

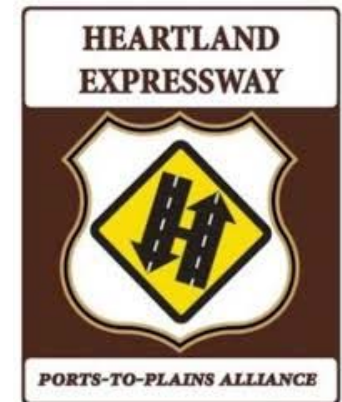
COLORADO
Department of Transportation

SH-71 UPDATE



AGENDA

1. CORRIDOR OVERVIEW
2. INTERCEPT SURVEY RESULTS
3. TRAVEL DEMAND MODELING / PROJECTED GROWTH RATE RESULTS
4. DRAW FROM I-25
5. BENEFIT/COST
6. PRIORITY CRITERIA & CURRENT PROJECT LIST
7. STEPS

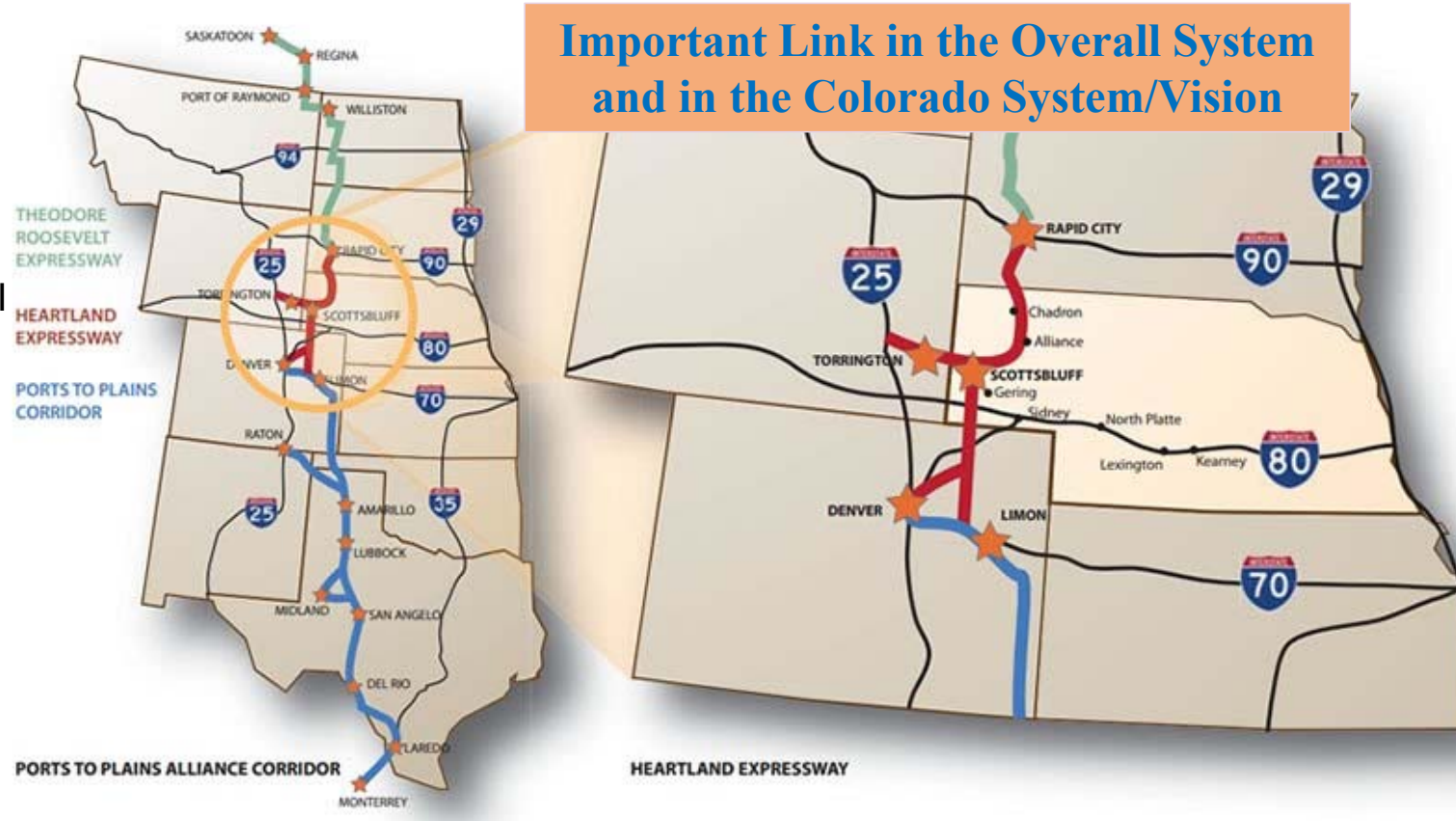




CORRIDOR OVERVIEW

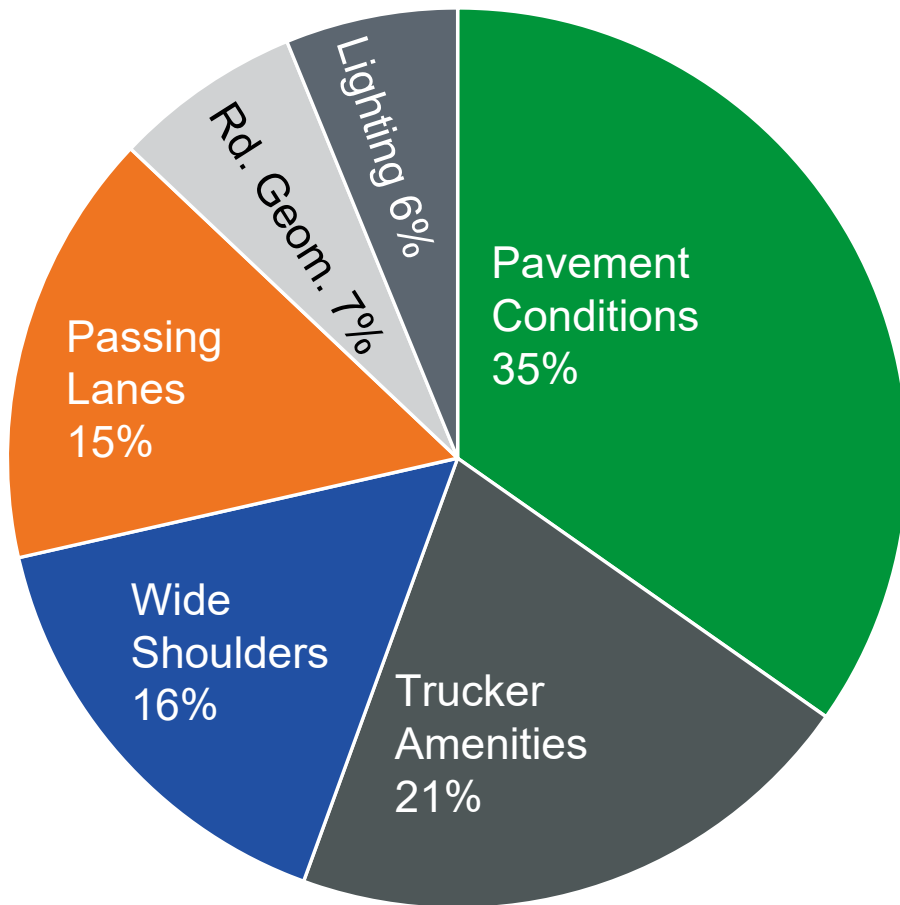
Safety/ Mobility/ Economic

71 from Limon north to the CO-NE line is a segment (specifically the Heartland Expressway) of the International Ports-to-Plains(P2P) Corridor, which spans from Mexico to Canada. 71 is a significant north-south freight corridor for Colorado carrying agribusiness and energy, as well as providing connectivity to East-West interstates and state highways. **71 is the only segment of the P2P Alliance Corridor that remains unimproved.**





INTERCEPT SURVEY RESULTS



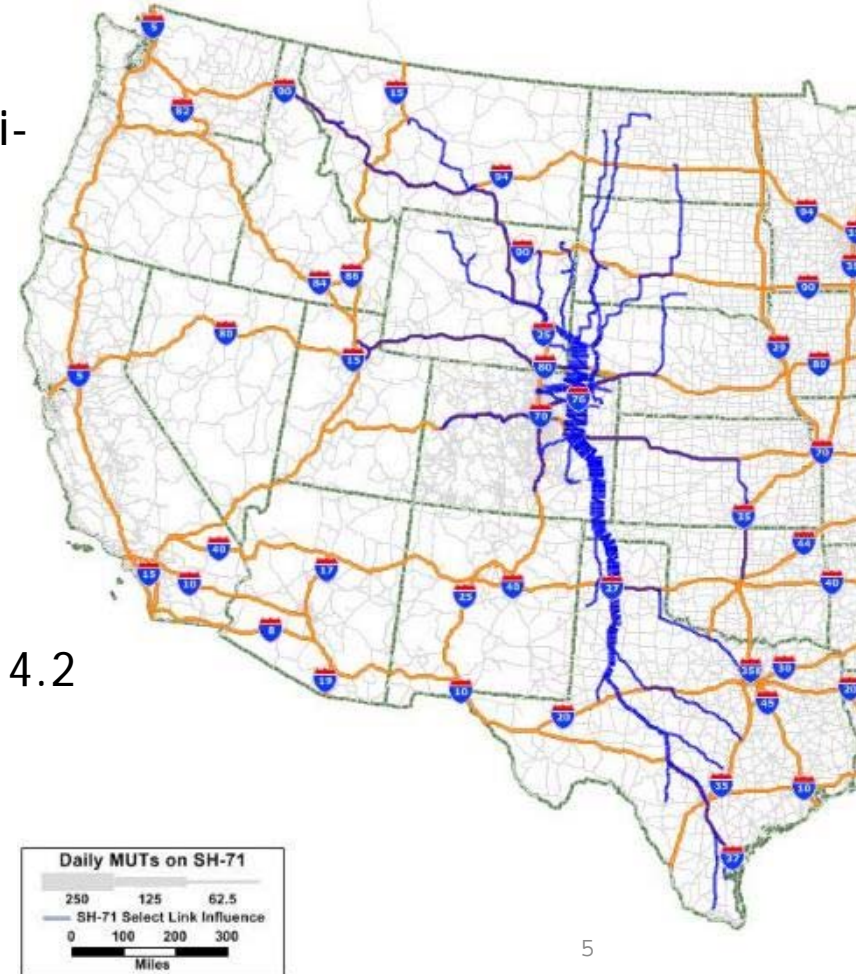
- Improvements could lure north/south truck traffic to either SH-71
- Improved travel time and roadway conditions were most influential reasons to draw truck traffic
- Rideability/Pavement Condition was identified as the most important roadway condition that draws truckers to a corridor
- Passing Lanes, Shoulders, Trucker Amenities were evenly ranked as the next most important draw for truckers



TRAVEL DEMAND MODELING

Methodology

- Established model to capture future growth of Multi-Unit Trucks traffic
- Select link analysis provides information of where traffic comes from and goes to at selected links.
- Utilized the WSP National Truck Model and the Colorado State Model
- Long term analysis through 2040
- Based on Freight Analysis Framework (FAF), version 4.2
- Covered 43 commodities
- Multi-Unit Trucks (MUTs) alone were modeled.
- 2016 base year was validated to recent MUT counts



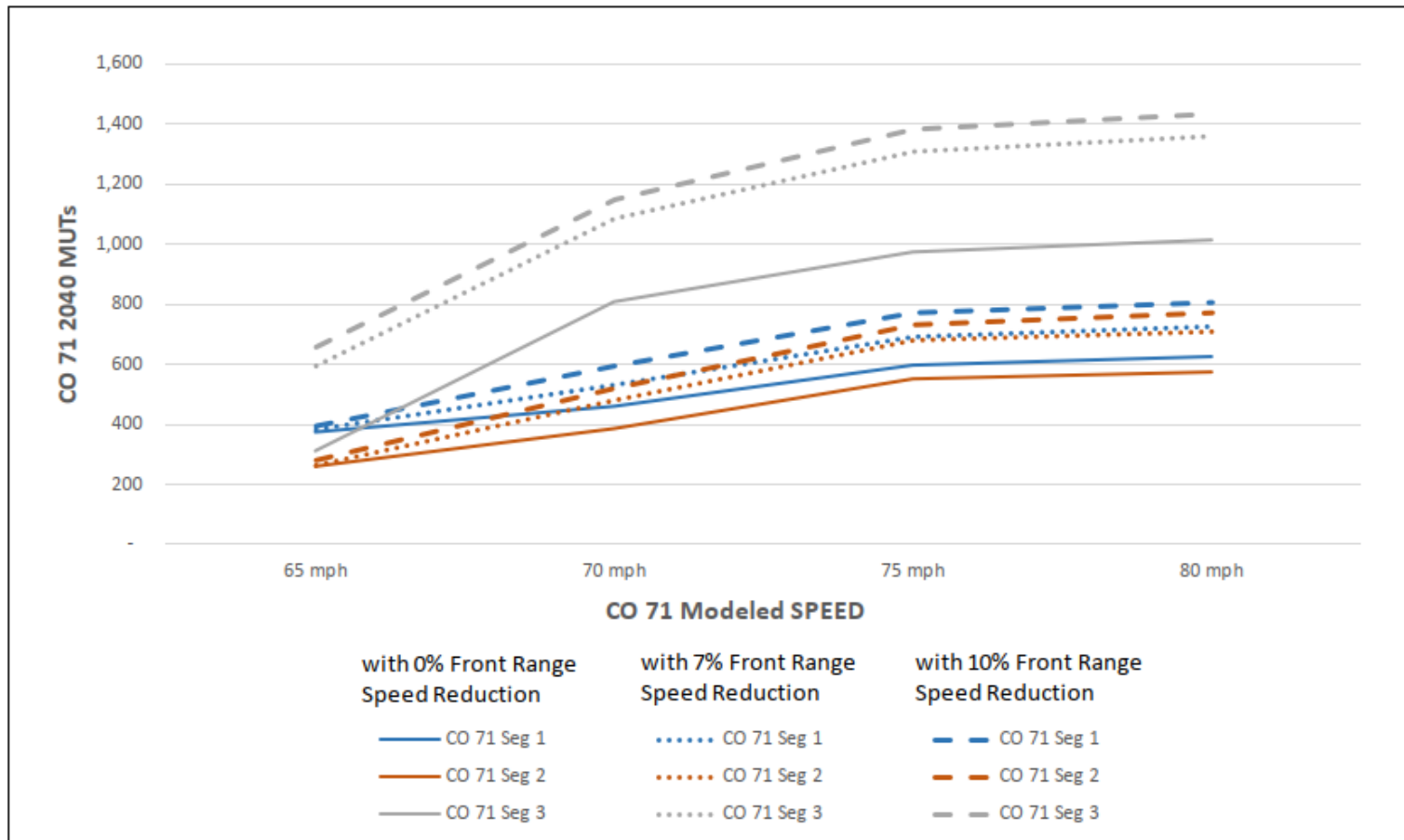


TRAVEL DEMAND MODELING





TRAVEL DEMAND MODELING





TRAVEL DEMAND MODELING

Travel Times Scenario 1 (in minutes)
I-25 Congested Conditions
SH-71 at 65 mph (SH 71 Existing)

Location	Dumas	Raton	Colorado Springs	Denver	Limon	Brush	Cheyenne	Scottsbluff	Douglas	North Platte
Dumas	0	172	302	344	272	333	435	443	544	418
Raton	172	0	133	210	206	273	301	380	420	417
Colorado Springs	302	133	0	84	87	148	172	259	284	300
Denver	344	210	84	0	89	85	98	184	211	230
Limon	272	206	87	89	0	68	176	186	288	222
Brush	333	273	148	85	68	0	115	108	235	148
Cheyenne	435	301	172	98	176	115	0	90	120	180
Scottsbluff	443	380	259	184	186	108	90	0	126	158
Douglas	544	420	284	211	288	235	120	126	0	283
North Platte	418	417	300	230	222	148	180	158	283	0

Travel Times Scenario 2 (in minutes)
I-25 Congested Conditions
SH-71 at 80 mph (SH 71 Improved)

Location	Dumas, TX	Raton, NM	Colorado Springs, CO	Denver, CO	Limon, CO	Brush, CO	Cheyenne, WY	Scottsbluff, NE	Douglas, WY	North Platte, NE
Dumas, TX	0	172	302	344	272	321	430	420	544	418
Raton, NM	172	0	133	210	206	259	301	357	420	405
Colorado Springs, CO	302	133	0	84	87	138	172	236	284	288
Denver, CO	344	210	84	0	89	85	98	175	211	230
Limon, CO	272	206	87	89	0	56	174	163	283	209
Brush, CO	321	259	138	85	56	0	115	97	226	148
Cheyenne, WY	430	301	172	98	174	115	0	90	120	180
Scottsbluff, NE	420	357	236	175	163	97	90	0	126	158
Douglas, WY	544	420	284	211	283	226	120	126	0	283
North Platte, NE	418	405	288	230	209	148	180	158	283	0



TRAVEL DEMAND MODELING

*Difference between Scenario 2 and Scenario 1
Minutes Saved*

Location	Dumas, TX	Raton, NM	Colorado Springs, CO	Denver, CO	Limon, CO	Brush, CO	Cheyenne, WY	Scottsbluff, NE	Douglas, WY	North Platte, NE
Dumas, TX	0	0	0	0	0	12	5	23	0	0
Raton, NM	0	0	0	0	0	14	0	23	0	12
Colorado Springs, CO	0	0	0	0	0	10	0	23	0	12
Denver, CO	0	0	0	0	0	0	0	9	0	0
Limon, CO	0	0	0	0	0	12	2	23	5	13
Brush, CO	12	14	10	0	12	0	0	11	9	0
Cheyenne, WY	5	0	0	0	2	0	0	0	0	0
Scottsbluff, NE	23	23	23	9	23	11	0	0	0	0
Douglas, WY	0	0	0	0	5	9	0	0	0	0
North Platte, NE	0	12	12	0	13	0	0	0	0	0



TRAVEL DEMAND MODELING

Human Factors

- Because it's difficult to model people's choices, Daily Vehicle Miles Traveled (DVMT) and AADT were used for analysis
 - Compared before-and-after volumes of improvements on US 287 (improvements were completed in 2012)
 - Growth on CO 71 is below the statewide average

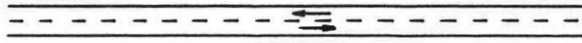
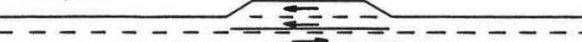
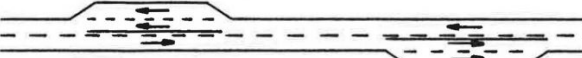
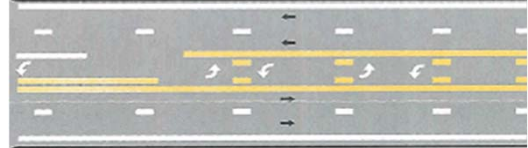


Yearly Growth Rate Comparison

	5-Year Period (2012-2017)	15-Year Period (2002-2017)
Statewide (All DVMT)	3.1%	1.6%
Statewide (Truck DVMT)	2.3%	0.6%
SH 71 (Total AADT)	1.9%	-0.6%
US 287 (Total AADT)	3.0%	2.0%
US 385 (Total AADT)	-1.5%	-0.7%



TRAVEL DEMAND MODELING

- Project improvements should meet the vision, safety, economic vitality, and move us toward a reasonable and achievable in the near future ultimate section.

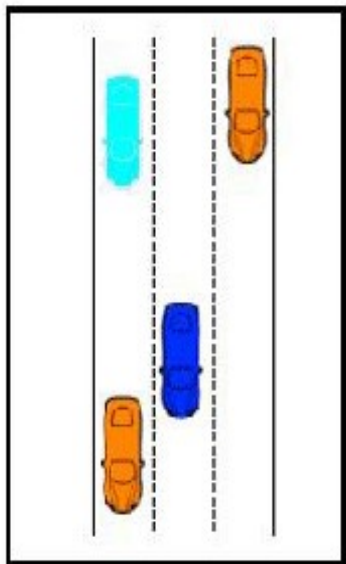
	Existing Pavm't <u>Rehab only</u>	\$ 510,000	\$ 1,330,000	PER MILE
	Add 8' <u>Shoulders only</u>	\$ 980,000	\$ 1,521,000	PER MILE
	<u>Pavm't Rehab, & Shoulders</u>	\$ 1,510,000	\$ 2,880,000	PER MILE
	<u>Isolated Passing lane</u> (& 4' shldr), 8' opp.shldr, & Pavm't Rehab.	\$ 2,340,000	\$ 3,600,000	PER MILE
	<u>Passing Lane both directions</u> (& 4' shldr) & Pavm't Rehab.	\$ 3,050,000	\$ 4,220,000	PER MILE
	After 8' shldrs in place, Widen to <u>4 Lanes with center turn lane</u>	\$ 4,320,000	\$ 5,910,000	PER MILE
				
	<u>Interstate Freeway</u> Roadway Rebuild with Frontage Roads & Interchanges Prorated into the Cost.	\$18,250,000	\$24,740,000	PER MILE

BY THE CAPACITY NUMBERS THE TIME GAP BETWEEN THE TWO ULTIMATE SECTIONS IS SIGNIFICANT = 40 TO 120 Years



TRAVEL DEMAND MODELING

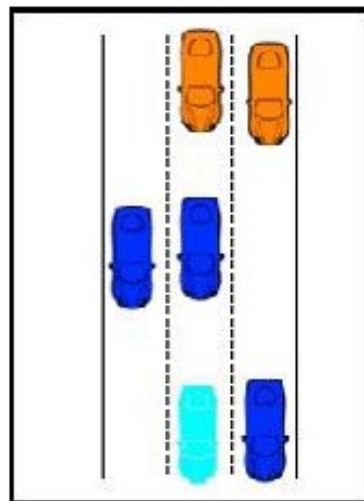
Applying a HYBRID growth rate (8% MUT, 3% Psg Veh) using HCM Capacity analysis SH 71 would reach capacity



Existing Conditions in 2045

4 lane with a center turn lane In 2100

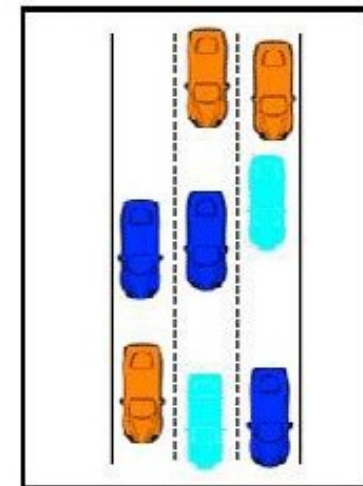
Level of Service C: Restricted flow that remains stable but with significant interactions with others in the traffic stream. The general level of comfort and convenience declines noticeable at this level.



Existing Conditions in 2052

4 lane with a center turn lane In 2106

Level of Service D: High-density flow in which speed and freedom to maneuver are severely restricted and comfort and convenience have declined even though flow remains stable.



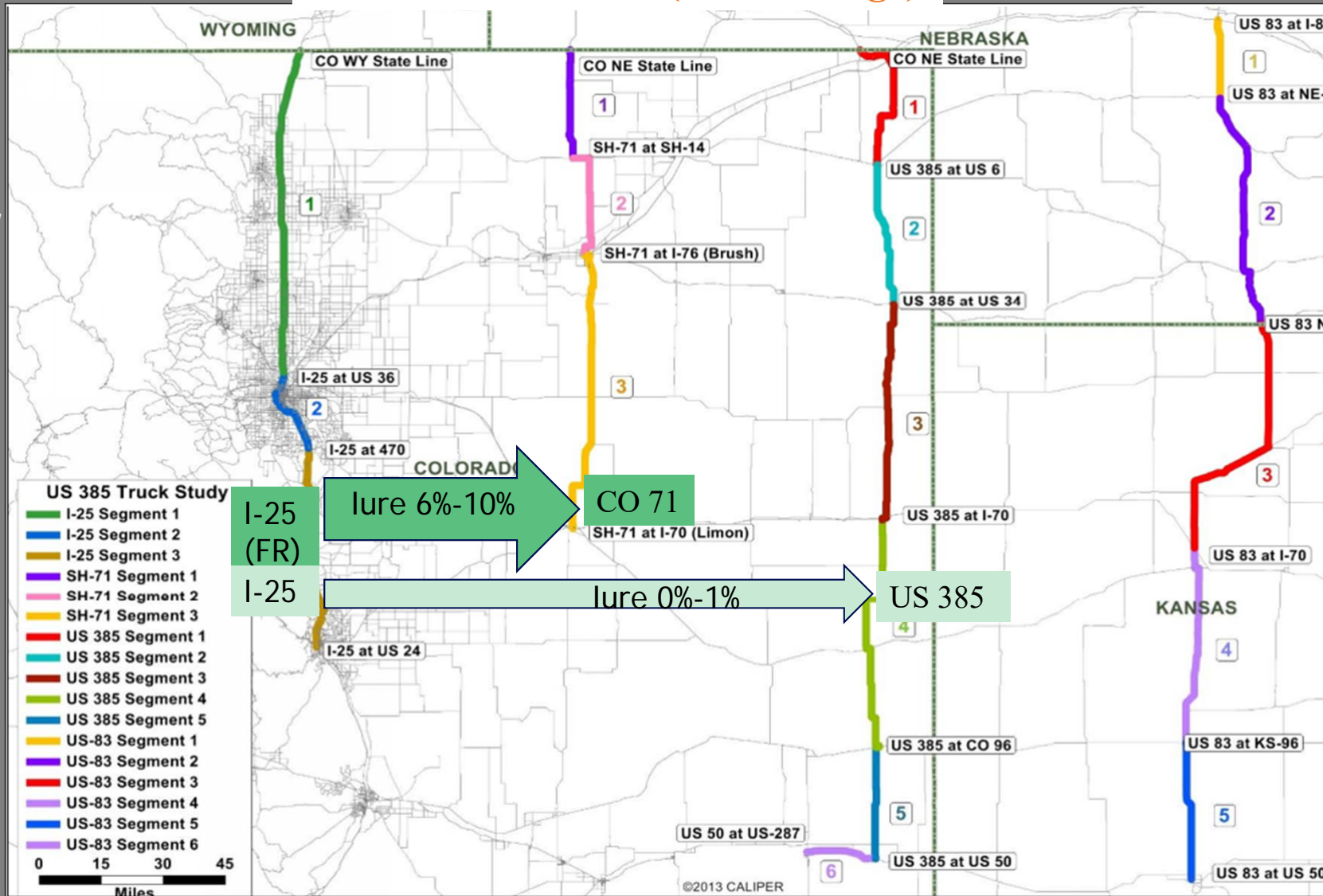
Existing Conditions in 2059

4 lane with a center turn lane In 2109

Level of Service E: Unstable flow at or near capacity levels with poor levels of comfort and convenience.

Improvements modeled by increasing the congestion (i.e. reduce speed 0, 7, & 10%) throughout the Front Range and increasing the speed on SH71 (to 70, 75, & 80 mph).

DRAW FROM I-25 (Front Range)





Benefit / Cost Analysis

Benefits+

Value of travel time savings for truck vehicle hours traveled

Value of crash reduction based on crash modification factors and monetized crash type

Disbenefits-

Value of emissions and vehicle operating costs for truck vehicle miles traveled

(1)Based on USDOT Benefit-Cost Analysis guidance for discretionary grant application

Capital Costs

Based on engineering estimates for three different highway templates:

Shoulders + Passing Lane

Four-Lanes with Center Turn

Operating and Maintenance Costs

Based on existing expenditures



Benefits / Cost





- This analysis compares the benefits and costs of the SH-71 Improvement Project, under three different Build alternatives, to a No-Build alternative in which no project is undertaken. It also relies on two different cost estimates and a mid-range point for each scenario.
- Benefit Cost Ratio (BCR):** The BCR is calculated by dividing the present value of incremental benefits by the present value (7% discount rate) of incremental costs. A BCR greater than 1.0 indicates that project's benefits exceed its costs, while a BCR less than 1.0 signifies that the project's monetizable benefits fall short of its costs.

Scenario	Shoulders & Passing Lanes	4-Lane Highway	Interstate Freeway
Low Cost	1.91	1.20	0.35
Medium Cost	1.40	1.00	0.30
High Cost	1.10	0.86	0.26



PRIORITY CRITERIA & CURRENT PROJECT LIST

PROJECTS ARE BEING GROUPED BY TYPE OF FUNDING AND THEN PRIORITIZED BY TECHNICAL ADVISORY GROUP VETTED CRITERIA

Project Type		Example Projects
	Bridge	Bridge widening, bridge replacements, bridge repair, guardrail
	Maintenance	Pavement rehabilitation, drainage improvements, culverts, asset replacement
	Safety	Signing, pavement markings, delineation, shoulder widening, flatten curves, superelevation, rumble strips
	Other	New roadway connections, closures, railroad crossings

Priority Criteria	
Safety	25%
Freight Mobility	20%
System Integrity	15%
Local Stakeholder Support and Economic Development	25%
Corridor Vision	15%



PRIORITY CRITERIA & CURRENT PROJECT LIST

Results – Top Safety Projects for 71D (Segment 3)

#	From	To	Description	Cost
8	112.3	113.0	HFST, shoulders, rumble strips, signing, striping	\$ 1,060,000 to \$ 2,020,000
10	114.9	115.9	HFST, shoulders, rumble strips, signing, striping	\$ 1,510,000 to \$ 2,880,000
23	147.65	147.85	HFST, shoulders, rumble strips, signing, striping	\$ 310,000 to \$ 580,000
26	153.44	173.52	Pavement rehabilitation and shoulders	\$ 30,330,000 to \$ 57,840,000
36	171.63	172.5	Add shoulders, rumble strips, signing, striping	\$ 1,320,000 to \$ 2,510,000



PRIORITY CRITERIA & CURRENT PROJECT LIST

Results – Top Traffic Projects for 71D (Segment 3)

#	From	To	Description	Cost
6	108.5	110.5	Northbound climbing lane 108.5-109.2 combined with north and southbound passing lane 109.75-110.5	\$ 6,100,000 to \$ 8,440,000
35	170.5	171.25	Southbound passing lane	\$ 1,760,000 to \$ 2,700,000
25	149.2	149.95	North and southbound passing lanes	\$ 2,290,000 to \$ 3,170,000
28	157.1	157.85	North and southbound passing lanes	\$ 2,290,000 to \$ 3,170,000
7	111.5	112.1	Northbound climbing lane	\$ 2,010,000 to \$ 2,920,000



PRIORITY CRITERIA & CURRENT PROJECT LIST

Results – Top Maintenance Projects for 71D (Segment 3)

#	From	To	Description	Cost
3	102.3	102.3	Minor repairs to G-22-BB	\$ 680,000 to \$ 990,000
17	101.97	138.01	Mill, overlay, add shoulders (gap projects)	\$ 35,280,000 to \$ 54,756,000
40	138.01	174.36	Mill, overlay, add shoulders (gap projects)	\$ 35,280,000 to \$ 54,756,000
2	102.0	108.0	Resurfacing	\$ 3,060,000 to \$ 7,980,000
37	171.85	171.85	Replace structure 071D171970BR	\$ 2,630,000 to \$ 5,050,000



PRIORITY CRITERIA & CURRENT PROJECT LIST

Projects for 71E (Segment 2) – not yet prioritized

#	From	To	Description	Cost	
1	176.44	176.44	Replace HMA bridge deck surface	\$ 835,000	\$ 835,000
2	176.9	181.35	Add 8' shoulder	\$ 1,250,000	\$ 5,562,500
3	181.27	182.56	Mill and overlay	\$ 920,000	\$ 1,186,800
4	182.56	185.16	Mill, overlay, add 8' shoulder	\$ 2,195,000	\$ 5,707,000
5	187.21	187.79	Mill and overlay	\$ 920,000	\$ 533,600
6	187.79	190.38	Mill, overlay, add 8' shoulder	\$ 2,195,000	\$ 5,685,050
7	190.38	193.16	Mill and overlay	\$ 920,000	\$ 2,557,600
8	193.16	195.36	Mill, overlay, add 8' shoulder	\$ 2,195,000	\$ 4,829,000



PRIORITY CRITERIA & CURRENT PROJECT LIST

Projects for 71F (Segment 1) – not yet prioritized

#	From	To	Description	Cost	
10	207.72	209.1	Mill and overlay	\$ 920,000	\$ 1,269,600
11	209.1	212.66	Mill, overlay, add 8' shoulder	\$ 2,195,000	\$ 7,814,200
12	211.63	211.63	Widen or replace structure B-22-H	\$ 3,840,000	\$ 3,840,000
13	217.1	217.9	Add northbound passing lane	\$ 2,970,000	\$ 2,376,000
14	224.3	225	Add northbound passing lane	\$ 2,970,000	\$ 2,079,000
15	225.2	227	Add northbound passing lane	\$ 2,970,000	\$ 5,346,000



NEXT STEPS

STEPS ACCOMPLISHED

- a) FREIGHT DIVERSION STUDY
 - a) INTERCEPT SURVEY
- b) POST FINAL REPORT AND EXECUTIVE SUMMARY TO CDOT STUDIES AND ASSESSMENTS
WEBPAGE: <https://www.codot.gov/projects/projects/studies-assessments>
- c) DESIGN LEVEL LIDAR SURVEY
- d) PROJECT PRIORITIZATION SEG.3
- e) SELECT PROJ. CONCEPTUAL DESIGN AND ESTIMATES

NEXT STEPS

- a) FINALIZE PROJECT PRIORITIZATION FOR ALL SEGMENTS
- b) PROJECT SELECTION
 - a) Inclusion in upcoming asset management projects as appropriate.
 - b) Pursue Funding as appropriate.
- c) STAKEHOLDER'S PRESENTATIONS

