4. Vision & Recommended Improvements

Vision

The ultimate vision of the CO 71 corridor should account for the long-term goals of the stakeholders, adjacent municipalities, and the P2P Alliance. The vision should be flexible/phase-able in accommodating potential capacity growth. A four-lane highway (see Figure 6), whether with a center turn lane (expressway) or a divided highway (i.e. future interstate). would easily accommodate traffic growth as the corridor "draws and develops", improve comfort and safety for freight traffic, and provide a safer and more mobile corridor for the general traveling public. Therefore, a phased approach (i.e. add shoulders, passing lanes, etc. to expand the pavement and improve the safety/design speed as funds are available) to a 4-lane expressway is the recommended vision.

Implementation Plan: Recommended Improvements

The project team analyzed the current conditions to develop a baseline for running the truck traffic model and establishing a list of recommended solutions. A preliminary list of recommended improvements were developed based on stakeholder comments, Current Condition data, and previous studies. The modeling analysis indicated that Segment 3 of the Study area has the highest potential for increased truck travel, consequently the recommendations are concentrated along Segment 3 between Brush, CO. and Limon, CO.

The Study team summarized the list to 31 preliminary recommendations. These recommendations are listed in **Table 1** and can be found in **Figure 7.** The preliminary recommendations are expected to improve the CO 71 corridor and therefore encourage freight movement, improve safety, and alleviate congestion on the I-25 corridor and the Front Range.

These projects were reviewed and vetted by CDOT, stakeholders, and through a safety analysis of the corridor. The recommendations in **Table 1** can be programed individually or packaged with other projects, however they are only a snapshot of today's needs and will require CDOT to coordinate with local, regional, and state partners to identify, prioritize, and fund the improvements. Recommendations for Segments 1 & 2 are underway as part of a separate endeavor.

Depending on travel demand, anticipated traffic, and funding sources, the selected scenario(s) (**Figure 6)** can be incrementally developed to first provide full/partial shoulders, or passing and/or climbing

lanes. Further project details will be determined during the design phase. Regardless of this Study, work will be done on the corridor which suggests that the Build-Out of CO 71 will eventually reach a 4-lane alignment. For additional details on the recommended scenarios, please see the **Final Report**.

Cost Estimates & Funding Opportunities

The recommended improvements in **Table 1** include current- market-based planning level cost estimates with low and high range likelihoods for additional shoulders, passing lanes, and travel lanes. Based on the estimates for the different roadway scenarios, the estimated cost for the recommended phased goal of passing lanes in both directions with shoulders is $0.40 to $0.55 billion and a 4-lane expressway would be $0.56 to $0.77 billion. The expressway should provide adequate capacity for at least 40 years. A full buildout of CO 71 to a long-term vision of a four-lane divided highway, an interstate highway, is between $2.4 billion and $3.2 billion (all expressions are in 2019 dollars).These estimated amounts will require CDOT and partners to incrementally program/phase the projects through funds from specific programs with detailed uses and restrictions.

For additional details please refer to **Appendix H: Potential Project Cost Estimating,** and for details of the potential funding programs' uses, potential restriction(s), and applicability to CO 71 please see **Table 9: Potential Funding Opportunities of the Final Report.**

Figure 7: Recommended Improvements

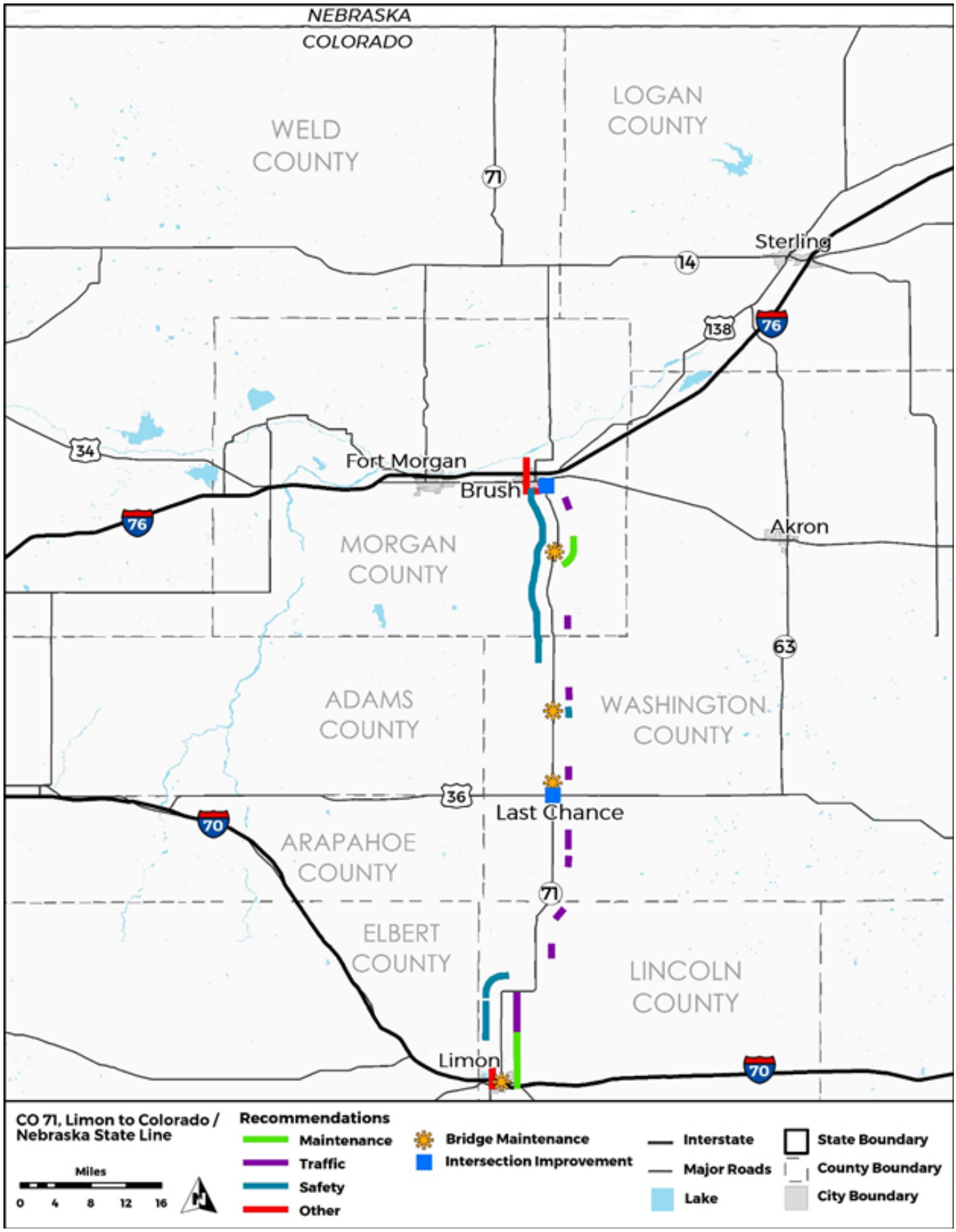

Table 1: Preliminary Recommendations

Project Number	Segment	MP From	MP To	Length (Miles) or Units	Description of Potential Project	Category	Project Type	Planning-Level Project Cost	
								Low Range	High Range
1	1	101.97	103.64	1.67	Realign highway to go around Limon	Other	6	$ 14,400,000	$ 25,410,000
2	1	102	108	6	Resurfacing	Maintenance	1	$ 3,060,000	$ 7,980,000
3	1	102.3	102.3	1	Repair G-22-BB	Maintenance	7	$ 680,000	$ 990,000
4	1	107.5	108.3	0.8	Mill and overlay	Safety	1	$ 410,000	$ 1,070,000
5	1	108.3	111.2	2.9	Mill, overlay, add shoulders	Safety	2	$ 4,380,000	$ 8,360,000
6	1	108.5	110.5	2	Northbound climbing lane 108.5-109.2 combined with north and southbound passing lane 109.75-110.5	Traffic	4	$ 6,100,000	$ 8,440,000
7	1	111.5	112.1	0.75	Northbound climbing lane	Traffic	5	$ 2,010,000	$ 2,920,000
8	1	112.3	113	0.7	High friction surface treatment, widen shoulders, add rumble strips, enhanced pavement markings, signage, and delineation	Safety	2	$ 1,060,000	$ 2,020,000
9	1	114.9	115.9	1	High friction surface treatment, widen shoulders, add rumble strips, enhanced pavement markings, signage, and delineation	Safety	2	$ 1,510,000	$ 2,880,000
10	1	119.5	120.3	0.8	North and southbound passing lanes	Traffic	4	$ 2,440,000	$ 3,380,000
11	1	125.15	126	0.85	Northbound passing lane 125.15-125.9, southbound passing/climbing lane 125.3-126.0	Traffic	4	$ 2,600,000	$ 3,590,000
12	1	130.4	130.9	0.75	Southbound climbing lane	Traffic	5	$ 2,010,000	$ 2,920,000
13	1	132.3	133.8	1.45	Southbound climbing (132.3-132.8) and passing (133.0-133.75) lane	Traffic	5	$ 3,890,000	$ 5,650,000
14	1	138.01	138	1	Intersection improvement (US 36)	Safety	9	$ 760,000	$ 1,120,000
15	2	139.43	139.4	1	Widen or replace E-22-J (over West Fork Plum Bush Creek)	Bridge	8	$ 2,630,000	$ 5,050,000
16	2	140.15	140.9	0.75	Northbound passing lane	Traffic	3	$ 1,760,000	$ 2,700,000
17	2	147.64	147.6	1	Widen or replace E-22-A (over Beaver Creek)	Bridge	8	$ 2,630,000	$ 5,050,000
18	2	147.75	147.9	0.2	High friction surface treatment, widen shoulders, add rumble strips, enhanced pavement markings, signage, and delineation	Safety	2	$ 310,000	$ 580,000
19	2	149.2	150	0.75	North and southbound passing lanes	Traffic	4	$ 2,290,000	$ 3,170,000
20	2	153.44	173.5	20.08	Pavement rehabilitation and add shoulders	Safety	2	$ 30,330,000	$ 57,840,000
21	2	156.3	156.6	0.3	Mill and overlay, add shoulders with rumble strips, enhanced pavement markings, signage, and delineation	Safety	2	$ 460,000	$ 870,000
22	2	157.1	157.9	0.75	North and southbound passing lanes	Traffic	4	$ 2,290,000	$ 3,170,000
23	2	158.94	159.3	0.33	Mill and overlay, add shoulders with rumble strips, enhanced pavement markings, signage, and delineation	Safety	2	$ 500,000	$ 960,000
24	2	161.42	164.4	3	Mill and overlay, add shoulders with rumble strips. Enhanced pavement markings, signage, and delineation in curves	Safety	2	$ 4,530,000	$ 8,640,000
25	2	165.25	166.5	1.2	Mill and overlay, add shoulders with rumble strips. Enhanced pavement markings, signage, and delineation in curves	Safety	2	$ 1,820,000	$ 3,460,000
26	2	165.72	165.7	1	Widen or replace D-22-C (over Big Beaver Creek)	Bridge	8	$ 2,630,000	$ 5,050,000
27	2	166.28	167.3	1.02	Mill and overlay	Maintenance	1	$ 530,000	$ 1,360,000
28	2	170.5	171.3	0.75	Southbound passing lane	Traffic	3	$ 1,760,000	$ 2,700,000
29	2	171.63	172.5	0.87	Add shoulders with rumble strips. Enhanced pavement markings, signage, and delineation in curves	Safety	2	$ 1,320,000	$ 2,510,000
30	2	173.52	173.5	1	Intersection sight distance improvements	Safety	10	$ 1,120,000	$ 1,630,000
31	2	174.36	174.4	3.64	Realign highway to go around Brush	Other	6	$ 31,380,000	$ 55,370,000

5. Benefit Cost Analysis

To assess if the projected benefits of the recommended alternatives and projects merit the estimated project cost, the project team conducted a Benefit Cost Analysis (BCA). The BCA framework includes a "No Build" scenario, and "Build" scenarios per the proposed alternatives. The total benefits over the course of the analysis are highlighted in Green in **Table 2**. Under all three cost estimates, the S/PL scenario had the most positive outcome in BCR and NPV. The **S/PL** scenario outperforms the **4LH** and Interstate Freeway scenarios in the BCR and NPV, and the benefits of the Interstate scenario are not justified because the high costs result in a BCR well below 1, even with the low-cost estimate.

Table 2: Summary of Benefit Cost Analysis, 2019 $Millions

SCENARIOS	WHAT WAS MEASURED	BENEFITS	DISBENEFITS	COMPONENTS OF BCA
NO-BUILD	• Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) from the National Truck Freight Travel Demand Model from a national perspective • Project Net Welfare Change, and Cost Savings • Project costs (e.g., operating and capital costs)	• Travel time savings • Reduced crash rate	• Change in emissions and vehicle operating costs from VMT increase	• Upfront capital costs • Expected increases in annual operating and maintenance (O&M) • Periodic Rehabilitation and Repair (R&R) costs.
Shoulders / Passing Lanes (S/PL): 12-foot passing lanes and 8-foot shoulders are added to SH-71				
Four-Lane Highway (4LH): the road is converted to four full 12-foot wide lanes with 8-foot shoulders				
Interstate Freeway: SH-71 is converted to a four-lane interstate with 10-foot shoulders with a two-lane frontage road for 50% of its length				

		S2PL		4LH		Interstate Freeway	
		Undisc.	Disc. (7%)	Undisc.	Disc. (7%)	Undisc.	Disc. (7%)
Total Benefits		$1,387	$321	$2,584	$593	$2,584	$593
Total Costs	*Low*	$242	$168	$711	$492	$2,422	$1,687
	Medium	$329	$229	$851	$590	$2,847	$1,985
	High	$416	$291	$990	$688	$3,272	$2,284
BCR	*Low*	5.73	1.91	3.63	1.20	1.07	0.35
	Medium	4.21	1.40	3.04	1.00	0.91	0.30
	High	3.33	1.10	2.61	0.86	0.79	0.26
NPV	*Low*	$1,145	$153	$1,873	$101	$162	($1,094)
	Medium	$1,058	$91	$1,734	$3	($263)	($1,393)
	High	$971	$30	$1,594	($95)	($688)	($1,691)

6. Stakeholder Engagement & TAG

The CO 71 Study included the organization of a 13-member Technical Advisory Group (TAG) to evaluate and provide input from key stakeholders and subject-matter experts. This group met throughout The Study and involved CDOT leadership, public works directors, town managers, and policy organization leadership. Another element of the public engagement strategy was the driver intercept survey. The survey provided a more comprehensive understanding of truck driver behavior and their route selection process. The project team surveyed drivers intercepted at 12 locations to help inform CDOT of driver perceptions of I-25, CO 71, and US 385. There were 542 total responses, and 372 of the responses were deemed valid.

The combination of information collected from the surveys and TAG's insight played an important role in the freight modeling process and the development of alternatives and proposed improvements. Additional information regarding the key stakeholders can be found in the **Final Report** and a copy of materials distributed during the stakeholder meetings is included in **Appendix E.** Furthermore, details on the survey methodology, questions and responses can be found in **Appendix G**.

Stakeholder Engagement

Driver Intercept Survey

Question 1: Where are you taking this survey?

Question 2: Which route do you plan on taking today?

Question 3: In which city did your load originate? (city, state)

Question 4: To which city(s) is you load destined? (city, state)

Question 5: What are you hauling today?

Question 6: How frequently do you travel this corridor?

Question 7: Why do you travel this highway?

Question 8: How is your route determined?

Question 9: What road features are important to your choice of route?

Question 10: Why do you avoid certain highways (i.e. I-25, SH 71, US 385, US 83)

Question 11: All things being equal, what factors would make you change your route?

Question 12: If significant improvements (i.e. wider shoulders, smooth pavement, additional lane, etc.) were made to SH 71 between I-70 (Limon, CO) and I-80 (Kimball, NE), would you use that route?

Question 13: If significant improvements (i.e. wider shoulders, smooth pavement, additional lane, etc.) were made to US 385 between US 40 (Cheyenne Wells, CO) and I-80 (Julesburg, CO), would you use that route?

Question 14: If significant improvements (i.e. wider shoulders, smooth pavement, additional lane, etc.) were made to both SH 71 and US 385, which route would you prefer to use?

Question 15: Is there anything else you want us to understand or know regarding North-South travel in this region of the US?