

2040 METRO VISION REGIONAL TRANSPORTATION PLAN

ACTION DRAFT: RTC & BOARD, APRIL 17 & 18, 2018

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1. INTRODUCTION

The Denver region's quality of life depends greatly on mobility, or the ease of moving people and goods from place to place. Such places should also be accessible by a variety of travel options. Rapid growth in the region poses a challenge to providing adequate mobility. By 2040, an additional 1.2 million residents and almost 700,000 jobs will place much greater demands on the transportation system. The 2040 Metro Vision Regional Transportation Plan (2040 MVRTP) addresses these challenges and guides the development of the Denver region's multimodal transportation system. The 2040 MVRTP includes the components of the transportation system that can be funded through 2040 as well as envisioned and unfunded components. The 2040 MVRTP is closely integrated with DRCOG's Metro Vision. Specifically, the 2040 MVRTP is based on Metro Vision's policy framework, and it includes and implements Metro Vision's transportation element.

A. What is the Metro Vision Regional Transportation Plan?

DRCOG is the designated metropolitan planning organization for the Denver region. As such, it is federally charged with developing a long-range regional transportation plan. The MVRTP presents the region's vision for a multimodal transportation system needed to respond to future growth and demographic trends. This vision is not constrained by financial limitations. Incorporated within the MVRTP is the 2040 Fiscally Constrained Regional Transportation Plan (2040 FCRTTP), which addresses federal requirements for a long-range transportation plan (Chapter 5). Specifically, the 2040 FCRTTP defines transportation elements and services to be provided over the next 25 years based on reasonably expected revenues. The revenues will fund construction of many types of projects, as well as maintain and operate the transportation system. The system includes roadway, transit, bicycle and pedestrian facilities and services. Expected revenues fall far short of fully addressing future transportation needs and desires. However, the 2040

FCRTTP provides for high-priority strategic investments in the Denver region's multimodal transportation system.

The fiscally constrained projects and strategies of the MVRTP will be implemented by many agencies across the region. Examples include the Colorado Department of Transportation (CDOT), the Regional Transportation District (RTD), DRCOG and local governments. DRCOG's short-range Transportation Improvement Program (TIP) documents will identify federally funded projects to be completed over a four-year period.

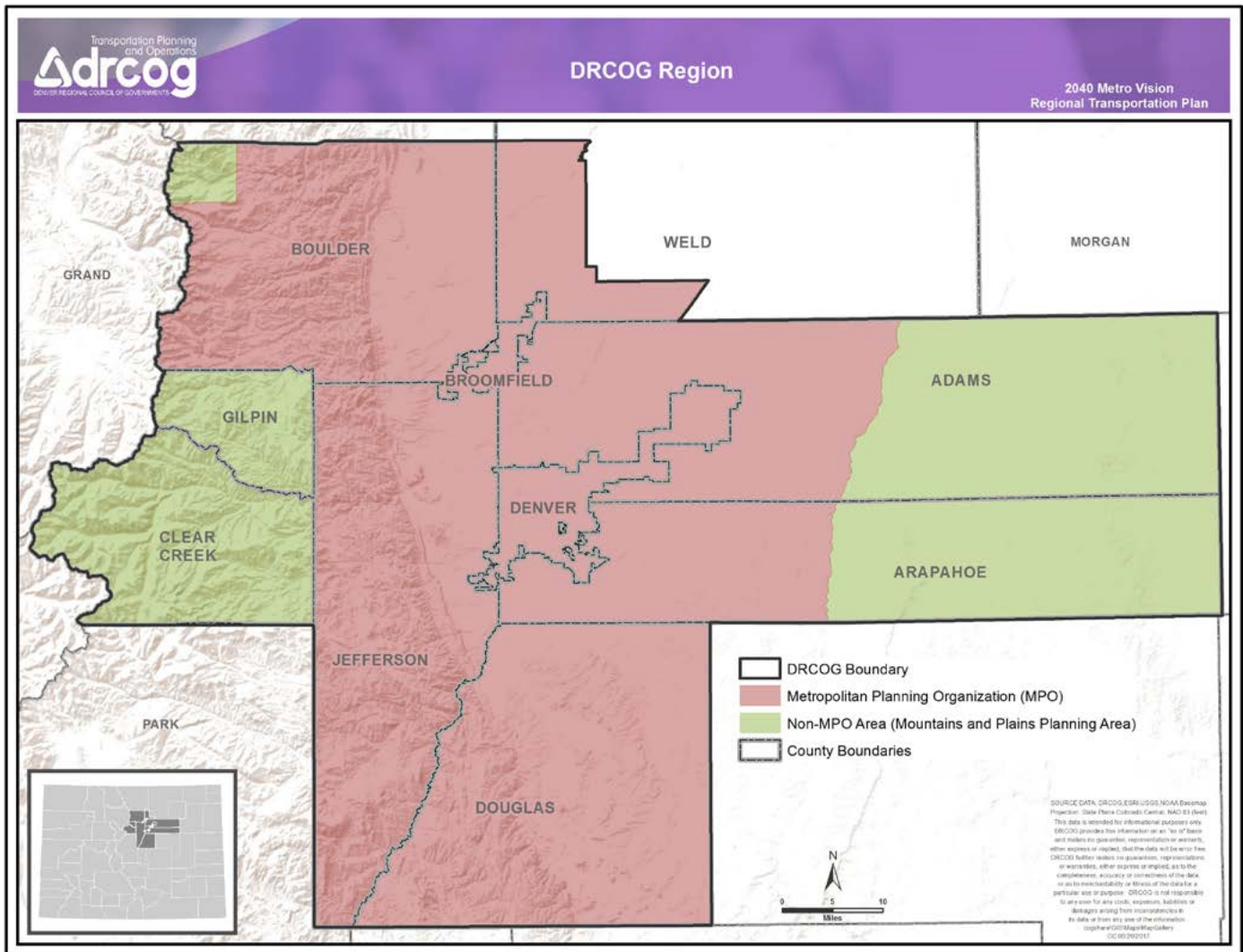
Regionally significant projects must be identified in a fiscally constrained long-range plan before they can be constructed. Further, the federal Clean Air Act Amendments of 1990 require transportation plans, programs and projects in air quality non-attainment/maintenance areas to conform to the State Implementation Plan (SIP) for air quality.

The MVRTP defines transportation facilities, improvements and services for the entire DRCOG region. It includes the metropolitan planning area's Transportation Management Area (TMA) and the mountains and plains portions of the DRCOG area, as shown in Figure 1.1 DRCOG Region on page 2.

To address current and future challenges, the MVRTP:

- Enhances the relationship between transportation and land use development;
- Provides for maintenance of a well-connected multimodal system;
- Incorporates transportation management actions to increase the existing system's efficiency;
- Includes travel demand management efforts to reduce single-occupant vehicle trips;

Figure 1.1 DRCOG Region



- Identifies transit and roadway improvements to increase the system’s people and freight movement capacity;
- Supports bicycle and pedestrian facilities;
- Prioritizes improvements given limited expected revenues;
- Encourages coordination between neighboring communities and between agencies, and
- Supports Metro Vision plan outcomes and objectives addressing growth and development, transportation, environmental quality, housing, and the economy.

DRCOG developed the 2040 MVRTP in cooperation with local governments, CDOT, RTD, the Regional Air Quality Council (RAQC) and the Air Pollution Control Division (APCD) of the Colorado Department of Public Health and Environment (CDPHE). Decisions were made through DRCOG’s transportation committee structure and by the DRCOG Board of Directors with significant public and stakeholder input. DRCOG also coordinated with CDOT’s 2040 Statewide Transportation Plan and with RTD’s implementation of its FasTracks rapid transit system. For more information see Figure 1.2 DRCOG Committee Structure for Transportation Decision-Making on page 5.

B. Relationship to DRCOG's Metro Vision

Metro Vision is the region's shared aspirational vision for the future of the DRCOG region. It fulfills DRCOG's duty to develop and adopt a regional plan for the physical development of the region's territory. While advisory, local jurisdictions can choose to adopt it as their official plan. Its six core principles are that Metro Vision:

- Protects and enhances the region's quality of life;
- Is aspirational, long-range and regional in focus;
- Offers ideas for local implementation;
- Respects local plans;
- Encourages communities to work together, and
- Is dynamic and flexible.

Metro Vision integrates growth and development, transportation, environmental quality, housing and the economy into a single comprehensive foundation for regional collaboration and shared decision-making. Its transportation section describes that the DRCOG region "aspires to have a connected multimodal transportation system that provides everyone with viable travel choices. The region will have a multimodal approach to move people and goods, with transportation facilities and services tailored to the needs and desires of individual communities. Over time, a greater share of travel will comprise public transit, bicycling, walking and carpooling. The region's transportation system will adapt quickly to major trends affecting the region, such as significant population growth, a rapidly aging population, new technology, an evolving economy and changing residential and workplace styles. Transportation and land-use planning will be integrated to improve the region's quality of life."

Specifically, Metro Vision's transportation element, "A Connected Multimodal Region," outlines a strategic planning framework for the transportation system organized around two regional outcomes:

- The regional transportation system is well-connected and serves all modes of travel.
- The transportation system is safe, reliable and well-maintained.

Regional and supporting objectives, performance measures and 2040 targets, and strategic initiatives for transportation and other topics (known as themes) help to achieve the regional outcomes.

The MVRTP helps implement the transportation theme of Metro Vision. Chapter 3 of the MVRTP contains Metro Vision's transportation theme ("A Connected Multimodal Region") and further discusses the relationship between both plans.

C. Federal Requirements

Developing the 2040 MVRTP spanned two iterations of federal surface transportation legislation:

- Moving Ahead for Progress in the 21st Century (MAP-21) – 2012
- Fixing America's Surface Transportation Act (FAST Act) – 2015

The MVRTP addresses applicable federal requirements for the region's long-range transportation planning contained in these acts. There are several requirements for which final federal rule-making guidance has not yet been completed, such as for the FAST Act's performance-based planning requirements. The MVRTP (including the 2040 FC RTP) address key federal requirements, including:

- **Fiscal constraint.** Reasonably expected revenues will be available to pay for the project costs identified in the 2040 FC RTP. Project costs do not exceed available revenues.
- **Air quality conformity.** The MVRTP conforms with all applicable air quality state implementation plans. Predicted emissions of pollutants from mobile sources through 2040 do not violate established

budget limits.

- **Public involvement.** The MVRTP planning process includes meaningful and accessible opportunities for public input and engagement.
- **Environmental justice.** Regionally funded fiscally constrained projects provide extensive benefits to areas with identified concentrations of low income and/or minority populations. These areas will not face disproportionate negative impacts.
- **Freight and transit.** The MVRTP contains a detailed freight and goods movement component and the federally required Coordinated Public Transit Human Services Transportation Plan.
- **Planning factors.** The MVRTP and metropolitan planning process consider projects and strategies that will address the 10 planning factors relating to safety, security, economic vitality and other national priorities, including the two planning factors added by the FAST Act addressing resiliency and reliability of the transportation system, and enhancing travel and tourism.
- **Performance-based planning process.** The FAST Act requires CDOT and DRCOG to develop transportation performance targets and report on progress toward achieving those targets for several topics in support of a performance-based approach to transportation planning and programming. Topics include safety, infrastructure, system performance and transit asset management. The MVRTP sets the stage for the region's performance-based planning process.
- **Planning emphasis areas.** The MVRTP addresses the topics identified by FHWA and FTA as "planning emphasis areas" for the metropolitan planning process, such as the performance-based planning process discussed above, and regional cooperation between DRCOG, RTD and CDOT, and foundational theme of this MVRTP.

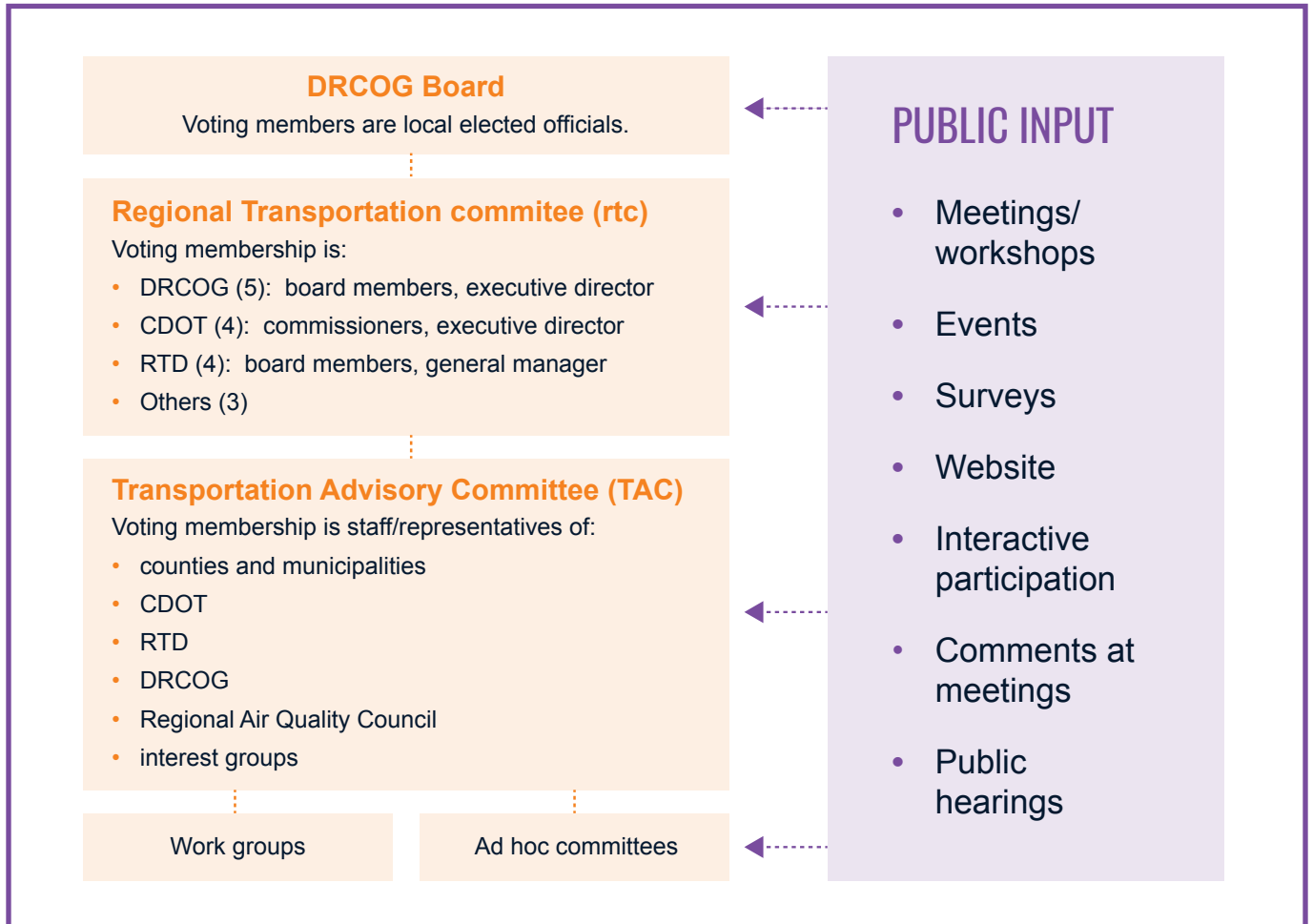
Each of these federal requirements is discussed in the appropriate section or appendix of the MVRTP.

D. Public Involvement and Decision-Making Process

The framework for involving the public in the MVRTP and 2040 FCRTTP process is defined by *Public Involvement in Regional Transportation Planning*, adopted by the DRCOG Board in 2010. Public participation was encouraged throughout the development of the MVRTP, the 2040 FCRTTP and the *Metro Vision Plan*. DRCOG held numerous workshops, stakeholder meetings, interactive online forums (such as MindMixer) and other public participation events. The public and stakeholders provided input toward developing the MVRTP and 2040 FCRTTP through the following example activities:

- Notification of events and review documents via the DRCOG website;
- Scenario planning workshop and plans update kickoff (June 2012);
- DRCOG Listening Tour (Spring 2012);
- CDOT Telephone Town Hall meetings (May 2014);
- DRCOG/Denver Regional Mobility and Access Council (DRMAC) Transit Forum (May 2014);
- Citizens Advisory Committee (13 meetings from April 2013 to December 2014);
- Metro Vision Planning Advisory Committee (21 meetings from January 2013 to December 2014);
- CDOT/DRCOG Transit Open House (May 2014);
- CDOT Statewide Freight Advisory Council (July, September and November 2015);
- More than 25 DRCOG Board and committee meetings covered transportation topics, and
- Public hearings in January and February 2013, July 2013, April 2014, January 2015, January 2016, August 2016, March 2017 and March 2018.

Figure 1.2 DRCOG Committee Structure for Transportation Decision-Making



Transportation issues and topics were also a focus of numerous activities of DRCOG's Sustainable Communities Initiative, such as corridor working groups and committees, neighborhood focus groups and others.

Events were advertised through the DRCOG website and other publications, news releases to the local media, including minority publications and radio stations, postcards, email blasts and public hearings. Summaries of testimony received at the public hearings are available at DRCOG.

i. Cooperative Decision-Making Process

Transportation issues cross the boundaries and responsibilities of individual jurisdictions and organizations. The DRCOG Board of Directors considers public input and the advice of numerous committees, including the Regional Transportation Committee (RTC), the Transportation Advisory Committee (TAC) and other specialized committees. The relationships between the various committees is illustrated in Figure 1.2. The RTC, which includes elected public officials, Colorado Transportation Commissioners and RTD Board members, reviews regional transportation issues and DRCOG transportation program issues and provides policy recommendations to the DRCOG Board. Figure 1.2 illustrates the committee structure in place as the 2040 MVRTP was developed.

Each of the partners in the transportation planning process brings a unique perspective. CDOT is responsible for the management, construction and maintenance of state highways, as well as statewide multimodal transportation planning efforts. RTD is responsible for the development, maintenance and operation of a public transportation system within its geographic area. RTD also provides service meeting Americans with Disabilities Act (ADA) requirements. DRCOG's local governments bring particular knowledge of their local areas and represent residents of their communities. The Air Pollution Control Division (APCD) and Regional Air Quality Council (RAQC) reflect the air quality interests of the state and the region. DRCOG is responsible for overall regional transportation, growth and development planning. DRCOG coordinates with the planning efforts of RTD and CDOT, representing the various perspectives of its more than 50 local governments.

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2. TRANSPORTATION CHALLENGES AND PLANNING ASSUMPTIONS

This chapter discusses the major long-range planning challenges and regional planning assumptions used to develop the MVRTP. There are many challenges to be considered in the regional transportation planning process relating to growth and development, multimodal travel, the environment, funding and other issues. Challenges are not inherently negative, but are major issues the region is confronting and addressing.

A. Growth Challenges

Population and economic growth. The population of the Denver region is expected to increase from about 3.1 million in 2015 to 4.3 million by 2040, an increase of 37 percent. The number of jobs is forecast to increase from 1.7 million in 2015 to almost 2.4 million by 2040, an increase of 39 percent. By 2040, people living in, working in and visiting the region will make over 20 million total person trips per day. Of these, DRCOG's forecasts suggest about 12.5 million vehicle trips will be made by cars, trucks and buses traveling more than 111 million miles per weekday. Table 2.1 and Figure 2.1 display past, current and forecast population, households and employment for the Denver region.

Population and employment growth outside the current DRCOG planning area in Elbert County, El Paso County, Larimer County and Weld County will also affect the Denver region. Congestion on major interregional highways such as Interstate 25, Interstate 70, U.S. Route 85 and U.S. Route 287 will be impacted by the increase in commuter and visitor trips to and from the region. The estimated number of work commuters between neighboring counties and the Denver region in 2010 are shown in Figure 2.2. According to 2009-2013 American Community Survey (ACS) data, almost 64,000 workers traveled into the region and about 26,000 residents traveled out of the region to work.

B. Land Development Challenges

Location of growth. DRCOG developed the land use demographic information for the period 2010-2040 using the UrbanSim model in consultation with DRCOG's local governments and the State Demography Office. Most of the expected increase in the region's population and employment will occur within defined growth areas. Figures 2.3 and 2.4 conceptually illustrate the *relative* distribution of new households and employment between 2015 and 2040. In addition, some of the new growth will occur in urban centers (Figure 2.5). However, growth will also occur in outlying areas. As the region's urban development expands, some people and businesses will inevitably have to make longer trips, placing greater demands on the transportation system. In some areas, urban centers will absorb a significant amount of growth and offer more convenient accessibility via bus or rail transit and opportunities for shorter non-motorized trips via walking and bicycling.

Less efficient development patterns. Developments with no pedestrian connections or bicycle facilities, and those with separated or disconnected residential and commercial areas, can result in an increased reliance on the automobile. The lack of direct pedestrian or bicycle access between subdivisions and arterial streets, commercial centers and other community resources (e.g., bus stops) discourages walking and bicycling.

Lower development densities. Many residential areas are developing or will develop at lower housing unit densities and cannot be served cost-effectively with conventional public transit. Lower density suburban office parks are also more difficult to serve efficiently with conventional public transit. This has implications for access to jobs and workers, as well as mobility for the growing older adult population.

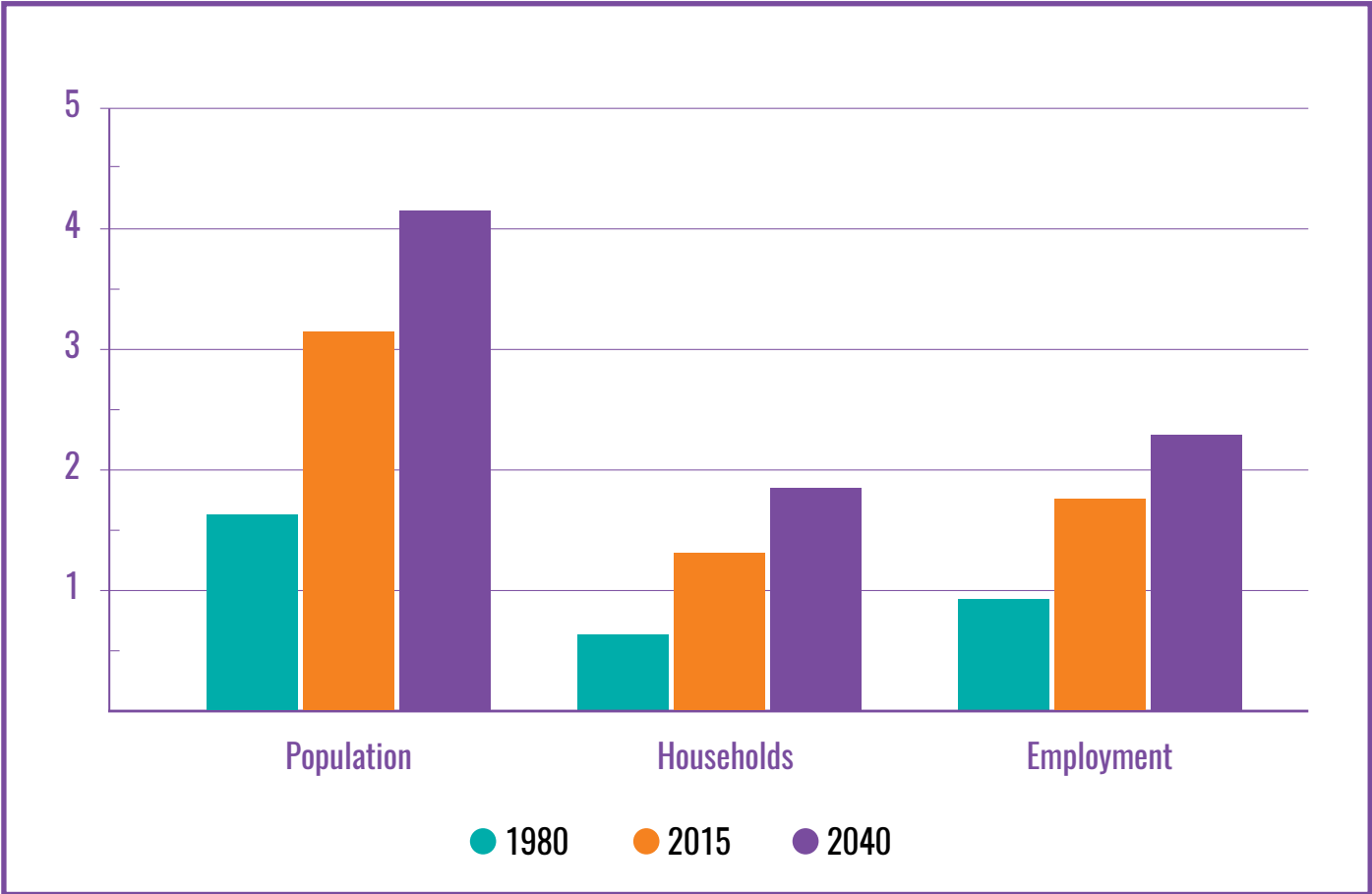
C. Social Challenges

- Increased travel.** Vehicle miles traveled (VMT) increased 4.7 percent annually between 1990 and 2000, but remained flat between 2006 and 2011. Starting in 2012, VMT began increasing again, growing each year through 2016. In 2016, the region's VMT increased by 3.5 percent, the second-highest year of VMT growth since DRCOG began tracking data in 2000. VMT will continue to increase through 2040 due to growth in population (37 percent increase) and employment (39 percent increase). Past VMT trends and future forecasts are displayed in Figure 2.6.
- Jobs/housing balance.** In areas that lack a good balance of jobs and housing, there are fewer opportunities to live close to work. It is also less likely that non-motorized modes can be used to travel to work. A good balance of jobs and housing provides more opportunities to live close to work, though that outcome is not ensured. People change jobs frequently and housing costs impact where workers can live.
- Growth of older adult population.** The region's older adult population is growing much faster than the general population. Between 2015 and 2040, the number of area residents aged 60 and older is expected to almost double, from approximately 560,000 to 1.1 million. Even more dramatically, the population of those 75 and older is forecast to increase 200 percent by 2040. Additionally, many older adults will choose to age in place, creating the need for the region's communities to retrofit existing transportation facilities and expand transportation services to serve the rapidly growing aging population. Finally, according to the most recent (2010-2014) American Community Survey data, the non-institutionalized population of individuals with disabilities is almost 270,000, or almost 10 percent of the region's total population. As the older adult population significantly increases, a similar increase in individuals with disabilities is also anticipated. The Coordinated Transit Plan (Appendix 6) discusses these issues in further detail.

Table 2.1 DRCOG Region Population, Households and Employment

	POPULATION			HOUSEHOLDS			EMPLOYMENT		
	1980	2015	2040	1980	2015	2040	1980	2015	2040
Denver TMA	1,607,400	3,111,400	4,274,000	656,000	1,258,000	1,801,800	915,100	1,699,300	2,365,500
Mountains and Plains	14,800	28,100	40,600	6,700	11,400	17,000	5,400	12,100	20,300
DRCOG Region Total	1,622,200	3,139,500	4,314,600	662,700	1,269,400	1,818,800	920,500	1,711,400	2,385,800

Figure 2.1 DRCOG Region Demographic Data 1980, 2015 and 2040



D. Transportation Challenges

- **Automobile dominance.** As is true nationally, the automobile (including cars, vans, pickups and sport utility vehicles) is the region's dominant form of household transportation. And for most trips, the automobile contains only a single occupant. The 2012-2016 American Community Survey (ACS) data showed that about 75 percent of workers traveled alone in their automobiles to work. Almost 8 percent worked at home, and the remaining 17 percent carpooled, walked, bicycled or took transit. As discussed in Chapters 3 and 7, DRCOG's Metro Vision establishes a performance target for non-SOV mode share to work of 35 percent by 2040.
- **Mobility options for individuals without a car.** According to the 2010 Census Transportation Planning Package (CTPP), about 70,000 households in the Denver region did not have an automobile available. People living in these households may choose not to have a car, or may not drive because of health or income reasons. They still have a need to travel to work, health facilities, schools, stores and other destinations. Friends or family members may provide rides, but it is important to also offer public transit services, carpool assistance, ride-sharing/ride-hailing and car-sharing services, and facilities for convenient walking and bicycling trips.
- **Traffic congestion.** Growth in the region's population, driving and VMT has outpaced the increase in highway capacity over the past 20 years. The result is about 390 miles of freeways and arterials identified with severe recurring congestion in 2016 (corridors with a DRCOG congestion mobility grade of D or F as shown in Figure 2.8). The number of congested miles is forecast to increase to about 660 miles by 2040. Figure 2.8 identifies key congested locations on the regional roadway system anticipated in 2040.
- **Traffic crashes.** There will likely be more annual crashes in 2040 because of the growth in population and VMT. However, the number and severity of crashes in the future (fatalities and serious injuries) will be highly dependent on technological, legislative, law enforcement and social actions. The 75,000 reported crashes for the Denver region in 2015 (the latest year available) resulted in approximately 24,000 injuries and 240 fatalities, and millions of hours of congestion delay for travelers.
- **Recreational traffic.** The Denver region's quality of life depends in part on the abundant recreational opportunities nearby. Thousands of people travel to and from recreational activities in the mountainous areas of Colorado, both within the Denver region and adjacent to it. Traditionally, they travel around the same general time. Roadways such as I-70 and U.S. Route 285 experience extreme congestion during weekend peak periods, such as Sunday afternoon traffic returning to the region. Local communities are impacted by this congestion, which affects the ease of making local trips, emergency vehicle response, as well as noise, air and water quality. While innovative smaller-scale traffic management approaches are being used in the I-70 mountain corridor, large-scale solutions are beyond the region's and state's funding abilities.
- **Future unknowns, including technology.** There are many unknown and unpredictable trends that will influence transportation and mobility between now and 2040. These include fuel prices and availability, personal habits, alternative fuels, connected and driverless vehicles, and others. Technology is rapidly evolving and could have significant implications that are unknown. In early 2018, DRCOG, CDOT, RTD, the Denver Metro Chamber of Commerce and other partners initiated Mobility Choice Blueprint, a regional effort to plan and prepare for rapid technological and other innovations affecting mobility.

Figure 2.4 Location of New Employment: 2015-2040

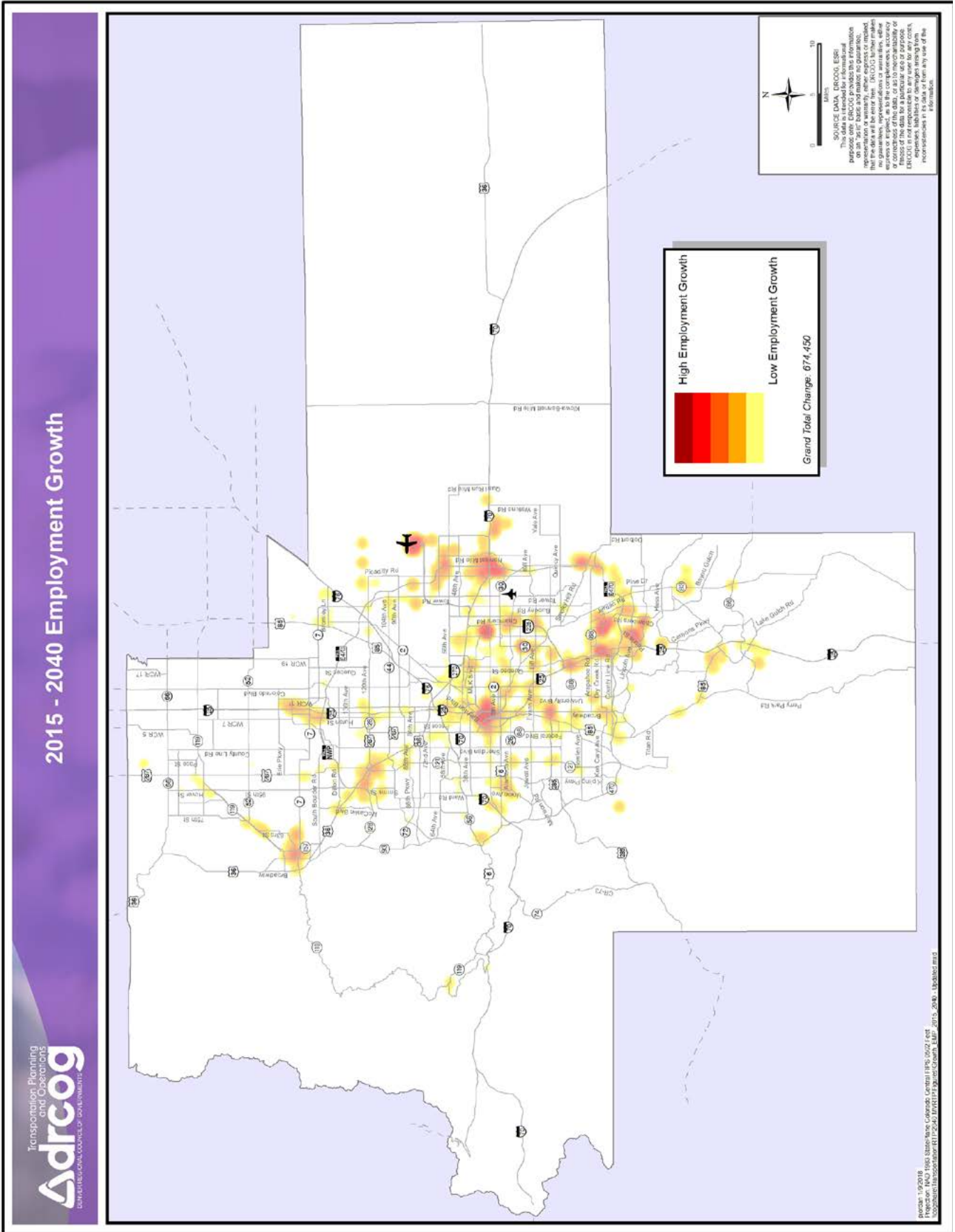


Figure 2.5 Existing Urban Centers

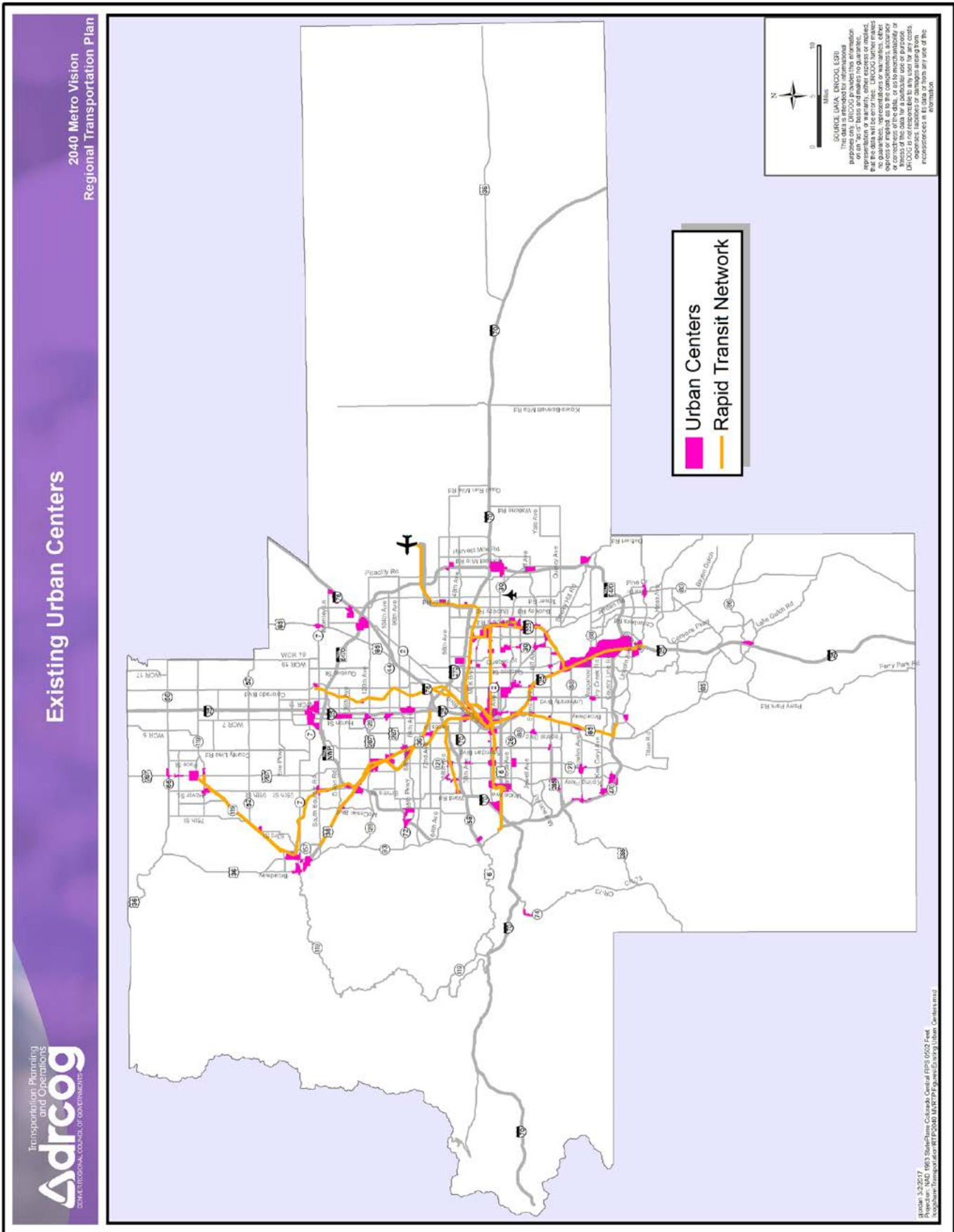
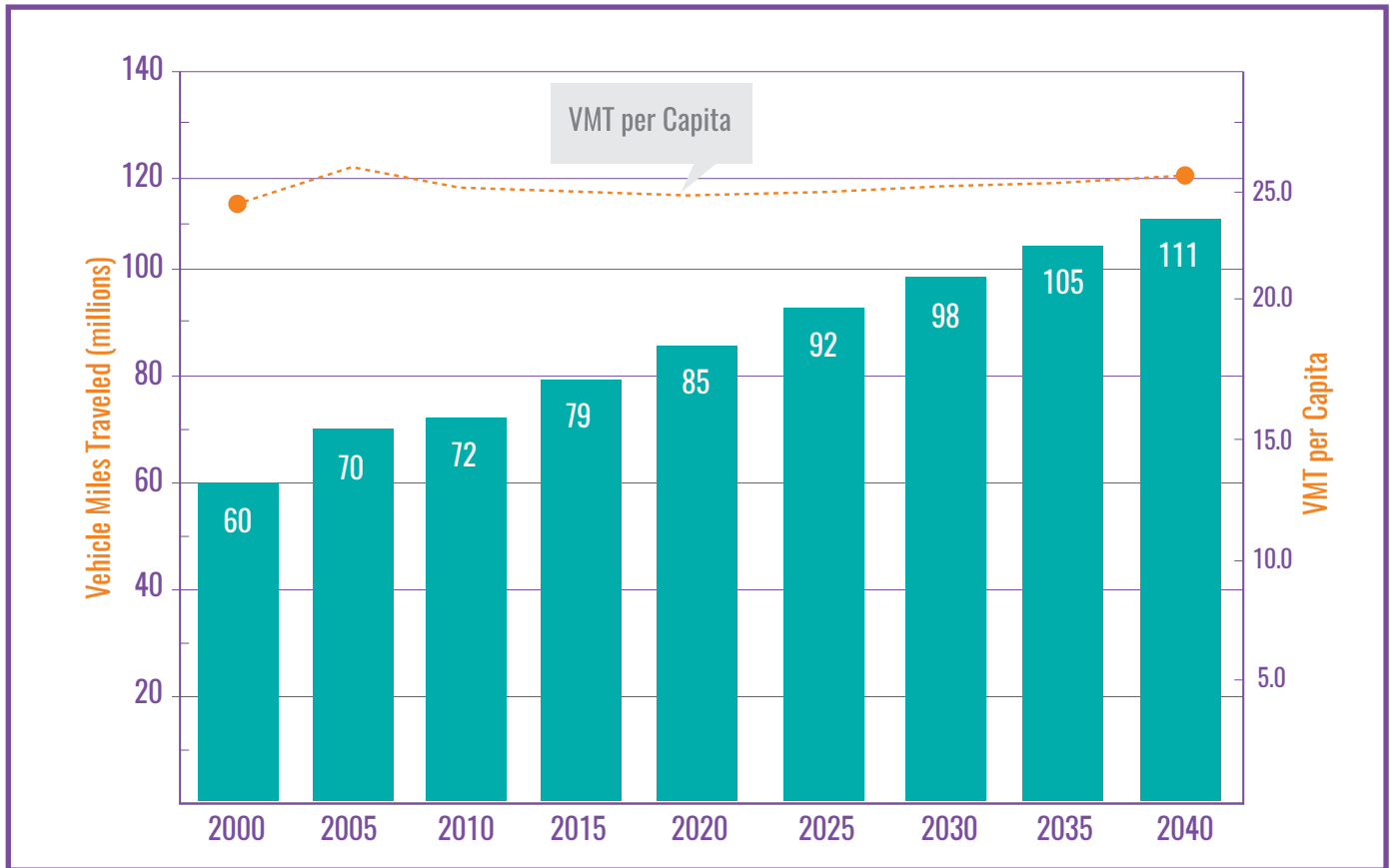


Figure 2.6 Weekday Vehicle Miles Traveled (VMT) and VMT per Capita in the DRCOG Region



Source: U.S. Census (historical); DRCOG forecast

E. Environmental Challenges

- Air quality.** Emissions from mobile sources, such as automobiles and trucks, are a major contributor to air pollution. Past trends in emission violations for the Denver region are illustrated in Figure 2.7. The number of pollutant violations recorded in the region has decreased from the 1980s, primarily due to automobile pollution control equipment, the state's inspection and maintenance program, the oxygenated fuels program, and changes in street sanding and sweeping practices.

Ground-level ozone is currently of greatest concern in the Denver region. It is formed in the summertime when volatile organic compounds and nitrogen oxides mix and react in the presence of sunlight. In 2012, the Denver Metro/North Front Range was designated by the Environmental Protection Agency (EPA) as a Marginal nonattainment area for the 2008 federal ozone standard. Results for the three-year

period 2012-2014 showed that the region did not achieve the standard by the designated attainment date of July 2015. As a result, the region was redesignated to a Moderate nonattainment area and the Regional Air Quality Council (RAQC), the lead air quality planning agency for the region, in coordination with the Air Pollution Control Division (APCD), has prepared a state implementation plan (SIP) for this standard. The SIP was approved by the Air Quality Control Commission (AQCC) in November 2016 and has been submitted to EPA for approval. The ozone SIP identifies control measures and the motor vehicle emissions budgets the region must use for air quality conformity upon a finding of adequacy by EPA. In 2015, the EPA further strengthened the ozone standard, referred to as the 2015 ozone National Ambient Air Quality Standard (NAAQS), which will require even greater efforts by the region to attain.

Even with continued technological improvements to pollution control equipment, expected VMT growth may jeopardize air quality. Consequently, ongoing efforts to promote optional

modes of travel and pursue technological improvements and cleaner fuels need to be made.

Water quality. Water pollution is caused by many factors related to regional development, including the construction and operation of transportation infrastructure. Growth in traffic can cause increased runoff of pollutants created by brakes and tires. As the physical transportation network expands, the amount of impervious surface increases, resulting in greater runoff.

F. Funding Challenges

Limited funds. Funding for the region’s multimodal transportation system through 2040 is anticipated to be less than needed to fully implement the entire Metro Vision transportation system (Chapter 5). However, the revenues expected to be available for operations,

maintenance and preservation will enable the continued provision of an adequate and operational transportation system. A portion of new capacity expenditures will also be used for reconstruction and rehabilitation. The unconstrained Metro Vision transportation system includes both unfunded and delayed funded needs as well as very long-term concepts (such as intercity rail) that are a future vision that the region is exploring. Even so, there is still clearly a need for additional transportation funding, to keep pace with anticipated growth, complete FasTracks and other projects, and address other mobility needs. Additional federal, state, local and private revenue sources must be found.

Figure 2.7 Air Quality Violation or Exceedance Days in the DRCOG Region

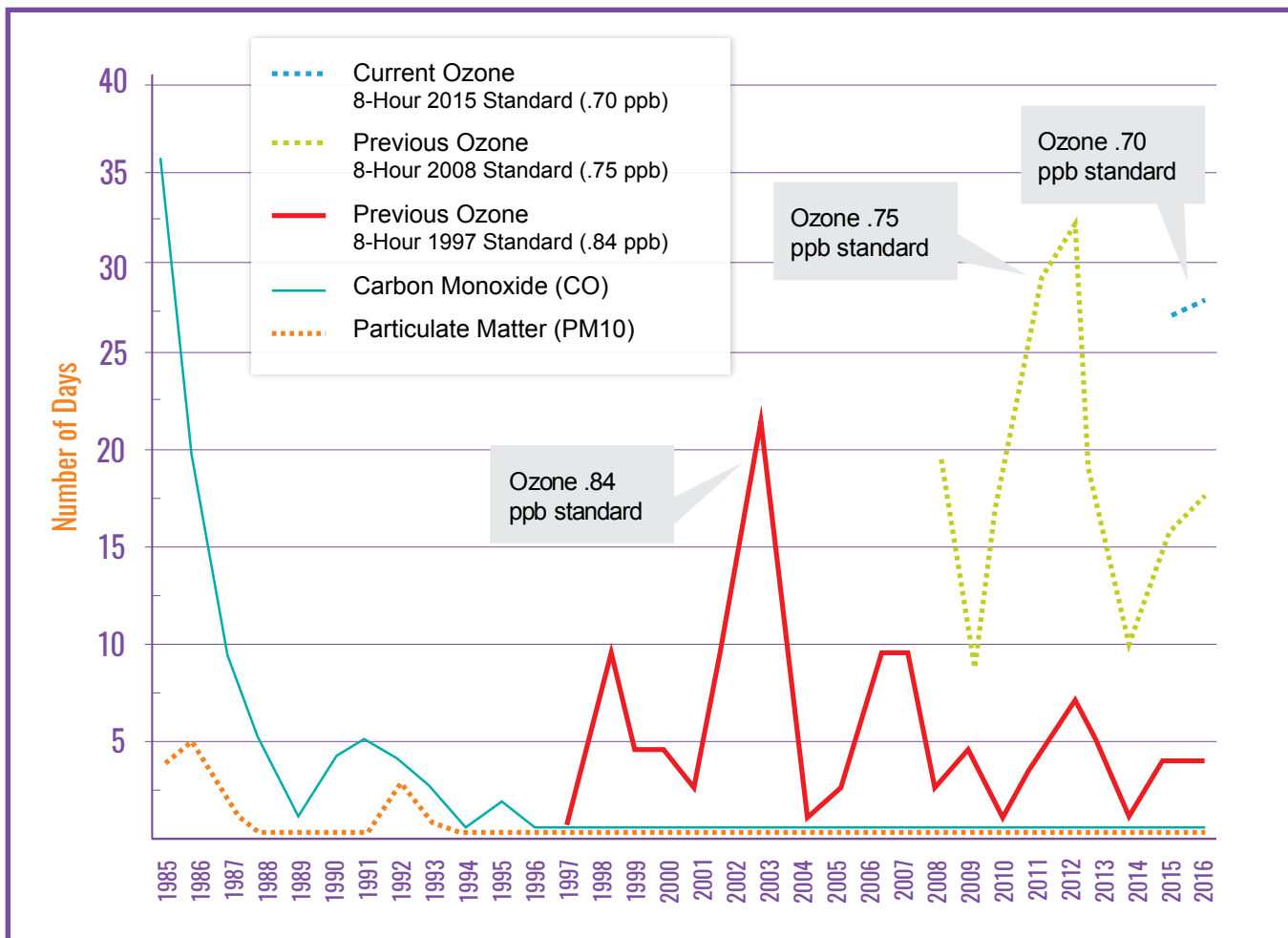
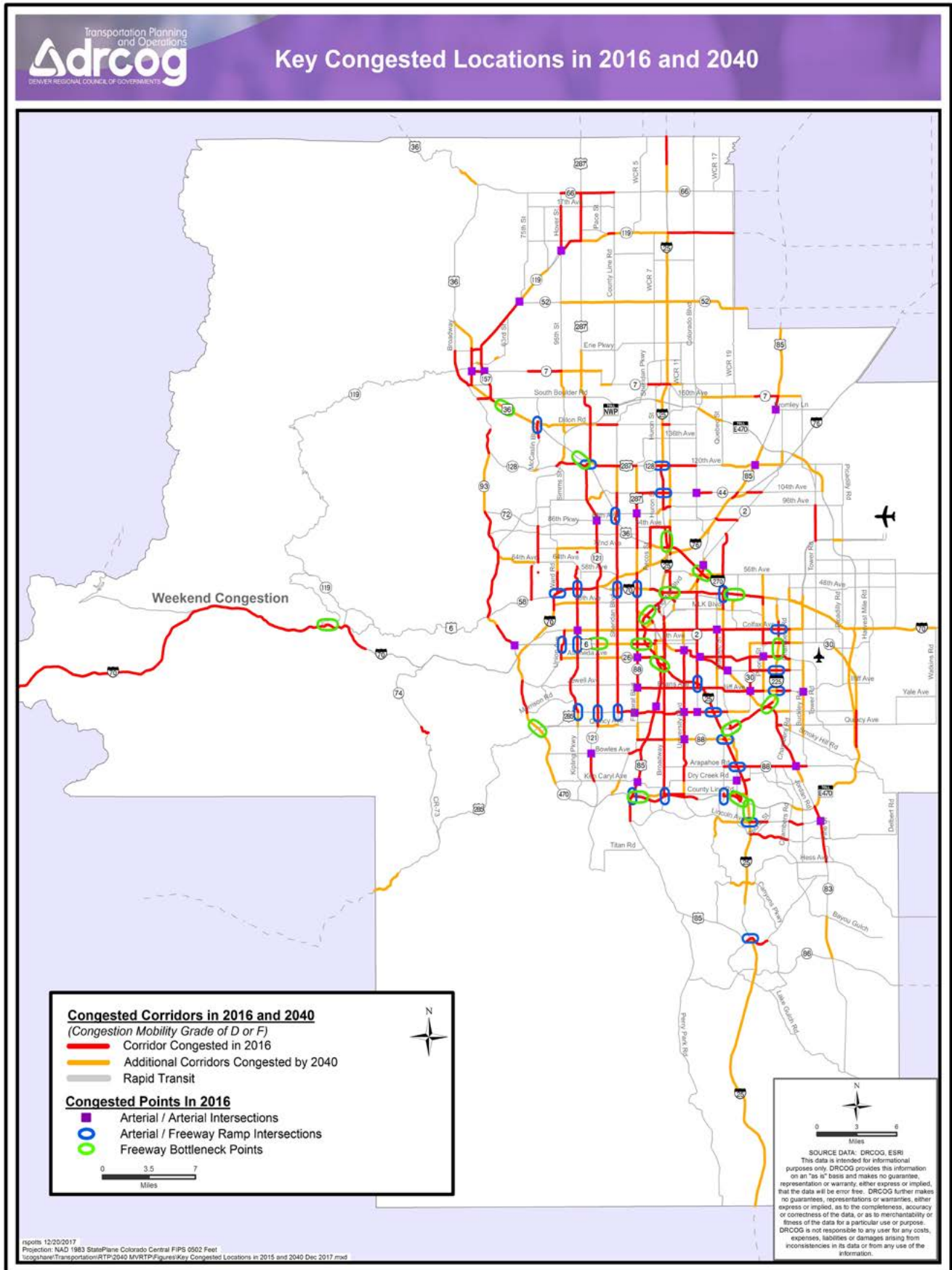


Figure 2.8 Key Congested Locations in 2014 and 2040



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3. METRO VISION INTEGRATION

Metro Vision is the region’s shared aspirational vision of the future of the DRCOG region. It fulfills DRCOG’s duty to develop and adopt a regional plan for the physical development of the region’s territory. While advisory, local jurisdictions can choose to adopt it as their official plan. Its six core principles are that Metro Vision:

- Protects and enhances the region’s quality of life;
- Is aspirational, long-range and regional in focus;
- Offers ideas for local implementation;
- Respects local plans;
- Encourages communities to work together, and
- Is dynamic and flexible.

Metro Vision integrates growth and development, transportation, environmental quality, housing and the economy into a single comprehensive foundation for regional collaboration and shared decision-making. As noted in Chapter 1, Metro Vision’s transportation element (theme), *A Connected Multimodal Region*, outlines a strategic planning framework for the transportation system organized around two regional outcomes:

- The regional transportation system is well-connected and serves all modes of travel.
- The transportation system is safe, reliable and well maintained.

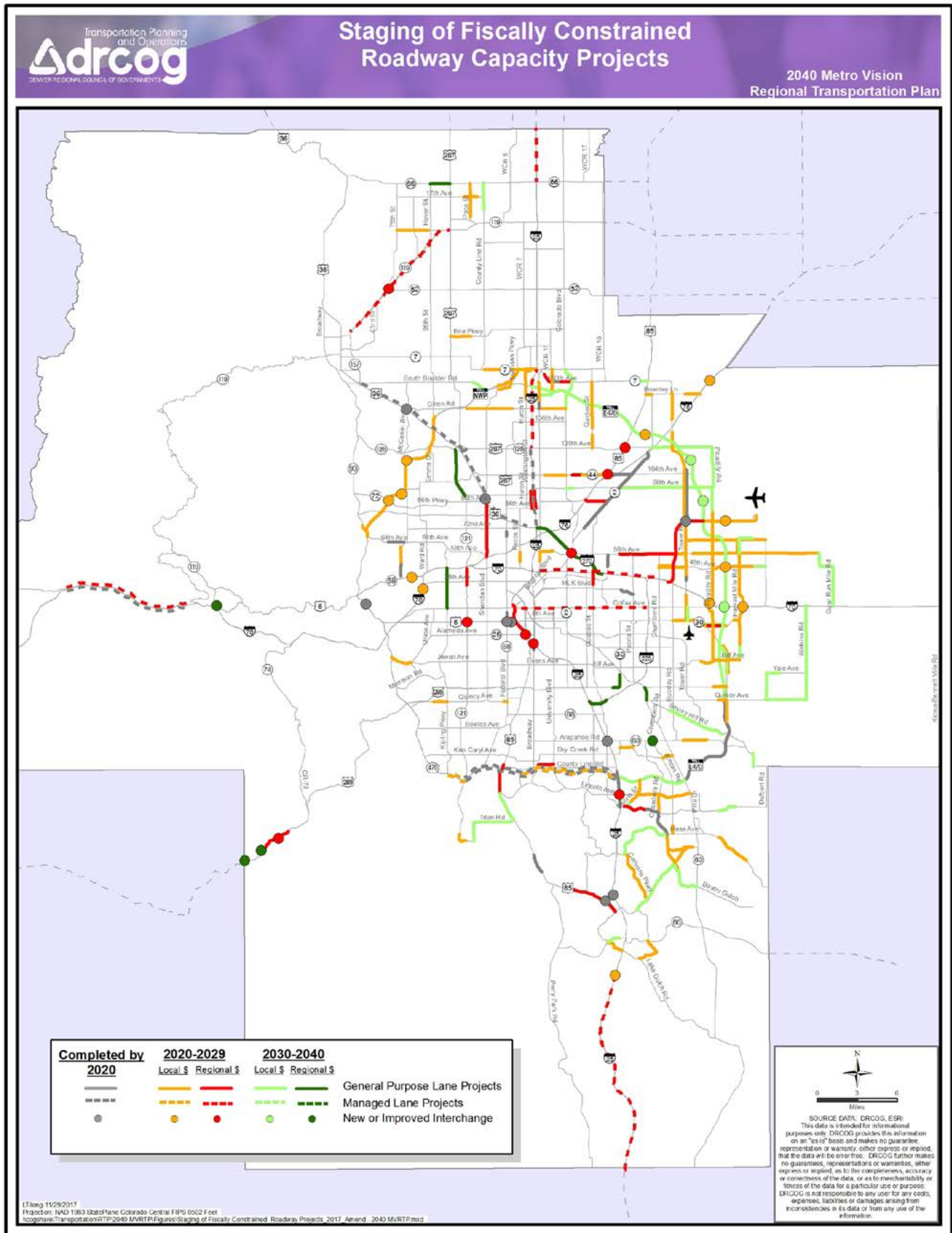
In addition to regional outcomes, each theme has regional and supporting objectives, performance measures and 2040 targets, and strategic regional and local initiatives to help achieve the regional outcomes. Several other Metro Vision themes, outcomes, objectives and performance measures also address transportation, including:

- Regional Objective 6a: Improve air quality and reduce greenhouse gas emissions
- Regional Objective 7b: Connect people to natural resource and recreational areas
- Regional Objective 10: Increase access to amenities that support healthy, active choices
- Regional Objective 11: Improve transportation connections to health care facilities and service providers
- Regional Objective 13: Improve access to opportunity
- Outcome 14: Investments in infrastructure and amenities allow people and businesses to thrive and prosper

The MVRTP helps implement the transportation theme and components of Metro Vision by funding multimodal projects, project categories, programs, services and other activities to address and help achieve the regional outcomes, objectives and performance measures described above.

The remainder of this chapter directly incorporates Metro Vision’s “A Connected Multimodal Region” theme in its entirety. Performance measures and associated 2040 targets are discussed further in Chapter 7.

Figure 3.1 Staging of Fiscally Constrained Roadway Capacity Projects



Source: Regional Transportation Plan

A. A Connected Multimodal Region

The Denver region aspires to have a connected multimodal transportation system that provides everyone with viable travel choices. The region will have a multimodal approach to move people and goods, with transportation facilities and services tailored to the needs and desires of individual communities. Over time, a greater share of travel will comprise public transit, bicycling, walking and carpooling. The region's transportation system will adapt quickly to major trends affecting the region, such as significant population growth, a rapidly aging population, new technology, an evolving economy, and changing residential and workplace styles. Transportation and land-use planning will be integrated to improve the region's quality of life.

Current transportation needs far outweigh available funding. This necessitates difficult tradeoffs and choices, such as balancing the need for additional multimodal capacity with maintenance and system preservation needs. The region must leverage a range of funding solutions to build and maintain transportation infrastructure and services. Coordinated regional and statewide actions must be taken to increase transportation funding.

The overall vision for the region's transportation system is organized around two regional outcomes:

- The regional transportation system is well-connected and serves all modes of travel.
- The transportation system is safe, reliable and well-maintained.

These outcomes focus on building and maintaining a world-class multimodal transportation system. Supporting objectives and initiatives will help the region achieve these outcomes. The companion 2040 Metro Vision Regional Transportation Plan implements the transportation element of Metro Vision. The 2040 Metro Vision Regional Transportation Plan defines the specific transportation system the region envisions and the portions that can be funded through 2040.

Why is this important?

Our region needs a connected, multimodal transportation system in order to:

Operate, maintain and expand the system with limited funding.

The region must operate and maintain our existing multimodal transportation system while accommodating more than 1 million new residents and 600,000 more jobs by 2040. However, transportation funding is limited. Our region must continue to facilitate the movement of people, goods and services to ensure the Denver region remains economically competitive. Providing a range of travel options will facilitate useful and convenient mobility for all travelers. New and reconstructed roadways must be designed to optimize movement of people and vehicles alongside system management and operations that leverage existing capacity and enable safe travel for all users.

Make connections that increase access and travel choices.

Our region continues to make significant investments in transit, such as the Regional Transportation District's FasTracks rapid transit system while also envisioning future intra- and inter-regional transit connections. Although the completed portions of the FasTracks program have expanded regional mobility, such improvements cannot be fully realized without easier connections for those walking, biking, driving, sharing a ride or riding a bus to first- or final-mile connections to transit. Our region and local jurisdictions continue to increase the viability of walking and bicycling by expanding the bicycle and pedestrian network and providing additional supportive infrastructure. Providing all of these travel choices can help reduce vehicle miles traveled, ground-level ozone and other air pollutants, which can lead to improved individual and environmental health. A transportation system that serves users of all modes of travel also helps ensure that people of all ages, income levels and abilities remain connected to their communities and have the means to access services, amenities and employment opportunities.

Embrace new technologies and innovations.

Car-sharing, ride-sharing and bike-sharing programs are already significant travel options within the region. Emerging transportation innovations, such as connected and driverless cars, have the potential to dramatically influence future personal mobility. Broader use of technology and other innovations (such as broadband, smartphones and trip-planning tools) has the potential to connect multimodal transportation system users to the information they need in order to manage travel, avoid and reduce congestion; optimizing available capacity.

WHAT IS OUR VISION?

Outcome 4: The regional transportation system is well-connected and serves all modes of travel.

The transportation system integrates regional and local roadways and streets, transit (bus and rail), bicycle and pedestrian facilities, and air and freight rail linkages. The transportation system connects the region to the rest of the state and beyond, and will evolve to include future technology and mobility innovations as appropriate.

Regional Transportation Plan

As the federally designated transportation planning agency for the Denver region, DRCOG develops the Metro Vision Regional Transportation Plan to guide the region's future multimodal transportation system. The Metro Vision Regional Transportation Plan is integrated with the Metro Vision plan to address the mobility needs of people of all ages, incomes and abilities. It identifies the desired vision for our transportation system in a scenario under which funding is unconstrained. It also defines the fiscally constrained multimodal system to be implemented by 2040 using revenues that are reasonably expected to be available. In addition to funding construction of major roadway and rapid transit projects, revenues must also be used to maintain and operate the transportation system, and for transit service, bicycle, pedestrian and other types of projects.

Denver Union Station

After a multiyear rehabilitation and restoration project, the historic Denver Union Station reopened in 2014 as a hub of multimodal transportation options for the entire region. A regional coalition including DRCOG joined forces to develop the plan to revitalize the historic structure and surrounding properties. Today bus, light rail, commuter rail, bike-sharing, ride-hailing and other travel options converge at Denver Union Station — a premier example of our vision of a connected multimodal transportation system. Denver Union Station has also emerged as a primary anchor in the central business district and is a primary catalyst for hundreds of millions of dollars in private development and investment.



WHAT IMPROVEMENTS DO WE NEED TO CONTINUE TO MAKE?

Regional Objective 4: Improve and expand the region's multimodal transportation system, services and connections.

The region will continue to invest in a well-connected, multimodal transportation system to improve mobility and accommodate anticipated increases of 1.16 million people and more than 600,000 jobs by 2040.

Transportation system investment initiatives may include expanding transit service and coverage, improving on-street and off-street bicycle and pedestrian facilities, widening and adding new roadways, and promoting travel options. The resulting transportation system will increase mobility choices within and beyond the region for people, goods and services.

Supporting Objectives:

- Improve the capacity of the multimodal regional roadway system.
- Improve the region's comprehensive transit system, including the timely completion of the FasTracks program.
- Improve bicycle and pedestrian accessibility.
- Improve interconnections of the multimodal transportation system within and beyond the region for people and freight.
- Expand travel demand management services and strategies.

WHAT MIGHT WE DO TO MAKE PROGRESS?

STRATEGIC INITIATIVES | IDEAS FOR IMPLEMENTATION

VOLUNTARY OPTIONS AVAILABLE TO REGIONAL ORGANIZATIONS

COLLABORATION

- Maintain a fiscally constrained regional transportation plan that defines long-range multimodal projects, services and programs to address mobility needs.
- Adopt Transportation Improvement Program project selection policies that consider all transportation users.
- Coordinate with the Regional Transportation District and other transit providers to implement major projects and services.
- Coordinate with Denver Regional Mobility and Access Council and transit operators to increase transportation for vulnerable populations, such as older adults, people with disabilities and low-income populations.
- Facilitate coordination between jurisdictions in expanding and connecting the region's bicycle and pedestrian network.
- Encourage integrated land use and transportation planning among state and regional agencies, local governments and the development community.
- Coordinate information and services among all transportation providers.
- Work with partners to expand the regional travel demand management program consisting of outreach, promotion, trip-planning and marketing activities to shift commute choices to non-single-occupant vehicle modes, including carpools, vanpools, transit, bicycling and walking, as well as telework and alternative work schedules. Continue and expand marketing consisting of advertising campaigns and events such as Bike to Work Day and Walk and Bike to School Day.
- Conduct a regionwide evaluation of potential bus rapid transit corridors via a joint effort of the Regional Transportation District, DRCOG, the Colorado Department of Transportation and other stakeholders.

VOLUNTARY OPTIONS AVAILABLE TO LOCAL ORGANIZATIONS

COLLABORATION

- Coordinate with the Regional Transportation District and other transit providers on transit service, facilities and infrastructure components of development projects, such as bus bulbs and queue jump lanes.
- Coordinate with neighboring jurisdictions to ensure a well-connected system across boundaries.
- Coordinate with public transit providers to improve regionally funded local service, maintaining the right to buy-up service for increased frequency and coverage.
- Coordinate local comprehensive plan and transportation plan updates with neighboring and affected jurisdictions.
- Coordinate transportation system improvements and operations to consider issues of land-use compatibility.
- Coordinate planning efforts to ensure real estate needed for the expansion of multimodal transportation facilities is identified and preserved for mobility uses.

POLICIES AND REGULATIONS

- Implement parking supply and pricing mechanisms, such as shared, unbundled, managed and priced parking in locally defined activity centers to manage parking availability and provide incentives for walking, bicycling, carpooling and transit use.
- Adopt and implement street and development standards to improve multimodal connectivity in a variety of contexts (urban, suburban and rural) while considering unique land-use settings, such as schools, parks and offices.
- Adopt policies and development regulations that support transit.
- Address the needs of mobility-limited populations in local transportation plans and policies.
- Adopt and implement local street standards and other development

VOLUNTARY OPTIONS AVAILABLE TO REGIONAL ORGANIZATIONS

- Work with stakeholders from across the region to develop a vision for a hierarchical, high-comfort, low-stress bicycle network for the region that can accommodate most ages and abilities.
- Coordinate with local governments to balance primary park-and-ride functions with opportunities for transit-oriented development.
- Collaborate with local and regional stakeholders in transportation planning activities to address the needs of mobility-limited populations.
- Facilitate coordinated local and regional investment in datasets to improve transportation planning and investment.

EDUCATION AND ASSISTANCE

- Encourage and support fare structures and subsidy programs that keep transit service affordable for all users.
- Provide tools, informational forums and resources to jurisdictions regarding bicycle- and pedestrian-facility design, guidance and implementation.
- Conduct activities to inform and promote the use of travel demand management strategies and services by transportation management associations/organizations and local travel demand management providers, such as ride-sharing, vanpools, carpools and school carpools.

INVESTMENTS

- Consider the use of managed lanes in new roadway capacity projects where feasible.
- Support bicycle-sharing programs regionwide.
- Include major roadway and transit capacity projects in DRCOG's fiscally constrained Regional Transportation Plan once construction funding is identified for such projects.
- Invest in and manage in the region's multimodal transportation system to improve freight and goods movement within and beyond the region.
- Upgrade existing facilities (sidewalks, crosswalks, bus stops and shelters) to improve transit access for older adults and mobility-limited populations.

VOLUNTARY OPTIONS AVAILABLE TO REGIONAL ORGANIZATIONS

codes and standards that address multimodal connectivity objectives in a variety of land-use contexts, such as cut-throughs for pedestrians and bicycles in cul-de-sacs.

- Ensure Americans with Disabilities Act standards are met or exceeded in constructing or retrofitting facilities such as curb cuts and ramps.
- Adopt local multimodal transportation plans that address connections within and between jurisdictions and communities.
- Adopt land-use standards around airports, railroad lines and facilities to guide compatible long-range development.
- Reserve adequate rights-of-way in developing and redeveloping areas, as feasible, for pedestrian, bicycle, transit and roadway facilities.

INVESTMENTS

- As a supplement to other funding sources, including federal funds, finance roadway preservation, operational and expansion projects through local capital improvement programs.
- Fund projects that address multimodal connectivity through non-metropolitan planning organization programs.
- Provide on-street and off-street bicycle and pedestrian infrastructure that is comfortable, safe and convenient.
- Explore strategies to create multimodal connections between smaller scale suburban centers and the region's existing and emerging employment centers
- Provide wayfinding signage for bicyclists, pedestrians and transit users to reach key destinations.
- Provide first- and final-mile bicycle and pedestrian facilities and connections to transit such as sidewalks, bicycle facilities, bike-sharing, wayfinding, bicycle parking and shelters, and car-sharing at transit stations.
- Implement off-street sidewalks and multi-use paths that are comfortable for a wide array of users by providing separation from traffic.
- Conduct local activities to inform and promote the use of travel

VOLUNTARY OPTIONS AVAILABLE TO REGIONAL ORGANIZATIONS

- Fund first- and final-mile bicycle and pedestrian facilities and connections to transit such as sidewalks, bicycle facilities, bike-sharing, wayfinding, bicycle parking, shelters and car-sharing at transit stations.
- Continue to allocate resources to support corridor planning efforts, infrastructure improvements and other efforts to spur further public/private investment.
- Provide funding, tools, informational forums and resources to jurisdictions, transportation management associations/organizations, nonprofits and other travel demand management stakeholders to increase travel demand management awareness and use.
- Maintain and enhance airport capacity throughout the region.
- Improve transportation linkages to major destinations, markets and attractions beyond the region.
- Connect populations in need of transportation service to new and improved services.
- Develop transportation service options to address mobility needs of older adults and mobility-limited residents.

VOLUNTARY OPTIONS AVAILABLE TO REGIONAL ORGANIZATIONS

demand management strategies and services by transportation management associations/organizations and local travel demand management providers.

- Promote educational and promotional events to encourage bicycling and walking, such as Safe Routes to School.
- Reserve adequate rights-of-way in developing and redeveloping areas, as feasible, for pedestrian, bicycle, transit and roadway facilities.
- Expand mobility options within urban centers and other locally defined activity centers.
- Implement transportation improvements that enhance transit-oriented development opportunities.

WHAT IS OUR VISION?

Outcome 5: The transportation system is safe, reliable and well-maintained.

Educational, enforcement and engineering approaches enhance safety to reduce crashes, serious injuries and fatalities. Coordinated operations and management of the system maximizes capacity and reliability for all users. Transportation system physical components are well-maintained to extend their useful life and provide a quality travel experience.

Traffic Operations

Since 1989, DRCOG has been working to reduce traffic congestion and improve air quality through its Traffic Operations program. Through the program, DRCOG, the Colorado Department of Transportation and local governments coordinate traffic signals on major roadways in the region. One of the first transportation planning agencies to conduct this type of program, DRCOG remains a national leader among agencies involved in traffic signal coordination. In 2015, the program retimed 259 signals on travel corridors in the region, reducing daily travel time for motorists along those corridors by more than 1,600,000 hours and reducing fuel consumption by 800,000 gallons. Additionally, pollutant emissions were reduced by 90 tons, while annual greenhouse gas emissions were reduced by 8,000 tons.

Congestion management process

Through its congestion management process, DRCOG works with local, state and national partners to alleviate congestion and help people and businesses avoid or adapt to it. DRCOG uses travel demand reduction and operational strategies to effectively manage transportation facilities. DRCOG has developed a toolkit for addressing congestion through construction, demand management, real-time information and operational strategies. Many of the strategies are implemented through DRCOG programs such as its travel demand management program, Way to Go, and its Traffic Signal System Improvement Program and Intelligent Transportation Systems management and operations. This process and its associated strategies enables DRCOG to monitor performance of the region's transportation system (summarized in annual reports), as well as identify, evaluate and implement strategies through the Metro Vision Regional Transportation Plan and short-range Transportation Improvement Program. The congestion management process is integral to DRCOG's performance-based planning process.

WHAT IMPROVEMENTS DO WE NEED TO CONTINUE TO MAKE?

Regional Objective 5: Operate, manage and maintain a safe and reliable transportation system.

The region will optimize the multimodal transportation system to improve the safe and reliable flow of people and goods. System optimization will include projects and initiatives that make the multimodal transportation system's capacity as productive as possible. The multimodal system will require maintenance to continue safe and sound conditions. Safety projects and other related initiatives will reduce fatalities and serious injuries for all travel modes. The region will also

increase the deployment of technology and mobility innovations to improve reliability and optimize capacity.

Supporting Objectives:

- Maintain existing and future transportation facilities in good condition.
- Improve transportation system performance and reliability.
- Improve transportation safety and security.

WHAT MIGHT WE DO TO MAKE PROGRESS?

STRATEGIC INITIATIVES | IDEAS FOR IMPLEMENTATION

VOLUNTARY OPTIONS AVAILABLE TO REGIONAL ORGANIZATIONS

COLLABORATION

- Collaborate with the Colorado Department of Transportation, the Regional Transportation District local governments and other regional stakeholders to implement and monitor asset management techniques.
- Work with the Colorado Department of Transportation, the Regional Transportation District and other regional stakeholders to expand effective Transportation Systems Management and Operations projects, incident management procedures and processes, transportation demand management initiatives, and other innovative tools and techniques to safely optimize performance.
- Coordinate efforts of the Colorado Department of Transportation, the Regional Transportation District, local governments and other regional stakeholders to most efficiently use the existing multimodal system while planning for future use.
- Way to Go and travel demand management stakeholders continue to work with local jurisdictions and employers to distribute information

VOLUNTARY OPTIONS AVAILABLE TO LOCAL ORGANIZATIONS

COLLABORATION

- Monitor and manage transportation systems (including traffic signal systems) in collaboration with neighboring jurisdictions.
- Participate in federal, state and regional initiatives related to safety and homeland security initiatives.
- Partner with local law enforcement agencies and advocacy groups on education and enforcement activities related to all road users.
- Accurately monitor and maintain crash and traffic safety data for all transportation modes.
- Support the use of congestion pricing and other tolling techniques.

POLICIES AND REGULATIONS

- Develop specific plans and strategies to operate roadways more efficiently (such as traffic signal coordination and better management of traffic incidents).

VOLUNTARY OPTIONS AVAILABLE TO REGIONAL ORGANIZATIONS

about and encourage the use of technology, including multimodal real-time trip planning.

- Collaborate with public safety stakeholders to assess threats to and vulnerabilities of the transportation system, including consideration of national and regional homeland security initiatives, and establish and implement resolution processes in response.
- Coordinate with federal, state, regional and local agencies to implement applicable homeland security plans and initiatives.
- Facilitate interagency coordination on safety and homeland security initiatives.
- Work with communities and transportation providers to identify and address challenges faced by mobility-limited populations and employment sectors with non-traditional work schedules.

EDUCATION AND ASSISTANCE

- Consider supporting alternative pricing and revenue-producing strategies that directly reflect the cost of vehicle travel to the user.

INVESTMENTS

- Support cost-effective improvements to driver, passenger, pedestrian and bicyclist safety.
- Maintain transportation system assets (vehicles and facilities) in a state of good repair per federal requirements.

VOLUNTARY OPTIONS AVAILABLE TO REGIONAL ORGANIZATIONS

- Develop and implement access management principles along major streets.
- Enforce traffic laws and other ordinances as they apply to all users of the transportation system.
- Implement Transportation Systems Management and Operations projects.
- Implement other active demand management strategies.
- Develop and implement strategies that enhance security.

INVESTMENTS

- Maintain transportation facilities in good condition and implement asset management principles and techniques.
- Implement access management projects to optimize the efficiency of roadways, reduce conflict points and improve safety.
- Implement projects that reduce the likelihood and severity of crashes involving motor vehicles, freight and passenger trains, buses, bicycles and pedestrians.



HOW WILL WE KNOW HOW WE ARE DOING?

Performance Measures

Performance measures are critically important in monitoring the region’s progress toward Metro Vision themes and outcomes. They are used to obtain regular measurement of outcomes and results. They also generate reliable data to help local governments and partners evaluate policies, programs and initiatives. As part of its reporting on plan progress toward becoming a connected multimodal region DRCOG will use the performance measures outlined below.

Large urban areas such as metropolitan Denver are vibrant places offering a variety of employment, service and recreation opportunities in locations regionwide. Therefore, at some points in time, traffic congestion is inevitable. Plan performance measures related to congested travel conditions establish targets that are higher than current baseline measurements, but below currently forecast future levels of congestion.

MEASURE	WHERE ARE WE TODAY? (BASELINE)	WHERE DO WE WANT TO BE? (2040 TARGET)
Non-single occupant vehicle (non-SOV) mode share to work	25.1 percent (2014)	35.0 percent
Daily vehicle miles traveled (VMT) per capita	25.5 daily VMT per capita (2010)	10.0 percent decrease from 2010
Average travel time variation (TTV) (peak vs. off-peak)	1.22 (2014)	Less than 1.30
Daily person delay per capita	6 minutes (2014)	Less than 10 minutes
Number of traffic fatalities	185 (2014)	Fewer than 100 annually

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4. METRO VISION REGIONAL TRANSPORTATION PLAN SYSTEM COMPONENTS

The Denver region’s transportation system consists of a multimodal network of integrated regional transportation facilities and services. Integration refers to travel modes acting in unison, such as a roadway with bike lanes and sidewalks, as well as transfers between modes, such as from rail to truck. An integrated network is essential to encourage travel and mobility choices. System components do not function in isolation – buses and bicyclists travel on roadways, for example, and automobile drivers may transfer to transit at park-and-ride lots.

System facilities and services are provided by both public and private entities. The estimated total cost to implement, operate, and maintain the complete Metro Vision transportation system from 2016 to 2040 is \$153.7 billion. However, only \$106.5 billion is estimated to be available through 2040. The Metro Vision Regional Transportation Plan (MVRTP) contains a vision plan not constrained by costs, outlining the region’s total transportation needs, as well as the 2040 Fiscally Constrained Regional Transportation Plan (Chapters 5 and 6), which includes those projects, services, and other components that can be implemented given reasonably expected revenues through 2040.

The Metro Vision transportation system was updated from 2035 to 2040 using several methods. DRCOG staff solicited additions, deletions or changes to unfunded “vision” roadway projects while updating the Regional Roadway System network (see below). For the regional transit network, DRCOG staff worked with the Regional Transportation District and the Colorado Department of Transportation’s Division of Transit and Rail to incorporate corridor recommendations from major studies, such as RTD’s Northwest Area Mobility Study and CDOT’s high speed rail studies. This chapter describes the components of the region’s multimodal Metro Vision transportation system.

A. Regional Roadway System

The majority of person travel and local freight movements in the Denver region occur on roads and highways using motor vehicles, such as passenger cars and trucks, buses, commercial vehicles, and service vehicles. Pedestrians and bicyclists are also important users of the roadway system. The 2040 transportation system will both shape and be shaped by growth and development in the Denver region. Several roadways will also serve as external connectors beyond the region.

i. Roadway System Background

The Denver region has numerous freeways, tollways and managed lanes, arterials, collectors, federal land access roads, and local streets. For transportation planning purposes, DRCOG designates a Regional Roadway System (RRS) consisting of freeways, tollways, major regional arterials, and principal arterials (freeways may include managed lanes or optional tolled segments). The RRS is the planning network DRCOG uses for air quality conformity analysis and for establishing transportation project eligibility for the FC RTP and Transportation Improvement Program (TIP). The RRS identifies both existing and planned roadways (freeways, major regional arterials, and principal arterials). RRS-designated principal arterials do not necessarily match those shown in local government plans, which may have more customized roadway classification designations. The RRS includes all state highways in the DRCOG region and many non-state (local) roadways.

The designated DRCOG RRS has been an important component of long-range transportation plans for more than 20 years. The RRS represents the most heavily traveled and important connecting roadways in the region. It accounts for over 75 percent of the vehicle miles traveled (VMT) traveled in the region.

The 2035 RRS was updated to 2040 as the first step in preparing the 2040 FC RTP, described in Chapter 5. The 2040 RRS is shown in Figure 4.1. It reflects a base existing network and future roadways and interchanges throughout the region. It is known as the Metro Vision Regional Roadway System because it includes fiscally constrained and unfunded (Metro Vision) roadway corridors and facilities. To be clear, the RRS comprises existing and future roadway corridors, not projects. However, fiscally constrained roadway projects included in the 2040 FC RTP must be located on an RRS facility.

Many of the specific attributes of the 2040 RRS are not known at this time, particularly for future facilities. Exact alignments for new roadways and design elements, such as the number of lanes, will be determined through future project-specific studies. Alignments depicted in Figure 4.1 are best estimates at this time.

The number of lane miles on the fiscally constrained RRS will increase from about 7,200 in 2015 to approximately 8,400 by 2040. The total Metro Vision RRS network (fiscally constrained and unfunded) includes an additional 900 lane miles, or 9,300 total. Lane miles represent the number of through-lanes multiplied by the roadway length. For example, a four-lane road that is three miles long equals 12 lane miles. Parking lanes and turning lanes are not included.

Roadways on the 2040 RRS are classified as one of three facility types:

- **Freeway/Tollway.** Divided highways with access restricted to grade-separated interchanges. Most are completely free, though some may be tolled fully (tollways, such as E-470 and Northwest Parkway). Others may be partially tolled and include specific managed bus and/or high-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes as part of the facility, such as Interstate 25 north and U.S. Route 36. About 33 percent of all vehicle miles traveled in the region are on the freeway system.
- **Major regional arterials.** Divided and undivided

roadways that provide for key intraregional connections and high traffic volumes by minimizing left turns, side access, and cross-streets. They permit at-grade access and crossings, but some intersections with other major facilities might be grade-separated. They form the backbone of the regional roadway system along with freeways. Examples include Wadsworth Boulevard, Colorado Boulevard, and state Highway 119.

- **Principal arterials.** Major connecting streets primarily serving through-traffic, with at-grade intersections and side access permitted but regulated. Several principal arterials in older established areas serve as multimodal streets with a high amount of pedestrian, transit, and commercial activity. Principal arterial examples include Alameda Avenue, Kipling Street, 104th Avenue, and state Highway 42/95th Street.

Interchanges are also part of the roadway system and include the following types:

- Freeway-to-freeway interchanges (e.g., Interstate 70 at I-25);
- Arterial-at-freeway interchanges (e.g., Alameda Avenue at Interstate 225), and
- Grade-separated arterial interchanges that replace at-grade intersections (e.g., Evans Avenue at U.S. Route 85).

The 2040 RRS network includes fiscally constrained projects and unfunded vision projects on its roadway facilities as follows:

- Freeways/tollways: 2,330 fiscally constrained lane miles, 231 additional vision lane miles
- Major regional arterials: 1,141 fiscally constrained lane miles, 108 additional vision lane miles
- Principal arterials: 4,893 fiscally constrained lane miles, 567 additional vision lane miles
- Freeway interchanges: 236 fiscally constrained,

nine additional vision interchanges

- Grade-separated arterial interchanges: 35 fiscally constrained, 20 additional vision arterial interchanges.

Managed lane (BRT, HOV and HOT lanes) investments are emphasized for the region's freeway corridors. I-25, U.S. Route 36, I-70, and C-470 all have fiscally constrained managed lane projects identified. Several freeway corridors will also have rapid transit lines added within or parallel to the right-of-way to make them true multimodal travel corridors. Road widening projects are identified for E-470 and to key sections of I-25, I-225, and I-270. Peak period managed lanes will be added to the I-70 mountain corridor.

Many arterials will be widened, primarily in suburban areas. New arterials will also be added to serve growing parts of the region within regionally defined growth areas. Roadways provide the conduit for regional and statewide automobile travel; local, regional, and statewide bus travel; and freight and goods movement. Without improvements, even more roadways will experience more severe congestion (see Figure 2.8).

Multimodal improvements that serve bicyclists,

CDOT Managed Lanes Policy

CDOT's Policy Directive 1603 requires the agency to strongly consider managed lanes during the planning and development of capacity improvements on state highway facilities that are or will be congested. In 2015, the Transportation Commission approved a resolution clarifying that HOV 3+ will be free for all CDOT toll facilities unless demonstrated to be infeasible.

pedestrians or transit users will be considered for all future roadway improvements, as applicable.

E-470 and the Northwest Parkway are currently the only entirely tolled highways in the region. The initial phase of Jefferson Parkway is planned for completion in the 2020-2029 timeframe. As noted previously, managed lanes will be added to several regional freeways. These projects include a tolling component, typically variable tolling by time of day for automobiles with less than three occupants, and free for three or more carpoolers and buses, known as high-occupancy vehicles (HOV).

While collector and local streets are not depicted as part of the regional roadway system, they are important for providing access to and through local developments and neighborhoods, and many are included in DRCOG's regional travel model. The costs to build and maintain local streets, including collectors and minor arterials, are included in the 2040 FC RTP. Similarly, roads operated by federal and state land agencies are not part of the regional roadway system, but they provide access to, within, and through the region's recreational playgrounds. Their costs are also included in the 2040 FC RTP.

ii. Congestion Management Process

On an average weekday in 2015, over 14 million trips were made by residents and visitors in the Denver region. More than 9 million were motor vehicle trips, and 2 million were nonmotorized (walking and bicycling) trips. Household, service, and commercial vehicles are driven almost 79 million miles per day on the streets and highways of the Denver region. Drivers and passengers face almost 500,000 hours of congestion delay per day. All of these measures are expected to increase significantly by 2040 with the population and employment growth of the region. It is therefore important that DRCOG work with its partners to improve the reliability of travel times on the region's transportation system and provide multiple mobility choices.

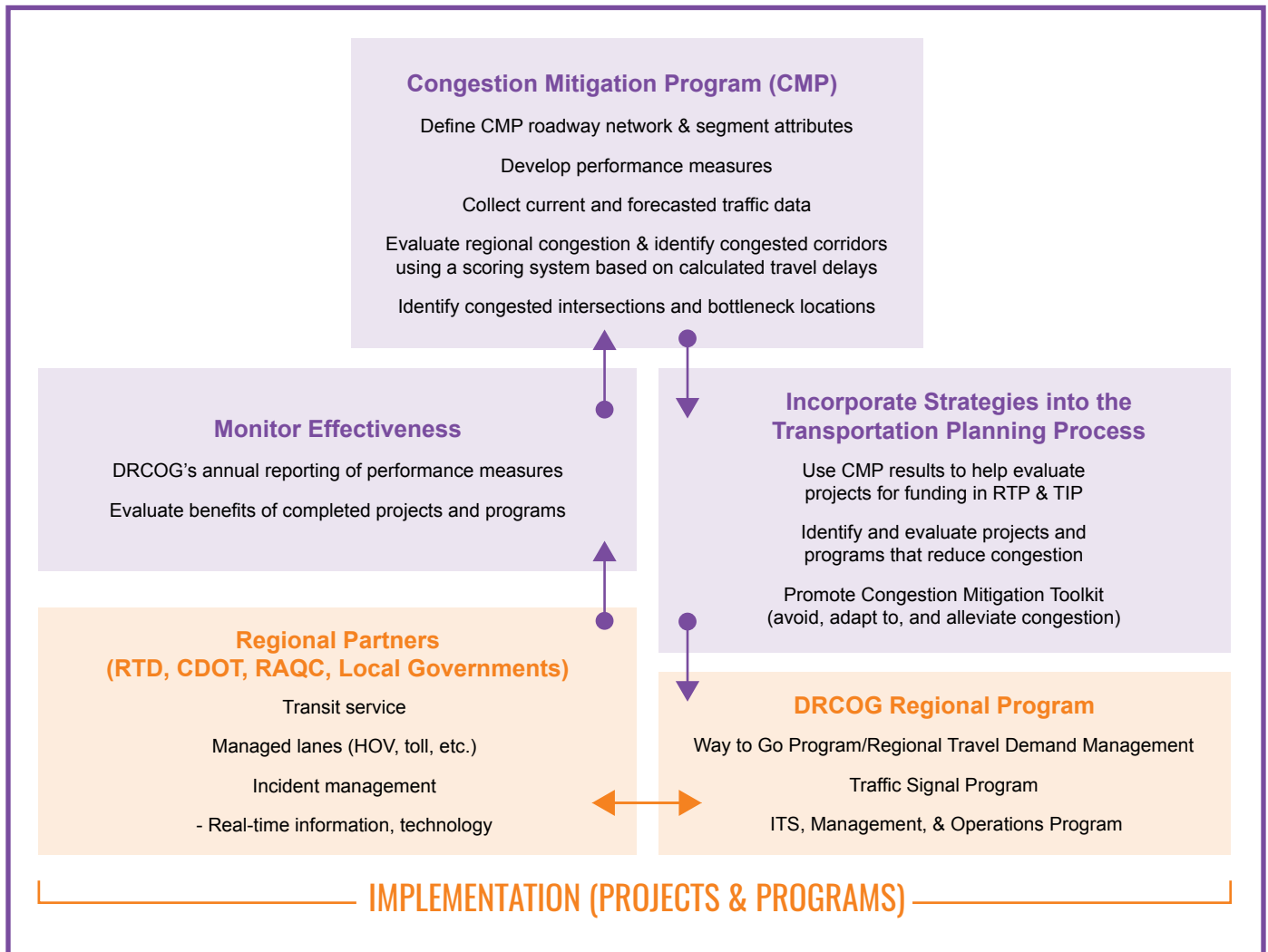
DRCOG administers a congestion management process (CMP) as part of its congestion mitigation program (Figure 4.2) in accordance with federal requirements. The CMP's three themes to mitigate congestion are:

- Help people *adapt* to congestion.
- Help people *avoid* congestion.
- *Alleviate* congestion with capacity and operational projects.

The CMP includes the following activities to enable the effective management and operation of the region's transportation system:

- Maintenance and annual updates of a database containing traffic volumes, capacity information, and congestion measures for the regional roadway system
- Coordination of the acquisition of traffic count, VMT and multimodal facility use data
- Identification of measures used in evaluating proposed roadway and multimodal projects for the TIP and FC RTP
- Reporting of regional performance measure results for congestion, travel delay, and travel time reliability (e.g. annual congestion reports and Table 7.1)

Figure 4.2 DRCOG Congestion Management System Process



Congestion Mitigation Toolkit Summary

(full toolkit)

1. ACTIVE ROADWAY MANAGEMENT

- A. traffic signal timing/coordination/equipment
- B. ramp meters
- C. access management
- D. incident management and response
- E. traveler information (message signs, internet)
- F. electronic toll collection
- G. roadway signage
- H. communication connections and surveillance

2. TDM/TRAVEL CHOICES

- A. transit service and facility expansion
- B. transit intersection queue-jump lanes and signal priority
- C. telework and flexible work schedules
- D. ride-sharing travel services (carpool, vanpool, Schoolpool)
- E. off-street multi-use trails (pedestrian and bicycle)
- F. on-street bicycle treatments
- G. efficient land use and development practices

3. PHYSICAL ROADWAY CAPACITY

- A. intersection turn lanes
- B. acceleration/deceleration lanes
- C. hill-climbing lanes
- D. grade-separated railroad crossings/intersections
- E. roundabout intersections
- F. new (or converted) managed/HOV/HOT lanes
- G. new travel lanes (widening), new roadways

- Identification of congested locations including roadway corridors, intersections, and freeway bottlenecks (see Figure 2.8)
- Identification of future performance measure targets
- Monitoring and presentation of privately provided congestion, delay, and reliability measures (e.g. INRIX data)
- Use of the CMP as a basis for defining a congestion-related purpose and need for corridor and project studies (to be further evaluated through the NEPA process)
- Establishment of a [toolkit](#) of construction, demand management, real-time information, and operational strategies for addressing congestion, to be implemented by state, regional, and local agencies
- Monitoring of TIP funded projects to evaluate and summarize effectiveness in reducing congestion or providing travel options

The CMP toolkit contains three categories of congestion mitigation strategies to address recurring and non-recurring congestion: active roadway management strategies, transportation demand management (TDM) and travel options strategies, and physical roadway capacity strategies. Specific toolkit strategies are described in applicable sections of the MV RTP.

DRCOG and its planning partners will closely monitor technological advances (and legislative actions) related to connected vehicles and infrastructure and autonomous vehicles. In particular, CDOT's RoadX initiative offers many opportunities to increase the efficiency, safety, and reliability for travelers using the roadway system. Planning, project programming, and project implementation efforts conducted throughout the MPO process must be nimble to respond to technological advancements.

Regionally funded roadway capacity projects must be at locations identified in CMP process. It must be shown (and reflected in project scoring and evaluation) that such projects will reduce traffic congestion, vehicle delay and person delay.

B. Public Transportation

The Denver region has an extensive and expanding transit system of bus, rail and specialized transit service. The major components of the region's transit system are briefly described below. More detail is provided in the Coordinated Public Transit Human Service Transportation Plan, located in Appendix 6. Known as the Coordinated Transit Plan, it is a federal requirement in order to: 1) identify the transportation needs of individuals with disabilities, older adults and people with low incomes; 2) provide strategies for meeting those needs; 3) and prioritize transportation services for funding and implementation. Federal requirements specify that projects funded under the Federal Transit Administration's (FTA's) 5310 program (mobility for the elderly and individuals with disabilities) be derived from a coordinated plan. DRCOG's Coordinated Transit Plan also integrates fixed route and rapid transit with the focus on human service transportation. The coordinated plan replaces DRCOG's former 2035 MVRTP Transit Element.

i. Rapid Transit System

The region's rapid transit system includes a network of existing and future light rail, commuter rail, bus rapid transit, Denver Union Station, other transit stations and park-and-ride lots, and existing and future bus/high-occupancy vehicle (HOV) lanes, some of which also function as high-occupancy toll (HOT) lanes. Other regional and intercity transit elements include Amtrak service, Greyhound and other intercity bus service, and interregional express bus service (Bustang) operated by CDOT.

As with other modes of the region's transportation system, the rapid transit system has components from both the 2040 FC RTP and unfunded vision (MVRTP)

components. The 2040 FC RTP rapid transit system is shown in Figure 6.2 and includes the portion of the Regional Transportation District's FasTracks program that is fiscally constrained through 2040 as well as BRT projects on Colfax Avenue and state Highway 119. It is important to note that the entire FasTracks program is funded, though some components are currently programmed for construction by RTD beyond 2040. These components, along with Colorado Department of Transportation's unfunded intercity rail and other conceptual transit corridors, comprise the vision (MVRTP) rapid transit system. The coordinated transit plan discusses the entire funded and envisioned rapid transit system in greater detail.

ii. Fixed Route Bus and Other Transit Services

RTD and other public and private operators provide important services to the region's growing population. A variety of services address the mobility needs of people who cannot drive and those who desire an alternative to the private motor vehicle. Bus routes provide extensive service to customers along most major streets. Denser urban areas are served by high-frequency bus service; more moderate service is provided in other areas. RTD also provides Call-n-Ride curb-to-curb transit service with smaller buses in suburban areas and freestanding communities that do not have sufficient demand to warrant fixed-route service. RTD's Call-n-Ride is also used to support the rapid transit system. RTD provides Americans with Disabilities Act (ADA) service through its Access-a-Ride program. Additional service is provided by private nonprofit agencies and local government-sponsored providers. Senior centers, places of worship and others also provide many trips.

C. Active Transportation (Bicycle and Pedestrian Travel)

The DRCOG region, known for its arid climate and abundance of sunshine, is an ideal place for walking and bicycling. Also referred to as active transportation, walking and bicycling are flexible, accessible, healthy and clean modes of transportation and can be used

exclusively or in conjunction with other modes. The cycling culture is especially strong not only in the DRCOG region, but statewide. The number of people who bike to work in the DRCOG region is more than twice the national average and is increasing at a greater rate than any other mode.

Currently, there are over 2 million trips made each day by walking or bicycling in the region. Trends point to a continued uptick in the number of people who get around by walking and bicycling. While the region has a robust sidewalk and bicycling network, there are gaps to be filled and needs to be addressed in order to meet the demands for walking and bicycling; provide safe and comfortable options for people of all ages and abilities; and to fulfill the performance measures and targets currently being established as part of Metro Vision.

The Active Transportation component of the 2040 MVRTP (Appendix 7) addresses the following topics: existing conditions for walking and bicycling in the DRCOG region, future projections for these modes, regional goals for active transportation and strategies for meeting the goals. There will be an opportunity to delve deeper into active transportation topics during the development of the Active Transportation Plan, which will be developed during 2018. The Active Transportation Plan will eventually become an element of the MVRTP.

D. Transportation Demand Management

Transportation demand management is a set of strategies to help people use the transportation system more efficiently while reducing traffic congestion, vehicle emissions and fuel consumption. transportation demand management strategies promote and facilitate the use of travel choices as options to reduce the demand for motor vehicle travel, particularly single-occupant vehicle travel during peak periods. Such travel choices include ride-sharing, vanpooling, transit, bicycling and walking, as well as varying travel times through teleworking and alternative work schedules. They also help to ensure personal mobility options for residents of the region.

Heavy traffic to and from the Denver region is not just a rush-hour phenomenon. For example, traffic and delays can be incurred between the Denver region and the mountains, especially during ski season. GO I-70 facilitates carpooling to Colorado resorts to help alleviate the impacts of ski traffic congestion. Additionally, CDOT expanded its interregional bus service, Bustang, providing trips to Broncos games as well as other destinations on weekends.

i. Transportation Demand Management Background

The original transportation demand management concepts developed in the 1970s and 1980s provided alternatives to single-occupant vehicle travel to save fuel and money, improve air quality, and reduce peak period congestion. Today, managing transportation demand has broadened to maximize transportation system performance not only for commute trips, but for non-commute trips and events. The need to manage transportation demand can occur throughout the day, evenings or on weekends.

Targeting work commuters, however, remains a priority focus since traffic congestion primarily occurs during weekday rush hours. Workplace trips tend to be more concentrated with routine schedules, enabling more efficient marketing efforts. As noted in Chapter 2, 75 percent of the region's workers drive alone to work.

Transportation demand management strategies can be implemented by means of marketing, outreach, programs, policies and infrastructure; and can be grouped into the following categories:

- Mobility options to single-occupant vehicle travel;

- Changes in work travel patterns;
- Incentives and policies to encourage the use of non-single-occupant vehicle mode options;
- Efficient land development designs and supporting infrastructure; and
- Information and Technology.

More information about these categories is provided in Section 5.



ii. Transportation Demand Management Structure and Providers in the Denver Region

The DRCOG region has a robust network of transportation demand management service providers anchored by DRCOG’s [Way to Go](#) program at the regional level; and transportation management associations, local governments and other transportation demand management providers in more focused areas. Strategies to promote and facilitate TDM will be implemented at four levels:

- **Interregional programs:** Includes organizations and service providers that focus on mobility between the DRCOG region and other regions, such as CDOT’s Bustang service, I-70 Coalition, VanGo vanpool (Fort Collins, Loveland, Greeley) and Metro Rides (Colorado Springs).
- **Regional programs.** Transportation demand management service providers at the regional level include DRCOG’s Way to Go program, Regional Air Quality Council and RTD.
- **Sub-area programs.** More localized transportation demand management programs and efforts are coordinated and implemented by transportation

management associations, local governments and other transportation demand management providers.

- **Site-based programs.** Implemented at individual workplaces with assistance from Way to Go or other transportation demand management service providers. Site-based programs address the specific travel needs of employees at one work site.

The DRCOG Way to Go program includes a formal partnership with the seven established transportation management associations in the region (referred to as the DRCOG transportation demand management partnership) to collaborate on a comprehensive and coordinated effort to address traffic congestion and air quality in the Denver region by promoting and implementing a suite of transportation demand management services. The partnership couples the proven successes of the regional Way to Go program with the subarea knowledge demonstrated by the seven partner agencies. The partnership is designed to take advantage of regionally produced materials and strategies, and implement them through the geographically-located transportation management associations.

DRCOG’s primary responsibilities in the partnership include oversight and day-to-day management of the regional marketing and outreach efforts, including:

- Managing the advertising agency, directing and coordinating regional advertising and promotional campaigns;
- Coordinating and facilitating effective employer and community outreach throughout the region;
- Managing the regional Way to Go vanpool program;
- Managing the region’s Schoolpool program, a nationwide model for promoting and facilitating families sharing rides to and from school;
- Managing large regional events and campaigns, such as Bike to Work Day and Way to Go-Tober;

- Developing and managing regional websites and trip planning platforms, such as MyWayToGo.org, and
- Administering the Guaranteed Ride Home program, which removes a significant barrier to non-single-occupant vehicle travel by offering a free ride home in the case of emergencies.

Currently, there are seven transportation management associations in the Denver region:

- Commuting Solutions
- Boulder Transportation Connections
- Denver South TMA (I-25 South/Denver Tech Center)
- Downtown Denver Partnership
- Northeast Transportation Connections
- Smart Commute Metro North (I-25 North corridor and the area between U.S. Route 36 and U.S. Route 287 to U.S. Route 85)
- Transportation Solutions (Cherry Creek, Colorado Boulevard, Alameda Station, University of Denver areas)

The main services provided by transportation management associations as part of the DRCOG Way to Go Partnership include employer and community outreach, as well as localized promotion and marketing of transportation demand management services in their respective areas. In addition to partnership services, transportation management associations may conduct many types of activities related to transportation demand management. For example, Commuting Solutions plays a pivotal role in the coordination and implementation of secure bike parking shelters at transit stations along the U.S. Route 36 corridor.

Outside the specific areas covered by Way to Go partner agencies, DRCOG's Way to Go outreach specialists conduct employer and community outreach. As the population in the region continues to grow, more transportation management associations may be

formed to address the need for transportation demand management services.

Various nonprofit organizations also provide transportation demand management products or services including, but not limited to:

- Bike Denver
- Community Cycles
- Boulder Valley School District
- Boulder B-Cycle
- Denver B-Cycle
- eGo car-sharing
- Groundwork Denver
- Transit Alliance
- WalkDenver

Additionally, there are numerous other organizations, such as nonprofit health, community and neighborhood organizations that collaborate with DRCOG and the transportation management associations on various transportation demand management activities.

DRCOG's [Regional TDM Short Range Plan \(2012-2016\)](#) further discusses transportation demand management participants, roles, responsibilities and funding. DRCOG funds transportation demand management programs, services and activities through a competitive funding process in TIP documents every two years.

The private sector also plays an important role in addressing travel choice options. Several car-sharing providers operate within the DRCOG region, with some having multiple programs for specific clientele, such as university students. Transportation network companies, more commonly known as ride-sharing or ride-hailing services, such as Uber and Lyft, also operate within the region, and it is expected that additional such services will also enter the marketplace in coming years. All of these services and providers emphasize an on-demand,

location-specific app-based approach through which a user can use their smart phone to request a ride or reserve a car-sharing vehicle with real-time, location-based availability. Particularly promising for the potential to reduce congestion are enhancements to these platforms which will facilitate multi-passenger trips, dynamically or in a coordinated fashion from pickup and drop-off points. Other apps specialize in delivery services, from groceries and food to more specialized products and services, potentially eliminating the need for certain trips (or more precisely, reducing consumer trips while increasing freight trips).

In addition to the national companies offering app-based services, numerous stakeholders in the region are working toward solutions that make smart trip planning easier and more comprehensive. DRCOG's Way to Go program developed and launched a multi-modal trip planning and tracking tool, known as MyWayToGo.org in 2013, and in 2015, the City and County of Denver, in partnership with Xerox, launched GoDenver, a pilot program app which overlays multiple services, including transit and parking information, into one easy-to-use platform. Ongoing discussions center around an ambitious goal for the region – to develop a one-stop

shop application where residents can not only plan their trip, but reserve, hail or purchase every aspect of their chosen trip.

iii. Transportation Demand Management Strategies

a. *Mobility Options to Single-Occupant Vehicle Travel*

The cornerstone of transportation demand management is to provide and promote mobility options to reduce single-occupant vehicle usage through the following avenues:

- ride-sharing programs and services (carpool, vanpool, school carpool);
- transit service and amenities, and fare pass options;
- active transportation programs and infrastructure (walking, bicycling, Bike to Work Day, bike-sharing, and bicycle and pedestrian facilities);
- car-sharing and transportation network company options (Lyft and Uber) as first- and final-mile solutions.

The Sharing Economy

The sharing economy, which includes several concepts, continues to rapidly evolve. For example, Uber and Lyft rides can be booked directly from the Google maps app. In 2016, Uber launched its Uber Eats food delivery service. Locally, RTD and Lyft started testing in 2016 a first- and final-mile pilot project to provide free Lyft rides within a defined service area to the Dry Creek light rail station in Centennial. These and many other examples illustrate the rapid changes in personal mobility options. The region's transportation demand management program will continue to work with partners to incorporate these concepts as feasible. However, it is important to distinguish between travel choice options and single-occupant vehicle trip reduction strategies. The former, as important as they are, do not necessarily lead to the latter.

b. Changes in Work Travel Patterns

Transportation demand management providers also promote and facilitate flexible employee work schedules, such as:

- Teleworking, or telecommuting, which involves working at home one or more days a week instead of commuting to and from work, and
- Alternative work schedules, including compressed work weeks and flex-time arrangements, such as starting work early or late to avoid peak hour travel.

c. Incentives, Policies and Pricing Mechanisms to Encourage Travel Choice Options

These strategies can encourage certain travel choice options and offer opportunities to save money and time:

- Transit fare subsidies or cash and merchandise incentive programs coordinated by transportation demand management providers.
- Parking management strategies, such as preferential carpool parking spaces, shared parking serving multiple users or destinations, paid on-street parking, time limits for on-street parking, permit parking in residential neighborhoods, additional parking at transit station park-and-rides and the reduction of parking minimums associated with development – especially for higher-density development located near other transportation options.
- Location-efficient mortgages, which qualify buyers for higher mortgage loan amounts when purchasing homes in close proximity to transit stations and high-service bus routes, since it's anticipated they will drive less and therefore have more to spend on housing.
- Guaranteed ride home programs, subsidized by an employer, which provides a free taxi

- ride home from the office for employees when personal emergencies arise.
- Road usage charges or vehicle miles traveled mileage fees (these fees would be paid by drivers in lieu of a gas tax, and are based on how much one drives).
- Mileage-based insurance or pay-as-you-drive insurance, also a by-the-mile form of auto insurance, linking insurance premiums to vehicle miles traveled and rewarding low-mileage drivers with lower premiums.
- Trip reduction ordinances requiring developers, employers or building managers to provide incentives for occupants or employees to use non-single-occupant vehicle modes of transportation.

d. Transportation Demand Management Strategies Related to Land Use

- One of the most influential elements in travel choice is development patterns and the proximity of, and connections to, an array of transportation options. There are many types of design strategies and principles that can encourage people to walk, bicycle or take transit, including:
 - Bicycle and pedestrian connections within, to, and from development; as well as to transit stops and stations;
 - Comfortable transit stops and waiting areas;
 - Pedestrian-friendly parking lots;
 - Cut-through paths for bicyclists and pedestrians within subdivisions;
 - Bicycle racks and secure bicycle parking;
 - Urban centers throughout the region, including many in suburban and highway-oriented locations;

- Transit-oriented developments near rapid transit stations or other high-transit service locations;
- Mobility hubs, typically near transit and higher density development, offering an array of transportation options, especially to make first- and final-mile connections;
- The development of convertible parking garages. In the Denver region, forward-thinking developers anticipating a drastic reduction in future parking demand and are building parking garages in a way where they can be converted to other uses such as residences, offices and retail.

E. Technology

Technology offers great promise for reducing traffic congestion in the region as well as increasing personal mobility. Private, public and nonprofit organizations are working to develop technologies to make choosing an efficient mode of travel more feasible. Technology that delivers real-time information to travelers is having a significant impact for commute and noncommute situations alike. Travelers and freight shippers can make better decisions with real-time information about how they travel (mode), when they travel (time), where and whether they travel (location), and which route they choose (path). Additionally, travel planning applications are incorporating multimodal options, and payment capabilities.

Beyond these applications, emerging technologies such as connected and autonomous vehicles will undoubtedly change the way people and freight get around the region in the future. Numerous entrepreneurial companies are conceptualizing autonomous circulating vans or shuttles which could move people throughout the region quite efficiently, at least in theory. While it is difficult to predict which specific technologies or providers will prevail, there is a great deal of interest and momentum in the region to capitalize on these opportunities. DRCOG will continue to support and facilitate deployment of technology-related mobility solutions that benefit the region.

i. Connected Vehicles and Autonomous Vehicles

Connected Vehicles is a set of technologies that allow a host of applications based on the sharing of data and information both between vehicles, known as vehicle to vehicle (V2V), and between vehicles and the roadway, known as vehicle to infrastructure (V2I). Federal research of these technologies has demonstrated safety, mobility and environmental benefits. Results of this research, especially the prospect of crash reduction, have prompted the National Highway Traffic Safety Administration (NHTSA) to propose rules requiring vehicle-to-vehicle communications capabilities in new vehicles. This will provide the foundation for applications that assist drivers in avoiding crashes. Auto manufacturers are already including some of these applications in current vehicles.

Autonomous Vehicles take the technology integration with the vehicle a step further and provide the vehicle with the capability to not only detect its surroundings, but directly operate the vehicle independent of a human operator.

The auto and truck industry, along with federal regulations, will facilitate the deployment of connected and autonomous vehicles. It represents a great opportunity for local governments, CDOT and other transportation system operators. Vehicles equipped to communicate with each other can also communicate with the infrastructure. This means such vehicles will serve as another source of probe data and, in select cases, the network and vehicle operations can automatically react to roadway conditions. This will require the deployment of an extensive connected vehicle environment (including on-site field devices, communications infrastructure and back-end data collection, management and monitoring services).

Both CDOT and the City and County of Denver have made commitments to develop a connected vehicle environment and implement suitable applications that benefit the traveling public. Primarily, these will include applications related to safety and mobility. This will help

current and future vehicles talk to each other (vehicle-to-vehicle), roadways (vehicle to infrastructure), and to transit. Some of these applications will be implemented through such programs as CDOT's [RoadX](#), and Denver's [Advanced Transportation and Congestion Management Technologies Deployment \(ATCMTD\) grant](#) from the U.S. Department of Transportation.

Since technology is rapidly evolving, transportation systems operators and planners must be nimble to implement such technologies while also looking at longer-term requirements, costs and impacts. More detailed descriptions of system management and operations improvements are contained in the Denver Regional Transportation Operations Improvement Program.

In early 2018, DRCOG, CDOT, RTD, the Denver Metro Chamber of Commerce and other partners initiated Mobility Choice Blueprint, a regional effort to plan and prepare for rapid technological and other innovations affecting mobility.

F. Safety

Between 2006 and 2015, the Denver region saw an annual average of 191 deaths and 1,807 serious injuries. The same time period saw an annual average of about 63,400 *reported* vehicle traffic crashes. Table 4.1 shows fatalities, serious injuries and total crashes for the DRCOG region for the most recent years of available data for each category. As the table notes, fatalities come from the national Fatal Analysis Reporting System (FARS), available through 2016. The remaining data are collaboratively calculated by DRCOG and CDOT based on GIS analysis of crash locations and accompanying database of crash characteristics and attributes.

Traffic crashes result in economic loss from damaged vehicles and goods, personal pain and suffering due to injury, and, occasionally and catastrophically, in loss of life. Crashes are also a major cause of congestion. DRCOG prepares two reports addressing safety at the regional level:

- The [Report on Traffic Crashes in the Denver Region](#) describes traffic safety issues within the region and provides information on crash mitigation strategies. DRCOG updates this report periodically as new crash data become available; the most current report was completed in March 2017.
- The [Pedestrian and Bicycle Safety in the Denver Region](#) report analyzes collisions in the Denver region between motor vehicles and pedestrians and bicyclists, and identifies mitigation strategies to prevent or reduce pedestrian and bicycle crashes. DRCOG typically updates this report in tandem with the regional crash report. The next version of this report will be completed as part of DRCOG's Active Transportation Plan.

i. Safety Background

Motor vehicle crashes are the most common safety concern regarding the transportation system. The region will continue implementing efforts to physically improve facilities to reduce the likelihood and severity of crashes. Even stronger efforts will be made to reduce the human errors that are the primary cause of about 80 percent of the crashes in the Denver region. Regional communities and lawmakers evaluate and consider law enforcement and legislative actions which address transportation safety, including:

- Drunk driving laws;
- Distracted driving laws;
- New driver licensing procedures;
- Photo enforcement of speeding and red-light running;
- Safety inspections;
- Work zone and aggressive driver laws;
- Commercial vehicle rules and regulations;
- Enforcement of bicycling and pedestrian laws, and
- Passenger restraint (seat belts and child safety seats).

Past advancements in safety improvements within vehicles, such as air bags, have helped reduce vehicle occupant fatality rates. Future technologies, such as vehicle-to-vehicle communication warning systems, hold promise for further reductions to both in-vehicle and out-of-vehicle pedestrian and bicyclist fatalities.

DRCOG staff works cooperatively with CDOT to annually geocode crash locations on off-system (non-state) roadways (CDOT geocodes on-system crashes). DRCOG provides crash data for the entire region on its [Regional Data Catalog](#) and [Denver Regional Visual Resources \(DRVR\)](#) sites.

CDOT's 2014 Strategic Highway Safety Plan (SHSP) identifies nine emphasis areas to "help direct the state's resources and organize stakeholders into teams which concentrate on a strategic problem area and produce an achievable action plan." The SHSP also notes the Federal Highway Administration's (FHWA's) guidance that emphasis areas should reflect "the greatest potential for reducing fatalities and injuries." The SHSP's nine emphasis areas are:

- aging road users (65-plus);
- bicyclists and pedestrians;
- data;
- impaired driving;
- infrastructure – rural and urban;
- motorcyclists;

- occupant protection;
- young drivers (age 15-20), and
- distracted driving task force.

ii. Safety Improvements

DRCOG, CDOT and local governments routinely analyze crash data to identify roadways and intersections with a high number or rate of crashes. Stand-alone safety projects are then identified and implemented, with many physical safety improvements built as a component of a larger project. Safety elements of candidate projects and existing facility crash rates are also considered during project evaluations for TIP documents. Key types of physical safety improvements will include, but are not limited to the following examples:

- Upgrading barriers in freeway medians and between freeways and frontage roads;
- Installing and upgrading traffic control devices such as traffic signals;
- Improving facility geometrics (hills, curves and sideslopes);
- Building auxiliary lanes for entering and/or departing traffic;
- Constructing hill-climbing lanes for slow-moving vehicles, especially in the mountainous area;
- Constructing pedestrian overpasses and

Table 4.1 DRCOG Region Summary Safety Data

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities (1)	215	203	230	160	166	162	176	179	185	238	278
Serious Injuries (2)	1,938	1,810	1,772	1,670	1,604	1,670	1,756	1,850	2,041	1,962	
Total Crashes (3)	66,694	63,812	59,634	58,240	57,713	59,376	59,253	64,074	69,831	75,214	

(1) Source: Fatal Analysis Reporting System (FARS), NHTSA

(2) Source: CDOT-DRCOG crash database

(3) Source: CDOT-DRCOG crash database; includes fatal, serious injury, and all other crash types

underpasses;

- Constructing protected, off-street or similar pedestrian and bicycle facilities;
- Installing fencing along busy railroad and light rail lines;
- Improving sight distances at intersections, and
- Removing fixed objects adjacent to travelways or providing proper protection.

Transportation facilities must also be well-maintained to preserve good safety performance. Key maintenance activities include:

- Repainting pavement and crosswalk markings and replacing nonreflective signs;
- Removing debris along roadways, sidewalks and multipurpose trails;
- Mitigating existing and potential future rock falls and mudslides;
- Trimming vegetation that impacts sight distances;
- Removing snow and ice;
- Replacing nonreflective signs and maintaining other traffic control devices;
- Repairing uneven manhole covers and replacing drainage grates;
- Repairing buckled sidewalks; and
- Removing permanent (e.g., utility poles) or temporary (e.g., construction materials) obstructions on sidewalks.

G. Aviation

Air transportation is an important element of the regional transportation system. It is critical to the regional and statewide economy. Tourists, business professionals, air cargo shippers and many other people depend on airports for their livelihood and quality of life.

CDOT's Division of Aeronautics is responsible for overall aviation planning in Colorado, with a primary tool being the 2011 Colorado Aviation System Plan (CASP) Technical Report update. The CASP covers the state's system of airports, including those in the Denver region, except for Denver International Airport (DEN). The Denver region's airport system comprises one air carrier airport (DEN), one military, four reliever and two general aviation airports (Figure 4.4).

The region's only military airport is Buckley Air Force Base (AFB). [Buckley AFB](#) hosts the 460th Space Wing, which directly supports combatant commands around the world. Additionally, Buckley AFB also hosts the 140th Wing of the Colorado Air National Guard, the Navy Operational Support Center, the Aerospace Data Facility-Colorado, the Army Aviation Support Facility and the Air Reserve Personnel Center. The base currently (2016) includes 3,100 active duty members from every service, 4,000 National Guard personnel and reservists, four commonwealth international partners, 2,400 civilians, 2,500 contractors, 36,000 retirees, and approximately 40,000 veterans and dependents.

The region's four reliever airports are Centennial, Erie Municipal, Front Range and Rocky Mountain Metropolitan. Centennial, Front Range and Rocky Mountain Metropolitan airports provide most of the region's corporate air traffic capacity. Boulder Municipal and Vance Brand are the region's two general aviation airports.

To accommodate peak period traffic, airports normally consider capacity expansion when they reach 60 percent of design operational capacity. According to the CASP, only one of the region's airports (excluding Denver International Airport) is forecast to reach this milestone by 2030; Centennial Airport will reach 70 percent capacity. According to CASP:

“Previous studies indicated that Centennial Airport's ability to increase its operational capacity was largely limited to additional or high speed taxiway exits; since the completion of the 2005 system plan, these high

speed taxiway exits have been developed. As noted in Chapter Three of this study, Centennial's annual operational levels have decreased. The demand/capacity ratio at this airport should continue to be monitored; but at this point, there are no additional recommendations related to increasing operational capacity at this airport.”

Denver International Airport (DEN) will continue to be the most important transfer point in the state for air passenger traffic, providing connections to national and international destinations. In 2016, the airport served 58.2 million passengers and moved 546 million pounds of cargo (2015). DEN's latest aviation forecast is that the airport will handle over 95 million passengers in 2040. Denver is the fifth-busiest airport in the United States by passenger volume and 15th busiest in the world. Additionally, about 35,000 people work at the airport.

On an average day, DEN sees almost 160,000 passengers. In 2016, 65 percent of boardings were passenger trips beginning or ending at DEN, meaning that about 104,000 passengers travel to or from DEN to begin or end an airline trip; the remainder were people making connections. Passengers and workers travel to DEN by car, commuter rail, buses, hotel shuttles, rental car shuttles, taxis, transportation network companies and other modes. Moving people efficiently to and from DEN is of critical regional importance. RTD's University of Colorado A Line from Denver Union Station to DEN opened in 2016 with two rail stations along the Peña Boulevard corridor and one station at the airport terminal. DRCOG's 2040 Metro Vision Rapid Transit System (Figure 6.5) shows a potential unfunded Tier 2 intercity transit corridor along E-470, and along Peña Boulevard from E-470 to the DEN terminal. Both components reflect CDOT's current long-range vision for potential intercity passenger rail. The 2040 FC RTP (Chapter 6) also includes a roadway widening project along Peña Boulevard between I-70 and E-470 as well as an interchange project at Peña Boulevard and Gun Club Road.

Access to the region's other airports is also an important issue. As shown in Figure 4.4, all of the region's airports are close to major highways, roadways or transit rail lines.

CDOT's CASP addresses future facility expansion and other recommended projects and actions for the region's and state's general aviation airports. For DEN, its master plan lists several long-range projects for the period 2021-2030 (as well as several shorter-range projects). Representative long-range projects include:

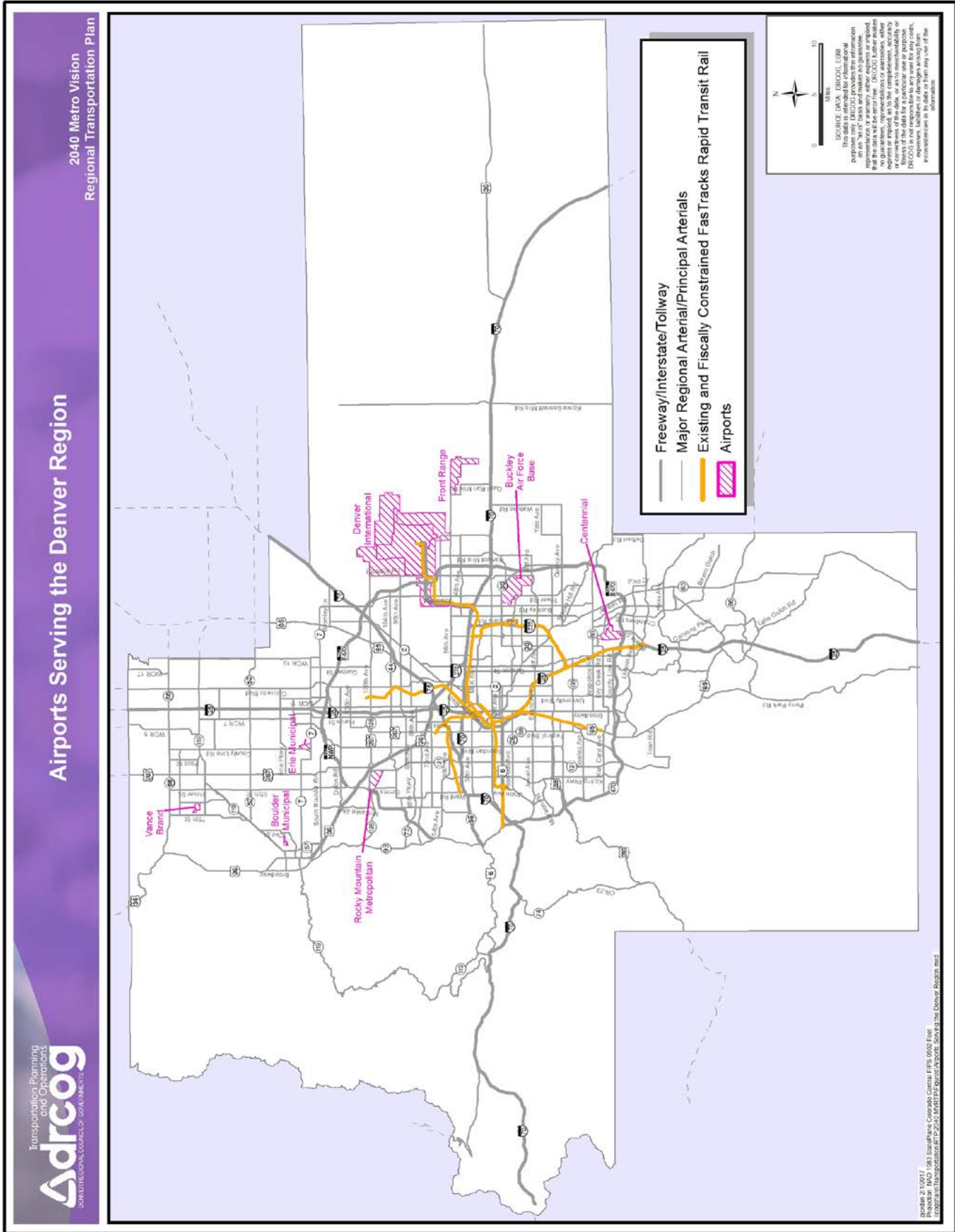
- Extending existing and construct new runways;
- Replacing airport traffic control tower;
- Expanding existing and construct new passenger terminal buildings;
- Extending concourses A, B or C;
- Relocating surface parking facilities and airport maintenance facilities;
- Constructing consolidated car rental facility;
- Constructing landside automated people mover;
- Constructing landside roadways, and
- Expanding cargo and support facilities.

DEN's master plan notes that many of these projects are planned to be completed incrementally as demand warrants, and could be advanced, deferred or otherwise revised over time.

H. Freight and Goods Movement

The efficient movement of freight, goods and packages is extremely important to Colorado and the Denver region's economy. Items are moved by railcars, trucks, vans, airplanes and pipelines. They move to, from, within and through points in the region. Major multimodal terminals transfer large amounts of cargo between the various travel modes and trucks. Most freight facilities and terminals are concentrated near

Figure 4.3 Airports Serving the Denver Region



freeways and major regional arterials. Local deliveries and pickups to and from businesses in the area depend on the reliability of the regional and local roadway systems.

“Freight customers and economics drive the market and locations where freight moves.”

- 2004 Freight Forum at DRCOG

Appendix 5 contains the freight and goods movement component of the MVRTP. It was prepared in close coordination with, and with extensive input from, industry and other stakeholders. The freight and goods movement component addresses the following topics in detail:

- Introduction and freight background;
- Federal freight requirements and guidance;
- Current freight planning efforts and stakeholder input;
- Freight network and facilities (trucks/roadways, commercial vehicles, safety, railroads, multimodal terminals, air cargo, pipelines, at-grade railroad crossings, warehousing, hazardous materials);
- Freight commodity flow data;
- MVRTP freight-related transportation improvements;
- Operations and technology;
- Air quality, and
- Other topics.

I. Transportation System Management and Operations Improvements

The general public is often unaware of the many critical day-to-day aspects of operating and managing the region’s transportation system. Snowplowing, emergency response, driving a bus, monitoring traffic and repairing traffic lights are just a few examples.

The overall focus of transportation system management

and operation (TSM&O) strategies is to safely provide more reliable trip travel times and reduce delays faced by drivers, passengers and trucks on the roadway and transit system. The strategies also have a positive impact on safety and air quality. To make the best use of the 2040 regional transportation system, both roadway operational improvements and system management and operations strategies will be implemented.

i. Roadway Operational Improvement Projects

Roadway operational improvement projects are generally low to moderate in cost and do not add significant new capacity to the system. These improvements have cost-effective delay reduction, traffic flow and safety benefits. Unique strategies will be applied to freeways and arterials on the regional roadway system.

Freeways

Major projects planned to rehabilitate and upgrade freeways will correct many operational bottlenecks. Stand-alone roadway operational improvement projects will be implemented at other locations. The following features will be pursued at appropriate locations:

- Paved shoulders to allow vehicles that are stalled or involved in minor incidents to be moved quickly out of the way and provide maneuvering space around the incident site;
- Improved and strengthened shoulder pavement to support bus-on-shoulder or managed lane operations;
- Paved areas to allow trucks and other vehicles to install or remove chains during snowstorms;
- Continuous acceleration/deceleration lanes between closely spaced interchanges to allow for smoother integration into and out of traffic, with decreased potential for crashes;
- Hill-climbing lanes in areas where steep grades and slow-moving vehicles cause congestion, and

- HOV bypass lanes at metered on-ramps to expedite flow of buses and carpools.

Arterials

On the arterial network, roadway operational improvement projects will address congestion due to intersection designs, at-grade railroad crossings and poorly managed access to and from arterials. All users of the roadway system, including pedestrians and bicyclists, must be considered in the planning, design and implementation of operational improvements. The following strategies are appropriate:

- Intersection treatments such as increased curb radii to accommodate buses and trucks, multiple left-turn lanes, right-turn lanes and additional side-street lanes.
- Improvements to reduce transit travel delay in corridors with high levels of bus service, including treatments such as transit queue jump/bypass lanes; adjustments to lane-channelization devices; bus bulbs; and relocation of, and enhancements to, bus stops;
- Access management projects, such as medians to control left turns, consolidation of roadway access points, side and rear access points between developments, reconstruction of driveways for proper width and gradient, and acceleration and deceleration lanes for turning traffic;
- Lane reconfigurations on urban roadways and signalized intersections to provide bike lanes;
- Shoulders on rural roadways to accommodate bicyclists, disabled vehicles and vehicles that drift off the travel lanes;
- Improved shoulders on select roadways to accommodate bus-on-shoulder operations, and
- Grade-separated bridges and underpasses for railroad tracks (see Appendix 5) and coordinated highway-rail interface systems and other operational

improvements for at-grade crossings.

ii. System Management and Operations Improvements

Personnel, technology and defined procedures are necessary to manage the regional transportation system to efficiently utilize the available capacity. System management and operations improvements and actions are largely supported and enabled by intelligent transportation systems (ITS) – technology tools and systems that facilitate and implement desired operations and processes.

A key to applying these improvements is integrating them as elements of all physical roadway improvements. Appropriate planning and design will include consideration for system management and operations, making it an integral part of all major road construction, such as new road, widening and reconstruction, and rapid transit projects. For example, CDOT recognized this fact when it adopted its Managed Lanes Policy Directive that requires the development of capacity improvements to consider implementation of managed lanes.

Across the region, system management and operations improvements to be pursued include:

Regionwide Improvements

- Surveillance systems (e.g., roadway detection systems, video camera systems and probe surveillance), deployed on or along freeways, arterials, and transit vehicles and facilities and supplemented with crowdsourced data to monitor travel conditions;
- Incident management systems and processes implemented consistently, to minimize incident duration, reduce first responder risk, improve traveler safety and reduce the resulting traffic congestion;
- Data-sharing systems to improve awareness of regional transportation network conditions. This

involves the interconnection of systems operated and maintained by both public and commercial entities. Systems should include an integrated transportation operations display to enable complete awareness of network conditions to operators in traffic, transit, emergency management and traveler information centers. Transportation operators will be better able to coordinate management and response activities;

- Integrated systems that disseminate real-time multimodal traveler information data, including: speed/travel time, incidents, special events, construction/work zone details, weather conditions, alternative travel options and pricing, and parking availability and pricing. This will be done through a variety of media including: dynamic message signs, highway advisory radio, commercial media, in-vehicle equipment, kiosks, smartphones and websites; and partnerships with traveler information service providers;
- A regional transportation data warehouse that collects and stores transportation data from multiple sources in the region mainly for performance monitoring and transportation planning, and
- Variable pricing schemes which charge higher fees during periods of highest demand can help manage demand for using tolled highway or managed lane facilities, other transportation services and parking districts. Each may be implemented individually, but are most effective in influencing travel choice when coordinated regionally.

Freeway Operation Improvements

- Ramp meters to manage the rate at which vehicles merge onto the freeway with less disruption and likelihood of triggering congested conditions. CDOT currently operates a ramp metering system in the DRCOG area and is exploring the implementation of a more advanced system – motorway management system;
- Freeway towing and courtesy patrol services will operate along many of the region's freeways in

support of incident management processes;

- Active traffic management (ATM) involves active monitoring and dynamically managing freeway traffic based on prevailing and predicated traffic conditions. The current example in the region is the implementation of dynamic lane use control, dynamic speed management and queue warning on U.S. Route 36 along with the managed lanes and bus-on-shoulder implementation; and,
- Electronic toll collection using a common technology to provide users of toll facilities, managed lanes and parking facilities an easier form of payment.

Arterial Operation Improvements

- Traffic signal systems that facilitate synchronization of traffic signals, operation of coordinated timing plans across jurisdictional boundaries and monitoring of system devices;
- Traffic-responsive, traffic-adaptive and other advanced traffic signal control strategies on select corridors with variable real-time conditions that cannot be adequately served by pre-set, time-of-day operations;
- Transit signal priority treatments operated in corridors with high levels of RTD's Limited class of bus service and long series of regularly-spaced signalized intersections to help keep buses on schedule;
- Bus-on-shoulder facility treatments and service;
- Coordination of signalized intersection operations with railroad grade crossings and freeway ramp meters; and,
- Coordination between traffic signal systems and emergency management centers and vehicles to effectively route responders around delays.

Transit Operation Improvements

- Transit vehicle tracking equipment, automated

passenger counting equipment and schedule assessment software to allow transit managers to dictate schedule adjustments or allocate fleet resources in response to real-time traffic, passenger demand and vehicle availability conditions;

- Electronic collection of transit fares and parking fees;
- Coordination with roadway operations systems to provide bus-on-shoulder operations and transit signal priority; and,
- Parking facility management to inform drivers and transit riders of park-and-ride lot parking space availability and alternatives.

J. Transportation Security

The security of the transportation system is an important expectation of its users. Although this is especially significant for air travel and transit facilities with respect to terrorist-based security risks, security of the general transportation system from both terrorism and natural hazards is also an important consideration for emergency management to ensure the transportation system's resiliency. Improved transportation security is an important Metro Vision objective.

Under state Executive Order D 2011-030, all-hazard emergency management regions were established across Colorado to improve interjurisdictional communication and coordination for emergency preparedness and response. The North Central All-Hazards Emergency Management Region, which largely encompasses the DRCOG region, is the body with responsibility for security planning, training and exercising. Consequently, DRCOG conducts traditional MPO planning activities with respect to security planning and coordination. DRCOG staff actively participate on applicable committees to assist with information provision and coordination between emergency management planning and related transportation planning efforts. DRCOG also considers

security issues when evaluating large-scale projects for inclusion in fiscally constrained regional transportation plans and TIP documents. Geographic proximity to higher security risk facilities identified in the Regional Transportation Plan (for example: military facilities, large freight or passenger intermodal terminals and airports) is an important consideration in the MPO planning and programming process. Other security-specific transportation system projects using federal funds are also carried through the MPO committee and planning process for inclusion in the TIP. For example, the Regional Transportation Operations Pool funds projects that directly and indirectly improve situational awareness of the transportation network, consequently improving transportation security.

There are four key phases to emergency management that operate in a continuous cycle:

- Planning and preparedness
- Mitigation and prevention
- Response
- Recovery

The transportation system is recognized as a critical resource to support emergency response and recovery. The transportation community has an equally significant role to assist in preparedness and prevention as it pertains to protecting the transportation system. Several aspects of security incidents which must be planned for include prevention measures, response plans, coordination and communication protocols, monitoring and information distribution.

i. Transportation Security Partners

A connected multimodal region requires interdepartmental and interagency coordination and data-sharing. This can also open the security of the infrastructure to a greater risk, which increases the complexity of transportation security requirements. Numerous agencies at different levels are involved and defined as follows:

Federal Agencies

- U.S. Department of Homeland Security – sets policy and regulations and provides grant funding administration
 - Federal Emergency Management Agency – directly involved in planning (i.e., National Incident Management System, National Preparedness Goal, etc.), response and recovery phases
 - Transportation Security Administration (airports) – directly involved in prevention and response phases
 - National Protection and Programs Directorate (cybersecurity) – directly involved in planning, prevention and response phases
- U.S. Department of Transportation – provides transportation security planning guidance
 - Colorado Information Analysis Center – data fusion center to establish and distribute collective security situational awareness
 - Critical Infrastructure Protection Section – identifies critical infrastructure, evaluates security status and makes protection recommendations
 - Division of Fire Prevention and Control – directly involved in planning, response and recovery phases
- Colorado Department of Regulatory Agencies
 - Public Utility Commission – oversight of transit security plans (Colorado state requirement)
- Colorado Department of Transportation – directly involved in planning, prevention, response and recovery phases
- Governor’s Resiliency and Recovery Office – focused on recovery phase, which is also reflected in planning
- Governor’s Office of Information Technology (cybersecurity) – directly involved in planning, prevention, response, recovery phases

State Agencies

- Colorado Department of Public Safety
 - Colorado State Patrol – directly involved in planning, prevention, response and recovery phases,
 - Division of Homeland Security and Emergency Management – policy set by Security and All-Hazards Senior Advisory Committee and Colorado Emergency Planning Commission
 - Office of Preparedness – directly involved in planning and prevention; direct coordination with All-Hazards Emergency Management Regions
 - Office of Emergency Management – directly involved in response and recovery phases; direct coordination and assistance to All-Hazards Emergency Management Regions
 - Office of Prevention and Security – focused on prevention phase

Regional Agencies

- North Central All-Hazards Emergency Management Region (NCR) – The purpose of this entity is to improve regional preparedness and response through planning, training and exercising. NCR also has responsibility for management of the State Homeland Security Grant Program within the region. In these roles, NCR directly interfaces the state Offices of Preparedness and Emergency Management with local counties and jurisdictions emergency management staff and other critical emergency management partners. Another important function of NCR is to disseminate security information in a timely manner to all agencies within the region.

A key partner to NCR is the Denver Urban Area Security Initiative (UASI), funded through the Department of Homeland Security to enhance regional preparedness in major metropolitan areas throughout the United States. The two groups have integrated efforts, forming joint committees to conduct planning, programming and training activities jointly. Their committee structure is organized around the 32 core capabilities of the National Preparedness Goal.

The North Central Region Homeland Security Strategy (2016 – 2019), its joint strategic plan, highlights two critical activities related to transportation security: improved communications between emergency management and transportation/public works partners; and, completion of the mass evacuation plan for the region.

- County/local emergency managers – Members of NCR, Denver UASI and DRCOG, these stakeholders have direct responsibility for planning, prevention, response and recovery phases.
- Regional Transportation District (RTD) – Major agency responsible for transit security planning, prevention, response and recovery phases.
- DRCOG – Fulfilling the traditional MPO role, DRCOG coordinates between emergency management and transportation planning, addressing transportation security elements as part of the existing regional transportation planning and transportation improvement planning processes.

ii. Transportation Security Improvements

The security of transportation users, facilities and property will be improved through specific projects and activities such as:

- Security cameras on transit vehicles, at park-and-

ride lots, at transit stations, at major bus stops, on other transit properties and in all public and secure areas at airports

- Screening and security measures at airports
- Security cameras and other sensors on critical roadway infrastructure
- Patrol and monitoring of roadways, transit facilities and airports by law enforcement and private security personnel
- Training of transportation staff to expand monitoring of transportation infrastructure security
- Commercial vehicle, railroad vehicle railroad tracks and freight inspections
- Implementation of cybersecurity network monitoring systems and processes
- Hazardous materials monitoring and tracking systems and processes

In addition, the regional transportation operators have day-to-day responsibilities to assist and support emergency management through:

- Day-to-day cooperation with the Colorado Information Analysis Center
- Monitoring roadway and traffic conditions and implementing traffic flow adjustments, as requested, to respond to and recover from security and hazard events
- Distributing emergency management event information, as directed, through the existing traveler information infrastructure
- Monitoring roadway critical infrastructure and cybersecurity network systems and coordinating with security partners in response and recovery
- Deploying transportation-focused incident

commanders to directly support overall emergency event incident commanders

The DRCOG region has been affected by and is susceptible to many types of natural disasters, such as:

- Snowstorms
- Flooding (river or creek floodplains, urban roadways)
- Drought
- Wildfires
- Rock falls and landslides
- Tornados
- Lightning and power outages

Of particular note are the disastrous 2013 floods that affected Boulder, Adams, Jefferson and Weld Counties within the DRCOG region. To promote resiliency in the regional transportation network, DRCOG expedited the flow of federal funds through its TIP for flood relief projects and participated in briefings and other coordination task force efforts focused on flood recovery.

Every county in Colorado has prepared a Multi-Hazard Mitigation Plan, coordinated through the [Colorado Division of Homeland Security and Emergency Management](#). As an example, the Jefferson County plan notes: “Since 2007, Emergency Management has worked with caregivers of those with special needs to create and exercise emergency plans. These trainings have been held for group homes, nursing homes and assisted living facilities within the county.” Additionally, the Colorado Department of Local Affairs completed the [Colorado Disaster Housing Plan](#) in 2011 and published the [Planning for Hazards: Land Use Solutions for Colorado](#) guide and website to help local governments “prepare for disasters and reduce risks.”

K. Asset Management and System Preservation

In recognition of the region’s considerable investment in the multimodal transportation system, managing and preserving facilities is increasingly important. The transportation system, including roadways, transit system, sidewalks and other components, naturally deteriorates due to use, time and especially climate (freeze-thaw cycle). Roadway and bridge deterioration is strongly related to use, especially by heavy trucks. The condition of transit buses declines quickly because of the hundreds of thousands of miles they travel in stop-and-go conditions. Sidewalks and multipurpose trails deteriorate through seasonal cycles, tree root growth and other factors.

i. Roadway System and Bridge Preservation

According to CDOT’s annual bridge condition inventory data, in 2014 about 1 percent of bridges in the DRCOG region that carry vehicular traffic were rated as structurally deficient, and 36 structures in the region had a sufficiency rating below 50 on a scale of 100. By 2040, less than one percent of the region’s bridges will be structurally deficient or functionally obsolete. Since 2009, the state Funding Advancements for Surface Transportation and Economic Recovery ([FASTER](#)) program has allowed CDOT to improve roadway safety, repair deteriorating bridges, and support and expand transit. Accordingly, bridge sufficiency ratings continue to improve. Additionally, of the more than 4,171 lane miles of state highways in the DRCOG region, approximately 22 percent have a poor surface condition.

Over the life of the 2040 MVRTP, major reconstruction projects will be needed in most corridors of the region, and costs are steadily rising. For example, many freeways and arterials are so heavily used during daylight hours that lane closures for repairs are acceptable only at night. However, night work increases construction costs. In many locations, the complete reconstruction of major facilities is most feasible if the roadway is being widened, as new and permanent pavement may serve as a construction detour while the old pavement is removed and replaced. The 2040 FCRTTP assumes that many older roadways targeted for

additional through lanes will be reconstructed coincident with adding that capacity.

To optimize system preservation activities, the 2040 MVRTP embraces the performance-based asset management philosophy being implemented by the region's transportation partners (DRCOG, CDOT and RTD) and other stakeholders of collecting asset condition information regularly over time, and analyzing that data to optimize and prioritize actions. CDOT, for example, has developed a pavement management system, while RTD is responsible for "state of good repair" asset management and system preservation activities for its system (see below). Local governments maintain their streets and accompanying sidewalks as well as off-street multi-use trails. Chapter 7 discusses asset management and system preservation from a performance-based planning perspective in more detail.

ii. Transit System Preservation

Maintenance of transit stations, on-street boarding stops and vehicles is critical to passenger comfort and transit service reliability. Stations or vehicles in poor condition (e.g., torn seats, broken wheelchair lifts or poor temperature control) affect the comfort and accessibility of transit patrons. On-street boarding locations that fall into disrepair with uneven or missing pavements affect safety and accessibility. Vehicle breakdowns may cause severe hardships to transit patrons, affecting future ridership.

Maintenance of transit operational facilities including park-and-ride lots, rail lines, bus-only travelways and ramps is critical to their long-term serviceability. Poorly maintained tracks, electrical and signal systems or pavement may damage vehicles or cause slower operations. In the case of park-and-ride lots, where private vehicles use the site as well as transit vehicles, deteriorating conditions affect a facility's use, and therefore transit ridership.

As discussed in Chapter 7, RTD is initiating State of Good Repair Dashboard reports to provide reliable, timely and data-driven information concerning the

performance, condition and age of RTD's assets. RTD will use several measures to assess its rolling stock (vehicle) assets.

iii. Pedestrian and Bicycle Facility Preservation

Communities in the Denver region have invested heavily in sidewalks, roadway bicycle treatments and an extensive multipurpose trail system. Maintenance of these facilities is needed for the comfort, safety, retention and growth of users. Tree roots, utility construction and normal weathering can greatly impact the condition and long-term life of sidewalks and bike paths. Roadway curb and gutter areas adjacent to where bicyclists tend to travel often deteriorate more quickly than the primary travel lanes. This can create dangerous situations that force bicyclists to quickly maneuver around hazards.

The Americans with Disabilities Act (ADA) requires that streets and roadways be brought up to full ADA standards whenever they are widened or reconstructed to include proper sidewalks, curb ramps and other elements. Local governments in the Denver region and other recipients of federal funds have created ADA transition plans to address ADA transportation needs and investments over time.

L. Conclusion

The Denver region's transportation system consists of a multimodal network of integrated regional transportation facilities and services that work together to expand access and mobility for people, goods and services. System facilities and services are provided by both public and private entities. The estimated total cost to implement, operate and maintain the complete Metro Vision transportation system from 2016 to 2040 is \$152.5 billion. This chapter provided a detailed profile of each component of the region's multimodal transportation system, describing facilities, services, usage, trends and key issues.

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5. 2040 FISCALLY CONSTRAINED RTP FINANCIAL PLAN

Introduction

This chapter documents the process, assumptions, data and results for the financial plan component of the 2040 Fiscally Constrained Regional Transportation Plan (2040 FCRTTP).

The three key steps in completing the 2040 FCRTTP financial plan were to:

1. Estimate revenues expected to be available through 2040,
2. Define system category expenditure needs, costs and revenue allocations; and
3. Evaluate and prioritize regionally significant projects.

DRCOG worked cooperatively with the Colorado Department of Transportation, Regional Transportation District, planning partners and other stakeholders through the MPO planning process to develop the 2040 FCRTTP financial plan described in this chapter.

Approximately \$106.5 billion is expected to be available from 2016 through 2040 to manage, operate, preserve, maintain and expand the DRCOG region’s multimodal transportation system (unless noted otherwise, all values presented in this chapter are shown in constant year [2015] dollars). The unconstrained future (Metro Vision) transportation system would cost almost \$154 billion through 2040.

The financial plan demonstrates that the 2040 FCRTTP, covering the period 2016-2040, is fiscally constrained. The 2040 FCRTTP is fiscally realistic, incorporating regional coordination and decision-making to balance system operations, preservation and maintenance with strategic investment in multimodal capacity projects to accommodate 1.2 million more residents and over a half-million more jobs by 2040. The 2040 FCRTTP uses

reasonably anticipated revenues to cover project and system costs as agreed to by DRCOG, CDOT and RTD through the metropolitan transportation planning process.

Table 5.1 summarizes fiscally constrained total transportation system costs and revenues. As shown, total costs and revenues are approximately \$106.5 billion in constant dollars and about \$142 billion in year of expenditure (YOE) dollars. The remainder of this documentation explains how these revenues and costs were developed.

Table 5.1 2040 Fiscally Constrained RTP Costs and Revenues

	(millions)	
	Constant (FY 15\$)	Inflated (YOE\$)
Transportation System Costs (2016-2040)	\$106,550	\$141,890
Anticipated Transportation System Revenues (2016-2040)	\$106,550	\$141,890

A. Background

The 2040 FCRTTP classifies transportation expenditures into two broad areas: 1) system categories, and 2) regionally significant projects for air quality conformity purposes.

System category expenditures are allocations to categories that are not project specific in the 2040 FCRTTP, but rather address broad areas of need. Examples include system preservation, base transit service, roadway operations and bicycle/pedestrian facilities. Non-regionally significant projects are not identified in the 2040 FCRTTP. Rather, estimated total expenditure amounts are listed by system category and constrained by available revenues through 2040. Actual projects in these categories are initiated by project sponsors through the short-range Transportation Improvement Program (TIP) process (if seeking federal

funds) or local agency capital improvement programs or budgets for non-federally funded projects. TIP decisions for federally funded projects within the Transportation Management Area (TMA) are made by the multi-agency regional planning process led by DRCOG. Outside the TMA, funding decisions are made by CDOT, with DRCOG input, through the Statewide Transportation Improvement Program (STIP).

In contrast, regionally significant projects are major roadway, interchange and rapid transit projects that considerably change the capacity of the transportation network. Examples of regionally significant projects include:

- **Roadway capacity:** Adding (or removing) at least one continuous through-lane-mile on the designated Regional Roadway System, such as widening a roadway from two lanes to four lanes.
- **Interchange capacity:** Building a new interchange, adding a missing movement to an existing interchange or upgrading a diamond arterial-freeway interchange by adding flyover ramps. Examples of the latter include the flyover ramps added to the South Santa Fe Drive interchanges with Interstate 25 and C-470.
- **Rapid transit capacity:** Constructing a rapid transit corridor/segment or transit station, such as FasTracks.

Regionally significant projects must be listed individually in the RTP by air quality staging completion period (2020-2029 or 2030-2040). The transportation networks containing these projects must be modeled to demonstrate compliance with federal air quality conformity requirements. These projects are listed in Appendix 4 and discussed and illustrated in Chapter 6.

B. Financial Plan Preparation Process

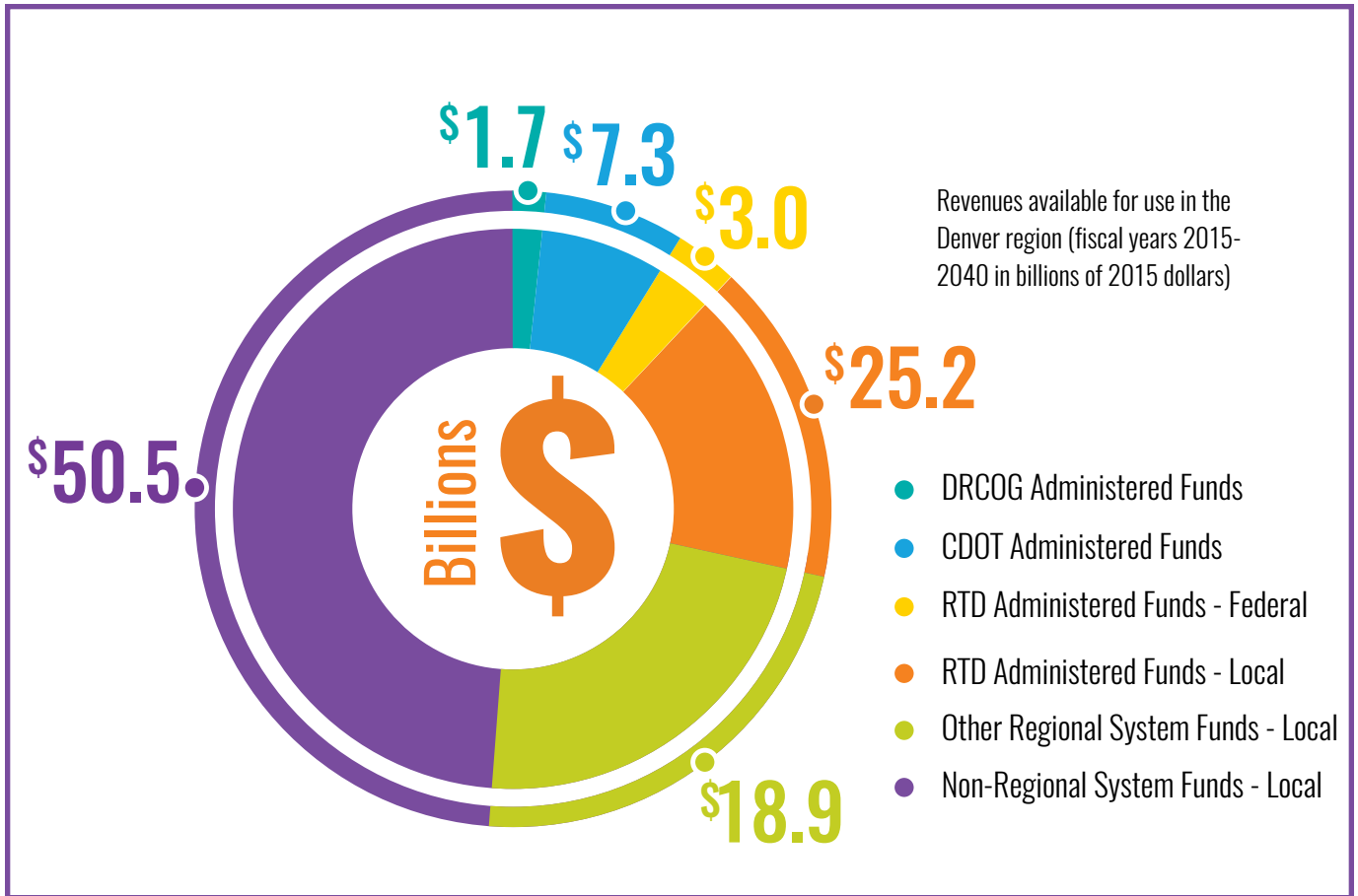
This section describes the process to develop project costs, revenues, allocations and expenditure assumptions underpinning the 2040 Fiscally Constrained RTP. The 2040 FC RTP was based on the 2035 MVRTP and the process used to prepare it. Several steps were taken to update the 2040 FC RTP financial plan as described below.

i. Revenues

DRCOG, in coordination with CDOT, RTD, local governments, special districts and authorities, paratransit operators, and various special funding agencies, estimated total revenues available for transportation purposes. The financial analysis covers the 25-year period of 2016 through 2040 and includes federal, state, local and private revenues. Table 5 later in this chapter also shows revenues in year of expenditure dollars. With inflation, revenues and costs presented in year of generation or expenditure are always larger than when presented in constant current dollars.

A factor of 1.33 was used to inflate most constant year revenues to year of expenditure. This factor is based on CDOT's 2035 Resource Allocation Key Rates and Factors calculations, which incorporates consumer price index (CPI) and Colorado construction cost index (CCI) rates and was used for the 2035 MVRTP. The 2035 version included annual escalation rates for the 2008 to 2035 period. DRCOG worked with CDOT to update the annual escalation rate calculations for the period 2015 to 2040. The updated annual escalation rates ranged from 1.00 (2015) to 1.818 (2040). The cumulative average of the annual rates from 2015 to 2040 is 1.33. This factor represents a mid-point average of the period 2016-2040 recognizing the inherent uncertainty of when and which specific revenues will be expended on specific projects or system categories during the 25-year RTP period.

Figure 5.1 Revenues Available for Use in the Denver Region



This approach was used for consistency rather than attempting to customize inflation factor assumptions for individual revenue sources. While CDOT’s program distribution process calculates revenues in both constant year and year of expenditure dollars, this information was not finalized until after the 2040 FC RTP financial plan was completed. DRCOG’s inflated (year of expenditure) revenues are consistent with CDOT’s program distribution calculations and are generally more conservative by revenue source.

RTD primarily uses the year of expenditure approach, but worked with DRCOG staff to generate constant dollar estimates for FasTracks and other transit revenues (and costs). Because all FasTracks components assumed to be fiscally constrained (through 2040) are under fixed-price contracts and will be completed by 2019, the difference between constant and inflated dollars is not significant. Local government

revenue estimates were first generated in current 2015 dollars and for year of expenditure dollars were assumed to grow over time based on anticipated growth in population and tax revenues.

Table 5.2 2040 Fiscally Constrained RTP Revenues (2016 to 2040)

FUNDING SOURCE/ADMINISTRATOR	REVENUES (\$ MILLIONS)	
	CONSTANT	INFLATED
	(FY 15\$)	(Y0ES)
DRCOG Administered Funds		
STP-Metro (Federal)	\$540	\$720
Non-Federal Match for STP-Metro	\$360	\$480
Transportation Alternatives Program (TAP)	\$50	\$60
Local Match/Overmatch for TAP	\$20	\$30
Congestion Mitigation/Air Quality (CMAQ)	\$540	\$720
Local Match/Overmatch for CMAQ	\$140	\$190
DRCOG Subtotal:	\$1,650	\$2,200
CDOT Administered Funds		
Asset Management - Maintenance	\$1,830	\$2,440
Asset Management - Surface Treatment Program	\$1,340	\$1,780
Asset Management - Structures On-System	\$370	\$490
Bridge Enterprise	\$280	\$370
Bridge Enterprise Bonding	\$850	\$1,130
Bridge - Off System	\$70	\$90
Regional Priority Program (RPP)	\$350	\$470
FASTER Safety	\$560	\$750
Strategic Projects (SB 228) (through 2020)	\$280	\$370
Discretionary and Other State Revenues	\$550	\$740
Strategic Projects - Transit (SB 228) (through 2020)	\$30	\$40
FASTER Transit (Local)	\$40	\$50
FASTER Transit (Statewide)	\$70	\$90
FTA Formula Funds (5310, 5311)	\$120	\$160
TSM&O: Congestion Relief	\$70	\$90
Transportation Alternatives Program (TAP)	\$50	\$70
Toll Revenue	\$400	\$530
CDOT Subtotal:	\$7,260	\$9,660
RTD Administered Funds		
RTD Sales and Use Tax (Base System and FasTracks)	\$21,750	\$28,970
Farebox Revenues	\$3,430	\$4,560
FTA New Starts (5309)	\$450	\$600
FTA Formula Funds (5307, Other FTA Grants)	\$2,270	\$3,020
Other FasTracks Financing	\$310	\$410
RTD Subtotal:	\$28,210	\$37,560

FUNDING SOURCE/ADMINISTRATOR	REVENUES (\$ MILLIONS)	
	CONSTANT	INFLATED
	(FY 15\$)	(Y0ES)
Other Revenues for Regional System		
Local/Private Funding for Improvements	\$2,640	\$3,520
Local Funding for Regional Operations and Preservation	\$11,720	\$15,610
Toll Authority Funding for Improvements	\$750	\$990
Toll Authority Funding for Preservation, Operations, and Debt	\$2,990	\$3,980
Local Funding for Transit Operations	\$520	\$690
Local and GOCO Lottery Funding for Bike/Ped	\$310	\$410
Other Regional System Subtotal:	\$18,930	\$25,200
Revenues for Non-Regional Facilities *		
Local/Private Funds for Non-Regional Facilities	\$33,400	\$44,500
Local Funds for Non-Regional System Preservation	\$17,090	\$22,770
Non-Regional Subtotal:	\$50,490	\$67,270
GRAND TOTAL:	\$106,550	\$141,890

* CDOT funds for non-regional facilities included in CDOT totals

Estimated revenues are illustrated in Figure 5.1 and detailed in Table 5.2. RTD will administer the largest individual-entity share of revenues, about \$28 billion. The largest source of funding for transportation will be locally derived sources, providing about \$95 billion. This amount includes almost \$70 billion from local governments, private sources and tolls, and about \$25 billion in sales tax and fares from RTD. These revenue estimates assume that transit fares will be increased in line with inflation.

The second-largest individual allocation of funds, \$7.3 billion, will be administered by CDOT. Federal and state fuel taxes are the primary funding sources. CDOT combines all federal funds (for Colorado) with state funds and then redistributes them through several categories as shown in Table 5.2. All federal funds expended in the Denver TMA must be approved by DRCOG for inclusion in TIP documents.

DRCOG administers and selects projects for three Federal Highway Administration (FHWA) formula

categories — Surface Transportation Program-Metro (STP-Metro), Congestion Mitigation and Air Quality (CMAQ), and Transportation Alternatives Program (TAP). Including match, these formula categories represent approximately \$1.7 billion. STP Metro funds can be used on a variety of project types, most commonly roadway improvements and transit projects. With FHWA approval, the DRCOG Board adopted the overall long-range planning assumption of 40 percent average non-federal matching funds for STP-Metro revenues to account for historical trends of local overmatch on major projects. TAP funds are primarily used for bicycle and pedestrian projects. CMAQ funds will be used for several types of projects and activities related to improving air quality. CDOT also administers some TAP and CMAQ funds. Example CMAQ projects include:

- DRCOG Way to Go program and transportation demand management pool;
- Regional Traffic Signal System Improvement Program;

- Regional Intelligent Transportation System Pool;
- New bus services and transit stations;
- New rapid transit facilities;
- Street sweepers, vacuums and liquid deicers;
- Intersection operational improvements; and
- Other air quality improvement projects (for example, diesel retrofits) and alternative fuel vehicles.

Local governments, along with private developers and tollway authorities, are anticipated to have about \$19 billion in available revenues to preserve, operate and expand the regional transportation system. Some of these revenues are reported in Table 5.2 as local matching funds to DRCOG- or CDOT-administered funds. An additional \$50 billion will be spent on non-Regional Roadway System facilities. This estimate is based on applying historical trends of private and local government expenditures to the forecast growth in population and local street mileage through 2040.

Periodically, federal revenues are awarded through grant programs such as the TIGER (Transportation Investments Generating Economic Recovery) program or the Recreational Trails Program. Projects chosen to receive funding from these programs must be included in the TIP. Colorado and the DRCOG region have established a multiyear track record of consistently receiving a variety of federal discretionary grant awards. Additionally, there continue to be multiple efforts at the state level to generate new transportation revenues. Accordingly, FHWA, CDOT and DRCOG concurred on incorporating a reasonable amount of additional discretionary and other state revenues in the financial plan as shown in Table 5.2.

a. Federal and State Revenues

DRCOG participated in CDOT’s program distribution process (explained below), which identified specific revenue sources and anticipated amounts by year and range of years (bands) through 2040 for most federal and state funds. The revenue estimates were

based on existing federal and state sources and include only what could be generated under current law and average economic conditions into the future.

CDOT Program Distribution and Process

Much of the foundation for the 2040 FC RTP’s revenue and expenditure assumptions came from CDOT’s program distribution process. As defined by CDOT, the program distribution process “outlines the assignment of projected revenues to various program areas for the time period of [its Statewide Transportation] Plan (FY 2016-2040),” (page 2) which matches the timeframe of the 2040 FC RTP. CDOT also notes that program distribution “provides a baseline for financial constraint” of its Statewide Plan, MPO Regional Transportation Plans and TIP documents, and CDOT’s Statewide Transportation Improvement Program. The program distribution [process](#) went through the statewide planning process (Statewide Transportation Advisory Council and Transportation Commission) for review and approval. Program distribution itself took several months and involved stakeholders from across the state. (This section provides embedded links to CDOT’s program distribution document; the full link is: codot.gov/programs/planning/documents/financial/2040-program-distribution.)

[Forecasts](#) were made of anticipated revenues for every major state and federal transportation funding source through 2040, including revenues that DRCOG controls: STP-Metro, CMAQ and TAP. Working with DRCOG staff and other stakeholders, CDOT incorporated many future trend assumptions into a revenue forecasting model. Assumptions were made for factors specifically affecting fuel tax revenues such as high population growth, vehicle fleet mix, fuel economy (mpg) and miles traveled (VMT). The model estimated whether the amount of revenue associated with a particular funding source would grow or decline over time (and at what rate), or remain stable through 2040. CDOT published its final program distribution documentation and calculations

(linked above) after the 2040 FC RTP financial plan was prepared. DRCOG staff worked with CDOT staff to compare both sets of revenue totals by category to confirm there were minimal differences by revenue category and in the total amount of all revenues.

As CDOT's program distribution process was a statewide process, DRCOG staff worked with CDOT to determine the proportion and corresponding amount of estimated revenues for the DRCOG region through 2040. This effort encompassed approximately 16 distinct multimodal funding

Table 5.3 2040 Fiscally Constrained RTP Revenues (2016 to 2040)

FUNDING PROGRAMS (All values are in constant rounded FY 16\$)	TOTAL STATEWIDE AMOUNT	2016 - 2040 SHARE FOR DRCOG (planning purpose revenues)		EXPENDITURE CATEGORIES			
				GENERAL TRANSPORTATION ACTIVITIES (operations, maintenance, etc.)		CAPACITY PROJECTS (includes reconstruction)	
CDOT:		%	Amount	%	Amount	%	Amount
Maintenance			\$1,826,575,900	100%	\$1,826,575,900	0%	\$0
Asset Management - Surface Treatment	\$4,104,577,800	33%	\$1,342,196,900	85%	\$1,140,867,400	15%	\$201,329,500
Asset Management - Structures On-System	\$866,517,400	43%	\$370,869,400	90%	\$333,782,500	10%	\$37,086,900
Bridge Enterprise	\$1,784,406,700	43%	\$278,089,400	20%	\$55,617,900	80%	\$222,471,500
Bridge Enterprise Bonding*	\$850,000,000		\$850,000,000	0%	\$0	100%	\$850,000,000
Bridge - Off-System	\$169,479,500	40%	\$67,791,800	90%	\$61,012,600	10%	\$6,779,200
Regional Priority Program	\$896,777,100	39%	\$350,731,000	40%	\$140,292,400	60%	\$210,438,600
FASTER Safety	\$1,528,662,000	37%	\$558,773,300	85%	\$474,957,300	15%	\$83,816,000
Strategic Projects through 2020 - SB 228	\$661,517,800	42%	\$277,837,500	0%	\$0	100%	\$277,837,500
Strategic Projects - Transit	\$73,502,000	40%	\$29,400,800	75%	\$22,050,600	25%	\$7,350,200
FASTER Transit (local program)	\$89,677,700	40%	\$35,871,100	100%	\$35,871,100	0%	\$0
FASTER Transit (statewide program)	\$179,355,400	40%	\$71,742,200	90%	\$64,568,000	10%	\$7,174,200
Toll Revenue	\$397,289,000	100%	\$397,289,000	0%	\$0	100%	\$397,289,000
CDOT Subtotal:			\$6,457,168,300		\$4,155,595,700		\$2,301,572,600
DRCOG:							
STP Metro (federal only)	\$718,075,900	75%	\$538,556,900	40%	\$215,422,800	60%	\$323,134,100
STP Metro (40% Matching Funds)	\$481,110,853	N/A	\$360,833,123	N/A	\$144,333,276	N/A	\$216,499,847
CMAQ (federal only) (eligible projects)	\$679,759,500	80%	\$543,807,600	80%	\$435,046,100	20%	\$108,761,500
CMAQ Required Local Match (20%)	\$169,939,900	N/A	\$135,951,900	N/A	\$108,761,500	N/A	\$27,190,400
DRCOG Subtotal:			\$1,579,149,523		\$903,563,676		\$675,585,847
Grand Totals:			\$8,036,317,823	63%	\$5,059,159,376	37%	\$2,977,158,447

*Assumes \$850 million in bonding capacity in fiscal year 2017, with corresponding reduction associated with debt service through 2040.

sources and programs — the three controlled by DRCOG noted above and 13 controlled by CDOT. The results of this process are shown in Table 5.3. In comparing Table 5.3 with Table 5.2, figures in Table 5.2 were rounded for display purposes from the amounts shown in Table 5.3, which fed the detailed financial analysis. Once DRCOG and CDOT determined revenue amounts through 2040 by funding source for the DRCOG region, the next step was to allocate those revenues to multimodal transportation system categories in the 2040 FC RTP, which is discussed in the Allocations section below. CDOT's program distribution process estimated revenues by year for 2016-2025 and by five year increments for 2026-2040 for each revenue source. DRCOG directly used these estimates in its financial plan calculations by using CDOT's total available revenues through 2040 that are based on (built up from) the interim year/period estimates by individual revenue source.

b. Transit-Related Revenues

DRCOG worked with RTD and CDOT to estimate transit revenues through 2040. These primarily include RTD's sales and use tax and farebox revenues, FTA formula grants (5307, 5310, 5311, 5339) and FTA New/Small Starts (5309). CDOT's program distribution process addressed Colorado transit revenues — SB 228 and FASTER Transit (statewide and local) revenues.

For RTD revenues, DRCOG used planning-level revenue estimates provided by RTD based on its [Strategic Budget Plan](#) (SBP), FasTracks Annual Program Evaluation (APE) and the state Senate Bill 90-208 (SB 208) FasTracks financial plan review assessment process. Through the SB 208 process, RTD's FasTracks finances have been reviewed extensively by DRCOG (and others) since FasTracks' inception in 2004. Leading up to the construction of the fiscally constrained FasTracks corridors and components, RTD annually

provided DRCOG with a SB 208 FasTracks Annual Report for DRCOG to review and determine the sufficiency of RTD's financial program, vehicle technology, operations and other topics. For several FasTracks annual reviews, DRCOG hired a financial and engineering consultant team to provide an independent and objective evaluation of fiscal constraint and sufficiency of RTD's FasTracks financial program. These reviews analyzed and evaluated RTD's:

- Base financial assumptions
- Capital and operating costs
- Revenues and financing
- Overall financial plan fiscal constraint assessment

Although the SB 208 review process focuses on FasTracks (rapid transit), RTD must also ensure it has the financial resources to operate and maintain its overall transit system while undertaking FasTracks capital construction and that bus service operations are not comprised. The SB 208 reviews also encompass sales and use tax forecasts for the entire system, not just FasTracks. Additionally, the reviews address numerous financial details such as material costs, labor unit costs and Davis-Bacon wage rates, labor productivity rates, inflation rates, contingencies and other fine-grain details of RTD's financial program. The following graphics from [DRCOG's SB 208 financial review of RTD's 2012 amendment](#) to DRCOG's 2035 MVRTP illustrate the detail inherent in the SB 208 financial plan review process. This RTP amendment is particularly relevant because RTD removed several FasTracks components from the 2035 MVRTP to maintain fiscal constraint for the overall transit system, which the 2040 FC RTP continues. These financial calculations were confirmed for the 2040 FC RTP through [RTD's 2014 Baseline Report](#) and DRCOG's [2014 FasTracks Baseline Review and Determination Report](#).

Exhibit 5.1 Base and FasTracks Operating Expense Forecast

FROM FASTRACKS FINANCIAL PLAN (\$1000)									
	2011	Δ %	2012	Δ %	2018	Δ % FROM 2018	2030	Δ % FROM 2030	2035
RTD BUS OPERATIONS	116,316	1.5%	118,066	1.5%	140,979	37.7%	194,091	10.5%	214,462
PRIVATE CARRIER OPERATIONS	90,930	1.2%	92,052	1.2%	108,299	38.0%	149,434	11.9%	167,196
SECURITY & FACILITIES MAINT.	23,443	-2.1%	22,951	-2.1%	27,752	37.5%	38,154	12.1%	42,774
COST SHARE AGREEMENTS	3,471	1.7%	3,531	1.7%	4,269	37.5%	5,870	12.1%	6,580
FASTRACKS BUS ADJUSTMENTS	-7,590	88.7%	-14,325	23.1%	-17,629	36.9%	-24,133	12.0%	-27,024
ADA OPERATIONS	39,883	3.9%	41,427	4.8%	61,639	84.8%	113,917	27.2%	144,906
FASTRACKS ADA ADJUSTMENTS	-4,747	-100.0%			-12,212	108.9%	-25,506	11.9%	-28,547
LRT OUTSIDE SE CORRIDOR	39,918	0.6%	40,156	20.9%	48,555	37.5%	66,755	12.1%	74,838
LRT IN SE CORRIDOR	2,000		2,000	-14.9%	1,702	37.5%	2,340	12.1%	2,623
OTHER FACILITIES & SECURITY	2,835	283.6%	10,874	-46.8%	5,788	37.5%	7,958	12.1%	8,922
COST OF INSURANCE	6,914	-6.7%	6,450	20.9%	7,799	37.5%	10,722	12.1%	12,021
ADMINISTRATIVE EXPENDITURES	59,829	14.5%	68,519	8.6%	74,399	37.5%	102,286	12.1%	114,671
TOTAL BASE	373,203	5.0%	391,701	15.2%	451,339	42.2%	641,888	62.5%	733,423
SE Corridor Service Enhancements					5,759	37.5%	7,917	18.4%	9,371
SW-CPV-Central Corridor Service Enhancements					5,919	37.5%	8,137	8.6%	8,836
West Corridor	2,303	237.0%	7,762	110.3%	16,328	37.5%	22,448	8.1%	24,265
I-225 Corridor			210	3038.6%	6,601	37.5%	9,075	50.8%	13,683
East Corridor Traction Power and Security					5,456	77.1%	9,663	12.1%	10,833
NW Rail Traction Power and Security					307	37.5%	422	12.1%	473
U.S. 36 Corridor - BRT					929	1460.0%	14,487	100.8%	29,086
Gold Line Traction Power and Security					1,799	37.5%	2,474	12.1%	2,773
North Metro Rail					2,026	59.8%	3,239	62.7%	5,268
Southeast Corridor Extension									6,841
Denver Union Station					2,913	37.5%	4,005	12.1%	4,490
Maintenance Facilities - Commuter Rail					743	37.5%	1,022	12.1%	1,146
Miscellaneous					1,047	37.5%	1,440	12.1%	1,614
Administrative Costs *	9,692	4.0%	10,078	-72.9%	2,731	-16.9%	2,270	12.1%	2,545
Service Increases - Bus	7,590	92.9%	14,644	20.4%	17,629	36.9%	24,133	12.0%	27,024
Service Increases -ADA	4,747	-100.0%			12,212	108.9%	25,506	11.9%	28,547
TOTAL FASTRACKS (RTD)	24,332	34.4%	32,695	152.0%	82,399	65.3%	136,238	29.8%	176,795
East Corridor					38,900	143.6%	94,761	13.0%	107,099
Gold Line					6,178	181.6%	17,397	22.8%	21,368
Northwest Corridor Electrified Segment					2,806	305.0%	11,363	30.6%	14,844
TOTAL FASTRACKS (EAGLE)					47,883	158.0%	123,521	16.0%	143,311
TOTAL FASTRACKS (RTD PLUS EAGLE)	24,332	34.4%	32,695	298.5%	130,283	99.4%	259,759	23.2%	320,106
TOTAL SYSTEM	397,535	6.8%	424,396	46.3%	581,622	55.0%	901,647	16.8%	1,053,529

Exhibit 5.2 Annual Average Escalation Projections

Average Annual Escalation Projections for O&M				
SERVICES	AVERAGE ANNUAL ESCALATION			COMMENTS
	2012-2035	2018-2030	2030-2035	
BASE SYSTEM (RTD)	2.8%	3.0%	2.7%	NO SERVICE CHANGES
BASE SYSTEM BUS SERVICES		2.7%	2.1%	NO SERVICE CHANGES
FASTRACKS ASSIGNED BUS SERVICES		4.0%	2.3%	
ALL FASTRACKS CORRIDORS (RTD) (INCLUDES EAGLE POWER AND SECURITY)		4.5%	7.3%	INCLUDES VEHICLE OVERHAULS 2018-2030 AND NEW SE LRT EXTENSION AFTER 2033
NORTH METRO (RTD)		4.2%	28.9%	INCLUDES VEHICLE OVERHAULS IN 2027 & 2032 PLUS EXTENDED SERVICE TO 72ND ST IN 2035
EAST, GOLD, & NW CORRIDORS (RTD)		4.5%	2.3%	TRACTION POWER AND SECURITY
EAST, GOLD, & NW CORRIDORS (DTP)		10.3%	7.3%	EXCLUDES SECURITY & TRACTION POWER
TOTAL BASE & FASTRACKS SYSTEM		3.7%	3.2%	INCLUDES EAGLE SERVICES

Exhibit 5.3 Net Debt Service Coverage

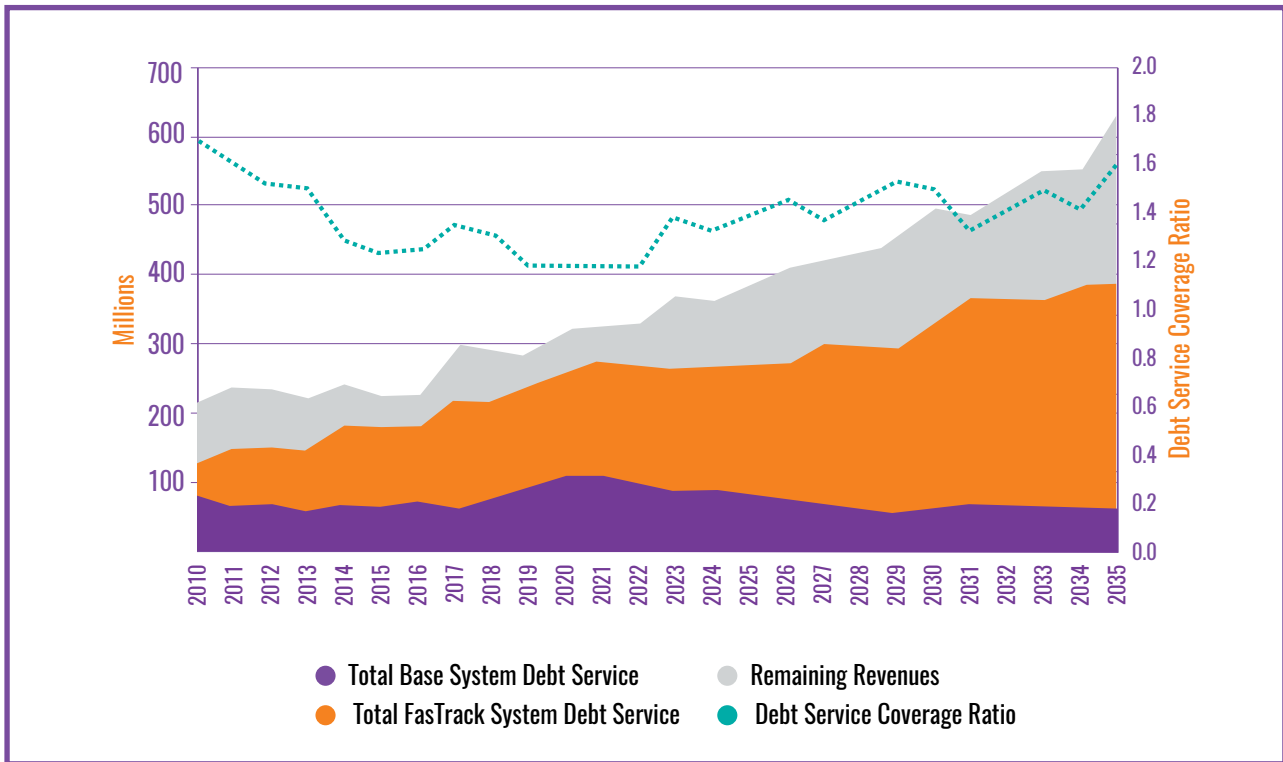
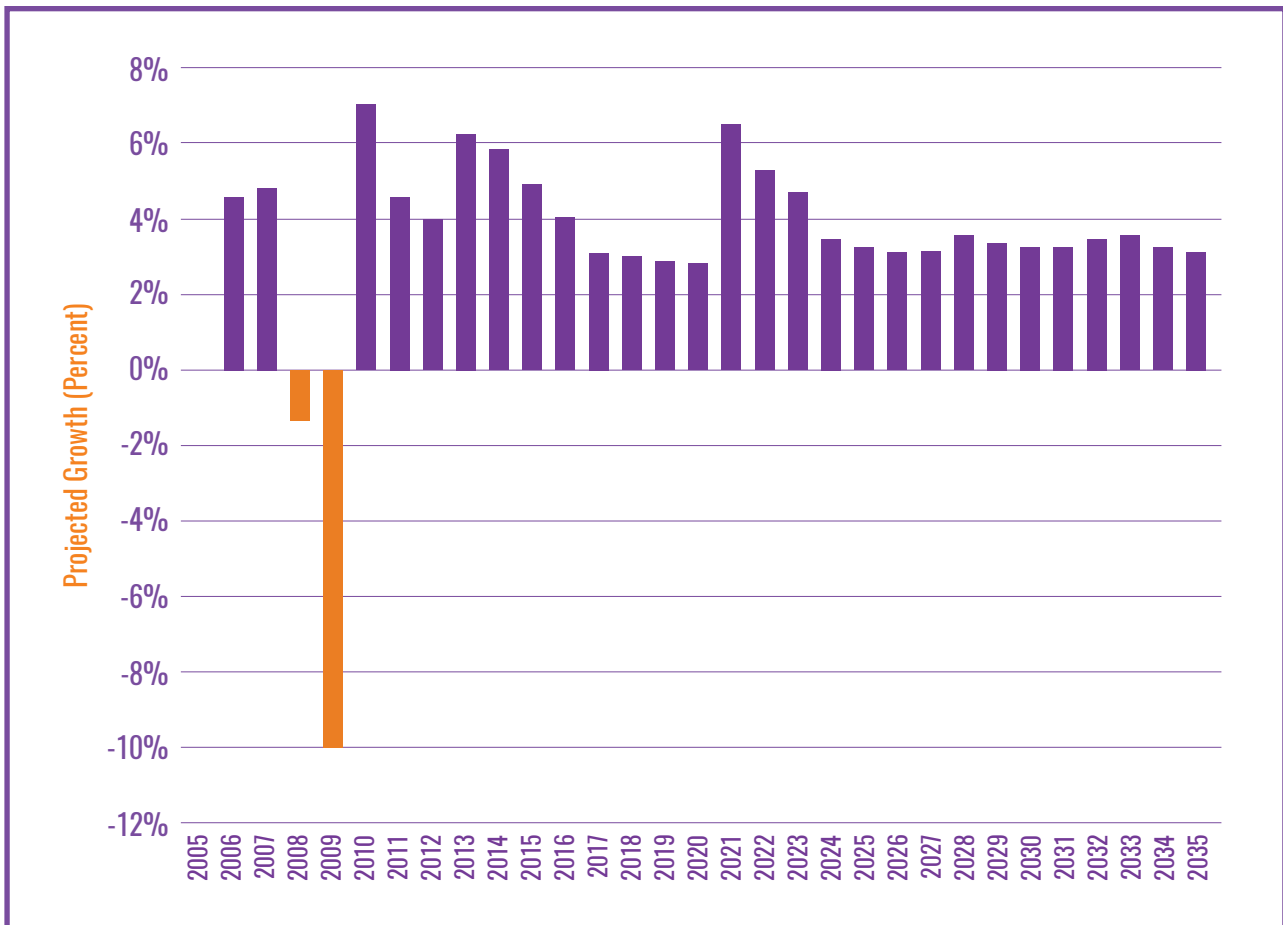


Exhibit 5.4 Projected Sales and Use Tax Growth 2005-2035



Based on the SB 208 process and RTD's APE and SBP, RTD provided DRCOG with transit revenues (and costs) for RTD's sales and use tax, fares, FTA formula funds (such as 5307), New/Small Starts and other RTD revenues.

For CDOT-controlled transit revenues, CDOT's program distribution process addressed SB 228 and FASTER Transit (statewide and local) revenues. FASTER transit local revenues are generally spent on rolling stock (vehicle) purchases and replacement, and those revenues are shown accordingly in Table 5.3 in the operations/maintenance section. FASTER transit statewide/regional revenues are more complex, but RTD spends a portion on transit capital construction activities, such as transit station facilities and amenities, transitway major reconstruction and enhancements, and similar activities. In consultation with CDOT's Division of Transit and Rail, CDOT and DRCOG staff agreed that it was reasonable to assume 10 percent of FASTER transit statewide revenues would be allocated for capacity-related expenditures.

For CDOT-controlled FTA 5310 and 5311 formula funds, DRCOG reviewed the FTA 5310 apportionment history for the Denver-Aurora urbanized area and CDOT's recent awards history to the DRCOG region for small urban and rural FTA 5310 and rural FTA 5311 formula funds. (Through 2014, DRCOG selected projects for FTA 5310 funding in the Denver-Aurora urbanized area on behalf of RTD and has participated with CDOT in project funding decisions since CDOT became the designated recipient in 2015 for FTA 5310 funds for the Denver-Aurora urbanized area.) Based on recent apportionment and award history for FTA 5310/5311 funds, DRCOG estimated a 2 percent average annual growth rate to 2040 to derive total constant year revenues and then estimated year of expenditure revenues. DRCOG then verified these assumptions and total revenue estimates with CDOT staff.

For New/Small Starts (5309), DRCOG, in consultation with RTD and FTA, conservatively included new funding only for the two projects — FasTracks Southeast Rail Extension (\$92 million) and Colfax bus rapid transit (\$50 million) — that have either received or are actively pursuing Small Starts funding. The financial plan, which was prepared in 2014, also includes a portion (\$300 million) of previously awarded (but not yet appropriated in 2014) New Starts funds for the FasTracks Eagle component through its 2016 opening. Otherwise, no additional New Starts funding was assumed.

c. Local Revenues

Local government roadway revenue forecasts were derived from receipts and expenditure reports provided to CDOT annually. The 1984 through 2012 revenues were converted into 2015 dollars per person by revenue group — local government general funds, local government special assessments, Colorado Highway Users Tax Fund (HUTF), developer/private and other sources. The final results were adjusted to 2015 constant dollars and to year of expenditure dollars.

ii. System Category Needs/Costs and Allocations

a. Needs and Costs

Total Metro Vision transportation needs and costs identified in the 2035 MVRTP for all expenditure categories were reconsidered, validated and updated. Costs for most system categories were updated directly from the 2035 MVRTP using the growth factor approach. Costs for some categories were updated using customized information, as available. For example, to estimate roadway maintenance, resurfacing and reconstruction costs, DRCOG surveyed every local government and CDOT to understand current pavement conditions, develop an average cost per lane mile, estimate an expenditure schedule to maintain current conditions through

2040 and estimate total roadway maintenance and reconstruction cost needs for the 2040 FC RTP.

Updated transit system category costs incorporated several factors, including the region's anticipated growth in total population and older adults by 2040 (especially the 75-plus population) and increasing need and costs to provide fixed route, complementary ADA and other specialized transit services (such as door-to-door and door-through-door). The Coordinated Transit Plan (Appendix 6) describes these and other factors affecting the full spectrum of transit services in greater detail. The updated transit system category costs and expenditures also correspond to the increase in transit vehicles and service hours shown in Table 6.1 reflecting RTD's asset management and vehicle inventory processes and RTD's estimates of rolling stock needs, revenue service miles and state of good repair objectives.

b. Allocations

In broad terms, the allocation process estimated how to conceptually proportion revenue amounts from each funding source to transportation system category types at a long-range planning level of detail. As illustrative examples, the allocation process addressed such questions as "What proportion of CDOT's Regional Priority Program revenues will be spent on roadway operations versus additional general purpose and managed lane capacity?" and "Which funding sources will be spent through 2040 on maintaining other transit services?" (primarily FTA 5310/5311, CDOT FASTER transit and local revenues). By considering how each revenue source would be conceptually proportioned by category type as well as how the funding for each category type would be proportioned among revenue sources, DRCOG — in collaboration with CDOT, RTD and other stakeholders — developed a 2040 FC RTP financial plan that is comprehensive but not overly prescriptive given its 25-year conceptual level of detail.

DRCOG staff worked with CDOT staff and RTD staff, the DRCOG Board and committees to determine the allocation for operation/maintenance and capacity/reconstruction for each funding source, shown in Table 3 previously. This effort was complex, as many funding sources are restricted to specific uses, and others can be flexed between uses and modes. An additional consideration was most widening and capacity projects also include reconstruction (as well as transit, bicycle and pedestrian) elements.

As shown in Table 5.3, this collaborative transportation planning process resulted in approximately 63 percent of DRCOG's share of CDOT program distribution revenues allocated to multimodal system operations, maintenance and preservation through 2040. About 37 percent was allocated to major multimodal capacity projects, which include reconstruction elements. The final allocation was based on historical trends and striking a balance between maintaining the multimodal transportation system in good condition while still funding selected high-priority capacity projects. Additionally, CDOT made conceptual funding source assumptions for certain projects that had to be factored into the overall allocation analysis. Finally, the allocation process, and the results shown in Table 5.3, are multimodal in nature and reflect all program distribution revenue sources — roadways, transit, bicycle and pedestrian, and other multimodal transportation system components.

Transit allocations were based on updated RTD estimates and staff guidance based on the state SB 208 process and RTD's Strategic Budget Plan and FasTracks financial analysis efforts. Most transit-related revenue sources are prescribed for specific uses, such as the FasTracks sales and use tax. Finally, local funds were allocated to preservation and maintenance, Regional Roadway System (RRS) roadways, non-RRS roadways and other activities based on information obtained from local

governments, special districts and authorities.

Once the allocations between operations and maintenance, and capacity and reconstruction were determined for each funding source, each funding source was proportioned by system category. These allocations were consistent with the 2035 MVRTP and considered new CDOT and RTD guidance, funding eligibility and restrictions, how other sources were funding specific categories, and other factors. This process was not an exercise in quantitative precision — it is impossible to predict with absolute certainty how 16 funding programs will be allocated to 30 different transportation system funding categories for a 25-year long-range plan. Rather, the allocation process strived to reasonably balance multimodal transportation system funding needs and optimize the limited funding anticipated to be available through 2040.

iii. Regionally Significant Projects Evaluation and Prioritization

DRCOG evaluated regionally significant rapid transit and roadway capacity projects for inclusion in the 2040 FC RTP based on processes and methodologies consistent with prior DRCOG Regional Transportation Plans. To be eligible for future federal or state funding, regionally significant projects must be identified as accurately as possible in the 2040 FC RTP. Regionally significant projects can be conceptual in nature and may change after environmental impact statement or other studies define specific details, such as exact alignment, cross-section, cost, construction schedule or operational details. Such studies are done in accordance with the National Environmental Policy Act (NEPA) and must be undertaken for all federally funded projects to evaluate the environmental impacts of projects and determine mitigation actions. Smaller-scale projects funded in the TIP must be consistent with eligibility standards for the applicable project type category.

a. Roadway and Interchange Capacity Projects

This section summarizes the evaluation and selection of regionally significant roadway capacity projects whose sponsors desire competitive (flexible) federal and state funding (known as regional funding in the FC RTP). Appendix 1 contains a more detailed description of the roadway scoring and evaluation process. The first step was to update the definition of the Regional Roadway System (RRS). Working through the Transportation Advisory Committee (TAC) and Regional Transportation Committee (RTC), DRCOG staff solicited additions, deletions or changes to the RRS from DRCOG's local governments and CDOT, resulting in minor additions and deletions to the RRS.

Once the RRS was updated, DRCOG staff solicited candidate roadway and interchange projects located on the RRS. All candidate projects were scored and priority-ranked, including regionally funded projects remaining from the 2035 MVRTP. Regional funds expected through 2040 (described in Section C below) were allocated to the higher-ranking projects until funds were depleted. This process used evaluation criteria addressing congestion, safety, freight, transit and other performance factors to score and rank each candidate project. See Appendix 1 for the full list of the project scoring and evaluation criteria and the specific methodology used.

DRCOG conducted this process for candidate roadway and interchange projects seeking regional funding controlled by DRCOG (primarily STP-Metro and some CMAQ). CDOT coordinated with DRCOG to identify a list of fiscally constrained regionally significant roadway and interchange capacity projects to fund with CDOT-controlled revenues. DRCOG and CDOT coordinated the two project lists to ensure a candidate project did not have to compete twice and was considered by either DRCOG or CDOT. CDOT's fiscally constrained projects are shown together with DRCOG-selected projects in Chapter 6 and Appendix 4.

As part of this process, cost estimates for regionally significant roadway and interchange projects in the 2035 MVRTP were reviewed in detail. All costs were initially updated from a 2008 constant dollar basis to a 2015 constant dollar basis for the 2040 FCRTTP using a growth factor of 27 percent. This was based on analysis of the Colorado Construction Cost Index provided by CDOT (now known as the Fisher Ideal Index). If a project submitter had its own updated cost estimate for a specific project, it was reviewed and then used directly. DRCOG staff reviewed all project cost estimates and also incorporated recent corridor, NEPA, Planning and Environmental Linkage and other studies to help update costs for specific projects.

For the competitively evaluated candidate roadway and interchange projects (regionally significant projects seeking federal and/or state funding), project sponsors were required to include an updated cost estimate. CDOT also provided updated cost estimates for projects it selected to fund with revenues it controls.

The other category of fiscally constrained regionally significant roadway capacity projects are those funded entirely with 100 percent locally derived funding sources. These are typically, but not exclusively, projects funded by local governments through funding sources they control, such as general fund revenues, developer contributions or other revenue sources.

DRCOG worked with all local governments and toll highway authorities to identify projects they currently commit to completing by 2040. Because many of these projects were eligible to compete for regional funding, those not selected for regional funding were either retained or deleted from the list as desired by project submitters.

b. Rapid Transit Projects

RTD provided the most recent version of the FasTracks financial plan project components expected to be completed by 2040. Although the entire FasTracks program will be funded through a dedicated sales and use tax, some components are currently anticipated to be constructed after 2040. RTD annually updates the FasTracks financial plan through its Annual Program Evaluation (APE) process. DRCOG reviewed the current APE as part of its state-required FasTracks review responsibilities and incorporated its cost assumptions in the 2040 FCRTTP. This fiscally constrained portion of FasTracks is shown in Chapter 6.

As part of the roadway project scoring and evaluation process described previously, RTD (with Boulder County) and the City and County of Denver each submitted candidate bus rapid transit (BRT) projects for potential regional funding. These two BRT projects were evaluated with the candidate roadway capacity projects because they are regionally significant from an air quality perspective, as they add (state Highway 119 BRT) or remove (Colfax BRT) roadway capacity as part of each project. Both projects scored highly in the project evaluation process and were selected by the DRCOG Board as fiscally constrained projects for regional funding in the 2040 FCRTTP. Project submitters for both BRT projects provided cost estimates as part of the regionally significant project evaluation process.

C. Summary Fiscally Constrained Revenue and Expenditure Results

This section describes the results of the financial plan preparation process in terms of available revenues by funding source and specific expenditures to transportation system categories. As shown in Table 5.2, the DRCOG region will have a total of about \$106.5 billion in federal, state, local and other revenues through 2040 to fund the 2040 FCRTTP.

Table 5.4 Metro Vision Transportation System Unconstrained Costs and 2040 Fiscally Constrained RTP Expenditures (2016 to 2040)

SYSTEM CATEGORY	(FY 15\$ MILLIONS)	
	TOTAL METRO VISION UNCONSTRAINED COSTS	2040 FISCALLY CONSTRAINED EXPENDITURES
1. Preserve and Maintain Existing System		
A. Regional Roadway System		
Day-to-Day Maintenance, Snow and Ice, etc.	\$11,250	\$8,580
Resurfacing and Reconstruction	\$4,700	\$3,490
Bridge (Specific Projects and Pool)	\$3,400	\$970
Toll Operations	\$700	\$520
B. Off-Street Bicycle/Pedestrian Facility Maintenance	\$44	\$40
C. Non-Regional Roadway System		
Non-Regional Roadways	\$17,300	\$16,970
Non-Regional Bridges	\$1,000	\$770
Preserve and Maintain System Subtotal:	\$38,400	\$31,340
2. Invest in Base Transit Services		
RTD System Facilities and Fleet	\$2,430	\$2,430
Base RTD Bus and Rail Service	\$13,400	\$13,400
Base RTD Complementary Americans with Disabilities Act Service	\$2,980	\$2,980
Maintain Other Transit Services	\$1,950	\$780
Invest in Base Transit Services Subtotal:	\$20,800	\$19,590
3. Management, Operations and Air Quality		
Roadway Operations, Multimodal, Railroad Grade Separations	\$1,180	\$410
Transportation Management (Capital), Intelligent Transportation Systems, Signal Systems	\$440	\$220
Transportation Management (Operate and Maintain), Intelligent Transportation Systems, Signal Systems	\$4,000	\$2,080
Safety-Specific Improvements	\$460	\$220
DRCOG Way to Go Program and Regional Transportation Demand Management	\$170	\$110
Air Quality Conformity Programs and Purchases	\$120	\$60
Management, Operations and Air Quality Subtotal:	\$6,400	\$3,100
4. New Capacity on Regional System and Other Facilities		
A. Regional Roadway System		
New/Additional Capacity (General Purpose Lanes and Interchanges)	\$16,170	\$4,090
Bus, Toll and Managed Lanes	\$3,290	\$2,690

SYSTEM CATEGORY	(FY 15\$ MILLIONS)	
	TOTAL METRO VISION UNCONSTRAINED COSTS	2040 FISCALLY CONSTRAINED EXPENDITURES
4. New Capacity on Regional System and Other Facilities (continued)		
B. Regional Transit System		
Construct FasTracks through 2040 (Rail and Bus)	\$7,190	\$5,590
Other Rapid Transit (Tier 1 BRT)	\$140	\$140
Other Rapid Transit (Tier 2)	\$800	\$0
State Intercity Corridors (Tier 2)	\$14,900	\$0
Other Conceptual Rapid Transit (Tier 3)	\$4,500	\$0
C. Other Capacity		
New Bicycle/Pedestrian Facilities	\$1,260	\$530
Eastern Freight Railroad Bypass	\$300	\$0
New Minor Arterials and Collectors	\$10,500	\$10,500
New Local (Developer) Streets	\$22,900	\$22,900
Roadway and Rapid Transit Capacity Subtotal:	\$82,000	\$46,440
5. Debt Service (Tollways and RTD)		
RTD FasTracks Debt Service	\$3,820	\$3,820
Toll Highway Debt Service	\$2,260	\$2,260
Debt Service Subtotal:	\$6,100	\$6,080
GRAND TOTAL:	\$153,700	\$106,550

i. Needs and Expenditure Allocations

Based on the financial analysis, Table 5.4 displays the estimated unconstrained (vision) costs for categories of transportation activities and the fiscally constrained expenditures through 2040 in fiscal year 2015 dollars.

The unconstrained vision costs are shown for illustrative purposes only. It must be noted that the revenues expected to be available for operations, maintenance and preservation will enable the continued provision of an adequate and operational transportation system. The additional needs identified in Table 5.4 would bring the system up to an even higher-quality desired standard. A significant proportion of new capacity expenditures will also be used for reconstruction and rehabilitation. Finally, the unconstrained vision costs also include very long-term concepts (such as intercity rail) that the region is exploring now given the long lead time to fund and implement.

The unfunded vision projects are described in Chapter 6.

Table 5.5 displays the fiscally constrained expenditure information in year of expenditure dollars. The following generalized categories are shown in both tables:

- preservation and maintenance of the regional roadway system, off-street bicycle and pedestrian system, and the local street system;
- provision of base transit services;
- future management, operational and air quality projects and services;
- capital improvements and expansion of the regional roadway, transit, bicycle, local street and freight railroad systems; and
- debt service payments.

Figure 5.2 2040 Unconstrained Costs and Fiscally Constrained Revenues by Expense Category



These five categories represent the surface transportation system. In most categories of expenditures, only a portion of total costs can be covered by fiscally constrained revenues. Figure 5.2 compares total envisioned system costs and fiscally constrained revenues from all sources by major expense category.

a. Preservation and Maintenance of the Roadway System and the Base Transit System

Almost half (48 percent) of total transportation expenditures will be used for preservation, maintenance and operation of the roadway system and base transit system. Table 5.5 details the expenditure of \$51 billion for these activities. Of that amount, about \$13.6 billion is estimated to be available to preserve and maintain the Regional Roadway System (RRS). About \$17.7 billion will be available to preserve and maintain non-RRS roads and bridges. RTD and other transit operators have identified about \$19.6 billion to provide base transit service.

b. Management and Operation of the Roadway System

About \$3.1 billion will be used for operational, safety and management activities to enable more

efficient travel on the transportation system. In light of limited revenues that will be available for system expansion, management and operational strategies will be critical to meet travel mobility needs. Technological innovation will continue to play a critical role in helping the region manage and operate its multimodal transportation system using available resources.

c. Transportation Demand Management

About two-thirds of the desired costs for providing transportation demand management services will be funded in the 2040 FC RTP. Extensive services will be provided with the \$110 million allotted to future programs run by DRCOG, transportation management organizations, local governments and other entities. With limited funding available for expansion of the roadway system, TDM services will be critical to reducing motor vehicle travel demand and offering mobility options.

d. Fiscally Constrained Projects

The fiscally constrained regionally significant projects are shown in Chapter 6 and listed in Appendix 4, which has four components:

Table 5.5 Metro Vision Transportation System Unconstrained Costs and 2040
Fiscally Constrained RTP Expenditures (2016 to 2040)

SYSTEM CATEGORY		FISCALLY CONSTRAINED EXPENDITURES (YOES MILLIONS)
1. Preserve and Maintain Existing System		
A.	Regional Roadway System	
	Day-to-Day Maintenance, Snow and Ice, etc.	\$11,420
	Resurfacing and Reconstruction	\$4,650
	Bridge (Specific Projects and Pool)	\$1,300
	Toll Operations	\$690
B.	Off-Street Bicycle/Pedestrian Facility Maintenance	\$50
C.	Non-Regional Roadway System	
	Non-Regional Roadways	\$22,600
	Non-Regional Bridges	\$1,020
Preserve and Maintain System Subtotal:		\$41,730
2. Invest in Base Transit Services		
	RTD System Facilities and Fleet	\$3,240
	Base RTD Bus and Rail Service	\$17,840
	Base RTD Complementary Americans with Disabilities Act Service	\$3,970
	Maintain Other Transit Services	\$1,040
Invest in Base Transit Services Subtotal:		\$26,090
3. Management, Operations and Air Quality		
	Roadway Operations, Multimodal, Railroad Grade Separations	\$540
	Transportation Management (Capital), Intelligent Transportation Systems, Signal Systems	\$290
	Transportation Management (Operate and Maintain), Intelligent Transportation Systems, Signal Systems	\$2,780
	Safety-Specific Improvements	\$300
	DRCOG Way to Go Program and Regional Transportation Demand Management	\$140
	Air Quality Conformity Programs and Purchases	\$80
Management, Operations and Air Quality Subtotal:		\$4,130
4. New Capacity on Regional System and Other Facilities		
A.	Regional Roadway System	
	New/Additional Capacity (General Purpose Lanes and Interchanges)	\$5,450
	Bus, Toll and Managed Lanes	\$3,580
B.	Regional Transit System	
	Complete FasTracks (Rail and Bus)	\$7,450
	Other Rapid Transit (Tier 1 BRT)	\$190

SYSTEM CATEGORY		FISCALLY CONSTRAINED EXPENDITURES (YOEIS MILLIONS)
	Other Rapid Transit (Tier 2)	\$0
	State Intercity Corridors (Tier 2)	\$0
	Other Conceptual Rapid Transit (Tier 3)	\$0
C.	Other Capacity	
	New Bicycle/Pedestrian Facilities	\$700
	Eastern Freight Railroad Bypass and Union Pacific Improvements	\$0
	New Minor Arterials and Collectors	\$13,970
	New Local (Developer) Streets	\$30,500
	Roadway and Rapid Transit Capacity Subtotal:	\$61,840
5. Debt Service (Tollways and RTD)		
	RTD FasTracks Debt Service	\$5,090
	Toll Highway Debt Service	\$3,010
	Debt Service Subtotal:	\$8,100
GRAND TOTAL:		\$141,890

- Roadway capacity projects funded with DRCOG-controlled funds;
- Roadway capacity projects funded with CDOT-controlled funds;
- Roadway capacity projects funded with 100 percent locally derived funds; and
- Regional transit projects (FasTracks components and other regional transit projects).

It is a federal requirement for DRCOG to demonstrate fiscal constraint for regionally significant projects not just in current year dollars but also in year of expenditure dollars. To do so for regionally significant roadway capacity projects, DRCOG conducted an analysis to inflate project costs and revenues and then compare them.

First, project costs as shown in Appendix 4 were sorted and summed by air quality conformity staging period. DRCOG, local governments, CDOT and RTD identified, for modeling purposes, best estimates as to which projects in the 2040 FC RTP would be completed by the end of each of the interim staging years. Consideration

was given to funding source, project schedule, status of studies, project scores, reconstruction needs, sponsor priority and availability of local match.

Second, the total project costs by staging period were inflated on an annual compound basis by an inflation factor of 2.80 percent. This inflation factor was estimated by reviewing historical Colorado Construction Cost Index (CCI) and Consumer Price Index (CPI) rates. More specifically, 3-, 5-, 10- and 15-year CPI growth rates were reviewed for the [Denver metropolitan area for the period 1998-2013](#). These rates ranged from 2.8 percent (3-year) and 1.94 (5-year) to 2.4 (15-year). CCI data were reviewed from 1987-2013. (After 2011, the data were rebased to first-quarter 2012 and, from that point, were calculated using the Fisher Ideal Index.) The CCI rates varied significantly depending on time period. Based on the analysis of CPI and CCI, and to be conservative, a project cost inflation factor of 2.80 percent was chosen.

Third, the compounded inflated project cost for the mid-year of each staging period was compared

with the constant year (2015) cost to derive percentage increases by staging period. While 2015-2019 is not an air quality staging period, the mid-year was chosen to represent the middle of each staging period on the planning assumption that approximately half the projects would be built before the middle year, and half after, within a staging period. The exact years for construction of projects are not known for a 25-year RTP due to the number of variables affecting funding and project development. A cost year at the beginning of the staging period would under-inflate average project costs for the entire staging period; a cost year at the end would over-inflate average project costs. Comparing constant costs with inflated (year of expenditure) costs resulted in the following percentage increases by staging period:

- 2015-2019: 6 percent (not an air quality staging period — see Chapter 6, Section I)
- 2020-2029: 21 percent
- 2030-2040: 69 percent

Finally, the total inflated cumulative cost was calculated and compared with inflated revenues for roadway capacity. Inflated revenues come from section 4A of Table 5.5 — new and additional capacity on the Regional Roadway System. The total 2040 inflated revenue amount is \$9.030 billion. The inflated project cost analysis described above resulted in a total 2040 inflated cost of \$9.029 billion, demonstrating fiscal constraint on a year of expenditure basis. Inflated revenues and costs were also compared by staging period to ensure fiscal constraint. This analysis is complex, as the first staging period includes two significant CDOT projects, Interstate 70 Central and Interstate 25 South managed lanes, that together cost \$1.4 billion in fiscal year 2015 dollars, about one-fourth the cumulative cost for regionally significant projects in the first staging period. However both projects, and several others, are in the DRCOG TIP and

CDOT Statewide Transportation Improvement Program to demonstrate fiscal constraint. This situation results in an up-fronting of both costs and revenues in the first staging period. Accounting for this circumstance, a comparison of inflated (year of expenditure) costs and revenues indicates fiscal constraint over the 2040 FC RTP period.

For regionally significant rapid transit projects, there is not a significant difference between constant year and year of expenditure costs for the fiscally constrained FasTracks components. Of the other two rapid transit projects, the Colfax BRT project is in an ongoing intensive environmental assessment process and project stakeholders are working with FTA to enter the New/Small Starts process. The state Highway 119 BRT project started the NEPA process in 2017 to, in part, develop a more refined and specific cost estimate for future potential amendment in the 2040 MVRTP.

This staging process is neither a guarantee nor a prohibition of funding in a certain staging period; rather, it reflects current best estimates. Actual project funding is determined through the TIP process (within the TMA) and the STIP process in the non-TMA portion of the region. Staging adjustments necessitated by TIP/STIP funding or schedule changes will be reflected in future MVRTP amendments and new air quality conformity determinations as needed.

e. Other Funding Considerations

In addition to the revenue, need, cost, allocation and expenditure components described in this document, other considerations informing the 2040 FC RTP's financial plan include:

- Fiscally constrained 2040 roadway system improvements in Figure 10 indicated to be funded with 100 percent locally derived revenues are not eligible for FHWA formula funds.

- Nearly all federal TAP funds expected to be available will be used for bicycle and pedestrian improvements. Some TAP funds will be used for other eligible improvements. Additional bicycle and pedestrian improvements are expected to be part of roadway capacity projects, and STP-Metro and CMAQ revenues will also be used to fund independent bicycle and pedestrian projects.
- Human service transit will be funded through RTD, FTA Section 5310, local government contributions and money generated by private carriers.

f. Innovations and an Eye Toward the Future

The DRCOG region has been a national leader in using innovative funding approaches to accelerate investment in its multimodal transportation system. RTD's Eagle public-private partnership (P3) was the nation's first P3 to implement multiple rapid transit corridors. CDOT used a P3 approach to accelerate managed lanes (high occupancy toll and bus rapid transit) investment on the U.S. Route 36 corridor. The state Transportation Commission adopted a high occupancy vehicle (HOV) policy in 2015 that assumes toll-free HOV for three or more vehicle occupants on all tolled HOV lanes on the state highway system. CDOT also has a policy directive to consider managed lanes for all new capacity projects on the state highway system. Across the state, examples abound of existing revenues being leveraged and optimized — and new revenues being created — to address transportation funding shortfalls and project backlogs. In future Regional Transportation Plan updates, DRCOG will further explore the potential benefits of these efforts on the fiscally constrained financial plan.

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6. 2040 FISCALLY CONSTRAINED REGIONAL TRANSPORTATION PLAN

Based on the financial plan described in Chapter 5 and the project evaluation and selection process described in Chapter 5 and Appendix 1, this chapter presents the 2040 Fiscally Constrained Regional Transportation Plan (2040 FC RTP).

As described previously, the 2040 FC RTP classifies transportation expenditures into two broad areas: system categories, and regionally significant projects for air quality conformity purposes.

System category expenditures are allocations to categories that are not project specific in the 2040 FC RTP, but rather address broad areas of need. Non-regionally significant projects within the system categories are not identified in the 2040 FC RTP. Rather, estimated expenditure amounts are listed by project type system category, such as safety, maintenance, etc., through 2040 as shown in Chapter 5.

In contrast, regionally significant projects are major roadway, interchange, and rapid transit projects that considerably change the capacity of the transportation network. Per federal requirements, regionally significant projects must be listed individually in the RTP by air quality staging completion period (2020-2029 or 2030-2040). The transportation networks containing these projects must be modeled to demonstrate compliance with federal air quality conformity requirements.

Regionally significant projects are listed in Appendix 4

and illustrated in Appendix 3 by funding source and air quality staging period. The 2040 fiscally constrained roadway network is shown in Figure 6.1, while Figure 6.2 shows the 2040 fiscally constrained rapid transit network. The 2040 fiscally constrained roadway network includes an expanded network of roadway- and transit-focused managed lane facilities; these are illustrated in Figure 6.3.

The key fiscally constrained regionally significant projects are discussed below by mode.

Figure 6.2 Fiscally Constrained Rapid Transit System Guideway Facilities and Stations

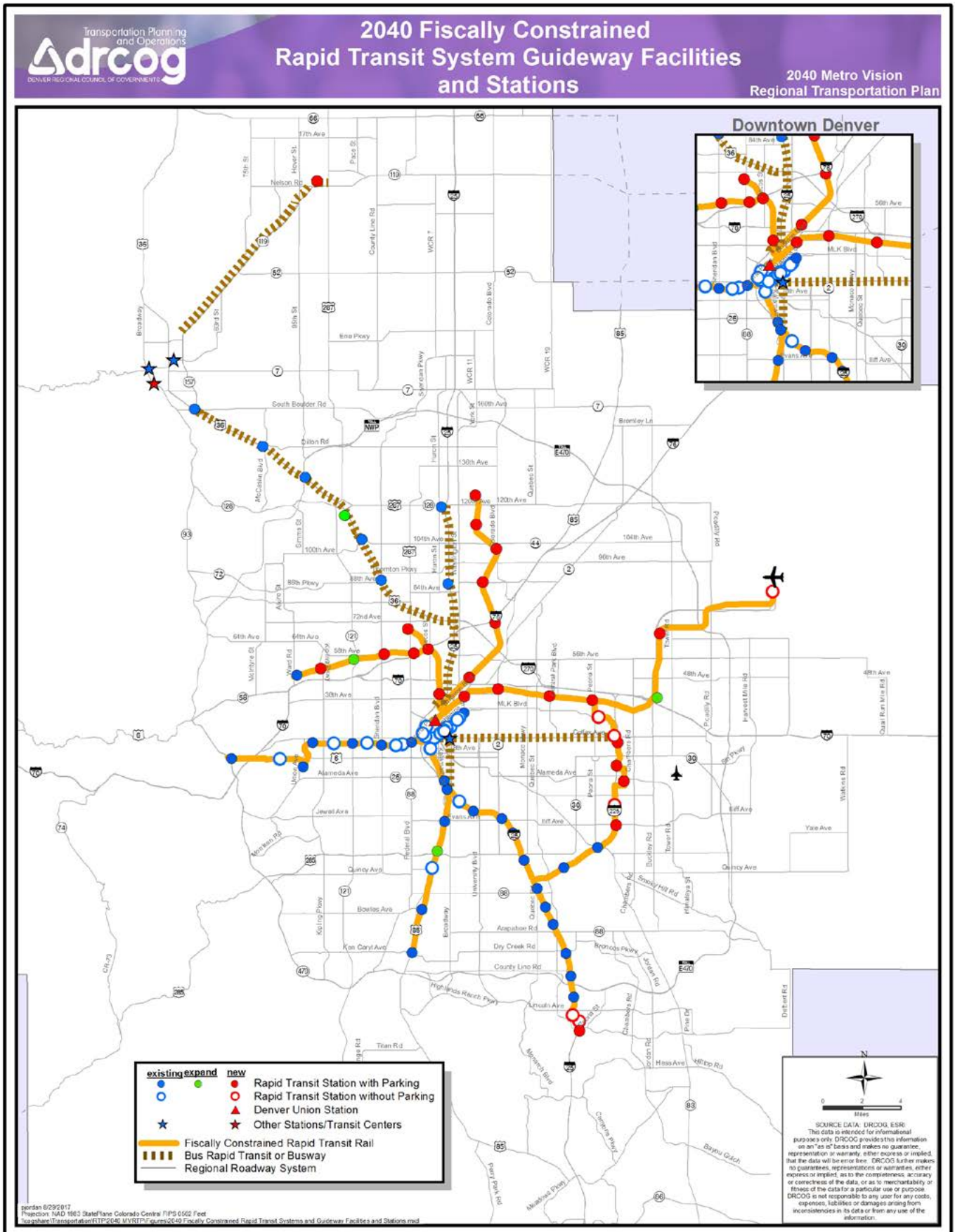
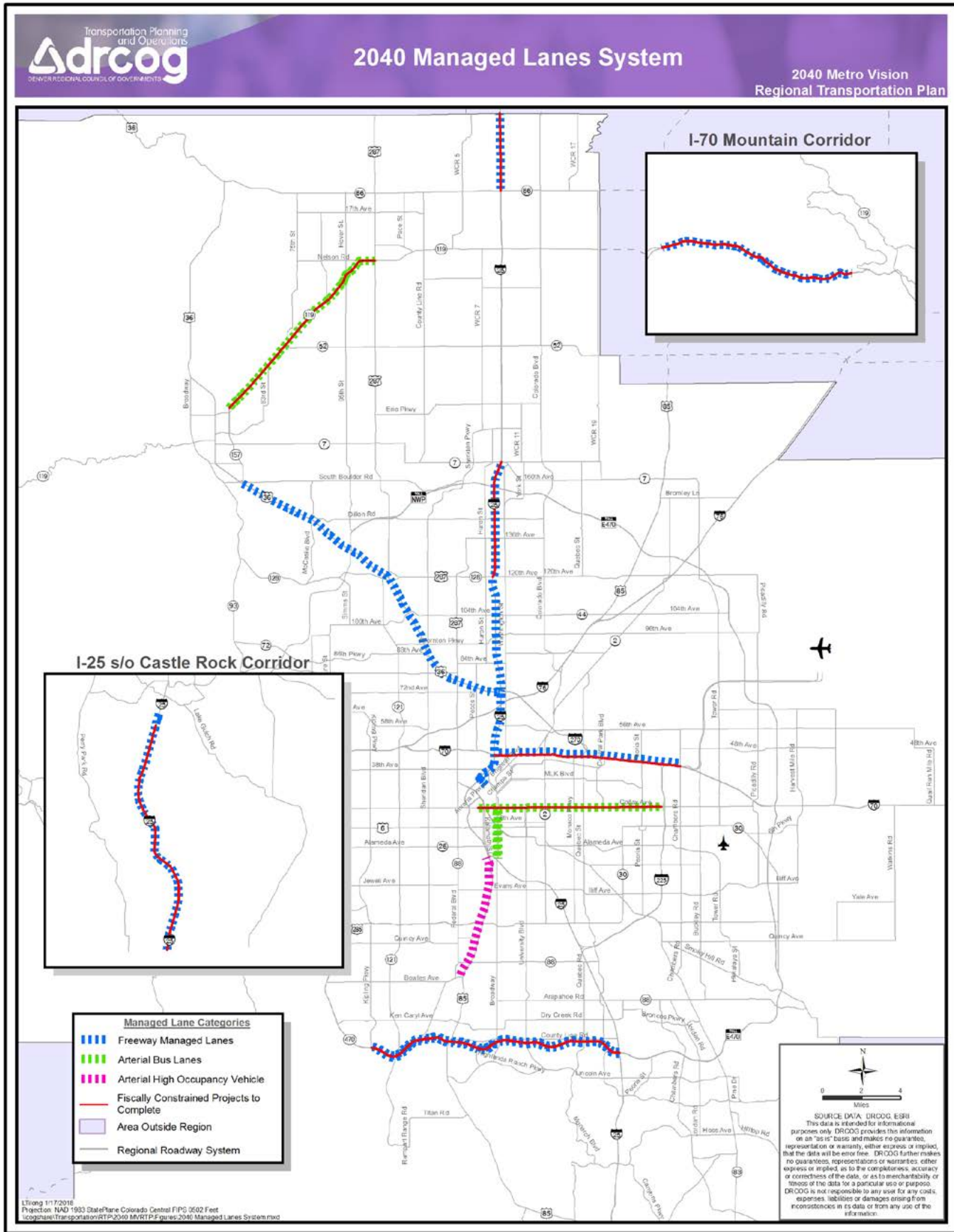


Figure 6.3 2040 Managed Lanes System



A. Freeways, Interchanges, and Roadways

Freeways/Tollways:

- Interstate 25 managed toll lanes from DRCOG south boundary (El Paso County) to Castle Rock
- Interstate 25 widening from Alameda Avenue to Walnut Street
- I-25 widening from U.S. 36 to state Highway 7
- I-25 widening from state Highway 66 to Weld County Road 38
- Interstate 270 widening from I-25 to Interstate 70
- I-70 peak period shoulder lanes from Empire Junction to Twin Tunnels (east of Idaho Springs)
- I-70 reconstruction from Brighton Boulevard to Chambers Road
- Peña Boulevard widening from I-70 to E-470
- C-470 managed toll lanes from Kipling Parkway to I-25
- E-470 widening from I-25 south to I-25 north
- Jefferson Parkway from state Highway 93 to state Highway 128

New Freeway/Tollway Interchanges:

- I-25/Crystal Valley
- I-25/Castle Rock Parkway (completed in 2016)
- I-70/Harvest Mile Road
- E-470 at 48th Avenue, 88th Avenue, 112th Avenue, and Potomac Street
- Jefferson Parkway at state Highway 72, Candelas Parkway, and Indiana Street

New Movements at Freeway Interchanges:

- I-70/Picadilly Road/Colfax Avenue

- U.S. Route 36/Wadsworth Boulevard/120th Avenue

Major Improvements of Freeway Interchanges:

- I-25 at Lincoln Avenue, Arapahoe Road, Alameda Avenue/Santa Fe Drive, and U.S. Route 6
- I-70 at 32nd Avenue
- U.S. Route 6 at Wadsworth Boulevard
- U.S. Route 6 at Federal Boulevard/I-25 (completed 2016)
- U.S. Route 36 at Sheridan Boulevard
- I-225 at Yosemite Street

Elimination of Freeway Interchanges:

- I-70 reconstruction (will eliminate some interchange movements between Brighton Boulevard and Colorado Boulevard)
- U.S. Route 6/Bryant (completed 2016)

Major Regional Arterial Roadways:

- 120th Avenue from east of U.S. Route 36 to U.S. Route 287 new roadway
- Arapahoe Road (state Highway 88) operational improvements from I-25 to Potomac Street
- U.S. Route 85 widening from Meadows Parkway to Louviers Avenue and from Titan Road to County Line Road
- Wadsworth Boulevard widening from 36th Avenue to 46th Avenue and from 92nd Avenue to state Highway 128
- Parker Road widening (state Highway 83) from Quincy Avenue to Hampden Avenue
- U.S. Route 285 widening from Pine Junction to Richmond Hill

Major Regional Arterial Grade-Separated Intersections:

- Longmont Diagonal (state Highway 119)/Mineral Road (state Highway 52)

- U.S. Route 85/Castle Rock Parkway (completed 2016)
- U.S. Route 85/104th Avenue and 120th Avenue
- U.S. Route 285/Pine Valley Road and Kings Valley Drive
- U.S. Route 6/ 19th Street (completed 2017)

Principal Arterials

About 850 lane miles of new principal arterial roadways are planned for construction as part of the 2040 FC RTP. Improvements are concentrated within the DRCOG urban growth boundary/area (UGB/A) except for arterials that connect noncontiguous UGB/A sections, such as freestanding communities. Improvements to principal arterial roadways are detailed in Appendix 4.

System Quality (Reconstruction)

Practically all of the regionally funded roadway improvements shown in Figure 6.1 include reconstruction of the current facility and structures in the estimated cost. Exceptions are entirely new roadways and interchanges. Some of the projects with notable reconstruction aspects include:

- I-70 widening from I-25 to Chambers Road
- I-270 widening from I-25 to I-70
- C-470 widening from Kipling Parkway to I-25
- U.S. Route 285 widening from Pine Junction to Richmond Hill
- U.S. Route 85 widening from Meadows Parkway to Louviers Avenue
- Major improvements of freeway interchanges such as I-25/Alameda Avenue/Santa Fe Drive/U.S. Route 6, I-70/Vasquez Boulevard, U.S. Route 6/Wadsworth Boulevard, U.S. Route 6/Federal Boulevard, and U.S. Route 36/Sheridan Boulevard.

Other Roadway Improvements

Many other improvements to the regional roadway

system are anticipated in the 2040 FC RTP but are not individually listed as regionally significant projects for air quality conformity modeling, nor have exact locations for such improvements been defined. Expenditures for these improvements are shown in Chapter 5, and are eligible for future Transportation Improvement Program funding from the following categories:

- Safety
- Operational, management and Intelligent Transportation Systems
- Reconstruction
- Bridges

B. Freight and Goods Movement

Freight concerns largely relate to mobility and access issues. Mobility issues pertain to smooth and reliable traffic conditions on the region's freeways, major regional and principal arterials, and at-grade crossings with freight railroad tracks. Access issues deal with road geometrics, bridge clearances and weight restrictions, and severe bottlenecks between the regional system roadways and major freight facilities. The following fiscally constrained roadway improvements will especially benefit freight and goods movement:

- Adding managed toll lanes to I-25 south of Castle Rock
- Reconstruction of I-70 east of I-25
- Widening of I-270, I-25 north of U.S. Route 36 and north of state Highway 66
- Widening key arterials such as U.S. Route 85 north of Castle Rock, 56th Avenue, Sheridan Boulevard, and state Highway 7 east of I-25
- Widening of U.S. Route 36 and north I-25 (HOT/HOV lanes)
- Improvements to I-70 and U.S. Route 285 in the mountains

- Other improvements to the regional roadway network (widening, new interchanges, interchange reconstruction)
- Operational and reconstruction pool projects to be selected in future TIP documents
- Expansion of the intelligent transportation systems facilities and traffic management capabilities.

More detail is provided in the freight and goods movement component (Appendix 5).

C. Rapid Transit

The 2040 rapid transit system includes four primary types of service and vehicle technologies:

- **Light rail transit:** Electric-powered, lighter-weight vehicles, high-frequency service (for example, 5- to 15-minute peak headways [frequency]), and numerous stations (as close as 1-mile spacing)
- **Commuter rail:** Diesel- or electric-powered heavy vehicles, moderate-frequency service (20- to 30-minute peak headways), and limited stations (average 4-mile spacing)
- **Bus rapid transit and managed lanes:** Exclusive travelway within or parallel to a highway right-of-way, bus rapid transit or frequent bus service, may serve park-and-ride lots or specialized bus rapid transit stations. Managed lanes include high-occupancy vehicle lanes, high-occupancy toll lanes, and toll lanes with congestion pricing
- **Intercity rail:** Diesel-powered heavy vehicles, low-frequency service, longer-distance trips, and very few stations (located in selected communities)

The fiscally constrained rapid transit system contained in the 2040 FC RTP is depicted in Figure 6.2 and the improvements are listed in Appendix 4. Park-and-rides and station locations are listed in Appendix 2. The 2040 FC RTP also includes funding for the fixed-route bus network and the other components described below.

In April 2013, the West Rail Line (W Line) opened for service. In 2016, U.S. Route 36 BRT (Flatiron Flyer), the East Rail Line (University of Colorado A Line), and the first segment of Northwest Rail (B Line) opened for service. In 2017, the I-225 Rail Line (R Line) opened for service. Together, these FasTracks components represent a significant step toward the completion of the 2040 fiscally constrained rapid transit system. The 2040 fiscally constrained portion of FasTracks will build all or parts of six additional light rail, commuter rail, and bus rapid transit lines. FasTracks is funded in large part by a 0.4 percent sales and use tax. Although the entire FasTracks program is funded, some components are funded beyond the MVRTP's 2040 fiscal constraint horizon. Completing these remaining FasTracks components continues to be a priority for the Denver region.

Two non-FasTracks bus rapid transit (BRT) projects are included in the fiscally constrained rapid transit system. One project would provide new BRT service between Boulder and Longmont on state Highway 119. BRT is also planned for the Colfax corridor between the light rail stations serving the Auraria campus in Denver and the Anschutz campus in Aurora.

D. Fixed-Route Bus and Other Transit Service

RTD will expand its fixed-route public bus service within its boundary. Fixed-route service includes scheduled regional, express, and local routes. Overall bus service is anticipated to have a net increase of about 29 percent between 2015 and 2040, from 3.5 million to 5.2 million bus service hours. Key elements of the 2040 system include:

- Increasing the fixed route bus fleet (including spares) from 1,094 to 1,120;
- Adjusting many bus routes to serve as feeders to rapid transit stations;
- Significantly expanding suburb-to-suburb crosstown bus service;
- Adding new bus routes;

- Making physical and operational improvements to multimodal streets that will have high-frequency bus service;
- RTD facilitating expanded bus service through an integrated system of timed transfer points;
- RTD significantly expanding complementary Americans with Disabilities Act (ADA) service to help meet the needs created by the region's rapidly aging population, and
- Significantly expanding non-RTD transit services for seniors and individuals with disabilities as funding permits.

RTD provides federally-required complementary ADA paratransit service (Access-a-Ride) within a ¼-mile buffer of its fixed route transit system. RTD also provides Access-a-Cab to augment Access-a-Ride. In addition to RTD, there are several smaller transportation providers throughout the region that provide accessible transportation. Many of the services go beyond ADA requirements (curb-to-curb) and provide door-to-door and door-through-door services. Two key agencies providing these services are Seniors' Resource Center, located in Jefferson County, and Via Mobility Services in Boulder. Funding sources include, but are not limited to, the Older Americans Act, grants such as FTA 5310 Enhanced Mobility of Seniors and Individuals with Disabilities, and assistance from local governments. The 2040 MVRTP's transit coordinated plan (Coordinated Public Transit Human Services Transportation Plan) addresses these issues in much greater depth.

There are also some transportation services available for low-income individuals offered in areas where there are limited or no RTD services available. The focus is typically employment-related trips. Many of these services were previously funded through the Job Access and Reverse Commute program under FTA 5316 and are now funded through FTA 5307 (through RTD) and FTA 5311 (through the Colorado Department of Transportation [CDOT]).

Another type of transit service available in the Denver

region is intercity bus, such as Greyhound. These types of intercity bus services are funded in part by FTA 5311(f) through CDOT. CDOT also funds and operates a commuter bus service, Bustang, along I-25 (Fort Collins and Colorado Springs to Denver), and I-70 (mountain corridor to Denver).

Park-n-Ride Lots, Stations, and Transfer Points

RTD's Park-n-Ride lots provide thousands of patrons with access to transit service. They are an integral part of the rapid transit and bus systems. Several existing lots reach capacity early in the morning each weekday, prohibiting more commuters from using transit. Many new lots will be constructed by 2040 and several existing lots will be expanded (see Appendix 2). RTD's current and planned Park-n-Ride lots serve a variety of transit options, including rail, bus and stand-alone lots for carpoolers. By 2040 the following facilities will be available:

- More than 100 RTD Park-n-Ride lots (stand-alone and rail stations with parking);
- Six carpool lots (CDOT-operated), and
- Approximately 50,000 total parking spaces.

In addition to the Park-n-Ride transit stations, there are numerous existing and planned stations without parking (see Appendix 2). There are currently 21 rapid transit stations without parking. Five additional fiscally constrained stations without parking are included in the FasTracks program.

More than 10,000 bus stops will be located throughout the region to serve transit patrons. Several bus stops will be enhanced to become key timed-transfer points in the system. Timed-transfer points enable convenient bus-to-bus, bus-to-rail, and rail-to-bus transfers. Others will receive enhanced station-like design elements for passengers to allow BRT buses to load more quickly.

To improve efficiency, new systems will transmit information to variable message signs on roadways to inform drivers of space availability in key Park-n-Ride lots. Transit information kiosks will be provided at major

Park-n-Ride lots, transfer points, and BRT stops to provide riders with information regarding transit arrivals and departures.

E. Managed Lanes

Managed lane facilities, shown in Figure 6.3, make up another component of the fiscally constrained rapid transit and roadway networks. As of 2017, there are approximately 51 miles of managed lanes which will increase to 145 miles by 2040. There are multiple types of managed lane facilities throughout the region that can be classified into the following three general categories shown in Figure 6.3:

- Freeway managed lanes adjacent to general purpose lanes: This category includes managed lanes on I-25 north of downtown Denver and south of Castle Rock, U.S. Route 36, I-70 (mountains and east of downtown Denver), and C-470.
- Arterial bus lanes: This category includes bus lanes in several design configurations that – when operating – are only for buses (and right-turning vehicles at intersections). These facilities are for future BRT service on Colfax Avenue and state Highway 119, and existing bus lanes on Broadway and Lincoln Street in Denver. RTD currently operates BRT service (Flatiron Flyer) on I-25 North and U.S. Route 36. Additionally, buses are allowed on every managed lane facility in the region.
- Arterial HOV: This category includes only one facility – along South Santa Fe Drive from I-25 to Bowles Avenue. Unlike the region’s other auto-focused managed lane facilities, there is no toll component. As of Jan. 1, 2017, it is the only HOV facility with an eligibility threshold of two or more occupants instead of three or more occupants for the region’s other managed lanes.

Finally, it should be noted that the region’s toll roads are not considered managed lane facilities as currently operated for two reasons. First, managed lane facilities offer travelers the choice to use free general purpose lanes

or choose to carpool and/or pay a toll to use the managed lane facility. Toll roads do not offer this choice. Second, managed lanes have occupancy, time-of-day, congestion levels or other criteria governing their use. Toll roads that charge a fixed toll to every traveler regardless of these criteria are not managed lanes. That said, toll roads are an important component of the region’s transportation system.

F. Other Modes, Services and Facilities

As described in Chapter 5 and summarized in this chapter, the 2040 FC RTP funds a comprehensive range of projects, programs, and services through allocations to project type system categories that are not project specific, but rather address broad areas of need. These system categories include everything from local bus service, bicycle and pedestrian projects, TDM activities and bridges to system operations and preservation and maintenance, local streets, safety, debt service, and other categories. Specific projects in these various system categories are developed by project sponsors when they apply for funding from DRCOG’s Transportation Improvement Program.

G. Vision (Unfunded) Projects

Vision projects are by definition not funded within the 2040 Fiscally Constrained RTP. Accordingly, they are not included within — or considered part of — the 2040 MV RTP. That said, they are useful to help define how the 2040 fiscally constrained transportation system was developed from a project perspective (Chapter 5 and Appendix 1), and, given available revenues, from a funding perspective (Chapter 5).

The vision projects combined with the fiscally constrained system are together known as the Metro Vision transportation system. This is the multimodal system that represents the region’s desired state by 2040. The 2040 FC RTP represents the subset of the Metro Vision transportation system that can be funded and implemented by 2040 given anticipated available revenues. The remainder are unfunded projects that are needed and desired within the region.

As a basis for updating the fiscally constrained system, the first step in developing the 2040 FC RTP was to update the inventory of vision projects. The vision projects inventory associated with the 2035 MVRTP was used as the starting point for DRCOG to solicit vision project additions, deletions, or modifications from local governments, RTD, and CDOT in 2013. DRCOG staff also worked with these and other stakeholders to update the vision projects inventory based on various project, corridor, and other transportation studies. Examples include the Interregional Connectivity Study (ICS) and Advanced Guideway Study (AGS) conducted by CDOT to study the feasibility and conceptual alignments of intercity rail through the Denver region.

Vision projects are defined by project sponsors and are not evaluated or modeled by DRCOG (except as candidate projects for funding in the 2040 FC RTP). Project sponsors identify vision projects based on their own comprehensive, corridor, project, or other plans and studies. Such projects represent community or agency needs and priorities. However, some vision projects also include very long term concepts (such as AGS/ICS) that may not represent an immediate need so much as a future vision that the region is exploring and working toward over time. Other vision projects may not be needed today, but will be necessary by the time they can be funded and implemented (such as a project to accommodate forecast growth).

Once the vision projects inventory was updated, DRCOG staff worked with stakeholders to update or develop planning level project costs. Roadway project costs were updated or developed consistent with the methodologies described in Chapter 5. Transit project costs were updated or developed primarily from studies, such as the ICS and AGS, RTD's Northwest Area Mobility Study, and others. FasTracks costs for components beyond 2040 were obtained from RTD. Other transit vision project costs were updated or developed on a per mile unit cost basis at a conceptual

planning level by considering recent light rail, BRT, and other transit technology unit costs in the Denver region and other comparable regions around the country.

Finally, based on the candidate project evaluation and selection process described in Chapter 5 and Appendix 1, some vision projects became part of the 2040 FC RTP either because such projects were selected for regional (federal or state) funding, or because project sponsors committed to fund them with 100 percent locally derived funds. All other projects not selected for funding make up the updated vision projects inventory. They are depicted along with fiscally constrained projects in Figure 6.4 (roadways) and Figure 6.5 (rapid transit projects).

H. 2040 Fiscally Constrained RTP System Characteristics

Table 6.1 compares the characteristics of the fiscally constrained 2040 surface transportation system to the existing 2015 system. Table 6.1 also shows the characteristics for the full unconstrained Metro Vision transportation system.

Figure 6.4 2040 FCRTF Fiscally Constrained and Unfunded Roadway Capacity Projects

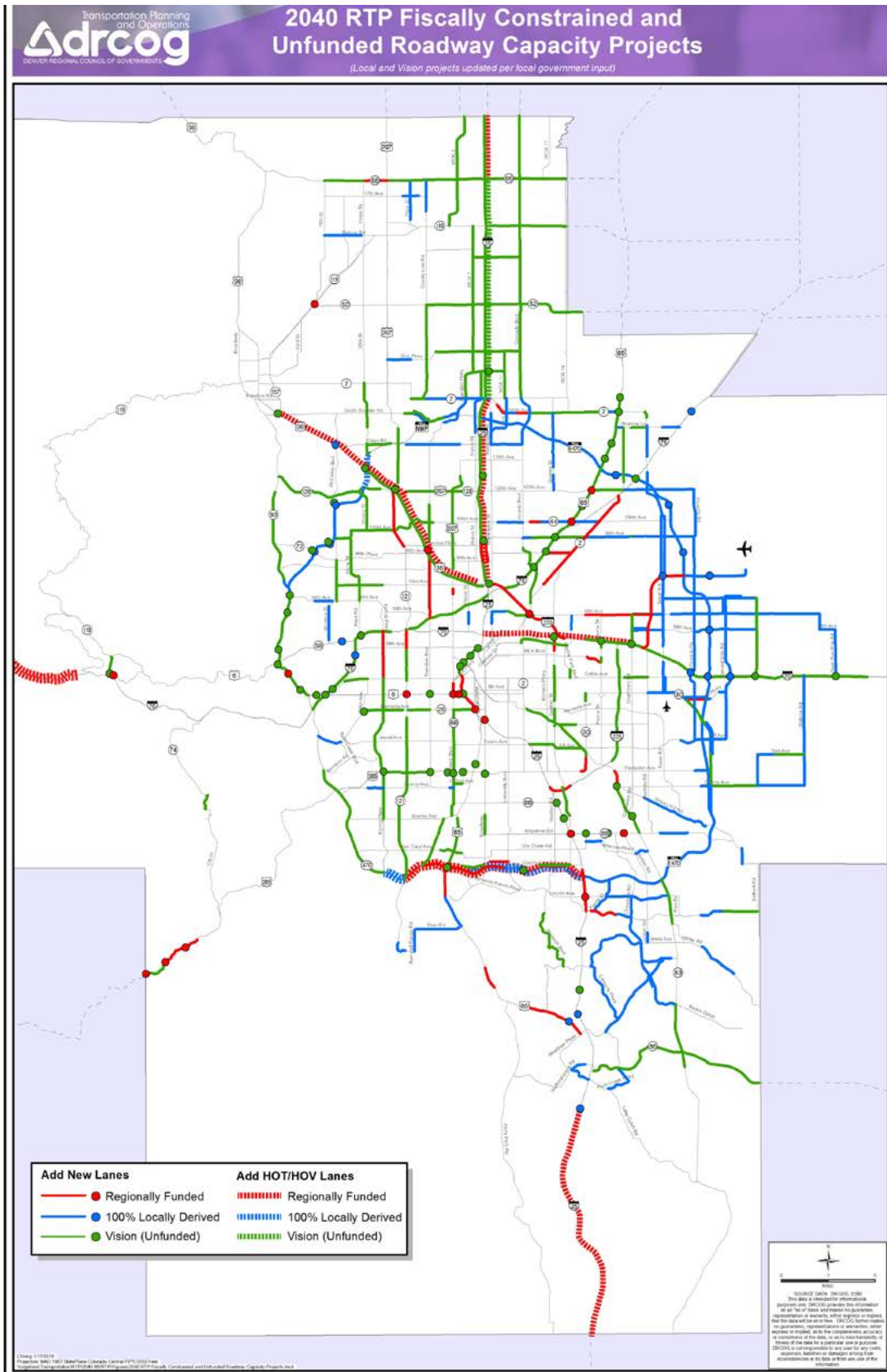


Figure 6.5 2040 Fiscally Constrained and Unfunded Rapid Transit Projects

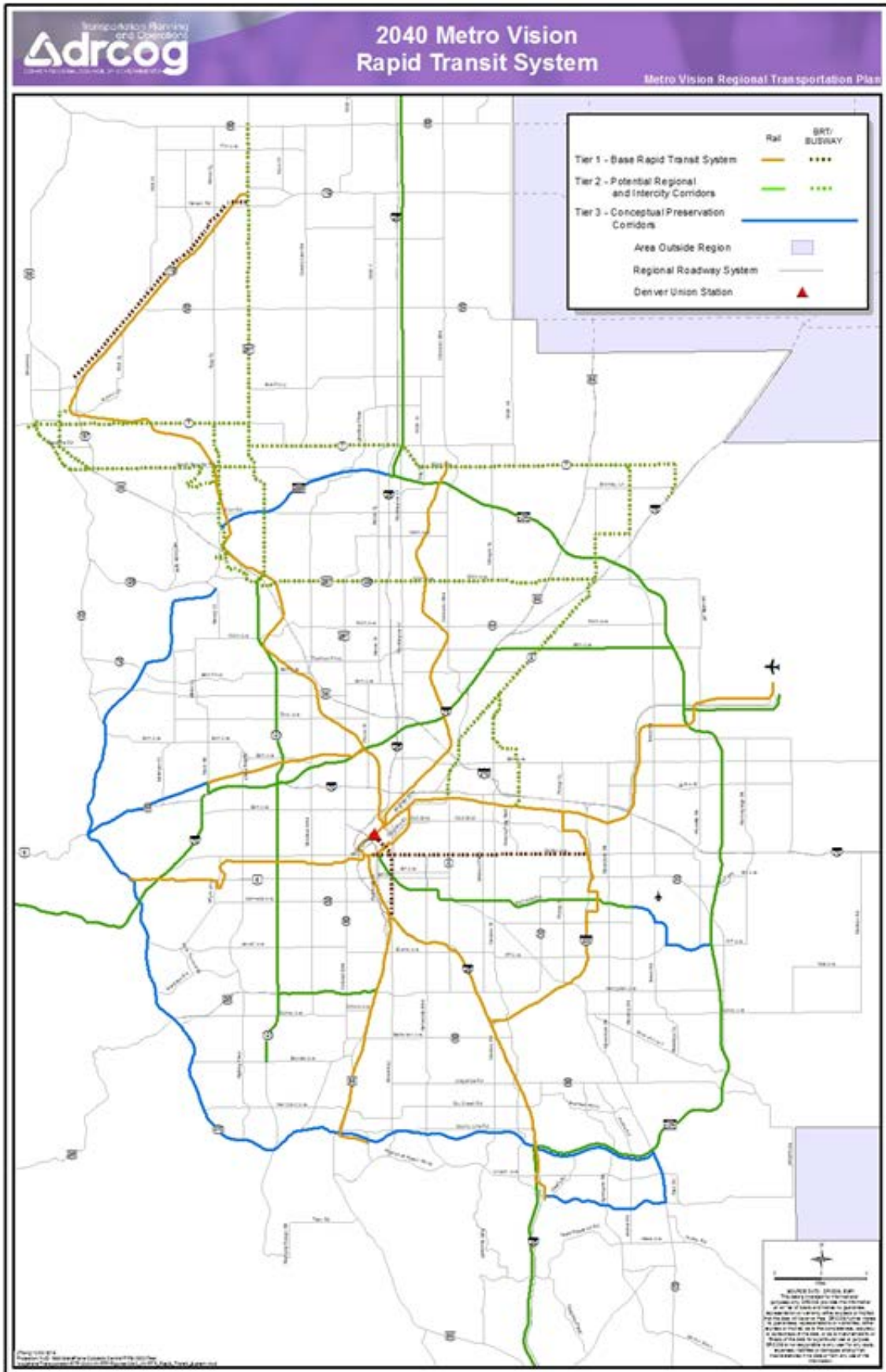


Table 6.1 2040 Fiscally Constrained RTP System Characteristics

SYSTEM CHARACTERISTIC	2015	2040 FISCALLY CONSTRAINED	2040 METRO VISION
REGIONAL ROADWAY LANE-MILES			
Freeways/Tollways	1,987	2,330	2,561
Major Regional Arterials	1,082	1,141	1,249
Principal Arterials	4,102	4,893	5,460
Total Regional Roadway System Lane Miles:	7,171	8,364	9,269
INTERCHANGES			
On Freeways/Tollways	223	236	245
On Major Regional Arterials, not Freeways	26	35	55
RAPID TRANSIT CENTERLINE MILES			
Light Rail	45	57	61
Commuter Rail	0	48	89
Intercity Passenger Rail	0	0	176
Bus Rapid Transit/Busway (exclusive right of way)	6	52	179
Total Rapid Transit System Miles:	51	157	505
TRANSIT SERVICE CHARACTERISTICS			
Fixed Route Fleet (including spares)	1,094	1,120	N/A
MallRide, MetroRide, and Call-n-Ride	103	106	N/A
ADA Paratransit	363	670	N/A
Light Rail Vehicles	172	201	N/A
Commuter Rail Vehicles	0	66	N/A
Bus Hours (millions in annual revenue service)	3.5	5.2	N/A
Light Rail Hours (millions in annual revenue service)	0.6	0.8	N/A
Commuter Rail Hours (millions in annual revenue service)	0	0.3	N/A
Total Revenue Hours	4.1	6.3	N/A
Bus Miles (millions in annual revenue service)	47	47	N/A
Light Rail Miles (millions in annual revenue service)	11	15	N/A
Commuter Rail Miles (millions in annual revenue service)	0	6	N/A
Total Revenue Miles	58	68	N/A
STATIONS: TRANSIT STATIONS AND PARK-N-RIDE LOTS (NUMBER OF PARKING SPACES)			
Rapid Transit Stations (with Parking)	25 (16,653)	48 (34,055)	N/A
Current Park-n-Rides that are Future Rapid Transit Stations with Parking	9 (5,970)	9 (8,110)	N/A
Rapid Transit Stations (without Parking)	22	27	N/A
Transit/Transfer Centers	4 (75)	4 (75)	N/A
RTD Park-n-Ride Lots	42 (8,362)	43 (7,114)	N/A
CDOT Carpool Lots	6 (926)	6 (926)	N/A
Total Parking Spaces	31,986	50,280	N/A

I. Amendments to the 2040 MVRTP

Since adoption of the 2040 MVRTP in April 2017, DRCOG has processed one amendment cycle to regionally significant projects requested by project sponsors. These amendments, shown in Table 6.2, have been incorporated in the 2040 MVRTP's text, maps, tables and appendices. Note that in the 2017 amendment cycle, all regionally significant projects were recategorized into modified air quality conformity staging periods to meet federal requirements. The air quality staging periods changed from 2015-2024, 2025-2034 and 2035-2040 to 2020-2029 and 2030-2040. DRCOG is transitioning from a base year of 2015 to a new base year of 2020 for air quality modeling. The new 2020 base year is within the maximum of 10 years allowed from the 2011 air quality emissions inventory. With a base year of 2020 and a maximum of 10-year staging periods, the new air quality staging periods become 2020-2029¹ and 2030-2040².

¹ January 1, 2020 to December 31, 2029

² January 1, 2030 to December 31, 2039

Table 6.2 Amendments to the 2040 Fiscally Constrained RTP

SPONSOR	PROJECT LOCATION	ORIGINAL 2040 FCRTTP PROJECT DESCRIPTION	TYPE OF CHANGE TO THE 2040 FCRTTP	MODEL NETWORK STAGING PERIOD
CDOT	I-25: Castle Rock to DRCOG South Boundary	Not in 2040 FCRTTP	Add 1 toll express lane in each direction	2020 – 2029
CDOT	I-25: 84th Avenue to Thornton Parkway	Not in 2040 FCRTTP	Add 1 northbound general purpose lane	2020 – 2029
CDOT	I-25 (New Managed Toll Express Lanes): SH-66 to Weld County Road 38 (DRCOG North Boundary)	Advance from 2035-2040 stage to 2020-2029 stage		
CDOT	US-85: 104th Avenue and 120th Avenue	Not in 2040 FCRTTP	Add new interchanges	2020 – 2029
City and County of Denver	<ul style="list-style-type: none"> • 35th Avenue: Brighton Boulevard to Walnut Street • Washington Street: Elk Place to 52nd Avenue 	Widen 2 to 4 lanes	Remove from 2040 MVRTTP	
Denver International Airport	Pena Boulevard: E-470 to Jackson Gap Street:	Not in 2040 FCRTTP	<ul style="list-style-type: none"> • Widen 6 to 8 Lanes • Relocate Westbound Off-Ramp to Gun Club Road • Add Eastbound On-Ramp from Gun Club Road 	2020 – 2029
Douglas County	Widen 4 to 6 Lanes: <ul style="list-style-type: none"> • US-85: Highlands Ranch Parkway to Blakeland Road • US-85: Blakeland Road to County Line Road 	2015-2024 AQ stage 2025-2034 AQ stage	Combine into one project and advance to 2020-2029 AQ stage	
Douglas County	• Waterton Road: SH-121 to Campfire Drive	Not in 2040 FCRTTP	Add project: widen 2 to 4 lanes	2020 – 2029
Jefferson County	Quincy Ave.: C-470 to Simms St.	Widen 2 to 4 lanes (2015-2024 stage)	Remove from 2040 MVRTTP	

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7. PERFORMANCE AND OUTCOMES OF THE 2040 FISCALLY CONSTRAINED RTP

The 2040 Metro Vision Regional Transportation Plan (2040 MVRTP) plays a major role in improving the economy, environmental quality, mobility and quality of life for the residents of the Denver region. Potential benefits of the MVRTP's balanced approach include:

- Residents and visitors have more travel choices and service options;
- Urban centers thrive;
- Senior citizens maintain their mobility or receive in-home services efficiently;
- Low – and moderate-income workers reach their job sites;
- Business owners attract customers or ship out products;
- Children travel to and from school more safely;
- Tourists and residents travel to, from and within recreation sites;
- Greenhouse gas emissions are reduced; and
- People breathe clean air.

Negative impacts of the transportation system are intended to be minimized and mitigated for new projects as determined through the environmental and project development process.

Current funding constraints, however, will limit the benefits that could be realized. The MVRTP makes the best use of available funds to achieve meaningful benefits, but these benefits will fall short of those envisioned for the full Metro Vision transportation system (Chapter 6). The lack of sufficient revenues necessitates prioritizing transportation funding decisions as discussed in Chapter 5.

A. Transportation System Performance Measures

This section presents measures comparing the performance of the 2015 transportation system with that of the 2040 fiscally constrained system. DRCOG measures transportation performance using observed and modeled data in the MVRTP, Metro Vision and in reports on topics such as congestion, safety and bicycle and pedestrian travel. Taken together, DRCOG has a plethora of performance measures addressing the multimodal transportation system's use, performance, condition and other traits. The following subsections discuss transportation performance by performance measure groupings: travel and mobility, facility and infrastructure condition, future FAST Act performance-based planning measures, energy consumption and Metro Vision's foundational measures and targets.

i. Travel and Mobility Performance Measures

Table 7.1 shows changes in regionwide travel measures between 2015 and 2040 using forecasts from DRCOG's Focus transportation model. The Focus model uses the growth in population and employment from DRCOG's Urban Sim model, along with other input variables, to forecast transportation trends and performance. The region's population and employment growth, the distribution of that growth, and the provision of transportation facilities and services will affect future travel patterns. Key points from Table 7.1 include:

- Regional vehicle miles traveled (VMT) will increase at a rate slightly higher than population growth, meaning that VMT per capita will also increase slightly.
- Bicycle and walking trips together will increase almost 50 percent, much higher than population growth (37 percent) and slightly higher than VMT growth (41 percent).

Table 7.1 Transportation System Mobility Performance Measures

MODELED SYSTEM MEASURES - WEEKDAY FOR DRCOG REGION	2015 BASELINE	2040 FORECAST	CHANGE
Population	3,139,500	4,314,600	37.4%
Households	1,269,400	1,818,800	43.3%
Employment	1,711,400	2,385,800	39.4%
Person Trips			
Within Region (Internal-Internal) SOV Drivers	5,307,100	7,220,500	36.1%
Internal-External SOV Drivers	256,000	431,000	68.4%
External-External SOV Drivers	12,800	21,200	65.6%
Commercial Vehicle Trips	1,559,300	2,188,500	40.4%
Total SOV Driver Trips	7,135,200	9,861,200	38.2%
Shared Ride Driver	1,946,800	2,645,500	35.9%
Shared Ride Passenger	2,704,100	3,640,800	34.6%
School Bus Trips	207,300	271,500	31.0%
Total Transit Trips (Bus and Rail)	259,600	405,300	56.1%
Drive Trips to and from Transit	132,100	219,800	66.4%
Pedestrian/Bicycle Trips to and from Transit	906,200	1,401,500	54.7%
Bicycling Trips	137,400	176,200	28.2%
Pedestrian Trips	1,028,500	1,445,000	40.5%
Total Person Trips:	14,457,200	20,066,800	38.8%
Vehicle and Congestion Performance Measures			
Vehicle Miles Traveled (VMT)	78,591,600	111,122,100	41.4%
Total Vehicle Trips	9,082,100	12,506,700	37.7%
VMT Per Capita	25.0	25.8	2.9%
Vehicle Hours Traveled	2,191,600	3,293,000	50.3%
Vehicle Hours of Delay	354,200	697,700	97.0%
Person Miles Traveled (PMT)	106,884,600	151,126,000	41.4%
Person Hours Traveled	2,980,500	4,478,500	50.3%
Person Hours of Delay	481,800	948,900	96.9%
Average Vehicle Speed - Peak Hours (mph)	31.6	29.0	-8.5%
Average Person Delay Per Trip (minutes)	2.5	3.6	44.4%
VMT/PMT	0.7	0.7	0.0%
Severely Congested Lane Miles (roadways with three or more hours of severe congestion) (volume to capacity ratio ≥ 0.95)	1,700	3,200	88.2%
Percent of VMT in Severe Congestion	13.3%	20.0%	50.4%

MODELED SYSTEM MEASURES - WEEKDAY FOR DRCOG REGION	2015 BASELINE	2040 FORECAST	CHANGE
Fixed Route Transit Performance Measures			
Rail Transit Boardings	98,500	218,300	121.6%
Bus Transit Boardings	262,100	384,700	46.8%
Total Transit Boardings:	360,600	603,000	67.2%
Total Transit Trips	259,600	405,300	56.1%
Person Miles Traveled on Transit	1,504,000	3,005,800	99.9%
Transit Share of Daily Work Trips	5.0%	6.1%	20.9%
Transit Share of Total Daily Trips	2.2%	2.5%	14.6%
Percent of Households Making a Transit Trip	10.6%	11.3%	5.9%
Accessibility Performance Measures			
Share of total population with good transit-job accessibility (100,000+ jobs within a 45-minute transit trip)	53%	63%	
Share of population in low-income or minority areas with good transit-job accessibility (1)	69%	77%	

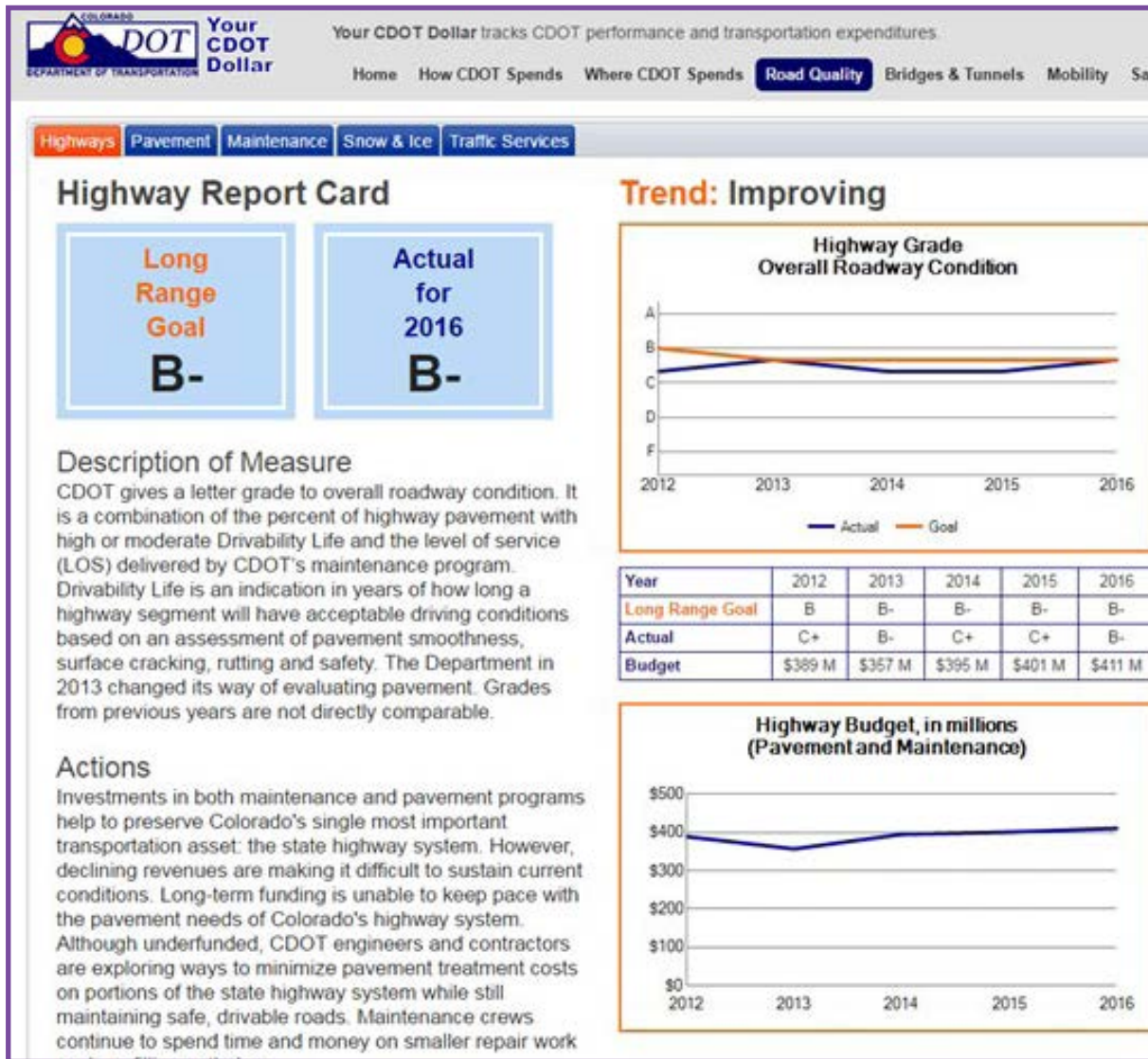
Source: DRCOG Travel Models: Base Year 2015; Model Year 2040

- Vehicle hours of travel will increase about 50 percent, reflecting a substantial increase in traffic congestion and vehicle hours of delay (which will almost double).
- The percentage of miles traveled in severe congestion will increase about 50 percent. Severely congested lane miles will almost double.
- Total transit trips will increase by more than 50 percent. Rail boardings will more than double.
- The transit-job accessibility measure for all residents, especially those living in low-income and minority communities, will increase, due primarily to Regional Transportation District FasTracks rapid transit, other bus rapid transit and local bus service improvements.
- 2015 transit data shown in Table 7.1 is modeled data, which will be different than RTD-reported boardings and other ridership characteristics.

RTD measures the performance of its transit system both internally and externally (for example, National Transit Database reporting). RTD annually assesses the performance of each bus route and rail line by service class (see Page 2 of [RTD's 2016 performance report](#) for a list of service classes) using its current service standards, which emphasize subsidy per boarding and boardings per hour. RTD uses data gathered through the assessment to inform route and service adjustments.

Through its Statewide Transportation Plan and Policy Directive 14, the Colorado Department of Transportation has developed a multimodal set of strategic policy initiatives with associated goals, performance measures and strategies addressing safety, pavement condition, travel time reliability and maintenance. CDOT's annual performance plan describes the agency's strategic framework and performance tracking of its strategic policy initiatives. The [2017-18 Performance Plan](#) is the most current example.

Exhibit 7.1 CDOT Highway Performance Report Card



ii. Facility and Infrastructure Condition Performance Measures

a. CDOT Facilities

CDOT has created a web-based performance portal as part of its home page (codot.gov). The portal provides its latest performance plan as well as tables, charts and maps showing how and where CDOT allocates its resources ([Your CDOT Dollar](#)) as well as current and forecast system performance and quality.

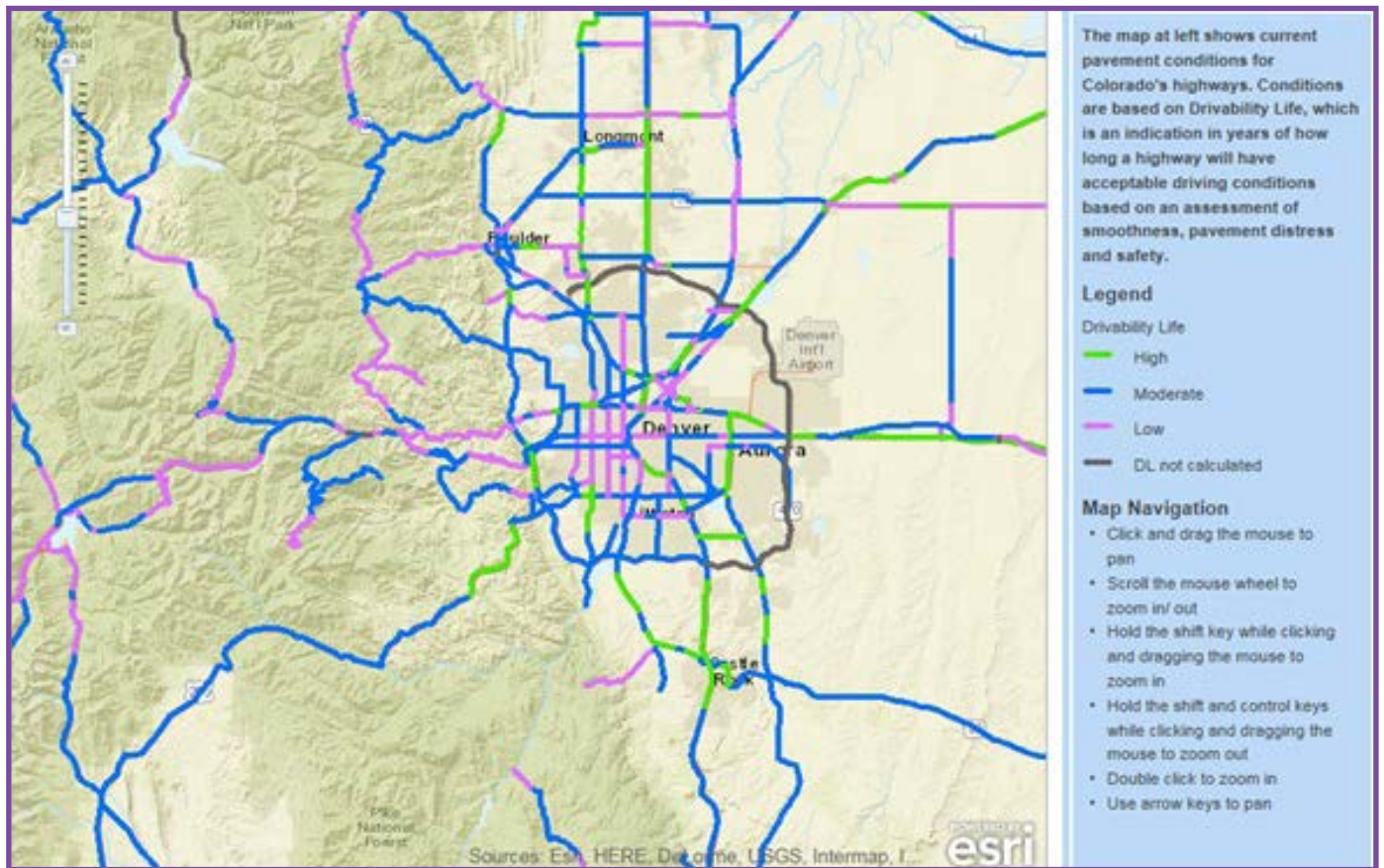
For example, for both highways and maintenance, CDOT provides a report card showing actual and long-range goal letter grades, yearly system performance trend data

and budget trend data. Exhibit 7.1 shows a snapshot of the report card for highway conditions for CDOT facilities.

CDOT uses a measurement known as Drivability Life to estimate the number of years a highway will have acceptable driving conditions. Drivability Life is a function of smoothness, pavement distress and safety.

Currently, 80 percent of CDOT's highway miles are rated high to moderate in Drivability Life. CDOT notes in its highway report card that "declining revenues are

Exhibit 7.2 CDOT Pavement Conditions



making it difficult to sustain current conditions. Long-term funding is unable to keep pace with the pavement needs of Colorado's highway system.”

Exhibit 7.2 shows another example of CDOT's pavement condition performance, using a screenshot of CDOT's web-based map tool displaying current pavement condition in the DRCOG region for CDOT facilities. Most highways are shown as moderate — with many designated low — on CDOT's Drivability Life index.

b. Local Facilities

As shown in Chapter 5, maintaining the non-CDOT Regional Roadway System at its current condition would cost an estimated \$1.4 billion by 2040. As discussed in Chapter 5, DRCOG surveyed local governments within the region and CDOT to understand current pavement conditions, develop an average cost

per lane mile, estimate an expenditure schedule to maintain current conditions through 2040 and estimate total roadway maintenance and reconstruction cost needs for the 2040 Fiscally Constrained RTP. DRCOG is further exploring methods to help local governments standardize the tracking and reporting of roadway and pavement conditions to improve data for existing and future condition, cost and expenditures.

c. RTD

RTD has an asset management program that concerns prioritization of investment based on condition and performance of assets. This activity is carried out by using an analytics program to support decisions regarding State of Good Repair (SGR). State of Good Repair analytics provide reliable, timely, and data-driven information concerning the performance, condition and age of RTD's assets. The program extends

Exhibit 7.3 RTD State of Good Repair Scoring Example

RTD - State Of Good Repair Assets Condition score - Category
Excluding Assets In Replacement Process

Report 1.1.1 (State of Good Repair Score By Category): This report displays Overall Average State Of Good repair Score based on Age, Condition & Performance-Cost base for RTD Bus, LRV Asset Categories. NB. RTD Follows SGR Score of "Zero" to "Five" where 5 is an Asset with Excellent Condition. Score 2.5 and below is Asset with Backlog. The Report Excludes Assets in Replacement Process- procurement in Progress!

CATEGORY	Age Based Score	Condition Based Score	Cost Based Score	Road Call Based Score	Incident Based Score	SGR Score
BUS	4.6	4.5	3.7	3.4	2.3	3.7
LRV	4.2	3.5	4.4	4.5	3.6	4.1

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to the four Federal Transit Administration physical asset classifications, including rolling stock, facilities, infrastructure, and equipment. RTD uses several added measures to assess its rolling stock (vehicle) assets. For example, the State of Good Repair Assets Condition Score is derived by scoring each asset using available data for performance, condition and age based on SGR standard scoring methodology. The individual asset scores are averaged into a non-weighted overall SGR score for each asset category. SGR scores range from zero to five (excellent condition) using the FTA Transit Economic Requirements Model scoring scale.

For 2014, RTD bus and light rail vehicle assets stand at overall SGR scores of 3.7 and 4.1, respectively as shown in Exhibit 7.3:

RTD will use the following additional performance measures for its rolling stock:

- Cost per mile (used to select the most cost-effective product over its life cycle in future rolling stock acquisitions)
- Road calls as in-service delay minutes (relates to number and duration of road calls)
- Road calls as passenger lost minutes (relates to the effect of in-service delays on RTD passengers and ridership)
- Incidents (to help identify irregularities, where focused attention and preventive actions may improve performance and rider experience)

RTD also publishes quarterly performance measure reports addressing several goals and associated objectives. As an example from the 2016 second-quarter report, Exhibit 7.4 shows the goals, objectives and partial performance measures addressing safety.

As of January 2017, RTD established FAST Act performance-based transit physical asset management targets addressing state of good repair. RTD intends to update these targets as part of its Transit Asset Management Plan (TAMP). RTD's established targets, including periodic updates, are incorporated by reference for consideration in DRCOG's transportation planning process and planning documents, such as the 2040 MVRTP and the Transportation Improvement Program (TIP), where applicable, to address the FAST Act's performance-based planning requirements (discussed in Section A.3 below). In the future, DRCOG's FAST Act transit asset management targets will reflect RTD's periodically updated targets in its TAMP.

d. Other Transit

CDOT maintains a comprehensive rolling stock inventory for most transit operators in the state. The inventory includes human service transit providers in addition to fixed route transit agencies. Of the nine non-RTD transit providers in the Denver region (all human service transit providers), analysis of the inventory data shows that:

- they currently operate and maintain 129 vehicles, approximately 11 percent of the region's total (when

Exhibit 7.4 RTD Performance Measure Report Example

2016 PERFORMANCE REPORT-SECOND QUARTER

VISION
 TO DELIVER REGIONAL MULTI-MODAL TRANSPORTATION SERVICES AND INFRASTRUCTURE IMPROVEMENTS THAT SIGNIFICANTLY AND CONTINUALLY INCREASE TRANSIT MARKET SHARE.

MISSION STATEMENT
 TO MEET OUR CONSTITUENTS' PRESENT AND FUTURE PUBLIC TRANSIT NEEDS BY OFFERING SAFE, CLEAN, RELIABLE, COURTEOUS, ACCESSIBLE, AND COST-EFFECTIVE SERVICE THROUGHOUT THE DISTRICT.

GOAL 1: TO MEET THE PRESENT TRANSPORTATION NEEDS OF THE DISTRICT BY PROVIDING SAFE TRANSPORTATION SERVICE.

Objectives:

- Reduce vehicle accident ratio
- Increase preventive maintenance
- Reduce passenger accident ratio
- Improve light rail safety
- Improve employee safety

PERFORMANCE MEASURES:

**1.1 Reduce the number of safety incidents.
 (Department: Bus Operations)**

	2014 Actual	2015 Actual	2016 Goal	2016 1st Qtr	2016 2nd Qtr
Vehicle Accident Involvements per 100,000 miles – Preventable¹					
RTD	0.7	0.9	≤2.0	1.17	1.14
First Transit - Commerce City	0.6	0.7	≤2.0	0.93	0.91
First Transit - Commerce City	1.2	1.3	≤2.0	1.76	1.65
Transdev (fka Veolia)	0.5	0.7	≤2.0	0.95	0.74
First Transit – Denver	1.0	1.3	≤2.0	2.05 ²	1.63
First Transit – Longmont	0.8	1.0	≤2.0	1.39	0.91
Passenger Accident Ratio per 100,000 miles – System-wide					
RTD	0.12	0.14	≤0.18	0.11	0.12
RTD	0.11	0.10	≤0.18	0.08	0.12
First Transit - Commerce City	0.14	0.21	≤0.18	0.16	0.20 ³
Transdev (fka Veolia)	0.12	0.14	≤0.18	0.08	0.04
First Transit – Denver	0.18	0.20	≤0.18	0.08	0.08
First Transit - Longmont	0.04	0.00	≤0.18	0.28	0.28 ³
Operator-Passenger Assault Ratio per 100,000 boardings¹					
RTD	0.04	0.04	≤0.06	0.04	0.04

¹ An accident is considered preventable any time the operator was not driving in full compliance with all applicable laws and regulations and in such a manner as to avoid involvement despite adverse conditions of road, weather or traffic or the errors of pedestrians or other drivers.

² Bad weather in March resulted in a higher number of preventable accidents. Four of the total nine preventable accidents that occurred in March happened when the roads were icy/snow-packed.

³ Of the total 12 passenger accidents reported through Q2, three were preventable. First Transit-Longmont had four passenger accidents with one preventable, and First Transit-Commerce City had five passenger accidents with two preventable. Transdev had one passenger accident and First Transit-Denver had two passenger accidents, but neither carrier exceeded goal.

RTD vehicles are included);

- of those 129 vehicles, almost 70 percent (89 vehicles) were operated by Seniors' Resource Center and Via Mobility; and
- 77 percent of the 129 vehicles were rated in excellent, good or fair condition. Eighteen vehicles were rated marginal or poor, and the remaining 34 vehicles were not rated.

iii. MAP-21/FAST Act Performance Measures and Targets

In 2012, the Moving Ahead for Progress in the 21st Century (MAP-21) Act created a performance-based approach to transportation planning and programming. MAP-21 identified seven national goal areas to guide decision making at state departments of transportation and metropolitan planning organizations. The concept of performance-based planning and programming applies performance management principles to transportation system policy and investment decisions, providing a link between management and long-range decisions about policies and investments. Connecting performance measures to goals and objectives through target-setting consequently provides a basis for understanding and sharing information with stakeholders and the public. CDOT and DRCOG are collaborating to set performance based planning targets for several measures. (Transit performance measures are discussed in Section 7.A.2.c. above).

Safety (Performance Measure 1)

Final federal rule-makings were effective April 14, 2016, for Safety Performance Management and the Highway Safety Improvement Program (HSIP). Annual safety targets are required of state departments of transportation and metropolitan planning organizations for five performance measures, are based on a five-year rolling average and apply to all public roads within the DRCOG transportation management area (TMA). DRCOG is required to establish safety targets within 180 days of CDOT establishing its targets, which CDOT did in August 2017. In January 2018, the DRCOG Board adopted the 2018 safety targets, listed in Table 7.2.

Infrastructure (Performance Measure 2)

Final rule-makings were effective on May 20, 2017, directing state departments of transportation and metropolitan planning organizations to establish targets to carry out the National Highway Performance Program (NHPP) and to assess pavement condition of the National Highway System, bridges carrying the National Highway System and pavement on the interstate system. CDOT is required to set targets for the following measures by May 2018. DRCOG will set targets for the following measures by November 2018:

- Percentage of pavement of the interstate system in good condition

Table 7.2 DRCOG 2018 Safety Targets

DRCOG 2018 SAFETY TARGETS – FIVE-YEAR MOVING AVERAGES	TARGET
FATALITIES	242
FATALITY RATE PER 100 MILLION VEHICLE MILES TRAVELED (VMT)	0.90
SERIOUS INJURIES	1,948
SERIOUS INJURY RATE PER 100 MILLION VEHICLE MILES TRAVELED (VMT)	7.20
NONMOTORIZED FATALITIES AND SERIOUS INJURIES	59 + 287 = 346

- Percentage of pavement of the interstate system in poor condition
- Percentage of pavement of the non-interstate National Highway System in good condition
- Percentage of pavement of the non-interstate National Highway System in poor condition
- Percentage of National Highway System bridges classified in good condition
- Percentage of National Highway System bridges in poor condition

System Performance (Performance Measure 3)

Final rule-makings were effective on May 20, 2017, directing state departments of transportation and metropolitan planning organizations to establish targets to assess the performance of the interstate and non-interstate National Highway System to carry out the NHPP, to assess freight movement on the interstate system and to assess traffic congestion and on-road mobile source emissions to carry out the CMAQ program. CDOT is required to set targets for the following measures by May 2018. DRCOG will set targets for the following measures by November 2018:

- Percentage of reliable person miles traveled on the interstate system
- Percentage of reliable person miles traveled on the non-interstate National Highway System
- Truck travel time reliability index (interstate system)
- Total tons of emissions reduced from CMAQ projects for applicable criteria pollutants and precursors
- Annual hours of peak hour excessive delay per capita (National Highway System)
- Percentage of non-single-occupant vehicle travel, including travel avoided by telecommuting (National Highway System)

Transit Asset Management

- State of good repair

iv. Energy Consumption Performance Measures

Energy consumption is closely related to greenhouse gas emissions associated with the burning of motor vehicle fuels. Direct energy consumption by motorists in 2040 will depend on changing behaviors relative to key factors discussed previously. Although somewhat hard to predict, a reduction in motor vehicle fuel consumption is anticipated.

The estimated petroleum fuel burned by motor vehicles in the Denver region in 2015 was about 3.8 million gallons per day. This reflects an average overall fuel economy of 20.5 miles per gallon for the entire vehicle fleet of cars and trucks. It also equates to approximately 5 quarts (1.25 gallons) per capita per day. By 2040, the amount is estimated to drop to approximately 3.3 million gallons per day, even though VMT is forecast to increase by about 41 percent. Average overall fuel economy is predicted to be 33.2 miles per gallon with 3 quarts (0.75 gallons) of fuel burned per capita per day. Most of the reduction in fuel burned will be due to more efficient engines and the increase in number of alternative fuel motor vehicles (for example, electricity and natural gas).

The MVRTP also contains several other strategies and facilities that will help slow the growth in energy consumption. For example, operations management strategies will help keep cars, trucks and buses moving smoothly by reducing stop-and-go conditions and addressing key congestion points. Strategies to enhance the transit system and support transportation demand management, bicycle and pedestrian improvements will provide travel choices to single-occupant vehicles.

v. Metro Vision Performance Measures

DRCOG's Metro Vision establishes a series of performance measures to help track progress toward the region's identified outcomes. The performance measures are based on:

- relevance to Metro Vision outcomes and objectives;
- availability of regularly updated and reliable data sources; and
- use of measurable quantitative information, rather than anecdotal insights.

Each performance measure has an associated baseline (current status) and a 2040 target (desired future outcome), shown in Table 7.3. DRCOG will periodically report on Metro Vision implementation progress using these performance measures, with reporting frequency based on data availability. As new information becomes available or circumstances change, targets or the methodology for measuring success may be refined.

The 2040 targets represent a balance between reasonably achievable and aspirational targets for the region. Accordingly, Metro Vision’s targets in Table 7.3 and the 2040 forecasts in Table 7.1 from DRCOG’s Focus transportation model are not directly comparable. Metro Vision and the targets in Table 7.3 are a starting point for implementation through collective initiatives and actions of the entire region – DRCOG, local governments and other stakeholders. The 2040 forecasts in Table 7.1 are a snapshot of current conditions that will continue to change as the region works together to implement Metro Vision. As the region identifies specific projects, services, programs, actions and initiatives, the MVRTP will be updated accordingly.

Table 7.3 Metro Vision Foundational Measures

PERFORMANCE MEASURE	WHERE ARE WE TODAY? (BASELINE)	WHERE DO WE WANT TO BE? (2040 TARGET)
Share of the region’s housing and employment located in urban centers	Housing: 10.0% (2014)	Housing: 25.0%
	Employment: 36.3% (2014)	Employment: 50.0%
Regional population-weighted density	850 people per square mile (2014)	25% increase from 2014
Non-single-occupant vehicle mode share to work	25.1% (2014)	35.0%
Daily vehicle miles traveled per capita	25.5 daily VMT per capita (2010)	10% decrease from 2010
Average travel time variation (peak vs. off-peak)	1.22 (2014)	Less than 1.30
Daily person delay per capita	Six minutes (2014)	Less than 10 minutes
Number of traffic fatalities	185 (2014)	Fewer than 100 annually
Surface transportation-related greenhouse gas emissions per capita	26.8 pounds per capita (2010)	60% decrease from 2010
Protected open space	1,841 square miles (2014)	2,100 square miles

PERFORMANCE MEASURE	WHERE ARE WE TODAY? (BASELINE)	WHERE DO WE WANT TO BE? (2040 TARGET)
Share of the region's housing and employment in high-risk areas	Housing: 1.2% (2014)	Less than 1.0%
	Employment: 2.9% (2014)	Less than 2.5%
Share of the region's population living in areas with housing and transportation costs affordable for the typical household in the region	41% (2013)	50%
Regional employment	1.8 million (2014)	2.6 million (1 to 1.5 percent annual growth)
Share of the region's housing and employment near rapid transit stations or high-frequency transit stops	Housing: 14.0% (2014)	20.0%
	Employment: 32.3% (2014)	45.0%

B. Environmental Justice

An important consideration for the MVRTP is its potential benefits to, and impacts on, the minority and low-income populations within the Denver region, as well as in comparison to benefits and impacts on the region's population as a whole. Guidance for evaluating these benefits and impacts is derived from Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low Income Populations, signed by President Bill Clinton on Feb. 11, 1994. The executive order and accompanying memorandum reinforced the requirements of Title VI of the Civil Rights Act of 1964 that address federal attention on environmental and human health conditions in minority and low-income communities.

The U.S. Department of Transportation order on environmental justice, issued to comply with Executive Order 12898, defines a member of a minority population as a person who is:

- Black (having origins in any of the black racial groups of Africa);
- Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
- Asian American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent or the Pacific Islands), or
- American Indian and Alaskan Native (having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition).

A low-income person means a person whose median household income is at or below the Department of Health and Human Services (HHS) poverty guidelines. For 2014, the [poverty threshold guideline](#) for a family of four was \$23,850.

Per federal requirements, transportation plans and programs 1) must provide a fully inclusive public outreach program, 2) should not disproportionately impact minority and low-income communities, and 3) must ensure the receipt of benefits by minority and low-income populations. The 2040 MVRTP addresses these

Figure 7.1 2040 Fiscally Constrained Regionally Funded Projects and Environmental Justice Areas

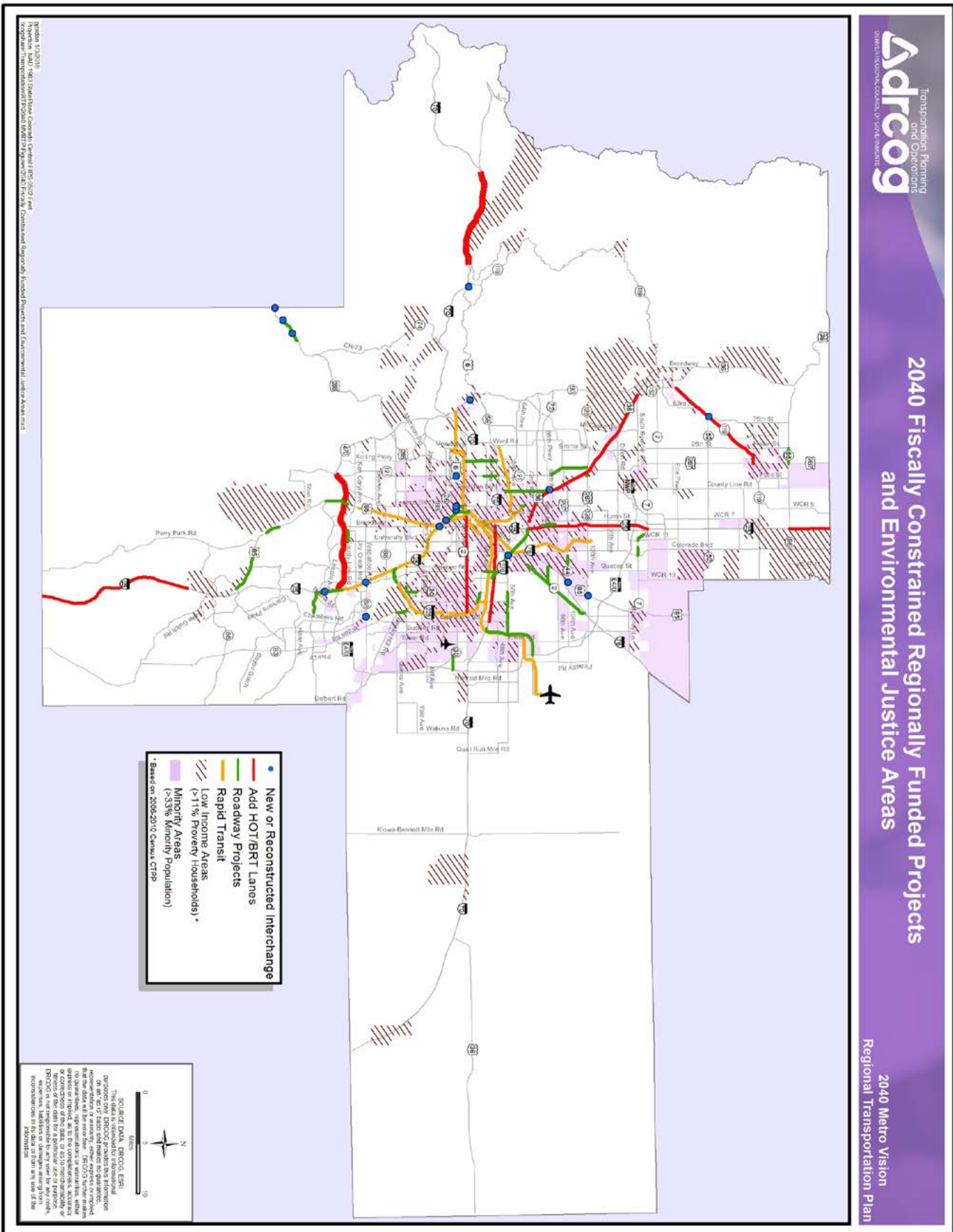
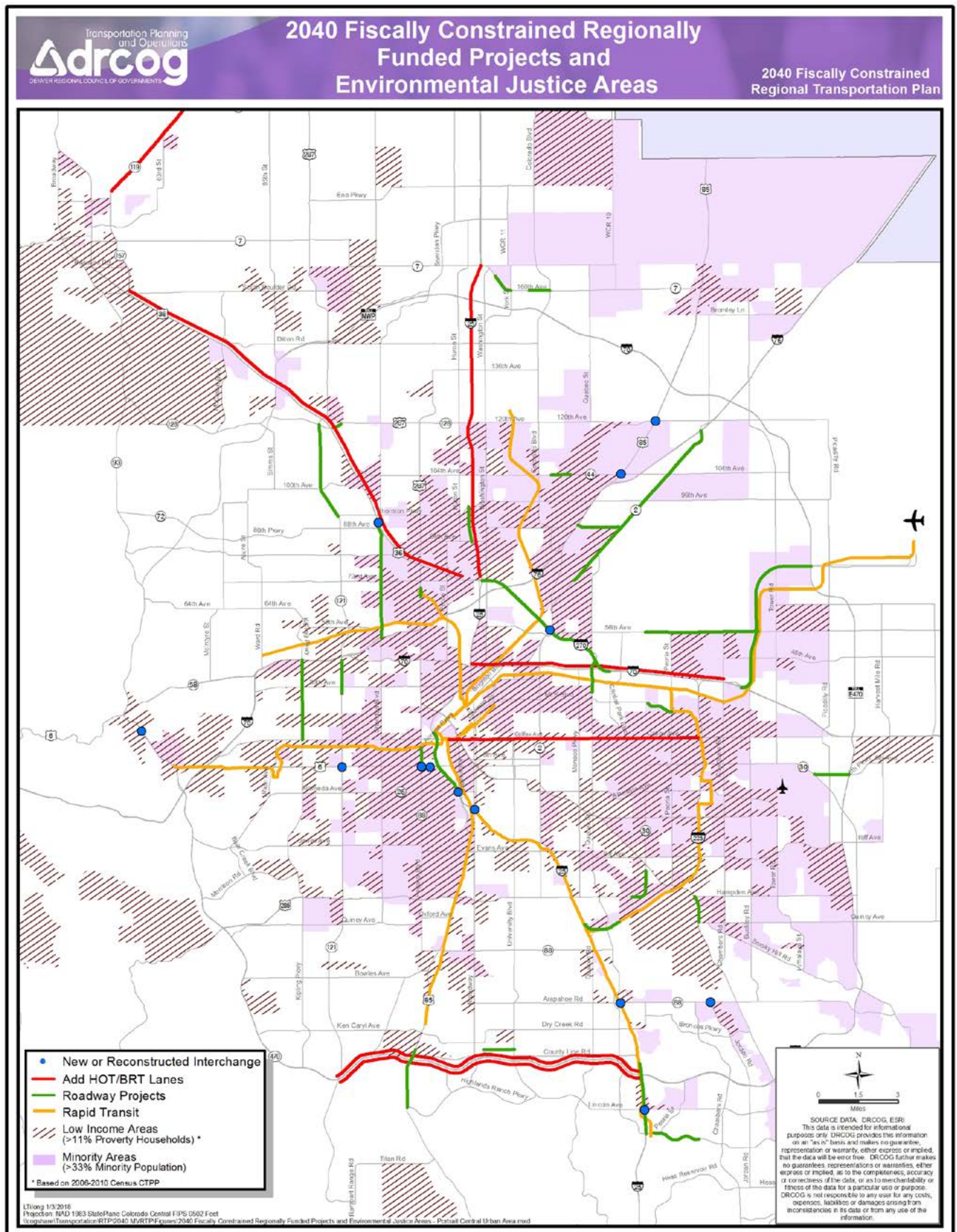


Figure 7.2 Fiscally Constrained Regionally Funded Projects and Environmental Justice Areas - Central Urban Area



three principles and they were considered throughout the decision-making process. Per federal requirements, these principles must also be considered in the project design and implementation phases for future specific projects.

Geographic Concentrations of Environmental Justice Communities

The first step in the environmental justice evaluation process for the 2040 MVRTP was to identify geographic

concentrations of minority and low-income populations. The transportation analysis zones identified with concentrations of either minority individuals or low-income households make up the environmental justice areas of the region. Figure 7.1 shows the transportation analysis zones where, based on 2006-2010 Census Transportation Planning Package (CTPP) data, the percent of minority population is at or above the regional minority percentage of 33 percent. It also shows the traffic analysis zones for which the percentage of

Table 7.4 Minority Means of Transportation to Work

WORKERS	DROVE ALONE		CARPOOLED		TRANSIT		WALKED		TAXI, MOTORCYCLE BICYCLE OR OTHER MEANS		WORKED AT HOME		REGIONAL TOTAL	
	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
WHITE, NON-HISPANIC OR LATINO	859,036	76.0%	74,008	6.5%	40,315	3.6%	28,272	2.5%	28,220	2.5%	100,070	8.9%	1,129,921	100%
MINORITY	399,596	72.0%	75,246	13.6%	33,914	6.1%	14,151	2.6%	9,045	1.6%	22,781	4.1%	554,733	100%
TOTAL	1,258,632	74.7%	149,254	8.9%	74,229	4.4%	42,423	2.5%	37,265	2.2%	122,851	7.3%	1,684,654	100%

Source: U.S. Census Bureau, 2012-2016 American Community Survey Five-Year Estimates (B08105 tables)

Table 7.5 Means of Transportation to Work by Worker Earnings

WORKER EARNINGS	DROVE ALONE		CARPOOLED		TRANSIT		WALKED		TAXI, MOTORCYCLE BICYCLE OR OTHER MEANS		WORKED AT HOME		REGIONAL TOTAL	
	TOTAL	%	TOTAL	%	TOTAL	%	TOTAL	%	TOTAL	%	TOTAL	%	TOTAL	%
\$34,999 AND UNDER	492,466	70.9%	75,517	10.9%	38,577	5.6%	25,307	3.6%	16,773	2.4%	45,679	6.6%	694,319	100%
\$35,000 TO \$49,999	209,016	79.2%	22,109	8.4%	9,688	3.7%	4,517	1.7%	4,884	1.9%	13,604	5.2%	263,818	100%
\$50,000 TO \$74,999	228,410	79.0%	20,782	7.2%	10,263	3.5%	4,986	1.7%	5,765	2.0%	19,045	6.6%	289,251	100%
\$75,000 OR MORE	272,274	76.3%	18,178	5.1%	11,314	3.2%	5,236	1.5%	8,468	2.4%	41,401	11.6%	356,871	100%
TOTAL	1,202,166	74.9%	136,586	8.5%	69,842	4.4%	40,046	2.5%	35,890	2.2%	119,729	7.5%	1,604,259	100%

Source: U.S. Census Bureau, 2012-2016 American Community Survey Five-Year Estimates (B08119 table)

households, by size, with incomes at or below the 2014 HHS poverty guidelines as applied to the 2006-2010 CTPP data, is at or above the regional percentage of 11 percent. Figure 7.2 shows the same information for the central urban area. Both figures also display the location of regionally funded roadway and rapid transit capacity projects in relation to the environmental justice areas.

Travel Characteristics of Minority and Low-Income Populations

DRCOG staff conducted an evaluation of the work travel characteristics of the Denver region's minority and low-income populations based on Census data, as shown in Tables 7.4 and 7.5.

This analysis revealed several key findings:

- Driving alone is the most prevalent travel mode to work for all races and income levels. More than 70 percent the population of every race and income level drive alone to work.
- A greater share of minority and low-income populations take transit to work – about six percent.
- Minority populations are twice as likely to take transit or carpool to work, and are less likely to taxi, bicycle or work from home.
- Driving alone to work and teleworking rates both generally increase as income levels increase.

According to the 2010 Census (Census Transportation Planning Package), about 70,000 households throughout the Denver region did not have an automobile available, whether by choice or circumstance. To ensure that residents of these households can travel to work, school or medical care, it is important that travel options such as public transit, sidewalks and bicycle paths are provided.

Benefits of the MVRTP in Environmental Justice Communities

The MVRTP includes many projects, services and policies that will improve transportation for people living

in environmental justice communities and especially for those unable to use an automobile to travel. It will also provide a system that connects people with a greater number of job opportunities via convenient commutes.

Figure 7.1 and Figure 7.2 also display the location of regionally funded roadway and rapid transit capacity projects in relation to environmental justice areas. Several beneficial projects will directly serve residents in these areas. Many other smaller-scale projects and services will be provided through future Transportation Improvement Program documents. Many future roadway projects will include multimodal elements that will benefit non drivers.

As discussed in Chapter 5, more than half of the MVRTP's fiscally constrained regional system expenditures will be for public transit and other non-roadway projects and services. Several additional rapid transit rail lines and extensions will be completed by RTD as part of FasTracks. Additionally, BRT and/or managed lanes have been or will be added to U.S. Route 36, state Highway 119, Colfax Avenue, Interstate 25 North, Interstate 70 and C-470. Bus service will also increase through 2040. The fiscally constrained Rapid Transit System, shown in Figure 6.2, is also displayed in Figures 7.1 and 7.2 in relation to environmental justice areas.

Transit accessibility to jobs will improve as the FasTracks system continues to be built out. Table 7.1 shows the share of population within environmental justice areas that met the good transit-job accessibility criterion used by DRCOG in 2015 (69 percent) and would meet the criterion in 2040 (77 percent) with implementation of the fiscally constrained multimodal transportation projects, programs and services. The criterion requires having at least 100,000 jobs located within a 45-minute transit trip of home, and is based on calculations from DRCOG's Focus travel model.

Other beneficial components of the 2040 MVRTP include extensive additions to the bicycle and pedestrian system, expansion of demand-responsive

transit service, and increased outreach by DRCOG's Way to Go Program (carpool- and vanpool-matching service and other transportation demand management strategies). All of the components described above are very beneficial in helping individuals with mobility challenges find transportation. Additionally, roadway capacity projects that reduce congestion will benefit the majority of all populations that travel by car to work, including minority populations.

In addition to the extensive transit system expansion that RTD is implementing, the 2040 MVRTP provides additional funding sources to serve the needs of low-income and minority populations. For example, the Federal Transit Administration has grant programs that provide potential benefits to environmental justice communities (although they do not specifically address minority populations). These grant programs allow, but do not require, expenditures toward developing new transportation options for welfare recipients and other low-income individuals to access employment and job training. They also provide funding to increase transportation options for older adults and individuals with disabilities.

Potential Impacts of the Fiscally Constrained MVRTP in Environmental Justice communities

The recommendations contained within the MVRTP should not have disproportionate adverse impacts on the region's low-income or minority communities. Negative impacts of the transportation system, such as air pollution, excessive noise and crashes would occur throughout the region. Similarly, negative impacts of transportation projects, such as construction effects and right-of-way acquisitions, would be associated with the improvements shown in Figures 7.1 and 7.2, and are not disproportionately located in low-income or minority communities.

The MVRTP does not reflect final alignments, design attributes or approvals for projects that are identified. Regionally significant projects can be conceptual in nature and may change after environmental impact

statements or other studies define specific details, such as exact alignment, cross-section, cost, construction schedule or operational details. Per federal requirements, environmental studies must be conducted before any transportation project involving federal funds or actions can be constructed. These studies must define mitigation, minimization or abatement strategies that address the following example environmental topics:

- noise levels
- right-of-way and property takings
- water quality
- parks
- site-specific air quality
- fish and wildlife
- social, community and economic impacts
- wetlands
- hazardous materials

Other Environmental Justice Considerations

DRCOG is in the process of preparing a Status and Impacts of DRCOG Transportation Planning and Programming with Environmental Justice report. This report describes how DRCOG incorporates environmental justice principles into its long- and short-range planning activities, with an emphasis on the MVRTP and the Transportation Improvement Program. The report also includes information on DRCOG's [Limited English Proficiency Plan](#) and [Civil Rights and Title VI](#) procedures.

C. Environmental Mitigation

The DRCOG region includes diverse environmental and ecological resources. These include extensive municipal, county, state and federal parks and public lands that are used by many residents and visitors, a comprehensive bicycle and pedestrian trail network, numerous areas of wildlife habitat of both Colorado

species of special concern and federally protected threatened and endangered species, and archaeological and historic resources. Protection of the environment is a key tenet in developing the region's multimodal transportation system.

The FAST Act contains requirements for identifying environmental resources potentially affected by the transportation plan. Figures 7.3-7.5 illustrate several features of the Denver region's environmental and ecological resources and features. Figure 7.3 shows regional open space, floodplains, lakes and rivers. Figure 7.4 shows habitat for federal- and state-designated threatened and endangered species, while Figure 7.5 shows large mammal habitats that are most common or pervasive in the Denver region (and thus may potentially have bearing in the transportation project development process). Finally, Figure 7.6 shows wildfire risk using data from the Colorado Wildfire Risk Assessment Portal.

It should be emphasized that identifying environmental resources and features at a regional scale is most useful for conceptual perspective and context. Doing so is not intended to address National Environmental Policy Act (NEPA) requirements that apply to the project development process, not to the MVRTP.

In addition to identifying environmental resources potentially affected by the transportation plan, the FAST Act also contains requirements to develop mitigation activities for natural and historic resources. Further, these mitigation strategies must be developed in consultation with federal, state and tribal wildlife, land management and regulatory agencies (resource agencies). Planning and environmental processes have historically been conducted separately from one another. However, as reinforced in the federal Metropolitan Planning Rule, it is congressional intent to more closely link them together to streamline the transportation planning and NEPA processes, reduce the duplication of work and expedite the delivery of transportation projects.

The following overall mitigation strategy applies generally to all resources in all corridors:

1. **Avoidance:** Alter the project so an impact does not occur.
2. **Minimization:** Modify the project to reduce the severity of the impact.
3. **Mitigation:** Undertake an action to alleviate or offset an impact or to replace an appropriated resource.

Examples of regional mitigation strategies include:

- **[Lynx in-lieu fee mitigation:](#)** Developed by CDOT, the Federal Highway Administration and the U.S. Fish and Wildlife Service, this effort allows individual transportation construction projects to contribute to a fund as their mitigation of impacts to Canada lynx. Doing so streamlined the mitigation process and facilitated a better conservation effort than if the funds were restricted to a specific project location or a lesser mitigation type. As CDOT notes, "it is the only in-lieu mitigation program for the Canada lynx in the country, and is the first in lieu fee bank to be run by a state department of transportation."
- **[Shortgrass Prairie Initiative:](#)** Also developed by CDOT, the Federal Highway Administration, the U.S. Fish and Wildlife Service, along with the Colorado Division of Wildlife and the Nature Conservancy, this initiative is preserving thousands of acres of shortgrass prairie in eastern Colorado while also improving the efficiency and effectiveness of environmental measures associated with CDOT's routine maintenance activities.

In developing the 2040 MVRTP, DRCOG participated in CDOT's Planning Insight Network (PIN), an interactive web-based mapping tool and process to solicit environmental consultation by resource agencies on major projects and travel corridors. DRCOG submitted to CDOT a representative list of major freeway and arterial roadway capacity projects to map in the PIN Tool

for consultation and comment by resource agencies. DRCOG then reviewed the comments received from resource agencies.

Specific mitigation strategies are developed as part of the NEPA environmental review process during project development activities. The project-level NEPA process is a separate and more detailed process than what is required for the MVRTP. Additionally, many regionally significant projects identified in the MVRTP are conceptual in nature, with exact alignment, design and other project scope elements to be determined in the project development process. For many projects, this process may not occur for years, or even decades.

However, many corridors in the DRCOG region are the sites of proposed improvements that have either recently completed the NEPA process with a Finding of No Significant Impact or a Record of Decision, or are currently undergoing the NEPA process. These NEPA studies are led by implementing agencies such as CDOT and RTD, and must undergo extensive coordination and consultation with resource and regulatory agencies as they are developed. These documents contain, or will contain, detailed mitigation strategies.

DRCOG staff often serve on technical committees and review draft project-level NEPA documents associated with the development process for specific projects and corridors. While it is the project sponsor's role to ensure compliance with all federal requirements, including NEPA, DRCOG staff review NEPA documents to ensure consistency – or a lack of conflicts with – the MVRTP and other DRCOG plans and programs.

DRCOG also participates in [CDOT's Transportation Environmental Resource Council](#) (TERC), a consortium of federal, state and local agencies to plan for environmental stewardship in the transportation planning process. CDOT also developed its [Environmental Stewardship Guide](#) to “assist internal and external users who want an overview of the transportation decision-making process and a better

understanding of the environmental considerations contained in that process.”

Numerous project- and corridor-level NEPA processes have been completed or initiated in the Denver region during the last several years, including:

- I-70 Central Environmental Impact Statement
- North I-25 Environmental Assessment
- I-25 Valley Highway Environmental Impact Statement
- C-470 Environmental Assessment
- I-25 Arapahoe Environmental Assessment
- U.S. Route 85: Titan Road/Highlands Ranch Parkway/Blakeland Drive NEPA and final design
- U.S. Route 85/C-470 Interchange final NEPA clearance and design
- State Highway 72 Alternative Analysis/NEPA
- State Highway 79 and U.S. Route 36 Grade Separation Environmental Assessment and Design Study
- Wadsworth (Wheat Ridge) Environmental Assessment

Additionally, numerous Planning and Environmental Linkage studies have been completed or initiated throughout the Denver region over the last several years. DRCOG's Unified Planning Work Program (UPWP) includes a list of ongoing planning studies and activities for fiscal year 2016-2017 by local governments, CDOT, RTD and other entities. These activities include:

- corridor, interchange, operational studies/ environmental assessments/environmental impact statements
- rapid transit station area or urban center master plans

Figure 7.3 Regional Open Space and Floodplains

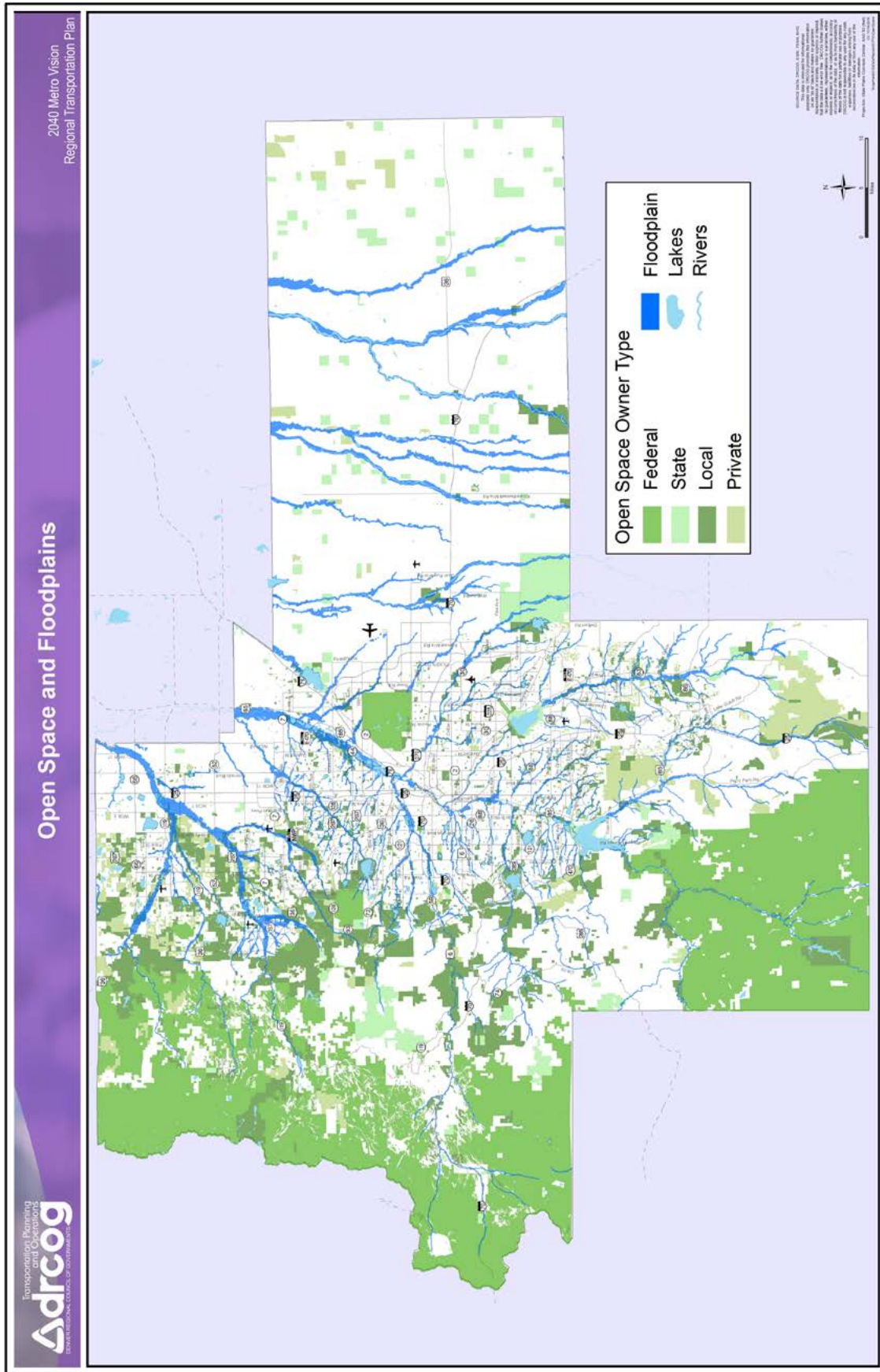


Figure 7.4 Threatened and Endangered Species Habitat

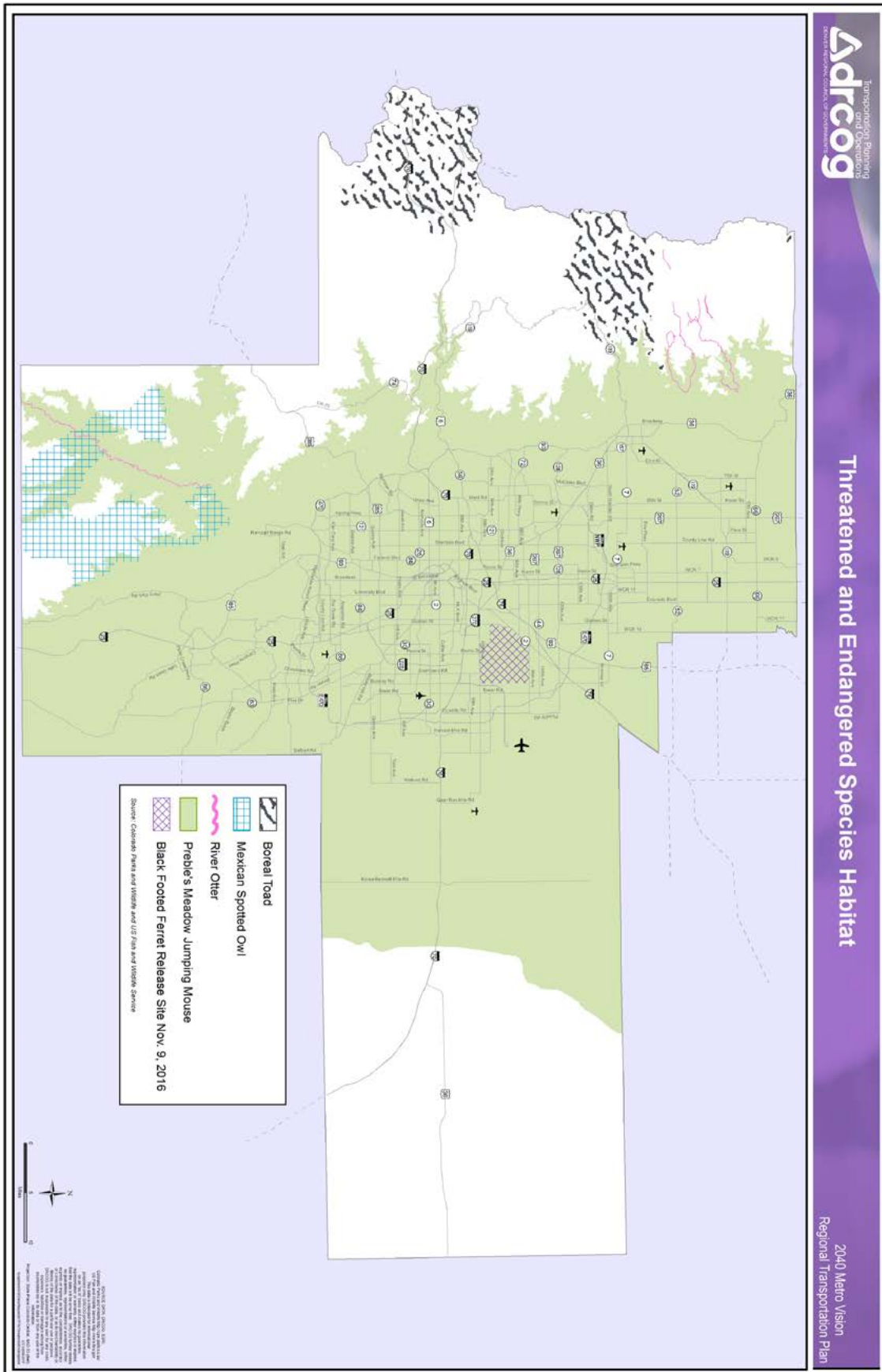
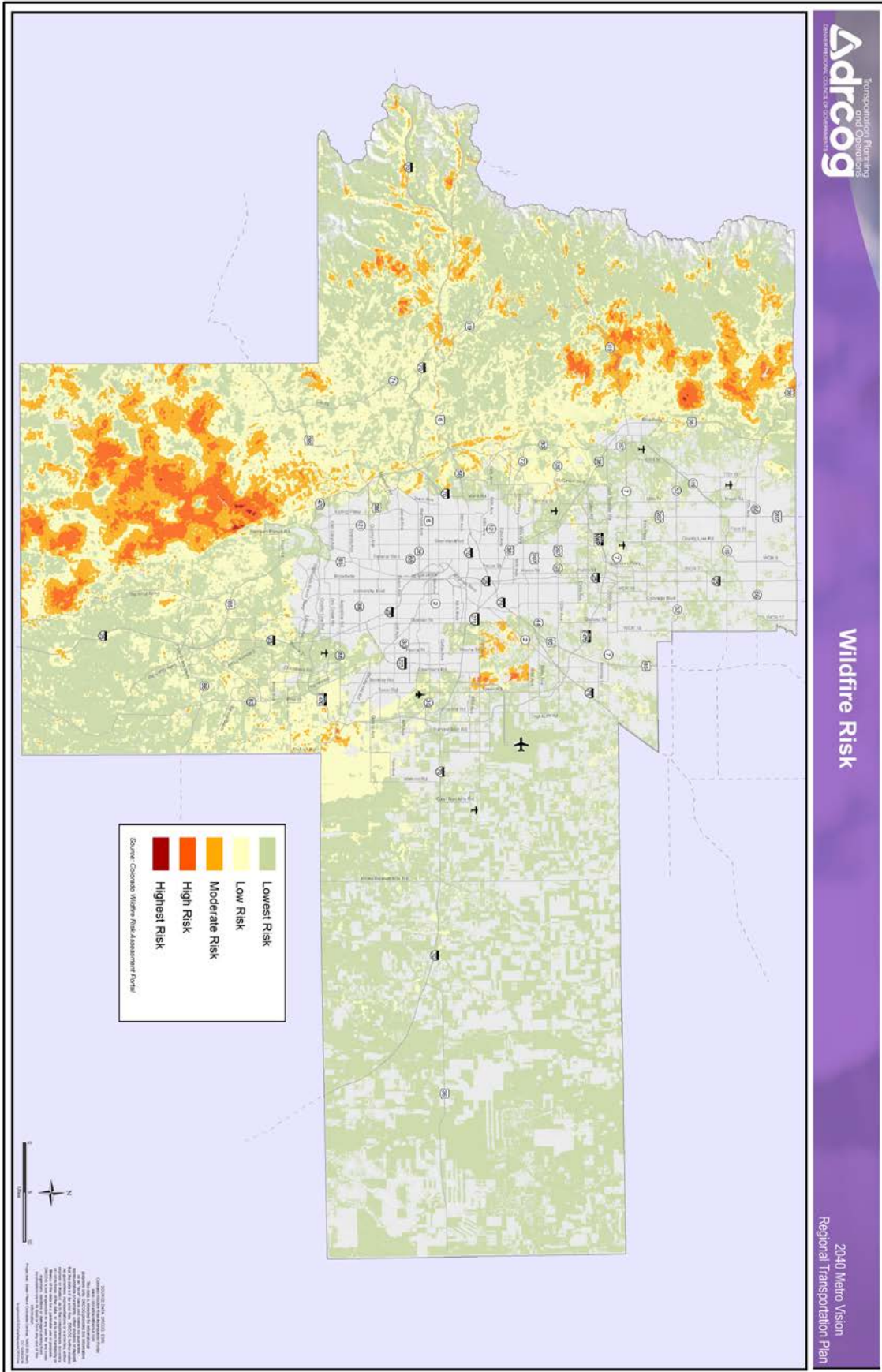


Figure 7.6 Wildfire Risk



- CDOT state planning and research program
- non-federally funded/local government planning activities

Finally, RTD issued a Programmatic Cumulative Effects Analysis in 2007 to evaluate the ecosystemwide cumulative effects of the FasTracks program. In addition to the impacts, the analysis describes three types of mitigation measures for each of the following resources: land use, water quality, air quality, energy, wetlands and social and environmental justice. They are: corridor mitigation (mitigation measures that can be implemented corridorwide), programmatic mitigation measures (measures that have already been agreed to by RTD or will eventually be implemented as each project advances) and recommended mitigation measures (suggested mitigation measures that RTD would support but are the responsibility of other organizations or entities).

D. Air Quality Conformity

The Clean Air Act, as amended in 1990, requires that federally funded transportation plans, programs and projects in non-attainment or maintenance areas conform to the State Implementation Plan for air quality. An air quality analysis of the 2040 MVRTP was prepared consistent with guidance issued by the Environmental Protection Agency in 2004. All criteria pollutants are forecast to decrease significantly through 2040, meaning that the 2040 MVRTP meets all federal air quality conformity requirements.

Coordination of transportation planning with the State Implementation Plan for air quality is accomplished through the participation of responsible air quality agencies at policy and technical committee levels in the decision-making process detailed above. The mountain area (Clear Creek and Gilpin counties) of the region is outside the air quality non-attainment/maintenance areas of the Denver region and is not subject to the conformity requirements. Eastern Adams and Arapahoe counties (east of Kiowa Creek) are not subject to PM₁₀ conformity requirements. To help ensure compliance

with the PM₁₀ SIP, 40 operating agencies have committed to reduce street sanding, substitute deicers for sand or increase street sweeping after snowfalls. These commitments are included in the conformity document.

The conformity of the 2040 MVRTP is documented in the *Denver Southern Subarea 8-Hour Ozone Conformity Determination for the DRCOG Fiscally Constrained 2040 Metro Vision Regional Transportation Plan and CO and PM₁₀ Conformity Determination for the DRCOG Fiscally Constrained 2040 Metro Vision Regional Transportation Plan* reports. These conformity documents demonstrate that the Denver region passes the federally prescribed emissions tests. The emissions tests involve comparisons with budgets which define the maximum amount of pollution which can be generated and still ensure attainment of the federal ambient air quality standard. All transportation projects of regional significance (federally, state- or locally funded) must be identified in the 2040 MVRTP by air quality staging period according to each project's estimated implementation. These projects also form the basis of future Transportation Improvement Program documents. The 2040 MVRTP meets all federal air quality conformity requirements by passing all emissions budget tests.

E. Conclusion

The 2040 Metro Vision Regional Transportation Plan addresses the challenges and guides the development of a multimodal transportation system over the next 25 years. Though current funding levels do not fully address the region's transportation needs, the MVRTP reflects the DRCOG region's collaborative and innovative problem-solving approach to maximize available resources. DRCOG's local governments and the region's transportation planning partners are working together to strengthen the region's multimodal transportation system to improve mobility, protect the environment and contribute to the region's desirable quality of life. As the region implement Metro Vision, the 2040 MVRTP will be modified accordingly.

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APPENDIX 1

Regionally Significant Roadway Capacity Project Selection Process

DRCOG-Funded Projects

DRCOG staff worked with the Transportation Advisory Committee to solicit and evaluate regionally significant roadway capacity candidate projects for regional funding. Projects in the 2035 RTP had not been thoroughly re-evaluated for many years because DRCOG's focus over the past three RTP update cycles had been on removing projects from the RTP due to the lack of revenues. With limited funds available for the 2040 Fiscally Constrained RTP (2040 FC RTP), DRCOG evaluated candidate projects to update the list of regionally significant roadway capacity projects.

Candidate projects were defined as:

- Projects already identified in the 2035 RTP with 100 percent locally derived funds
- Projects identified previously as vision unfunded projects
- New projects

DRCOG solicited candidate projects from local governments within the metropolitan planning organization area, Colorado Department of Transportation and the Regional Transportation District. Approximately 30 eligible projects were submitted for evaluation. These projects were scored together with approximately 20 projects *remaining* (construction not yet undertaken) in the 2035 RTP that were candidates for regional funding in the 2040 FC RTP.

Although several 2035 RTP projects evaluated were CDOT projects (submitted by CDOT or funded with CDOT-controlled revenues), CDOT did not submit any candidate projects for 2040 FC RTP evaluation. Instead, as described further below, CDOT separately submitted a list of fiscally constrained projects to be

funded with CDOT-controlled revenues for the 2040 FC RTP. Accordingly, the project evaluation, scoring and selection process described here was applied to roadway capacity projects seeking DRCOG-controlled regional funding (STP-Metro and CMAQ).

Project Scoring Evaluation Criteria

The Transportation Advisory Committee and a subset work group of local government technical staff reviewed and revised the criteria used to evaluate and score roadway capacity projects in previous RTP updates. The revised criteria, shown in Table A, were approved by the DRCOG Board in April 2014. As with previous versions, the revised criteria integrate and address Metro Vision goals and policy direction as of April 2014.

The criteria encompass several factors to evaluate projects from a high-level, comparative, long-range planning perspective using readily available data. Transportation criteria included congestion severity, cost per peak period person mile traveled, arterial roadway spacing, safety, intermodal and high security facilities, and rapid or frequent transit service. Land use criteria included serving urban and rural town centers and urban growth boundary/area status. Table A also summarizes the data used to evaluate projects and how the projects were scored.

The DRCOG Board and committees used the project evaluation and scoring process as the primary means to choose which projects to include in the fiscally constrained roadway network for air quality conformity modeling, given estimated project costs and anticipated available revenues through 2040. The evaluation and scoring process was viewed as the most objective and equitable way of making difficult project selection decisions, given limited available revenues. There were two additional considerations in this process:

- First, CDOT separately submitted its list of fiscally constrained roadway capacity projects to be funded with CDOT-controlled revenues. CDOT later included on its project list to fully fund a few projects that DRCOG evaluated and scored. Those projects, such as the U.S. Route 6/Wadsworth interchange reconstruction, were removed from the DRCOG candidate project list because CDOT included them on its list.
- Second, because a few candidate projects were eligible for Congestion Mitigation and Air Quality (CMAQ) funding, those projects were addressed separately. Scores from the main candidate list were retained for CMAQ-eligible projects, to demonstrate they merited selection for funding. With demonstrated merit, DRCOG removed them from the main candidate projects list, allowing consideration of remaining projects for the limited available STP-Metro funding.

TABLE A

Project Scoring Evaluation Criteria for 2040 RTP Regionally Significant Roadway Capacity Projects

DRCOG Board Approved April 16, 2014

	CRITERIA CATEGORY	POINT DISTRIBUTION PROCESS	MAXIMUM POINTS
1.	Congestion Severity (Existing and Future) <i>(current or parallel facility)</i> <i>Existing: Congestion Management Program (CMP) score</i> <i>Future: 2040 existing and committed network model</i>	Existing Congestion: Points (0-20) based on CMP score Future Congestion: Points (0-10) based on peak period (6.5 hours) volume/capacity ratio (v/c) > 0.54 Prorate by one-point increments based on range of values	30
2.	Cost per Peak Period Person Mile Traveled (PMT) <i>2040 model run</i>	Project cost divided by peak 6.5 hour PMT (from FOCUS Travel Model) Prorate by one-point increments based on range of values	17
3.	Gap Closure <i>Completes all or part of a lane or segment gap</i>	15 points if gap is completely closed, Eight points for partial gap closure (min 50% closure) (gap must be < 5 miles)	15
4.	Arterial Roadway Spacing <i>proximity to parallel Regional Roadway System facilities</i>	Five points if nearest parallel arterial is > 3 miles away Two points if > 1.5 miles away	5
5.	Regional Roadway System Classification <i>Freeways, major regional arterials, or National Highway System-principal arterial segments</i>	Four points for freeway Two points for major regional arterial (MRA) One point for principal arterial on National Highway System (NHS)	4
6.	Serves Urban Centers/Rural Town Center <i>Proximity to designated urban centers/rural town centers</i>	Five points if project is within or touching Three points for roadway segment project, if within 1/2 mile	5
7.	Safety Measure <i>Most recent three years of crash data</i>	Based on weighted crash rate (crashes/vmt) (Injury and fatal crashes factored by five) Eight points to 10% of projects with highest value Four points to next 15% of projects	8
8.	Urban Growth Boundary/Area <i>Is the project entirely within the urban growth boundary/area?</i>	Two points if the project is entirely within the contiguous urban growth boundary area (including preserved land)	2
9.	Serve Major Intermodal or High Security Facility <i>Denver International Airport, Union Station, general aviation airports, intermodal freight terminals, Buckley Air Force Base</i>	Four points if project is within or touching Two points if within 1 mile	4
10.	Rapid/Frequent Transit Corridor <i>Support of major transit corridors</i>	Rapid Transit Tier 1 Corridor: 10 points. 15 min. or better headway corridor (average weekday peak period): Five points	10
			100

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APPENDIX 2

Fiscally Constrained Park-n-Ride Lots and Transit Stations

RTD FACILITY NAME	TIER 1 RAPID TRANSIT CORRIDOR	STATUS	PARKING SPACES			
			EXISTING 2015	SPACES BY 2025	TOTAL 2040	NET CHANGE (2015-2040)
RAPID TRANSIT STATIONS WITH PARKING						
13th Ave	I-225	New	0	250	690	690
30th/Downing	Central Corridor	Existing	27	27	27	0
38th/Blake	East Corridor	New	0	200	500	500
40th/Colorado	East Corridor	New	0	200	1,800	1,800
41st/Fox	Gold Line (may be shared with Northwest Rail in future)	New	0	500	770	770
48th and Brighton at National Western Center	North Metro	New	0	40	40	40
60th/Sheridan-Arvada Gold Strike	Gold Line	New	0	330	330	330
61st/Peña Blvd	East Corridor	New	0	800	800	800
Alameda	Central Corridor	Existing	302	302	302	0
Arapahoe at Village Center	Southeast Corridor	Existing	1,115	817	817	-298
Arvada Ridge	Gold Line	New	0	280	280	280
Aurora Metro Center	I-225	New	0	200	200	200
Belleview	Southeast Corridor	Existing	59	59	59	0
Central Park	East Corridor	New	0	1,500	1,500	1,500
Clear Creek/Federal	Gold Line	New	0	280	370	370
Colorado	Southeast Corridor	Existing	363	363	363	0
Commerce City/72nd	North Metro	New	0	359	330	330
County Line	Southeast Corridor	Existing	388	388	388	0
Dayton	Southeast Corridor	Existing	250	250	250	0
Decatur-Federal	West Corridor	Existing	1,900	474	474	-1,426
Downtown Longmont	Northwest Rail	New	0	0	439	439

RTD FACILITY NAME	TIER 1 RAPID TRANSIT CORRIDOR	STATUS	PARKING SPACES			
			EXISTING 2015	SPACES BY 2025	TOTAL 2040	NET CHANGE (2015-2040)
RAPID TRANSIT STATIONS WITH PARKING						
Dry Creek	Southeast Corridor	Existing	235	235	235	0
Eastlake at 124th	North Metro	New	0	410	960	960
Englewood	Southwest Corridor	Expansion	910	910	1,350	440
Federal/Evans	Southwest Corridor	Existing	99	99	99	0
Federal Center	West Corridor	Existing	1,000	1,000	1,000	0
I-25/Broadway	Central Corridor	Existing	1,248	1,040	740	-508
Iliff	I-225	New	0	600	600	600
Jefferson County-Golden	West Corridor	Existing	705	705	705	0
Lakewood-Wadsworth	West Corridor	Existing	1,000	1,000	1,000	0
Lincoln	Southeast Corridor	Existing	1,734	1,734	1,734	0
Littleton/Downtown	Southwest Corridor	Existing	361	361	361	0
Littleton/Mineral Station	Southwest Corridor	Existing	1,227	1,227	1,227	0
Nine Mile	Southeast Corridor	Existing	1,225	1,225	1,225	0
Northglenn/112th	North Metro	New	0	316	1,200	1,200
Oak	West Corridor	Existing	200	200	200	0
Orchard	Southeast Corridor	Existing	48	48	48	0
Original Thornton at 88th	North Metro	New	0	561	1,500	1,500
Pecos Junction	Gold Line (may be shared with Northwest Rail in future)	New	0	300	300	300
Peoria	I-225/East Corridor	New	0	550	1,900	1,900
RidgeGate Parkway	Southeast Corridor	New	0	0	2,100	2,100
Second Avenue/Abilene	I-225	New	0	200	200	200
Sheridan	West Corridor	Existing	800	800	800	0
Southmoor	Southeast Corridor	Existing	788	788	788	0

RTD FACILITY NAME	TIER 1 RAPID TRANSIT CORRIDOR	STATUS	PARKING SPACES			
			EXISTING 2015	SPACES BY 2025	TOTAL 2040	NET CHANGE (2015-2040)
RAPID TRANSIT STATIONS WITH PARKING						
Thornton Crossroads at 104th	North Metro	New	0	907	1,460	1,460
University of Denver Station	Southeast Corridor	Existing	540	540	540	0
Westminster	Northwest Rail	New	0	350	925	925
Yale	Southeast Corridor	Existing	129	129	129	0
Subtotal			16,653	23,854	34,055	17,402

2040 METRO VISION REGIONAL TRANSPORTATION PLAN
APPENDIX 2: FISCALLY CONSTRAINED
PARK-N-RIDE LOTS AND TRANSIT STATIONS

RTD FACILITY NAME	TIER 1 RAPID TRANSIT CORRIDOR	STATUS	PARKING SPACES			
			EXISTING 2015	SPACES BY 2025	TOTAL 2040	NET CHANGE (2015-2040)
EXISTING PARK-N-RIDES (FUTURE RAPID TRANSIT STATIONS) WITH PARKING						
40th/Airport Blvd - Gateway Park	East Corridor	Expansion	1,079	1,079	2,200	1,121
Olde Town Arvada	Gold Line	Expansion	200	200	400	200
Table Mesa	US-36 BRT	Existing	824	824	824	0
US 36/Broomfield	US-36 BRT	Existing	940	940	1,810	870
US-36/Church Ranch	US-36 BRT	Existing	396	396	396	0
US-36/East Flatiron Circle	US-36 BRT	Existing	264	264	264	0
US-36/McCaslin	US-36 BRT	Existing	466	466	466	0
US-36/Sheridan	US-36 BRT	Existing	1,310	1,310	1,310	0
Wheat Ridge and Ward	Gold Line	Existing	491	440	440	-51
Subtotal			5,970	5,919	8,110	2,140
RAPID TRANSIT STATIONS WITHOUT PARKING						
10th/Osage	Central Corridor	Existing	N/A	N/A	N/A	N/A
16th St/California	Central Corridor	Existing	N/A	N/A	N/A	N/A
16th St/Stout	Central Corridor	Existing	N/A	N/A	N/A	N/A
18th St/California	Central Corridor	Existing	N/A	N/A	N/A	N/A
18th St/Stout	Central Corridor	Existing	N/A	N/A	N/A	N/A
20th St/Welton	Central Corridor	Existing	N/A	N/A	N/A	N/A
25th St/Welton	Central Corridor	Existing	N/A	N/A	N/A	N/A
27th St/Welton	Central Corridor	Existing	N/A	N/A	N/A	N/A
29th St/Welton (inactive)	Central Corridor	Existing (inactive)	N/A	N/A	N/A	N/A
Auraria at Colfax	Central Corridor	Existing	N/A	N/A	N/A	N/A
Auraria West	Central Platte Valley	Existing	N/A	N/A	N/A	N/A

RTD FACILITY NAME	TIER 1 RAPID TRANSIT CORRIDOR	STATUS	PARKING SPACES			
			EXISTING 2015	SPACES BY 2025	TOTAL 2040	NET CHANGE (2015-2040)
RAPID TRANSIT STATIONS WITHOUT PARKING						
Colfax	I-225	New	N/A	N/A	N/A	N/A
Denver Airport	East Corridor	New	N/A	N/A	N/A	N/A
Fitzsimons	I-225	New	N/A	N/A	N/A	N/A
Florida	I-225	Existing	N/A	N/A	N/A	N/A
Garrison	West Corridor	Existing	N/A	N/A	N/A	N/A
Knox	West Corridor	Existing	N/A	N/A	N/A	N/A
Lamar	West Corridor	Existing	N/A	N/A	N/A	N/A
Lone Tree City Center	Southeast Corridor	New	N/A	N/A	N/A	N/A
Louisiana / Pearl	Southeast Corridor	Existing	N/A	N/A	N/A	N/A
Oxford-City of Sheridan	Southwest Corridor	Existing	N/A	N/A	N/A	N/A
Pepsi Center/Elitch Gardens	Central Platte Valley	Existing	N/A	N/A	N/A	N/A
Perry	West Corridor	Existing	N/A	N/A	N/A	N/A
Red Rocks College	West Corridor	Existing	N/A	N/A	N/A	N/A
Sports Authority Field at Mile High	Central Platte Valley	Existing	N/A	N/A	N/A	N/A
Sky Ridge	Southeast Corridor	New	N/A	N/A	N/A	N/A
Theatre District/Convention Center	Central Corridor	Existing	N/A	N/A	N/A	N/A
TRANSIT/TRANSFER CENTERS						
Boulder Junction at Depot Square Station		Existing	75	75	75	0
Civic Center Station		Existing	0	0	0	0
Denver Union Station		Existing	0	0	0	0
Downtown Boulder Station		Existing	0	0	0	0
Subtotal			75	75	75	0

2040 METRO VISION REGIONAL TRANSPORTATION PLAN
APPENDIX 2: FISCALLY CONSTRAINED
PARK-N-RIDE LOTS AND TRANSIT STATIONS

FACILITY NAME	STATUS	PARKING SPACES			
		EXISTING 2015	SPACES BY 2025	TOTAL 2040	NET CHANGE (2015-2040)
RTD PARK-N-RIDE LOTS					
8th/Coffman	Existing	97	197	197	100
27th Way/Broadway	Existing	59	59	59	0
39th St/Table Mesa Drive	Existing	40	40	40	0
70th/Broadway	Existing	308	308	308	0
104th Ave/Revere	Existing	89	89	89	0
Alameda/Havana	Existing	128	128	128	0
Aspen Park	Existing	162	162	162	0
Bergen Park	Existing	160	160	160	0
Broadway Marketplace	Existing	221	221	221	0
Boulder Church of the Nazarene	Existing	49	49	49	0
C-470/University Blvd	Existing	440	440	440	0
El Rancho	Existing	36	36	36	0
Evergreen	Existing	45	45	45	0
Genesee Park	Existing	21	21	21	0
Highlands Ranch Town Center	Existing	177	177	177	0
Hwy 119 / Niwot	Existing	28	28	28	0
Ken Caryl / C-470	Existing	268	268	268	0
Lafayette	Existing	136	136	136	0
Lincoln/Jordan	Existing	102	102	102	0
Longmont (to be replaced by Downtown Longmont)	Existing	101	0	0	-101
Lutheran Church	Existing	41	41	41	0
Lyons	Existing	27	27	27	0
Montbello	Existing	84	84	84	0

2040 METRO VISION REGIONAL TRANSPORTATION PLAN
APPENDIX 2: FISCALLY CONSTRAINED
PARK-N-RIDE LOTS AND TRANSIT STATIONS

FACILITY NAME	STATUS	PARKING SPACES			
		EXISTING 2015	SPACES BY 2025	TOTAL 2040	NET CHANGE (2015-2040)
RTD PARK-N-RIDE LOTS					
Nederland	Existing	75	75	75	0
Olympic Park	Existing	152	152	152	0
Paradise Hills	Existing	26	26	26	0
Parker	Existing	173	173	173	0
Pine Junction	Existing	92	92	92	0
Pinery	Existing	79	79	79	0
SH-72/SH-93	Existing	14	14	14	0
Smoky Hill/Picadilly	Existing	55	55	55	0
Southwest Plaza	Existing	200	200	200	0
Stapleton (Replaced by Central Park Station in 2016)	Existing	1,314	0	0	-1,314
Tantra Drive/Table Mesa	Existing	105	105	105	0
Thornton	Existing	817	817	817	0
US-285 / Mountain View	Existing	183	183	183	0
US-285 / Twin Forks	Existing	77	77	77	0
US-287/Niwot Rd	Existing	40	40	40	0
US-287/Ute Rd (State Highway 66)	New	0	150	150	150
US-85 / 72nd Avenue (to be replaced by 72nd Avenue Station)	Existing	83	0	0	-83
US-85 / Bridge St	Existing	234	234	234	0
Wadsworth / Hampden	Existing	284	284	284	0
Wagon Rd	Existing	1,540	1,540	1,540	0
Subtotal		8,362	7,114	7,114	-1,248

2040 METRO VISION REGIONAL TRANSPORTATION PLAN
APPENDIX 2: FISCALLY CONSTRAINED
PARK-N-RIDE LOTS AND TRANSIT STATIONS

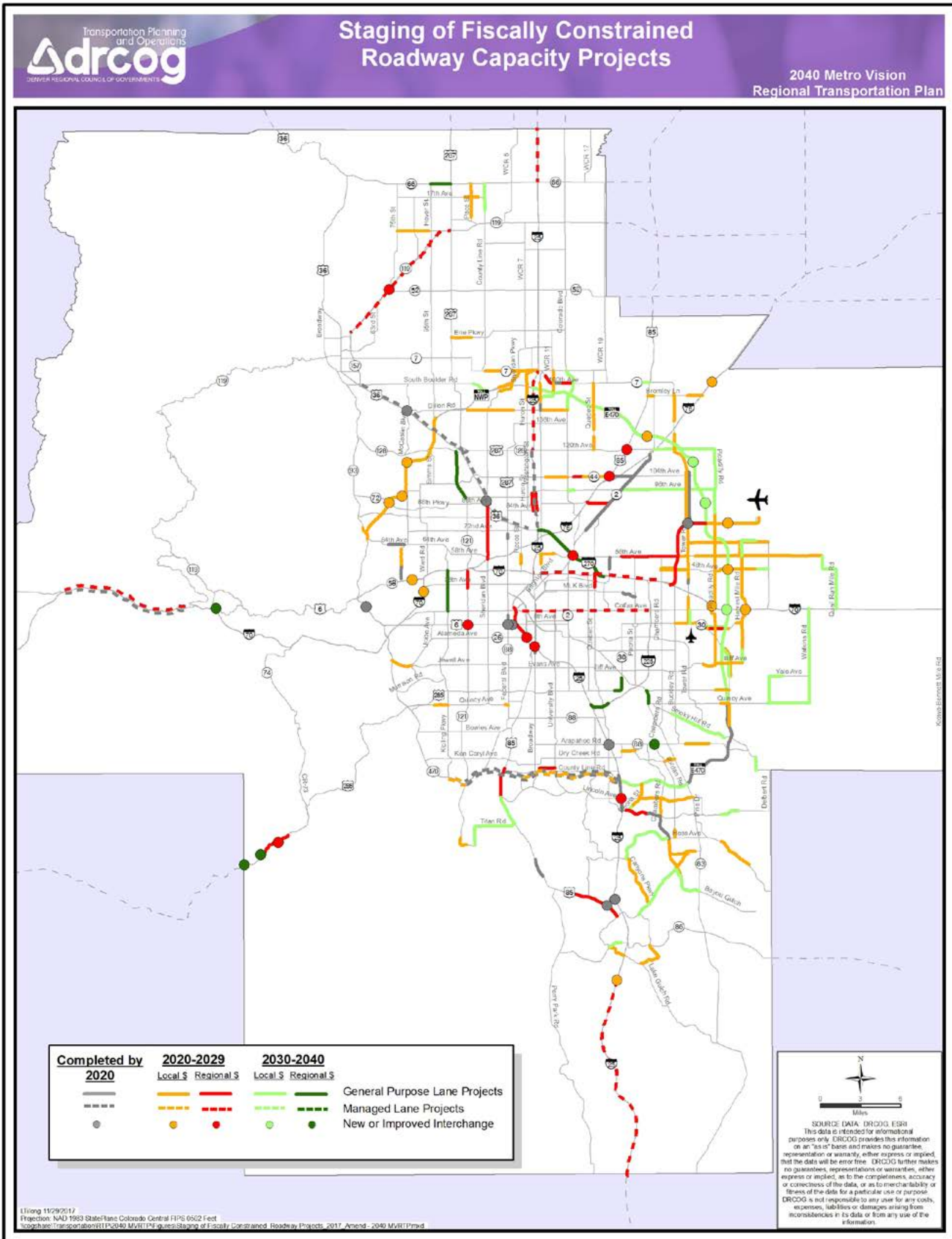
FACILITY NAME	STATUS	PARKING SPACES			
		EXISTING 2015	SPACES BY 2025	TOTAL 2040	NET CHANGE (2015-2040)
CDOT CARPOOL LOTS					
Castle Pines Parkway	Existing	106	106	106	0
Hogback	Existing	512	512	512	0
I-25/SH-52	Existing	94	94	94	0
I-25/SH-66	Existing	56	56	56	0
I-25/SH-119	Existing	102	102	102	0
I-25/Weld County Road 8	Existing	56	56	56	0
Subtotal		926	926	926	0
Grand Total Parking Spaces		31,986	37,888	50,280	18,294

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APPENDIX 3

Staging of Fiscally Constrained Roadway Projects



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APPENDIX 4

2040 Metro Vision Regional Transportation Plan

Fiscally Constrained Roadway and Rapid Transit Capacity Improvements

Remaining Project Cost Allocations (Fiscal Years 2016 to 2040) | February 2018

ROADWAY	CDOT ROAD	PROJECT LOCATION (LIMITS)	IMPROVEMENT TYPE	LENGTH (MILES)	NETWORK STAGING PERIOD	REMAINING PROJECT COST (FY 15S, MILLIONS)	COUNTY
A. REGIONAL ROADWAY SYSTEM PROJECTS							
1. Regionally Funded with DRCOG-Controlled Funds							
6th Pkwy.		SH-30/Liverpool St. to E-470	New 2 Lane Road	1.3	2020-2029	\$19.9	Arapahoe
56th Ave.		Havana St. to Peña Blvd.	Widen from 2 to 6 Lanes	4.3	2020-2029	\$45.0	Denver
88th Ave.		I-76 Northbound Ramps to SH-2	Widen from 2 to 4 Lanes	1.7	2020-2029	\$21.5	Adams
104th Ave.	SH-44	Grandview Ponds to McKay Rd.	Widen from 2 to 4 Lanes	0.7	2020-2029	\$8.1	Adams
120th Ave.		Allison St. to Emerald St.	New 6 Lanes	0.4	2015-2019	\$0.0 ⁽¹⁾	Broomfield
Arapahoe Rd.	SH-88	Havana St. (or Jordan Rd.)	New Grade Separation		2030-2040	\$16.0	Arapahoe
County Line Rd.		Phillips St. to University Blvd.	Widen from 2 to 4 Lanes	1.2	2020-2029	\$9.5	Douglas
Hampden Ave./ S. Havana St.	SH-30	Florence St. to South of Yale Ave.	Widen from 5 to 6 Lanes	1.4	2030-2040	\$14.0	Denver
I-25	I-25	Lincoln Ave.	Interchange Capacity		2020-2029	\$49.4	Douglas
I-25	I-25	Broadway	Interchange Capacity		2020-2029	\$50.0	Denver
I-25	I-25	RidgeGate Pkwy. to County Line Rd. South Ramps	Widen from 6 to 8 Lanes	2.7	2015-2019	\$0.0 ⁽¹⁾	Douglas
I-70	I-70	I-25 to Chambers Rd.	Add 2 New Managed Lanes	3.8	2020-2029	\$1,175.7 ⁽²⁾	Denver/Adams
Kipling St.	SH-391	Colfax Ave. to I-70	Widen from 4 to 6 Lanes	3.0	2030-2040	\$18.0	Jefferson
Martin Luther King Jr. Blvd.		Havana St./Iola St. to Peoria St.	Widen 2 to 4 Lanes; New 4 Lane Road	1.0	2015-2019	\$15.0	Denver
Parker Rd.	SH-83	Quincy Ave. to Hampden Ave.	Widen from 6 to 8 Lanes	1.0	2030-2040	\$18.5	Arapahoe
Peña Blvd.		I-70 to E-470	Widen from 4 to 8 Lanes	6.4	2020-2029	\$55.0	Denver
Quebec St.	SH-35	35th Ave. to Sand Creek Dr. S.	Widen from 4 to 6 Lanes	1.2	2020-2029	\$11.0	Denver
RidgeGate Pkwy.		Havana St. to Lone Tree E. City Limit	Widen from 2 to 4 Lanes	1.8	2020-2029	\$8.0	Douglas
SH-7	SH-7	164th Ave. to Dahlia St.	Widen from 2 to 4 Lanes	2.2		\$24.0	Adams
		164th Ave. to York St.	Widen from 2 to 4 Lanes	0.8	2020-2029		Adams
		Big Dry Creek to Dahlia St.	Widen from 2 to 4 Lanes	0.8	2020-2029		Adams
Sheridan Blvd.	SH-95	I-76 to US-36	Widen from 4 to 6 Lanes	4.5	2020-2029	\$23.0	Adams/Jefferson
US-6	US-6	Federal Blvd. to Bryant St.	Interchange Capacity		2015-2019	\$0.0 ⁽¹⁾	Denver
US-36	US-36	I-25 Express Lanes to Table Mesa Dr.	Add 1 Toll/Managed Lane Each direction	17.2	2015-2019	\$0.0 ⁽¹⁾	Regional

ROADWAY	CDOT ROAD	PROJECT LOCATION (LIMITS)	IMPROVEMENT TYPE	LENGTH (MILES)	NETWORK STAGING PERIOD	REMAINING PROJECT COST (FY 15\$ MILLIONS)	COUNTY
US-36	US-36	Sheridan Blvd.	Interchange Capacity		2015-2019	\$0.0 ⁽¹⁾	Jefferson
US-85	US-85	Highlands Ranch Pkwy. to North of County Line Rd.	Widen from 4 to 6 Lanes	2.1	2020-2029	\$50.1	Douglas
Wadsworth Blvd.	SH-121	35th Ave. to 48th Ave.	Widen from 4 to 6 Lanes	1.2	2020-2029	\$31.0	Jefferson
Wadsworth Pkwy.	SH-121	92nd Ave. to SH-128	Widen from 4 to 6 Lanes	3.7	2030-2040	\$31.6	Jefferson
					A.1. Subtotal:	\$1,694.3	

Notes

(1) Project funds have been fully obligated prior to fiscal year 2015; project was under construction in fiscal year 2015.

(2) Includes DRCOG contribution of \$50 million. CDOT-derived funds make up \$1,125.7 billion.

2. Regionally Funded with CDOT-Controlled Funds							
C-470	C-470	Wadsworth Blvd. to I-25	Add Toll Managed Lanes			\$220.0	Douglas/ Jefferson
		<i>Eastbound: Wadsworth Blvd. to I-25</i>	<i>Add 1 New Toll/Managed Lane</i>	10.8	2015-2019		Douglas/ Jefferson
		<i>Westbound: I-25 to Colorado Blvd.</i>	<i>Add 2 New Toll/Managed Lanes</i>	4.1	2015-2019		Douglas
		<i>Westbound: Colorado Blvd. to Wadsworth Blvd.</i>	<i>Add 1 New Toll/Managed Lane</i>	8.2	2015-2019		Douglas/ Jefferson
Federal Blvd.	SH-88	6th Ave. to Howard Pl.	Widen from 5 to 6 Lanes	0.8	2015-2019	\$23.4	Denver
I-25	I-25	El Paso County Line to North of Crystal Valley Pkwy.	Add 1 Toll/Managed Lane in Each Direction	15.7	2020-2029	\$300.0	Douglas
I-25	I-25	Arapahoe Rd.	Interchange Capacity		2015-2019	\$50.4	Arapahoe
I-25	I-25	Santa Fe Dr. (US-85) to Alameda Ave.	Interchange Capacity		2020-2029	\$27.0	Denver
I-25	I-25	Alameda Ave. to Walnut St. (Bronco Arch)	Add 1 New Lane in Each Direction	2.6	2020-2029	\$30.0	Denver
I-25	I-25	84th Ave. to Thornton Pkwy.	Add 1 New Northbound Lane	1.3	2020-2029	\$30.0	Adams
I-25	I-25	84th Ave. to Thornton Pkwy.	Add 1 New Southbound Lane	1.3	2020-2029	30.0	Adams
I-25	I-25	US-36 to 120th Ave.	Add 1 Toll/Managed Lane Each direction	5.9	2015-2019	\$68.5	Adams
I-25	I-25	120th Ave. to SH-7	Add 1 Toll/Managed Lane Each direction	6.0	2020-2029	\$55.0	Adams/ Broomfield
I-25	I-25	SH-66 to WCR 38 (DRCOG Boundary)	Add 1 Toll/Managed Lane Each direction	4.1	2020-2029	\$172.0	Weld
I-225	I-225	I-25 to Yosemite St.	Interchange Capacity		2030-2040	\$43.0	Denver
I-70	I-70	Empire Junction (US-40) to Twin Tunnels	Add/Convert 1 New East-bound Peak Period Managed Lane	9.6	2015-2019	\$24.0	Clear Creek

ROADWAY	CDOT ROAD	PROJECT LOCATION (LIMITS)	IMPROVEMENT TYPE	LENGTH (MILES)	NETWORK STAGING PERIOD	REMAINING PROJECT COST (FY 15\$, MILLIONS)	COUNTY
2. Regionally Funded with CDOT-Controlled Funds (continued)							
I-70	I-70	Twin Tunnels to Empire Junction (US-40)	Add 1 Westbound Peak Period Managed Lane	9.6	2020-2029	\$50.0	Clear Creek
I-70	I-70	Vicinity of US-6 and Floyd Hill	TBD		2030-2040	\$100.0	Clear Creek
I-270	I-270	I-25 to I-70	Widen from 4 to 6 Lanes	6.3	2030-2040	\$160.0	Adams
I-270	I-270	Vasquez Blvd. (US 6/85)	Interchange Capacity		2020-2029	\$60.0	Adams
SH-66	SH-66	Hover St. to Main St. (US-287)	Widen from 2 to 4 Lanes	1.5	2030-2040	\$19.0	Boulder
SH-119	SH-119	SH-52	New Interchange		2020-2029	\$30.0	Boulder
US-6	US-6	19th St.	New Interchange		2015-2019	\$20.0	Jefferson
US-6	US-6	Wadsworth Blvd.	Interchange Capacity		2020-2029	\$60.0	Jefferson
US-85	US-85	Meadows Pkwy. to Louviers Ave.	Widen from 2 to 4 Lanes	5.7		\$59.0	Douglas
		<i>Meadows Pkwy. to Daniels Park Rd.</i>			2020-2029		
		<i>Daniels Park Rd. to SH-67 (Sedalia)</i>			2020-2029		
		<i>MP 191.75 to Louviers Ave.</i>			2015-2019		
US-85	US-85	104th Ave.	New Interchange		2020-2029	\$65.0	Adams
US-85	US-85	120th Ave.	New Interchange		2020-2029	\$65.0	Adams
US-285	US-285	Pine Junction to Richmond Hill					
		<i>Pine Valley Rd. (CR 126)/Mt Evans Blvd.</i>	<i>New Interchange</i>		2030-2040	\$14.0	Jefferson
		<i>Kings Valley Dr.</i>	<i>New Interchange</i>		2020-2029	\$11.0	Jefferson
		<i>Kings Valley Dr. to Richmond Hill Rd.</i>	<i>Widen from 3 to 4 Lanes (Add 1 Southbound Lane)</i>	0.9	2020-2029	\$10.0	Jefferson
		<i>Shaffers Crossing to Kings Valley Dr.</i>	<i>Widen from 3 to 4 Lanes (Add 1 Southbound Lane)</i>	1.4	2020-2029	\$12.0	Jefferson
		<i>Parker Ave.</i>	<i>New Interchange</i>		2030-2040	\$9.0	Jefferson
A.2. Subtotal:						\$1,817.3	

3. 100% Locally Derived Funding							
6th Ave.		Airport Blvd. to Tower Rd.	Widen from 2 to 6 Lanes	1.0	2020-2029	\$10.2	Arapahoe
6th Ave.	SH-30	Tower Rd. to 6th Pkwy.	Widen from 2 to 6 Lanes	1.6	2020-2029	\$14.1	Arapahoe
6th Pkwy.		SH-30 to E-470	Widen from 2 to 6 Lanes	1.3	2030-2040	\$34.9	Arapahoe
6th Pkwy.		E-470 to Gun Club Rd.	Widen from 2 to 6 Lanes	0.3	2020-2029	\$4.9	Arapahoe
6th Ave.		6th Pkwy. to Harvest Mile Rd.	Widen from 2 to 6 Lanes	0.4	2020-2029	\$13.2	Arapahoe
17th Ave.		Alpine St. to Ute Creek Dr.	Widen from 2 to 4 Lanes	1.0	2020-2029	\$2.3	Boulder

ROADWAY	CDOT ROAD	PROJECT LOCATION (LIMITS)	IMPROVEMENT TYPE	LENGTH (MILES)	NETWORK STAGING PERIOD	REMAINING PROJECT COST (FY 15S, MILLIONS)	COUNTY
3. 100% Locally Derived Funding (continued)							
48th Ave.		Imboden Rd. to Quail Run Rd.	Widen from 2 to 6 Lanes	1.0	2030-2040	\$9.7	Adams
48th Ave.		Picadilly Rd. to Powhaton Rd.	New 6 Lanes	3.0	2020-2029	\$40.7	Adams
48th Ave.		Powhaton Rd. to Monaghan Rd.	New 6 Lanes	1.0	2030-2040	\$13.6	Adams
56th Ave.		E-470 to Imboden Rd.	Widen from 2 to 6 Lanes	7.0	2020-2029	\$67.9	Adams
56th Ave.		Picadilly Rd. to E-470	Widen from 2 to 6 Lanes	1.0	2020-2029	\$9.7	Adams
56th Ave.		Dunkirk St. to Himalaya St.	Widen from 4 to 6 Lanes	0.5	2020-2029	\$11.5	Denver
56th Ave.		Himalaya St. to Picadilly Rd.	Widen from 2 to 6 Lanes	1.0	2020-2029	\$5.8	Denver
56th Ave.		Peña Blvd. to Tower Rd.	Widen from 4 to 6 Lanes	0.7	2020-2029	\$17.3	Denver
58th Ave.		Washington St. to York St.	Widen from 2 to 4 Lanes	1.0	2020-2029	\$10.4	Adams
64th Ave.		Denver/Aurora City Limit to Himalaya St.	Widen from 2 to 6 Lanes	0.5	2020-2029	\$6.5	Adams
64th Ave.		Harvest Mile Rd. to Powhaton Rd.	New 2 Lanes	1.0	2020-2029	\$6.5	Adams
64th Ave.		Harvest Mile Rd. to Powhaton Rd.	Widen from 2 to 4 Lanes	1.0	2030-2040	\$10.9	Adams
64th Ave.		Himalaya Rd. to Harvest Mile Rd.	Widen from 2 to 4 Lanes	3.0	2020-2029	\$12.3	Adams
64th Ave.		Powhaton Rd. to Monaghan Rd.	New 4 Lanes	1.0	2020-2029	\$6.7	Adams
64th Ave.		Tower Rd. to Denver/Aurora City Limits	Widen from 2 to 4 Lanes	0.5	2020-2029	\$0.7	Denver
64th Ave.		Terry St. to Kendrick Dr.	Widen from 2 to 4 Lanes	1.2	2015-2019	\$6.4	Jefferson
96th Ave.		SH-2 to Tower Road	Widen from 2 to 4 Lanes	5.0	2030-2040	\$46.7	Adams
96th Ave.		Tower Rd. to Picadilly Rd.	Widen from 2 to 6 Lanes	2.0	2030-2040	\$14.7	Adams
96th St.		96th St. at NorthWest Pkwy. to SH-128	Add Toll Lanes	2.3	2020-2029	\$39.4	Broomfield
104th Ave.		Marion St. to Colorado Blvd	Widen from 4 to 6 Lanes	1.6	2020-2029	\$6.3	Adams
104th Ave.		US-85 to SH-2	Widen from 2 to 4 Lanes	1.8	2015-2019	\$41.2	Adams
104th Ave.	SH-44	McKay Road to US-85	Widen from 2 to 4 Lanes	1.9	2020-2029	\$40.6	Adams
120th Ave.		Sable Blvd. to E-470	Widen from 2 to 6 Lanes	2.0	2030-2040	\$29.7	Adams
120th Ave.		E-470 to Picadilly Rd.	Widen from 2 to 6 Lanes	2.6	2030-2040	\$15.5	Adams
144th Ave.		Washington St. to York St.	Widen from 2 to 4 Lanes	1.0	2020-2029	\$12.8	Adams
144th Ave.		York St. to Colorado Blvd.	Widen from 2 to 4 Lanes	1.0	2020-2029	\$10.4	Adams
144th Ave.		US-287 to Zuni St.	Widen from 2 to 4 Lanes	3.5	2020-2029	\$21.2	Broomfield
152nd Ave.		Washington St. to York St.	Widen from 2 to 4 Lanes	1.2	2030-2040	\$11.1	Adams
160th Ave.		Lowell Blvd. to Sheridan Pkwy.	New 2 Lanes	1.0	2020-2029	\$3.8	Broomfield
Alameda Ave.		McIntyre St. to Rooney Rd.	Widen from 2 to 6 Lanes	0.3	2020-2029	\$2.6	Jefferson
Alameda Ave.		Bear Creek Blvd. to McIntyre St.	Widen from 2 to 4 Lanes	1.3	2020-2029	\$7.6	Jefferson

ROADWAY	CDOT ROAD	PROJECT LOCATION (LIMITS)	IMPROVEMENT TYPE	LENGTH (MILES)	NETWORK STAGING PERIOD	REMAINING PROJECT COST (FY 15S, MILLIONS)	COUNTY
3. 100% Locally Derived Funding (continued)							
Arapahoe Rd.		Himalaya Way to Liverpool St.	Widen from 4 to 6 Lanes	0.5	2020-2029	\$6.2	Arapahoe
Arapahoe Rd.		Waco St. to Himalaya St.	Widen from 2 to 6 Lanes	1.3	2020-2029	\$20.4	Arapahoe
Bayou Gulch Rd. / Chambers Rd.		Parker Road to Parker S. Town Limit	Widen from 0/2 to 4 Lanes	2.4	2030-2040	\$18.4	Douglas
Broadway		Arizona Ave. to Mississippi Ave.	Widen from 4 to 6 Lanes	0.1	2015-2019	\$2.5	Denver
Broadway		Kentucky Ave. to Exposition Ave.	Widen from 4 to 6 Lanes	0.3	2015-2019	\$4.8	Denver
Broadway		Mississippi Ave. to Kentucky Ave.	Widen from 6 to 8 Lanes	0.3	2015-2019	\$5.0	Denver
Broncos Pkwy.		Jordan Rd. to Parker Rd.	Widen from 4 to 6 Lanes	0.8	2020-2029	\$6.9	Arapahoe
Broncos Pkwy.		Havana St. to Peoria St.	Widen from 4 to 6 Lanes	1.0	2020-2029	\$8.1	Arapahoe
Buckley Rd.		118th Ave. to Cameron Dr.	Widen from 2 to 6 Lanes	1.3	2020-2029	\$13.9	Adams
Buckley Rd.		136th Ave. to Bromley Ln.	Widen from 2 to 4 Lanes	2.0	2020-2029	\$7.8	Adams
C-470	C-470	S. Kipling Pkwy. to I-25	Add New Toll/Managed Lanes				
		<i>Westbound: Wadsworth Blvd. to S. Kipling Pkwy.</i>	<i>Add 1 Toll/Managed Lane</i>	1.4	2020-2029	\$45.0	Jefferson
		<i>Eastbound: S. Kipling Pkwy. to Wadsworth Blvd.</i>	<i>Add 1 Toll/Managed Lane</i>	3.0	2020-2029		Jefferson
		<i>Westbound: Colorado Blvd. to Lucent Blvd.</i>	<i>Add 1 Toll/Managed Lane</i>	3.7	2020-2029	\$120.0	Douglas
		<i>Eastbound: Broadway to I-25</i>	<i>Add 1 Toll/Managed Lane</i>	6.6	2020-2029		Douglas
Canyons Pkwy.		Crowfoot Valley Rd. to Hess Rd.	New 4 Lanes	4.1	2020-2029	\$19.1	Douglas
Central Park Blvd.		47th Ave. (Northfield Blvd.) to 56th Ave.	New 4 Lanes	0.9	2015-2019	\$4.3	Denver
Chambers Rd.		Crowfoot Valley Road to Parker S. Town Limit	New 2 Lanes	0.7	2020-2029	\$3.1	Douglas
Chambers Rd.		Crowfoot Valley Road to Parker S. Town Limit	Widen from 2 to 4 Lanes	0.7	2030-2040	\$3.1	Douglas
Chambers Rd.		Crowfoot Valley Rd. to Hess Rd.	New 4 Lanes	2.3	2020-2029	\$15.4	Douglas
Chambers Rd.		Hess Rd. to Mainstreet	Widen from 2 to 4 Lanes	1.9	2015-2019	\$12.6	Douglas
Chambers Rd.		Mainstreet to Lincoln Ave.	Widen from 2 to 4 Lanes	1.4	2020-2029	\$4.4	Douglas
Colorado Blvd.		144th Ave. to 168th Ave.	Widen from 0/2 to 4 Lanes	3.7	2030-2040	\$23.5	Adams
Crowfoot Valley Rd.		Stroh Rd. to Chambers Rd.	Widen from 2 to 4 Lanes	1.4	2020-2029	\$6.4	Douglas
Crowfoot Valley Rd.		Macanta Rd. to Chambers Rd.	Widen from 2 to 4 Lanes	3.6	2030-2040	\$22.9	Douglas
Crowfoot Valley Rd.		Founders Pkwy. to Macanta Rd.	Widen from 2 to 4 Lanes	1.1	2030-2040	\$5.1	Douglas
E. Bromley Ln.		Hwy 85 to Sable Blvd.	Widen from 4 to 6 Lanes	0.5	2020-2029	\$1.3	Adams
E. Bromley Ln.		Tower Rd. to I-76	Widen from 4 to 6 Lanes	1.1	2020-2029	\$1.9	Adams

ROADWAY	CDOT ROAD	PROJECT LOCATION (LIMITS)	IMPROVEMENT TYPE	LENGTH (MILES)	NETWORK STAGING PERIOD	REMAINING PROJECT COST (FY 15S, MILLIONS)	COUNTY
3. 100% Locally Derived Funding (continued)							
E-470		48th Ave.	Add New Interchange		2020-2029	\$26.9	Adams
E-470		88th Ave.	Add New Interchange		2030-2040	\$17.6	Adams
E-470		I-25 North to I-76	Widen from 4 to 6 Lanes	11.0	2030-2040	\$100.0	Adams
E-470		Potomac	Add New Interchange		2020-2029	\$15.0	Adams
E-470		112th Ave.	Add New Interchange		2030-2040	\$17.6	Adams
E-470		I-70 to Peña Blvd.	Widen from 4 to 6 Lanes	7.4	2030-2040	\$29.3	Adams/Denver
E-470		Peña Blvd. to I-76	Widen from 4 to 6 Lanes	7.6	2030-2040	\$60.0	Adams/Denver
E-470		I-25 to Parker Rd.	Widen from 6 to 8 Lanes	5.5	2030-2040	\$45.0	Arapahoe
E-470		Parker Rd. to Quincy Ave.	Widen from 4 to 6 Lanes	8.1	2015-2019	\$80.0	Arapahoe/Douglas
E-470		Quincy Ave. to I-70	Widen from 4 to 6 Lanes	7.0	2030-2040	\$60.0	Arapahoe
East County Line Rd.		9th Ave. to SH-66	Widen from 2 to 4 Lanes	2.0	2030-2040	\$9.8	Boulder
Erie Pkwy.		US-287 to 119th St.	Widen from 2 to 4 Lanes	1.5	2020-2029	\$14.6	Boulder
Green Valley Ranch Blvd.		Chambers Rd. to Telluride St.	Widen from 4 to 6 Lanes	1.5	2020-2029	\$9.9	Denver
Green Valley Ranch Blvd.		Chambers Rd. to Peña Blvd.	Widen from 2 to 4 Lanes	1.0	2020-2029	\$2.4	Denver
Green Valley Ranch Blvd.		Telluride St. to Tower Rd.	Widen from 4 to 6 Lanes	0.5	2020-2029	\$1.7	Denver
Gun Club Rd.		1.5 Miles South of Quincy Ave. to Quincy Ave.	Widen from 2 to 6 Lanes	1.6	2020-2029	\$26.7	Arapahoe
Gun Club Rd.	SH-30	Yale Ave. to Mississippi Ave.	Widen from 2/4 to 6 Lanes	2.1	2030-2040	\$10.9	Arapahoe
Hampden Ave.		Picadilly Rd. to Gun Club Rd.	Widen from 2 to 4 Lanes	1.1	2020-2029	\$12.4	Arapahoe
Harvest Mile Rd.		56th Ave. to 64th Ave.	New 3 Lanes	1.0	2020-2029	\$6.5	Adams
Harvest Mile Rd.		56th Ave. to 64th Ave.	Widen from 3 to 6 Lanes	1.0	2030-2040	\$7.8	Adams
Harvest Mile Rd.		I-70 to 56th Ave.	New 6 Lanes	4.1	2020-2029	\$54.3	Adams
Harvest Mile Rd.		Jewell Ave. to Mississippi Ave.	Widen from 2 to 6 Lanes	1.0	2030-2040	\$13.3	Arapahoe
Harvest Rd.		6th Ave. to I-70	New 6 Lanes	1.1	2020-2029	\$13.3	Adams
Harvest Rd.		Alameda Ave. to 6th Ave.	Widen from 3 to 6 Lanes	1.0	2020-2029	\$6.7	Arapahoe
Harvest Rd.		Mississippi Ave. to Alameda Ave.	New 6 Lanes	1.0	2020-2029	\$13.3	Arapahoe
Hess Rd.		I-25 to Chambers Rd.	Widen from 2 to 4 Lanes	5.1	2030-2040	\$44.5	Douglas
Hilltop Rd.		Canterberry Pkwy. to Singing Hills Rd.	Widen from 2 to 4 Lanes	2.7	2020-2029	\$17.8	Douglas
Huron St.		150th Ave. to 160th Ave.	Widen from 2 to 4 Lanes	1.3	2020-2029	\$8.6	Broomfield
Huron St.		160th Ave. to SH-7	Widen from 2 to 4 Lanes	1.2	2020-2029	\$5.1	Broomfield

ROADWAY	CDOT ROAD	PROJECT LOCATION (LIMITS)	IMPROVEMENT TYPE	LENGTH (MILES)	NETWORK STAGING PERIOD	REMAINING PROJECT COST (FY 15\$, MILLIONS)	COUNTY
3. 100% Locally Derived Funding (continued)							
I-25	I-25	Castlegate Dr.	Add New Interchange		2015-2019	\$15.3	Douglas
I-25	I-25	Crystal Valley Pkwy.	Add New Interchange		2020-2029	\$44.5	Douglas
I-70	I-70	E-470	Interchange Capacity		2030-2040	\$100.0	Adams/ Arapahoe
I-70	I-70	Harvest Mile Rd.	Add New Interchange		2020-2029	\$39.6	Adams/ Arapahoe
I-70	I-70	32nd Ave.	Interchange Capacity		2020-2029	\$22.4	Jefferson
I-70	I-70	Picadilly Rd.	Add New Interchange		2020-2029	\$27.5	Adams
I-76	I-76	Bridge St.	Add New Interchange		2020-2029	\$25.4	Adams
Imboden Rd.		48th Ave. to 56th Ave.	Widen from 2 to 6 Lanes	1.0	2030-2040	\$10.3	Adams
Jefferson Pkwy.		Initial Phase: SH-93 to SH-128	New 4 Lane Toll Road; 3 Partial Interchanges	10.2	2020-2029	\$259.1	Jefferson
		<i>Candelas Pkwy.</i>	<i>New Partial Interchange</i>		<i>2020-2029</i>		
		<i>Indiana St. South of SH-128</i>	<i>New Partial Interchange</i>		<i>2020-2029</i>		
		<i>SH-72</i>	<i>New Partial Interchange</i>		<i>2020-2029</i>		
Jewell Ave.		E-470 to Gun Club Rd.	Widen from 2 to 6 Lanes	0.5	2020-2029	\$4.9	Arapahoe
Jewell Ave.		Gun Club Rd. to Harvest Rd.	Widen from 2 to 6 Lanes	1.0	2020-2029	\$10.0	Arapahoe
Jewell Ave.		Himalaya Rd. to E-470	Widen from 3 to 6 Lanes	1.4	2020-2029	\$13.2	Arapahoe
Jordan Rd.		Bradbury Pkwy. to Hess Rd.	Widen from 2 to 4 Lanes	0.6	2020-2029	\$3.0	Douglas
Lincoln Ave.		First St. to Keystone Blvd.	Widen from 4 to 6 Lanes	1.8	2020-2029	\$8.3	Douglas
Lincoln Ave.		Keystone Blvd. to Parker Rd.	Widen from 4 to 6 Lanes	1.6	2020-2029	\$8.0	Douglas
Lincoln Ave.		Peoria St. to First St.	Widen from 4 to 6 Lanes	0.7	2020-2029	\$3.2	Douglas
Mainstreet		Canterberry Pkwy. to Tomahawk Rd.	Widen from 2 to 4 Lanes	1.4	2030-2040	\$7.6	Douglas
Mainstreet		Lone Tree E. City Limit to Chambers Rd.	Widen from 2 to 4 Lanes	0.9	2015-2019	\$7.6	Douglas
McIntyre St.		44th Ave. to 52nd Ave.	Widen from 2 to 4 Lanes	1.0	2015-2019	\$3.5	Jefferson
McIntyre St.		52nd Ave. to 60th Ave.	Widen from 2 to 4 Lanes	1.0	2020-2029	\$6.5	Jefferson
Monaghan Rd.		Quincy Ave. to Yale Ave.	New 6 Lanes	2.0	2030-2040	\$22.9	Arapahoe
Nelson Rd.		75th St. to Affolter Dr.	Widen from 2 to 4 Lanes	2.3	2020-2029	\$5.2	Boulder
Pace St.		5th Ave. to Ute Rd.	Widen from 2 to 4 Lanes	2.5	2020-2029	\$3.8	Boulder
Pecos St.		52nd Ave. to I-76	Widen from 2 to 4 Lanes	1.3	2020-2029	\$8.7	Adams
Peña Blvd.		Tower Rd.	Add on-ramp to Westbound Peña		2015-2019	\$3.8	Denver

ROADWAY	CDOT ROAD	PROJECT LOCATION (LIMITS)	IMPROVEMENT TYPE	LENGTH (MILES)	NETWORK STAGING PERIOD	REMAINING PROJECT COST (FY 15S, MILLIONS)	COUNTY
3. 100% Locally Derived Funding (continued)							
Peña Blvd.		Jackson Gap St. West Ramps to DEN Terminal	Widen from 6 to 8 Lanes	1.7	2020-2029	\$10.2	Denver
Peña Blvd.		E-470 to Jackson Gap St	Widen from 6 to 8 Lanes	2.9	2020-2029	\$33.0	Denver
Peña Blvd.		Gun Club Rd	Interchange Capacity		2020-2029	\$15.0	Denver
Peoria St.		E-470 to 0.75 miles South of Lincoln Ave.	Widen from 2 to 4 Lanes	1.9	2020-2029	\$4.4	Douglas
Peoria St.		0.75 miles South of Lincoln Ave. to Mainstreet	Widen from 2 to 4 Lanes	0.5	2030-2040	\$4.4	Douglas
Picadilly Rd.		48th Ave. to 56th Ave.	Widen from 2 to 6 Lanes	1.2	2020-2029	\$13.6	Adams
Picadilly Rd.		56th Ave. to 70th Ave./Aurora City Limits	New 6 Lanes	1.7	2020-2029	\$20.4	Adams
Picadilly Rd.		82nd Ave. to 96th Ave.	New 6 Lanes	1.8	2030-2040	\$21.6	Adams
Picadilly Rd.		Colfax Ave. to I-70	New 6 Lanes	0.3	2020-2029	\$12.9	Adams
Picadilly Rd.		I-70 to Smith Rd.	Widen from 2 to 6 Lanes	0.5	2020-2029	\$5.3	Adams
Picadilly Rd.		Smith Rd. to 48th Ave.	Widen from 2 to 6 Lanes	2.2	2020-2029	\$22.5	Adams
Picadilly Rd.		96th Ave. to 120th Ave.	New 6 Lanes	3.0	2030-2040	\$49.0	Adams
Picadilly Rd.		6th Ave. to Colfax Ave.	Widen from 2 to 6 Lanes	1.6	2020-2029	\$10.0	Arapahoe
Picadilly Rd.		Jewell Ave. to 6th Pkwy.	New 4 Lanes	2.7	2020-2029	\$18.1	Arapahoe
Picadilly Rd.		70th Ave. to 82nd Ave.	New 6 Lanes	1.5	2020-2029	\$11.4	Denver
Plum Creek Pkwy.		Gilbert St. to Ridge Rd.	Widen from 2 to 4 Lanes	1.5	2020-2029	\$5.1	Douglas
Powhatan Rd.		Smoky Hill Rd. to County Line Rd.	Widen from 2 to 6 Lanes	1.0	2030-2040	\$3.5	Arapahoe
Quail Run Rd.		I-70 to 48th Ave.	New 6 Lanes	3.0	2030-2040	\$36.4	Adams
Quebec St.		120th Ave. to 128th Ave.	Widen from 2 to 4 Lanes	1.0	2020-2029	\$8.4	Adams
Quebec St.		132nd Ave. to 160th Ave.	Widen from 2 to 4 Lanes	3.5	2020-2029	\$21.0	Adams
Quincy Ave.		Plains Pkwy. to Gun Club Rd.	Widen from 2 to 6 Lanes	0.6	2020-2029	\$13.3	Arapahoe
Quincy Ave.		Hayesmount Rd. to Watkins Rd.	Widen from 2 to 6 Lanes	2.0	2030-2040	\$16.0	Arapahoe
Quincy Ave.		Monaghan Rd. to Hayesmount Rd.	Widen from 2 to 6 Lanes	1.1	2030-2040	\$18.9	Arapahoe
Quincy Ave.		Simms St. to Kipling Pkwy.	Widen from 2 to 4 Lanes	1.0	2020-2029	\$12.0	Jefferson
Quincy Ave.		Irving St. to Federal Blvd.	New 2 Lanes	0.3	2020-2029	\$3.8	Arapahoe
Rampart Range Rd.		Waterton Rd. to Titan Rd.	Widen from 2 to 4 Lanes	1.5	2030-2040	\$10.2	Douglas
Ridge Rd.		Plum Creek Pkwy. to SH-86	Widen from 2 to 4 Lanes	1.1	2020-2029	\$3.8	Douglas
S. Boulder Rd./160th Ave.		120th St. to Boulder/Broomfield County Line	New 2 Lanes	1.2	2030-2040	\$10.2	Boulder
SH-2	SH-2	72nd Ave. to I-76	Widen from 2 to 4 Lanes	7.5	2015-2019	\$21.7	Adams
SH-7	SH-7	Riverdale Rd. to US-85	Widen from 2 to 4 Lanes	1.1	2030-2040	\$16.3	Adams

ROADWAY	CDOT ROAD	PROJECT LOCATION (LIMITS)	IMPROVEMENT TYPE	LENGTH (MILES)	NETWORK STAGING PERIOD	REMAINING PROJECT COST (FY 15S, MILLIONS)	COUNTY
3. 100% Locally Derived Funding (continued)							
SH-7	SH-7	Boulder County Line to Sheridan Pkwy.	Widen from 2 to 4 Lanes	2.5	2020-2029	\$6.6	Broomfield
SH-7	SH-7	Sheridan Pkwy. to I-25	Widen from 2 to 6 Lanes	1.5	2020-2029	\$10.2	Broomfield
SH-7	SH-7	York St. to Big Dry Creek	Widen from 2 to 4 Lanes	0.7	2020-2029	\$8.0	Adams
SH-58	SH-58	Cabela St.	Add New Interchange		2020-2029	\$19.6	Jefferson
Sheridan Blvd.		Lowell Blvd. to NorthWest Pkwy.	Widen from 2 to 4 Lanes	1.1	2020-2029	\$7.6	Broomfield
Sheridan Pkwy.		NorthWest Pkwy. to SH-7	Widen from 2 to 4 Lanes	1.3	2020-2029	\$5.7	Broomfield
Smoky Hill Rd.		Pheasant Run Pkwy. to Versailles Pkwy.	Widen from 4 to 6 Lanes	4.4	2030-2040	\$33.9	Arapahoe
SouthWest Ring Rd.		Wolfensberger Rd. to I-25	Widen from 2 to 4 Lanes	1.4	2020-2029	\$5.1	Douglas
Stroh Rd.		Crowfoot Valley Rd. to J Morgan Blvd.	Widen from 2 to 4 Lanes	0.5	2020-2029	\$6.4	Douglas
Stroh Rd.		Chambers Rd. to Crowfoot Valley Rd.	New 4 Lanes	1.4	2020-2029	\$10.6	Douglas
Thornton Pkwy.		Colorado Blvd. to Riverdale Rd.	Widen from 2 to 4 Lanes	0.5	2030-2040	\$14.0	Adams
Titan Rd.		Rampart Range Rd. to Santa Fe Dr.	Widen from 2 to 4 Lanes	3.0	2030-2040	\$38.1	Douglas
Tower Rd.		Colfax Ave. to Smith Rd.	Widen from 2 to 6 Lanes	1.0	2020-2029	\$8.7	Adams
Tower Rd.		Peña Blvd. to 104th Ave.	Widen from 2 to 4 Lanes	3.8	2015-2019	\$40.5	Adams
Tower Rd.		Peña Blvd. to 104th Ave.	Widen from 4 to 6 Lanes	3.8	2020-2029	\$20.0	Adams
Tower Rd.		6th Ave. to Colfax Ave.	New 2 Lanes	1.0	2020-2029	\$9.5	Arapahoe
Tower Rd.		6th Ave. to Colfax Ave.	Widen from 2 to 6 Lanes	1.0	2030-2040	\$16.3	Arapahoe
Tower Rd.		38th/40th Ave. to Green Valley Ranch Blvd.	Widen from 2/4 to 6 Lanes	1.0	2015-2019	\$26.7	Denver
Tower Rd.		56th Ave. to Peña Blvd.	Widen from 4 to 6 Lanes	2.4	2020-2029	\$16.0	Denver
Tower Rd.		48th Ave. to 56th Ave.	Widen from 4 to 6 Lanes	1.0	2020-2029	\$5.3	Denver
Tower/Buckley Rd.		105th Ave. to 118th Ave.	New 4 Lanes	2.0	2020-2029	\$8.8	Adams
US-85	US-85	Titan Rd. to Highland Ranch Pkwy.	Widen from 4 to 6 Lanes	2.2	2030-2040	\$5.9	Douglas
US-85	US-85	Castlegate Dr.	Add New Interchange		2015-2019	\$31.8	Douglas
Washington St.		52nd Ave. to 58th Ave.	Widen from 2 to 4 Lanes	0.8	2020-2029	\$4.4	Adams
Washington St.		144th Ave. to 152nd Ave.	Widen from 2 to 6 Lanes	0.7	2015-2019	\$28.9	Adams
Washington St.		152nd Ave. to 160th Ave.	Widen from 2 to 6 Lanes	1.4	2020-2029	\$37.3	Adams
Waterton Rd.		SH-121 to Campfire St.	Widen from 2 to 4 Lanes	1.0	2020-2029	\$12.0	Douglas
Watkins Rd.		Quincy Ave. to I-70	Widen from 2 to 6 Lanes	7.1	2030-2040	\$54.7	Arapahoe
Wolfensberger Rd.		Coachline Rd. to Prairie Hawk Dr.	Widen from 2 to 4 Lanes	1.0	2030-2040	\$7.5	Douglas
Yale Ave.		Monaghan Rd. to Hayesmount Rd.	Widen from 2 to 6 Lanes	1.1	2030-2040	\$17.3	Arapahoe
York St.		152nd Ave. to E-470	Widen from 2 to 4 Lanes	0.2	2030-2040	\$2.0	Adams

ROADWAY	CDOT ROAD	PROJECT LOCATION (LIMITS)	IMPROVEMENT TYPE	LENGTH (MILES)	NETWORK STAGING PERIOD	REMAINING PROJECT COST (FY 15S, MILLIONS)	COUNTY
3. 100% Locally Derived Funding (continued)							
York St.		160th Ave. (SH-7) to 168th Ave.	Widen from 2 to 4 Lanes	1.0	2020-2029	\$7.5	Adams
York St.		E-470 to SH-7	Widen from 2 to 4 Lanes	0.7	2020-2029	\$10.7	Adams
A.3. Subtotal:						\$3,386.1	
Grand Total for Regional Roadway System Projects:						\$6,897.7	
B. REGIONAL TRANSIT PROJECTS							
FasTracks Components							
Eagle Project						\$1,033.2	
East Rail Line		DUS to DEN	Commuter Rail	22.8	2015-2019		Adams/Denver
Gold Line		DUS to Ward Rd.	Commuter Rail	11.2	2015-2019		Multiple
NorthWest Rail Phase 1		DUS to 71st/Lowell Blvd.	Commuter Rail	6.2	2015-2019		Adams/Denver
I-225 Rail Line		Parker Rd. to East Rail Line	Light Rail	10.5	2015-2019	\$476.9	Adams/ Arapahoe
North Metro Commuter Rail		DUS to 124th Ave.	Commuter Rail	13.0	2015-2019	\$606.8	Adams/Denver
SouthEast Rail Extension		Lincoln Ave. to Ridgeway Pkwy.	Light Rail	2.3	2015-2019	\$205.9	Douglas
US-36 Bus Rapid Transit		DUS to Table Mesa	Bus Rapid Transit	18.0	2015-2019	\$78.9	Multiple
Other FasTracks Projects						\$99.4	
Other Regional Transit							
Colfax Ave.	US-40	7th St. to Potomac St.	Bus Rapid Transit	10.5	2020-2029	\$115.0	Adams/Denver
SH-119	SH-119	Foothills Pkwy. to US-287	Bus Rapid Transit	11.0	2020-2029	\$57.0	Boulder
Total of Regional Transit Projects						\$2,673.1	

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APPENDIX 5

Freight and Goods Movement Component

A. Introduction

The economy of Colorado and the Denver region depends on the efficient movement of freight, goods and packages into, out of and through the region. Items are moved by railcars, trucks, vans, airplanes and pipelines. They move to, from and within points in the region or pass through without a delivery or pickup. Major multimodal terminals transfer large amounts of cargo between the various travel modes and trucks. Most freight facilities and terminals are concentrated near freeways and major regional arterials. Local deliveries to and pickups from businesses in the area depend on the reliability of the regional and local roadway systems.

“Freight customers and economics drive the market and locations where freight moves.”

B. Freight Background

Freight represents any physical goods, parcels, raw materials or finished products that are transported from one place to another. The Metro Vision Regional Transportation Plan (MVRTP) focuses on surface freight transportation modes and facilities — highways, streets, rail and multimodal terminals. (The aviation section of the MVRTP addresses issues related to freight delivery by air.) Examples of freight movement include:

- Coal shipped by rail from Wyoming through Denver to Texas;
- Goods transported by truck or rail to the Denver region for local or statewide distribution;
- Local products shipped from the metro area via truck or railcar to the Midwest;

- Perishable agricultural products shipped within and beyond the region (farm to table);
- Packages delivered within the region from Longmont to Littleton;
- Automobiles arriving from manufacturers via railcar, then transferred to truck trailers;
- Letters and parcels arriving by air and then distributed by express delivery services; and
- Cross-country goods traveling westbound that arrive in triple-trailer trucks and then are converted to double-trailer and single-trailer trucks to cross the mountains.

Freight transport has become more diverse in recent years. Examples include home grocery delivery, app-based on-demand delivery of goods and services and food trucks.

Denver is the northern end of the Ports-to-Plains corridor connecting Colorado to Mexico via Laredo, Texas. Its location could result in an increased role for the Denver region as a distribution center and freight consolidation point for goods shipped to and from Mexico via I-70, U.S. Route 40 and U.S. Route 287.

C. Federal Freight Requirements and Guidance

The Fixing America’s Surface Transportation (FAST) Act contains several provisions addressing freight, including:

- Establishing a National Multimodal Freight Policy that includes national goals to guide decision-making, and creates the National Multimodal Freight Network, with corridors eligible to receive \$4.5 billion over five years through a new discretionary freight-focused grant program.

- Establishing a National Highway Freight Network and a National Highway Freight Program, and providing \$6.3 billion in formula funds over five years for states to invest in freight projects on the National Highway Freight Network.
- Requiring states to develop freight plans to be eligible to receive funding under the National Highway Freight Program.
- Requiring the development of a National Freight Strategic Plan to implement the goals of the new National Multimodal Freight Policy.
- Creating new authorities and requirements to improve project delivery and facilitate innovative finance.
- Encouraging the establishment of state-level freight advisory committees.

The FAST Act establishes a National Multimodal Freight Policy of maintaining and improving the condition and performance of the National Multimodal Freight Network. It specifies goals associated with this national policy related to the condition, safety, security, efficiency, productivity, resiliency and reliability of the network, and to reduce the adverse environmental effects of freight movement on the network. Federal statutes state that these goals are to be pursued in a manner that is not burdensome to state and local governments. Specifically, the network is used:

- To assist states in strategically directing resources toward improved system performance for the efficient movement of freight on the National Multimodal Freight Network;
- To inform freight transportation planning;
- To assist in the prioritization of federal investment; and
- To assess and support federal investments to achieve National Multimodal Freight Policy goals, and National Highway Freight Program goals.

Projects on the National Multimodal Freight Network are eligible to receive discretionary grants focused on freight in which states, metropolitan planning organizations, local governments and other parties compete for funding (\$4.5 billion over five years) to complete projects that improve safety, eliminate freight bottlenecks and improve critical freight movements.

The National Freight Strategic Plan will address the conditions and performance of the multimodal freight system, identify strategies and best practices to improve intermodal connectivity and the performance of the national freight system, and mitigate the effects of freight movement on communities.

The FAST Act also includes provisions intended to reduce the time it takes to break ground on new freight transportation projects, such as promoting best contracting practices and innovative financing and funding opportunities, and reducing uncertainty and delays with respect to environmental reviews and permitting.

To receive funding under the National Highway Freight Program (\$6.3 billion over five years for projects on the National Highway Freight Network), states must develop a state freight plan, which must comprehensively address the state's freight planning activities and investments, both immediate and long-range. A state may develop its freight plan either separately from, or incorporated within, its statewide federally required long-range transportation plan. Among other requirements, a state freight plan must:

- cover a five-year forecast period;
- be fiscally constrained;
- include a freight investment plan with a list of priority projects; and
- describe how the state will invest and match its National Highway Freight Program funds.

Additionally, the FAST Act continues a Moving Ahead for Progress in the 21st Century (MAP-21) requirement for

DRCOG, in coordination with the Colorado Department of Transportation (CDOT), to develop and report on freight-related performance-based planning targets and measures.

Finally, DRCOG's freight planning efforts (described in the next section) address federal transportation planning factors, in particular:

- Planning Factor 1: Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity and efficiency.
- Planning Factor 4: Increase the accessibility and mobility options available to people and for freight.
- Planning Factor 6: Enhance the integration and connectivity of the transportation system, across and between modes, and for people and freight.
- Planning Factor 7: Promote efficient system management and operation.

The FAST Act added two new factors that DRCOG's planning efforts will also address:

- Improve resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation, and
- Enhance travel and tourism.

D. Current Freight Planning Efforts and Stakeholder Input

DRCOG, CDOT and key freight stakeholders are currently involved in several freight-related planning efforts. For example, this document updates and significantly expands the content of the freight section of the 2035 MVRTP. It is the first step in conducting a regional freight movement study, a task in DRCOG's Unified Planning Work Program. This study will be prepared using data, information and outcomes from CDOT's multimodal freight plan for future amendment into the MVRTP.

DRCOG also recently completed a commercial vehicle survey to provide data for its regional travel forecasting model, Focus. The survey was conducted in partnership with CDOT and other Front Range Metropolitan Planning Agencies (MPOs) to increase understanding of how commercial vehicles of all types affect travel and traffic patterns in the Front Range.

CDOT convened a state Freight Advisory Council in 2015, with DRCOG hosting the kickoff meeting and participating on an ongoing basis. Among other responsibilities, this group advises CDOT on freight-related priorities, issues, projects and funding needs.

CDOT completed the State Highway Freight Plan in 2014. It is the first phase of CDOT's overall multimodal freight planning efforts. CDOT is developing its state freight plan in two phases. The State Highway Freight Plan, compliant with MAP-21, was the first phase completed in 2014. The second phase will develop an integrated freight plan that incorporates rail and aviation freight modes. As noted above, DRCOG is participating in this process to leverage data, information, outcomes and recommendations for the DRCOG planning area.

CDOT also developed the State Freight and Passenger Rail Plan in 2012 to meet the requirements of the federal Passenger Rail Investment and Improvement Act of 2008. The plan's purpose is to "provide a framework for future freight and passenger rail planning in Colorado" and "to move freight rail transportation forward with a focus on economic development, as well as set the stage for the state to take advantage of the momentum around the country in regard to the interest in expanding passenger rail service." The plan also created and adopted a vision and several goals addressing the state's freight and passenger rail system. Finally, policy recommendations and short- and long-term rail system improvement needs were also identified in the plan.

Freight Stakeholder Input

DRCOG has conducted, hosted and participated in numerous freight stakeholder activities, events and organizations in recent years. Key examples include:

- Colorado Freight Summit (July 2009)
- Colorado Freight Summit Roadmap (December 2009)
- I-70 Mountain Corridor Coalition (ongoing)
- CDOT MPO Town Halls (May 2014)
- CDOT Statewide Freight Advisory Council (July, September and November 2015)
- Focus group on freight and commercial vehicles within mixed-use communities (September 2015)
- DRCOG Commercial Vehicle Survey (2015/2016)

Key Concerns from Stakeholders

- DRCOG has also received significant feedback from freight stakeholders over the years; this feedback has consistently emphasized the following concerns:
 - Congestion on the road system: The levels of congestion slow truck operations and increase the cost of moving freight. Ultimately, the consumer pays higher prices for goods and services
 - One effect of increased roadway congestion may be more truck traffic on the roads during peak periods. Most trucking companies must meet customer-required delivery and pickup times. As the speed of traffic slows, more trucks may be added to the traffic flow to meet the customer schedules. This is because an individual truck may not be able to make as many deliveries or travel as far during congested periods.
 - Rail freight traffic through the Front Range metropolitan areas is slow and there are safety issues at rail-highway crossings.
- Many of the older roadways present problems for efficiently moving freight. Facilities built in the 1950s used design principles for shorter trucks and lower volumes. The design for shoulders were narrow and for lower volumes at interchanges. Turning radii on the surface streets were tighter for smaller trucks or reduced as lanes were added within existing rights-of-way. Many long-haul operations now use two (tandem) or even three (triple) trailer combinations. The turning movements of these longer trailer combinations take more space than was designed into many existing roads.
- Many bridges cannot handle the larger freight loads. Bridges with weight limits force trucks to take detours, increasing miles traveled, time consumed and cost to move freight.
- With increases in overall freight movement and size of truck fleets, many existing connections to multimodal freight facilities need to be improved to accommodate the need for more capacity.
- The increase in truck traffic has overloaded rest area spaces for parking trucks while en route. Many truckers are stopping in undesignated places, including the side of the road.
- According to the Colorado Motor Carriers Association, various regulations affect the times deliveries and pickups can be made. This affects freight operations by limiting the number of stops a truck can make. It also leads to more trucks operating during peak periods, increasing the time to complete trips. Both of these characteristics increase the cost to move freight. The second adds to congestion during the peak periods. Some of this results in more trucks on the road with partial loads.
- Shortages of qualified commercial vehicle drivers in the labor force.
- Poor roadway conditions, such as pavement, markings, crumbling pavement and generally aging infrastructure.

- Circulation and delivery within transit-oriented developments, traditional neighborhood developments and other new urban neighborhoods with very narrow streets.

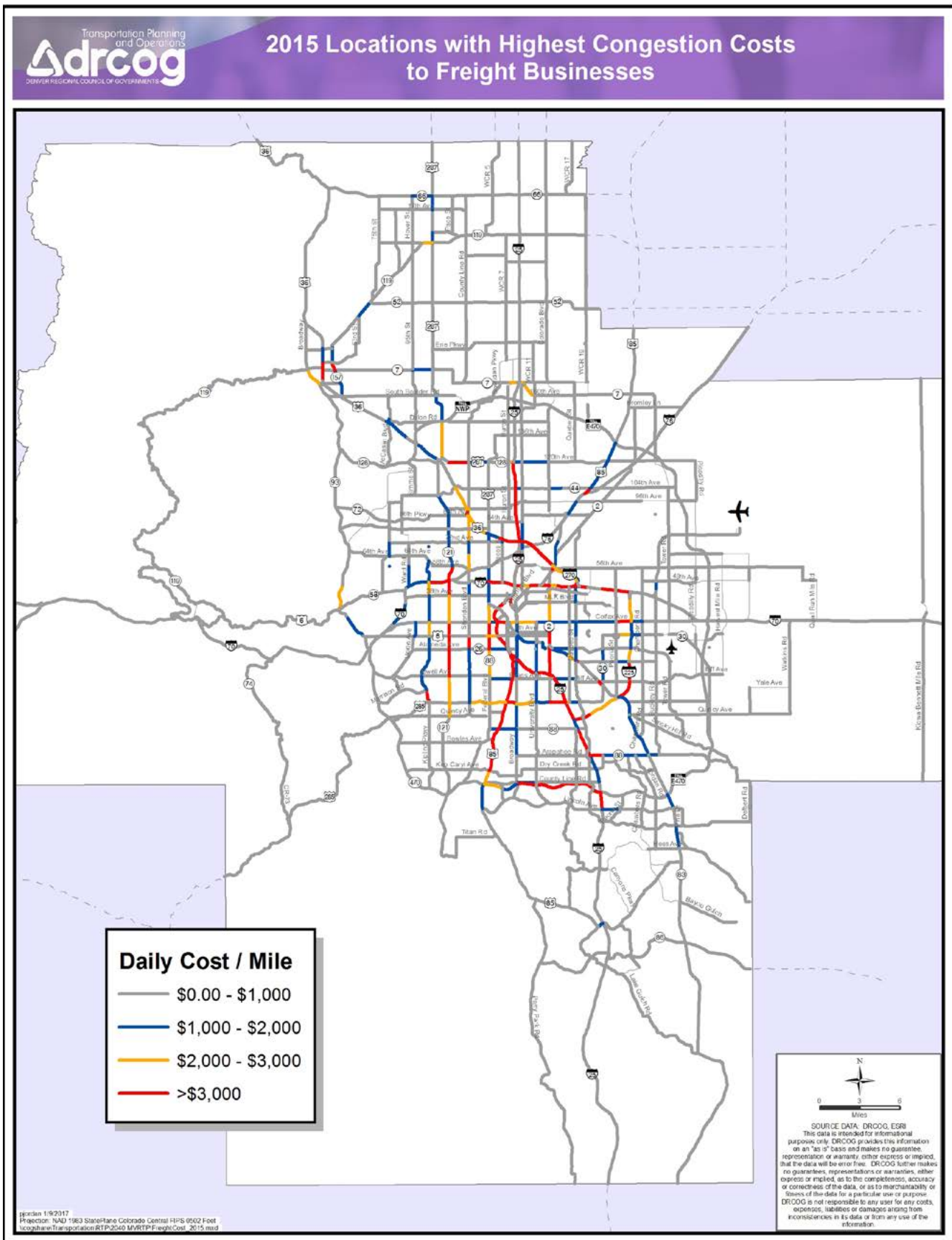
Consistent freight-related themes from the 2014 MPO and Transportation Planning Region telephone town halls, as well as Transportation Planning Region meetings, included:

- more work is needed at the regional level to identify freight bottlenecks, factors hindering freight movement and the importance of freight corridors to the entire state;
- multistate freight corridors are important to the state and regional economies and should be prioritized for improvements;
- reliability of freight movement enables many regional businesses to compete in global markets;
- many planned highway improvements will benefit the movement of truck freight;
- air freight is vital to regional businesses to bring in shipments of important goods and enable client and employee travel;
- transportation planning regions and MPOs could facilitate the creation of more or improved freight multimodal transfer points (train/truck, truck/train and truck/plane);
- truck freight is sensitive to consumer demand and economic activities; and
- mitigation of the effects of freight movement on communities and highways is needed, particularly because freight movement is increasing and trucks are getting larger, and hauling heavier loads. Noise mitigation and wear and tear on roadways are also issues.

Other Activities

DRCOG also addresses freight in its Congestion Mitigation Program. For example, the [2016 Annual Report on Traffic Congestion in the Denver Region](#) contains a section analyzing the cost of congestion to commercial vehicles, mitigation strategies and other data. Figure 1, updated with 2015 data, identifies the locations with the highest congestion costs to freight and businesses. In total, the cost of congestion delay is more than \$1 million a day to commercial vehicles and businesses in the DRCOG region.

Figure 1: Locations with Highest Congestion Costs to Freight Businesses



E. Freight Network and Facilities

Freight is transported in the Denver region through an interconnected system served by several major travel modes, a roadway and railroad system on the ground, and several multimodal transfer facilities. Figure 2 shows the Denver region's rail, air and multimodal freight network. The regional freight network includes both public (Figure 2) and private facilities; the latter include railroad tracks, loading docks, production warehouses and other similar components. Every street is part of the freight network, facilitating long-haul trucking on interstate highways to residential deliveries on local streets.

The FAST Act establishes a [National Multimodal Freight Network](#) to help states and the federal government plan and strategically allocate funding to support efficient freight movement. An [interim network](#) was released in mid-2016 and serves as a draft for the final National Multimodal Freight Network.

In Colorado, the interim National Multimodal Freight Network includes the National Highway Freight Network in Colorado. This includes the interstates, small segments of E-470, U.S. Route 6, U.S. Route 85 and state Highway 2 in the metro Denver area and eight intermodal connectors in the metro Denver area, all Class I railroads and Denver International Airport. The initial Multimodal Freight Network was designated in 2016. As new National Freight Highway Program projects are selected, new Critical Rural and Urban Freight Corridors will be designated, as necessary, to match the corridors where projects are selected. National Freight Highway Program projects must be on the Multimodal Freight Network to be eligible for funding from the National Freight Highway Program.

The FAST Act continues a MAP-21 requirement that the U.S. Department of Transportation establish a national freight network consisting of the National Highway System, freight intermodal connectors and aerotropolis (airport-related) facilities. The FAST Act repealed both the

Primary Freight Network and National Freight Network from MAP-21, and established a National Highway Freight Network to strategically direct federal resources and policies toward improved performance of highway portions of the U.S. freight transportation system.

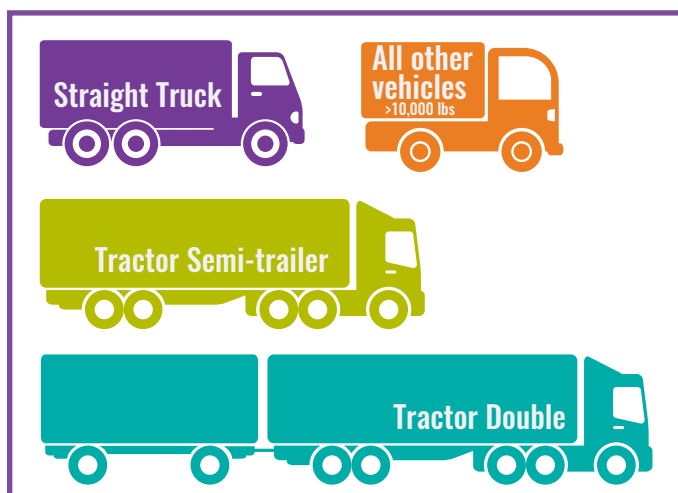
The National Highway Freight Network includes the following subsystems of roadways:

- **Primary Highway Freight System:** A network of highways identified as the most critical highway portions of the U.S. freight transportation system determined by measurable and objective national data. The network consist of 41,518 centerline miles, including 37,436 centerline miles of interstate and 4,082 centerline miles of non-interstate roads.
- **Other interstate portions not on the Primary Highway Freight System:** Highways consisting of the remaining portion of interstate roads are not included in the Primary Highway Freight System. These routes provide continuity and access to freight transportation facilities. These portions amount to an estimated 9,511 centerline miles of interstate nationwide and will fluctuate with additions to and deletions from the Dwight D. Eisenhower National System of Interstate and Defense Highways.
- **Critical Rural Freight Corridor:** Public roads outside of urbanized areas which provide access and connections to the Primary Highway Freight System and the interstate system with other ports, public transportation facilities or other intermodal freight facilities.
- **Critical Urban Freight Corridors:** These are public roads in urbanized areas which provide access and connection to the Primary Highway Freight System and the interstate system with other ports, public transportation facilities or other intermodal transportation facilities.

Prior to designation of Critical Rural Freight Corridors and Critical Urban Freight Corridors, the National

Highway Freight Network consists of the Primary Highway Freight System and other interstate portions not on the Primary Highway Freight System, for an estimated total of 51,029 centerline miles. States and, in certain cases, MPOs including DRCOG, are responsible for designating public roads for the Critical Rural Freight Corridors and Critical Urban Freight Corridors in accordance with the FAST Act. State designation of the Critical Rural Freight Corridors is limited to a maximum of 150 miles of highway or 20 percent of the Primary Highway Freight System mileage in the state, whichever is greater. State and MPO designation of Critical Urban Freight Corridor is limited to a maximum of 75 miles of highway or 10 percent of the Primary Highway Freight System mileage in the state, whichever is greater. Colorado's mileage limits are 160.69 centerline miles statewide for Critical Rural Freight Corridors and 80.35 centerline miles statewide for Critical Urban Freight Corridors (for urbanized areas over 50,000 in population). As of fall 2016, DRCOG and CDOT were working together to define the critical freight corridors within the DRCOG region.

CDOT's 2015 State Highway Freight Plan also designates specific freight corridors based on a range of criteria, including truck traffic, connectivity, federal requirements and stakeholder input. In the DRCOG region, CDOT's freight corridors include interstate highways, freeways and a few major regional arterials, such as U.S. Route 287, state Highway 119 and South Santa Fe Drive.



Trucks/Roadways

The majority of freight movement in the Denver region occurs via commercial vehicles such as trucks and vans across the entire roadway system. Trucks are generally classified as a vehicle with a gross weight greater than 10,000 pounds. For example, a Ford F-350 pickup marks the bottom end of the weight threshold.

The MVRTP's 2040 fiscally constrained regional roadway system includes 8,300 lane miles of freeways, tollways, major regional arterials and principal arterials that serve many of the major freight origin and destination locations. Thousands of additional miles of local roadways provide direct access to the remaining locations. A few roadways are also designated as National Highway System Connectors. They are noted in Figure 8 and provide connections to major multimodal terminals such as airports, rail terminals, truck terminals, pipeline terminals, park-and-ride lots, bus terminals and bus stations.

Regulatory and other issues facing truck movements include the following

- CDOT regulations and rules for longer combination vehicles, trucks that pull more than one trailer;
- local regulations regarding the time of day that trucks can make deliveries and pickups;
- weight and winter chain law restrictions on roadways;
- upgrading the port of entry into Denver to include smart technologies for electronic credential checking and weigh-in-motion facilities;
- increased homeland security concerns, including criminal background checks, facility security plans and updating of hazardous material placards on trucks;
- emergency response to truck crashes; and
- rest stops, truck stops and parking.

One important but often overlooked regulatory aspect is the conflict between federal work shift requirements,

or the maximum length of a work shift, and CDOT road closures. For example, if CDOT has a winter closure in the I-70 mountain corridor, a long-haul trucker cannot extend his or her work shift to accommodate the time delay from that closure. This type of situation has incident management implications and is one illustration of the interconnectedness of the various facets of freight movement.

Commercial Vehicle Volumes

Figures 3 and 4 show 2015 and 2040 forecast commercial vehicle volumes on the region's major roadways and highways. These data are from

DRCOG's [2016 Annual Report on Traffic Congestion in the Denver Region](#). As expected, the region's interstates and freeways have the highest volumes of commercial vehicles, though portions of roadways such as South Santa Fe Drive, Parker Road and Wadsworth Boulevard also have high commercial vehicle volumes. Additionally, relatively lower-volume roadways, such as interstates in rural areas, may have a high percentage of commercial vehicle traffic.

Package Delivery – from Seller to Buyer

One way that commercial vehicles affect our daily lives is in the delivery of packages, particularly with

Exhibit 1: Example of Logistical Complexities

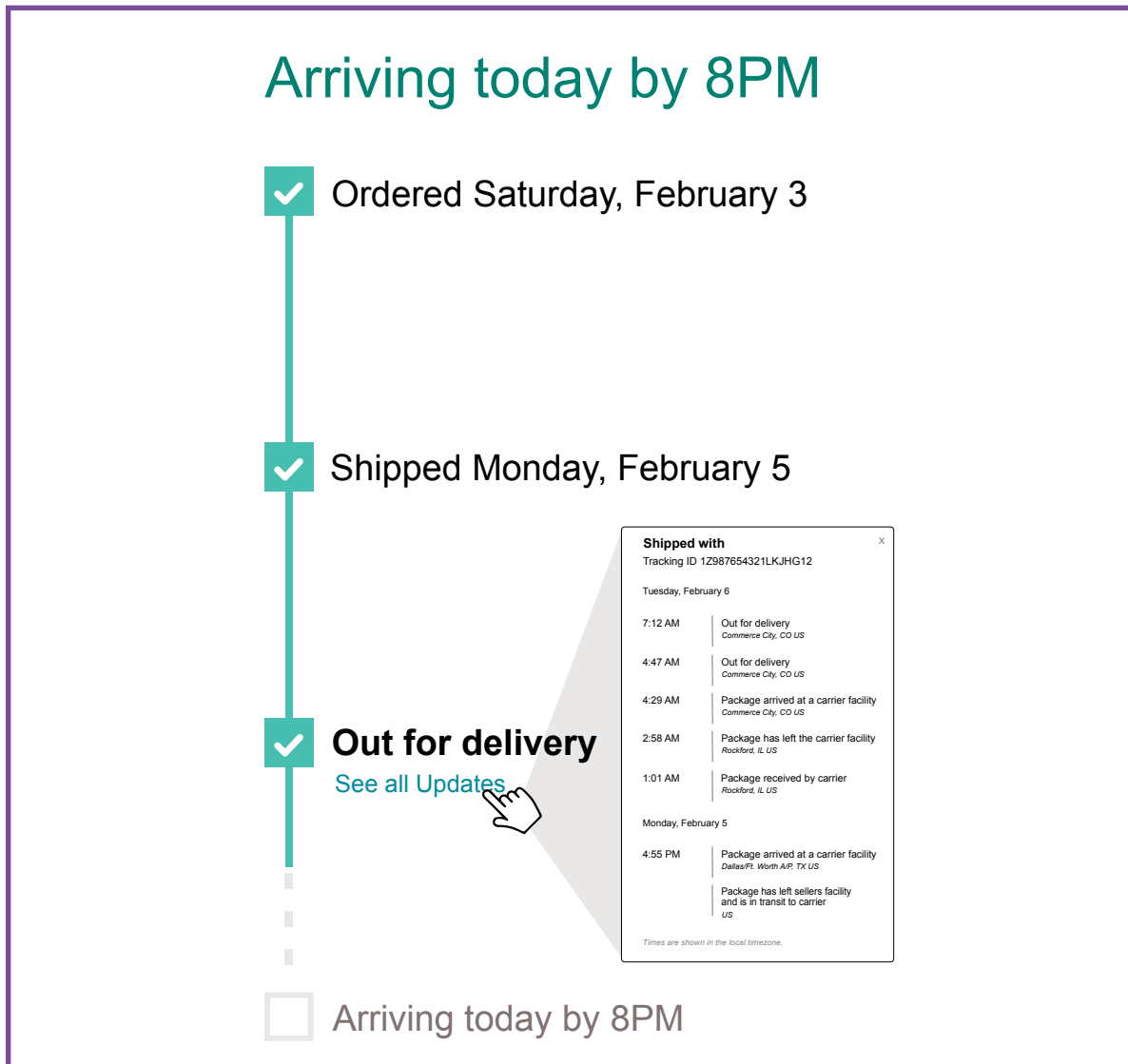
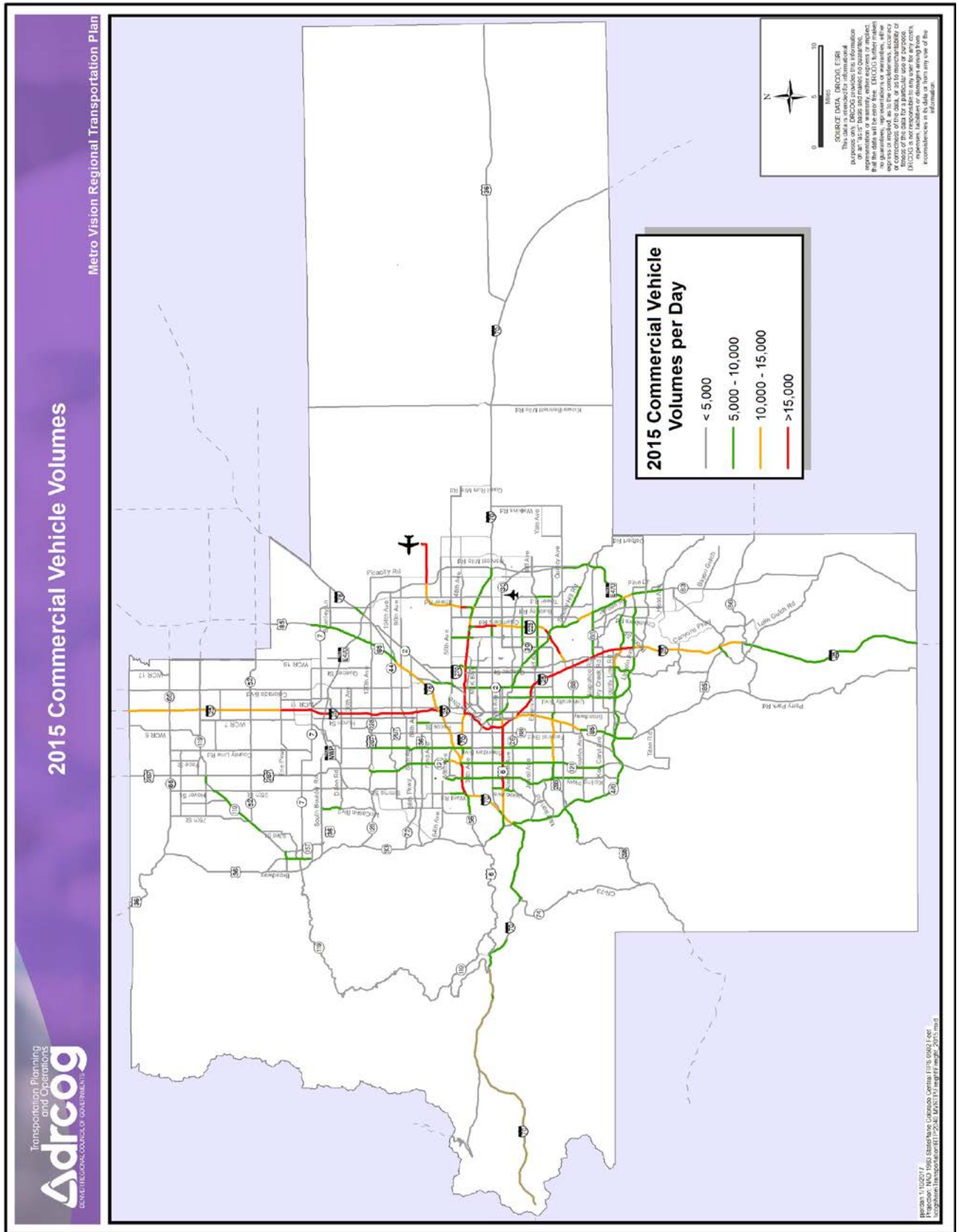


Figure 3: 2015 Commercial Vehicle Volumes

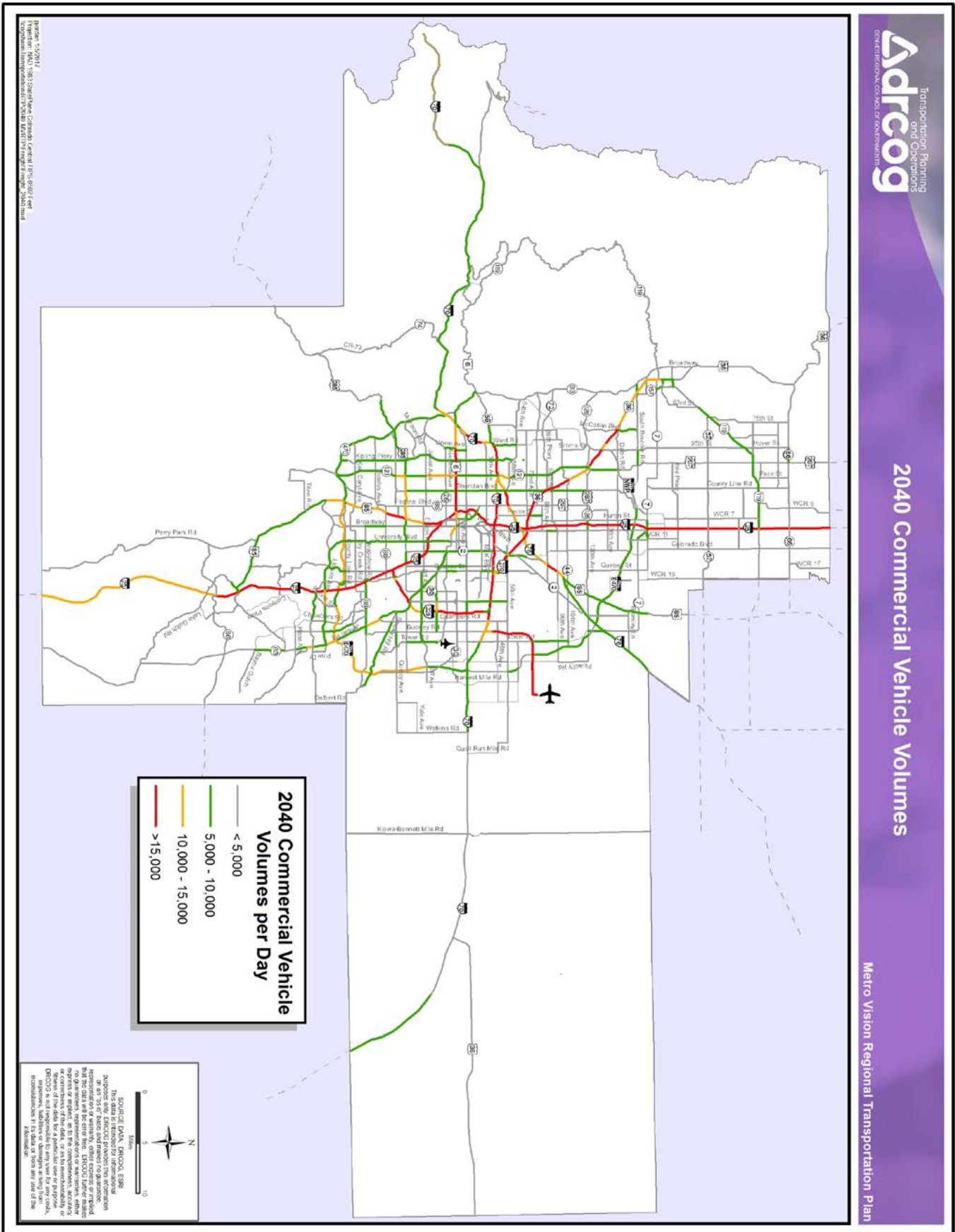


2015 Commercial Vehicle Volumes

Metro Vision Regional Transportation Plan



Figure 4: 2040 Commercial Vehicle Volumes



increasing e-commerce. The graphics to the right and below illustrate typical updates offered to consumers to track the delivery status of their packages.

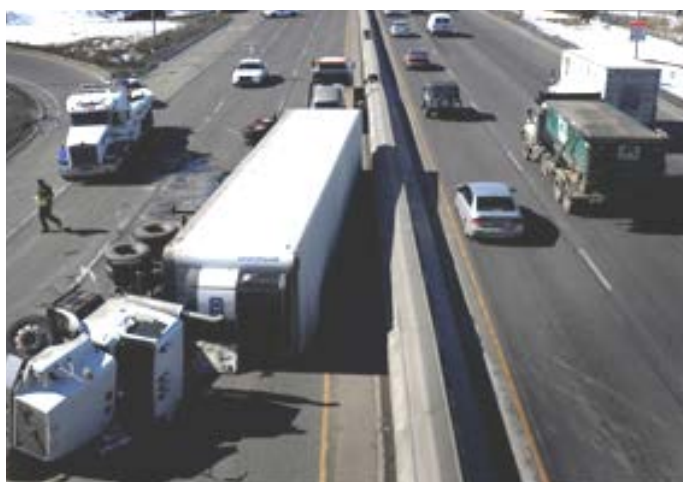
From a goods movement perspective, it is interesting to note how many places a package is transferred to and what modes it may have traveled to reach the consumer. For example, both packages originated close to each other and were routed through a carrier facility in Hodgkins, Illinois (suburban Chicago), and then were likely shipped by truck to a distribution center in Commerce City, Colorado, based on the 1.5 days of transit time. Both packages were then sorted and routed early the next morning for delivery later that day. This example illustrates the logistical complexities of goods movement and the importance of reliable travel and delivery times.

Crash/Safety

During the most recent three-year period available (2011-2013), there were approximately 7,200 crashes involving trucks in the Denver region,

Table 1: Comparison of Truck and Total Crashes (2011-2013)

	TOTAL CRASHES		SERIOUS INJURIES		FATALITIES	
	Number	Percent	Number	Percent	Number	Percent
TRUCKS	6,800	4%	160	3%	35	7%
ALL VEHICLES	176,300		5,000		500	



resulting in 172 serious injuries and 33 fatalities (Table 1). Truck-involved crashes made up about 4 percent of all crashes and 3 percent of serious injuries, but 6 percent of all fatalities. Between 2011 and 2013, truck-involved crashes increased 15 percent, while total crashes increased only 8 percent. State highway crash related statistics can vary considerably from year to year, and that comparing truck-involved crash trends can be difficult because they make up such a small proportion of total crashes.

Due to the potential for injury, loss-of-life and delays to freight movement, crashes at railroad crossings are also an important issue. Figure 5 shows the number of railroad crossing crashes statewide from 2005-2014 based on data from the [Federal Railroad Administration's Office of Safety Analysis](#). As shown, the number of crashes has been decreasing significantly. Though the data does not break out fatalities or injuries, it includes other interesting information. For example, for the most recent four-year period (2011-2014), automobiles were the largest single category (35 percent) of total crashes at crossings. The BNSF Railway had the highest proportion of crashes (44 percent); Regional Transportation District rail lines were involved in a single crash during the four-year period.

Freight Railroads

Railroad cars carry the most ton-miles of freight in the Denver region. Railroads generally carry heavy and bulky cargo of lesser value per unit of weight than freight shipped by truck. Freight that is hauled by rail instead of trucks causes less damage to the roadway infrastructure. Exhibit 2 illustrates the flow of freight by highways, railroads and waterways for 2010. Although Colorado is an important state for connecting long-haul freight shipping, the relative volume of freight passing through the state is less compared with adjacent states.

Freight rail traffic in the Denver region is dominated by two Class I railroads: Union Pacific and BNSF Railway. Class I railroads are the largest carriers and are designated as such by the Surface Transportation Board

Figure 5: Colorado Railroad Crossing Crashes (2005-2014)

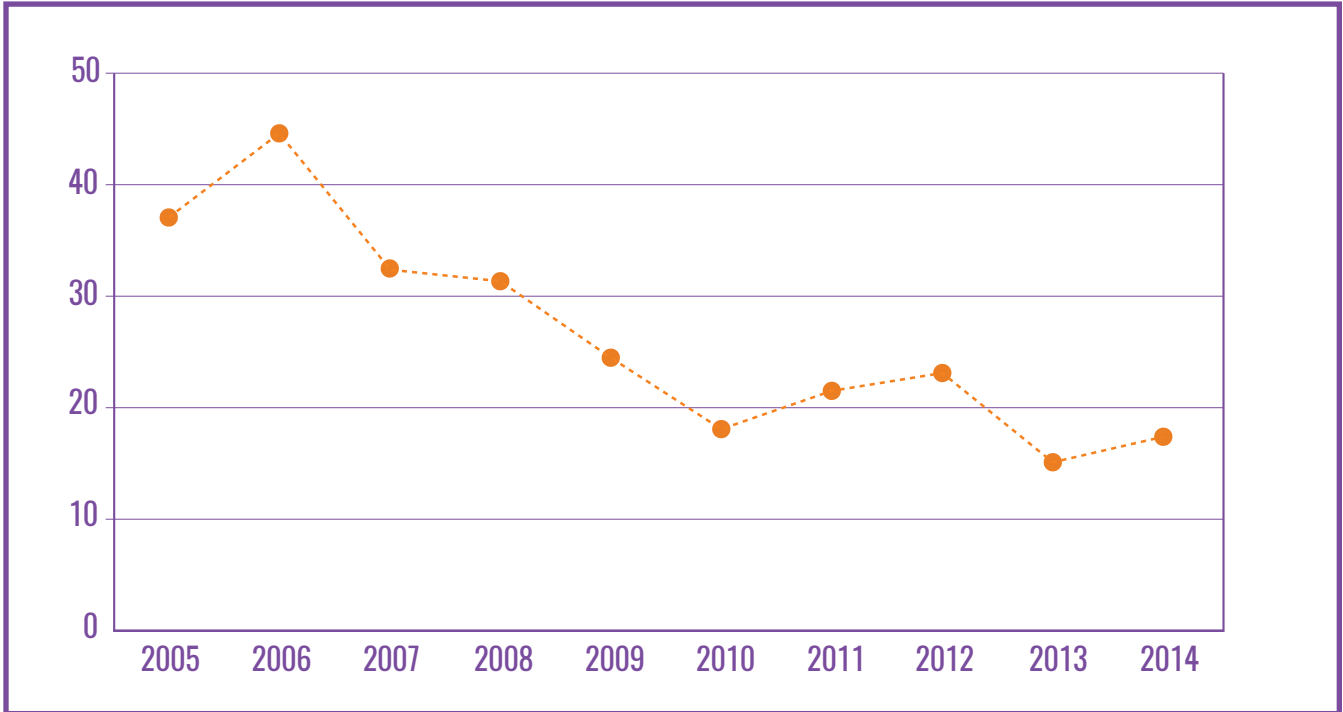
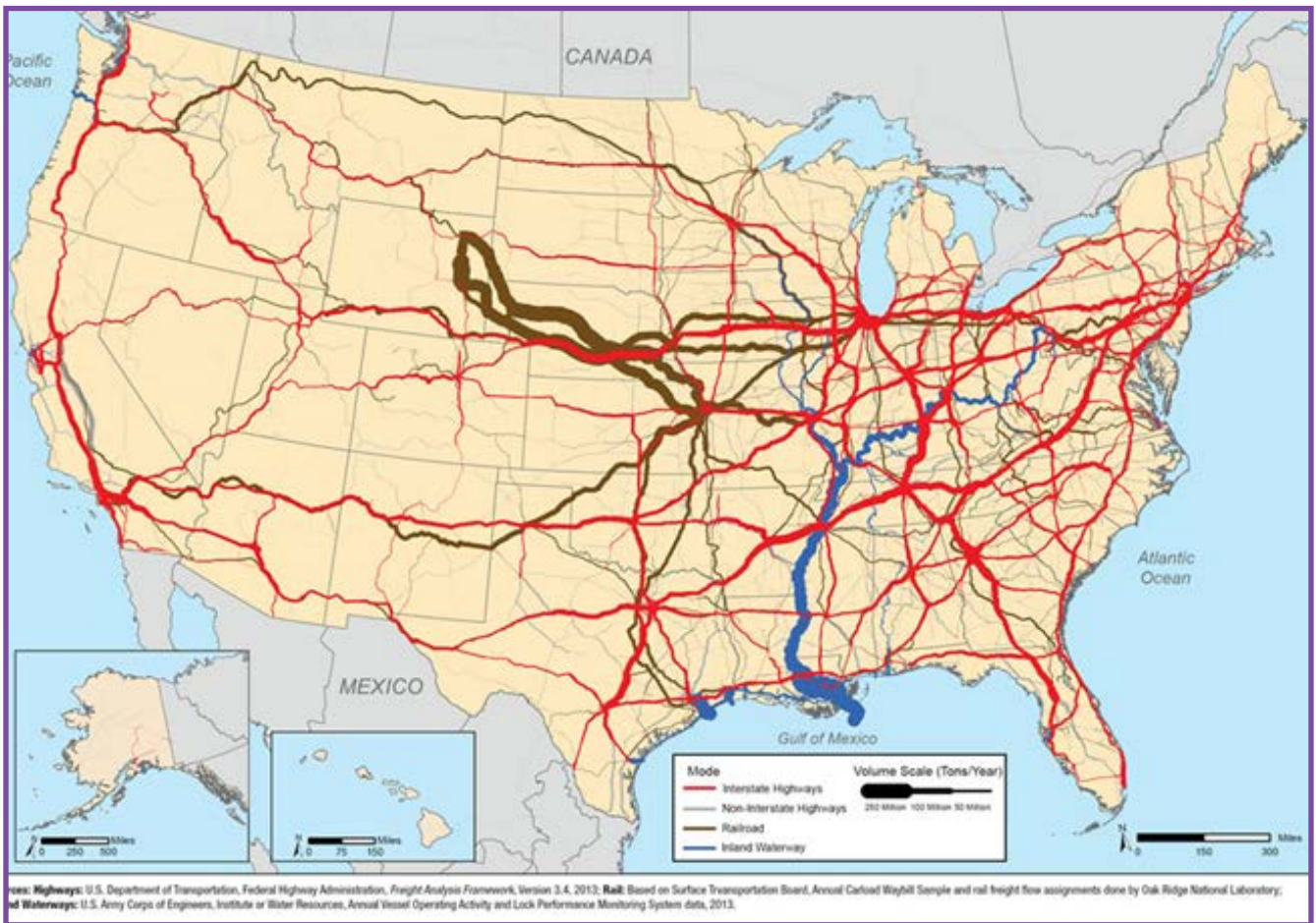


Exhibit 2: 2010 Freight Flows by Highway, Railroad and Waterway



of the U.S. Department of Transportation. Two Class III railroads also operate within the Denver region: Denver Rock Island Railroad and Great Western Railway of Colorado. Active rail lines in the region are illustrated in Figure 8 along with switching yards, multimodal terminals and major transfer facilities.

BNSF Railway operates north-south and east-west main lines in the Denver region. The line east connects Denver with both Wyoming’s Powder River Basin, a major source of coal via Brush and Sterling, and Chicago through Omaha and Iowa; Amtrak’s California Zephyr operates daily on this route. A line north connects Denver with Cheyenne, Wyoming, Billings, Montana, the Pacific Northwest and Canada.

BNSF Railway’s line south from Denver, operated in coordination with Union Pacific as far as Pueblo, connects Denver with Colorado Springs, Pueblo, and points in Texas, New Mexico, Arizona and southern California as well as Mexico. West from Denver, BNSF operates on Union Pacific track through western Colorado to reach Salt Lake City, Reno, Sacramento and the Bay Area of California. In addition, BNSF Railway operates three branch lines within the region: Denver-Golden, Broomfield-Lafayette and Longmont-Barnett.

Union Pacific operates major north-south lines and east-west lines within the region. The north-south line connects Denver with Pueblo and Cheyenne, Wyoming

Table 2: Existing Multimodal Freight Facilities

NAME	LOCATION	TYPE
CONOCO PIPELINE TRANSFER	56th Ave. and Brighton Rd.	Pipeline Terminal
KANAB PIPELINE TRANSFER	80th Ave. and W. of SH-2	Pipeline Terminal
BNSF RENNICKS YARD	53rd Ave. and Bannock St.	Rail Yard
BNSF 31ST ST. YARD	Globeville Rd. and 38th St.	Rail Yard
UNION PACIFIC BURHAM (4TH AVE.) YARD	800 Seminole Rd.	Rail Yard
UNION PACIFIC MONACO	Smith Rd. and Monaco Pkwy.	Rail Yard
UNION PACIFIC ROYDALE	Smith Rd. and Peoria St.	Rail Yard
UNION PACIFIC 36TH ST. YARD	Wazee St.	Rail Yard
BNSF BIG LIFT	SH-85 and Louviers Ave.	Rail-Truck Transfer Facility
UNION PACIFIC NORTH YARD	901 W. 48th Ave.	Rail-Truck Transfer Facility
BNSF TRAILER ON FLATCAR YARD	Pecos St. and 56th Ave.	Rail-Truck Transfer Facility
UNION PACIFIC ROLLA AUTO TRANSFER	96th Ave. and US-85	Rail-Truck Transfer Facility
UNION PACIFIC 40TH ST. YARD	40th Ave. and York St.	Rail-Truck Transfer Facility
BNSF IRONDALE AUTO TRANSFER	SH-2 and 88th Ave.	Rail-Truck Transfer Facility
UNION PACIFIC PULLMAN YARD	North of 40th Ave. and Southeast of Brighton Blvd.	Rail-Truck Transfer Facility
BNSF LOCOMOTIVE SHOPS	Park Ave., Delgany, and South Platte River	Rail-Truck Transfer Facility

East-west lines connect Denver with Utah and western Colorado to Kansas. RTD purchased from Union Pacific the 33-mile branch line connecting Commerce City to the Boulder area. It is active only from Commerce City to just north of 120th Avenue.

BNSF Railway and Union Pacific have joint operations and track-sharing agreements south of downtown Denver. The joint line is known as the Consolidated Main Line and operated as a paired track, with one track used for northbound traffic and the other track used for southbound traffic.

The Denver Rock Island Railroad has a switching and terminal spur line north of Interstate 25 and 58th Avenue running roughly parallel to I-270 and connecting the Union Pacific and BNSF facilities. The Great Western Railway of Colorado operates branch lines connecting North Front Range communities such as Fort Collins and Loveland to Longmont. Great Western Railway of Colorado has an interchange point with BNSF at Longmont (switching only).

Major Multimodal Terminals

Figure 2 shows the location of the current Union Pacific and BNSF multimodal rail-truck transfer facilities. They are also listed in Table 2. BNSF operates the Rennicks and Globeville (31st Street) switching yards. BNSF has major terminals and freight transfer facilities to serve trailers on flat cars and auto transport. Union Pacific has major terminals and freight transfer facilities in the Denver region including the North Yard, 40th Street Yard, Rolla Auto Transfer Yard and Pullman Yard, in addition to several switching yards. The National Highway System also includes the following [intermodal connectors](#) in the Denver region:

- RTD Transit Stations: Broadway light rail transit station, Broomfield Park-n-Ride, Civic Center Station, Denver Union Station (Amtrak), Southmoor Park-n-Ride, Central Park Park-n-Ride, Table Mesa Park-n-Ride, Thornton Park-n-Ride, Wagon Road Park-n-Ride and Westminster Center Park-n-Ride

- Railroad Facilities: BNSF auto/railroad transfer facilities, Southern Pacific Railroad transfer facility, Union Pacific auto/railroad transfer facilities
- Pipeline Facilities: Conoco Pipeline Transfer, Kaneb Pipeline Transfer, Phillips Pipeline, Total Petroleum Pipeline Terminal
- Other Facilities: Denver International Airport, Denver Greyhound Bus Terminal

The appendix contains two concept examples of aerial photographs showing multimodal terminals and the major roadway connectors providing access to them. These examples illustrate the location of these multimodal terminals in relation to the region's multimodal transportation network.

Air Cargo

Air cargo activity to and from Denver has grown dramatically over the past 25 years. According to [Denver International Airport's Master Plan](#), total cargo volume is forecast to increase from approximately 310,800 tons in 2006 to approximately 714,000 tons by 2030. The number of all-cargo aircraft operations is forecast to increase from about 21,000 in 2006 to about 40,000 in 2030. Air freight is, by its nature, high-value, time-sensitive and linked to the types of retail, service and manufacturing businesses expected to lead the region's future economic development. Denver International Airport handles thousands of packages and containers per day, with much smaller volumes at Centennial, Rocky Mountain Metropolitan and Front Range airports. The aviation section of the Metro Vision Regional Transportation Plan (Chapter 4, Section G) contains more detailed information about the region's airport operations and future implications for air cargo.

Pipelines

Pipelines transport oil products and natural gas into and out of the Denver region. Crude oil is processed into usable fuels such as gasoline and delivered by truck to filling stations. Colorado's only oil refinery is

Figure 6: At-Grade Railroad Crossings on the Regional Roadway System

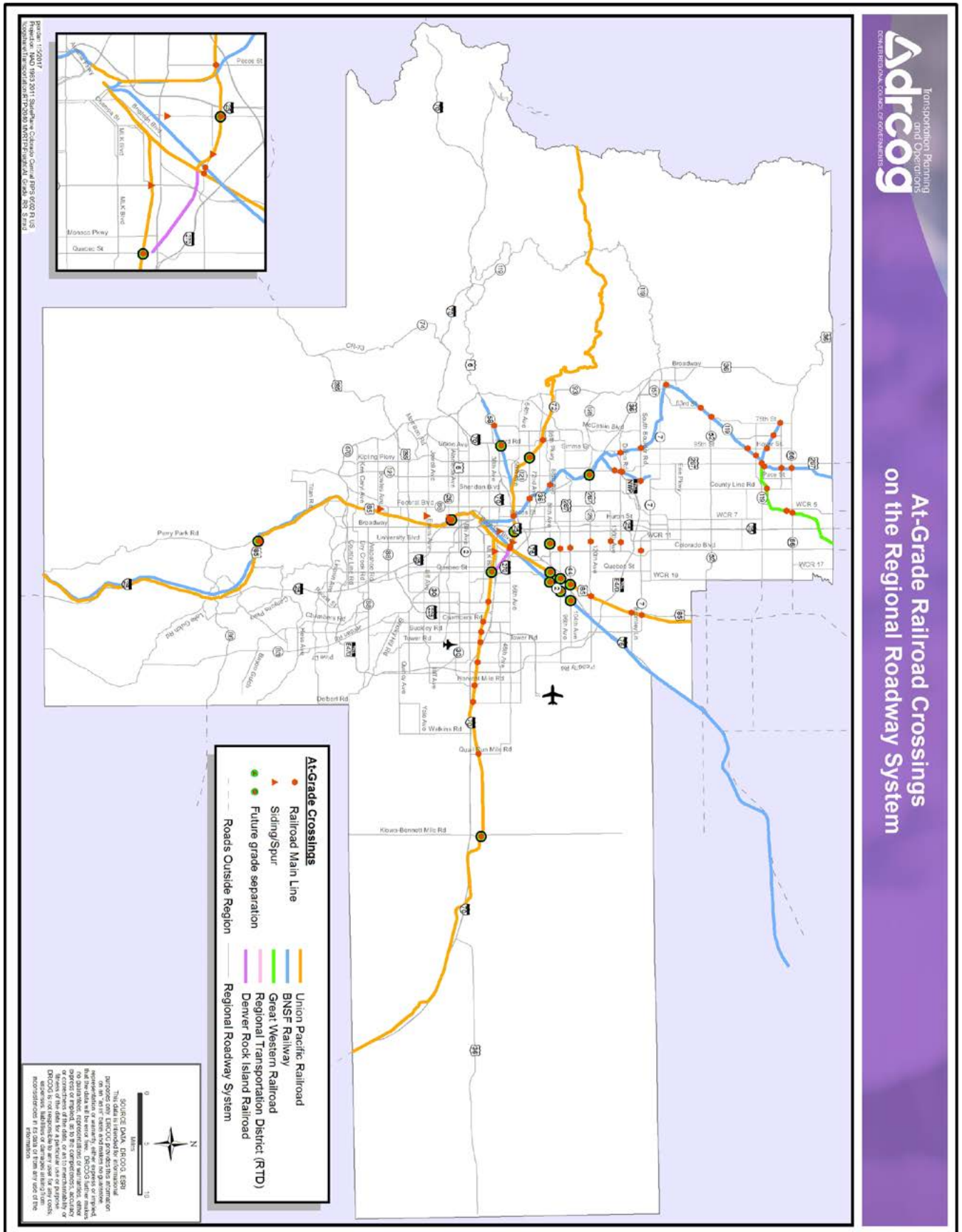
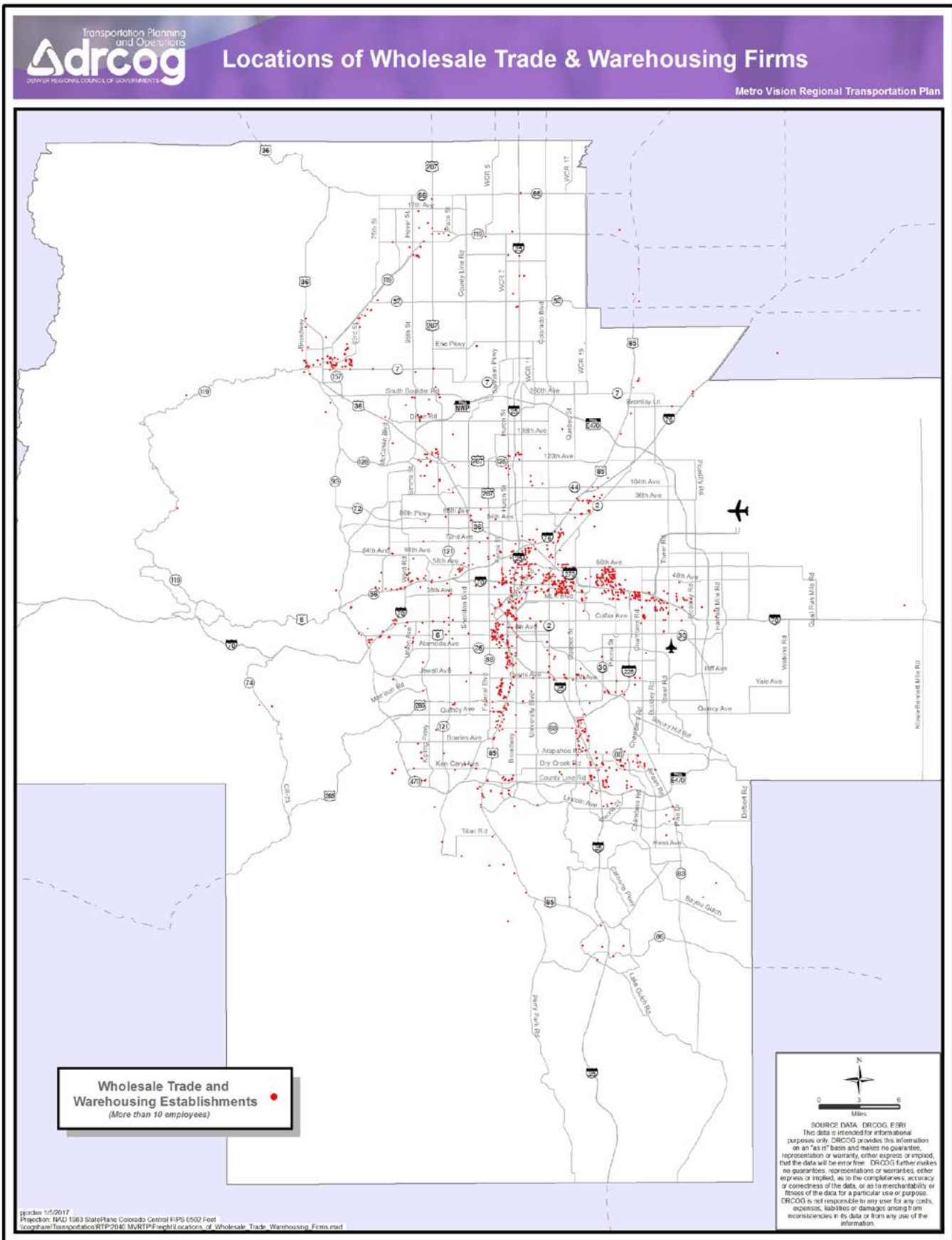


Figure 7: Locations of Wholesale Trade and Warehousing Firms



in Commerce City near I-270. Natural gas is used to generate electricity for homes and businesses. Pipeline transfer facilities are shown in Figure 2.

At-Grade Arterial Railroad Crossings

More than 500 at-grade intersections exist between the rail system and the roadway system in the Denver region. Many of these at-grade crossings are found north of the Interstate 70 corridor in predominately industrial and warehouse areas. At-grade crossings can pose safety concerns as well as delays to auto and truck traffic and emergency services. The 58 rail-on-roadway crossings on the regional highway network are shown in Figure 7.

The number of trains that cross a road per day will increase on those lines that may serve future commuter rail. Corridor studies will determine the need for constructing additional grade separations at such locations. In recent years, the region has converted several at-grade crossings into grade-separated crossings, such as the Union Pacific crossing at Wadsworth Bypass/Grandview Avenue, the Union Pacific crossing at Pecos Street and the Union Pacific/RTD East Rail crossing at Peoria Street.

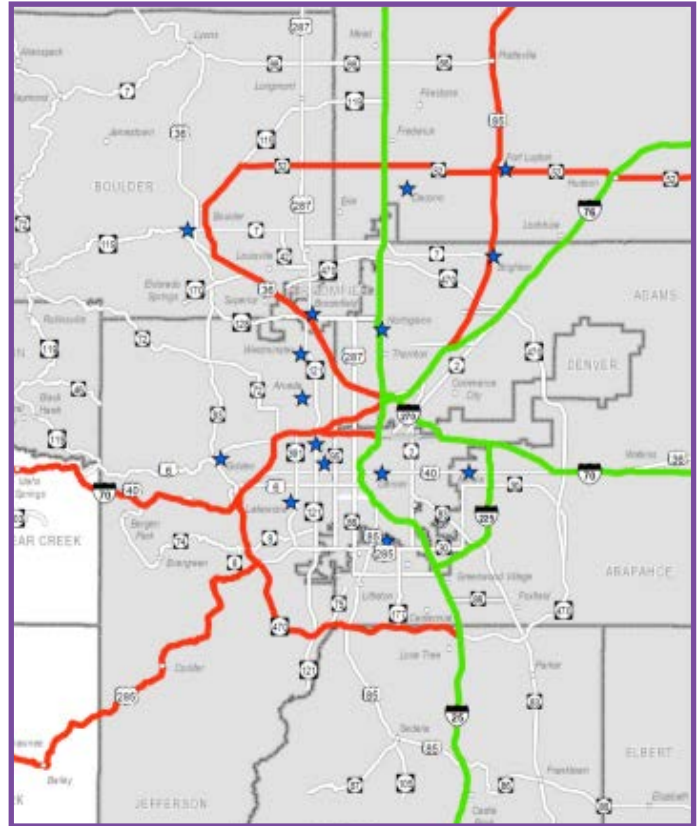
Warehousing

The Denver region is the state's hub for warehousing and distribution activities. Quarterly Census of Employment and Wages data show that almost 3,000 firms (each with at least 10 employees) are engaged in wholesale trade and warehousing activities in the Denver region. Figure 8 shows the locations and concentrations of wholesale trade and warehousing firms in the Denver region based on the same data.

Hazardous Materials

CDOT is responsible for designating hazardous and nuclear materials routes based on several criteria and policy directives, such as Title 42, Article 20 of the Colorado Revised Statutes and CDOT Policy Directives

Exhibit 3: Designated Hazardous and Nuclear Materials



1903 and 1903.1. CDOT's Hazmat Advisory Team analyzes whether a proposed route meets several criteria. If so, the Transportation Commission must approve the proposed designation, and then CDOT files a petition with the Colorado State Patrol for final approval. The 12 required criteria consider connectivity, interstate commerce, traffic volumes, safety, surrounding land uses and other factors (see [CDOT's Hazmat Routing Overview](#) for more information).

Exhibit 3 shows CDOT's graphical representation of hazardous and nuclear materials routes in the DRCOG region. Roadways in green are designated hazardous and nuclear materials routes; those in red are hazardous material routes only. The stars indicate municipalities that require gasoline, diesel and liquefied petroleum gas to comply with routing requirements. Designated routes in the Denver region include interstates and portions of U.S. Route 36, U.S. Route 85, U.S. Route 285, C-470, state Highway 119 and state Highway 52.

F. Key Freight Commodity Flow Data

CDOT prepared commodity flow data profiles identifying the top commodities transported by truck into and out of 14 economic regions in Colorado. CDOT identifies the Denver economic region as Freight Zone 3 (Exhibit 4), which corresponds to DRCOG's planning area excluding outwest Weld County. However, additional data for Weld County, where feasible, are included. According to CDOT's State Highway Freight Plan, oil and gas activity is heavily concentrated in Weld County, with over 21,000 active wells (40 percent of the statewide total). In addition to oil and gas, agriculture is a key industry in Weld County.

CDOT used the IHS Market Transearch 2010 database, consistent with the State Highway Freight Plan, to prepare the commodity flow analysis, which focuses on the top commodities transported by truck by weight in class for 2010 and forecast for 2040. The Transearch

database combines the primary shipment data obtained from many of the nation's largest rail and truck freight carriers with information from public, commercial and proprietary sources to generate a base year estimate of freight flows at the county level. A separate model is then used to predict 2040 forecasts using proprietary forecasts, as well as using supply and demand factors including employment, output and purchases by industry and county. The Transearch forecast focuses on freight tonnage, but a value forecast is also produced, which holds the base year price as fixed.

In preparing the commodity flow data profiles, CDOT determined the top commodities being transported and the most frequent locations to and from which they are being transported. Based on CDOT's analysis, the following tables and maps highlight the top commodities transported on highways within the DRCOG region. Commodities highlighted in light green represent secondary traffic, commodities which are not necessarily produced in that region, but travel through it.

Exhibit 4: CDOT Freight Zone 3



Transported Out of the Region

Tables 3 and 4 list the top commodities originating in Freight Zone 3 that were transported out of the zone on trucks in 2010. The tables also provide 2040 forecasts. As shown in Table 3, gravel, sand and concrete products are some of the top individual commodities that originate in and are transported out of the Denver region by weight. In contrast, missile and space vehicle parts, electronic data processing equipment and malt liquors are the top commodities by value (Table 4).

Table 3: Top Commodities (by Weight) Transported out of the Denver Region by Truck

COMMODITY	2010 EXISTING		2040 FORECAST	
	TONS	PERCENT	TONS	PERCENT
WAREHOUSE AND DISTRIBUTION CENTER	2,580,580	12%	4,469,500	12%
GRAVEL OR SAND	2,197,050	10%	3,674,070	10%
READY-MIX CONCRETE, WET	2,175,630	10%	4,511,520	12%
CONCRETE PRODUCTS	1,784,190	8%	3,539,820	10%
MALT LIQUORS	1,653,190	8%	1,982,880	5%
ASPHALT PAVING BLOCKS OR MIX	1,035,290	5%	937,950	3%
OTHER COMMODITIES	10,145,190	47%	17,745,650	48%
TOTAL TONNAGE	21,571,120	100%	36,861,390	100%

Table 5 shows the tonnage and value breakdown of commodity flows by mode exported from Freight Zone 3 in 2010, as well as 2040 forecasts. Most freight is exported from the Denver region by truck in terms of both tonnage and value — about 98 percent by either measure. The 2040 forecasts are similar. This does not mean that rail, air and other modes are not important, but it underscores the importance of the region’s highways, roadways and streets to freight and goods movement.

Exhibits 7 and 8 show the top in-state destinations for commodities transported out of the Denver region by tons (Exhibit 5) and by value (Exhibit 6) for both 2010 and 2040. As noted previously, CDOT separates Weld County from the rest of the DRCOG region into a different freight zone economic region. Even if CDOT had grouped southwest Weld County in Freight Zone 3, the results of exhibits 7 and 8 would not likely change.

Table 4: Top Commodities (by Value) Transported out of the Denver Region by Truck

COMMODITY	2010 EXISTING		2040 FORECAST	
	VALUE	PERCENT	VALUE	PERCENT
WAREHOUSE AND DISTRIBUTION CENTER	\$2,738,910,550	10%	4,743,728,330	6%
MISSILE OR SPACE VEHICLE PARTS	\$1,652,912,180	6%	3,668,958,830	5%
ELECTRONIC DATA PROCESSING EQUIP.	\$1,565,718,120	5%	7,613,461,930	10%
MALT LIQUORS	\$1,517,309,710	5%	1,819,391,540	2%
ORTHOPAEDIC OR PROSTHETIC SUPPLIES	\$1,004,238,680	3%	4,525,069,570	6%
RAIL INTERMODAL DRAYAGE FROM RAMP	\$941,645,050	3%	2,473,170,180	3%
MISCELLANEOUS PLASTIC PRODUCTS	\$845,860,200	3%	2,028,632,810	3%
DRUGS	\$687,976,570	2%	2,477,405,670	3%
SOLID STATE SEMICONDUCTORS	\$169,017,800	1%	5,741,746,760	8%
OTHER COMMODITIES	\$17,700,284,860	61%	38,781,659,150	52%
TOTAL VALUE	\$28,823,873,720	100%	73,873,224,770	100%

Table 5: Total Commodities Exported from the Denver Region by Tonnage, Value, and Mode

MODE SPLIT	2010		2040	
	TONNAGE	VALUE	TONNAGE	VALUE
TRUCK	21,188,500	\$27,423,589,220	36,179,390	\$70,083,469,740
RAIL	257,190	\$99,909,760	483,550	\$211,445,410
AIR	124,830	\$609,301,600	195,030	\$1,079,716,150
OTHER	600	\$3,096,570	3,420	\$21,187,800
TOTALS	21,571,120	\$28,135,897,150	36,861,390	\$71,395,819,100

Exhibit 5: Top Colorado Destinations of Denver Region Exports by Tons in 2010 and 2040

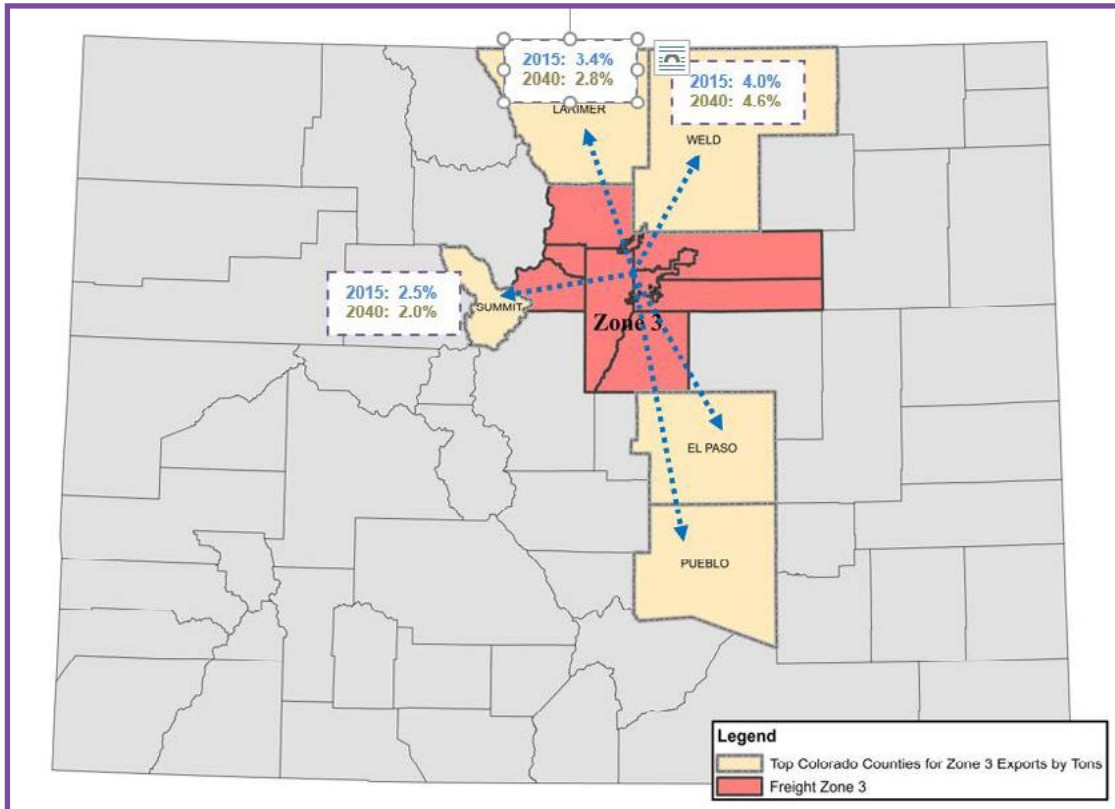
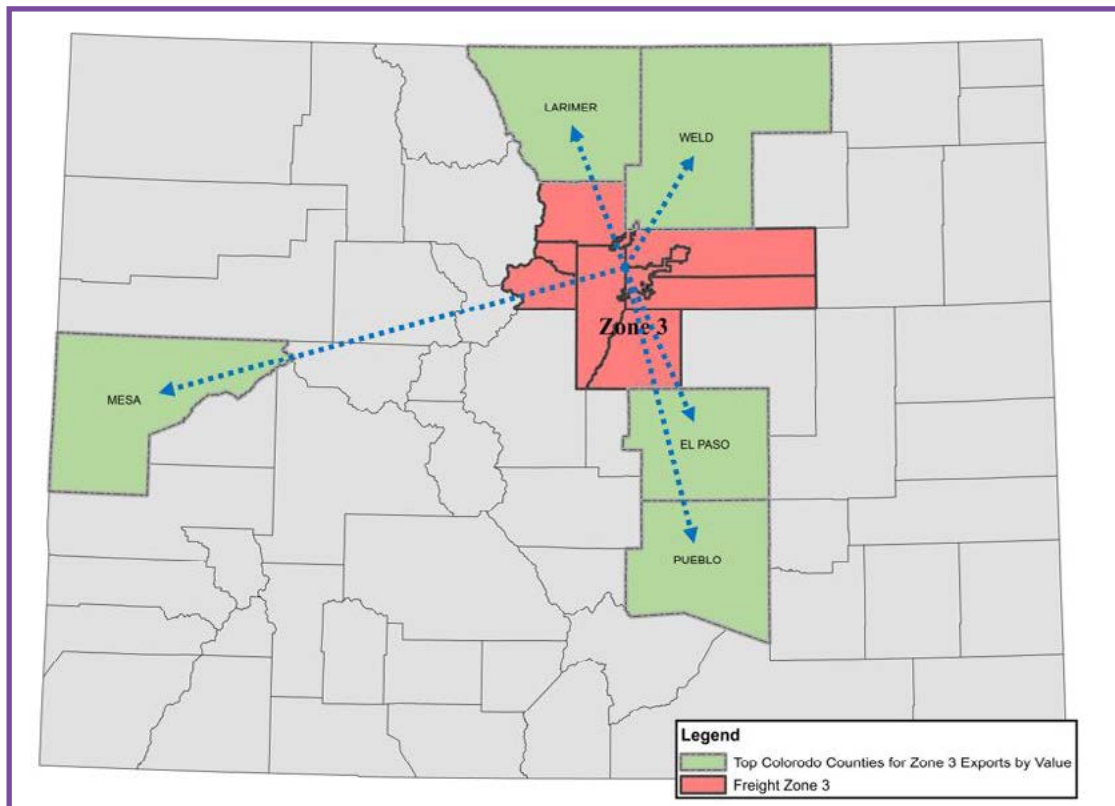


Exhibit 6: Top Colorado Destinations of Denver Region Exports by Value in 2010 and 2040



Transported Out of State

Table 6 and Exhibit 7 show the top out-of-state destinations for commodities originating within and exported from the Denver region by truck, by weight in tons, for 2010 and 2040. An area that receives freight is known as business economic area (BEA). The Casper, Wyoming, area was the Denver region's top export destination in 2010 and is forecast to continue to be its

top business economic area for exports in 2040. The top five business economic area destinations for DRCOG region commodity exports do not change between 2010 and 2040, though their ranking changes slightly (for example, Albuquerque and Wichita). Table 7 and Exhibit 8 show similar information by commodity value.

Table 6: Top Out-of-State Destinations (by Weight) of Denver Region Exports by Truck

BUSINESS ECONOMIC AREA (BEA)	2010 EXISTING		2040 FORECAST	
	TONS	PERCENT	TONS	PERCENT
WYOMING PORTION OF CASPER	1,318,840	16%	2,176,950	15%
UTAH PORTION OF SALT LAKE CITY	949,770	12%	1,565,610	11%
NEW MEXICO PORTION OF ALBUQUERQUE	375,840	5%	634,920	4%
KANSAS PORTION OF WICHITA	329,690	4%	664,540	5%
NON-CENSUS METROPOLITAN AREA SASKATCHEWAN	239,770	3%	428,960	3%
OTHER DESTINATIONS	4,899,770	60%	8,777,940	62%
TOTAL TONNAGE	8,113,680	100%	14,248,920	100%

Exhibit 7: Top Out-of-State Destinations of Denver Region Exports by Tons in 2010 and 2040

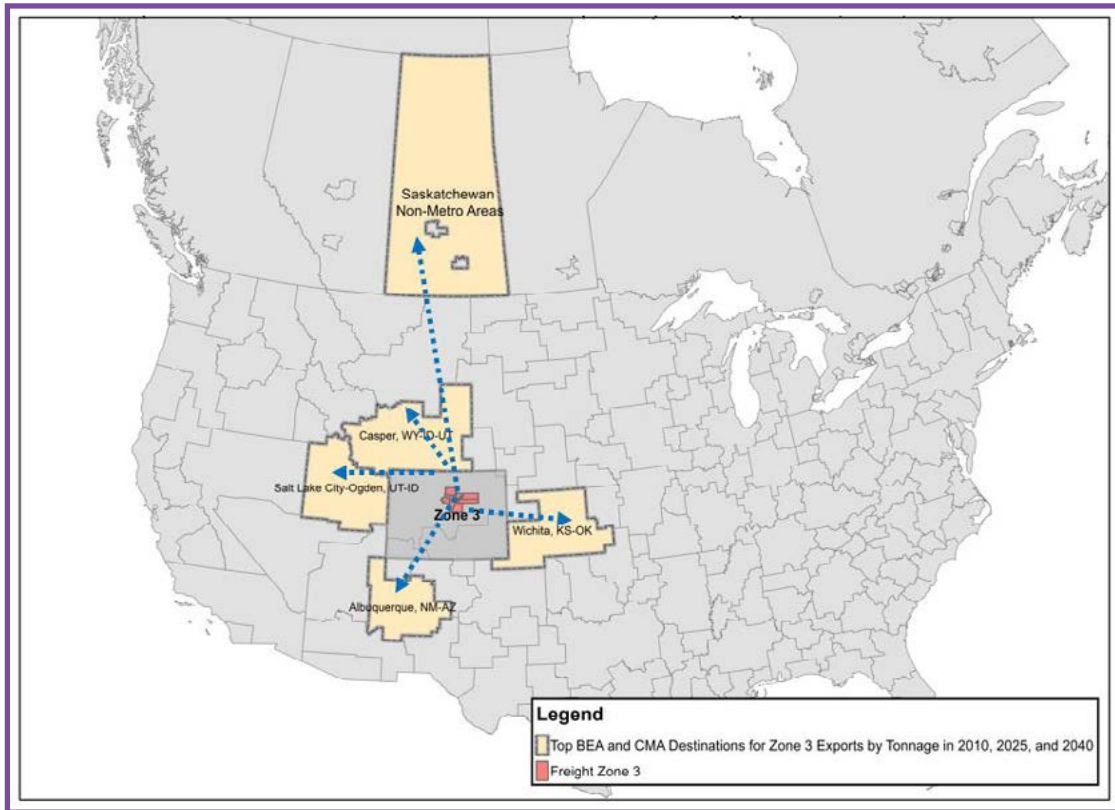
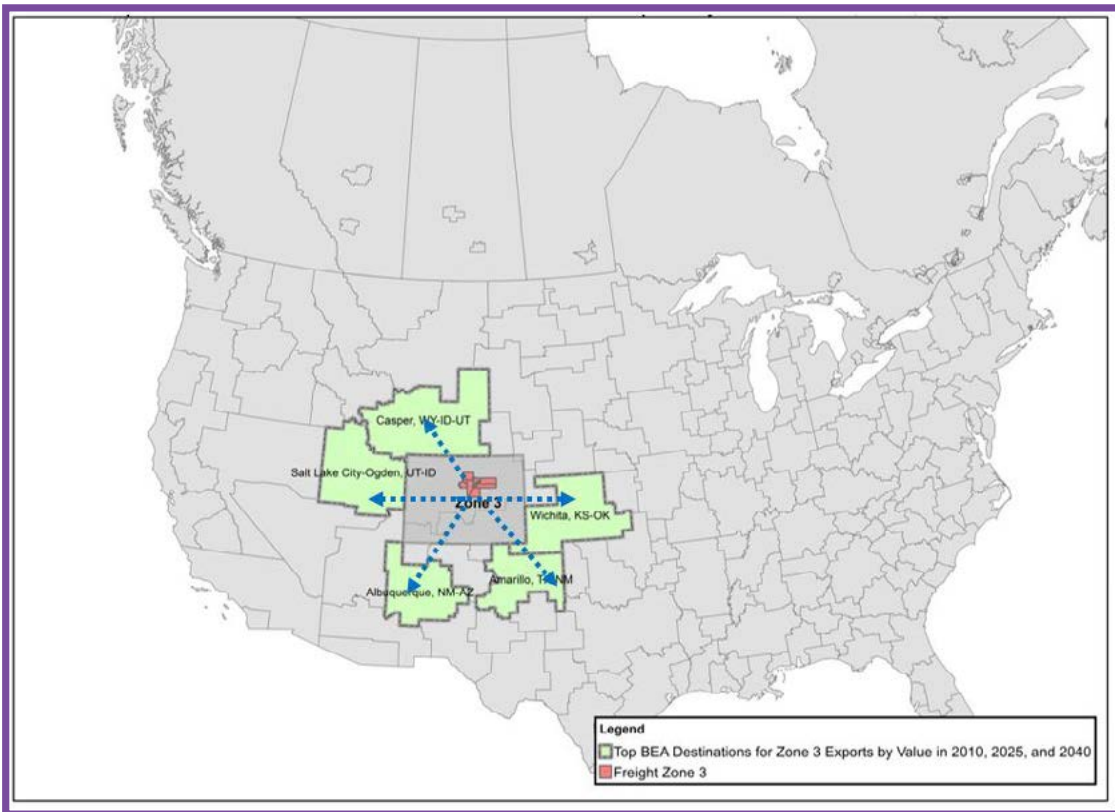


Table 7: Top Out-of-State Destinations (by Value) of Denver Region Exports by Truck

BUSINESS ECONOMIC AREA (BEA)	2010 EXISTING		2040 FORECAST	
	VALUE	PERCENT	VALUE	PERCENT
WYOMING PORTION OF CASPER	\$1,828,477,320	9%	\$3,743,802,300	7%
UTAH PORTION OF SALT LAKE CITY	\$1,775,745,960	9%	\$3,253,535,190	6%
NEW MEXICO PORTION OF ALBUQUERQUE	\$1,292,333,840	7%	\$2,909,081,890	5%
KANSAS PORTION OF WICHITA	\$1,150,107,780	6%	\$3,580,855,490	7%
TEXAS PORTION OF AMARILLO	\$752,754,740	4%	\$2,184,338,060	4%
OTHER DESTINATIONS	\$12,633,129,260	65%	\$38,185,693,000	71%
TOTAL VALUE	\$19,432,548,900	100%	\$53,857,305,930	100%

Exhibit 8: Top Out-of-State Destinations of Denver Region Exports by Value in 2010 and 2040



Transported into the Region (from In-State)

Tables 8 and 9 are lists of the top commodities imported into the DRCOG region (Freight Zone 3) by truck for 2010 and 2040 (forecast). As shown in Table 8, crude petroleum, gravel, sand and concrete products are some of the top individual commodities by weight that

are transported into the Denver region by truck. Crude petroleum is also one of the top commodities by value, along with petroleum refining products, plastics products and electronic data processing equipment (Table 9).

Table 8: Top Commodities (by Weight) Transported into the Denver Region by Truck

COMMODITY	2010 EXISTING		2040 FORECAST	
	TONS	PERCENT	TONS	PERCENT
CRUDE PETROLEUM	5,493,840	12%	7,615,930	10%
WAREHOUSE AND DISTRIBUTION CENTER	4,668,530	10%	13,960,910	18%
GRAVEL OR SAND	4,347,910	10%	6,445,850	8%
READY-MIX CONCRETE, WET	3,837,630	8%	8,628,340	11%
BROKEN STONE/RIPRAP	3,191,810	7%	4,923,360	6%
GRAIN	3,070,240	7%	4,121,570	5%
ALL OTHER COMMODITIES	20,939,370	46%	33,454,150	42%
TOTAL TONNAGE	45,549,330	100%	79,150,110	100%

Table 9: Top Commodities (by Value) Transported into the Denver Region by Truck

COMMODITY	2010 EXISTING		2040 FORECAST	
	VALUE	PERCENT	VALUE	PERCENT
WAREHOUSE AND DISTRIBUTION CENTER	\$4,954,965,870	10%	14,817,486,140	12%
CRUDE PETROLEUM	\$2,333,185,230	5%	3,234,418,240	3%
PETROLEUM REFINING PRODUCTS	\$1,793,903,510	3%	1,270,911,540	1%
MISCELLANEOUS PLASTIC PRODUCTS	\$1,497,621,040	3%	2,488,609,190	2%
ELECTRONIC DATA PROCESSING EQUIPMENT	\$1,367,234,890	3%	5,288,313,520	4%
CASH GRAINS, NOT ELSEWHERE CLASSIFIED	\$1,062,393,230	2%	1,238,915,990	1%
DRUGS	\$856,487,510	2%	3,894,871,780	3%
SOLID STATE SEMICONDUCTORS	\$743,859,160	1%	22,645,608,370	18%
RADIO OR TV TRANSMITTING EQUIPMENT	\$647,978,110	1%	3,749,756,770	3%
OTHER COMMODITIES	\$36,291,372,900	70%	68,202,299,000	54%
TOTAL VALUE	\$51,549,001,450	100%	126,831,190,540	100%

Table 10 shows the tonnage and value breakdown of commodity flows by mode transported into the DRCOG region in 2010, as well as 2040 forecasts. As with exports (Table 5), most freight is imported into the Denver region by truck in terms of both tonnage and value — about 98 percent by either measure. The 2040 forecasts are similar. This does not mean that rail, air and other modes are not important, but the volume of freight moved by trucks underscores the importance of the region’s highways, roadways and streets to freight and goods movement.

Exhibits 9 and 10 show the top in-state origins for commodities transported into the Denver region by tons (Exhibit 9) and by value (Exhibit 10) for both 2010 and 2040. As noted previously, CDOT groups Weld County in a different freight zone economic region than the rest of the DRCOG region. Even if CDOT had grouped southwest Weld County in Freight Zone 3, the results depicted in exhibits 9 and 10 would not likely change.

Table 10: Total Commodities Transported in the Denver Region by Tonnage, Value, and Mode

MODE SPLIT	2010		2040	
	TONNAGE	VALUE	TONNAGE	VALUE
TRUCK	21,188,500	\$27,423,589,220	36,179,390	\$70,083,469,740
RAIL	257,190	\$99,909,760	483,550	\$211,445,410
AIR	124,830	\$609,301,600	195,030	\$1,079,716,150
OTHER	600	\$3,096,570	3,420	\$21,187,800
TOTALS	21,571,120	\$28,135,897,150	36,861,390	\$71,395,819,100

Exhibit 9: Top Colorado Origins of Commodities Transported into the Denver Region by Tons in 2010 and 2040

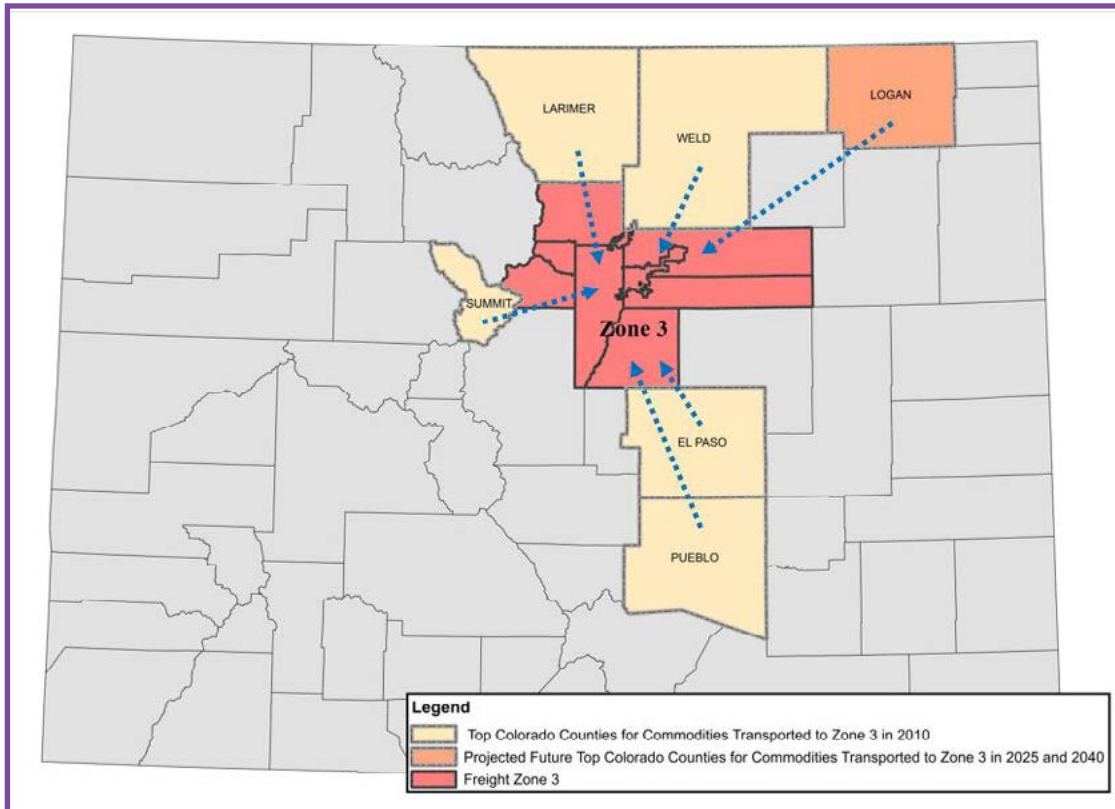
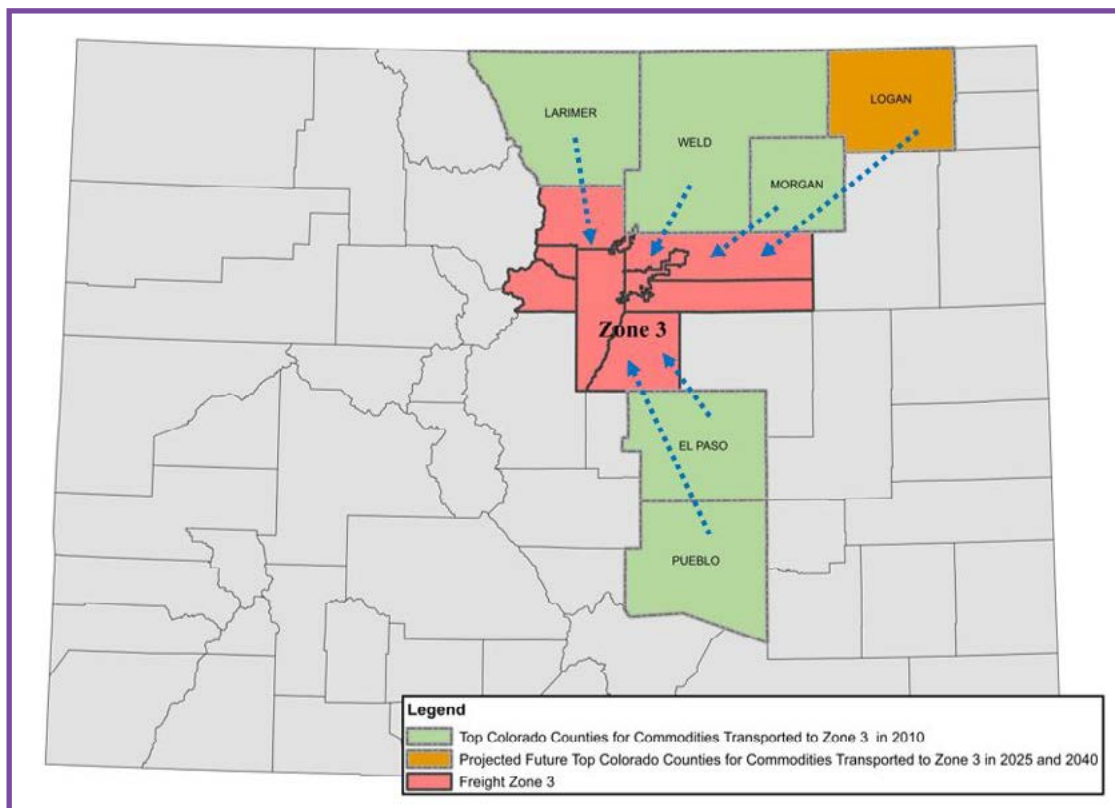


Exhibit 10: Top Colorado Origins of Commodities Transported into the Denver Region by Value in 2010 and 2040



Transported into the Region (from Out-of-State)

Table 11 and Exhibit 11 show the top out-of-state origins for commodities transported into the Denver region by truck, by weight in tons for 2010 and 2040. As shown, the Edmonton, Alberta, region was the top import origin in 2010 and forecast for 2040. The top five destinations for DRCOG region commodity imports do not change

significantly between 2010 and 2040, though their ranking changes slightly. Table 12 and Exhibit 12 show similar information, by commodity value. Areas shown are business economic areas except as noted by census metropolitan area (CMA).

Table 11: Top Out-of-State Destinations (by Weight) of Denver Region Exports by Truck

BUSINESS ECONOMIC AREA (BEA)	2010 EXISTING		2040 FORECAST	
	TONS	PERCENT	TONS	PERCENT
EDMONTON, ALBERTA CENSUS METROPOLITAN AREA	5,504,500	26%	7,655,840	20%
UTAH PORTION OF SALT LAKE CITY	1,235,940	6%	2,490,820	7%
CALIFORNIA PORTION OF LOS ANGELES	1,149,340	5%	2,555,990	7%
KANSAS PORTION OF WICHITA	995,650	5%	2,274,530	6%
WYOMING PORTION OF CASPER	801,670	4%	1,415,520	4%
OTHER ORIGINS	11,274,290	54%	21,897,760	57%
TOTAL TONNAGE	20,961,390	100%	38,290,460	100%

Exhibit 11: Top Out-of-State Origins of Denver Region Imports by Tons in 2010 and 2040

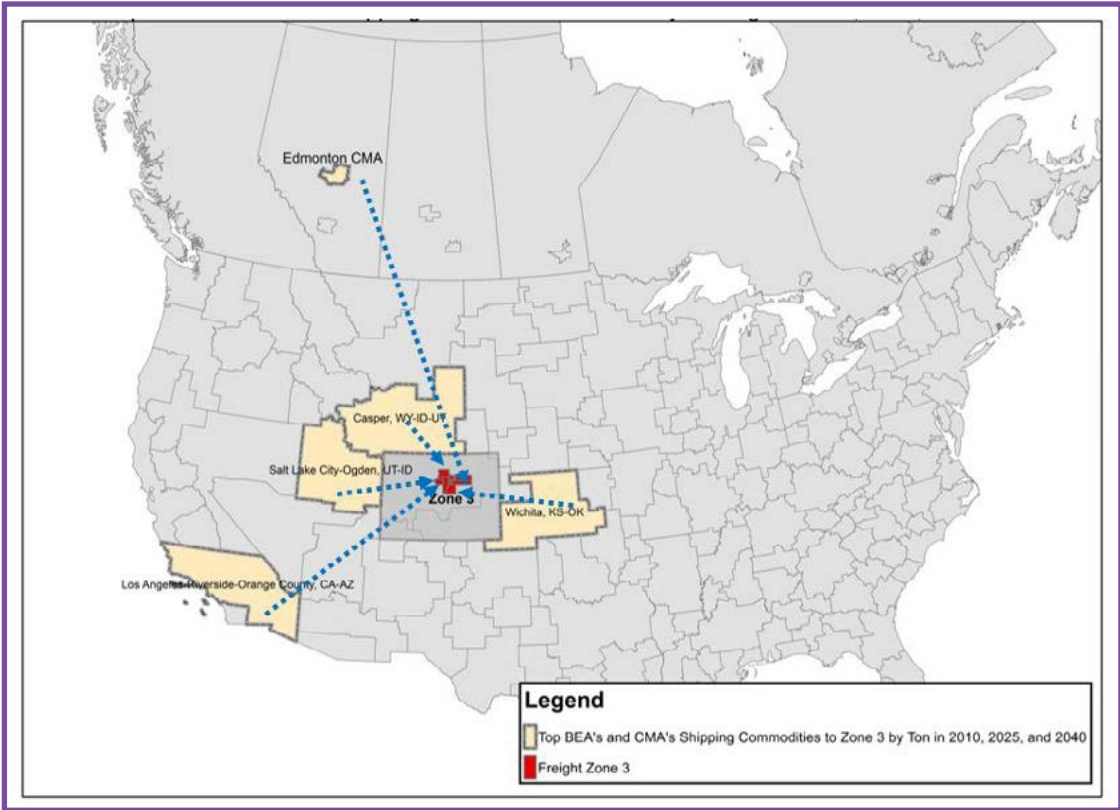
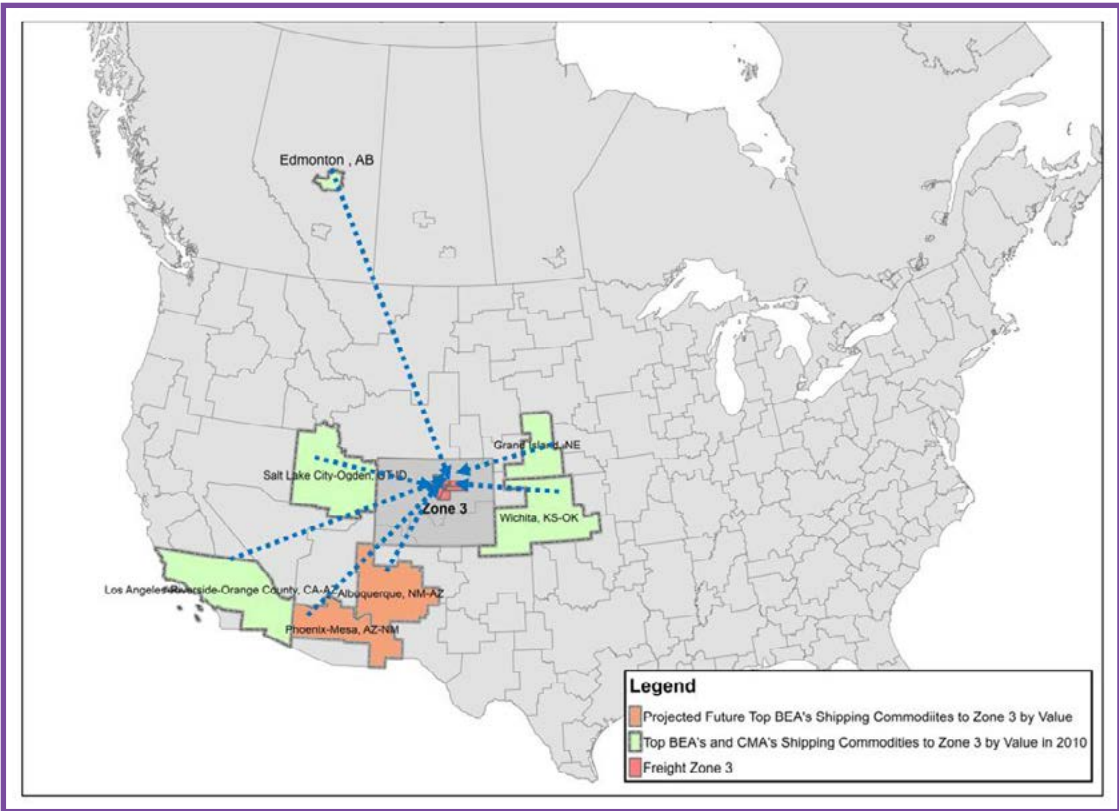


Table 12: Top Out-of-State Destinations (by Value) of Denver Region Exports by Truck

BUSINESS ECONOMIC AREA (BEA)	2010 EXISTING		2040 FORECAST	
	VALUE	PERCENT	VALUE	PERCENT
CALIFORNIA PORTION OF LOS ANGELES	\$7,489,348,240	18%	\$18,790,425,150	17%
UTAH PORTION OF SALT LAKE CITY	\$4,999,349,150	12%	\$20,284,254,420	19%
EDMONTON, ALBERTA CENSUS METROPOLITAN AREA	\$2,362,353,550	6%	\$3,351,652,410	3%
KANSAS PORTION OF WICHITA	\$1,676,616,910	4%	\$3,769,683,340	3%
GRAND ISLAND, NEBRASKA	\$1,278,166,320	3%	\$2,551,631,130	2%
NEW MEXICO PORTION OF ALBUQUERQUE	\$681,291,780	2%	\$5,523,340,610	5%
ARIZONA PORTION OF PHOENIX	\$439,420,810	1%	\$4,848,587,270	4%
OTHER ORIGINS	\$21,929,858,150	54%	\$48,805,180,950	45%
TOTAL VALUE	\$40,856,404,910	100%	\$107,924,755,280	100%

Exhibit 12: Top Out-of-State Origins of Denver Region Imports by Value in 2010 and 2040



Tables 13 and 14 show the top commodities with both an origin and destination within the DRCOG region (Freight Zone 3) that were shipped on trucks in 2010, as well as 2040 forecasts. Table 13 shows the information by weight; Table 14 shows the information by commodity value.

Finally, Table 15 shows the percentage of commodities that have both an origin and destination within the DRCOG region by year, by both weight and value.

Table 13: Top Commodities by Weight with Origins and Destinations in the DRCOG Region

COMMODITY	2010 EXISTING		2040 FORECAST	
	TONS	PERCENT	TONS	PERCENT
GRAVEL OR SAND	9,629,660	26%	15,925,380	26%
BROKEN STONE/RIPRAP	7,089,910	19%	12,548,350	20%
WAREHOUSE AND DISTRIBUTION CENTER	4,067,040	11%	6,763,940	11%
READY-MIX CONCRETE, WET	3,286,600	9%	5,399,580	9%
PETROLEUM REFINING PRODUCTS	1,869,100	5%	2,144,570	3%
ASPHALT PAVING BLOCKS OR MIX	1,519,850	4%	1,371,450	2%
CONCRETE PRODUCTS	1,491,560	4%	2,636,600	4%
RAIL INTERMODAL DRAYAGE FROM RAMP	1,270,730	3%	3,386,910	6%
OTHER COMMODITIES	7,137,340	19%	11,132,710	18%
TOTAL TONNAGE	37,361,790	100%	61,309,490	100%

Table 14: Top Commodities by Value with Origins and Destinations in the DRCOG Region

COMMODITY	2010 EXISTING		2040 FORECAST	
	VALUE	PERCENT	VALUE	PERCENT
RAIL INTERMODAL DRAYAGE FROM RAMP	\$5,374,774,700	24%	\$14,325,566,410	31%
WAREHOUSE AND DISTRIBUTION CENTER	\$4,316,578,420	19%	\$7,178,946,820	15%
RAIL INTERMODAL DRAYAGE TO RAMP	\$1,866,509,330	8%	\$4,656,595,880	10%
PETROLEUM REFINING PRODUCTS	\$1,707,505,090	7%	\$1,959,154,690	4%
DRUGS	\$980,875,800	4%	\$3,292,437,990	7%
MISSILE OR SPACE VEHICLE PARTS	\$918,236,870	4%	\$2,988,822,500	6%
MAIL AND EXPRESS TRAFFIC	\$776,770,930	3%	\$612,344,870	1%
AIR FREIGHT DRAYAGE TO AIRPORT	\$553,175,460	2%	\$653,062,740	1%
BREAD OR OTHER BAKERY PRODUCTS	\$517,063,430	2%	\$779,363,600	2%
OTHER COMMODITIES	\$5,775,282,160	25%	\$10,053,149,680	22%
TOTAL VALUE	\$22,786,772,190	100%	\$46,499,445,180	100%

Table 15: Top Commodities by Value with Origins and Destinations in the DRCOG Region

YEAR	TONNAGE	VALUE
2010	55%	29%
2025	56%	26%
2040	53%	23%

G. MVRTP Freight-Related Transportation Improvements

One of the most consistent feedback themes provided by freight stakeholders is the importance of travel time reliability and the effects of congestion on freight and goods movement. The following roadway system improvement project types contained in the MVRTP will directly benefit the movement of freight by decreasing congestion and improving travel time reliability:

- Expand the Regional Roadway System (add nearly 1,200 lane miles) by widening roads, removing bottlenecks and constructing new roads and interchanges.
- Construct railroad crossing grade-separations at critical locations.
- Provide roadway management and Intelligent Transportation System applications such as traveler information systems, incident management and variable message signs.
- Efficiently operate, maintain and repair roadways and other transportation facility assets so freight and traffic can travel smoothly and safely.

The following examples of regionally significant roadway capacity projects in the 2040 Fiscally Constrained RTP will specifically benefit freight and goods movement because they are located on roadways that are either designated freight corridors, provide access to multimodal freight terminals, have a large volume of commercial vehicles or are otherwise important to freight and goods movement:

- I-25 (U.S. Route 36 to State Highway 7): add managed lanes — opened in 2016
- I-25 (Santa Fe Drive to Walnut Street): interchange capacity
- I-70 (I-25 to Chambers Road): add one managed lane in each direction

- I-70 (Empire Junction (U.S. Route 40) to Twin Tunnels): add peak period shoulder managed lanes
- I-270 (I-25 to I-70): widen from four to six lanes
- I-270/Vasquez Blvd: interchange capacity
- U.S. Route 36 (I-25 to Table Mesa Drive): add managed lanes — opened in 2015
- U.S. Route 85 (Highlands Ranch Parkway to County Line Road): widen from four to six lanes
- C-470 (Kipling Parkway to I-25): add toll managed lanes
- State Highway 2 (72nd Ave. to I-76): widen from two to four lanes
- Peña Boulevard (I-70 to E-470): widen from four to eight lanes
- 88th Ave. (I-76 to State Highway 2): widen from two to four lanes

The MVRTP includes the following projects, strategies and concepts to benefit the freight railroad system:

- Eastern railroad bypass. CDOT concluded the Colorado Rail Relocation Implementation Study in 2009. Two alternative alignments were determined to have a positive benefit-to-cost ratio. Either alignment could result in the diversion of a substantial amount of freight rail traffic that currently uses the Consolidated Main Line through the Denver region.
- Railroad grade-separation bridges and underpasses on the regional roadway system at the following example locations:
 - BNSF at 88th Avenue
 - BNSF at 96th Avenue
 - BNSF at 104th Avenue
 - BNSF at State Highway 67 and Union Pacific at State Highway 67 (Sedalia)

- BNSF/Union Pacific at Santa Fe Drive/ Kalamath Street
- RTD at 88th Avenue
- Union Pacific at 72nd Avenue
- Union Pacific at 88th Avenue
- Union Pacific at 96th Avenue
- Union Pacific at 104th Avenue
- Union Pacific at Broadway (State Highway 53)
- Union Pacific at Quebec Street frontage road ramps
- Union Pacific at State Highway 79
- Union Pacific at Washington Street
- Railroad grade-separations on local streets off the regional roadway system will be considered at critical locations.

DRCOG’s Transportation Improvement Program (TIP) also contains many multimodal transportation projects that will benefit freight and goods movement, such as the U.S. Route 36 managed lanes project. The TIP implements the MVRTP and identifies all transportation projects to be completed in the Denver region over a six-year period with federal, state or local funds.

Other improvements will be implemented as components of larger-scale projects built by CDOT or by local governments:

- Improve intersection turning radii at busy locations where trucks have difficulty making turns;
- Construct or widen shoulders to provide adequate space for trucks to pull over;
- Reconstruct bridges to handle typical truck load weights; and
- Construct additional rest areas or expand parking at existing areas on the outskirts of the Denver region.

In 2015, the City and County of Denver reached agreement with adjacent jurisdictions to begin developing an aerotropolis around Denver International Airport. Potential freight implications include constructing air cargo and airport-related storage, warehouse, transfer and other facilities for higher-value goods.

Landowners near Front Range Airport have proposed Spaceport Colorado, an air/rail/highway multimodal facility. Planned or envisioned improvements that will benefit terminals include

- widening several regional system roadways near multimodal terminals, and
- constructing new multimodal freight centers to accommodate truck/rail transfers and relocate some existing multimodal terminals.

H. Operations and Technology

Operations and technology are important aspects of freight and goods movement. Transportation system management and operation strategies safely provide more reliable trip travel times and reduce the amount of delays faced by drivers, passengers, trucks and commercial vehicles on the roadway and transit system.

The strategies positively affect safety and air quality. Roadway operational improvement projects are generally low- to moderate-cost and do not explicitly add significant new capacity to the system. These improvements cost-effectively reduce delay, improve traffic flow (such as by reducing bottlenecks) and increase safety — all important benefits to freight and goods movement and the delivery of services. At a federal level, the U.S. Department of Transportation has recognized the importance of operations and technology by including in the National Intelligent Transportation Systems Architecture components on carrier operations and fleet management, cargo movement and condition, roadside safety, driver security, hazardous material management and commercial vehicle tracking.

Technology plays an ever increasing role in freight through advances such as real-time traffic, travel and weather data and managing fleet deployment and payload logistics. Connected vehicle applications are an emerging technology providing information such as curve speed warnings, oversize vehicle warnings and smart roadside wireless inspection of vehicles.

CDOT recently unveiled its RoadX initiative to use cutting-edge technology to improve transportation system safety, mobility and efficiency. Such technology could include smart device apps, connected vehicles, truck platoons linked through technology and virtual guardrails. CDOT will initially invest \$20 million to start RoadX and partner with the private sector to evolve the program.

Since 2008 CDOT's Heavy Tow or Quick Clearance winter program offers standby heavy wreckers at strategic locations along I-70 between Floyd Hill and Vail Pass. According to CDOT, this allows stalled commercial vehicles to be moved quickly from traffic lanes. The program reduces traffic congestion and delays along the I-70 West corridor. Service is provided between late November and late April and sometimes during holidays or severe storms as needed. Before implementation of the Heavy Tow or Quick Clearance program, the average time to clear a commercial vehicle from a traffic lane was approximately 50 minutes. This program has cut that time in approximately half.

An article in the winter 2016 edition of *In Transition* (the magazine of the North Jersey Transportation Planning Authority) discusses how e-commerce has become a significant share of the retail market, 6 percent, or more than \$1 trillion worth of goods worldwide in 2014. Rapid growth is expected to continue. To keep up with demand, retailers are looking beyond giant warehouses on the peripheries of metropolitan areas. While there will still be demand for suburban warehouses, smaller sites are popping up within a 10- to 30-minute drive from central business districts. These sites tend to be smaller and often move-in ready. Because of their central location and ability to enable

shorter delivery turnarounds to population-dense areas, these sites are sometimes referred to as last-mile terminals. E-commerce companies such as Amazon are investigating another emerging concept — drone delivery. Along with other emerging and rapidly-evolving technologies, drones could potentially revolutionize freight travel and delivery, but their transportation and mobility implications are still unknown.

In the near future, autonomous vehicles and drones will make deliveries. For example, Anheuser-Busch recently collaborated with Otto, a subsidiary of Uber that is developing self-driving truck technology, on a test run to use an autonomous vehicle to ship beer from Fort Collins to Colorado Springs.

I. Air Quality Concerns Related to Freight Movement

The economic benefit of freight travel is not without environmental effects, particularly to the region's air quality. A large percentage of heavy trucks are powered by diesel engines. The state Air Pollution Control Division estimates that heavy-duty diesel vehicles are responsible for about 50 percent of the primary particulate matter emissions of less than 10 microns from motor vehicles. Similarly, heavy-duty diesel engines are a large contributor to nitrogen oxide emissions. Continued improvements to diesel engines and fuels, including alternative fuels to the extent practical for the freight industry, will result in cleaner-running trucks. Improvements that reduce roadway and rail congestion will also reduce pollution from truck and rail operations.

In August 2016 the U.S. Environmental Protection Agency and the National Highway Traffic Safety Administration jointly finalized standards for medium- and heavy-duty vehicles that would improve fuel efficiency and cut carbon pollution to reduce the effects of climate change, while bolstering energy security and spurring manufacturing innovation.

These standards cover model years 2018-2027 for certain trailers and model years 2021-2027 for semi-trucks, large pickup trucks, vans and all buses and work trucks. The standards are expected to lower carbon dioxide emissions by approximately 1.1 billion metric tons, save vehicle owners fuel costs of about \$170 billion and reduce oil consumption by up to 2 billion barrels over the lifetime of the vehicles sold under the program.

J. Summary – Eye Toward the Future

Freight and goods movement has become a greater planning emphasis at the federal, state, regional and local levels. Many freight-related issues, concerns and solutions apply to the region's entire transportation system, while some are specific to freight and goods movement. As with other components of the MVRTP, DRCOG, CDOT, local governments and key stakeholders will continue to work closely with freight stakeholders to plan for the future. The entities that have collaborated to make the MVRTP possible recognize that rapid technological evolution requires the region to be nimble, flexible and responsive to adapt quickly to changing trends and innovations.

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APPENDIX 6

DRCOG Coordinated Transit Plan

Section I: Introduction

Transit is a vital part of the DRCOG region's multimodal transportation system, connecting people to jobs, schools, shopping, medical care and recreation. It also promotes independence and economic development. The region's transit system must also increasingly address major trends, such as a rapidly aging population, new technology, an evolving economy, and changing residential and workplace preferences. Transit services are available throughout the DRCOG region in rural, suburban and urban areas.

Though the region is making unprecedented investments in transit service and facilities through FasTracks and other efforts, the envisioned transit system far exceeds anticipated revenues through 2040. Thus, coordination is increasingly important to optimize existing funding, services and facilities. Innovative funding alternatives, technology and other new approaches are also important.

A. Plan Purpose and Federal Requirements

The DRCOG Coordinated Transit Plan is the

1. Transit component of DRCOG's Metro Vision Regional Transportation Plan (MVRTP), and
2. Federally-required Coordinated Public Transit Human Services Transportation Plan for the DRCOG region.

The Coordinated Transit Plan inventories existing transit services and identifies fiscally constrained and envisioned transit service and system needs for the DRCOG region. It looks at both general public transit and human service transportation. These services are not mutually exclusive. For example, while many

older adults and individuals with disabilities will be served by transit modes specifically designed for their needs, many more will use general public transit. This plan integrates transit modes intended for specific populations and for the general public. The Federal Transit Administration (FTA) requires that projects selected under the FTA 5310 grant program (Enhanced Mobility for Seniors and Individuals with Disabilities) be included in a coordinated transit plan like this one.

The purpose of this plan is to improve mobility for older adults, individuals with disabilities, low-income individuals and others with mobility challenges. Existing service providers are identified, service gaps are forecast and strategies are identified to address mobility needs. The Coordinated Transit Plan also addresses the following FTA requirements, including:

- An assessment of available services that identifies current transportation providers (public, private and nonprofit);
- An assessment of transportation needs for individuals with disabilities and older adults. (This assessment can be based on the experiences and perceptions of the planning partners, on more sophisticated data collection efforts, and gaps in service.);
- Strategies, activities or projects to address the identified gaps between current services and needs, as well as opportunities to achieve efficiencies in service delivery, and
- Priorities for implementation based on resources, time and feasibility for implementing specific strategies and activities identified¹.

¹ FTA Circular C 9070.1G Enhanced Mobility of Seniors and Individuals with Disabilities Program Guidance and Application Instructions- June 6, 2014

As noted previously, FTA requires projects funded in the FTA 5310 program be included in the Coordinated Transit Plan. However, “FTA maintains flexibility in how projects appear in the Coordinated Plan. Programs and projects may be identified as strategies, activities or specific projects addressing an identified service gap or transportation coordination objective articulated and prioritized in this plan².” For example, a proposed 5310 project to expand transportation services for individuals with disabilities is consistent with the section of the Coordinated Transit Plan defining the needs for expanded services for that population.

B. Public and Stakeholder Outreach

Public and stakeholder participation was essential in preparing this plan. Older adults; individuals with disabilities; representatives of public, private and nonprofit transportation and human service providers; and other members of the public actively participated in developing this plan.

Staff received valuable input from key partners, including the [Denver Regional Mobility and Access Council \(DRMAC\)](#), the [Regional Transportation District \(RTD\)](#) and the [Colorado Department of Transportation \(CDOT\)](#). A variety of techniques were used to provide information and solicit public comment, including public forums and meetings, surveys and community planning sessions. Major outreach and engagement activities that helped develop the Coordinated Transit Plan include the following:

DRCOG and DRMAC Forum

DRCOG and DRMAC jointly hosted a public forum in 2014 to solicit input for the Coordinated Transit Plan. More than 30 people attended and more than 20 organizations directly involved in serving older adults, individuals with disabilities and low-income individuals were represented.

2016-2019 DRCOG Area Plan on Aging – Public Input from Community Conversations

The [DRCOG Area Agency on Aging \(Area Agency on Aging\)](#) conducted 17 community conversations and talked with almost 500 people between February and May of 2015. In each community conversation, the role of the Area Agency on Aging was described, service categories were explained and examples given of services in each category. Participants identified services most needed to increase or sustain independence for older adults in their community.

CDOT Statewide Transit Plan and DRCOG Open House

DRCOG and CDOT jointly hosted an open house for [CDOT’s Statewide Transit Plan](#) and DRCOG’s Metro Vision Regional Transportation Plan in 2014.

CDOT Statewide Transit Survey of Older Adults and Adults with Disabilities

For its Statewide Transit Plan, CDOT conducted a [statewide survey](#) of older adults (65 years or older) and disabled residents (18 years or older) of Colorado regarding their travel behavior, transportation priorities, needs and preferences. Of the 3,113 participants statewide, 626 were from the DRCOG region.

Local Coordinating Councils

A local coordinating council is a formal, multi-purpose, long-term alliance of community organizations, individuals and interest groups that work together to achieve common goals regarding human service transportation. Local coordinating councils promote efficient, accessible and easy to arrange transportation options in their communities.

² FTA Circular C 9070.1 G Enhanced Mobility of Seniors and Individuals with Disabilities Program Guidance and Application Instructions- July 7, 2014

There are local coordinating councils [representing each county in the DRCOG region](#). These organizations are in various stages of assessing and prioritizing needs. In 2013, DRMAC partnered with four local coordinating councils in the DRCOG region and the University of Colorado-Denver to develop needs assessments and service gap analyses. Studies were prepared for the local coordinating councils in Adams, Arapahoe, Boulder and Broomfield counties. Douglas and Jefferson counties completed needs assessments with help from consultants. All of the needs assessments and gaps analyses were reviewed as important input for this plan.

Community Assessment Survey for Older Adults (CASOA)

DRCOG's Area Agency on Aging contracted with the National Research Center to conduct a Community Assessment Survey for Older Adults. The 2015 Community Assessment Survey for Older Adults is a statistically valid survey of the needs of older adults as reported by older adults themselves in communities throughout the DRCOG Area Agency on Aging's planning area. The Boulder and Weld County area agencies on aging both conducted their own surveys.

County Council on Aging Surveys

DRCOG Area Agency on Aging staff conducted this survey at County Council on Aging meetings for each of the eight counties the DRCOG Area Agency on Aging serves. The survey results inform the planning process, including:

- Developing the Area Agency on Aging four-year plan ([Aging with Choice in the Denver Region](#), 2015-2019);
- Area Agency on Aging 2015-2017 Older Americans Act/state awards for senior services, and
- DRCOG Coordinated Transit Plan.

The Boulder and Weld County area agencies on aging also conducted similar surveys.

2013 RTD Paratransit Customer Satisfaction Survey

A random sample of about 6,800 certified paratransit customers (approximately 50 percent of the active user database) participated in the survey. The survey is important because Regional Transportation District uses its results to:

- learn customers' overall perceptions;
- compare service types or service areas;
- monitor the success of improvement efforts, and
- prioritize projects.

United States of Aging Study of Denver Region

The United States of Aging Study was created by the National Council on Aging, the National Association of Area Agencies on Aging and United Health Care in 2012 to study community preparedness for an aging population. Each year, various metropolitan areas across the country are chosen to be oversampled in a national survey. The 2015 survey conducted a more thorough sampling and analysis for the Denver region. DRCOG staff served on the Local Engagement Committee. More information about the survey can be found at ncoa.org/news/usoa-survey/.

DRMAC Membership Meetings

DRMAC holds regular membership meetings which are open to the public. The members represent specialized transportation providers, riders, advocacy groups and funders.

DRCOG Board and Committee Meetings

All DRCOG meetings are open to the public. The meetings provide a forum for citizens to provide input on various topics including transportation topics covered in this plan.

RTD Board and Committee Meetings

RTD is governed by a 15-member publicly elected board of directors. Directors are elected to a four-year term and represent a specific district. Each RTD board and committee meeting (several per month) includes time for public input.

RTD Citizens' Advisory Committee

RTD's Citizens' Advisory Committee meets quarterly to advise RTD. Committee members are appointed by the RTD board of directors to three-year terms. The meeting venue alternates around the region to make it easier for stakeholders to offer input.

RTD Local Government Meetings

RTD holds regular meetings with its local government planning partners including municipalities, counties other transit providers, community based organizations and DRCOG.

Community Living Advisory Group to the Governor of Colorado

The [Community Living Advisory Group](#) worked closely with the Colorado Commission on Aging and other planning groups to consider and recommend changes to the delivery of long-term services and supports through Medicaid managed care programs. Transportation was one of the key items discussed.

Sustainable Communities Initiative

DRCOG's Sustainable Communities Initiative, financed by a three-year grant from a federal collaboration among the U.S. Department of Housing and Urban Development, the U.S. Department of Transportation and the Environmental Protection Agency, addressed ways in which jurisdictions, housing and economic development agencies, investors and developers, and nonprofit organizations can work together to focus future housing and jobs around transit stations. The Sustainable Communities Initiative was a coordinated effort among 86 partner organizations led by DRCOG to address one of the region's most pressing and exciting challenges: leveraging the planned multibillion-dollar expansion of the transit system to meet other regional needs and opportunities.

Definitions

Several important terms are used throughout the Coordinated Transit Plan and are defined in Figure 1.

Figure 1: Definitions of Terms

demand response: any nonfixed route system of transporting individuals that requires advanced scheduling by the customer, including services provided by public entities, nonprofits and private providers

door-through-door services: personal, hands-on assistance for persons who have difficulties getting in and out of vehicles and buildings

fixed route: a system of providing designated public transportation in which a vehicle is operated along a prescribed route according to a fixed schedule

general public transportation: regular, continuing shared-ride surface transportation services that are open to the general public

human service transportation: shared-ride surface transportation services (often demand response) that are open to segment(s) of the general public defined by age, disability or low income

local coordinating council: an alliance of community organizations and individuals that work together to achieve common goals regarding human service transportation

paratransit: complementary transportation service required by the Americans with Disabilities Act for individuals with disabilities who are unable to use fixed route transportation systems

public transportation: regular, continuing shared-ride surface transportation service (demand response or fixed route) that are **open** to the general public and/or segment(s) of the general public defined by age, disability or low income

regional coordinating council: an alliance of community organizations and individuals that works together to identify and fulfill the public and human service transportation needs of their region focusing on travel across local jurisdictional boundaries

transit: transportation by a conveyance that provides regular and continuing general or special transportation to the public

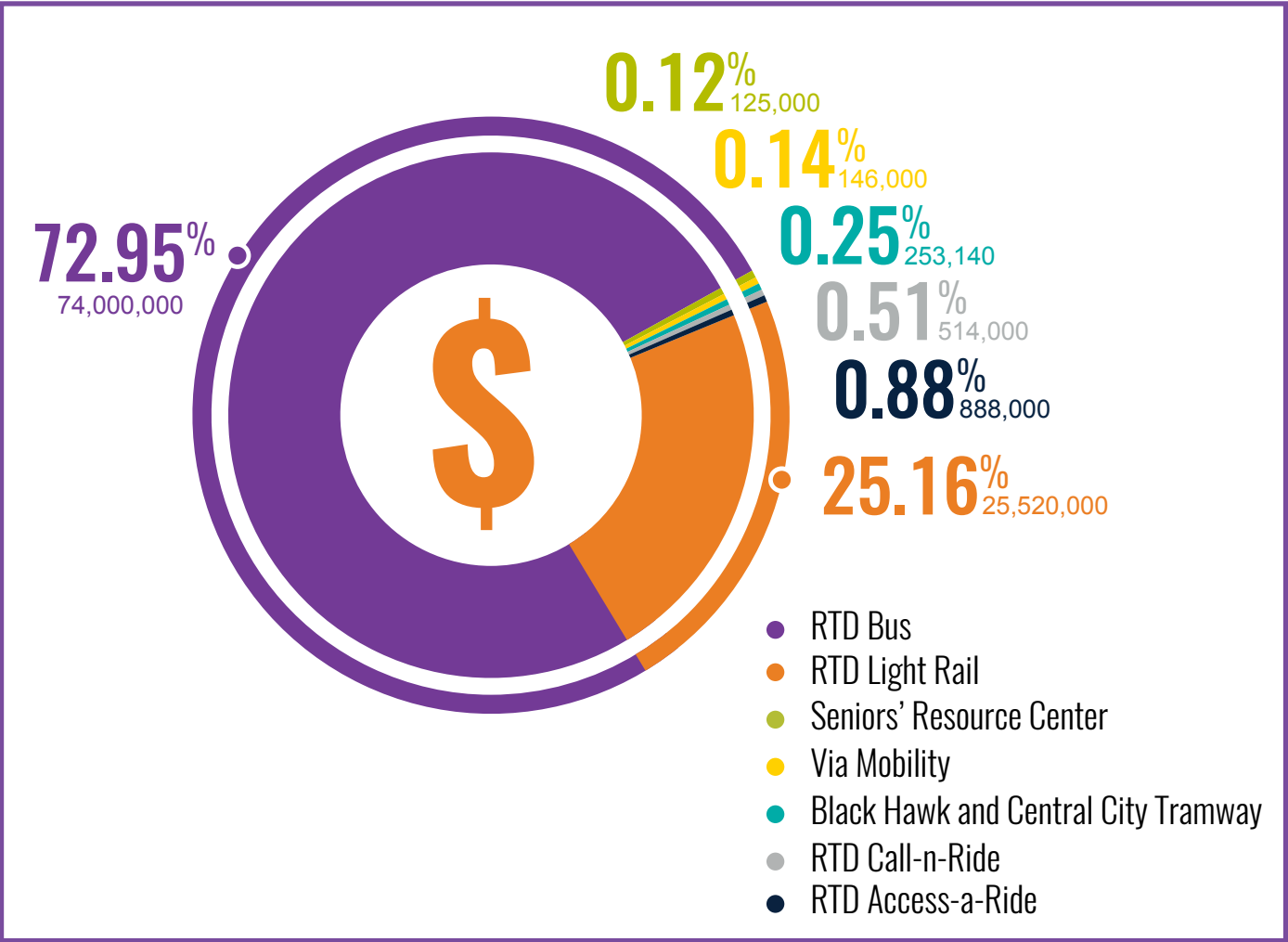
transit-dependent person: someone who must use public transportation for travel

Section II: Assessment of Available Transit Services

This section profiles existing transit services and facilities in the DRCOG region and their ridership. The region's transit services include general public transportation, paratransit and human service transportation. The largest operator of general public transportation in the DRCOG region is the [Regional Transportation District \(RTD\)](#). RTD operates general public transportation and paratransit. Conversely, human service transportation is provided by several nonprofit, for-profit and volunteer organizations. Figure 2 shows the total annual boardings for RTD, Black Hawk and Central City Tramway, and the region's two largest human service transportation providers (Via Mobility Services and Seniors' Resource Center³). In any given year RTD comprises more than 98 percent of the total boardings in the DRCOG region. RTD's systemwide ridership in 2016 was just over 101 million. Average weekday boardings were approximately 340,000.

³ Seniors' Resource Center 2016 data from staff interview; Via Mobility 2016 data from Via 2016 Annual Report to the Community (paratransit trips, does not include trips as an RTD contractor); RTD 2016 data from Service Performance 2016 Networked Family of Services (bus ridership excludes special services); 2016 Black Hawk and Central City Tramway data from Black Hawk and Central City Tramway 2016 Annual Report

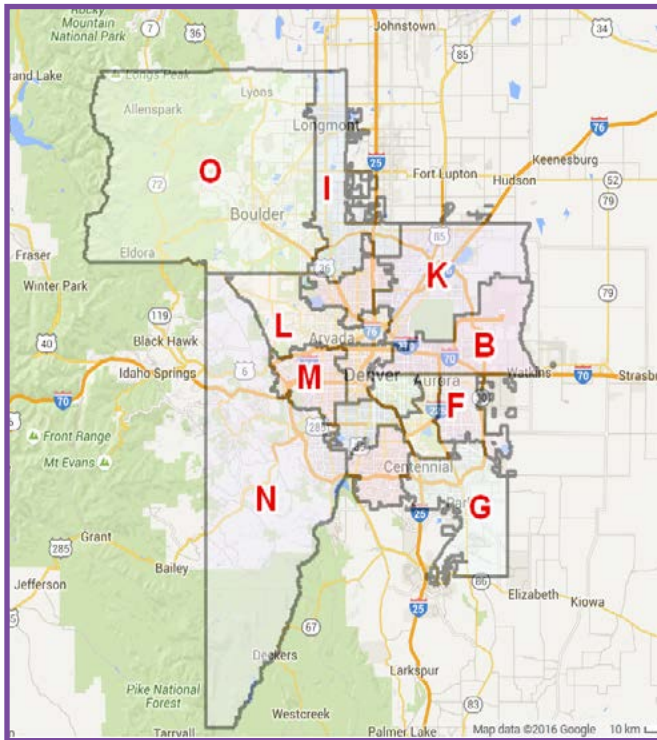
Figure 2: Annual Ridership: RTD, Black Hawk and Central City Tramway, Via Mobility Services and Seniors' Resource Center



A. RTD Service Boundaries

RTD's boundary spans a 2,340-square-mile area with 2.8 million people in eight counties. This large district covering rural, suburban and urban areas has diverse terrain including mountains and plains. In addition, there are many parcels of open space. Some places within the boundaries are currently unserved for a variety of reasons. RTD decides where service should be provided, and at what level, based on its service standards.

Figure 3: RTD Service Boundary and Board of Director District Map



B. Bus Service

RTD Fixed Route Bus

RTD has almost 150 local, airport and regional fixed bus routes serving approximately 10,000 bus stops and more than 70 Park-n-Rides with 30,000 parking spaces. There were about 70 million boardings on RTD's fixed route bus system in 2016.

RTD Bus Rapid Transit

The term bus rapid transit is not easy to define. It refers to a variety of operational service and technology characteristics that enable greatly improved bus service. RTD currently operates bus service in several corridors that include bus rapid transit features. Examples include the 16th Street MallRide in exclusive right-of-way, bus routes in designated lanes on Broadway and Lincoln with signal priority, and as of January 2016, Flatiron Flyer bus rapid transit service between Boulder and Denver in managed lanes along U.S. Route 36 and Interstate 25.

RTD Call-n-Ride

RTD's Call-n-Ride offers demand response service available to the general public within a defined service area. This service generally operates in more suburban settings. Customers call to reserve a trip within each Call-n-Ride service boundary. RTD offers a subscription service for Call-n-Ride. Select Call-n-Ride service areas offer flex route service. The flex routes offer commuters a reservation-free ride during morning and evening rush hours at scheduled stops and times along the route. There were over a half million Call-n-Ride boardings in 2014.

Other Fixed Route

Black Hawk and Central City Tramway

[Black Hawk Tramway](#) connects major destinations in Black Hawk and Central City seven days a week. The free service is supported by the Black Hawk casinos and Central City. There are about a quarter million boardings on this service annually.

Boulder Community Transit Network

The [Boulder Community Transit Network](#) is a network of bus routes throughout Boulder and connecting to surrounding cities and RTD's regional routes. The network has 10 bus routes: HOP, SKIP, JUMP, LONG JUMP, BOUND, STAMPEDE, DASH, BOLT, CLIMB

and H2C (Hop to Chautauqua, summer only). All routes are part of the RTD system and are operated by RTD except the HOP and H2C, which are operated by Via Mobility Services.

Clear Creek Prospector

[The Clear Creek Prospector](#) is a new (late 2016) deviated fixed route service in Clear Creek County serving Georgetown and Idaho Springs. This service is funded with FTA 5311 and local dollars.

Englewood Art Shuttle

The City of Englewood provides a [free circulator shuttle](#) with 19 stops between the Englewood light rail station, downtown Englewood, and several hospital and medical buildings. Englewood contracts with RTD to operate the service, which operates every 15 minutes on weekdays between 6:30 a.m. and 6:30 p.m.

University of Colorado at Boulder (Buff Bus)

The [Buff Bus](#) is a transportation service for students living in residence halls. The shuttle connects students with the main campus when classes are in session.

Lone Tree Link

The [Lone Tree Link](#) (initiated in 2014) is a free shuttle service connecting major employment centers along Park Meadows Drive with restaurants, retail and the RTD system. The Link is funded through a public-private partnership of employers and local government.

Intercity and Regional Bus

Other regional and intercity transit services include [Amtrak](#) service, [Greyhound](#), CDOT's [Bustang](#) service and other intercity bus service. Intercity and regional buses link the DRCOG region to the rest of the state and beyond.

C. RTD Rail

There were almost 30 million boardings on RTD's rail system in 2016. Therefore, ridership numbers do not reflect future lines.

D. Intermodal Facilities

Denver Union Station (DUS)

At the heart of RTD's bus and rail network is [Denver Union Station \(DUS\)](#). DUS is a major intermodal passenger terminal connecting commuter rail, light rail, Amtrak, RTD buses, intercity buses, cars, taxis, trucks, bicyclists and pedestrians.

Other Major Facilities

Several park-and-ride lots and transit stations exist for people to access transit via car, walking or bicycling. Examples of stations serving as key transfer points include the following:

- Civic Center Station
- Boulder Transit Center and Boulder Junction
- Peoria Station
- I-25 and Broadway
- More than 70 additional park-and-ride lots spread across the region

E. Paratransit, Human Service Transportation, and Other Services

RTD Paratransit (Access-a-Ride)

Under the Americans with Disabilities Act (ADA), transit agencies must provide complementary transportation services for people with disabilities who are unable to use fixed route bus or rail services.

ADA complementary paratransit service must be provided within three quarters of a mile of a bus route or rail station, at the same hours and days, for not greater than twice the regular fixed route fare. RTD's service is branded as [Access-a-Ride](#). Under contract with RTD, [Easterseals](#) evaluates potential clients to determine ADA eligibility. Access-a-Ride provided more than 880,000 boardings in 2016, roughly the same as in 2015.

Other Human Service Transportation

Several agencies provide human service transportation throughout the region. Many offer services that go beyond the requirements of ADA: door-through-door services and in areas not covered by paratransit. Human service transportation includes specialized services for older adults and individuals with disabilities. It can also include services for individuals with low-income offered in areas where fixed route services are limited or unavailable. Major providers of human service transportation in the region include [Via Mobility Services](#), [Seniors' Resource Center \(SRC\)](#) and [Douglas County](#) (contracts with multiple providers).

Via Mobility Services is a private, nonprofit agency that offers a variety of transportation services. Its portfolio includes demand responsive and deviated fixed route. Via's transportation services operate in 19 communities in five counties, including Boulder and Boulder County, Brighton, rural Adams and Arapahoe counties (Watkins, Strasburg, Bennett, Byers and Deer Trail), and other communities. Via also conducts travel training, a comprehensive, intensive instruction designed to teach participants how to travel safely and independently on general public transportation.

Seniors' Resource Center is also a private, nonprofit agency that provides human service transportation among other services. Seniors' Resource Center directly transports and brokers transportation in multiple counties: Adams, Arapahoe, Broomfield, Denver, Douglas, Jefferson, Clear Creek, Gilpin and Park. Seniors' Resource Center also operates [A-Lift](#)

transportation via contract with Adams County for county residents who are 60 or older or are mobility challenged, regardless of age.

Douglas County contracts with a wide range of providers in a brokerage model for transportation for older adults, individuals with disabilities and low-income individuals. Contracted providers include

- [Castle Rock](#) and [Parker](#) senior centers;
- [Love INC of Littleton](#) and [Neighbor Network](#) volunteer driver programs;
- Seniors' Resource Center, and
- [To the Rescue](#).

Each entity (Via Mobility Services, Seniors' Resource Center and Douglas County) integrates FTA 5310 funding, federal Older Americans Act funding, other federal funds, local funds and other sources to pay for services.

A recent DRMAC study (Transportation Coordination Systems) notes the "region appears to be divided into three or four natural sub-regions: Boulder County, Denver metro and environs (Jefferson County, Broomfield, Adams, Denver and Arapahoe counties) and Douglas County." Each sub-region has a primary human service transportation agency that directly provides and brokers trips with other smaller providers.

Other agencies that receive or recently received federal funding to provide human service transportation include but are not limited to

- [City and County of Broomfield \(Broomfield Easy Ride\)](#)
- [Lakewood Rides](#)
- [Developmental Pathways](#)
- [Developmental Disabilities Center \(Imagine!\)](#)
- [Easterseals Colorado](#)
- [Boulder County](#)

In addition, the following agencies provide human service transportation and are members of DRMAC:

- [Amazing Wheels](#)
- [Boulder County CareConnect](#)
- Colorado Cab Company
- [First Transit](#)
- [Littleton Omnibus and Shopping Cart](#)
- [Metro Taxi and South Suburban Taxi](#)
- [Town of Castle Rock](#)

It is important to note that the list of providers currently receiving or potentially eligible to receive federal funding to provide human service transportation is always changing. This is because federal eligibility requirements change and because providers evolve over time. The Colorado Association of Transit Agencies maintains a database of transit agencies in the Denver region and across the state. DRMAC maintains a web-based interactive tool to help connect clients with service providers, called [Transit Options](#). DRMAC also regularly publishes the [Getting There Guide](#) which lists transportation providers and resources.

Volunteer Drivers

A significant portion of trips for the population dependent on transit are provided by volunteer drivers. Volunteer drivers include friends, neighbors and relatives providing transportation in informal arrangements (such as taking a home-bound neighbor to a doctor appointment). It also includes formalized volunteer driver programs. Seniors' Resource Center, Via Mobility Services, Douglas County and others also coordinate volunteer driver programs with their other services. They often reimburse volunteer driver mileage with grant funding through programs like FTA 5310.

Other Transit Services

Gilpin Connect

Gilpin Connect is a demand response service for people to access health care and other destinations outside of Gilpin County. This service is funded by gaming revenues.

Taxi Cabs

Taxi services play an important role in the provision of transit in the DRCOG region. This includes RTD's Access-a-Cab program and job access taxi voucher programs. Access-a-Cab is offered to current eligible Access-a-Ride customers as an alternative. Access-a-Cab does not meet the requirements for complementary paratransit service under the ADA and is not meant to replace the Access-a-Ride program. However, Access-a-Cab provides a more flexible schedule and is often less costly to RTD and the user. Douglas County and the Town of Castle Rock offer employment access trips using a taxi voucher program. This offers people who live or work where RTD service is limited or unavailable a way to get to and from work.

Transportation Network Companies

Transportation Network Companies like Uber and Lyft supply prearranged transportation services for a fee using an online-enabled application or platform to connect drivers using their personal vehicles with passengers. In August 2016, the City of Centennial teamed up with Lyft to offer free rides to and from the Dry Creek light rail station. Recently, Uber gave customers the option to summon self-driving cars from their phones in downtown Pittsburgh. Depending on the success of this pilot program, there may be expansion to other cities in the near future. This could be a new way for transit riders to travel the first and final mile. The state Public Utilities Commission regulates transportation network companies.

Other Operators

Several private operators offer transportation for recreational travelers to the mountains. Many ski resorts have shuttle services for their employees. Additionally, many private operators provide rides to ski areas. Multiple providers offer bus service from the metro area to the casinos in Black Hawk and Central City; scheduled trips are made daily to the gaming communities. [Super Shuttle](#) and other airport shuttles provide service to and from [Denver International Airport](#). There are also shuttles that provide transportation to trailheads. Boulder County began the Hessie Trailhead shuttle program in the summer of 2012 to address issues of vehicles that were parking at trailheads and traffic becoming congested on the way to the trailhead.

Section III: Funding and Coordination

Funding for transit is complex. The U.S. Department of Health and Human Services has conducted two inventories to ascertain how many federal programs provide funding that can be used for public transportation. The most recent inventory found 70 programs across 14 federal departments or independent agencies. This section provides an overview of local, state and federal transit funding sources and how they are used in the DRCOG region.

Table 1 shows the major federal and state transit funding programs and the typical annual allocation from each program for the DRCOG region. It includes grants, fare box, and RTD's sales and use tax. In addition, for illustrative purposes, forecast future RTD revenues are also included. Each funding program is described in more detail later in this chapter. The region receives about \$73 million annually through federal allocations. Transit agencies and providers in the region are eligible to compete for a portion of another approximately \$27 million annually in federal and state funds that are competitively awarded statewide. The largest single federal funding source is the FTA 5307 program, which funds capital and operating assistance in urbanized areas; RTD directly receives FTA 5307 funds as an

annual formula allocation.

Transit funds can be categorized in three broad terms:

- **How the funds are distributed:** Federal and state transit funding is provided either directly through a specific *allocation*, such as through formula funding programs (FTA 5307, 5310, etc.) or is awarded *competitively* through a merit-based program (such as CDOT's FASTER transit program). In a complicated twist, formula funding programs can also be competitive. For example, the DRCOG region has a history of awarding FTA 5310 funds competitively. Conversely, competitive funds can be awarded by formula – RTD directly receives \$3 million annually from CDOT's FASTER transit program and is eligible to compete for additional FASTER transit funds.
- **Where/how the funds can be spent:** All transit funds have some restrictions on eligible activities and many come with geographic restrictions. For example, the DRCOG region's FTA 5310 large urban funds can be spent only on specific eligible activities in the Denver-Aurora urbanized area.
- **Who controls the allocation of funds to specific projects/services:** RTD directly receives FTA 5307 funds from FTA. It also controls FTA 5307 funds for the small urban areas in the DRCOG region. In contrast, FTA 5310 large urban funds for the Denver region are currently allocated by CDOT, but must be spent within the Denver-Aurora Urbanized Area. And while RTD receives FTA 5307 funds directly, CDOT competitively awards FTA 5311 rural and FTA 5310 small urban funds statewide.

Tables 5 and 6 show the distribution of sources for RTD operating and capital funds. It is interesting to note that local funds make up the majority of funding for both operating and capital. Further, because of federal rules pertaining to how federal funding can be used in large urbanized areas federal assistance makes up a greater share of capital funding than operating for RTD. It is important to note that RTD currently anticipates transferring some base system revenue to FasTracks to help fund operating and maintenance costs starting in 2023. In order not to double count, transferring base system revenue is not reflected in the table.

A. Human Service Transportation

Human service transportation includes a broad range of service options designed to meet the needs of the transportation disadvantaged, including individuals with disabilities, low-income individuals and older adults. These individuals have different needs and require a variety of transportation services to ensure quality of life. Typically, these services are separate from those available to the general public and are often available only to qualified individuals based age, disability and income. Key funding sources are described below.

Local Entities

Municipalities, counties, nonprofits and other local entities typically contribute toward the cost of providing human service transportation. Many state and federal grants require a local match. Local project sponsors can provide matching funds or may choose to contribute resources above and beyond grant requirements. Some local services are provided solely with local funds, forgoing state and federal grants. Fares and donations also make up an important part of local funding.

FTA Section 5310 (Enhanced Mobility for Seniors and Individuals with Disabilities)

The FTA 5310 program funds transportation for older adults and individuals with disabilities. In the DRCOG region, project funding decisions are currently made

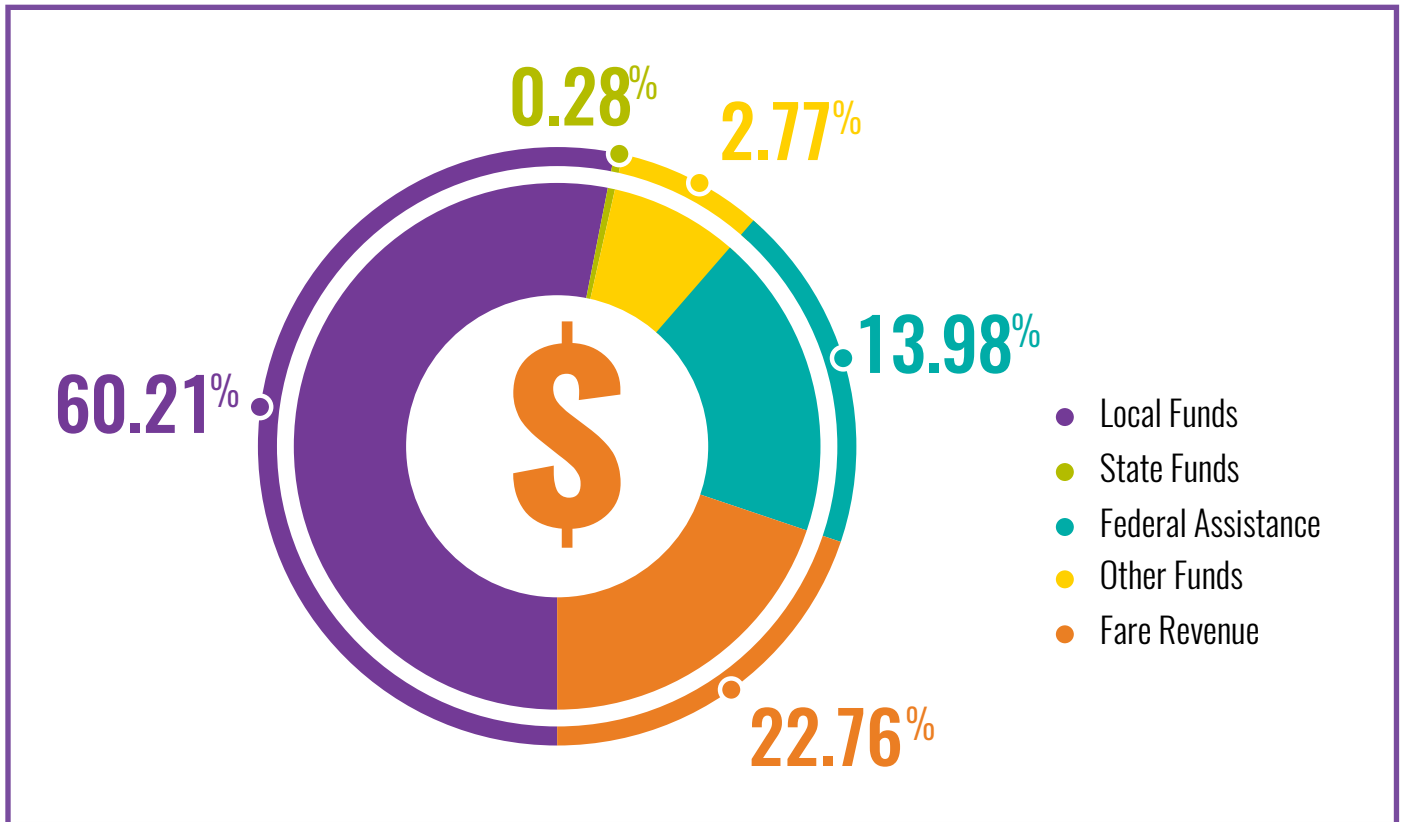
by CDOT through a competitive funding process in consultation with DRCOG and other stakeholders. FTA has the following specific project-type criteria for allocating 5310 funds:

At least 55 percent of program funds must be used on capital or traditional 5310 projects. Examples include:

- Buses and vans; wheelchair lifts, ramps and securement devices; transit-related information technology systems including scheduling, routing and one-call systems; and mobility management programs.
- Acquisition of transportation services under a contract, lease or other arrangement. Both capital and operating costs associated with contracted service are eligible capital expenses. User-side subsidies are considered one form of eligible arrangement.
- The remaining 45 percent is for projects formerly allowed under the 5317 New Freedom program. Capital and operating expenses for new public transportation services and alternatives beyond those required by the ADA, designed to assist individuals with disabilities and older adults are eligible under this category. Examples include:
 - Travel training; volunteer driver programs; building an accessible path to a bus stop including curb-cuts, sidewalks, accessible pedestrian signals or other accessible features; improving signage or wayfinding technology; incremental cost of providing same day service or door-to-door service; purchasing vehicles to support new accessible taxi, ride-sharing and/or vanpooling programs.
- Mobility management is an allowable expense in both categories.

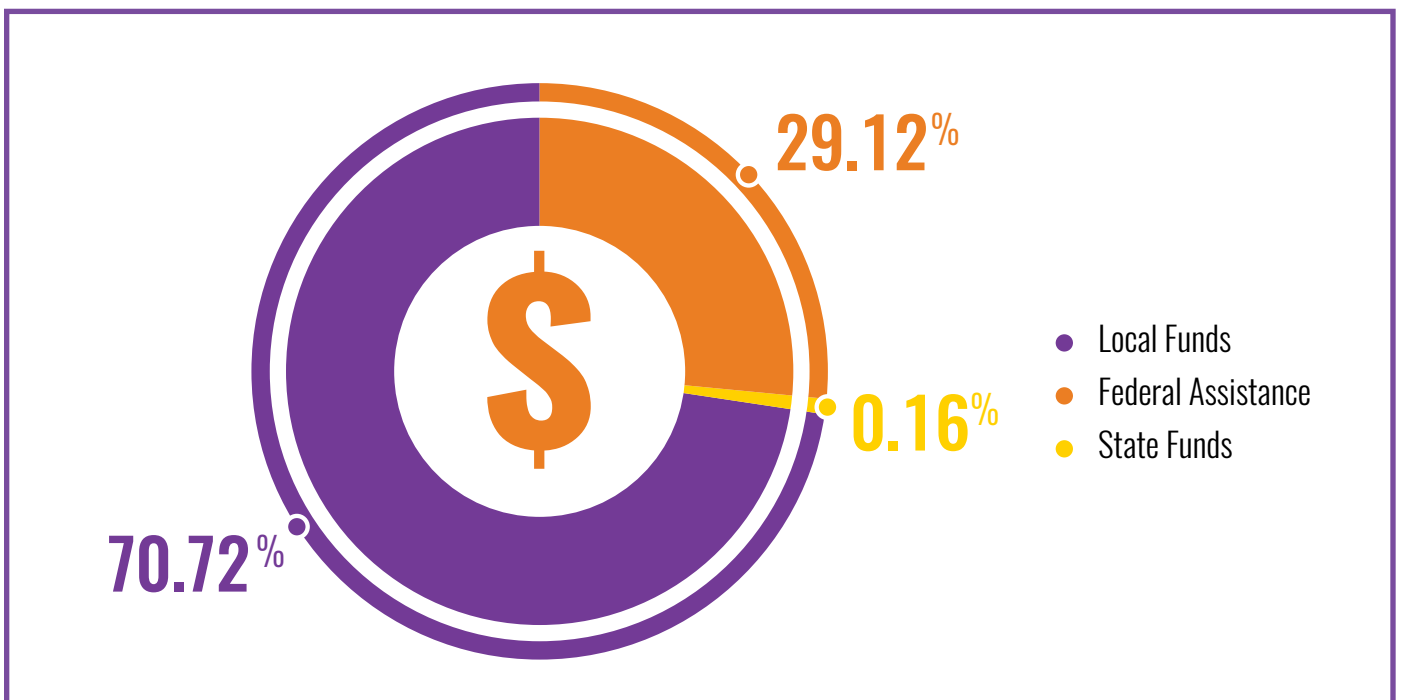
Table 2 shows the most recent FTA 5310 awards.

Figure 4: Sources for RTD Operating Funds



Source: National Transit Database-Denver Regional Transportation District 2014 Annual Agency Profile

Figure 5: Sources for RTD Capital Funds



Source: National Transit Database- Denver Regional Transportation District 2014 Annual Agency Profile

Table 1: Estimated DRCOG Region Annual Transit Funding Amounts

ANNUAL FEDERAL TRANSIT ADMINISTRATION FORMULA FUNDING AND FASTER SET-ASIDES FOR DRCOG REGION	
PROGRAM	ESTIMATED ANNUAL ALLOCATION (ROUNDED MILLIONS)
FTA 5307 for Denver-Aurora Urbanized Area	\$48.0
FTA 5307 for Boulder Urbanized Area	\$3.4
FTA 5307 for Lafayette-Louisville-Erie Urbanized Area	\$1.1
FTA 5307 for Longmont Urbanized Area	\$2.3
FTA 5310 for Denver-Aurora Urbanized Area	\$1.6
FTA 5337 High Intensity Fixed Guideway State of Good Repair for Denver-Aurora Urbanized Area	\$8
FTA 5337 High Intensity Motorbus State of Good Repair for Denver-Aurora Urbanized Area	\$0.8
FTA 5339 for Denver-Aurora Urbanized Area	\$4.5
FASTER Set-Aside for RTD	\$3
Total	\$72.7
FTA AND FASTER FUNDING CONTROLLED BY CDOT (PROJECTS IN DRCOG REGION MAY BE ELIGIBLE TO COMPETE)	
PROGRAM	ESTIMATED ANNUAL ALLOCATION (ROUNDED MILLIONS)
FTA 5310 for Urbanized Areas Under 50,000 Population	\$0.55
FTA 5310 for Urbanized Areas 50,000 to 199,999 Population	\$0.97
FTA 5311 for the Entire State	\$11
FTA 5339 for Urbanized Areas Under 50,000 Population	\$1.3
FTA 5339 for Urbanized Areas 50,000 to 199,999 Population	\$1.2
FASTER Statewide and Regional Pool ⁴	\$4
FASTER Local Pool	\$5
Total	\$24.02

⁴ RTD and Bustang each receive a \$3 million set aside from FASTER Statewide and Regional pool annually. These set asides have been subtracted from the total.

2017 RTD REVENUE (NONGRANT) FOR BASE SYSTEM AND FASTRACKS ADOPTED BUDGET						
Fare Box (Base System)						\$114.2
Fare Box (FasTracks)						\$26.4
Sales and Use Tax (Base System)						\$351.6
Sales and Use Tax (FasTracks)						234.4
Other Income (Base System)						\$8.1
Other Income (FasTracks)						\$14.3
Bond Proceeds (FasTracks)						\$17.3
Local and Third-Party Contributions (FasTracks)						\$88.2
Total						\$854.5
RTD FORECAST MAJOR REVENUE SOURCES (NONGRANT) FOR BASE SYSTEM AND FASTRACKS ROUNDED MILLIONS						
	2018	2019	2020	2021	2022	2023
FARE BOX						
Base System	\$115.2	\$127.7	\$128.5	\$129.3	\$142.9	\$143.7
FasTracks	\$31.6	\$41.2	\$44.3	\$46.0	\$52.3	\$54.0
SALES AND USE TAX						
Base System	\$371.1	\$386.4	\$399.4	\$409.7	\$422.0	\$441.1
FasTracks	\$247.4	\$257.6	\$266.3	\$273.2	\$281.3	\$294.1
OTHER INCOME						
Base System	\$8.4	\$18.6	\$8.9	\$9.1	\$9.3	\$9.6
FasTracks	\$14.7	\$15.2	\$14.8	\$13.8	\$13.9	\$13.2
Bond Proceeds (FasTracks)	—	—	—	—	—	—
Local and Third Party Contributions (FasTracks)	\$28.1	—	—	—	—	—
Totals	\$816.5	\$836.7	\$862.2	\$881.1	\$921.7	\$955.7

Adopted from [2018-2023 Strategic Budget Plan \(SBP\) & 2017 Annual Program Evaluation \(APE\) Long Range Financial Plan \(as presented to DRCOG Board on September 20, 2017\)](#)

Table 2: Federal Fiscal Year 2016-17 Federal Transit Administration 5310 Awards in the DRCOG Region

SPONSOR	PROJECT	AWARD
Via	Call Center Operating	\$270,225
Via	Mobility Management (Travel Training, Mobility Management Activities)	\$300,000
Seniors' Resource Center	Operational Support	\$250,000
Denver Regional Mobility and Access Council (DRMAC)	Regional Mobility Management	\$200,000
Douglas County	5310 Mobility Management	\$109,000
Douglas County	5310 Capital Operating	\$176,000
Seniors' Resource Center	Brokerage/Mobility Management	\$230,000
Via	Section 5310: Mobility Management - Travel Training	\$200,000
Via Mobility Services	Replace Three Body-on-Chassis Paratransit Buses	\$45,200
Via Mobility Services	Replace Three Body-on-Chassis Paratransit Buses	\$45,200
Via Mobility Services	Rebuild Three Body-on-Chassis Paratransit Buses	\$9,120
Via Mobility Services	Replace Three Body-on-Chassis Paratransit Buses	\$45,200
Via Mobility Services	Via Mobility Services Rebuild Three Body-on-Chassis Paratransit Buses	\$9,120
Via Mobility Services	Rebuild Three Body-on-Chassis Paratransit Buses	\$9,120
Via Mobility Services	Rebuild One Paratransit Van	\$9,120
Seniors' Resource Center	Seniors' Resource Center (Adams) A-Lift Fleet Replacements	\$128,000
Seniors' Resource Center	Seniors' Resource Center Fleet Vehicle Replacements	\$120,000
Easterseals Colorado	Body-on-Chassis Replacement	\$50,440

Sources: CDOT- Final Fiscal Year 2017 FASTER and Fiscal Year 16 Federal Transit Administration Awards List 2-25-16 and 2016-2017 Awards for Administration, Operating and Capitalized Operating Programs

Area Agencies on Aging (Older Americans Act Funding)

Area agencies on aging were established under the Older Americans Act of 1965 to respond to the needs of Americans 60 and older. The DRCOG Area Agency on Aging covers the DRCOG region except for Boulder and southwest Weld Counties, who each have county-run Area Agency on Agings. The [Boulder County Area Agency on Aging](#) is a division of the Boulder County Community Services Department. The [Weld County Area Agency on Aging](#) is the County's Department of Human Services.

All three Area Agency on Agings administer Title III Federal Older Americans Act and Older Coloradans Act State funding. A significant portion is available for transportation for adults over the age of 60. The DRCOG Area Agency on Aging contracts with counties and transportation agencies in the DRCOG region for transportation. The Boulder and Weld County Area Agency on Agings manage Older Americans Act transportation funding in their counties.

Medicaid – Non-Emergent (Emergency) Medical Transportation (NEMT)

Non-Emergent Medical Transportation is for Medicaid clients with no other means of transportation to and from Medicaid medical appointments. In addition to directly paying for transportation, reimbursement also may be given for gas, bus tokens and bus passes.

In the DRCOG region, the Colorado Department of Health Care Policy and Financing contracts with a private company to broker this service. This contract covers Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, Larimer and Weld counties. In Gilpin County Non-Emergent Medical Transportation is arranged through the Department of Human Services. In Clear Creek County, Seniors' Resource Center, through its Evergreen operation, provides Non-Emergent Medical Transportation as part of its overall transportation contract with the county.

Coordination of Funding Sources for Human Services Transportation

Figure 6 paints a broad – but simplified – picture of funding sources for transit in the DRCOG region. It shows key federal funding sources, where they come from and how they are distributed from the federal to the local level. However, it is not an exhaustive list. For example, many local sources of funding are not included, such as RTD's sales and use tax revenue.

It is important to emphasize the FTA allows non-USDOT federal funds to be used toward the required local match for FTA grants in many circumstances. Of significance to the DRCOG region is the ability to use Older Americans Act funds as local match for FTA funds. In the October 16, 2012 Federal Register in the 5310 Section under the subheading of "Local Match" it states the following:

"Funds provided under other Federal programs (other than those of the Department of Transportation, with the exception of the Federal Lands Transportation Program and Tribal Transportation Program established by sections 202 and 203 of title 23 U.S.C.) may be used for local match for funds provided under section 5310 and revenue from service contracts may be used as local match."

Figure 7 is federal policy guidance on mixing federal and local transportation funds. Mixing of eligible funds is encouraged by the federal government and is a key strategy identified in Section VI to improve human service transportation. Mixing of funding could also help break down silos and increase access to transportation for purposes outside specific funding sources such as medical trips.

Figure 6: Schematic of Federal Funding Sources, Distributors, and Recipients

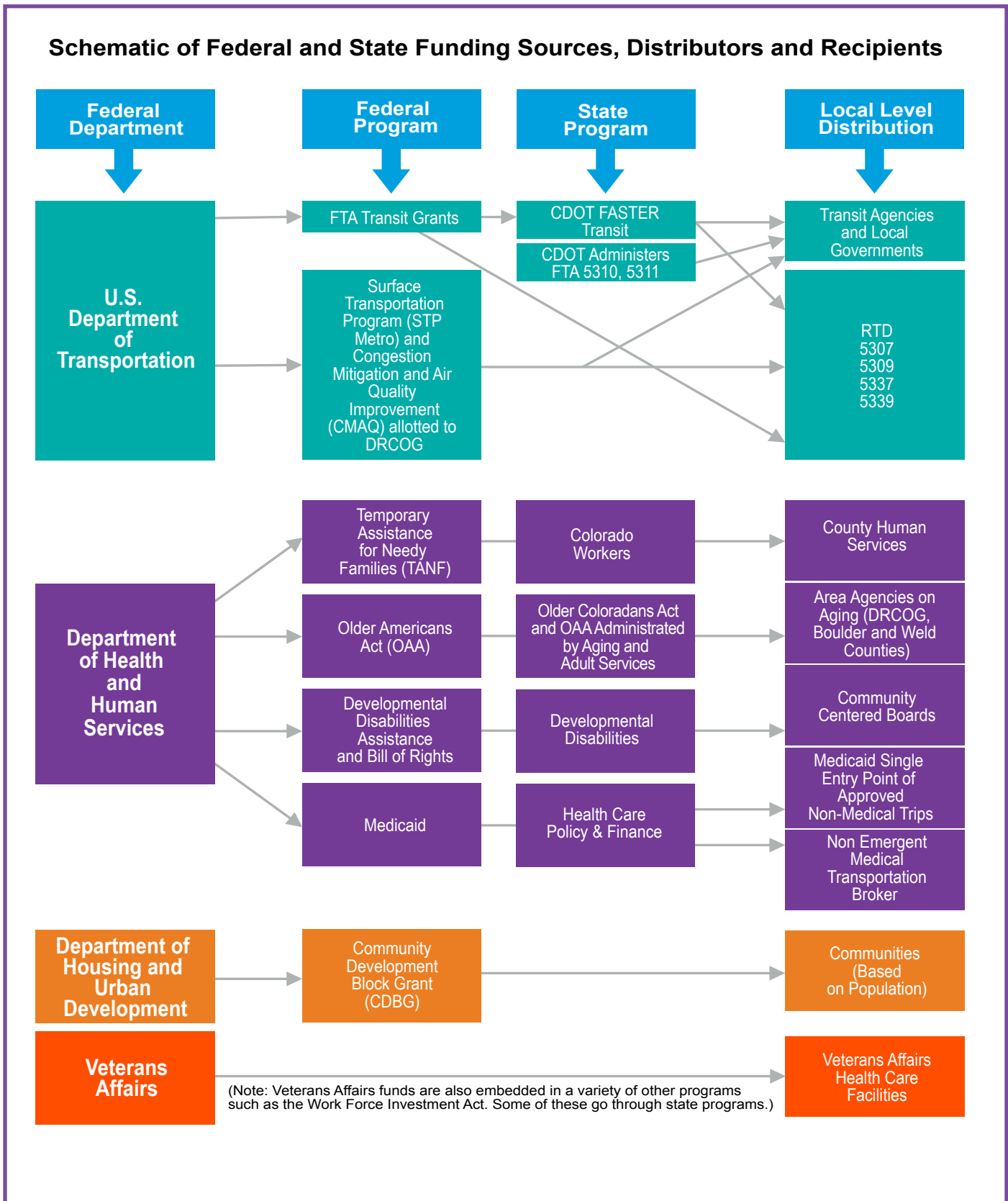


Figure 7: Policy Statement Summary on Resource Sharing from the Federal Interagency Coordinating Council on Access and Mobility

Background: Often federal grantees at the state and local levels restrict transportation services funded by a federal program to clients or beneficiaries of that federal program. Some grantees do not permit vehicles and rides to be shared with other federally assisted program clients or other members of the riding public. Federal grantees may attribute such restrictions to federal requirements. This view is a misconception of federal intent.

Purpose: This policy guidance clarifies that federal cost principles do not restrict grantees to serving only their own clients. To the contrary, applicable cost principles enable grantees to share the use of their own vehicles if the cost of providing transportation to the community is also shared. This maximizes the use of all available transportation vehicles and facilitates access for individuals with disabilities, individuals with low income, children and senior citizens to community and medical services, employment and training opportunities and other necessary services.

Applicable Programs: This policy guidance applies to federal programs that allow funds to be used for transportation services. This guidance pertains to federal program grantees that either directly operate transportation services or procure transportation services for, or on behalf of, their clientele.

Federal Cost Principles Permit Sharing

Transportation Service: A basic rule of appropriations law is that program funds must only be used for the purposes intended. Therefore, if an allowable use of a program's funds includes the provision of transportation services, then the federal program may share transportation costs with other federal programs and/or community

organizations that also allow funds to be used for transportation services, as long as the programs follow appropriate cost allocation principles.

None of the standard financial principles expressed in any of the Office of Management and Budget circulars or associated federal agency implementing regulations preclude vehicle resource sharing, unless the federal program's own statutory or regulatory provisions restrict or prohibit using program funds for transportation services. For example, one common financial rule states the following: "The grantee or sub grantee shall also make equipment available for use on other projects or programs currently or previously supported by the federal government, providing that such use will not interfere with the work on the project or program for which it was originally acquired. First preference for other use shall be given to other programs or projects supported by the awarding agency. User fees should be considered if appropriate."

In summary, allowability of costs is determined in accordance with applicable Federal program statutory and regulatory provisions and the cost principles in the Office of Management and Budget circular that applies to the entity incurring the costs. Federal cost principles allow programs to share costs with other programs and organizations. Program costs must be reasonable, necessary and allocable. Thus, vehicles and transportation resources may be shared among multiple programs, as long as each program pays its allocated (fair) share of costs in accordance with relative benefits received.

Source: Federal Interagency Coordinating Council on Access and Mobility Final Policy Statement. Oct. 1, 2006

Figure 8: Estimated Cost for Human Service Transportation 2015-2040

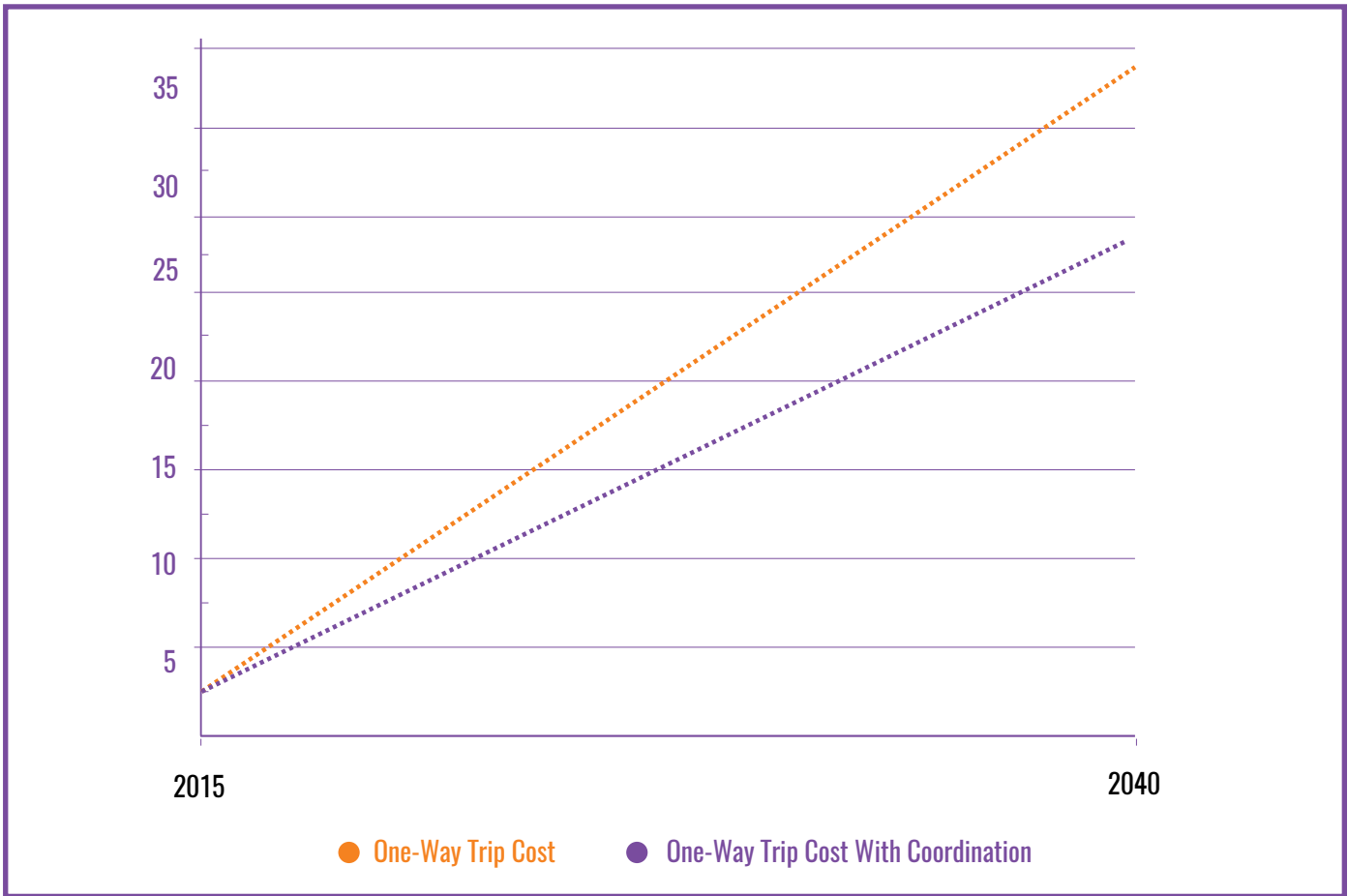


Figure 8 shows what the effect of successful coordination and travel training efforts could be on meeting transit demand. The increased efficiency that coordination provides could slow the growth of costs. The average cost per passenger trip on human service transportation in the region is around \$16⁴. With four percent inflation, the cost could be over \$40 per trip in 2040. If coordination reduces the cost by 20 percent, which is conservative based on United States General Accounting Office findings from several case studies⁵, the cost per trip could be around \$30. Based on this savings, approximately 55,000 annual additional trips could be provided annually.

B. General Public Transportation

General public transportation is not restrictive to the type of user. It can be fixed route or demand responsive. The ADA requires that public transportation be accessible for individuals with disabilities.

RTD

Sales and Use Tax

A 1-cent sales tax within the Regional Transportation District helps pay for RTD services: \$0.04 funds FasTracks and \$0.06 funds RTD's base system (all services excluding FasTracks). This revenue accounts for almost 60 percent of RTD's base system operating budget.

⁴ Transportation Coordination Systems Advisor Project Final Report- Denver Regional Mobility and Access Council

⁵ The United States General Accounting Office Report to Congressional Committees- Transportation Coordination: Benefits and Barriers Exist and Planning Efforts Progress Slowly- October 1999 gao.gov/new.items/rc00001.pdf

Fares

Passenger farebox revenues (known as farebox recovery) account for less than 25 percent of RTD’s base system operating budget revenue. Farebox recovery is the second-largest source of revenue after the sales and use tax.

Local Governments

Douglas County, the Town of Parker and RTD formed a partnership to save RTD’s Call-n-Ride service in Parker from elimination. The agreement includes financial and in-kind contributions from Douglas County and the Town of Parker in order to fund the service, and an agreement to collaborate to improve and promote the service to grow ridership.

The Longmont Free Fare Pilot Program provides free rides on local Longmont bus service. This program is managed and paid for by Boulder County and the City of Longmont through grants and the voter-approved Transit and Trails sales tax. The program is designed to

benefit low-income residents and increase ridership on the local Longmont transit routes. Some communities, such as Boulder, also fund buy-ups of RTD service to provide more service (such as better headways) than what RTD can afford on a particular route.

State

FASTER Transit

The Funding Advancements for Surface Transportation and Economic Recovery (FASTER) Act of 2009 provides \$15 million annually to transit projects. Of this total, \$5 million is competitively awarded to local projects and \$10 million to state and regional projects. RTD and Bustang each receive a \$3 million set-aside from the statewide and regional pool. FASTER is for capital projects only, except for the set-aside for Bustang and a small allocation for interregional operating assistance. Table 3 shows the most recent FASTER awards in the DRCOG region. This table includes the RTD \$3 million set-aside.

Table 3: State Fiscal Year 2017 FASTER Awards in the DRCOG Region

SPONSOR	PROJECT	AWARD
RTD	19th and California Light Rail Crossing Rehab and Reconstruction	\$2,000,000
RTD	Light Rail Midlife Refurbishment and Overhaul (3 vehicles)	\$1,000,000
RTD	First- and Last-Mile Study	\$200,000
RTD	Mineral Park-n-Ride Bridge Rehab	\$56,938
RTD	Thornton Park-n-Ride Passenger Amenities	\$308,000
CDOT Region 1	CDOT Region 1 Bus on Shoulder	\$350,000

Source: CDOT- 2016-2017 Awards for Administration, Operating and Capitalized Operating Programs

Federal

FTA Section 5307 (Urbanized Area Formula Program)

Funds are for urbanized areas with more than 50,000 people. The funding formula takes population and population density into account. This program is generally used for transit capital expenditures but under certain circumstances, funds may also be used for operating assistance and transportation planning. Additionally, up to 10 percent of formula funds can be used for ADA service. Projects previously eligible under the Section 5316 Job Access Reverse Commute (JARC) program are now eligible under Section 5307. RTD is the designated recipient for the Denver-Aurora Urbanized Area. RTD also receives funding for the small urbanized areas within the RTD District: Boulder, Louisville-Lafayette and Longmont. In total, RTD is allocated about \$50 million annually, which it typically uses for vehicle maintenance and procurements.

Pockets of the DRCOG region, mostly in southern Douglas County, were added to the Denver-Aurora Urbanized Area based on the 2010 Census, but are outside RTD boundaries. Those communities are eligible to receive this funding through RTD or become an additional designated recipient.

Section 5309 (Transit Capital Investment Program)

Fixed Guideway Capital Investment Grants (New Starts, Small Starts and Core Capacity)

This program funds new and expanded rail, bus rapid transit and ferry systems that reflect local priorities to improve transportation options in key corridors. Eligible projects include:

- New fixed guideways or extensions to fixed guideways (projects that operate on a separate right-of-way exclusively for public transportation or that include a rail or a catenary system);

- Bus rapid transit projects operating in mixed traffic that represent a substantial investment in the corridor, and
- Projects that improve capacity on an existing fixed-guideway system.

New Starts projects are new fixed guideway projects or extensions to existing fixed guideway systems with a total estimated capital cost of \$300 million or more, or are seeking \$100 million or more in Section 5309 Capital Investment Grant Program funds. Small Starts projects are new fixed guideway projects, extensions to existing fixed guideway systems or corridor-based bus rapid transit projects with a total estimated capital cost of less than \$300 million and that are seeking less than \$100 million in Section 5309 Capital Investment Grant Program funds. Core Capacity projects are substantial corridor-based capital investments in existing fixed guideway systems that increase capacity by at least 10 percent in corridors that are at capacity today or will be in five years. Core Capacity projects may not include elements designed to maintain a state of good repair. Programs of Interrelated Projects comprise of any combination of two or more New Starts, Small Starts or Core Capacity projects. The projects in the program must have logical connectivity to one another and all must begin construction within a reasonable timeframe.

The Eagle P3 (public-private partnership) Project (East Rail Line, Gold Line and Northwest Rail Phase I), the West Rail Line and the Southeast Extension have received or are in the process of receiving grants from this program, as follows:

- Approximately \$1 billion for the Eagle P3 Project
- Approximately \$300 million for the West Rail Line
- Approximately \$92 million for the Southeast Rail Extension

Table 4: Federal Fiscal Year 2016 FTA 5311 Awards in the DRCOG Region

SPONSOR	PROJECT	AWARD
Seniors' Resource Center	Rural (Seniors' Resource Center-Evergreen) Administration/Operating Support	\$201,880
Seniors' Resource Center	Rural Clear Creek Transportation	\$90,000
Via Mobility Services	Section 5311: Administration/ Operating (Rural Services)	\$333,380

Sources: CDOT- Final FY17 FASTER and FY16 FTA Awards List 2-25-16 and 2016-2017 Awards for Administration, Operating and Capitalized Operating Programs

Section 5311 (Formula Grants for Rural Areas)

This program provides capital, operating and administrative assistance for general public transit in areas with fewer than 50,000 people. Transit services in rural portions of the DRCOG region are eligible; applicants must apply through CDOT. Both Seniors' Resource Center and Via Mobility Services have received funding for service in rural parts of the DRCOG region, such as rural Jefferson, Adams, Arapahoe and Boulder counties as well as Clear Creek and Gilpin counties. As with the FTA 5307 program, projects previously eligible under the FTA 5316 JARC program are now eligible under FTA 5311. CDOT coordinates with DRCOG in selecting projects in the DRCOG region. Table 4 shows the most recent FTA 5311 awards.

Section 5337 (State of Good Repair)

The formula-based State of Good Repair program is FTA's first standalone initiative dedicated to repairing and upgrading the nation's rail transit systems and other rapid transit such as bus rapid transit. Transit systems in urbanized areas with fixed guideway public transportation facilities operating for at least seven years are eligible. RTD plans to use this funding to upgrade existing rail corridors and the 16th Street Mall.

Section 5339 (Bus and Bus Facilities Program)

This program allocates capital funding to replace, rehabilitate and purchase buses and related equipment and to construct bus-related facilities. RTD receives most

of the funds in the DRCOG region and uses them for vehicle purchases and improvements to transit stations.

Under MAP-21 and continued under the FAST Act, the FTA 5339 program replaced the portion of the FTA 5309 program that used earmarks for distributing bus and bus facility capital funds. Colorado previously submitted a single unified FTA 5309 application and earmarks typically totaled about \$8-13 million annually. This program now distributes funds to states on a formula basis. Colorado receives about \$1.75 million for small urban and rural areas. The three large urbanized areas (Denver-Aurora, Colorado Springs, Fort Collins-Loveland) each receive their own formula funding. RTD receives about \$3 million annually for the Denver-Aurora urbanized area.

Public-Private Partnerships

RTD pioneered efforts to generate revenue for FasTracks through public-private partnerships. The Eagle P3 project is a nationally-renowned example of a public-private partnership. RTD contracts with a concessionaire selected through a competitive process to design, build, finance, operate and maintain the Eagle project, with RTD making an annual payment to the concessionaire. This allows RTD to spread out large upfront costs over approximately 30 years. The Eagle project comprises RTD's East Rail Line (University of Colorado A Line), Gold Line, Commuter Rail Maintenance Facility and Northwest Rail Line

Westminster segment. Other FasTracks projects that use public-private partnerships are North Metro, Southeast Extension and U.S. Route 36.

At the local level, the Lone Tree Link, mentioned in Section II, is funded through a public-private partnership of businesses, nonprofits and local government.

Section IV: Demographics and Forecast Growth

DRCOG staff forecast the growth for major populations groups that may be more likely than the general public to need and use transit services in the future.

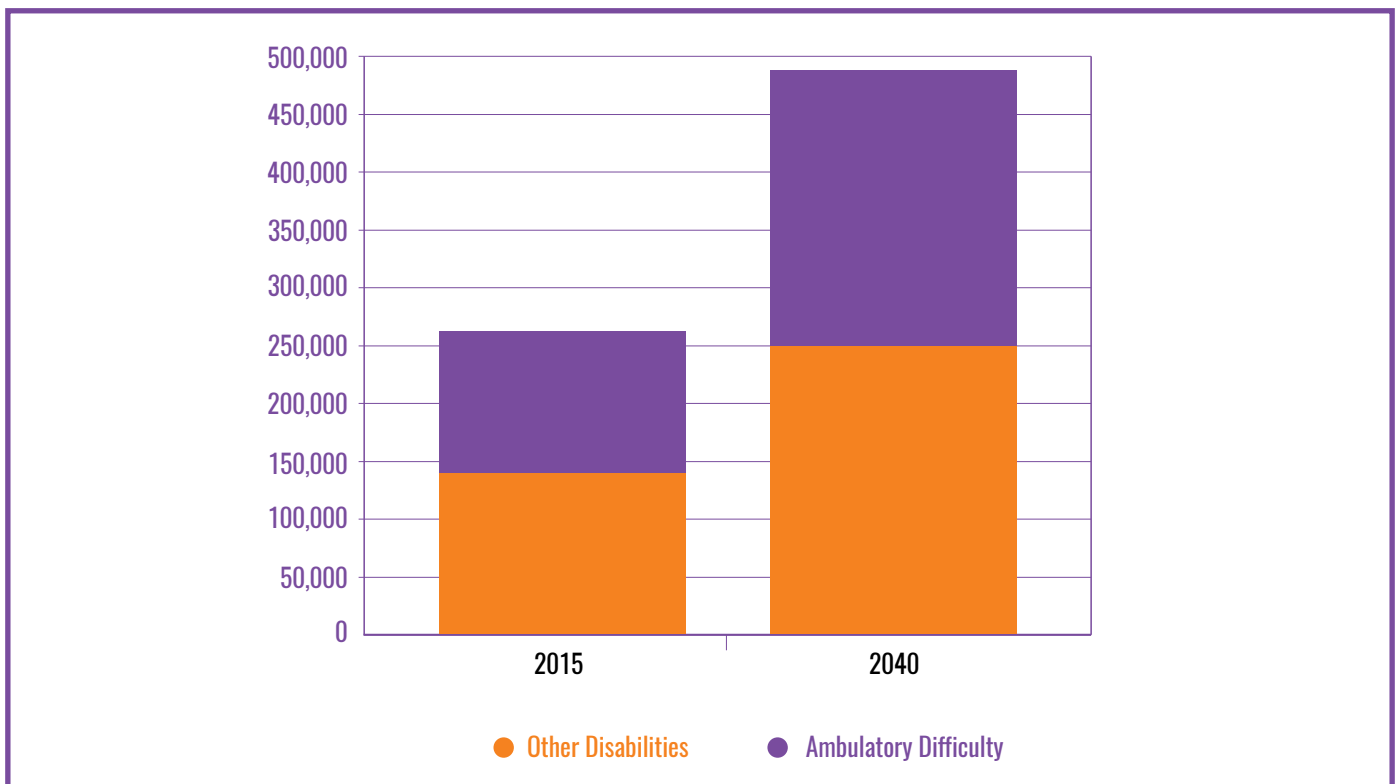
The population groups identified are: individuals with disabilities, older adults, youth, zero-car households, low-income, minority and limited English proficiency. Each group is analyzed separately with acknowledgement of overlap between groups (such as a disabled older adult without access to a car).

A. Individuals with Disabilities

Individuals with disabilities often lack transportation options. Many rely on public transit, human service transportation or other means to fulfill activities of daily living. The ADA requires public transportation to be accessible and complementary paratransit to be available for individuals with disabilities when barriers prevent them from riding fixed route.

The most recent five-year estimate from the American Community Survey (2010-2014) shows the noninstitutionalized population for individuals with disabilities in the DRCOG region is almost 270,000, or roughly 9 percent of the region's total population. About one-third of all people in the Denver region older than 65 have a disability compared with about 6 percent for the population under 65. If the proportion of individuals with a disability in each age group remains the same, by 2040 the region could have over 480,000 individuals with a disability. These data are shown in Figure 9.

Figure 9: Individuals with Disabilities in the DRCOG Region



Sources: 2015 – Colorado State Demography Office; 2040 – DRCOG Forecast with proportional increase by age group; American Community Survey (2010-2014)

Table 5: Estimated Population in the DRCOG Region by Disability Type

DISABILITY TYPE	TOTAL
With a hearing difficulty	92,134
With a vision difficulty	52,471
With a cognitive difficulty	65,446
With an ambulatory difficulty	133,111
With an independent living difficulty	91,675
With a self-care difficulty	50,724

Source: 2009-2013 American Community Survey Five-Year Estimates

In 2008, the U.S. Census Bureau introduced new questions related to disabilities. These new questions enable the Census to classify the following disability types:

- Hearing difficulty
- Vision difficulty
- Cognitive difficulty
- Ambulatory difficulty
- Self-care difficulty
- Independent living difficulty

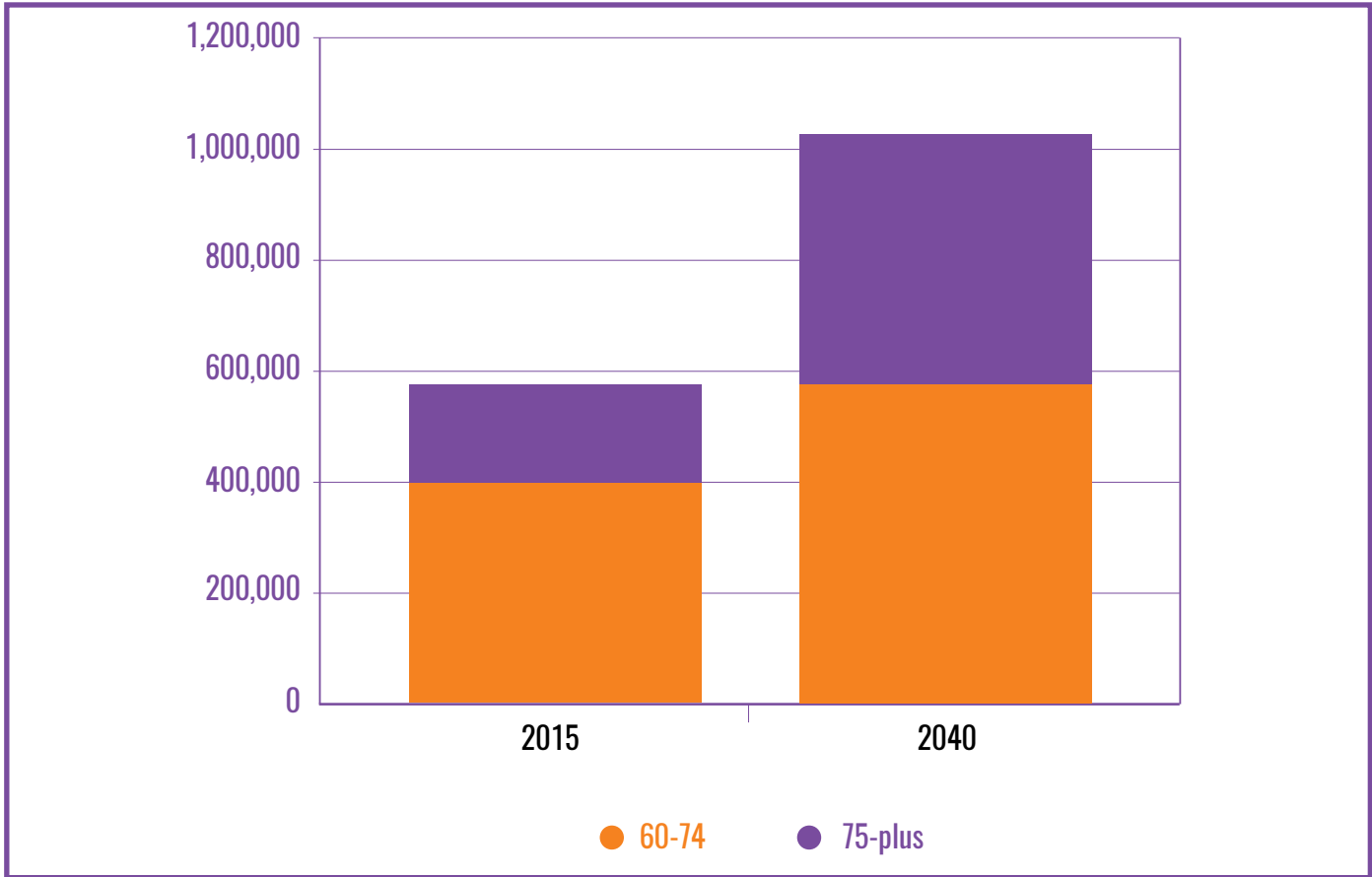
Table 5 shows disability types by age group in the DRCOG region. The number of people within disability categories is roughly the same in both the 18 to 64 and 65 and older age groups.

B. Older Adults

Many older adults are reluctant to stop driving for fear of losing their independence. Like individuals with disabilities, many older adults who do not drive rely on public transportation and other means to maintain their independence.

The older adult population is increasing much faster than the general population. While the 60-and-older population is expected to almost double, the population under 60 is expected to grow by roughly a third. As shown in Figure 10, more than a half-million residents in the DRCOG region are currently 60 years old or older. Between 2010 and 2015, this cohort grew by 27 percent as baby boomers, born between 1946 and 1964, entered this age group. The 60-plus population in the region is anticipated to increase to over one million by 2040. By then, one in four individuals in the region will be over the age of 60. Further, the population of adults age 75 and older is forecast to be 476,000 by 2040, an increase of about 200 percent from 2015.

Figure 10: Forecast Growth of Age 60+ Population in the DRCOG Region



Sources: 2015 – Colorado State Demography Office; 2040 – DRCOG Forecast

2013 RTD Paratransit Survey Demographic Profile

A recent survey of paratransit users was conducted by RTD. The following demographic information obtained is noteworthy for planning purposes:

- RTD paratransit customers tend to be older than users of other RTD service types, with 56 percent of Access-a-Ride customers and 59 percent of Access-a-Cab customers 65 or older, compared with 7 percent for fixed route riders.
- RTD’s paratransit services frequently provide transportation for low-income populations. About 50 percent of Access-a-Ride and 60 percent of Access-a-Cab customers report household incomes of less than \$15,000 per year, compared with about 26 percent for fixed route riders.
- Paratransit customers tend to have lower education levels when compared with customers using other services. Nearly half of all customers indicated they graduated from high school or have fewer than 12 years of formal education, compared with 28 percent of fixed route riders.
- About 86 percent of paratransit customers are retired or are unable to work; about 10 percent of fixed route riders indicated they are retired or are unable to work.
- Nearly two-thirds of Access-a-Ride customers and 80 percent of Access-a-Cab customers are female.
- 25 percent of paratransit customers indicated they used a fixed route service in the 12 months preceding the survey.

C. Youth

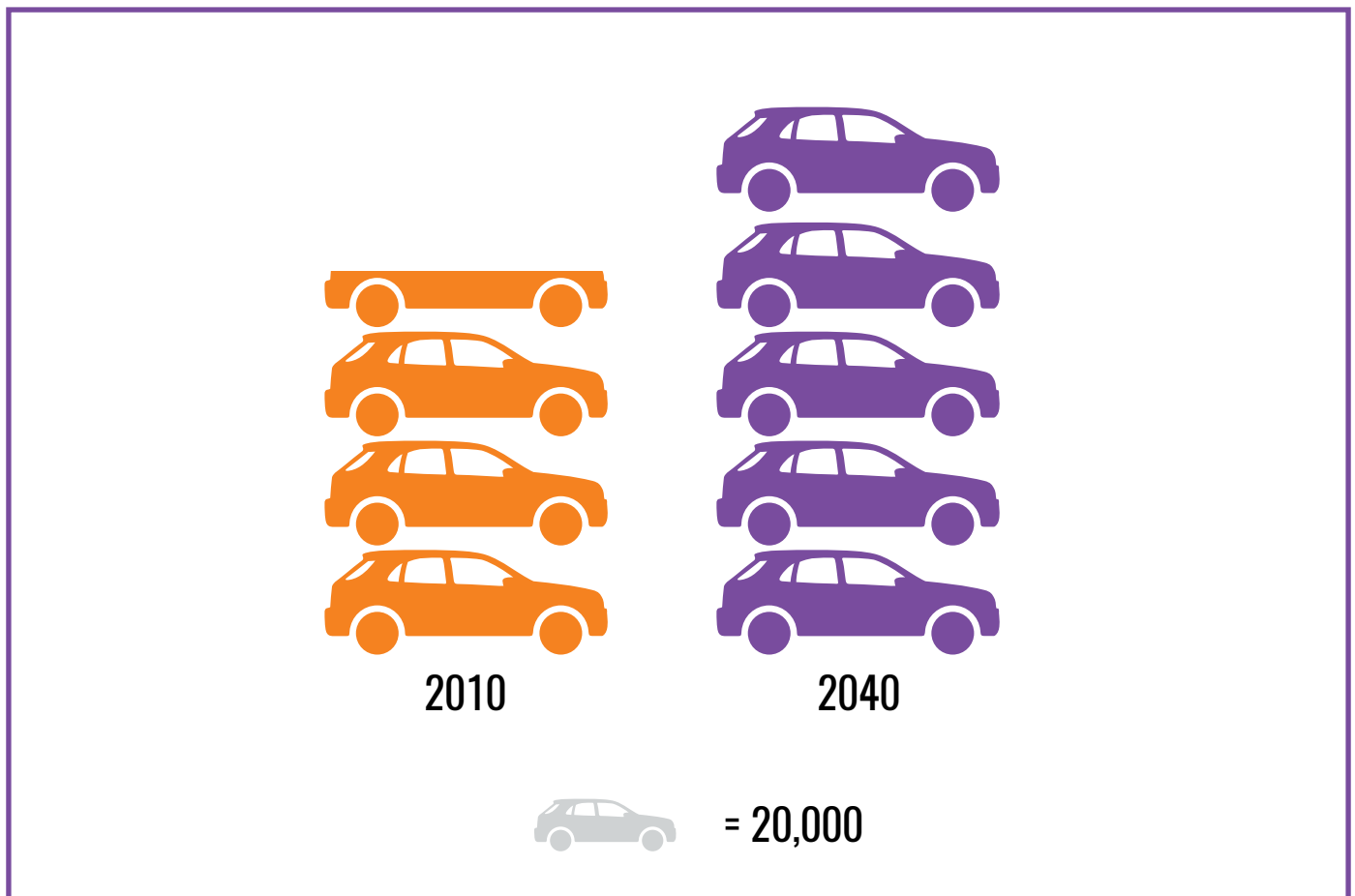
Growth is also anticipated among youth (age 12-20). High school students receive a discounted rate on RTD buses and often use them to get to and from school⁶. For example, an estimated 2,400 Denver public high school students use RTD to go to and from school. Between 2015 and 2040, this population is expected to increase by over 20 percent, from approximately 377,000 to 460,000.

D. Zero-Vehicle Households

Households without a motor vehicle are, by definition, dependent on modes of transportation other than a privately-owned automobile. These modes include transit, walking, bicycling, taxi, car-sharing and others. Many zero-vehicle households have no vehicle by choice, while other households cannot afford to purchase and maintain an automobile or do not have a resident legally permitted to drive.

Based on 2010 Census Transportation Planning Package data, about 70,000 households in the DRCOG region have no vehicle available. If this number grows proportionately with the overall population, then there could be almost 100,000 zero-vehicle households by 2040 (Figure 11).

Figure 11: Zero-Vehicle Households in the DRCOG Region



Source: U.S. Census Bureau, 2010 Census Transportation Planning Package proportional increase to 2040

⁶ http://www.dpsk12.org/docs/hs_transportation/

E. Low-Income Population

The current estimate for population below 100 percent of the poverty level is 363,000, or about 12 percent of the total population for the DRCOG region. 100 percent of poverty is \$11,770 for a one-person household; \$24,250 for a household of four. If this population represents the same proportion of the current total population in 2040, there could be approximately 516,000 low-income individuals in the Denver region (Figure 12).

Limited English Proficiency

Limited English proficiency (LEP) refers to a person who is not fluent in the English language, often because it is not their native language. The most common language spoken at home other than English among the LEP population in the DRCOG region is Spanish or Spanish Creole (161,576 or about 6 percent). The population of individuals that speak English less than “very well” increased significantly between 1980 and 2010, a twelve-fold increase. However, recent estimates indicate a downward trend. The American Community Survey 2007-2014 estimate for this population is 217,257, or about 7 percent of the total population. Despite a recent downward trend, there will continue to be transportation need in this community through 2040.

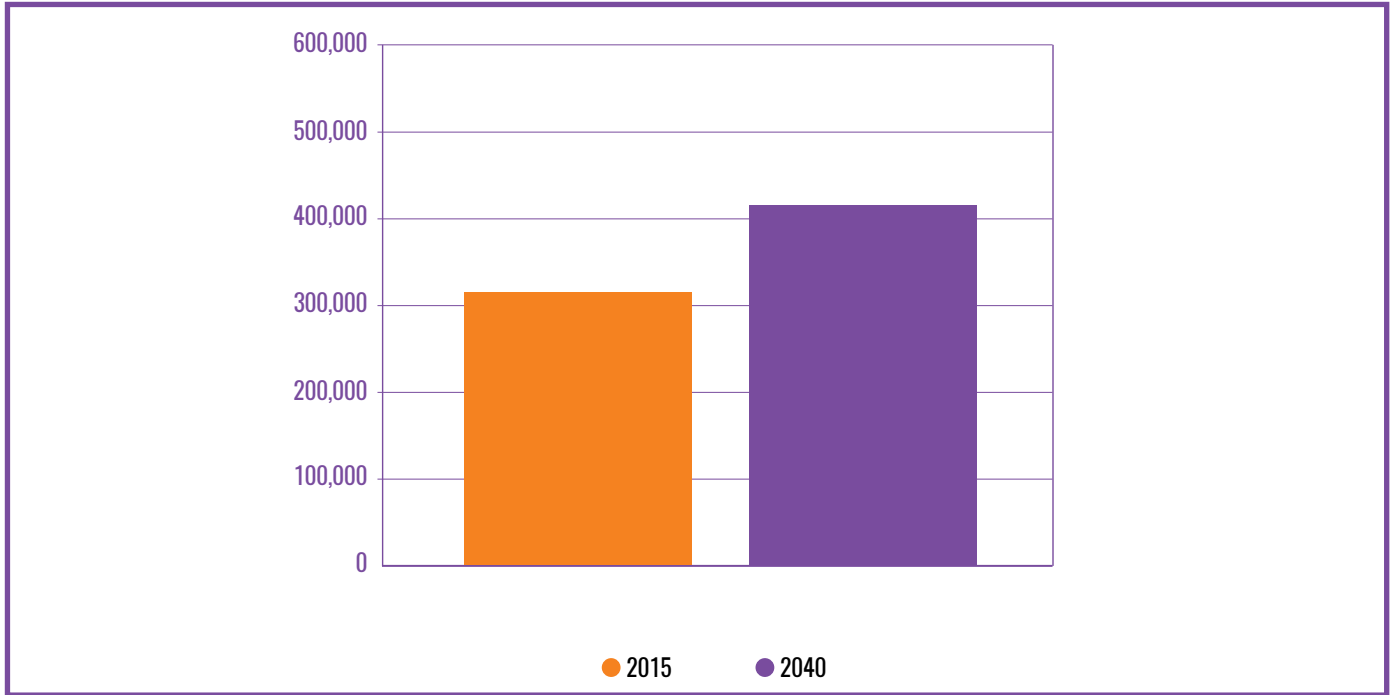
There is also a growing immigrant and refugee population in the DRCOG region. Colorado resettles nearly 2,000 refugees a year; approximately 90 percent settle in the DRCOG region. These newcomers are given legal and permanent status, work authorization, five years of English classes and access to public assistance to help them obtain financial self-sufficiency. DRCOG’s Elder Refugee Program offers assistance and guidance, including transportation assistance, to refugees who are older adults. In partnership with the Colorado Refugee Service Program and the federal Office of Refugee Resettlement, DRCOG’s Elder Refugee Program has created a gathering place for elder refugees to decrease social isolation, increase integration and interaction, and build community connections.

F. Minority Population

Minorities (non-Caucasian) make up a significant portion of RTD ridership. On many RTD routes, minority ridership is higher than their proportion of the region’s total population. RTD conducted a transit ridership demographic comparison for its 2013-2015 Title VI Report. Figure 13, adapted from RTD’s report, compares the non-Caucasian population with all others for RTD’s bus service categories. RTD condensed the minority definitions used for this specific analysis from the definitions the Census uses.

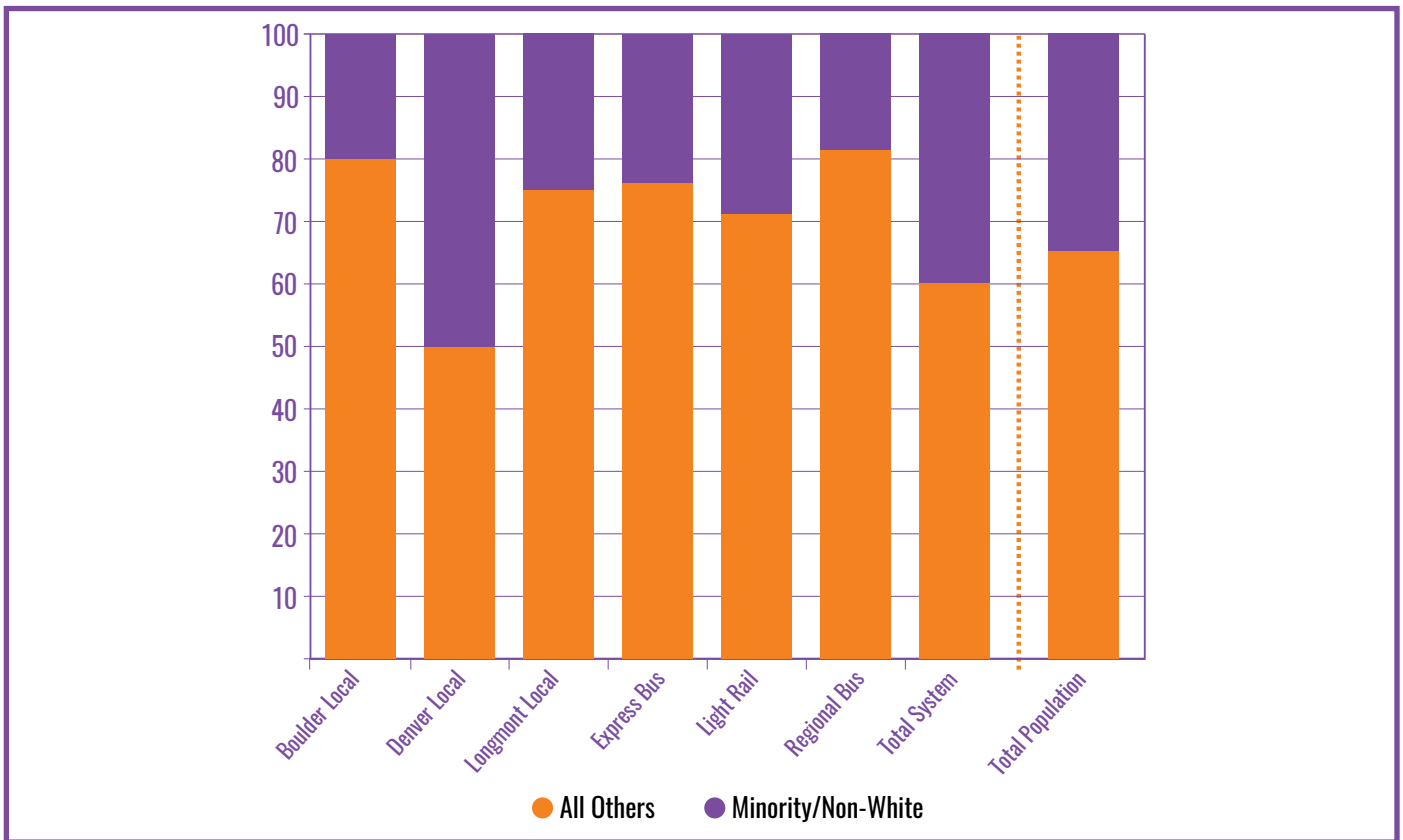
According to Census data, almost 2 million white non-Hispanic residents live in the DRCOG region, or more than two-thirds of the total population. About 630,000, or almost a quarter of the population, is Hispanic (all races). Applying the state demographer’s statewide growth rates to the 2010 DRCOG region population data, the Hispanic (all races) share grows by 9 percent and the white, non-Hispanic share decreases by 13 percent in 2040 (Figures 14 and 15).

Figure 12: Population in Poverty in the DRCOG Region



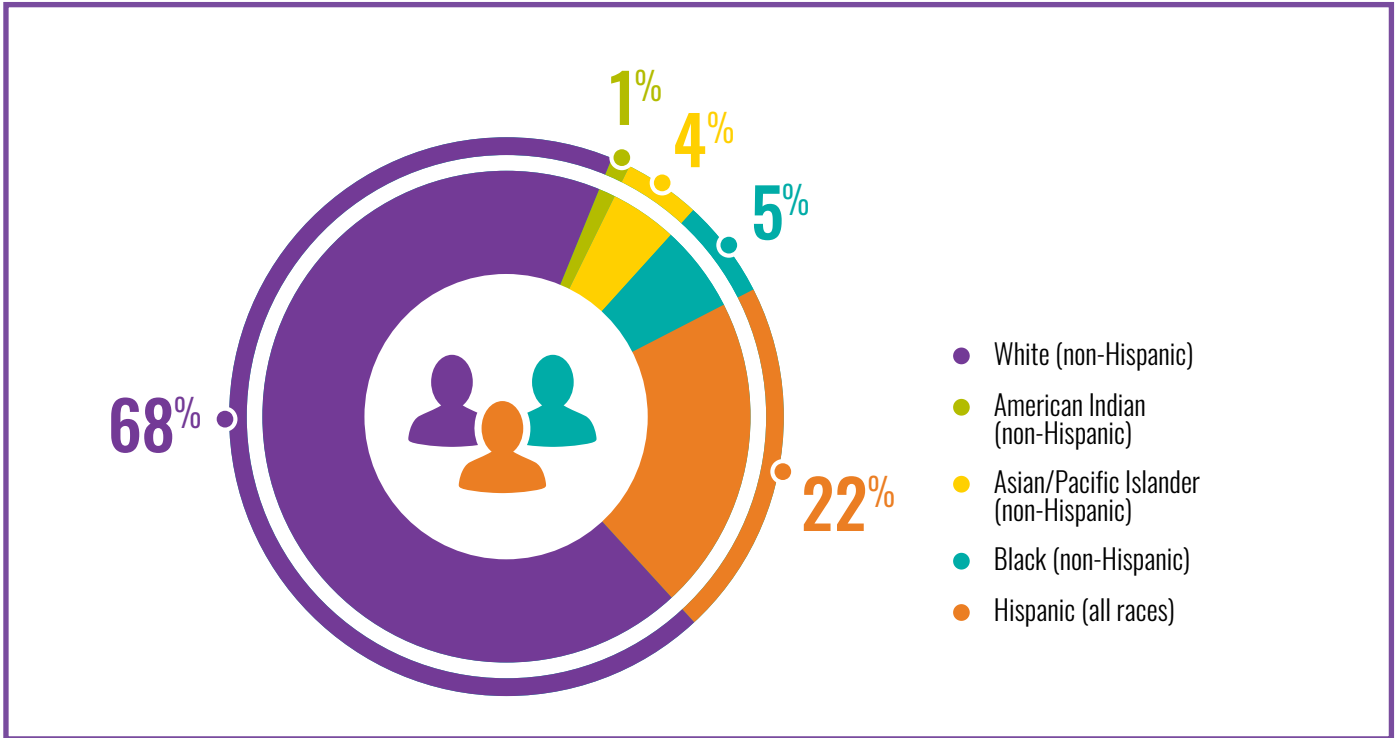
Source: U.S. Census Bureau; proportional increase to 2040

Figure 13: 2011 RTD Minority/Caucasian Ridership



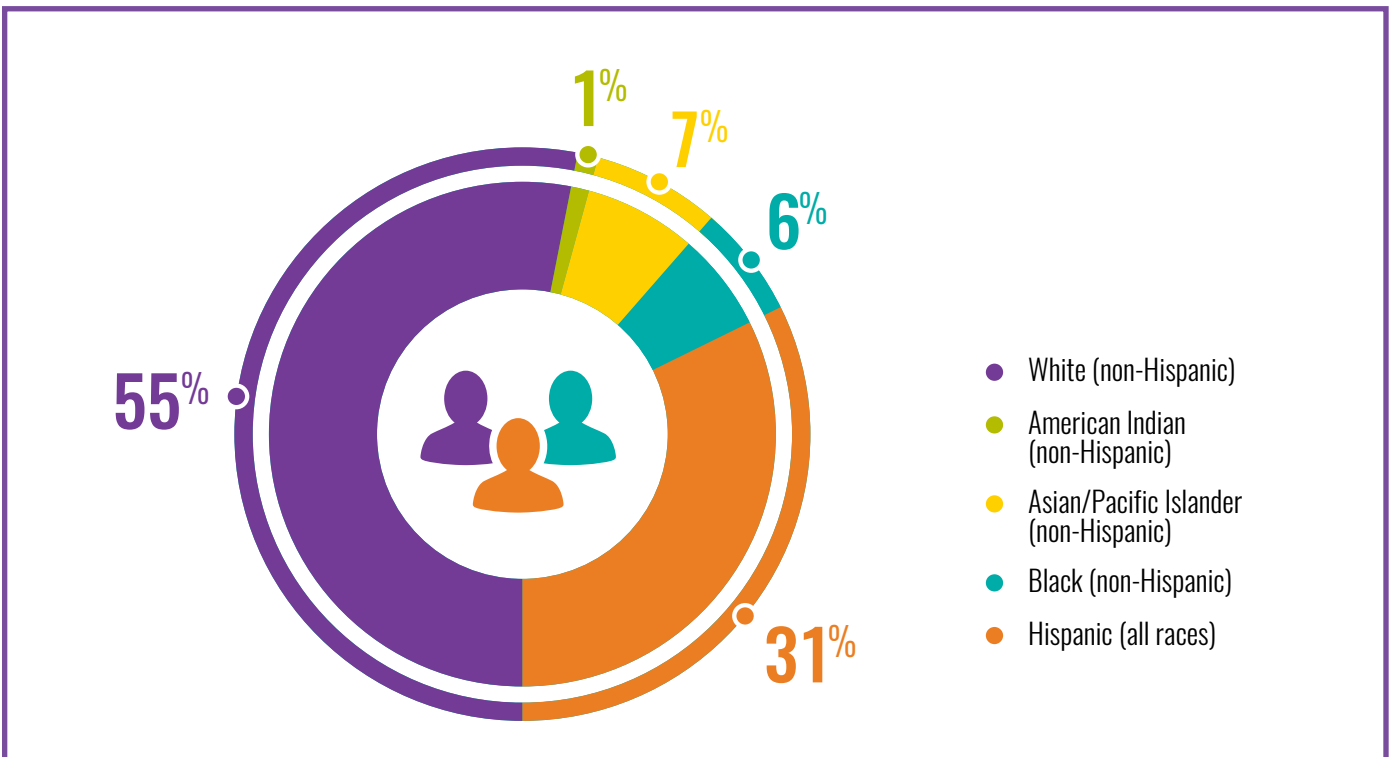
Source: U.S. Census Bureau; proportional increase to 2040

Figure 14: 2010 DRCOG Minority Population



Source: Colorado State Demography Office

Figure 15: 2040 Estimated DRCOG Minority Population



Source: Colorado State Demography Office

Section V: Assessment of Transportation Needs

The previous section illustrated in broad terms the potential demand for all types of transit service, particularly human service transportation, by 2040. This section discusses and identifies transit capital, operating and related needs to assist in responding to the potential demand. FasTracks will help serve this demand, but RTD's base services and service from other agencies must also increase.

A. Transit Agency Capital and Operating Needs

Based on grant-funded projects and interviews with transportation agencies in the region, overarching needs include vehicles (replacement and expansion), operating assistance (personnel, drivers, maintenance, fuel, etc.) mobility management and capital expenditures to keep fleet, facilities and other key assets in a state of good repair.

In 2013, FTA estimated that, nationwide, more than 40 percent of buses and 25 percent of rail transit assets were in marginal or poor condition. Estimates from the National State of Good Repair Assessment identified an \$86 billion backlog in deferred maintenance and replacement needs, a backlog that continues to grow⁷. RTD's State of Good Repair Dashboard indicates a 2014 score of 3.7 for bus vehicle assets and 4.1 for light rail vehicle assets, where a score of 5 represents excellent condition.

CDOT has developed a statewide asset inventory database to track transit capital needs and to help inform state and federal grant project funding decisions. The asset inventory database shows that RTD has 89 percent of vehicles in the DRCOG region (1,023 vehicles). Among other agencies in the region, Via Mobility Services and Seniors' Resource Center have the most with 53 and 36 respectively. Transit agencies are also able to use the database to track their capital inventory.

⁷ <http://www.fta.dot.gov/13248.html>

Access to Employment

[Where the Jobs Are: Employer Access to Labor by Transit](#) (Brookings Institution, 2012) combined detailed data on employment, transit systems and household demographics to determine transit accessibility within and across the country's 100 largest metro areas. The share of jobs in the Denver-Aurora Metropolitan Statistical Area in neighborhoods with transit service is 87 percent; this ranked 12th among the 100 largest metros. The Brookings study did not take into account time of day. Many low-income workers have jobs with nontraditional hours (e.g. evenings and weekends). This coverage is expected to improve when more FasTracks lines and stations open in the next few years. Despite this, there are still pockets of the region where transit-job access is needed or can be improved.

B. Human Service Transportation Needs

Human service transportation needs are more complex and are identified from a variety of input sources, including surveys, studies and public meetings. Stakeholders and the general public contributed significantly to this process. Key input sources and a high-level summary of major needs are listed below.

Input Sources

- DRCOG and DRMAC Forum
- 2016-2019 DRCOG Area Plan on Aging (public input from community conversations)
- DRCOG Transportation Advisory Committee
- DRCOG Advisory Committee on Aging
- County Council on Aging Survey
- Older Americans Act/Older Coloradans Act Transportation Agencies
- CDOT Statewide Transit Survey of Older Adults and Adults with Disabilities

- local coordinating councils
- 2013 RTD Paratransit Customer Satisfaction Survey
- Community Assessment Survey for Older Adults for the DRCOG, Boulder County and Weld County area agencies on aging
- United States of Aging Study Oversample of Denver Region
- Community Living Advisory Group to the Governor of Colorado

Summary of Needs

- Transportation ranked as a top service priority for older adults and individuals with disabilities
- Affordable fares, especially for older adults, individuals with disabilities and/or low incomes
- More cross-jurisdictional trips, better trip coordination and more accessibility
- Better regional coordination to build on improving local coordination
- Demand for transportation will increase as the population increases and ages
- Expand volunteer driver programs
- Continue to work with DRMAC to implement the Transportation Coordination Systems project and other technological improvements
- Accessible and understandable transportation information and referral services
- Increase service areas, frequency, service hours (nights and weekends) where gaps exist
- Increase transportation options for quality-of-life trips such as hair appointments and social visits
- Remove barriers to ride fixed route, including improving access to bus stops and rail stations and providing travel training

- Improve access to healthcare for nonemergent visits
- Make sure that veterans have access to transportation

Section VI: Strategies and Activities to Address Identified Needs and Service Gaps

A. Future Transit Services

This section identifies strategies and activities to address service gaps between current services and identified needs. Strategies and activities addressed in this section include opportunities to achieve efficiencies in service delivery.

MVRTP 2040 Fiscally Constrained Rapid Transit System and Base Rapid Transit System

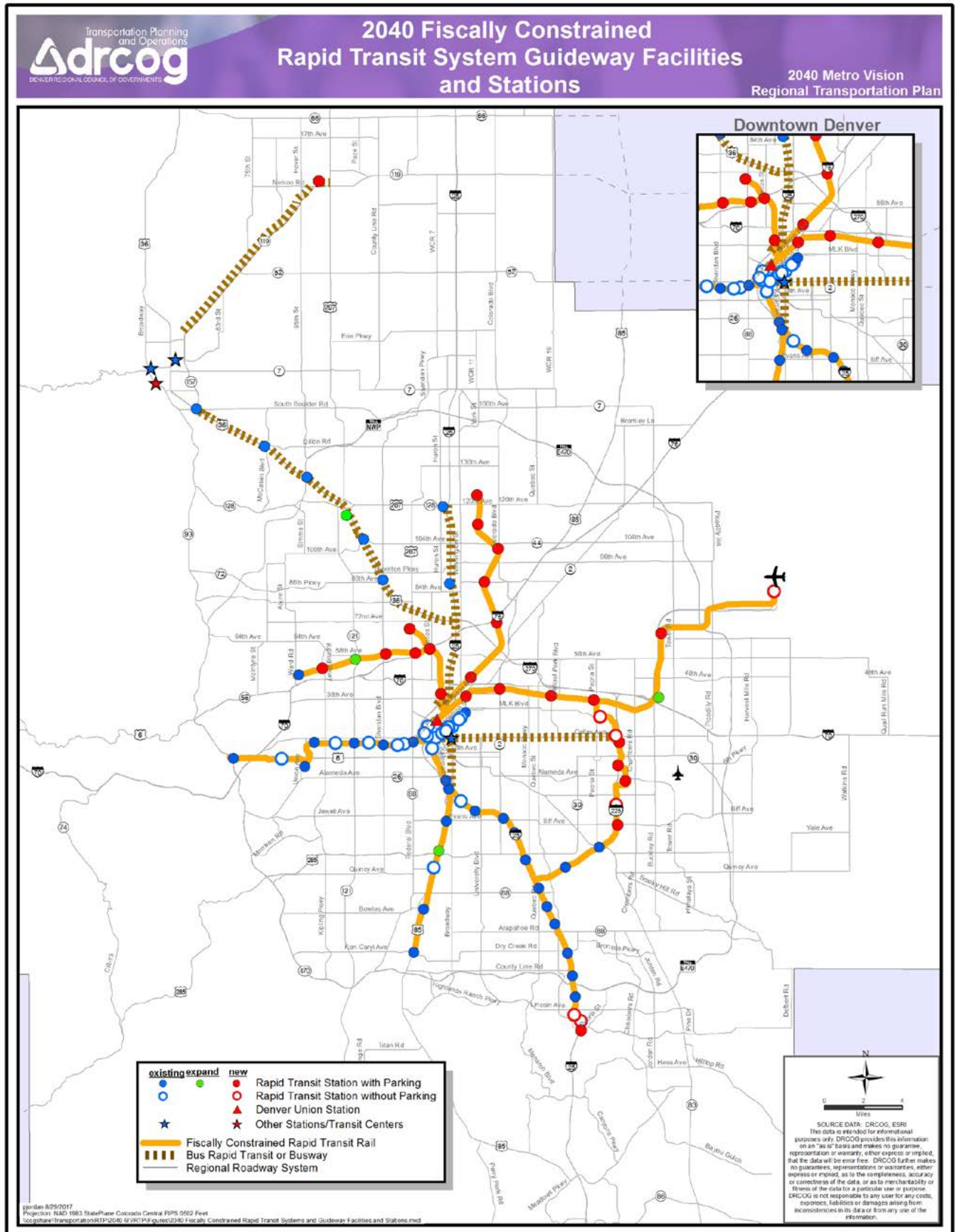
Figure 16 shows the fiscally constrained rapid transit system contained in the Metro Vision Regional Transportation Plan (MVRTP). By definition, revenues needed to complete these improvements are reasonably expected to be available by 2040. The majority of the rapid transit network is open to the public or currently under construction. Two bus rapid transit corridors (East Colfax and state Highway 119) must secure programmed funding and complete environmental studies before construction can begin.

The Tier 1 Base Rapid Transit System (depicted in Figure 17) is a 269-mile system of light rail, commuter rail and bus rapid transit corridors and bus/high-occupancy vehicle facilities that are operating, under construction or included in FasTracks (see below). Most of Tier 1 is fiscally constrained through 2040, with the exception of some FasTracks projects funded beyond 2040.

FasTracks

RTD's FasTracks is a multi-billion-dollar comprehensive transit expansion plan. This plan includes 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit and 21,000 new parking spaces at light rail stations and park-and-rides.

Figure 16: 2040 Fiscally Constrained Rapid Transit System Guideway Facilities and Stations



The West Rail line was the first FasTracks corridor to open in spring 2013. Several other corridors are set to open in 2016; two more are scheduled to open by 2019. All FasTracks projects are funded in the FasTracks Plan. However, RTD's current financial forecasts indicate not all projects will be constructed by 2040; these are:

- Central Rail Extension (30th and Downing to 38th and Blake)
- North Metro Rail Line from 124th Avenue and Eastlake to 162nd Avenue and state Highway 7
- Northwest Rail Line from Westminster Station to Longmont
- Southwest Extension from Littleton and Mineral to C-470 and Lucent.

To learn more about FasTracks please visit rtd-denver.com/Fastracks.shtml.

Additional Envisioned Rapid Transit Corridors

The 2040 vision rapid transit network is an inventory of unfunded projects that are illustrative only. It is separated into three system tiers in Figure 18, including the fiscally constrained portion of the entire envisioned regional transit network. The following tiers represent relative priorities for implementation based on resources, time and feasibility:

Tier 2: Potential Regional and State Intercity Corridors. Regional corridors that could have future rapid transit include Wadsworth Boulevard, C-470, and Speer and Alameda avenues. Intercity corridors are envisioned to include rapid transit service west to the mountains ([CDOT Advanced Guideway Study](#)) and north to Fort Collins and south to Colorado Springs and Pueblo along Interstate 25 ([CDOT Interregional Connectivity Study](#)). The approximate mileage for Tier 2 projects within the DRCOG region is 350 miles. Tier 2 also includes arterial bus rapid transit projects identified in [RTD's Northwest Area Mobility Study](#).

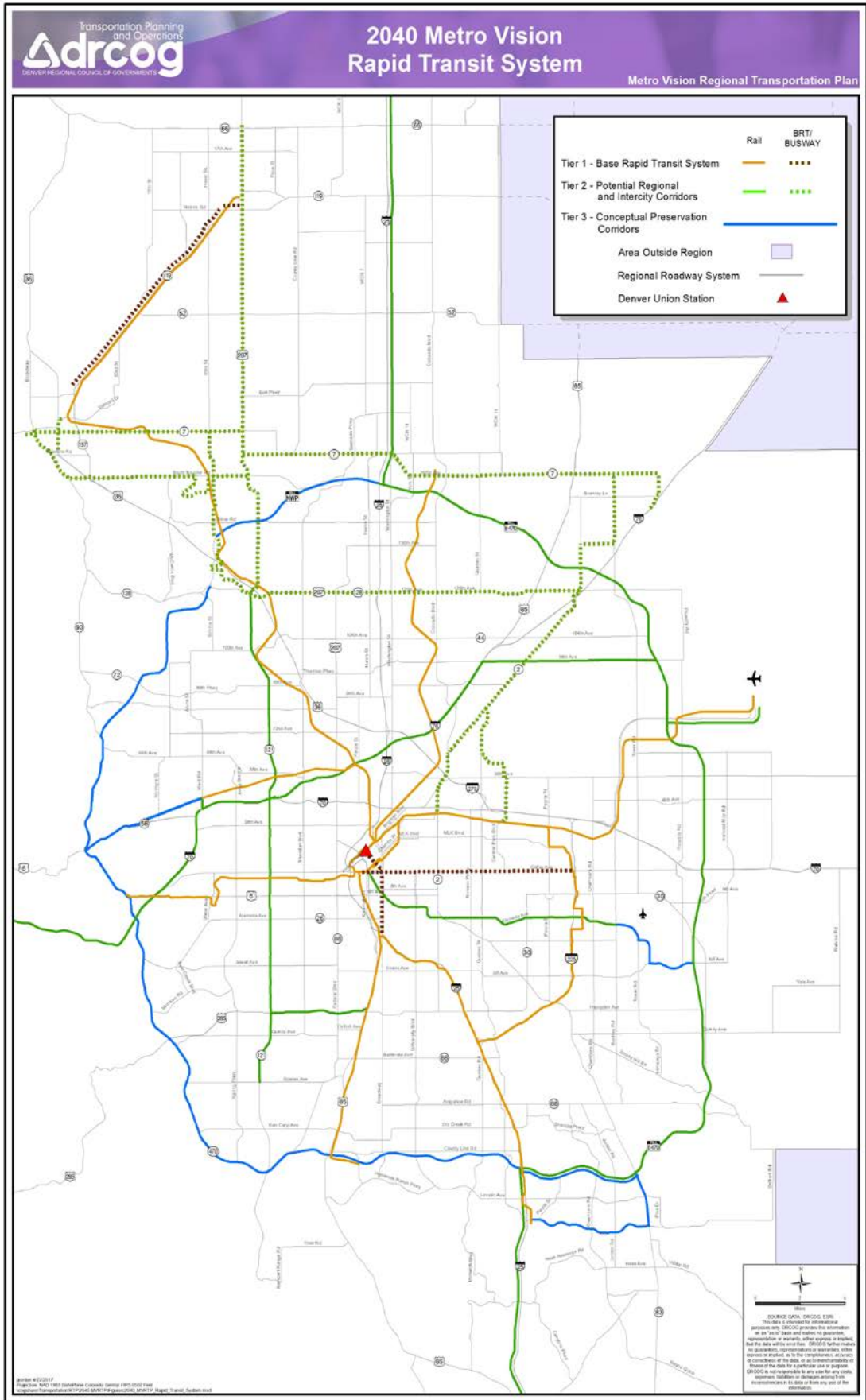
Tier 3: Conceptual Preservation Corridors. These future prospective rapid transit corridors are located along major highways or freight railroad lines such as E-470, Jefferson Parkway and the U.S. Route 85 and Interstate 76 corridor. Projects in this tier would cover about 82 miles, though depicted alignments are very conceptual. Rights-of-way will be preserved to the extent possible in these corridors for potential rapid transit use in the future.

RTD General Public Bus and Rail System

RTD's 2015-2020 Strategic Plan identifies seven overall strategies serving its mission. Each strategy is accompanied by a goal statement, narrative describing the strategic theme in more detail, and a set of initiatives that articulate short-, medium- and long-term implementation. Most of these initiatives are ongoing in nature and will be a continuous effort during the five-year plan time-frame. Below are those strategies and some associated initiatives. This plan is available at rtd-denver.com/documents/2015-2020-strategic-plan.pdf.

1. Deliver customer-oriented service
 - Provide a seamless customer interface between RTD and contracted services
 - Enhance policies for accommodating needs of passengers on vehicles
 - Provide opportunities for customer engagement
2. Foster a safety culture
 - Build a strong alliance and partnership between management, employees and customers
 - Establish and implement an internal safety audit system for bus operations
 - Create training modules for management and supervisory staff focused on safety training, accident prevention, team-building, hazard recognition and safety communication

Figure 17: 2040 Metro Vision Rapid Transit System



3. Strengthen fiscal resiliency and explore financial innovation
 - Direct funding to the highest priority projects and enhance strategic budget planning
 - Seek innovative funding opportunities to expand revenue sources
 - Preserve financial sustainability and maintain a structurally balanced long-range budget
4. Improve customer access and support transit-oriented communities
 - Support and coordinate investments to improve first and final mile connections to transit facilities
 - Foster livable, equitable and accessible communities at transit facilities
 - Optimize districtwide parking resources
5. Optimize service delivery
 - Pursue ongoing enhancements and improvements to the existing transit system (services and facilities)
 - Work with partners to develop, fund and complete FasTracks and increase ridership
 - Continuously improve service delivery and reliability, including integration of new corridors with existing services
6. Use technology to operate efficiently and improve the customer experience
 - Integrate technology systems to automate data transfers and improve service delivery
 - Establish agencywide information governance strategy
 - Improve the rider experience with easy fare payment options through smart card technology
7. Foster a dynamic and sustainable workforce

- Establish transition paths for workforce as the agency evolves
- Attract and train skilled workers in key trades
- Strengthen workforce by building on the success of leadership programs

B. Other Services

Removing Barriers to Ride Fixed Route

Removing barriers to ride fixed route service can help reduce costs and provide independence. There is significant interest in this objective based on information gathered from public outreach. In addition, DRMAC facilitates a Transit and Accessibility Taskforce that focuses on this issue. Projects that can improve access to fixed route service and decrease reliance by individuals with disabilities on complementary paratransit include, but are not limited to, travel training and construction projects that improve accessibility to transit stops.

Infrastructure Improvements

Improving the accessibility of transit stops, especially bus stops, and the surrounding pedestrian infrastructure is a key strategy for enabling older adults and individuals with disabilities to use fixed route transit. This includes adding amenities such as benches and shelters. Bus stops have been a focal point for many accessibility improvements since the ADA was enacted. The need for accessibility, however, extends beyond the actual stop to the pathways that connect to the stop. Cracked sidewalks, sidewalks with snow and ice, and missing sidewalk networks often pose a barrier to riding fixed route not only for older adults and individuals with disabilities but the general public as well.

Connections to and from bus stops are not always provided. Transit agencies do not always have the authority or ability to make these improvements. Sometimes improvements are not made due to lack of funding. Incomplete or poorly maintained sidewalks, difficult street crossings, lack of curb cuts and obstacles

in the pathway such as utility poles create barriers for people with disabilities, limiting or preventing access to fixed-route transit service.

Transit Supportive Land Use

Land use and transit are inherently linked. Transit service is most effective when coupled with specific types of local land uses. Preferred uses have a high population ratio compared with the size of the spaces they occupy and create consistent foot traffic and high levels of activity. Further, built environments that are designed to maximize motor vehicle traffic convenience may reduce active transport (walking and cycling) accessibility and transit accessibility since most transit trips include walking and cycling links. This is especially true for older adults and individuals with disabilities who may have a more difficult time walking longer distances and traversing built environments designed to accommodate automobiles.

First- and Last-Mile Connections

Another key strategy to remove barriers to riding fixed route transit is providing first- and last-mile connections. First- and last-mile connections are improvements that can help better connect people from bus stops and transit stations to final destinations (and vice versa). Such improvements may include infrastructure such as sidewalks, shuttle buses and bike sharing services.

Travel Training

Travel training is instruction offered to those who need assistance to increase their mobility and travel on public transportation independently. It includes a variety of plans, methods and strategies used by professional trainers to increase the independent travel skills of the people they serve. Via Mobility Services offers this service to older adults, people with disabilities and others living with mobility limitations who reside within the RTD system boundaries. In addition to one-on-one training, Via offers an abbreviated travel training program for groups, Seniors on the Move and Train the Trainer programs.

Improvements that remove physical and nonphysical barriers to using transit, making it more accessible for older adults, individuals with disabilities and the general public, are a key strategy emphasized by this Coordinated Transit Plan.

Affordable Fare Programs

A common theme among public and stakeholder input was a need for affordable transportation for people with low incomes. This is an important but difficult issue to address given limited financial resources for low-income riders and for RTD without an influx of additional funding to replace the farebox revenues that would be lost from offering discounted fares. The Free Ride Longmont program provides fare free local bus service in Longmont on a pilot basis. In 2012, the town of Nederland, working with Boulder County's transportation department, administered a grant that provided Nederland residents free RTD transit passes. This program was funded through DRCOG's regional transportation demand management program pool.

RTD is currently working with stakeholders to evaluate all its pass programs which includes the investigation of opportunities to expand income-qualified programs.

Improve Access to Employment

Key recommendations based on the findings of DRCOG's Sustainable Communities Initiative study pertaining to access to employment include:

- Plan station areas as complete communities;
- Manage parking in station areas;
- Develop a regional approach to housing;
- Market transit-oriented communities as economic catalysts;
- Embrace collaboration as a foundation for success, and
- Expand education, outreach and community engagement.

More information about this initiative can be found online at drcog.org/planning-great-region/sustainable-communities.

Pilot New Technology and Practices to Improve Mobility

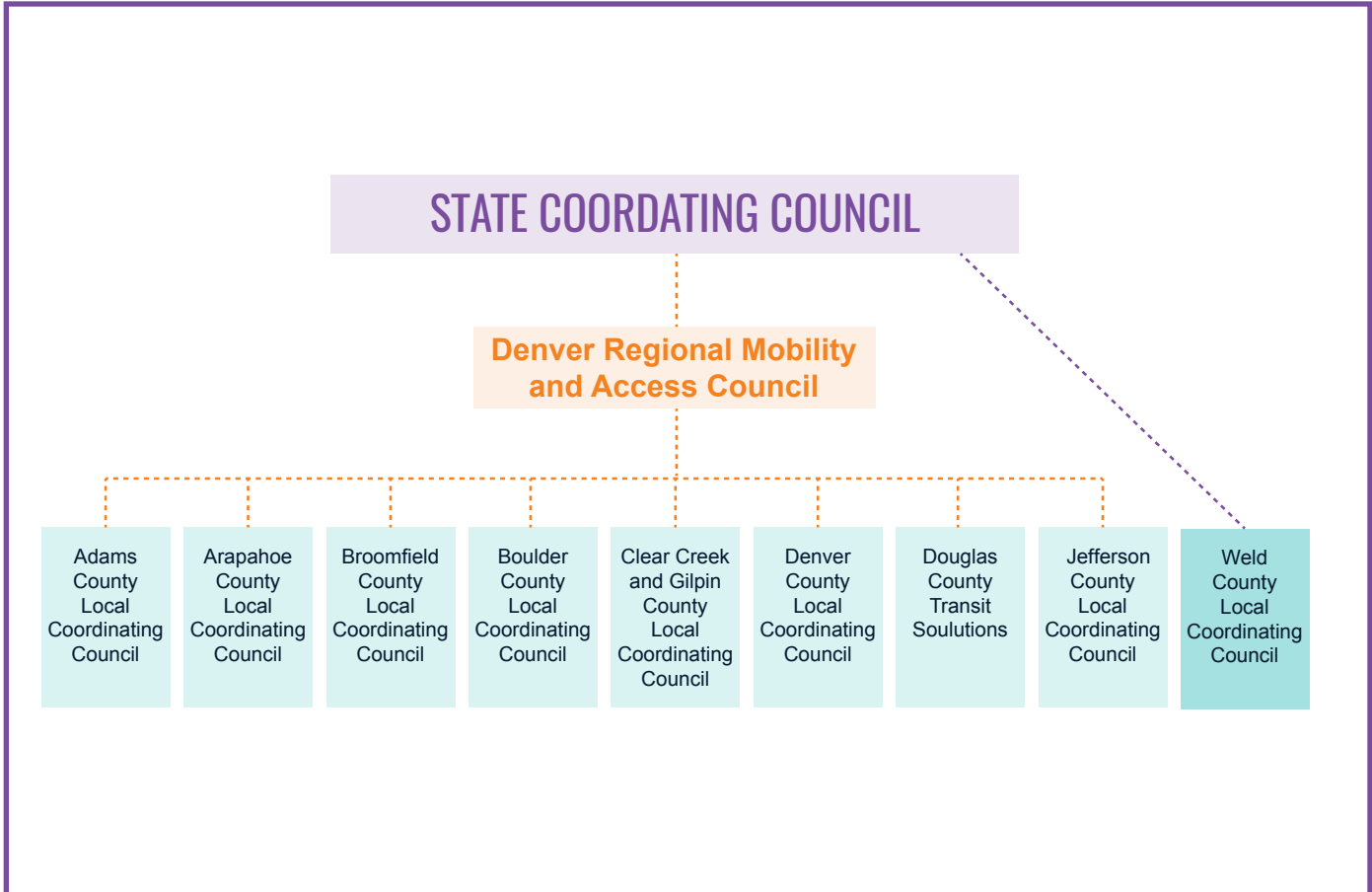
In October 2016, Transportation for America and Sidewalk Labs announced the sixteen members of a new Transportation for America Smart Cities Collaborative to explore how technology can improve urban mobility, creating a tangible new opportunity for cities that did not win U.S. Department of Transportation Smart City Challenge. Over the coming year, the collaborative will bring together these cities to share best practices and technical assistance, and to pilot new programs. Of the sixteen cities chosen from nearly 60 applicants, three are in the DRCOG region: Denver, Lone Tree and Centennial.

C. Future Human Service Transportation Coordination Efforts and Strategies

Coordination Efforts

Nine local coordinating councils are active in the DRCOG region including the Weld County Mobility Council supported by the North Front Range Metropolitan Planning Organization. Clear Creek and Gilpin Counties share a local coordinating council. DRMAC serves as the local coordinating council for the City and County of Denver and the regional coordinating council for most of the DRCOG region. As the regional coordinating council, DRMAC facilitates coordination between them. The state coordinating council supports the local coordinating councils and regional coordinating councils across the state. Figure 18 illustrates these relationships.

Figure 18: Human Service Transportation Coordination Organizations



The Colorado Interagency Coordinating Council for Transportation Access and Mobility (state coordinating council) was created in 2005 in response to the federal United We Ride initiative. The state coordinating council brings together various state departments with programs that either provide or depend on transportation services for their clients. The council addresses issues related to funding and regulatory requirements at the state level. The council's goals include:

- More rides for target populations for the same or fewer assets;
- Simplify access, and
- Increase customer satisfaction.

The council produced the how-to manual [Handbook for Creating Local Coordinating Councils in Colorado](#).

DRMAC works to ensure people with mobility challenges have access to the community by increasing, enhancing, sharing and coordinating regional transportation services and resources. DRMAC initiated the Transportation Coordination Systems project to improve coordination of human service transportation programs and service delivery in the Denver region. This study, funded by the Veterans Transportation and Community Living Initiative examined ways to coordinate trip requests, booking, scheduling to help veterans with mobility challenges better navigate their community. Of course, the while the project focuses on improving mobility for veterans, the improvements will benefit many more. Based on Transportation Coordination Systems study recommendations, DRMAC recently initiated a trip exchange database technology development project. This technology is anticipated to help multiple human service transportation agencies share trips to use existing resources (such as vehicles) more efficiently and provide more and better service.

Strategies

The following are suggested strategies to address human service transit coordination. These strategies are based on public meetings, other plans, surveys and other input sources.

Fund transit projects that address identified needs and FTA program guidelines

The project selection process for FTA Section 5310 should focus on service needs relative to these and other program goals:

- Enhance mobility for seniors and individuals with disabilities;
- Serve the special needs of transit-dependent populations beyond traditional public transportation services and ADA complementary paratransit services, and
- Coordinate human service transportation and transit.

Spend local, regional, state and federal funds more efficiently

It is important to find ways to do more with existing resources. A key strategy is blending multiple funding sources. Transportation providers and local governments should work with state and regional partners to combine funds like FTA 5310 with Older Americans Act, Medicaid and others to fill more seats on each vehicle to reduce inefficiencies. Via, Seniors' Resource Center and Douglas County do this. In addition, there is also the opportunity to blend federal funds to reduce or eliminate the need for transportation grantees to contribute toward the local match.

Increase human service transportation coordination efforts

Greater coordination is a critical strategy to fund more trips with existing revenues. DRMAC coordinates with many organizations and agencies to better meet the needs of the region by increasing efficiencies.

Stakeholders and transportation providers should continue to work with DRMAC and other groups on efforts to improve coordination of human service transportation. Increasing efficiencies could mean more transportation options for a greater variety of trip purposes including shopping trips and social visits. This could help more people age in place and live independently longer, deferring the costly move to assisted living facilities and nursing homes.

Integrating veterans and veterans programs into the coordinated transportation system could help veterans better access transportation. Stakeholders in the region should continue to reach out to veterans and veterans groups so that veterans' needs are accounted for. The Transportation Coordination Systems project will continue to be a key instrument to achieve this.

Address cross-jurisdictional, cross-service-boundary and interregional trips

Mobility needs do not stop at city, county or even regional boundaries; residents across the Denver region often travel across jurisdictions to get to their destinations. For example, the Veterans Affairs Medical Center in Denver is a destination that draws veterans throughout the region and beyond. One of the key needs and strategies is to improve service and coordination across jurisdictional boundaries. A key objective of the Veterans Transportation and Community Living Initiative funded Transportation Coordination Systems project is to help veterans access Veterans Affairs medical facilities and other important destinations dispersed across the region.

The Via Mobility Services and RTD coordination and technology pilot project uses automated, mobile technology to coordinate RTD and Via demand response services in Longmont. Goals for this ongoing project include increasing trips while maintaining or reducing the combined vehicles in service, decreasing cost and developing a model that can be used in other places around the region and the country. The initial funding for this pilot program was provided by FTA 5317

(New Freedom), RTD, the City of Longmont and Via Mobility.

Via has since been awarded an FTA Mobility Services for All Americans (MSAA) grant to enhance trip data exchange between RTD's general public Call-n-Ride services and human services transportation provided by Via and other entities in the region. The project is intended to address institutional and jurisdictional boundaries that limit coordination as well as technological barriers.

Figure 3 from the [2040 RTP](#) shows workflow patterns into and out of the DRCOG region. One significant commuting pattern that crosses MPO boundaries is between Boulder and Fort Collins. Local agencies are currently collaborating across jurisdictional and MPO boundaries on a project that extends bus service between these two cities. As the project moves forward, those involved are designing a blueprint for similar future projects. Public and private employers are key stakeholders who may be able to help work toward solutions.

Implement trip exchange initiatives from transportation studies

Two studies were recently conducted to evaluate strategies for coordination of human service transportation in the Denver region: the Transportation Coordination Systems study and the [Evaluation of the DRCOG Area Agency on Aging Transportation Support Service Program by BBC Research and Consulting](#).

Both studies share the same overarching goal: accessible and affordable transportation that is easy to book and meets current and future demand. Shared components recommended by both studies include:

- Leverage funding to support human service transportation
- Offer regionwide support and incentives to all transportation agencies

- Enable electronic data interchange capability within information technology systems
- Explore new sources of funding with a long-term focus
- Foster regional coordination and cooperation
- Strengthen county partnerships

A key difference between the two studies – the structure of a potential regional one-call, one-click center – needs to be further defined. The Transportation Coordination Systems study recommended a sub-regional brokerage approach, while the BBC study recommended the region explore a single call center for scheduling and dispatch. After the trip exchange database is developed, stakeholders should address other Transportation Coordination Systems and BBC Research and Consulting recommendations and re-evaluate the structure of the one-call-one-click center.

Improve access to key services such as healthcare and employment through coordination

The pervasiveness of chronic disease has a desperate effect on low-income populations. A key factor is lack of transportation for treatment and screening. An effective transportation system can help individuals preserve and improve their independence and decrease the likelihood of institutionalization. This prompted the FTA to launch the Rides to Wellness Initiative to increase partnerships between health and transportation providers and demonstrates the positive financial benefit to such partnerships. In DRCOG region, continued efforts to coordinate nonemergent transportation with the Colorado Department of Health Care Policy and Financing can improve efficiency and effectiveness and improve access to healthcare, especially for low-income individuals.

Conclusion

In addition to providing a broad view of the region’s transit system and serving as the transit component of the Metro Vision Regional Transportation Plan, this document also serves as the Coordinated Public Transit and Human Services Transportation Plan for the DRCOG region (Coordinated Transit Plan). A Coordinated Transit Plan is federally required, particularly in selecting projects for funding in the FTA 5310 grant program. This integrated plan addresses transit geared for specific populations and transit available for the general public because both are important to increase mobility. For example, while many older adults and individuals with disabilities will be served by transit modes specifically designed for their needs, many more will use general public transportation.

Transit is a vital component in the DRCOG region’s multimodal transportation system. It provides mobility and access for many and is available throughout the DRCOG region in rural, suburban and urban areas. There are around 350,000 transit boardings each weekday. Not only does transit connect residents, employees and visitors to jobs, schools, shopping, medical care and recreation, it promotes independence and economic development.

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APPENDIX 7

2040 Metro Vision Regional Transportation Plan Active Transportation Component

A. Introduction

The DRCOG region, known for its arid climate and abundance of sunshine, is an ideal place for walking and bicycling. Also referred to as active transportation, walking and bicycling are flexible, accessible, healthy and clean modes of transportation and can be used exclusively or in conjunction with other modes. The cycling culture is especially strong not only in the DRCOG region, but statewide. The number of people who bike to work in the DRCOG region is more than twice the national average and is increasing at a greater rate than any other mode.

Currently, there are just over 2 million trips made each day by walking or bicycling in the region. Trends point to a continued uptick in the number of people who get around by walking and bicycling. While the region has a robust sidewalk and bicycling network, there are gaps to be filled and needs to be addressed in order to meet the demands for walking and bicycling: 1) provide safe and comfortable options for people of all ages and abilities; and 2) to fulfill the performance measures and targets currently set forth in Metro Vision.

The Active Transportation component of the 2040 Metro Vision Regional Transportation Plan (MVRTP) addresses the following topics: existing conditions for walking and bicycling in the DRCOG region, future projections for these modes, regional goals for active transportation and strategies for meeting the goals. There will be an opportunity to delve deeper into active transportation topics during the development of the Active Transportation Plan, which will be completed by the end of 2018. The Active Transportation Plan will eventually become an element of the MVRTP.

B. Defining Active Transportation

Active transportation¹ is a way of getting around powered primarily by human energy, via pedestrian and bicycling modes of travel. Pedestrian travel includes people walking or using wheelchairs², longboards, Segways and other mobility devices, such as walkers or crutches. Bicycling includes any type of wheeled and pedaled cycle, with or without an attached motor. Such means of travel enables multimodal transportation solutions to connect people of all ages, incomes and abilities to where they need to go.

C. Walking and Bicycling in the DRCOG Region – Existing Conditions

Every day, more than 2,072,000 trips are made by walking and bicycling in the DRCOG region (DRCOG Travel Model, 2015). The region has a strong walking and bicycling culture, as evidenced by the country's second-largest annual Bike to Work Day. As the region's population continues to increase, so will the number of people who travel via active transportation modes. While pedestrian and bicycle trips make up only 14 percent (DRCOG Travel Model, 2015) of all person trips, they account for about 25 percent (National Highway Traffic Safety Administration – Fatality Analysis Reporting System, 2014) of traffic fatalities, a disproportionately high percentage considering the shorter distances and travel times by these modes.

i. Existing Active Transportation Facilities

DRCOG collects and maintains geographic information systems data for the region including pedestrian and bicycle facilities. While there are limitations in determining the exact number of miles of active transportation facilities, especially sidewalks and bike lanes, the technology and method of data collection is

¹“Active transportation” and “bicycling and walking” will be used interchangeably throughout this document.

²All reference to walking and pedestrian travel in this document includes people using wheelchairs.

rapidly evolving and improving. Through the Denver Regional Aerial Photography Project (DRAPP), DRCOG has collected sidewalk data throughout the region.

Planimetric data and quantifying sidewalk miles

In 2016, DRCOG completed the regionwide planimetric project to map infrastructure features and assets, including sidewalk centerlines.

1,308 square miles of the urban core in the DRCOG region were mapped. Within that area, there are approximately 17,700 miles of sidewalk.

Using planimetric data currently captures sidewalks that are 5 feet wide or more. In the future, it might be possible to capture the entire sidewalk system, including total mileage. Regional planimetric data collected to date can be accessed at the DRCOG Regional Data Catalog.³

Obtaining bicycle facilities data and determining the number of miles is attainable by means of geographic information systems. DRCOG collects geographic information systems data from member governments annually, which includes bicycle facilities. Through this effort DRCOG can map and quantify the miles of roadways with bicycle facilities and miles of multiuse trails in the region. The DRCOG region has a robust bicycle network comprising more than 1,500 miles of multiuse trail and over 750 miles of roadways with signed shared lanes or designated bicycle facilities. Table 1 classifies the bicycle facilities and associated miles into four categories including roadways with signed shared lanes, roadways with bicycle lanes, roadways with protected bicycle lanes and multiuse trails.

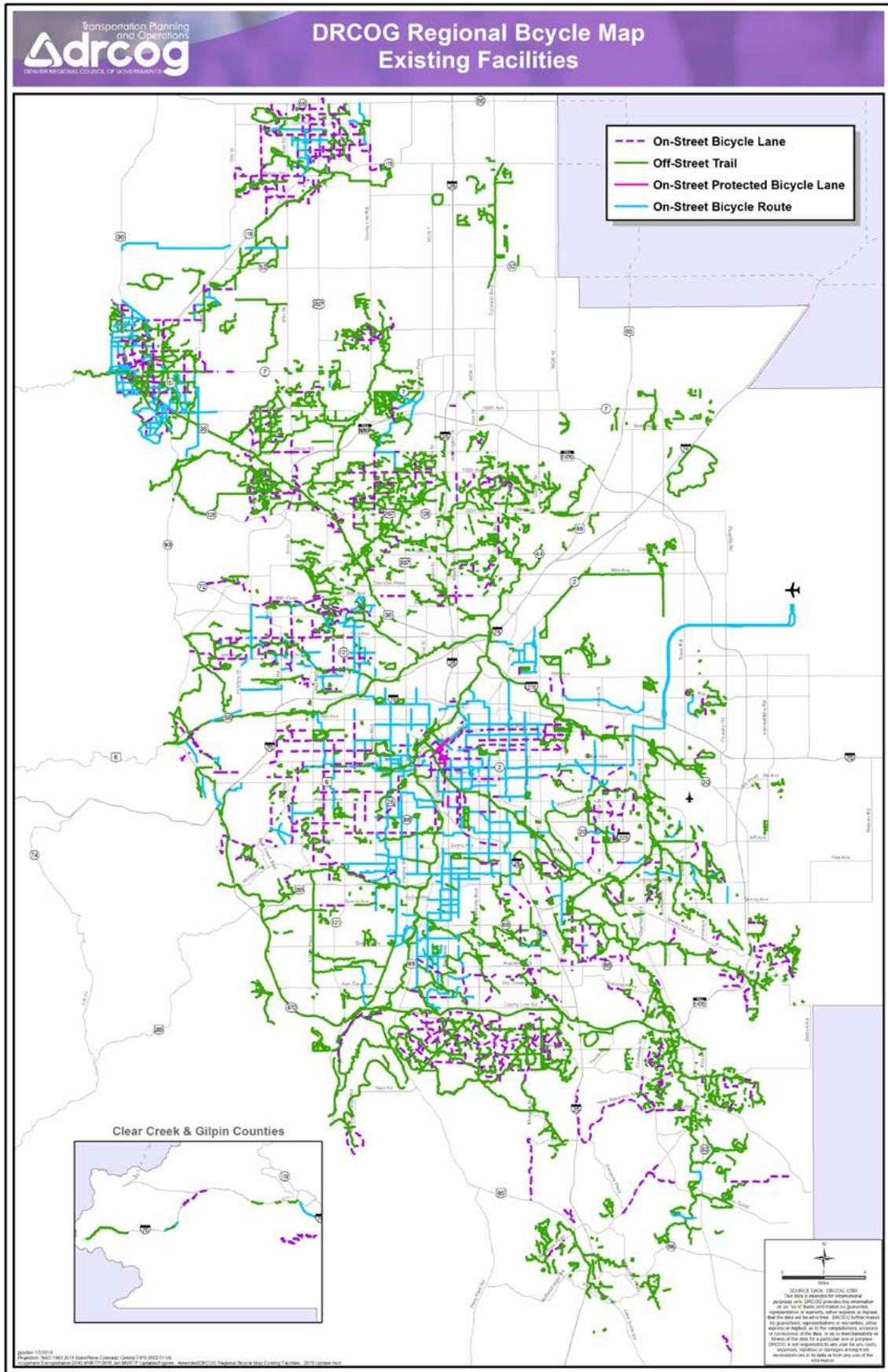
Table 1: Bicycle Facilities in the DRCOG Region

BICYCLE FACILITY TYPE	MILES
Roadways with Signed Shared Lanes:	
Bicycle Route	361
Marked Shoulder Lanes	30
Roadways with Bicycle Lanes	515
Roadways with Protected Bicycle Lanes	4
Multiuse Trail:	
Wide Sidewalk*	52
Off-Street Trail	1613
Regional Total	2575

* The multiuse trail category includes select sidewalks (some communities permit bicycling on wide sidewalks, particularly as connections between other bicycle facilities and along busy major arterials).

³ data.drcog.org

Figure 1: DRCOG Regional Bicycle Map | Existing Facilities



ii. Mapping the Active Transportation Network

DRCOG uses the geographic information systems bicycle facilities data collected to maintain the [Denver Regional Bicycle Map](#),⁴ an interactive map of the existing bicycle inventory throughout the region. The method for mapping and classifying bicycle facilities varies among jurisdictions. DRCOG classifies bicycle facilities for mapping purposes into four categories: 1) on-street bicycle route; 2) on-street bicycle lane; 3) on-street protected bicycle lane; and 4) off-street trails. The map also includes bike-sharing station locations. Figure 1 is an image of the Denver Regional Bicycle Facility Map.

iii. Active Transportation Facility Types in the DRCOG Region

There is a wide cross-section of pedestrian and bicycle facility types throughout the region which can be classified into two main categories. First, there are travelways, which is the infrastructure people walk and bicycle on. Then there is the infrastructure which supports walking and bicycling such as trees and other landscaping along sidewalks, wayfinding and bicycle parking. Both travelways and the supporting infrastructure are important components in enabling active transportation by making these modes more convenient, accessible and comfortable.

- **Pedestrian facilities.** The characteristics and quality of pedestrian facilities vary throughout the region. Many new residential and commercial developments incorporate wide sidewalks or buffered multiuse facilities. Conversely, many older neighborhoods have narrow or crumbling sidewalks, making it difficult to accommodate large numbers of people using wheelchairs or other mobility devices. In many places, facilities are nonexistent and pedestrians are forced to travel along the road or on an unpaved social path.

Pedestrian facilities go beyond the sidewalk.

On-street facilities refer to pedestrian treatments and travelways within the street used to improve and enhance pedestrian safety. Table 2 and the corresponding photo gallery include a cross-section of pedestrian facility categories and types found throughout the region.

CONDUITS FOR WALKING

As conduits for pedestrian movement and access, (sidewalks) enhance connectivity and promote walking.

— NACTO Urban Street Design Guide

- **Bicycle Facilities.** The DRCOG region has a robust bicycle system comprises off-street trails, roadways with bicycle lanes, protected bicycle lanes, signed shared lanes, shoulders and shared-use sidewalks. As illustrated in Table 1 and Figure 1, the majority of the existing bicycle network comprises shared-use paths (or multiuse trails) accommodating both pedestrians and bicyclists, either in the form of off-street trails or wide sidewalks. Figure 2 depicts the over 1,500 miles of multiuse trails in the region. Table 3 and the corresponding photo gallery include a cross-section of bicycle facility categories and types within the region.

⁴gis.drcog.org/bikeroutes/

Table 2: Pedestrian Facility Types in the DRCOG Region

PEDESTRIAN FACILITY CATEGORY	FACILITY TYPE	DESCRIPTION	PHOTO LINK
SIDEWALKS	ATTACHED SIDEWALKS	Pedestrian travelways connected to the curb or motor vehicle travel lane edge.	Attached sidewalk #1 Attached sidewalk #2 Attached sidewalk #3
	DETACHED SIDEWALKS	Pedestrian travelways separated from vehicle travel lanes using a planting strip or other appropriate buffer treatment.	Detached sidewalk
	SHARED-USE PATHS	Accommodating both pedestrians and bicyclists, these travelways are physically separated from motorized vehicular traffic by an open space or buffer and are either within the roadway right-of-way or within an independent right-of-way. Shared-use paths can be located (but not limited to) in a park, greenway; along rivers, railroads, utility rights-of-way; and along roadways.	Shared-use path
ON-STREET	CROSSWALKS	Typically defined as the portion of a roadway designated for pedestrians to use in crossing the street at an intersection (conventional) or between intersections (midblock). Mid-block crosswalks are used to facilitate pedestrian crossings when there is significant distance between designated crossings or where there are destinations or places people want to go (pedestrian desire lines) but are not well served by existing traffic signals.	Crosswalk and pedestrian island
	PEDESTRIAN ISLANDS	Pedestrian islands can be in the middle of a street at an intersection or at mid-block crossings. These islands provide a refuge for individuals moving at a slower speed when crossing a roadway. They are generally applied where there are higher speeds and volumes, but may be used on both wide and narrow streets.	
	SHOULDERS (RURAL)	Roadway shoulders provide a gravel or paved area for pedestrians to walk next to the roadway, particularly in rural area where sidewalks and shared-use paths are not feasible (FHWA Safety Program).	N/A
OTHER	ALLEYS	Sometimes used by pedestrians (except where prohibited), function primarily as a place for trash collection, service vehicle access and parking access. In some places such as downtowns and urban areas, alleys have been converted to public spaces for people to walk, play and interact.	Alley transformed to a public space (Source: Downtown Denver Partnership)
	INTERSECTIONS AT ALLEYS	When an alley crosses a sidewalk, potential conflicts can occur between pedestrians and vehicles. Rumble strips, warning signs and raising the intersections to the sidewalk grade could mitigate conflict.	N/A
	PEDESTRIAN WALKWAYS IN PARKING LOTS AND STRUCTURES	Sidewalks provided through parking lots to the destination they are serving and to nearby pedestrian facilities, provides a safe place for pedestrians to travel.	Pedestrian walkways in parking lot
PEDESTRIAN ZONES AND PLAZAS		Also known as auto-free zones and car-free zones, are areas of a city or town reserved for pedestrian-only use and limits or prohibits vehicular traffic.	Pedestrian zones and plazas
PEDESTRIAN SUPPORT INFRASTRUCTURE	WAYFINDING	Signage or pavement markings to guide both pedestrians and bicyclists to their destinations. Many jurisdictions have implemented or are implementing a destination-direction-distance based wayfinding system.	Wayfinding - whimsical



Pedestrian Infrastructure in the DRCOG Region

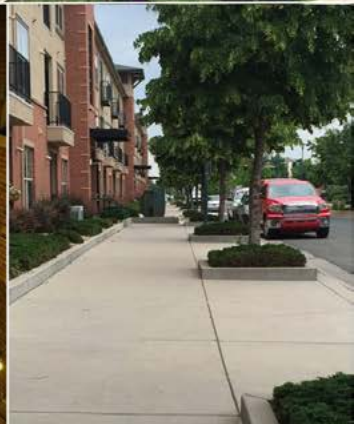


Table 3: Bicycle Facility Types in the DRCOG Region

BICYCLE FACILITY CATEGORY	FACILITY TYPE	DESCRIPTION	PHOTO LINKS
ON-STREET BICYCLE FACILITIES	CONVENTIONAL BICYCLE LANES	On-street bike lanes for exclusive use by bicyclists through the use of pavement markings and signage. They are typically on the right side of the roadway, located adjacent to and flow in the same direction as motor vehicle traffic. While less common, bike lanes are sometimes placed on the left side of one-way streets or two-way median divided streets.	Conventional bike lane #1 (Source: City and County of Denver) Conventional bike lane #2
	BUFFERED BIKE LANES	On-street conventional bike lanes paired with an additional buffer from motor vehicle traffic by means of pavement markings or a parking lane. Parking protected bike lanes refer to bike lanes buffered (or protected) from motor vehicle traffic by parked cars. Parking Protected Bike Lanes sometimes fall under the protected bike lane category.	Buffered bike lane
	PROTECTED BIKE LANES (PBL)	These bicycle facilities have three key characteristics: 1) There is physical, stationary, vertical separation between the bike lane and motor vehicle traffic. Examples of vertical separation may include bollards, curbs, plastic posts, planters, raised bumps or parked cars; 2) They are exclusively for bicycles; 3) They are on or immediately adjacent to the roadway. Protected bike lanes are part of the street grid and can be at street level, raised to the sidewalk level or somewhere in between. The three types of protected bike lanes include one-way, two-way and raised.	Protected bike lane with flex tubular markers (Source: City and County of Denver) Protected bike lane with planters
	BICYCLE BOULEVARDS	Also referred to as neighborhood bikeways and neighborhood greenways, these are streets with low traffic speeds and volumes that are designated and designed to give priority to bicycle travel through a range of design treatments. Typically, there is not a dedicated bike lane, but rather the street is shared by motor vehicles and bikes.	N/A
	PAVED SHOULDER BICYCLE ROUTES	Paved shoulders are typically applied along roadways in rural communities or less-developed areas. They should be striped and signed as a bicycle route and provide adequate space for bicyclists.	Paved shoulder with bike lane
OFF-STREET BICYCLE FACILITIES	SHARED-USE PATHS	Description provided in pedestrian section. There are three categories of shared-use paths: 1) along roadway with buffer; 2) along roadway with no buffer (sidepath); 3) along waterway, railroad, through open space.	Shared-use path along roadway Shared use path-waterway (Source: City and County of Denver)
	BRIDGES/OVERPASSES AND UNDER-PASSES	Provide crossings for bicyclists and pedestrians where barriers exist, both real and perceived, such as interstates, freeways, arterials with high speeds and volumes, railroads, rivers and other obstacles.	Underpass - multiuse

BICYCLE FACILITY CATEGORY	FACILITY TYPE	DESCRIPTION	PHOTO LINKS
OTHER BICYCLING SUPPORT INFRASTRUCTURE	BIKE-SHARING	Bicycles available for short-term use from a network of stations within a given geographic area.	Bike share
	BICYCLE LIBRARIES	Similar to bike-sharing, but differ in that the bikes are typically checked out at a central location and are intended for longer-term use.	Bicycle library (Source: City of Golden)
	BICYCLE PARKING	There are many forms of short-term bicycle parking options such as U racks, bike trees and bike corrals located on sidewalks and streets. These should be both visible and convenient to the businesses and locations they support.	Bicycle parking at transit Bicycle parking corral (Source: City and County of Denver)
	SECURE BICYCLING PARKING	Intended for longer-term bicycle parking offering secure, weather-protected places to park bicycles at locations such as residential buildings, office buildings and at transit stations.	Secure bicycle parking (Source: Boulder County)
	WAYFINDING	Signage or pavement markings to guide both bicyclists and pedestrians to their destinations. Many jurisdictions have implemented or are implementing a destination- direction-distance based wayfinding system.	Wayfinding



Bicycle Infrastructure in the DRCOG Region



iv. Mode Share and Trip Statistics

On a typical day in the Denver region just over 1.9 million pedestrian trips and about 150,600 bicycle trips are made (DRCOG Travel Model, 2015). As of 2016, the combined percentage of people in the DRCOG region who commute to work by bicycle or walking throughout the year was 3.7 percent (U.S. Census Bureau, Five Year American Community Survey 2012-2016). This percentage is higher in summer months and in downtown areas like Boulder and Denver. While the percentage is small, the number of people who bicycle or walk to work has increased significantly over the past decade. For example, between 2005 and 2016, there was a 32 percent increase in the number of people who typically walk and bicycle to work (American Community Survey, One-Year Estimates).

Pedestrian Travel

Everyone is a pedestrian at some point. Walking is the most flexible mode of travel and part of nearly all trips, even those taken primarily by another mode. Therefore, it is important that people have access to inviting and safe facilities to walk or travel by wheelchair. For some people, pedestrian travel may be the exclusive mode to get from one place to another. For others, pedestrian travel may be used in combination with other travel modes, such as transit, bicycling or driving. Walking is often the first and final mode of travel when combined with other modes.

13 percent of all daily person trips in the region are made by walking

All Trips. Of the more than 14.4 million total person trips (all modes) made in the region per day, 13 percent of these trips are made by walking. Countless more short walking trips are made at the start or finish of trips by other modes. As expected, most walk trips are short, with an average distance of about 0.4 miles (DRCOG

2010 Front Range Travel Count Surveys). Of all the daily trips in the region that are 0.4 miles or less, around 100,000 are made by driving alone (DRCOG Travel Model 2016).

Work Trips. On a typical day in the region about 40,000 people, or 2.5 percent, of the working population walk to work (U.S. Census Bureau, 2012-2016 American Community Survey). This percentage is much higher when weather is nicer and in denser locations with a mix of land uses. Even more people walk to transit to get to work. While the percentage of people walking to work has declined since 1980, trends have remained relatively steady since 2000 with slight fluctuations.

Walk to Work (35-year Trend for the DRCOG Region)

	1980	1990	2000	2010	2016
PERCENT OF WORKERS	4.7%	3.4%	2.4%	2.2%	2.5%

U.S. Census Bureau (1980-2010); Five-Year American Community Survey (2012-2016)

Bicycle Travel

The DRCOG region has one of the highest rates of bicycle use in the nation and a strong bicycling culture. The climate, relatively concentrated urban development, extensive off-street trail system, expanding bike-sharing systems and health-oriented population contribute to the popularity of bicycling. Bicycles provide an efficient means of transportation for short- to medium-length trips. The number of people who bike to work has doubled in the DRCOG region between 2000 and 2014; the greatest percentage increase of all modes. Like pedestrian travel, bicycling may also be used in combination with other modes of transportation, especially transit.

1 percent of all daily person trips in the region are made by bicycling

All Trips. Of the more than 14.4 million total person trips (all modes) made in the region per day, about 150,600, or 1 percent of these trips, are made by bicycling. The average bike trip distance in the DRCOG region is about 2 miles (DRCOG 2010 Front Range Travel Count Surveys). There are more than one million drive-alone trips of 2 miles or less made each day in household vehicles (DRCOG Travel Model 2016). There is potential to convert some of these short drive-alone trips to bicycle trips.

Work Trips. The number of people who bike to work is increasing at a greater rate than any other mode. On a typical day in the region about 19,000 people or 1.2 percent of the working population bike to work (U.S. Census Bureau, 2012-2016 American Community Survey) which is double the national average of 0.6 percent (U.S. Census Bureau, 2012-2016 American Community Survey). This percentage is much higher in warm weather months and in denser locations where there is a mix of land uses, mobility options such as bike-sharing, and bicycle infrastructure. There is a clear gender gap in bicycle commuters. In the DRCOG region, 71 percent of bicycle commuters are male, whereas 29 percent are female (U.S. Census Bureau, 2012-2016 American Community Survey). This characteristic is typical nationwide.

Bike to Work (35-Year Trend – DRCOG Region)

	1980	1990	2000	2010	2016
PERCENT OF WORKERS	0.7%	0.7%	0.7%	1.1%	1.2%

U.S. Census Bureau, 1980 – 2000; American Community Survey Data 2012-2016

v. Safety

Pedestrians and bicyclists are particularly vulnerable transportation system users due to the high level of injury severity in the event of a crash. Active transportation users account for a disproportionately high percentage of traffic fatalities, considering the distance and time of travel by these modes. Lack of adequate sidewalks and crosswalks could

lead pedestrians to compromise their safety by walking in the street or crossing mid-block. Lack of adequate bicycling infrastructure can result in bicyclists taking to the sidewalks due to safety concerns, creating unintended conflict with pedestrians. Also, bicycling on sidewalks could potentially lead to conflicts with turning vehicles at intersections if the bicyclist rides through the crosswalk.

Pedestrian Crash Statistics in the DRCOG Region

From 2010-2016, there were 1,384 traffic fatalities in the DRCOG region. Pedestrians made up 269, or 19 percent, of the fatalities (National Highway Traffic Safety Administration – Fatality Analysis Reporting System data), yet only 13 percent of all trips were made by walking (DRCOG Travel Model, 2015). The majority of pedestrian crashes occur on arterial streets (56 percent) and at intersections (64 percent). The majority of fatal pedestrian crashes occurred while the involved vehicle was traveling straight (81 percent), and 57 percent of the fatal pedestrian crashes occurred at mid-block locations.

Many factors contribute to collisions involving pedestrians:

- high-volume and high-speed roadways;
- turning vehicles at intersections;
- driver distractions – texting, talking, using the phone; and
- lack of dedicated crossing areas, such as significant gaps between crossing locations; and streets designed primarily for motor vehicles.

Bicycle Crash Statistics in the DRCOG Region

During the period from 2010 to 2015, about 79 percent of bicycle crashes resulted in injury. Like pedestrians, bicyclists are considered vulnerable transportation system users, due to the high level of injury severity in the event of a crash. There are approximately 100 bicyclists seriously injured in reported traffic crashes each year in the DRCOG region.

Of the 1,384 total traffic fatalities in the DRCOG region from 2010-2016, 50, or 3.6 percent, were bicyclists (Fatality Analysis Reporting System). Around 12 percent of bicycle

SUMMARY

Pedestrian Crash Characteristics in the DRCOG Region

19 percent

of traffic fatalities were pedestrians

56 percent

of reported pedestrian crashes occurred on arterial streets

64 percent

of reported pedestrian crashes occurred at an intersection

81 percent

of fatal pedestrian crashes involved a vehicle going straight

57 percent

of fatal pedestrian crashes occurred mid-block

crashes results in a fatality or serious injury. (CDOT/ DRCOG Crash Database 2013-2015). The majority of bicycle crashes occur on arterial streets (53 percent) and at intersections (73 percent). Almost all fatal bicycle crashes involved a vehicle going straight (95 percent). Bicyclists age 15 to 24 had the highest crash involvement. (CDOT/ DRCOG Crash Database, 2013-2015).

Many factors contribute to collisions involving bicyclists. Some examples include:

- high-volume and high-speed roadways;
- turning vehicles at intersections;
- driver distractions (texting, talking, using the phone); and
- driver or bicyclist failure to signal or stop.

Understanding crash characteristics (how, why, where and who) and trends is important in understanding how to apply appropriate mitigation strategies and countermeasures. Roadway types, existing infrastructure, crash history, pedestrian activity and bicycle usage (existing and anticipated) should also be considered when determining mitigation strategies.

More details on pedestrian and bicycle safety, including statistics and mitigation strategies, are available in the [Pedestrian and Bicycle Safety in the Denver Region Report](#) (to be updated as part of the Active Transportation Plan).

Safety Initiatives

Safety concerns are a leading barrier to more people walking and bicycling as a mode of travel. Many people are discouraged from walking and bicycling because of the real or perceived danger of vehicle traffic. This concern is most prevalent for bicycling. Many local and national organizations are striving to improve safety for all transportation users, with bicyclists and pedestrians being no exception. Two leading national efforts are Toward Zero Deaths and Vision Zero Initiatives. These efforts, aiming to reduce and eliminate traffic deaths and severe injuries, have been gaining traction throughout the United States.

- **Toward Zero Deaths.** Toward Zero Deaths, supported by Federal Highway Administration, is a highway safety vision in the U.S. that includes numerous organizations committed to reducing annual U.S. traffic fatalities to zero. The Toward Zero Deaths plan provides organizations in the fields of engineering, law enforcement, education and emergency medical services with initiatives and safety countermeasures designed to eliminate traffic fatalities. Colorado joined this national effort in March 2015. CDOT's Strategic Highway Safety Plan incorporates Moving Towards Zero Deaths as a core value within the plan. CDOT's plan establishes a 2.9 percent annual reduction rate of all traffic fatalities starting in 2014 through 2019.
- **Vision Zero.** Vision Zero is an initiative which aims to eliminate traffic-related fatalities and serious injuries on the roadways while increasing safe, healthy, equitable mobility for all. Vision Zero, started in Sweden and implemented throughout Europe, is now gaining momentum in major U.S. cities. In early 2016, Denver joined other major U.S. cities that have adopted a Vision Zero policy.

A safe active transportation system is paramount to reducing and eliminating pedestrians and bicyclists from being seriously injured or killed, and in instilling confidence in more people to get around by walking and bicycling.

D. Benefits of Active Transportation

Active transportation is a key component in a robust transportation system providing mobility options for all people. There are many quality-of-life benefits associated with active transportation including: personal mobility, environmental quality, public health and economic benefits.

SUMMARY

Bicycle Crash Characteristics in the DRCOG Region

79 percent of reported bicycle crashes result in injuries

100 bicyclists seriously injured in reported traffic crashes each year

12 percent of reported bicycle crashes results in a fatality or serious injury

53 percent of reported bicycle crashes occur on arterial streets

73 percent of reported bicycle crashes occur at an intersection

95 percent of fatal bicycle crashes involved a vehicle going straight

Bicyclists age **15 to 24** had the highest crash involvement

Personal Mobility

Some people choose not to drive, while others cannot drive. According to the 2010 Census, about 70,000 households in the region did not have an automobile available. A robust and safe pedestrian and bicycle infrastructure network can provide cost-effective mobility options for people of all ages, abilities and incomes, especially when combined with the region's transit network. Walking and bicycling are essential modes of travel for many people to access jobs, school, groceries, health care and other activities of daily living.

COMFORT AND SAFETY

The 8 to 80 rule is a litmus test that involves imagining a public space, especially a busy city street or intersection, and asking whether it is suitable for children, persons with disabilities and older adults alike.

– Citylab, *The 8 to 80 Problem: Designing Cities*

Environmental Benefits

Active transportation is an important tool to help the region address environmental challenges related to transportation, such as reducing air pollution, greenhouse gas emissions and vehicle miles traveled. About 1 million drive-alone trips are made each day that are equal to or less than the average bicycle trip distance (1.8 miles) and over 100,000 drive-alone trips that are equal to or less than the average walk trip distance (0.4 miles). There are a number of factors as to why these trips are made by driving alone; however, there is potential to shift some of these trips to walking and bicycling.

Health Benefits

One out of every two U.S adults is living with a chronic disease such as heart disease, cancer or diabetes and more than two-thirds of American adults are either overweight or obese. While Colorado leads the nation

in terms of healthy people, obesity rates in the state are projected to more than double by 2030 (surgeongeneral.gov, 2016). Additionally, the percentage of overweight children in the United States is growing at an alarming rate, with more than one-third of children and adolescents considered overweight or obese. In Colorado, 27 percent children age 2 to 14 were considered overweight or obese in 2013 (Colorado Department of Public Health and Environment, March 2015). Walking and bicycling can be one factor in helping to reduce or mitigate stress, obesity and chronic disease. Children who ride a bike two or more times a week are less likely to be overweight. Adolescents who bike are 48 percent less likely to be overweight as adults (People for Bikes, Statistics Library). The health benefits of active transportation are no longer isolated to the health care field and have become a central topic in planning and policy.

OPPORTUNITY FOR CHANGE

There are over 1 million trips made each day by driving alone that have the potential to shift to bicycling or walking.

Economic Benefits

Walking and bicycling are cost effective options for getting around, can help people save money and benefit local economies. Opting to bicycle or walk instead of driving can help reduce motor vehicle ownership costs, such as gasoline, maintenance and parking. These savings can equate to more money spent on local goods and services. Additionally, while the cost to construct these facilities greatly varies, many roadways can easily be retrofitted to accommodate bicycles and pedestrians using low-cost materials such as paint, planters and trees. Demonstration, pilot and interim design projects are low-cost options to test out projects and applications where budgets are limited or public education and buy-in is necessary.

GOOD DESIGN

“Decisions and plans made by the transportation, land use and community design sector can affect whether communities and streets are designed to support walking.

This sector can change the design of communities and streets through roadway design standards, zoning regulations and building codes and improve the pedestrian experience through landscaping, street furniture and building design.

This sector is also integral in the planning and implementation of public transit systems.”

— Surgeon General, 2015

Supporting the Framework of Metro Vision

In addition to the aforementioned benefits, a robust, safe and well-connected active transportation system supports the framework of DRCOG’s Metro Vision Plan. Active transportation is a key component in many of the outcomes and regional objectives developed as part of Metro Vision. Additionally, an expanded active transportation system and increased use of these modes are essential elements in meeting the performance measures and targets, such as increasing non-single-occupant vehicle mode share to work, and reducing greenhouse gas emissions, vehicle miles traveled and number of traffic fatalities.

ECONOMIC DEVELOPMENT

“The No. 1 thing they want is bike lanes. Ten years ago we never would have thought that walkability or bike lanes would be economic development tools.”

— Tami Door, Downtown Denver Partnership, on what tech companies say they want in order to locate to or stay in Denver

E. Future Trends for Active Transportation – Projections for 2040

Looking forward to 2040, total person trips are forecast to increase by 39 percent, whereas walking and bicycling trips combined are projected to increase by about 46 percent. Currently, just over 2,070,000 trips, or about 14 percent of all trips, are made by walking and bicycling. By 2040, over 3 million trips will be made by walking and bicycling each day, accounting for 15 percent of all weekday person trips (DRCOG Travel Model 2016).

Estimated Daily Walking and Bicycling Trips: 2015 and 2040

DAILY DRCOG REGION TRIPS	2015	2040
Total Person Trips	14,457,200	20,066,800
Walking Trips	1,028,500	1,445,000
Bicycling Trips	137,400	176,200
Walking to and from Transit Trips	893,000	1,380,900
Bicycling to and from Transit Trips	13,200	20,600
Total Walking and Bicycling Trips	2,072,100	3,022,700

DRCOG Travel Model 2016

To summarize active transportation in the DRCOG region:

- By 2040, the region's population is projected to increase by 37 percent and the number of active transportation trips is projected to increase by 46 percent.
- While the DRCOG region has a robust pedestrian and bicycle network, there are many gaps in the system and barriers to bicycling and walking.
- There are numerous quality of life benefits associated with walking and bicycling.
- A mode share increase in walking and bicycling is necessary to meet Metro Vision outcomes, objectives, and performance targets.
- Pedestrians and bicyclists are vulnerable transportation system users and are more susceptible to being killed or seriously injured in the event of a crash.

F. Active Transportation Goals

In order to address the demands and challenges associated with regional growth, the demand for active transportation options and support the framework of Metro Vision, the following objectives must be addressed:

- Increase walking and bicycling mode share and trips beyond what is projected.
- Provide a robust walking and bicycle network for people of all ages and abilities.
- Improve the safety of the pedestrian and bicycle network thereby reducing (and ultimately striving to eliminate) serious injuries and deaths as a result of crashes.

These three objectives are synergistic; where, for example, a robust and safe active transportation network should result in a mode share increase for both bicycling and walking. How does the region:

- achieve and maximize the benefits of walking and bicycling?
- improve the safety of the network?
- create a network where people of most ages and abilities feel comfortable walking and bicycling?
- and ultimately, increase the active transportation mode share?

G. Elements to Fulfill Active Transportation Goals

This section identifies some of the elements that are necessary to fulfill the three objectives identified. These and additional elements will be further explored and expanded upon in the development of DRCOG's Active Transportation Plan.

i. Low-Stress (or High-Comfort) Network

One of the most essential elements in attracting more people to walking and bicycling is a low-stress network of active transportation facilities. Low-stress facilities, also referred to as high-comfort facilities, induce the least amount of stress on the users and attract a wider segment of the population to walk and bicycle. Low-stress facilities are *typically* on or adjacent to roadways with lower traffic volumes and lower speeds (especially if the facility is on-street) and can include wide sidewalks buffered by landscaping, protected bike lanes, sidepaths, shared-use path facilities, buffered bike lanes, bicycle boulevards and neighborhood bikeways. Pedestrian and bicycle bridges and underpasses also provide a low-stress experience, allowing active transportation users to avoid busy intersections and roadways, and enabling mostly uninterrupted travel.

Over the past few years, there has been a regional focus on constructing, expanding and connecting a low-stress network of facilities to appeal to a wide audience of ages and abilities. Pedestrian and bicycle facilities alike should be planned and developed for the most vulnerable users: children, older adults and people with disabilities.

LOW-STRESS CONNECTIVITY

–ATTRACTS THE WIDEST POSSIBLE SEGMENT TO BICYCLING

In a 2012 study from Northeastern University, “Network Connectivity and Low-Stress Bicycling,” researchers write: “For a bicycling network to attract the widest possible segment of the population, its most fundamental attribute should be low-stress connectivity. That is, providing routes between people’s origins and destinations that do not require cyclists to use links that exceed their tolerance for traffic stress, and that do not involve an undue level of detour.”

—Furth et al., “Network Connectivity and Low-Stress Bicycling,” Submitted to Transportation Research Board for the 2013 annual meeting and publication in Transportation Research

ii. Connecting the Active Transportation Network

Also essential to attracting more people to walking and bicycling is continuity and consistency in the active transportation system achieved by connecting the low-stress network. In addition to filling in gaps and connecting facilities, it is important to identify and connect to desirable destinations and to other modes of transportation. A low-stress, well-connected network of active transportation facilities can be obtained through the following actions:

- Taking inventory of the existing bicycle and pedestrian network.
- Identifying missing segments and barriers in the existing network.
- Filling in gaps and removing barriers to the existing network.

- Identifying gaps and barriers to first- and final-mile connections.
- Filling in gaps and removing barriers to first- and final-mile connections.
- Create a consistency in the network.
- Expanding the active transportation network, ideally with low-stress facilities.

iii. Multimodal Transportation Nodes

Having a mix of transportation options and amenities conveniently available and located at popular destinations, in urban and town centers, and at transit stations, can make walking and bicycling more feasible. People might be willing to get around more by walking or bicycling if modes were clustered together and easily accessible, such as car-sharing, transit, transportation network companies (Uber, Lyft) and taxis, bike-sharing and secure bicycle parking. Denver Union Station is a premier example of a multimodal transportation node in the Denver region. However, multimodal transportation nodes are not reserved only for urban cores, and they have the potential to be successful in suburban town centers and suburban transit-oriented development.

iv. Complete Streets

Complete Streets are designed to safely accommodate both motorized and active modes of transportation. According to the National Complete Streets Coalition, complete streets are those designed and operated to enable safe access and travel for all users. Pedestrians, bicyclists, motorists, transit users, and travelers of all ages and abilities will be able to move along the street network safely. Although the Federal Highway Administration does not have an official Complete Streets policy, the concept is closely associated with the principles promoted by the Interagency Partnership for Sustainable Communities, a joint endeavor involving the U.S. Department of Transportation, U.S. Department of Housing and Urban Development and U.S. Environmental Protection Agency ([Federal Highway](#)

[Administration, Public Roads](#), July/August 2010). All modes, including walking and bicycling, should be considered in new roadway and reconstruction projects to enable safe travel for all transportation users. As of 2017, the only known jurisdictions in the DRCOG region to have adopted or incorporated Complete Streets practices in policies, resolutions or plans include the City and County of Denver, the City of Golden and the City of Thornton.

v. Supporting Infrastructure and Technology

Infrastructure and amenities supporting active transportation are influential to their usage. Examples of supporting infrastructure include: pedestrian shelters at transit stops; shade trees and landscaping along sidewalks; bicycle racks and secure bicycle parking; and wayfinding. Additionally, real-time multimodal transportation applications and routing capabilities further support and enable walking and bicycling as stand-alone modes or used in conjunction with another mode. For example, technology can easily enable people using transit to reserve a bicycle (bike-sharing) or car (car-sharing) at the beginning or end of their trip. Supporting infrastructure, amenities and technology should be convenient, easily accessible and intuitive.

H. Role of DRCOG in Implementing Active Transportation Projects

DRCOG plays an integral role in both supporting and funding active transportation in the DRCOG region. Projects categorized as pedestrian and bicycle infrastructure are funded directly through the Transportation Improvement Program process. The percentage of funds allocated to pedestrian and bicycle projects has increased over the past three TIP cycles. In the 2016-2021 Transportation Improvement Program, 22 percent of funds were allocated to projects classified as bicycle or pedestrian infrastructure and all the projects were either protected or grade separated from the roadway. Pedestrian and bicycle projects are also constructed as elements of larger Transportation Improvement Program projects, such as roadway

projects. Roadway projects have been incentivized in the Transportation Improvement Program application process to include multimodal features like bicycle and pedestrian travelways and support facilities.

In 2018, DRCOG will complete an Active Transportation Plan. The Active Transportation Plan will become an element of the MVRTP. The Active Transportation Plan will expand upon the elements of this section of the MVRTP and incorporate additional components and products such as a regional bicycle network vision. DRCOG staff will work closely with member jurisdictions and other stakeholders in the development of the Active Transportation Plan.

I. Design Guidelines and Resources

Pedestrian and bicycling facilities are not one-size-fits-all. Designs will vary depending on local community factors such as existing and planned land uses, density, adjacent roadway types and widths, and usage. Recognizing the great diversity in the region, DRCOG does not prescribe blanket design guidelines and requirements that apply equally to all jurisdictions and projects. The Transportation Improvement Program policy establishes certain design requirements for project eligibility, such as minimum widths for multiuse facilities, and directs jurisdictions to follow design standards set forth by Americans with Disabilities Act and the American Association of State Highway and Transportation Officials. Additionally, there are a variety of design resources (Figures 4 and Figure 5) available which are continually evolving. In addition to local guidelines and requirements, jurisdictions should use these guides in the planning and design process of pedestrian and bicycle facilities. DRCOG encourages jurisdictions to communicate and coordinate on pedestrian and bicycle plans and projects with neighboring jurisdictions and other applicable stakeholders to achieve consistency and connectivity across boundaries.

Figure 4: Design Guide Resources for Pedestrian Facilities

Design guide resources for pedestrian facilities

- [*Guide for the Planning, Design, and Operation of Pedestrian Facilities*](#), July 2004, AASHTO Pedestrian Guide.
- [*Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*](#). ITE Guide. This guide is useful in gaining an understanding of the flexibility that is inherent in the AASHTO green book, [*A Policy on Geometric Design of Highways and Streets*](#).
- *Urban Street Design Guide*, 2013, National Association of City Transportation Officials.
- *Guidance Memorandum on Promoting the Implementation of Proven Safety Countermeasures*, 2012, Federal Highway Administration.
- [*2010 ADA Standards for Accessible Design*](#), Department of Justice.
- [*Proposed Guidelines for Pedestrian for Pedestrian Facilities in the Public Right-of-Way*](#), United States Access Board, 2011.

Figure 5: Design Guide Resources for Bicycle Facilities

Design guide resources for bicycle facilities

- [Urban Bikeway Design Guide](#), 2014 – Second Edition, National Association of City Transportation Officials.
- [Designing for All Ages and Abilities](#), 2017 (National Association of City Transportation Officials)
- [Bike Share Station Siting Guide](#), 2016 (National Association of City Transportation Officials)
- [CDOT Roadway Design Guide – Chapter 14 Bicycle and Pedestrian Facilities](#), January 2013, Revision 1, (Colorado Department of Transportation).

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APPENDIX 8

Consideration of FAST Act Federal Planning Factors

Fixing America’s Surface Transportation (FAST) Act calls for metropolitan planning organizations to ensure that the planning process provides for consideration and implementation of projects, strategies and services for the 10 factors described below. In addition to identifying the planning factors, the list includes descriptions of how the 2040 Metro Vision Regional Transportation Plan (2040 MVRTP) has considered them. The 2040 MVRTP includes the 2040 Fiscally Constrained Regional Transportation Plan, the transportation theme (component) of DRCOG’s Metro Vision, as well as components addressing transit, freight and active transportation. These elements are integrated within the 2040 MVRTP to help address the planning factors.

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

The 2040 MVRTP provides a network of transportation facilities and connections to link employment centers with major multimodal passenger facilities and intermodal freight terminals, both nationally and internationally. The plan specifically addresses connections with Denver International Airport, which provides a direct link between the region’s economy and the global economy. Connections with the region’s other general aviation airports to facilitate business travel and cargo are also emphasized in the MVRTP. The provision of an extensive transit system enables a greater share of the labor force to have access to more jobs. Finally, the 2040 MVRTP includes an extensive freight component addressing these issues.

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

The plan addresses several aspects of safety such as law enforcement and legislative actions, planned safety improvements to be made, safety-related maintenance activities, and the relationship to CDOT’s [Strategic Highway Safety Plan](#) (Chapter 4). Although site-specific safety-designated improvements, because of their relatively small scale, are not specifically listed or mapped, safety is being given due consideration through Unified Planning Work Program activities, Transportation Improvement Program project selection criteria, future Regional Transportation Plan system improvement evaluations and the incorporation of safety elements into larger-scale projects. Safety was also a key criterion in evaluating and prioritizing regionally significant roadway capacity projects for regional funding in the 2040 MVRTP (Appendix 1). The 2040 MVRTP also identifies funding commitments to future safety projects, strategies and services. Additionally, the plan also sets the stage for the FAST Act’s performance-based planning process by identifying baseline data for and discussing safety-related performance measures (Chapter 7), as well as including safety data from DRCOG’s most recent *Traffic Crashes in the Denver Region* report (Chapters 4 and 7). Finally, Metro Vision’s transportation theme includes a performance measure and target addressing the region’s focus on reducing traffic fatalities (Chapter 3).

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

Residents and visitors will travel in the Denver region with confidence. DRCOG’s role in regional transportation security activities are discussed in detail in Chapter 4, with an emphasis on substantial coordination among all agencies charged with transportation system security. Activities that

facilitate preparedness and prevention, such as vulnerability assessments, are key to increasing security, but attention will also be paid to improving response and recovery.

4. Increase accessibility and mobility of people and freight.

A key focus of the 2040 MVRTP is to provide improved mobility for the region's residents and businesses. Both roadway and transit improvements are identified and funded in the 2040 MVRTP that reduce delay and enhance mobility. The plan also includes several alternative modes of transportation to provide travel choices. Future funds are allocated for promoting alternative modes on three levels: regionally, in subareas and at individual business sites. Pedestrian and older adult accessibility strategies are emphasized in the 2040 MVRTP's active transportation and transit plan components. Mobility of freight and goods movement is specifically addressed in the freight component. Management activities to improve freight mobility include incident detection and response, and intelligent transportation systems applications. The plan also identifies pools of funding that can be used for all previously mentioned activities.

5. 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.

All these concepts are part of the 2040 MVRTP and Metro Vision:

- *Protecting and enhancing the environment* is a key focus of the 2040 MVRTP (Chapter 7). The planning process facilitated the active involvement of the air quality regulatory agencies and residents interested in air quality. The 2040 MVRTP 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.

- DRCOG participated in CDOT's Planning Insight Network (PIN), an interactive web-based mapping tool and process to solicit environmental consultation by resource agencies on major projects and travel corridors. DRCOG submitted a representative list of major freeway and arterial roadway capacity projects to CDOT for it to map in the PIN tool for consultation and comment by resource agencies. DRCOG reviewed and considered resulting comments. Further, before individual major projects go through final design engineering and construction, federal requirements specify they must go through appropriate National Environmental Policy Act (NEPA) reviews and studies. This ensures project alignments, designs and mitigation measures result in environmentally sensitive projects. Chapter 7 also discusses other environmental issues, data and considerations at the long-range planning level.
- *Energy conservation* is promoted through Metro Vision land use and development objectives, and by attempting to minimize travel delays and provide extensive transit services and other alternative travel modes through the 2040 MVRTP. Metro Vision objectives such as extent of urban growth (urban growth boundaries), urban centers and community design seek to avoid land use patterns that lead to increased vehicles miles traveled and by encouraging more pedestrian- and transit-friendly development. In the 2040 MVRTP, promoting and facilitating alternative travel modes are acknowledged through the travel demand management programs, such as DRCOG's Way to Go program, funded through the plan, as well as the transit and active

transportation components. In addition, the synchronization of traffic signals across the region is supported in both the 2040 MVRTP and in Metro Vision. DRCOG provides for traffic signal synchronization through its regional [traffic operations program](#), including the Traffic Signal System Improvement Program, which times signals to be more efficient and coordinated across corridors. These activities result in reducing stop-and-go delays and achieve fuel savings. Finally, petroleum fuel consumption and greenhouse gas emissions are reported in the 2040 MVRTP (Chapter 7).

- *Quality of life* is also addressed throughout the 2040 MVRTP and Metro Vision. Several objectives and strategic initiatives (Metro Vision) and funded projects, programs and services (2040 MVRTP) will improve quality of life for individuals throughout the region. The very first principle of Metro Vision is to “protect and enhance the region’s quality of life” and its most basic purpose is to “safeguard for future generations the region’s many desirable qualities.” From the 2040 MVRTP perspective, environmental justice for disadvantaged individuals will be enhanced by the implementation of the regional transit system, alternative mode services and facilities, and environmentally sensitive designs developed for specific projects (Chapter 7).
- Metro Vision explicitly *considered state and local planned growth and economic development patterns* through extensive outreach to local governments and economic development organizations. The 2040 MVRTP serves the desired growth and development identified in Metro Vision.

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

The 2040 MVRTP specifically address the integration of transportation system elements. The plan discusses multimodal connections with respect to several modes, as well as shared opportunities for multimodal transportation development. For example, Park-and-ride lots will have convenient auto, pedestrian and bicycle connections. Transit-to-transit transfer facilities are identified as well as transit-to-aviation connections. The key multimodal passenger facilities identified in the 2040 MVRTP are Denver Union Station and Denver International Airport. Roadway improvements near major intermodal freight facilities are included in the MVRTP and reference is provided to new or improved intermodal freight facilities that are envisioned. First- and last-mile connections — and the role of multimodal travel options to enable them — are discussed throughout the 2040 MVRTP. Finally, system connectivity is addressed in the plan’s freight, transit and active transportation components, while freight is addressed in-depth in the freight component.

7. Promote efficient system management and operation.

The 2040 MVRTP makes extensive reference to system management and operational activities (particularly in chapters 4, 5, 6 and 7). 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. The 2040 MVRTP also contemplates the role evolving technology could play in system management and operations. Finally,

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" (Chapter 3).

8. Emphasize the preservation of the existing transportation system.

Preservation of the existing transportation system is a key focus of the 2040 MVRTP. Chapter 5 emphasizes 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. Chapter 7 also discusses DRCOG, CDOT and RTD activities related to system preservation and state of good repair.

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

Transportation system resiliency is addressed in Chapter 4 of the 2040 MVRTP and is a core theme (chapter) of Metro Vision, which addresses resiliency of the natural and built environment. In the 2040 MVRTP, transportation resiliency is addressed through many facets, such as safety, security and operations (Chapter 4), as well as environmental mitigation (Chapter 6). While stormwater reduction and mitigation is addressed during the project development and implementation process, Chapter 7 discusses the importance of stormwater and related environmental issues at the regional level. DRCOG monitors NEPA and Planning and Environmental Linkage studies to ensure stormwater (among many other issues) is addressed during corridor and project studies.

10. Enhance travel and tourism.

The 2040 MVRTP funds a connected network of multimodal projects, programs and services to increase travel mobility for all users. 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. Traffic operations and technology also enhance the traveling experience, from app-based notifications and wayfinding to traffic operations that result in smoother and more predictable travel among, and between, travel modes. The 2040 MVRTP'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 and Sports Authority Field at Mile High), and other important activity centers that facilitate tourism (and general travel).

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LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AFB	Air Force Base
APE	Annual Program Evaluation (RTD FasTracks)
APCD	Air Pollution Control Division
AQCC	Air Quality Control Commission
ATIS	Advanced traveler information systems
ATMS	Advanced transportation management systems
BNSF	BNSF Railway
BRT	Bus rapid transit
CAA	Clean Air Act
CAB	Colorado Aeronautical Board
CBD	Central Business District
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CFRT	Colorado Front Range Trail
CMAQ	Congestion Mitigation and Air Quality
CO	Carbon monoxide
DEIS	Draft Environmental Impact Statement
DIA	Denver International Airport
DMS	Dynamic Message Sign
DRIR	Denver Rock Island Railroad
DRCOG	Denver Regional Council of Governments
DRMAC	Denver Regional Mobility and Access Council
DUS	Denver Union Station
EA	Environmental Assessment
E&D	Elderly and disabled
EIS	Environmental impact statement
EJ	Environmental Justice
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAST Act	Fixing America's Surface Transportation Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
FTA	Federal Transit Administration
GA	General aviation
GHG	Greenhouse gas emissions
GWR	Great Western Railway
HOT	High occupancy toll
HOV	High occupancy vehicle
HUTF	Highway Users Tax Fund
ITS	Intelligent Transportation Systems
JARC	Job Access and Reverse Commute
LRT	Light rail transit
MAP-21	Moving Ahead for Progress in the 21st Century
MP	Milepost
MPO	Metropolitan Planning Organization

MRA	Major regional arterial
MVRTP	Metro Vision Regional Transportation Plan
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHS	National Highway System
NO _x	Nitrogen oxides
NPL	National Priorities List
PCEA	Programmatic Cumulative Effects Analysis
PEIS	Programmatic Environmental Impact Statement
PEL	Planning and Environmental Linkage
PM ₁₀	Particulate matter less than 10 microns in size
PMT	Person-miles of travel
Ppm	Parts per million
RAMP	Responsible Acceleration of Maintenance and Partnerships
RAQC	Regional Air Quality Council
RASP	Regional Aviation System Plan
ROD	Record of Decision
RPP	Regional Priority Program
RRS	Regional Roadway System
RTC	Regional Transportation Committee
RTD	Regional Transportation District
RTP	Regional Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act - A Legacy for Users
SGPI	Shortgrass Prairie Initiative
SH	State Highway
SIP	State Implementation Plan
SO ₂	Sulfur Dioxide
SOV	Single occupant vehicle
STIP	Statewide Transportation Improvement Program
STP	Surface Transportation Program
TAC	Transportation Advisory Committee
TANF	Temporary Assistance for Needy Families
TAP	Transportation Alternatives Program
TAZ	Transportation analysis zone
TCM	Transportation control measure
TCSP	Transportation and Community System Preservation
TDM	Travel demand management
TIP	Transportation Improvement Program
TOD	Transit-oriented development
TMA	Transportation management area
TMO/A	Transportation management organization/association
TSM	Transportation systems management
UGB/A	Urban growth boundary/area
UP or UPRR	Union Pacific Corp.
UPWP	Unified Planning Work Program
US FWS	U.S. Fish and Wildlife Service
USC	United States Code
VMT	Vehicle miles traveled
VOC	Volatile Organic Compounds
YOE	Year of Expenditure

LIST OF KEY AGENCY WEBSITES

Air Pollution Control Division (APCD): www.colorado.gov/airquality/

Colorado Department of Transportation (CDOT): www.codot.gov/

Denver Regional Council of Governments (DRCOG): www.drcog.org

Federal Highway Administration (FHWA): www.fhwa.dot.gov

Federal Transit Administration (FTA): www.fta.dot.gov

Regional Air Quality Council (RAQC): www.raqc.org

Regional Transportation District (RTD): www.rtd-denver.com

U.S. Census Bureau: www.census.gov/

U.S. Department of Transportation: www.dot.gov/

U.S. Environmental Protection Agency (EPA): www.epa.gov



We make life better!

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