Appendix A

Blueprint Actions Sorted by Initiator and Additional Participants

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Note on Coordination Effort and Cost information: Each of the Blueprint's Tactical Actions will require some level of monetary investment from public sector agencies. In addition, their implementation will take some level of coordination.

In the tables below, coordination effort is shown for each Action on a scale of 1 (very low effort) to 9 (very high effort).

The cost estimates shown here are meant to indicate order of magnitude. They're broken down into ranges across two main categories. Capital expenditures reflect the up-front cost (including professional services) to the region's public agencies with some possible contributions from private-sector partners (existing or future). Operating expenditures reflect the year-to-year cost of maintaining a given program or project (including staff time, which is further broken down by FTEs required). Note that some Actions would only require operating investments in the first few years.

The conceptual cost estimates shown here are meant to indicate order of magnitude. They're broken down into ranges across two main categories. Capital expenditures reflect the up-front cost (including professional services) to the region's public agencies; some of these costs may be offset by potential contributions from private-sector partners (existing or future). Operating expenditures reflect the year-to-year cost of maintaining a given program or project (including staff time, which is further broken down by FTEs required). Note that some Actions would only require operating investments in the first few years.

The Blueprint's recommendations are designed to maximize the region's existing transportation investments by helping to establish common priorities related to emerging technologies. In many cases, the Tactical Actions can be successfully implemented by using existing funding sources differently. The total cost of implementing all of the Blueprint's recommended Tactical Actions is estimated to be less than 5% of the amount the region's public agencies (including CDOT, DRCOG, RTD, and all 50-plus cities and counties) currently spend on transportation. It would be to the discretion of each of these entities to determine whether new funding is needed to advance any of the tactics or if existing dollars could be redirected. By strategically integrating emerging technologies in their planning processes, the region's public agencies will consider funding options and look for opportunities to catalyze private sector investment through both new and established partnerships.

The Blueprint's recommendations are intentionally flexible, with the intention that initiating agencies would work with partners to clearly define programs and projects. Therefore, the cost and coordination estimates shown here are designed to expectations about the relative level of effort for each of these levers required to successfully implement the actions.

Table 1: Recommended Tactical Actions with level of Coordination Effort and Cost Ranges

Tactical Actions		CDOT	DRCOG	RTD	Chamber	Cities & Counties	Additional Participants	Coordination Effort	Capital Expenditure (Low)	Capital Expenditure (High)	Operating Expenditure - Annual (Low)	Operating Expenditure - Annual (High)	Staff Required
				Initiator					Cost (in Millions)				
Objective 1: Regional Collaboration													
1.1	Establish a mobility technology advisory committee	●	●	●	●		New mobility entity	2	$0.2	$0.3	$0.2	$0.2	1 to 2
1.2	Establish a new public-private mobility entity or entities to pursue mobility technology implementation	●	●	●	●		N/A	7	$0.3	$0.5	$0.2	$0.2	1 to 2
1.3	Engage university resources to develop mobility technology research and development		●				New mobility entity, university collaborative	6	$0.2	$0.3	-	-	Oversight
1.4	Make Mobility as a Service available to all		●				New mobility entity, nonprofits and human service providers	9	$8.0	$15.0	$1.5	$2.0	1
1.5	Develop regional guidelines for drone delivery and drone passenger travel	●					FAA, state legislature, Denver Metro Chamber	7	$0.5	$0.7	$0.2	$0.2	1
1.6	Establish a regional smart mobility navigator		●				CDOT, RTD, cities, counties	9	$0.2	$0.3	$0.5	$0.5	2
Objective 2: System Optimization													
2.1	Evaluate technology upgrades and interoperability in projects in DRCOG's Transportation Improvement Program		●				New mobility entity	1	$0.2	$0.3	-	-	Oversight
2.2	Prepare for technology upgrades and interoperability in project development of transportation projects	●	●				New mobility entity	2	$0.3	$0.5	$0.1	$0.1	0.5
2.3	Accelerate testing of bicycle/pedestrian detection at crossings					●	N/A	1	$1.0	$5.0	$0.1	$0.1	Oversight
2.4	Implement transit priority on all major bus corridors			●			Cities, counties, CDOT	6	$20.0	$30.0	$1.0	$1.0	4
2.5	Implement smart traffic signal control technology on all major regional arterial corridors			●			Cities, counties, CDOT	6	$120.0	$170.0	$5.0	$5.0	10

Tactical Actions		CDOT	DRCOG	RTD	Chamber	Cities & Counties	Additional Participants	Coordination Effort	Capital Expenditure (Low)	Capital Expenditure (High)	Operating Expenditure - Annual (Low)	Operating Expenditure - Annual (High)	Staff Required
2.6	Pilot integrated corridor management on ten arterial corridors		●				CDOT, RTD, cities, counties, new mobility entity	9	$12.0	$17.0	$0.5	$0.5	2
2.7	Implement "smart corridor" operations on all regional freeways	●					Cities, counties, DRCOG	4	$25.0	$30.0	$3.0	$5.0	10 to 20
2.8	Coordinate traffic management center systems and operations	●					DRCOG, cities, counties	8	$20.0	$30.0	$3.0	$3.0	10
2.9	Pilot mobility technologies on mountain corridors	●					New mobility entity, I-70 Coalition	2	$20.0	$30.0	$3.0	$3.0	10
2.10	Pilot modular lanes	●					N/A	3	$2.0	$5.0	-	-	Oversight
	Objective 3: Shared Mobility												
3.1	Develop a universal mobility app for trip planning and payment			●			New mobility entity , E-470, Northwest Parkway	6	$3.0	$8.0	$0.4	$0.8	1 to 2
3.2	Adopt a regional compact defining common standards for micromobility services		●				Cities, counties	9	$0.3	$0.5	$0.2	$0.2	1
3.3	Develop incentives to improve ridehailing and ridesharing operations			●		●	DRCOG	3	$1.0	$2.0	$0.5	$0.5	2
3.4	Implement curbside management standards		●	●			Cities, counties, new mobility entity	8	$0.3	$0.5	-	-	Oversight
3.5	Pilot neighborhood-scale mobility hubs		●	●			Cities, counties, new mobility entity , TMAs	2	$1.0	$5.0	-	-	Oversight
3.6	Partner with the private sector to provide transportation in mobility-challenged communities		●	●			Cities, counties, neighborhood groups, TMAs	4	$0.5	$1.0	$1.0	$3.0	Oversight
3.7	Pilot smart parking at Park-n-Rides			●			New mobility entity	1	$1.0	$2.0	-	-	Oversight
	Objective 4: Data Security and Sharing												
4.1	Establish a regional mobility data platform	●	●	●	●		Cities, counties, NREL, universities, new mobility entity , COIT	8	$6.0	$8.0	$0.5	$0.5	2
4.2	Establish data sharing requirements for private sector roadway users		●				New mobility entity, cities, counties	4	$0.3	$0.4	-	-	Oversight
	Objecetive 5: Mobility Electrification												
5.1	Incentivize ridehailing and ridesharing providers to use electric vehicles		●				New mobility entity	3	$0.2	$0.3	-	-	Oversight
5.2	Create an electrified mobility development program					●	Utility companies (i.e., Xcel), Public Utilities Commission, state legislature	5	$0.3	$0.5	$0.2	$0.2	1
5.3	Transition government fleets to electric and other zero-emission vehicles	●	●	●			Cities, counties, Colorado Energy Office, Regional Air Quality Council	7	$275.0	$475.0	$15.0	$18.0	50 to 60
	Objective 6: Driverless Vehicle Preperation												
6.1	Pilot driverless microtransit to increase public exposure to automated vehicle technology			●			New mobility entity , cities, counties, CDOT, DRCOG, TMAs	6	$1.0	$5.0	-	-	Oversight
6.2	Minimize zero occupancy and encourage high shared use of driverless automated vehicles	●	●				State legislature, ridehailing providers	8	$0.2	$0.3	-	-	Oversight
6.3	Support legislative efforts to ensure that automated vehicles operate safely	●					USDOT, Denver Metro Chamber, state legislature	5	$0.3	$0.4	$0.2	$0.2	1
	Objective 7: New Transportation Funding												
7.1	Expand DRCOG funding earmark for a mobility technology innovation fund		●				N/A	2	$20.0	$30.0	-	-	Oversight
7.2	Explore the concept of a road usage charge for Colorado	●					DRCOG, state legislature, Denver Metro Chamber	5	$0.5	$0.7	-	-	Oversight
7.3	Support legislative efforts to ensure that driverless automated vehicles generate appropriate funding				●		CDOT	7	$0.3	$0.4	$0.2	$0.2	1

Tactical Actions							Initiator				Cost (in Millions)						
	CDOT	DRCOG	RTD	Chamber	Cities & Counties	Additional Participants					Coordination Effort	Capital Expenditure (Low)	Capital Expenditure (High)	Operating Expenditure - Annual (Low)	Operating Expenditure - Annual (High)	Staff Required	
Total												$541.1	$874.9	$36.5	$44.4	111 to 138	

Table 2: Tactical Actions with CDOT Designated as Initiator

Tactical Actions		CDOT	DRCOG	RTD	Chamber	Cities & Counties	Additional Participants
	Objective 1: Regional Collaboration						
1.1	Establish a mobility technology advisory committee	●	●	●	●		New mobility entity
1.2	Establish a new public-private mobility entity or entities to pursue mobility technology implementation	●	●	●	●		N/A
1.5	Develop regional guidelines for drone delivery and drone passenger travel	●					FAA, state legislature, Denver Metro Chamber
	Objective 2: System Optimization						
2.2	Prepare for technology upgrades and interoperability in project development of transportation projects	●	●				New mobility entity
2.7	Implement "smart corridor" operations on all regional freeways	●					Cities, counties, DRCOG
2.8	Coordinate traffic management center systems and operations	●					DRCOG, cities, counties
2.9	Pilot mobility technologies on mountain corridors	●					New mobility entity, I-70 Coalition
2.10	Pilot modular lanes	●					N/A
	Objective 4: Data Security and Sharing						
4.1	Establish a regional mobility data platform	●	●	●	●		Cities, counties, NREL, universities, new mobility entity , COIT
	Objecetive 5: Mobility Electrification						
5.3	Transition government fleets to electric and other zero-emission vehicles	●	●	●			Cities, counties, Colorado Energy Office, Regional Air Quality Council
	Objective 6: Driverless Vehicle Preperation						
6.2	Minimize zero occupancy and encourage high shared use of driverless automated vehicles	●	●				State legislature, ridehailing providers
6.3	Support legislative efforts to ensure that automated vehicles operate safely	●					USDOT, Denver Metro Chamber, state legislature
	Objective 7: New Transportation Funding						
7.2	Explore the concept of a road usage charge for Colorado	●					DRCOG, state legislature, Denver Metro Chamber

Table 3: Tactical Actions with DRCOG Designated as Initiator

#	Tactical Actions	CDOT	DRCOG	RTD	Chamber	Cities & Counties	Additional Participants
	Objective 1: Regional Collaboration						
1.1	Establish a mobility technology advisory committee	●	●	●	●		New mobility entity
1.2	Establish a new public-private mobility entity or entities to pursue mobility technology implementation	●	●	●	●		N/A
1.3	Engage university resources to develop mobility technology research and development		●				New mobility entity, university collaborative
1.6	Establish a regional smart mobility navigator		●				CDOT, RTD, cities, counties
	Objective 2: System Optimization						
2.1	Evaluate technology upgrades and interoperability in projects in DRCOG's Transportation Improvement Program		●				New mobility entity
2.2	Prepare for technology upgrades and interoperability in project development of transportation projects	●	●				New mobility entity
2.5	Implement smart traffic signal control technology on all major regional arterial corridors		●				Cities, counties, CDOT
2.6	Pilot integrated corridor management on ten arterial corridors		●				CDOT, RTD, cities, counties, new mobility entity
	Objective 3: Shared Mobility						
3.2	Adopt a regional compact defining common standards for micromobility services		●				Cities, counties
3.4	Implement curbside management standards		●	●			Cities, counties, new mobility entity
3.5	Pilot neighborhood-scale mobility hubs		●	●			Cities, counties, new mobility entity , TMAs
3.6	Partner with the private sector to provide transportation in mobility-challenged communities		●	●			Cities, counties, neighborhood groups, TMAs
	Objective 4: Data Security and Sharing						
4.1	Establish a regional mobility data platform	●	●	●	●		Cities, counties, NREL, universities, new mobility entity , COIT
4.2	Establish data sharing requirements for private sector roadway users		●				New mobility entity, cities, counties
	Objecetive 5: Mobility Electrification						
5.1	Incentivize ridehailing and ridesharing providers to use electric vehicles		●				New mobility entity
	Objective 6: Driverless Vehicle Preperation						
6.2	Minimize zero occupancy and encourage high shared use of driverless automated vehicles	●	●				State legislature, ridehailing providers
	Objective 7: New Transportation Funding						
7.1	Expand DRCOG funding earmark for a mobility technology innovation fund		●				N/A

Table 4: Tactical Actions with RTD Designated as Initiator

Tactical Actions	CDOT	DRCOG	RTD	Chamber	Cities & Counties	Additional Participants
Objective 1: Regional Collaboration						
1.1 Establish a mobility technology advisory committee	●	●	●	●		New mobility entity
1.2 Establish a new public-private mobility entity or entities to pursue mobility technology implementation	●	●	●	●		N/A
1.4 Make Mobility as a Service available to all			●			New mobility entity, nonprofits and human service providers
Objective 2: System Optimization						
2.4 Implement transit priority on all major bus corridors			●			Cities, counties, CDOT
Objective 3: Shared Mobility						
3.1 Develop a universal mobility app for trip planning and payment			●			New mobility entity , E-470, Northwest Parkway
3.3 Develop incentives to improve ridehailing and ridesharing operations			●		●	DRCOG
3.4 Implement curbside management standards		●	●			Cities, counties, new mobility entity
3.5 Pilot neighborhood-scale mobility hubs		●	●			Cities, counties, new mobility entity , TMAs
3.6 Partner with the private sector to provide transportation in mobility-challenged communities		●	●			Cities, counties, neighborhood groups, TMAs
3.7 Pilot smart parking at Park-n-Rides			●			New mobility entity
Objective 4: Data Security and Sharing						
4.1 Establish a regional mobility data platform	●	●	●	●		Cities, counties, NREL, universities, new mobility entity , COIT
Objecetive 5: Mobility Electrification						
5.3 Transition government fleets to electric and other zero-emission vehicles	●	●	●			Cities, counties, Colorado Energy Office, Regional Air Quality Council
Objective 6: Driverless Vehicle Preperation						
6.1 Pilot driverless microtransit to increase public exposure to automated vehicle technology			●			New mobility entity , cities, counties, CDOT, DRCOG, TMAs

Table 5: Tactical Actions with Denver Metro Chamber Designated as Initiator

Tactical Actions		Initiator					Additional Participants
		CDOT	DRCOG	RTD	Chamber	Cities & Counties	
	Objective 1: Regional Collaboration						
1.1	Establish a mobility technology advisory committee	●	●	●	●		New mobility entity
1.2	Establish a new public-private mobility entity or entities to pursue mobility technology implementation	●	●	●	●		N/A
	Objective 4: Data Security and Sharing						
4.1	Establish a regional mobility data platform	●	●	●	●		Cities, counties, NREL, universities, new mobility entity , COIT
	Objecetive 5: Mobility Electrification						
5.2	Create an electrified mobility development program				●		Utility companies (i.e., Xcel), Public Utilities Commission, state legislature
	Objective 7: New Transportation Funding						
7.3	Support legislative efforts to ensure that driverless automated vehicles generate appropriate funding				●		CDOT

Table 6: Tactical Actions with Cities & Counties Designated as Initiator

Tactical Actions		CDOT	DRCOG	RTD	Chamber	Cities & Counties		Additional Participants	Coordination
	Objective 2: System Optimization								
2.3	Accelerate testing of bicycle/pedestrian detection at crossings					●	N/A		1
	Objective 3: Shared Mobility								
3.3	Develop incentives to improve ridehailing and ridesharing operations			●		●	DRCOG		3