

H. Freight Facilities

The efficient movement of freight, goods, and packages is extremely important to the Denver region's economy. These 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 intermodal terminals transfer large amounts of cargo between the various travel modes and trucks. Most freight facilities and terminals are concentrated near the freeways and major regional arterials. The majority of local deliveries and pickups to and from businesses in the area depend on the reliability of the regional and local roadway systems.

Applicable Metro Vision transportation policies and action strategies are as follows:

Freight Facilities: Metro Vision Transportation Policies and Action Strategies

Policy #3. Roadways. Provide a sustainable roadway system that enables safe and efficient travel by automobiles, trucks, buses, and bicycles.

- Maintain and enhance a regional roadway system comprised of existing, expanded, or new freeways, major regional arterials and principal arterials that provide regional and statewide connectivity for the movement of people and goods.
- Expand the capacity of existing regional roadways in the most critically congested corridors and at key traffic bottlenecks, after considering demand management strategies and operational efficiencies. Prioritize roadway capacity funds for projects that address gaps in the existing roadway system and eliminate bottlenecks consistent with findings of the congestion management planning process.
- Develop opportunities for implementing congestion pricing and other tolling techniques on existing freeways, and implement a tolling component (price-management) on new freeway lane-addition projects, where feasible, with all impacted communities included in the tolling decision and surplus revenue directed to multimodal investment or system preservation; and
- Support legislation that would implement VMT-based fees, pay-as-you-drive insurance, and other pricing strategies that more directly and immediately reflect the cost of vehicle travel to the user.

Policy #4. Management and Operations. Make the best use of existing and future transportation facilities by implementing measures that actively manage and integrate systems to optimize system performance and safety, provide accurate real-time information, reduce the demand for single-occupant motor vehicle travel, and reduce per capita Vehicle Miles Traveled (VMT).

- Implement transportation systems management (TSM) projects such as intersection improvements, ramp metering, and acceleration/deceleration lanes that improve the flow of motor vehicles and transit.
- Deploy Intelligent Transportation Systems (ITS) such as vehicle flow treatments and national real-time system information programs, and transit monitoring system to improve the effectiveness and efficiency of the transportation system.

Policy #10. Interconnections. Provide efficient interconnection of the transportation system within modes, between different modes, and between the metropolitan area and the rest of the state and nation.

- Facilitate the movement of goods throughout the region by reducing obstructions such as congestion, bottlenecks, and disconnections between facilities, while providing sufficient opportunities for intermodal freight connection.
- Consider opportunities for the development of an intercity commuter rail or bus system along the Front Range, and also incorporate, within the region, elements of a statewide intercity rail system.

- Ensure convenient access to Denver International Airport (DIA) for all modes of travel, and maintain DIA's important role in connecting the Denver region to the rest of the nation.
- Support continuing activities that might eventually enable through rail freight traffic to bypass population centers.

Freight Background

In the context of the 2035 MVRTP, freight represents any physical goods, parcels, raw materials, or finished products that are transported from one place to another. The focus of this plan is on surface and aviation transportation modes and associated facilities. Limited attention is given to pipelines. Examples of types 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;
- 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” trucks to cross the mountains.

Denver is the northern end of the Ports to Plains corridor connecting Colorado to Mexico via Laredo, Texas. This could lead to increasing the Denver region's role as a distribution center and freight consolidation point for goods shipped to and from Mexico. In the DRCOG region, the Ports to Plains corridor encompasses I-70 East.

Overall, 68 million tons of freight are shipped to and from the DRCOG region and another 35 million tons are distributed internally. About 67 percent by weight is shipped by truck. Rail accounts for 28 percent. The remaining freight is shipped by air, pipeline or a combination of modes. The freight shares by travel modes based on value, weight, and ton-mileage are shown in Table 4.

The data in the 1997 Commodity Flow Survey indicated that the Denver region was a net importer of freight with an import to export ratio of 1.30. The data in the 2002 Survey shows the Denver region has a balanced import to export ratio of 1.00.

Table 4			
Freight Movement Shares for Denver Region by Travel Mode in 2002			
Travel Mode	Value	Weight	Ton-Miles
Heavy Truck	65%	67%	25%
Rail	3%	28%	72%
Other Modes and Combination (air, parcels, etc.)	32%	5%	3%
Totals	100%	100%	100%

Source: 2002 Commodity Flow Survey, U.S. Bureau of the Census

Other key freight facts are:

- Between 1997 and 2002, rail freight declined from 5 percent to 3 percent of total freight value but increased from 23 percent to 28 percent by weight and from 47 percent to 72 percent by ton-miles.
- Freight imported to the Denver region has higher value than exported. Inbound freight has a value of \$46.3 billion while the outbound value is \$41.8 billion.
- Exported freight is shipped farther from the Denver region than it is imported with outbound freight at 24.4 billion ton-miles and only 20.2 billion ton-miles inbound.
- Major freight points of origin are Arizona, California, Alabama, and Texas.
- Major freight points of destination are California, Texas, and Illinois.

Electronics (25 percent) and furniture and manufactured products (20 percent) are the major categories shipped by value. Coal and petroleum products is the major category by weight (38 percent) and ton-miles (68 percent).

Freight that stays within the Denver region accounts for 32 percent of the value and 51 percent of the weight. Freight shipped to and from other areas of Colorado accounts for 16 percent of the value and 15 percent of the weight.

The reliability of freight movements is critical to the operation of many businesses in the region. Such establishments often require just-in-time deliveries of raw materials. Rather than maintain large storage facilities for raw materials, it is more cost-effective to have them shipped in just prior to their use in the production of finished products. Congestion on the transportation system can severely delay production.

The relationship of major freight facilities to the other transportation, growth, and development elements is displayed in the exhibits in Appendix 1. More information regarding specific freight projects and strategies is presented in the corridor vision plan sheets in Appendix 1.

2035 Freight System Elements

Freight is transported in the Denver region through an interconnected system served by several major travel modes and several intermodal transfer facilities. Figure 19 shows the rail, air, and intermodal freight network.

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. The 2035 regional roadway system includes 9,000 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 on Figure 19 and provide connections to major intermodal terminals such as airports, rail terminals, truck terminals, pipeline terminals, park-n-Ride lots, bus terminals, and bus stations.

The following improvements planned for the roadway system will directly benefit the movement of freight by trucks by decreasing congestion and improving travel time reliability:

- Expand the regional roadway system (add nearly 2,100 lane-miles) by widening roads, removing bottlenecks, and constructing new roads and interchanges;
- Construct railroad crossing grade-separations at critical locations; and
- Provide roadway management and Intelligent Transportation System applications such as traveler information systems, incident management, and variable message signs.

There are other improvements that 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.

Other issues facing truck movements include:

- CDOT regulations and rules for longer combination vehicles (LCVs), trucks that pull more than one trailer;
- Local regulations regarding the time of day that trucks can make deliveries and pickups;
- Weight 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—criminal background checks, facility security plans, updating of hazardous material placards on trucks; and
- Emergency response to truck crashes.

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. Freight that is hauled by rail instead of trucks causes less damage to the roadway infrastructure. Freight rail traffic in the Denver metropolitan region is predominated by two Class I railroads: Union Pacific (UP) and Burlington Northern Santa Fe (BNSF). Class I railroads are the largest carriers and are designated as such by the Surface Transportation Board of the U.S. Department of Transportation. Two Class III railroads also operate within the Denver region: Denver Rock Island Railroad (DRIR) and Great Western Railway of Colorado (GWR). Active rail lines in the region are illustrated in Figure 19 along with switching yards, intermodal terminals, and major transfer facilities.

The BNSF railroad’s principal line through the Denver region runs north-south carrying trains from Wyoming to Texas. Its principal cargo is coal. The BNSF operates four branch lines within the region: Golden to Denver, Broomfield-Lafayette, Longmont-Barnett, and a line connecting Denver, northeastern Colorado, and Nebraska to the northeast.

The UP operates major north-south lines and east-west lines within the region. The north-south line connects Denver with Cheyenne and Pueblo. East-west lines connect Denver with Utah and western Colorado to Kansas. The Regional Transportation District (RTD) recently purchased from

UP 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.

The BNSF and UP have joint operations and track sharing agreements south of downtown Denver. The joint line is known as the Consolidated Mainline. It is operated as a paired track; one track used for northbound traffic and the other track used for southbound traffic.

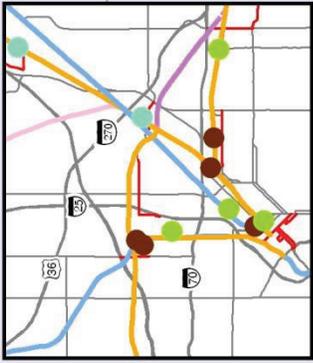
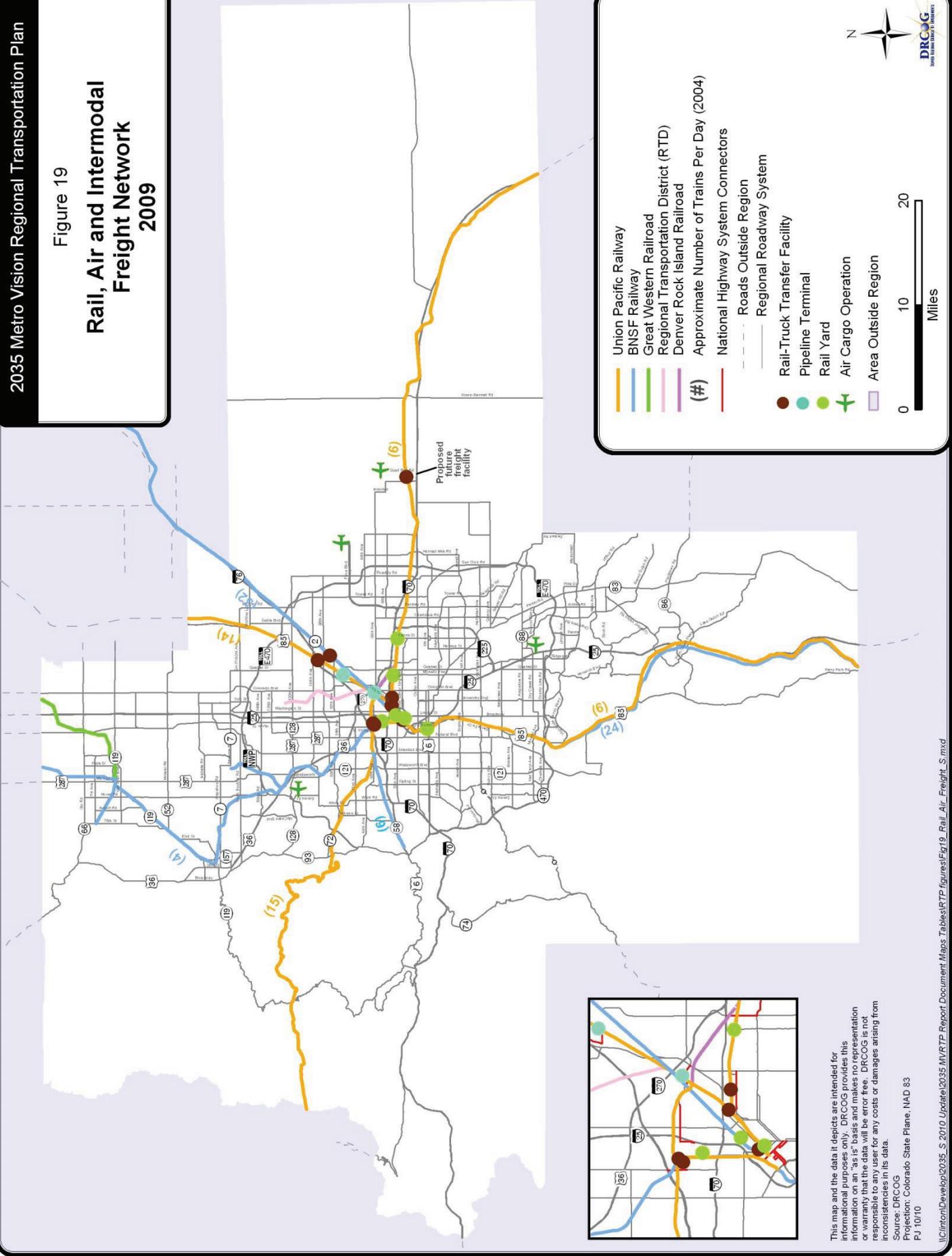
The DRIR has a switching and terminal spur line north of I-25 and 58th Avenue running roughly parallel to I-270 connecting the UP and BNSF facilities. The GWR operates branch lines connecting North Front Range communities such as Fort Collins and Loveland to Longmont. GWR has an interchange point with BNSF at Longmont (switching only).

At-Grade Arterial Railroad Crossings

Over 500 at-grade intersections exist between the rail system and the roadway system in the Denver metropolitan region. Many of these at-grade crossings are found north of the I-70 corridor in predominately industrial and warehouse areas. At-grade crossings can pose safety concerns as well as problems of delay to auto and truck traffic and emergency services. The 58 rail-on-roadway crossings on the regional highway network are shown in Figure 20.

The number of trains that cross a road per day will increase on those lines that may serve commuter rail in the future. Corridor studies will determine the need for constructing additional grade-separations at such locations.

Figure 19
**Rail, Air and Intermodal
 Freight Network
 2009**



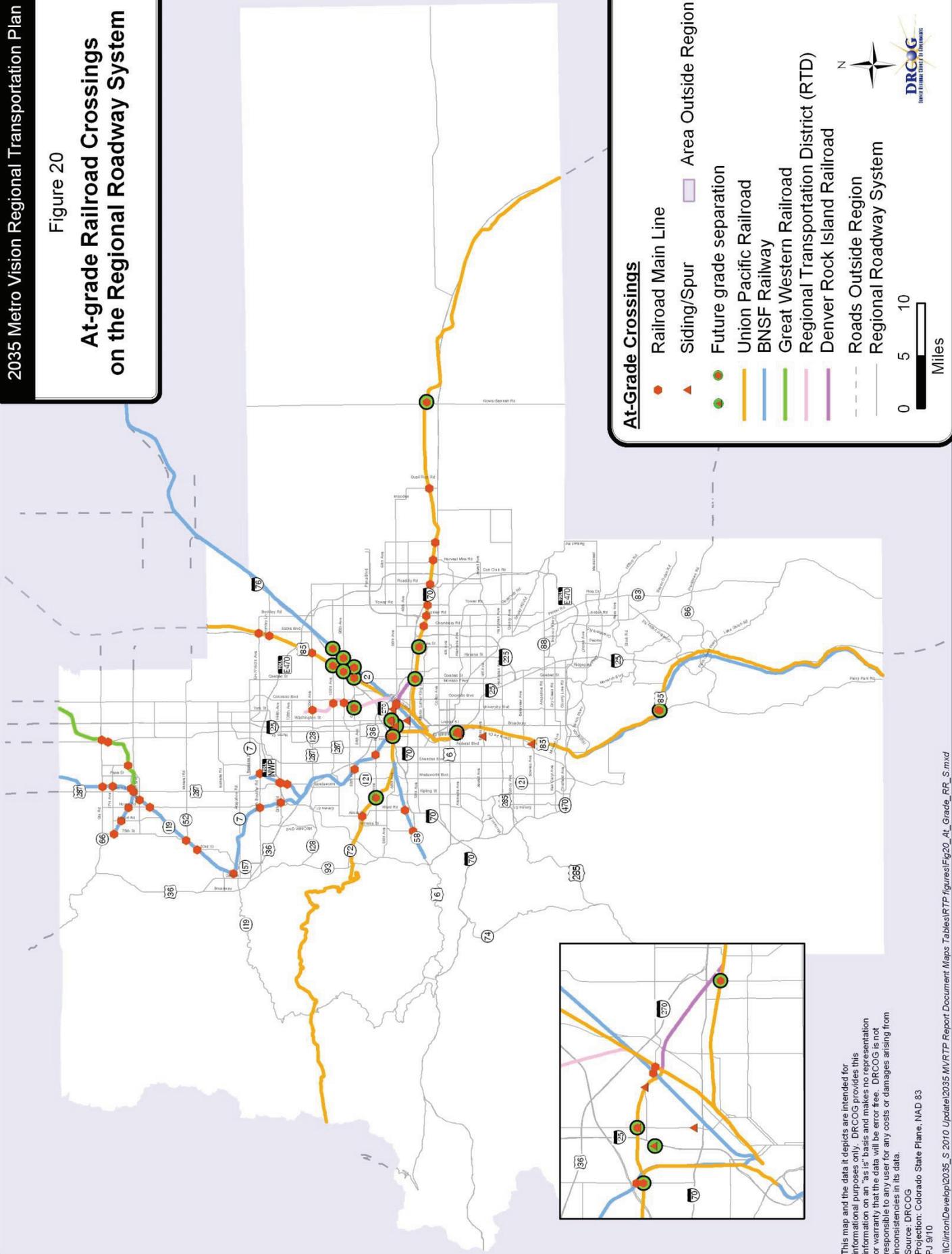
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- Union Pacific Railway
- BNSF Railway
- Great Western Railroad
- Regional Transportation District (RTD)
- Denver Rock Island Railroad
- (#) Approximate Number of Trains Per Day (2004)
- National Highway System Connectors
- Roads Outside Region
- Regional Roadway System
- Rail-Truck Transfer Facility
- Pipeline Terminal
- Rail Yard
- Air Cargo Operation
- Area Outside Region



Figure 20

At-grade Railroad Crossings on the Regional Roadway System



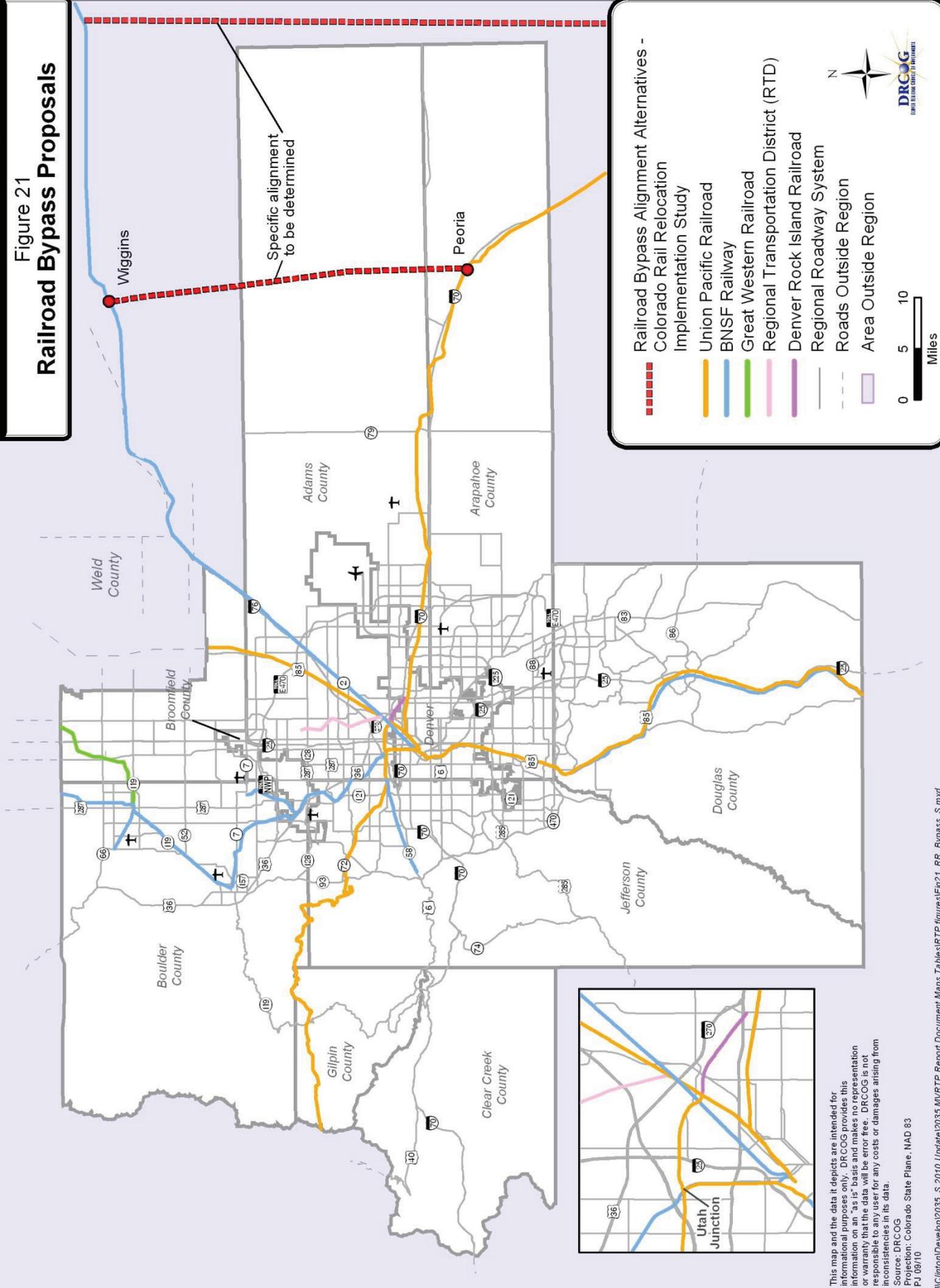
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The following improvements are envisioned for the freight railroad system:

- **Eastern railroad bypass.** CDOT concluded the Colorado Rail Relocation Implementation Study (aka R2C2 Study) in 2009. The two alternative alignments (see Figure 21) were determined to have a positive benefit-to-cost ratio. Either alignment could result in a diversion of a substantial amount of freight rail traffic that currently uses the Consolidated Mainline through the Denver region.
- **Railroad grade-separation bridges/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 SH-67 and UP at SH-67 (Sedalia)
 - BNSF/UP at Santa Fe Drive/Kalamath Street
 - RTD at 88th Avenue
 - UP at 72nd Avenue
 - UP at 88th Avenue
 - UP at 96th Avenue
 - UP at 104th Avenue
 - UP at Broadway (SH-53)
 - UP at Pecos Street (under construction)
 - UP at Quebec Street frontage road ramps
 - UP at SH-79
 - UP at Washington Street
 - UP/RTD at Peoria Street
- **Railroad grade-separations on local streets off the regional roadway system** will also be considered at critical locations.

Figure 21
Railroad Bypass Proposals



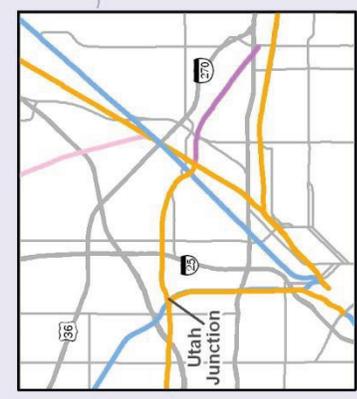
Railroad Bypass Alignment Alternatives -

- - - Colorado Rail Relocation Implementation Study
- Union Pacific Railroad
- BNSF Railway
- Great Western Railroad
- Regional Transportation District (RTD)
- Denver Rock Island Railroad
- Regional Roadway System
- - - Roads Outside Region
- Area Outside Region

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 Project: Colorado State Plan, NAD 83
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Major Intermodal Terminals

Figure 19 shows the location of the current UP and BNSF intermodal rail-truck transfer facilities. They are also listed in Appendix 6. The BNSF operates the Rennicks and Globeville (31st Street) switching yards. BNSF has major terminals and freight transfer facilities to serve trailers on flat cars (TOFCs) and auto transport. UP has major terminals and freight transfer facilities known as the North Yard, 40th Street Yard, Rolla Auto Transfer Yard, and Pullman Yard, in addition to several switching yards. Land owners in the vicinity of Front Range Airport have proposed a new air/rail/highway intermodal facility. Planned or envisioned improvements that will benefit terminals include:

- Widening of several regional system roadways that are located in the vicinity of intermodal terminals; and
- Constructing new intermodal freight centers to handle truck/rail transfers and relocate some existing intermodal terminals.

Air Cargo

Air cargo activity to and from Denver has grown dramatically over the past 25 years and is expected to nearly double by 2035. Air freight is by nature high value and time sensitive and is linked to the types of retail, service, and manufacturing businesses expected to lead the region's economic development through 2035. DIA handles thousands of packages and containers per day, with much smaller levels at Centennial, Rocky Mountain Metropolitan, and Front Range Airports. Additional air cargo handling capacity will likely be required before 2035. The likely location for most expansion will be at DIA and/or at Front Range Airport with limited expansion of the type of current services at Rocky Mountain Metropolitan Airport.

Pipelines

Pipelines in the Denver region ship in oil products and natural gas. Crude oil is processed into usable fuels such as gasoline and delivered by truck to filling stations. Natural gas is used for homes and businesses and to generate electricity. Pipeline transfer facilities are shown on Figure 19.

Air Quality Concerns with Freight Movement

The economic benefit of freight travel is not without environmental impacts, particularly to the region's air quality. A large percentage of heavy trucks are powered by diesel engines. The Air Pollution Control Division (APCD) estimates that heavy-duty diesel vehicles are responsible for

about 50 percent of the primary PM₁₀ emissions from motor vehicles. Similarly, heavy-duty diesel engines are a large contributor to NO_x emissions. Continued improvements to diesel engines and fuels will result in cleaner running trucks. Improvements that reduce roadway and rail congestion will also result in less pollution from truck and rail operations.

I. System Management and Operational Improvements

The region's Metro Vision transportation system will be efficiently managed and effectively operated, as stated in the following Metro Vision transportation policy and action strategies:

System Management and Operational Improvements: Metro Vision Transportation Policies and Action Strategies

Policy #3. Roadways. Provide a sustainable roadway system that enables safe and efficient travel by automobiles, trucks, buses, and bicycles.

- Develop opportunities for implementing congestion pricing and other tolling techniques on existing freeways, and implement a tolling component (price-management) on new freeway lane-addition projects, where feasible, with all impacted communities included in the tolling decision and surplus revenue directed to multimodal investment or system preservation.

Policy #4. Management and Operations. Make the best use of existing and future transportation facilities by implementing measures that actively manage and integrate systems to optimize system performance and safety, provide accurate real-time information, reduce the demand for single-occupant motor vehicle travel, and reduce per capita Vehicle Miles Traveled (VMT).

- Implement transportation systems management (TSM) projects such as intersection improvements, ramp metering, and acceleration/deceleration lanes that improve the flow of motor vehicles and transit.
- Deploy Intelligent Transportation Systems (ITS) such as vehicle flow treatments and national real-time system information programs, and transit monitoring system to improve the effectiveness and efficiency of the transportation system.
- Work with all involved parties to develop strategies for incident management that reduce the impact of incidents such as motor vehicle crashes upon the movement of vehicles on the regional roadway system.
- Implement coordinated traffic signal systems including across jurisdictional lines and integrate transit signal priority techniques for transit and emergency vehicles.
- Manage access (curb cuts on arterials or interchanges on freeways) to maintain and restore capacity in accordance with the CDOT State Highway Access Code along state highways, and encourage local governments to develop similar standards for non-state roadways.
- Implement parking pricing mechanisms that better reflect the cost of providing infrastructure for personal vehicles.

Management and Operations Background

The overall objective of management and operational strategies is to provide more reliable travel times and reduce the amount of delay 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 2035 regional transportation system, two classes of system management and operations strategies will be implemented:

- Site-specific operational improvement projects; and
- Active management of the transportation system.

Pricing strategies will also be explored for implementation in severely congested corridors and in areas with high demand for parking. A tolling component will be considered for all new freeway lane-addition projects. More information regarding specific projects and strategies is presented in the corridor vision plan sheets in Appendix 1.

Site-Specific Operational Improvement Projects

Operational improvement projects are generally of low to moderate cost and do not add significant new capacity to the system. However, they have cost-effective delay reduction, traffic flow, and safety benefits. Unique strategies will be applied to freeways and arterials on the regional system.

Freeways

Major projects planned to rehabilitate and upgrade freeways will correct many operational bottlenecks. Stand-alone 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;
- Paved areas to allow trucks and other vehicles to install or remove chains pursuant to using I-70 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, operational improvement projects will address congestion problems at intersections and at-grade railroad crossings. Access to and from arterials will also be better managed. 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 sidestreet lanes.
- Improvements to reduce transit travel delay in corridors with high levels of bus service, including treatments such as queue jump lanes, adjustments to lane-channelization devices, and relocation of and enhancements to bus stops;
- Access management projects to smooth traffic flow such as medians to control left turns, consolidation of access points, reconstruction of driveways for proper width and gradient, and acceleration/deceleration lanes for turning traffic;
- Shoulders on rural roadways to accommodate bicyclists, disabled vehicles, and vehicles that drift off the travel lanes; and
- Grade-separated bridges and underpasses for railroad tracks (see list in Chapter 4, Section H).

Active Management

Personnel and technology are necessary to actively manage the transportation system to assure efficient and effective day-to-day operations. This class of actions generally falls under the umbrella of Intelligent Transportation Systems (ITS). Simply put, ITS can be thought of as:

- Gathering data by monitoring the real-time functioning of the system;
- Disseminating information to operators and travelers;
- Managing flow using various traffic control devices; and
- Integrating all of this so it works together.

ITS for the Entire System

- Surveillance devices (e.g., roadway detectors or video cameras) deployed on or along freeways, arterials, and transit vehicles and facilities to collect information on travel conditions;
- A communications network that connects traffic, transit, and emergency management centers;

- A consolidated regional transportation operations display (e.g., secure website) that provides transportation operators and emergency vehicle dispatchers details of the transportation system conditions across the region; and
- A regional advanced traveler information system that disseminates real-time information regarding speeds/travel times, incidents, events, construction, weather, parking availability, and transit operations. This will be done through a variety of media including dynamic message signs, highway advisory radio, commercial media, in-vehicle traveler information equipment, kiosks, imminent arrival signs, and websites.

ITS for Freeways

- Ramp meters to release entering vehicles at a steadier rate so they can merge into traffic with less disruption;
- Incident management programs, including incident detection, to minimize the amount of time that an incident disrupts traffic (subject to the needs of attending the injured and the safety of emergency workers and other travelers) and the management of traffic through and around the incident area. Freeway service (courtesy) patrols will operate along many of the region's freeways to expedite incident management;
- Probe surveillance via tracking devices installed on vehicles to collect information on travel conditions; and
- Electronic toll collection using a single device to allow users of all toll facilities and managed lanes in the region to pay without stopping.

ITS for Arterials

- Traffic signal systems that facilitate synchronization of traffic signals, operation of coordinated timing plans across jurisdictional boundaries, and monitoring of devices;
- Traffic-responsive control of traffic signal systems in select corridors instead of pre-set, time-of-day operations to better respond to real-time detected conditions;
- Transit signal priority treatments operated in corridors with high levels of bus service to help keep buses on schedule and possibly reduce scheduled transit travel time;
- Coordination of traffic signal systems with railroad grade crossings and freeway ramp meters; and

- In select corridors, the advanced traveler information system and the traffic signal system will be linked to an emergency management center so emergency vehicles can be routed around locations that could delay responsiveness.

ITS for Transit System

- 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 availability conditions;
- Electronic collection of transit fares and parking fees; and
- Parking facility management to inform transit riders of park-n-Ride lot parking space availability and alternatives.

A more detailed description of these and other ITS strategies considered appropriate for the Denver region is contained in the *Denver Regional Intelligent Transportation System Strategic Plan*. The *DRCOG Regional Transportation Operations Strategy* identifies further strategies to effectively use existing resources to coordinate day-to-day functions that improve the efficiency of travel across the region.

Pricing Strategies

Variable pricing schemes (charging higher fees during periods of highest demand) can be implemented to help manage facility demand on any:

- Tolled highway or tolled lane facility,
- Transit vehicle where the rider pays a fare, or
- Paid parking facility.

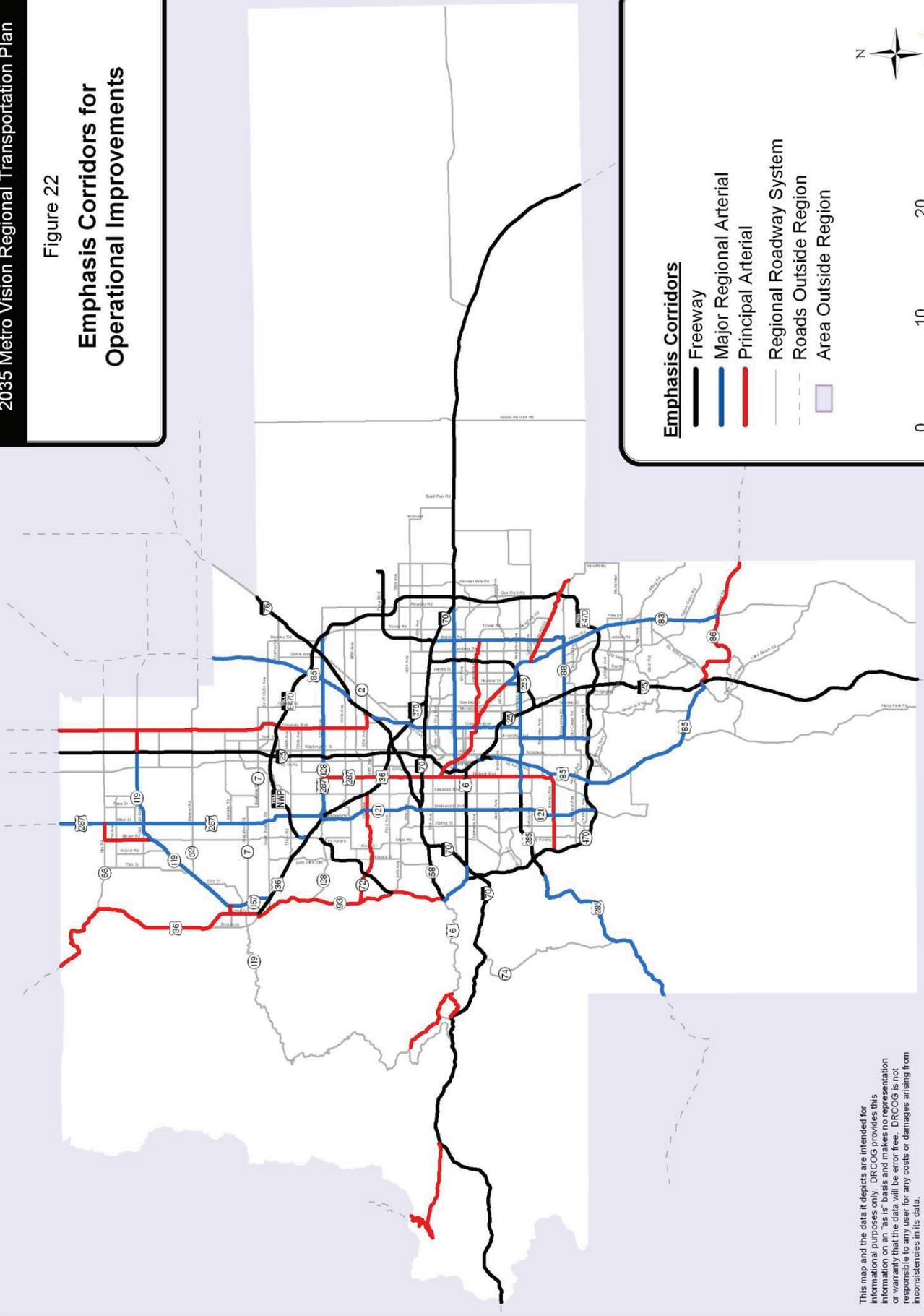
There are two methods of applying variable pricing schemes to freeway operations: time-of-day and dynamic pricing. On the I-25 Express Lanes north of downtown Denver, the pricing for single-occupant vehicles varies based on a fixed time-of-day schedule. The amount is highest during the peak periods, and the fee and the time periods can be changed at reasonable intervals. With dynamic pricing, the price charged would be based on real-time conditions (i.e. current volume or speed of vehicles using the facility). Pricing concepts or managed lanes are being considered in some ongoing environmental studies in major corridors. The regionwide policy on providing a sustainable roadway system includes exploring the potential to use variable pricing to manage demand on congested facilities along with other strategies.

Location Emphasis

Figure 22 shows the corridors of emphasis for implementing system management and operations strategies. All freeways and major regional arterials in the region are a primary emphasis. A secondary emphasis is established for a limited number of principal arterial segments based on traffic volumes, levels of congestion, linkage to freeways and major regional arterials, and identification as a rapid transit corridor or external statewide connector. Transit operational improvements and signal priority are emphasized on roadways with high levels of bus service. ITS linked to the event facilities in the Denver central business district is also a priority. Appropriate physical operational attributes and ITS infrastructure are included as integral parts of all major road construction (new road, widening, reconstruction) and rapid transit projects.

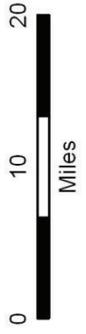
Figure 22

Emphasis Corridors for Operational Improvements



Emphasis Corridors

- Freeway
- Major Regional Arterial
- Principal Arterial
- Regional Roadway System
- Roads Outside Region
- Area Outside Region



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J. Travel Demand Management

Travel demand management (TDM) is a set of strategies to reduce the demand for motor vehicle travel, especially in the peak travel periods. TDM strategies promote and facilitate the use of alternatives to single-occupant vehicle (SOV) travel. Such alternatives include ridesharing, vanpooling, transit, bicycling and walking, as well as alternative times of travel through teleworking and alternative work schedules. They also help to ensure personal mobility options for residents of the region.

Applicable Metro Vision transportation policies and action strategies are as follows:

Travel Demand Management: Metro Vision Transportation Policies and Action Strategies

Policy #4. Management and Operations. Make the best use of existing and future transportation facilities by implementing measures that actively manage and integrate systems to optimize system performance and safety, provide accurate real-time information, reduce the demand for single-occupant motor vehicle travel, and reduce per capita Vehicle Miles Traveled (VMT).

- Implement stand-alone and project-related Travel Demand Management (TDM) strategies, including selective incentives and targeted promotions that will reduce the demand for single-occupant motor vehicle trips by informing the region's residents and businesses about alternative travel choices and encouraging their use.
- Facilitate and encourage trip and vehicle sharing and teleworking.

Policy #11. Transportation-efficient Housing and Business Developments. Design new developments within communities to allow the efficient movement of pedestrians, bicyclists, buses, and motor vehicles within, to, and through the area.

Policy # 14. Environmental Quality. Develop and maintain a sustainable transportation system that protects and enhances air quality, energy efficiency and the overall environment.

- Provide a wide variety of transportation facilities, including rapid transit, bus service, high-occupancy vehicle (HOV) lanes, and bicycle and pedestrian facilities, that are more energy efficient and less polluting in aggregate than single-occupant vehicles.

Two important overall Metro Vision goals are directly related to TDM:

- Reduce the percent of trips to work by SOV to 65 percent by 2035, and
- Reduce the regional per capita VMT by 10 percent by 2035.

The current SOV to work share is about 74 percent. The current per capita VMT is about 26 miles. The goal is to bring that value down to 23 miles per person by 2035.

TDM Background

The convenience and freedom of choice offered by traveling alone in a personal vehicle is undeniable. However, the attractiveness and perceived low cost of driving has resulted in congested roadways, increased pavement, greater pollution, and human injuries and fatalities. The infrastructure to support travel by car is well established in the region, and includes roadways, parking lots, parking garages, and gas stations. The assumption for the 2035 MVRTP is that these basic attributes will not change substantially, but that travel times will increase on many roadways as traffic congestion gets worse. Shortages of fuel could greatly reduce the demand for SOV travel, as occurred in the late 1970s, but it is unknown if that type of event will happen by 2035.

The establishment of common work hours many years ago created the Monday through Friday “rush hour” phenomenon. What used to be an hourly occurrence in the morning and afternoon has expanded to cover several hours with the majority of workers traveling by SOV. Though not the only focus of TDM efforts, work trips continue to warrant significant attention. The Denver region had one of the highest rates of persons working at home, 4.7 percent, compared to other metropolitan areas around the country. This “teleworking” phenomenon is a trend to build upon in the future.

The *Regional TDM Strategic Plan* (adopted November 2005 and currently being updated) identifies the goal of TDM efforts in the region as “reduce the demand for SOV travel either by eliminating trips, changing the mode of travel, or changing the time of day the trip is made.” The plan describes several TDM strategies that can support achieving this goal and also help people and businesses avoid or adapt to congestion.

TDM strategies fall into four general categories that are discussed in the following sections:

Promotion of Alternatives to SOV Travel

Programs to promote and facilitate alternatives to SOV travel will be implemented at three levels:

- Regional programs – TDM service providers such as the DRCOG RideArrangers Program, RTD, or VanGo Vanpool;
- Sub-area programs and activities coordinated by localized established TDM service providers (transportation management organizations (TMOs) or local governments) that include:
 - Boulder East Community Transportation Options

- Downtown Denver Partnership
 - GoBoulder
 - South I-25 Urban Corridor Transportation Management Association (Southeast Business Partnership)
 - Stapleton Transportation Management Association
 - Transportation Solutions (Cherry Creek/Colorado Boulevard/University of Denver area);
 - 36 Commuting Solutions
 - Additional TMOs which may be established in areas expected to have significant employment growth.
- Site-based programs are implemented at individual workplaces with assistance from RideArrangers or other TDM service providers. Site-based programs address the specific travel needs of employees at one work site.

Services that will be provided by some or all of the above types of programs will include:

- Carpool and vanpool matching services to assist people in finding fellow commuters that have similar travel times and destinations. Other common destinations such as schools provide opportunities for carpool matching (e.g., DRCOG's Schoolpool). Vanpool programs are most successful for longer distance travelers that have limited transit service available;
- Guaranteed Ride Home programs that provide a free taxi ride home in case of an emergency for an employee who does not drive alone to work;
- Sponsorship of events to promote non-SOV travel, such as Bike to Work Day;
- Provision of information on alternative travel choices such as transit routes, HOV lanes, flexible schedules, and parking management;
- EcoPass (transit pass) distribution and subsidies; and
- Bicycle-sharing programs that make available a fleet of uniquely identified bicycles for any person to use for travel within a designated area. These are typically run in downtown areas of cities (e.g., Denver Bike Sharing).

Of major relevance to promoting alternatives to the SOV is that the 2035 MVRTTP envisions a multimodal transportation system that provides many more choices, facilities, and services to travelers than the current system.

Promotion of Changes in Work Patterns

The following strategies will be promoted and facilitated to modify typical employee work schedules:

- Teleworking (or telecommuting) involves working at home any number of days per month to remove the need to commute to and from work. It will be promoted and facilitated by regional and sub-area programs and by individual employers; and
- Alternative work schedules, including compressed work weeks (e.g., four 10-hour days per week) and flex-time arrangements (e.g., starting work early or late to avoid peak hour travel).

Incentives to Encourage Use of Alternative Travel Modes

Some strategies will encourage the use of alternative modes of transportation by offering enticing opportunities to save money or time:

- Transit fare reduction or cash and merchandise incentive programs coordinated by TDM service providers;
- Parking management strategies that reward people who use alternative travel modes and avoid SOV commuting. One example is an employer-run parking cash-out program that allows employees the choice of a free parking space or the cash equivalent of the space. Another strategy is preferential carpool parking spaces at businesses, in private parking lots or at busy park-n-Ride lots.
- Car-sharing programs that purchase a number of automobiles to be shared among a group of people that are recruited to participate. Participants will pay a routine fee or a per use/mileage fee to use a car on selected occasions. They can save money by not having to purchase their own car and insurance. More importantly, they naturally tend to drive less than if they had their own car available at all times.
- Location-efficient mortgages that recognize when people buy houses in close proximity to transit stations and high-service bus routes, they will drive less and have more to spend on housing. Homebuyers who wish to purchase homes in designated areas will qualify for a higher mortgage loan amount.

Promote Efficient Land Development Designs

There are many types of design strategies and principles (TDM-friendly design) that can encourage people to walk, bicycle, or take transit in lieu of driving alone:

- Transit-oriented developments (TOD) established throughout the region near rapid transit stations or other high transit service locations;
- Bicycle and pedestrian connections within, to, and from developments, and 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 storage racks and lockers; and
- Urban centers.

These concepts and others are articulated in such documents as the DRCOG's *Suburban Mobility Design Manual* and *A Checklist for Designing a TDM-Friendly Development, Nonmotorized Access to Transit* and RTD's *Creating Livable Communities: A Transit-Friendly Approach*.

Locational Emphasis

TDM promotion and facilitation efforts will be offered throughout the region but concentrated in the following areas:

- Downtowns of major cities, urban centers, and high employment concentration areas;
- Along highway corridors with bus/HOV lanes;
- Adjacent to rapid transit lines/stations and high transit service locations; and
- In conjunction with major highway construction projects.

More information regarding specific TDM strategies is presented in the corridor vision plan sheets in Appendix 1.

K. System Preservation

In recognition of the considerable investment in the transportation system, preserving existing facilities is an important Metro Vision transportation policy. The transportation system naturally deteriorates due to use, time, and climate. Bridge and roadway 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 that they travel in stop-and-go conditions. Even sidewalks and multipurpose trails deteriorate through seasonal cycles. There are two action strategies related to the Metro Vision system preservation policy:

System Preservation: Metro Vision Transportation Policies and Action Strategies

Policy #1. System Preservation. Assure existing and future transportation facilities are maintained and preserved.

- Allocate transportation funds to cost-effectively maintain existing and future transportation infrastructure so as to protect the serviceability of previous investments.
- Develop and apply asset management principles and techniques for maintaining existing transportation infrastructure.

Roadway System Preservation

In 2009, about 6 percent of the region’s bridges were rated as structurally deficient and there were 89 structures in the region with a sufficiency rating below 50 (on a 100 scale). There will be about 1,184 bridges in the region more than 50 years old by 2035. Of the more than 4,077 lane-miles of state highway in the region, approximately 36 percent have a “poor” surface condition.

Over the life of the plan, major reconstruction projects are needed in most corridors of the region and the 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. 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” permanent pavement may serve as a detour while the “old” pavement is removed and replaced. The regional roadway system presented assumes that many older roadways targeted for additional through-lanes will be reconstructed coincident with adding that capacity.

The resources required to maintain and preserve the existing system will be substantial. To optimize these activities, the 2035 MVRTP embraces an asset management philosophy, comprised of two major actions--the collection of condition information (recurring over time) and the analysis of that data to optimize and prioritize actions. CDOT has generally assumed the responsibility for data collection for all roadway bridges and a management system for bridge structures on state highways. CDOT also gathers pavement condition data on state highways and National Highway System (NHS) roadways, and has developed a pavement management system. Local governments will embrace the underlying system philosophy and use these or similar tools to effectively manage their infrastructure.

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 of the 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. Continued support of ongoing vehicle maintenance and replacement programs is emphasized in the 2035 MVRTP.

Maintenance of transit operational facilities including park-n-Ride lots, rail lines, bus-only travel ways, 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-n-Ride lots, where private vehicles use the site as well as transit vehicles, deteriorating conditions affect a facility's use, and therefore transit ridership.

Pedestrian and Bicycle Facility Preservation

Communities in the Denver region have invested heavily in sidewalks and an extensive multipurpose trail system. Maintenance of these facilities is needed for the comfort, safety, and retention 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.

L. Safety

Between 2005 and 2009, an average of 210 people died per year and about 23,000 were injured per year in the Denver region from about 73,600 reported vehicle traffic crashes occurring annually. One crash occurs for every 43,000 vehicle trips and, sadly, one fatal crash occurs for every 15,400,000 vehicle trips. 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.

Applicable Metro Vision transportation policies and action strategies are as follows:

Safety: Metro Vision Transportation Policies and Action Strategies

Policy #7. Safety. Develop and maintain a safe transportation system for all users.

- Emphasize projects on existing and future facilities that will reduce the likelihood or severity of crashes involving motor vehicles, trains, bicycles, and pedestrians; and
- Support legislation aimed at cost-effectively improving the safety of drivers, passengers, pedestrians, and bicyclists.

Safety Background

Motor vehicles crashes are the most common safety concern regarding the transportation system. As discussed in the DRCOG report, *Overview of Traffic Safety in the Denver Region*, crashes injure or kill drivers, passengers, pedestrians (which include road workers, emergency responders, and stranded motorists), and bicyclists. Roadways will never be crash-free, but efforts will be made 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. Both conscious decisions and inattentive driving maneuvers lead to tragic crashes and outcomes. Law enforcement and legislative actions that address transportation safety must be evaluated and considered by regional communities and lawmakers. Examples of such actions include:

- Drunk driving laws;
- Distracted driving laws;
- New driver licensing procedures;
- Photo enforcement (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).

The benefits of facility improvements that directly or indirectly improve safety must not be undervalued. The 2035 MVRTP strives to reduce and minimize the risk of crashes occurring on the system, and encourages the integrated consideration of roadway, vehicle, and driver elements in a system perspective.

Safety Goals

CDOT's *Strategic Plan for Improving Roadway Safety (2005)* contains short-term statewide goals related to safety measures in several different categories. The statewide goal to reduce the rate of fatal crashes to 1.0 per 100 million VMT was incorporated in the original 2035 MVRTP as Denver region goals. Since 2005 the rate had actually decreased to 0.68 by 2009. The goal was achieved due to a significant decrease in the number of fatal crashes (from 225 to 147 in 2009). Therefore, a revised goal to decrease the fatal crash rate to 0.60 per 100 million VMT has been established. A second goal is to reduce the rate of injury crashes to 55 per 100 million VMT (65.0 in 2005).

Safety Improvements

DRCOG, CDOT, and local governments routinely analyze annual crash data to identify roadways and intersections with a high number or rate of crashes. Stand-alone safety projects will be identified and implemented, but many physical safety improvements will be built as a component of a larger project. The design of such larger-scale capital, operational, and reconstruction projects will thoroughly consider safety implications and incorporate appropriate features and actions. Design engineers first consider the location, quantity, types, and causes of crashes. These factors, along with measures of possible reductions in the number or severity of crashes, determine the safety improvements to provide.

Safety will be given due consideration during the development of Transportation Improvement Programs. Projects on roadway segments with higher than average crash experience and a greater likelihood of improvement will be given attention.

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/departing traffic;
- Constructing hill-climbing lanes for slow-moving vehicles, especially in the mountainous area;
- Constructing pedestrian over- and underpasses;
- Installing fencing along high-activity railroad and light rail lines;
- Improving sight distances at intersections; and

- Removing fixed objects adjacent to travelways or providing proper protection.

Transportation facilities must be well maintained to preserve good safety performance. The following are key maintenance activities:

- Repainting pavement and crosswalk markings and replacing non-reflective signs;
- Removing debris along roadways, sidewalks, and multipurpose trails;
- Mitigating existing and potential future rockfalls 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.

M. Security

Residents and visitors will not be afraid to travel in the Denver region. Applicable Metro Vision transportation policies and action strategies are as follows:

Security: Metro Vision Transportation Policies and Action Strategies

Policy #8: Security. Develop and maintain a transportation system that provides increased security for all users.

- 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 elements of the Transportation Systems Sector-Specific Plan (SSP) of the National Infrastructure Protection Plan (NIPP); and
- Develop and implement projects and strategies that enhance security of transportation facilities and users including air and transit passengers, and aid in the efficient movement of people and vehicles during homeland security events.

Security Background

Security for the transportation system and its users involves numerous federal, state, regional, and local agencies. In this region, security is included in emergency management planning, which is coordinated by the public safety community. Key agencies include:

- U.S. Department of Homeland Security (DHS)
- Federal Emergency Management Agency (FEMA)
 - National Incident Management System
- Governor’s Office of Homeland Security
 - Homeland Security and All-Hazards Senior Advisory Committee
- Colorado Department of Local Affairs
 - Division of Emergency Management
 - Colorado North Central All-Hazards Region (also coordinates Homeland Security)
 - Critical Infrastructure Committee
 - Communications Committee
 - Evacuation Committee
 - Traffic Management Subcommittee
 - Shelter and Special Needs Subcommittees
 - Colorado Northeast All-Hazards Region (also coordinates Homeland Security)
- Colorado Department of Public Safety
 - Colorado State Patrol
 - Office of Preparedness, Security, and Fire Safety
 - Colorado Information Analysis Center
- Colorado Department of Transportation
- County Emergency Managers
- Denver Urban Area Security Initiative (UASI)

Emergency management planning is generally subdivided into four phases: preparedness, prevention, response, and recovery. The transportation system is recognized as a critical resource that must be available to assist emergency response and recovery; therefore, the transportation community also has a role to assist in preparedness and prevention as it pertains to protecting the transportation system. Several aspects of security incidents must be planned for such as prevention measures, response plans, coordination and communication protocols, monitoring, and information distribution.

Security Improvements

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

- Coordination between regional transportation planning and regional homeland security planning groups;
- Annual regional vulnerability assessment to identify critical transportation system infrastructure;

- Coordination with public safety agencies to define and implement critical infrastructure protection requirements, such as:
 - Security cameras on buses and at park-n-Ride lots, transit stations, and major bus stops;
 - Security cameras and other sensors on critical roadway infrastructure;
 - Patrolling of roadways, transit facilities, and airports by law enforcement and private security personnel;
 - Inspection of trucks and railroad tracks; and
 - Screening and security measures at airports.
- Day-to-day cooperation with the Colorado Information Analysis Center;
- In support of emergency management response and recovery, operate and maintain ITS mechanisms to:
 - Monitor roadway and traffic conditions and implement traffic flow adjustments;
 - Distribute information, as directed, through strategically-located dynamic message signs, highway advisory radio and other means to assist incident commanders in the direction of traffic in an emergency.

N. 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.

Applicable Metro Vision transportation policies and action strategies are as follows:

Aviation: Metro Vision Transportation Policies and Action Strategies

Policy #8: Security. Develop and maintain a transportation system that provides increased security for all users.

- Coordinate with federal, state, regional and local agencies to implement elements of the Transportation Systems Sector-Specific Plan (SSP) of the National Infrastructure Protection Plan (NIPP); and
- Develop and implement projects and strategies that enhance security of transportation facilities and users including air and transit passengers, and aid in the efficient movement of people and vehicles during homeland security events.

Policy #10. Interconnections. Provide efficient interconnection of the transportation system within modes, between different modes, and between the metropolitan area and the rest of the state and nation.

- Ensure convenient access to Denver International Airport (DIA) for all modes of travel, and maintain DIA's important role in connecting the Denver region to the rest of the nation.

- Maintain the capacity of DIA and support the provision of capacity enhancements in response to air transportation demands, consistent with original DIA development plans.
- Support actions to maintain and incrementally improve regional general aviation airport capacity.

Policy #12. Land Use Integration. Implement transportation system components that support Metro Vision’s urban growth boundary/area, urban centers, open space, and associated concepts.

- **Encourage decision makers** to consider mutual effects of airport operations, off-airport activities, and neighboring land uses on each other.

Aviation Background

The *2005 Colorado Aviation System Plan (CASP)*, prepared by the Colorado Division of Aeronautics, covers the state’s system of airports including those in the Denver region except for Denver International Airport, and serves as a partial basis for the aviation element of the 2035 MVRTP. Aviation is discussed in this chapter in terms of four airport categories: air carrier, military, reliever, and general aviation. Air carrier airports offer scheduled passenger service. Military airports support the aviation activity of the various branches of the U.S. Department of Defense. Reliever airports are designated by the Federal Aviation Administration (FAA) to alleviate congestion at commercial airports. Though general aviation activities may occur at all airports, airports are only classified as general aviation if they are not already classified in any of the other categories.

Regional Airport System

The existing public airports will serve the region in the future. No additional airports are formally proposed. The region’s 2035 airport system is composed of one air carrier, one military, four reliever, and two general aviation airports (see Figure 23).

Denver International Airport (DIA) services airlines providing scheduled passenger service as well as cargo service. DIA is designed to accommodate aircraft of greater than 75,000 pounds gross weight. DIA’s airfield pavement design aircraft is the B747-400, which has a maximum gross takeoff weight of 850,000 pounds. As discussed in Chapter 4, Section G, passenger activity at DIA is expected to more than double by 2035. Air cargo activity is forecast to nearly double by 2035.

The region’s only military airport is Buckley Air Force Base (AFB). Buckley AFB supports flights for the Air National Guard and Army National Guard, including the 22 fighter jets and 50 helicopters based there.

The region’s relievers are Centennial, Erie Municipal, Front Range, and Rocky Mountain Metropolitan (formerly Jefferson County) airports. Centennial, Front Range and Rocky Mountain

Metropolitan airports provide most of the region's corporate air traffic capacity. The three airports currently have runways designed to accommodate aircraft weighing between 12,500 and 75,000 pounds gross weight. Erie Municipal's runway is designed to accommodate aircraft weighing 12,500 pounds.

Boulder Municipal and Vance Brand are the general aviation airports of the region. Boulder Municipal Airport can accommodate aircraft weighing up to 16,000 pounds gross weight and Vance Brand Airport can accommodate aircraft weighing up to 30,000 pounds gross weight. Boulder Municipal Airport will continue to accommodate the majority of the soaring (glider) activity in the metropolitan area.

To accommodate peak-period traffic, airports are normally considered for capacity expansion when they reach 60 percent of design operational capacity. Two of the region's airports are forecast to reach this milestone by 2025. The 2005 CASP reports that, in 2025, Rocky Mountain Metropolitan is expected to be at 88 percent of capacity and Centennial will be operating at 86 percent of capacity.

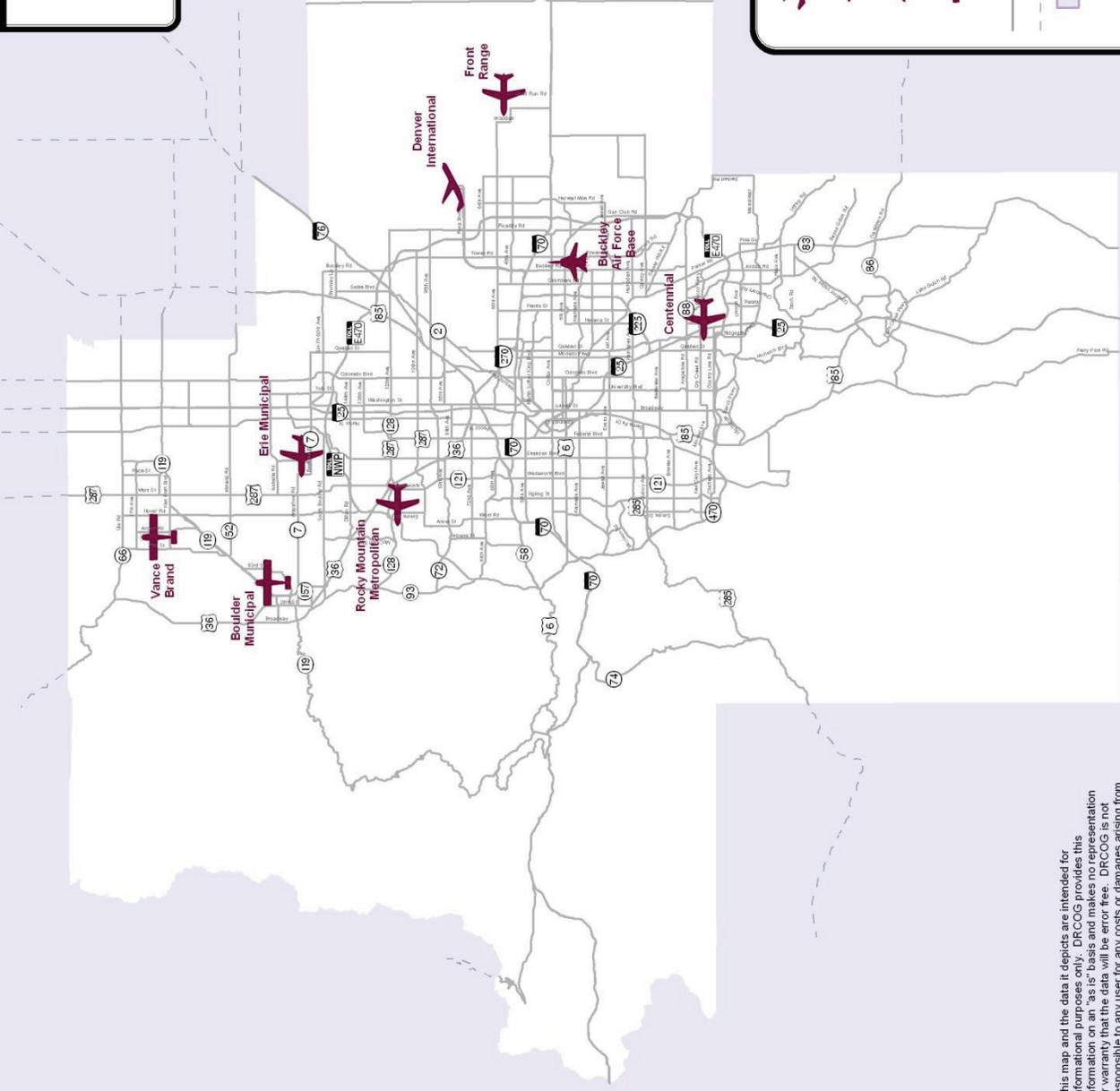
Centennial Airport is currently operating at 66 percent of capacity. It is the third-busiest general aviation airport in the country. Due to availability of land and compatible land use issues, expansion projects at Centennial are extremely unlikely in the foreseeable future. For this reason, the 2005 CASP proposed the consideration of a new utility airport in the south or southeast metro area to relieve Centennial of some of its light general aviation traffic. If a public entity can be identified to sponsor the development of a new airport, such a facility could help Centennial accommodate the forecast growth in corporate aircraft traffic. However, a new airport is not included in the DRCOG region in the 2035 MVRTP.

While Rocky Mountain Metropolitan is forecast to exceed 60 percent of capacity, expansion is unlikely due to availability of land and compatible land use constraints. Boulder Municipal, Erie Municipal, and Vance Brand airports are expected to operate at less than 50 percent of capacity in 2025, and will, therefore, likely be in a position to accept any light general aviation traffic that might be displaced from Rocky Mountain Metropolitan Airport in the future due to excessive delays.

Air cargo is an important growing activity at DIA. Additional air cargo handling capacity will likely be required before 2035. The likely location for most expansion will be either at DIA and/or Front Range Airport with limited expansion of the type of current services at Rocky Mountain Metropolitan Airport.

Figure 23

Airports Serving the Denver Region



This map and the data it depicts are intended for informational purposes only. DRCOG provides this information on an "as is" basis and makes no representation or warranty that the data will be error free. DRCOG is not responsible to any user for any costs or damages arising from inconsistencies in its data.
 Source: DRCOG
 Projection: Colorado State Plane, NAD 83
 FJ 08/07
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Most of the public airports will require expansion of their facilities to keep up with demand and repairs to infrastructure to maintain basic facilities. Several key capital improvements have been identified within the 2035 planning period for each of the airports:

- Denver International Airport
 - Construct up to four new runways and associated parallel taxiways
 - Extend taxiways
 - Upgrade facilities to permit handling larger aircraft (taxiways and gates)
 - Construct deicing pads
 - Expand concourses and gates
 - Improve/expand terminal, automated guideway transit system and baggage handling
 - Construct commuter rail station
 - Expand parking and widen airport roads
 - Expand cargo and support facilities.
- Boulder Municipal Airport
 - Construct service road
 - Rehabilitate runway, taxiway, and ramp
- Centennial Airport
 - Acquire land for approaches
 - Rehabilitate runways, taxiways, and adjacent surface pavement areas
 - Construct new taxiways
 - Construct de-icing pad
 - Pave runway shoulders
- Erie Municipal Airport
 - Rehabilitate runway lighting system
 - Install taxiway lighting
 - Update airport master plan
 - Construct hangar
- Front Range Airport
 - Extend and strengthen Runway 8/26
 - Relocate self-fuel storage facility and expand fuel farm
 - Upgrade instrument landing system equipment
 - Rehabilitate taxiways, ramps, and aprons
 - Construct perimeter road
 - Improve lighting for Taxiway A

- Rocky Mountain Metropolitan Airport
 - Overlay and widen Runway 11R/29L
 - Overlay and rehabilitate taxiways and other runways
 - Realign Airport Road
 - Update Airport Master Plan
- Vance Brand (Longmont) Airport
 - Improve taxiway
 - Reconstruct airport entrance road
 - Rehabilitate airfield lighting
 - Update Airport Master Plan

Airports and the Environment

Environmental concerns that can affect airport planning activities are primarily in three areas: noise, water quality, and air quality. Perceived noise impact in areas around airports is typically at the root of local opposition to any airport expansion to meet growing demand. To help reduce perceived and actual aircraft noise impacts in the region, airports should work with the Federal Aviation Administration to develop and implement noise abatement policies and preferential runway programs where possible. Of major importance is the need for airport compatible land use policies in the areas that are potentially affected by airport operations. Local governments need to develop and implement such land use policies that protect the existing airport investment. The DRCOG publication, *Airport Compatible Land Use Design Handbook*, provides some guidelines.

Of the regulated air pollutants, the Colorado PM₁₀ and Carbon Monoxide SIPs indicate that aircraft contribute to carbon monoxide and nitrogen oxides (NO_x) emissions. According to those SIPs, aircraft contributed an estimated 3.5 percent of the region's total NO_x, and less than 1 percent of the region's total carbon monoxide in 2007. Aircraft also create PM₁₀, SO₂, and VOC emissions. The Clean Air Act mandates that jet engine manufacturers meet emissions standards for smoke and hydrocarbons, but tests are not required for carbon monoxide or NO_x. Aircraft piston engine emissions are not currently regulated for any pollutants, and standards are not anticipated due to the relatively low emission levels from this source.