

DRCOG Metro Vision Regional Transportation Plan Freight & Goods Movement Component

DRAFT for TAC Review: November 18, 2015

A. Introduction

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, 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 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

B. Freight Background

Freight represents any physical goods, parcels, raw materials, or finished products that are transported from one place to another. For the MVRTP, the focus is on surface freight transportation modes and facilities – highways, streets, rail, and multimodal terminals. (The aviation section of the MVRTP addresses aviation-related freight issues.) Examples of freight movement types 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/market”);
- 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 even food trucks.

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 via I-70, US-40, and US-287.

C. MAP-21 Freight Requirements and Guidance

MAP-21 includes a number of provisions to improve the condition and performance of the transportation system to enhance the movement of freight and support investment in freight-related surface transportation projects.

MAP-21 establishes a national freight policy and associated goals — *“to improve the condition and performance of the national freight network to ensure that the network provides the foundation for the United States to compete in the global economy and achieve each [of the following] goals...”* —

- To invest in infrastructure improvements and implement operational improvements that:
 - Strengthen the contribution of the national freight network to the economic competitiveness of the United States;
 - Reduce congestion, and
 - Increase productivity, particularly for domestic industries and businesses that create high value jobs.
- To improve the safety, security, and resilience of freight transportation;
- To improve the state of good repair of the national freight network;
- To use advanced technology to improve the safety and efficiency of the national freight network;
- To incorporate concepts of performance, innovation, competition, and accountability into the operation and maintenance of the national freight network;
- To improve the economic efficiency of the national freight network, and
- To reduce the environmental impacts of freight movement on the national freight network.

MAP-21 also encourages state DOTs to develop a state freight plan. CDOT completed the State Highway Freight Plan in 2014. It is the first phase of CDOT's overall multimodal freight planning efforts. Finally, MAP-21 will also require DRCOG, in coordination with CDOT, to develop and report on freight-related performance-based planning targets and measures.

DRCOG's freight planning efforts are also designed to address MAP-21's transportation planning factors, specifically:

- 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.

D. Current Freight Planning Efforts & Stakeholder Input

CDOT is developing its state freight plan in two phases. The MAP-21-compliant State Highway Freight Plan completed in 2014 was the first phase. The second phase will develop an integrated freight plan that incorporates rail and aviation freight modes. CDOT has convened a Freight Advisory Council to do so, which includes DRCOG.

DRCOG is conducting a commercial vehicle survey to provide data for its regional travel forecasting model, FOCUS. The survey is being conducted in partnership with CDOT and other Front Range MPOs to increase understanding of how commercial vehicles of all types affect travel and traffic patterns in the Front Range.

1. 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)

2. Key Concerns from Stakeholders

DRCOG has also received significant feedback from freight stakeholders over the years; this feedback has consistently emphasized the following concerns:

- The level of congestion on the road system slows truck operations and increases the cost of moving freight. Ultimately, the consumer pays higher prices for goods and services. (see Figure 1, pg. 6)
- One impact of increased roadway congestion may be more truck traffic on the roads during peak periods with smaller payloads. 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 has safety issues at rail-highway crossings.
- Many of the older roadways present problems in 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 radius on the surface streets were tighter for smaller trucks or reduced as lanes added within existing rights-of-way. Many long haul operations now use two (tandem) or even three (triple) trailer combinations. The turning movements, especially, take more space than was designed into many existing roads.
- Many of the bridges cannot handle the larger freight loads. Bridges with weight limits create out-of-direction travel, 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.
- The increase in truck traffic has overloaded the rest area spaces for parking trucks while in-route. Many truckers are stopping anywhere, including the side of the road.
- According to the Colorado Motor Carriers Association, local governments and freight customer rules affect the times deliveries and pickups can be made. This has an effect on 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 latter adds to congestion during the peak periods. Some of this can be seen as more trucks on the road with partial loads.



- Shortages of qualified commercial vehicle/truck drivers in the labor force.
- Poor roadway conditions, such as pavement, markings, and others.
- Another important freight issue is 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 (TPR)

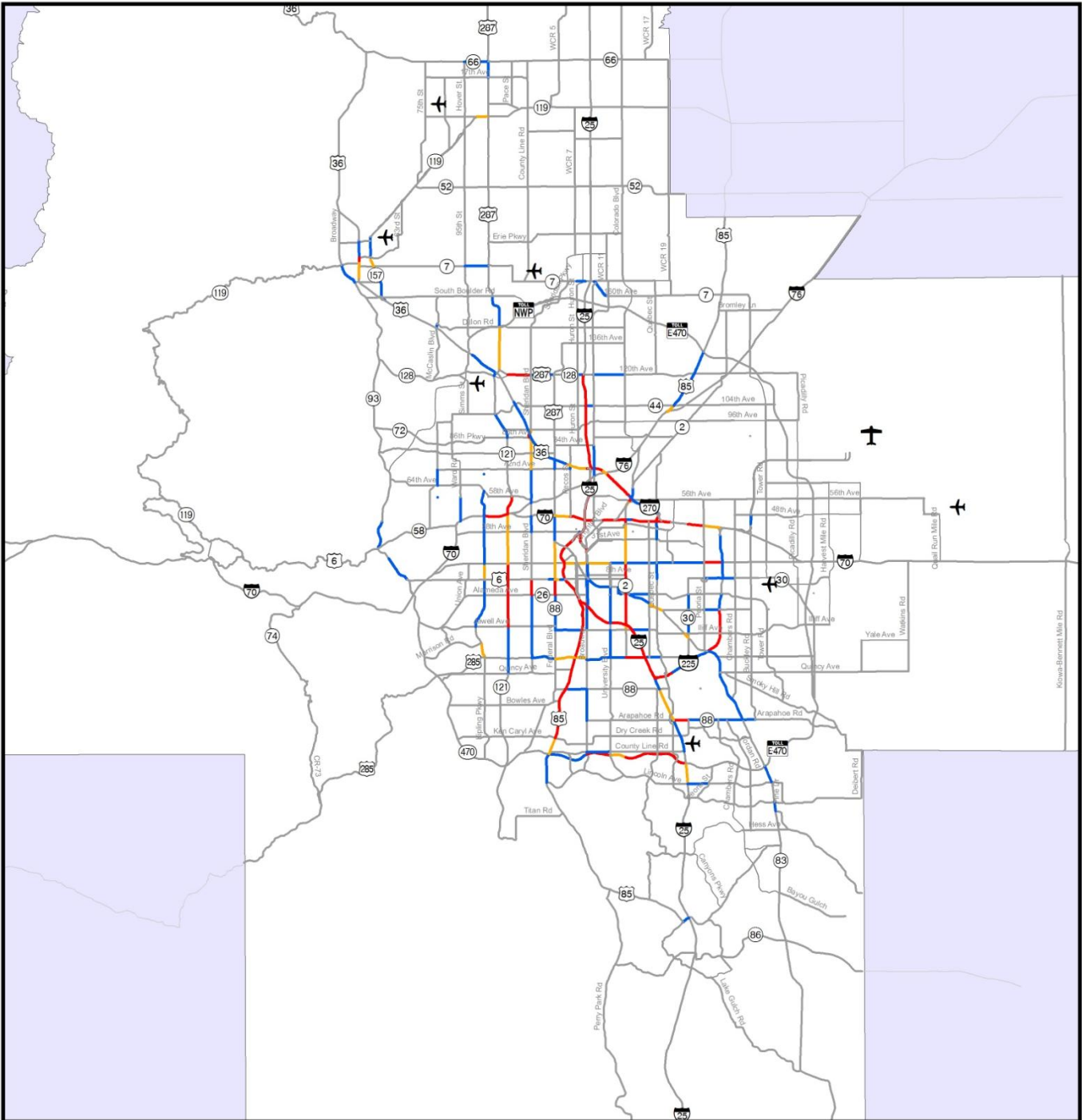
Telephone Town Halls and TPR meetings included:

- 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.
- Multi-state 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 is vital to regional businesses to bring in shipments of important goods and enable client and employee travel.
- TPRs and MPOs could facilitate the creation of more or improved freight multimodal transfer points (train/truck, truck/train, and truck/plane).
- Truck freight is very sensitive to consumer demand and economic activities.
- Mitigation of impacts of freight movement on communities and highways is needed, particularly because freight movement is increasing and trucks are getting larger, and hauling heavier loads.

3. Other Activities

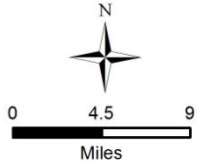
DRCOG also addresses freight in its Congestion Mitigation Program (CMP). For example, the *2012 Annual Report on Traffic Congestion in the Denver Region* contains a section analyzing the cost of congestion to commercial vehicles, mitigation strategies, and other data. It also includes the following map (Figure 1) identifying 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
2014 Locations with Highest Congestion Costs to Freight/Businesses



LEGEND

- Daily Cost / Mile**
- < \$1,000
 - \$1,000 - \$2,000
 - \$2,000 - \$3,000
 - > \$3,000



SOURCE DATA:
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Projection: State Plane Colorado Central, NAD 83 (feet)

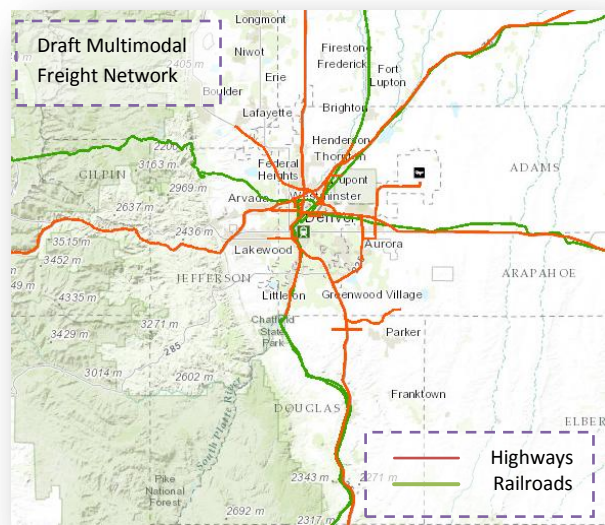
E. Freight Network & Facilities

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. It is important to remember that every single street is part of the freight network, from long-haul trucking on interstate highways to residential deliveries on local streets.

From the national perspective, MAP-21 directed US DOT to establish a national freight network consisting of the National Highway System, freight intermodal connectors, and aerotropolis (airport-related) facilities. More specifically, the national freight network will include the Primary Freight Network (PFN), non-PFN portions of the interstate highways system, and critical rural freight corridors. The PFN in turn consists of the 27,000 highway centerline miles that are most critical to freight movement.

In October 2015, US DOT released the draft National Freight Strategic Plan for public and stakeholder review. The draft plan notes US DOT's "efforts to incorporate all of the criteria required of the PFN by MAP-21 did not yield a network that could comprehensively represent the most critical elements of [the] national freight system..." For this reason, the draft plan identifies a proposed national Multimodal Freight Network (MFN) consisting of the highest volume freight routes and facilities for highways, railroads, airports, waterways, and pipelines. An interactive map of the proposed PFN is accessible here: www.transportation.gov/freight/MFN.

In the DRCOG region, the proposed MFN includes the interstate highways, Pena Boulevard and Denver International Airport, and portions of US-85, US-6, US-36, and E-470. It also includes the multimodal freight facilities and terminals and the portions of arterial roadways that connect to them, such as 80th Avenue, Brighton Road, 88th Avenue, Pecos Street, and Broadway. Finally, it also includes portions of East 6th Avenue in Aurora and Lincoln Road in Lone Tree.



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

CDOT also developed the State Freight and Passenger Rail Plan in 2012 to meet the requirements of the federal Passenger Rail Improvement and Investment 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 illustrative rail system improvement needs were also identified in the plan.



Credit: natsn.com



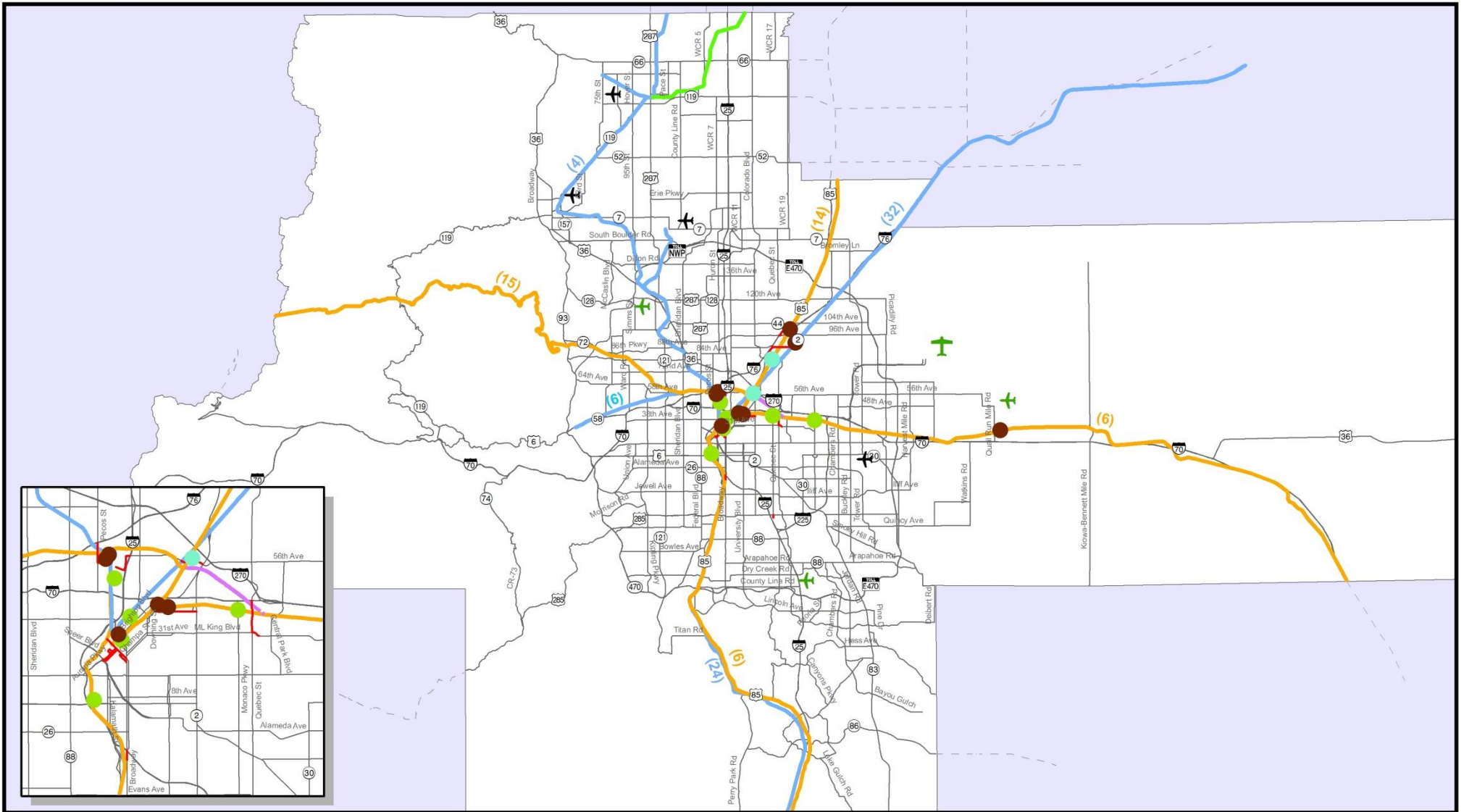
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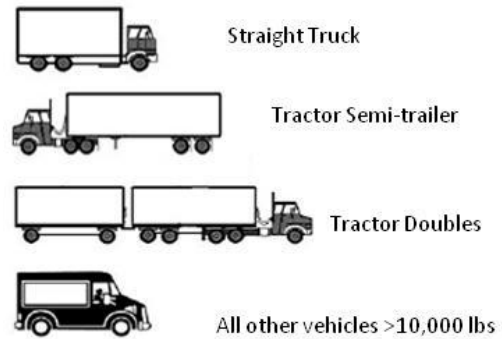
- Union Pacific Railway
- BNSF Railway
- Great Western Railroad
- Denver Rock Island Railroad
- (#)** Approximate Number of Trains Per Day (2004)
- National Highway System Connectors
- Rail-Truck Transfer Facility
- Pipeline Terminal
- Rail Yard
- ✈ Air Cargo Operation



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1. 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 F350 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 on Figure 8 and provide connections to major multimodal terminals such as airports, rail terminals, truck terminals, pipeline terminals, Park-n-Ride lots, bus terminals, and bus stations.

Regulatory and 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 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—criminal background checks, facility security plans, updating of hazardous material placards on trucks;
- Bridge clearance and associated lane weaving;
- 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 (the maximum length of a work shift) and CDOT road closures. For example, if CDOT has a

wintertime closure in the I-70 mountain corridor, a long-haul trucker cannot extend his work shift to accommodate the time delay from that closure. This type of situation has incident management implications – one illustration of the interconnectedness of the various facets of freight movement.

2. Commercial Vehicle Volumes

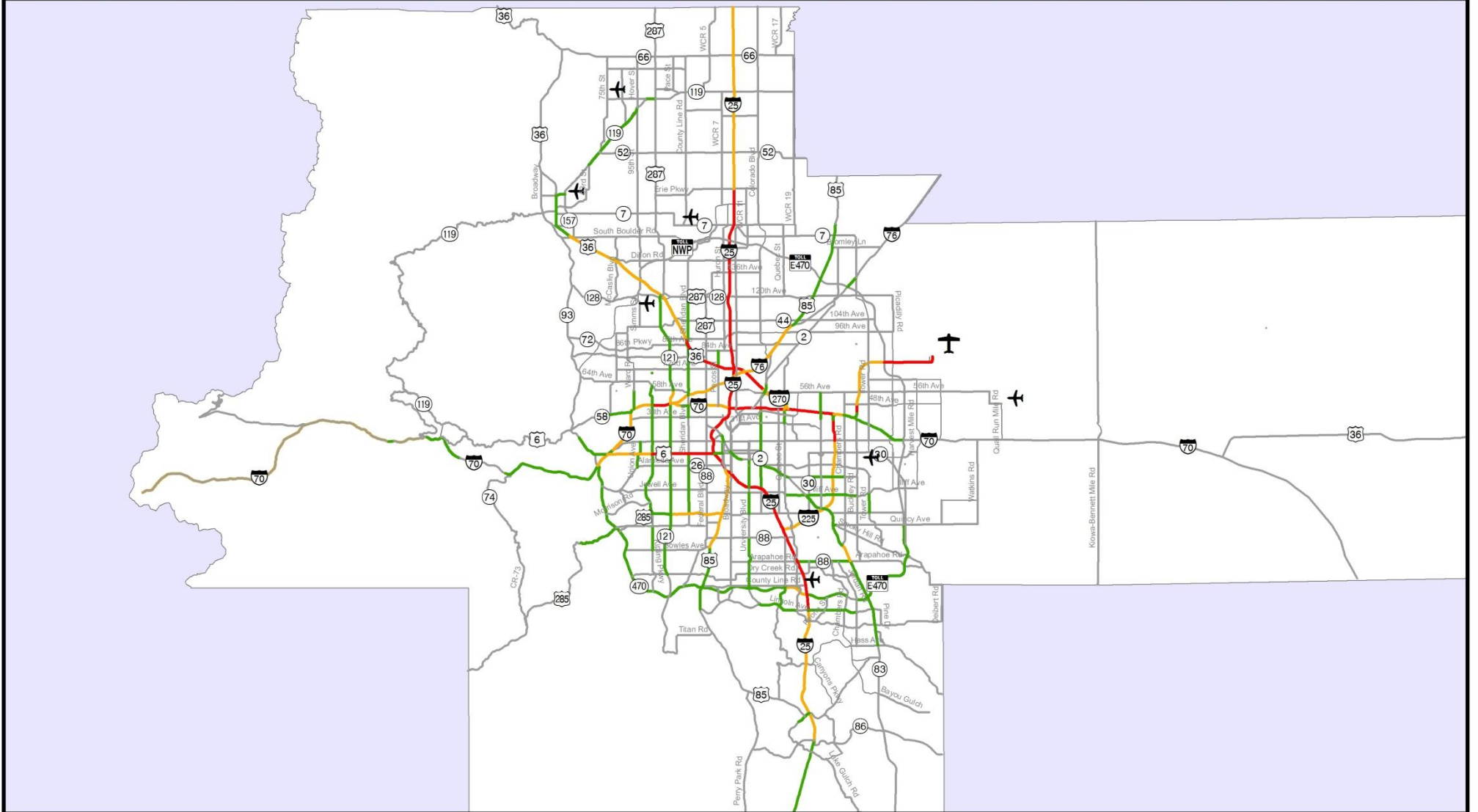
Figures 3 and 4 show 2014 and 2040 forecasted commercial vehicle volumes on the region’s major roadways and highways. These data are from DRCOG’s *2014 Annual Report on Traffic Congestion in the Denver Region*. As expected, the region’s interstates and freeways have the highest volumes of commercial 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 key way commercial vehicles affect our daily lives is in the delivery of packages. The accompanying graphics 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 in the Midwest 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 based on the 1.5 days of transit time. Both packages were then sorted and routed very early the next morning for delivery later that day. This illustrates the multimodal nature of goods movement, logistical complexities, and the importance of reliable travel and delivery times.

Location	Date	Local Time	Activity
DENVER, CO, US	10/29/2015	3:39 P.M.	Delivered
Commerce City, CO, United States	10/29/2015	5:22 A.M.	Out For Delivery
	10/29/2015	12:45 A.M.	Arrival Scan
Hodgkins, IL, United States	10/27/2015	5:18 P.M.	Departure Scan
Hodgkins, IL, United States	10/26/2015	10:32 P.M.	Arrival Scan
Shepherdsville, KY, United States	10/26/2015	6:00 P.M.	Departure Scan
	10/26/2015	5:23 P.M.	Origin Scan
United States	10/26/2015	7:41 P.M.	Order Processed: Ready for UPS

Latest update: Wednesday, Nov 4	
2:42 PM	Package was delivered in office The delivery was signed by: SANDI Lakewood, CO, US
1:25 AM	Out for delivery Commerce City, CO, US
1:04 AM	Package received by carrier Commerce City, CO, US
Tuesday, Nov 3	
10:30 PM	Package arrived at a carrier facility Commerce City, CO, US
Monday, Nov 2	
3:41 PM	Package has left the carrier facility Hodgkins, IL, US
3:28 AM	Package arrived at a carrier facility Hodgkins, IL, US
1:12 AM	Package has left the carrier facility Indianapolis, IN, US
Friday, Oct 30	
10:10 PM	Package received by carrier Indianapolis, IN, US
5:04 PM	Package received by carrier Plainfield, IN, US
2:03 PM	Package has left seller facility and is in transit to carrier Plainfield, IN, US



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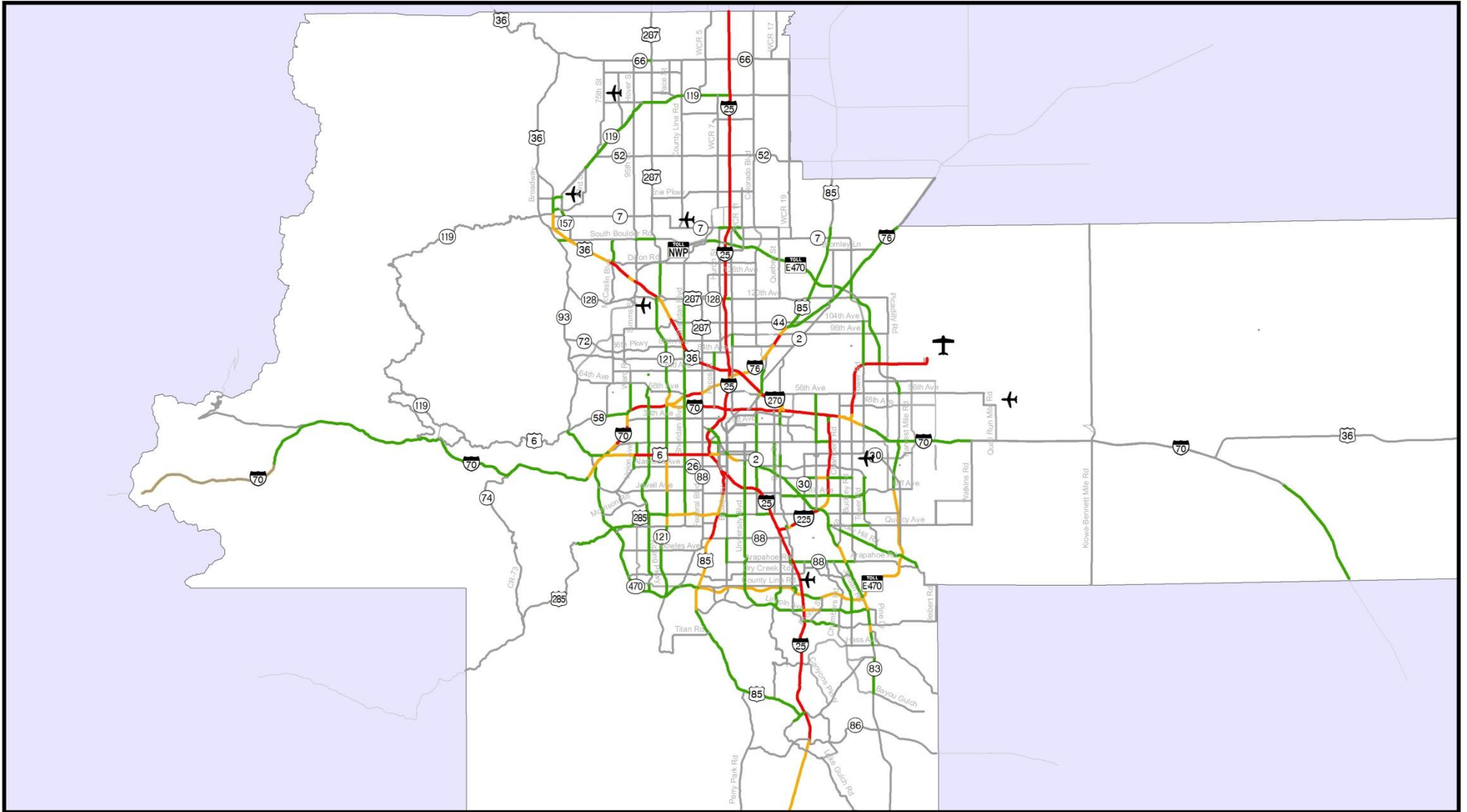
2014 Commercial Vehicle Volumes per Day

- < 5,000
- 5,000 - 10,000
- 10,000 - 15,000
- >15,000



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 Projection: State Plane Colorado Central, NAD 83 (feet)



LEGEND

2040 Commercial Vehicle Volumes per Day

- < 5,000
- 5,000 - 10,000
- 10,000 - 15,000
- > 15,000



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3. Crash/Safety

During the most recent three-year period available (2010-2012), there were 6,800 crashes involving trucks in the Denver region, resulting in 159 serious injuries and 34 fatalities (Table 1). Truck-involved crashes made up about four percent of all crashes and three percent of serious injuries, but seven



percent of all fatalities. Between 2010

and 2012, truck-involved crashes

increased nine percent, while total crashes increased only three percent.

Serious injuries in truck-involved crashes increased 68 percent, while

total serious injuries increased nine

percent. Finally, between 2010 and

2012, fatalities in truck-involved crashes decreased 23 percent compared to a six

percent increase in total fatalities. It is

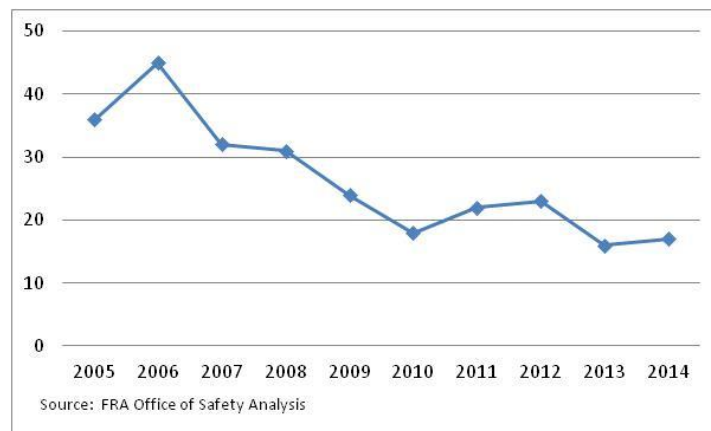
important to note crash-related statistics can vary considerably from year to year, and comparing truck-involved crash trends can be difficult because they make up such a small proportion of total crashes.

Table 1: Comparison of Truck and Total Crashes (2010-2012)

	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	

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 FRA data does not break out fatalities or injuries, it does include 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); RTD rail lines were involved in a single crash during the four-year period.

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



4. 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. Figure 6 (FHWA) illustrates freight flows by highways, railroads, and waterways for 2010. While 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.

Figure 6: 2010 Freight Flows by Highway, Railroad, and Waterway



Sources: Highways: U.S. Department of Transportation, Federal Highway Administration, *Freight Analysis Framework*, Version 3.4, 2013; Rail: Based on Surface Transportation Board, *Annual Carload Waybill Sample* and rail freight flow assignments done by Oak Ridge National Laboratory; Inland Waterways: U.S. Army Corps of Engineers, Institute of Water Resources, *Annual Vessel Operating Activity and Lock Performance Monitoring System* data, 2013.

Freight rail traffic in the Denver metropolitan region is dominated 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 8 along with switching yards, multimodal terminals, and major transfer facilities.

The BNSF railroad's principal line through the Denver region runs north-south carrying the majority of 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. RTD 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).

5. Major Multimodal Terminals

Figure 2 shows the location of the current UP and BNSF multimodal rail-truck transfer facilities. They are also listed in Table 2 below. 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. The National Highway System also includes the following [intermodal connectors](#) in the Denver region:

- RTD Transit Stations: Broadway LRT station, Broomfield Park-n-Ride, Civic Center Station, Denver Union Station (Amtrak), Southmoor Park-n-Ride, Stapleton (now 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: Burlington Northern Railroad Auto/Railroad Transfer Facilities, Southern Pacific Railroad Transfer Facility, Union Pacific Railroad Auto/Railroad Transfer Facilities
- Pipeline Facilities: Conoco Pipeline Transfer, Kanab Pipeline Transfer, Phillips Pipeline, Total Petroleum Pipeline Terminal
- Other Facilities: Denver International Airport, Denver Greyhound Bus Station

Table 2: Existing Multimodal Freight Facilities

Name	Location	Type
Conoco Pipeline Transfer	56 th Ave. and Brighton Rd.	Pipeline Terminal
Kanab Pipeline Transfer	80 th Ave. and W. of SH-2	Pipeline Terminal
BNSF Rennicks Yard	53 rd Ave. and Bannock St.	Rail Yard
BNSF 31 st St. Yard	Globeville Rd. and 38 th St.	Rail Yard
UP Burham (4 th Ave.) Yard	800 Seminole Rd.	Rail Yard
UP Monaco	Smith Rd. and Monaco Pkwy.	Rail Yard
UP Roydale	Smith Rd. and Peoria St.	Rail Yard
UP 36th St. Yard	Wazee St.	Rail Yard
BNSF Big Lift	SH-85 and Louviers Ave.	Rail-Truck Transfer Facility
UP North Yard	901 W. 48 th Ave.	Rail-Truck Transfer Facility
BNSF TOFC Yard	Pecos St. and 56 th Ave.	Rail-Truck Transfer Facility
UP Rolla Auto Transfer	96 th Ave. and US-85	Rail-Truck Transfer Facility
UP 40 th St. Yard	40th Ave. and York St.	Rail-Truck Transfer Facility
BNSF Irondale Auto Transfer	SH-2 and 88 th Ave.	Rail-Truck Transfer Facility
UP Pullman Yard	N. of 40 th Ave. and SE of Brighton Blvd.	Rail-Truck Transfer Facility
BNSF Locomotive Shops	Park Ave., Delgany, and S. Platte River	Rail-Truck Transfer Facility

The appendix contains two “concept examples” of aerial photographs showing multimodal terminals and the major roadway connectors providing access to them. These examples illustrate where these multimodal terminals are located in relation to the region’s multimodal transportation network.

6. Air Cargo

Air cargo activity to and from Denver has grown dramatically over the past 25 years. According to [DIA’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 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 in the future. DIA handles thousands of packages and containers per day, with much smaller levels at Centennial, Rocky Mountain Metropolitan, and Front Range Airports. The aviation section contains more detailed information about the region's airport operations and future implications.

7. 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. Colorado's only oil refinery is located in Commerce City near I-270. Natural gas is used to generate electricity for homes (heating and cooking) and businesses. Colorado requires investor-owned utilities to obtain 30 percent of their electricity from renewable sources. Pipeline transfer facilities are shown in Figure 2.

8. At-Grade Arterial Railroad Crossings

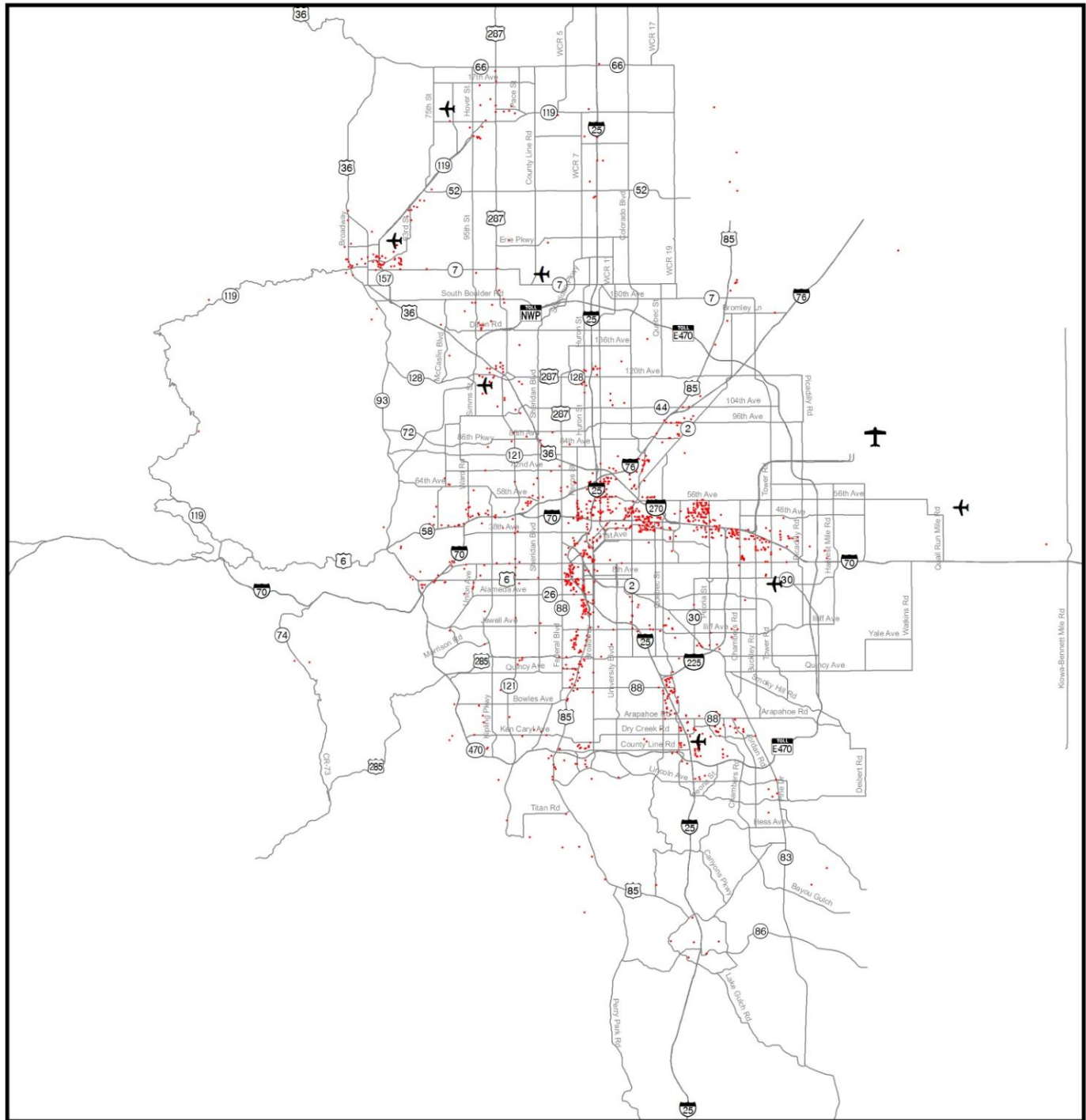
Over 500 at-grade intersections exist between the rail system and the roadway system in the Denver metropolitan region. Many of these at-grade crossings are found north of the I-70 corridor in predominately industrial and warehouse areas. At-grade crossings can pose safety concerns as well as problems 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 7.

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. In recent years, the region has converted several at-grade crossings into grade-separated ones, such as the UP at Wadsworth Bypass/Grandview Avenue, the UP At Pecos Street, the UP/RTD East Rail at Peoria Street, and others.

9. Warehousing

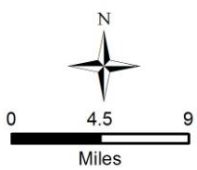
The Denver region is the hub of the state for warehousing and distribution activities. National Quarterly Census of Employment and Wages (QCEW) data shows almost 3,000 firms (with at least 10 employees) are engaged in wholesale trade and warehousing activities in the Denver region. Figure 8 shows the locations and concentrations of wholesale trade and warehousing firms in the Denver region based on the same data, which uses national NAICS employment category codes.

Figure 8
Locations of Wholesale Trade & Warehousing Firms



LEGEND

Wholesale Trade and Warehousing Establishments ●
(More than 10 employees)



SOURCE DATA:
Enter all data sources here, included base map information.
This data is intended for informational purposes only. DRCOG provides this information on an "as is" basis and makes no guarantees, representation or warranty, either express or implied, that the data will be error free. DRCOG further makes no guarantees, representations or warranties, either express or implied, as to the completeness, accuracy or correctness of the data, or as to merchantability or fitness of the data for a particular use or purpose. DRCOG is not responsible to any user for any costs, expenses, liabilities or damages arising from inconsistencies in its data or from any use of the information.
Projection: State Plane Colorado Central, NAD 83 (feet)

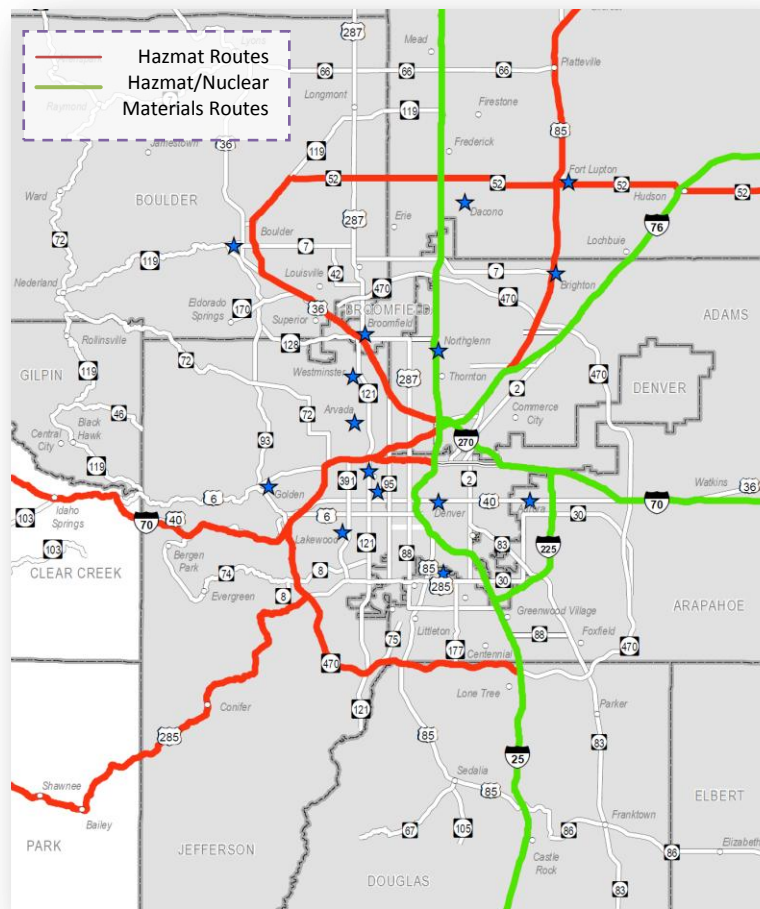
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\\cogshare\Transportation\RTP\2040 MVRTP\Freight\Fig8_Locations_of_Wholesale_Trade_Warehousing_Firms.mxd

10. Hazardous Materials

CDOT is responsible for designating hazardous materials (hazmat) routes based on several criteria and policy directives, such as Title 42, Article 20 of the Colorado Revised Statutes and CDOT Policy Directives 1903 and 1903.1. In practical terms, 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 [here](#) for more information).

Figure 9 shows CDOT's graphical representation of hazmat and nuclear materials routes in the DRCOG region. Roadways shown in green are designated hazmat and nuclear materials routes; those in red are hazmat 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 US-36, US-85, US-285, C-470, SH-119, and SH-52.

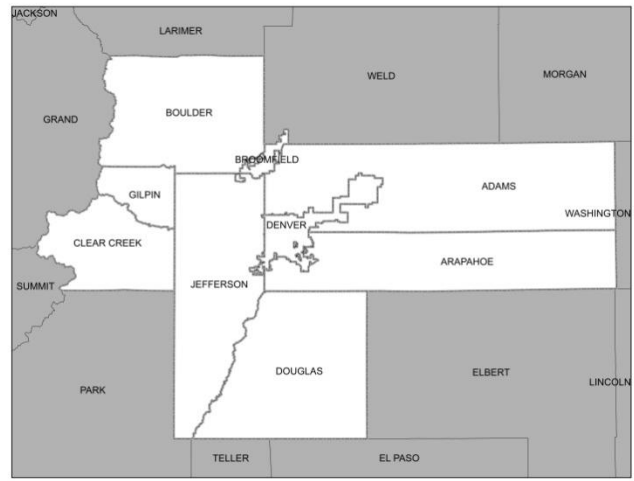
Figure 9: Designated Hazmat & Nuclear Materials Routes



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 (Figure 10), which corresponds to DRCOG’s planning area except for excluding southwest Weld County. However, additional data for Weld County is included where feasible. 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). Besides oil and gas, agriculture is a principal industry in Weld County.

Figure 10: CDOT Freight Zone #3



CDOT used the IHS Global Insight, Inc. 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 top locations where they are being transported to and from. Commodities in the database were grouped using four digit Standard Transportation Commodity Codes (“STCC”) a system designed by a special committee of the Association of American Railroads (AAR). Currently, the STCC is maintained and published by the AAR and has been updated over the years to meet the needs of its users, particularly the North American Freight Railroads.

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 are considered to be

secondary traffic, thereby indicating that a commodity is not necessarily produced in that region, but is traveling through it.

1. Transported Out of the Region

Tables 3 and 4 are a list of the top commodities originating in Freight Zone #3 that are 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 Denver Region by Truck

Commodity	2010 Existing		2040 Forecast	
	Tons	Percent	Tons	Percent
Warehouse & 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 4: Top Commodities (by Value) Transported out of Denver Region by Truck

Commodity	2010 Existing		2040 Forecast	
	Value	Percent	Value	Percent
Warehouse & 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%
Misc. 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 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 very similar. This does not mean rail, air, and other modes are not important, but it does underscore the importance of the region’s highways, roadways, and streets to freight and goods movement.

Table 5: Total Commodities Exported from 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

Figures 11 and 12 show the top in-state destinations for commodities transported out of the Denver Region by tons (Figure 9) and by value (Figure 10) for both 2010 and 2040. As noted previously, CDOT groups all of 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 of Figures 11 and 12 would not likely change.

Figure 11: Top Colorado Destinations of Denver Region Exports by Tons in 2010 and 2040

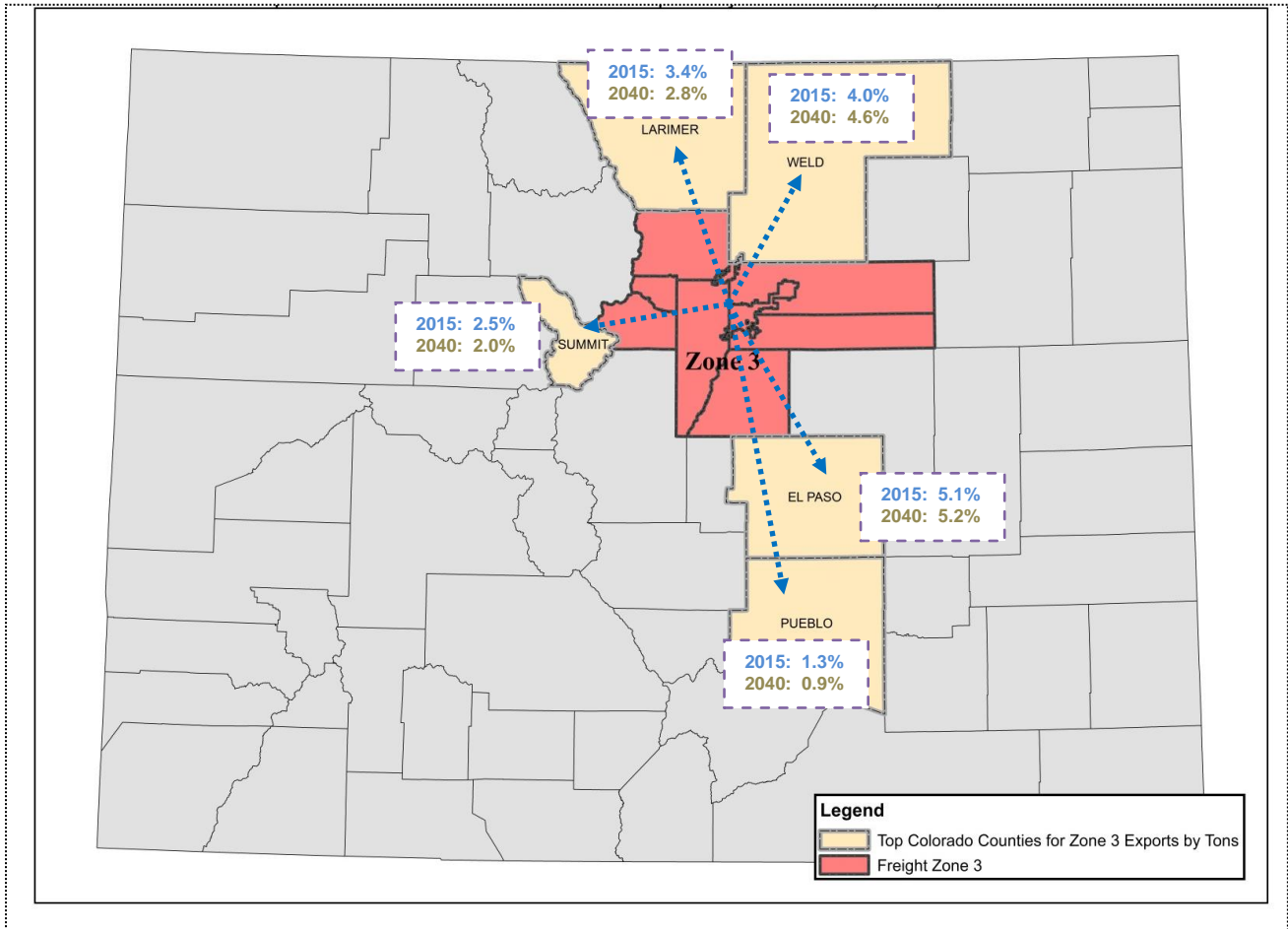
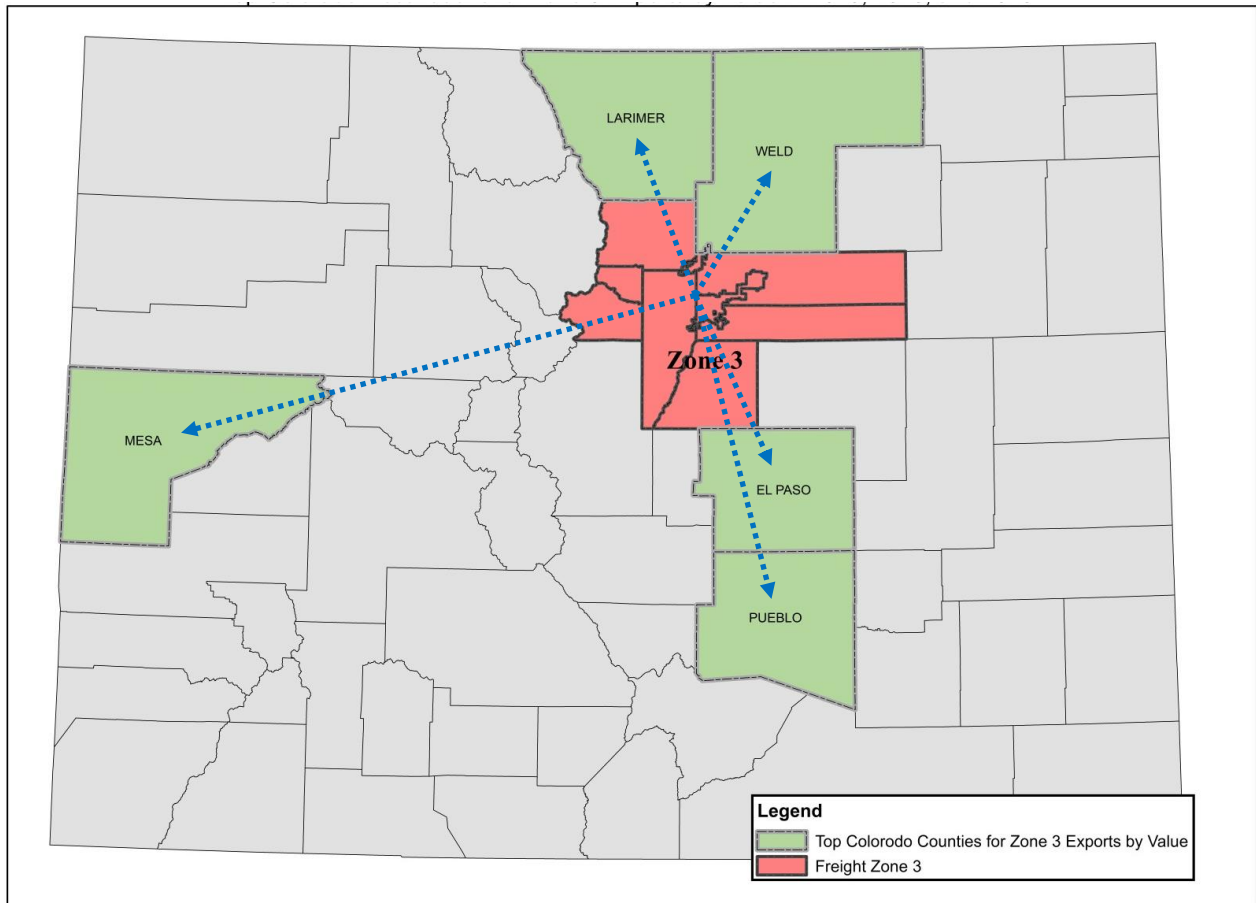


Figure 12: Top Colorado Destinations of Denver Region Exports by Value in 2010 and 2040



2. Transported Out of State

Table 6 and Figure 13 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. As shown, the Casper, Wyoming region (known as Business Economic Area, or BEA) is the top export destination, both in 2010 and forecasted for 2040. The top five BEA destinations for DRCOG region commodity exports do not change between 2010 and 2040, though their ranking changes slightly (between Albuquerque BEA and Wichita BEA). Table 7 and Figure 14 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 BEA	1,318,840	16%	2,176,950	15%
Utah Portion of Salt Lake City BEA	949,770	12%	1,565,610	11%
New Mexico Portion of Albuquerque BEA	375,840	5%	634,920	4%
Kansas Portion of Wichita BEA	329,690	4%	664,540	5%
Non-CMA 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%

Figure 13: Top Out of State Destinations of Denver Region Exports by Tons in 2010 and 2040

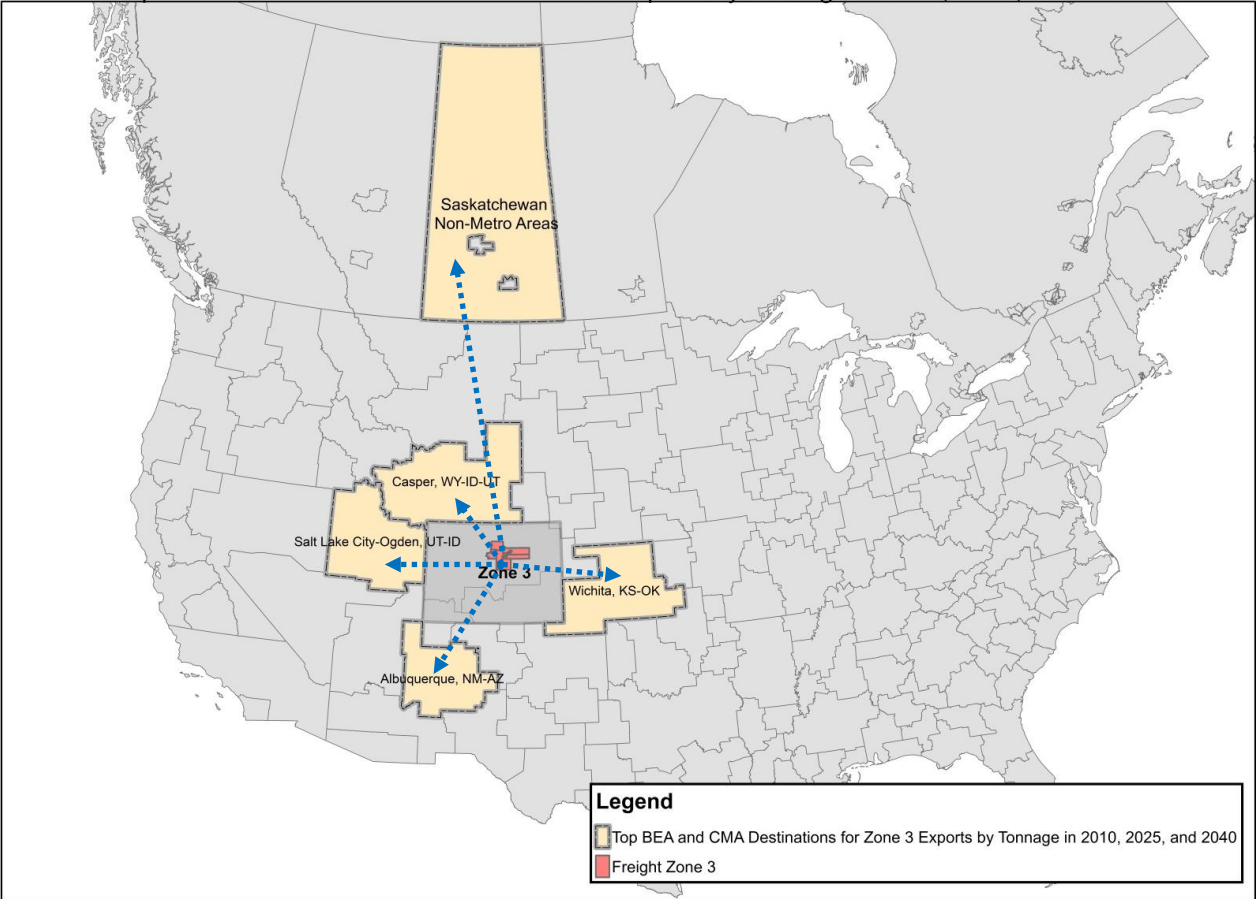
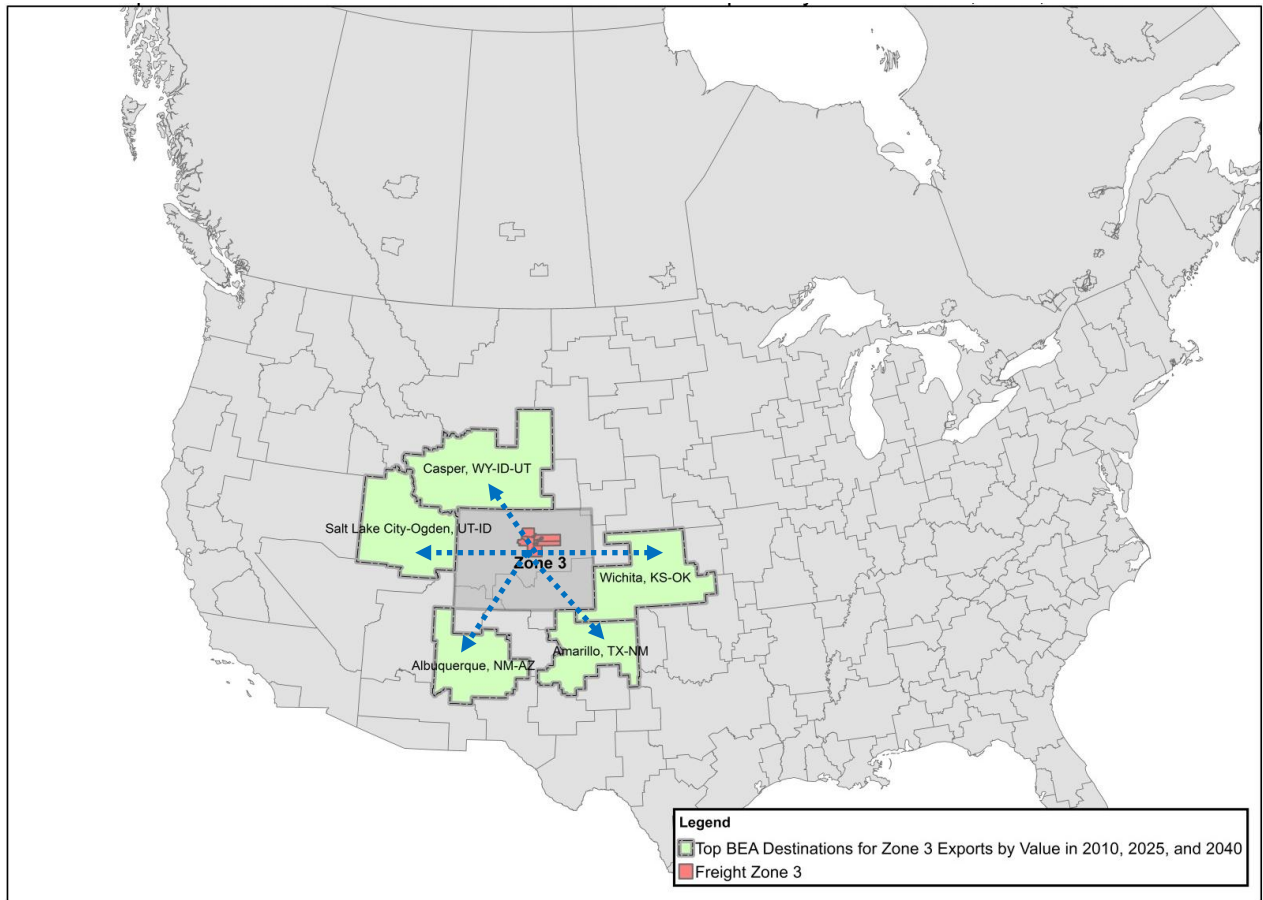


Table 7: Top Out of State Destinations (by Value) of Denver Region Exports by Truck

Business Economic Area (BEA)	2010 Existing		2040 Forecast	
	Value	Percent	Value	Percent
Wyoming Portion of Casper BEA	\$1,828,477,320	9%	\$3,743,802,300	7%
Utah Portion of Salt Lake City BEA	\$1,775,745,960	9%	\$3,253,535,190	6%
New Mexico Portion of Albuquerque BEA	\$1,292,333,840	7%	\$2,909,081,890	5%
Kansas Portion of Wichita BEA	\$1,150,107,780	6%	\$3,580,855,490	7%
Texas Portion of Amarillo BEA	\$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%

Figure 14: Top Out of State Destinations of Denver Region Exports by Value in 2010 and 2040



3. Transported Into the Region (from in-state)

Tables 8 and 9 are a list 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 & 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 & 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%
Misc. Plastic Products	\$1,497,621,040	3%	2,488,609,190	2%
Electronic Data Processing Equip.	\$1,367,234,890	3%	5,288,313,520	4%
Cash Grains, NEC	\$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 Equip.	\$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 very similar. As noted previously, this does not mean that rail, air, and other modes are not important, but it does underscore the importance of the region’s highways, roadways, and streets to freight and goods movement.

Table 10: Total Commodities Transported into 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

Figures 15 and 16 show the top in-state origins for commodities transported into the Denver Region by tons (Figure 15) and by value (Figure 16) for both 2010 and 2040. As noted previously, CDOT groups all of 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 of Figures 15 and 16 would not likely change.

Figure 15: Top Colorado Origins of Commodities Transported into the Denver Region by Tons in 2010 and 2040

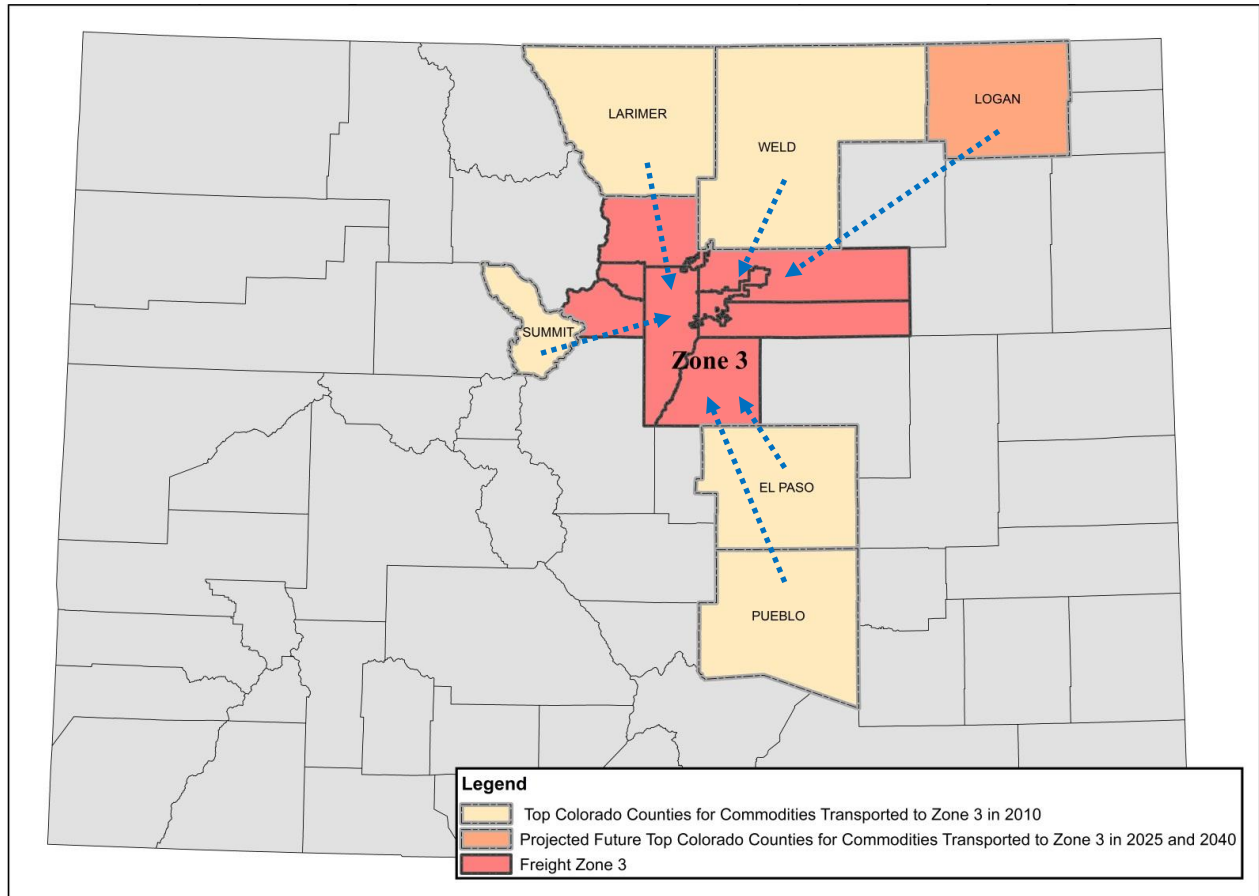
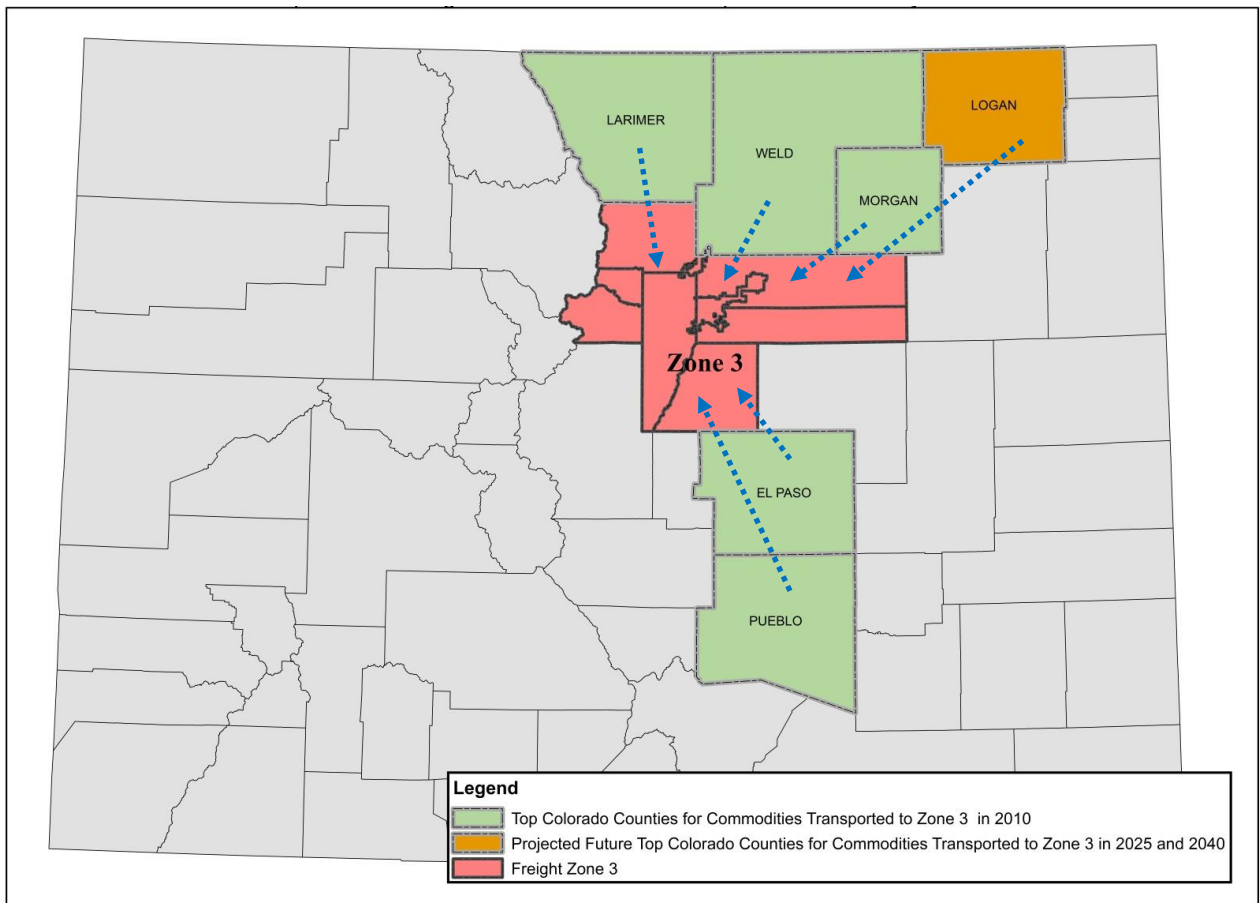


Figure 16: Top Colorado Origins of Commodities Transported into the Denver Region by Value in 2010 and 2040



4. Transported Into the Region (from out of State)

Table 11 and Figure 17 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 is the top import origin, both in 2010 and forecasted 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 Figure 18 show similar information, by commodity value.

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 CMA	5,504,500	26%	7,655,840	20%
Utah Portion of Salt Lake City BEA	1,235,940	6%	2,490,820	7%
California Portion of Los Angeles BEA	1,149,340	5%	2,555,990	7%
Kansas Portion of Wichita BEA	995,650	5%	2,274,530	6%
Wyoming Portion of Casper BEA	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%

Figure 17: Top Out of State Origins of Denver Region Imports by Tons in 2010 and 2040

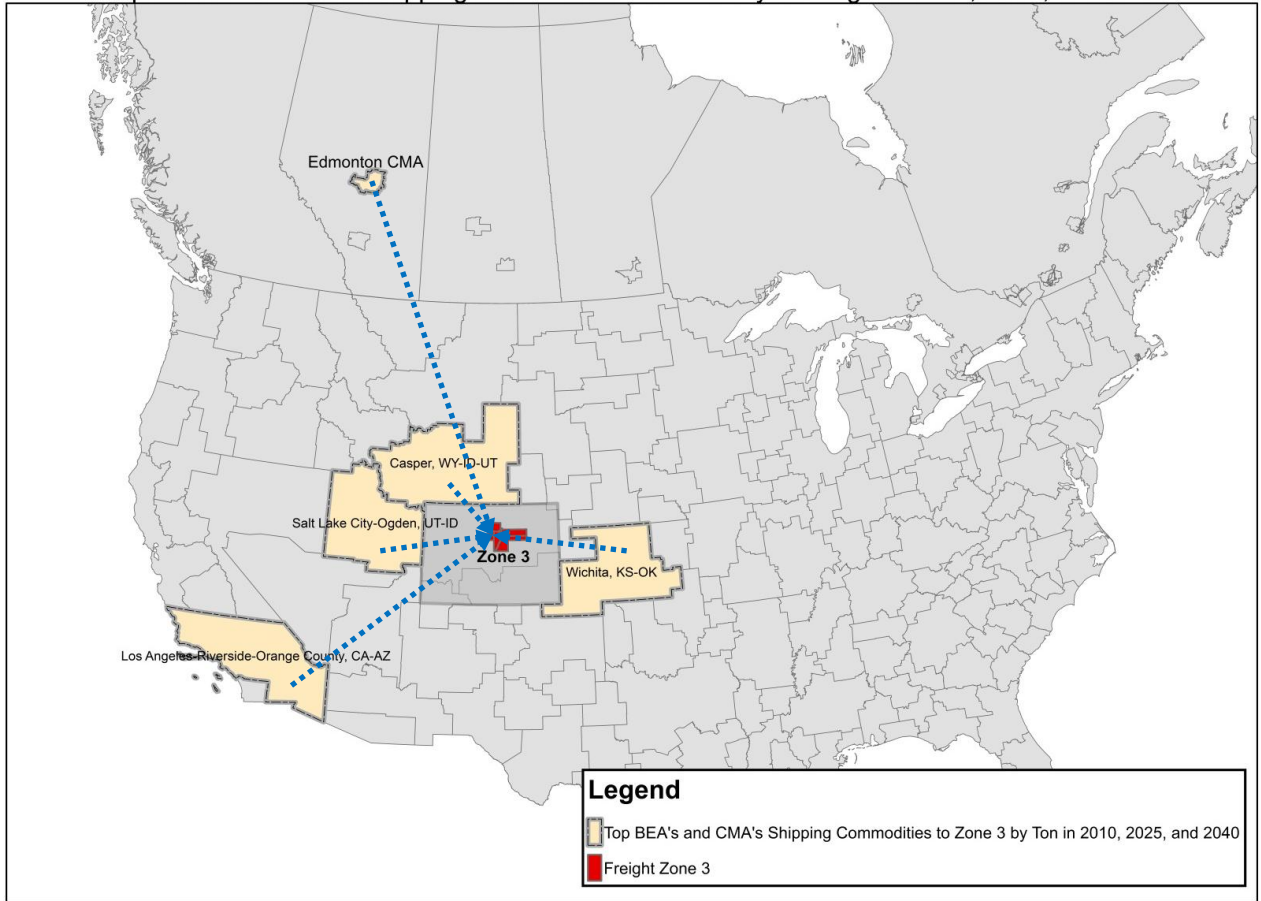
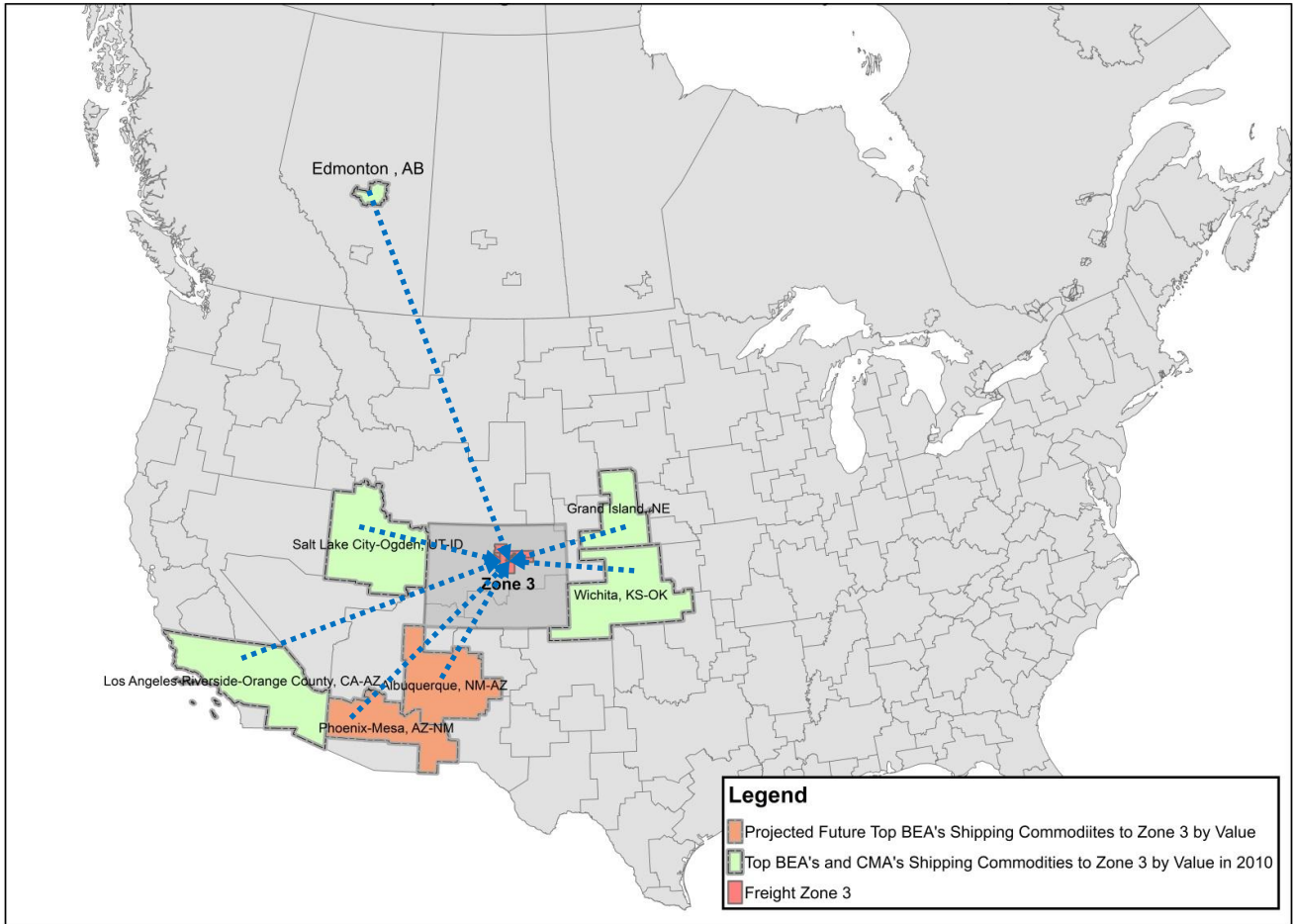


Table 12: Top Out of State Origins (by Value) of Denver Region Imports by Truck

Business Economic Area (BEA)	2010 Existing		2040 Forecast	
	Value	Percent	Value	Percent
California Portion of Los Angeles BEA	\$7,489,348,240	18%	\$18,790,425,150	17%
Utah Portion of Salt Lake City BEA	\$4,999,349,150	12%	\$20,284,254,420	19%
Edmonton, Alberta CMA	\$2,362,353,550	6%	\$3,351,652,410	3%
Kansas Portion of Wichita BEA	\$1,676,616,910	4%	\$3,769,683,340	3%
Grand Island, Nebraska BEA	\$1,278,166,320	3%	\$2,551,631,130	2%
New Mexico Portion of Albuquerque BEA	\$681,291,780	2%	\$5,523,340,610	5%
Arizona Portion of Phoenix BEA	\$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%

Figure 18: Top Out of State Origins of Denver Region Imports by Value in 2010 and 2040



5. Transported Within the Region

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 for 2010, and 2040 forecasts. Table 13 shows the information by weight; Table 14 shows the information by commodity value.

Table 13: Top Commodities by Weight with Origins and Destinations in 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 & 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 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 & 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%

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 15: Commodities that Stay Within 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 over time is the importance of travel time reliability and the impact 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; and
- Provide roadway management and Intelligent Transportation System applications, such as traveler information systems, incident management, and variable message signs.

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 (US-36 to SH-7): add managed lanes
- I-25 (Santa Fe Drive to US-6): interchange capacity
- I-70 (Brighton Boulevard to I-270): add 4 new managed lanes (project is currently being amended)
- I-70 (Empire Junction (US-40) to Twin Tunnels): add peak period shoulder managed lanes
- I-270 (I-25 to I-70): widen from 4 to 6 lanes
- I-270/Vasquez Boulevard: interchange capacity
- US-36 (I-25 to Table Mesa Drive): add managed lanes
- US-85 (Highlands Ranch Parkway to County Line Road): widen from 4 to 6 lanes
- C-470 (Kipling Parkway to I-25): add toll managed lanes
- SH-2 (72nd Avenue to I-76): widen from 2 to 4 lanes
- Pena Blvd. (I-70 to E-470): widen from 4 to 8 lanes
- 88th Ave. (I-76 to SH-2): widen from 2 to 4 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 (aka R2C2 Study) in 2009. Two alternative alignments 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 Quebec Street frontage road ramps
 - UP at SH-79
 - UP at Washington Street
- **Railroad grade-separations on local streets off the regional roadway system** will also be considered at critical locations.

DRCOG's Transportation Improvement Program (TIP) also contains many multimodal transportation projects that will address and benefit freight and goods movement, such as the US-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.

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.

The City of Denver reached agreement in 2015 with adjacent jurisdictions to begin developing an “aerotropolis” around DIA. Potential freight implications include air cargo and airport-related storage, warehouse, transfer and other facilities for higher-value goods.

Land owners in the vicinity of Front Range Airport have proposed a new air/rail/highway multimodal facility known as Spaceport Colorado. Planned or envisioned improvements that will benefit terminals include:

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

H. Operations & Technology

Operations and technology are important aspects of freight and goods movement. The overall objective of transportation system management and operation (TSM&O) strategies is to safely provide more reliable trip travel times and reduce the amount of delay faced by drivers, passengers, trucks, and commercial vehicles on the roadway and transit system. The strategies also have a positive impact on 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 shipping and delivery of goods and services. As another example, the National ITS Architecture includes components on carrier operations and fleet management, cargo movement and condition, roadside safety, driver security, hazmat management, and commercial vehicle tracking.

Technology is important in many ways, such as real-time traffic/travel and weather data and managing fleet deployment and payload logistics. Connected vehicle applications are an emerging technology that is working to address such topics as curve speed warnings, oversize vehicle warnings, and smart roadside wireless inspection. CDOT recently unveiled its [RoadX](#) initiative to use innovative technology to improve transportation system safety, mobility, and efficiency. Such technology could include smart device apps, connected vehicles, truck platoons linked through technology, virtual guardrails, and others. CDOT will initially invest \$20 million to start RoadX and partner with the private sector to evolve the program.

I. 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 state 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.

J. Summary – Eye on the Future

Freight and goods movement is increasingly important at the federal, state, regional, and local levels. Many freight-related issues, concerns, and solutions apply to the region's overall transportation system, while some are unique to freight and goods movement. As with other components of the MVRTP, DRCOG, CDOT, local governments, and others will continue to work closely with freight stakeholders to plan for the future. The MVRTP recognizes that rapid technological evolution requires the region to be nimble, flexible, and responsive to adapt quickly to changing trends and innovations.

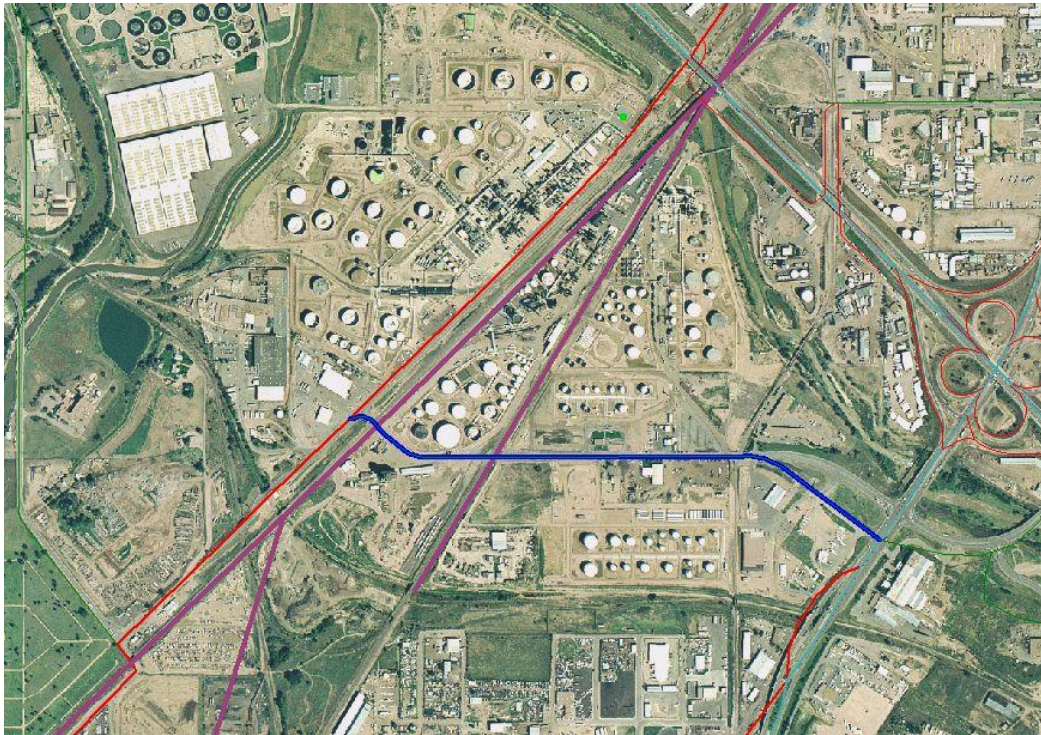
APPENDIX

DRAFT Concept Examples of Multimodal Terminal Graphics



Kaneb Pipeline Transfer (80th)

BNSF Auto Transfer (88th)



Conoco, Total Petro., and Phillips Pipeline Transfer (56th and Brighton)