APPENDIX 1

Regionally Significant Roadway Capacity Project Selection Process

APPENDIX 1

Regionally Significant Roadway Capacity Project Selection Process

DRCOG-Funded Projects

DRCOG staff worked with the Transportation Advisory Committee to solicit and evaluate regionally significant roadway capacity candidate projects desiring regional funding.

Projects in the 2035 RTP had not been thoroughly re-evaluated for many years because the focus over the past three RTP update cycles was on removing projects from the RTP due to the lack of revenues.

With limited funds available for the 2040 RTP, DRCOG evaluated candidate projects to update the list of regionally significant roadway capacity projects.

Candidate projects were defined as:

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

DRCOG solicited candidate projects from local governments within the MPO planning area, CDOT, and RTD. Approximately 30 eligible projects were submitted for evaluation. These projects were scored together with approximately 20 projects "remaining" in the 2035 RTP (construction not yet undertaken) that were candidates for regional funding in the 2040 RTP.

It is important to note that, while several 2035 RTP projects evaluated were "CDOT projects" (submitted by CDOT or funded with CDOT-controlled revenues), CDOT did not submit any candidate projects for 2040 RTP evaluation. Instead, as described further below, CDOT separately submitted a list of fiscally constrained projects to be funded with CDOT-controlled revenues for the 2040 RTP. Accordingly, the project evaluation, scoring, and selection process described here applied to roadway capacity projects seeking DRCOG-controlled regional funding (STP-Metro and CMAQ).

Project Scoring Evaluation Criteria

The Transportation Advisory Committee and a subset work group of local technical staff reviewed and revised the criteria used to evaluate and score roadway capacity projects used in previous RTP updates.

The revised criteria, shown in Table A, were approved by the DRCOG Board in April 2014. As with previous versions, the revised criteria integrate and address Metro Vision goals and policy direction.

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

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

- First, as noted previously, CDOT separately submitted its list of fiscally constrained roadway capacity projects to be funded with CDOT-controlled revenues. A few projects that DRCOG evaluated and scored CDOT later included on its project list to fully fund. Those projects, such as the US-6/Wadsworth interchange reconstruction, were therefore removed from the DRCOG candidate project list, since CDOT included them on its list.
- Second, since a few candidate projects were eligible for CMAQ funding, those projects were addressed separately. They competed for DRCOG-controlled funding by score rank to demonstrate they scored high enough to merit selection for funding. With demonstrated merit, they were then removed from the main candidate projects list, which focused on competition for the limited available STP-Metro funding.

Table A

Project Scoring Evaluation Criteria for 2040 RTP

Regionally Significant Roadway Capacity Projects

DRCOG Board Approved April 16, 2014

Criteria Category	Point Distribution Process	Maximum Points
1. Congestion Severity (Existing and Future) *(current or parallel facility)* *Existing: Congestion Management Program (CMP) Score* *Future: 2040 Existing and Commited Network Model*	Existing Congestion: Points (0-20) based on CMP score Future Congestion: Points (0-10) based on peak period (6.5 hours) volume/capacity ratio (v/c) > 0.54 Prorate by 1-point increments based on range of values	30
2. Cost per Peak Period Person Mile Traveled (PMT) *2040 model run*	Project cost divided by peak 6.5 hour PMT (from FOCUS Travel Model) Prorate by 1-point increments based on range of values	17
3. Gap Closure *completes all or part of a lane or segment gap*	15 points if gap is completely closed, 8 points for partial gap closure (min 50% closure) (gap must be < 5 miles)	15
4. Arterial Roadway Spacing *proximity to parallel Regional Roadway System facilities*	5 points if nearest parallel arterial is > 3 miles away 2 points if > 1.5 miles away	5
5. Regional Roadway System Classification *Freeways, MRAs, or NHS-Principal Arterial segments*	4 points for freeway 2 points for major regioinal arterial (MRA) 1 point for principal arteral on National Highway System (NHS)	4
6. Serves Urban Centers/Rural Town Center *Proximity to designated Urban Centers/Rural Town Centers*	5 points if project is within or touching 3 points for roadway segment project, if within 1/2 mile	5
7. Safety Measure *Most recent 3-years of crash data*	Based on weighted crash rate (crashes/vmt) (Injury and fatal crashes factored by 5) 8 points to 10% of projects with highest value 4 points to next 15% of projects	8
8. Urban Growth Boundary/Area *is project entirely within the UGB/A?*	2 points if the project is entirely within the contiguous urban growth boundary area (including preserved land)	2
9. Serve Major Intermodal or High Security Facility *DIA, Union Station, GA airports* *intermodal freight terminals, Buckley AFB*	4 points if project is within or touching 2 points if within 1 mile	4
10. Rapid/Frequent Transit Corridor *support of major transit corridors*	Rapid Transit Tier 1 Corridor: 10 points. 15 mins. or better headway corridor (avg. weekday peak period): 5 points	10
		100

APPENDIX 2

2040 Fiscally Constrained Park-n-Ride Lots and Transit Stations

2040 Metro Vision Regional Transportation Plan
Appendix 2: Fiscally Constrained
Park-n-Ride Lots and Transit Stations

Transit Stations					
			Parking Spaces		
Facility Name	Tier 1 Rapid Transit Corridor	Status	Existing 2015	(2015-2040)	Total 2040
Rapid Transit Stations with Parking					
Thornton Crossroads at 104th	North Metro	New	0	1,460	1,460
Northglenn/112th	North Metro	New	0	1,200	1,200
2nd Ave/Abilene	I-225	New	0	200	200
13th Ave	I-225	New	0	690	690
30th/Dow ning	Central Corridor	Existing	27	0	27
38th/Blake	East Corridor	New	0	500	500
41st/Fox	Gold Line (may be shared w ith NW Rail in future)	New	0	770	770
60th/Sheridan-Arvada Gold Strike	Gold Line	New	0	330	330
61st/Peña Blvd	East Corridor	New	0	800	800
Commerce City/72nd	North Metro	New	0	330	330
Original Thorton at 88th	North Metro	New	0	1,500	1,500
Alameda	Central Corridor	Existing	302	0	302
Arapahoe at Village Center	Southeast Corridor	Existing	1,115	0	1,115
Arvada Ridge	Gold Line	New	0	280	280
Belleview	Southeast Corridor	Existing	59	0	59
Central Park	East Corridor	New	0	1,500	1,500
Aurora Metro Center	I-225	New	0	200	200
Clear Creek/Federal	Gold Line	New	0	370	370
Colorado	Southeast Corridor	Existing	363	0	363
40th/Colorado	East Corridor	New	0	1,800	1,800
County Line	Southeast Corridor	Existing	388	0	388
Dayton	Southeast Corridor	Existing	250	0	250
Dow ntow n Longmont	Northw est Rail	New	0	439	439
Dry Creek	Southeast Corridor	Existing	235	0	235
Eastlake at 124th	North Metro	New	0	960	960
Englew ood	Southw est Corridor	Expansion	910	440	1,350
Evans	Southw est Corridor	Existing	99	0	99
Federal Center	West Corridor	Existing	1,000	0	1,000
Decatur-Federal	West Corridor	Existing	1,900	0	1,900
I-25 / Broadw ay	Central Corridor	Existing	1,248	0	1,248
Iliff	I-225	New	0	600	600
Jeffco/Golden	West Corridor	Existing	705	0	705
Lakew ood/Wadsw orth	West Corridor	Existing	1,000	0	1,000
Lincoln	Southeast Corridor	Existing	1,734	0	1,734
Littleton Dow ntow n	Southw est Corridor	Existing	361	0	361
Littleton Mineral Station	Southw est Corridor	Existing	1,227	0	1,227
48th and Brighton at National Western Center	North Metro	New	0	40	40
Nine Mile	Southeast Corridor	Existing	1,225	0	1,225
Oak	West Corridor	Existing	200	0	200
Orchard	Southeast Corridor	Existing	48	0	48
Pecos Junction	Gold Line (may be shared w ith NW Rail in future)	New	0	300	300
Peoria	I-225 / East Corridor	New	0	1,900	1,900
RidgeGate Parkw ay	Southeast Corridor	New	0	2,100	2,100
Sheridan	West Corridor	Existing	800	0	800
Southmoor	Southeast Corridor	Existing	788	0	788
University of Denver Station	Southeast Corridor	Existing	540	0	540
Westminster	Northw est Rail	New	0	925	925
Yale	Southeast Corridor	Existing	129	0	129
		Subtotal	**16,653**	**19,634**	**36,287**

2040 Metro Vision Regional Transportation Plan
Appendix 2: Fiscally Constrained
Park-n-Ride Lots and Transit Stations

Transit Stations					
	Tier 1 Rapid Transit Corridor		Parking Spaces		
Facility Name		Status	Existing 2015	(2015-2040)	Total 2040
Existing PnRs (Future Rapid Transit Stations) with Parking					
40th Ave & Airport Blvd - Gateway Park	East Corridor	Expansion	1,079	1,121	2,200
Broomfield	US-36 BRT	Existing	940	870	1,810
US-36/Flatirons	US-36 BRT	Existing	264	0	264
Olde Town Arvada	Gold Line	Expansion	200	200	400
US-36/Table Mesa	US-36 BRT	Existing	824	0	824
US-36 / Church Ranch	US-36 BRT	Existing	396	0	396
US-36 / McCaslin	US-36 BRT	Existing	466	0	466
Wheat Ridge/Ward Rd	Gold Line	Existing	491	-51	440
US-36/Sheridan	US-36 BRT	Existing	1,310	0	1,310
		Subtotal	**5,970**	**2,140**	**8,110**
Rapid Transit Stations without Parking					
10th/Osage	Central Corridor	Existing	0	0	0
16th/California	Central Corridor	Existing	0	0	0
16th/Stout	Central Corridor	Existing	0	0	0
18th/California	Central Corridor	Existing	0	0	0
18th/Stout	Central Corridor	Existing	0	0	0
20th/Welton	Central Corridor	Existing	0	0	0
25th/Welton	Central Corridor	Existing	0	0	0
27th/Welton	Central Corridor	Existing	0	0	0
29th/Welton (doesn't exist in 2035)	Central Corridor	Existing	0	0	0
Auraria	Central Corridor	Existing	0	0	0
Auraria West	Central Platte Valley	Existing	0	0	0
Colfax	I-225	New	0	0	0
Convention Center	Central Corridor	Existing	0	0	0
Fitzsimons	I-225	New	0	0	0
Denver Airport	East Corridor	New	0	0	0
Florida	I-225	Existing	0	0	0
Garrison	West Corridor	Existing	0	0	0
Knox	West Corridor	Existing	0	0	0
Lamar	West Corridor	Existing	0	0	0
Lone Tree City Center	Southeast Corridor	New	0	0	0
Louisana / Pearl	Southeast Corridor	Existing	0	0	0
Oxford-City of Sheridan	Southwest Corridor	Existing	0	0	0
Pepsi Center	Central Platte Valley	Existing	0	0	0
Perry	West Corridor	Existing	0	0	0
Red Rocks College	West Corridor	Existing	0	0	0
Sports Authority Field at Mile High	Central Platte Valley	Existing	0	0	0
Sky Ridge	Southeast Corridor	New	0	0	0
Transit/Transfer Centers					
Downtown Boulder Station		Existing	0	0	0
Boulder Junction at Depot Square Station		Existing	100	0	100
Civic Center Station		Existing	0	0	0
Denver Union Station		Existing	0	0	0
		Subtotal	**0**	**0**	**0**

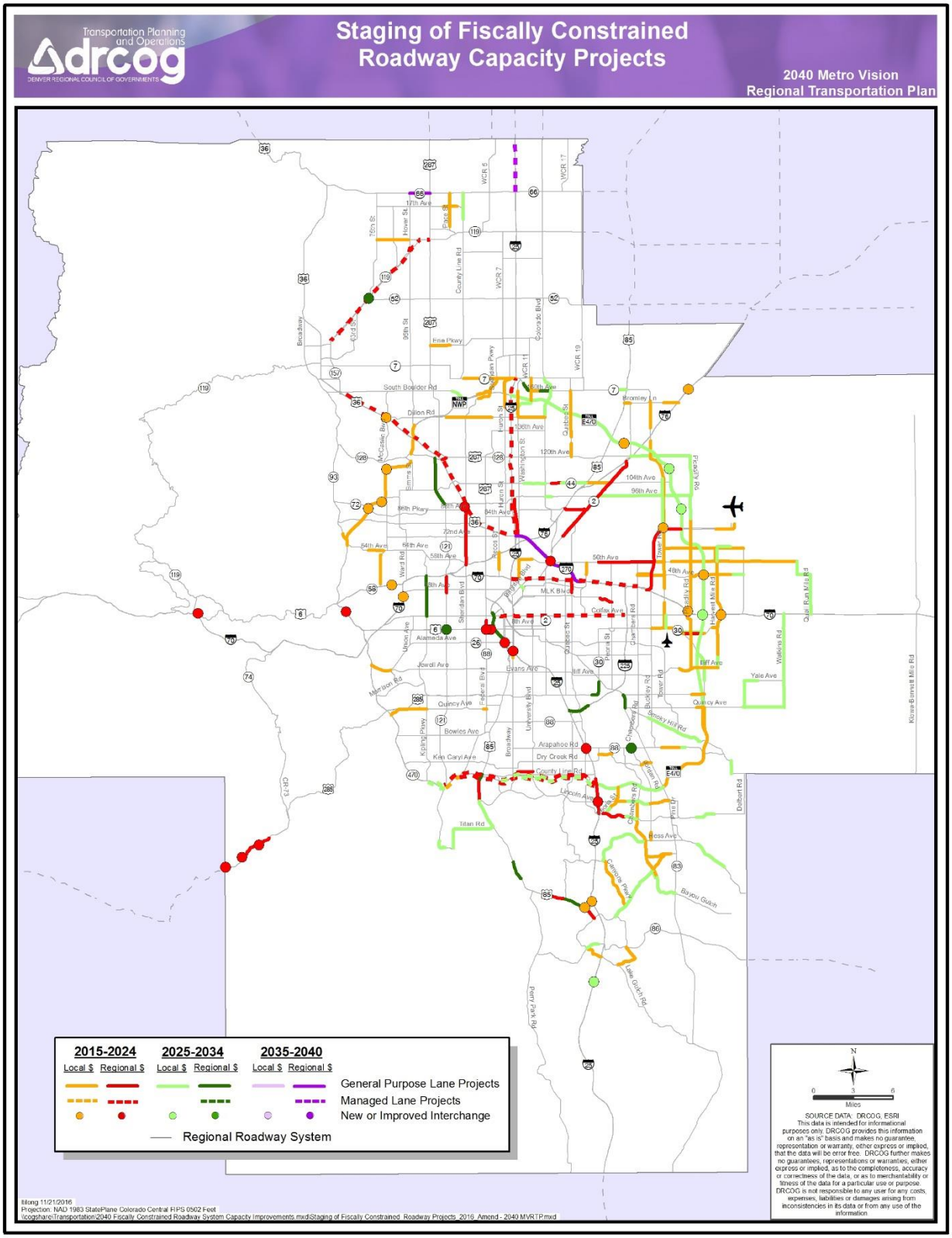
2040 Metro Vision Regional Transportation Plan
Appendix 2: Fiscally Constrained
Park-n-Ride Lots and Transit Stations

Park-n-Ride Lots

Facility Name	Status	Parking Spaces		
		Existing 2015	(2015-2040)	Total 2040
RTD park-n-Ride Lots				
104th Ave & Revere	Existing	89	0	89
39th/Table Mesa Dr	Existing	40	0	40
70th/Broadway	Existing	308	0	308
Aspen Park	Existing	162	0	162
Bergen Park	Existing	160	0	160
Broadway / 27th Way	Existing	59	0	59
Broadway Marketplace	Existing	221	0	221
Boulder Church of the Nazarene	Existing	49	0	49
C-470 / University	Existing	440	0	440
El Rancho	Existing	36	0	36
Evergreen	Existing	45	0	45
Genesee Park	Existing	21	0	21
Alameda/Havana	Existing	128	0	128
Highlands Ranch Town Center	Existing	177	0	177
Ken Caryl / C-470	Existing	268	0	268
Lafayette	Existing	136	0	136
Lincoln/Jordan	Existing	102	0	102
Longmont (replaced by Downtown Longmont Station)	Existing	101	-101	0
Lutheran Church of the Cross	Existing	41	0	41
Lyons	Existing	27	0	27
Montbello	Existing	84	0	84
Nederland	Existing	75	0	75
Olympic	Existing	152	0	152
Paradise Hills	Existing	26	0	26
Parker	Existing	173	0	173
Pine Junction	Existing	92	0	92
Pinery	Existing	79	0	79
SH-72/SH-93	Existing	14	0	14
8th and Coffman	Existing	97	100	197
SH-119 / Niwot	Existing	28	0	28
Smoky Hill/Picadilly	Existing	55	0	55
Southwest Plaza	Existing	200	0	200
Stapleton (replaced by Central Park Station)	Existing	1,314	-1,314	0
Tantra Dr/Table Mesa	Existing	105	0	105
Thornton	Existing	817	0	817
US-285 / Mountain View	Existing	183	0	183
US-285 / Twin Forks	Existing	77	0	77
US-287/Ute Rd (Hwy 66)	New	0	150	150
US-287/Niwot Rd	Existing	40	0	40
US-85 / 72nd Ave (replaced by 72nd Avenue Station)	Existing	83	-83	0
US-85 / Bridge St	Existing	234	0	234
Wadsworth / Hampden	Existing	284	0	284
Wagon Rd	Existing	1,540	0	1,540
	Subtotal	**8,362**	**-1,248**	**7,114**
CDOT Carpool Lots				
Castle Pines Parkway	Existing	106	0	106
Hogback	Existing	512	0	512
I-25/SH-119	Existing	102	0	102
I-25/SH-52	Existing	94	0	94
I-25/SH-66	Existing	56	0	56
I-25/WCR 8	Existing	56	0	56
	Subtotal	**926**	**0**	**926**
	Grand Total Parking Spaces	**31,911**	**20,526**	**52,437**

APPENDIX 3

Staging of Fiscally Constrained Roadway Projects (2015, 2025, 2035 and 2040)


Transportation Planning and Operations
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DENVER REGIONAL COUNCIL OF GOVERNMENTS
Staging of Fiscally Constrained Roadway Capacity Projects
2040 Metro Vision Regional Transportation Plan
2015-2024
Local $ Regional $
2025-2034
Local $ Regional $
2035-2040
Local $ Regional $
General Purpose Lane Projects
Managed Lane Projects
New or Improved Interchange
Regional Roadway System
N
0 3 6
Miles
SOURCE DATA: DRCOG, ESRI
This data is intended for informational purposes only. DRCOG provides this information on an "as is" basis and makes no guarantee, 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
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\\cogshare\Transportation\2040 Fiscally Constrained Roadway System Capacity Improvements.mxd\Staging of Fiscally Constrained Roadway Projects_2016_Amend - 2040 MVRTP.mxd

APPENDIX 4

Fiscally Constrained Roadway & Rapid Transit Capacity Improvements and Cost Allocations (FY 2015 – 2040)

Appendix 4 - 2040 Metro Vision Regional Transportation Plan
Fiscally Constrained Roadway & Rapid Transit Capacity Improvements
Remaining Project Cost Allocations (FY 2016 - 2040)

Dec-16

Roadway	CDOT Road	Project Location (Limits)	Improvement Type	Length (Miles)	Air Quality Network Staging	Remaining Project Cost (FY '15 $millions)	County
A. Regional Roadway System Projects							
1. Regionally Funded with DRCOG-Controlled Funds							
6th Pkwy.		SH-30/Liverpool St. to E-470	New 2 Lane Road	1.3	2015-2024	$19.9	Arapahoe
56th Ave.		Havana St. to Pena Blvd.	Widen from 2 to 6 Lanes	4.3	2015-2024	$45.0	Denver
88th Ave.		I-76 NB Ramps to SH-2	Widen from 2 to 4 Lanes	1.7	2015-2024	$21.5	Adams
104th Ave.	SH-44	Grandview Ponds to McKay Rd.	Widen from 2 to 4 Lanes	0.7	2015-2024	$8.1	Adams
120th Ave.		Allison St. to Emerald St.	New 6 Lanes	0.4	2015-2024	$0.0 (1)	Broomfield
Arapahoe Rd.	SH-88	Havana St. (or Jordan Rd.)	New Grade Separation		2025-2034	$16.0	Arapahoe
County Line Rd.		Phillips St. to University Blvd.	Widen from 2 to 4 Lanes	1.2	2015-2024	$9.5	Douglas
Hampden Ave./ S. Havana St.	SH-30	Florence St. to s/o Yale Ave.	Widen from 5 to 6 Lanes	1.4	2025-2034	$14.0	Denver
I-25	I-25	Lincoln Ave.	Interchange Capacity		2015-2024	$49.4	Douglas
I-25	I-25	Broadway	Interchange Capacity		2015-2024	$50.0	Denver
I-25	I-25	Ridgegate Pkwy. to County Line Rd. S. Ramps	Widen from 6 to 8 Lanes	2.7	2015-2024	$0.0 (1)	Douglas
I-70	I-70	I-25 to Chambers Rd.	Add 2 New Managed Lanes	3.8	2015-2024	$1,175.7 (2)	Denver/Adams
Kipling St.	SH-391	Colfax Ave. to I-70	Widen from 4 to 6 Lanes	3.0	2025-2034	$18.0	Jefferson
Martin Luther King Jr. Blvd.		Havana St./Iola St. to Peoria St.	Widen 2 to 4 Lanes; New 4 Lane Road	1.0	2015-2024	$15.0	Denver
Parker Rd.	SH-83	Quincy Ave. to Hampden Ave.	Widen from 6 to 8 Lanes	1.0	2025-2034	$18.5	Arapahoe
Pena Blvd.		I-70 to E-470	Widen from 4 to 8 Lanes	6.4	2015-2024	$55.0	Denver
Quebec St.	SH-35	35th Ave. to Sand Creek Dr. S.	Widen from 4 to 6 Lanes	1.2	2015-2024	$11.0	Denver
Ridgegate Pkwy.		Havana St. to Lone Tree E. City Limit	Widen from 2 to 4 Lanes	1.8	2015-2024	$8.0	Douglas
SH-7	SH-7	164th Ave. to Dahlia St.	Widen from 2 to 4 Lanes	2.2	2025-2034	$24.0	Adams
		164th Ave. to York St.	*Widen from 2 to 4 Lanes*	*0.8*	*2025-2034*		*Adams*
		Big Dry Creek to Dahlia St.	*Widen from 2 to 4 Lanes*	*0.8*	*2025-20234*		*Adams*
Sheridan Blvd.	SH-95	I-76 to US-36	Widen from 4 to 6 Lanes	4.5	2015-2024	$23.0	Adams/Jefferson
US-6	US-6	Federal Blvd. to Bryant St.	Interchange Capacity		2015-2024	$0.0 (1)	Denver
US-36	US-36	I-25 Express Lanes to Table Mesa Dr.	Add HOT Lanes	17.2	2015-2024	$0.0 (1)	Regional
US-36	US-36	Sheridan Blvd.	Interchange Capacity		2015-2024	$0.0 (1)	Jefferson
US-85	US-85	Blakeland Dr. to County Line Rd.	Widen from 4 to 6 Lanes	0.5	2025-2034	$26.0	Douglas
US-85	US-85	Highlands Ranch Pkwy. to Blakeland Dr.	Widen from 4 to 6 Lanes	1.6	2015-2024	$24.1	Douglas
Wadsworth Blvd.	SH-121	35th Ave. to 48th Ave.	Widen from 4 to 6 Lanes	1.2	2015-2024	$31.0	Jefferson
Wadsworth Pkwy.	SH-121	92nd Ave. to SH-128	Widen from 4 to 6 Lanes	3.7	2025-2034	$31.6	Jefferson
					Subtotal:	**$1,694.3**	
2. Regionally Funded with CDOT-Controlled Funds							
C-470	C-470	Wadsworth Blvd. to I-25	Add Toll Managed Lanes			$220.0	Douglas/Jefferson
		EB: Wadsworth Blvd. to I-25	*Add 1 New Toll Managed Lane*	*10.8*	*2015-2024*		*Douglas/Jefferson*
		WB: I-25 to Colorado Blvd.	*Add 2 New Toll Managed Lanes*	*4.1*	*2015-2024*		*Douglas*
		WB: Colorado Blvd. to Wadsworth Blvd.	*Add 1 New Toll Managed Lane*	*8.2*	*2015-2024*		*Douglas/Jefferson*
Federal Blvd.	SH-88	6th Ave. to Howard Pl.	Widen from 5 to 6 Lanes	0.8	2015-2024	$23.4	Denver
I-25	I-25	Arapahoe Rd.	Interchange Capacity		2015-2024	$50.4	Arapahoe
I-25	I-25	Santa Fe Dr. (US-85) to Alameda Ave.	Interchange Capacity		2015-2024	$27.0	Denver
I-25	I-25	Alameda Ave. to Walnut St. (Bronco Arch)	Add 1 New Lane in each direction	2.6	2025-2034	$30.0	Denver
I-25	I-25	US-36 to Thornton Pkwy.	Add 1 New SB Lane	2.8	2015-2024	$30.0	Adams
I-25	I-25	US-36 to 120th Ave.	Add 1 Toll/Managed Lane each direction	5.9	2015-2024	$68.5	Adams
I-25	I-25	120th Ave. to SH-7	Add 1 Toll/Managed Lane each direction	6.0	2015-2024	$55.0	Adams/Broomfield
I-25	I-25	SH-66 to WCR 38 (DRCOG Boundary)	Add 1 Toll/Managed Lane each direction	4.1	2035-2040	$92.0	Weld
I-225	I-225	I-25 to Yosemite St.	Interchange Capacity		2025-2034	$43.0	Denver
I-70	I-70	Empire Junction (US-40) to Twin Tunnels	Add/Convert 1 new EB Peak Period Managed Lane	9.6	2015-2024	$24.0	Clear Creek
I-70	I-70	Twin Tunnels to Empire Junction (US-40)	Add 1 WB Peak Period Managed Lane	9.6	2025-2034	$50.0	Clear Creek
I-70	I-70	Vicinity of US-6 and Floyd Hill	TBD		2015-2024	$100.0	Clear Creek

Notes

(1) Project funds have been fully obligated prior to FY '15; project is under construction.

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

Appendix 4 - 2040 Metro Vision Regional Transportation Plan
Fiscally Constrained Roadway & Rapid Transit Capacity Improvements
Remaining Project Cost Allocations (FY 2016 - 2040)
Dec-16

Roadway	CDOT Road	Project Location (Limits)	Improvement Type	Length (Miles)	Air Quality Network Staging	Remaining Project Cost (FY '15 $millions)	County
2. Regionally Funded with CDOT-Controlled Funds (cont'd.)							
I-270	I-270	I-25 to I-70	Widen from 4 to 6 Lanes	6.3	2035-2040	$160.0	Adams
I-270	I-270	Vasquez Blvd. (US 6/85)	Interchange Capacity		2015-2024	$60.0	Adams
SH-66	SH-66	Hover St. to Main St. (US-287)	Widen from 2 to 4 Lanes	1.5	2035-2040	$19.0	Boulder
SH-119	SH-119	SH-52	New Interchange		2025-2034	$30.0	Boulder
US-6	US-6	19th St.	New Interchange		2015-2024	$20.0	Jefferson
US-6	US-6	Wadsworth Blvd.	Interchange Capacity		2025-2034	$60.0	Jefferson
US-85	US-85	Meadows Pkwy. to Louviers Ave.	Widen from 2 to 4 Lanes	5.7		$59.0	Douglas
		Meadows Pkwy. to Castlegate			*2015-2024*		
		Castlegate to Daniels Park Rd.			*2025-2034*		
		Daniels Park Rd. to SH-67 (Sedalia)			*2015-2024*		
		MP 191.75 to Louviers Ave.			*2025-2034*		
US-285	US-285	Pine Junction to Richmond Hill					
		Pine Valley Rd. (CR 126)/Mt Evans Blvd.	*New Interchange*		*2015-2024*	$14.0	Jefferson
		Kings Valley Dr.	*New Interchange*		*2015-2024*	$11.0	Jefferson
		Kings Valley Dr. to Richmond Hill Rd.	*Widen 3 to 4 Lanes (Add 1 SB Lane)*	0.9	*2015-2024*	$10.0	Jefferson
		Shaffers Crossing to Kings Valley Dr.	*Widen 3 to 4 Lanes (Add 1 SB Lane)*	1.4	*2015-2024*	$12.0	Jefferson
		Parker Ave.	*New Interchange*		*2015-2024*	$9.0	Jefferson
					Subtotal:	**$1,277.3**	
3. 100% Locally Derived Funding							
6th Ave.		Airport Blvd. to Tower Rd.	Widen from 2 to 6 Lanes	1.0	2015-2024	$10.2	Arapahoe
6th Ave.	SH-30	Tower Rd. to 6th Pkwy.	Widen from 2 to 6 Lanes	1.6	2015-2024	$14.1	Arapahoe
6th Pkwy.		SH-30 to E-470	Widen from 2 to 6 Lanes	1.3	2025-2034	$34.9	Arapahoe
6th Pkwy.		E-470 to Gun Club Rd.	Widen from 2 to 6 Lanes	0.3	2015-2024	$4.9	Arapahoe
6th Ave.		6th Pkwy. to Harvest Mile Rd.	Widen from 2 to 6 Lanes	0.4	2015-2024	$13.2	Arapahoe
17th Ave.		Alpine St. to Ute Creek Dr.	Widen from 2 to 4 Lanes	1.0	2015-2024	$2.3	Boulder
35th Ave.		Brighton Blvd. to Walnut St.	Widen from 2 to 4 Lanes	0.3	2025-2034	$2.5	Denver
48th Ave.		Imboden Rd. to Quail Run Rd.	Widen from 2 to 6 Lanes	1.0	2025-2034	$9.7	Adams
48th Ave.		Picadilly Rd. to Powhaton Rd.	New 6 Lanes	3.0	2015-2024	$40.7	Adams
48th Ave.		Powhaton Rd. to Monaghan Rd.	New 6 Lanes	1.0	2025-2034	$13.6	Adams
56th Ave.		E-470 to Imboden Rd.	Widen from 2 to 6 Lanes	7.0	2015-2024	$67.9	Adams
56th Ave.		Picadilly Rd. to E-470	Widen from 2 to 6 Lanes	1.0	2015-2024	$9.7	Adams
56th Ave.		Dunkirk St. to Himalaya St.	Widen from 4 to 6 Lanes	0.5	2015-2024	$11.5	Denver
56th Ave.		Himalaya St. to Picadilly Rd.	Widen from 2 to 6 Lanes	1.0	2015-2024	$5.8	Denver
56th Ave.		Pena Blvd. to Tower Rd.	Widen from 4 to 6 Lanes	0.7	2015-2024	$17.3	Denver
58th Ave.		Washington St. to York St.	Widen from 2 to 4 Lanes	1.0	2015-2024	$10.4	Adams
64th Ave.		Denver/Aurora City Limit to Himalaya St.	Widen from 2 to 6 Lanes	0.5	2015-2024	$6.5	Adams
64th Ave.		Harvest Mile Rd. to Powhaton Rd.	New 2 Lanes	1.0	2015-2024	$6.5	Adams
64th Ave.		Harvest Mile Rd. to Powhaton Rd.	Widen from 2 to 4 Lanes	1.0	2025-2034	$10.9	Adams
64th Ave.		Himalaya Rd. to Harvest Mile Rd.	Widen from 2 to 4 Lanes	3.0	2015-2024	$12.3	Adams
64th Ave.		Powhaton Rd. to Monaghan Rd.	New 4 Lanes	1.0	2015-2024	$6.7	Adams
64th Ave.		Tower Rd. to Denver/Aurora City Limits	Widen from 2 to 4 Lanes	0.5	2015-2024	$0.7	Denver
64th Ave.		Terry St. to Kendrick Dr.	Widen from 2 to 4 Lanes	1.2	2015-2024	$6.4	Jefferson
96th Ave.		SH-2 to Tower Road	Widen from 2 to 4 Lanes	5.0	2025-2034	$46.7	Adams
96th Ave.		Tower Rd. to Picadilly Rd.	Widen from 2 to 6 Lanes	2.0	2025-2034	$14.7	Adams
96th St.		96th St. at Northwest Pkwy. to SH-128	Add Toll Lanes	2.3	2015-2024	$39.4	Broomfield
104th Ave.		Marion St to Colorado Blvd	Widen from 4 to 6 Lanes	1.6	2025-2034	$6.3	Adams
104th Ave.		US-85 to SH-2	Widen from 2 to 4 Lanes	1.8	2015-2024	$41.2	Adams
104th Ave.	SH-44	McKay Road to US-85	Widen from 2 to 4 Lanes	1.9	2025-2034	$40.6	Adams
120th Ave.		Sable Blvd. to E-470	Widen from 2 to 6 Lanes	2.0	2025-2034	$29.7	Adams
120th Ave.		E-470 to Picadilly Rd.	Widen from 2 to 6 Lanes	2.6	2025-2034	$15.5	Adams
144th Ave.		Washington St. to York St.	Widen from 2 to 4 Lanes	1.0	2015-2024	$12.8	Adams
144th Ave.		York St. to Colorado Blvd.	Widen from 2 to 4 Lanes	1.0	2015-2024	$10.4	Adams
144th Ave.		US-287 to Zuni St.	Widen from 2 to 4 Lanes	3.5	2015-2024	$21.2	Broomfield
152nd Ave.		Washington St. to York St.	Widen from 2 to 4 Lanes	1.2	2025-2034	$11.1	Adams

Appendix 4 - 2040 Metro Vision Regional Transportation Plan
Fiscally Constrained Roadway & Rapid Transit Capacity Improvements
Remaining Project Cost Allocations (FY 2016 - 2040)
Dec-16

Roadway	CDOT Road	Project Location (Limits)	Improvement Type	Length (Miles)	Air Quality Network Staging	Remaining Project Cost (FY '15 $millions)	County
3. 100% Locally Derived Funding (cont'd.)							
160th Ave.		Lowell Blvd. to Sheridan Pkwy.	New 2 Lanes	1.0	2015-2024	$3.8	Broomfield
Alameda Ave.		McIntyre St. to Rooney Rd.	Widen from 2 to 6 Lanes	0.3	2015-2024	$2.6	Jefferson
Alameda Ave.		Bear Creek Blvd. to McIntyre St.	Widen from 2 to 4 Lanes	1.3	2015-2024	$7.6	Jefferson
Arapahoe Rd.		Himalaya Way to Liverpool St.	Widen from 4 to 6 Lanes	0.5	2025-2034	$6.2	Arapahoe
Arapahoe Rd.		Waco St. to Himalaya St.	Widen from 2 to 6 Lanes	1.3	2015-2024	$20.4	Arapahoe
Bayou Gulch Rd. /Chambers Rd.		Parker Road to Parker S. Town Limit	Widen from 0/2 to 4 Lanes	2.4	2025-2034	$18.4	Douglas
Broadway		Arizona Ave. to Mississippi Ave.	Widen from 4 to 6 Lanes	0.1	2015-2024	$2.5	Denver
Broadway		Kentucky Ave. to Exposition Ave.	Widen from 4 to 6 Lanes	0.3	2015-2024	$4.8	Denver
Broadway		Mississippi Ave. to Kentucky Ave.	Widen from 6 to 8 Lanes	0.3	2015-2024	$5.0	Denver
Broncos Pkwy.		Jordan Rd. to Parker Rd.	Widen from 4 to 6 Lanes	0.8	2015-2024	$6.9	Arapahoe
Broncos Pkwy.		Havana St. to Peoria St.	Widen from 4 to 6 Lanes	1.0	2015-2024	$8.1	Arapahoe
Buckley Rd.		118th Ave. to Cameron Dr.	Widen from 2 to 6 Lanes	1.3	2015-2024	$13.9	Adams
Buckley Rd.		136th Ave. to Bromley Ln.	Widen from 2 to 4 Lanes	2.0	2015-2024	$7.8	Adams
C-470	C-470	S. Kipling Pkwy. to I-25	Add New Toll/Managed Lanes				
		WB: Wadsworth Blvd. to S. Kipling Pkwy.	*Add 1 Toll/Managed Lane*	*1.4*	*2025-2034*	*$45.0*	*Jefferson*
		EB: S. Kipling Pkwy. to Wadsworth Blvd.	*Add 1 Toll/Managed Lane*	*3.0*	*2025-2034*		*Jefferson*
		WB: Colorado Blvd. to Lucent Blvd.	*Add 1 Toll/Managed Lane*	*3.7*	*2025-2034*	*$120.0*	*Douglas*
		EB: Broadway to I-25	*Add 1 Toll/Managed Lane*	*6.6*	*2025-2034*		*Douglas*
Canyons Pkwy.		Crowfoot Valley Rd. to Hess Rd.	New 4 Lanes	4.1	2015-2024	$19.1	Douglas
Central Park Blvd.		47th Ave. (Northfield Blvd.) to 56th Ave.	New 4 Lanes	0.9	2015-2024	$4.3	Denver
Chambers Rd.		Crowfoot Valley Road to Parker S. Town Limit	New 2 Lanes	0.7	2025-2034	$3.1	Douglas
Chambers Rd.		Crowfoot Valley Road to Parker S. Town Limit	Widen from 2 to 4 Lanes	0.7	2015-2024	$3.1	Douglas
Chambers Rd.		Crowfoot Valley Rd. to Hess Rd.	New 4 Lanes	2.3	2015-2024	$15.4	Douglas
Chambers Rd.		Hess Rd. to Mainstreet	Widen from 2 to 4 Lanes	1.9	2015-2024	$12.6	Douglas
Chambers Rd.		Mainstreet to Lincoln Ave.	Widen from 2 to 4 Lanes	1.4	2015-2024	$4.4	Douglas
Colorado Blvd.		144th Ave. to 168th Ave.	Widen from 0/2 to 4 Lanes	3.7	2025-2034	$23.5	Adams
Crowfoot Valley Rd.		Stroh Rd. to Chambers Rd.	Widen from 2 to 4 Lanes	1.4	2015-2024	$6.4	Douglas
Crowfoot Valley Rd.		Macanta Rd. to Chambers Rd.	Widen from 2 to 4 Lanes	3.6	2025-2034	$22.9	Douglas
Crowfoot Valley Rd.		Founders Pkwy. to Macanta Rd.	Widen from 2 to 4 Lanes	1.1	2025-2034	$5.1	Douglas
E. Bromley Ln.		Hwy 85 to Sable Blvd.	Widen from 4 to 6 Lanes	0.5	2015-2024	$1.3	Adams
E. Bromley Ln.		Tower Rd. to I-76	Widen from 4 to 6 Lanes	1.1	2015-2024	$1.9	Adams
E-470		48th Ave.	Add New Interchange		2015-2024	$26.9	Adams
E-470		88th Ave.	Add New Interchange		2025-2034	$17.6	Adams
E-470		I-25 North to I-76	Widen from 4 to 6 Lanes	11.0	2025-2034	$100.0	Adams
E-470		Potomac	Add New Interchange		2015-2024	$15.0	Adams
E-470		112th Ave.	Add New Interchange		2025-2034	$17.6	Adams
E-470		I-70 to Pena Blvd.	Widen from 4 to 6 Lanes	7.4	2025-2034	$29.3	Adams/Denver
E-470		Pena Blvd. to I-76	Widen from 4 to 6 Lanes	7.6	2025-2034	$60.0	Adams/Denver
E-470		I-25 to Parker Rd.	Widen from 6 to 8 Lanes	5.5	2025-2034	$45.0	Arapahoe
E-470		Parker Rd. to Quincy Ave.	Widen from 4 to 6 Lanes	8.1	2015-2024	$80.0	Arapahoe/Douglas
E-470		Quincy Ave. to I-70	Widen from 4 to 6 Lanes	7.0	2025-2034	$60.0	Arapahoe
East County Line Rd.		9th Ave. to SH-66	Widen from 2 to 4 Lanes	2.0	2025-2034	$9.8	Boulder
Erie Pkwy.		US-287 to 119th St.	Widen from 2 to 4 Lanes	1.5	2015-2024	$14.6	Boulder
Green Valley Ranch Blvd.		Chambers Rd. to Telluride St.	Widen from 4 to 6 Lanes	1.5	2015-2024	$9.9	Denver
Green Valley Ranch Blvd.		Chambers Rd. to Pena Blvd.	Widen from 2 to 4 Lanes	1.0	2015-2024	$2.4	Denver
Green Valley Ranch Blvd.		Telluride St. to Tower Rd.	Widen from 4 to 6 Lanes	0.5	2015-2024	$1.7	Denver
Gun Club Rd.		1.5 Miles s/of Quincy Ave. to Quincy Ave.	Widen from 2 to 6 Lanes	1.6	2015-2024	$26.7	Arapahoe
Gun Club Rd.	SH-30	Yale Ave. to Mississippi Ave.	Widen from 2/4 to 6 Lanes	2.1	2025-2034	$10.9	Arapahoe
Hampden Ave.		Picadilly Rd. to Gun Club Rd.	Widen from 2 to 4 Lanes	1.1	2015-2024	$12.4	Arapahoe
Harvest Mile Rd.		56th Ave. to 64th Ave.	New 3 Lanes	1.0	2015-2024	$6.5	Adams
Harvest Mile Rd.		56th Ave. to 64th Ave.	Widen from 3 to 6 Lanes	1.0	2025-2034	$7.8	Adams
Harvest Mile Rd.		I-70 to 56th Ave.	New 6 Lanes	4.1	2015-2024	$54.3	Adams
Harvest Mile Rd.		Jewell Ave. to Mississippi Ave.	Widen from 2 to 6 Lanes	1.0	2025-2034	$13.3	Arapahoe
Harvest Rd.		6th Ave. to I-70	New 6 Lanes	1.1	2015-2024	$13.3	Adams
Harvest Rd.		Alameda Ave. to 6th Ave.	Widen from 3 to 6 Lanes	1.0	2015-2024	$6.7	Arapahoe

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Dec-16

Roadway	CDOT Road	Project Location (Limits)	Improvement Type	Length (Miles)	Air Quality Network Staging	Remaining Project Cost (FY '15 $millions)	County
3. 100% Locally Derived Funding (cont'd.)							
Harvest Rd.		Mississippi Ave. to Alameda Ave.	New 6 Lanes	1.0	2015-2024	$13.3	Arapahoe
Hess Rd.		I-25 to Chambers Rd.	Widen from 2 to 4 Lanes	5.1	2025-2034	$44.5	Douglas
Hilltop Rd.		Canterberry Pkwy. to Singing Hills Rd.	Widen from 2 to 4 Lanes	2.7	2025-2034	$17.8	Douglas
Huron St.		150th Ave. to 160th Ave.	Widen from 2 to 4 Lanes	1.3	2015-2024	$8.6	Broomfield
Huron St.		160th Ave. to SH-7	Widen from 2 to 4 Lanes	1.2	2015-2024	$5.1	Broomfield
I-25	I-25	Castlegate Dr.	Add New Interchange		2015-2024	$15.3	Douglas
I-25	I-25	Crystal Valley Pkwy.	Add New Interchange		2025-2034	$44.5	Douglas
I-70	I-70	E-470	Interchange Capacity		2025-2034	$100.0	Adams/Arapahoe
I-70	I-70	Harvest Mile Rd.	Add New Interchange		2015-2024	$39.6	Adams/Arapahoe
I-70	I-70	32nd Ave.	Interchange Capacity		2015-2024	$22.4	Jefferson
I-70	I-70	Picadilly Rd.	Add New Interchange		2015-2024	$27.5	Adams
I-76	I-76	Bridge St.	Add New Interchange		2015-2024	$25.4	Adams
Imboden Rd.		48th Ave. to 56th Ave.	Widen from 2 to 6 Lanes	1.0	2025-2034	$10.3	Adams
Jefferson Pkwy.		Initial Phase: SH-93 to SH-128	New 4 Lane Toll Road; 3 Partial Interchanges	10.2	2015-2024	$259.1	Jefferson
		Candelas Pkwy.	*New Partial Interchange*		*2015-2024*		
		Indiana St. s/o SH-128	*New Partial Interchange*		*2015-2024*		
		SH-72	*New Partial Interchange*		*2015-2024*		
Jewell Ave.		E-470 to Gun Club Rd.	Widen from 2 to 6 Lanes	0.5	2015-2024	$4.9	Arapahoe
Jewell Ave.		Gun Club Rd. to Harvest Rd.	Widen from 2 to 6 Lanes	1.0	2015-2024	$10.0	Arapahoe
Jewell Ave.		Himalaya Rd. to E-470	Widen from 3 to 6 Lanes	1.4	2015-2024	$13.2	Arapahoe
Jordan Rd.		Bradbury Pkwy. to Hess Rd.	Widen from 2 to 4 Lanes	0.6	2015-2024	$3.0	Douglas
Lincoln Ave.		1st St. to Keystone Blvd.	Widen from 4 to 6 Lanes	1.8	2025-2034	$8.3	Douglas
Lincoln Ave.		Keystone Blvd. to Parker Rd.	Widen from 4 to 6 Lanes	1.6	2015-2024	$8.0	Douglas
Lincoln Ave.		Peoria St. to 1st Ave.	Widen from 4 to 6 Lanes	0.7	2015-2024	$3.2	Douglas
Mainstreet		Canterberry Pkwy. to Tomahawk Rd.	Widen from 2 to 4 Lanes	1.4	2025-2034	$7.6	Douglas
Mainstreet		Lone Tree E. City Limit to Chambers Rd.	Widen from 2 to 4 Lanes	0.9	2025-2034	$7.6	Douglas
McIntyre St.		44th Ave. to 52nd Ave.	Widen from 2 to 4 Lanes	1.0	2015-2024	$3.5	Jefferson
McIntyre St.		52nd Ave. to 60th Ave.	Widen from 2 to 4 Lanes	1.0	2015-2024	$6.5	Jefferson
Monaghan Rd.		Quincy Ave. to Yale Ave.	New 6 Lanes	2.0	2025-2034	$22.9	Arapahoe
Nelson Rd.		75th St. to Affolter Dr.	Widen from 2 to 4 Lanes	2.3	2015-2024	$5.2	Boulder
Pace St.		5th Ave. to Ute Rd.	Widen from 2 to 4 Lanes	2.5	2015-2024	$3.8	Boulder
Pecos St.		52nd Ave. to I-76	Widen from 2 to 4 Lanes	1.3	2015-2024	$8.7	Adams
Pena Blvd.		Tower Rd.	Add on-ramp to WB Pena		2015-2024	$3.8	Denver
Pena Blvd.		Jackson Gap St. West Ramps to DIA Terminal	Widen from 6 to 8 Lanes	1.7	2015-2024	$10.2	Denver
Peoria St.		E-470 to .75 miles s/o Lincoln Ave.	Widen from 2 to 4 Lanes	1.9	2015-2024	$4.4	Douglas
Peoria St.		.75 miles s/o Lincoln Ave. to Mainstreet	Widen from 2 to 4 Lanes	0.5	2025-2034	$4.4	Douglas
Picadilly Rd.		48th Ave. to 56th Ave.	Widen from 2 to 6 Lanes	1.2	2015-2024	$13.6	Adams
Picadilly Rd.		56th Ave. to 70th Ave./Aurora City Limits	New 6 Lanes	1.7	2015-2024	$20.4	Adams
Picadilly Rd.		82nd Ave. to 96th Ave.	New 6 Lanes	1.8	2025-2034	$21.6	Adams
Picadilly Rd.		Colfax Ave. to I-70	New 6 Lanes	0.3	2015-2024	$12.9	Adams
Picadilly Rd.		I-70 to Smith Rd.	Widen from 2 to 6 Lanes	0.5	2015-2024	$5.3	Adams
Picadilly Rd.		Smith Rd. to 48th Ave.	Widen from 2 to 6 Lanes	2.2	2015-2024	$22.5	Adams
Picadilly Rd.		96th Ave. to 120th Ave.	New 6 Lanes	3.0	2025-2034	$49.0	Adams
Picadilly Rd.		6th Ave. to Colfax Ave.	Widen from 2 to 6 Lanes	1.6	2015-2024	$10.0	Arapahoe
Picadilly Rd.		Jewell Ave. to 6th Pkwy.	New 4 Lanes	2.7	2015-2024	$18.1	Arapahoe
Picadilly Rd.		70th Ave. to 82nd Ave.	New 6 Lanes	1.5	2015-2024	$11.4	Denver
Plum Creek Pkwy.		Gilbert St. to Ridge Rd.	Widen from 2 to 4 Lanes	1.5	2015-2024	$5.1	Douglas
Powhaton Rd.		Smoky Hill Rd. to County Line Rd.	Widen from 2 to 6 Lanes	1.0	2025-2034	$3.5	Arapahoe
Quail Run Rd.		I-70 to 48th Ave.	New 6 Lanes	3.0	2025-2034	$36.4	Adams
Quebec St.		120th Ave. to 128th Ave.	Widen from 2 to 4 Lanes	1.0	2015-2024	$8.4	Adams
Quebec St.		132nd Ave. to 160th Ave.	Widen from 2 to 4 Lanes	3.5	2015-2024	$21.0	Adams
Quincy Ave.		Plains Pkwy. to Gun Club Rd.	Widen from 2 to 6 Lanes	0.6	2015-2024	$13.3	Arapahoe
Quincy Ave.		Hayesmount Rd. to Watkins Rd.	Widen from 2 to 6 Lanes	2.0	2025-2034	$16.0	Arapahoe
Quincy Ave.		Monaghan Rd. to Hayesmount Rd.	Widen from 2 to 6 Lanes	1.1	2025-2034	$18.9	Arapahoe
Quincy Ave.		C-470 to Simms St.	Widen from 2 to 4 Lanes	1.9	2015-2024	$8.0	Jefferson
Quincy Ave.		Simms St. to Kipling Pkwy.	Widen from 2 to 4 Lanes	1.0	2015-2024	$12.0	Jefferson

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3. 100% Locally Derived Funding (cont'd.)							
Quincy Ave.		Irving St. to Federal Blvd.	New 2 Lanes	0.3	2015-2024	$3.8	Arapahoe
Rampart Range Rd.		Waterton Rd. to Titan Rd.	Widen from 2 to 4 Lanes	1.5	2025-2034	$10.2	Douglas
Ridge Rd.		Plum Creek Pkwy. to SH-86	Widen from 2 to 4 Lanes	1.1	2015-2024	$3.8	Douglas
S. Boulder Rd./160th Ave.		120th St. to Boulder/Broomfield County Line	New 2 Lanes	1.2	2025-2034	$10.2	Boulder
SH-2	SH-2	72nd Ave. to I-76	Widen from 2 to 4 Lanes	7.5	2015-2024	$21.7	Adams
SH-7	SH-7	Riverdale Rd. to US-85	Widen from 2 to 4 Lanes	1.1	2025-2034	$16.3	Adams
SH-7	SH-7	Boulder County Line to Sheridan Pkwy.	Widen from 2 to 4 Lanes	2.5	2015-2024	$6.6	Broomfield
SH-7	SH-7	Sheridan Pkwy. to I-25	Widen from 2 to 6 Lanes	1.5	2015-2024	$10.2	Broomfield
SH-7	SH-7	York St. to Big Dry Creek	Widen from 2 to 4 Lanes	0.7	2015-2024	$8.0	Adams
SH-58	SH-58	Cabela St.	Add New Interchange		2015-2024	$19.6	Jefferson
Sheridan Blvd.		Lowell Blvd. to NW Pkwy.	Widen from 2 to 4 Lanes	1.1	2015-2024	$7.6	Broomfield
Sheridan Pkwy.		NW Pkwy. to SH-7	Widen from 2 to 4 Lanes	1.3	2015-2024	$5.7	Broomfield
Smoky Hill Rd.		Pheasant Run Pkwy. to Versailles Pkwy.	Widen from 4 to 6 Lanes	4.4	2025-2034	$33.9	Arapahoe
Southwest Ring Rd.		Wolfensberger Rd. to I-25	Widen from 2 to 4 Lanes	1.4	2015-2024	$5.1	Douglas
Stroh Rd.		Crowfoot Valley Rd. to J. Morgan Blvd.	Widen from 2 to 4 Lanes	0.5	2015-2024	$6.4	Douglas
Stroh Rd.		Chambers Rd. to Crowfoot Valley Rd.	New 4 Lanes	1.4	2015-2024	$10.6	Douglas
Thornton Pkwy.		Colorado Blvd. to Riverdale Rd.	Widen from 2 to 4 Lanes	0.5	2025-2034	$14.0	Adams
Titan Rd.		Rampart Range Rd. to Santa Fe Dr.	Widen from 2 to 4 Lanes	3.0	2025-2034	$38.1	Douglas
Tower Rd.		Colfax Ave. to Smith Rd.	Widen from 2 to 6 Lanes	1.0	2015-2024	$8.7	Adams
Tower Rd.		Pena Blvd. to 104th Ave.	Widen from 2 to 6 Lanes	3.8	2015-2024	$40.5	Adams
Tower Rd.		Pena Blvd. to 104th Ave.	Widen from 4 to 6 Lanes	3.8	2025-2034	$20.0	Adams
Tower Rd.		6th Ave. to Colfax Ave.	New 2 Lanes	1.0	2015-2024	$9.5	Arapahoe
Tower Rd.		6th Ave. to Colfax Ave.	Widen from 2 to 6 Lanes	1.0	2025-2034	$16.3	Arapahoe
Tower Rd.		38th/40th Ave. to Green Valley Ranch Blvd.	Widen from 2/4 to 6 Lanes	1.0	2015-2024	$26.7	Denver
Tower Rd.		56th Ave. to Pena Blvd.	Widen from 4 to 6 Lanes	2.4	2015-2024	$16.0	Denver
Tower Rd.		48th Ave. to 56th Ave.	Widen from 4 to 6 Lanes	1.0	2015-2024	$5.3	Denver
Tower/Buckley Rd.		105th Ave. to 118th Ave.	New 4 Lanes	2.0	2015-2024	$8.8	Adams
US-85	US-85	Titan Rd. to Highland Ranch Pkwy.	Widen from 4 to 6 Lanes	2.2	2025-2034	$5.9	Douglas
US-85	US-85	Castlegate Dr.	Add New Interchange		2015-2024	$31.8	Douglas
Washington St.		Elk Pl. to 52nd Ave.	Widen from 2 to 4 Lanes	0.6	2015-2024	$13.3	Denver
Washington St.		52nd Ave. to 58th Ave.	Widen from 2 to 4 Lanes	0.8	2015-2024	$4.4	Adams
Washington St.		144th Ave. to 152nd Ave.	Widen from 2 to 6 Lanes	0.7	2015-2024	$28.9	Adams
Washington St.		152nd Ave. to 160th Ave.	Widen from 2 to 6 Lanes	1.4	2015-2024	$37.3	Adams
Waterton Rd.		Dante Dr. to Campfire St.	Widen from 2 to 4 Lanes	1.0	2025-2034	$3.8	Douglas
Watkins Rd.		Quincy Ave. to I-70	Widen from 2 to 6 Lanes	7.1	2025-2034	$54.7	Arapahoe
Wolfensberger Rd.		Coachline Rd. to Prairie Hawk Dr.	Widen from 2 to 4 Lanes	1.0	2025-2034	$7.5	Douglas
Yale Ave.		Monaghan Rd. to Hayesmount Rd.	Widen from 2 to 6 Lanes	1.1	2025-2034	$17.3	Arapahoe
York St.		152nd Ave. to E-470	Widen from 2 to 4 Lanes	0.2	2025-2034	$2.0	Adams
York St.		160th Ave. (SH-7) to 168th Ave.	Widen from 2 to 4 Lanes	1.0	2015-2024	$7.5	Adams
York St.		E-470 to SH-7	Widen from 2 to 4 Lanes	0.7	2015-2024	$10.7	Adams
					Subtotal:	**$3,353.7**	
			Grand Total for Regional Roadway System Projects:			**$6,325.3**	

B. Regional Transit Projects

FasTracks Components							
Eagle Project						$1,033.2	
East Rail Line		DUS to DIA	Commuter Rail	22.8	2015-2024		Adams/Denver
Gold Line		DUS to Ward Rd.	Commuter Rail	11.2	2015-2024		Multiple
Northwest Rail Phase 1		DUS to 71st/Lowell Blvd.	Commuter Rail	6.2	2015-2024		Adams/Denver
I-225 Rail Line		Parker Rd. to East Rail Line	Light Rail	10.5	2015-2024	$476.9	Adams/Arapahoe
North Metro Commuter Rail		DUS to 124th Ave.	Commuter Rail	13.0	2015-2024	$606.8	Adams/Denver
Southeast Rail Extension		Lincoln Ave. to Ridgegate Pkwy.	Light Rail	2.3	2015-2024	$205.9	Douglas
US-36 Bus Rapid Transit		DUS to Table Mesa	Bus Rapid Transit	18.0	2015-2024	$78.9	Multiple
Other FasTracks Projects						$99.4	
Other Regional Transit							
Colfax Ave.	US-40	7th St. to Potomac St.	Bus Rapid Transit	10.5	2015-2024	$115.0	Adams/Denver
SH-119	SH-119	Foothills Pkwy to US-287	Bus Rapid Transit	11.0	2015-2024	$57.0	Boulder
					Total of Regional Transit Projects	**$2,673.1**	

APPENDIX 5

2040 MVRTP Freight & Goods Movement Component

APPENDIX 5. FREIGHT AND GOODS MOVEMENT COMPONENT

DRAFT: December 2016

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 food trucks, and other examples.

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. Federal Freight Requirements & Guidance

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

- Establishing a National Multimodal Freight Policy (NMFP) that includes national goals to guide decision-making, and creates the National Multimodal Freight Network (NMFN), with corridors eligible to receive $4.5 billion over five years through a new discretionary freight-focused grant program.
- Establishing a National Highway Freight Network (NHFN) and a National Highway Freight Program (NHFP) and providing $6.3 billion in formula funds over five years for states to invest in freight projects on the NHFN.
- Requiring states to develop freight plans to be eligible to receive funding under the NHFP.
- Requiring the development of a National Freight Strategic Plan (NFSP) to implement the goals of the new National Multimodal Freight Policy.
- Creating new authorities and requirements to improve project delivery and facilitate innovative finance.
- Encouraging the establishment of state-level Freight Advisory Committees.

The FAST Act establishes an NMFP of maintaining and improving the condition and performance of the National Multimodal Freight Network (NMFN). It specifies goals associated with this national policy related to the condition, safety, security, efficiency, productivity, resiliency, and reliability of the network, and also to reduce the adverse environmental impacts of freight movement on the network. These goals are to be pursued in a manner that is not burdensome to State and local governments. Specifically, the network is used for four key purposes:

1) Assist states in strategically directing resources toward improved system performance for the efficient movement of freight on the NMFN;
2) Inform freight transportation planning;
3) Assist in the prioritization of federal investment, and
4) Assess and support federal investments to achieve national multimodal freight policy goals, and national highway freight program goals.

Projects on the NMFN are eligible to receive discretionary freight-focused grants in which states, MPOs, local governments, and other parties compete for funding ($4.5 billion over five years) to complete projects that improve safety, eliminate freight bottlenecks, and improve critical freight movements.

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

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

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

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

Additionally, the FAST Act continues a MAP-21 requirement for DRCOG, in coordination with CDOT, to develop and report on freight-related performance-based planning targets and measures.

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

- Planning Factor #1: Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity and efficiency.
- Planning Factor #4: Increase the accessibility and mobility options available to people and for freight.

- Planning Factor #6: Enhance the integration and connectivity of the transportation system, across and between modes, and for people and freight.
- Planning Factor #7: Promote efficient system management and operation.

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

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

D. Current Freight Planning Efforts & Stakeholder Input

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

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

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

CDOT completed the State Highway Freight Plan in 2014. It is the first phase of CDOT's overall multimodal freight planning efforts. CDOT is developing its state freight plan in two phases. The 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. As noted above, DRCOG is participating in this process to leverage data, information, outcomes, and recommendations for the DRCOG planning area.

CDOT also developed the State Freight and Passenger Rail Plan in 2012 to meet the requirements of the federal Passenger Rail 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.

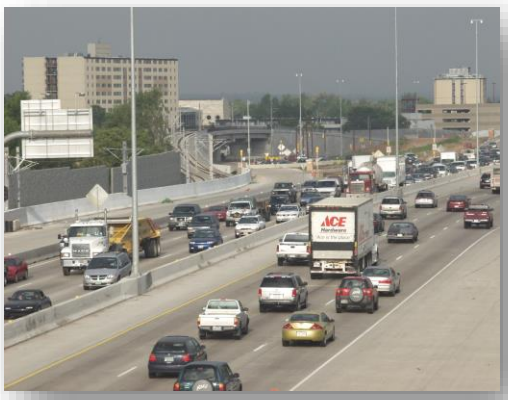
1. Freight Stakeholder Input

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:



- Congestion on the road system. The levels of congestion slow truck operations and increase the cost of moving freight. Ultimately, the consumer pays higher prices for goods and services. (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 in undesignated places, including the side of the road.
- According to the Colorado Motor Carriers Association, various regulations affect the times deliveries and pickups can be made. This 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 second 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, crumbling pavement, generally aging infrastructure, 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 – noise mitigation and wear and tear on roadways are also issues

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. Figure 1, updated with 2014 data, identifies the locations with the highest congestion costs to freight and businesses. In sum total, the cost of congestion delay is more than $1 million a day to commercial vehicles and businesses in the DRCOG region.

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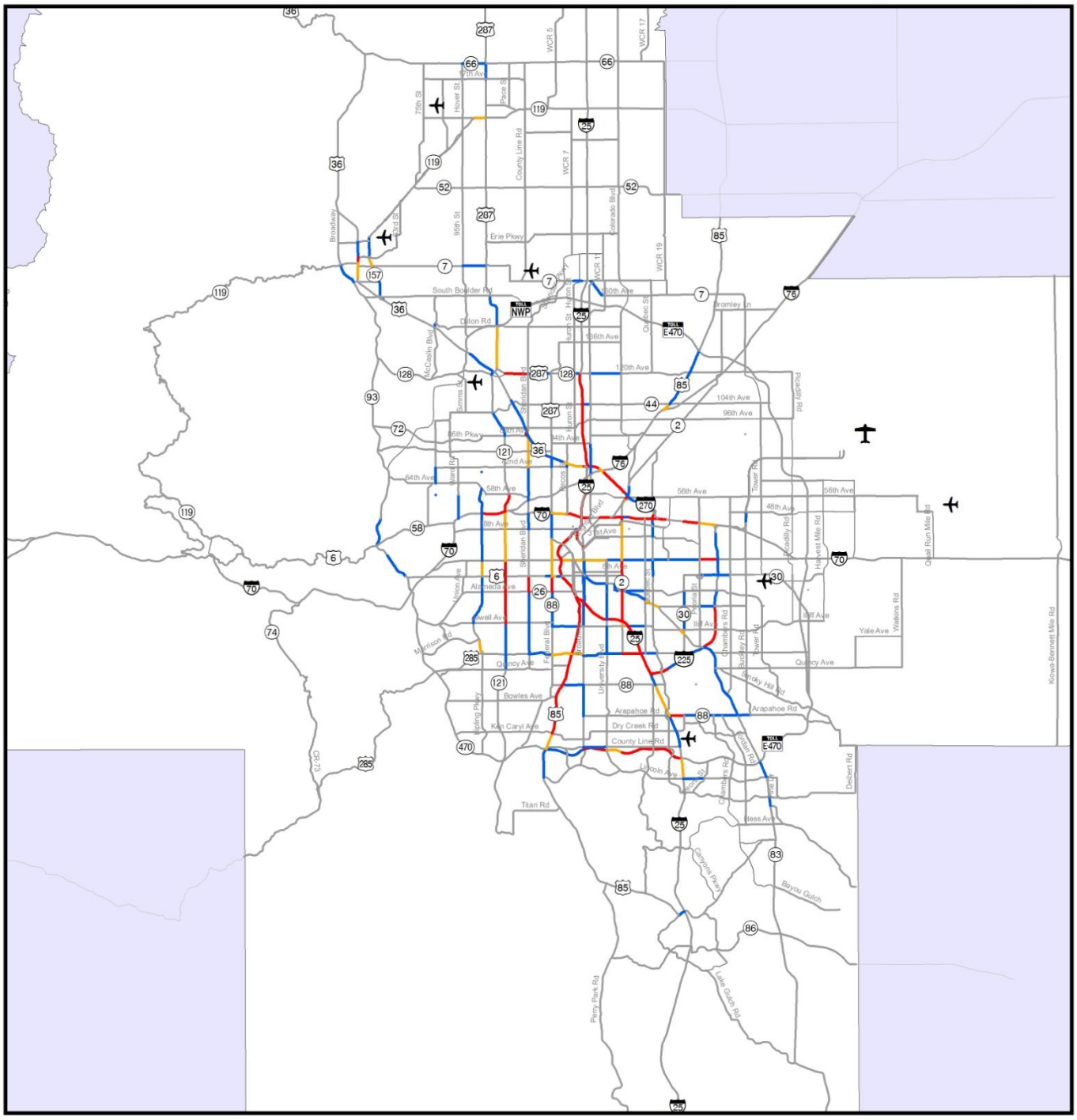
Figure 1
2014 Locations with Highest Congestion Costs to Freight/Businesses

Metro Vision Regional Transportation Plan



LEGEND

Daily Cost / Mile

- < $1,000
- $1,000 - $2,000
- $2,000 - $3,000
- >$3,000

N

0 4.5 9

Miles

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 guarantee, 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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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.

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

In Colorado, the interim NMFN includes the National Highway Freight Network (NHFN) in Colorado (the interstates, small segments of E-470, US 6, US 85, and SH 2 in the metro Denver area and eight intermodal connectors in the metro Denver area), as well as all Class I railroads, and Denver International Airport. The final NMFN will be designated by the end of 2016 and will further incorporate any Critical Rural and Urban Freight Corridors designated by that time.

The FAST Act continues a MAP-21 requirement that US DOT establish a national freight network consisting of the National Highway System, freight intermodal connectors, and aerotropolis (airport-related) facilities. The FAST Act repealed both the Primary Freight Network and National Freight Network from MAP-21, and established a NHFN to strategically direct Federal resources and policies toward improved performance of highway portions of the U.S. freight transportation system.

The NHFN includes the following subsystems of roadways:

- **Primary Highway Freight System (PHFS):** This is a network of highways identified as the most critical highway portions of the U.S. freight transportation system determined by measurable and objective national data. The network consist of 41,518 centerlines miles, including 37,436 centerline miles of Interstate and 4,082 centerline miles of non-Interstate roads.
- **Other Interstate portions not on the PHFS:** These highways consist of the remaining portion of Interstate roads not included in the PHFS. These routes provide important continuity and access to freight transportation facilities. These portions amount to an estimated 9,511 centerline miles of Interstate,

nationwide, and will fluctuate with additions and deletions to the Interstate Highway System.

- **Critical Rural Freight Corridors (CRFCs):** These are public roads not in an urbanized area which provide access and connection to the PHFS and the Interstate with other important ports, public transportation facilities, or other intermodal freight facilities.

- **Critical Urban Freight Corridors (CUFCs):** These are public roads in urbanized areas which provide access and connection to the PHFS and the Interstate with other ports, public transportation facilities, or other intermodal transportation facilities.

Prior to designation of CRFCs and CUFCs, the NHFN consists of the PHFS and other Interstate portions not on the PHFS, for an estimated total of 51,029 centerline miles. States and in certain cases, MPOs including DRCOG, are responsible for designating public roads for the CRFCs and CUFCs in accordance with the FAST Act. State designation of the CRFCs is limited to a maximum of 150 miles of highway or 20 percent of the PHFS mileage in the State, whichever is greater. State and MPO designation of the CUFC is limited to a maximum of 75 miles of highway or 10 percent of the PHFS mileage in the State, whichever is greater. Colorado's mileage limits are 160.69 centerline miles statewide for CRFCs and 80.35 centerline miles statewide for CUFCs (for urbanized areas over 50,000 in population). As of fall 2016, DRCOG and CDOT are working together to define the critical freight corridors within the DRCOG region.

CDOT's 2015 State Highway Freight Plan also designates specific freight corridors based on a range of 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.

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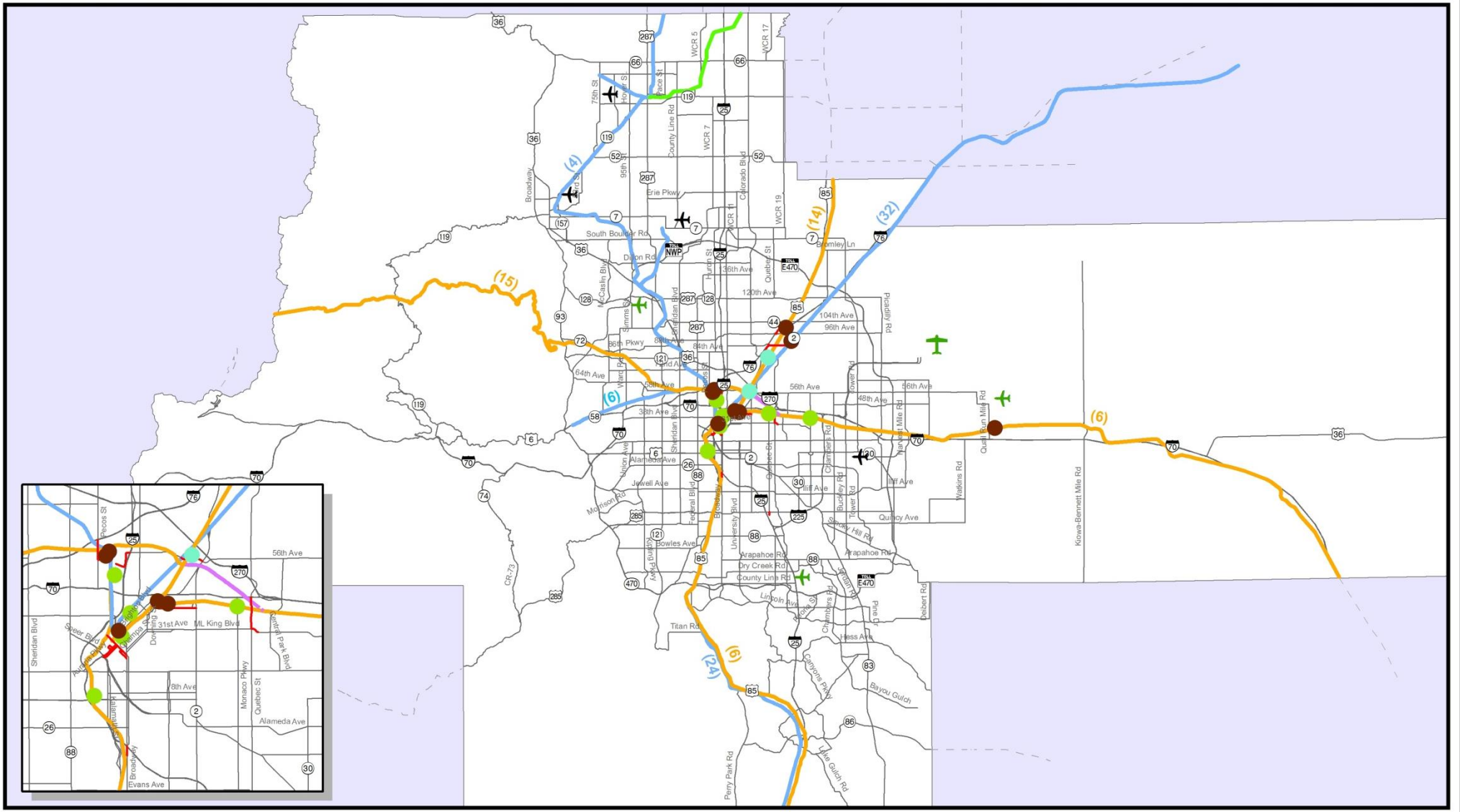
Figure 2
Rail, Air and Intermodal Freight Network
2014

Metro Vision Regional Transportation Plan



LEGEND

- 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

N

0 5 10
Miles

SOURCE DATA:
Enter all data sources here, included base map information

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

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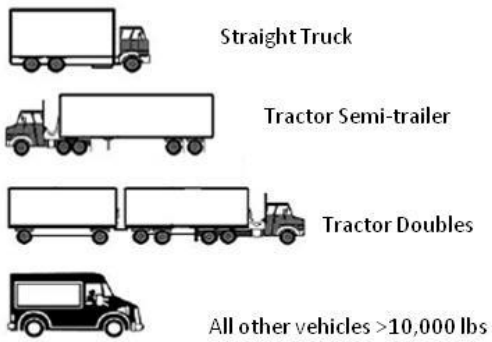
1. Trucks/Roadways

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;
- 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 winter-time 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.

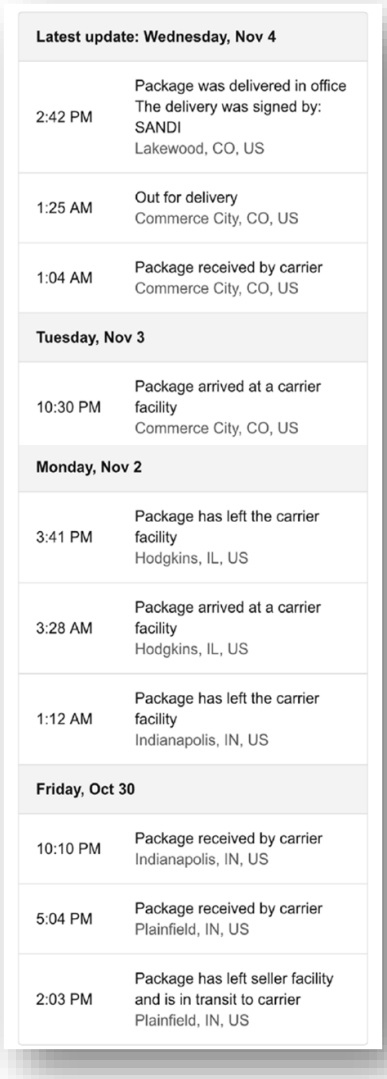
2. Commercial Vehicle Volumes

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.

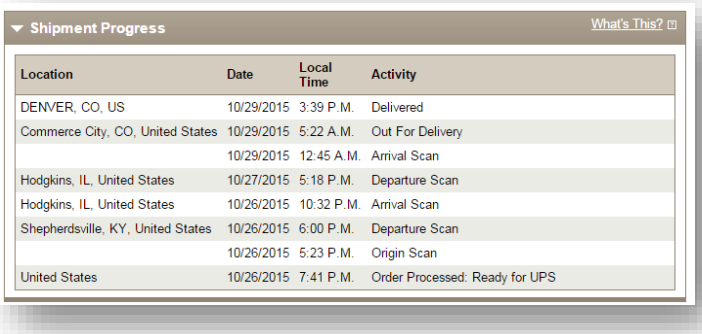
Package Delivery – from Seller to Buyer

One key way that commercial vehicles affect our daily lives is in the delivery of packages, particularly with increasing e-commerce. The graphics to the right and below illustrate typical updates offered to consumers to track the delivery status of their packages.

From a goods movement perspective, it is interesting to note how many places a package is transferred to and what modes it may have traveled to reach the consumer. For example, both packages originated in the Midwest and were routed through a carrier facility in Hodgkins, IL (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.



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



Shipment Progress What's This?

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

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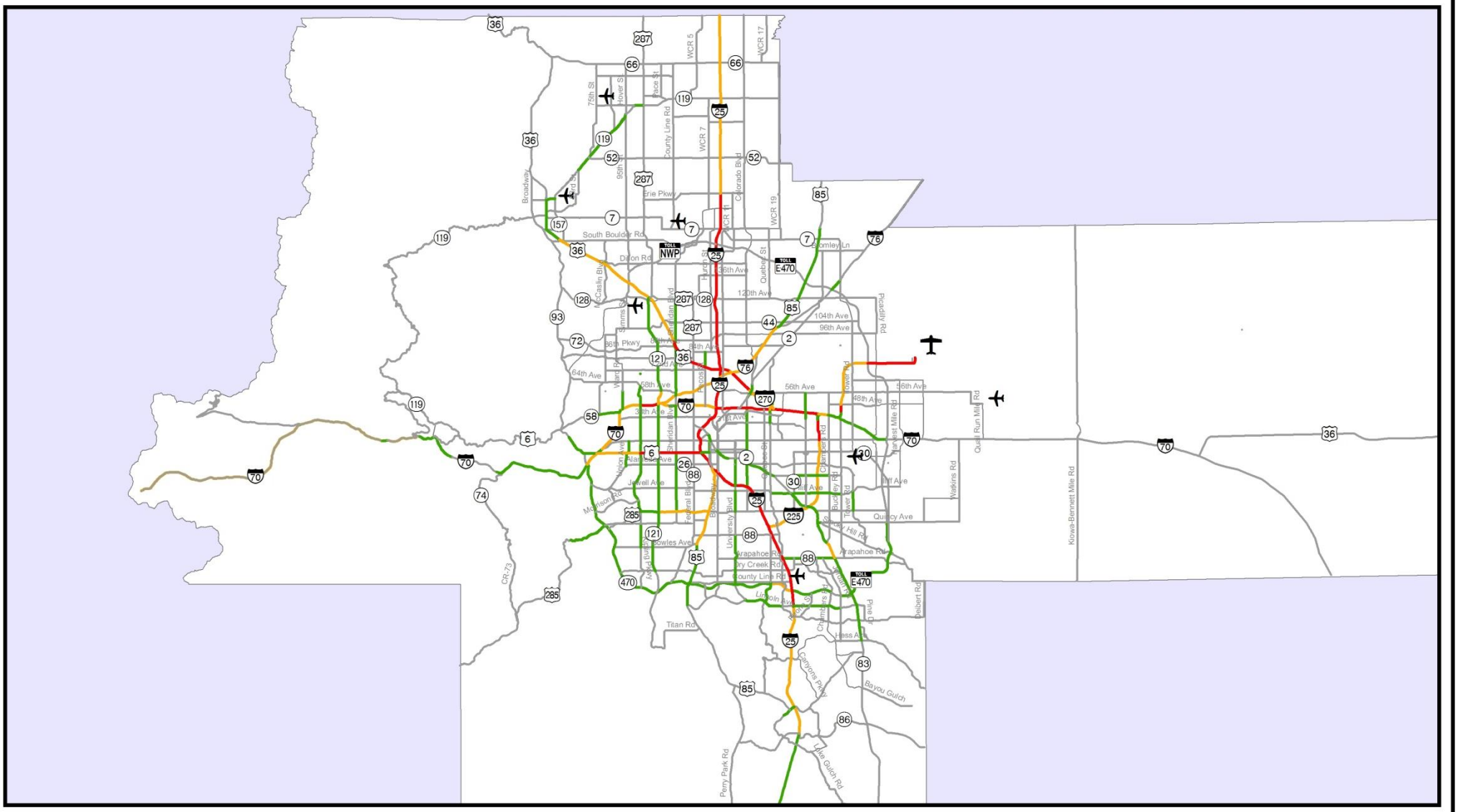
Figure 3

2014 Commercial Vehicle Volumes

Metro Vision Regional Transportation Plan



LEGEND

2014 Commercial Vehicle Volumes per Day

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

N

0 5 10

Miles

SOURCE DATA:
Enter all data sources here, included base map information

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

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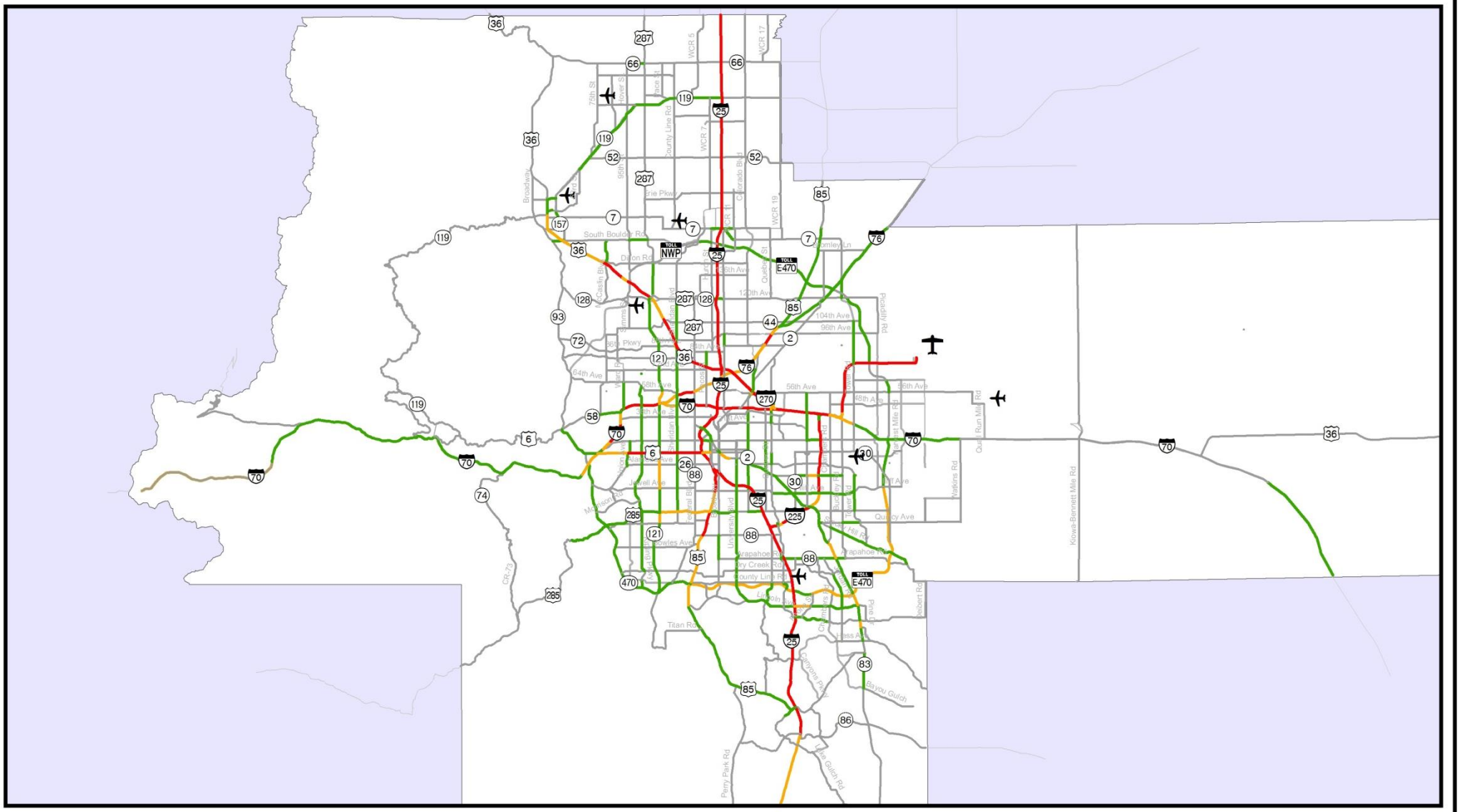
Figure 4
2040 Commercial Vehicle Volumes
Metro Vision Regional Transportation Plan



LEGEND

2040 Commercial Vehicle Volumes per Day

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

N

0 5 10
Miles

SOURCE DATA:
Enter all data sources here, included base map information

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

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

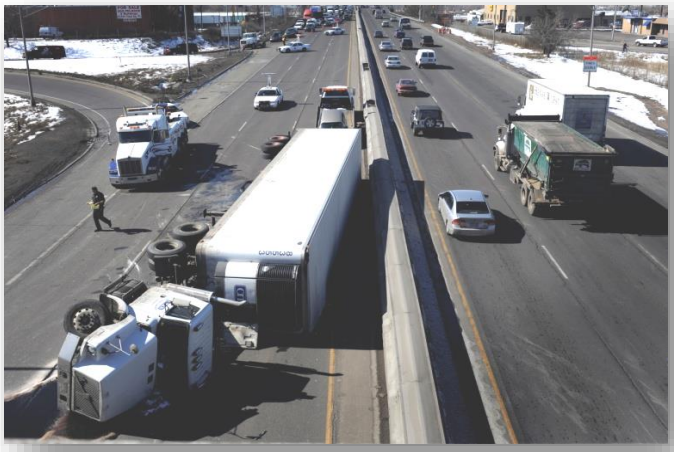
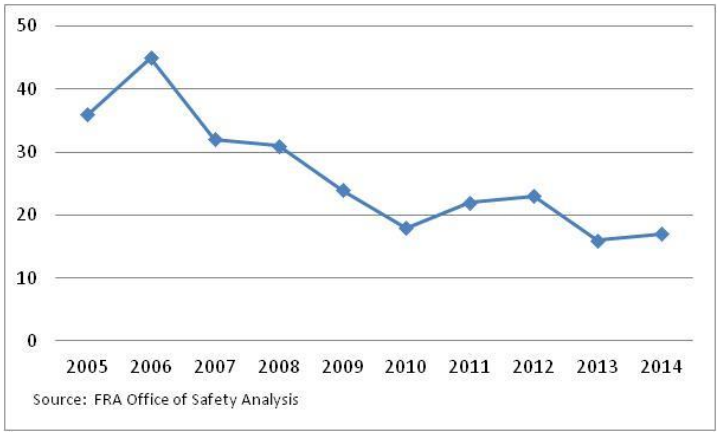


Table 1: Comparison of Truck and Total Crashes (2010-2012)

	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.

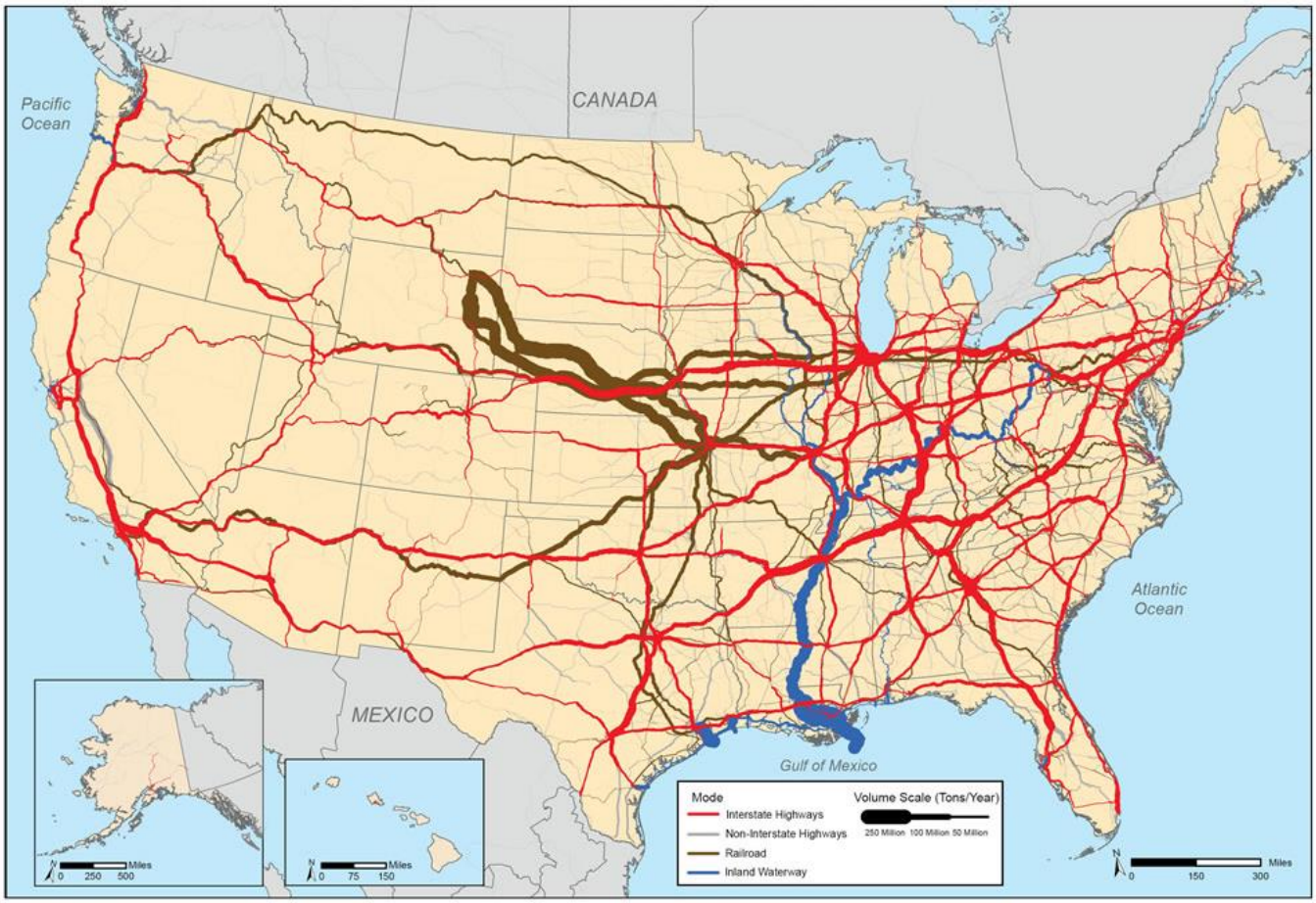
Figure 5: Colorado Railroad Crossing Crashes (2005-2014)



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 Trvansportation 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 or 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, Kaneb 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	56th Ave. and Brighton Rd.	Pipeline Terminal
Kanab Pipeline Transfer	80th Ave. and W. of SH-2	Pipeline Terminal
BNSF Rennicks Yard	53rd Ave. and Bannock St.	Rail Yard
BNSF 31st St. Yard	Globeville Rd. and 38th St.	Rail Yard
UP Burham (4th 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. 48th Ave.	Rail-Truck Transfer Facility
BNSF TOFC Yard	Pecos St. and 56th Ave.	Rail-Truck Transfer Facility
UP Rolla Auto Transfer	96th Ave. and US-85	Rail-Truck Transfer Facility
UP 40th St. Yard	40th Ave. and York St.	Rail-Truck Transfer Facility
BNSF Irondale Auto Transfer	SH-2 and 88th Ave.	Rail-Truck Transfer Facility
UP Pullman Yard	N. of 40th 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 show that 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.

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Figure 7
At-Grade Railroad Crossings on the Regional Roadway System

LEGEND

At-Grade Crossings

- Railroad Main Line
- Siding/Spur
- Future grade separation

- Union Pacific Railroad
- BNSF Railway
- Great Western Railroad
- Regional Transportation District (RTD)
- Denver Rock Island Railroad

- Roads Outside Region
- Regional Roadway System

N

0 5 10
Miles

SOURCE DATA:
Enter all data sources here, included base map information

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

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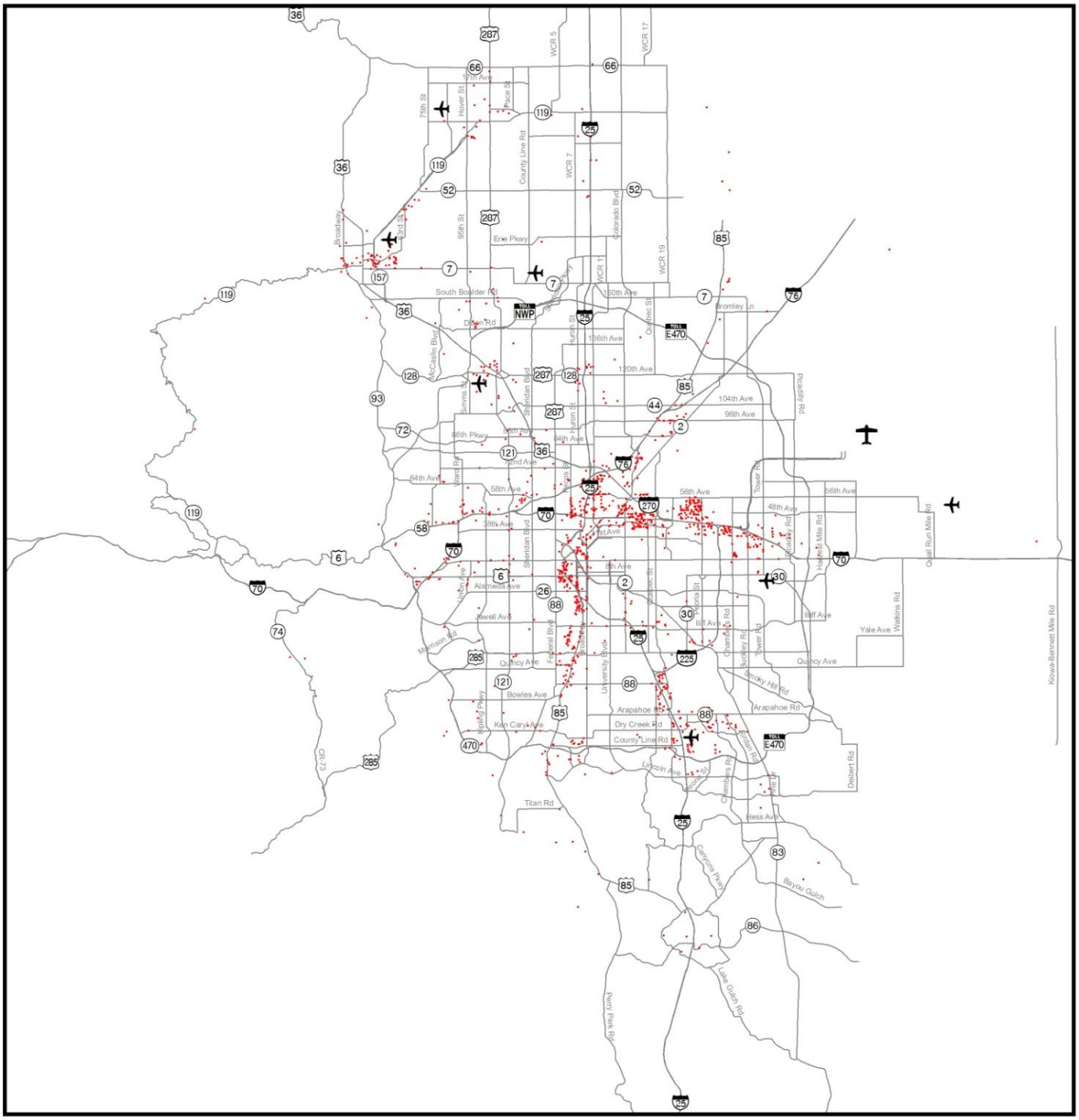
Figure 8
Locations of Wholesale Trade & Warehousing Firms
Metro Vision Regional Transportation Plan



LEGEND

Wholesale Trade and Warehousing Establishments
(More than 10 employees)

N

0 4.5 9
Miles

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 guarantee, 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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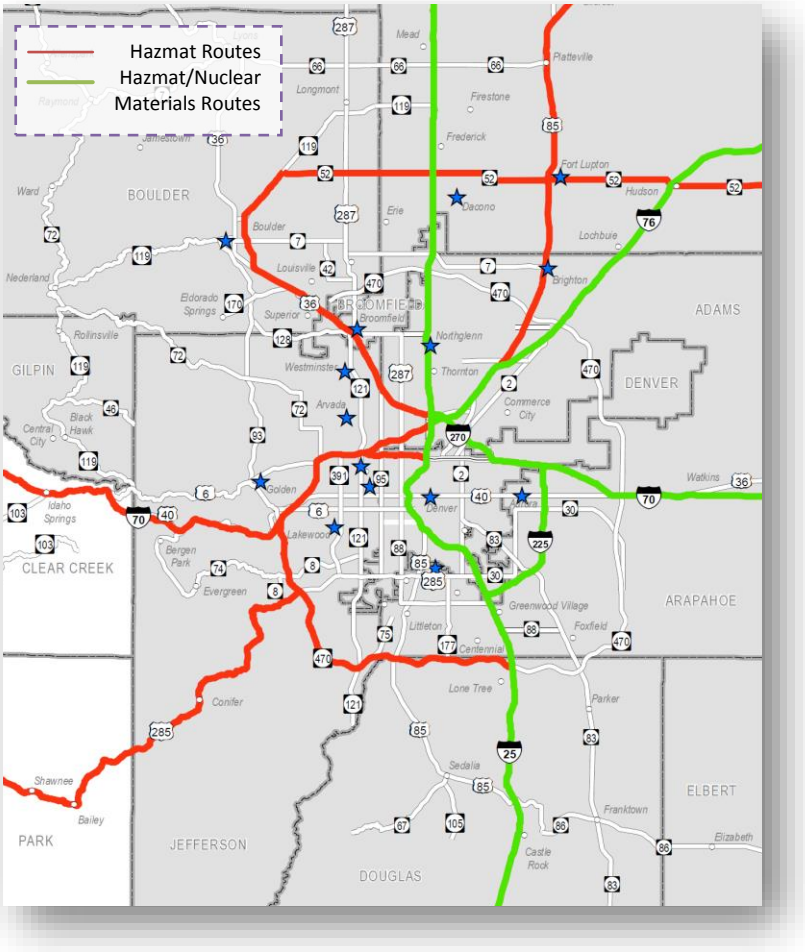
10. Hazardous Materials

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.

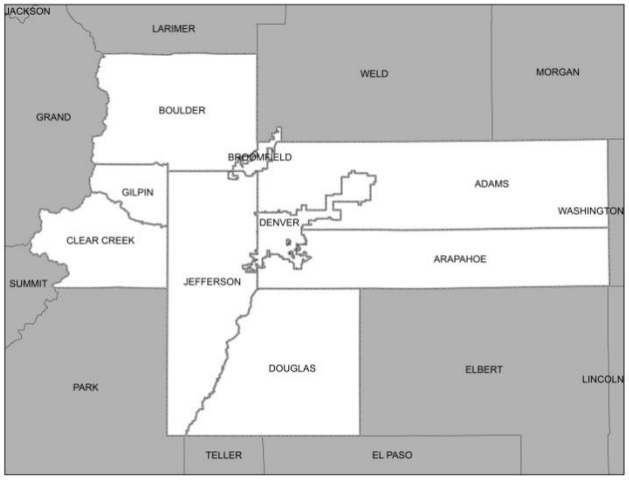
Figure 9: Designated Hazmat & Nuclear Materials Routes



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, where feasible, is included. According to CDOT's *State Highway Freight Plan*, oil and gas activity is heavily concentrated in Weld County, with over 21,000 active wells (40% 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 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 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

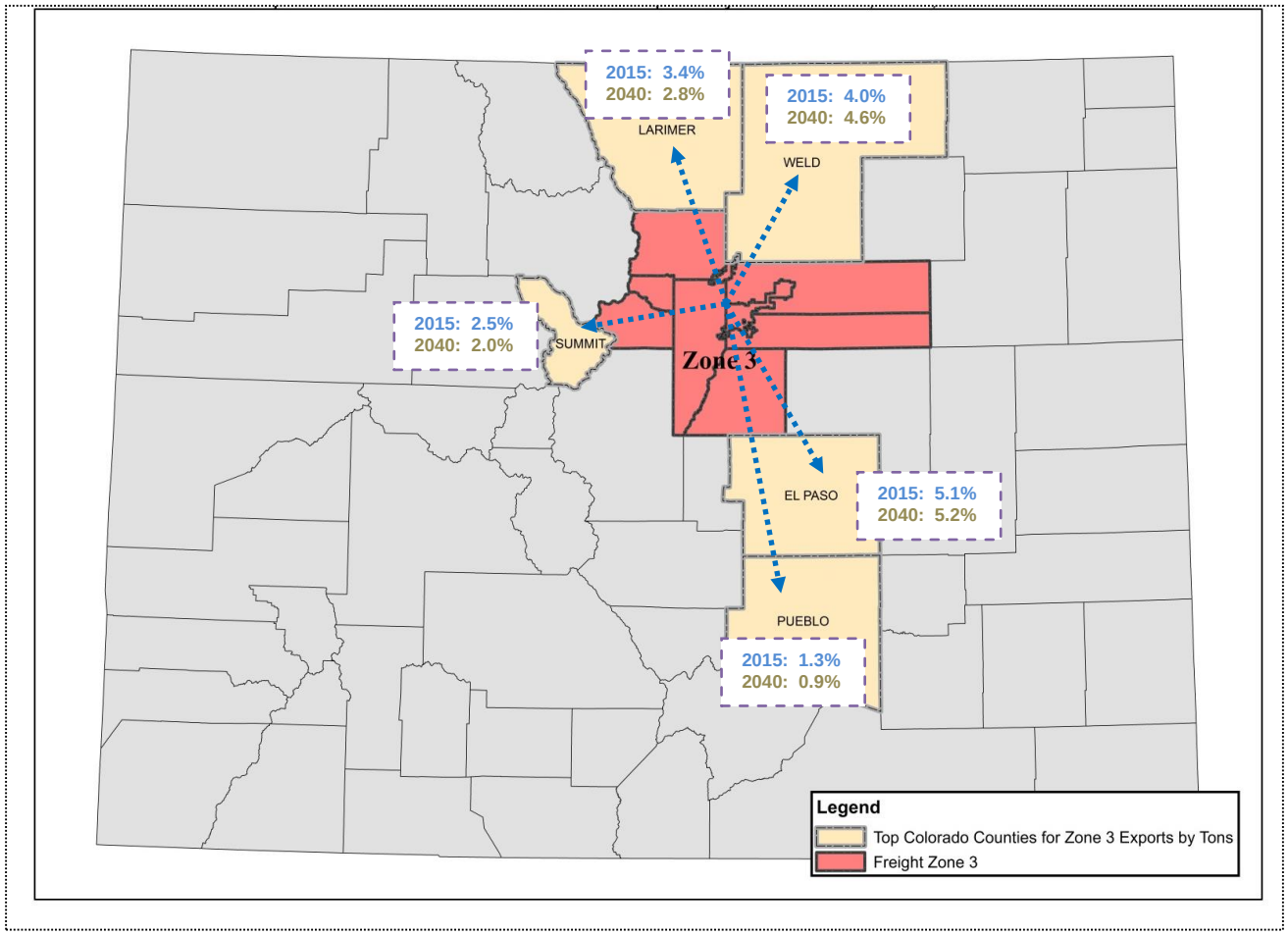
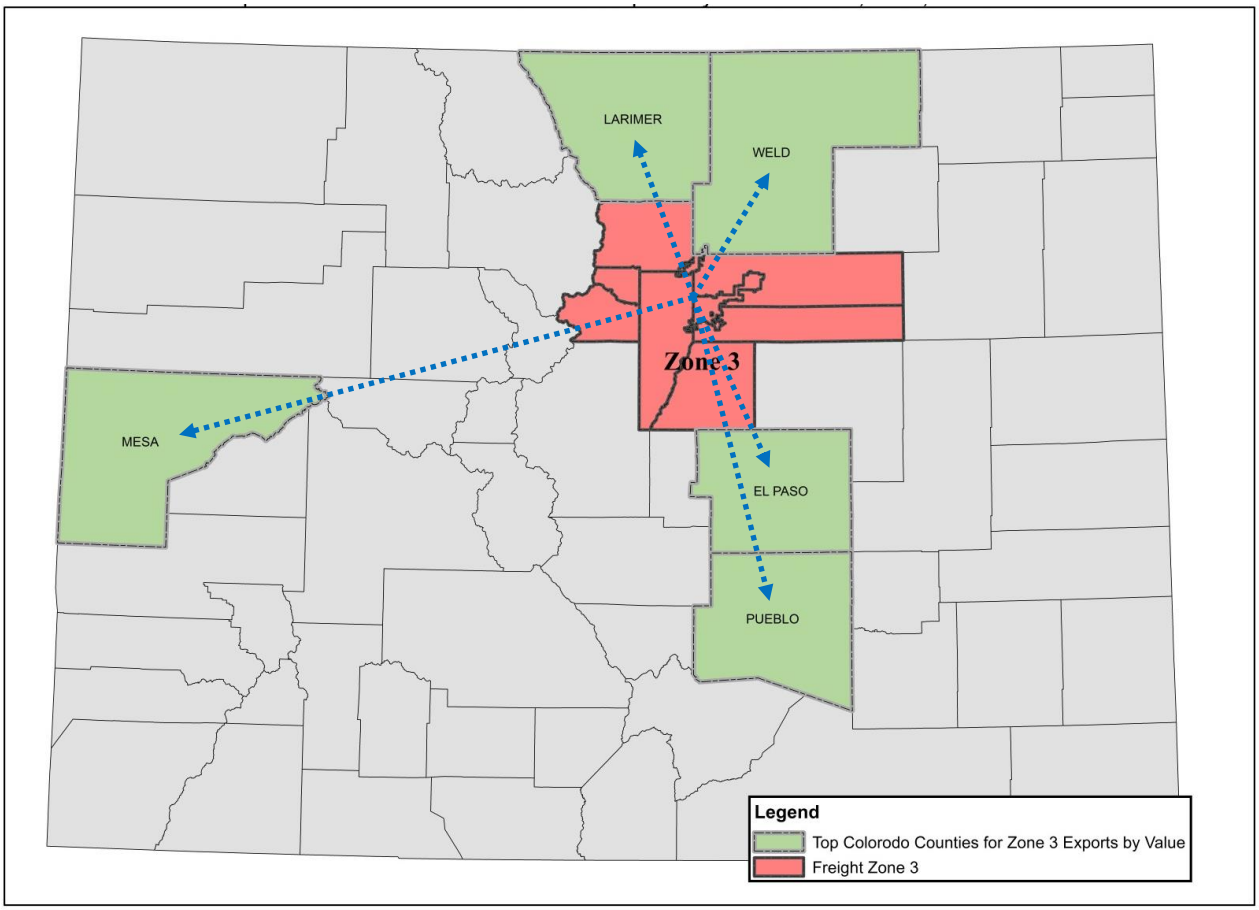


Figure 12: Top Colorado Destinations of Denver Region Exports by Value in 2010 and 2040



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

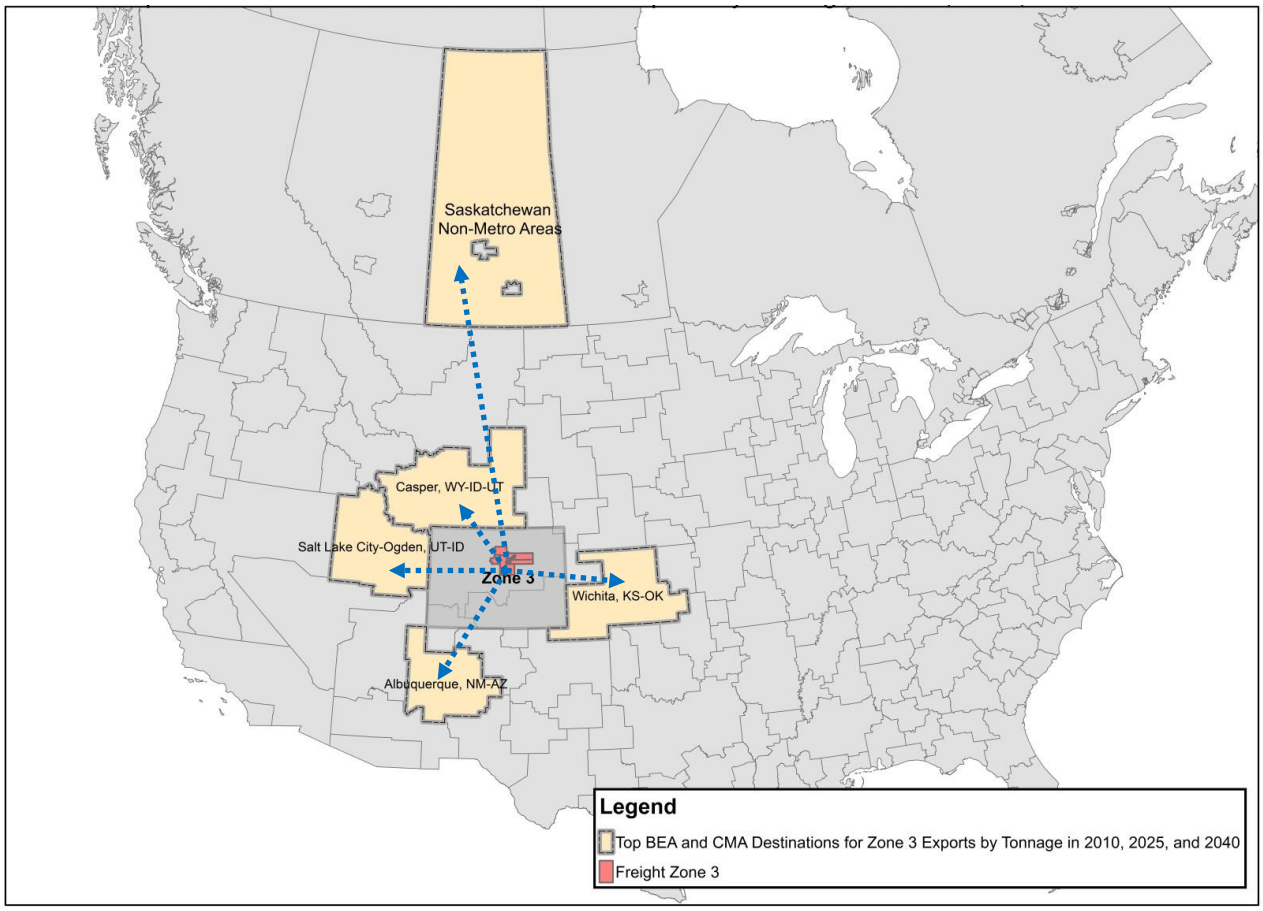
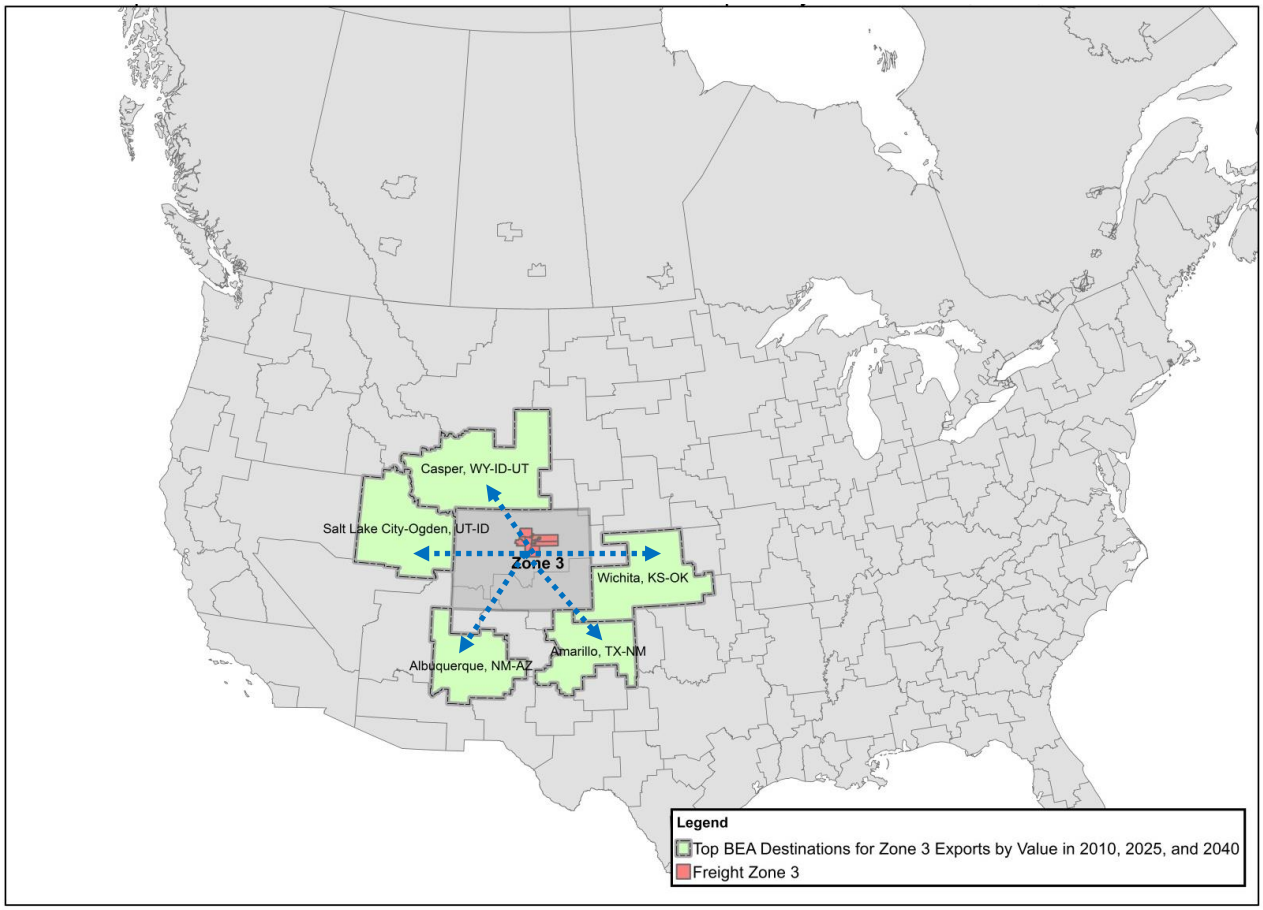


Table 7: Top Out of State Destinations (by Value) of Denver Region Exports by Truck

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

	2010		2040	
Mode Split	**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

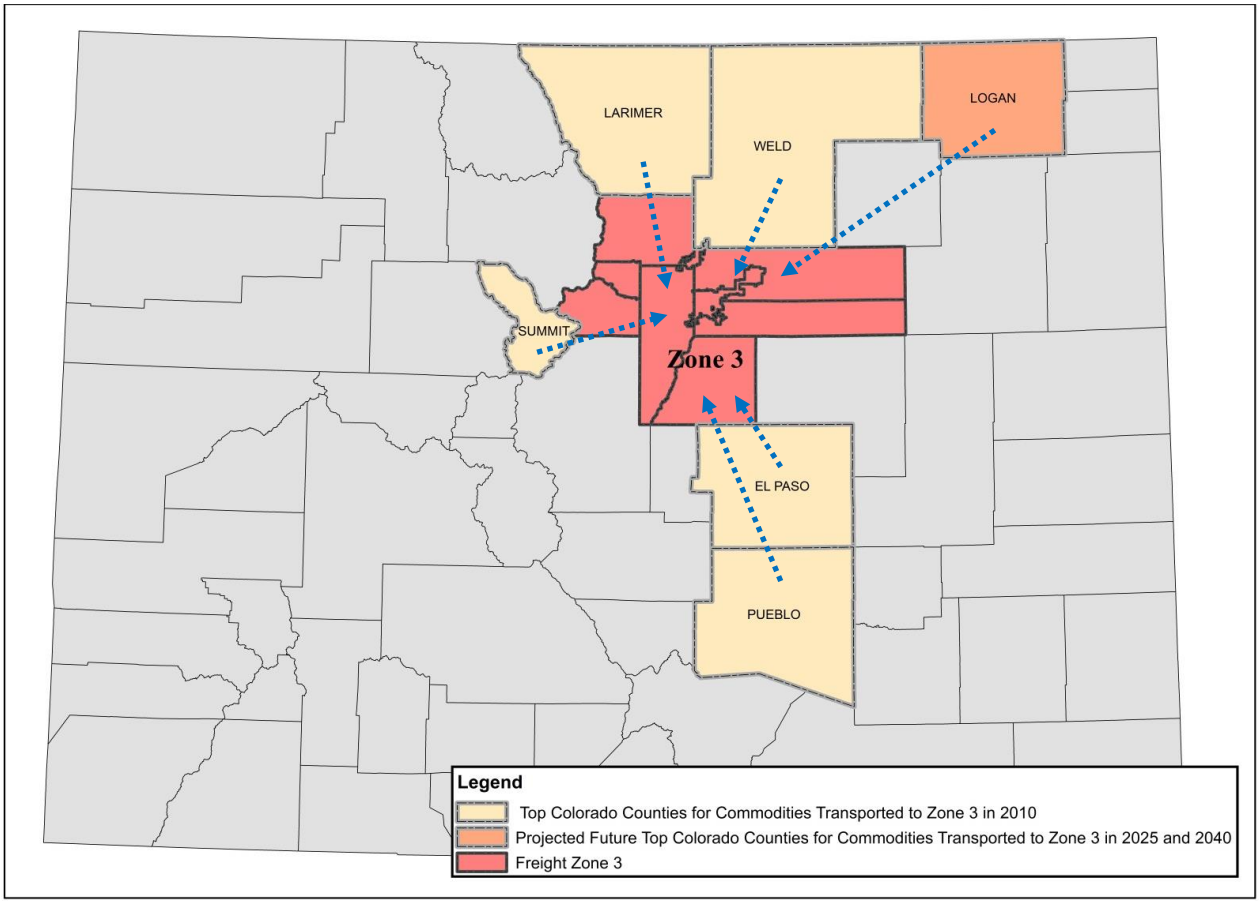
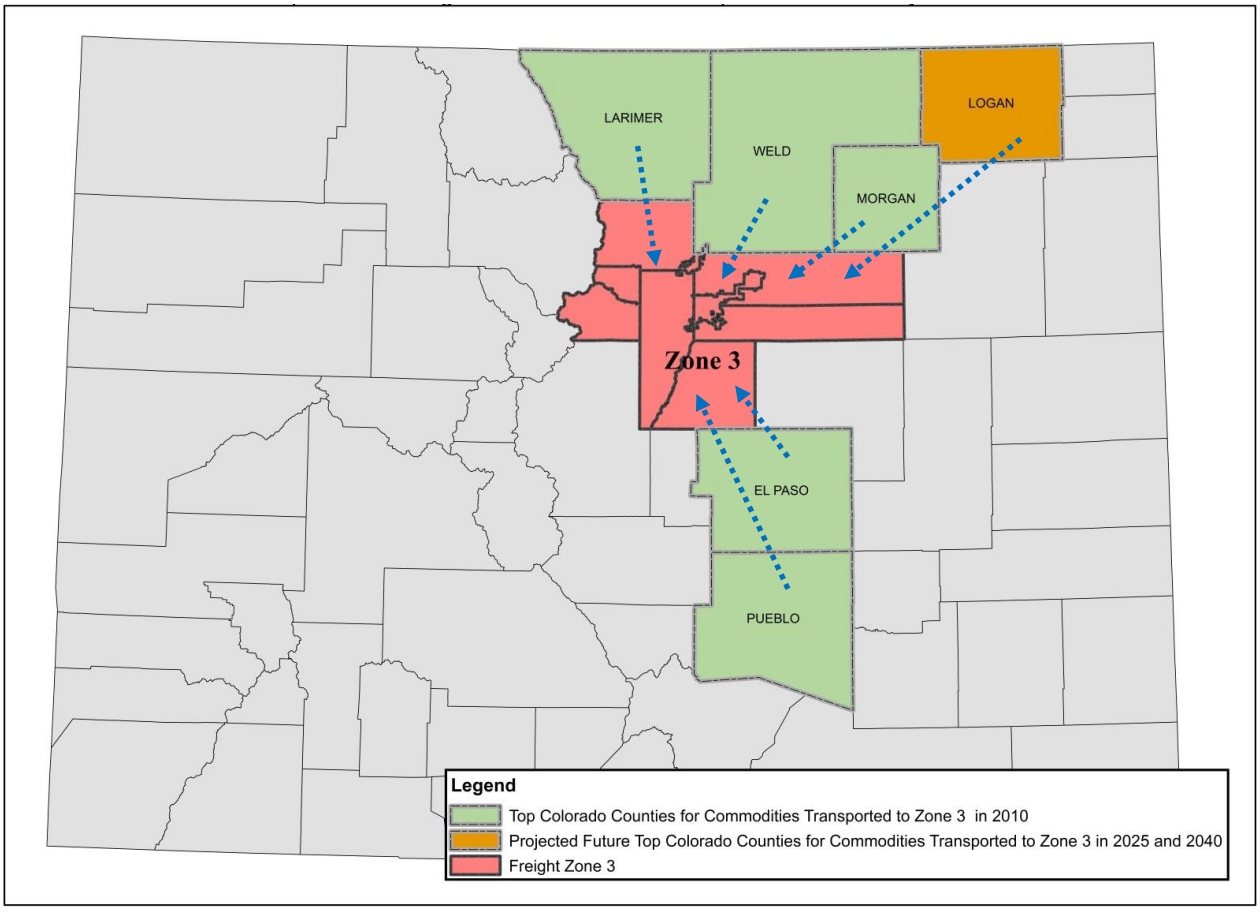


Figure 16: Top Colorado Origins of Commodities Transported into the Denver Region by Value in 2010 and 2040



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

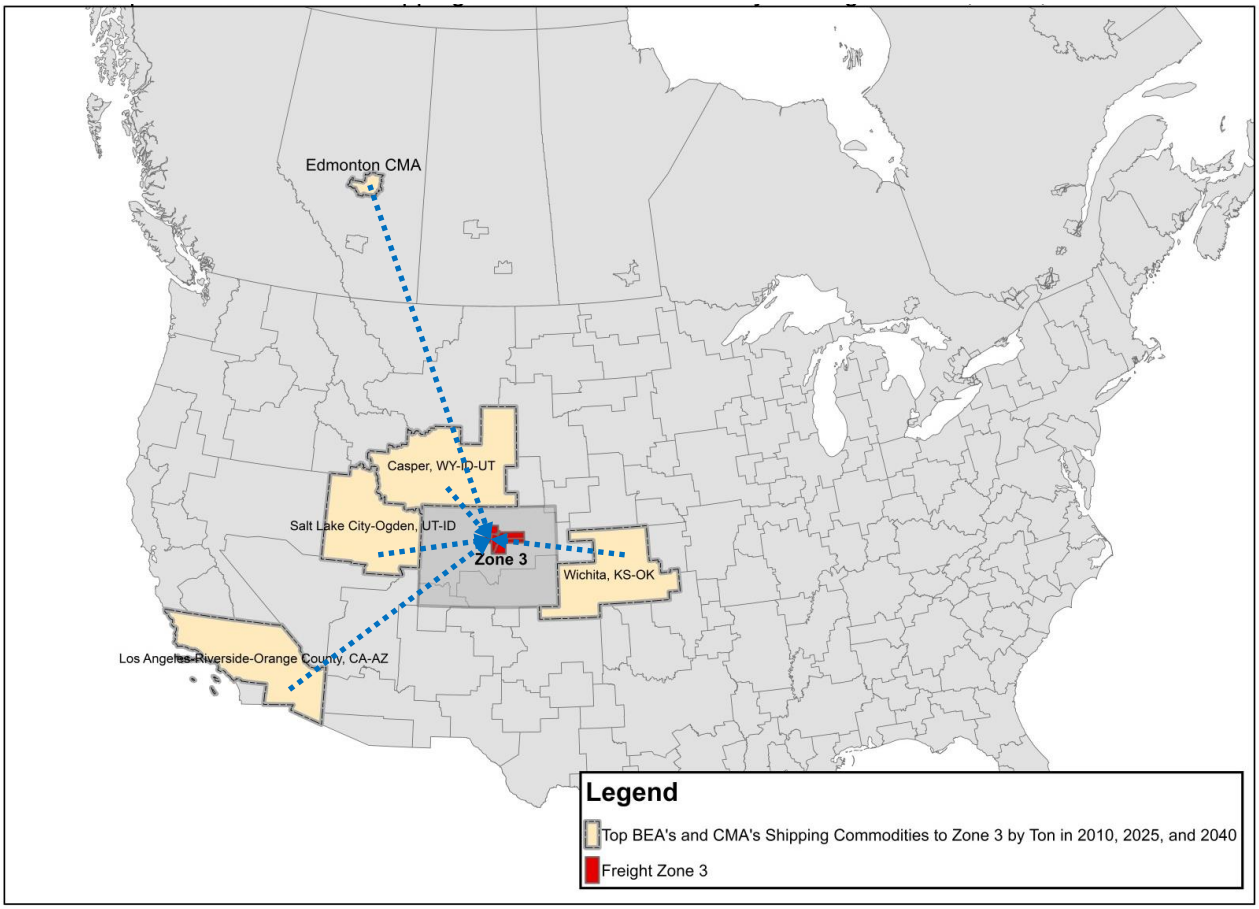
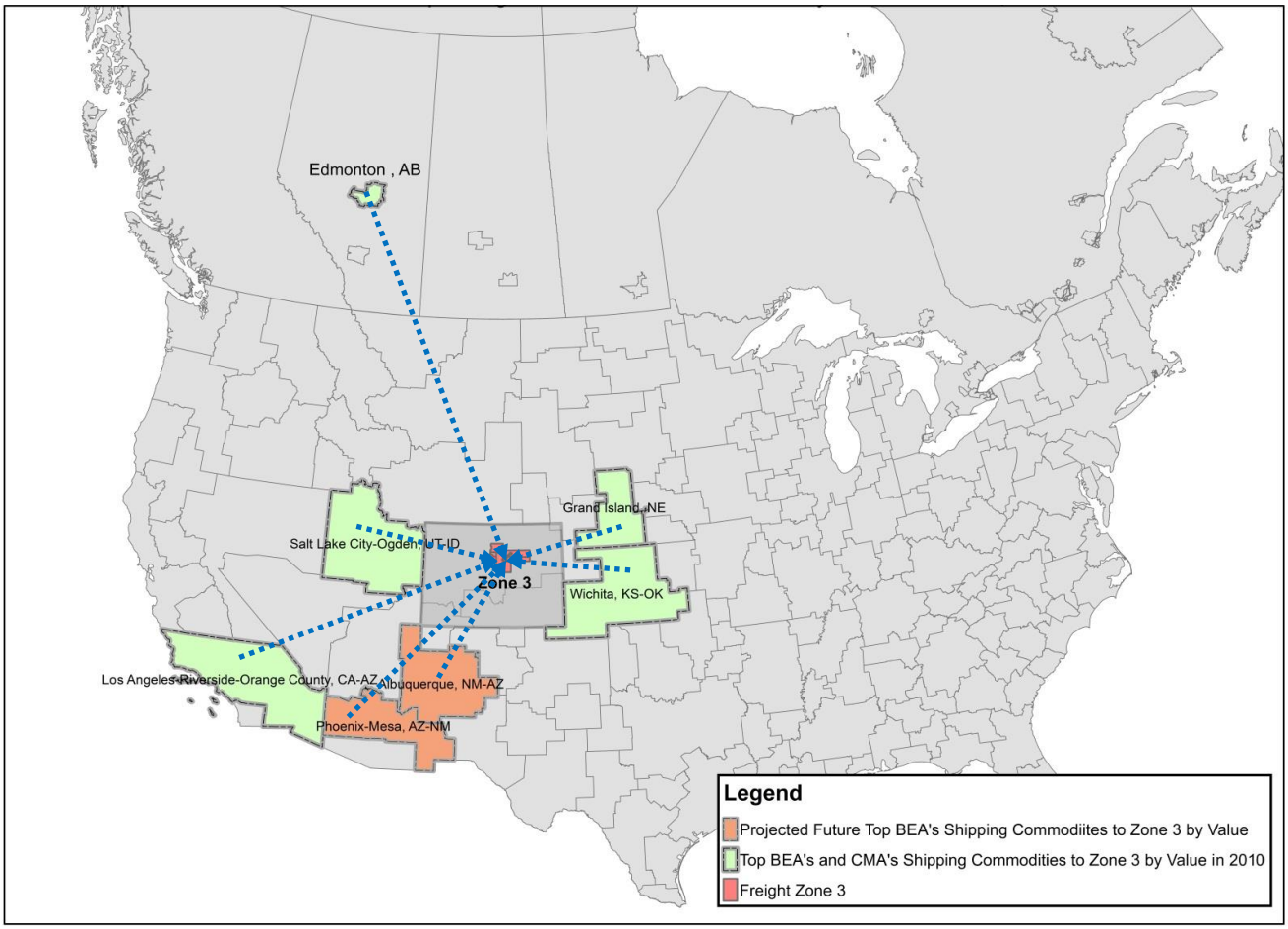


Table 12: Top Out of State Origins (by Value) of Denver Region Imports by Truck

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;
- Provide roadway management and Intelligent Transportation System applications such as traveler information systems, incident management, and variable message signs, and
- Efficiently operate, maintain, and repair roadways and other transportation facility assets so that freight and all traffic can travel smoothly and safely.

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

- I-25 (US-36 to SH-7): add managed lanes – opened in 2016
- I-25 (Santa Fe Dr. to US-6): interchange capacity
- I-70 (Brighton Boulevard to Chambers Rd.): add 2 new managed lanes
- 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 Blvd: interchange capacity
- US-36 (I-25 to Table Mesa Dr.): add managed lanes – opened in 2015
- US-85 (Highlands Ranch Pkwy. to County Line Rd.): widen from 4 to 6 lanes
- C-470 (Kipling Pkwy. to I-25): add toll managed lanes
- SH-2 (72nd Ave. 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 are 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.

Since 2008 CDOT's Heavy Tow or Quick Clearance winter program offers standby heavy wreckers at strategic locations along I-70, between Floyd Hill and Vail Pass. This allows stalled commercial vehicles to be moved quickly from traffic lanes. This program, continues to be successful at reducing traffic congestion and delays along the Interstate 70 West corridor. Service is provided between late November and late April each year and sometimes during holidays or as severe storms as needed. Before implementation of the Quick Clearance program, the average time to clear a commercial vehicle from a traffic lane was approximately 50 minutes. This program has cut that time in approximately half[1].

Additionally, e-commerce has become a significant share of the retail market, 6 percent, or more than $1 trillion worth of goods worldwide in 2014. Rapid growth is expected to continue. To keep up with demand, retailers are looking beyond giant warehouses on the peripheries of metropolitan areas. While there will still be demand for those types of warehouses, smaller sites are popping up in places within a 10 to 30-minute drive from central business districts. These sites tend to be smaller; often there are move-in ready sites available. Because of their central location, these sites are sometimes referred to as "last-mile terminals" as they enable shorter delivery turnarounds to places where there is more population density[2]. Relatedly, drone delivery is an emerging concept being investigated by e-commerce companies like Amazon. These and other emerging and rapidly-evolving technologies could potentially revolutionize freight travel and delivery; at the same time, their transportation and mobility implications are still unknown.


Credit: CNN/Amazon

In the near future deliveries will be made using autonomous vehicles and drones. An example of using autonomous vehicles to make a delivery happened in Colorado. Recently there was a test run when a Anheuser-Busch collaborated with Otto, a subsidiary of Uber that is developing self-driving truck technology, to ship beer from Fort Collins to Colorado Springs on an autonomous vehicle[3].

In light of growing urban freight delivery demand, the City of Seattle is teaming up with Costco, Nordstrom, and UPS to rethink the management of traffic congestion, curbs, sidewalks, parking, and other infrastructure through University of Washington's new Urban Freight Lab. This lab will test more

[1] Colorado Department of Transportation, "Winter Driving Assistance Programs", accessed Dec. 8, 2016 (https://www.codot.gov/travel/winter-driving/CommercialVehicles.html)
[2] Nate Berg, "The E-Commerce Revolution: Online Boom Testing Infrastructure's Limits", *In Transition*, Winter 2016, Volume 25, 4-13
[3] LeBeau, Phil, "Driverless beer run; Bud makes shipment with self-driving truck", CNBC, October 25, 2016, http://www.cnbc.com/2016/10/25/driverless-beer-run-bud-makes-shipment-with-self-driving-truck.html

efficient methods to deliver goods ordered online to large retail and commercial buildings. Possible strategies could include centralized drop-off lockers and curb space management[4].

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 PM_{10} emissions from motor vehicles. Similarly, heavy-duty diesel engines are a large contributor to NO_x emissions. Continued improvements to diesel engines and fuels, including alternative fuels to the extent practical to the freight industry, will result in cleaner running trucks. Improvements that reduce roadway and rail congestion will also result in less pollution from truck and rail operations.

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

The final phase two program promotes a new generation of cleaner, more fuel efficient trucks by encouraging the development and deployment of new and advanced cost-effective technologies. These standards cover model years 2018-2027 for certain trailers and model years 2021-2027 for semi-trucks, large pickup trucks, vans, and all types and sizes of buses and work trucks. The standards are expected to lower CO_2 emissions by approximately 1.1 billion metric tons, save vehicle owners fuel costs of about $170 billion, and reduce oil consumption by up to two billion barrels over the lifetime of the vehicles sold under the program.

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.

[4] Associated Press, "New Seattle freight lab tackles urban delivery congestion", *Denver Post*, Oct. 15, 2016 (http://www.denverpost.com/2016/10/15/seattle-freight-lab-urban-delivery-congestion/)

APPENDIX 6

2040 MVRTP Coordinated Transit Plan

2040 MVRTP Appendix 6
DRCOG Coordinated Transit Plan

DRAFT: December 2016

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Section I: Introduction

Transit is a vital part of the DRCOG region's multimodal transportation system. one-way trips were provided by public transit agencies have been near or above 100 million for almost a decade. Transit provides mobility by connecting people to jobs, schools, shopping, medical care, and recreation. It also promotes independence and economic development. The region's transit system must also increasingly address major trends, such as a rapidly aging population, new technology, an evolving economy, and changing residential and workplace preferences. Transit services are available throughout the DRCOG region in rural, suburban, and urban areas.

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

A. Plan Purpose & Federal Requirements

The DRCOG Coordinated Transit Plan is the

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

The Coordinated Transit Plan inventories existing transit services and identifies fiscally constrained and envisioned transit service and system needs for the DRCOG region. It looks at both general public transit and human service transportation. These services are not mutually exclusive. For example, while many older adults and individuals with disabilities will be served by transit modes specifically designed for their needs, many more will use general public transit. This plan integrates transit modes intended for specific populations and for the general public. The Federal Transit Administration (FTA) requires that projects selected under the FTA 5310 grant program (Enhanced Mobility for Seniors and Individuals with Disabilities) be included in a Coordinated Transit Plan like this one.

The purpose of this plan is to improve mobility for older adults, individuals with disabilities, low-income individuals, and others with mobility challenges. Existing service providers are identified, service gaps

are forecasted, and strategies are identified to address mobility needs. As the CPTHSTP, the Coordinated Transit Plan also addresses the following FTA requirements:

- An assessment of available services that identifies current transportation providers (public, private, and non-profit);
- An assessment of transportation needs for individuals with disabilities and older adults. (This assessment can be based on the experiences and perceptions of the planning partners, and/or on more sophisticated data collection efforts, and gaps in service.);
- Strategies, activities, and/or projects to address the identified gaps between current services and needs, as well as opportunities to achieve efficiencies in service delivery, and
- Priorities for implementation based on resources, time, and feasibility for implementing specific strategies and/or activities identified[1].

As noted previously, FTA requires projects funded in the FTA 5310 program be included in the Coordinated Transit Plan. However, "FTA maintains flexibility in how projects appear in the Coordinated Plan. Programs and projects may be identified as strategies, activities, and/or specific projects addressing an identified service gap or transportation coordination objective articulated and prioritized in this plan[2]." For example, a proposed 5310 project to expand transportation services for individuals with disabilities is consistent with the section of the Coordinated Transit Plan defining the needs for expanded services for that population.

B. Public and Stakeholder Outreach

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

Staff received valuable input from key partners, including the Denver Regional Mobility and Access Council (DRMAC), the Regional Transportation District (RTD), and the Colorado Department of Transportation (CDOT). A variety of techniques were used to provide information and solicit public

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

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

comment, including public forums and meetings, surveys, and community planning sessions. Major outreach and engagement activities that helped develop the Coordinated Transit Plan include the following:

DRCOG and DRMAC Forum

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

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

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

CDOT Statewide Transit Plan and DRCOG Open House

DRCOG and CDOT jointly hosted an open house for *CDOT's Statewide Transit Plan* and DRCOG's Metro Vision Regional Transportation Plan in 2014.

CDOT Statewide Transit Survey of Older Adults and Adults with Disabilities

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

Local Coordinating Councils

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

There are LCCs representing each county in the DRCOG region. These organizations are in various stages of assessing and prioritizing needs. In 2013, DRMAC partnered with four LCCs in the DRCOG region and the University of Colorado-Denver to develop needs assessments and service gaps analyses. Studies were prepared for the LCCs in Adams, Arapahoe, Boulder, and Broomfield Counties. Douglas and

Jefferson Counties completed needs assessments with help from consultants. All of the needs assessments and gaps analyses were reviewed as important input for this plan.

Community Assessment Survey for Older Adults (CASOA™)

DRCOG's AAA contracted with the National Research Center to conduct a CASOA™. The 2015 CASOA™ is a statistically valid survey of the needs of older adults as reported by older adults themselves in communities throughout the DRCOG AAA's planning area. The Boulder and Weld County AAAs both conducted their own surveys.

County Council on Aging Surveys

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

- Developing the AAA Four Year Plan (2015-2019);
- AAA 2015-2017 Older Americans Act/State awards for Senior Services, and
- This Coordinated Transit Plan.

The Boulder and Weld County AAAs also conducted similar surveys.

2013 RTD Paratransit Customer Satisfaction Survey

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

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

United States of Aging Study of Denver Region

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

DRMAC Membership Meetings

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

DRCOG Board & Committee Meetings

All DRCOG meetings are open to the public. The meetings provide a forum for citizens to provide input on various topics including transportation topics covered in this plan.

RTD Board & Committee Meetings

RTD is governed by a 15-member publicly elected Board of Directors. Directors are elected to a four-year term and represent a specific district. Each RTD Board and committee meeting (several per month) includes time for public input.

RTD Citizens Advisory Committee

RTD's Citizens Advisory Committee meets quarterly to advise RTD. Committee members are appointed by the RTD Board of Directors to three-year terms. The meeting venue alternates around the region to make it easier for stakeholders to offer input.

RTD Local Government Meetings

RTD holds regular meetings with its local government planning partners including municipalities, counties other transit providers, community based organizations, and DRCOG.

Community Living Advisory Group to the Governor of Colorado

The Community Living Advisory Group worked closely with the Colorado Commission on Aging and other planning groups to consider and recommend changes to the delivery of long term services and supports through Medicaid managed care programs. Transportation was one of the key items discussed.

Sustainable Communities Initiative (SCI)

DRCOG's SCI, financed by a three-year grant from a federal collaboration of the U.S. Department of Housing and Urban Development, the U.S. Department of Transportation and the U.S. Environmental Protection Agency, addressed ways in which jurisdictions, housing and economic development agencies, investors and developers, and non-profit organizations can work together to focus future housing and jobs around transit stations. SCI was a coordinated effort among 86 partner organizations led by the DRCOG to address one of the region's most pressing and exciting challenges: leveraging the planned multi-billion-dollar expansion of the transit system to meet other regional needs and opportunities.

C. Definitions and Acronyms

Several important terms and acronyms are used throughout the Coordinated Plan and are defined in Figures 1 and 2.

Figure 1: Definition of Terms

- **demand response:** any non-fixed route system of transporting individuals that requires advanced scheduling by the customer, including services provided by public entities, nonprofits, and private providers
- **door-through-door services**: personal, hands-on assistance for persons who have difficulties getting in and out of vehicles and buildings
- **fixed route:** a system of providing designated public transportation in which a vehicle is operated along a prescribed route according to a fixed schedule
- **general public transportation:** regular, continuing shared-ride surface transportation services that are open to the general public
- **human service transportation:** shared-ride surface transportation services (often demand response) that are open to segment(s) of the general public defined by age, disability, or low income
- **Local Coordinating Council (LCC):** an alliance of community organizations and individuals that work together to achieve common goals regarding human service transportation
- **paratransit:** complementary transportation service required by the ADA for individuals with disabilities who are unable to use fixed route transportation systems
- **public transportation:** regular, continuing shared-ride surface transportation service (demand response or fixed route) that are open to the general public and/or segment(s) of the general public defined by age, disability, or low income
- **Regional Coordinating Council (RCC):** an alliance of community organizations and individuals that works together to identify and fulfill the public and human service transportation needs of their region focusing on travel across local jurisdictional boundaries
- **transit:** transportation by a conveyance that provides regular and continuing general or special transportation to the public
- **transit dependent person:** someone who must use public transportation for his/her travel

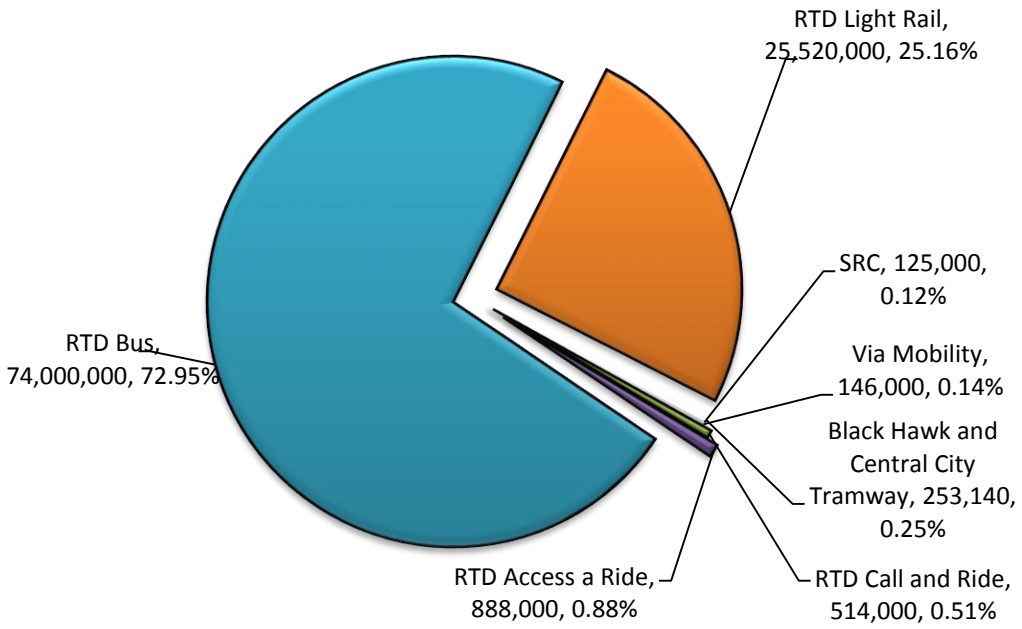
Figure 2: Acronyms

- AAA: Area Agency on Aging
- ADA: Americans with Disabilities Act
- BRT: Bus Rapid Transit
- CDOT: Colorado Department of Transportation
- CPTHSTP: Coordinated Public Transit-Human Services Transportation Plan
- DRMAC: Denver Regional Mobility and Access Council
- FAST Act: Fixing America's Surface Transportation Act
- FTA: Federal Transit Administration
- FHWA: Federal Highway Administration
- JARC: Job Access-Reverse Commute
- LCC: Local Coordinating Council
- MAP-21: Moving Ahead for Progress in the 21st Century
- NEMT: Non Emergent Medical Transportation (for Medicaid clients)
- RCC: Regional Coordinating Council
- RTD: Regional Transportation District
- SCI: Sustainable Communities Initiative
- SRC: Seniors' Resource Center
- TCS: Transportation Coordination Systems
- TNC: Transportation Network Company
- TOD: Transit Oriented Development

Section II: Assessment of Available Transit Services

This section profiles existing transit services and facilities in the DRCOG region and their ridership. The region's transit services include general public transportation, paratransit, and human service transportation. RTD is the major operator of general public transportation and paratransit. Conversely, human service transportation is provided by several non-profit, for-profit, and volunteer organizations. Figure 3 shows the total annual boardings for RTD, Black Hawk and Central City Tramway, and the region's two largest human service transportation providers (Via Mobility Services and Seniors' Resource Center[3]). In a given year RTD comprises more than 98% of the total boardings in the DRCOG region. RTD's system wide ridership in 2015 was just under 102 million. Average weekday boardings during the period from December 2014 to November 2015 was almost 340,000.

Figure 3: Annual Ridership- RTD, Black Hawk & Central City Tramway, Via Mobility Services, and Seniors' Resource Center

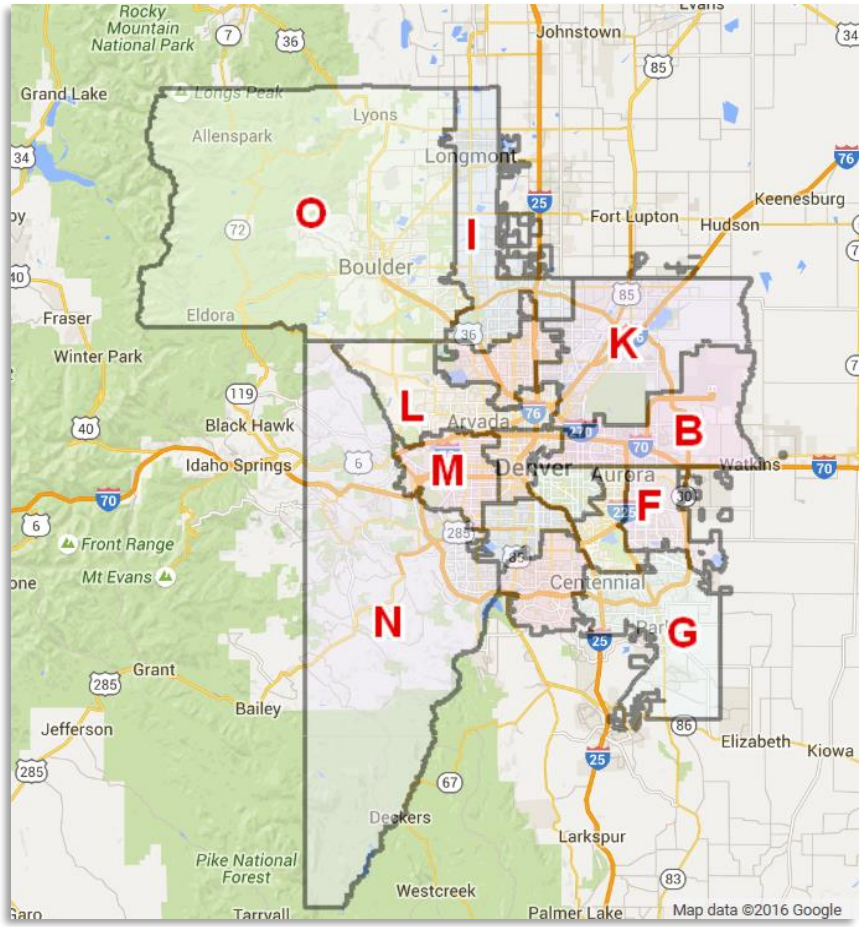


[3] SRC 2014 data from FTA 5310 Application; Via Mobility 2014 data from Via *2014 Annual Report to the Community*; RTD 2015 Data from *Service Performance 2015 Networked Family of Services*

A. RTD Service Boundaries

RTD serves a 2,340 square mile area where 2.8 million people live in all or parts of eight counties.

Figure 4: RTD Service Boundary and Board of Director District Map



B. Bus Service

RTD Fixed Route

The largest operator of general public transportation in the DRCOG region is the Regional Transportation District (RTD). RTD has almost 150 local, airport and regional fixed bus routes serving approximately 10,000 bus stops and more than 70 Park-n-Rides with 30,000 parking spaces. There were about 74 million boardings on RTD's fixed route bus system in 2015.

RTD Bus Rapid Transit

The term "Bus Rapid Transit" (BRT) is not easy to define. It refers to a variety of operational service, and technology characteristics that enable greatly improved bus service. RTD currently operates bus service in several corridors that include BRT features. Examples include the 16th Street MallRide in exclusive

ROW, bus routes in designated lanes on Broadway and Lincoln with signal priority, and as of January 2016, Flatiron Flyer BRT service between Boulder and Denver in managed lanes along US 36 and I-25.

RTD Call-n-Ride

RTD's Call-n-Rides offer demand response service available to the general public within a defined service area. This service generally operates in more suburban settings. Customers call to reserve a trip within each Call-n-Ride service boundary. RTD offers subscription service for the Call-n-Rides. Select Call-n-Ride service areas offer flex route service. The flex routes offer commuters a reservation-free ride during morning and evening rush-hours at scheduled stops and times along the route. There were over a half million Call-n-Ride boardings in 2014.

Other Fixed Route

Boulder Community Transit Network

The Boulder Community Transit Network is a network of bus routes throughout Boulder and connecting to surrounding cities and RTD's regional routes. The network has 10 bus routes: HOP, SKIP, JUMP, LONG JUMP, BOUND, STAMPEDE, DASH, BOLT, CLIMB, and H2C (Hop to Chautauqua, summer only). All routes are part of the RTD system and are operated by RTD except the HOP and H2C, which are operated by Via.

Englewood Art Shuttle

The City of Englewood provides a free circulator shuttle with 19 stops between the Englewood light rail station, downtown Englewood, and several hospital and medical buildings. Englewood contracts with RTD to operate the service, which operates every 15 minutes on weekdays between 6:30 am and pm.

University of Colorado at Boulder (Buff Bus)

The Buff Bus is a transportation service for students living in residence halls. The shuttle connects students with the Main Campus when classes are in session.

Black Hawk & Central City Tramway

Black Hawk Tramway connects major destinations in Black Hawk and Central City seven days a week. The free service is supported by the Black Hawk casinos and Central City. There are about a quarter million boardings on this service annually.

Lone Tree Link

The Lone Tree Link (initiated in 2014) is a free shuttle service connecting major employment centers along Park Meadows Drive with restaurants, retail, and the RTD system. The Link is funded through a public private partnership of employers and local government.

Intercity and Regional Bus

Other regional and intercity transit services include Amtrak service, Greyhound, CDOT's Bustang service, and other intercity bus service. Intercity and regional buses link the DRCOG region to the rest of the state and beyond.

C. RTD Rail

There were over 25 million boardings on RTD's rail system in 2015. Therefore, ridership numbers do not reflect future lines. Note that several lines opened in 2016.

Figure 5: FasTracks Map

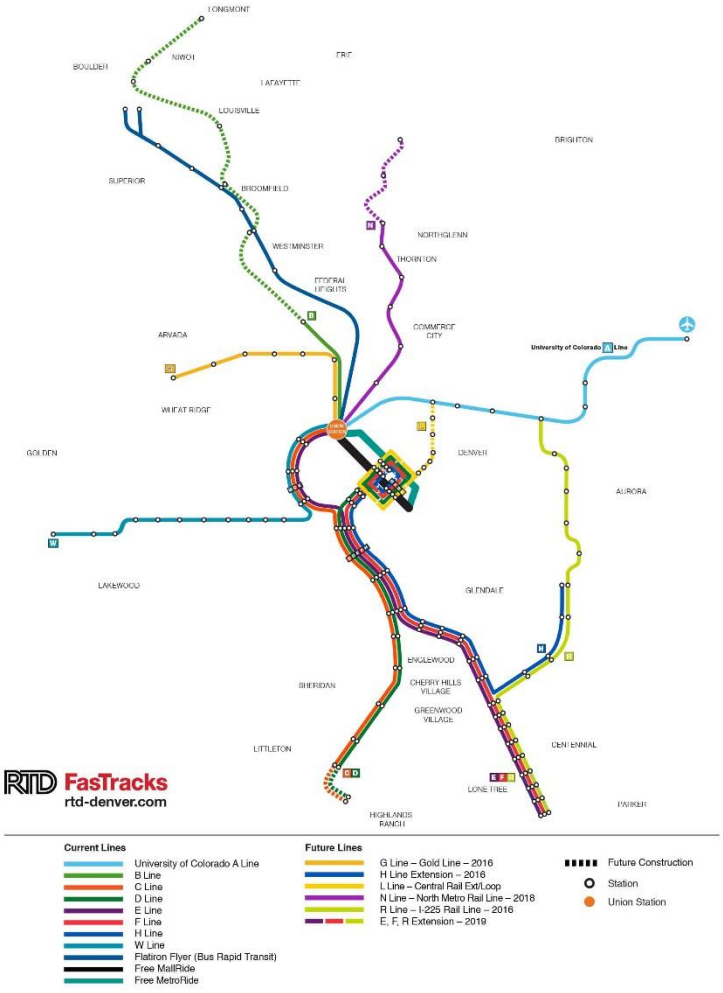


Figure 5 shows RTD's existing and future rapid transit (rail and bus) routes that are part of FasTracks along with the rest of the rapid transit system.

D. Intermodal Facilities

Denver Union Station (DUS)

At the heart of RTD's bus and rail network is Denver Union Station (DUS). DUS is a major intermodal passenger terminal connecting commuter rail, light rail, Amtrak, RTD buses, intercity buses, cars, taxis, trucks, bicyclists, and pedestrians.

Other Major Facilities

Several park-n-ride lots and transit stations exist for people to access transit via car, walking, or bicycling. Examples of stations serving as key transfer points include the following:

- Civic Center Station
- Boulder Transit Center and Boulder Junction
- Peoria Station
- I-25/Broadway
- An additional 70+ Park-and-Ride lots spread across the region

E. Paratransit, Human Service Transportation, and Other Services

RTD Paratransit (Access-a-Ride)

Under the Americans with Disabilities Act (ADA), transit agencies must provide complementary transportation services for people with disabilities who are unable to use fixed route bus or rail services. ADA complementary paratransit service must be provided within ¾ of a mile of a bus route or rail station, at the same hours and days, for not greater than twice the regular fixed route fare. RTD's service is branded as Access-a-Ride. Under contract with RTD, Easter Seals evaluates potential clients to determine ADA eligibility. Access-a-Ride provided almost 900,000 boardings in 2015, an increase of over 25% from 2014.

Other Human Service Transportation

Several agencies provide human service transportation throughout the region. Many offer services that go beyond the requirements of ADA: door-through-door services and in areas not covered by paratransit. Human service transportation includes specialized services for older adults and individuals

with disabilities. It can also include services for persons with low-income offered in areas where there is limited or no fixed route services. Major providers of human service transportation in the region include Via Mobility Services, Seniors' Resource Center (SRC), and Douglas County (contracts with multiple providers).

Via is a private, non-profit agency that offers a variety of transportation services. Their portfolio includes demand responsive and deviated fixed route. Via's transportation services operate in 19 communities in five counties, including Boulder and Boulder County, Brighton, rural Adams and Arapahoe Counties (Watkins, Strasburg, Bennett, Byers, and Deer Trail), and other communities. Via also conducts travel training: a comprehensive, intensive instruction designed to teach participants how to travel safely and independently on general public transportation.

SRC is also a private, non-profit agency that provides human service transportation among other services. SRC directly transports and/or brokers transportation in multiple counties: Adams, Arapahoe, Broomfield, Denver, Douglas, Jefferson, Clear Creek, Gilpin, and Park. SRC also operates A-Lift transportation via contract with Adams County for county residents who are 60+ or are mobility challenged, regardless of age.

Douglas County contracts with a wide range of providers in a brokerage model for transportation for older adults, individuals with disabilities, and low-income individuals. Contracted providers include

- Castle Rock and Parker Senior centers;
- Love, INC of Littleton, and Neighbor Network volunteer driver programs;
- SRC, and
- To the Rescue.

Each entity (Via, SRC, and Douglas County) integrates FTA 5310 funding, federal Older Americans Act funding, other federal funds, local funds, and other sources to pay for services.

A recent DRMAC study (Transportation Coordination Systems or TCS) notes the "region appears to be divided into three or four natural sub-regions: Boulder County, Denver metro and environs (Jefferson County, Broomfield, Adams, Denver, and Arapahoe counties), and Douglas County." Each sub-region has a primary human service transportation agency that directly provides and/or brokers trips with other smaller providers.

Other agencies that receive or recently received federal funding to provide human service transportation include but are not limited to

- City and County of Broomfield (Broomfield Easy Ride)
- Lakewood Rides
- Developmental Pathways
- Developmental Disabilities Center (Imagine!)
- Easter Seals Colorado
- Boulder County

In addition, the following agencies provide human service transportation and are members of DRMAC:

- Amazing Wheels
- Boulder County CareConnect
- Colorado Cab Company
- First Transit
- Littleton Omnibus and Shopping Cart
- Metro Taxi and South Suburban Taxi
- Town of Castle Rock

It is important to note that the list of providers currently receiving or potentially eligible to receive federal funding to provide human service transportation is always changing. This is because federal eligibility requirements change and because providers evolve over time (existing ones change, new ones are created). The Colorado Association of Transit Agencies (CASTA) maintains a database of transit agencies in the Denver region and across the state. DRMAC maintains a web-based interactive tool to help connect clients with service providers, called *Transit Options*. DRMAC also regularly publishes the *Getting there Guide* which lists transportation providers and resources.

Volunteer Drivers

A significant portion of trips for the transit-dependent population are provided by volunteer drivers. Volunteer drivers include friends, neighbors, and relatives providing transportation in informal arrangements (such as taking a home-bound neighbor to a doctor appointment). It also includes formalized volunteer driver programs. SRC, Via, Douglas County, and others also coordinate volunteer driver programs with their other services. They often reimburse volunteer driver mileage with grant funding through programs like FTA 5310.

F. Other Transit Services

Gilpin Connect

Gilpin Connect is a demand response service for people to access health care and other destinations outside of Gilpin County. This service is funded by gaming revenues.

Taxi Cabs

Taxi services play an important role in the provision of transit in the DRCOG region. This includes RTD's Access-a-Cab program and job access taxi voucher programs. Access-a-Cab is offered to current eligible Access-a-Ride customers as an alternative. Access-a-Cab does not meet the requirements for complementary paratransit service under the ADA and is not meant to replace the Access-a-Ride program. However, Access-a-Cab provides a more flexible schedule and is often less costly to RTD and the user. Douglas County and the Town of Castle Rock offer employment access trips using a taxi voucher program. This offers people who live and/or work where RTD service is limited or unavailable a way to get to and from work.

Transportation Network Companies

Transportation Network Companies (TNCs) like Uber and Lyft supply prearranged transportation services for a fee using an online-enabled application or platform (such as smart phone apps) to connect drivers using their personal vehicles with passengers. In August 2016, the City of Centennial teamed up with Lyft to offer free rides to and from the Dry Creek light-rail station. Users can get order a ride by going through the Go Centennial mobile app. Recently, Uber customers got the option to summon self-driving cars from their phones in downtown Pittsburgh Depending on the success of this pilot program, there may be expansion to other cities in the near future. This could be a new way for transit riders to travel the first and final mile. The State Public Utilities Commission (PUC) regulates TNC's.

Other Operators

Several private operators offer transportation for recreational travelers to the mountains. Many ski resorts have shuttle services for their employees. Additionally, many private operators provide rides to ski areas. Multiple providers offer bus service from the metro area to the casinos in Black Hawk and Central City; scheduled trips are made daily to the gaming communities. Super Shuttle and other airport shuttles provide service to and from Denver International Airport (DIA). Colorado Mountain Express (CME) offers shuttle service from DIA to mountain resorts. There are also shuttles that provide transportation to trailheads. Boulder County began the Hessie Trailhead shuttle program in the summer

of 2012 to address issues of vehicles that were parking and traffic becoming congested on the way to the trailhead.

Section III: Funding and Coordination

Funding for transit is complex. The US Department of Health and Human Services has conducted two inventories to ascertain how many federal programs provide funding that can be used for public transportation. The most recent inventory found 70 programs across 14 federal departments or independent agencies. This section provides an overview of local, state, and federal transit funding sources and how they are used in the DRCOG region.

Table 1 shows the major federal and state transit funding programs, and the "typical" annual allocation from each program for the DRCOG region. Each funding program is described in more detail later in this chapter. The region directly receives about $73 million annually through federal allocations. Transit agencies and providers in the region are eligible to compete for a portion of another $27 million annually in federal and state funds that are competitively awarded statewide. The largest single federal funding source is the FTA 5307 program, which funds capital and operating assistance in urbanized areas; RTD directly receives FTA 5307 funds as an annual formula allocation.

Transit funds can be categorized in three broad terms:

- *How the funds are distributed*: Federal and state transit funding is provided either directly through a specific allocation, such as through formula funding programs (FTA 5307, 5310, etc.), or is awarded competitively through a merit-based program (such as CDOT's FASTER transit program). In a complicated twist, formula funding programs can also be competitive. For example, the DRCOG region has a history of awarding FTA 5310 funds competitively. Conversely, competitive funds can be awarded by formula – RTD directly receives $3 million annually from CDOT's FASTER transit program and is eligible to compete for additional FASTER transit funds.

- *Where/how the funds can be spent*: All transit funds have some restrictions on eligible activities, and many come with geographic restrictions. For example, the DRCOG region's FTA 5310 large urban funds can be spent only on specific eligible activities in the Denver-Aurora urbanized area.

- *Who controls the allocation of funds to specific projects/services*: RTD directly receives FTA 5307 funds from FTA. It also controls FTA 5307 funds for the small urban areas in the DRCOG region. In contrast, FTA 5310 large urban funds for the Denver region are currently allocated by CDOT, but must be spent within the Denver-Aurora Urbanized Area. And while RTD receives FTA 5307

funds directly, CDOT competitively awards FTA 5311 rural and FTA 5310 small urban funds statewide.

Table 1 shows major transit funding sources and estimated amounts for the DRCOG region. It includes grants, fare box, and RTD's sales and use tax. In addition, forecasted future RTD revenues are also included.

Table 1: Estimated DRCOG Region Annual Transit Funding Amounts (Rounded Millions)

Annual FTA Formula Funding and FASTER Set-asides for DRCOG Region	
Program	Estimated Annual Allocation
FTA 5307 for Denver-Aurora Urbanized Area	$48
FTA 5307 for Boulder Urbanized Area	$3.4
FTA 5307 for Lafayette-Louisville-Erie Urbanized Area	$1.1
FTA 5307 for Longmont Urbanized Area	$2.3
FTA 5310 for Denver-Aurora Urbanized Area	$1.6
FTA 5337 High Intensity Fixed Guideway State of Good Repair for Denver-Aurora Urbanized Area	$8
FTA 5337 High Intensity Motorbus State of Good Repair for Denver-Aurora Urbanized Area	$.8
FTA 5339 for Denver- Aurora Urbanized Area	$4.5
FASTER Set-aside for RTD	$3
Total	**$72.7**

FTA and FASTER Funding Controlled by CDOT (projects in DRCOG region may be eligible to compete)	
Program	Estimated Annual Allocation
FTA 5310 for Urbanized Areas under 50,000 population	$.55
FTA 5310 for Urbanized Areas 50,000 to 199,999 population	$.97
FTA 5311 for the entire state	$11
FTA 5339 for Urbanized Areas under 50,000 population	$1.3
FTA 5339 for Urbanized Areas 50,000 to 199,999 population	$1.2
FASTER Statewide and Regional Pool[4]	$4
FASTER Local Pool	$5
Total	**$24.02**

[4] RTD and Bustang each receive a $3 million set aside from FASTER Statewide and Regional pool annually. These set asides have been subtracted from the total.

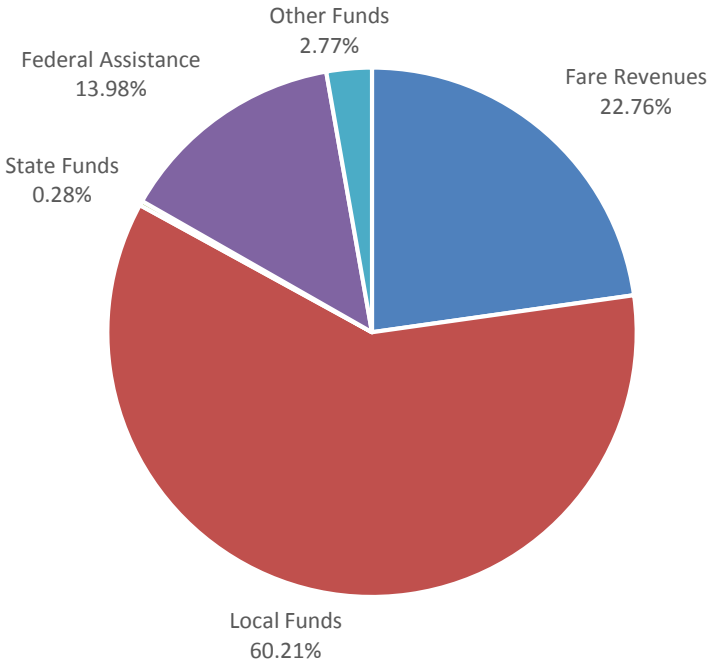
2015 RTD Revenue (non-grant)	
Fare Box	$119.3
Sales and Use Tax (FasTracks + Base System)	$330.8
Other Income	$ 8.1
Total	**$458.2**

RTD Forecasted Major Revenue Sources (non-grant) Rounded Millions						
	2016	**2017**	**2018**	**2019**	**2020**	**2021**
Fare Box	$131.3	$131.3	$131.3	$144.4	$144.4	$144.4
Sales and Use Tax	$346.8	$370.5	$390.8	$405.6	$418.6	$433.2
Other Income	$ 8.3	$ 8.6	$ 8.9	$ 9.1	$ 9.4	$ 9.6
Totals	**$486.4**	**$510.4**	**$531**	**$559.1**	**$572.4**	**$587.2**

Adopted from *Regional Transportation District Strategic Budget Plan Cash Flow Base System Capital and Operations 2016-2021*

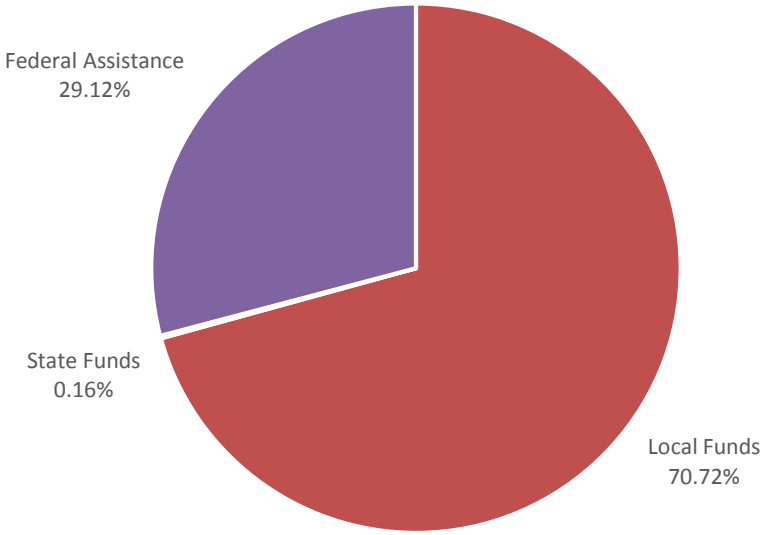
Tables 6 and 7 show the distribution of sources for RTD operating and capital funds. It is interesting to note that local funds make up the majority of funding for both operating and capital. Further, because of federal rules pertaining to how federal funding can be used in large urbanized areas federal assistance makes up a greater share of capital funding than operating for RTD. It is important to note that Figure 7 includes a portion of the New Starts grant for the Eagle P3 Project and, therefore, not fully representative of a typical year.

Figure 6: Sources for RTD Operating Funds



Source: National Transit Database- Denver Regional Transportation District 2014 Annual Agency Profile

Figure 7: Sources for RTD Capital Funds



Source: National Transit Database- Denver Regional Transportation District 2014 Annual Agency Profile

A. Human Service Transportation

Human service transportation includes a broad range of service options designed to meet the needs of the transportation disadvantaged, including persons with disabilities, low income individuals, and older adults. These individuals have different needs and require a variety of transportation services to ensure quality of life. Typically, these services are separate from those available to the general public and are often available only to qualified persons based age, disability, and/or income. Key funding sources are described below.

Local Entities

Municipalities, counties, non-profits, and other local entities typically contribute towards the cost of providing human service transportation. Many state and federal grants require a local match. Local project sponsors can provide matching funds or may choose to contribute resources above and beyond grant requirements. Some local services are provided solely with local funds, forgoing state and federal grants. Fares and donations also make up an important part of local funding.

FTA Section 5310 (Enhanced Mobility for Seniors and Individuals with Disabilities)

The FTA 5310 program funds transportation for older adults and individuals with disabilities. In the DRCOG region, project funding decisions are currently made by CDOT through a competitive funding process in consultation with DRCOG and other stakeholders. FTA has the following specific project-type criteria for allocating 5310 funds:

- *At least 55% of program funds must be used on capital or "traditional" 5310 projects. Examples include:*
    - *Buses and vans; wheelchair lifts, ramps, and securement devices; transit-related information technology systems including scheduling/routing/one-call systems; and mobility management programs.*
    - *Acquisition of transportation services under a contract, lease, or other arrangement. Both capital and operating costs associated with contracted service are eligible capital expenses. User-side subsidies are considered one form of eligible arrangement.*
- *The remaining 45% is for projects formerly allowed under the 5317 New Freedom program. Capital and operating expenses for new public transportation services and alternatives beyond those required by the ADA, designed to assist individuals with disabilities and older adults are eligible under this category. Examples include:*
    - *Travel training; volunteer driver programs; building an accessible path to a bus stop including curb-cuts, sidewalks, accessible pedestrian signals or other accessible features; improving signage, or way-finding technology; incremental cost of providing same day service or door-to-door service; purchasing vehicles to support new accessible taxi, rides sharing and/or vanpooling programs.*
- *Mobility Management is an allowable expense in both categories.*

Table 2 shows the most recent FTA 5310 awards.

Table 2: Federal Fiscal Year 2016 5310 Awards in the DRCOG Region

Sponsor	Project	Award
Via	Call Center Operating	$270,225
Via	Mobility Management (Travel Training, MM)	$300,000
Seniors' Resource Center	Operational Support	$250,000
Denver Regional Mobility and Access Council (DRMAC)	Regional Mobility Management	$200,000
Douglas County	5310 Mobility Management	$109,000
Douglas County	5310 Capital Operating	$176,000
Seniors' Resource Center	Brokerage/Mobility Management	$230,000
Via	Section 5310: Mobility Management - Travel Training	$200,000
Via Mobility Services	Replace Three Body-on-Chassis Paratransit Buses	$45,200
Via Mobility Services	Replace Three Body-on-Chassis Paratransit Buses	$45,200
Via Mobility Services	Rebuild Three Body-on-Chassis Paratransit Buses	$9,120
Via Mobility Services	Replace Three Body-on-Chassis Paratransit Buses	$45,200
Via Mobility Services	Via Mobility Services Rebuild Three Body-on-Chassis Paratransit Buses	$9,120
Via Mobility Services	Rebuild Three Body-on-Chassis Paratransit Buses	$9,120
Via Mobility Services	Rebuild One Paratransit Van	$9,120
Seniors Resource Center	Seniors Resource Center (Adams) A-Lift Fleet Replacements	$128,000
Seniors Resource Center	SRC Fleet Vehicle Replacements	$120,000
Easter Seals Colorado	BOC Replacement	$50,440

Sources: CDOT- Final FY17 FASTER and FY16 FTA Awards List 2-25-16 & 2016-2017 Awards for Administration, Operating, and Capitalized Operating Programs

Area Agencies on Aging (Older Americans Act Funding)

Area Agencies on Aging (AAA) were established under the Older Americans Act (OAA) of 1965 to respond to the needs of Americans 60 plus years of age. The DRCOG AAA covers the DRCOG region except for Boulder and southwest Weld Counties, who each have county-run AAAs. The Boulder County AAA is a division of the Boulder County Community Services Department. The Weld County AAA is the County's Department of Human Services.

All three AAAs administer Title III Federal OAA and Older Coloradans Act State funding. A significant portion is available for transportation for adults over the age of 60. The DRCOG AAA contracts with counties and transportation agencies in the DRCOG region for transportation. The Boulder and Weld County AAAs manage OAA transportation funding in their counties.

Medicaid – Non-Emergent (Emergency) Medical Transportation (NEMT)

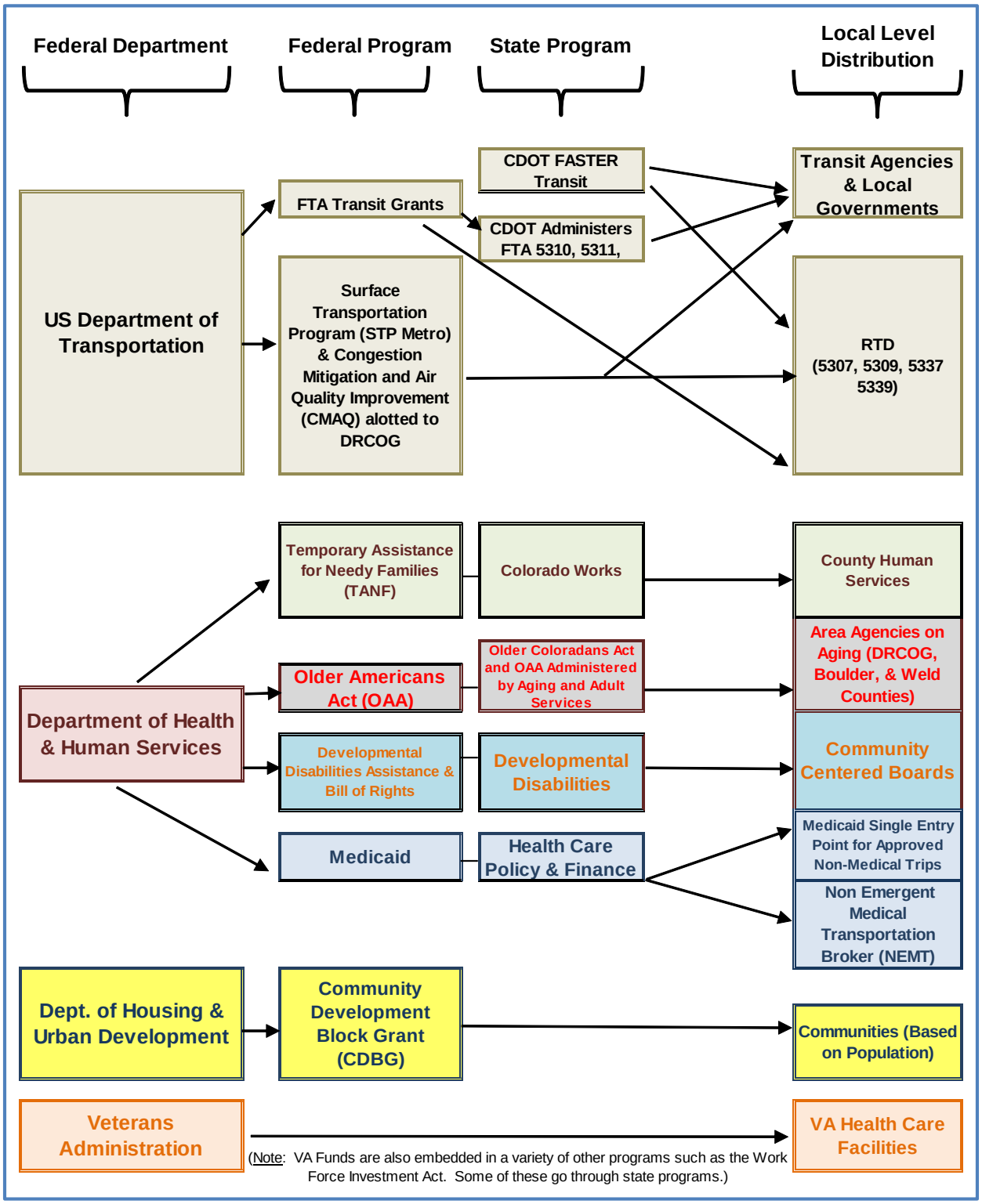
NEMT is transportation for Medicaid clients with no other means of transportation to and from Medicaid medical appointments. In addition to directly paying for transportation, reimbursement also may be given for gas, bus tokens, and bus passes.

In the DRCOG region, the Colorado Department of Health Care Policy and Financing (HCPF) contracts with a private company to broker this service. This contract covers Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, Larimer, and Weld counties. In Gilpin County NEMT is arranged through the Department of Human Services. In Clear Creek County, SRC, through its Evergreen operation, provides NEMT as part of their overall transportation contract with the County.

Coordination of Funding Sources for Human Services Transportation

Figure 8 paints a broad – but simplified – picture of funding sources for transit in the DRCOG region. It shows key federal funding sources, where they come from, and how they are distributed from the federal to the local level. However, it is not an exhaustive list. For example, many local sources of funding are not included, such as RTD's sales and use tax revenue.

Figure 8: Schematic of Federal Funding Sources, Distributers, & Recipients



It is important to emphasize the FTA allows non-US DOT federal funds to be used toward the required local match for FTA grants in many circumstances. Of significance to the DRCOG region is the ability to use Older Americans Act funds as local match for FTA funds. In the October 16, 2012 Federal Register in the 5310 Section under the subheading of "Local Match" it states the following:

> ***"Funds provided under other Federal programs (other than those of the Department of Transportation, with the exception of the Federal Lands Transportation Program and Tribal Transportation Program established by sections 202 and 203 of title 23 U.S.C.) may be used for local match for funds provided under section 5310, and revenue from service contracts may be used as local match."***

Figure 9 is federal policy guidance on co-mingling of federal and local transportation funds. Co-mingling of eligible funds is encouraged by the federal government, and is a key strategy identified in Section VI to improve human service transportation. Co-mingling of funding could also help breakdown silos and increase access to transportation for purposes outside specific funding sources such as medical trips.

Figure 9: Policy Statement Summary on Resource Sharing from the Federal Interagency Coordinating Council on Access & Mobility

Background:

Often Federal grantees at the State and local levels restrict transportation services funded by a Federal program to clients or beneficiaries of that Federal program. Some grantees do not permit vehicles and rides to be shared with other federally-assisted program clients or other members of the riding public. Federal grantees may attribute such restrictions to Federal requirements. This view is a misconception of Federal intent.

Purpose:

This policy guidance clarifies that Federal cost principles do not restrict grantees to serving only their own clients. To the contrary, applicable cost principles enable grantees to share the use of their own vehicles if the cost of providing transportation to the community is also shared. This maximizes the use of all available transportation vehicles and facilitates access for persons with disabilities, persons with low income, children, and senior citizens to community and medical services, employment and training opportunities, and other necessary services.

Applicable Programs:

This policy guidance applies to Federal programs that allow funds to be used for transportation services. This guidance pertains to Federal program grantees that either directly operate transportation services or procure transportation services for or on behalf of their clientele.

Federal Cost Principles Permit Sharing Transportation Service:

A basic rule of appropriations law is that program funds must only be used for the purposes intended. Therefore, if an allowable use of a program's funds includes the provision of transportation services, then that Federal program may share transportation costs with other Federal programs and/or community organizations that also allow funds to be used for transportation services, as long as the programs follow appropriate cost allocation principles.

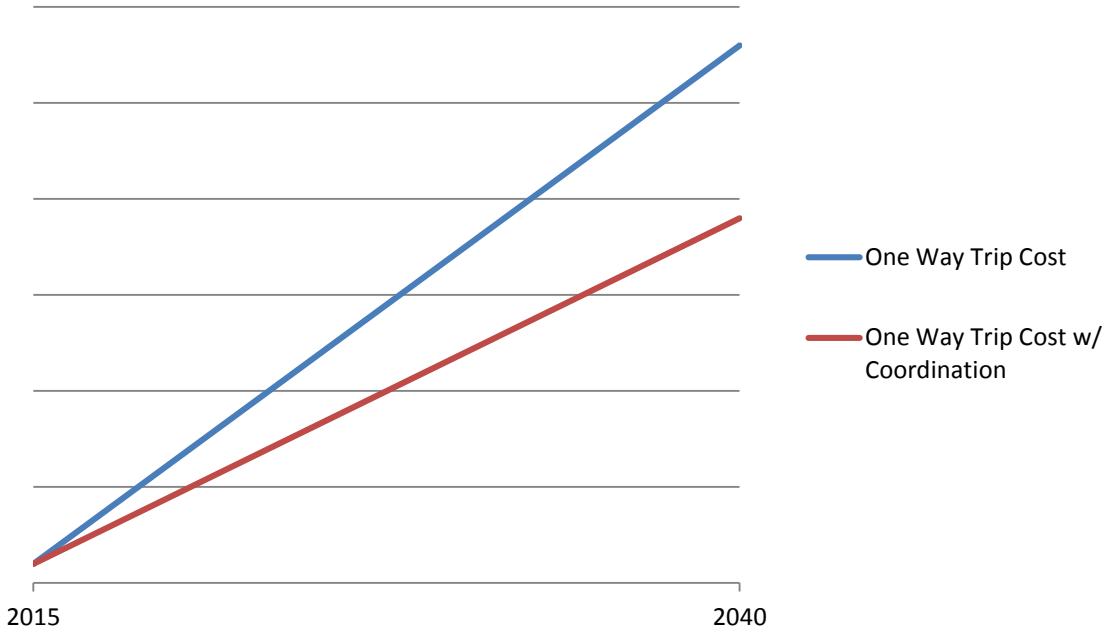
None of the standard financial principles expressed in any of the OMB circulars or associated Federal agency implementing regulations preclude vehicle resource sharing, unless the Federal program's own statutory or regulatory provisions restrict or prohibit using program funds for transportation services. For example, one common financial rule states the following. "The grantee or sub grantee shall also make equipment available for use on other projects or programs currently or previously supported by the Federal Government, providing that such use will not interfere with the work on the project or program for which it was originally acquired. First preference for other use shall be given to other programs or projects supported by the awarding agency. User fees should be considered if appropriate."

In summary, allowability of costs is determined in accordance with applicable Federal program statutory and regulatory provisions and the cost principles in the OMB Circular that applies to the entity incurring the costs. Federal cost principles allow programs to share costs with other programs and organizations. Program costs must be reasonable, necessary, and allocable. Thus, vehicles and transportation resources may be shared among multiple programs, as long as each program pays its allocated (fair) share of costs in accordance with relative benefits received.

Source: Federal Interagency Coordinating Council on Access and Mobility Final Policy Statement. October 1, 2006

Figure 10 shows what the impact of successful coordination and travel training efforts could be on meeting transit demand. The increased efficiency that coordination provides could slow the growth of costs. The average cost per passenger trip on human service transportation in the region is around $16[5]. With four percent inflation, the cost could be over $40 per trip in 2040. If coordination reduces the cost by 20%, which is conservative based on United States General Accounting Office findings from several case studies[6], the cost per trip could be around $30. Based on this savings, approximately 55,000 annual additional trips could be provided annually.

Figure 10: Estimated Cost for Human Service Transportation 2015-2040



B. General Public Transportation

General public transportation is not restrictive to the type of user. It can be fixed route or demand responsive. The ADA does require that public transportation be accessible for individuals with disabilities.

[5] *Transportation Coordination Systems Advisor Project Final Report*- Denver Regional Mobility and Access Council

[6] The United States General Accounting Office Report to Congressional Committees- *Transportation Coordination: Benefits and Barriers Exist, and Planning Efforts Progress Slowly*- October 1999 http://www.gao.gov/new.items/rc00001.pdf

RTD

Sales and Use Tax

A one penny sales tax within the RTD District helps pay for RTD services: $0.04 funds FasTracks and $0.06 funds RTD's base system (all services excluding FasTracks). This revenue accounts for almost 60 percent of RTD's base system operating budget.

Fares

Passenger farebox revenues (known as farebox recovery) account for less than 25 percent of RTD's base system operating budget revenue. Farebox recovery is the second-largest source of revenue after the sales and use tax.

Local Governments

Douglas County, the Town of Parker, and RTD formed a partnership to save RTD's Call-n-Ride service in Parker from elimination. The agreement includes financial and in-kind contributions from Douglas County and the Town of Parker in order to fund the service, and an agreement to collaborate to improve and promote the service to grow ridership.

The Longmont Free Fare Pilot Program provides free rides on local Longmont bus service. This program is managed and paid for by Boulder County and the City of Longmont, through grants and the voter-approved Transit and Trails sales tax. The program is designed to benefit income-limited residents and increase ridership on the local Longmont transit routes. Some communities, such as Boulder, also fund "buy ups" of RTD service to provide more service (such as better headways) than what RTD can afford on a particular route.

State

FASTER Transit

The Funding Advancements for Surface Transportation and Economic Recovery Act of 2009 (FASTER) provides $15 million annually to transit projects. Of this total, $5 million is competitively awarded to "local" projects and $10 million to state and regional projects. RTD and Bustang each receive a $3 million set-aside from the state-wide and regional pool. FASTER is for capital projects only, with the exception of the set-aside for Bustang and a small allocation for interregional operating assistance. Table 3 shows the most recent FASTER awards in the DRCOG region. This table includes the RTD $3 million set-aside.

Table 3: State Fiscal Year 2017 FASTER Awards in the DRCOG Region

Sponsor	Project	Award
RTD	19th and California Light Rail Crossing Rehab and Reconstruction	$2,000,000
RTD	Light Rail Midlife Refurbishment and Overhaul (3 vehicles)	$1,000,000
RTD	First and Last Mile Study	$200,000
RTD	Mineral PnR Bridge Rehab	$56,938
RTD	Thornton PnR Passenger Amenities	$308,000
CDOT Region 1	CDOT Region 1 Bus on Shoulder	$350,000

Source: CDOT- 2016-2017 Awards for Administration, Operating, and Capitalized Operating Programs

Federal

FTA Section 5307 (Urbanized Area Formula Program)

Funds are for urbanized areas with more than 50,000 people. The funding formula takes population and population density into account. This program is generally used for transit capital expenditures, but under certain circumstances, funds may also be used for operating assistance and transportation planning. Additionally, up to 10 percent of formula funds can be used for ADA service. Projects previously eligible under the Section 5316 Job Access Reverse Commute (JARC) program are now eligible under Section 5307. RTD is the Designated Recipient for the Denver-Aurora Urbanized Area. RTD also receives funding for the small urbanized areas within the RTD District: Boulder, Louisville-Lafayette, and Longmont. In total, RTD is typically allocated about $50 million annually, which it typically uses for vehicle maintenance and procurements.

Pockets of the DRCOG region, mostly in southern Douglas County, were added to the Denver-Aurora Urbanized area based on the 2010 Census, but are outside RTD boundaries. Those communities are eligible to receive this funding through RTD, or become an additional designated recipient.

Section 5309 (Transit Capital Investment Program)

Fixed Guideway Capital Investment Grants *(New Starts, Small Starts, and Core Capacity)*

This program funds new and expanded rail, bus rapid transit, and ferry systems that reflect local priorities to improve transportation options in key corridors. Eligible projects include the following:

- New fixed-guideways or extensions to fixed guideways (projects that operate on a separate right-of-way exclusively for public transportation, or that include a rail or a catenary system);
- Bus rapid transit projects operating in mixed traffic that represent a substantial investment in the corridor, and
- Projects that improve capacity on an existing fixed-guideway system.

There are four categories of eligible New Starts projects are new fixed guideway projects or extensions to existing fixed guideway systems with a total estimated capital cost of $300 million or more, **or** that are seeking $100 million or more in Section 5309 CIG program funds. Small Starts projects are new fixed guideway projects, extensions to existing fixed guideway systems, or corridor-based bus rapid transit projects with a total estimated capital cost of less than $300 million **and** that are seeking less than $100 million in Section 5309 CIG program funds. Core Capacity projects are substantial corridor-based capital investments in existing fixed guideway systems that increase capacity by not less than 10 percent in corridors that are at capacity today or will be in five years. Core capacity projects may not include elements designed to maintain a state of good repair. Programs of Interrelated Projects are comprised of any combination of two or more New Starts, Small Starts, or Core Capacity projects. The projects in the program must have logical connectivity to one another and all must begin construction within a reasonable timeframe.

The Eagle P3 Project (East Rail Line, Gold Line, and Northwest Rail Phase I), the West Rail Line, and the Southeast Extension have received or are in the process of receiving grants from this program, as follows:

- Approximately $1 billion for the Eagle P3 Project
- Approximately $300 million for the West Rail Line
- Approximately $92 million for the Southeast Rail Extension

Section 5311 (Formula Grants for Rural Areas)

This program provides capital, operating, and administrative assistance for general public transit in areas with fewer than 50,000 people. Transit services in rural portions of the DRCOG region are eligible; applicants must apply through CDOT. Both SRC and Via have received funding for service in rural parts of the DRCOG region, such as rural Jefferson, Adams, Arapahoe, and Boulder Counties as well as Clear Creek and Gilpin Counties. As with the FTA 5307 program, projects previously eligible under the FTA 5316 JARC program are now eligible under FTA 5311. CDOT coordinates with DRCOG in selecting projects in the DRCOG region. Table 4 shows the most recent FTA 5311 awards.

Table 4: Federal Fiscal Year 2016 FTA 5311 Awards in the DRCOG Region

Sponsor	Project	Award
Seniors' Resource Center	Rural (SRC-Evergreen) Admin/Ops. Support	$201,880
Seniors' Resource Center	Rural Clear Creek Transportation	$90,000
Via Mobility Services	Section 5311: Admin/Operating (Rural Services)	$333,380

Sources: CDOT- Final FY17 FASTER and FY16 FTA Awards List 2-25-16 & 2016-2017 Awards for Administration, Operating, and Capitalized Operating Programs

Section 5337 (State of Good Repair)

The formula-based State of Good Repair program is FTA's first stand-alone initiative dedicated to repairing and upgrading the nation's rail transit systems and other rapid transit such as BRT. Transit systems in urbanized areas with fixed guideway public transportation facilities operating for at least seven years are eligible. RTD plans to use this funding to upgrade existing rail corridors and the 16th Street Mall.

Section 5339 (Bus and Bus Facilities Program)

This program allocates capital funding to replace, rehabilitate, and purchase buses and related equipment and to construct bus-related facilities. RTD receives most of the funds in the DRCOG region and uses them for vehicle purchases and improvements to transit stations.

Under MAP-21 and continued under the FAST Act, the FTA 5339 program replaced the portion of the FTA 5309 program that used "earmarks" for distributing bus and bus facility capital funds. Colorado previously submitted one unified 5309 application, and earmarks typically totaled about $8-13 million annually. This program now distributes funds to states on a formula basis. Colorado receives about $1.75 million for small urban and rural areas. The three large urbanized areas (Denver-Aurora, Colorado Springs, Fort Collins-Loveland) each receive their own formula funding. RTD receives about $3 million annually for the Denver-Aurora urbanized area.

Public Private Partnerships

RTD pioneered efforts to generate revenue for FasTracks through public private partnerships. The Eagle P3 project is a nationally-renowned example of a public private partnership. RTD contracts with a

"concessionaire" selected through a competitive process to design, build, finance, operate, and maintain the Eagle project, with RTD making an annual payment to the concessionaire. This allows RTD to spread out large upfront costs over approximately 30 years. The Eagle project is comprised of RTD's East Rail Line, Gold Line, Commuter Rail Maintenance Facility and Northwest Rail Line Westminster segment. Other FasTracks projects that use public private partnerships are North Metro, Southeast Extension, and US 36.

At the local level, the Lone Tree Link, mentioned in Section II, is funded through a public private partnership of businesses, non-profits, and local government.

Section IV: Demographics and Forecasted Growth

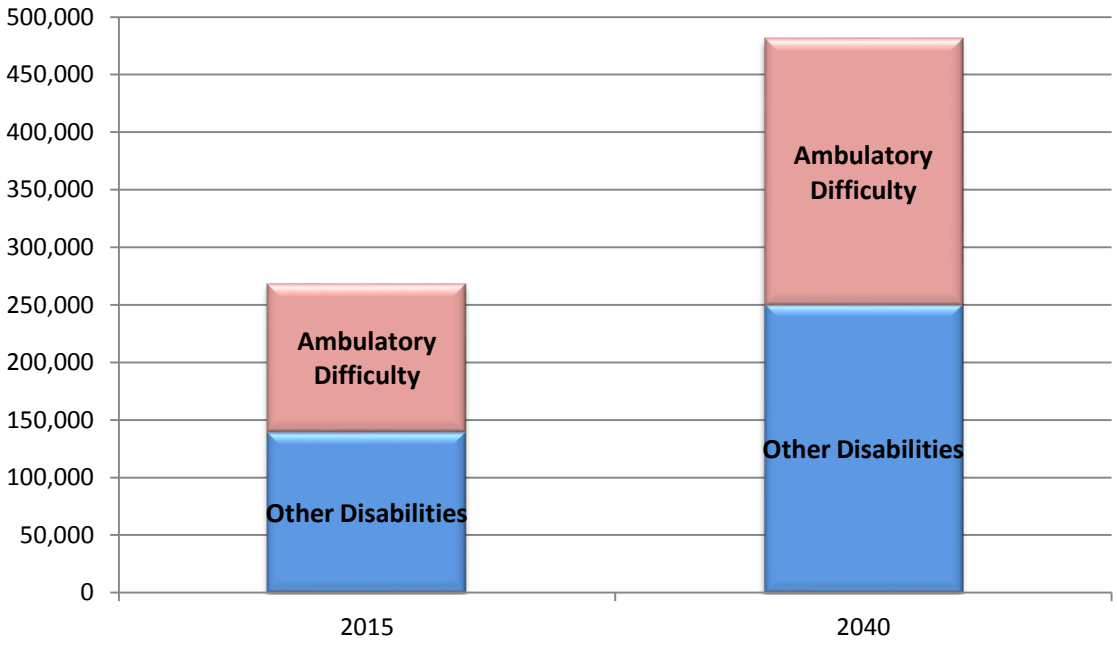
DRCOG staff forecasted the growth for major populations groups that may be more likely than the general public to need and use transit services in the future. The population groups identified are: individuals with disabilities, older adults, youth, zero car households, low income, minority, and limited English proficiency. Each group is analyzed separately with acknowledgement of overlap between groups (such as a disabled older adult without access to a car).

A. Individuals with Disabilities

Individuals with disabilities often lack transportation options. Many rely on public transit, human service transportation, or other means to fulfill activities of daily living. The ADA requires public transportation to be accessible and complementary paratransit to be available for individuals with disabilities when barriers prevent them from riding fixed route.

The most recent five-year estimate from the American Community Survey (2010-2014) shows the noninstitutionalized population for individuals with disabilities in the DRCOG region is almost 270,000, or roughly 9% of the region's total population. About one-third of all people in the Denver region older than 65 have a disability compared to about 6% for the population under 65. If the proportion of persons with a disability in each age group remains the same, by 2040 the region could have over 480,000 persons with a disability. This data is shown in Figure 11.

Figure 11: Individuals with Disabilities in the DRCOG Region



Sources: 2015 – Colorado Demography Office; 2040 – DRCOG Forecast with proportional increase by age group; American Community Survey (2010-2014)

In 2008, the US Census Bureau introduced new questions related to disabilities. These new questions enable the Census to classify the following disability types:

- Hearing difficulty
- Vision difficulty
- Cognitive difficulty
- Ambulatory difficulty
- Self-care difficulty
- Independent living difficulty

Table 3 shows the estimated population in the DRCOG region by disability type.

Table 5: Estimated Population in the DRCOG Region by Disability Type

Disability Type	Total
With a hearing difficulty	92,134
With a vision difficulty	52,471
With a cognitive difficulty	65,446
With an ambulatory difficulty	133,111
With an independent living difficulty	91,675
With a self-care difficulty	50,724
Total persons with a disability (not equal the sum of all disability types because some have more than one disability)	**485,561**

Source: 2009-2013 American Community Survey 5-Year Estimates

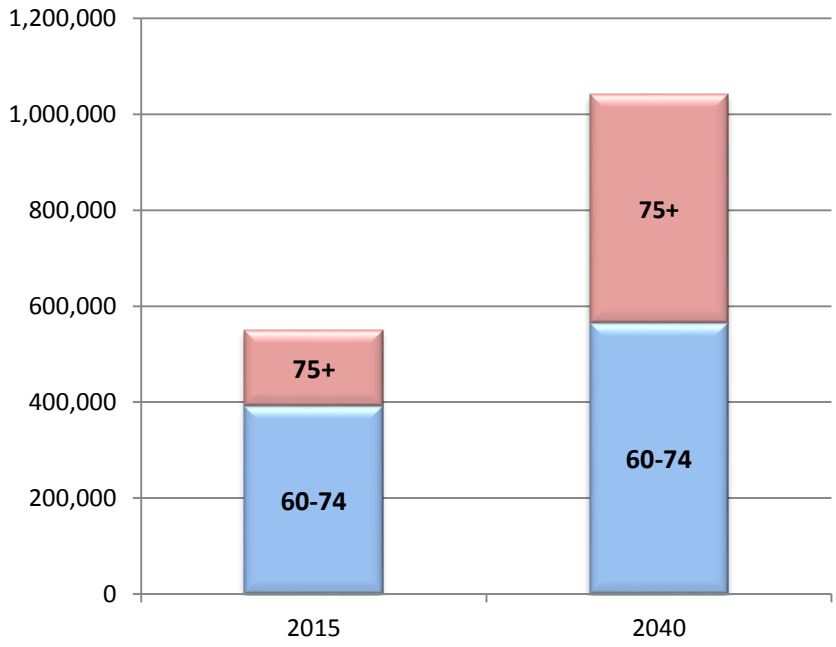
Table 5 shows disability types by age group in the DRCOG region. The number of people within disability categories is roughly the same in both the 18-64 and 65+ age groups.

B. Older Adults

Many older adults are reluctant to stop driving for fear of losing their independence. Like individuals with disabilities, many older adults that do not drive rely on public transportation and other means to maintain their independence.

The older adult population is increasing much faster than the general population. While the 60+ population is expected to almost double, the population under 60 is expected to grow by roughly a third. As shown in Figure 12, more than a half million residents in the DRCOG region are currently 60 years old or older. Between 2010 and 2015, this group grew by 27 percent as Baby Boomers (born between 1946 and 1964) entered this age group. The 60+ population in the region is anticipated to increase to over one million by 2040. By then, one in four persons in the region will be over the age of 60. Further, the population of adults age 75 and older is forecast to be 476,000 by 2040, an increase of about 200 percent from 2015.

Figure 12: Forecast Growth of Age 60+ Population in the DRCOG Region



Sources: 2015 – Colorado Demography Office; 2040 – DRCOG Forecast

2013 RTD Paratransit Survey Demographic Profile

A recent survey of paratransit users was conducted by RTD. The following demographic information obtained is noteworthy for planning purposes:

- RTD paratransit customers tend to be older than users of other RTD service types. 56% of Access-a-Ride customers and 59% of Access-a-Cab customers are 65 years of age or older, compared to 7% for fixed route riders.
- RTD's paratransit services frequently provide transportation for low income populations. About 50% of Access-a-Ride and 60% of Access-a-Cab customers report household incomes of less than $15,000 per year, compared to about 26% for fixed route riders.
- Paratransit customers tend to have lower education levels when compared to customers using other services. Nearly half of all customers indicated they graduated high school or have less than 12 years of formal education, compared to 28% of fixed route riders.
- About 86% of paratransit customers are retired or are unable to work; about 10% of fixed route riders indicated they are retired or are unable to work.
- Nearly two thirds of Access-a-Ride customers and 80% of Access-a-Cab customers are female.

- 25% of paratransit customers indicated they used a fixed route service in the 12 months preceding the survey.

C. Youth

Growth is also anticipated for the youth cohort (12-20 years of age). High school students receive a discounted rate on RTD buses and often use them to get to and from school. For example, an estimated 2,400 Denver Public high school students use RTD to go to and from school[7]. Between 2015 and 2040, this population is expected to increase by over 20 percent, from approximately 377,000 to 460,000.

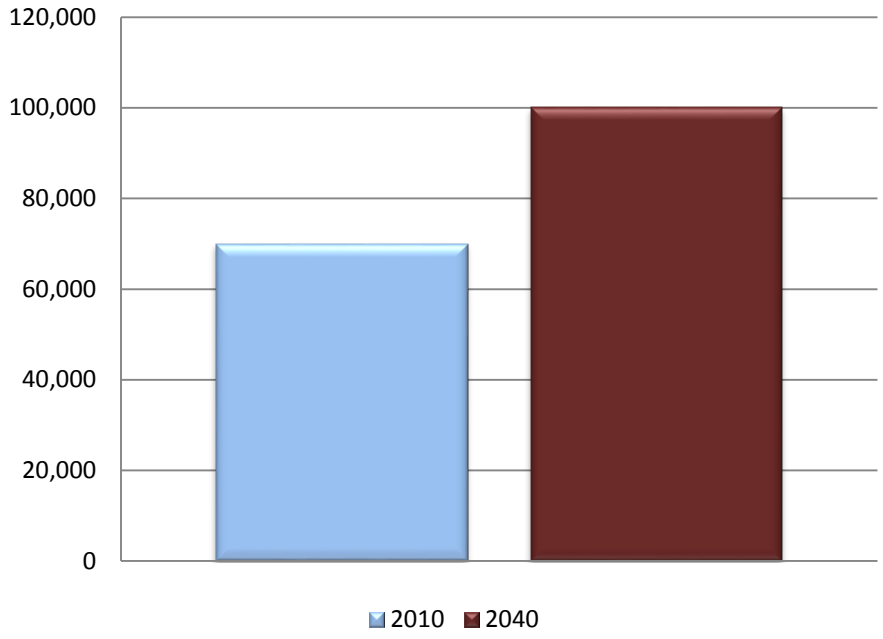
D. Zero Vehicle Households

Households without a motor vehicle are by definition dependent on modes of transportation other than a privately-owned automobile. These modes include transit, walking, bicycling, taxi, carshare, and others. Many zero vehicle households have no vehicle by choice, while other households cannot afford to purchase and maintain an automobile or do not have a resident legally permitted to drive.

Based on 2010 Census (CTPP) data, about 70,000 households in the DRCOG region have no vehicle available. If this number grows proportionately with the overall population, then there could be almost 100,000 zero-vehicle households by 2040 (Figure 13).

[7] http://www.dpsk12.org/docs/hs_transportation/

Figure 13: Zero Vehicle Households in the DRCOG Region

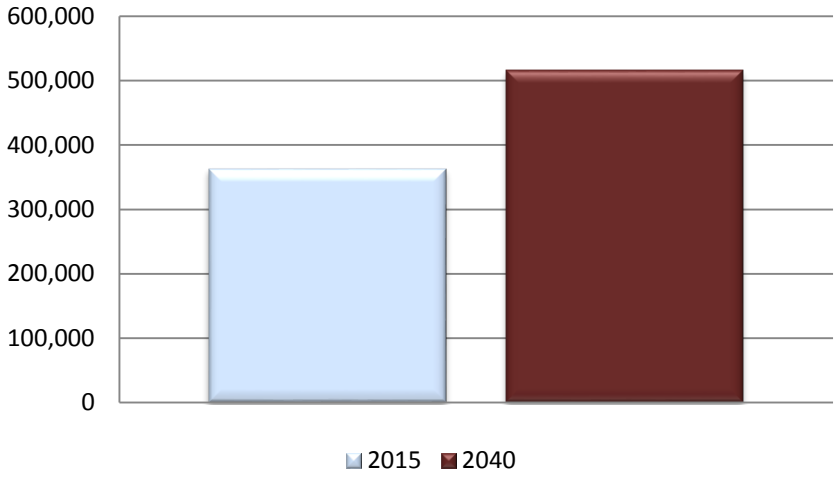


Source: US Census, 2010 Census Transportation Planning Package proportional increase to 2040

E. Low Income Population

The current estimate for population below 100 percent of poverty is 363,000, or about 12 percent of the total population for the DRCOG region. 100 percent of poverty is $11,770 for a one-person household; it is $24,250 for a household of four. If this population is the same proportion of the current total population in 2040, there could be approximately 516,000 low-income individuals in the Denver region (Figure 14).

Figure 14: Population in Poverty in the DRCOG Region



Source: US Census; proportional increase to 2040

F. Limited English Proficiency

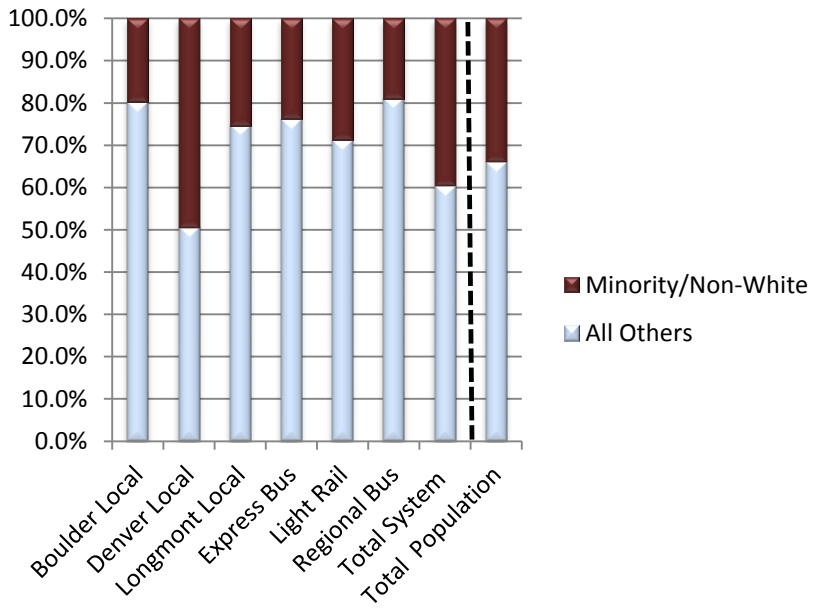
Limited English Proficiency (LEP) refers to a person who is not fluent in the English language, often because it is not their native language. The most common language spoken at home other than English among the LEP population in the DRCOG region is Spanish or Spanish Creole (161,576 or about 6 percent). The population of individuals that speak English less than "very well" increased significantly between 1980 and 2010 (a twelve-fold increase). However, recent estimates indicate a downward trend. The American Community Survey 2007-2014 estimate for this population is 217,257, or about 7 percent of the total population. Despite a recent downward trend, there will continue transportation need in this community through 2040.

There is also a growing immigrant and refugee population in the DRCOG region. Colorado resettles nearly 2,000 refugees a year; approximately 90% settle in the DRCOG region. These newcomers are given legal and permanent status, work authorization, five years of English classes, and access to public assistance to help them obtain financial self-sufficiency. DRCOG's Elder Refugee Program offers assistance and guidance, including transportation assistance, to refugees who are older adults. In partnership with the Colorado Refugee Service Program and the federal Office of Refugee Resettlement, DRCOG's Elder Refugee Program has created a gathering place for elder refugees to decrease social isolation, increase integration and interaction, and build community connections.

G. Minority Population

Minorities (non-Caucasian) make up a significant portion of RTD ridership. On many RTD routes, minority ridership is higher than their proportion of the region's total population. RTD conducted a transit ridership demographic comparison for their 2013-2015 Title VI Report. Figure 15, adapted from RTD's report, compares the non-Caucasian population with all others for RTD's bus service categories. RTD condensed the minority definitions used for this specific analysis from the definitions the Census uses.

Figure 15: 2011 RTD Minority/Caucasian Ridership



Source: RTD 2013-2015 Title VI Report and 2010 US Census

According to Census data, almost 2 million white non-Hispanic residents live in the DRCOG region, or over two thirds of the total population. About 630,000, or almost a quarter of the population, is Hispanic (all races). Applying the state demographer's statewide growth rates to the 2010 DRCOG region population data, the Hispanic (all races) share grows by 9 percent and the white, non-Hispanic share decreases by 13 percent in 2040 (Figures 16 and 17).

Figure 16: 2010 DRCOG Minority Population

Source: Colorado Demography Office

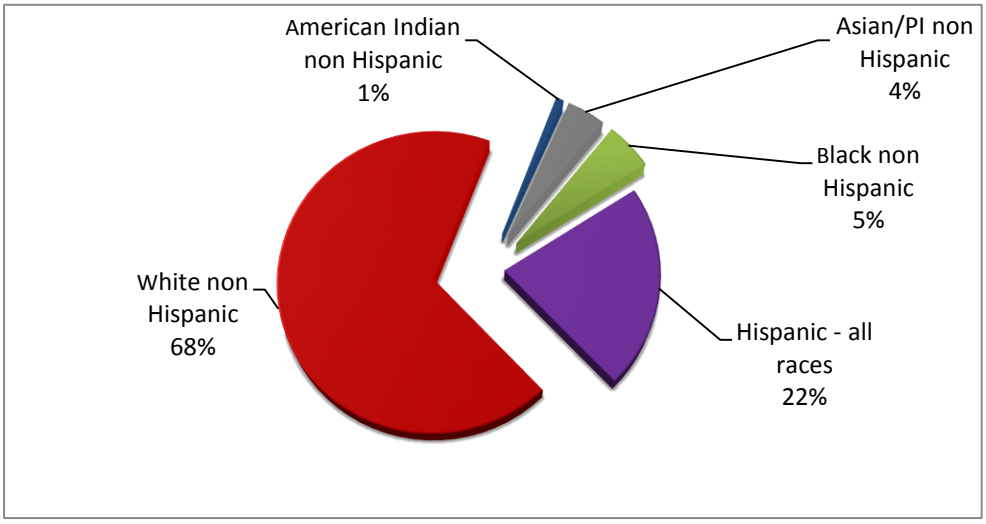
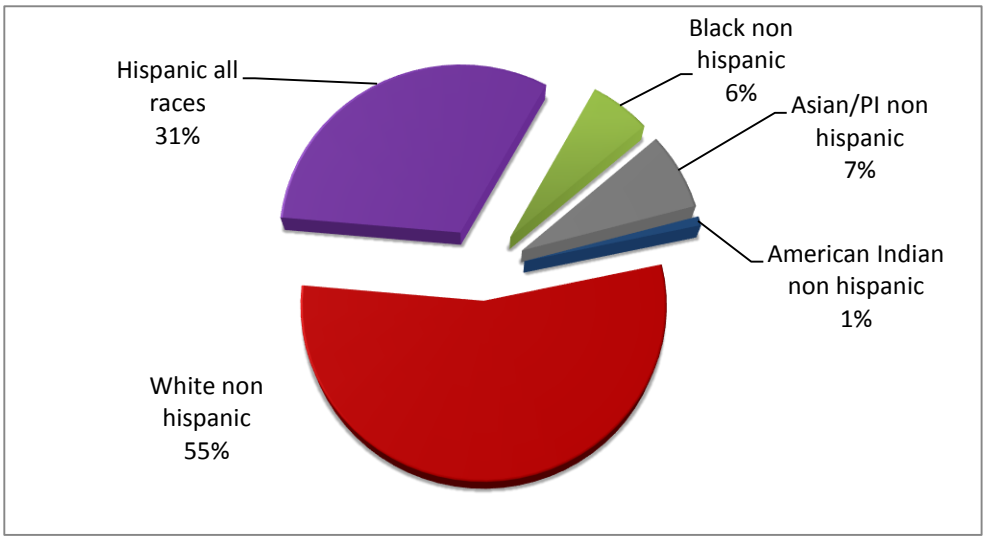


Figure 17: 2040 Estimated DRCOG Minority Population



Source: Colorado Demography Office

Section V: Assessment of Transportation Needs

The previous section illustrated in broad terms the potential demand for all types of transit service, particularly human service transportation, by 2040. This section discusses and identifies transit capital, operating, and related needs to assist in responding to the potential demand. FasTracks will help serve this demand, but RTD's base services and service from other agencies must also increase.

A. Transit Agency Capital and Operating Needs

Based on grant-funded projects and interviews with transportation agencies in the region, over-arching needs include vehicles (replacement and expansion), operating assistance (personnel, drivers, maintenance, fuel, etc.) mobility management, and capital expenditures to keep fleet, facilities, and other key assets in a state of good repair.

In 2013, FTA estimated that, nationwide, more than 40 percent of buses and 25 percent of rail transit assets were in marginal or poor condition. Estimates from the National State of Good Repair Assessment identified an $86 billion backlog in deferred maintenance and replacement needs, a backlog that continues to grow[8]. RTD's State of Good Repair Dashboard indicates a 2014 score of 3.7 for bus vehicle assets and 4.1 (out of 5) for light rail vehicle assets, where a score of 5 is excellent condition.

CDOT has developed a statewide asset inventory database to track transit capital needs and to help inform state and federal grant project funding decisions. The asset inventory database shows that RTD has 89% of rolling stock in the DRCOG region (1,023 vehicles). Among other agencies in the region, Via and SRC have the most with 53 and 36 respectively. Transit agencies are also able to use the database to track their capital inventory.

Access to Employment

Where the Jobs Are: Employer Access to Labor by Transit (Brookings Institution – 2012) combined detailed data on employment, transit systems, and household demographics to determine transit accessibility within and across the country's 100 largest metro areas. The share of jobs in the Denver-Aurora Metropolitan Statistical Area in neighborhoods with transit service is 87%; this ranked 12th among the 100 largest metros. The Brookings study did not take into account time of day. Many low income workers have jobs with nontraditional hours (e.g. evenings and weekends). This coverage is

[8] http://www.fta.dot.gov/13248.html

expected to improve when more FasTracks lines and stations open in the next few years. Despite this, there are still pockets of the region where transit-job access is needed or can be improved.

B. Human Service Transportation Needs

Human service transportation needs are more complex and are identified from a variety of input sources, including surveys, studies, and public meetings. Stakeholders and the general public contributed significantly to this process. Key input sources and a high-level summary of major needs are listed below.

Input Sources

- DRCOG and DRMAC Forum
- 2016-2019 DRCOG Area Plan on Aging – Public Input from Community Conversations
- DRCOG Transportation Advisory Committee
- DRCOG AAA Aging Advisory Committee
- County Council on Aging Survey
- Older Americans Act/Older Coloradans Act Transportation Agencies
- CDOT Statewide Transit Survey of Older Adults and Adults with Disabilities
- Local Coordinating Councils (LCCs)
- 2013 RTD Paratransit Customer Satisfaction Survey
- Community Assessment Survey for Older Adults for the DRCOG, Boulder, and Weld AAAs
- United States of Aging Study Oversample of Denver Region
- Community Living Advisory Group to the Governor of Colorado

Summary of Needs

- Transportation ranked as a top service priority for older adults and individuals with disabilities
- Affordable fares, especially for older adults, individuals with disabilities and/or low incomes
- More cross-jurisdictional trips, better trip coordination, and more accessibility
- Better regional coordination to build on improving local coordination
- Demand for transportation will increase as the population increases and ages
- Expand volunteer driver programs
- Continue to work with DRMAC to implement the Transportation Coordination Systems (TCS) project and other technological improvements
- Accessible and understandable transportation information and referral services

- Increase service areas, frequency, service hours (nights and weekends) where gaps exist
- Increase transportation options for quality of life trips such as hair appointments and social visits
- Remove barriers to ride fixed route, including improving access to bus stops and rail stations and providing travel training
- Improve access to healthcare for non-emergent visits
- Make sure that veterans have access to transportation

Section VI: Strategies and Activities to Address Identified Needs & Service Gaps

A. Future Transit Services

This section identifies strategies and activities to address service gaps between current services and identified needs. Strategies and activities addressed in this section include opportunities to achieve efficiencies in service delivery.

MVRTP 2040 Fiscally Constrained Rapid Transit System & Base Rapid Transit System

Figure 18 shows the fiscally constrained rapid transit system contained in the Metro Vision Regional Transportation Plan (MVRTP). By definition, revenues needed to complete these improvements are reasonably expected to be available by 2040. The majority of the rapid transit network is open to the public or currently under construction. Two BRT corridors (East Colfax and SH-119) must secure programmed funding and complete environmental studies before construction can begin.

The Tier 1 Base Rapid Transit System (depicted in Figure 19) is a 269-mile system of light rail, commuter rail, and BRT corridors and bus/HOV facilities that are operating, under construction, or included in FasTracks (see below). Most of Tier 1 is fiscally constrained through 2040, with the exception of some FasTracks projects funded beyond 2040.

FasTracks

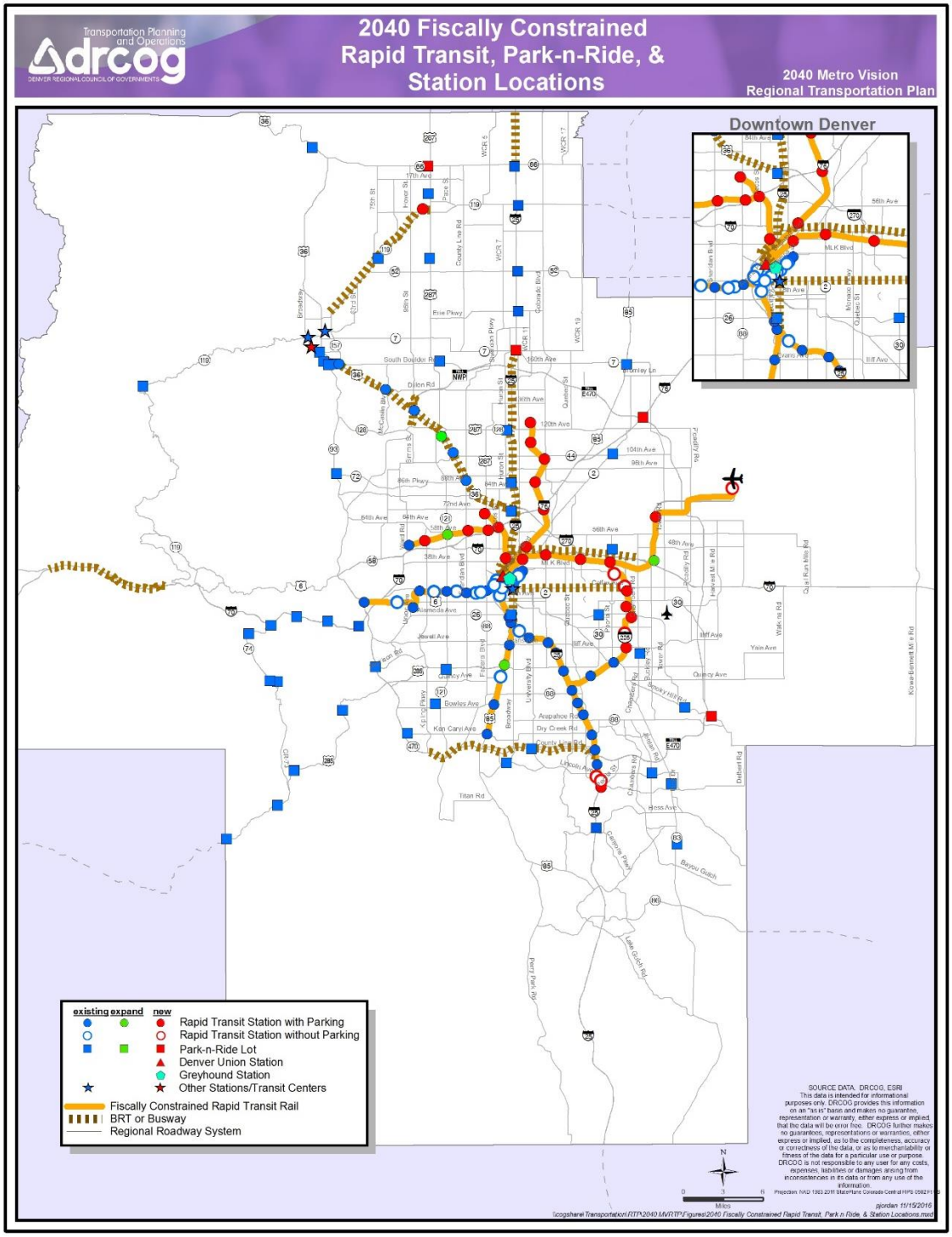
RTD's FasTracks is a multi-billion-dollar comprehensive transit expansion plan. This plan includes 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit (BRT), and 21,000 new parking spaces at light rail stations and park-and-rides.

The West Rail line was the first FasTracks corridor to open in spring 2013. Several other corridors are set to open in 2016; two more are scheduled to open by 2019. All FasTracks projects are funded in the FasTracks Plan. However, RTD's current financial forecasts indicate not all projects will be constructed by 2040; these are:

- Central Rail Extension (30th/Downing to 38th/Blake)
- North Metro Rail Line from 124th/Eastlake to 162nd/SH-7
- Northwest Rail Line from Westminster Station to Longmont
- Southwest Extension from Littleton/Mineral to C470/Lucent.

To learn more about FasTracks please visit http://www.rtd-denver.com/Fastracks.shtml.

Figure 18: 2040 Fiscally Constrained Rapid Transit, Park-n-Ride, & Station Locations



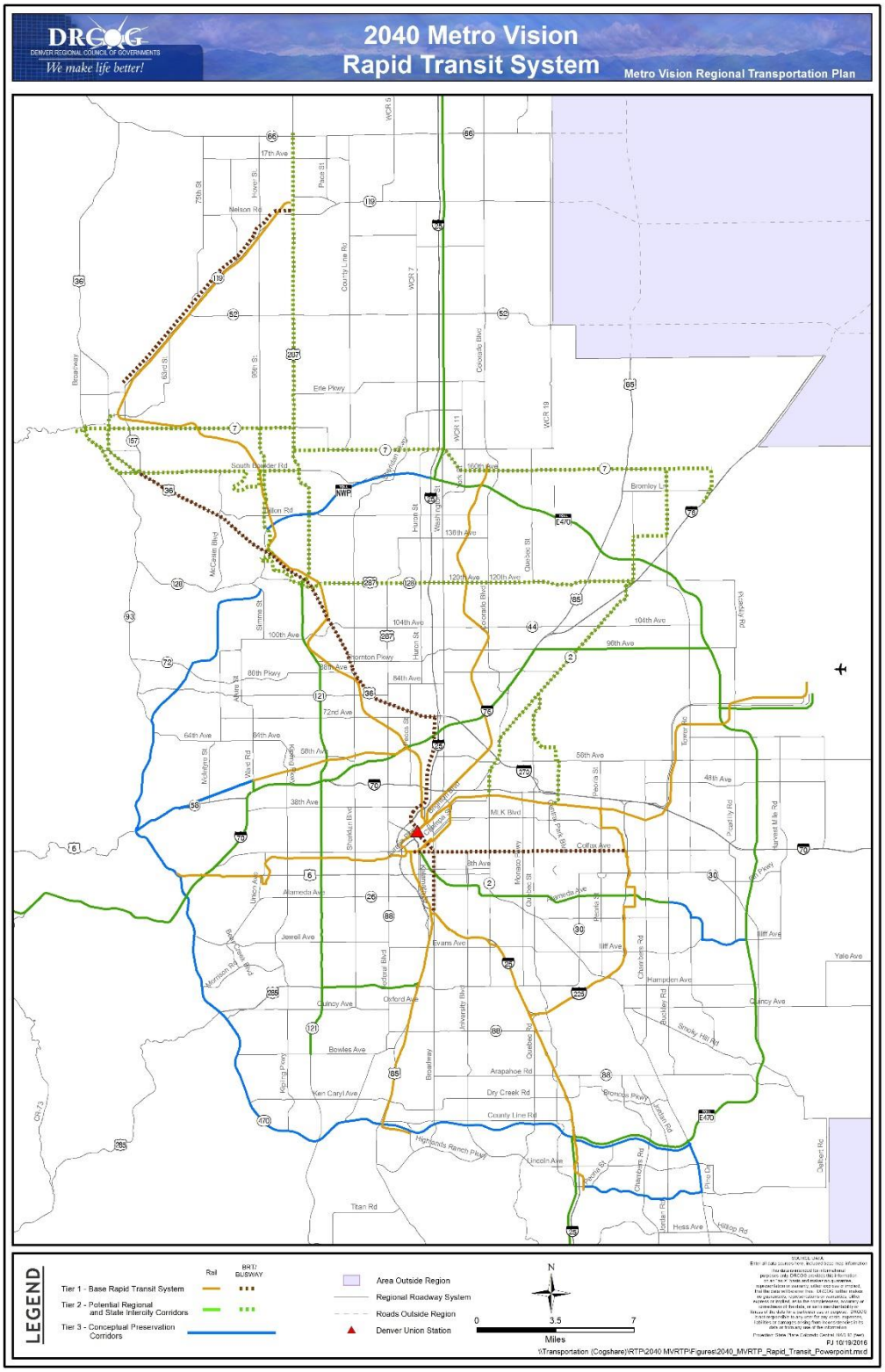
Additional Envisioned Rapid Transit Corridors

The 2040 vision rapid transit network is an inventory of unfunded projects that are illustrative only. It is separated into three system tiers in Figure 19, including the fiscally constrained portion of the entire envisioned regional transit network. The following tiers represent relative priorities for implementation based on resources, time, and feasibility:

Tier 2: **Potential Regional and State Intercity Corridors**. Regional corridors that could have future rapid transit include Wadsworth Boulevard, C-470, and Speer/Alameda Avenue. Intercity corridors are envisioned to include rapid transit service west to the mountains (*CDOT Advanced Guideway Study or AGS*) and north to Fort Collins and south to Colorado Springs and Pueblo along Interstate 25 (*CDOT Interregional Connectivity Study or ICS*). The approximate mileage for Tier 2 projects within the DRCOG region is 350 miles. Tier 2 also includes arterial BRT projects identified in *RTD's Northwest Area Mobility Study (NAMS)*.

Tier 3: **Conceptual Preservation Corridors**. These future prospective rapid transit corridors are located along major highways or freight railroad lines such as E-470, Jefferson Parkway, and the US-85/I-76 corridor. Projects in this tier would cover about 82 miles, though depicted alignments are very conceptual. Rights-of-way will be preserved to the extent possible in these corridors for potential rapid transit use in the future.

Figure 19: 2040 Metro Vision Rapid Transit System



RTD General Public Bus and Rail System

RTD's *2015-2020 Strategic Plan* identifies seven overall strategies serving its mission. Each strategy is accompanied by a goal statement, narrative describing the strategic theme in more detail, and a set of initiatives that articulate short-, medium-, and long-term implementation. Most of these initiatives are ongoing in nature, and will be a continuous effort during the five-year plan time-frame. Below are those strategies and some associated initiatives. This plan is available at http://www.rtd-denver.com/documents/2015-2020-strategic-plan.pdf.

1. Deliver Customer Oriented Service
    - Provide a seamless customer interface between RTD and contracted services
    - Enhance policies for accommodating needs of passengers on vehicles
    - Provide opportunities for customer engagement
2. Foster a safety culture
    - Build a strong alliance and partnership between management, employees and customers
    - Establish and implement an internal safety audit system for Bus Operations
    - Create training modules for management and supervisory staff focused on safety training, accident prevention, team building, hazard recognition, and safety communication
3. Strengthen fiscal resiliency and explore financial innovation
    - Direct funding to highest-priority projects and enhance strategic budget planning
    - Seek innovative funding opportunities to expand revenue sources
    - Preserve financial sustainability and maintain a structurally balanced long-range budget
4. Improve customer access and support transit-oriented communities
    - Support and coordinate investments to improve first and final mile connections to transit facilities
    - Foster livable, equitable, and accessible communities at transit facilities
    - Optimize District-wide parking resources
5. Optimize service delivery
    - Pursue ongoing enhancements and improvements to the existing transit system (services and facilities)
    - Work with partners to develop, fund and complete FasTracks and increase ridership

- Continuously improve service delivery and reliability, including integration of new corridors with existing services

6. Use technology to operate efficiently and improve the customer experience
    - Integrate technology systems to automate data transfers and improve service delivery
    - Establish agency-wide information governance strategy
    - Improve the rider experience with easy fare payment options through Smart Card Technology
7. Foster a Dynamic and Sustainable Workforce
    - Establish transition paths for workforce as the agency evolves
    - Attract and train skilled workers in key trades
    - Strengthen workforce by building on the success of Leadership Programs

B. Other Services

Removing Barriers to Ride Fixed Route

Removing barriers to ride fixed route service can help reduce costs and provide independence. There is significant interest in this objective based on information gathered from public outreach. In addition, DRMAC facilitates a Transit and Accessibility Taskforce that focuses on this issue. Projects that can improve access to fixed route service and decrease reliance by individuals with disabilities on complementary paratransit include, but are not limited to, travel training and construction projects that improve accessibility to transit stops.

Infrastructure Improvements

Improving the accessibility of transit stops, especially bus stops, and the surrounding pedestrian infrastructure is a key strategy for enabling older adults and individuals with disabilities to use fixed route transit. This includes adding amenities such as benches and shelters. Bus stops have been a focal point for many accessibility improvements since the ADA was enacted. The need for accessibility, however, extends beyond the actual stop to the pathways that connect to the stop. Cracked sidewalks, sidewalks with snow and ice, and missing sidewalk networks often pose a barrier to riding fixed route not only for older adults and individuals with disabilities but the general public as well.

Connections to and from bus stops are not always provided. Transit agencies do not always have the authority or ability to make these improvements. Sometimes improvements are not made due to lack of funding. Incomplete or poorly maintained sidewalks, difficult street crossings, lack of curb cuts, and

obstacles in the pathway such as utility poles create barriers for people with disabilities, limiting or preventing access to fixed-route transit service.

Transit Supportive Land Use

Land use and transit are inherently linked. Transit service is most effective when coupled with specific types of local land uses. Preferred uses have a high population ratio compared to the size of the spaces they occupy and create consistent foot traffic and high levels of activity. Further, built environments that are designed to maximize motor vehicle traffic convenience may reduce active transport (walking and cycling) accessibility, and transit accessibility since most transit trips include walking and cycling links. This is especially true for older adults and individuals with disabilities who may have a more difficult time walking longer distances and traversing built environments designed to accommodate automobiles.

First and Last Mile Connections

Another key strategy to remove barriers to riding fixed route transit is providing first and last mile connections. First and last mile connections are improvements that can help better connect people from bus stops and transit stations to final destinations (and vice versa). Such improvements may include infrastructure such as sidewalks, shuttle buses, and bike sharing services.

Travel Training

Travel training is instruction offered to those who need assistance to increase their mobility and travel on public transportation independently. It includes a variety of plans, methods and strategies used by professional trainers to increase the independent travel skills of the people they serve. Via Mobility Services offers this service to older adults, people with disabilities, and others living with mobility limitations who reside within the RTD system boundaries. In addition to one-on-one training, Via offers an abbreviated travel training program for groups, Seniors on the Move and Train the Trainer programs.

Improvements that remove physical and nonphysical barriers to using transit, making it more accessible for older adults, individuals with disabilities, and the general public, are a key strategy emphasized by this Coordinated Transit Plan.

Affordable Fare Programs

A common theme among public and stakeholder input was a need for affordable transportation for people with low incomes. This is an important but difficult issue to address given limited financial resources for low income riders and for RTD without an influx of additional funding to replace the

farebox revenues that would be lost from offering discounted fares. The Free Ride Longmont program provides fare free local bus service in Longmont on a pilot basis. In 2012, the town of Nederland, working with Boulder County's transportation department, administered a grant that provided Nederland residents free RTD transit passes. This program was funded through DRCOG's Regional Transportation Demand Management (TDM) Program Pool.

RTD is currently working with stakeholders to evaluate all of their pass programs which includes the investigation of opportunities to expand income qualified programs. Details of this program will become available in 2016.

Improve Access to Employment

Key recommendations based on the findings of DRCOG's SCI study pertaining to access to employment include:

- Plan station areas as complete communities;
- Manage parking in station areas;
- Develop a regional approach to housing;
- Market transit-oriented communities as economic catalysts;
- Embrace collaboration as a foundation for success, and
- Expand education, outreach, and community engagement.

More information about this initiative can be found online at https://drcog.org/planning-great-region/sustainable-communities.

Pilot New Technology and Practices to Improve Mobility

In October 2016, Transportation for America and Sidewalk Labs announced the sixteen members of a new T4A Smart Cities Collaborative to explore how technology can improve urban mobility, creating a tangible new opportunity for cities that did not win USDOT's Smart City Challenge. Over the coming year, the collaborative will bring together these cities to share best practices and technical assistance, and pilot new programs. Of the sixteen cities chosen from nearly sixty applicants, three are in the DRCOG region: Denver, Lone Tree, and Centennial.

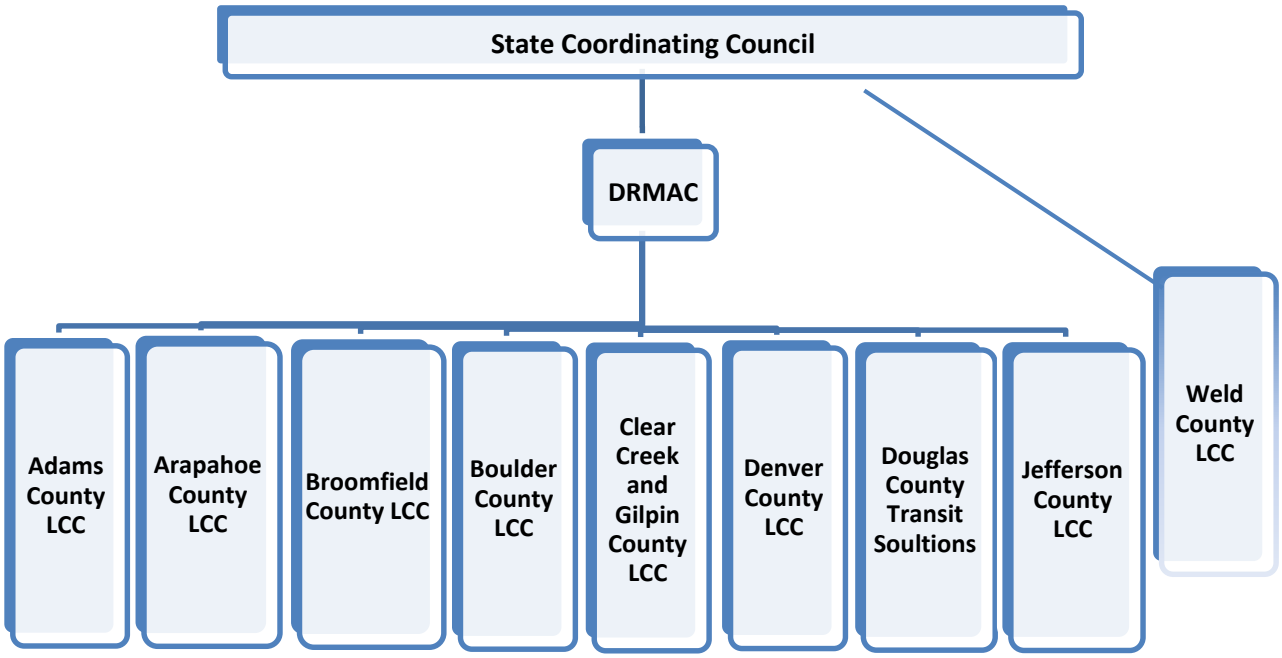
C. Future Human Service Transportation Coordination Efforts and Strategies

Coordination Efforts

Nine Local Coordinating Councils (LCC's) are active in the DRCOG region including the Weld County Mobility Council supported by the North Front Range Metropolitan Planning Organization (NFRMPO).

Clear Creek and Gilpin Counties share an LCC. DRMAC serves as the LCC for Denver County and the Regional Coordinating Council for most of the DRCOG region. As the Regional Coordinating Council, DRMAC facilitates coordination between them. The State Coordinating Council supports the LCCs and RCCs across the state. Figure 20 illustrates these relationships.

Figure 20: Human Service Transportation Coordination Organizations



The Colorado Interagency Coordinating Council for Transportation Access and Mobility (State Coordinating Council) was created in 2005 in response to the federal *United We Ride* initiative. The State Coordinating Council brings together various state departments with programs that either provide or

depend on transportation services for their clients. The Council addresses issues related to funding and regulatory requirements at the state level. The Council's goals include:

- More rides for target populations for the same or fewer assets;
- Simplify access, and
- Increase customer satisfaction.

The Council produced the how to manual *Handbook for Creating Local Coordinating Councils in Colorado*.

DRMAC works to ensure people with mobility challenges have access to the community by increasing, enhancing, sharing, and coordinating regional transportation services and resources. DRMAC initiated the TCS to improve coordination of human service transportation programs and service delivery in the Denver region. This study, funded by the Veterans Transportation Community Living Initiative (VTCLI) examined ways to coordinate trip requests, booking, scheduling to help veterans with mobility challenges better navigate their community. Of course, the while the project focuses on improving mobility for veterans, the improvements will benefit many more. Based on TCS recommendations, DRMAC recently initiated a trip exchange database technology development project. This technology is anticipated to help multiple human service transportation agencies share trips to use existing resources (such as vehicles) more efficiently and provide more and better service.

Strategies

The following are suggested strategies to address human service transit coordination. These strategies are based on public meetings, other plans, surveys, and other input sources.

Fund transit projects that address identified needs and FTA program guidelines

The project selection process for FTA Section 5310 should focus on service needs relative to these and other program goals:

- Enhance mobility for seniors and persons with disabilities;
- Serve the special needs of transit-dependent populations beyond traditional public transportation services and ADA complementary paratransit services, and
- Coordinate human service transportation and transit.

Spend local, regional, state, and federal funds more efficiently

It is important to find ways to do more with existing resources. A key strategy is blending multiple funding sources. Transportation providers and local governments should work with state and regional partners to combine funds like FTA 5310 with Older Americans Act, Medicaid, and others to fill more seats on each vehicle to reduce inefficiencies. Via, SRC, and Douglas County do this. In addition, there is also the opportunity to blend federal funds to reduce or eliminate the need for transportation grantees to contribute toward the local match.

Increase human service transportation coordination efforts

Greater coordination is a critical strategy to fund more trips with existing revenues. DRMAC coordinates with many organizations and agencies to better meet the needs of the region by increasing efficiencies. Stakeholders and transportation providers should continue to work with DRMAC and other groups on efforts to improve coordination of human service transportation. Increasing efficiencies could mean more transportation options for a greater variety of trip purposes including shopping trips and social visits. This could help more people "age in place" and live independently longer deferring the costly move to assisted living facilities and nursing homes.

Integrating veterans and veterans programs into the coordinated transportation system could help veterans better access transportation. Stakeholders in the region should continue to reach out to veterans and veterans groups so that veterans' needs are accounted for. The TCS project will continue to be a key instrument to achieve this.

Address cross-jurisdictional, cross service boundary, and interregional trips

Mobility needs do not stop at city, county, or even regional boundaries; residents across the Denver region often travel across jurisdictions to get to their destinations. For example, The Veterans Affairs Medical Center in Denver is a destination that draws veterans throughout the region and beyond. One of the key needs and strategies is to improve service and coordination across jurisdictional boundaries. A key objective of the VTCLI funded TCS project is to help veterans access VA medical facilities and other important destinations dispersed across the region.

The Via Mobility Services and RTD Coordination Pilot Project uses automated, mobile technology to coordinate RTD and Via demand response services in Longmont. Goals for this ongoing project include increasing trips while maintaining or reducing the combined vehicles in service, decreasing cost, and developing a model that can be used in other places around the region and the country. The initial

funding for this pilot program was provided by FTA 5317 (New Freedom), RTD, the City of Longmont, and Via Mobility.

Via has since been awarded an FTA Mobility Services for All Americans (MSAA) grant to enhance trip data exchange between RTD's general public Call-n-Ride services and human services transportation provided by Via and other entities in the region. The project is intended to address institutional and jurisdictional boundaries that limit coordination as well as technological barriers.

Figure 3 from the 2040 RTP shows workflow patterns into and out of the DRCOG region. One significant commuting pattern that crosses MPO boundaries is between Boulder and Fort Collins. Local agencies are currently collaborating across jurisdictional and MPO boundaries on a project that extends bus service between these two cities. As the project moves forward, those involved are designing a blueprint for similar future projects. Public and private employers are key stakeholders who may be able to help work towards solutions.

Implement trip exchange initiatives from transportation studies

Two studies were recently conducted to evaluate strategies for coordination of human service transportation in the Denver region: the Transportation Coordination Systems and the *Evaluation of the DRCOG Area Agency on Aging Transportation Support Service Program* by BBC Consulting.

Both studies share the same overarching goal: accessible and affordable transportation that is easy to book and meets current and future demand. Shared components recommended by both studies include:

- Leverage funding to support human service transportation
- Offer region-wide support and incentives to all transportation agencies
- Enable electronic data interchange capability within information technology (IT) systems
- Explore new sources of funding with a long term focus
- Foster regional coordination and cooperation
- Strengthen county partnerships

A key difference between the two studies – the structure of a potential regional "one call, one click center" – needs to be further defined. The TCS study recommended a sub-regional brokerage approach, while the BBC study recommended the region explore a single call center for scheduling and dispatch.

After the trip exchange database is developed, stakeholders should address other TCS and BBC recommendations and re-evaluate the structure of the one-call-one-click center.

Improve access to key services such as healthcare and employment through coordination

The pervasiveness of chronic disease has a desperate impact on low-income populations. A key factor is lack of transportation for treatment and screening. An effective transportation system can help individuals preserve and improve their independence and decrease the likelihood of institutionalization. This prompted the FTA to launch the Rides to Wellness Initiative to increase partnerships between health and transportation providers and show the positive financial benefit to such partnerships. In DRCOG region, continued efforts to coordinate non-emergent transportation with HCPF can improve efficiency and effectiveness and improve access to healthcare, especially for low-income individuals.

Conclusion

In addition to providing a broad view of the region's transit system and serving as the transit component of the Metro Vision Regional Transportation Plan, this document also serves as the Coordinated Public Transit and Human Services Transportation Plan for the DRCOG region (Coordinated Transit Plan). A Coordinated Transit Plan is federally required, particularly in selecting projects for funding in the FTA 5310 grant program. This integrated plan addresses transit geared for specific populations and transit available for the general public because both are important to increase mobility. For example, while many older adults and individuals with disabilities will be served by transit modes specifically designed for their needs, many more will use general public transportation.

Transit is a vital component in the DRCOG Region's multimodal transportation system. It provides mobility and access for many and is available throughout the DRCOG region in rural, suburban, and urban areas. There are around 350,000 transit boardings each weekday. Not only does transit connect residents, employees, and visitors to jobs, schools, shopping, medical care, and recreation, it promotes independence and economic development.

APPENDIX 7

2040 MVRTP Active Transportation Component

ACTIVE TRANSPORTATION SECTION

A. Introduction

The DRCOG region, known for its arid climate and abundance of sunshine, is an ideal place for walking and bicycling. Also referred to as active transportation, walking and bicycling are flexible, accessible, healthy, and clean modes of transportation and can be used exclusively or in conjunction with other modes. The cycling culture is especially strong not only in the DRCOG region, but statewide. The number of people who bike to work in the DRCOG region is more than twice the national average and is increasing at a greater rate than any other mode.

Presently, there are almost 900,000 trips made each day by walking or bicycling in the region. Trends point to a continued uptick in the number of people who get around by walking and bicycling. While the region has a robust sidewalk and bicycling network, there are gaps to be filled and needs to be addressed in order to meet the demands for walking and bicycling; provide safe and comfortable options for people of all ages and abilities; and to fulfill the performance measures and targets currently being established as part of Metro Vision 2040.

The Active Transportation section of the RTP addresses the following topics; existing conditions for walking and bicycling in the DRCOG region, future projections for these modes, regional goals for active transportation, and strategies for meeting the goals. There will be an opportunity to delve deeper into active transportation topics during the development of the Active Transportation Plan, scheduled to commence in early 2017. The Active Transportation Plan will eventually be adopted as part of the RTP.

B. Defining Active Transportation

Active transportation[1] is defined as a way of getting around powered primarily by human energy, via pedestrian and bicycling modes of travel. Pedestrian travel includes people walking or using wheelchairs[2], longboards, segways, and other mobility devices, such as walkers or crutches. Bicycling includes any type of wheeled and pedaled cycle, with or without an attached motor. Such means of travel enables multimodal transportation solutions to connect people of all ages, incomes, and abilities to where they need to go.

C. Walking and Bicycling in the DRCOG Region – Existing Conditions

Every day, almost 900,000 trips are made by walking and bicycling in the DRCOG region (*Source: DRCOG Travel Mode, 2015*). The region has a strong walking and bicycling culture, as evidenced by the country's second-largest annual Bike to Work Day. As the region's population continues to increase, so will the number of people who travel via active transportation modes. While pedestrians and bicyclists make up only seven percent (*Source: DRCOG Travel Model, 2015*) of all person trips, they account for about 25 percent (*Source: NTSA – FARS, 2014*) of traffic fatalities, a disproportionally high percentage considering the shorter distances and travel times by these modes.

1. Miles of Active Transportation Facilities

DRCOG collects and maintains Geographic Information Systems (GIS) data for the region including pedestrian and bicycle facilities. While there are limitations in determining the exact miles of active transportation facilities, especially sidewalks, the technology and method of data collection is rapidly evolving and improving. Through the *Denver Regional Aerial Photography Project* (DRAPP) endeavor,

Planimetrics and quantifying sidewalk miles

In 2015, DRCOG began working on a region-wide project to map infrastructure features and assets, including sidewalk centerlines.

1,308 square miles of the urban core in the DRCOG Region have been mapped. Within that area, there is approximately 17,700 miles of sidewalk. This project was completed summer 2016.

[1] "Active transportation" and "bicycling and walking" will be used interchangeably throughout this document.
[2] All reference to walking and pedestrian travel in this document includes people using wheelchairs.

DRCOG is in the process of obtaining sidewalk data throughout the region.

The method, referred to as *planimetrics*, currently captures sidewalks that are five feet wide or more. In the future, it might be possible to capture the entire sidewalk system, including total mileage. Regional planimetrics data collected to date can be accessed here.

Obtaining bicycle facilities data and determining the number of miles is attainable by means of GIS. DRCOG collects GIS data from member governments annually, which includes bicycle facilities. Through this effort DRCOG is able to map and quantify the number of miles of bicycle facilities in the region. The DRCOG region has a robust bicycle network comprised of over 2,300 miles of bicycle facilities. Table 1 classifies the bicycle facilities and associated miles into four categories including: roadways with signed shared lanes; roadways with bicycle lanes, roadways with protected bicycle lanes, and multi-use trails.

Table 1
Miles of Bicycle Facilities in the DRCOG Region

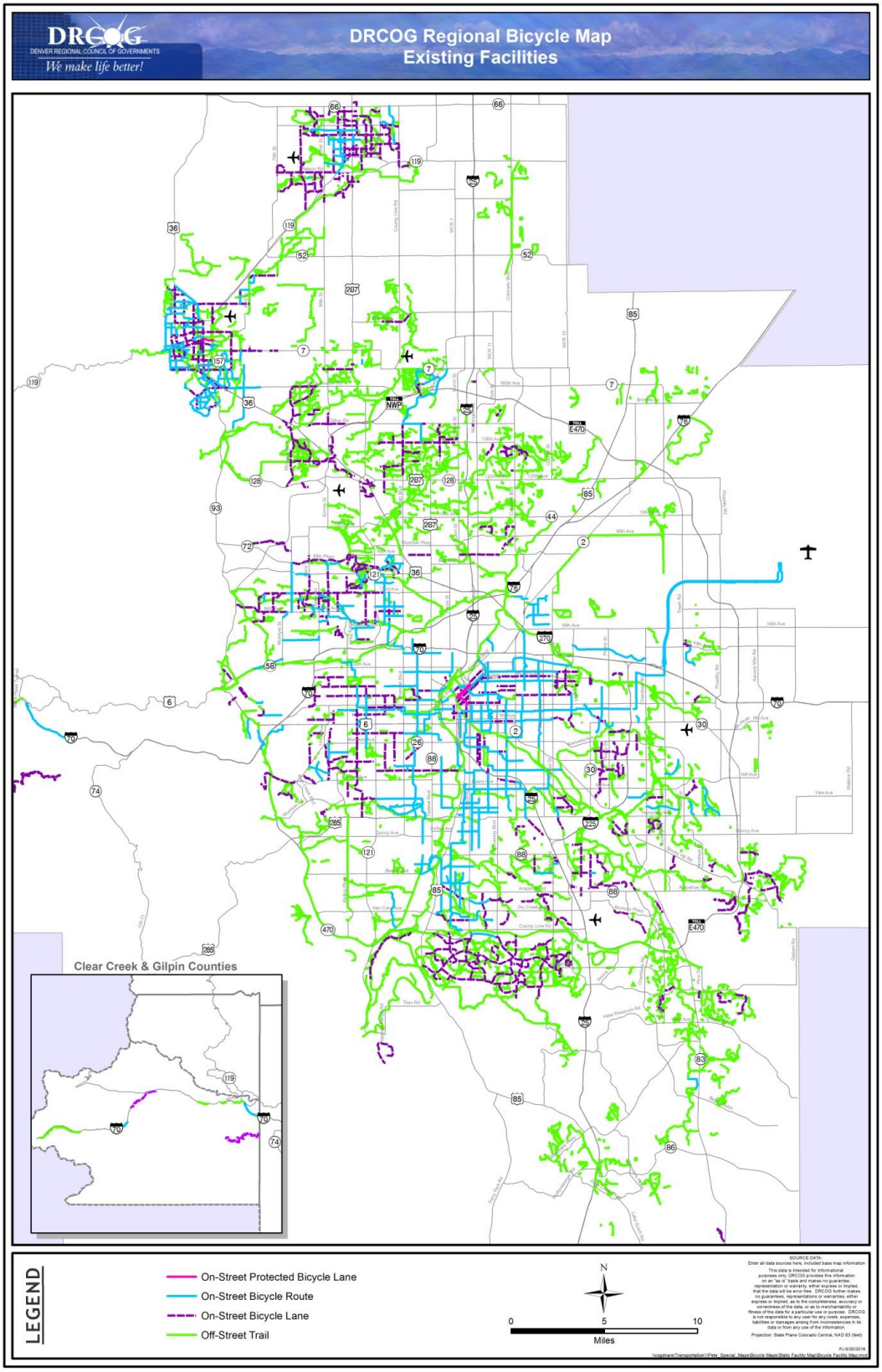
Bicycle Facility Type	Miles
Roadways with Signed Shared Lanes:	
Bicycle Route	325
Marked Shoulder Lanes	28
Roadways with Bicycle Lanes	430
Roadways with Protected Bicycle Lanes	3
Multi-use Trail:	
Wide Sidewalk*	35
Off-street Trail	1523
Regional Total	**2344**

*** The multi-use trail category includes selected sidewalks (some communities permit bicycling on wide sidewalks, particularly as connections between other bicycle facilities and along busy major arterials).**

2. Maps

DRCOG uses the GIS bicycle facilities data collected to maintain the *Denver Regional Bicycle Map*, an interactive map of the existing bicycle inventory throughout the region. The method for mapping and classifying bicycle facilities varies among jurisdictions. DRCOG classifies bicycle facilities for mapping purposes into four categories: on-street bicycle route; on-street bicycle lane; on-street protected bicycle lane; and off-street trails. The map also includes bicycle share station locations. Figure 1 is an image of the *Denver Regional Bicycle Map*.

Figure 1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DENVER REGIONAL COUNCIL OF GOVERNMENTS
We make life better!
DRCOG Regional Bicycle Map
Existing Facilities
Clear Creek & Gilpin Counties
LEGEND
On-Street Protected Bicycle Lane
On-Street Bicycle Route
On-Street Bicycle Lane
Off-Street Trail
N
0
5
10
Miles

3. Active Transportation Facility Types in the DRCOG Region

There is a wide cross-section of pedestrian and bicycle facility types throughout the region which can be classified into two main categories. First, there are travelways, which is the infrastructure people walk and bicycle on. Then there is the infrastructure which supports walking and bicycling such as trees and other landscaping along sidewalks, wayfinding, and bicycle parking. Both travelways and the supporting infrastructure are important components in enabling active transportation by making these modes more convenient, accessible, and comfortable.

- ***Pedestrian facilities.*** The characteristics and quality of pedestrian facilities vary throughout the region. Many new residential and commercial developments incorporate wide sidewalks or buffered multiuse facilities. Conversely, many older neighborhoods have narrow and/or crumbling sidewalks, making it difficult to accommodate large numbers or people using wheelchairs or other mobility devices. In many places, facilities are non-existent and pedestrians are forced to travel along the road or on an unpaved social path.

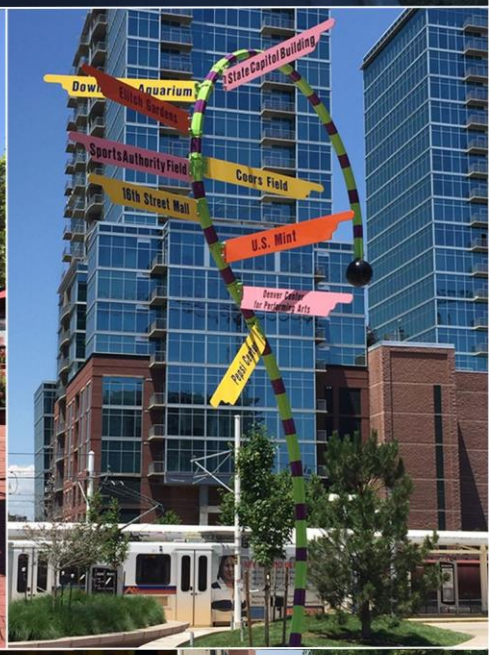
  > ***Conduits for walking***
  >
  > As conduits for pedestrian movement and access, (sidewalks) enhance connectivity and promote walking.
  >
  > — NACTO Urban Street Design Guide

  Pedestrian facilities go beyond the sidewalk. On-street facilities refer to pedestrian treatments and travelways within the street used to improve and enhance pedestrian safety. Table 2 and the corresponding photo gallery include a cross-section of pedestrian facility categories and types found throughout the region.

Table 2
Pedestrian Facility Types in the DRCOG Region

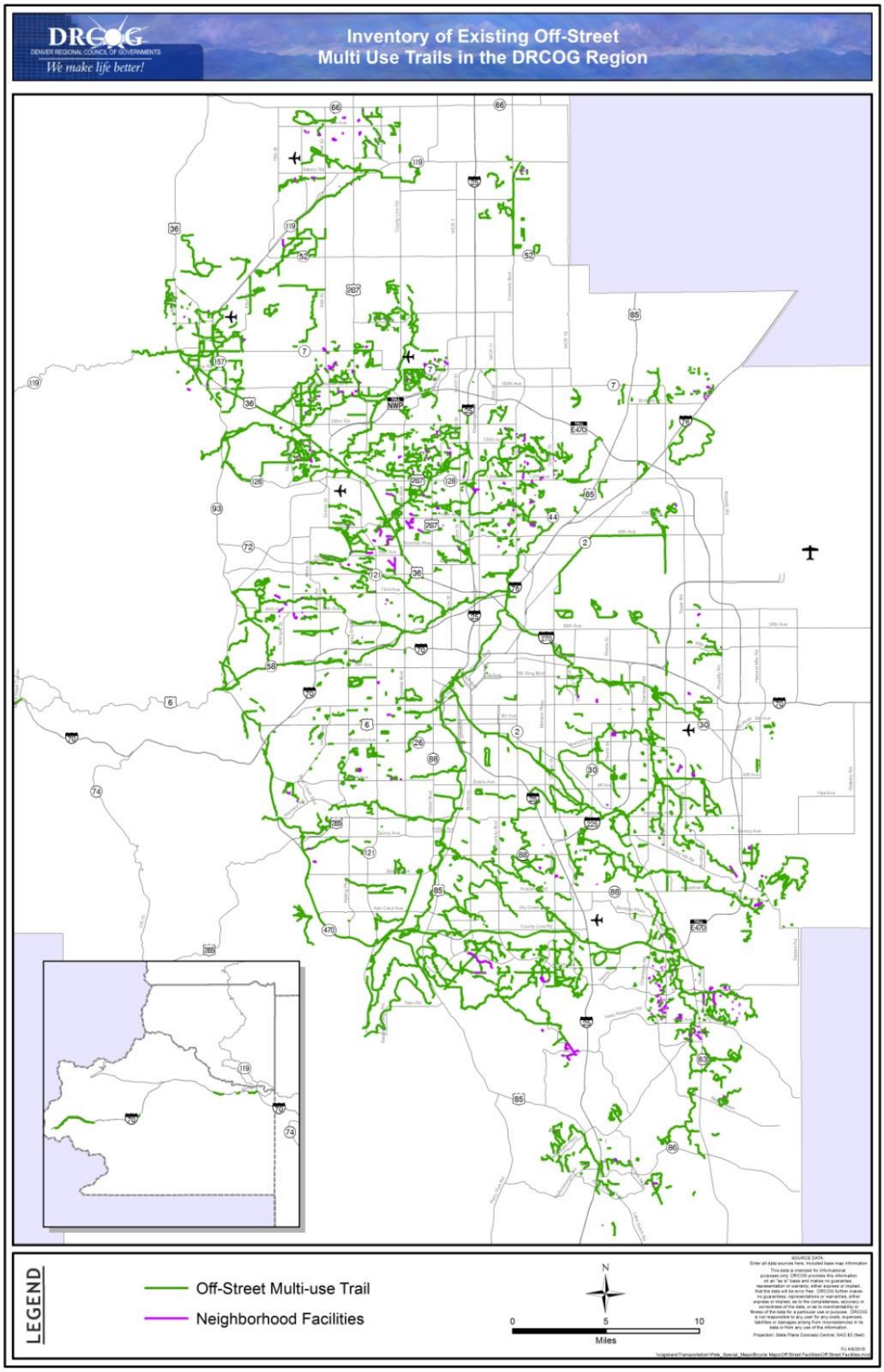
Pedestrian Facility Category	Facility Type	Description	Photo #
Sidewalks	*Attached Sidewalks*	Pedestrian travelways connected to the curb or motor vehicle travel lane edge.	Attached sidewalk #1 Attached sidewalk #2 Attached sidewalk #3
	Detached Sidewalks	Pedestrian travelways separated from vehicle travel lanes using a planting strip or other appropriate buffer treatment.	Detached sidewalk
	Shared-Use Paths	Accommodating both pedestrians and bicyclists, these travelways are physically separated from motorized vehicular traffic by an open space or buffer and are either within the roadway right-of-way or within an independent right-of-way. Shared-use paths can be located (but not limited to) in a park, greenway; along rivers, railroads, utility rights of way; and along roadways.	Shared-use path
On-Street	*Crosswalks*	Typically defined as the portion of a roadway designated for pedestrians to use in crossing the street at an intersection (conventional), or between intersections (mid-block). Mid-block crosswalks are used to facilitate pedestrian crossings when there is significant distance between designated crossings and/or where there are destinations/places people want to go (pedestrian desire lines) but are not well served by existing traffic signals.	Crosswalk and pedestrian island
	Pedestrian Islands	Pedestrian islands can be located in the middle of a street at an intersection or at mid-block crossings. These islands provide a refuge for individuals moving at a slower speed when crossing a roadway. They are generally applied where there are higher speeds and volumes, but may be used on both wide and narrow streets.	
	Shoulders (rural)	Roadway shoulders provide a gravel or paved area for pedestrians to walk next to the roadway, particularly in rural area where sidewalks and pathways are not feasible (FHWA Safety Program).	N/A
Other	*Alleys*	Sometimes used by pedestrians (except where prohibited), function primarily as a place for trash collection, service vehicle access, and parking access. In some places such as downtowns and urban areas, alleys have been converted to public spaces for people to walk, play and interact.	Alley transformed to a public space (Source: Downtown Denver Partnership)
	Intersections at Alleys	When an alley crosses a sidewalk, potential conflicts can occur between pedestrians and vehicles. Rumble strips, warning signs, and raising the intersections to the sidewalk grade could mitigate conflict.	N/A
	Pedestrian walkways in parking lots and structures	Sidewalks provided through parking lots to the destination they are serving and to nearby pedestrian facilities, provides a safe place for pedestrians to travel.	Pedestrian walkways in parking lot
	Pedestrian Zones and Plazas	Also known as auto-free zones and car-free zones, are areas of a city or town reserved for pedestrian-only use and limits/prohibits vehicular traffic.	Pedestrian zones and plazas
Pedestrian Support Infrastructure	*Wayfinding*	Signage and/or pavement markings to guide both pedestrians and bicyclists to their destinations. Many jurisdictions have implemented or are implementing a destination-direction-distance based wayfinding system.	Wayfinding - whimsical

Pedestrian Infrastructure in the DRCOG Region



- ***Bicycle Facilities.*** The DRCOG region has a robust bicycle system comprised of off-street trails, roadways with bicycle lanes, protected bicycle lanes, signed shared lanes, shoulders, and shared-use sidewalks. As illustrated in Table 1 and Figure 1, the majority of the existing bicycle network is comprised of multi-use trails accommodating both pedestrians and bicyclists, either in the form of off-street trails or wide sidewalks. Figure 2 depicts the over 1,500 miles of multi-use trails in the region. Table 3 and the corresponding photo gallery include a cross-section of bicycle facility categories and types within the region.

Figure 2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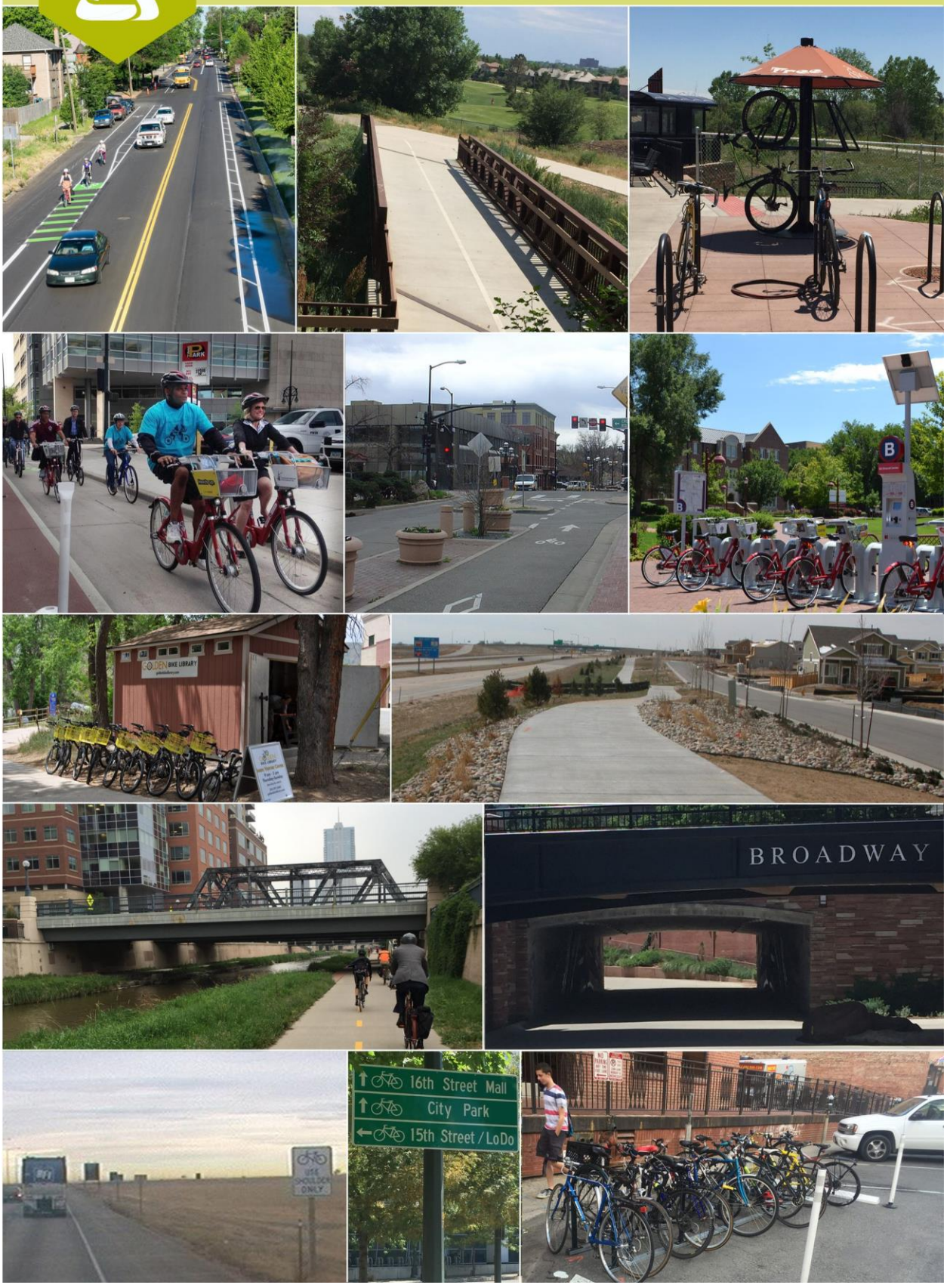
We make life better!
Inventory of Existing Off-Street
Multi Use Trails in the DRCOG Region
LEGEND
Off-Street Multi-use Trail
Neighborhood Facilities
N
0
5
10
Miles

Table 3
Bicycle Facility Types in the DRCOG Region

Bicycle Facility Category	Facility Type	Description	Photo Links
On-Street Bicycle Facilities	*Conventional Bicycle Lanes*	On-street bike lanes for exclusive use by bicyclists through the use of pavement markings and signage. They are *typically* on the right side of the roadway, located adjacent to and flow in the same direction as motor vehicle traffic. While less common, bike lanes are sometimes placed on the left side of one-way streets or two-way median divided streets.	Conventional bike lane #1 (Source: City & County of Denver) Conventional bike lane #2
	Buffered Bike Lanes	On-street conventional bike lanes paired with an additional buffer from motor vehicle traffic by means of pavement markings and/or a parking lane. Parking Protected Bike Lanes refer to bike lanes buffered (or protected) from motor vehicle traffic by parked cars. Parking Protected Bike Lanes sometimes fall under the Protected Bike Lane category.	Buffered bike lane
	Protected Bike Lanes (PBL)	These bicycle facilities have three key characteristics: 1.) There is physical, stationary, vertical separation between the bike lane and motor vehicle traffic. Examples of vertical separation may include bollards, curbs, plastic posts, planters, raised bumps or parked cars; 2.) They are exclusively for bicycles; 3.) They are on or immediately adjacent to the roadway. PBL's are part of the street grid and can be at street level, raised to the sidewalk level, or somewhere in between. The three types of protected bike lanes include one-way, two-way and raised.	Protected bike lane with flex tubular markers (Source: City & County of Denver) Protected bike lane w/planters
	Bicycle Boulevards	Also referred to as Neighborhood Bikeways, Neighborhood Greenways, etc., these are streets with low traffic speeds and volumes that are designated and designed to give priority to bicycle travel through a range of design treatments. Typically, there is not a dedicated bike lane, but rather the street is shared by motor vehicles and bikes.	N/A
	Paved Shoulder Bicycle Routes	Paved shoulders are typically applied along roadways in rural communities or less developed areas. They should be striped and signed as a bicycle route and provide adequate space for bicyclists.	Paved shoulder with bike lane
Off-Street Bicycle Facilities	*Shared-use Paths*	Description provided in Pedestrian Section. There are three categories of shared-use paths: along roadway with buffer; along roadway with no buffer (sidepath); along waterway, railroad, through open space, etc.	Shared-use path along roadway Shared use path-waterway (Source: City & County of Denver)
	Bridges/Overpasses and Underpasses	Provide crossings for bicyclists and pedestrians where barriers exist, both real and perceived, such as: interstates, freeways, arterials with high speeds and volumes, railroads, rivers, and other obstacles.	Underpass - multiuse
Other Bicycling Support Infrastructure	*Bike Share*	Bicycles available for short-term use from a network of stations within a given geographic area.	Bike share
	Bicycle Libraries	Similar to bike share, but differ in that the bikes are typically checked out at a central location and are intended for longer-term use.	Bicycle library (Source: City of Golden)
	Bicycle Parking	There are many forms of short-term bicycle parking options such as U-racks, bike trees and bike corrals located on sidewalks and streets. These should be both visible and convenient to the businesses and locations they support.	Bicycle parking at transit Bicycle parking corral (Source: City & County of Denver)
	Secure Bicycling Parking	Intended for longer-term bicycle parking offering secure, weather-protected places to park bicycles at locations such as residential buildings, office buildings and at transit stations.	Secure bicycle parking (Source: Boulder County)
	Wayfinding	Signage and/or pavement markings to guide both bicyclists and pedestrians to their destinations. Many jurisdictions have implemented or are implementing a destination- direction-distance based wayfinding system.	Wayfinding

Bicycle Infrastructure in the DRCOG Region



4. Mode Share and Trip Statistics

On a typical day in the Denver region over 737,000 pedestrian trips and over 123,000 bicycle trips are made (*DRCOG Travel Model, 2015*). As of 2014, the combined percentage of people in the DRCOG region who commute to work by bicycle or walking throughout the year was 3.7 percent (*US Census, 5 year ACS 2010-2014)*. This percentage is higher in summer months and also in downtowns like Boulder and Denver. While the percentage is small, the number of people who bicycle or walk to work has increased significantly over the past decade. For example, between 2005 and 2014, there was a 32 percent increase in the number of people who walk and bicycle to work (*Source*).

Pedestrian Travel

Everyone is a pedestrian at some point. Walking is the most flexible mode of travel and part of nearly all trips, even those taken primarily by another mode. Therefore, it is important that people have access to inviting and safe facilities to walk or travel by wheelchair. For some people, pedestrian travel may be the exclusive mode to get from one place to another. For others, pedestrian travel may be used in combination with other travel modes, such as transit, bicycling or driving. Walking is often the first and/or final mode of travel when combined with other modes.

- ***All Trips.*** Of the more than 12 million total person trips (all modes) made in the region per day, six percent of these trips are made by walking. Countless more short walking "trips" are made at the start or finish of trips by other modes. As expected, most walk trips are short, with an average distance of about 0.4 miles (*Source: DRCOG 2010 FRTC*). Of all the daily trips in the region that are 0.4 miles or less, around 100,000 are made by driving alone (*Source: DRCOG model 2015*).

- ***Work Trips.*** On a typical day in the region about 37,000 people, or 2.4 percent, of the working population walk to work (*US Census, 5 year 2010-2014*). This percentage is much higher when weather is nicer and in more dense locations with a mix of land uses. While the percentage of people walking to work has declined since 1980, trends have remained relatively steady since 2000 with slight fluctuations.

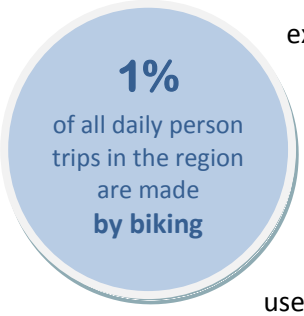
Walk to Work (35-year trend – DRCOG Region)

	1980	1990	2000	2010	2014
Mode Share	4.7 %	3.4 %	2.4 %	2.2 %	2.4 %

Source: US Census (1980-2010); 5-Year ACS (2010-2014)

Bicycle Travel

The DRCOG region has one of the highest rates of bicycle use in the nation and a strong bicycling culture. The climate, relatively concentrated urban development, extensive off-street trail system, expanding bike share systems, and health-oriented population contribute to the popularity of bicycling. Bicycles provide an efficient means of transportation for short- to medium-length trips. The number of people who bike to work has doubled in the DRCOG region between 2000 and 2014; the greatest percentage increase of all modes. Like pedestrian travel, bicycling may also be used in combination with other modes of transportation, especially transit.



- ***All Trips.*** Of the more than 12 million total person trips (all modes) made in the region per day, about 123,000 or one percent of these trips, are made by bicycling. The average bike trip distance in the DRCOG region is about two miles (*Source: DRCOG 2010 FRTC*). There are more than one million or 17 percent of drive-alone trips made each day that are two miles or less (*Source: DRCOG model 2015*).There is potential for some of these short drive-alone trips to be bicycle trips.

- ***Work Trips.*** The number of people who bike to work is increasing at a greater rate than any other mode. On a typical day in the region about 20,000 people or 1.3 percent of the working population bike to work (*US Census, 2014*) which is more than double the national average of 0.6 percent (*US Census ACS – Five Year 2010-2014*). This percentage is much higher in warm weather months and in more dense locations where there is a mix of land uses, mobility options such as bikeshare, and bicycle infrastructure. There is a clear gender gap in bicycle commuters. In the DRCOG region, 71 percent of bicycle commuters are male, whereas 29 percent are female (*ACS, 5 year, 2010-2014*). This trend is typical nationwide.

Bike to Work (35-year trend – DRCOG Region)

	1980	1990	2000	2010	2014
Mode Share	.7 %	.7%	.7 %	1.1%	1.2%

US Census, 1980 – 2000; ACS Data 2010 – 2014

SUMMARY
Pedestrian Crash Characteristics
in the DRCOG Region

20% of traffic fatalities were pedestrians

61% of pedestrian crashes occur mostly on arterial streets

63% of pedestrian crashes occur at an intersection

77% of **fatal** pedestrian crashes involved a vehicle going straight

60% of **fatal** pedestrian crashes occur mid-block

17% of all traffic fatalities are those 65 and older, who currently make up 10% of the regional population

5. Safety

Pedestrians and bicyclists are particularly vulnerable transportation system users due to the high level of injury severity in the event of a crash. Active transportation users account for a disproportionately high percentage of traffic fatalities, considering the distance and time of travel by these modes. Lack of adequate sidewalks and crosswalks could lead pedestrians to compromise their safety by walking in the street or crossing mid-block. Lack of adequate bicycling infrastructure can result in bicyclists taking to the sidewalks due to safety concerns, creating unintended conflict with pedestrians. Also, bicycling on sidewalks could potentially lead to conflicts with turning vehicles at intersections if the bicyclist rides through the crosswalk.

Pedestrian Crash Statistics in the DRCOG Region

From 2010-2014, there were 868 traffic fatalities in the DRCOG region. Pedestrians made up 175, or 20 percent, of the fatalities (*NHTSA - FARS data*), yet only six percent of all trips were made by walking (*Source: DRCOG Travel Model, 2015*). The majority of pedestrian crashes occur on arterial streets (61%) and at intersections (63%). The vast majority of fatal pedestrian crashes occurred with a vehicle travelling straight (77%), with many occurring at mid-block (60%). While those 65 or older make up only ten percent of the regional population, they comprise 17 percent of pedestrian fatalities (*CDOT 2010-2012, NHTSA, 2014*).

Many factors contribute to collisions involving pedestrians. Some examples include:

- high-volume and high-speed roadways;
- turning vehicles at intersections;
- driver distractions – texting, talking, using the phone; and
- lack of dedicated crossing areas – e.g., significant gaps between crossing locations; and streets designed primarily for motor vehicles.

Bicycle Crash Statistics in the DRCOG Region

During the period from 1991 to 2014, about 80 percent of bicycle crashes resulted in injury. Like pedestrians, bicyclists are considered vulnerable transportation system users, due to the high level of injury severity in the event of a crash. There are approximately 100 bicyclists seriously injured in reported traffic crashes each year in the DRCOG region.

Of the 868 total traffic fatalities in the DRCOG region from 2010-2014, thirty, or 3.5 percent of the fatalities, were bicyclists (*FARS data*). Around 12 percent of bicycle crashes results in a fatality or serious injury. (*CDOT 2010-2012*). The majority of bicycle crashes occur on arterial streets (53%) and at intersections (74%). Fatal bicycle crashes usually involved a vehicle going straight (71%). Bicyclists age 15 to 24 had the highest crash involvement. (*CDOT 2010-2012, FARS through 2014*).

Many factors contribute to collisions involving bicyclists. Some examples include:

- high-volume and high-speed roadways;
- turning vehicles at intersections;
- driver distractions – texting, talking, using the phone; and
- driver or bicyclist failure to signal or stop.

Understanding crash characteristics (how, why, where, and who) and trends is important in understanding how to apply appropriate mitigation strategies and countermeasures. Roadway types, existing infrastructure, crash history, pedestrian activity, and bicyclist usage (existing and anticipated) should also be considered when determining mitigation strategies.

More details on pedestrian and bicycle safety, including statistics and mitigation strategies, are available in the *Pedestrian and Bicycle Safety in the Denver Region Report* (2012 currently available, to be updated in 2016).

SUMMARY

Bicycle Crash Characteristics

in the DRCOG Region

80% of bicycle crashes resulted in injury from 1991-2014

100 bicyclists **seriously injured** in reported traffic crashes each year

12% of bicycle crashes results in a fatality or serious injury

53% of bicycle crashes occur mostly on arterial streets

74% of bicycle crashes occur at an intersection

71% of **fatal** bicycle crashes involved a vehicle going straight

Those ages 15 to 24 had the highest crash involvement

Safety Initiatives

Safety concerns are a leading barrier to more people walking and bicycling as a mode of travel. Many people are discouraged from walking and bicycling because of the real or perceived danger of vehicle traffic. This concern is most prevalent for bicycling. Many local and national organizations are striving to improve safety for all transportation users, with bicyclists and pedestrians being no exception. Two leading national efforts are Towards Zero Deaths and Vision Zero Initiatives. These efforts, aiming to reduce and eliminate traffic deaths and severe injuries, have been gaining traction throughout the United States.

- ***Toward Zero Deaths.*** Toward Zero Deaths (TZD), supported by FHWA, is a highway safety vision in the U.S. that includes numerous organizations committed to reducing annual U.S. traffic fatalities to zero. The TZD Plan provides organizations in the fields of engineering, law enforcement, education and emergency medical services (EMS) with initiatives and safety countermeasures designed to eliminate traffic fatalities. The State of Colorado joined this national effort in March 2015. CDOT's *Strategic Highway Safety Plan* incorporates Moving Towards Zero Deaths as a core value within the plan. CDOT's plan establishes a 2.9 percent annual reduction rate of all traffic fatalities starting in 2014 through 2019.

- ***Vision Zero.*** Vision Zero is an initiative which aims to eliminate traffic-related fatalities and serious injuries on the roadways while increasing safe, healthy, equitable mobility for all. Vision Zero, started in Sweden and implemented throughout Europe, is now gaining momentum in major U.S. cities. In early 2016, Denver joined other major U.S. cities that have adopted a Vision Zero policy.

A safe active transportation system is paramount in reducing and eliminating pedestrians and bicyclists from being seriously injured or killed, and in instilling confidence in more people to get around by walking and bicycling.

D. Benefits of Active Transportation

Active transportation is a key component in a robust transportation system providing mobility options for all people. There are many quality of life benefits associated with active transportation including: personal mobility, environmental quality, public health, and economic benefits.

Personal Mobility

Some people choose not to drive, while others cannot drive. According to the 2010 Census, about 70,000 households in the region did not have an automobile available. A robust and safe pedestrian and bicycle infrastructure network can provide cost-effective mobility options for people of all ages, abilities, and incomes, especially when combined with the region's transit network. Walking and bicycling are essential modes of travel for many people to access jobs, school, groceries, health care, and other activities of daily living.

Comfort and Safety

The 8 to 80 rule is a litmus test that involves imagining a public space, especially a busy city street or intersection, and asking whether it is suitable for children, persons with disabilities, and older adults alike.

– Citylab, The 8 to 80 Problem: Designing Cities for Young and Old

Environmental Benefits

Active transportation is an important tool to help the region address environmental challenges related to transportation, such as reducing air pollution, greenhouse gas emissions, and vehicle miles of travel. About one million drive-alone trips are made each day that are equal to or less than the average bicycle trip distance (1.8 miles) and over 100,000 drive-alone trips that are equal to or less than the average walk trip distance (0.4 miles). There are a number of factors as to why these trips are made by driving alone; however, there is potential to shift some of these trips to walking and bicycling.

Health Benefits

One out of every two U.S adults is living with a chronic disease such as heart disease, cancer or diabetes and more than two-thirds of American adults are either overweight or obese. While Colorado leads the nation in terms of healthy people, obesity rates in the state are projected to more than double by 2030 (Source: Surgeongeneral.gov, 2016). Additionally, the percentage of overweight children in the United States is growing at an alarming rate, with more than one-third of children and adolescents considered overweight or obese. In Colorado, 27% children ages 2 – 14 were considered overweight or obese in 2013 (Source: Colorado Department of health, March 2015). Walking and bicycling can be one factor in helping to reduce or mitigate stress, obesity, and chronic disease. Children who ride a bike two or more times a week are less likely to be overweight. Adolescents who bike are 48% less likely to be overweight as adults (Source: People for Bikes, Statistics Library). The

Opportunity for Change

There are over 1 million trips made each day by driving alone that have the potential to shift to bicycling or walking.

health benefits of active transportation are no longer isolated to the health care field and have become a central topic in planning and policy.

Economic Benefits

Walking and bicycling are cost effective options for getting around, can help people save money, and benefit local economies. Opting to bicycle or walk instead of driving can help reduce motor vehicle ownership costs, such as gasoline, maintenance and parking. These savings can equate to more money spent on local goods and services. Additionally, while the cost to construct these facilities greatly varies, many roadways can easily be retrofit to accommodate bicycles and pedestrians through the use of low-cost materials such as paint, planters and trees. Demonstration, pilot and interim design projects are low-cost options to test out projects and applications where budgets are limited, and/or public education and buy-in is necessary.

Good Design

"Decisions and plans made by the transportation, land use, and community design sector can affect whether communities and streets are designed to support walking.

This sector can change the design of communities and streets through roadway design standards, zoning regulations, and building codes and improve the pedestrian experience through landscaping, street furniture, and building design.

This sector is also integral in the planning and implementation of public transit systems."

— Surgeon General, 2015

Economic Development

"The number one thing they want is bike lanes. Ten years ago we never would have thought that walkability or bike lanes would be economic development tools."

— Tami Door, Downtown Denver Partnership, on what tech companies say they want in order to locate to or stay in Denver

Supporting the Framework of Metro Vision

In addition to the aforementioned benefits, a robust, safe and well-connected active transportation system supports the framework of DRCOG's Metro Vision Plan. Active transportation is a key component in many of the Outcomes and Regional Objectives developed as part of the draft Metro Vision Plan. Additionally, an expanded active transportation system and increased use of these modes are essential elements in meeting the Performance Measures and Targets in the plan, such as increasing non-SOV mode share to work, and reducing greenhouse gas emissions, vehicle miles of travel, and number of traffic fatalities.

E. Future Trends for Active Transportation – Projections for 2040

Looking forward to 2040, all total person trips are projected to increase by 35 percent, whereas walking and bicycling trips are projected to increase by 56 and 45 percent, respectively. Currently, about 737,000 or six percent of trips are made by walking. By 2040, over one million trips will be made by walking each day, accounting for almost seven percent of all weekday person trips. Bicycle trips are also projected to increase, from around 123,000 to 180,000 trips per day, but are forecast to still account for only one percent of all weekday person trips by 2040 (*Source: DRCOG travel model*).

Walking and Bicycling Trips: 2015 and 2040

Number of daily person trips	2015	2040
All Trips	12,977,100	17,475,878
By Walking	736,942	1,148,311
By Bicycling	122,759	178,501

F. Active Transportation Goals

To summarize active transportation in the DRCOG region:

- By 2040, the region's population is projected to increase by 37% and the number of active transportation trips is projected to increase by 54%.
- While the DRCOG region has a robust pedestrian and bicycle network, there are many gaps in the system and barriers to bicycling and walking.
- The quality of life benefits associated with walking and bicycling are numerous.
- A mode share increase in walking and bicycling is necessary in order to meet *Metro Vision* outcomes, objectives, and performance measures and targets.
- Pedestrians and bicyclists are vulnerable transportation system users and are more susceptible to being killed or seriously injured in the event of a crash.

In order to address the demands and challenges associated with regional growth, the demand for active transportation options, and support the framework of *Metro Vision*, the following goals pertaining to active transportation must be addressed:

1. Increase walking and bicycling mode share and trips beyond what is projected.
2. Provide a robust walking and bicycle network for people of all ages and abilities.

3. Improve the safety of the pedestrian and bicycle network thereby reducing (and ultimately striving to eliminate) serious injuries and deaths as a result of crashes.

These three goals are synergistic; where, for example, a robust and safe active transportation network should result in a mode share increase for both bicycling and walking. How does the region:

- achieve these objectives?
- achieve and maximize the benefits of walking and bicycling?
- improve the safety of the network?
- create a network where people of most ages and abilities feel comfortable walking and bicycling?
- and ultimately, increase the active transportation mode share?

G. Elements to Fulfill Active Transportation Goals

This section identifies some of the elements that are necessary to fulfill the three goals identified. While this is not an all-encompassing list, it does include the major pillars necessary in supporting the goals and vision for active transportation by 2040. These and additional elements will be further explored and expanded upon in the development of DRCOG's *Active Transportation Plan*, scheduled to commence in late 2016.

1. Low Stress (or High Comfort) Network

One of the most important elements in attracting more people to walking and bicycling is a low-stress network of active transportation facilities. Low-stress facilities, also referred to as high-comfort facilities, induce the least amount of stress on the users, and attract a wider segment of the population to walk and bicycle. Low-stress facilities are *typically* on or adjacent to roadways with lower traffic volumes and lower speeds (especially if the facility is on-street) and can include wide sidewalks buffered by landscaping, protected bike lanes, sidepaths, multiuse facilities, buffered bike lanes, bicycle boulevards, and neighborhood bikeways. Pedestrian and bicycle bridges and underpasses also provide a low-stress experience, allowing active transportation users to avoid busy intersections and roadways, and enabling mostly uninterrupted travel.

Low-stress Connectivity – *Attracts the Widest Possible Segment to Bicycling*

In a 2012 study from Northeastern University, *Low Stress Bicycle Bicycling and Network Connectivity*, researchers write: "For a bicycling network to attract the widest possible segment of the population, its most fundamental attribute should be low-stress connectivity. That is, providing routes between people's origins and destinations that do not require cyclists to use links that exceed their tolerance for traffic stress, and that do not involve an undue level of detour."

—Furth et al., *Network Connectivity for Low-Stress Bicycling,* Submitted to TRB for the 2013 Annual meeting and publication in Transportation Research Board

Over the past few years, there has been a regional focus on constructing, expanding and connecting a low-stress network of facilities to appeal to a wide audience of ages and abilities. Pedestrian and bicycle facilities alike should be planned and developed for the most vulnerable users (children, older adults, and people with disabilities).

2. Connecting the Active Transportation Network

Also essential to attracting a wider segment to walking and bicycling is continuity and consistency in the active transportation system achieved by **connecting the low-stress network**. In addition to filling in gaps and connecting facilities, it is important to identify and connect to desirable destinations and to other modes of transportation. A low-stress, well-connected network of active transportation facilities can be obtained through the following actions:

- Taking inventory of the existing bicycle and pedestrian network.
- Identifying missing segments and barriers in the existing network.
- Filling in gaps and removing barriers to the existing network.
- Identifying gaps and barriers to first and final mile connections.
- Filling in gaps and removing barriers to first and final mile connections.
- Create a consistency in the network.
- Expanding the active transportation network, ideally with low-stress facilities.

3. Multimodal Transportation Nodes

Having a mix of transportation options and amenities conveniently available and located at popular destinations, in urban and town centers, and at transit stations, can make walking and bicycling more feasible. People might be willing to get around more by walking or bicycling if modes were clustered together and easily accessible, such as carshare, transit, transportation network companies (Uber, Lyft) and taxis, bike share and secure bicycle parking. Denver Union Station is a premier example of a multimodal transportation node in the Denver region. However, multimodal transportation nodes are not reserved only for urban cores, and they have the potential to be successful in suburban town centers and suburban transit-oriented development.

4. Complete Streets

Complete streets are designed to safely accommodate both motorized and active modes of transportation. According to the National Complete Streets Coalition, complete streets are those designed and operated to enable safe access and travel for all users. Pedestrians, bicyclists, motorists,

transit users, and travelers of all ages and abilities will be able to move along the street network safely. Although the FHWA does not have an official complete streets policy, the concept is closely associated with the principles promoted by the Interagency Partnership for Sustainable Communities, a joint endeavor involving the U.S. Department of Transportation (USDOT), U.S. Department of Housing and Urban Development (HUD), and U.S. Environmental Protection Agency (EPA). *(Source: FHWA, Public Roads, July/August 2010).* All modes, including walking and bicycling, should be considered in new roadway and reconstruction projects to enable safe travel for all transportation users. As of 2016, the only known jurisdictions in the DRCOG region to have adopted or incorporated complete streets in policies, resolutions, or plans include the City of Denver and City of Golden.

5. Supporting Infrastructure and Technology

Infrastructure and amenities supporting active transportation are influential to their usage. Examples of supporting infrastructure include: pedestrian shelters at transit stops; shade trees and landscaping along sidewalks; bicycle racks and secure bicycle parking; and wayfinding. Additionally, real-time multimodal transportation applications and routing capabilities further support and enable walking and bicycling as stand-alone modes or used in conjunction with another mode. For example, technology could easily enable people using transit to reserve a bicycle (bikeshare) or car (carshare) at the end of the trip to access their final destination. Supporting infrastructure, amenities, and technology should be convenient, easily accessible and intuitive.

H. Role of DRCOG in Implementing Active Transportation Projects

DRCOG plays an integral role in both supporting and funding active transportation in the DRCOG region. Projects categorized as pedestrian and bicycle infrastructures are funded directly through the TIP process. The percentage of funds allocated to pedestrian and bicycle projects has increased over the past three TIP cycles. In the current TIP (2016-2021), 22 percent of funds are allocated to projects classified as bicycle and/or pedestrian infrastructure and 100 percent of these projects selected were either protected or grade separated from the roadway. Pedestrian and bicycle projects are also funded indirectly as elements of larger TIP projects, such as roadway projects. Roadway projects have been incentivized in the TIP application process to include multimodal features like bicycle and pedestrian travelways and support facilities.

In 2016, DRCOG will undertake the development of an Active Transportation (AT) Plan. It is intended for the Active Transportation Plan to eventually become an element of, and adopted into the MVRTP. The Active Transportation Plan will expand upon the elements of this section of the MVRTP and incorporate

additional components and products such as a Regional Bicycle Network Vision. DRCOG staff will work closely with member jurisdictions and other stakeholders in the development of this plan.

I. Design Guidelines and Resources

Pedestrian and bicycling facility typologies and design are not one size fits all and will vary depending on local community character factors such as existing/planned land uses, density, adjacent roadway types and widths, density, and usage. Recognizing the great diversity in the region, DRCOG does not prescribe blanket design guidelines and requirements that apply equally to all jurisdictions and projects. The TIP policy establishes certain requirements for the project selection process, such as minimum widths for multiuse facilities, and directs jurisdictions to follow ADA and AASHTO design standards. Additionally, there are a variety of design resources (Figures 4 and Figure 5) available which are continually evolving. In addition to local guidelines and requirements, jurisdictions should utilize these guides in the planning and design process of pedestrian and bicycle facilities. DRCOG encourages jurisdictions and counties to communicate and coordinate where possible on pedestrian and bicycle plans and projects with neighboring jurisdictions and other applicable stakeholders to achieve consistency and connectivity across boundaries.

Figure 4

DESIGN GUIDE RESOURCES FOR PEDESTRIAN FACILITIES

- *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, July 2004, (AASHTO Pedestrian Guide)
- *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*. (ITE Guide). This guide is useful in gaining an understanding of the flexibility that is inherent in the AASHTO "Green Book," *A Policy on Geometric Design of Highways and Streets*.
- *Urban Street Design Guide*, 2013, (National Association of City Transportation Officials)
- *Guidance Memorandum on Promoting the Implementation of Proven Safety Countermeasures,* 2012, (FHWA)
- *2010 ADA Standards for Accessible Design,* (Department of Justice)
- *Proposed Guidelines for Pedestrian for Pedestrian Facilities in the Public Right-of-Way (PROWAG)*, (United States Access Board), 2011

Figure 5

DESIGN GUIDE RESOURCES FOR BICYCLE FACILITIES

- *Guide for the Development of Bicycle Facilities*, 2012 – Fourth Edition, (American Association of State Highway and Transportation Officials)
- *Urban Bikeway Design Guide*, 2014 – Second Edition, (National Association of City Transportation Officials)
- *CDOT Roadway Design Guide – Chapter 14 Bicycle and Pedestrian Facilities, Jan 2013, Revision 1, (CDOT).*

APPENDIX 8

Consideration of FAST Act Federal Planning Factors

APPENDIX 8

Consideration of FAST Act Federal Planning Factors

Fixing America's Surface Transportation (FAST) Act calls for MPOs to ensure that the planning process provides for consideration and implementation of projects, strategies, and services for the 10 factors described below. The following lists the "planning factors" and describes how the *2040 Metro Vision Regional Transportation Plan* (2040 MVRTP) has considered them. The 2040 MVRTP includes the 2040 Fiscally Constrained RTP, the transportation theme (component) of DRCOG's *Metro Vision*, as well as modal components addressing transit, freight, and active transportation. All of these elements integrate together within the 2040 MVRTP to help address the planning factors.

1. **Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.**

The 2040 MVRTP provides a network of transportation facilities and connections to link employment centers with major multimodal passenger facilitates and intermodal freight terminals, both nationally and internationally. The plan specifically addresses connections with Denver International Airport, which provides a direct linkage between the region's economy and the global economy. Connections with the region's other general aviation airports to facilitate business travel and cargo are also emphasized. The provision of an extensive transit system enables a greater share of the labor force to have access to many more jobs. Finally, the 2040 MVRTP includes an extensive freight component addressing these issues.

2. **Increase the safety of the transportation system for motorized and nonmotorized users.**

The plan addresses several aspects of safety such as law enforcement and legislative actions, safety improvements to be made, maintenance activities related to safety, and the relationship to CDOT's *Strategic Highway Safety Plan* (Chapter 4). While site-specific safety designated improvements, because of their relatively small scale, are not specifically listed or mapped, safety is being given due consideration through UPWP planning activities, TIP project selection criteria, future RTP system improvement evaluations, and the incorporation of safety elements into larger scale projects. Safety was also a key criterion in evaluating and prioritizing regionally significant roadway capacity projects for regional funding in the 2040 MVRTP (Appendix 1). The 2040 MVRTP also identifies funding commitments to future identified safety projects, strategies, and services. Additionally, the plan also sets the stage for the FAST Act's performance-based planning process by identifying baseline data for and discussing the safety-related performance measures (Chapter 7), as well as

including safety data from DRCOG's most recent *Traffic Crashes in the Denver Region* report (Chapters 4 and 7). Finally, Metro Vision's transportation theme includes a performance measure and target addressing the region's focus on reducing traffic fatalities (Chapter 3).

3. Increase the security of the transportation system for motorized and nonmotorized users.

Residents and visitors will travel in the Denver region with confidence. DRCOG's role in regional transportation security activities are discussed in detail in Chapter 4, with an emphasis on substantial coordination among all agencies charged with transportation system security. Activities that facilitate preparedness and prevention, such as vulnerability assessments, are key to increasing security, but attention will also be paid to improving response and recovery.

4. Increase accessibility and mobility of people and freight.

A key focus of the 2040 MVRTP is to provide improved mobility for the region's citizens and businesses. Both roadway and transit improvements are identified and funded in the 2040 MVRTP that reduce delay and enhance mobility. The plan also includes a number of alternative modes of transportation to provide travel choices. Future funds are allocated for the promotion of alternative modes on three levels: regionally, in subareas, and at individual business sites. Pedestrian and senior citizen accessibility strategies are emphasized in the 2040 MVRTP's active transportation and transit plan components. Mobility of freight and goods movement is specifically addressed in the freight component. Management activities to improve freight mobility include incident detection and response, and Intelligent Transportation Systems applications. The plan also identifies pools of funding that can be used for all of the previously mentioned activities.

5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns.

All of these concepts are part of the 2040 MVRTP and *Metro Vision*:

- *Protecting and enhancing the environment* is a key focus of the 2040 MVRTP (Chapter 7). The planning process provided for the active involvement of the air quality regulatory agencies and citizens interested in air quality. The 2040 MVRTP is in conformance with the State Implementation Plan for air quality. Projects identified for inclusion in the transit and highway networks both are considered with respect to environmental impact at the system level.

DRCOG participated in CDOT's Planning Insight Network (PIN) Tool process, an interactive web-based mapping tool and process to solicit environmental consultation by resource agencies on major projects and travel corridors. DRCOG submitted a representative list of major freeway and arterial roadway capacity projects to CDOT for it to map in the PIN Tool for consultation and comment by resource agencies. DRCOG reviewed and considered the comments received. Further, before individual major projects go through final design engineering and construction they must go through appropriate NEPA environmental reviews and studies. This assures that project alignments, designs, and mitigation measures result in environmentally sensitive projects. Chapter 7 also discusses other environmental issues, data and considerations at the long range planning level.

- *Energy conservation* is promoted through *Metro Vision* land use/development objectives and by attempting to minimize travel delays and provide extensive transit services and other alternative travel modes through the 2040 MVRTP. Metro Vision objectives such as extent of urban growth (urban growth boundaries), urban centers, and community design seek to avoid land use patterns that lead to increased vehicles miles of travel (VMT) and by encouraging more pedestrian and transit-friendly development. In the 2040 MVRTP, the promotion and facilitation of alternative travel modes is acknowledged through the travel demand management (TDM) programs, such as DRCOG's *Way to Go* program, funded in the plan, as well as the transit and active transportation components. In addition, the synchronization of traffic signals across the region is supported in both the 2040 MVRTP and in *Metro Vision*. DRCOG provides for such synchronization through its regional traffic operations program, including the Traffic Signal System Improvement Program, which times signals to be more efficient and coordinated across corridors. Stop-and-go delays are reduced and fuel savings are achieved as a result of these activities. Finally, petroleum fuel consumption and greenhouse gas emissions are reported in the 2040 MVRTP (Chapter 7).

- *Quality of life* is also addressed throughout the 2040 MVRTP and *Metro Vision*. Several objectives and strategic initiatives (*Metro Vision*) and funded projects, programs, and services (2040 MVRTP) will improve quality of life for persons living throughout the region. The very first principle of *Metro Vision* is to "protect and enhance the region's quality of life" and its most basic purpose is to "safeguard for future generations the region's many desirable qualities…" From the 2040 MVRTP perspective, environmental justice for disadvantaged persons will be enhanced by the implementation of the regional transit system, alternative mode services and facilities, and environmentally sensitive designs that are developed for specific projects (Chapter 7).

- *Metro Vision* explicitly *considered State and local planned growth and economic development patterns* through extensive outreach to local governments and economic development organizations. The 2040 MVRTP serves the desired growth and development identified in *Metro Vision*.

6. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.

The 2040 MVRTP specifically address the integration of transportation system elements. The plan discusses multimodal connections with respect to a number of modes, as well as shared opportunities for multimodal transportation development. For example, park-n-Ride lots will have convenient auto, pedestrian and bicycle connections. Transit-to-transit transfer facilities are identified as well as transit and aviation connections. The key multimodal passenger facilities identified in the 2040 MVRTP are Denver Union Station and Denver International Airport. Roadway improvements near major intermodal freight facilities are included and reference is provided to new or improved intermodal freight facilities that are envisioned. First and last mile connections – and the role of multimodal travel options to do so – are discussed throughout the 2040 MVRTP. Finally, system connectivity is addressed in the plan's, freight, transit, and active transportation components, while freight is obviously addressed in depth in the freight component.

7. Promote efficient system management and operation.

The 2040 MVRTP makes extensive reference to system management and operational activities (particularly in Chapters 4, 5, 6, and 7). The plan identifies and funds operational improvements, facility management, traveler and transit information systems, and travel demand modification efforts to ensure that the regional transportation system will work as efficiently as possible. ITS efforts will provide transportation efficiency benefits, as well as safety and security enhancements. The 2040 MVRTP also contemplates the role evolving technology could play in system management and operations. Finally, a key outcome (with associated objectives and strategic initiatives) of *Metro Vision's* transportation theme is that "the regional transportation system is well-connected and serves all modes of travel" (Chapter 3).

8. Emphasize the preservation of the existing transportation system.

Preservation of the existing transportation system is a key focus of the 2040 MVRTP. Chapter 5 emphasizes the allocation of more than half of available revenues towards system preservation, operation, and maintenance. Preservation is applied to all types of travel mode facilities on the system, from roadways to

transit stations to sidewalks. Chapter 7 also discusses DRCOG, CDOT, and RTD activities related to system preservation and state of good repair.

9. Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of the transportation system.

Transportation system resiliency is addressed in Chapter 4 of the 2040 MVRTP and is a core theme (chapter) of *Metro Vision*, which addresses resiliency of both the natural and built environment. In the 2040 MVRTP, transportation resiliency is addressed through many facets, such as safety, security, and operations (Chapter 4), and environmental mitigation (Chapter 6). While stormwater reduction and mitigation is addressed during the project development and implementation process, Chapter 7 discusses the importance of stormwater and related environmental issues at the regional level. DRCOG monitors NEPA and PEL studies to ensure that stormwater (among many other issues) are addressed during corridor and project studies.

10. Enhance travel and tourism

The 2040 MVRTP funds a connected network of multimodal projects, programs and services to increase travel mobility for all users. The issues of travel, mobility, and accessibility are discussed throughout the plan, as is the issue of balancing increased mobility for individual users while reducing desiring to reduce or limit increases in VMT, greenhouse gas emissions, and SOV mode share to work at the regional level. Traffic operations and technology also play an important role in enhancing the traveling experience, from app-based notifications and wayfinding to traffic operations that result in smoother and more predicable travel among and between travel modes. The 2040 MVRTP's investments in key transportation facilities and services also facilitate tourism, such as interstate highways, Denver International Airport (DIA), Denver Union Station, and others. For example, RTD's FasTracks system includes connections to DIA (University of Colorado A Line), major regional tourist attractions (Coors Field and Sports Authority Field at Mile High), and other important activity centers that facilitate tourism (and general travel).

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(November 2016)

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Regional Transportation District

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LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AFB	Air Force Base
APE	Annual Program Evaluation (RTD FasTracks)
APCD	Air Pollution Control Division
AQCC	Air Quality Control Commission
ATIS	Advanced traveler information systems
ATMS	Advanced transportation management systems
BNSF	Burlington Northern Santa Fe Railroad
BRT	Bus rapid transit
CAA	Clean Air Act
CAB	Colorado Aeronautical Board
CBD	Central Business District
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CFRT	Colorado Front Range Trail
CMAQ	Congestion Mitigation and Air Quality
CO	Carbon monoxide
DEIS	Draft Environmental Impact Statement
DIA	Denver International Airport
DMS	Dynamic Message Sign
DRIR	Denver Rock Island Railroad
DRCOG	Denver Regional Council of Governments
DRMAC	Denver Regional Mobility and Access Council
DUS	Denver Union Station
EA	Environmental Assessment
E&D	Elderly and disabled
EIS	Environmental impact statement
EJ	Environmental Justice
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAST Act	Fixing America's Surface Transportation Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
FTA	Federal Transit Administration
GA	General aviation
GHG	Greenhouse gas emissions
GWR	Great Western Railway
HOT	High occupancy toll
HOV	High occupancy vehicle
HUTF	Highway Users Tax Fund
ITS	Intelligent Transportation Systems
JARC	Job Access and Reverse Commute
LRT	Light rail transit
MAP-21	Moving Ahead for Progress in the 21st Century
MP	Milepost
MPO	Metropolitan Planning Organization

MRA	Major regional arterial
MVRTP	Metro Vision Regional Transportation Plan
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHS	National Highway System
NO_x	Nitrogen oxides
NPL	National Priorities List
PCEA	Programmatic Cumulative Effects Analysis
PEIS	Programmatic Environmental Impact Statement
PEL	Planning and Environmental Linkage
PM_{10}	Particulate matter less than 10 microns in size
PMT	Person-miles of travel
Ppm	Parts per million
RAMP	Responsible Acceleration of Maintenance and Partnerships
RAQC	Regional Air Quality Council
RASP	Regional Aviation System Plan
ROD	Record of Decision
RPP	Regional Priority Program
RRS	Regional Roadway System
RTC	Regional Transportation Committee
RTD	Regional Transportation District
RTP	Regional Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act - A Legacy for Users
SGPI	Shortgrass Prairie Initiative
SH	State Highway
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOV	Single occupant vehicle
STIP	State Transportation Improvement Program
STP	Surface Transportation Program
TAC	Transportation Advisory Committee
TANF	Temporary Assistance for Needy Families
TAP	Transportation Alternatives Program
TAZ	Transportation analysis zone
TCM	Transportation control measure
TCSP	Transportation and Community System Preservation
TDM	Travel demand management
TIP	Transportation Improvement Program
TOD	Transit-oriented development
TMA	Transportation Management Area
TMO/A	Transportation management organization/association
TSM	Transportation systems management
UGB/A	Urban growth boundary/area
UP or UPRR	Union Pacific Railroad
UPWP	Unified Planning Work Program
US FWS	United States Fish and Wildlife Service
USC	United States Code
VMT	Vehicle miles traveled
VOC	Volatile Organic Compounds
YOE	Year of Expenditure

LIST OF KEY AGENCY WEBSITES

Air Pollution Control Division (APCD): www.colorado.gov/airquality/

Colorado Department of Transportation (CDOT): www.coloradodot.info/

Denver Regional Council of Governments (DRCOG): www.drcog.org

Federal Highway Administration (FHWA): www.fhwa.dot.gov

Federal Transit Administration (FTA): www.fta.dot.gov

Regional Air Quality Council (RAQC): www.raqc.org

Regional Transportation District (RTD): www.rtd-denver.com

U.S. Census Bureau: www.census.gov/

U.S. Department of Transportation: www.dot.gov/

U.S. Environmental Protection Agency (EPA): www.epa.gov