

Colorado Transportation Commission

Schedule & Agenda
November 16-17, 2022

For link to YouTube meeting access please see website:

<http://www.coloradodot.info/about/transportation-commission/meeting-agenda.html>

Don Stanton, Chair

Arvada, District 2

Yessica Holquin

Denver, District 1

Eula Adams

Arapahoe County, District 3

Karen Stuart

Broomfield, District 4

Kathleen Bracke

Fort Collins, District 5

Barbara Vasquez

Cowdrey, District 6

Kathy Hall

Grand Junction, District 7

Mark Garcia

Pagosa Springs, District 8

Lisa Hickey

Colorado Springs, District 9

Terry Hart

Pueblo, District 10

Gary Beedy, Vice-Chair

Genoa, District 11

THE CHAIRMAN MAY ALTER THE ITEM SEQUENCE OR TIMES

The times indicated for each topic on the Commission agenda are an estimate and subject to change. Generally, upon the completion of each agenda item, the Commission will immediately move to the next item. However, the order of agenda items is tentative and, when necessary to accommodate the public or the Commission's schedules, the order of the agenda items are subject to change.

Documents posted at <http://www.coloradodot.info/about/transportation-commission/meeting-agenda.html> no less than 24 hours prior to the meeting. The documents are in draft form and for information only until the Commission takes final action.

TRANSPORTATION COMMISSION WORKSHOPS

Wednesday, November 16, 2022

- 12:00 p.m. Commissioner Lunch (optional)
- 1:00 p.m. Budget Workshop (Jeff Sudmeier and Bethany Nicholas)
- FY 23 Budget Amendment
 - FY 24 Final Proposed Annual Budget
- 1:45 p.m. FY23-26 Transportation Asset Management Plan (Rebecca White and William Johnson)
- 2:30 p.m. Eisenhower-Johnson Memorial Tunnel (EJMT) TC/BTE Board Joint Workshop (Patrick Holinda, Neal Retzer, & Jeff Sudmeier)
- 3:00 p.m. Freight Committee (Rebecca White and Craig Hurst)
- National Highway Freight Program Overview
 - Truck Parking Playbook and update
 - Inland Port Study

3:45 p.m. Joint OIM/Freight Meeting (Kay Kelly, Rebecca White, Ashley Nylen, Craig Hurst)
• Connected Freight

4:30 p.m. Adjournment

TRANSPORTATION COMMISSION ADDITIONAL MEETING NOTICE - TENTATIVE

Wednesday, November 16, 2022

5:30 p.m. Dinner with the RTD Board – Springhill Suites: 1190 Auraria Parkway, 80204

TRANSPORTATION COMMISSION MEETING

Thursday, November 17, 2022

8:00 a.m. Commissioner Breakfast

9:00 a.m. 1. Call to Order, Roll Call

9:05 a.m. 2. Public Comments

9:20 a.m. 3. Comments of the Chair and Individual Commissioners

9:40 a.m. 4. Executive Director's Management Report (Shoshana Lew)

9:45 a.m. 5. Chief Engineer's Report (Steve Harelson)

9:50 a.m. 6. CTIO Director's Report (Nick Farber)

9:55 a.m. 7. FHWA Division Administrator Report (John Cater)

10:00 a.m. 8. STAC Report (Vincent Rogalski)

10:05 a.m. 9. Act on Consent Agenda

- a) Proposed Resolution #1: Approve the Regular Meeting Minutes of October 20, 2022 (Herman Stockinger)
- b) Proposed Resolution #2: IGA Approval >\$750,000 (Steve Harelson)
- c) Proposed Resolution #3: Abandonment: SH 95 (MM 14-14.24 and 14.34-14.5) to City of Westminster (Jessica Myklebust)
- d) Proposed Resolution #4: Disposal: I-25 & Broadway (Parcels 6-EX, 615C-EX, PE605-EX & 605-EX) (Jessica Myklebust)
- e) Proposed Resolution #5: Disposal: SH 95 (Sheridan) & US 36 (Parcel 4-EX & 72-Rev-EX) (Jessica Myklebust)
- f) Proposed Resolution #6: Property Exchange and Relocation: R2 Mtc. Site, Pueblo (Richard Zamora)
- g) Proposed Resolution #7: Adoption of Policy Directive 600.0 Equal Employment Opportunity and Affirmative Action Policy (Herman Stockinger/Kristi Graham-Gitkind)
- h) Proposed Resolution #8: Adoption of Policy Directive 1500.0 Guide Signing Policy (Herman Stockinger/Sari Weichbrodt)

- 10:10 a.m. 10. Discuss and Act on Proposed Resolution #9: Budget Supplement of FY 2023 (Jeff Sudmeier and Bethany Nicholas)
- 10:15 a.m. 11. Discuss and Act on Proposed Resolution #10: FY24 Final Proposed Annual Budget (Jeff Sudmeier)
- 10:20 a.m. 12. Recognition
- 10:25 a.m. 13. Other Matters
- 10:30 a.m. 14. Adjournment

The Bridge Enterprise Board of Directors meeting will begin immediately following the adjournment of the Transportation Commission Meeting. Est. Start Time: 10:30 a.m.

BRIDGE AND TUNNEL ENTERPRISE BOARD OF DIRECTORS MEETING

Thursday, November 17, 2022

- 10:30 a.m. 1. Call to Order and Roll Call
2. Public Comments (provided to directors in writing before meeting)
3. Act on Consent Agenda
- Proposed Resolution #BTE1: to Approve the Regular Meeting Minutes of October 20, 2022 (Herman Stockinger)
4. Discuss and Act on Proposed Resolution #BTE2: Draft FY2024 Budget Allocation Plan (Jeff Sudmeier)
5. Other Matters
6. Adjournment

INFO ONLY

- Project Budget/Expenditure Memo (Jeff Sudmeier)
- DTR Programs Report - Q1 (July 1, 2022 - Sept 30, 2022) (Amber Blake)
- TC Grants Memo (Hannah Reed)
- Central 70 Quarterly Status Update (Bob Hayes)
- Bridge & Tunnel Enterprise Q1 FY2023 Quarterly Report (Patrick Holinda)

MEMORANDUM

TO: THE TRANSPORTATION COMMISSION
FROM: JEFF SUDMEIER, CHIEF FINANCIAL OFFICER
BETHANY NICHOLAS, BUDGET DIRECTOR
DATE: NOVEMBER 16, 2022
SUBJECT: FY 2022-23 BUDGET AMENDMENT

Purpose

To review the third budget amendment to the FY 2022-23 Annual Budget in accordance with Policy Directive (PD) 703.0.

Action

The Division of Accounting and Finance (DAF) is requesting the Transportation Commission (TC) to review the third budget amendment to the FY 2022-23 Annual Budget, which consists of xx items that require TC approval. The third budget amendment reallocates

FY 2022-23 Budget Amendments

Capital Construction Cost Escalation Fund

The Division of Accounting and Finance (DAF) is requesting \$30.0 million to create a Capital Construction Cost Escalation Fund to ensure sufficient funds are available to address recent cost escalation in capital construction projects without causing undue delay to projects. This would be a non-emergency contingency fund that could be utilized to address funding shortfalls in the case of cost escalation where no other alternative sources are available. Staff discussed this concept with the Commission during the August 2022 meeting and agreed to return in November 2022 with a proposal, after the revenue reconciliation and federal redistribution processes were complete. Based on the final results of revenue reconciliation and the Department receiving a record amount for federal redistribution, staff recommends establishing this fund with an initial allocation of \$30 million.

The third budget amendment reallocates \$30,000,000 to a separate account within the TC Program Reserve line (Line 73), and renames the line, "Commission Reserve Funds".

Mountain Corridor Resiliency Projects

The Department is requesting \$20.0 million to support resiliency improvements associated with key mountain travel corridors. The \$20 million would be used to provide state match for a grant application with a total estimated project cost of \$100 million. The grant application will focus on resiliency improvements to Glenwood Canyon itself, as well as design and construction of improvements on alternative routes to Glenwood Canyon, including Cottonwood Pass and US 40. The exact make up of improvements will be scaled to the available funds ranging from \$20 million if the grant application is unsuccessful to the full \$100 million envisioned if the grant is awarded in the amount requested.

The third budget amendment reallocates \$20,000,000 from the TC Program Reserve (Line 73) to the 10 Year Plan Projects - Capital AM line (Line 10). *Although this is not a 10-Year Plan Project, for programming and delivery purposes the TC Program Reserve funds allocated to this project will be allocated to the 10-Year Plan -Capital AM budget program.*

Strategic Pavement Investments

The Division of Transportation Development is requesting \$24.0 million for strategic paving investments. This includes:

- \$10.0 million for strategic preventative maintenance to improve the condition of pavement through low cost/high benefit treatments including chip seals and crack seals.
- \$10.0 million for a Poor Interstate Fund to invest in the treatment of interstate sections currently rated poor.
- \$4.0 million to address ride quality concerns associated with deteriorated sections of concrete pavement near the Kansas Border.

The third budget amendment reallocates \$24,000,000 million from the TC Program Reserve (Line 73) to Surface Treatment (Line 4).

Backfill Bridge and Tunnel Enterprise (BTE) Subsidy

The BTE is requesting \$4.1 million to help cover its debt service obligations in FY 2022-23. Pursuant to the MOU between BTE and CDOT, 80% of existing debt service is paid from federal funds and the remaining obligation is covered by BTE revenue. BTE's existing debt was issued in 2010 under the Build America Bonds program, which included an annual federal subsidy on the interest. Currently that subsidy totals approximately \$5.1 million annually. However, the subsidy is set to expire without further Congressional authorization and there is no indication that authorization is forthcoming at this time. Staff is requesting \$4.1 million to backfill 80% of the lost subsidy in the current Fiscal Year, pursuant to the terms of the MOU.

The third budget amendment reallocates \$4,118,562 from the TC Program Reserve (Line 73) to Agency Operations (Line 66), which will be transferred to the Debt Service-BTE line (Line 89) to backfill the lost Build America Bonds subsidy and cover debt service obligations in FY 2022-23.

Workers' Compensation Budget Shortfall

DAF is requesting \$1.4 million to address a budget shortfall in the Workers Compensation budget for FY 2022-23. The Department of Personnel and Administration (DPA) oversees the workers' compensation program, which is used to pay worker's compensation benefits to state employees for claims, including both indemnity and medical payments. The State's actuary estimates prospective claims for all state departments on an annual basis and the budget is requested by DPA on their behalf. For FY 2022-23, budget allocations for Workers' Compensation were increased based on updated estimates from the State's actuary, but the change occurred late in the budget setting process after the Transportation Commission approved CDOT's Annual Budget in March 2022. CDOT now needs an additional \$1.4 million to pay DPA for CDOT's share of the FY 2022-23 program costs, as estimated by the State's actuary and DPA.

The third budget amendment reallocates \$1,447,207 from the TC Program Reserve (Line 73) to the Agency Operations line (Line 66) to cover additional workers' compensation costs for FY 2022-23.

Attachments

- Attachment A - FY 2022-23 Amended Revenue Allocation Plan
- Attachment B - Presentation

Attachment A: FY 2022-23 CDOT AMENDED ANNUAL BUDGET (November 2022)

Line	Budget Category / Program	Rollforward from FY 2021-22	FY 2022-23 Allocation Plan	Proposed TC Amendments	Approved TC Amendments	EMT and Staff Approved Adjustments	Total FY23 Program Budget Available including Changes	Directed By	Funding Source
1	COLORADO DEPARTMENT OF TRANSPORTATION								
2	Capital Construction	\$1,318.4 M	\$656.8 M	\$44.0 M	\$15.5 M	\$363.6 M	\$2,398.3 M		
3	Asset Management	\$103.3 M	\$392.3 M	\$44.0 M	\$15.5 M	-\$3.0 M	\$552.1 M		
4	Surface Treatment	\$16.6 M	\$225.6 M	\$24.0 M	\$0.0 M	-\$1.3 M	\$264.9 M	TC	FHWA / SH / SB 09-108
5	Structures	\$9.8 M	\$62.5 M	\$0.0 M	\$0.0 M	\$0.3 M	\$72.6 M	TC	FHWA / SH / SB 09-108
6	System Operations	\$3.1 M	\$26.9 M	\$0.0 M	\$0.0 M	-\$0.4 M	\$29.5 M	TC	FHWA / SH
7	Geohazards Mitigation	\$6.9 M	\$10.0 M	\$0.0 M	\$0.0 M	\$0.0 M	\$16.9 M	TC	SB 09-108
8	Permanent Water Quality Mitigation	\$2.3 M	\$6.5 M	\$0.0 M	\$0.0 M	\$1.4 M	\$10.1 M	TC	FHWA / SH
9	Emergency Relief	\$9.1 M	\$0.0 M	\$0.0 M	\$0.0 M	-\$2.9 M	\$6.2 M	FR	FHWA
10	10 Year Plan Projects - Capital AM	\$55.5 M	\$60.9 M	\$20.0 M	\$15.5 M	\$0.0 M	\$151.9 M	TC / FR	FHWA
11	Safety	\$52.7 M	\$121.6 M	\$0.0 M	\$0.0 M	\$40.0 M	\$214.3 M		
12	Highway Safety Improvement Program	\$22.5 M	\$39.4 M	\$0.0 M	\$0.0 M	\$0.0 M	\$61.9 M	FR	FHWA / SH
13	Railway-Highway Crossings Program	\$2.7 M	\$3.6 M	\$0.0 M	\$0.0 M	-\$0.2 M	\$6.1 M	FR	FHWA / SH
14	Hot Spots	\$0.5 M	\$2.2 M	\$0.0 M	\$0.0 M	\$0.0 M	\$2.6 M	TC	FHWA / SH
15	FASTER Safety	\$13.8 M	\$69.2 M	\$0.0 M	\$0.0 M	\$40.2 M	\$123.3 M	TC	SB 09-108
16	ADA Compliance	\$13.2 M	\$7.2 M	\$0.0 M	\$0.0 M	\$0.0 M	\$20.4 M	TC	FHWA / SH
17	Mobility	\$1,162.4 M	\$142.9 M	\$0.0 M	\$0.0 M	\$326.6 M	\$1,631.8 M		
18	Regional Priority Program	\$46.1 M	\$50.0 M	\$0.0 M	\$0.0 M	\$1.5 M	\$97.6 M	TC	FHWA / SH
19	10 Year Plan Projects - Capital Mobility	\$1,080.8 M	\$72.2 M	\$0.0 M	\$0.0 M	\$325.1 M	\$1,478.1 M	SL	FHWA / SB 17-267 / SB 21-260
20	Freight Programs	\$35.5 M	\$20.7 M	\$0.0 M	\$0.0 M	\$0.0 M	\$56.1 M	FR	FHWA / SH / SL
21	Maintenance and Operations	\$37.0 M	\$372.3 M	\$0.0 M	\$11.5 M	\$1.5 M	\$419.3 M		
22	Asset Management	\$31.0 M	\$336.1 M	\$0.0 M	\$11.5 M	\$2.2 M	\$377.9 M		
23	Maintenance Program Areas	\$2.9 M	\$273.8 M	\$0.0 M	\$0.0 M	\$0.0 M	\$273.8 M		
24	Roadway Surface	\$0.0 M	\$37.7 M	\$0.0 M	\$0.0 M	\$0.0 M	\$37.7 M	TC	SH
25	Roadside Facilities	\$0.0 M	\$22.8 M	\$0.0 M	\$0.0 M	\$0.0 M	\$22.8 M	TC	SH
26	Roadside Appearance	\$0.0 M	\$10.8 M	\$0.0 M	\$0.0 M	\$0.0 M	\$10.8 M	TC	SH
27	Structure Maintenance	\$0.0 M	\$5.7 M	\$0.0 M	\$0.0 M	\$0.0 M	\$5.7 M	TC	SH
28	Tunnel Activities	\$0.0 M	\$6.4 M	\$0.0 M	\$0.0 M	\$0.0 M	\$6.4 M	TC	SH
29	Snow and Ice Control	\$0.0 M	\$84.1 M	\$0.0 M	\$0.0 M	\$0.0 M	\$84.1 M	TC	SH
30	Traffic Services	\$0.0 M	\$71.9 M	\$0.0 M	\$0.0 M	\$0.0 M	\$71.9 M	TC	SH
31	Materials, Equipment, and Buildings	\$0.0 M	\$18.2 M	\$0.0 M	\$0.0 M	\$0.0 M	\$18.2 M	TC	SH
32	Planning and Scheduling	\$0.0 M	\$16.1 M	\$0.0 M	\$0.0 M	\$0.0 M	\$16.1 M	TC	SH
33	Express Lane Corridor Maintenance & Operations	\$1.5 M	\$11.0 M	\$0.0 M	\$0.0 M	\$1.8 M	\$14.3 M	TC	SH
34	Property	\$0.0 M	\$27.9 M	\$0.0 M	\$6.5 M	-\$0.2 M	\$34.2 M	TC	SH
35	Capital Equipment	\$19.6 M	\$23.4 M	\$0.0 M	\$0.0 M	\$0.6 M	\$43.7 M	TC	SH
36	Maintenance Reserve Fund	\$7.0 M	\$0.0 M	\$0.0 M	\$5.0 M	\$0.0 M	\$12.0 M	TC	SH
37	Safety	\$1.1 M	\$12.2 M	\$0.0 M	\$0.0 M	\$0.0 M	\$13.3 M		
38	Strategic Safety Program	\$1.1 M	\$12.2 M	\$0.0 M	\$0.0 M	\$0.0 M	\$13.3 M	TC	FHWA / SH
39	Mobility	\$4.9 M	\$24.0 M	\$0.0 M	\$0.0 M	-\$0.7 M	\$28.2 M		
40	Real-Time Traffic Operations	\$0.6 M	\$14.0 M	\$0.0 M	\$0.0 M	-\$1.2 M	\$13.4 M	TC	SH
41	ITS Investments	\$4.3 M	\$10.0 M	\$0.0 M	\$0.0 M	\$0.5 M	\$14.7 M	TC	FHWA / SH
42	Multimodal Services & Electrification	\$206.9 M	\$46.3 M	\$0.0 M	\$35.1 M	\$33.2 M	\$321.5 M		
43	Mobility	\$206.9 M	\$46.3 M	\$0.0 M	\$35.1 M	\$33.2 M	\$321.5 M		
44	Innovative Mobility Programs	\$13.0 M	\$8.9 M	\$0.0 M	\$0.0 M	\$0.0 M	\$21.9 M	TC	FHWA / SH
45	National Electric Vehicle Program	\$8.4 M	\$11.3 M	\$0.0 M	\$0.0 M	\$3.2 M	\$22.9 M	FR	FHWA
46	10 Year Plan Projects - Multimodal	\$164.2 M	\$17.2 M	\$0.0 M	\$0.0 M	\$0.0 M	\$181.4 M	TC	FHWA / SB 17-267, SB 21-260
47	Rail Commission	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	SL	SL
48	Bustang	\$21.3 M	\$8.8 M	\$0.0 M	\$35.1 M	\$30.0 M	\$95.3 M	TC	SB 09-108 / Fare Rev.
49	Suballocated Programs	\$544.9 M	\$373.2 M	\$0.0 M	-\$35.1 M	\$65.4 M	\$948.3 M		
50	Aeronautics	\$12.3 M	\$35.3 M	\$0.0 M	\$0.0 M	\$30.2 M	\$77.8 M		
51	Aviation System Programs	\$12.3 M	\$35.3 M	\$0.0 M	\$0.0 M	\$30.2 M	\$77.8 M	AB	SA
52	Highway	\$270.8 M	\$143.9 M	\$0.0 M	\$0.0 M	\$3.7 M	\$418.4 M		
53	STBG-Urban (STP-Metro)	\$178.7 M	\$61.9 M	\$0.0 M	\$0.0 M	\$0.0 M	\$240.6 M	FR	FHWA / LOC
54	Congestion Mitigation and Air Quality	\$55.9 M	\$51.7 M	\$0.0 M	\$0.0 M	\$1.0 M	\$108.7 M	FR	FHWA / LOC
55	Metropolitan Planning	\$9.7 M	\$10.7 M	\$0.0 M	\$0.0 M	\$0.7 M	\$21.1 M	FR	FHWA / FTA / LOC
56	Off-System Bridge Program	\$26.5 M	\$19.5 M	\$0.0 M	\$0.0 M	\$2.0 M	\$48.1 M	TC / FR	FHWA / SH / LOC
57	Transit and Multimodal	\$261.8 M	\$194.1 M	\$0.0 M	-\$35.1 M	\$31.5 M	\$452.2 M		
58	Recreational Trails	\$1.2 M	\$1.6 M	\$0.0 M	\$0.0 M	-\$0.1 M	\$2.7 M	FR	FHWA
59	Safe Routes to School	\$9.4 M	\$3.1 M	\$0.0 M	\$0.0 M	\$0.0 M	\$12.6 M	TC	FHWA / LOC
60	Transportation Alternatives Program	\$37.7 M	\$20.6 M	\$0.0 M	\$0.0 M	\$0.0 M	\$58.4 M	FR	FHWA / LOC
61	Transit Grant Programs	\$81.7 M	\$61.0 M	\$0.0 M	\$0.0 M	\$6.1 M	\$148.7 M	FR / SL / TC	FTA / LOC / SB 09-108
62	Multimodal Options Program - Local	\$91.5 M	\$97.6 M	\$0.0 M	-\$35.1 M	\$0.0 M	\$154.0 M	SL	SB 21-260
63	Carbon Reduction Program - Local	\$0.0 M	\$9.5 M	\$0.0 M	\$0.0 M	\$9.0 M	\$18.5 M	FR	FHWA / LOC
64	Revitalizing Main Streets Program	\$40.3 M	\$0.7 M	\$0.0 M	\$0.0 M	\$16.5 M	\$57.5 M	SL / TC	SB 21-260
65	Administration & Agency Operations	\$24.0 M	\$105.3 M	\$5.6 M	-\$6.5 M	-\$2.1 M	\$126.2 M		
66	Agency Operations	\$22.9 M	\$59.7 M	\$5.6 M	-\$7.5 M	-\$4.3 M	\$76.4 M	TC / AB	FHWA / SH / SA / SB 09-108
67	Administration	\$0.0 M	\$42.9 M	\$0.0 M	\$0.0 M	\$0.0 M	\$42.9 M	SL	SH
68	Project Initiatives	\$1.0 M	\$2.6 M	\$0.0 M	\$1.0 M	\$2.2 M	\$6.9 M	TC	SH
69	Debt Service	\$230.4 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	\$230.4 M		
70	Debt Service	\$230.4 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	\$230.4 M	DS	SH
71	Contingency Reserve	\$38.0 M	\$0.0 M	-\$49.6 M	\$0.0 M	\$5.8 M	-\$5.8 M		
72	Contingency Fund	\$38.0 M	\$0.0 M	\$0.0 M	\$0.0 M	\$5.8 M	\$43.7 M	TC	FHWA / SH
73	Commission Reserve Funds	\$0.0 M	\$0.0 M	-\$49.6 M	\$0.0 M	\$0.0 M	-\$49.6 M	TC	FHWA / SH
74	Other Programs	\$55.9 M	\$29.5 M	\$0.0 M	\$0.0 M	-\$17.1 M	\$68.4 M		
75	Safety Education	\$22.5 M	\$14.1 M	\$0.0 M	\$0.0 M	\$1.9 M	\$38.6 M	TC/FR	NHTSA / SSE
76	Planning and Research	\$6.4 M	\$15.1 M	\$0.0 M	\$0.0 M	\$0.2 M	\$21.7 M	FR	FHWA / SH
77	State Infrastructure Bank	\$27.0 M	\$0.3 M	\$0.0 M	\$0.0 M	-\$19.2 M	\$8.0 M	TC	SIB
78	TOTAL - CDOT	\$2,455.3 M	\$1,583.3 M	\$0.0 M	\$20.5 M	\$450.3 M	\$4,509.4 M		

Key to Acronyms:
 TC = Transportation Commission
 FR = Federal
 SL = State Legislature
 AB = Aeronautics Board
 SH = State Highway
 SIB = State Infrastructure Bank
 LOC = Local
 SB = Senate Bill
 DS = Debt Service
 SA = State Aviation

Line	Budget Category / Program	Rollforward from FY 2021-22	FY 2022-23 Allocation Plan	Proposed TC Amendments	Approved TC Amendments	EMT and Staff Approved Adjustments	Total FY23 Program Budget Available including Changes	Directed By	Funding Source
79	COLORADO BRIDGE & TUNNEL ENTERPRISE								
80	Capital Construction	\$36.2 M	\$94.5 M	\$0.0 M	\$0.0 M	\$0.0 M	\$130.7 M		
81	Asset Management	\$36.2 M	\$94.5 M	\$0.0 M	\$0.0 M	\$0.0 M	\$130.7 M		
82	Bridge Enterprise Projects-CBE	\$36.2 M	\$94.5 M	\$0.0 M	\$0.0 M	\$0.0 M	\$130.7 M	BTEB	SB 09-108, SB 21-260
83	Maintenance and Operations	\$0.5 M	\$0.8 M	\$0.0 M	\$0.0 M	\$0.0 M	\$1.3 M		
84	Asset Management	\$0.5 M	\$0.8 M	\$0.0 M	\$0.0 M	\$0.0 M	\$1.3 M		
85	Maintenance and Preservation-CBE	\$0.5 M	\$0.8 M	\$0.0 M	\$0.0 M	\$0.0 M	\$1.3 M	BTEB	SB 09-108
86	Administration & Agency Operations	\$3.9 M	\$1.9 M	\$0.0 M	\$0.0 M	\$0.0 M	\$5.8 M		
87	Agency Operations-CBE	\$3.9 M	\$1.9 M	\$0.0 M	\$0.0 M	\$0.0 M	\$5.8 M	BTEB	SB 09-108
88	Debt Service	\$2.1 M	\$48.0 M	\$4.1 M	\$0.0 M	-\$17.2 M	\$37.1 M		
89	Debt Service-CBE	\$2.1 M	\$48.0 M	\$4.1 M	\$0.0 M	-\$17.2 M	\$37.1 M	BTEB	FHWA / SH
90	TOTAL - BRIDGE & TUNNEL ENTERPRISE	\$42.8 M	\$145.2 M	\$4.1 M	\$0.0 M	-\$17.2 M	\$174.9 M		

91	COLORADO TRANSPORTATION INVESTMENT OFFICE (CTIO)								
92	Maintenance and Operations	\$53.6 M	\$36.1 M	\$0.0 M	\$0.0 M	\$7.2 M	\$96.9 M		
93	Express Lanes Operations-HPTE	\$53.6 M	\$36.1 M	\$0.0 M	\$0.0 M	\$7.2 M	\$96.9 M	CTIOB	Tolls / Managed Lanes Revenue
94	Administration & Agency Operations	\$3.3 M	\$4.1 M	\$0.0 M	\$0.0 M	\$2.4 M	\$9.7 M		
95	Agency Operations-HPTE	\$3.3 M	\$4.1 M	\$0.0 M	\$0.0 M	\$2.4 M	\$9.7 M	CTIOB	Fee for Service
96	Debt Service	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M		
97	Debt Service-HPTE	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	CTIOB	Fee for Service
98	TOTAL - COLORADO TRANSPORTATION INVESTMENT OFFICE	\$56.9 M	\$40.1 M	\$0.0 M	\$0.0 M	\$9.6 M	\$106.6 M		

99	CLEAN TRANSIT ENTERPRISE								
100	Suballocated Programs	\$0.0 M	\$6.8 M	\$0.0 M	\$0.0 M	-\$1.3 M	\$5.6 M		
101	Transit and Multimodal	\$0.0 M	\$6.8 M	\$0.0 M	\$0.0 M	-\$1.3 M	\$5.6 M		
102	CTE Projects	\$0.0 M	\$6.8 M	\$0.0 M	\$0.0 M	-\$1.3 M	\$5.6 M	CTB	SB 21-260
103	Administration & Agency Operations	\$0.1 M	\$1.4 M	\$0.0 M	\$0.0 M	\$1.3 M	\$2.7 M		
104	Agency Operations-CTE	\$0.1 M	\$0.6 M	\$0.0 M	\$0.0 M	\$1.3 M	\$1.9 M	CTB	SB 21-260
105	Contingency Reserve-CTE	\$0.0 M	\$0.8 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.8 M		
106	Debt Service	\$0.0 M	\$0.1 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.1 M		
107	Debt Service-CTE	\$0.0 M	\$0.1 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.1 M	CTB	SB 21-260
108	TOTAL - CLEAN TRANSIT ENTERPRISE	\$0.1 M	\$8.3 M	\$0.0 M	\$0.0 M	\$0.0 M	\$8.3 M		

109	NONATTAINMENT AREA AIR POLLUTION MITIGATION ENTERPRISE								
110	Multimodal Services & Electrification	\$0.0 M	\$6.6 M	\$0.0 M	\$0.0 M	-\$0.3 M	\$6.3 M		
111	Mobility	\$0.0 M	\$6.6 M	\$0.0 M	\$0.0 M	-\$0.3 M	\$6.3 M		
112	NAAPME Projects	\$0.0 M	\$6.6 M	\$0.0 M	\$0.0 M	-\$0.3 M	\$6.3 M	NAAPMEB	SB 21-260
113	Administration & Agency Operations	\$0.1 M	\$0.4 M	\$0.0 M	\$0.0 M	\$0.3 M	\$0.8 M		
114	Agency Operations-NAAPME	\$0.1 M	\$0.2 M	\$0.0 M	\$0.0 M	\$0.3 M	\$0.6 M	NAAPMEB	SB 21-260
115	Contingency Reserve-NAAPME	\$0.0 M	\$0.2 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.2 M		
116	Debt Service	\$0.0 M	\$0.1 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.1 M		
117	Debt Service-NAAPME	\$0.0 M	\$0.1 M	\$0.0 M	\$0.0 M	\$0.0 M	\$0.1 M	NAAPMEB	SB 21-260
118	TOTAL - NONATTAINMENT AREA AIR POLLUTION MITIGATION ENTERPRISE	\$0.1 M	\$7.1 M	\$0.0 M	\$0.0 M	\$0.0 M	\$7.2 M		
119	TOTAL - CDOT AND ENTERPRISES	\$2,555.1 M	\$1,784.0 M	\$4.1 M	\$20.5 M	\$442.7 M	\$4,806.5 M		



COLORADO

Department of Transportation

November 2022 FY23 Budget Amendment



Agenda:

- TC Program Reserve Reconciliation
- FY23 Budget Amendments
 - Capital Construction Cost Escalation Fund
 - Mountain Corridor Resiliency
 - Strategic Pavement Investments
 - Bridge and Tunnel Enterprise BABs Subsidy
 - Workers Compensation Budget Shortfall





TC Program Reserve Reconciliation

October Beginning Balance	\$59,812,379
Revenue Reconciliation	
FY22 Flexible HUTF	\$18,346,530
FY22 Flexible FHWA	(\$32,126,644)
FY22 Miscellaneous Revenue	(\$3,513,235)
Total after Revenue Reconciliation	\$42,519,030
FY22 FHWA Redistribution	\$102,000,000
TOTAL	\$144,519,030





FY23 Budget Amendments

Staff plans to request \$79.5 from the TC Program Reserve as part of the November Budget Amendment for the following initiatives:

Budget Amendment Request:	Amount:
Capital Construction Cost Escalation Fund	\$30.0 M
Mountain Corridor Resiliency Projects	\$20.0 M
Strategic Pavement Investments	\$24.0 M
Backfill Bridge and Tunnel Enterprise BABs Subsidy	\$4.1 M
Workers' Compensation Budget Shortfall	\$1.4 M
Total Request from TC Program Reserve	\$79.5 M



Capital Construction Cost Escalation Fund

- Ensure sufficient funds are available to address recent cost escalation in capital construction projects without causing undue delay to projects
- Intent is not to supplant existing sources of funding to address shortfalls, but to provide an alternative source when funds are not available from existing sources or where the use of such funds would result in delays or cancellation of other projects
- Proposed fund would include an accelerated administrative approval process



Capital Construction Cost Escalation Fund

As proposed, any capital construction project, including 10-Year Plan Projects, asset management, or safety projects, would be eligible to request funds.

- Requests can be made for cost escalation, not additional scope.
- Requests can be made at the time of an increased cost estimate or when the low bid is higher than budgeted.
- Existing funding sources (SUR, RPP, etc.) should be utilized first, before making a request. Requests from the Capital Construction Cost Escalation Fund should result only if it is determined that funds cannot be made available from other sources without cancelling/delaying other projects.
- Regions would be provided with an “allocation” amount (based on the allocation formula used for the 10-year Plan) that could be used as a constraint with which to manage requests at the Region level.
- Any unused Capital Construction Cost Escalation funds returned from projects would be returned to the fund.



Mountain Corridor Resiliency

Since the fires and floods of 2020 and 2021, Region 3 Staff have been working on a multi-pronged approach for resiliency





Mountain Corridor Resiliency

The IIJA offers various grant opportunities to address Resiliency.

Requested funds would be used both as potential match for grants -as well as a contingent plan to spend the money in a useful manner should those grant applications be unsuccessful.





Mountain Corridor Resiliency

\$20 M request

Plan A- Used as a Match for \$100 M Grant Package

Plan B- \$20 M Non-Grant Package

Could be scaled anywhere between extremes should grant be partially successful





Mountain Corridor Resiliency

I-70 Glenwood Canyon-Exp. Joint and Guardrail Replacement	\$48.2M
US 40 Passing Lanes, Corridor and Safety Improvements	\$17.8M
SH9 MM 120.5-122.5 “Shale Bluffs”	\$11.0M
Cottonwood Pass-Blue Hill Design and Construction	\$23.0M
Total	\$100.0M

*The exact composition of grant elements and allocation of dollars to those elements is subject to change based on cost/benefit and other additional analysis.



Mountain Corridor Resiliency

I-70 Glenwood Canyon-Guardrail Replacement	\$8.6 M
I-70 Glenwood Canyon Bridge Joint Replacement	\$8.4 M
Cottonwood Pass-Blue Hill Design	\$3.0 M
Total	\$20.0 M



Strategic Pavement Investments

- **Strategic Preventive Maintenance - \$10 million**
 - Improve the condition of non-interstate statewide pavement through low cost/high benefit treatments.
 - Preference given to Chip Seals and crack seals as identified through meeting treatment criteria.
 - Regions will be allocated \$2 million each.
- **Poor Interstate Fund - \$10 million**
 - Additional investment to continue addressing poor pavement sections.
 - Currently at 3.9% Poor Interstates - Federal poor threshold is 5% Poor.
- **I-70 near the Kansas border “Kanorado” - \$4 million**
 - Total project cost is estimated to be \$15 million
 - Funded in part by reallocating funds from existing I-70 10-Year Plan project and reducing the scope of that project.
 - 11 miles of westbound direction only (worst section)
 - Address ride quality concerns associated with deteriorated section of concrete pavement.





\$10 Million for Strategic Preventive Maintenance

- Focus on Tier 2, 3 & 4 roads
- \$2M per Region
- Meet criteria for treatment

Strategic Chip Seal Opportunities	
Roadway Tier (Category)	Number of Lane Miles (Percent of asphalt network)
Tier 1 (Interstate Highways)	0 miles (0% of asphalt Tier 1 Interstate network)
Tier 2 (High Volume)	3318 miles (50% of asphalt Tier 2 High Volume network)
Tier 3 (Medium Volume)	6251 miles (100% of asphalt Tier 3 Medium Volume network)
Tier 4 (Low Volume)	4728 miles (100% of asphalt Tier 4 Low Volume network)
Totals	14,297

	Chip Seal Costs by Business Area		
	Engineering	Maintenance	M-Project
Lane Mile Cost	\$50K	\$20K	\$30K
Total Lane Miles Covered	200	500	333

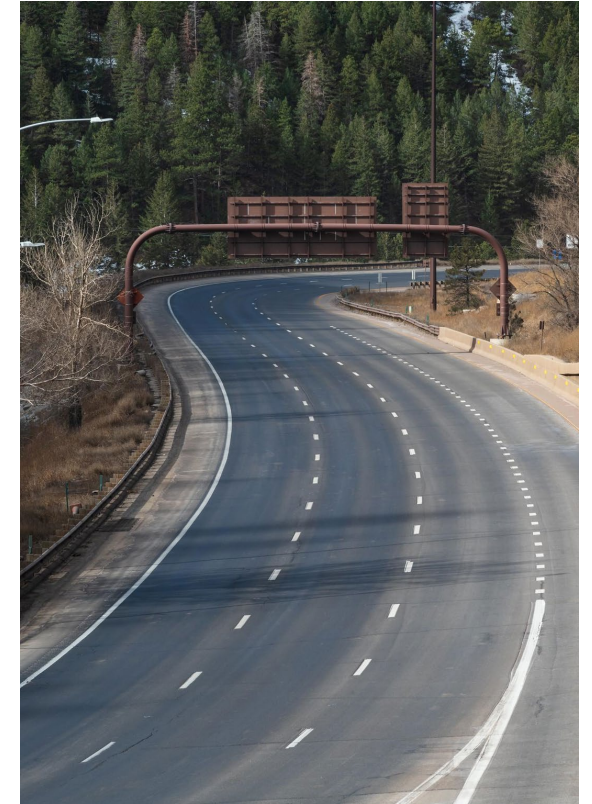
- Challenges with CDOT Mtc staff resources (30% unfilled rate)
- Likely a mix between Engineering and M-Project delivery



\$10 Million for Poor Interstates

Overview

- Currently 3.9% poor Interstates under National Performance Measures
 - I-76—\$2.9M concrete diamond grind in 2022
 - Will eliminate 1.6% points—dropping us to 2.3% poor.
 - Forecast to return to 3.6% poor Interstates
 - Gained 1.3% points between 2021-22
- \$14.8M of FY26/27 Pavement funds planned to go to poor Interstates
 - From FY22-25 a total of \$140.7 Million is planned to go towards interstate projects that contain poor pavement sections.





Poor Interstates Options

Potential Project Locations: (estimates represent total cost, but actual projects can be completed in phases)

- I-25 MP 94-100 Minor Rehabilitation
 - 10 poor segments - Est. \$15.6 Million
- I-76 132.9-149.3 Preventive Maintenance - slab replacements/diamond grind
 - 96 poor segments - Est. \$29 Million
- I-70 Westbound Kanorado to Burlington
 - 0 poor segments - could transition quickly to poor
- I-70 EJMT East - Eastbound
 - 14 poor segments - Est. \$20.2 Million
- I-70 Rifle PCCP - Eastbound - slab replacement/diamond grind
 - 23 poor segments - Est. \$41.8 Million





Poor Interstates Options

I-70 Burlington to Kanorado \$4 Million

- No Federal poor segments, however; if left untreated, it would quickly deteriorate to poor
- \$15 million estimate for Westbound direction only addresses worst section
 - Funded in part by reallocating funds from existing I-70 10-Year Project and reducing the scope of that project.
 - \$4m from redistribution would contribute to the funding need.
- Addresses ride quality concerns associated with deteriorated section of concrete pavement
- 3 inch asphalt overlay (proposed)

Alkali-silica reactivity (ASR) distress



Pothole (filled) as a result of ASR





Bridge and Tunnel Enterprise BABS Subsidy \$4.1M

- Pursuant to the MOU between BTE and CDOT, 80% of the debt service is paid from federal funds and the remaining obligation is covered by BTE revenue
- Anticipating the loss of BABS subsidy on interest in FY 23

Workers' Compensation Budget Shortfall \$1.4M

- The State's actuary estimates prospective claims for all state departments on an annual basis and the budget is requested by DPA on their behalf
- For FY 2022-23, budget allocations for Workers' Compensation were increased based on updated estimates from the State's actuary, but the change occurred late in the budget setting process after the Transportation Commission approved CDOT's Annual Budget in March 2022
- CDOT now needs an additional \$1.4 million to pay DPA for CDOT's share of the FY 2022-23 program costs

MEMORANDUM

TO: THE TRANSPORTATION COMMISSION
FROM: JEFF SUDMEIER, CHIEF FINANCIAL OFFICER
BETHANY NICHOLAS, BUDGET DIRECTOR
DATE: NOVEMBER 16, 2022
SUBJECT: PROPOSED FY 2023-24 ANNUAL BUDGET

Purpose

To review and approve the Proposed FY 2023-24 Annual Budget Allocation Plan.

Action

The Division of Accounting and Finance (DAF) is requesting Transportation Commission (TC) review and approval of the Proposed FY 2023-24 Annual Budget Allocation Plan. The TC will be asked to adopt the final budget at the meeting in March 2023 after the plan is updated based on the December 2022 revenue forecast.

Proposed FY 2023-24 Annual Budget Allocation Plan

The Proposed FY 2023-24 Annual Budget Allocation Plan is available on the Department's website: <https://www.codot.gov/business/budget/cdot-budget>. In addition to the Budget Narrative, the following Appendices to the FY 2023-24 Budget are now available:

- Appendix A: FY 2023-24 Revenue Allocation Plan
- Appendix B: FY 2023-24 Spending Plan
- Appendix C: List of Open Projects and Unexpended Project Balances
- Appendix D: List of Planned Projects
- Appendix E: Estimated Construction Budget
- Appendix F: CE and Indirect Allocations
- Appendix G: CDOT Personnel Report

The Proposed FY 2023-24 Revenue Allocation Plan (see Attachment B) totals \$1,793.4 billion (including the enterprises) and allocates:

- \$719.7 M to capital construction programs
- \$452.1 M to maintenance and operations programs
- \$328.7 M to suballocated programs
- \$53.1 M to multimodal services and electrification

The FY 2023-24 Spending Plan, which estimates operating and capital program expenditures during the fiscal year using new revenue and cash balances rolled forward from previous fiscal years, reflects \$2,359.9 million in total spending for CDOT and the enterprises. For CDOT specifically, this includes \$1,193.6 million for capital construction and \$344.7 million for maintenance and operations.

Changes to the Proposed Budget Since October 2022

Since the Commission reviewed the Proposed FY 2023-24 Annual Budget in October, staff made several minor changes and updates to revenue and allocations. The most significant change is an update to the revenue forecast for the Multimodal Transportation and Mitigation Options Fund (MMOF) for FY 2023-

24. The draft budget presented in October reflected \$56.0 million in revenue which included a General Fund transfer of \$48.6 million and retail delivery fee revenue of \$7.4 million. The current budget reflects \$0 for the General Fund transfer because the state's revenue for FY 2021-22 exceeded the state's excess revenue cap triggering a General Fund transfer of \$112.5 million (\$105.7 million to MMOF and \$6.7 million to Revitalizing Main Streets) in FY 2022-23, pursuant to SB 21-260. CDOT is not anticipating a General Fund transfer to the MMOF during FY 2023-24 so the Budget now reflects only the \$7.4 million in retail delivery fee revenue. Based on current law, General Fund transfers will resume in FY 2024-25.

Additionally, the CDOT share of the MMOF (15% of the \$7.4 million above, or \$1.1 million) was moved from the 10 Year Plan Projects - Multimodal line (Line 46) to the Bustang line (Line 48) to align with the Commission's approval for this change beginning in FY 2022-23. The revised total budget allocated to 10 Year Plan Projects lines in the FY 2023-24 Budget is \$118.9 million and 10% of this amount was placed in the 10 Year Plan Projects - Multimodal line (Line 46) based on a previously established target that at least 10% of 10-Year Plan funding go to transit/multimodal projects. Later in the budget development process, staff may propose to adjust allocations to provide additional funding for 10 Year Plan projects.

After the Governor's Budget Request was submitted to the legislature on November 1 (see below for more information), the Administration line (line 67) was increased by \$2.2 million to a current allocation of \$45.1 million because of increases to statewide common policies that were included in CDOT's legislative request.

Finally, the draft Proposed FY 2023-24 Annual Budget reflected an allocation of \$15.0 million in the TC Contingency Fund line (Line 72). After incorporating final statewide common policies and other minor adjustments, the allocation was reduced by \$1.7 million to \$13.3 million. This amount is available for further increases to statewide common policies, decision items, or other balancing adjustments that need to be made during the budget development process. At this time, staff is forecasting a large balance in the Contingency Fund at the end of the current Fiscal Year, which will be available to address contingency requests in FY 2023-24.

Please also reference Attachment A, which provides a more detailed explanation of significant changes in program allocations between FY 2022-23 and FY 2023-24, many of which are the result not of Transportation Commission allocation decisions, but rather variation year over year in legislative funding.

Governor's November 1 Budget Submission

As mentioned above, the Governor's Budget Request was submitted to the legislature on November 1, 2022. The final request for the Administration line is \$45.1 million, which is \$2.2 million, or 5.0%, more than the initial FY 2022-23 budget that was approved by the TC in March 2022. This increase is primarily attributable to statewide common policies, including a requested 5% increase to salaries for all state employees, and other statewide requests.

More detail on the Governor's Budget Request including proposals relevant to CDOT can be found on the Office of State Planning and Budgeting website: <https://www.colorado.gov/governor/Office-State-Planning-Budgeting>. These items are anticipated to be addressed during the 2022 legislative session and the Department will provide updates as needed.

Potential Additional Changes to the FY 2023-24 Budget Allocation Plan

The following outstanding items could result in further changes to the FY 2023-24 Annual Budget Allocation Plan:



- **Decision Items:** The TC will have an opportunity to review any potential Decision Item requests during the February 2023 Budget Workshop, prior to the March adoption of the Final FY 2023-24 Annual Budget Allocation Plan.
- **Administration (Line 67):** Legislative and OSPB actions during the budget development cycle may require further changes in Administration spending for CDOT. The Administration number will be updated throughout the fall and winter.
- **Maintenance Reserve (Line 36) and Contingency Funds (Line 72):** After final adjustments for common policy, etc., and consideration of current balances in the TC Contingency and Maintenance Reserve, the Commission may also be asked to consider options for the allocation of any residual flexible HUTF funding or flexible federal funding, including amounts currently allocated to the TC Contingency and Maintenance Reserve, to other programs including the 10-Year Plan, Maintenance Program Areas, or other asset management programs.

Options and Recommendation

1. Approve the Proposed FY 2023-24 Annual Budget Allocation Plan (staff recommendation).
2. Direct staff to make changes to the Proposed FY 2023-24 Annual Budget Allocation Plan and approve in advance of the December 15, 2022 submission deadline to the legislature and OSPB.

Next Steps

- TC adoption of the Proposed FY 2023-24 Annual Budget Allocation Plan for submission to the OSPB on or before December 15, 2022.
- In February 2023, the TC will be asked to review any Decision Items that are \$1 million or more, additional changes related to common policy updates, changes resulting from updated revenue forecasts, or any other changes.
- In March 2023, the TC will be asked to review and adopt the Final FY 2023-24 Annual Budget Allocation Plan.

Appendices and Attachments

Attachment A - Description of Significant Changes from FY 2022-23

Attachment B - FY 2023-24 Revenue Allocation Plan

Attachment C - Presentation



Attachment A: Explanation of Significant Changes from the FY 2022-23 Revenue Allocation Plan for CDOT

(defined as + / - 25% over FY 2022-23 initial approved allocations)

Line#	Budget Line	\$ Change from FY23	% Change from FY23	Explanation
15	FASTER Safety	(\$19.9 M)	(28.79%)	Senate Bill 21-260 and HB 22-1351 temporarily reduced the Road Safety Surcharge fee for two years, resulting in a projected revenue shortfall of approximately \$10.2M for FY24. HB 22-1351 provided \$10.2M General Fund to backfill the lost revenue in FY23, and the funds are anticipated to roll forward to FY24 so the total available budget for FASTER Safety will be \$59.5M.
19	10 Year Plan Projects - Capital Mobility	(\$24.4 M)	(38.44%)	Any remaining flexible FHWA funds are placed in this line for 10 Year Plan Projects in FY24. Also 10% of the total allocation for 10 Year Plan Projects (\$11.9M) was moved to the 10 Year Plan Projects - Multimodal line based on a previously established target that at least 10% of 10-Year Plan funding go to transit/multimodal projects. Collectively total 10-Year Plan project funds in the FY 2023-24 budget are consistent with prior projections and the four-year estimated total of \$1.3 billion between FY 2022-23 and FY 2025-26.
45	National Electric Vehicle Program	\$3.2 M	28.64%	The FHWA apportionment for NEVI increased for FY24 to account for a one-time reduction to the apportionment in FY22 for administrative costs. Also staff increased the allocation to account for estimated local match beginning in FY24.
46	10 Year Plan Projects - Multimodal	(\$5.3 M)	(30.98%)	The CDOT portion of the Multimodal Transportation and Mitigation Options Fund (MMOF) was moved to Bustang (\$1.1M). This line now reflects 10% of the total allocation to 10 Year Plan Projects in the FY24 Budget.
51	Aviation System Program	\$39.3 M	111.65%	The Division of Aeronautics is forecasting record jet fuel sales and use tax revenue for FY24 resulting from high prices of jet fuel.
62	Multimodal Options Program - Local	(\$91.3 M)	(93.56%)	In addition to retail delivery fee revenue, the MMOF received a one-time General Fund transfer of \$105.7M in FY23 related to the state excess revenue cap, pursuant to SB260. For FY24, staff is forecasting \$7.4M in retail delivery fee revenue to the MMOF, of which 85% is the local share.



64	Revitalizing Main Streets Program	(\$0.7 M)	(100.00%)	Revitalizing Main Streets received a one-time General Fund transfer of \$6.9M in FY23 related to the state excess revenue cap, pursuant to SB260. For FY24, the program is not anticipated to receive new revenue. Annual General Fund transfers for this program are anticipated to resume in FY25.
77	State Infrastructure Bank	\$0.8 M	273.43%	Staff is forecasting higher interest earnings for the SIB program in FY24 attributable to the higher available balance in the SIB account and higher interest rates.



FY 2023-24 Revenue Allocation Plan

Line	Budget Category / Program	A. Estimated Rollforward from FY 2022-23*	B. FY 2022-23 Final Allocation Plan	C. FY 2023-24 Proposed Allocation Plan	FY 2023-24 Total Proposed Available Budget (A+C)	Directed By	Funding Source	Year over Year % Change (B vs C)
1 COLORADO DEPARTMENT OF TRANSPORTATION								
2	Capital Construction	\$10.2 M	\$647.9 M	\$617.6 M	\$627.8 M			-4.68%
3	Asset Management	\$0.0 M	\$392.3 M	\$399.3 M	\$399.3 M			1.79%
4	Surface Treatment	\$0.0 M	\$225.6 M	\$225.6 M	\$225.6 M	TC	FHWA / SH / SB 09-108	0.02%
5	Structures	\$0.0 M	\$62.5 M	\$63.3 M	\$63.3 M	TC	FHWA / SH / SB 09-108	1.34%
6	System Operations	\$0.0 M	\$26.9 M	\$26.3 M	\$26.3 M	TC	FHWA / SH	-2.23%
7	Geohazards Mitigation	\$0.0 M	\$10.0 M	\$9.7 M	\$9.7 M	TC	SB 09-108	-3.00%
8	Permanent Water Quality Mitigation	\$0.0 M	\$6.5 M	\$6.5 M	\$6.5 M	TC	FHWA / SH	0.00%
9	Emergency Relief	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	FR	FHWA	0.00%
10	10 Year Plan Projects - Capital AM	\$0.0 M	\$60.9 M	\$68.0 M	\$68.0 M	TC / FR	FHWA	11.58%
11	Safety	\$10.2 M	\$121.6 M	\$105.4 M	\$115.6 M			-13.32%
12	Highway Safety Improvement Program	\$0.0 M	\$39.4 M	\$42.9 M	\$42.9 M	FR	FHWA / SH	8.92%
13	Railway-Highway Crossings Program	\$0.0 M	\$3.6 M	\$3.8 M	\$3.8 M	FR	FHWA / SH	6.14%
14	Hot Spots	\$0.0 M	\$2.2 M	\$2.2 M	\$2.2 M	TC	FHWA / SH	0.00%
15	FASTER Safety	\$10.2 M	\$69.2 M	\$49.3 M	\$59.5 M	TC	SB 09-108	-28.79%
16	ADA Compliance	\$0.0 M	\$7.2 M	\$7.2 M	\$7.2 M	TC	FHWA / SH	0.00%
17	Mobility	\$0.0 M	\$134.1 M	\$112.9 M	\$112.9 M			-15.79%
18	Regional Priority Program	\$0.0 M	\$50.0 M	\$50.0 M	\$50.0 M	TC	FHWA / SH	0.00%
19	10 Year Plan Projects - Capital Mobility	\$0.0 M	\$63.4 M	\$39.0 M	\$39.0 M	SL	FHWA / SB 17-267 / SB 21-260	-38.44%
20	Freight Programs	\$0.0 M	\$20.7 M	\$23.9 M	\$23.9 M	FR	FHWA / SH / SL	15.46%
21	Maintenance and Operations	\$0.0 M	\$372.3 M	\$387.8 M	\$387.8 M			4.16%
22	Asset Management	\$0.0 M	\$336.1 M	\$351.1 M	\$351.1 M			4.48%
23	Maintenance Program Areas	\$0.0 M	\$273.8 M	\$278.0 M	\$278.0 M			1.55%
24	Roadway Surface	\$0.0 M	\$37.7 M	\$39.9 M	\$39.9 M	TC	SH	5.74%
25	Roadside Facilities	\$0.0 M	\$22.8 M	\$23.7 M	\$23.7 M	TC	SH	3.93%
26	Roadside Appearance	\$0.0 M	\$10.8 M	\$9.1 M	\$9.1 M	TC	SH	-15.99%
27	Structure Maintenance	\$0.0 M	\$5.7 M	\$5.5 M	\$5.5 M	TC	SH	-3.85%
28	Tunnel Activities	\$0.0 M	\$6.4 M	\$4.9 M	\$4.9 M	TC	SH	-23.71%
29	Snow and Ice Control	\$0.0 M	\$84.1 M	\$82.8 M	\$82.8 M	TC	SH	-1.49%
30	Traffic Services	\$0.0 M	\$71.9 M	\$73.9 M	\$73.9 M	TC	SH	2.74%
31	Materials, Equipment, and Buildings	\$0.0 M	\$18.2 M	\$20.7 M	\$20.7 M	TC	SH	13.19%
32	Planning and Scheduling	\$0.0 M	\$16.1 M	\$17.7 M	\$17.7 M	TC	SH	9.47%
33	Express Lane Corridor Maintenance and Operations	\$0.0 M	\$11.0 M	\$12.1 M	\$12.1 M	TC	SH	10.06%
34	Property	\$0.0 M	\$27.9 M	\$25.6 M	\$25.6 M	TC	SH	-8.24%
35	Capital Equipment	\$0.0 M	\$23.4 M	\$23.4 M	\$23.4 M	TC	SH	0.00%
36	Maintenance Reserve Fund	\$0.0 M	\$0.0 M	\$12.0 M	\$12.0 M	TC	SH	N/A
37	Safety	\$0.0 M	\$12.2 M	\$12.2 M	\$12.2 M			0.00%
38	Strategic Safety Program	\$0.0 M	\$12.2 M	\$12.2 M	\$12.2 M	TC	FHWA / SH	0.00%
39	Mobility	\$0.0 M	\$24.0 M	\$24.4 M	\$24.4 M			1.73%
40	Real-Time Traffic Operations	\$0.0 M	\$14.0 M	\$14.4 M	\$14.4 M	TC	SH	2.97%
41	ITS Investments	\$0.0 M	\$10.0 M	\$10.0 M	\$10.0 M	TC	FHWA / SH	0.00%
42	Multimodal Services & Electrification	\$0.0 M	\$55.1 M	\$44.8 M	\$44.8 M			-18.64%
43	Mobility	\$0.0 M	\$55.1 M	\$44.8 M	\$44.8 M			-18.64%
44	Innovative Mobility Programs	\$0.0 M	\$8.9 M	\$9.0 M	\$9.0 M	TC	FHWA / SH	1.14%
45	National Electric Vehicle Program	\$0.0 M	\$11.3 M	\$14.5 M	\$14.5 M	FR	FHWA	28.64%
46	10 Year Plan Projects - Multimodal	\$0.0 M	\$17.2 M	\$11.9 M	\$11.9 M	TC	FHWA / SB 17-267, SB 21-260	-30.98%
47	Rail Commission	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	SL	SL	0.00%
48	Bustang	\$0.0 M	\$8.8 M	\$9.4 M	\$9.4 M	TC	SB 09-108 / Fare Rev. / SB 21-260	6.20%
49	Suballocated Programs	\$0.0 M	\$373.2 M	\$321.1 M	\$321.1 M			-13.97%
50	Aeronautics	\$0.0 M	\$35.3 M	\$74.6 M	\$74.6 M			111.65%
51	Aviation System Program	\$0.0 M	\$35.3 M	\$74.6 M	\$74.6 M	AB	SA	111.65%
52	Highway	\$0.0 M	\$143.9 M	\$151.9 M	\$151.9 M			5.58%
53	STBG-Urban (STP-Metro)	\$0.0 M	\$61.9 M	\$66.0 M	\$66.0 M	FR	FHWA / LOC	6.66%
54	Congestion Mitigation and Air Quality	\$0.0 M	\$51.7 M	\$52.8 M	\$52.8 M	FR	FHWA / LOC	2.00%
55	Metropolitan Planning	\$0.0 M	\$10.7 M	\$10.7 M	\$10.7 M	FR	FHWA / FTA / LOC	0.15%
56	Off-System Bridge Program	\$0.0 M	\$19.5 M	\$22.4 M	\$22.4 M	TC / FR	FHWA / SH / LOC	14.61%
57	Transit and Multimodal	\$0.0 M	\$194.1 M	\$94.6 M	\$94.6 M			-51.27%
58	Recreational Trails	\$0.0 M	\$1.6 M	\$1.6 M	\$1.6 M	FR	FHWA	0.00%
59	Safe Routes to School	\$0.0 M	\$3.1 M	\$3.1 M	\$3.1 M	TC	FHWA / LOC	0.00%
60	Transportation Alternatives Program	\$0.0 M	\$20.6 M	\$21.6 M	\$21.6 M	FR	FHWA / LOC	4.61%
61	Transit Grant Programs	\$0.0 M	\$61.0 M	\$52.3 M	\$52.3 M	FR / SL / TC	FTA / LOC / SB 09-108	-14.19%
62	Multimodal Options Program - Local	\$0.0 M	\$97.6 M	\$6.3 M	\$6.3 M	SL	SB 21-260	-93.56%
63	Carbon Reduction Program - Local	\$0.0 M	\$9.5 M	\$9.6 M	\$9.6 M	FR	FHWA / LOC	2.00%
64	Revitalizing Main Streets Program	\$0.0 M	\$0.7 M	\$0.0 M	\$0.0 M	SL / TC	SB 21-260	-100.00%
65	Administration & Agency Operations	\$0.0 M	\$105.3 M	\$107.4 M	\$107.4 M			2.07%
66	Agency Operations	\$0.0 M	\$59.7 M	\$59.7 M	\$59.7 M	TC / AB	FHWA / SH / SA / SB 09-108	0.00%
67	Administration	\$0.0 M	\$42.9 M	\$45.1 M	\$45.1 M	SL	SH	5.09%
68	Project Initiatives	\$0.0 M	\$2.6 M	\$2.6 M	\$2.6 M	TC	SH	0.00%
69	Debt Service	\$171.3 M	\$0.0 M	\$29.0 M	\$200.4 M			N/A
70	Debt Service	\$171.3 M	\$0.0 M	\$29.0 M	\$200.4 M	DS	SH	N/A
71	Contingency Reserve	\$0.0 M	\$0.0 M	\$13.3 M	\$13.3 M			N/A
72	Contingency Fund	\$0.0 M	\$0.0 M	\$13.3 M	\$13.3 M	TC	FHWA / SH	N/A
73	Commission Reserve Funds	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	TC	FHWA / SH	N/A
74	Other Programs	\$0.0 M	\$29.5 M	\$34.1 M	\$34.1 M			15.62%
75	Safety Education	\$0.0 M	\$14.1 M	\$15.7 M	\$15.7 M	TC/FR	NHTSA / SSE	11.28%
76	Planning and Research	\$0.0 M	\$15.1 M	\$17.4 M	\$17.4 M	FR	FHWA / SH	14.80%
77	State Infrastructure Bank	\$0.0 M	\$0.3 M	\$1.1 M	\$1.1 M	TC	SIB	273.43%
78	TOTAL - CDOT	\$181.5 M	\$1,583.3 M	\$1,555.2 M	\$1,736.8 M			

Key to Acronyms:
 TC = Transportation Commission
 FR = Federal
 SL = State Legislature
 AB = Aeronautics Board
 SH = State Highway
 SIB = State Infrastructure Bank
 LOC = Local
 SB = Senate Bill
 SA = State Aviation

Line	Budget Category / Program	A. Estimated Rollforward from FY 2022-23*	B. FY 2022-23 Final Allocation Plan	C. FY 2023-24 Proposed Allocation Plan	FY 2023-24 Total Proposed Available Budget (A+C)	Directed By	Funding Source	Year over Year % Change (B vs C)
79	COLORADO BRIDGE & TUNNEL ENTERPRISE							
80	Capital Construction	\$0.0 M	\$94.5 M	\$102.1 M	\$102.1 M			8.11%
81	Asset Management	\$0.0 M	\$94.5 M	\$102.1 M	\$102.1 M			8.11%
82	Bridge Enterprise Projects	\$0.0 M	\$94.5 M	\$102.1 M	\$102.1 M	BEB	SB 09-108, SB 21-260	8.11%
83	Maintenance and Operations	\$0.0 M	\$0.8 M	\$0.8 M	\$0.8 M			0.00%
84	Asset Management	\$0.0 M	\$0.8 M	\$0.8 M	\$0.8 M			0.00%
85	Maintenance and Preservation	\$0.0 M	\$0.8 M	\$0.8 M	\$0.8 M	BEB	SB 09-108	0.00%
86	Administration & Agency Operations	\$0.0 M	\$1.9 M	\$2.0 M	\$2.0 M			1.41%
87	Agency Operations-BTE	\$0.0 M	\$1.9 M	\$2.0 M	\$2.0 M	BEB	SB 09-108	1.41%
88	Debt Service	\$0.0 M	\$48.0 M	\$48.0 M	\$48.0 M			0.00%
89	Debt Service-BTE	\$0.0 M	\$48.0 M	\$48.0 M	\$48.0 M	BEB	FHWA / SH	0.00%
90	TOTAL - BRIDGE & TUNNEL ENTERPRISE	\$0.0 M	\$145.2 M	\$152.9 M	\$152.9 M			

91	COLORADO TRANSPORTATION INVESTMENT OFFICE (CTIO)							
92	Maintenance and Operations	\$0.0 M	\$36.1 M	\$63.6 M	\$63.6 M			76.35%
93	Express Lanes Operations	\$0.0 M	\$36.1 M	\$63.6 M	\$63.6 M	HPTEB	Tolls / Managed Lanes Revenue	76.35%
94	Administration & Agency Operations	\$0.0 M	\$4.1 M	\$4.1 M	\$4.1 M			0.00%
95	Agency Operations-CTIO	\$0.0 M	\$4.1 M	\$4.1 M	\$4.1 M	HPTEB	Fee for Service	0.00%
96	Debt Service	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M			N/A
97	Debt Service-CTIO	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	HPTEB	Fee for Service	N/A
98	TOTAL - COLORADO TRANSPORTATION INVESTMENT OFFICE (CTIO)	\$0.0 M	\$40.1 M	\$67.7 M	\$67.7 M			

99	CLEAN TRANSIT ENTERPRISE							
100	Suballocated Programs	\$0.0 M	\$6.8 M	\$7.7 M	\$7.7 M			12.49%
101	Transit and Multimodal	\$0.0 M	\$6.8 M	\$7.7 M	\$7.7 M			12.49%
102	CTE Projects	\$0.0 M	\$6.8 M	\$7.7 M	\$7.7 M	CTB	SB 21-260	12.49%
103	Administration & Agency Operations	\$0.0 M	\$1.4 M	\$1.4 M	\$1.4 M			0.00%
104	Agency Operations-CTE	\$0.0 M	\$0.6 M	\$0.6 M	\$0.6 M	CTB	SB 21-260	0.00%
105	Contingency Reserve-CTE	\$0.0 M	\$0.8 M	\$0.8 M	\$0.8 M	CTB	SB 21-260	0.00%
106	Debt Service	\$0.0 M	\$0.1 M	\$0.1 M	\$0.1 M			0.00%
107	Debt Service-CTE	\$0.0 M	\$0.1 M	\$0.1 M	\$0.1 M	CTB	SB 21-260	0.00%
108	TOTAL - CLEAN TRANSIT ENTERPRISE	\$0.0 M	\$8.3 M	\$9.1 M	\$9.1 M			

109	NONATTAINMENT AREA AIR POLLUTION MITIGATION ENTERPRISE							
110	Multimodal Services & Electrification	\$0.0 M	\$6.6 M	\$8.3 M	\$8.3 M			24.68%
111	Mobility	\$0.0 M	\$6.6 M	\$8.3 M	\$8.3 M			24.68%
112	NAAPME Projects	\$0.0 M	\$6.6 M	\$8.3 M	\$8.3 M	NAAPMEB	SB 21-260	24.68%
113	Administration & Agency Operations	\$0.0 M	\$0.4 M	\$0.2 M	\$0.2 M			-47.17%
114	Agency Operations-NAAPME	\$0.0 M	\$0.2 M	\$0.2 M	\$0.2 M	NAAPMEB	SB 21-260	-0.76%
115	Contingency Reserve-NAAPME	\$0.0 M	\$0.2 M	\$0.0 M	\$0.0 M	NAAPMEB	SB 21-260	-100.00%
116	Debt Service	\$0.0 M	\$0.1 M	\$0.0 M	\$0.0 M			-100.00%
117	Debt Service-NAAPME	\$0.0 M	\$0.1 M	\$0.0 M	\$0.0 M	NAAPMEB	SB 21-260	-100.00%
118	TOTAL - NONATTAINMENT AREA AIR POLLUTION MITIGATION ENTERPRISE	\$0.0 M	\$7.1 M	\$8.5 M	\$8.5 M			
119	TOTAL - CDOT AND ENTERPRISES	\$181.5 M	\$1,784.0 M	\$1,793.4 M	\$1,974.9 M			

*Roll forward budget is budget from a prior year that hasn't been committed to a project or expended from a cost center prior to the close of the fiscal year. Estimated Roll forward budget will be incorporated prior to finalizing the FY 2024 budget, and updated after the close of FY 2023.



COLORADO

Department of Transportation

FY 2023-24 Budget Workshop: Proposed Annual Budget Allocation Plan



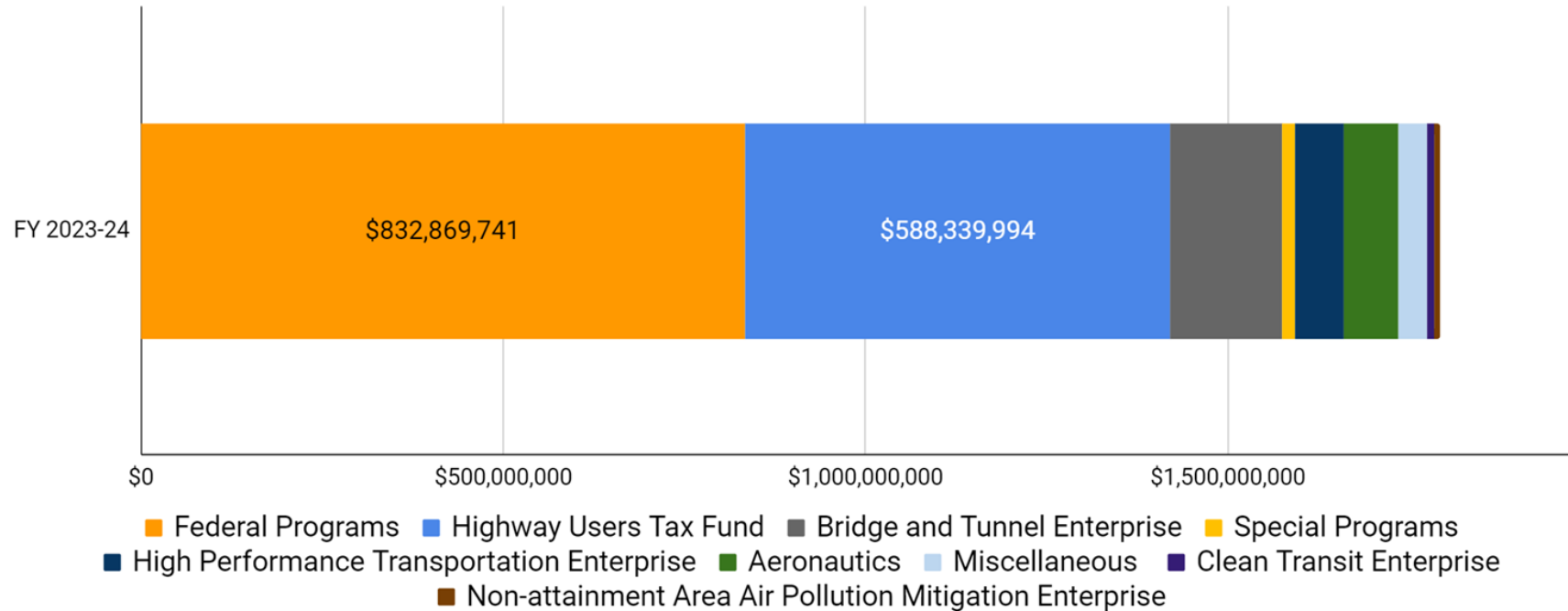
- Proposed FY24 Budget Allocation Plan
 - Final FY24 Sources and Uses of Revenue
 - Narrative and Appendices
- Adjustments to the Proposed Budget
 - Changes Since October
 - Additional Adjustments Coming
- Legislative Budget
- Timeline and Next Steps





FY24 Budget Allocation Plan Sources

FY 2023-24 Sources

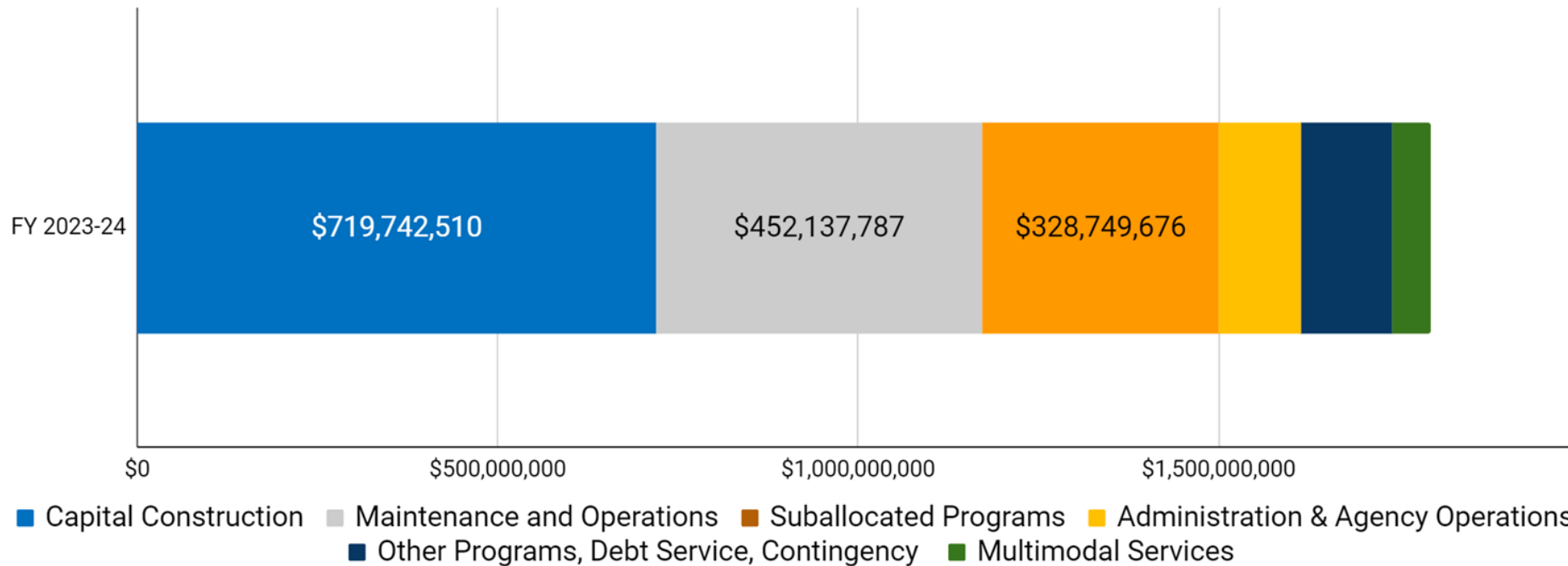


Total -
\$1,793.4 million



FY24 Budget Allocation Plan Uses

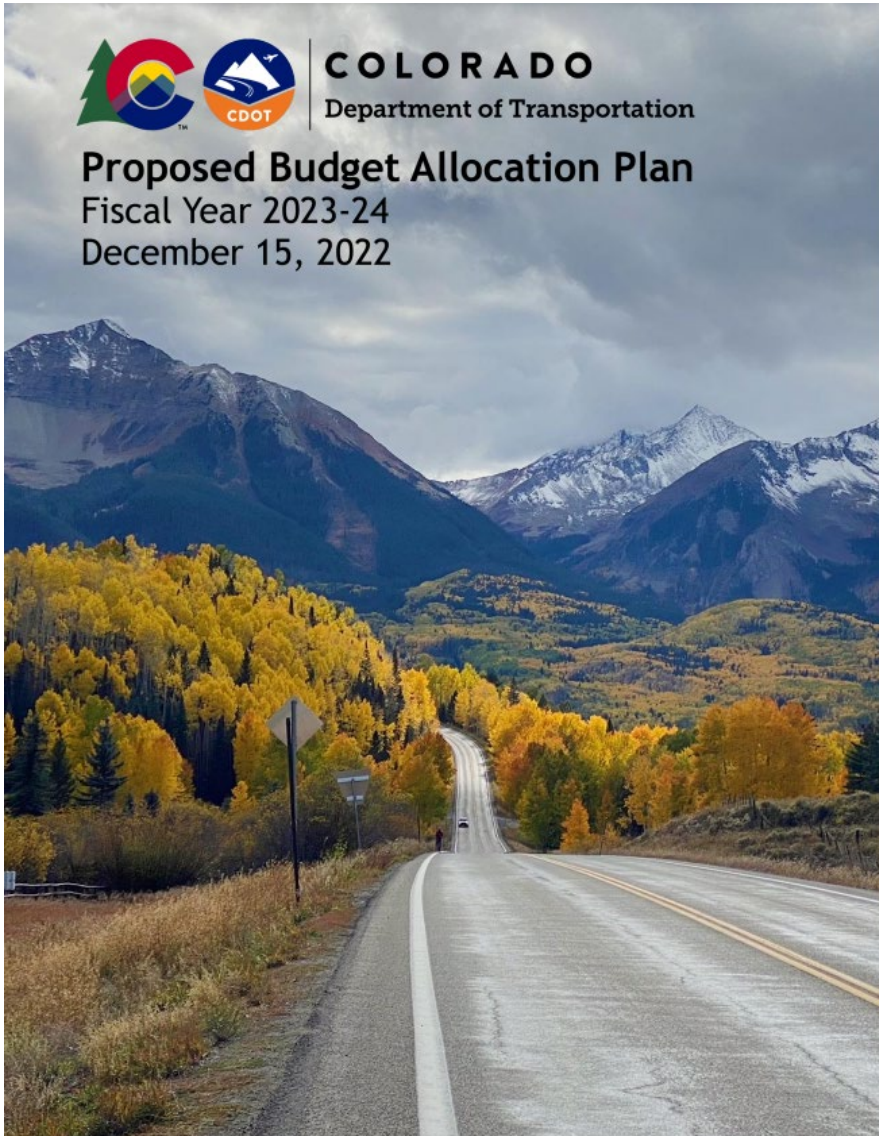
FY 2023-24 Uses



Total -
\$1,793.4 million



Narrative and Other Budget Appendices



Review the Narrative and Appendices on CDOT's Website:

<https://www.codot.gov/business/budget/cdot-budget>

- Appendix A - Revenue Allocation Plan
- Appendix B - Spending Plan
- Appendix C - Open Projects and Unexpended Project Balances
- Appendix D - Planned Projects
- Appendix E - Total Construction Budget
- Appendix F - Project Indirect Costs and Construction Engineering
- Appendix G - CDOT Personnel Report



FY 2023-24 Revenue Allocation Plan

(Appendix A)

FY 2023-24 Revenue Allocation Plan

Line	Budget Category / Program	A. Estimated Rollforward from FY 2022-23*	B. FY 2022-23 Final Allocation Plan	C. FY 2023-24 Proposed Allocation Plan	FY 2023-24 Total Proposed Available Budget (A+C)	Directed By	Funding Source	Year over Year % Change (B vs C)
I. COLORADO DEPARTMENT OF TRANSPORTATION								
2	Capital Construction	\$10.2 M	\$647.9 M	\$617.7 M	\$627.9 M			-4.67%
3	Asset Management	\$0.0 M	\$392.3 M	\$399.4 M	\$399.4 M			1.83%
4	Surface Treatment	\$0.0 M	\$222.6 M	\$222.6 M	\$222.6 M	TC	PHWA / SH / SB 09-108	0.00%
5	Structures	\$0.0 M	\$62.5 M	\$63.3 M	\$63.3 M	TC	PHWA / SH / SB 09-108	1.34%
6	System Operations	\$0.0 M	\$26.9 M	\$26.3 M	\$26.3 M	TC	PHWA / SH	-2.23%
7	Geohazards Mitigation	\$0.0 M	\$10.0 M	\$9.7 M	\$9.7 M	TC	SB 09-108	-3.00%
8	Permanent Water Quality Mitigation	\$0.0 M	\$6.5 M	\$6.5 M	\$6.5 M	TC	PHWA / SH	0.00%
9	Emergency Relief	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	FR	PHWA	0.00%
10	10 Year Plan Projects - Capital AM	\$0.0 M	\$60.9 M	\$68.0 M	\$68.0 M	TC / FR	PHWA	11.66%
11	Safety	\$10.2 M	\$121.6 M	\$106.4 M	\$115.6 M			-13.33%
12	Highway Safety Improvement Program	\$0.0 M	\$39.4 M	\$42.9 M	\$42.9 M	FR	PHWA / SH	8.91%
13	Railway-Highway Crossings Program	\$0.0 M	\$3.6 M	\$3.8 M	\$3.8 M	FR	PHWA / SH	6.14%
14	Hot Spots	\$0.0 M	\$1.2 M	\$1.2 M	\$1.2 M	TC	PHWA / SH	0.00%
15	FASTER Safety	\$10.2 M	\$69.4 M	\$49.3 M	\$59.3 M	TC	SB 09-108	-32.79%
16	ADA Compliance	\$0.0 M	\$7.2 M	\$7.2 M	\$7.2 M	TC	PHWA / SH	0.00%
17	Mobility	\$0.0 M	\$134.1 M	\$112.9 M	\$112.9 M			-15.79%
18	Regional Priority Program	\$0.0 M	\$50.0 M	\$50.0 M	\$50.0 M	TC	PHWA / SH	0.00%
19	10 Year Plan Projects - Capital Mobility	\$0.0 M	\$63.4 M	\$39.0 M	\$39.0 M	SL	PHWA / SB 17-267 / SB 21-260	-38.44%
20	Freight Program	\$0.0 M	\$30.7 M	\$33.9 M	\$33.9 M	FR	PHWA / SH / SL	10.42%
21	Maintenance and Operations	\$0.0 M	\$372.3 M	\$387.8 M	\$387.8 M			4.18%
22	Asset Management	\$0.0 M	\$396.1 M	\$351.1 M	\$351.1 M			-4.48%
23	Maintenance Program Areas	\$0.0 M	\$273.8 M	\$278.0 M	\$278.0 M			1.55%
24	Roadway Surface	\$0.0 M	\$37.7 M	\$39.9 M	\$39.9 M	TC	SH	5.74%
25	Roadside Facilities	\$0.0 M	\$22.8 M	\$23.7 M	\$23.7 M	TC	SH	3.93%
26	Roadside Appearance	\$0.0 M	\$10.8 M	\$9.1 M	\$9.1 M	TC	SH	-15.99%
27	Structure Maintenance	\$0.0 M	\$5.7 M	\$5.3 M	\$5.3 M	TC	SH	-8.26%
28	Tunnel Activities	\$0.0 M	\$6.4 M	\$4.9 M	\$4.9 M	TC	SH	-23.71%
29	Snow and Ice Control	\$0.0 M	\$64.1 M	\$62.8 M	\$62.8 M	TC	SH	-1.49%
30	Traffic Services	\$0.0 M	\$71.9 M	\$73.9 M	\$73.9 M	TC	SH	2.74%
31	Materials, Equipment, and Buildings	\$0.0 M	\$18.2 M	\$20.7 M	\$20.7 M	TC	SH	13.19%
32	Planning and Scheduling	\$0.0 M	\$16.1 M	\$17.7 M	\$17.7 M	TC	SH	9.47%
33	Express Lane Corridor Maintenance and Operations	\$0.0 M	\$11.0 M	\$12.1 M	\$12.1 M	TC	SH	10.00%
34	Property	\$0.0 M	\$27.9 M	\$29.6 M	\$29.6 M	TC	SH	6.14%
35	Capital Equipment	\$0.0 M	\$23.4 M	\$23.4 M	\$23.4 M	TC	SH	0.00%
36	Maintenance Reserve Fund	\$0.0 M	\$0.0 M	\$12.0 M	\$12.0 M	TC	SH	N/A
37	Safety	\$0.0 M	\$12.2 M	\$12.2 M	\$12.2 M	TC	PHWA / SH	0.00%
38	Strategic Safety Program	\$0.0 M	\$12.2 M	\$12.2 M	\$12.2 M	TC	PHWA / SH	0.00%
39	Mobility	\$0.0 M	\$24.0 M	\$24.4 M	\$24.4 M			1.79%
40	Real-Time Traffic Operations	\$0.0 M	\$14.4 M	\$14.4 M	\$14.4 M	TC	SH	0.00%
41	ITS Investments	\$0.0 M	\$10.0 M	\$10.0 M	\$10.0 M	TC	PHWA / SH	0.00%
42	Multimodal Services & Electrification	\$0.0 M	\$55.1 M	\$44.8 M	\$44.8 M			-18.64%
43	Mobility	\$0.0 M	\$55.1 M	\$44.8 M	\$44.8 M			-18.64%
44	Innovative Mobility Programs	\$0.0 M	\$8.9 M	\$9.0 M	\$9.0 M	TC	PHWA / SH	1.14%
45	National Electric Vehicle Program	\$0.0 M	\$11.3 M	\$14.2 M	\$14.2 M	FR	PHWA	28.64%
46	10 Year Plan Projects - Multimodal	\$0.0 M	\$17.2 M	\$11.9 M	\$11.9 M	TC	PHWA / SB 17-267, SB 21-260	-30.85%
47	Rail Commission	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M	SL		0.00%
48	Burton	\$0.0 M	\$8.8 M	\$9.1 M	\$9.4 M	TC	SB 09-108 / Here Rev / SB 21-26	6.20%
49	Suballocated Programs	\$0.0 M	\$372.2 M	\$321.1 M	\$321.1 M			-13.97%
50	Aeronautics	\$0.0 M	\$35.3 M	\$74.6 M	\$74.6 M			111.65%
51	Aviation System Program	\$0.0 M	\$35.3 M	\$74.6 M	\$74.6 M	AB	SA	111.65%
52	Highway	\$0.0 M	\$143.9 M	\$151.9 M	\$151.9 M			5.58%
53	STBG-Urban (STP-Metro)	\$0.0 M	\$61.9 M	\$66.0 M	\$66.0 M	FR	PHWA / LOC	6.66%
54	Congestion Mitigation and Air Quality	\$0.0 M	\$51.7 M	\$52.8 M	\$52.8 M	FR	PHWA / LOC	2.00%
55	Metropolitan Planning	\$0.0 M	\$10.7 M	\$10.7 M	\$10.7 M	FR	PHWA / FTA / LOC	0.00%
56	Off-System Bridge Program	\$0.0 M	\$19.5 M	\$22.4 M	\$22.4 M	TC / FR	PHWA / SH / LOC	14.81%
57	Transit and Multimodal	\$0.0 M	\$184.1 M	\$84.6 M	\$84.6 M			-51.37%
58	Recreational Trails	\$0.0 M	\$1.6 M	\$1.6 M	\$1.6 M	FR	PHWA	0.00%
59	Safe Routes to School	\$0.0 M	\$3.1 M	\$3.1 M	\$3.1 M	TC	PHWA / LOC	0.00%
60	Transportation Alternatives Program	\$0.0 M	\$20.0 M	\$21.6 M	\$21.6 M	FR	PHWA / LOC	8.00%
61	Transit Open Programs	\$0.0 M	\$24.9 M	\$23.2 M	\$23.2 M	FR / SL / TC	FTA / LOC / SB 09-108	-6.89%
62	Multimodal Options Program - Local	\$0.0 M	\$27.6 M	\$6.3 M	\$6.3 M	SL	SB 21-260	-77.26%
63	Carbon Reduction Program - Local	\$0.0 M	\$9.5 M	\$9.6 M	\$9.6 M	FR	PHWA / LOC	2.00%
64	Revitalizing Main Streets Program	\$0.0 M	\$0.7 M	\$0.0 M	\$0.0 M	SL / TC	SB 21-260	-100.00%
65	Administration & Agency Operations	\$0.0 M	\$106.3 M	\$107.4 M	\$107.4 M			2.07%
66	Agency Operations	\$0.0 M	\$59.7 M	\$59.7 M	\$59.7 M	TC / AB	PHWA / SH / SA / SB 09-108	0.00%
67	Administration	\$0.0 M	\$42.9 M	\$45.1 M	\$45.1 M	SL	SH	5.09%
68	Project Initiatives	\$0.0 M	\$14.6 M	\$14.6 M	\$14.6 M	TC	SH	0.00%
69	Debt Service	\$171.3 M	\$0.0 M	\$29.0 M	\$296.4 M			N/A
70	Debt Service	\$171.3 M	\$0.0 M	\$29.0 M	\$200.4 M	DS	SH	N/A
71	Contingency Reserve	\$0.0 M	\$0.0 M	\$13.3 M	\$13.3 M			N/A
72	Contingency Fund	\$0.0 M	\$0.0 M	\$13.3 M	\$13.3 M	TC	PHWA / SH	N/A
73	Commission Reserve Funds	\$0.0 M	\$0.0 M	\$0.0 M	\$0.0 M			N/A
74	Other Programs	\$0.0 M	\$19.5 M	\$24.3 M	\$24.3 M			24.52%
75	Safety Education	\$0.0 M	\$14.1 M	\$13.7 M	\$13.7 M	TC/FR	NHTSA / SEE	-14.25%
76	Planning and Research	\$0.0 M	\$15.1 M	\$17.4 M	\$17.4 M	FR	PHWA / SH	14.80%
77	State Infrastructure Bank	\$0.0 M	\$0.3 M	\$1.1 M	\$1.1 M	TC	SB	279.43%
78	TOTAL - CDOT	\$181.5 M	\$1,583.3 M	\$1,565.3 M	\$1,796.8 M			

- Balanced using September 2022 revenue forecast
- Flexible revenue allocated based on FY23 budget amounts adopted by TC in March 2022 (and subsequently amended), with some adjustments to balance
- Inflexible revenue automatically adjusted based on FY24 revenue forecast
- Asset Management and Maintenance programs funded according to the FY24 Asset Management Planning Totals, approved by the TC in November 2019.
- The FY24 Revenue Allocation Plan reflects:
 - \$1,555.2 million for CDOT programs
 - \$238.2 million for transportation enterprises
 - \$1,793.4 million total for FY24



FY 2023-24 Spending Plan (Appendix B)

Department of Transportation - FY 2023-24 Spending Plan
Last updated November 2022

Projected Cash Balance	\$ 2,225.5M
Projected FY24 Revenue	\$ 1,553.0M
Projected FY24 Receivables	\$ 150.0M
Total Projected - CDOT	\$ 3,928.5M

Line	Budget Category / Program	FY 2023-24 Projected Expenditures	% Spent
1	COLORADO DEPARTMENT OF		
2	Capital Construction	\$ 1193.6M	0.00%
3	Pre-Construction Activities	\$ 170.5M	0.00%
4	Right of Way	\$ 30.1M	0.00%
5	Acquisitions	\$ 13.7M	0.00%
6	Personal Services	\$.8M	0.00%
7	Professional Services	\$ 1.1M	0.00%
8	Other	\$ 14.7M	0.00%
9	Design and Other Pre-Construction Activities	\$ 140.4M	0.00%
10	Professional Services	\$ 108.4M	0.00%
11	Personal Services	\$ 18.7M	0.00%
12	Other	\$ 13.3M	0.00%
13	Construction Activities	\$ 826.7M	0.00%
14	Contractor Payments	\$ 800.0M	0.00%
15	Professional Services	\$ 19.4M	0.00%
16	Personal Services	\$ 2.3M	0.00%
17	Other	\$ 5.0M	0.00%
18	Other Capital Project Activities	\$ 196.4M	0.00%
19	Indirect Allocations	\$ 105.3M	0.00%
20	Construction Engineering Allocations	\$ 91.1M	0.00%
21	Maintenance and Operations	\$ 344.7M	0.00%
22	Personal Services	\$ 162.4M	0.00%
23	Operating	\$ 137.3M	0.00%
24	Capital	\$ 6.5M	0.00%
25	Property	\$ 17.1M	0.00%
26	Capital Equipment	\$ 21.5M	0.00%
27	Multimodal Services, Non Construction	\$ 61.7M	0.00%
28	Personal Services	\$ 6.3M	0.00%
29	Operating	\$ 53.1M	0.00%
30	Capital	\$ 2.3M	0.00%
31	Suballocated Programs	\$ 240.6M	0.00%
32	Aeronautics	\$ 35.5M	0.00%
33	Payments to Local Governments	\$ 205.1M	0.00%
34	Administration & Agency Operations	\$ 107.5M	0.00%
35	Personal Services	\$ 39.1M	0.00%
36	Operating	\$ 49.4M	0.00%
37	Capital	\$ 19.1M	0.00%
38	Debt Service	\$ 123.3M	0.00%
39	Debt Service	\$ 123.3M	0.00%
40	Other Programs, Non Construction	\$ 20.3M	0.00%
41	Personal Services	\$ 7.2M	0.00%
42	Operating	\$ 6.5M	0.00%
43	Capital	\$.1M	0.00%
44	Studies (Non-construction Activities) (DTD)	\$ 6.7M	0.00%
45	Total Projected - CDOT	\$ 2,091.4M	0.00%

Line	Budget Category / Program	Projected	% Spent
46	COLORADO BRIDGE & TUNNEL ENTERPRISE		
	Projected Cash Balance	\$ 181.3M	
	Projected FY24 Revenue	\$ 152.9M	
	Total Projected - CBTE	\$ 334.2M	
47	Capital Construction		
48	Asset Management		
49	Bridge Enterprise Projects-CBTE	\$ 178.1M	0.00%
50	Maintenance and Operations		
51	Asset Management		
52	Maintenance and Preservation-CBTE	\$.8M	0.00%
53	Administration & Agency Operations		
54	Agency Operations-CBTE	\$ 14M	0.00%
55	Debt Service		
56	Debt Service-CBTE	\$ 48.7M	0.00%
57	Total CBTE	\$ 229.0M	0.00%
58	COLORADO TRANSPORTATION INVESTMENT OFFICE		
	Projected Cash Balance	\$ 80.6M	
	Projected FY24 Revenue	\$ 67.7M	
	Total Projected - CTIO	\$ 148.3M	
59	Maintenance and Operations		
60	Express Lanes Operations	\$ 8.4M	0.00%
61	Administration & Agency Operations		
62	Agency Operations	\$ 5.5M	0.00%
63	Debt Service		
64	Debt Service	\$ 9.8M	0.00%
65	Total CTIO	\$ 23.7M	0.00%

Line	Budget Category / Program	Projected	% Spent
66	CLEAN TRANSIT ENTERPRISE		
	Projected Cash Balance	\$ 7M	
	Projected FY24 Revenue	\$ 9.1M	
	Total Projected - CTE	\$ 16.1M	
67	Suballocated Programs		
68	CTE Projects	\$ 7.7M	0.00%
69	Administration & Agency Operations		
70	Agency Operations-CTE	\$ 0.6M	0.00%
	Contingency Reserve-CTE	\$ 0.8M	0.00%
71	Debt Service		
72	Debt Service-CTE	\$ 0.0M	0.00%
73	Total - CTE	\$ 9.1M	0.00%
74	NONATTAINMENT AREA AIR POLLUTION MITIGATION ENTERPRISE		
	Projected Cash Balance	\$ 6.9M	
	Projected FY24 Revenue	\$ 8.5M	
	Total Projected - NAAPME	\$ 15.4M	
75	Multimodal Services & Electrification		
76	NAAPME Projects	\$ 6.5M	0.00%
77	Administration & Agency Operations		
78	Agency Operations - Nonattainment	\$ 0.2M	0.00%
	Contingency Reserve-NAAPME	\$ 0.0M	0.00%
79	Debt Service		
80	Debt Service-NAAPME	\$ 0.0M	0.00%
81	TOTAL - NAAPME	\$ 6.7M	0.00%
82	TOTAL - CDOT AND ENTERPRISES	\$ 2,359.9M	0.00%

Total estimated expenditures in FY 2023-24, \$2,359.9 M:

- CDOT: \$2,091.4 million
- BE: \$229.0 million
- HPTE: \$23.7 million
- Clean Transit: \$9.1 million
- Nonattainment Enterprise: \$6.7 million



Changes Since October 2022

Changes made since October TC Meeting:

- **MMOF** - revenue adjustment resulted in a reduction of \$56.0M for FY24 (\$105.7M General Fund transfer received in FY23 per SB 21-260, \$0 General Fund for FY24)
 - Total revenue forecasted for MMOF for FY24 is \$7.4M in retail delivery fee revenue
 - CDOT Share of MMOF (\$1.1M) moved to Bustang in Line 48
 - MMOF Local Share in Line 62
- **10 Year Plan Projects:** Total FY24 revenue allocated to 10 Year Plan Projects is now \$118.9M
 - 10% is placed in the 10 Year Plan Projects - Multimodal line 46
- **Administration** line 67 updated to reflect statewide common policies submitted with Governor's November 1 Budget
 - see slide 11 for more info on CDOT's legislative budget request
- **Contingency Fund**, Line 72, reduced from \$15.0M to \$13.3M to address statewide common policies
 - Additional adjustments may be proposed during the budget setting process



Explanation of Year Over Year Changes

Line#	Budget Line	\$ Change from FY23	% Change from FY23	Explanation
15	FASTER Safety	(\$19.9 M)	(28.79%)	Senate Bill 21-260 and HB 22-1351 temporarily reduced the Road Safety Surcharge fee for two years, resulting in a projected revenue shortfall of approximately \$10.2M for FY24. HB 22-1351 provided \$10.2M General Fund to backfill the lost revenue in FY23, and the funds are anticipated to roll forward to FY24 so the total available budget for FASTER Safety will be \$59.5M.
19	10 Year Plan Projects - Capital Mobility	(\$24.4 M)	(38.44%)	Any remaining flexible FHWA funds are placed in this line for 10 Year Plan Projects in FY24. Also 10% of the total allocation for 10 Year Plan Projects (\$11.9M) was moved to the 10 Year Plan Projects - Multimodal line based on a previously established target that at least 10% of 10-Year Plan funding go to transit/multimodal projects. Collectively total 10-Year Plan project funds in the FY 2023-24 budget are consistent with prior projections and the four-year estimated total of \$1.3 billion between FY 2022-23 and FY 2025-26.
45	National Electric Vehicle Program	\$3.2 M	28.64%	The FHWA apportionment for NEVI increased for FY24 to account for a one-time reduction to the apportionment in FY22 for administrative costs. Also, staff increased the allocation to account for estimated local match beginning in FY24.
46	10 Year Plan Projects - Multimodal	(\$5.3 M)	(30.98%)	The CDOT portion of the Multimodal Transportation and Mitigation Options Fund (MMOF) was moved to Bustang (\$1.1M). This line now reflects 10% of the total allocation to 10 Year Plan Projects in the FY24 Budget.
51	Aviation System Program	\$39.3 M	111.65%	The Division of Aeronautics is forecasting record jet fuel sales and use tax revenue for FY24 resulting from high prices of jet fuel.
62	Multimodal Options Program - Local	(\$91.3 M)	(93.56%)	In addition to retail delivery fee revenue, the MMOF received a one-time General Fund transfer of \$105.7M in FY23 related to the state excess revenue cap, pursuant to SB260. For FY24, staff is forecasting \$7.4M in retail delivery fee revenue to the MMOF, of which 85% is the local share.
64	Revitalizing Main Streets Program	(\$0.7 M)	(100.00%)	Revitalizing Main Streets received a one-time General Fund transfer of \$6.9M in FY23 related to the state excess revenue cap, pursuant to SB260. For FY24, the program is not anticipated to receive new revenue. Annual General Fund transfers for this program are anticipated to resume in FY25.
77	State Infrastructure Bank	\$0.8 M	273.43%	Staff is forecasting higher interest earnings for the SIB program in FY24 attributable to the higher available balance in the SIB account and higher interest rates.



Additional Adjustments Coming

Still to come....

- **Decision items** - Per PD 703.0, requests of less than \$1 million are reviewed and subject to approval by the Executive Management Team (EMT), while decision items of \$1 million or greater are reviewed by the EMT and then forwarded to the TC for consideration, with final approval with the Final Annual Budget Allocation Plan in March 2023. The TC will have an opportunity to review any potential decision item requests during the February 2023 Budget Workshop, prior to the March adoption of the Final FY 2023-24 Annual Budget Allocation Plan.
- **Administration Budget (Line 67)** - Legislative and Office of State Planning & Budget (OSPB) actions during the budget-building cycle may require changes in Administration spending for CDOT. There will likely be additional adjustments throughout the legislative budget process and the Administration line will be updated accordingly.
- **Maintenance Reserve and Contingency Funds (Lines 36 and 72)** - The Proposed Budget reflects the full historical allocation of \$12.0 million to the Maintenance Reserve Fund (Line 36) and \$13.3 million to the Contingency Fund (Line 72). These allocations may be reduced for the Final Budget if additional funds are needed for statewide common policies or other critical initiatives, or to increase funds available for the 10 Year Plan.
- **Other potential changes**, including updates after the next revenue forecast in December 2022.



CDOT's Capital Requests: \$3.96 million

- **Vail Pass Snow Supporting Structures** - Snow fencing for avalanche defense at the Narrows avalanche path on Vail Pass.
- **EJMT West Portal Avalanche System Upgrade and Redeployment** - Replace 8 Obellx gas exploders above the Eisenhower Johnson Memorial Tunnel (EJMT) with a motorized tramway to deliver ordinance to release avalanches and redeploy the 8 Obellx gas exploders for avalanche mitigation.

Statewide Decision Items: \$2.32 million (CDOT Share)

Four Office of Information Technology (OIT) requests and three Department of Personnel and Administration requests for cybersecurity defense, myColorado expansion, IT asset management, data governance, to transfer Performance Budgeting to DPA, and the annual fleet request.



Timeline and Next Steps

After November, DAF will continue to address the following items for the FY 2023-24 Annual Budget:

- January 2023: The Annual Budget Allocation Plan may be updated to reflect the most current revenue forecast (December 2022).
- February 2023: The TC will be asked to review and approve any decision items of \$1 million or more, and additional changes as necessary.
- March 2023: The TC will be asked to review and adopt the FY 2023-24 Final Annual Budget Allocation Plan.





DATE: Nov. 16, 2022
TO: Colorado Transportation Commission
FROM: Rebecca White, Director, Division of Transportation Development
William Johnson, Performance and Asset Management Branch Manager
Toby Manthey, Asset Management Program Manager
SUBJECT: CDOT 2022 Transportation Asset Management Plan

Purpose

This memorandum describes CDOT's 2022 Transportation Asset Management Plan.

Action

Informational.

Background

Pursuant to 23 CFR 515.9, the Federal Highway Administration (FHWA) requires all state Departments of Transportation (DOTs) to produce a 10-year Transportation Asset Management Plan (TAMP) for pavement and bridges on the National Highway System every four years. CDOT submitted a plan meeting these conditions to FHWA in July 2022. The Department's previous asset-management plan was approved by FHWA in 2019.

Per federal statute, the TAMP must include elements such as an overall asset management objective; performance measures and targets (including those for NHS pavement and bridges); a summary description of the condition of all NHS pavement and bridges in the state; identification of gaps between performance and targets; life-cycle planning; risk-management analyses; a financial plan; and investment strategies. Additionally, state DOTs must report to FHWA each year on TAMP implementation.

While FHWA requires the TAMPs to include pavement and bridges, these are not CDOT's only asset classes. The Department is one of the few DOTs to go beyond FHWA's basic requirements by developing a TAMP that includes not just pavement and bridges, but all 12 asset classes in CDOT's Transportation Asset Management (TAM) program. The November packet for the Transportation Commission contains this expanded TAMP, which will be submitted to FHWA in November/December 2022.

Details

CDOT's TAM program focuses on asset preservation and replacement and does not fund projects that increase the capacity of Colorado's transportation system. The program's core organizational structure and responsibilities are memorialized in the Commission's Policy Directive 1609.0.

CDOT's expanded 2022 TAMP is designed to:

- Describe the TAM program—its inventories, asset conditions, life-cycle approaches, performance measures, targets, risk-mitigation strategies, and more—in an understandable way for FHWA, CDOT staff (including the Regions), the public, and other transportation stakeholders.
- Memorialize the processes of the TAM program, such as the process to establish planning budgets and develop treatment lists for CDOT's major asset classes.



- Provide a strategy for investing additional revenue in the TAM program, should such opportunities arise. This strategy focuses primarily on achieving the Commission’s performance targets in Policy Directive 14, and secondarily on eliminating any backlog of assets in “poor” condition.

Next Steps

- Staff will finalize the 2022 Transportation Asset Management Plan and submit it to FHWA in November/December 2022.

Attachments

- 2022 Transportation Asset Management Plan
- Asset Management Plan Presentation





COLORADO

Department of Transportation

2022 Transportation Asset Management Plan

Nov. 16, 2022
Page 46 of 532



Agenda

- **Transportation Asset Management (TAM) program overview**
- **2022 Transportation Asset Management Plan (TAMP)**
 - Required plan (NHS pavement and bridges)
 - Ancillary asset plans

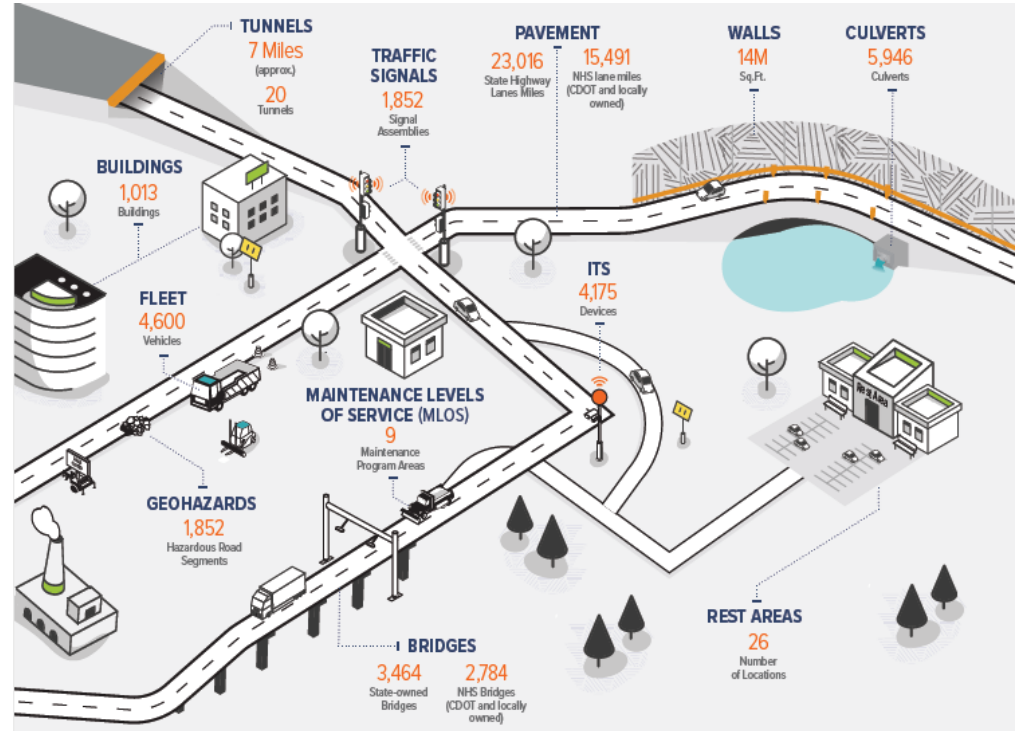




CDOT's TAM Program

Transportation Asset Management (TAM) Program

- 12 Asset Classes
- Created in 2012.
- Annual budget of about \$790 million, (including MLOS and Bridge and Tunnel Enterprise).
- PD 1609.0 governs TAM program.
- PD 14.0 contains TC performance measures and targets for each asset class.





TAMP Development

Update to federally required Transportation Asset Management Plan (TAMP)

- Previous plan approved in 2019.
- Submitted required elements to FHWA in July.
- Submitting expanded plan in November.

Federal Minimum Requirements (23 CFR 515):

- NHS pavement & bridge condition
- Asset management objectives/metrics
- Performance gaps
- Life-cycle planning
- Risk-management analysis
- Financial plan, minimum 10 years
- Investment strategies
- Must develop and implement

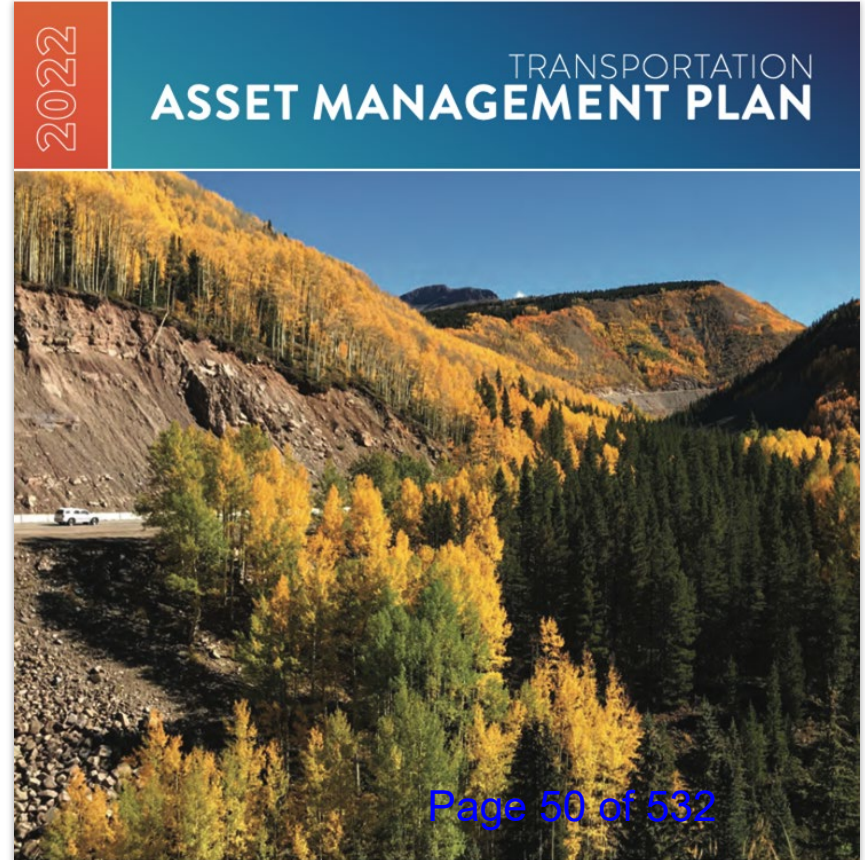




Plan Overview

2022 TAMP:

- Exceeds FHWA requirements by including 12 asset classes vs. required two.
- Designed to memorialize CDOT's business practices.
- Built in a modular fashion.
- Graphical Executive Summary





Executive Summary

Executive Summary:

- Gives a quick, *graphical* look at:
 - What we do
 - Asset performance vs. targets
 - Asset-management process
 - Top risks
 - Future improvements
 - Letter from the Executive Director



WHERE WE ARE AND WHAT WE DO

CDOT's Transportation Asset Management (TAM) program includes 12 asset programs, including pavement, bridges and many more. Each program is vital to achieving CDOT's mission of providing the best multimodal transportation system that effectively and safely moves people, goods, and information. The programs also advance asset management goals by preserving infrastructure condition at a least life-cycle cost. **Figure ES-1** illustrates the function and number of assets in each program, and the text that follows describes the benefits of each asset type.

Figure ES-1 Summary of CDOT's Assets





Ch. 1: Introduction

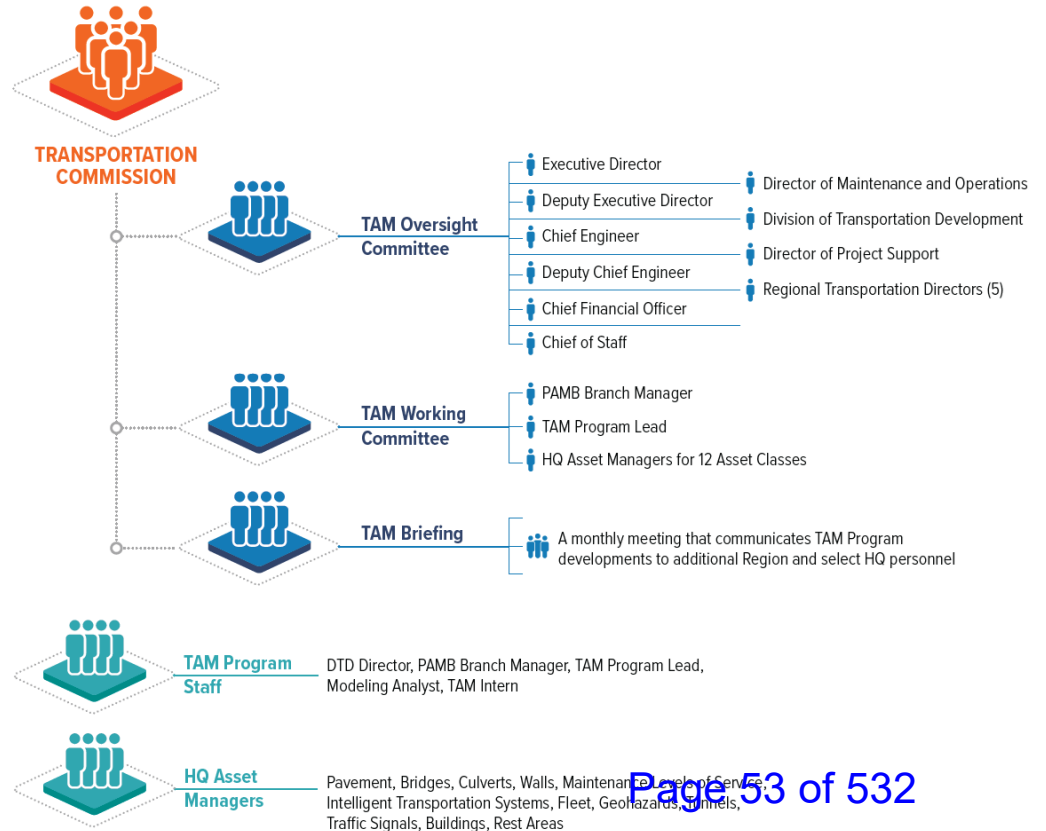
- TAMP Vision
- Improvements since 2019
- Overview of TAMP

IMPROVED AREA	OUTCOME ACHIEVED
<p>The Transportation Commission reaffirmed and adopted PD 14.0 in November 2020, with revised performance measures and objectives.</p>	<p>Linking performance management across the areas of safety, asset management, and mobility in accordance with MAP-21.</p>
<p>CDOT has moved the Resilience Program to within the Performance and Asset Management Branch (PAMB).</p>	<p>Improved integration of risk, resilience, performance, and asset management.</p>
<p>CDOT has improved and expanded its asset management practices, including expanding documentation of treatment types to include additional asset classes, advancing asset modeling capabilities, and refining the Pavement National Performance Measure model.</p>	<p>Enhanced life-cycle planning analysis and forecasting of pavement National Performance Measures.</p>
<p>CDOT has updated its budget-setting process. This includes separating it from a larger program meeting and providing the Oversight Committee with "scenarios" - potential budget distributions for each asset.</p>	<p>The TAM Oversight Committee has more explicit budget requests so the committee knows exactly what each asset class is asking for, how the money will be used, and what they would use the money for.</p>
<p>Addition of Regional Transportation Directors to the TAM Oversight Committee.</p>	<p>Increased effectiveness and understanding of delivering investment strategies.</p>
<p>CDOT has implemented additional engagement processes with local planning partners responsible for the National Highway System and broader transportation network.</p>	<p>Improved communication and support to improve asset management practice throughout Colorado.</p>
<p>The Transportation Commission adopted PD 1609.0 in January 2021, as the primary asset management policy directive.</p>	<p>Created clearly defined TAM Program principles, functions, and processes. This includes a) listing planning budgets and treatment lists.</p>



Ch. 2: TAM at CDOT

- Organizational structure and governance
- Relationship to other planning processes
- Planning partner responsibilities





Ch. 3: Performance Management

- Chapter describes current asset performance vs. targets.
- Includes internal measures (PD-14) and FHWA's national performance measures (NPMs).
- Also describes safety and mobility NPMs, as well as air-quality efforts.

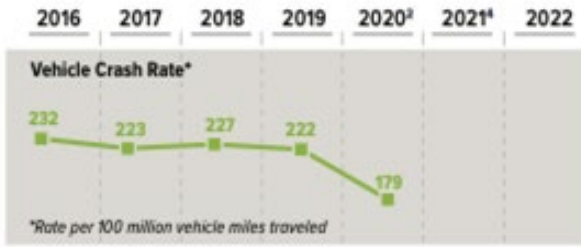


Table 1 Asset Management Performance Targets Per PD 14.0

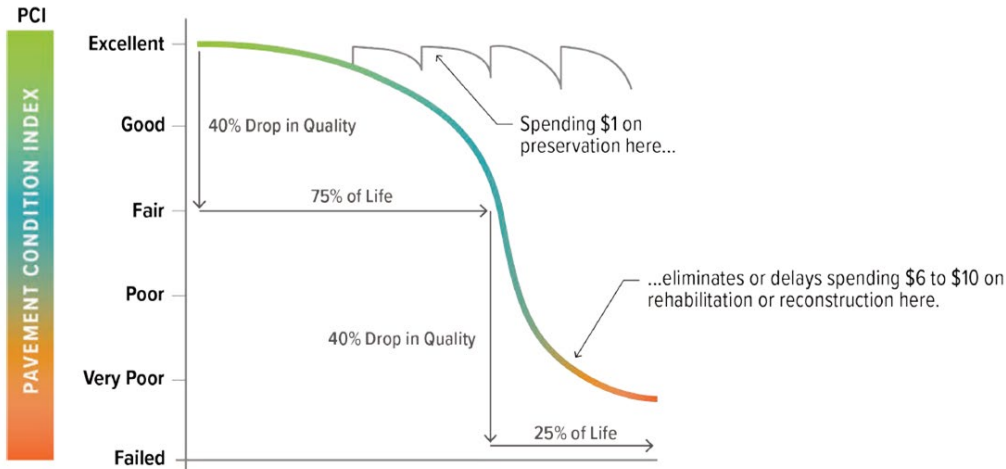
Asset Class	Unit	2021 Inventory	PD 14.0 Performance Measure	Target	2021 Performance (unless stated)
Pavements	Lane Miles	23,016	Percent with high or moderate Drivability Life	80%	All 2020: 89% Interstate, 82% NHS, 79% State Highway System
Bridges	Number of State-Owned Bridges	3,464	Percent deck area on NHS and State Highway System in good condition, and percent deck area in poor condition. ¹	40% or > in good condition 10% or < in poor condition	37.3% NHS, 37.1% State Highway System 5.1 % NHS, 5.6% State Highway System
Maintenance Levels of Service (MLOS)	N/A	N/A	Level of Service for State Highway System	MLOS B- grade	C-
Buildings	Number of Buildings	1,013 (2020)	Average Statewide Letter Grade	85% C or better	49% Graded C or Better
ITS	Number of Devices	4,175 (approx.)	Average percent of life expended	90% or below	70%
Fleet	Number of Vehicles	4,600 (approx.)	Average percent of life expended	75% or below	69%



Chapters 4 & 5: Inventory/Condition & Life-Cycle Planning

- How we achieve our state of good repair at the lowest life-cycle cost
 - Treatment strategies
 - AIMS modeling
 - Project selection process
- Budget-setting process

Benefits of Pavement Preservation



Pavement Project-Selection Process





Chapter 6: Risk and Resilience 1 / 2

Chapter identifies and scores threats and mitigation strategies.

This chapters identifies risks to CDOT as a whole, as well as to pavement and bridges.

Top **enterprise** threats include:

1. Flood
2. Post-Fire Debris Flow
3. Funding Uncertainty
4. Geohazards
5. Cost Uncertainty
6. Fire
7. Missing NPM Targets

(continued next slide)

Threat/ Opportunity	Risk Management Strategy
Flood	Treat by implementing design standards; following agency continuity of operations plan; maintaining incident command center management structure; maintaining an Office of Emergency Management (OEM).
Post-Fire Debris Flow	Treat by maintaining an office of OEM. Maintenance landscaping, erosion control, jersey barriers and other practices.
Funding Uncertainty (positive and negative)	Tolerate/take advantage of—manage on per event basis.
Geohazards	Treat by implementing the geohazards management program and robust geohazards-management plan.
Cost Uncertainty	Treat by bid process (e.g., bid rejection), re-scoping projects, price hedging, and by hedging materials; then tolerate.
Fire	Tolerate in the case of wildfires; and treat by tunnel fire-suppression systems and bridge-design standards, etc.
Missing Infrastructure Targets for National Performance Measure	Treat by implementing formal asset management program.



Chapter 6: Risk and Resilience 2/2

Top enterprise threats (cont.)

- 8. Snow (Avalanche)
- 9. Cybersecurity
- 10. Staffing: Attrition

Threat/ Opportunity	Risk Management Strategy
Snow (Avalanche)	Treat. Maintain a Winter Operations Program.
Cybersecurity	Transfer to Governor's Office of Information Technology. Treat by maintaining firewalls; virus protection software; training employees on cybersecurity.
Staffing: Attrition	Treat by documenting policies and procedures.

Plan describes risk initiatives throughout Department, including at program level (e.g., Geohazards study on climate change).

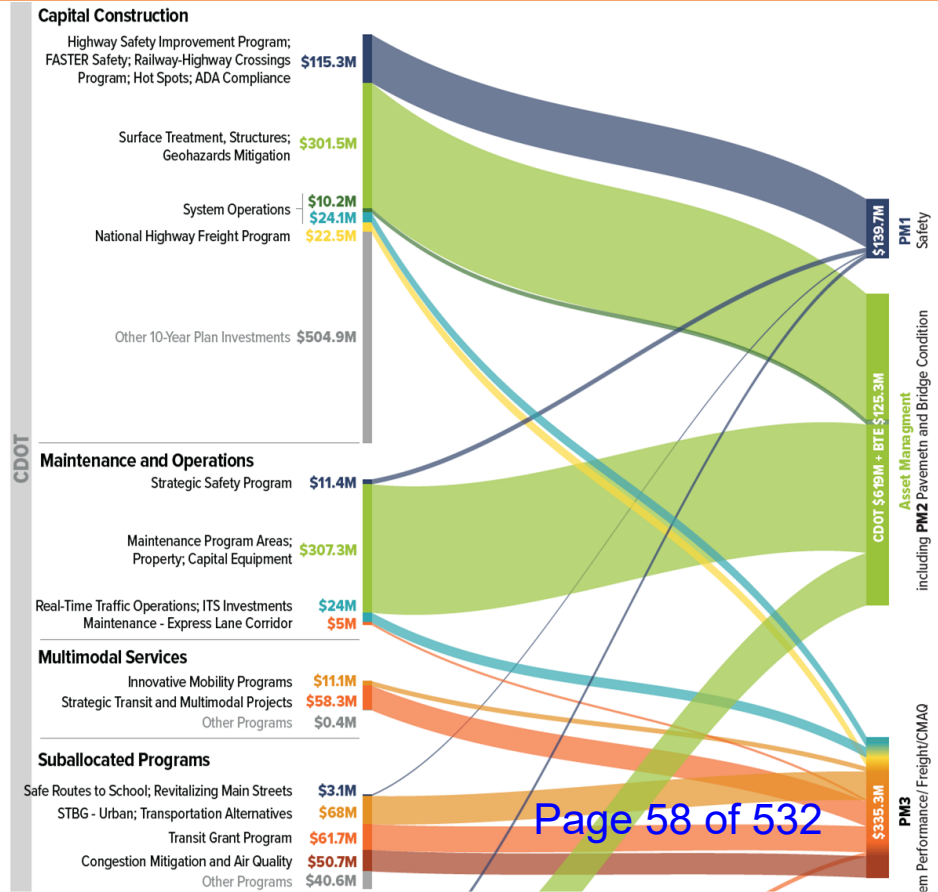
Table 15 CDOT's Risk-Management Levels, Responsible Parties, and Risk Management Initiatives

Level	Responsibility	CDOT Risk Management Initiatives
Program	Program Managers	<p>Enterprise Risk Register (Programmatic, Business Line Risks)—Documented list of risks that affect CDOT's ability to deliver projects and meet targets within a program (but not related to a specific project).</p> <p>Changing Climate and Extreme Weather Impacts on Geohazards in Colorado—An assessment of how extreme weather and climate change may affect geohazard impacts through changes to their frequency and magnitude.</p> <p>Asset Class-Specific Risk Register—Documented list of risks that specifically affect one of CDOT's 12 asset classes.</p> <p>4 R Framework for Identifying and Evaluating Resiliency in Transportation System Assets and Organizations—Details the "4 R Principle" framework used to evaluate resiliency in transportation systems. The document provides examples of both a resilient organization and asset.</p>



Ch. 7: Financial Plan

- Links \$\$\$ to performance
 - Lists revenue sources
 - Recent distribution to asset classes
- 10-Year Plan for Investment
 - Investment alignment with 10-Year Plan
- Asset Valuation
- Crosswalks CDOT's budget categories with federal performance areas





Ch. 8: Investment Strategies

Chapter describes our investment strategies for pavement and bridges, shown through forecasted distribution among five work types that align with our life-cycle planning:

1. Maintenance
2. Preservation
3. Rehabilitation
4. Reconstruction
5. Initial Construction
(Estimating new construction remains a work in progress. Figures are averages of the early years of the 10-Year Plan.)

Table 18 *Pavement Investment Strategy FY 2022–31 (in Millions)*

Work Type	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
Maintenance*	\$40.4	\$41.6	\$40.7	\$41.9	\$43.2	\$44.5	\$45.8	\$47.2	\$48.6	\$50.1
Preservation	\$6.94	\$28.99	\$14.09	\$7.30	\$33.02	\$27.44	\$32.15	\$24.51	\$22.29	\$22.29
Rehabilitation	\$217.66	\$196.62	\$208.85	\$221.70	\$195.98	\$201.56	\$196.85	\$204.49	\$206.71	\$206.71
Reconstruction	N/A	42.67	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Initial Construction	\$118.7	\$118.7	\$118.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	\$383.7	\$385.91	\$385.01	\$270.9	\$272.2	\$273.5	\$274.8	\$276.2	\$277.6	\$279.1

Table 19 *Bridge Investment Strategy, FY 2022–31 (in Millions)*

Work Type	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
Maintenance*	\$5.4	\$5.2	\$5.0	\$5.1	\$5.3	\$5.4	\$5.6	\$5.8	\$5.9	\$6.3
Preservation	\$19.39	\$22.15	\$22.96	\$16.76	\$19.08	\$20.92	\$24.20	\$38.15	\$38.30	\$31.88
Rehabilitation	\$7.02	\$15.15	\$15.34	\$21.54	\$1.73	\$0	\$20.08	\$0.15	\$33.12	\$32.39
Reconstruction	\$108.65	\$54.24	\$86.17	\$84.90	\$134.61	\$93.81	\$110.27	\$121.38	\$90.95	\$102.69
Initial Construction	\$93.2	\$93.2	\$93.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	\$233.3	\$189.94	\$222.67	\$128.30	\$160.72	\$120.13	\$160.15	\$165.48	\$168.27	\$173.26



Ch. 9: Performance-Gap Analysis

From here to there:

- Analysis of delta between current condition, forecasted condition, and target condition
- Compares estimated cost to achieve both federal and CDOT targets versus expected revenue

Traffic Signals Forecast

The anticipated annual budget of \$8.2 million will not meet the performance target of ensuring that less than 2 percent of traffic signals are in severe condition. The annual cost of meeting the target by 2031 is about \$18.2 million, or an additional \$10 million per year.





Chapter 10: Future Improvements

Chapter describes future improvements, such as:

- Tracking delivery of asset treatments through program-delivery software.
- Improving tradeoff analyses, including optimized cross-asset allocation.
- Improved life-cycle analysis/planning in asset models for forecasting and optimized treatment recommendations.

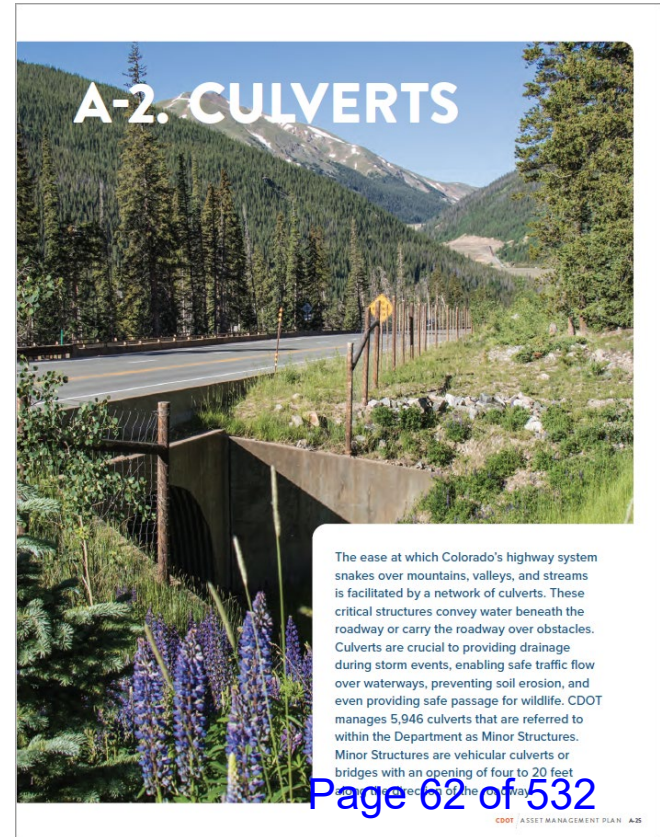
Figure 37 Future Improvement Areas

	IMPROVEMENT AREA	OUTCOME ACHIEVED
SHORT TERM	Treatment-delivery tracking. Improve ability to track planned asset treatments from planning stage through project delivery, ideally through a transportation project-management system such as PM Web.	Improves understanding of the link between asset-management treatment selections and STIP project delivery.
	Risk integration. Integrate Risk and Resilience Program within the Performance and Asset Management Branch and continue to implement risk practices across the Department.	Improves risk and resilience communication and practices. Leads to more proactive management of threats.
	Process documentation. Build on the recent Policy Directive 1609.0, which documents core asset-management practices, with a new procedural directive and other documentation.	Manages risks from staff turnover and provides a starting point for further enhancement.
	Bridge and tunnel asset management. Improve life-cycle planning for these assets and further develop the recently created tunnels portion of the Bridge and Tunnel Enterprise.	Minimizes life-cycle costs and better prioritizes investments.
MID-TERM	Extreme weather and resilience. Enhance current approaches for integrating as part of lifecycle cost and risk management analyses.	Improves the ability for infrastructure to handle weather and climate disasters.
	Life-cycle planning. Continue to enhance analyses from assets' model (AIMS). For example, include a broader range of work types within the model for non-pavement/bridge assets.	Improves ability to estimate future funding needs and to prioritize asset treatments.
LONG TERM	Tradeoff analyses. Improve ability to perform multi-objective decision analysis (MODA) and cross-asset optimization for asset management decision making.	Improves understanding of alternative funding strategies.



Ancillary Asset Plans

- Why include 12 asset classes?
 - Explains full program
 - Memorializes processes
 - Includes “game plan” for assets going forward, including:
 - Strategic use of additional revenue
 - People, process, and technology improvements
- Content for smaller assets guided by federal TAMP requirements where appropriate.





Plan Elements 1 / 2

INVENTORY AND CONDITION

CDOT owns and maintains 3,219 units of rolling-stock¹ fleet assets that are divided into four categories: Essential, Road, Off-Road, and Support. CDOT tracks these fleet assets within the SAP Equipment Database, which includes data on age, utilization, and cost of maintenance that are used to determine each asset's condition.

INVENTORY

Of the 3,219 vehicles in the fleet, 978 are classified as Essential vehicles, critical for important missions. These include snowplow trucks and other snow-removal vehicles (e.g., snowcats and snow blowers), as well as aerial-lift trucks for signal maintenance. The fleet asset inventory is provided in **Table A.3-2**.

Table A.3-2 Current Inventory and Condition of Fleet Assets

Asset Type	Current Count	Useful Life (Years)	Average Age (Years)	Percent Useful Life Expended
ESSENTIAL	978	15	12.00	80%
Snowplow trucks	868	12	12.00	100%
Snowcats	5	15	10.4	70%
Others	105	15	9.1	60%
ROAD	1069	10	10.08	100%
One-Ton Trucks	377	10	9.6	96%
Mechanic Trucks	69	10	11.1	111%
Others	623	10	11.6	116%
OFF-ROAD	667	15	12.92	86%
Dozers	10	15	13.1	87%
Motor Graders	85	12	15.9	133%
Loaders	263	15	13.7	91%
Others	309	15	11.4	76%
FLEET SUPPORT	505	15	9.99	66%
Personnel Lifts (Scissor Lifts)	5	10	14.2	142%
Large Welders	8	15	20.5	137%
Others	492	15	9.7	65%
Total	3219	13.2	12.23	93%

¹ This number changes weekly based on fleet turns and up-fit schedules.

PERFORMANCE GAP ANALYSIS

CDOT uses a performance-driven approach to manage traffic signals. This section describes the projected performance of these assets given the planned funding and investment strategies described in the previous two sections. The section then compares projected performance against the performance target. CDOT's ability to close performance gaps largely depends on receiving additional funding. For traffic signals, CDOT also is assessing additional opportunities to close performance gaps that focus on adjustments to life-cycle planning strategies.

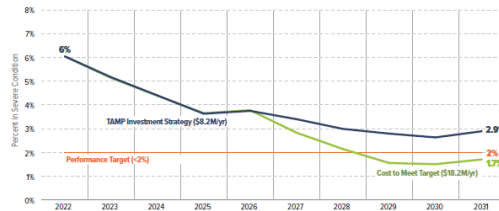
NEEDS AND PROJECTED CONDITION

CDOT's AIMS model predicts the long-term performance of signals given expected funding. Signal components deteriorate in the model using step functions based on the expected life cycle of each component (i.e., assembly, controller, and cabinet). The components deteriorate from Good to Fair, then to Poor, and then to Severe based on the expected life of each component. The model assumes that 80 percent of planned budgets is dedicated to signal assemblies, while 10 percent is dedicated to cabinets, and 10 percent to controllers.

At planned funding levels (about \$8.2 million annually), traffic signals are not expected to meet the performance target of having no more than 2 percent of signals in Severe condition by 2031. As shown in **Figure A.8-3**, an additional \$10 million in annual budget is required to meet CDOT's performance target by 2029 and sustain that state until year 2033. At that point in time, a significant number of signals owned by CDOT will begin reaching the end of their designed service lives. To sustain the targeted performance beyond 2033, an additional \$25-\$50 million in annual budget will be required to replace signals.

Figure A.8-3 Forecasted Percentage of Signals in Severe Condition

The anticipated annual budget of \$8.2 million will not meet the performance target of ensuring that less than 2 percent of traffic signals are in severe condition. The annual cost of meeting the target by 2031 is about \$8.2 million, or an additional \$10 million per year.



FINANCIAL PLAN

CDOT sets planning budgets for its asset programs four years in advance. The plan below assumes that funding for the Culverts program will remain static for the foreseeable future, at the level most recently set (\$8.2 million for fiscal year 2025). These budget assumptions, combined with CDOT's life-cycle management approaches discussed in the subsequent section, inform the investment strategies for culverts that CDOT plans to leverage to achieve system-wide asset performance goals while minimizing life-cycle costs.

FUNDING SOURCES

The culverts portion of the Transportation Asset Management (TAM) program supports the life-cycle management for culvert assets. Of the allocated funding, approximately \$1 million per year is used for inspections. Meanwhile, preservation and maintenance provided by the Maintenance Levels of

Service (MLOS) program is budgeted separately, in the MLOS Financial Plan.

PLANNED FUNDING

Table A.2-7 summarizes the projected funding levels for the Culverts program for fiscal years 2022-31.

Table A.2-7 Culverts 10-Year Financial Plan Budgets FY22-31 (in Millions)

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
\$8.3	\$8.3	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2





Plan Elements 2/2

LIFE-CYCLE PLANNING

CDOT analyzes its wall inventory and inspection data to forecast investment needs and set work priorities. This process is known as life-cycle planning and accounts for the whole-life costs of planning, constructing, and maintaining walls, with consideration for minimizing long-term costs while preserving or improving the condition. Currently, the main driver for applying life-cycle strategies to wall assets is condition. CDOT leverages the findings from its annual condition-assessment report and employs various treatments to address the needs of walls in different conditions. Major rehabilitation and reconstruction restore walls that are identified as Emergency Repair Findings or in Poor condition. Walls in Good and Fair condition receive routine maintenance, as needed.

LIFE-CYCLE PLANNING

CDOT uses a condition-based approach to the life-cycle management of a wall. This means condition data is used to determine the appropriate type and timing of work and to prioritize potential work within available budgets. CDOT identifies damaged walls that diminish the resiliency and reliability of the highway system and prioritizes these assets. Impacts of poorly functioning walls on CDOT's highway system are discussed in the section named Impacts of Insufficient Funding. CDOT prioritizes wall projects for maintenance to minimize such safety, mobility, environmental, public perception, public health, and asset management risks.

The Walls program maintains, repairs, rehabilitates, and replaces walls. Some design work is performed in-house, but most construction is performed by contractors. CDOT's Maintenance Levels of Service (MLOS) program delivers routine maintenance, preservation treatments, and repairs that do not require engineering.

The current program approach for managing wall assets is typically reactive in nature. CDOT's wall-maintenance program prioritizes addressing walls that pose substantial risks, (i.e., are identified with Emergency Repair Findings). As a result, most repairs and wall maintenance are carried out in response to inspection findings. Examples of inspection findings

requiring repair include deterioration due to water, vehicle-impact damage, or observed deterioration reported by maintenance staff or periodic inspections.

PROGRAM DECISION-MAKING

CDOT uses several different treatments to address wall deterioration. Wall treatments can range from vegetation removal to patching or replacement, depending on the wall condition and availability of funds. Definitions of the wall treatment work types are summarized below. A list of wall treatments and their typical costs are shown in **Table A.10-5**.

- **Preservation** consists of activities that prolong the life of the structure without changing the condition rating (i.e., preventative maintenance). Examples include vegetation removal and drainage cleanout.
- **Maintenance** includes patching and other repair treatments that do not have the potential to change condition but provide an expected extension of service life.
- **Rehabilitation** includes repairs or replacements of portions of walls that provide a change in wall condition and expected extension of service life. Examples include replacing deteriorated blocks, resetting bulging or rotated concrete panels, or patching extensive cracks or spalls.

RISK MANAGEMENT

Aligned with CDOT's overall risk-management approach, the Traffic Signals program manages risk across multiple levels—agency, programmatic, and project/asset. Section 6 of the overall TAMP provides more information about CDOT's risk-management methodology and processes.

The Traffic Signals program maintains a register of risks to its overall program and projects. Top risks to the Traffic Signals program are presented in **Table A.8-6**.

Table A.8-6 Top Traffic Signal Risks

Risk Level	Threat/Opportunity	Risk Score	Risk-Management Strategy
Program	Changing federal and state laws, policies, standards, and specifications in the near future (e.g., Update to the Manual on Uniform Traffic Control Devices [MUTCD], ADA requirements, multi-modal considerations).	39.6 (L)5 * (C)3.9 * (V)2 ¹	Treat, tolerate—maintain existing infrastructure, replace/upgrade to the latest standards when asset treatment is required.
Project	Loss of communication due to fiber damage or utility-line damage (e.g., loss of power, fiber cuts).	374 (L)5 * (C)3.7 * (V)2	Treat by location. Tolerate—repair, replace, where required. Collect damages from utility operators.
Project	Signal components (cabinets, poles) damaged by vehicles.	374 (L)5 * (C)3.7 * (V)2	Treat, tolerate, terminate. Repair, replace based on post-event inspection.
Program	Increased construction costs and labor/material shortages.	36.0 (L)5 * (C)3.6 * (V)2	Treat, tolerate—maintain existing infrastructure, implement innovative project-delivery methods.

Table A.10-5 Wall Life-Cycle Management Activities

FHWA Treatment Work Type	Activity	Typical Costs/Square Foot
Preservation	Vegetation Removal	\$15
Maintenance	Patching	\$180
Rehabilitation	Replacing Deteriorated Blocks	\$250
Reconstruction (Replacement)	Replacement	\$300



“Game Plan”

FUTURE IMPROVEMENTS

CDOT plans several improvements to processes, technology, and analysis capabilities to increase the efficiency and effectiveness of the Traffic Signals program.

PROCESS

CDOT plans to improve its management processes for traffic signals over the next 10 years, including the following activities.

- **Identification/classification of signal maintenance activities/costs.** Maintenance activities related to traffic signals assets are currently being charged to a one-mile section in SAP, CDOT's financial system. In the future, traffic signal assets and subcomponents will be identified in SAP so that the asset-related activities can be charged to a particular location. This will provide the granular information needed to make informed decisions on maintenance and repair/replacement activities. Work Manager, a web-based tool, is being piloted in some regions to efficiently log traffic-signal work orders.
- **Automation of preventive maintenance data-collection process.** The data collection staff and technicians will be trained on the new approach, including how to log the condition data into the mobile application. This GIS-based application is being piloted in Region 1.

TECHNOLOGY AND ANALYSIS CAPABILITIES

Several planned improvements are being explored to enhance traffic-signal technology and to support the analysis process, as summarized below.

- **Review of inputs in AIMS model.** In particular, the deterioration models should be continuously reviewed and updated. They could be enhanced to be equipment-type specific. The review of the deterioration curves should reflect the actual age when the signals become inoperable or when there is a safety issue.
- **Automated Traffic-Signal Performance Measurement:** Following upgrades to the existing traffic signal infrastructure, CDOT is considering automating performance measurement by:

- Updating old signal controllers to newer advanced transportation controllers (ATC).
- Updating existing signal cabinets to ATC cabinets at the end of their useful life cycle.
- Upgrading the Central Traffic Signal Control System statewide.
- Establishing Center-to-Center Communication (C2C) between CDOT Regions and the Colorado Traffic Management Center (CTMC) to manage the signal systems after normal working hours, thereby providing 24/7 active management of the arterial corridors.
- Implementing Automated Traffic Signal Performance Measures (ATSPMs) to proactively manage the operation and maintenance activities.
- **Traffic Adaptive Technology:** The traffic signal infrastructure (signal timing) will be adapted to be based on the traffic measurement in real time, making traffic-signal operations more accurate and reliable.
- **Future Connected-and-Automated Vehicle (CAV) Integration Capabilities:** The existing Intelligent ATC signal controllers deployed in recent years have CAV integration capabilities. Additional instrumentation is required, such as on-board units (OBU), roadside units (RSU), communication devices, and field infrastructure, to deploy CAV technology on arterial corridors. A pilot project is underway in Region 1 primarily focused on a Snowplow Priority application, using CAV technology.
- **Integration and Communication with Other Devices or Software:** CDOT is considering system-level integration with the recently deployed Advance Transportation Management System (ATMS) at the Colorado Traffic Management Center. The system brings together all transportation/traffic related applications and stakeholders to make data-driven decisions possible using system-wide data and analytics.

Priorities for additional revenue:

- Meet PD-14 targets
- Address backlog of poor assets

STRATEGIC USE OF ADDITIONAL REVENUE

“Should CDOT receive additional revenue to fund the Walls asset class, the Department’s first priority is to eliminate any funding gaps related to achieving the PD-14 performance target. Once goals are achieved, the Department will reduce its “Poor” backlog with a priority toward the most critical and/or vulnerable assets to improve system resilience. CDOT estimates the current “Poor” backlog for Walls could be eliminated with about \$216.4 million.”



Questions?



Thank You!



COLORADO
Department of Transportation

2022

TRANSPORTATION ASSET MANAGEMENT PLAN



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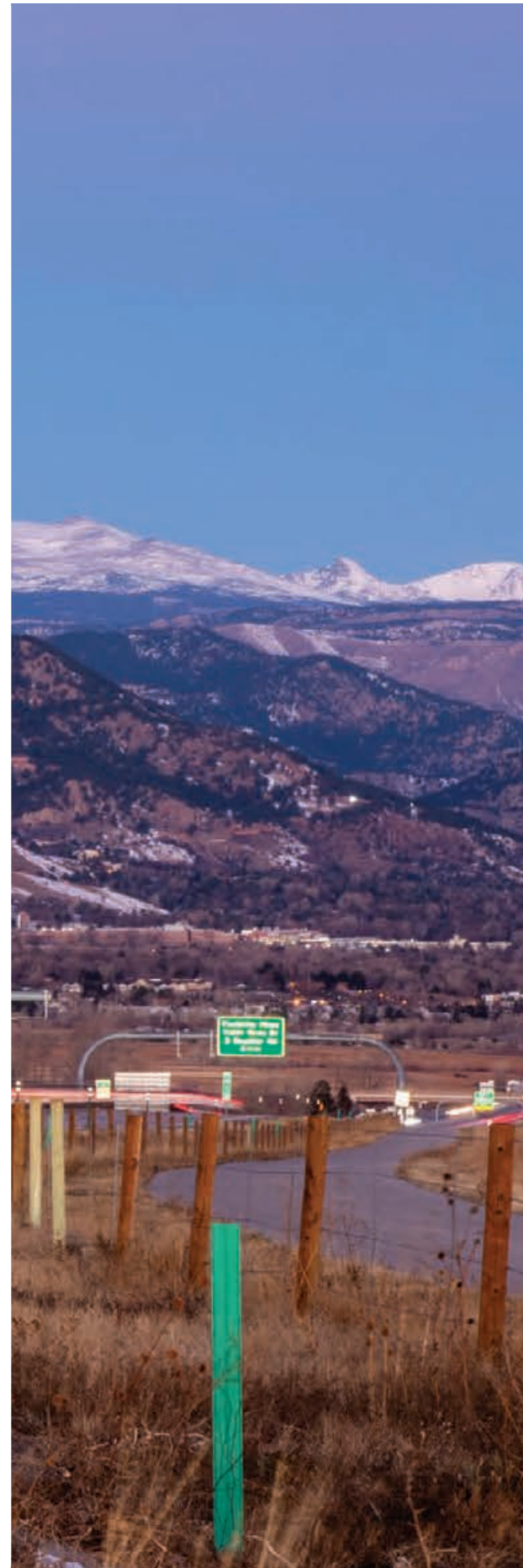
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- Policy Directive 1609.0—Transportation Asset Management
- Policy Directive 14.0—Policy Guiding Statewide Plan Goals and Objectives
- Memo on TAM Treatment Changes



EXECUTIVE SUMMARY

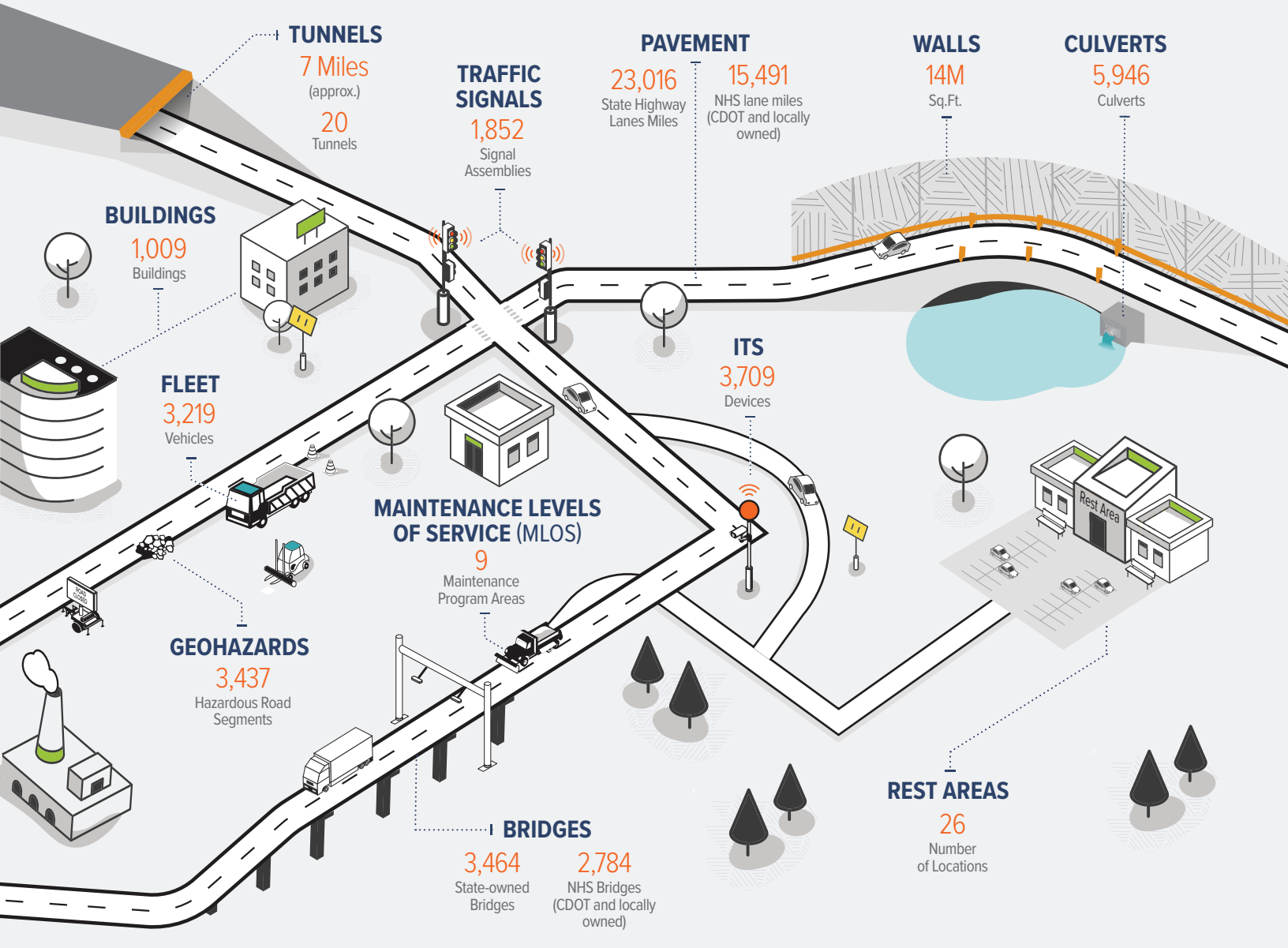
Colorado's transportation infrastructure is as diverse and dynamic as the state itself. Bridges span majestic canyons and rivers. Miles of pavement climb and descend the mountainous landscape. And culverts, retaining walls, rockfall fences, traffic signals, cameras, wireless technology, and other assets make the whole system work.

CDOT's 2022 Transportation Asset Management Plan (TAMP) describes how the Department will manage these assets effectively. In doing so, the plan will enable CDOT to support, maintain, and expand the transportation system, and to play a proactive role in the economic vitality of the state and the quality of life of its people.

WHERE WE ARE AND WHAT WE DO

CDOT's Transportation Asset Management (TAM) program comprises 12 asset programs, including pavement, bridges and many more. Each program is vital to achieving CDOT's mission of providing the best multimodal transportation system that effectively and safely moves people, goods, and information. The programs also advance asset management goals by preserving infrastructure condition at a least life-cycle cost. **Figure ES-1** illustrates the function and number of assets in each program, and the text that follows describes the benefits of each asset type.

Figure ES-1 Summary of CDOT's Assets



CDOT's asset programs provide a range of benefits to Colorado:

PAVEMENT:

PAVEMENTS AND BRIDGES. Pavement and bridge assets reach every corner of the state—traversing mountains, spanning lakes and rivers, and connecting Coloradans to seven neighboring states. Pavements and bridges form the backbone of the highway system and are the system's highest-valued assets in terms of replacement cost.

BRIDGES:



BUILDINGS. Buildings provide facilities to safely store and maintain essential vehicles, equipment, and supplies. Buildings also provide offices for administrative staff and laboratories for technicians.



CULVERTS. Culverts are structures that convey water beneath the roadway or carry the roadway over obstacles. These assets are crucial to providing drainage during storm events, enabling safe traffic flow over waterways, preventing soil erosion, and even providing safe passage for wildlife.



FLEET. CDOT's diverse fleet of vehicles and roadway equipment supports the safety and mobility of the traveling public and the preservation of Colorado's highway system by facilitating safe, timely, and efficient roadway operations, repairs, and improvements.



GEOHAZARDS. The Geohazards program identifies and manages geologic risks to Colorado's transportation system—such as from falling rocks, landslides, and sinkholes—by implementing risk-reducing treatments on strategic highway segments and corridors.



INTELLIGENT TRANSPORTATION SYSTEMS. Intelligent Transportation Systems (ITS) assets advance the safety and mobility across Colorado's diverse landscape by processing and sharing information. ITS assets enable calls for emergency services on secluded mountain passes, use cameras to monitor traffic and ease congestion, deploy messages via signs to assist travelers in adverse weather conditions, and provide broadband access to connect communities.



MAINTENANCE LEVELS OF SERVICE. Maintenance Levels of Service (MLOS) provides major operational services—notably snow and ice removal from roadways—as well as preservation and maintenance services for pavement, bridges, tunnels, culverts, walls, rest areas, and more. MLOS also manages many safety- and traffic-related assets, such as signs, guardrails, pavement markings, delineators, roadway lights, crash/energy attenuators, and fences.



REST AREAS. Rest areas provide an oasis where travelers can safely pull over to take a break, use the restroom, and get information on local attractions. Rest Areas support the safety of the traveling public and attract tourism to help support the state's economy.



SIGNALS. Traffic signals are vital to helping travelers safely navigate Colorado's diverse highway network, ensuring that vehicles avoid collisions, easing traffic congestion, protecting bicyclists, and allowing pedestrians to safely cross streets.



TUNNELS. Tunnels significantly shorten the distance and time of travel through Colorado's mountainous terrain. They ensure optimum protection for the surrounding environment and landscape by minimizing interference with surface life, as compared to deep cuts or longer routes.



WALLS. Walls help ensure roadways are stable across Colorado's rugged landscape and fit into the natural environment. CDOT's walls retain embankments, support bridges, and serve as physical barriers to block highway noise.



WHAT ARE OUR TOP RISKS?

CDOT uses an enterprise-wide approach to manage risks, from the Department-wide level down to the asset level, incorporating four levels of risk management:

- » Enterprise (Strategic, Corporate)—Threats that affect the agency's mission and vision, as well as the results of the asset-management program.
- » Program (Business Line)—Threats that affect CDOT's ability to deliver projects and meet targets within a program.

- » Project—Threats that affect the cost and schedule to deliver projects throughout the agency.
- » Activity—Threats that affect ongoing functions that support programs, projects, and asset classes.

Each asset class maintains its own risk register.

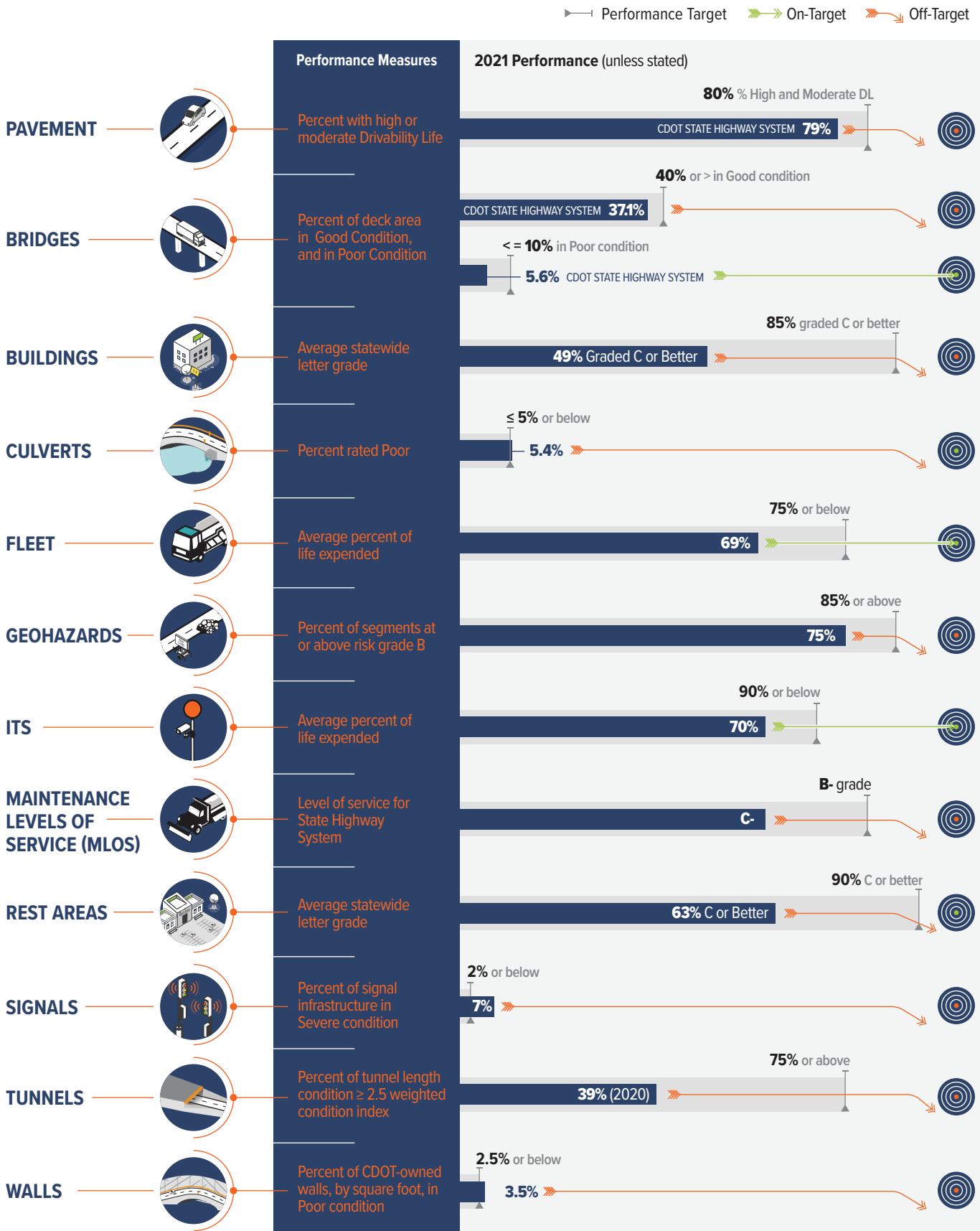
Table ES-1 shows CDOT's top enterprise risks.

Table ES-1 Top 10 Enterprise Risks at CDOT

Threat/ Opportunity	Risk Statement	Risk Management Strategy
Flood	There is a risk that flooding occurs, leading to asset/route damage that causes mobility and safety impacts as well as increased asset management cost.	Treat by implementing design standards; following agency continuity of operations plan; maintaining incident command center management structure; maintaining an Office of Emergency Management (OEM). Use tools and processes developed under the resilience program to identify high risk assets and corridors for focused analysis.
Post-Fire Debris Flow	There is a risk that post-fire debris flow occurs, leading to asset/route damage that causes mobility and safety impacts as well as increased asset management cost.	Treat by maintaining an office of OEM, as well as through landscaping, erosion control, jersey barriers and other practices.
Funding Uncertainty	There is a risk of funding changes leading to increased/reduced investment that causes improved/diminished asset management outcomes.	Tolerate/take advantage of—manage on per event basis.
Geohazards	There is a risk of geotechnical failure that causes mobility and safety impacts as well as increased asset management cost.	Treat by maintaining geohazards program and robust geohazards-management plan.
Cost Uncertainty	There is a risk that price escalation occurs, leading to unsustainable costs and thereby limiting the ability to deliver organizational objectives.	Treat by bid process (e.g., bid rejection), re-scoping projects, price hedging, and by hedging materials; then tolerate.
Fire	There is a risk that fire occurs, leading to asset/route damage that causes mobility and safety impacts as well as increased asset management cost.	Tolerate in the case of wildfires; and treat by tunnel fire-suppression systems and bridge-design standards, etc. Use tools and processes developed under the resilience program to identify high risk assets and corridors for focused analysis.
Missing Infrastructure Targets for National Performance Measures	There is a risk that CDOT is not able to meet PM2 condition minimum requirements, leading to restricted funding that limits the agency's ability to meet its objectives.	Treat by implementing formal asset management program. Use tools and processes developed under the resilience program to identify high risk assets and corridors for focused analysis.
Snow (Avalanche)	There is a risk of avalanche that causes mobility and safety impacts as well as increased asset management cost.	Treat. Maintain a Winter Operations Program. Use tools and processes developed under the resilience program to identify high risk assets and corridors for focused analysis.
Cybersecurity	There is a risk that a cyber-attack occurs, leading to a reduction in CDOT ability/effectiveness, which results in reduced mobility and safety outcomes.	Transfer to Governor's Office of Information Technology. Treat by maintaining firewalls; virus protection software; training employees on cybersecurity.
Staffing: Attrition	There is a risk that CDOT suffers from a shrinking workforce, leading to loss of institutional knowledge that reduces efficiency and effectiveness.	Treat by documenting policies and procedures.

Figure ES-2 Summarizes how CDOT's assets are currently performing. Any additional performance measures for assets excluding pavements and bridges can be found within the individual asset plans in the Asset Plan Appendix.

Figure ES-2 Current Performance of CDOT's Asset Programs against PD 14.0 Targets



FEDERAL NATIONAL PERFORMANCE MEASURES—CURRENT PERFORMANCE

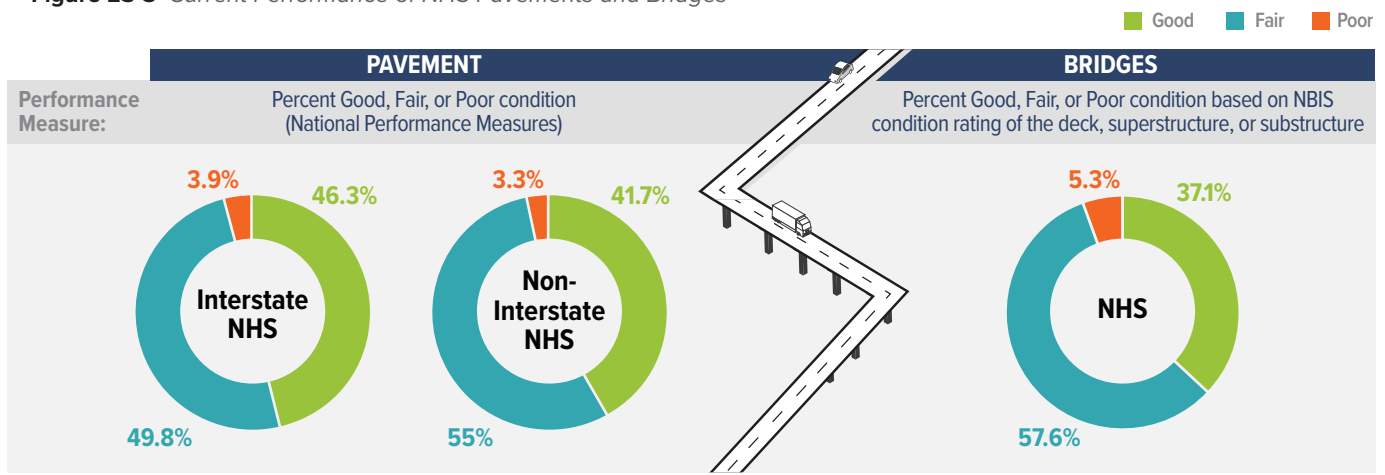
The Federal Highway Administration (FHWA) requires state departments of transportation (DOTs) to provide an asset-management plan that, at minimum, addresses pavements and bridges on the National Highway System (NHS).

Figure ES-3 summarizes the current condition of pavement and bridges on the National Highway System, according to FHWA's National Performance Measures (NPMs). While the federal measures for pavement quality (Good, Fair, and Poor) incorporate some of the same quality indicators as CDOT's internal

pavement measures (High, Moderate, and Low Drivability Life), the measures are not comparable. Meanwhile, CDOT's primary measures for evaluating bridge condition (Good, Fair, and Poor) are identical to the federal measure.

The NHS includes Interstate and certain non-Interstate highways. CDOT owns and maintains all Interstate pavement. While the Department owns a majority of the non-Interstate NHS, certain municipalities and counties own stretches as well.

Figure ES-3 Current Performance of NHS Pavements and Bridges

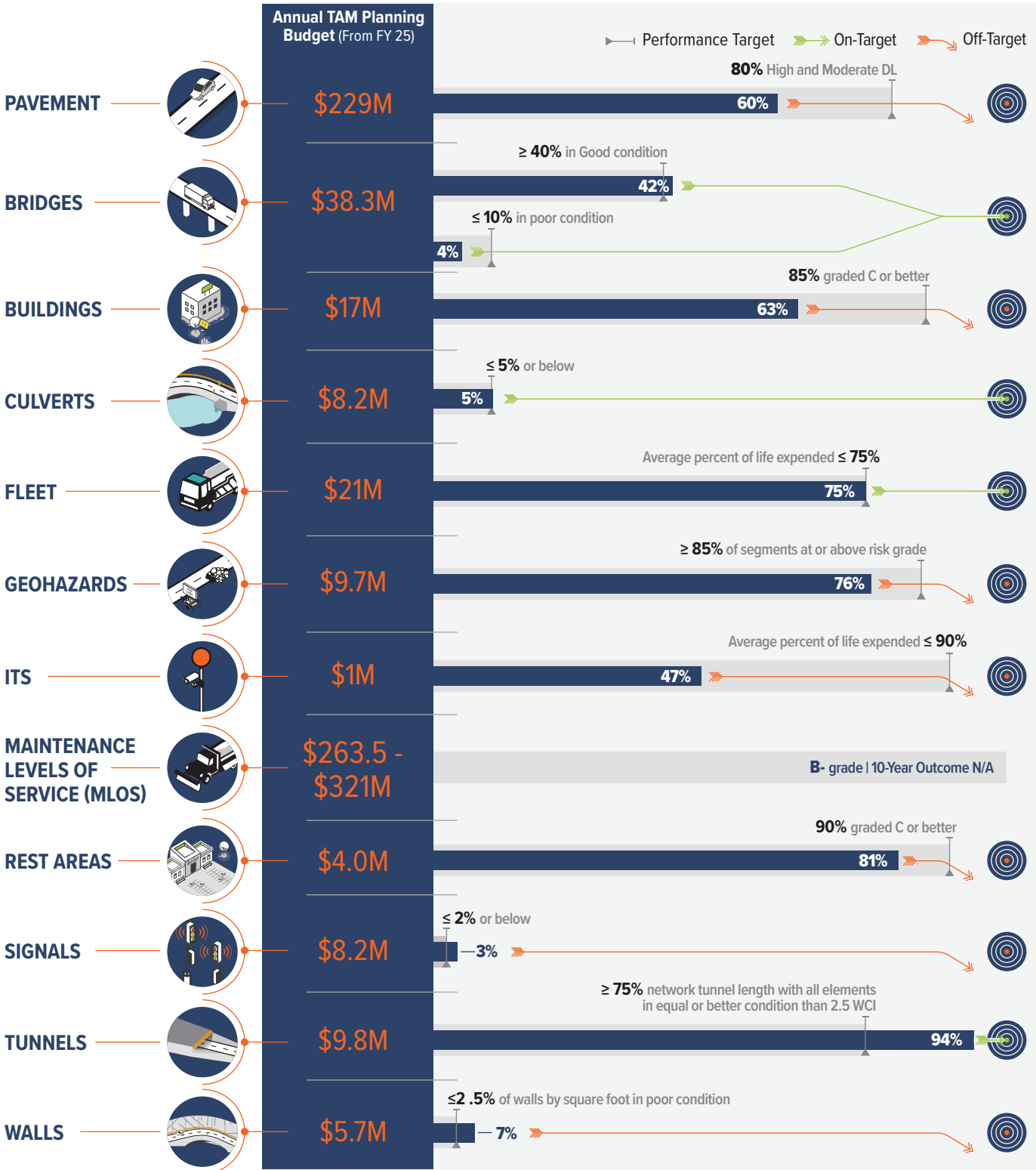


WHERE WE ARE GOING

The financial plan presented in this TAMP (and the Asset Plan Appendix) provides sufficient funding for four of CDOT's 12 asset classes to meet the Department's internal performance targets within the 10-year analysis period.

Bridges, Culverts, Fleet, and Tunnels will meet their targets, while the remaining asset classes require additional funding. The majority of that additional funding would be for pavements, buildings, geohazards, ITS, and walls. **Figure ES-4** summarizes projected performance for CDOT's 12 asset programs over the 10-year TAMP analysis period.

Figure ES-4 Projected 10-Year Performance of CDOT's 12 Asset Classes



Anticipated additional funding required to meet performance targets in the TAMP timeframe (2031): **\$350M PER YEAR**

PAVEMENT—PROJECTED PERFORMANCE

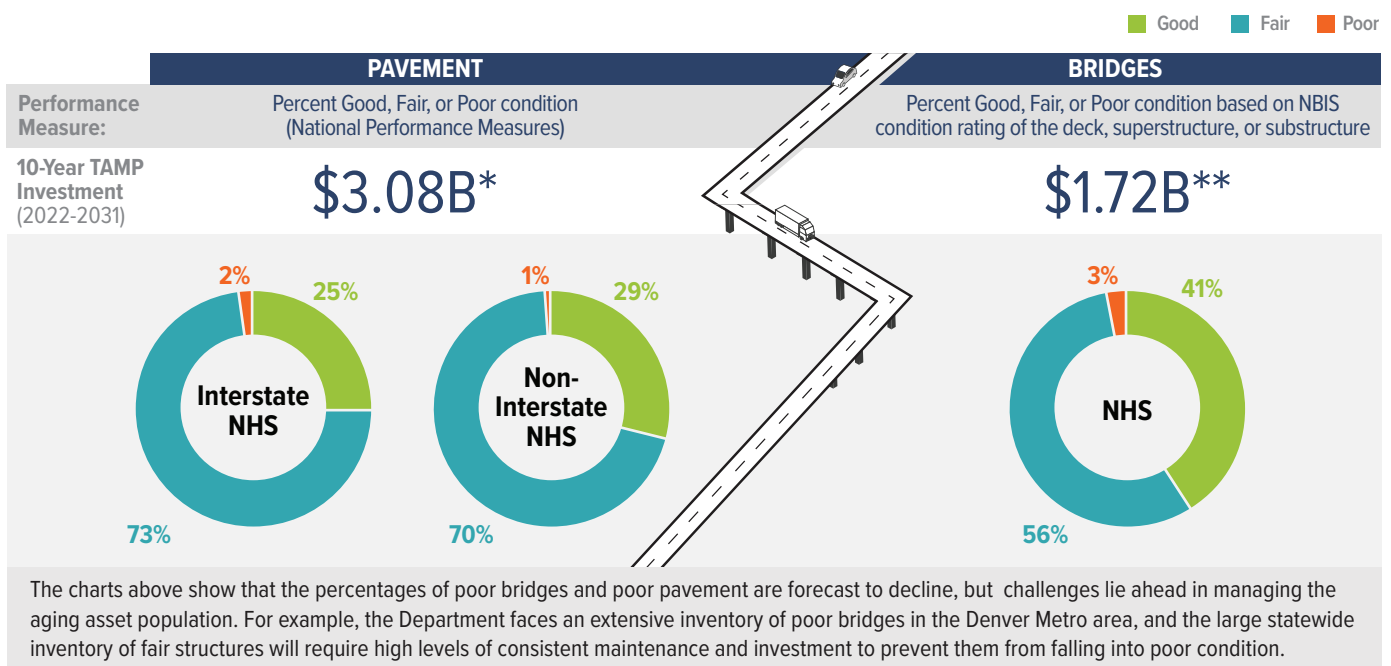
Over this plan's 10-year timeframe, State Highway System pavement in High and Moderate condition, based on CDOT's Drivability Life metric, is forecast to fall before it begins to recover. This is because a large proportion of pavement (30 percent of total lane miles) is expected to move from Moderate to Poor condition over this time period. However, a key strategy of CDOT's pavement program is to preserve Good and Moderate pavements, which will improve long-term outcomes. This strategy will enable CDOT to come close to meeting the Department's internal performance target within a 15-year timeframe.

About 79 percent of pavement is expected to reach High or Moderate condition by 2036, just shy of the 80 percent target.

NATIONAL PERFORMANCE MEASURES—PROJECTED PERFORMANCE

Figure ES-5 summarizes the projected future performance for pavement and bridge assets on the National Highway System (NHS). Projections indicate that National Performance Measure (NPM) targets for both pavement and bridge assets will be met over the 10-year period.

Figure ES-5 Projected 10-Year Performance of NHS Pavements and Bridges



* Includes maintenance levels of service

** Includes maintenance levels of service and Statewide Bridge and Tunnel Enterprise



HOW WE WILL GET THERE

CDOT is committed to managing the state's transportation infrastructure to the highest standards possible, for as long as possible, and has long embraced asset management principles as standard business practice.

Going forward, CDOT will continue to guide investment decisions to maintain assets in a state of good repair for the least practicable cost. To do so, CDOT's asset-management program will leverage recent and updated policies that drive asset performance, including by establishing performance measures and targets. The program also will continue to employ its comprehensive set of asset-management practices and decision-support tools.

ASSET MANAGEMENT POLICIES

The Transportation Commission adopted the updated Policy Directive 14.0 in 2020, which included revised goals that measure the success of the Department's efforts to improve asset management, safety, and mobility, as well as support the national goals for surface transportation. PD 14.0 encourages the Transportation Commission to direct funds to budget categories that support the accomplishment of the directive's performance targets.

In January 2021, Transportation Commission adopted Policy Directive 1609.0, which requires the Department's 12 asset classes to maintain an inventory, condition information, performance metrics, and performance targets. This formally re-affirmed CDOT's commitment to asset management across all asset classes by mandating the collection, development, and sustainment of foundational asset data.

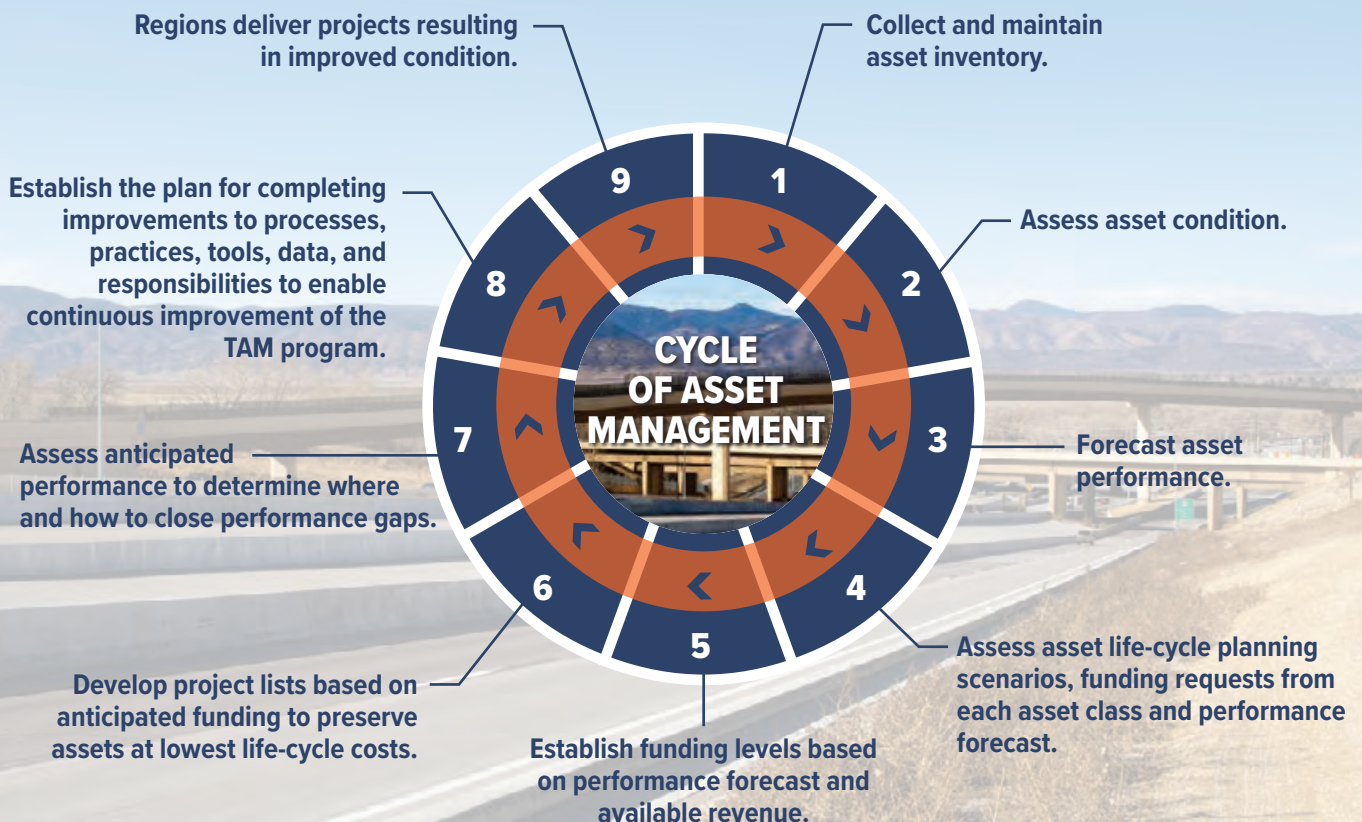
ASSET MANAGEMENT PRACTICES

CDOT's established asset management cycle defines how the Department makes decisions about its assets, including considering a range of life-cycle management approaches that reflect the criticality of different assets to the asset management, safety, and mobility outcomes the Department wants to achieve. **Figure ES-6** illustrates CDOT's asset management cycle.

ASSET MANAGEMENT DECISION-SUPPORT TOOLS

CDOT's Asset Investment Management System (AIMS) is modeling software that uses past performance data, deterioration assumptions, and treatment information to predict the future condition of an asset class under

Figure ES-6 *Asset Management Cycle at CDOT*



varying funding levels. The software also recommends the most cost-effective asset treatments to achieve the Department's performance goals for each asset class.

By comparing forecasted performance under different funding levels, the software helps the TAM Program determine how much funding an asset class should receive. AIMS helps to ensure that the Department's assets are used most efficiently, enhancing asset functionality by achieving the greatest benefit at the lowest cost while maximizing the asset's lifespan.

CONTINUOUS IMPROVEMENT

CDOT intends to leverage this TAMP to advance processes that optimize asset investments to achieve Department performance goals. To that end, the TAM program intends to:

- » Strengthen the alignment of asset management processes with overarching CDOT goals.

- » Satisfy federal requirements detailed in 23 U.S.C. 119(e)(1), MAP-21 § 1106.
- » Establish and document asset management processes and guidance without limiting flexibility.
- » Communicate the importance of asset management to key audiences.
- » Promote internal communication, understanding, and collaboration across asset types and between CDOT's Headquarters and Regions.
- » Promote more uniform processes and analysis approaches across asset programs to advance CDOT's ability to analyze and consider tradeoffs.
- » Expand the reach of asset management principles and needs within CDOT.
- » Establish performance measures and the desired state of good repair for pavement and bridges on the Interstate and National Highway System.

Planned improvements to the TAM program include the following:

	IMPROVEMENT AREA	OUTCOME ACHIEVED
SHORT TERM	Treatment-delivery tracking. Improve ability to track planned asset treatments from planning stage through project delivery, ideally through a transportation project-management system such as PM Web.	Improves understanding of the link between asset-management treatment selections and STIP project delivery.
	Risk integration. Integrate Risk and Resilience Program within the Performance and Asset Management Branch and continue to implement risk practices across the Department.	Improves risk and resilience communication and practices. Leads to more proactive management of threats.
	Process documentation. Build on the recent Policy Directive 1609.0, which documents core asset-management practices, with a new procedural directive and other documentation.	Manages risks from staff turnover and provides a starting point for further enhancement.
	Bridge and tunnel asset management. Improve life-cycle planning for these assets and further develop the recently created tunnels portion of the Bridge and Tunnel Enterprise.	Minimizes life-cycle costs and better prioritizes investments.
MID-TERM	Extreme weather and resilience. Enhance current approaches for integrating as part of lifecycle cost and risk management analyses.	Improves the ability for infrastructure to handle weather and climate threats.
	Life-cycle planning. Continue to enhance analyses from assets' model (AIMS). For example, include a broader range of work types within the model.	Improves ability to estimate future funding needs and to prioritize asset treatments.
LONG TERM	Tradeoff analyses. Improve ability to perform multi-objective decision analysis (MODA) and cross-asset optimization for asset management decision making.	Improves understanding of alternative funding strategies.

CDOT'S COMMITMENT TO COLORADO

Dear reader,

I am pleased to present the Colorado Department of Transportation's 2022 Transportation Asset Management Plan (TAMP).

CDOT's previous asset-management plan was approved by the Federal Highway Administration (FHWA) in 2019. This update goes far beyond that document and plan requirements in 23 CFR 515.9. Not only does the plan include required pavement and bridge assets, its appendices include plans for the 10 other assets in our comprehensive Transportation Asset Management (TAM) Program.

As shown in the following pages, CDOT employs an asset-management approach across all asset types—roads, bridges, tunnels, culverts, and many more—to minimize risks, disruptions and life-cycle costs associated with Colorado's highways. At the same time, our asset-management approach maximizes asset performance and supports economic and recreational opportunities in all corners of the state.

The state of Colorado in recent years has demonstrated its commitment to asset management by passing Senate Bills 260 and 267. Over the next five years these sources will contribute more than \$2 billion to highway projects in CDOT's 10-Year Plan. In addition to funding strategic expansion projects, the 10-Year Plan serves as a parallel funding mechanism to our base asset-management program to maintain existing roads and bridges. SB-260 also generates fees to expand the Statewide Bridge and Tunnel Enterprise beyond its historical mission of improving poor bridges to caring for critical tunnels, such as the Eisenhower Johnson Memorial Tunnel.

Recently adopted policy directives at CDOT further demonstrate the commitment of the Department to embed asset management and risk and resilience into the work we do every day. This TAMP reinforces that commitment by documenting how we use data and predictive tools to recommend the most cost-effective mix of maintenance and preservation activities, and to forecast future performance. Moreover, the TAMP shows how we are allocating funding to achieve internal performance targets, as well as targets for National Performance Measures. Finally, the TAMP describes how we manage threats at all levels and how we plan to improve asset management going forward.

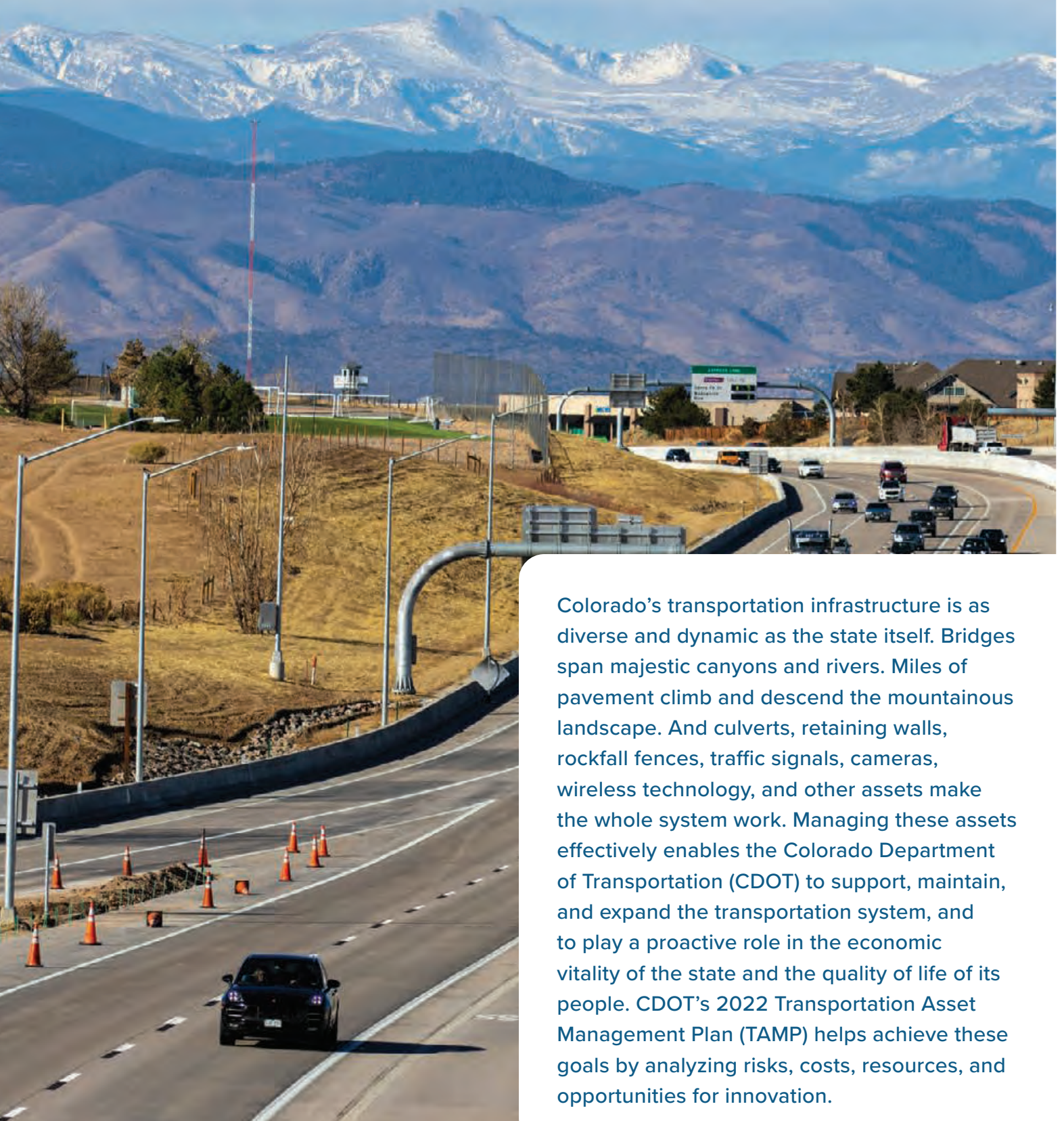
With this plan, CDOT reaffirms its commitment to asset management as a critical tool in delivering our mission, improving the economic vitality of the state, and enhancing the quality of life of all Coloradans.

Best regards,

Shoshana M. Lew
CDOT Executive Director



1. INTRODUCTION



Colorado's transportation infrastructure is as diverse and dynamic as the state itself. Bridges span majestic canyons and rivers. Miles of pavement climb and descend the mountainous landscape. And culverts, retaining walls, rockfall fences, traffic signals, cameras, wireless technology, and other assets make the whole system work. Managing these assets effectively enables the Colorado Department of Transportation (CDOT) to support, maintain, and expand the transportation system, and to play a proactive role in the economic vitality of the state and the quality of life of its people. CDOT's 2022 Transportation Asset Management Plan (TAMP) helps achieve these goals by analyzing risks, costs, resources, and opportunities for innovation.

1.1 OVERVIEW

CDOT is committed to managing the state’s transportation infrastructure to the highest standards possible, for as long as possible. The Department understands that in a time of constrained budgets, effective management of transportation assets is a priority. Recognizing this imperative, the U.S. Congress codified asset management principles into law in 2012 as part of the Moving Ahead for Progress in the 21st Century Act (MAP-21). The law required all states to develop and implement risk-based transportation asset management plans (TAMPs). The 2015 Fixing America’s Surface Transportation (FAST) Act reaffirmed this requirement, and in October 2016 the Federal Highway Administration (FHWA) issued regulations spelling out the requirements for TAMP submissions. In 2021, Congress continued its focus on transportation asset management in the Infrastructure Investment and Jobs Act (IIJA), including a historic increase in funding for infrastructure and for improving resilience.

CDOT’s 2022 TAMP aligns with federal requirements, as well as with the Department’s mission and its Transportation Commission Policy Directive 14.0. (PD 14.0), Policy Guiding Statewide Plan Goals and Objectives. The goals for PD 14.0 and CDOT’s *2045 Statewide Transportation Plan* align with the FAST Act’s nationally stated goals, and the PM1 (safety), PM2 (bridge and pavement condition), and PM3 (system performance, freight, congestion mitigation and air quality [CMAQ]) National Performance Measures. Each PD 14.0 goal area—asset management, safety, and mobility—contains multiple performance measures and objectives that allow CDOT’s internal stakeholders to evaluate statewide efforts, how they align with the overall direction of the agency, and how they support the achievement of National Performance Measures. The Department’s TAMP also integrates with performance objectives set forth in related policies and documents, such as CDOT’s *Greenhouse Gas (GHG) Pollution Reduction Roadmap*, the *CDOT Performance Plan*, and the *Governor’s Wildly Important Goals (WIGs)*. For example, the safety goal area statement and objectives reflected in this TAMP align with the *Colorado Strategic Transportation Safety Plan (STSP)*.

The measures and targets in PD 14.0 help establish a performance-based Transportation Asset

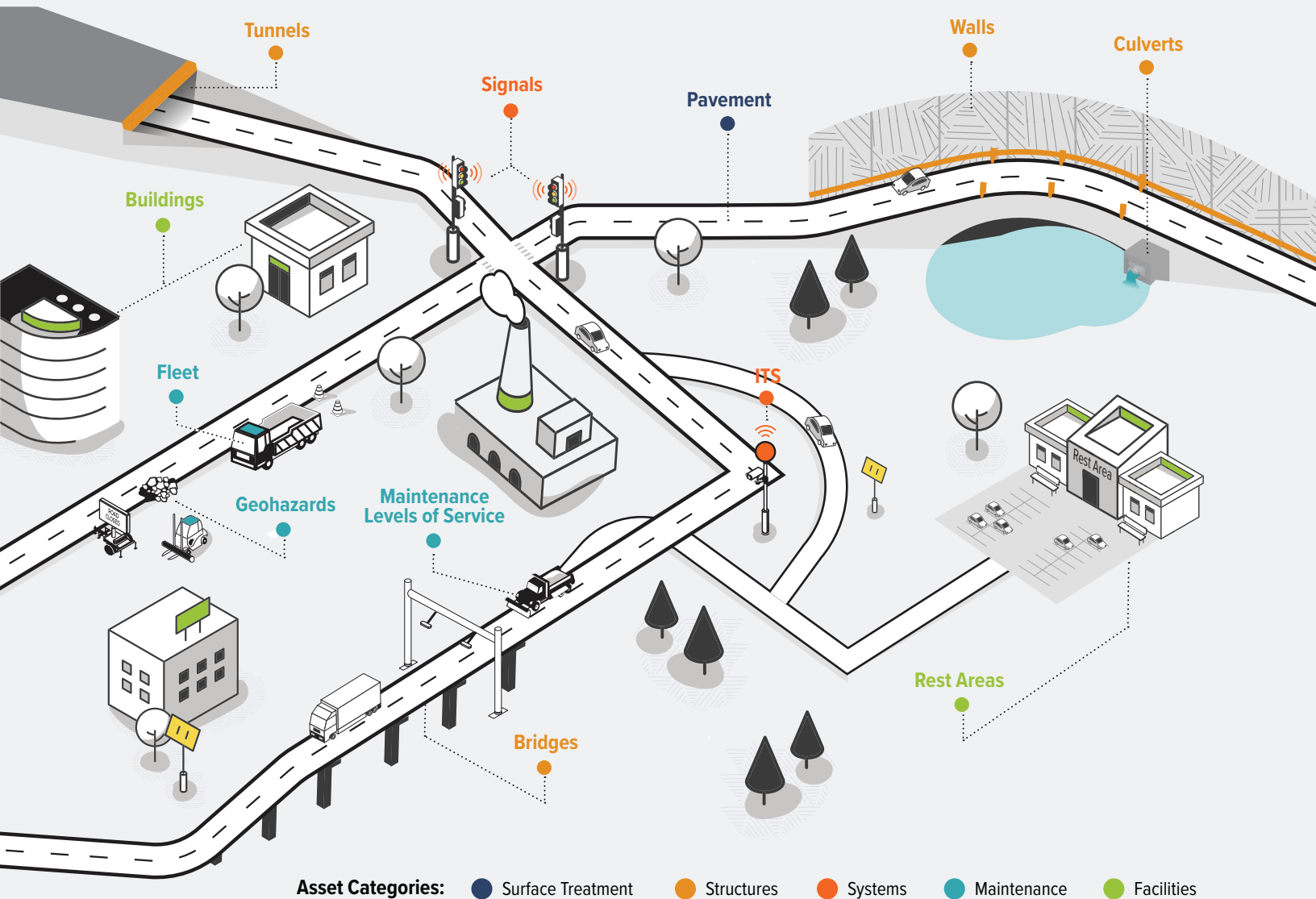
The American Association of State Highway and Transportation Officials (AASHTO) defines transportation asset management as “a strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively through their life cycle. It focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision-making based on quality information and well-defined objectives.”

Management (TAM) Program at CDOT and encourage a comprehensive, data-driven approach. In addition to PD 14.0, CDOT’s new Policy Directive 1609.0 (PD 1609.0), Transportation Asset Management, ensures the Department will stay committed to key asset-management practices—such as maintaining inventories and asset models.

CDOT’s approach aligns with the focus of the IIJA to plan and make improvements to advance resiliency. It sets the foundation for enhancing CDOT’s approach towards considering extreme weather events and resilience in life-cycle planning and investment strategies. This includes implementation of CDOT’s Policy Directive 1905.0 (PD 1905.0), Building Resilience into Transportation Infrastructure and Operations, adopted in 2018. The directive positions CDOT to deliver on FHWA’s emphasis on resilience by directing the Department to incorporate the concept into all aspects of CDOT business, including strategic decisions about assets and operations.

This TAMP prepares Colorado’s transportation infrastructure for the future by analyzing risks, costs vs. needs, resources, and innovation opportunities across all 12 of its asset classes. In addition to raising awareness of the asset management process and objectives throughout the Department and its Engineering Regions, the plan communicates CDOT’s commitment to asset management to other transportation stakeholders and to the public. **Figure 1** presents the 12 asset classes managed within CDOT’s TAM Program.

Figure 1 CDOT's 12 Asset Classes



Pavement and bridge assets are the primary focus of this TAMP, as required by FHWA. However, within the main document, summary information will be provided about all 12 asset classes. “Asset plans” for all non-pavement/bridge assets are included in the Asset Plan Appendix to this TAMP.

1.2 TAMP VISION STATEMENT

The vision of CDOT’s 2022 TAMP is to advance processes that optimize asset investments to achieve Department performance goals. The plan helps prepare Colorado’s transportation infrastructure for the future by analyzing risks, costs, resources, and opportunities for innovation. To accomplish this vision, the plan focuses on:

- » Aligning asset management processes with overarching CDOT goals.
- » Satisfying federal requirements for asset management plans.
- » Establishing and documenting asset management processes and guidance without limiting flexibility.
- » Communicating the importance of asset management to key audiences.
- » Promoting internal communication, understanding, and collaboration across asset types and between CDOT’s Headquarters and Regions.
- » Promoting more uniformity among assets and augmenting CDOT’s ability to consider tradeoffs.
- » Expanding the reach of asset management within CDOT.

1.3 CONTINUOUS IMPROVEMENT SINCE 2019 TAMP

CDOT has made several improvements to its TAM Program since the previous TAMP was submitted in 2019. As shown in **Figure 2**, these changes have focused on better integration with functional areas, such as CDOT’s Risk and Resilience Program, and enhancement of analyses, communication, and program management.

Figure 2 Improved Areas Since 2019 TAMP

IMPROVED AREA	OUTCOME ACHIEVED
The Transportation Commission reaffirmed and adopted PD 14.0 in November 2020, with revised performance measures and objectives.	Linking performance management across the areas of safety, asset management, and mobility in accordance with MAP-21.
CDOT has moved the Resilience Program to within the Performance and Asset Management Branch (PAMB).	Improved integration of risk, resilience, performance, and asset management.
CDOT has improved and expanded its asset management practices, including expanding documentation of treatment types to include additional asset classes, advancing asset modeling capabilities, and refining the Pavement National Performance Measure model.	Enhanced life-cycle planning analysis and forecasting of pavement National Performance Measures.
CDOT has updated its budget-setting process. This includes separating it from a larger program meeting and providing the Oversight Committee with "scenarios"—potential budget distributions for each asset.	The TAM Oversight Committee has more explicit budget requests so the committee knows exactly what each asset class is asking for, how the money will be used, and what they would use the money for.
Addition of Regional Transportation Directors to the TAM Oversight Committee.	Increased effectiveness and understanding of delivering investment strategies.
CDOT has implemented additional engagement processes with local planning partners responsible for the National Highway System and broader transportation network.	Improved communication and support to improve asset management practice throughout Colorado.
The Transportation Commission adopted PD 1609.0 in January 2021, as the primary asset management policy directive.	Created clearly defined TAM Program principles, functions, and processes. This included processes for establishing planning budgets and treatment lists.

1.4 TAMP SCOPE AND ORGANIZATION

This plan satisfies all federal requirements for a complete asset management plan, including addressing Colorado’s National Highway System (NHS) pavement and bridges, regardless of ownership. The document is organized based on FHWA guidance and includes the following sections.

1.4.1 TAMP ORGANIZATION



Introduction: Section 1 (this section) features CDOT’s vision for the plan, describes the improvements made to the TAM Program since the previous TAMP period, and establishes the structure of CDOT’s 2022 TAMP.



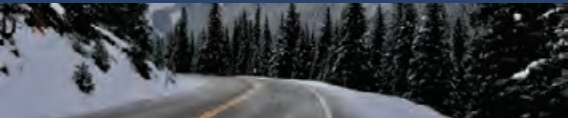
Asset Management at CDOT: Section 2 outlines CDOT’s approach to asset management and how it aligns with organizational goals and objectives. This includes asset management’s relationship with other planning processes and how the agency plans to continue to advance asset management to help meet statewide infrastructure goals. It also describes the asset-management planning process as it relates to the Statewide Transportation Improvement Program (STIP).



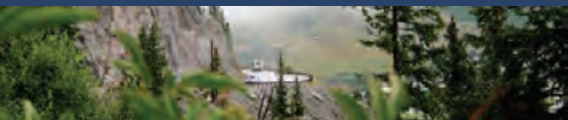
Performance Management: Section 3 presents both federal- and state-established performance measures and CDOT’s targets for the entire State Highway System and for NHS pavement and bridges.



Asset Inventory and Condition: Section 4 provides a summary of inventory and condition data for CDOT’s pavement and bridge assets. This section also identifies the current condition of these assets, who owns the assets, and which assets are part of the NHS.



Life-Cycle Planning: Section 5 describes how CDOT approaches life-cycle planning. It includes a discussion of how deterioration is modeled and how appropriate treatments are selected. The section also discusses CDOT’s management strategies for minimizing life-cycle costs.



Risk and Resilience Management: Section 6 outlines CDOT’s approach to risk management within asset management, including processes the Department uses to identify and manage top-priority risks to the overall agency and to asset programs.



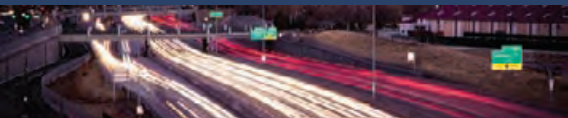
Financial Plan: Section 7 explains CDOT’s 10-year financial plan for pavement and bridges, including an overview of revenue streams, sources, and uses; the process for asset-management resource assignment and budget allocation; and asset values. The section also describes the cost to achieve CDOT’s “state-of-good-repair” targets.



Investment Strategies: Section 8 identifies investment strategies for CDOT’s asset management program. The strategies include estimated spending by work type.



Performance-Gap Analysis: Section 9 describes gaps between current performance and target performance for both federal- and state-established performance measures and CDOT’s targets for the entire State Highway System and for the NHS.



Future Improvements: Section 10 identifies process enhancements that CDOT plans to implement. The section discusses near-term opportunities to improve asset management, including ways to strengthen the project selection and prioritization process to advance multiple goal areas.



Appendices: The Asset Plan Appendix consists of asset plans for the 10 other asset classes that—along with pavement and bridges—comprise CDOT’s TAM Program: Buildings, Culverts, Fleet, Geohazards, ITS, Maintenance Levels of Service (MLOS), Rest Areas, Traffic Signals, Tunnels, and Walls. Policy Directives 1609.0 and 14.0, and Memo on TAM Treatment Changes are included as Appendix B.

A scenic mountain landscape featuring a bridge and a waterfall. The bridge is a long, low-profile structure with a reddish-brown metal railing, spanning across a rocky gorge. Below the bridge, a waterfall cascades down a steep, rocky cliff face. The surrounding terrain is rugged, with rocky slopes and patches of green and yellow vegetation. In the background, more mountains rise, partially shrouded in mist or fog. The overall scene is a mix of natural beauty and infrastructure.

2. ASSET MANAGEMENT AT CDOT

CDOT's asset management goal is to achieve and sustain a state of good repair for the Department's assets over their life cycles at a minimum practicable cost. This goal aligns with the federally defined purpose of asset management.

The TAM Program is well-positioned to achieve its goal by virtue of its structure, its integration with strategic initiatives, and its collaboration with the program's executive Oversight Committee, the Colorado Transportation Commission, and local planning partners.

2.1 TAM PROGRAM PURPOSE

CDOT's mission is to provide the best multimodal transportation system that effectively and safely moves people, goods, and information. The TAM Program develops and implements risk-based strategies to ensure the Department's limited funding is applied to the right project, for the right asset, at the right time.

2.2 PERFORMANCE AND ASSET MANAGEMENT BRANCH

The Performance and Asset Management Branch (PAMB) leads CDOT's asset management, performance measurement, risk and resilience, and economic analysis programs. PAMB empowers CDOT's strategic planning and decision-making by providing tools to measure, analyze, forecast, and communicate the performance of the Department's asset programs and investment decisions to staff and transportation stakeholders. The PAMB's four programs are illustrated in **Figure 3**.

To fulfill these responsibilities, PAMB produces several reports required by statute, as well as voluntary reports and performance-measurement tools. PAMB's asset management efforts include activities that inform project selection and setting planning budgets for asset classes.

2.3 TAM RELATIONSHIP TO OTHER CDOT PLANNING PROCESSES

CDOT's *2045 Long Range Statewide Transportation Plan*, published in 2020, aligns with both National Performance Measures and the performance-based approach of PD 14.0, and its focus on the goals of improving asset management, mobility, and safety.

In addition, CDOT understands the importance of linking the TAM Program to broader CDOT planning processes to achieve common goals. Because TAM and Planning both consider long-term network outcomes, better coordination and linkage of life-cycle planning strategies (i.e., asset treatments) and their delivery through projects will increase the efficiency of project delivery and minimize the impact on the traveling public.

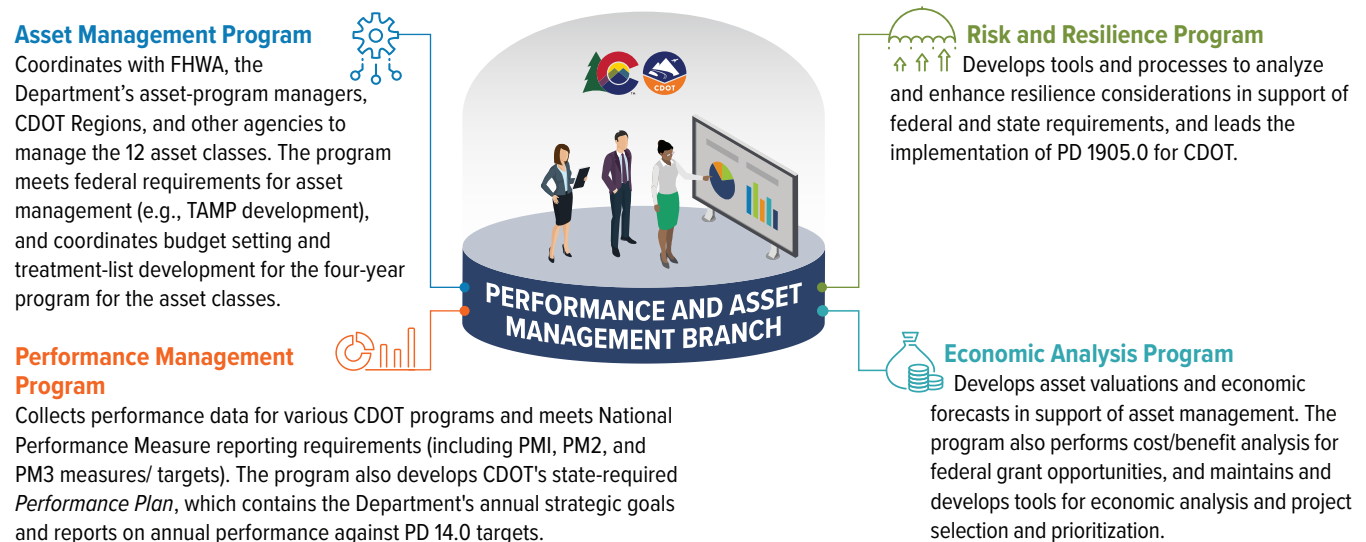
In May 2020, CDOT adopted a *10-Year Plan* that identifies transportation strategic investments across the state, ranging from long-deferred resurfacing projects to large and complex projects. The integration of this *10-Year Plan* with the TAM Program is the focus of several initiatives including:

» **10-Year Plan Integration in TAM Forecasting.**

Wherever possible, projects within the *10-Year Plan* are incorporated within CDOT's Asset Investment Management System (AIMS) model to account for any forecasted condition improvements, and also within the financial plan figures.

» **Tracking Treatments to Projects.** In collaboration with the Program Reporting and Transparency Office, the TAM Program is enhancing processes to track treatments from their initial programming on the four-year TAM treatment lists, through planning, design, procurement, and construction processes.

Figure 3 PAMB Structure



Linking systems across CDOT to track these treatments will help compare expected outcomes to actual outcomes.

2.4 TAM ORGANIZATIONAL STRUCTURE

The governance structure of the TAM Program, shown in **Figure 4**, includes the Colorado Transportation Commission, the Transportation Asset Management Oversight Committee (TAMOC) and the Transportation Asset Management Working Committee (TAM Working Committee).

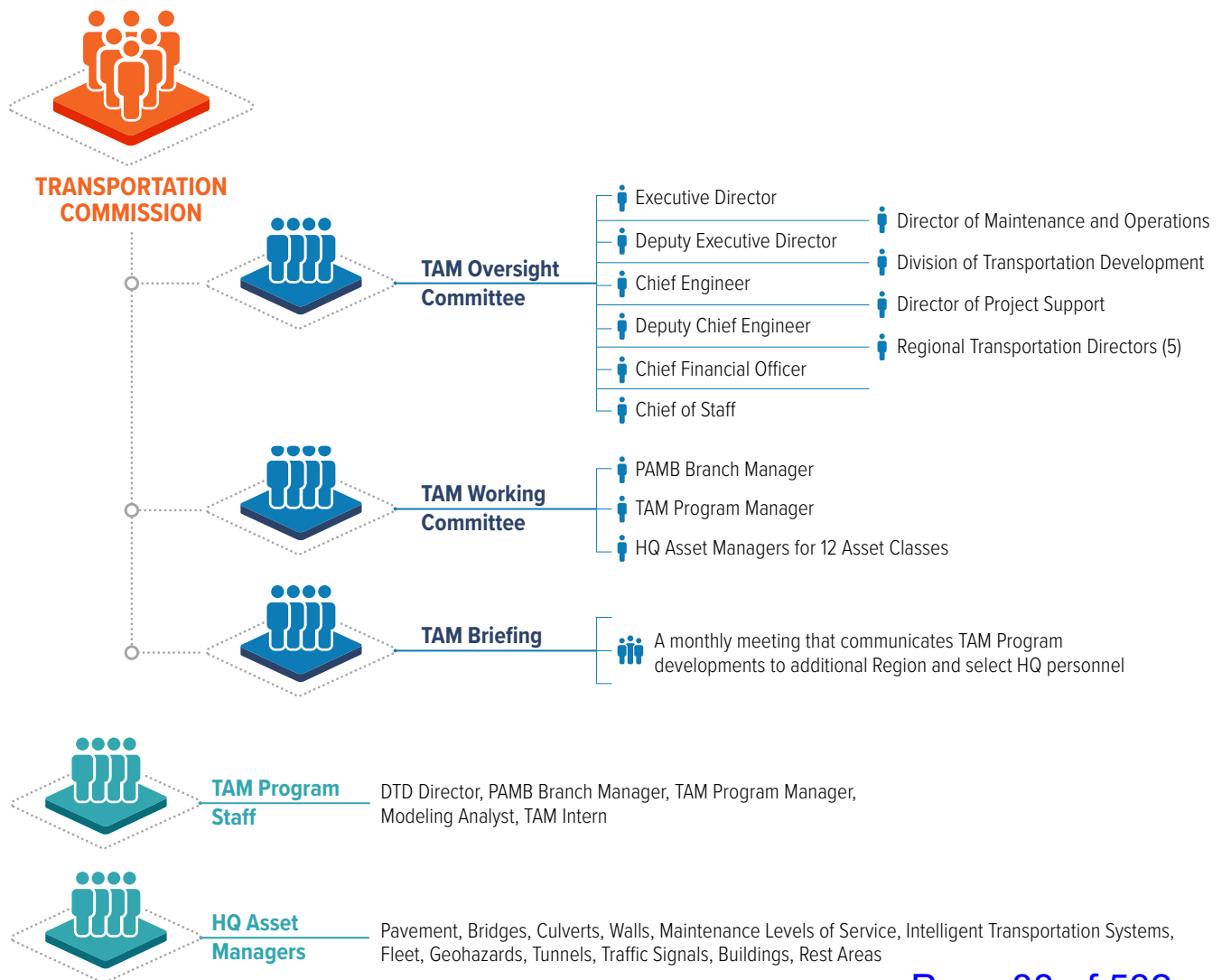
The Transportation Commission sets the program’s strategic direction by establishing policies and performance metrics and targets for PD 14.0, and by approving annual planning budgets for all asset programs. The TAMOC consists of the Executive Director, Deputy Director, Chief of Staff, Chief Engineer, Deputy Chief Engineer, Chief Financial Officer, Director of Transportation Development,

Director of Maintenance and Operations, Director of Project Support, and the five Regional Transportation Directors.

The TAMOC meets monthly and performs a variety of functions, including:

- » Establishing federal NPM targets.
- » Deciding the yearly TAM Cap, which is the total funding dedicated to the TAM Program each year. The cap is subsequently adopted (or modified) by the Transportation Commission.
- » Determining the funding distribution of the TAM Cap among the 12 asset classes. This distribution is subsequently adopted (or modified) by the Transportation Commission.
- » Designing the timeline and procedures for the TAM budget-setting process.
- » Deciding the process of approving and changing the TAM treatment lists.

Figure 4 CDOT Asset Management Organizational Structure



- » Approving and providing oversight on program documents, such as this TAMP.
- » Providing initial approval for performance metrics and targets for each asset program. Most of these metrics and targets are subsequently adopted or modified by the Transportation Commission as part of PD 14.0.

The TAM Working Committee is a staff-level group that refines asset management processes, develops new four-year treatment lists, maintains and operates asset-modeling systems, and implements other ideas that the TAMOC may introduce. This group includes asset managers for all 12 asset classes and a representative from the Office of Financial Management and Budget (OFMB). The TAM Working Committee works to liaise with the TAMOC and other groups within CDOT, both to obtain feedback on and build buy-in for TAM improvements, impacts, and benefits.

Once a month, Region, finance, and other staff who are less directly involved with the TAM Program attend a briefing on program events, projects, changes, and other updates. This session is another opportunity for TAM Working Committee members to inform and receive feedback.

2.4.1 PLANNING PARTNERS COORDINATION

CDOT and regional FHWA representatives communicate regularly with Colorado’s Metropolitan Planning Organizations (MPOs) about performance measures and targets, data collection, and asset management practices. This coordination happens through:

- » Statewide MPO Meetings at CDOT’s Headquarters, held monthly. These meetings allow for collaboration between CDOT and MPO staff on issues related to the state transportation program. Including regular updates on the performance of

the system (as measured through federal FAST Act performance measures), sharing of performance data, and collaboration on setting targets for federal performance measures.

- » Colorado Transportation Asset Management User Group (COTAMUG). This new group includes cities, counties, MPOs, CDOT, and others. The group discusses general asset management practices, including policy, software, and new ideas.

Coordination with planning partners includes the following data and information processes:

- » **Inventory and Condition Data.** CDOT works with MPOs to develop a coordinated data-sharing process and to ensure agreement on responsibilities. The Department collects pavement and bridge condition data for the full NHS, including assets owned by local agencies.
- » **Performance Measurement and Target Setting.** CDOT provides historical data on FHWA-required asset-management metrics to help MPOs understand performance trends, especially for bridges and pavement. CDOT has Memorandums of Understanding with each of Colorado’s five MPOs that outline the responsibilities of the state and MPOs related to National Performance Measures.
- » **Facilities Repeatedly Requiring Repair and Reconstruction Due to Emergency Events** (23 CFR 667). CDOT is working with local authorities to understand the data that is available to assess repeat damage on all public roads.

CDOT is currently participating in a joint process review with the FHWA Colorado Division to develop approaches to manage the performance of pavement and bridges on the NHS owned by other agencies. The aim of this effort is to establish a formal policy for the management of these NHS assets, such as what, if any, role the Department should have in managing performance.



3. PERFORMANCE MANAGEMENT



CDOT manages asset performance primarily through two performance frameworks: PD 14.0 and the national Transportation Performance Management (TPM) goals. PD 14.0's broad goal areas of asset management, safety, and mobility align with the national transportation goal areas.

3.1 FEDERAL TRANSPORTATION PERFORMANCE MANAGEMENT

The federal Moving Ahead for Progress in the 21st Century Act (MAP-21) and the Fixing America’s Surface Transportation (FAST) Act established TPM as a strategic approach that uses information to make investment and policy decisions to achieve national performance goals. As a result, federal National Performance Measures (NPMs) are expected to be integrated into the planning process and project prioritization at state departments of transportation (DOTs). DOTs are expected to invest in projects that achieve state targets for NPMs and contribute to the national goals.

The measures were established by the following laws and regulations:




- » 23 USC §150(b) established national goals and performance-management measures that transformed the Federal-aid highway program and provided a means to invest federal transportation funds most efficiently by focusing on performance.
- » 23 CFR Part 490 outlined the specific measures required for each state DOT to establish targets and report on a regular basis. Performance is monitored by the FHWA and the Federal Transit Administration (FTA) on a periodic basis, to determine whether the state DOT has made significant progress toward achieving its targets.

CDOT has incorporated the NPMs into its own performance framework, established in the current *Statewide Transportation Plan* and in PD 14.0. This incorporation demonstrates that CDOT’s priorities are intertwined with national performance priorities. Performance on the federal metrics is monitored through PD 14.0 “scorecards” and reporting to FHWA.

3.2 PERFORMANCE MANAGEMENT AT CDOT

The Transportation Commission adopted the updated PD 14.0 in 2020, thereby updating CDOT’s top performance goals. The revised goals measure success of the Department’s efforts to improve in safety, asset management, and mobility, and guide implementation of the multimodal *Statewide Transportation Plan*. The revised goals also support National Performance Measure goals for surface transportation. Additionally, the updated Policy



- **Safety**
The future of Colorado is zero deaths and serious injuries so all people using any transportation mode arrive at their destination safely.
- **Asset Management**
Maintain a high-quality transportation network by working to maintain a state of good repair for all assets and a highly traversable road network.
- **Mobility**
Reduce travel time lost to congestion and improve connectivity across all modes with a focus on environmental impact, operations, and transportation choice statewide.

Directive aligns performance targets with other key guiding policies, such as Colorado’s *Greenhouse Gas Pollution Reduction Roadmap* and HB19-1261 (“Climate Action Plan to Reduce Pollution”).

PD 14.0 establishes investment priorities for the Transportation Commission and provides the framework for how CDOT tracks and measures success in achieving those priorities. The following sections in this chapter provide more detail on the different PD 14.0 goals and how performance targets were developed. For asset management and safety, a summary of current performance is also included.

3.3 SAFETY PERFORMANCE

The performance targets for highway safety in PD 14.0 align with targets in the *2020-23 Colorado Strategic Transportation Safety Plan*. The development of the STSP is a collaborative, data-driven process that identifies achievable highway-safety targets for 2021-24. PD 14.0 targets apply to all roads in the state. (Targets related to CDOT employee safety are addressed in another document.)

To establish 2022 performance targets for safety, CDOT analyzed fatal-crash data going back to 2002, developed multiple models, created best-fit curves, and determined targets based on examination of the various predicted values. The fatality-rate target assumes that fatal crashes and vehicle miles traveled (VMT) are both increasing in the near term.

Contributing factors were considered, including population growth, increases in VMT, economic growth, potential funding changes, and legislative changes. All models indicated future increases in fatality rates. As a result, CDOT's short-term safety performance targets recognize an uptick in the fatality rate, and the need to continue focusing on programs that reduce crashes to achieve goals. The long-term vision for the state, captured in the *State Transportation Safety Plan*, is the aspirational goal of moving Colorado toward zero deaths.

Although forecast models using regression and exponential smoothing models were applied to predict 2022 numbers, the increase in fatalities and decrease in travel volume in the pandemic year of 2020 were deemed too uncertain to accurately project the number of fatalities and serious injuries in subsequent years. As a result, CDOT executive leadership directed that calendar 2019 numbers be used as the target for the 2018-22 five-year average.

Figure 5 presents the 2022 highway safety performance targets per PD 14.0 and National Performance Measures.

Figure 5 2022 Highway Safety Performance Targets Per PD 14.0 and Federal Requirements

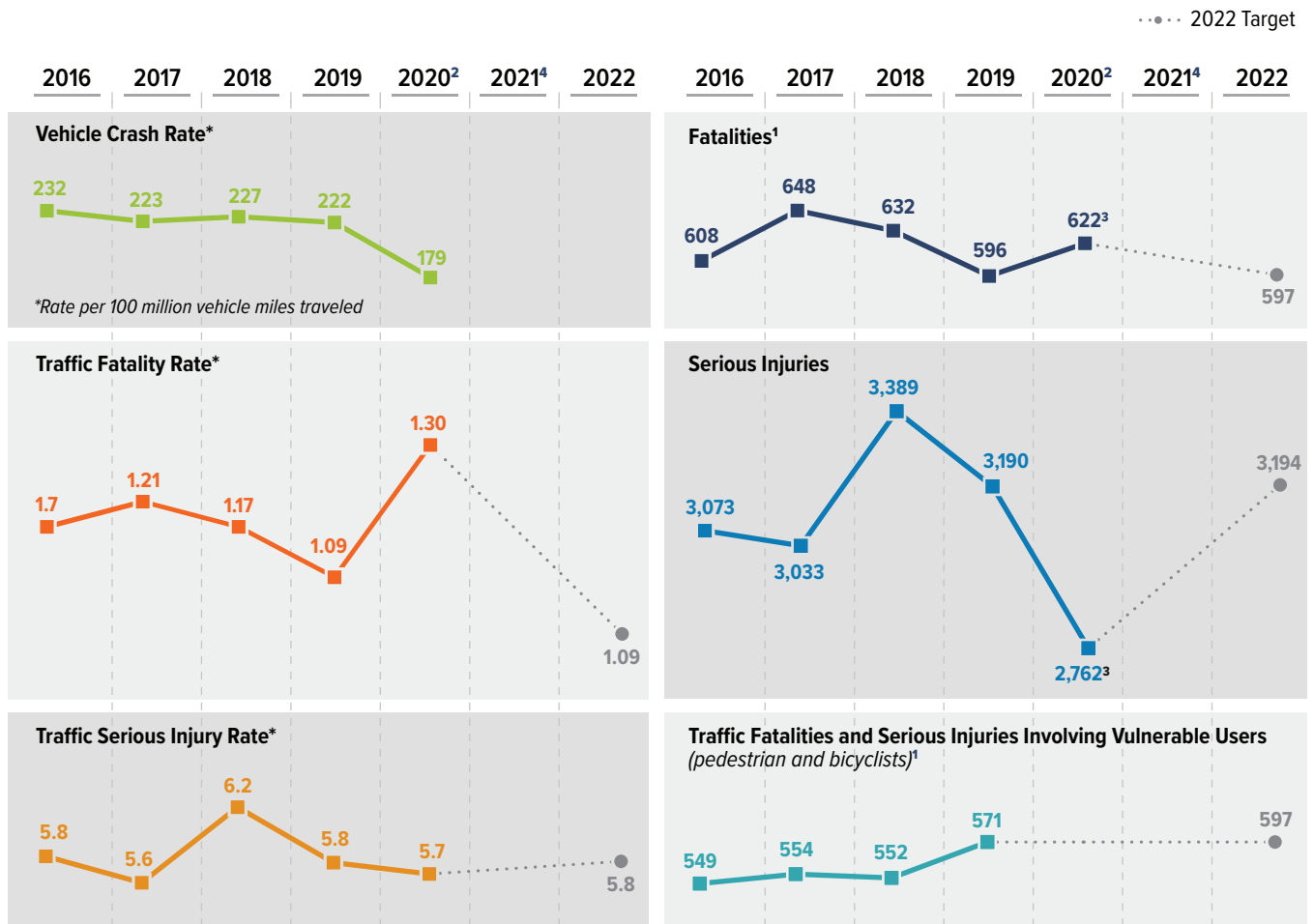


Figure 5 Notes:

¹ Measures aligned with FHWA Safety Performance Management measures. The number of fatalities and number of serious injuries are not listed in PD 14.0 but are tracked as part of federal reporting requirements and as an input to rate measurements.

² Annual performance figures shown here. Federal reporting considers five-year averages. Both numbers are reported here: <https://www.fhwa.dot.gov/tpm/reporting/state/safety.cfm?state=Colorado>

³ 2020 (pandemic year) is seen as having fatalities and serious injuries that do not follow recent trends.

⁴ 2021 data not yet available.

3.4 ASSET MANAGEMENT PERFORMANCE

CDOT’s performance targets for asset management, which are contained in PD 14.0, are intended to be achieved or maintained over 10 years (2021-30) and are aligned with federal requirements. The performance targets are used to help determine funding levels for each of the 12 asset classes within CDOT’s asset management program.

The performance targets were developed in part through analysis from the AIMS model. The Department regularly evaluates various investment

strategies produced by AIMS to determine which is best to meet performance targets. Based on the AIMS analysis, the Department may alter its existing strategy by adjusting treatments, funding levels, and condition targets to help close performance gaps.

Performance targets per PD 14.0 and the 2021 performance levels for asset classes in the TAM Program are summarized in **Table 1**. Further discussion on these targets, along with current and future performance, is provided in the remainder of this TAMP for pavements and bridges, and within the Asset Plan Appendix for other assets.

Table 1 Asset Management Performance Targets Per PD 14.0

Asset Class	Unit	2021 Inventory	PD 14.0 Performance Measure	Target	2021 Performance (unless stated)
Pavement	Lane Miles	23,016	Percent with high or moderate Drivability Life	80%	All 2020: 89% Interstate, 82% NHS, 79% State Highway System
Bridges	Number of State-Owned Bridges	3,464	Percent deck area on NHS and State Highway System in good condition, and percent deck area in poor condition. ¹	40% or > in good condition	37.3% NHS, 37.1% State Highway System
				10% or < in poor condition	5.1% NHS, 5.6% State Highway System
Maintenance Levels of Service (MLOS)	N/A	N/A	Level of Service for State Highway System	MLOS B- grade	C-
Buildings	Number of Buildings	1,009	Average Statewide Letter Grade	85% C or better	49% Graded C or Better
ITS	Number of Devices	3,709	Average percent of life expended	90% or below	70%
Fleet	Number of Vehicles	3,219	Average percent of life expended	75% or below	69%
Tunnels	Length in Miles, Number of Tunnels	7 miles (approx.), 20 tunnels	Percent of tunnel length (all elements) in equal or better condition than 2.5 weighted condition index	75% or above	39% (2020)
Culverts	Number of Culverts	5,946	Percent rated poor	5% or below	5.4 %
Geohazards	Hazardous Road Segments	3,437	Percent of segments at or above risk grade B	85% or above	75%
Signals	Signals Assemblies	1,852	Percent of signal infrastructure in severe condition	2% or below	7%
Walls	Square Feet	14 million	Percent of CDOT-owned walls, by square foot, in poor condition (have a rating of 4 or less)	2.5% or below	3.5%
Rest Areas	Number of Sites	26	Average Statewide Letter Grade	90% C or better	63% C or Better

PD 14.0 also sets out performance measures and targets for transit assets that align with FTA requirements.

¹ See Bridge section for secondary measures.

3.4.1 NATIONAL PERFORMANCE MEASURE TARGETS

The Department’s current FHWA National Performance Measure (NPM) targets for the NHS are listed in **Table 2**. Further discussion on the differences between the two pavement measures (Drivability Life and NPM) is included in Section 4.2.2 (Page 17).

Table 2 NHS National Performance Measure Targets

Asset Class	FHWA National Performance Measure Targets
Pavement	2-Year target (2024) 45% Good, 4% Poor
	4-Year target (2026) 47% Good, 3.5% Poor
Bridge	2-Year target (2024) 36% Good, 4% poor
	4-Year target (2026) 36% Good, 4% Poor

3.5 MOBILITY PERFORMANCE

PD 14.0 requires CDOT to coordinate and collaborate with internal and external partners to achieve mobility goals in Colorado. Through this collaborative approach, CDOT will take actions to fulfill the goals outlined within the Department’s Greenhouse Gas Pollution Reduction Roadmap.

PD 14.0 performance targets within the mobility goal area are intended to be achieved during the 2021-30 timeframe. A portion of the targets within the goal area are aligned with the CDOT *Greenhouse Gas Pollution Reduction Roadmap*, and HB19-126—Climate Action Plan to Reduce Pollution. Other targets within the goal area help increase reliability of the State Highway System and increase the use of multimodal travel statewide. The mobility performance measures cover a wide range of items and are not included here in detail. The areas of focus covered by mobility include:

- » Reliability and congestion
- » Environmental impact
- » Multimodal options

CDOT provides an annual update to the Transportation Commission on PD 14.0 measures.

3.5.1 NATIONAL PERFORMANCE MEASURE TARGETS

In addition to PD 14.0 mobility targets, CDOT defines National Performance Measure targets for System Reliability and Congestion Mitigation and Air Quality

(CMAQ). These targets were established by using forecasts from the National Performance Management Research Data Set (NPMRDS), supplemented with Highway Performance Monitoring System (HPMS) data, CDOT Online Transportation Information System (OTIS) traffic volumes, and short-term vehicle class counts.

To establish Congestion Mitigation and Air Quality (CMAQ) targets, CDOT reviewed the emission-reduction benefit from previous years to establish the targets for each emission-reduction benefit that must be reported.

3.6 COORDINATION, REPORTING, AND IMPLEMENTATION

CDOT works closely with MPOs to establish, report, and implement Colorado’s performance targets for National Performance Measures. A summary of the coordination process for target setting for each goal area is as follows:

- » **Safety**—Four of the five MPOs in the state chose to support the state targets for the past four target-setting periods (i.e., 2019, 2020, 2021, 2022). The Denver Regional Council of Governments (DRCOG) chose to establish its own targets for each of the safety performance measures within its MPO boundary for each year.
- » **Asset Management**—All MPOs in Colorado chose to support the state targets for pavement and bridge condition, including the original targets in 2018 and target revisions in 2020.
- » **Mobility**—All MPOs in Colorado chose to support the state targets for the system reliability and congestion metrics. Only three of the five MPOs are in nonattainment or maintenance with regards to national ambient air quality standards pollutants in the state. DRCOG and North Front Range MPO were federally required to establish specific targets for projects administered and to establish targets (in conjunction with CDOT) for traffic congestion measures.

Section 2.4.1 discussed MPO coordination for delivering asset management outcomes for the NHS and the broader transportation network.

23 CFR 490 requires state DOTs and MPOs to establish performance targets for the National Performance Measures.

4. ASSET INVENTORY AND CONDITION

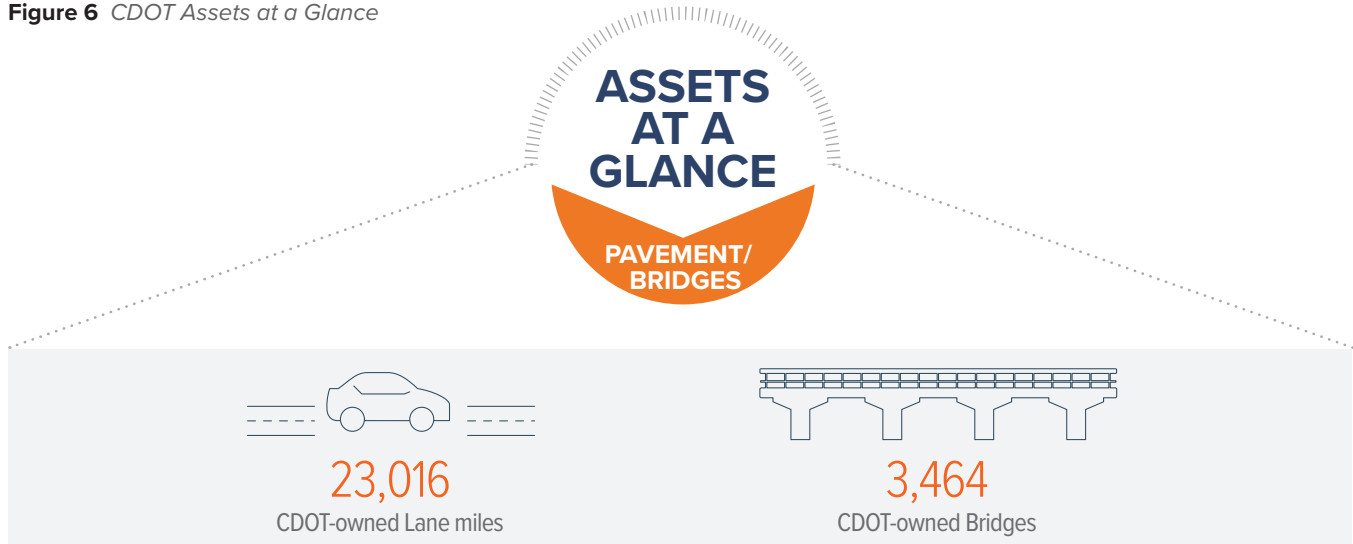


CDOT strives to make informed, data-driven decisions across all assets and has recently adopted this approach as agency policy. Policy Directive 1609.0 requires the Department's 12 asset programs to maintain an inventory, condition information, performance metrics, and performance targets. While bridge and pavement assets are in relatively good condition, CDOT's models are forecasting a need for higher investment levels to avoid a decline in condition.

4.1 ASSETS AT A GLANCE

Pavement and bridge assets reach every corner of the state—crossing the continental divide, spanning lakes and rivers, and connecting Coloradans to seven neighboring states. Pavements and bridges form the backbone of the highway system and are the system’s highest-valued assets in terms of replacement cost. **Figure 6** summarizes CDOT’s inventory of pavement and bridge assets.

Figure 6 CDOT Assets at a Glance



This chapter provides details on the process, performance measures, targets, and current inventory and condition data for pavements and bridges. Details for other assets are included within the Asset Plan Appendix.

4.2 PAVEMENT

Since 1991, CDOT has collected pavement condition data annually—between January and June—to understand the physical conditions of the roadway network. The Department uses an outside vendor to collect high-speed, automated pavement-condition data for the full CDOT pavement network, including the full National Highway System (NHS) and Highway Performance Management System (HPMS) sample segments. In collaboration with CDOT staff, the vendor collects data and performs quality management consistent with federal requirements. Historically, CDOT collected data for its internal performance measures: Remaining Service Life (RSL), and as of 2013, Drivability Life (DL). As federal requirements have changed over time, CDOT has expanded the data it collects. Currently, the primary data collected aligns with the pavement condition metrics in FHWA regulations. This includes International Roughness Index data, cracking percent, rutting, and faulting (23 CFR 490.311), and others including surface type and section location (23 CFR 490.309(c)). CDOT uses this historical condition data to develop deterioration models and predict future conditions.

CDOT has developed standard protocols and quality-management procedures to meet the

reporting requirements for both the federal National Performance Measure and the CDOT Drivability Life metric. The quality-management process involves activities such as the specification of data-collection protocols, quality criteria, personnel responsibilities, quality control, quality acceptance, corrective action, and quality-management documentation. The standard protocols followed by CDOT for the four pavement-condition metrics required by FHWA regulations (23 CFR 490.311) are documented in the Department’s Pavement Data Quality Management Plan (QMP).

4.2.1 INVENTORY

CDOT owns and maintains 23,016 lane miles of highways as of 2020. Lane miles are calculated by measuring the centerline length of a road and multiplying that number by the total number of lanes on the road. CDOT’s highways include 15,491 lane miles of pavement on the NHS and 9,500 lane miles of pavement not on the NHS. FHWA only requires NHS pavement to be included in the TAMP. CDOT-owned NHS comprises 4,164 lane miles of Interstate system and 9,352 lane miles of non-Interstate NHS. Local agencies own and maintain an additional 1,975 lane miles of the non-interstate NHS. CDOT

exclusively owns and maintains the Interstate pavement, while CDOT coordinates with other municipalities and counties to operate the non-Interstate NHS pavement. Thus, CDOT owns 87 percent of pavement on the NHS (13,516 lane miles) in Colorado, while local agencies own the remaining 13 percent. **Figure 7** summarizes CDOT’s owned lane miles and NHS lane miles, both CDOT and locally owned.

Table 3 below presents a breakdown of locally owned NHS pavement inventory and condition within each Colorado MPO jurisdiction.

4.2.2 PERFORMANCE MEASURES

In this TAMP, CDOT assesses NHS pavement condition using two approaches. The first approach uses an internal performance metric, Drivability Life. The second approach uses National Performance Measures that evaluate NHS pavement in terms of the percentage of lane miles classified as being in Good or Poor condition.

CDOT Drivability Life

The first approach to reporting pavement performance is CDOT’s internal measure of Drivability Life. CDOT has assessed pavement network conditions using Drivability Life since 2013. Drivability Life combines similar distresses used for computing the FHWA National Performance Measures and incorporates additional distresses (e.g., corner breaks for concrete pavements only, as well as additional asphalt pavement distresses such as longitudinal

DRIVABILITY LIFE CATEGORIES

CDOT Internal Measures used to assess CDOT Pavement Network Condition:

HIGH: DL ≥ 11 YEARS

MODERATE: DL = 4–10 YEARS

LOW: DL ≤ 3 years

Figure 7 Colorado Highway Network Breakdown (lane miles)

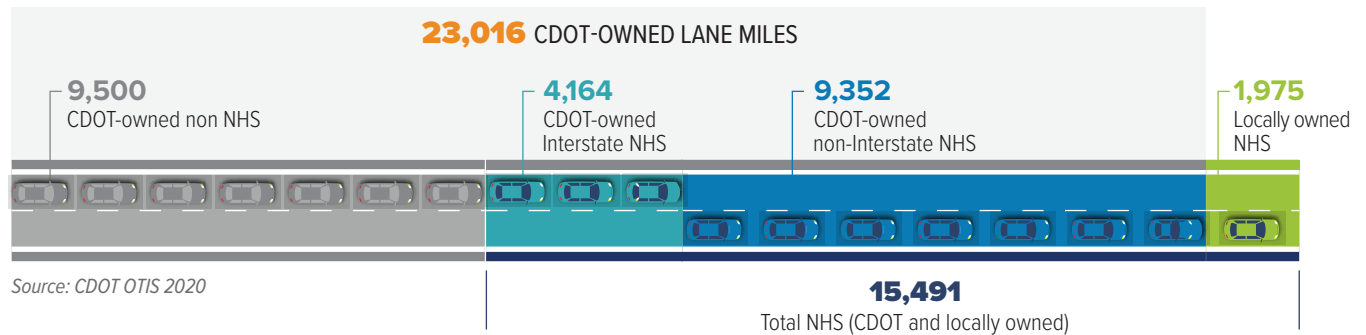


Table 3 Inventory of Locally Owned NHS Pavement and 2020 Condition

Agency	Good	Fair	Poor
<i>Denver Regional Council of Governments—Centerline Miles</i>	32.3	242.5	37.7
Lane miles	126.1	986.1	141.2
Percent of lane miles	10.0%	78.7%	11.3%
<i>Pikes Peak Area—Centerline Miles</i>	45.6	120.9	10.5
Lane miles	171.3	480.5	35.8
Percent of lane miles	24.9%	69.9%	5.2%
<i>Pueblo Area—Centerline Miles</i>	0.9	0.7	0.4
Lane miles	1.8	1.3	0.8
Percent of lane miles	45.9%	33.7%	20.4%
<i>Grand Valley—Centerline Miles</i>	0	1	0
Lane miles	0	2.8	0
Percent of lane miles	0%	100%	0%

and transverse cracking). However, Drivability Life communicates different information and uses different distress thresholds than the National Performance Measures. Drivability Life is an indication in years of how long a highway segment will have acceptable driving conditions based on an assessment of pavement distresses that measure smoothness and safety. Drivability Life implements traffic-based highway categories, associated category drivability condition standards, and allowable pavement treatments. Unacceptable driving conditions are specific to each traffic-based highway category and means drivers must reduce speeds to compensate for poor conditions, navigate around damaged pavement, or endure intolerably rough rides. There are three categories of Drivability Life: High (greater than 10 years of Drivability Life remaining); Moderate (four to 10 years remaining); and Low (three or fewer years remaining).

National Performance Measure (NPM)

The second method for reporting pavement performance uses the National Performance Measure for pavement, which is how FHWA monitors states' progress toward meeting federally required performance targets for the NHS. CDOT calculates the federal measure using the following distresses: International Roughness Index (IRI), rutting (asphalt pavements only), faulting (concrete pavements only), and cracking percentage. To calculate the performance of a particular pavement section, CDOT combines the four distresses in accordance with FHWA-established condition [thresholds](#). **Figure 8** shows the thresholds².

Figure 8 Federal Pavement Metric Thresholds

	Good	Fair	Poor
IRI (inches / mile)	<95	95-170	>17
Cracking Percent (%)	<5	CRCP*: 5-10 Jointed Concrete: 5-15 Asphalt: 5-20	>10 >15 >20
Rutting (inches)	<0.20	0.20 - 0.40	>0.40
Faulting (inches)	<0.10	0.10 - 0.15	>0.15

* CRCP = Continuously Reinforced Concrete Pavement

NATIONAL PERFORMANCE MEASURES FOR PAVEMENT

Used to assess National Highway System pavement:

% INTERSTATE IN GOOD CONDITION

% INTERSTATE IN POOR CONDITION

% NON-INTERSTATE NHS IN GOOD CONDITION

% NON-INTERSTATE NHS IN POOR CONDITION

Use of CDOT Drivability Life and FHWA's National Performance Measures

Figure 9 shows the different distresses and criteria used in computing National Performance Measures and Drivability Life. The key distinction between the two metrics is that for a pavement segment to be classified as Low Drivability Life, *only one* of the distresses (IRI, rutting, transverse cracking, longitudinal cracking, fatigue cracking, or corner breaks) needs to be rated as Low. In contrast, under the National Performance Measures, a segment is classified as Poor if *two or more* distresses (IRI, cracking percent, and rutting or faulting) are Poor. This difference leads to fewer segments classified as Poor when using the national measures than are classified as Low under Drivability Life.

² US 49 CFR 1.85 Part 490 – National Performance Management Measures

Figure 9 Comparison of Drivability Life and National Performance Measures

CDOT Drivability Life Metric Pavement Condition Assessment	FHWA Good/Fair/Poor Metric Pavement Condition Assessment
<p>Pavement Distresses</p> <ul style="list-style-type: none"> » International Roughness Index (IRI) » Rutting » Cracking (each cracking distress is subdivided into High, Moderate, and Low severity based upon crack widths) <ul style="list-style-type: none"> – Fatigue (Asphalt only) – Transverse – Longitudinal – Corner break (Concrete only) <p>Criteria: To have Low DL segment, one distress must fall below an acceptable threshold.</p>	<p>Pavement Distresses</p> <ul style="list-style-type: none"> » International Roughness Index (IRI) » Rutting (Asphalt only) » Faulting (Concrete only) » Cracking <ul style="list-style-type: none"> – Percent wheel path cracked for asphalt – Percent slabs cracked for concrete <p>Criteria: To have a poor segment, two distresses must fall below an acceptable threshold.</p>

CDOT continues to use Drivability Life as the primary driver for pavement management and resource allocation, while using the National Performance Measures to meet federal reporting requirements.

4.2.3 TARGET SETTING

Table 4 shows PD 14.0 condition targets for pavement versus 2020 performance. CDOT achieved most targets for each measure. The table indicates how targets for Drivability Life are specific to the type of roadway, based on functional classification. Green indicates the target was achieved; red indicates the opposite.

2020 data has been used for pavements within this TAMP.

4.2.4 CONDITION

Under National Performance Measures, 46.3 percent of the Interstate NHS pavement was in Good condition in 2020, while 49.8 percent was in Fair condition, and 3.9 percent was in Poor condition. Additionally, 41.7 percent of non-Interstate NHS pavement was in Good condition, 55.0 percent was in Fair condition, and 3.3 percent was Poor. Under the FAST Act, there is a minimum performance level for Interstate pavement condition in Poor condition. If a state exceeds 5 percent Poor, they lose flexibility of a portion of federal funds. Specifically, they must obligate a set amount of funds to eligible projects on pavements on the Interstate until the condition exceeds the minimum standard. To date, CDOT has avoided this restriction.

Using CDOT’s Drivability Life metric, about 89 percent of the Interstate NHS had High or Moderate Drivability Life, and 11 percent had Low Drivability Life. At 89 percent High or Moderate Drivability Life, CDOT’s Interstate pavement condition is nine percentage points more than the state’s PD 14.0 target of 80 percent. This indicates that CDOT is making significant efforts to make the best use of resources to maintain the system in a state of good repair. In addition, about 29 percent of non-Interstate NHS pavement had High Drivability Life, 53 percent had Moderate Drivability Life, and 18 percent had Low Drivability Life. Thus, CDOT achieved the PD 14.0 targets for the NHS while also being close to meeting the State Highway targets.

Table 4 CDOT PD 14.0 Measures for Pavement—Drivability Life

Asset	Measure	2020 Performance	Target
Pavement Percentage high/moderate Drivability Life	Interstate	89%	80% or greater
	CDOT-owned NHS (excluding Interstates)	82%	80% or greater
	State Highway System (including Interstate and CDOT-owned NHS)	79%	80% or greater



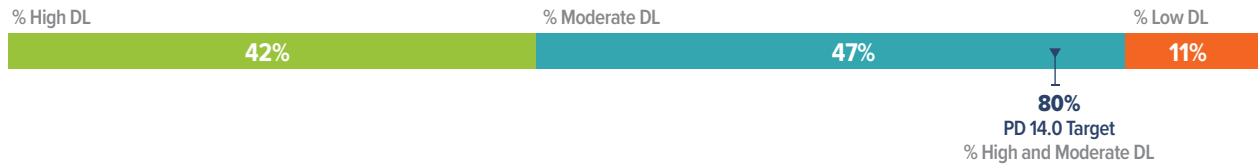
Figure 10 summarizes the current FHWA and CDOT pavement condition ratings along with the number of lane miles in each classification for each condition category.

Figure 10 CDOT Pavement Current Condition Snapshot

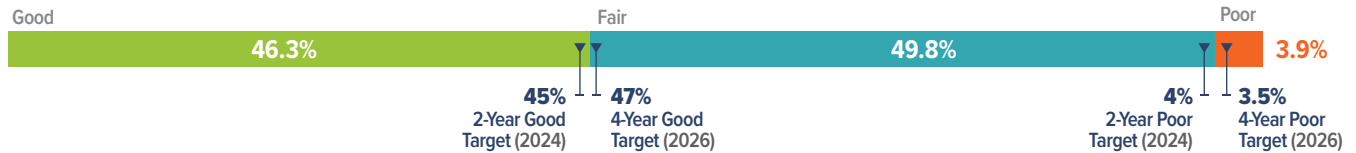
Interstate and Non-Interstate NHS performance targets are currently being met for Drivability Life. For the overall State Highway System, condition is one percentage point behind the DL target. CDOT is on track to meet National Performance Measure targets.

INTERSTATE NHS

Drivability Life 2020 Condition

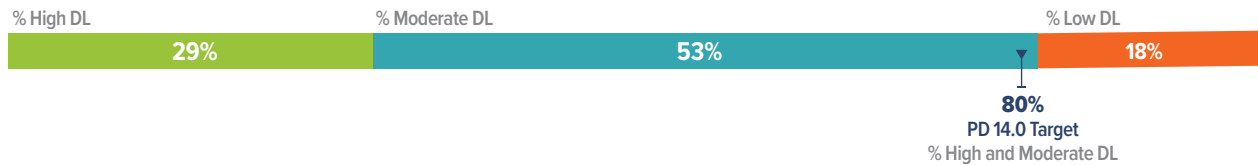


National Performance Measures 2020 Condition

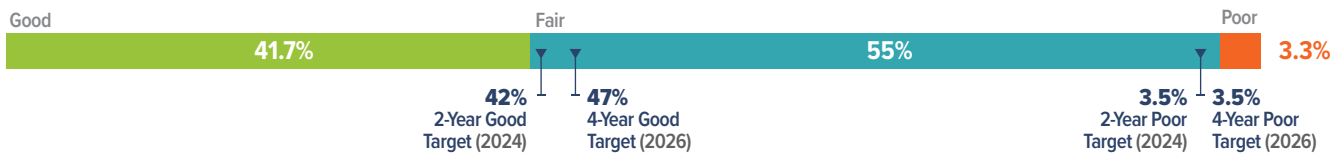


NON-INTERSTATE NHS

Drivability Life 2020 Condition

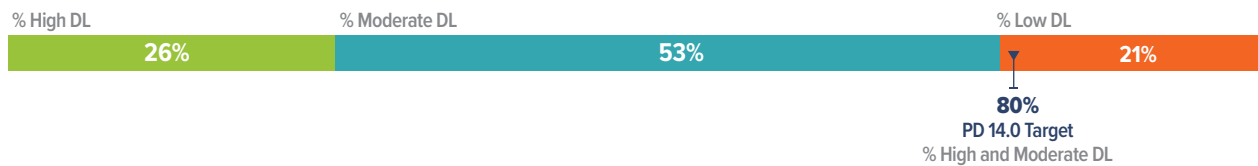


National Performance Measures 2020 Condition



CDOT STATE HIGHWAY SYSTEM

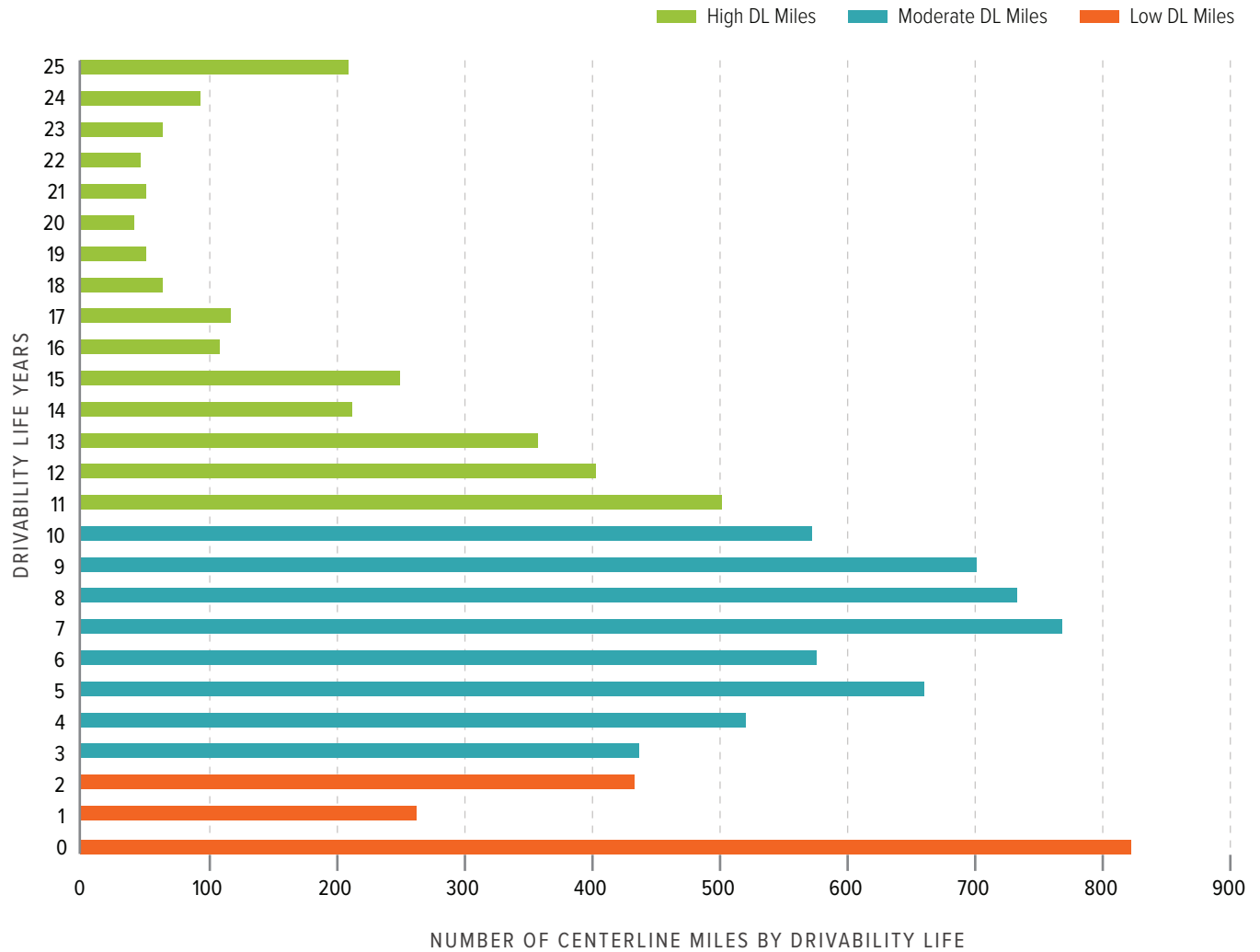
Drivability Life 2020 Condition



Although CDOT is meeting many of its pavement targets, challenges remain. **Figure 11** illustrates that about 50 percent of the network currently has Moderate Drivability Life. About 30 percent of the network rated moderate is forecasted to deteriorate to Low Drivability Life within four years.

Figure 11 CDOT Current Pavement Condition Drivability Life Profile

50% of lane miles are in moderate condition. Many of these (30% over the next 4 years) are expected to fall into low condition.



4.2.5 CONDITION TRENDS

Figure 12 shows the historic performance trend of the different classes of pavements according to Drivability Life. Generally, state highway pavement conditions have improved over time.

Such condition trends provide insight into future performance. CDOT uses these trends, projected funding, expert knowledge, and decision-support tools to establish performance targets. In 2022, the Department has updated its 2024 (two-year) and 2026 (four-year) performance targets for the National Performance Measures. Drivability Life metrics have also been reassessed as part of this process (Drivability Life metrics were originally established in 2013). See Section 3 for more information on setting targets and how they relate to investment decisions.

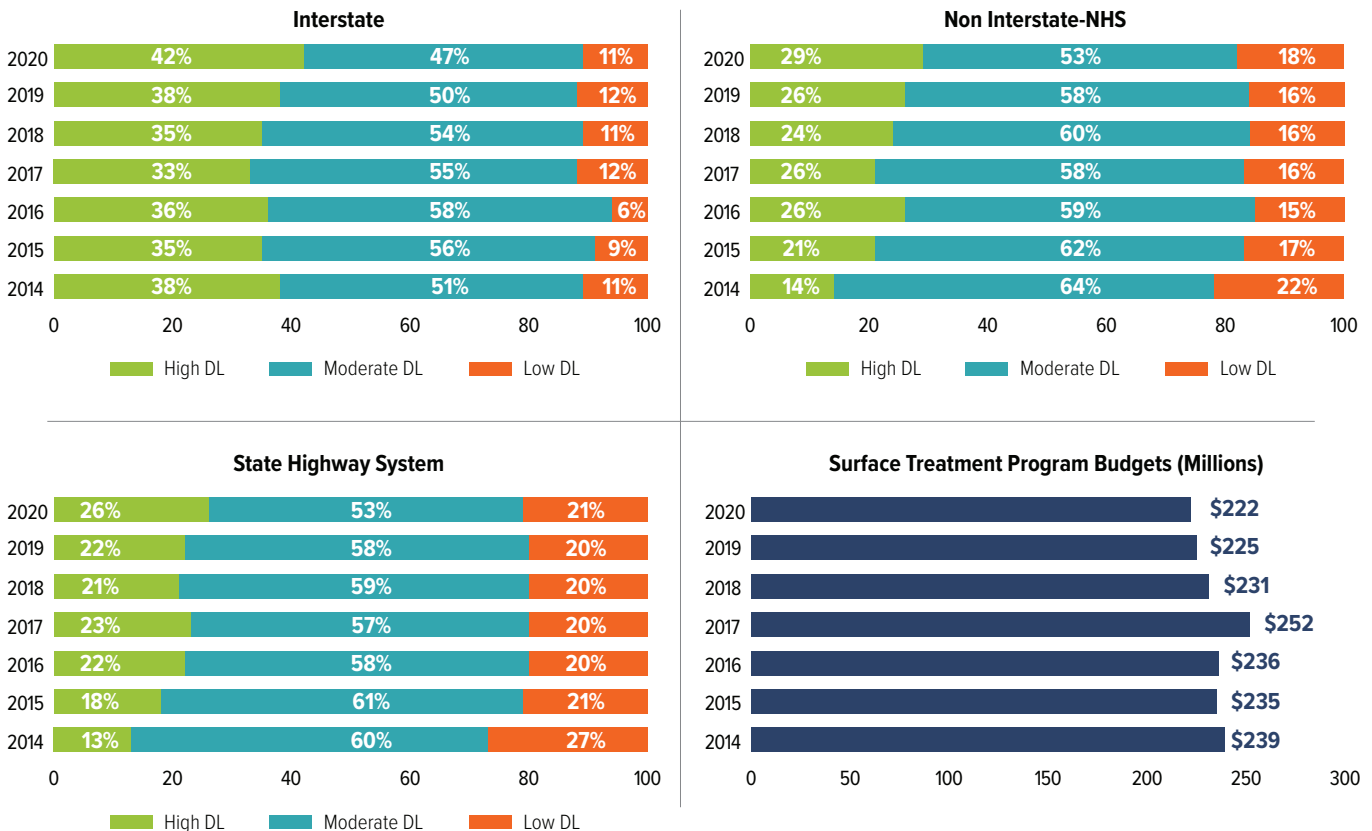
4.3 BRIDGES

Bridges are referred to within CDOT as Major Structures, which are defined as vehicular bridges or culverts with a clear opening of greater than 20 feet along the direction of the roadway³.

CDOT inspects the condition of major bridges and major culverts according to National Bridge Inspection Standards (NBIS). The NBIS provides standards for inspecting and rating the nation's bridges based on materials and the physical condition of the deck, superstructure, and substructure of bridges, and the overall condition of culverts. As required by federal regulations, structures subject to the NBIS are inspected at least once every two years, although they may be inspected more frequently if the structure is deemed a risk by the bridge inspection manager. In addition, the inspection interval may be up to four years with written FHWA approval.

Figure 12 Condition Trends for Colorado Pavements Using Drivability Life Metric and Historical Investments

The amount of Good pavements has increased since 2014. For Interstate pavement the amount of Poor pavements has increased since 2015. For the Non-Interstate NHS and State Highway System the amount of Poor pavements has remained constant.

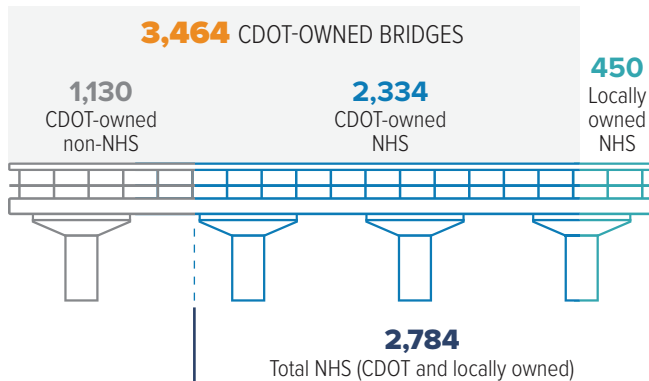


³ An opening may be between abutments, spring lines of arches, extreme ends of openings for multiple boxes, or extreme ends of openings for multiple pipes.

4.3.1 INVENTORY

CDOT owns and maintains 3,464 bridges with about 34.2 million square feet of bridge deck area as of 2021. There are 2,784 bridges on the NHS in Colorado. CDOT owns 2,334, or 84 percent, of the bridges on the NHS, while the other 16 percent of NHS bridges are locally owned, as shown in **Figure 13** and **Table 5**.

Figure 13 CDOT and NHS Bridges in Colorado



The Department has two bridge programs:

- » **The Colorado Bridge Preservation Program (Staff Bridge)** inspects, maintains, repairs, rehabilitates, and replaces CDOT’s major structures.
- » **The Statewide Bridge and Tunnel Enterprise (BTE)** finances, repairs, reconstructs, and replaces designated Poor-rated major structures.

The Colorado Bridge Enterprise (CBE) was formed in 2009 as part of the state’s Funding Advancement for Surface Transportation and Economic Recovery (FASTER) legislation (SB 09-108). In 2021, the passage of the Sustainability of the Transportation System legislation (SB 21-260) expanded the existing CBE to include surface transportation projects for tunnels and renamed the expanded enterprise as the Statewide

Bridge and Tunnel Enterprise (BTE). BTE operates as a public-private enterprise within CDOT, with the Colorado Transportation Commission serving as the BTE Board. The majority of CDOT’s bridges are managed by CDOT’s bridge unit (Staff Bridge), while the BTE manages structures where ownership has been transferred to the state-run enterprise, as described below.

The business purpose of the BTE is to finance, repair, reconstruct, and replace bridges with a Poor rating and then maintain those bridges. Bridges with a Poor rating are eligible for BTE funding and are transferred to BTE after project completion (for replacement structures) or prior to construction (for rehabilitation projects). While the bridges remain state-owned, direct control and maintenance of the structures becomes the responsibility of the BTE. There are currently 110 BTE assets, of which 68 are on the NHS. BTE has its own prioritization process for selecting which Poor-rated, CDOT-owned bridges it will rehabilitate or replace.

4.3.2 PERFORMANCE MEASURES

Based on federal guidelines, CDOT assigns structures an overall condition of Good, Fair, or Poor according to the following criteria:

- » For bridges: the minimum NBIS condition rating of the deck, superstructure, or substructure.
- » For culverts: the NBIS condition rating.

If the NBIS rating is four or below for any of the three bridge components or for the culverts rating, the structure is classified as Poor (See **Figures 14 and 15**). Bridges in Poor condition are classified as Structurally Deficient, but this does not mean the bridge is unsafe. It is important to note that the conditions of Poor and Structurally Deficient are now synonymous, despite historically having different definitions.

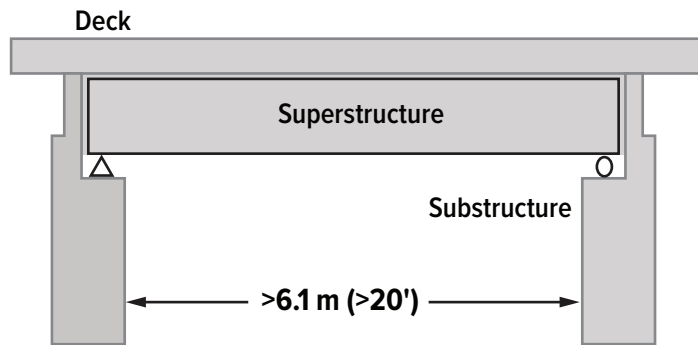
Table 5 CDOT and NHS Bridge Ownership

Asset	Number	Deck Area (square feet)
CDOT-owned Bridges	3,464	34.2 million
NHS Bridges (owned by CDOT, and local agencies)	2,784	32.4 million
CDOT-Owned NHS Bridges	2,334	26.9 million
CDOT “Staff Bridge” Unit	2,266	25.7 million
Statewide Bridge and Tunnel Enterprise (BTE)	68	1.2 million
Local Agency NHS Bridges	450	5.5 million

Source: National Bridge Inventory for CDOT, 2021

Figure 14 CDOT Major Structures, Including NBIS Bridge Components

BRIDGES



CULVERTS

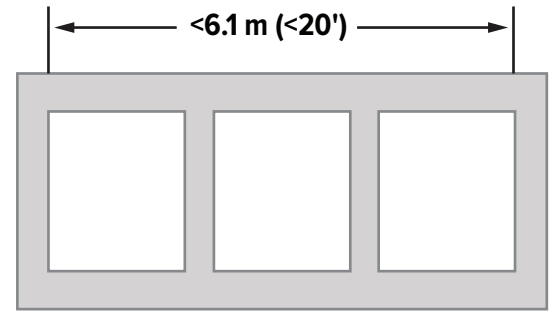


Figure 15 National Bridge Inspection Rating Scale



CDOT must establish performance targets for and report bridge conditions according to National Performance Measures standards. FHWA requires state DOTs to report the percentage of bridge-deck area on the NHS in Good condition and Poor condition.

Under the FAST Act, there is a minimum performance level for bridge condition on the NHS in Poor condition (see 23 USC 119 (f)(2)). **No more than 10 percent of bridge deck area on the NHS may be classified as Poor.** If a state exceeds this minimum condition threshold, the state can lose flexibility on how to use a portion of federal funds. Specifically, the state must then obligate a set amount of funds to eligible projects on bridges on the NHS

until the condition exceeds the minimum standard. As of October 2021, 5.1 percent of deck area on the NHS is rated Poor in Colorado—well under the 10 percent threshold.

4.3.3 TARGET SETTING

In addition to the national goals, CDOT maintains internal metrics and goals for bridges in the Department’s Policy Directive 14.0 (PD 14.0). PD 14.0 contains broad goals and specific performance targets set by the Transportation Commission that guide the distribution of CDOT’s financial resources. Goals in the directive align with MAP-21 National Performance Areas, such as infrastructure condition. The Department’s infrastructure goals for all asset categories is “to preserve the transportation infrastructure condition to ensure safety and mobility at a least life cycle cost.” The goal is consistent with risk-based asset management practices.



Table 6 shows the PD 14.0 performance targets for bridges, beginning with the condition measures, followed by related bridge metrics for preservation, risk, and freight movement.

Table 6 CDOT PD 14.0 Performance Targets

Performance Measure		Current Performance (2021)	Target	Performance Gap (Current State vs. Target)	
Condition	National Highway System	Percent of bridge deck area in good condition ¹	37.3%	40%	-2.7 % points
		Percent of bridge deck area in poor condition ¹	5.1%	10%	+4.9 % points
	CDOT-owned bridges	Achieve or maintain the percent of total bridge deck area in good condition at or above	37.1%	40%	-2.9 % points
		Achieve or maintain the percent of total bridge deck area in poor condition below ²	5.6%	10%	+4.4 % points
Preservation Treatments		Percentage of expansion joints in Fair, Poor, or Severe condition (by length) on CDOT-owned bridges	43.4%	26% or less	-17.4 % points
		Percentage of CDOT-owned bridge deck area that is unsealed or otherwise unprotected	33.8%	35% or less	+1.2 % points
Risk Mitigation		Percentage of CDOT-owned bridges over waterways that are scour critical	5.5%	5.0%	-0.5 % points
		Percentage of bridge crossings over Interstates, U.S. routes and Colorado state highways with a vertical clearance less than the statutory maximum vehicle height of 14-feet-6-inches	2.0%	1.0%	-1.0 % point
		Percentage of bridge crossings over Interstates, U.S. routes and Colorado state highways with a vertical clearance less than the minimum design requirement of 16-feet-6-inches	19.8%	18.0%	-1.8 % points
		Percentage of CDOT-owned bridges with a load restriction	2.4%	0.9%	-1.5 % points
		Percentage of CDOT-owned bridges posted for load	0.4%	0.1%	-0.3 % points

Source: National Bridge Inventory for CDOT 2021

¹ Measures aligned with FHWA National Performance Measures.

² Primary measure as the basis for performance modeling and budget setting.

Good and Fair bridges are prioritized for joint and deck membrane treatments during the project-selection process. Ideally, treating joints and decks in a timely fashion will maximize the life-cycle and condition of Good structures at the optimal costs. Poor bridges are addressed primarily through BTE. Scour, height-restricted, and load-restricted structures are monitored as risk metrics. These structures are addressed as funding allows.

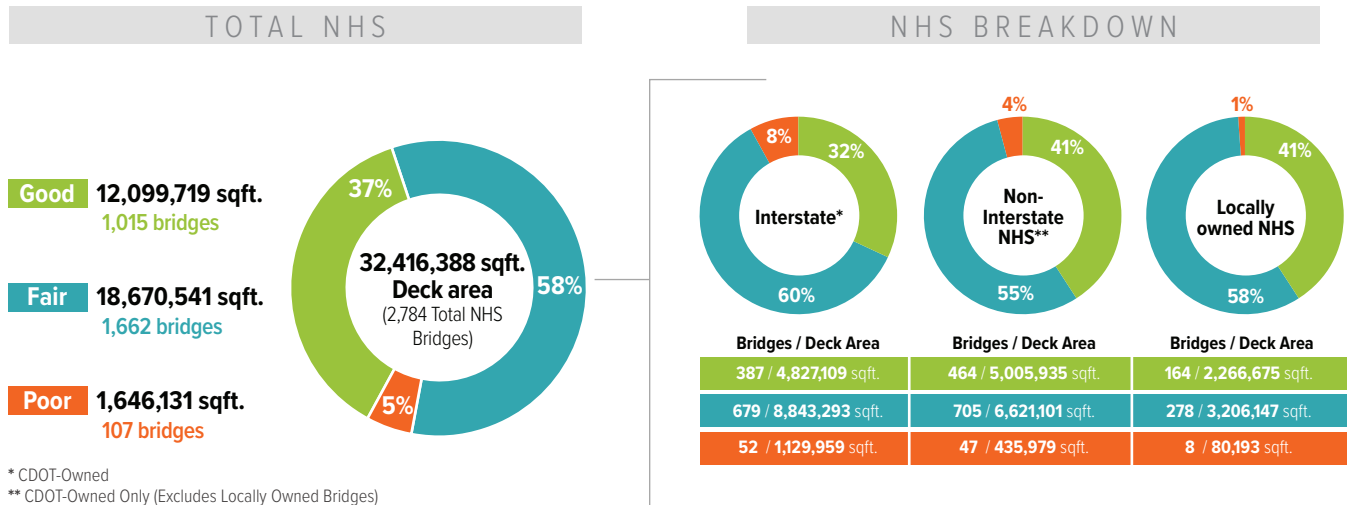
4.3.4 CONDITION

Each component of a bridge—deck, superstructure, and substructure is assessed and assigned an NBIS rating. Culverts receive a single overall NBIS rating. If the rating is four or below for any one of the bridge

three components or the overall culvert rating, the structure is classified as Poor, or Structurally Deficient. **Figure 16** presents the deck area and percentage of deck area given a Good, Fair, or Poor rating for each classification. About 37 percent of the deck area on the NHS in Colorado is in Good condition as of 2021, while 58 percent of the deck area is in Fair condition. Just 5 percent of the NHS deck area is in Poor condition, which is lower than the FAST Act limit of 10 percent.

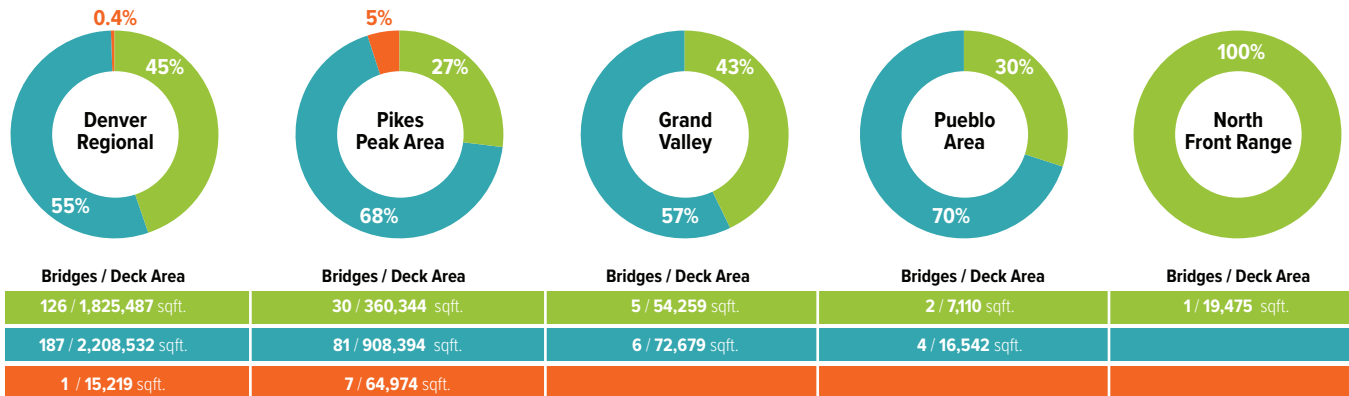
Looking at locally owned NHS bridges, 58 percent of the deck area is in Fair condition, with 41 percent in Good condition, and 1 percent in Poor condition. NHS inventory and condition data for Metropolitan Planning Organizations (MPOs) are summarized in **Figure 17**.

Figure 16 Condition of Bridges on the NHS (2021)



Source: National Bridge Inventory for CDOT, 2021

Figure 17 Condition of Locally Owned Bridges on the NHS by MPO (2021). Percentage based on deck area.



Source: National Bridge Inventory for CDOT, 2021

Good Fair Poor



4.3.5 CONDITION TRENDS

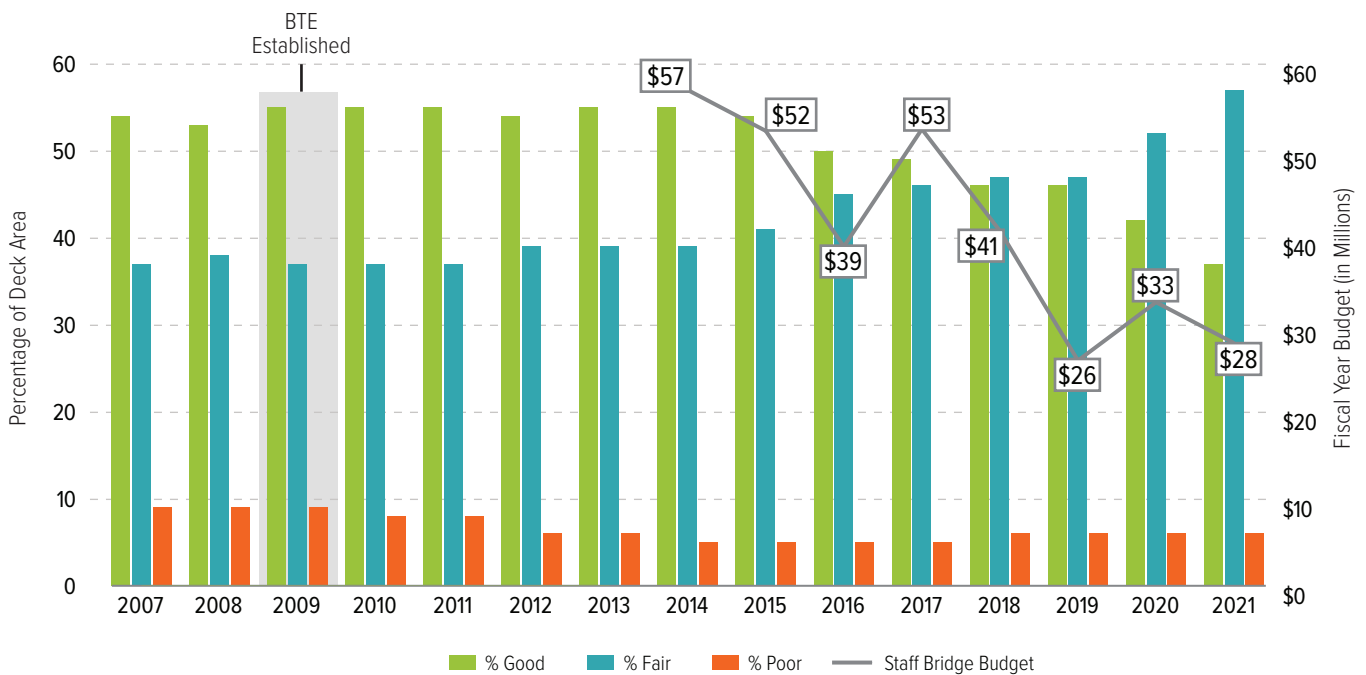
Bridges on the NHS in Colorado are in relatively good condition. However, many structures built in the 1950s or before are past the end of their designed service lives of 50 years. The next 10 years will see the largest number of Colorado’s bridges ever meet the end of their designed service lives, resulting in considerable funding needs for replacements and rehabilitations.

Figure 18 shows the percentage of deck area on NHS bridges in Good, Fair, and Poor condition since 2007. Since the formation of BTE in 2009, the percentage of deck area in Poor condition has decreased, while the percentage of deck area in Fair condition has recently begun to exceed the percentage in Good condition. Figure 18 also presents the historical trends for the bridge-preservation program’s spending.

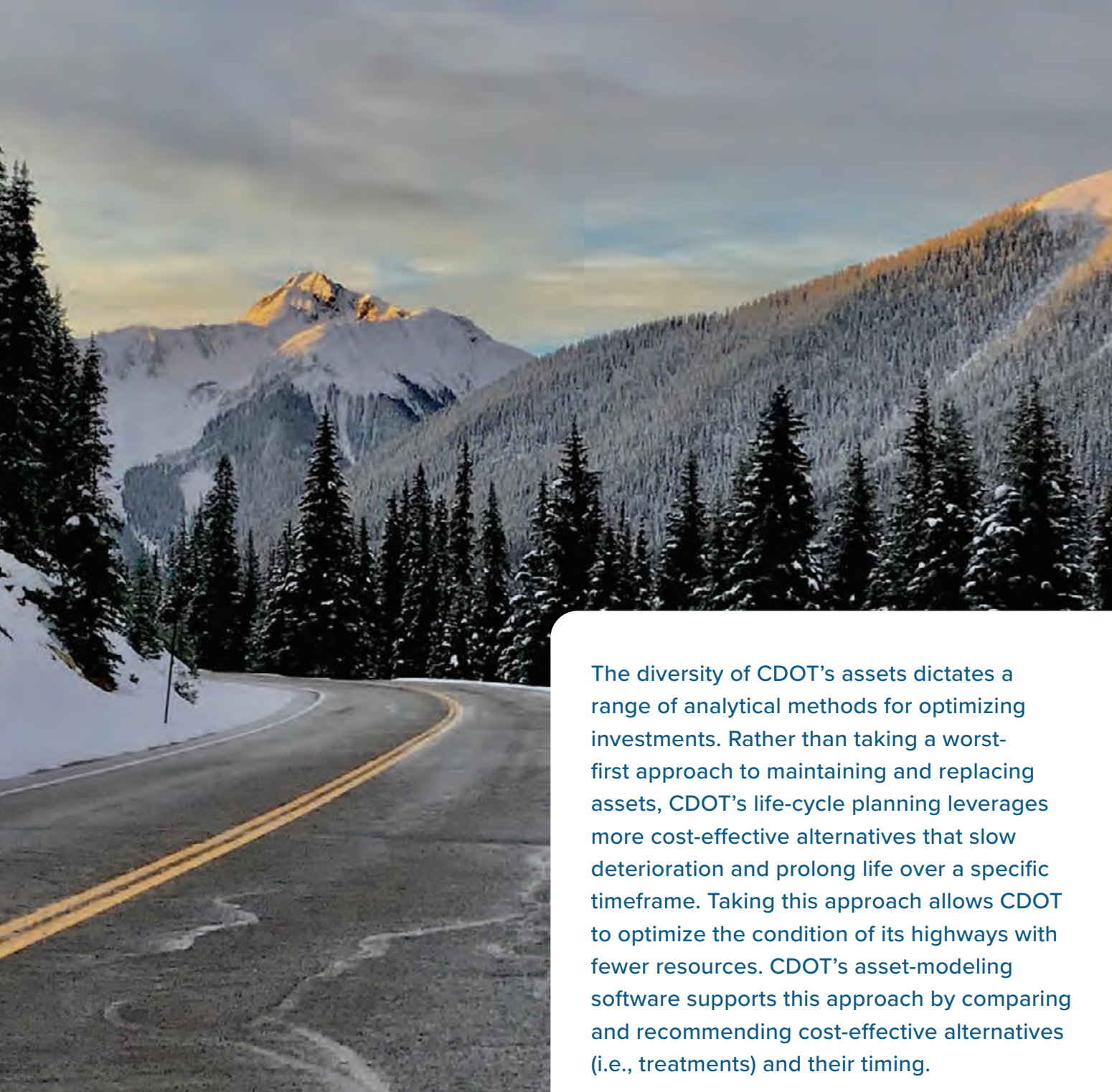
CDOT’s \$1.2 billion Central 70 project is improving 10 miles along the Interstate and has already replaced one of CDOT’s largest poor structures. This bridge, which comprised about one percent of all bridge-deck area in Colorado and almost two percent of total NHS bridge-deck area, fell from Fair to Poor condition in 2019. The Central 70 project has replaced this structure and will replace other Poor bridges that, combined, represented 35 percent of CDOT’s Poor rated bridge deck area.

Figure 18 Condition Trends and Bridge Preservation Program Expenditures for CDOT-Owned Bridges (in Millions)

With reduced funding for Staff Bridge since 2014, the area of Good bridge deck has decreased, and the Fair bridge deck area has increased. Since the establishment of the BTE in 2009 the area of Poor bridge deck area has decreased.



5. LIFE-CYCLE PLANNING



The diversity of CDOT’s assets dictates a range of analytical methods for optimizing investments. Rather than taking a worst-first approach to maintaining and replacing assets, CDOT’s life-cycle planning leverages more cost-effective alternatives that slow deterioration and prolong life over a specific timeframe. Taking this approach allows CDOT to optimize the condition of its highways with fewer resources. CDOT’s asset-modeling software supports this approach by comparing and recommending cost-effective alternatives (i.e., treatments) and their timing.

5.1 CDOT LIFE-CYCLE PLANNING STRATEGY AND TOOLS

CDOT’s life-cycle planning strategy incorporates preventive maintenance, preservation, and rehabilitation activities. As **Figure 19** illustrates, these activities slow the deterioration of an asset and prolong its life. As lifespan is extended, replacement can be delayed. As a result, preservation and rehabilitation strategies can drive down ownership costs.

CDOT develops life-cycle planning strategies for each asset based on the cost and benefits of treatments required to preserve or improve the asset’s condition. CDOT then develops treatment recommendations to achieve the best asset performance possible with limited resources.

5.1.1 ASSET INVESTMENT MANAGEMENT SYSTEM

The Department’s Asset Investment Management System (AIMS) modeling software uses past performance data, deterioration curves for each asset, and treatment information to predict the future condition of an asset class. AIMS also recommends treatments (e.g., maintenance vs. preservation vs. rehabilitation vs. reconstruction) that will improve asset conditions and optimize the budget allocations to create the best forecasted performance.

By comparing projected performance under different funding levels, the software helps the TAM Program determine how much funding an asset class should

receive. For example, the software can show how additional funding will benefit the performance of bridges relative to giving that same funding to the pavement asset class.

AIMS functionality includes:

- Analyzing individual assets
- Supporting target setting
- Optimizing decisions across assets
- Recommending investment strategies

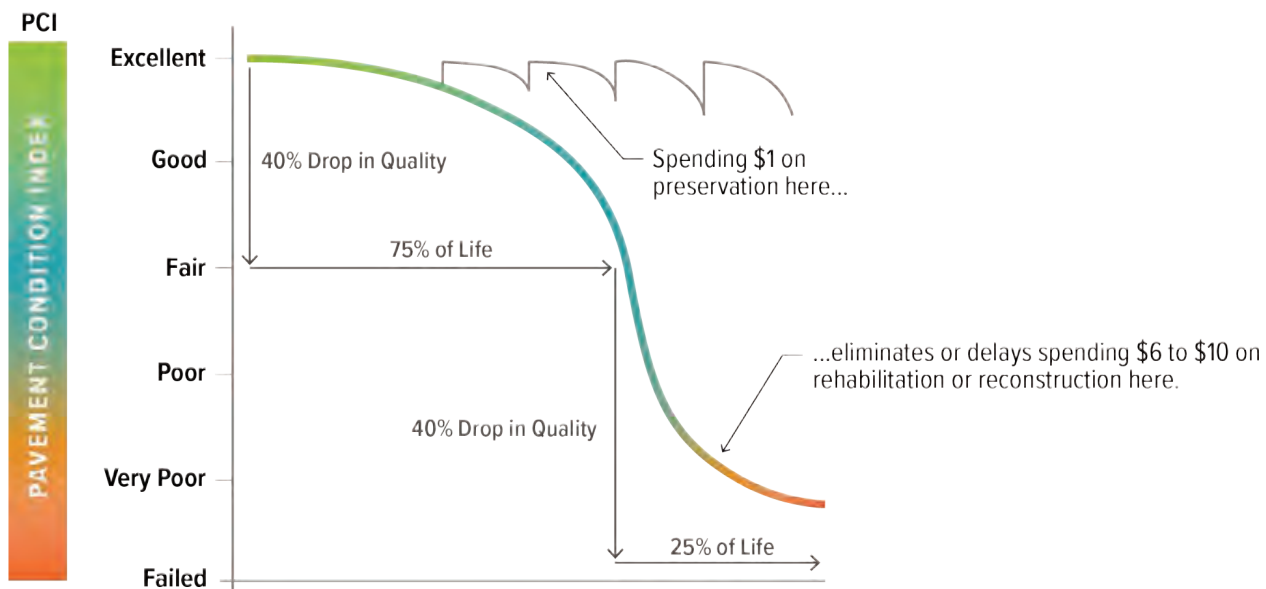
The work associated with AIMS is primarily contracted out, although the PAMB team includes a modeling analyst who helps refine the model, improve data quality and documentation, and interpret model results. CDOT continues to make incremental enhancements and refinements to improve AIMS analyses.

5.1.2 LIFE-CYCLE MANAGEMENT APPROACHES

Because CDOT manages so many asset classes, a range of life-cycle management approaches is required. The Department considers a range of approaches that reflect the criticality of different assets to the asset management, safety, and mobility

Figure 19 *Benefit of Pavement Preservation*

This illustration, from FHWA’s Pavement Preservation Compendium II, shows the cost-effectiveness of pavement preservation treatments. Costs shown are not specific to CDOT.



Source: FHWA

Resiliency Initiative: Understanding the greenhouse gas impacts of construction materials.

In response to the Buy Clean Colorado Act (HB 21-1303), CDOT is beginning to collect Environmental Product Declarations (EPD’s) on eligible materials. An EPD is a document that communicates the environmental impacts of a product or material over a specified life-cycle. This initiative helps CDOT meet the intention of the IIJA and will also inform life-cycle management decisions.

CDOT has chosen to focus EPDs on 32 primary bid items that comprise more than 70 percent of average annual construction expenditures. These items include asphalt, concrete, retaining walls, reinforcing steel, culverts, and guardrail.

CDOT is to use these EPDs to develop a policy establishing maximum Global Warming Potential (GWP) for each eligible material.

outcomes it wants to achieve. These life-cycle management approaches include the following:

- » **Condition/Risk-Based:** The condition or risk profile of an asset is measured and used to forecast performance and identify the onset of failure. A condition approach is used to plan treatments for pavements and bridges. A risk-based approach is used for Geohazards.
- » **Interval/Age-Based:** Asset performance data and/or manufacturers’ suggested life-expectancy estimates are used to establish a time interval representative of the service life beyond which the cost of asset failure outweighs the cost of replacement.
- » **Reactive:** CDOT reacts to fix a problem after it has occurred.

Communicating what approaches are used for which assets creates a consistent understanding of risk.

5.1.3 DEVELOPING PLANNING BUDGETS

Prior to 2021, CDOT held a large, day-long workshop to set the planning budget for each asset class. This involved a presentation on funding needs from teams representing each asset class. Executives, selected Region staff, and Headquarters asset managers then voted on how to distribute asset management funding among the 12 asset classes.

In November 2020, the TAM Oversight Committee (TAMOC) approved a new process by which planning budgets are developed for all asset classes, except maintenance levels of service (MLOS), as presented in **Figure 20**.

Figure 20 *How Planning Budgets are Developed*

PLANNING BUDGETS ARE ADOPTED BY TRANSPORTATION COMMISSION

The TAM Oversight Committee approves the annual TAM Cap

The TAM Oversight Committee approves the annual TAM Cap, or the total dollars dedicated to the asset-management program for a particular year, four years in advance. Staff runs AIMS model analyses to show the condition forecast for each asset class. These data provide an estimate of what funding level each asset would need to meet performance goals.

The TAM Program holds its State of the Assets Annual Meeting

The TAM Program holds its State of the Assets Annual Meeting, targeting a broad audience throughout the Department, including members of the TAMOC. Asset managers describe each asset class’s performance measures and targets, performance and funding history, performance forecast, risks, and other relevant information.

Budget requests submitted

Asset class managers submit a budget request and justification report to TAM Program staff. The reports describe challenges facing each asset class and what could be achieved with additional funding.

TAM planning budget scenarios

Based on the data provided from the asset managers and model results, DTD designs TAM planning budget scenarios. One scenario may boost funding for pavement and bridges, for example, while another may boost funding for smaller assets classes, such as culverts or traffic signals.

Refine draft TAM planning budgets

The TAMOC refines and approves one of the proposed budget scenarios, or comes to a consensus on an entirely new one.

Proposed budget submitted for approval

The agreed-upon budget is sent to the Executive Director, the Deputy Director, and the Chief Engineer for concurrence.

5.2 PAVEMENTS LIFE-CYCLE PLANNING

CDOT’s pavement life-cycle planning is based on established treatment strategies, informed by the AIMS model. The model performs a life-cycle analysis for various treatment strategies on each highway segment. The benefit of the life-cycle strategy is balanced against cost, and segments with the highest benefit/cost ratio are recommended for funding.

5.2.1 LIFE-CYCLE PLANNING STRATEGIES

The objective of CDOT’s asset management program for pavement (i.e., the Surface Treatment Program) is to maintain the quality of pavement on state highways at the highest level possible by allocating resources through a data-driven approach over the life of pavement assets. CDOT achieves this objective through three foundational strategies: preservation first, risk-based prioritization, and integrated decision making (see **Figure 21**).

5.2.2 TREATMENT STRATEGIES

Treatments commonly applied to the pavement network include chip seals, ultra-thin overlays, preventive maintenance, minor rehabilitations, major rehabilitations, and reconstructions. Each treatment type is suitable to address particular distresses. The AIMS model helps the Department determine when a treatment should be triggered.



Figure 21 *Pavement Life-Cycle Planning Strategies*

PRESERVATION FIRST

Conduct More Preventive Maintenance on Pavement

- » Lower-cost treatments are applied in a timely manner.
- » High-cost rehabilitation and reconstruction treatments are minimized.
- » Preventive maintenance adds three to six years of Drivability Life to highway segments.
- » Preventive treatments prevent moisture infiltration in low-volume roads.

RISK-BASED

Prioritize Interstates and High- and Medium-Volume Roadways

- » Risk-based targets are used in guiding investment recommendations.
- » Different Drivability Life standards are established based on traffic volumes.
- » Higher performance expectation is required for high-volume roadways.
- » Treatment selection for a given roadway is based on traffic volume to maximize treatment benefits.

INTEGRATED DECISION MAKING

Achieve Economic Efficiencies by Coordinating the Surface Treatment Program

- » Delays and congestion due to construction are minimized through coordination among different programs and projects.
- » Treatments are aligned with any safety and capacity improvement projects.
- » Project coordination is achieved at the regional and statewide planning levels.

Following the application of a given treatment, condition improvement is expected, which is defined as the increase in the Drivability Life of the pavement segment over the analysis period. The impacts of treatment on pavement condition, and the cost effectiveness of treatments, are both configured in the AIMS model and updated frequently based on historical data. Pavement segments are prioritized in the model based on the benefit-cost ratios and available budget. **Table 7** summarizes CDOT’s strategies for addressing pavement and the corresponding benefits in Drivability Life.

Pavement life-cycle cost is driven by the sum of unit costs of each treatment applied over the life of the pavement in question. CDOT has developed cost models and tables that are incorporated into the AIMS model. CDOT uses historical cost-per-lane-mile data from similar projects around the state to determine the cost per square yard of the treatments. This cost does not include non-essential items. **Table 7** shows the high-level pavement treatment cost per mile, the benefit after the application of treatment, and treatment cost effectiveness.

Table 7 illustrates the cost effectiveness of some of the cheaper treatment types. Applying treatment

types at the right time is critical to extending the life of a pavement; not doing so leads to reliance on more expensive treatments.

CDOT has developed several inputs and rules to support the AIMS model’s analysis for pavement. These inputs include deterioration models based on eight years of historical pavement data, treatment decision trees that determine when a treatment needs to be applied, treatment effectiveness, and treatment unit costs.

In addition to these input parameters, CDOT gathers relevant data from the Regions within the Department to support the analysis. This data enables CDOT to generate both family deterioration curves and site-specific deterioration curves for each condition index used in AIMS. Some of the supporting data CDOT uploads into the AIMS model annually includes:

- » The network definition of routes, for undivided and divided routes
- » Features located along those routes (intersections, mileposts, etc.)
- » Traffic data, including Average Annual Daily Traffic (AADT) and Equivalent Single Axle Load (ESAL) information

Table 7 *Pavement Work Types, Treatment Examples, Costs and Benefits*

Work Type	Example Treatments	Treatment Type	Cost Per Lane Mile	Benefit in Drivability Life (years)	Treatment Cost Effectiveness (per year)
Preservation	Chip seals, ultra thins, microsurfacing, crack sealing, joint sealing, concrete diamond grinding, concrete-slab replacements, and others.	Preventive Maintenance	\$52,200	4 to 5	\$10,400
		Chip Seal	\$56,000	Up to 10	\$5,600
		Ultra-Thin Overlay	\$149,300	Up to 14	\$10,700
Maintenance	Performed By MLOS program.				
Rehabilitation	Minor rehabilitation and major rehabilitation treatments.	Minor Rehabilitation	\$261,200	15 to 18	\$14,500
		Major Rehabilitation	\$447,700	20 to 23	\$19,500
Reconstruction	Complete reconstruction/ replacement of the existing pavement.	Reconstruction	\$1,052,200	25	\$42,100
Initial Construction	Capacity increases, pavement widening for capacity/safety, and horizontal/vertical changes of pavement alignment.				

- » Pavement condition data (raw measures and indexes)
- » Pavement historical project data
- » Pavement historical maintenance

CDOT’s deterioration models account for the effect of environmental conditions on the performance (Drivability Life) of pavements. Pavement distresses progress at different rates under varying environmental conditions. Environmental stressors such as precipitation and freeze-thaw cycles impact pavement design and treatment choice. Therefore, CDOT analyzes life-cycle planning strategies with consideration of environmental conditions.

Additional information on the deterioration models, input parameters, and how CDOT configures and conducts pavement analysis in AIMS is documented in *CDOT Asset Investment System – Pavement Asset Management*. **Figure 22** illustrates the key components of AIMS for pavement analysis and the actions taken to configure or update each component.

5.2.3 IMPLEMENTING PAVEMENT LIFE-CYCLE PLANNING

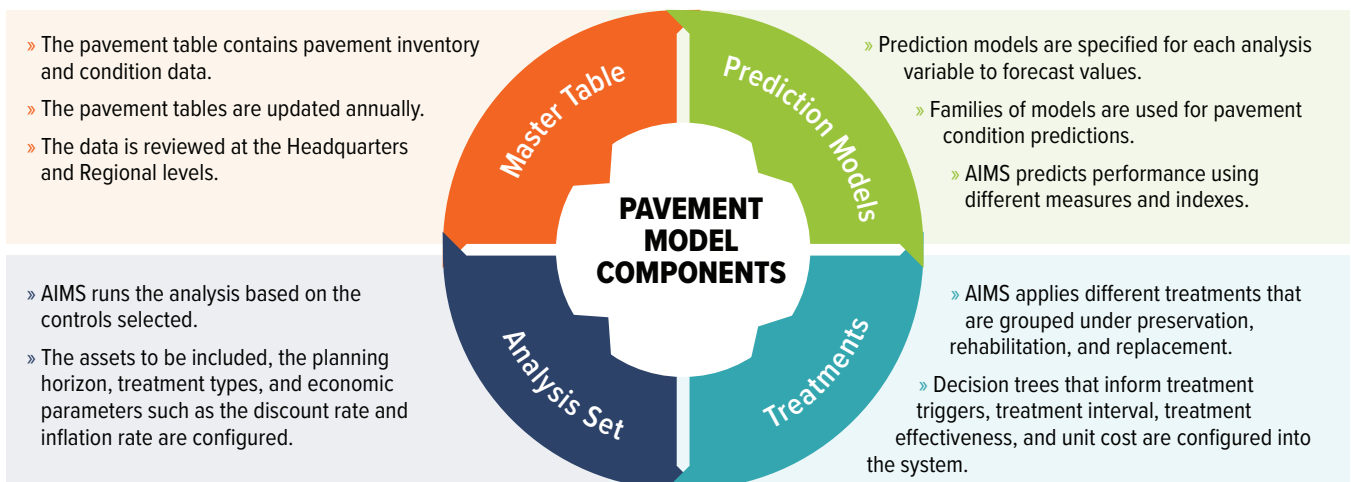
The main goal of asset management is to move away from costly strategies, such as prioritizing replacements of assets in poor condition, to preservation strategies that minimize the whole-life cost of pavements. CDOT achieves this goal by evaluating alternative life-cycle planning (LCP) strategies over the pavement’s life. At the network and regional level, CDOT integrates LCP information into asset management decision making, by incorporating LCP analysis results into the development of planned treatments and projects.

CDOT has a formal planning process with its Regions to develop a three- to five-year surface treatment plan. CDOT’s life-cycle planning is informed by the Department’s pavement-management software. From a network perspective, the software performs a life-cycle analysis of various treatment strategies on each highway segment. The benefit of the life-cycle strategy is balanced against cost. The software analyzes about 3,900 distinct pavement segments and compares the treatment strategies with the highest benefit/cost ratio statewide. CDOT’s pavement management team has identified deterioration rates for each pavement section based upon either deterioration curves for a “family” of pavements or a curve specific to each section. As the software models deterioration of an individual segment, it identifies potential treatment options for that segment based on distresses (smoothness, rutting, and cracking) and overall condition (Drivability Life) ratings.

The cost for each potential treatment, or strategy of treatments over time, is calculated as the total dollar cost. The benefit is calculated as an increase to the segment’s Drivability Life score over the analysis period, and it includes a traffic-weighting factor. This factor increases the benefit relative to the amount of Annual Average Daily Traffic (AADT) on the highway segment. The benefit of a treatment or strategy on a given highway segment is divided by the cost to determine the benefit/cost ratio. The higher the ratio for a treatment or strategy, the more cost effective it is.

The number of potential treatments or strategies for a pavement segment can range from as few as 21 to as many as 200 treatments over a 20-year analysis period. Such a high number of options are available because of the length of the analysis period, the expected life of the asset, and the combination of

Figure 22 Components of CDOT’s Pavement Model—AIMS

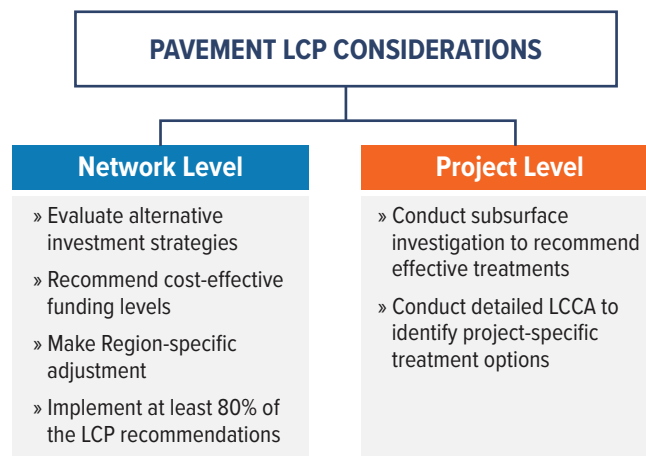


treatment strategies available under different funding scenarios. Assuming the average highway asset has 100 potential treatments or strategies, when all 3,900 segments are iteratively analyzed, the program will have identified 390,000 potential treatments. The software distributes dollars to treatments based on highest benefit/cost ratios and available budget.

CDOT headquarters' pavement-management team builds and maintains the pavement management models and software. Each year's production model is delivered to the Regions for project-level development of the surface treatment project plan. Regions modify their models to account for Region-specific variable and issues. CDOT has a policy that at least 80 percent of pavement projects must match recommendations from the software. This ensures CDOT accounts for life-cycle planning considerations and adheres to optimized pavement treatment selection.

Model treatment recommendations are shared with each of CDOT's Regions, which make Region-specific adjustments based on local knowledge. To support data-driven decisions, CDOT has a policy that at least 80 percent of pavement treatments align with project recommendations from the AIMS model. This policy enables CDOT to account for LCP considerations and to adhere to optimized pavement treatment selection. It also allows the Regions some flexibility when selecting projects.

No model captures every factor that should be considered when choosing a project. CDOT therefore conducts further analysis including pavement-history research, field visits, traffic-data review, and other site-specific analyses to inform the final pavement treatment and project approach. For example, when pavement-material construction costs are estimated to exceed \$3 million, a detailed Life-Cycle Cost Analysis (LCCA) for specific treatment options is recommended. While the AIMS model identifies cost-effective treatment categories given site conditions and predicted deterioration, the project-level LCCA compares specific treatment options against each other with the benefit of detailed site conditions, including information from a subsurface investigation. Detailed information on CDOT's LCCA process can be found in CDOT's *Pavement Design Manual*.⁴



CDOT evaluates road surfaces for their AADT and condition (Drivability Life) and then compares whether it would be more cost effective to undertake frequent short-term minor maintenance (e.g., sealing, surface treatments), or to wait for long-term, major treatments (e.g., major rehabilitation). Determining the ultimate strategy for a particular roadway surface would also consider overall CDOT pavement budgets and maintenance work schedules. This project selection process is summarized in **Figure 23**.

5.2.4 INFORMING INVESTMENT SCENARIOS

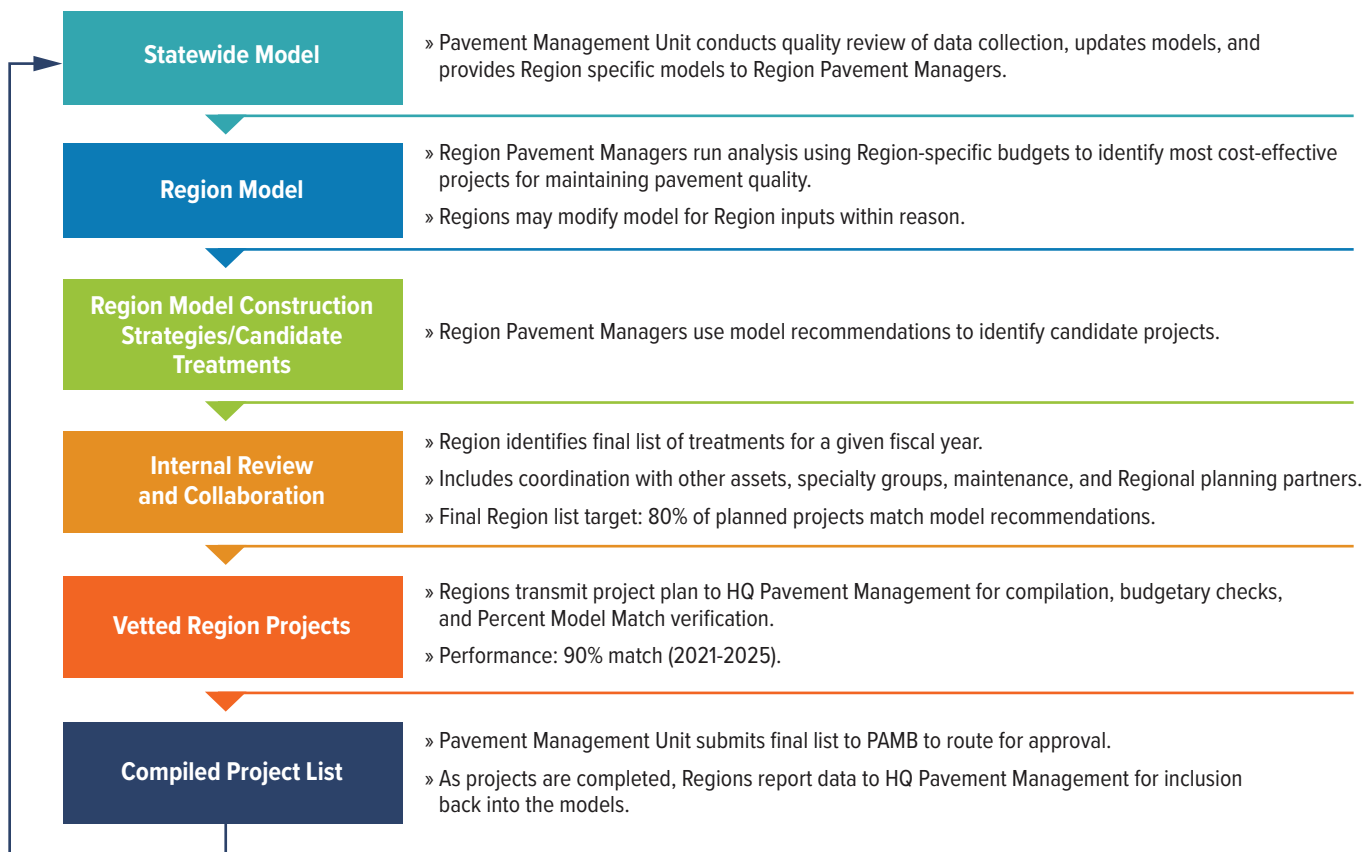
In addition to helping to choose projects, life-cycle planning is a major component of CDOT's budgeting process for its assets. Life-cycle information provides insight into the long-term performance forecast of pavements based on a specific funding scenario, as well as the long-term funding commitment needed to achieve a desired performance level. Life-cycle planning also helps identify the long-term consequence of not taking a given action in the short term. CDOT conducts these analyses using the AIMS model.

Resiliency/Sustainability Initiative: Use of Reclaimed Asphalt

CDOT continues (since 2012) to track the use of reclaimed asphalt in pavements. In 2021, 15 percent of asphalt material was reclaimed.

⁴ <https://www.codot.gov/business/designsupport/materials-and-geotechnical/manuals/2021-m-e-pave-design-manual>

Figure 23 Pavement Project-Selection Process



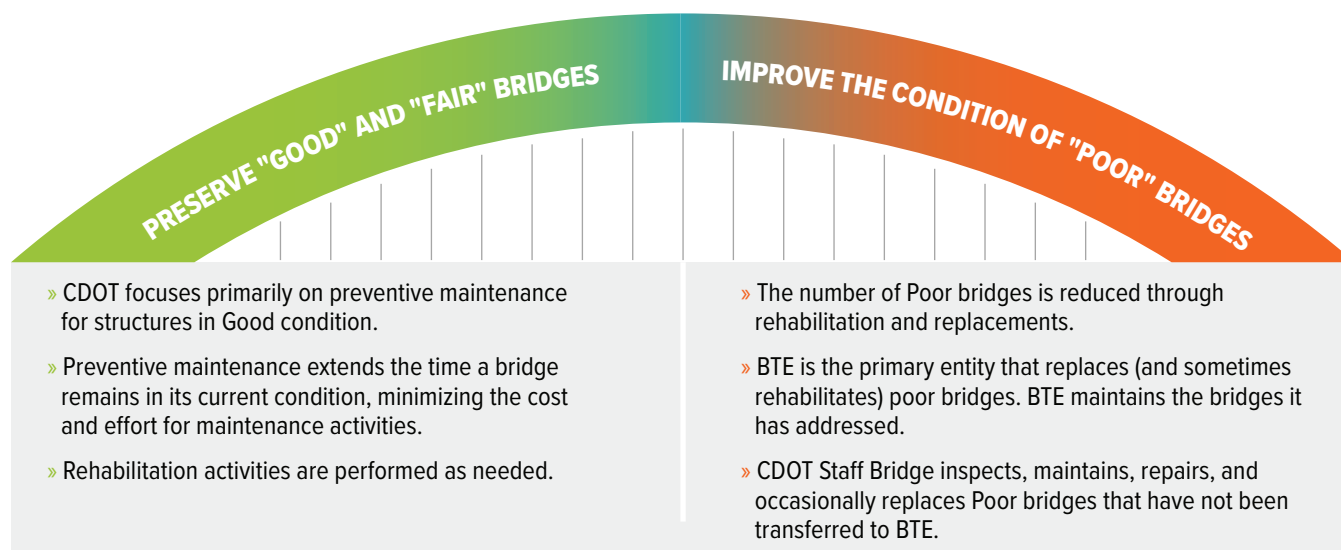
5.3 BRIDGES LIFE-CYCLE PLANNING

As with pavements, CDOT incorporates LCP in its investment strategies for bridges and in developing bridge-related planning budgets and treatment recommendations.

5.3.1 LIFE-CYCLE PLANNING STRATEGIES

There are two main tenets of CDOT’s bridge LCP strategy: preserve Good and Fair bridges and improve Poor bridges. CDOT’s Staff Bridge unit focuses on Good and Fair bridges, working to maintain healthy bridges instead of waiting for them to get to the point where costly rehabs and replacements are necessary (see **Figure 24**). The BTE improves Poor bridges. The BTE is a government-owned business created in 2009 specifically to perform work on Poor-rated structures.

Figure 24 Life-Cycle Management Approaches to Bridge Treatments



5.3.2 TREATMENT STRATEGIES

CDOT’s treatment strategy is to apply the appropriate level of effort for bridges in all conditions. Replacement is the costliest and most effort-intensive bridge treatment; CDOT therefore reserves replacements for Poor-rated structures. **Table 8** summarizes CDOT’s treatment strategies for addressing major structures.

Table 8 Bridge Work Types and Treatments

Work Type	Description	Structure Condition	Work Unit	Cost	Level of Effort	ROI	Example Treatments
Preservation	Activities that prolong the life of the structure by arresting deterioration or re-establishing element protection without changing the condition rating.	Good or Fair	Staff Bridge, Maintenance Sections	Lowest	Lowest	Highest	Bridge rinsing, painting, concrete sealing, joint replacements, deck sealing
Maintenance	Repairs that prolong the life of the structure by arresting deterioration or re-establishing element protection without changing the condition rating.	Fair	Staff Bridge, Maintenance Sections	Medium	Low	High	Deck repairs, deck sealing, minor patching, crack arrest, joint replacements
Rehabilitation	Repairs expected to prolong the life of the structure and improve an element- or component-condition rating.	Fair or Poor	Staff Bridge, BTE	High	High	Low	Deck/substructure/ superstructure rehabilitation and split-timber girder rehabilitation.
Reconstruction	Replacement of an existing structure	Poor	BTE	Highest	Highest	Lowest	
Initial (new) Construction	Construction of a bridge where no bridge has ever been built, such as new interchanges. Widening of the structure to accommodate the addition of any lanes to the existing configuration (e.g., turn lanes, accel/decel lanes, additional general purpose or managed lanes, multi-use pathways). Widening of the structure to accommodate construction phasing. Initial construction does not include shoulder widening or addition of a new shoulder to meet current design standards.						

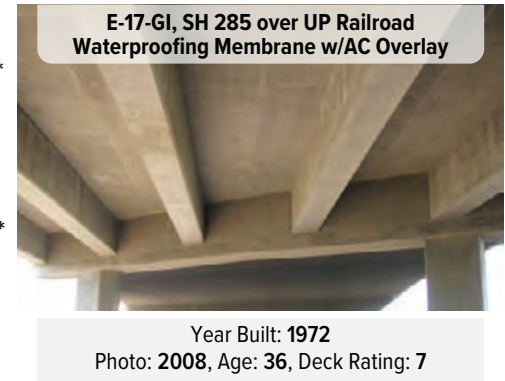
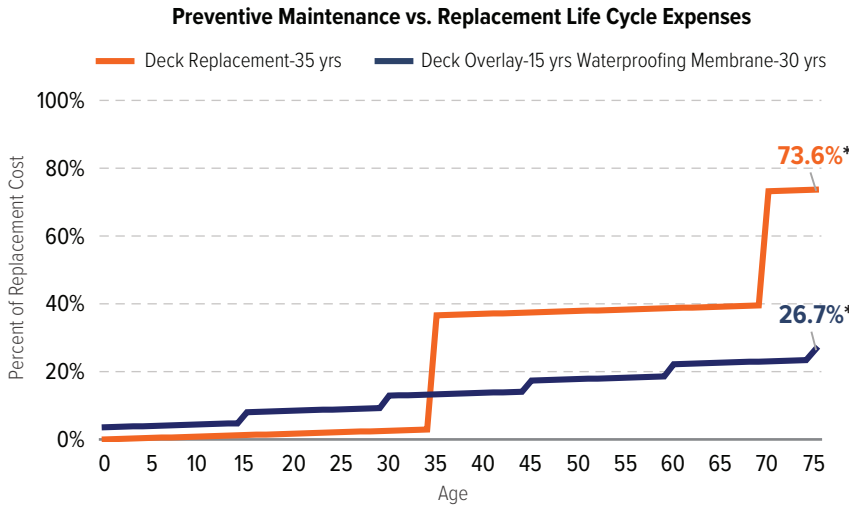
Table 8 illustrates the cost effectiveness of some of the cheaper treatment types. Applying treatment types at the right time is critical to extending the life of a bridge; not doing so leads to reliance on more expensive treatments.

For bridges, LCP is an emerging approach at CDOT to inform the selection of bridge type and preventive actions. Life-cycle planning seeks to identify the total life-cycle cost—per service year and in current dollars—of extending the life of existing structures by performing preventive maintenance. Such maintenance can extend the life of a bridge from an anticipated design service life of 75 years to closer to 100 years. Life-cycle planning recognizes that not all components of a structure will last 75 years without periodic maintenance. Bridge-deck sealing (i.e., applying a waterproofing membrane) and joint replacement are the two activities used in a preliminary LCCA model at CDOT that calculates the annual cost to meet current performance targets for major structures. The model uses historical data

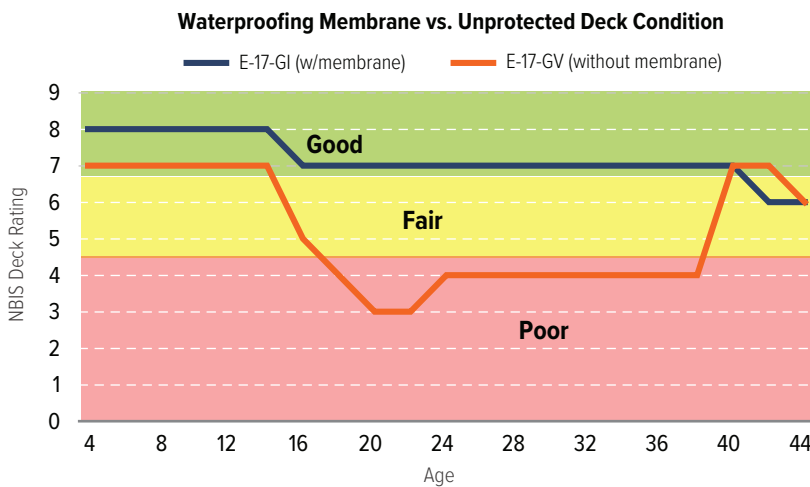
for treatment frequency and cost. The unit cost for deck sealing is \$40 per square foot, and the treatment frequency is 30 years. The unit cost for joint replacement is \$1,500 per linear foot, and the frequency is 15 years. The model is conservative in that it does not account for the current condition of major structures. It is not conservative in that a waterproofing membrane may not last 30 years, and the average bridge joint does not survive 15 years. **Figure 25** illustrates some of this LCCA process for the use of waterproofing membranes for deck sealing. It illustrates reduced costs and improved outcomes achieved by effective bridge-preservation processes. Along with developing the emerging bridge model, CDOT periodically updates assumptions in its AIMS model, including unit costs, deterioration rates, and more. Along with extensive communication between Regions and CDOT’s Staff Bridge unit, analyses from the new bridge model and AIMS may help identify future bridge candidates for replacement, repair, rehabilitation, and preservation.

Figure 25 Bridge Deck Preservation, Life-Cycle Cost Comparison

Effective bridge preservation techniques can save almost 50 percent of bridge replacement costs over a 75-year analysis period.



* Expressed as percentage of total bridge replacement costs.



5.3.3 IMPLEMENTING BRIDGE LIFE-CYCLE PLANNING

The Staff Bridge Branch provides project support to the Regions by collecting bridge data, assessing bridge conditions, and grouping bridges into recommended replacement, repair, or preventive maintenance categories.

The BTE develops a prioritization plan for bridges rated Poor and takes ownership and maintenance responsibilities for bridges that are rehabilitated or replaced with BTE funding.

Throughout the project-selection process, the Regions provide invaluable local input regarding project needs and desires. Ultimately, the Regions identify candidate structures to treat with budgeted asset management funds and establish preventive maintenance or repair budgets.

Resiliency Initiative: Focused Scour Inspections

Each spring the Staff Bridge provides direction to Regions on 'scour watch' for bridges. This includes the need to focus on structures near recent wildfire locations to examine for damage from post-fire debris flows.

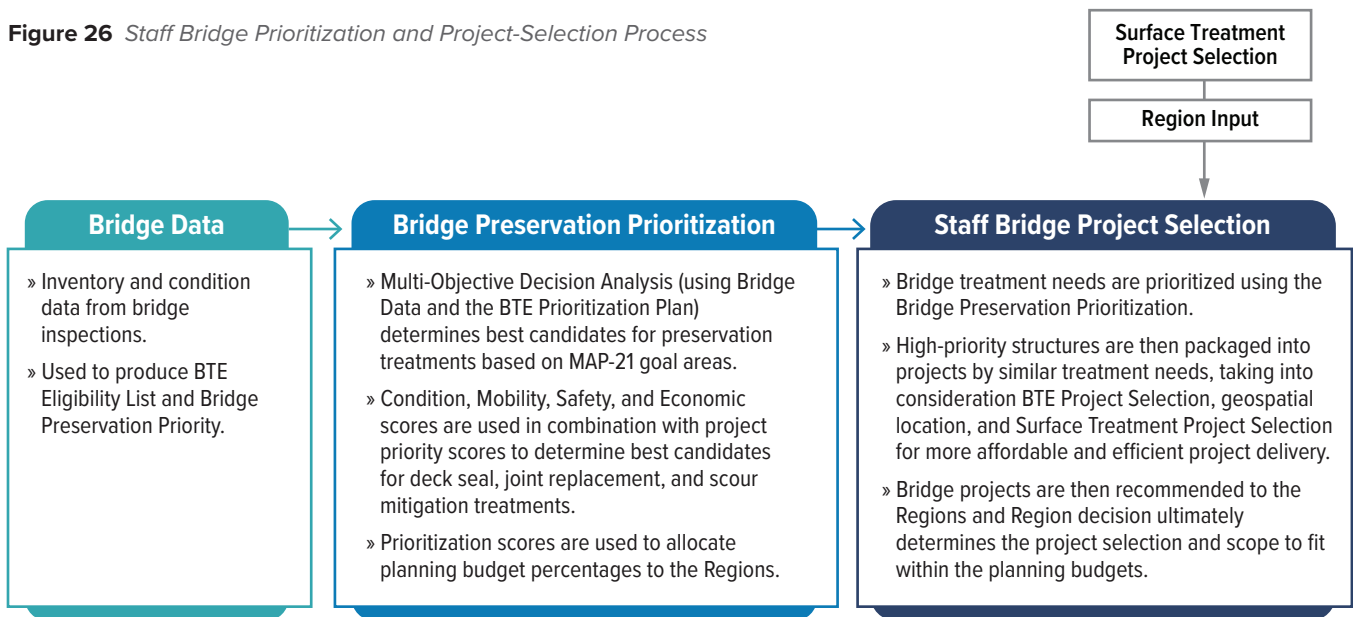
The implementation of bridge projects is formalized through the Structure Asset Management (SAM) Plan, which incorporates the Structure Preservation Program and BTE project prioritization lists into a final, four-year asset management plan. The SAM Plan is developed by first identifying treatment needs for the full structures inventory, and then developing cost estimates for those treatments. Opportunities

to combine work are identified, and Bridge and Surface Treatment program lists and priorities are coordinated. All potential future projects are aggregated based on location, proximity, and work type. Projects that will target high asset-priority scores and move performance metrics with a high return on investment are then identified. This process includes coordination between BTE planned rehabilitation/ replacement projects and bridge maintenance/ preservation to ensure all treatments achieve the expected life-cycle. **Figure 26** provides a summary of the CDOT-owned bridge project-selection process.

5.3.4 DEVELOPING INVESTMENT SCENARIOS

As with pavements, CDOT informs its overall bridge budgets with life-cycle considerations. Estimated annualized costs for appropriate life-cycle treatments on CDOT’s bridges far outweigh anticipated budgets for the Staff Bridge Branch. This makes it critical that every dollar spent maximizes the value CDOT achieves in improving its bridge assets.

Figure 26 Staff Bridge Prioritization and Project-Selection Process



6. RISK AND RESILIENCE



CDOT's risk and resilience practices identify, evaluate, track, and manage threats throughout the Department. Recent and ongoing initiatives target and pilot practice improvements. With a strong risk-management foundation in place, CDOT is focusing on integrating those practices and initiatives with asset management decision-making processes.

6.1 COLORADO CONTEXT

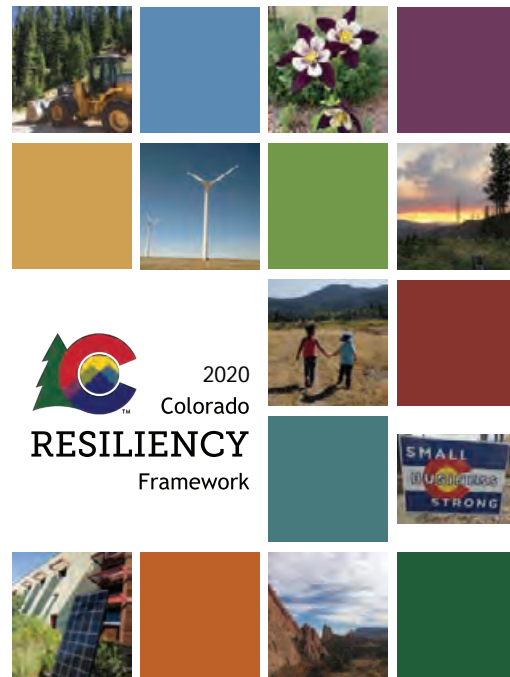
CDOT’s approach to resilience was motivated in large part by several natural disasters and man-made threats:

- » Colorado experienced significant flooding in 2013, which devastated its Front Range region. The flood-recovery process took CDOT several years.
- » Several of the state’s most destructive wildfires in history occurred in 2012 and 2020 and contributed to a heightened awareness of the need for resiliency.
- » A significant cyber-attack against CDOT in 2018 pushed the agency to bolster resiliency to man-made threats.

The State of Colorado defines resiliency as “the ability of communities to rebound, positively adapt to, or thrive amidst changing conditions or challenges—including disasters and climate change—and maintain quality of life, healthy growth, durable systems, and conservation of resources for present and future generations.”

Colorado follows a statewide resiliency plan known as the [Colorado Resiliency Framework](#).⁵ The Resiliency Framework was adopted in 2015 and updated in 2020. This plan looks at natural threats and disasters in Colorado, including floods, droughts, earthquakes, tornadoes, wildfires, and landslides.

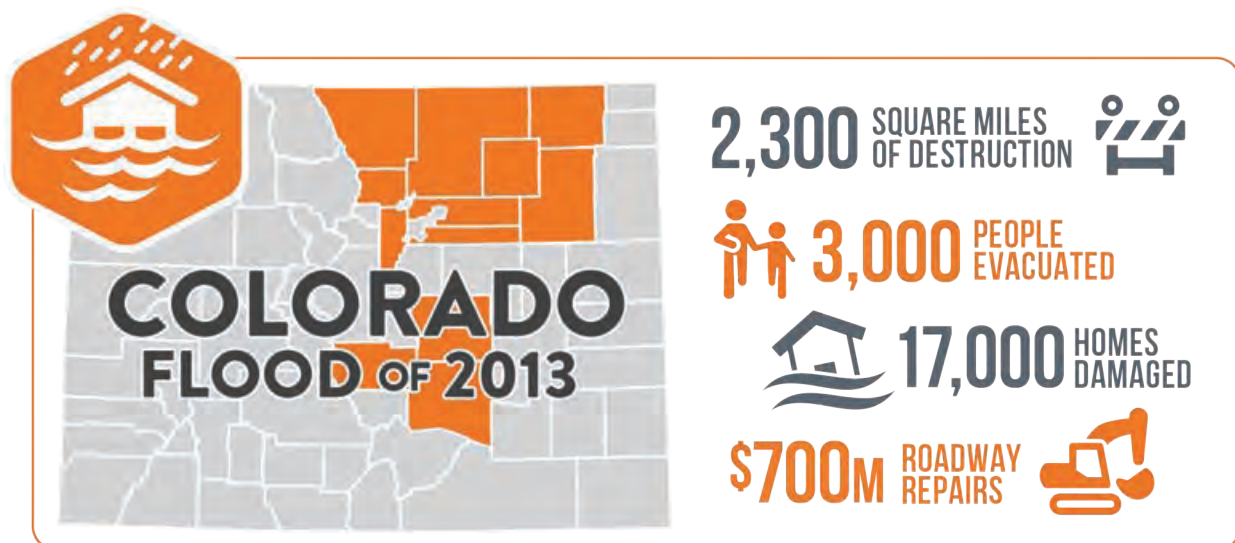
The Resiliency Framework serves two purposes: to show a commitment from the State to identify and implement strategies to increase resiliency, and to outline guiding principles and tools for community stakeholders and a commitment to partnership and action.




 2020
 Colorado
RESILIENCY
 Framework

One of CDOT’s first resiliency initiatives was a Risk and Resilience Pilot in 2015, focused on assessing vulnerability of assets located along Interstate 70. The Department analyzes the criticality of roadways, as described in the 2015 pilot, and is exploring the use of criticality in the project-prioritization process.

CDOT has established a Resiliency Working Group as well as an Executive Oversight Committee, which are implementing a Resiliency Integration project across all aspects of CDOT operations. Furthermore, the Department has produced a manual that can be used as a standalone document to conduct a risk and resiliency analysis on assets.



⁵ <https://www.coresiliency.com/colorado-resiliency-framework>

6.2 RISK AND RESILIENCE AT CDOT

CDOT's risk management approach focuses on planning and managing vulnerabilities; CDOT's resilience approach focuses on recovery and adaptation.

In November 2018, CDOT's Transportation Commission adopted Policy Directive 1905.0, Building Resilience into Transportation Infrastructure and Operations. The directive established the CDOT Resilience Program and directed CDOT to incorporate resilience into strategic decisions about transportation assets and operations. This has positioned CDOT well to meet federal requirements to consider extreme weather and resilience as part of life-cycle cost and risk management, as defined by 23 U.S.C. 119(e)(4)(D).

When the Risk and Resilience Program was created, the focus was on recovering from the 2013 flood event and dealt more with how CDOT recovered in a way that was more adaptable to extreme events. The program more recently has focused on how to harden CDOT's organization and assets for future events, in particular where it makes sense from a benefit/cost perspective. The Colorado floods of 2013 and other events also have led CDOT to begin prioritizing and adopting efforts to address climate-change risk. CDOT has recently taken on various efforts to better understand climate impacts to CDOT's system and operations, including a 2021 study on how changing climate and extreme weather impact geohazards in Colorado.

The Department has defined three cornerstones for considering risk and resilience in its asset management program. These include:

- 1. Enterprise Risk Management.** An approach to managing risk across various levels—including agency, programmatic, and project/activity levels.
- 2. Defined Risk Process.** The development of CDOT's risk register to establish risk-management priorities across the Department.
- 3. Risk and resilience as part of life-cycle planning and life-cycle cost analysis.** A comprehensive decision-making process that includes risk management and resilience as a part of budget setting and treatment selection. This also applies to the identification and treatment of twice-damaged assets (as required under 23 CFR 667).

These cornerstones are described in more detail in the following sections.

6.3 ENTERPRISE RISK MANAGEMENT

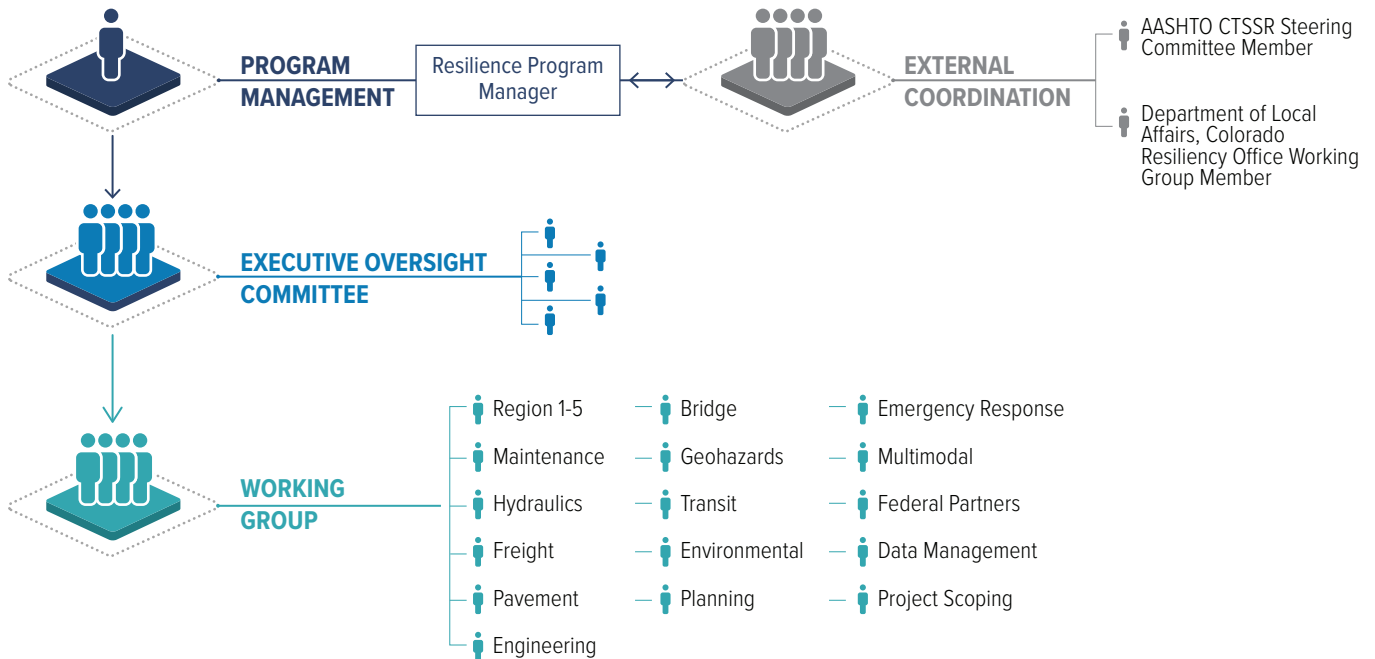
CDOT uses an enterprise-wide approach to manage risks, from the Department-wide level down to the activity level. Specifically, CDOT incorporates four levels of risk management into its program:

- » **Enterprise (Strategic, Corporate)**—Threats that affect mission, vision, and overall results of the asset-management program. Examples include politics, public perception, reputation, and levels of available revenue.
- » **Program (Business Line)**—Threats that affect CDOT's ability to deliver projects and meet targets within a program. These may include organizational and systemic issues as well as revenue and economic uncertainties that cause delays. These causes are not related to any specific projects. Examples include project-delivery threats, revenue uncertainties, cost-estimating processes, revenue and inflation projection inaccuracies, construction cost variations, materials price volatility, data quality, and employee retirements.
- » **Project**—Threats that affect the cost and schedule to deliver projects throughout the agency. Examples include shortages in material supplies that cause a delay in the project schedule, and unexpected increases in materials costs that increase the overall project budget.
- » **Activity-Level**—Threats that affect the ability of an asset to perform its function, assessed against the likelihood of the asset failing (asset condition) and the consequence to CDOT and/or users if the asset were to fail (asset criticality). For example, a bridge that is Structurally Deficient has a higher probability of failing than a bridge that is not. And the failure of a signal located at a major interchange could cause major delays to system users.

6.3.1 RISK AND RESILIENCE MANAGEMENT

CDOT's Risk and Resilience Program is managed by the Performance and Asset Management Branch. The program focuses on developing tools, processes, and projects that advances CDOT resilience practice. The Risk and Resilience Program structure is presented in **Figure 27**.

Figure 27 Risk and Resilience Program Organization Structure



While outside of the Risk and Resilience Program structure shown in Figure 27, the TAM Working Committee considers risk in the TAM program as part of its responsibility.

6.4 CDOT'S RISK-MANAGEMENT PROCESS

CDOT's risk management process (Figure 28) has been guided by documents including the American Association of State Highway and Transportation Officials' (AASHTO) Guide for Enterprise Risk Management, and the International Organization for Standardization (ISO) 31000 Risk Management guidelines. Whenever possible, CDOT sought to incorporate ISO 31000 processes for risk management

and associated nomenclature. ISO guidance includes identifying sources of threats, causes, areas of impacts, and potential consequences.

6.4.1 RISK ASSESSMENT

CDOT's approach to evaluating and prioritizing risks includes assessing likelihood, consequence, vulnerability, and priority. The TAM Working Committee and other Department experts in 2022 updated scores for these variables for all threats in the risk register. This includes the top 10 enterprise

Figure 28 CDOT Risk Management Process



risks as well as risks to each of CDOT’s 12 asset classes. CDOT also added and scored new threats, where applicable.

Calculating of Risk Scores

CDOT incorporates three factors in scoring its risks: threat likelihood, consequence of impact, and vulnerability. Specifically, the risk formula is as follows:

$$\text{Risk Score} = T \times C \times V$$

- T = Threat likelihood (probability) event will occur
- C = Consequences and consideration of risk event
- V = Vulnerability of CDOT to risk event or consequences; this can also be seen as the probability that estimated consequence will be realized

Risk scores under this formula range between one and 156.25. The broad scoring range offers more precision in ranking events because it decreases the likelihood of repeat scores. Each component of the overall risk score is discussed below.

Threat Likelihood

Threat likelihood (T) is the probability that a threat event will occur, not its potential of impact to CDOT. This variable is based on expert opinion and historical and predictive analysis of the frequency of the event

(i.e., annually, every 10-20 years, every 50 or more years, etc.) and assigned a numeric value from one to five based on a scaling rubric. **Table 9** illustrates the threat-likelihood scoring rubric, where one represents the lowest threat and five represents the highest.

Consequence and Consideration

Consequences and considerations (C) are impacts or results directly caused by a threat event. In the CDOT risk register, consequences are large-scale direct impacts that can be qualified and quantified. Considerations are results that may have an impact, but the level of impact is unknown.

There are four consequence variables for which CDOT assigns a value of one to five, with one being low or no impact, and five being severe impact. The four variables are:

- » **Safety**—event causes crashes, injuries, fatalities, or property damage (non-CDOT owned).
- » **Mobility**—event affects access for the traveling public, commerce, etc.
- » **Asset Damage**—event causes physical damage to CDOT-owned assets.
- » **Other Financial Impacts**—event causes financial impacts to CDOT, or financial impact on the community or overall economy, etc.

Table 9 Threat Likelihood Scoring Rubric

Level	Descriptor	Description	Annual Probability Range	Probability
1	Low	50+ years between events	<2%	1.0%
2	Medium - Low	20 to 50 years between events	2% to 5%	3.5%
3	Medium	5 to 20 years between events	5% to 20%	12.5%
4	Medium - High	1 to 5 years between events	20% to 100%	40.0%
5	High	Once annual occurrence or greater	100%	99.0%

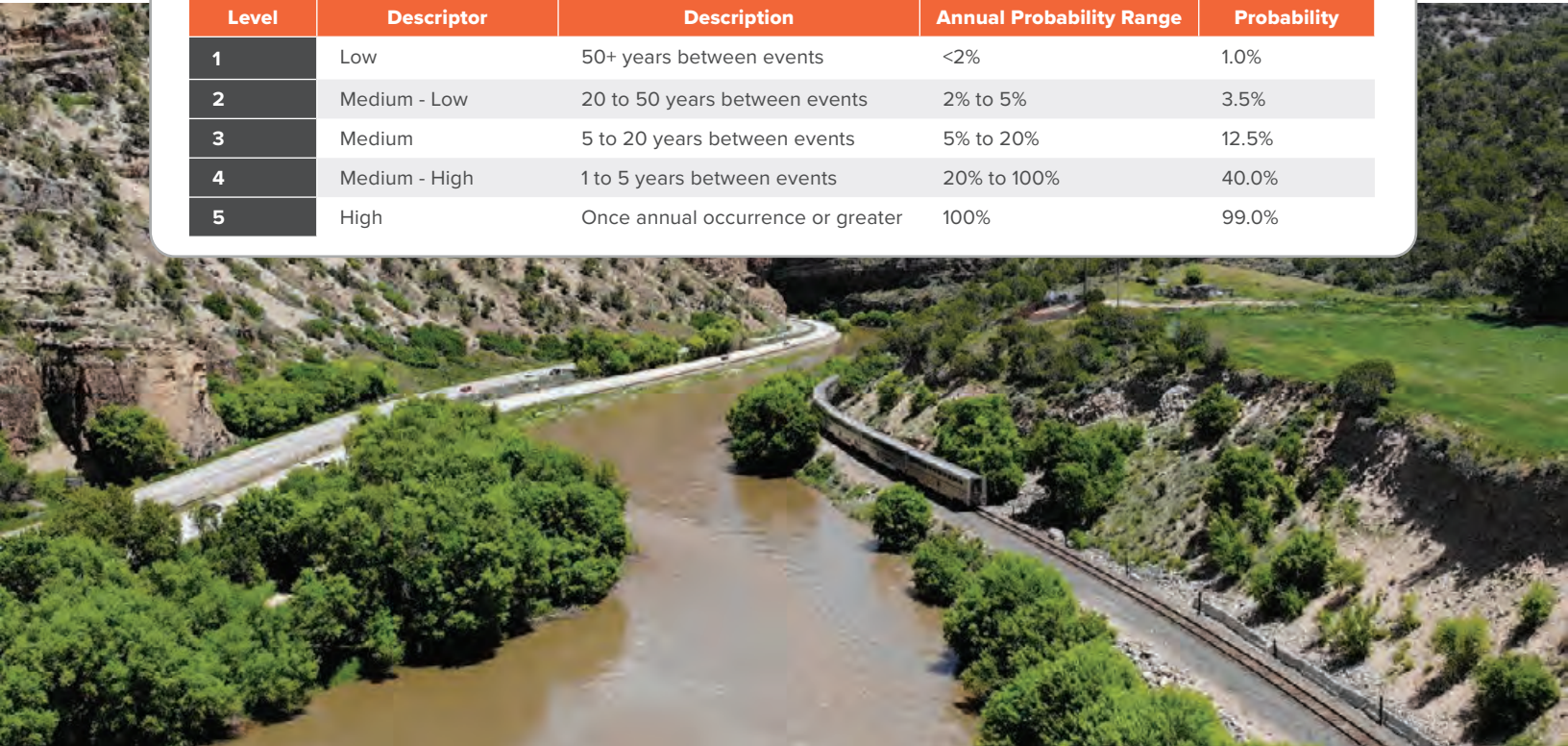


Table 10 illustrates the consequence and consideration scoring rubric.

Table 10 *Consequence and Consideration Scoring Rubric*

Level	Descriptor	Description	Cost Range for Event	Set Safety Cost for Event
<i>Safety</i>				
1	Negligible	Negligible safety hazard	<\$100K	\$50,000
2	Minor	Minimal safety hazard	\$100K to \$500K	\$300,000
3	Major	Likely minor injuries	\$500K to \$2M	\$1,250,000
4	Critical	Likely major injuries	\$2M to \$10M	\$6,500,000
5	Catastrophic	Likely fatalities and major injuries	>\$10M	\$20,000,000
<i>Mobility</i>				
1	Negligible	Situation affects a small area (neighborhood or town) and/or small number of travelers for a short time (minutes).	<\$100K	\$50,000
2	Minor	Situation affects a small area (neighborhood or town) and/or small number of travelers for a moderate time (hours).	\$100K to \$500K	\$300,000
3	Major	Situation affects a small area (neighborhood or town) and/or small number of travelers for a sustained period (days-weeks).	\$500K to \$2M	\$1,250,000
4	Critical	Situation affects a large number of travelers for a short period (minutes-hours).	\$2M to \$10M	\$6,500,000
5	Catastrophic	Situation affects a large number of travelers for a sustained period (days-weeks).	>\$10M	\$20,000,000
<i>Asset Damage</i>				
1	Negligible	Minimal or cosmetic damage	<\$100K	\$50,000
2	Minor	Minor damage requiring repair	\$100K to \$500K	\$300,000
3	Major	Moderate damage requiring repair	\$500K to \$2M	\$1,250,000
4	Critical	Extensive damage requiring significant repair or replacement	\$2M to \$10M	\$6,500,000
5	Catastrophic	Destroyed or large-scale damage requiring replacement	>\$10M	\$20,000,000
<i>Other Financial Impacts</i>				
1	Negligible	Negligible financial impact	<\$100K	\$50,000
2	Minor	Minor financial impact	\$100K to \$500K	\$300,000
3	Major	Major financial impact	\$500K to \$2M	\$1,250,000
4	Critical	Critical financial impact	\$2M to \$10M	\$6,500,000
5	Catastrophic	Catastrophic financial impact	>\$10M	\$20,000,000

As mentioned, considerations within the register are impacts that are difficult to quantify. There are five consideration variables in the register:

- » **Funding**—Does CDOT have adequate funds to deal with the risk event and potential impacts? Could the event affect future agency funding?
- » **Insurance**—Do current levels of insurance cover potential impacts (e.g., personal injury, property damage, fines, or lawsuits)?
- » **Regulatory**—Do federal, state, or local regulations inform CDOT planning and response to a risk event? What penalties exist for non-compliance?
- » **Political**—Would the risk event spark political interest or response?
- » **Reputation**—Would the event affect CDOT’s reputation with relevant stakeholders (e.g., the media, traveling public, or taxpayers)?

CDOT assigns a value of 0.05 to each consideration relevant to the risk in question. Under the risk calculation, consequences and considerations are calculated independently. They are then combined using an algorithm to give an overall (C) score.

$$C = Os \times [(Ss + Ms + Ds + Fs)/4]$$

Os = Considerations Value = 1 + (0.05 × [Number of Selected Considerations])

Ss = Safety Value

Ms = Mobility Value

Ds = Asset Damage Value

Fs = Other Financial Impact

Vulnerability

The vulnerability (V) variable is a comparison of the potential impacts of a natural or manmade event to the robustness of the asset and system, or to CDOT response planning. This variable helps CDOT evaluate risk exposure to certain events, by considering previous resiliency efforts, asset engineering, and other risk management strategies. Asset managers assign a numeric value from one to five for vulnerability, with one representing low vulnerability to the event (i.e., strong preparedness or resiliency), and five representing severe vulnerability. **Table 11** illustrates the vulnerability scoring rubric.

Adding the vulnerability variable changed CDOT's understanding of the priority of threat events. Many asset programs have taken steps to prepare for events with a high likelihood of severe consequences. However, adding the vulnerability variable resulted in a decrease to overall risk scores when compared to previous evaluations. Conversely, risk scores rose for certain events that are infrequent or have low impacts.

6.4.2 MANAGING RISK

CDOT's risk register provides preferred approaches to risk management by identifying combinations of five strategies to manage top-priority risks. These strategies include:

- » **Treating the risk**—taking action to reduce the chance of the risk occurring or lessening impacts.
- » **Tolerating the risk**—accepting the current risk profile and planning for appropriate response if the risk event occurs.
- » **Transferring the risk**—allowing another agency or third party to take on the risk exposure instead of CDOT (e.g., insurance).
- » **Taking advantage of the risk**—seizing opportunities, such as by using unexpected revenue to improve the transportation network.
- » **Terminating the risk**—taking action to eliminate a risk event or impacts.

Table 11 Vulnerability Scoring Rubric

Score	Level	Description
1	Very low	<ul style="list-style-type: none"> » Established risk management process(es) exist for event » CDOT responses and contingency plans already in place, and are fully tested » Asset engineering design or asset condition ensures full functionality » Previous resilience efforts provide a high degree of protection
2	Low	<ul style="list-style-type: none"> » Established risk management process(es) mostly exist for event » CDOT responses and contingency plans already in place, but with limited testing » Asset engineering design or asset condition ensures mostly full functionality » Previous resilience efforts provide a moderate degree of protection
3	Medium	<ul style="list-style-type: none"> » Risk management process(es) for event being fully developed » CDOT responses and contingency plans partially in place, with limited or no testing » Asset engineering design and asset condition ensure only partial functionality » Previous resilience efforts provide a low degree of protection
4	High	<ul style="list-style-type: none"> » Established risk management process(es) for event in early development » CDOT responses and contingency plans in early development, with no testing » Asset engineering design and asset condition provide little assurance of functionality » Previous resilience efforts provide a very low degree of protection
5	Very High	<ul style="list-style-type: none"> » Established risk management process(es) do not exist for event » No CDOT responses and contingency plans being developed » Asset engineering design and asset condition will not assure functionality » Previous resilience efforts provide no level of protection

In addition to these response approaches, CDOT has been integrating additional response analyses to its risks. For example, CDOT recently adopted a mitigation plan for Interstate 70 in Glenwood Canyon (see Section 6.8.3), looking at ways to reduce annualized risk and improve system resilience for specific assets at specific price points (e.g., replacing existing rockfall fences with more and higher capacity fences). The Department also has recently adopted benefit/cost calculations to assess alternative mitigation measures and reductions of annualized risks, expressed in dollars, to help justify mitigation plans to identified risks.

6.4.3 MONITORING RISK

CDOT actively monitors its risks, working in coordination with the various asset programs and divisions. The purpose of such monitoring and review, as defined by ISO 31000, includes:

- » Ensuring risk-control mechanisms are effective and efficient in design and operation.
- » Obtaining further information to improve risk-assessment procedures.
- » Analyzing lessons learned from events (including near misses), changes, trends, successes, and failures.

- » Detecting changes in context (external and internal), including changes to risk criteria and the risk itself, which requires revision of currently established risk treatments and priorities.
- » Identifying emerging or previously overlooked threats.

CDOT has designed the risk register to identify and monitor top-priority risks. The register will be updated regularly as contexts and circumstances change, or as risk-management efforts influence overall risk exposure. CDOT will be establishing roles and responsibilities for risk management within CDOT and individual asset groups.

6.5 ENTERPRISE-LEVEL RISKS

CDOT maintains both an enterprise-level risk register and individual risk registers for each asset class, identifying risks that pose a threat to the Department. The risk register is maintained by the TAM Working Committee, according to the approach outlined in Section 6.4. **Table 12** lists the top 10 enterprise-level risks in 2022 and CDOT’s overarching approach to responding to those risks.

Table 12 CDOT Enterprise-Level Risk Register

Threat/ Opportunity	Risk Statement	Risk Score	Risk Management Strategy
Flood	There is a risk that flooding occurs leading to asset/route damage that causes mobility and safety impacts as well as increased asset management cost.	68 ⁶ (T)5 * (C)4.5 * (V)3	Treat by implementing design standards; following agency continuity of operations plan; maintaining incident command center management structure; maintaining an Office of Emergency Management (OEM). Use tools and processes developed under the resilience program to identify high risk assets and corridors for focused analysis.
Post-Fire Debris Flow	There is a risk that post-fire debris flow occurs leading to asset/route damage that causes mobility and safety impacts as well as increased asset management cost.	48 (T)4 * (C)3 * (V)4	Treat by maintaining an office of OEM. Maintenance landscaping, erosion control, jersey barriers and other practices.
Funding Uncertainty (positive and negative)	There is a risk of funding changes leading to increased/reduced investment that causes improved/diminished asset management outcomes.	38 (T)4 * (C)2.4 * (V)4	Tolerate/take advantage of—manage on per event basis.
Geohazards	There is a risk of geotechnical failure that causes mobility and safety impacts as well as increased asset management cost.	33 (T)5 * (C)3.3 * (V)2	Treat by implementing the geohazards management program and robust geohazards-management plan.
Cost Uncertainty	There is a risk that price escalation occurs, leading to unsustainable costs and thereby limiting the ability to deliver organizational objectives.	15 (T)3 * (C)1.65 * (V)3	Treat by bid process (e.g., bid rejection), re-scoping projects, price hedging, and by hedging materials; then tolerate.
Fire	There is a risk that fire occurs, leading to asset/route damage that causes mobility and safety impacts as well as increased asset management cost.	14 (T)4 * (C)1.2 * (V)3	Tolerate in the case of wildfires; and treat by tunnel fire-suppression systems and bridge-design standards, etc. Use tools and processes developed under the resilience program to identify high risk assets and corridors for focused analysis.

⁶ Risk Score = Threat Likelihood (T) * Total Consequence and Consideration Score (C) * Vulnerability (V)

Threat/ Opportunity	Risk Statement	Risk Score	Risk Management Strategy
Missing Infrastructure Targets for National Performance Measures	There is a risk that CDOT is not able to meet PM2 condition minimum requirements, leading to restricted funding that limits the agency's ability to meet its objectives.	14 (T)3 * (C)2.4 * (V)2	Treat by implementing formal asset management program.
Snow (Avalanche)	There is a risk of avalanche occurring that causes mobility and safety impacts as well as increased asset management cost.	11 (T)4 * (C)2.7 * (V)1	Treat by maintaining a Winter Operations Program. Use tools and processes developed under the resilience program to identify high risk assets and corridors for focused analysis.
Cybersecurity	There is a risk that a cyber-attack occurs, leading to a reduction in CDOT ability/effectiveness that results in reduced mobility and safety outcomes.	9 (T)5 * (C)1.8 * (V)1	Transfer to Governor's Office of Information Technology. Treat by maintaining firewalls; virus protection software; training employees on cybersecurity.
Staffing: Attrition	There is a risk that CDOT suffers from a shrinking workforce, leading to loss of institutional knowledge that reduces efficiency and effectiveness.	4 (T)4 * (C)1.1 * (V)1	Treat by documenting policies and procedures.

6.6 PROGRAM-LEVEL ASSET CLASS RISKS

In addition to the agency-wide risk register, each asset class is responsible for maintaining and monitoring risks in their asset class-specific risk register. Asset class owners identify and analyze risks as part of CDOT's regular update to the register.

The TAM Working Group works with the asset class owners to ensure the risk register is updated and provides input to the risk-management approach. Further, the TAM Working Group compiles the risks from each asset class. Where applicable, risks specific

to asset classes may roll-up to the enterprise-level risk register. Each asset class plan in the Appendix includes the top three to five risks for each class, including responses to the risks and control measures in place to monitor the risks. **Tables 12 and 13** includes the top risks for bridge and pavement assets, respectively. Refer to the Asset Plan Appendix to review the top risks for the other 10 asset classes.

6.6.1 TOP RISKS TO PAVEMENT

Table 13 Identifies the top risks to CDOT's pavement assets.

Table 13 Top Risks for Pavement Assets

Threat Number	Threat Title	Risk Statement	Risk Score	Risk Management Response
1	Construction Cost Escalation	There is a risk that construction cost variation occurs, leading to a reduced ability to deliver projects, which prevents achieving desired outcomes.	78 (T)4 * (C)3.9 * (V)5	Tolerate—Advance future-year funding, reduce planned treatments, deliver fewer projects, eliminate projects.
2	Pavement Forecasting Misalignment	There is a risk that a misalignment of the current pavement management model leads to incorrect forecasting of outcomes that causes reported NPM performance goals not to be met.	62 (T)4 * (C)3.9 * (V)4	Treat—Assessing misalignments, reviewing 1/10-mile NPM data, sharing focus areas with Regions, using funding for specific, focused projects.
3	Severe Weather—Fire	There is a risk that fire occurs as a result of severe weather, leading to local pavement damage (such as from post-fire debris flows) that causes diversion of funds and inability to meet performance goals.	58 (T)4 * (C)4.8 * (V)3	Treat—use tools and processes developed under the resilience program to identify high risk corridors for focused analysis and strategy development.
4	Severe Weather—Flood	There is a risk that flooding occurs as a result of severe weather, leading to pavement damage that causes diversion of funds and inability to meet performance goals.	45 (T)2 * (C)5.6 * (V)4	Treat—use tools and processes developed under the resilience program to identify high risk corridors for focused analysis. Develop reasonable alternative strategies when planned treatments are identified and prioritized.

6.6.2 TOP RISKS TO BRIDGES

Table 14 Identifies the top risks to CDOT’s bridge assets.

Table 14 *Top Risks for Bridge Assets*

Threat Number	Threat Title	Risk Statement	Risk Score	Risk Management Response
1	Bridge Strike	There is a risk that bridges are hit by vehicles, leading to repairs/closures that cause mobility/safety impacts.	60 (T)5 * (C)4 * (V)3	Treat—Replace or raise low bridges, lower grade.
2	Essential Repairs	There is a risk that essential unplanned repairs will be required, leading to reduced funding for other projects, which reduces the ability to meet performance goals.	47 (T)5 * (C)3.2 * (V)3	Treat— Use tools and processes developed under the resilience program to prioritize investments. Maintain a contingency fund for these repairs when required.
3	Inadequate Funding	There is a risk that inadequate funding occurs, leading to limited ability to preserve good bridges, which could cause the percentage of deck area in good condition to continue to decline.	44 (T)5 * (C)2.2 * (V)4	Tolerate—Continue to prioritize investment based on asset management principles.
4	Severe Weather— Flood	There is a risk that flooding occurs as a result of severe weather, leading to bridge damage that causes diversion of funds and inability to meet performance goals.	22 (T)2 * (C)5.4 * (V)2	Treat—use tools and processes developed under the resilience program to identify high risk corridors for focused analysis. Develop reasonable alternative strategies when planned treatments are identified and prioritized.

6.7 RISK AND RESILIENCE AS PART OF LIFE-CYCLE PLANNING AND LIFE-CYCLE COST ANALYSIS

CDOT asset managers currently develop their annual treatment lists based primarily on condition needs. To integrate risk more formally into decision making, the Department is refining processes and tools to incorporate risk management and resilience considerations into asset-management treatment selection and prioritization processes.

CDOT has undertaken a broad range of risk initiatives to understand and respond to risk. These can be viewed in detail on the CDOT website⁷. **Table 15** summarizes the range of CDOT’s risk-management initiatives.

Table 15 *CDOT’s Risk-Management Levels, Responsible Parties, and Risk Management Initiatives*

Level	Responsibility	CDOT Risk Management Initiatives
Enterprise	Senior Executives, policy makers	<p>Enterprise Risk Register (Enterprise-wide, Strategic, Corporate Risks)—Documented list of risks that affect the mission, vision, and overall results of the asset management program.</p> <p>Climate Change Impacts to CDOT—CDOT is regularly assessing various impacts to its network based on climate change and extreme weather conditions, including its recent study, “Changing Climate and Extreme Weather Impacts on Geohazards in Colorado,” conducted in 2021.</p>
	Program Managers	<p>Enterprise Risk Register (Programmatic, Business Line Risks)—Documented list of risks that affect CDOT’s ability to deliver projects and meet targets within a program (but not related to a specific project).</p> <p>Changing Climate and Extreme Weather Impacts on Geohazards in Colorado—An assessment of how extreme weather and climate change may affect geohazard impacts through changes to their frequency and magnitude.</p> <p>Asset Class-Specific Risk Register—Documented list of risks that specifically affect one of CDOT’s 12 asset classes.</p> <p>4 R Framework for Identifying and Evaluating Resiliency in Transportation System Assets and Organizations—Details the “4 R Principle” framework used to evaluate resiliency in transportation systems. The document provides examples of both a resilient organization and asset.</p>

⁷ <https://www.codot.gov/programs/planning/cdot-resilience-program>

Level	Responsibility	CDOT Risk Management Initiatives
Project	Project Managers	<p>Colorado Department of Transportation Risk and Resilience Analysis Procedure—A Manual for Calculating Risk to CDOT Assets from Flooding, Rockfall, and Fire Debris Flow (Pilot)—procedure documenting CDOT’s approach to managing risk and resiliency to a specific highway asset from specific threats (developed based on Risk and Resilience I-70 Pilot).</p> <p>Project Prioritization Score Sheet—A Microsoft Excel tool that allows users to prioritize projects based on the level of risk mitigation addressed by each project.</p> <p>CDOT Project Risk Assessment Tool—A Microsoft Excel tool that describes how risk management will be structured and performed on CDOT projects; it follows the common risk-management approach and a standard risk register format, tailored to CDOT.</p> <p>Region Engineers’ Project Risk Management—In project delivery CDOT utilizes a Project Risk assessment tool that provides a process and record for risk identification, analysis, response strategy definition, monitoring and control.</p>
Activity	Activity Managers, staff	<p>CDOT’s Damaged-Asset Database—A database containing past damaged assets, which can be updated as additional assets sustain damage in emergency events.</p> <p>Asset Criticality Model for System Resilience—A process for determining asset criticality (impact to CDOT if an asset were to fail).</p> <p>Asset Resiliency Mapping Application—A GIS mapping tool that allows users to assess risk as it relates to environmental risk factors, including drought severity and wildfire risk, as well as asset conditions like highway Drivability Life, and social vulnerability documented by Disproportionately Impacted Community Census Block Groups.</p> <p>Risk and Resiliency Tool—A Microsoft Excel tool that allows users to calculate the total risk for an asset by inputting pre-mitigation data on each of the six criticality factors and performing a benefit-cost analysis on mitigation tactics.</p>

6.8 ASSETS REPEATEDLY DAMAGED BY EMERGENCY EVENTS

Federal regulations require state DOTs to conduct periodic evaluations of facilities that have repeatedly required repair and reconstruction due to emergency events (23 CFR 667). To meet these requirements, CDOT maintains a database listing past damaged assets, and is developing processes to update the database as additional assets sustain damage in emergency events. The Department has also asked MPOs for data on locally owned damaged assets.

6.8.1 IDENTIFYING AND TRACKING TWICE-DAMAGED ASSETS AT CDOT

CDOT’s process for identifying and tracking twice-damaged pavement and bridge assets involves the following activities:

- » Review a list of pavement segments falling within the geographic boundaries of each emergency event.
- » Review a list of any bridges within the geographic boundaries of each emergency event.
- » Review bridge and pavement projects that may show relevant repair work in the geographic boundaries of the emergency events.
- » Compare the above information to a list of projects funded by emergency response dollars.

Based on this analysis, CDOT currently has identified two twice-damaged assets, both in the same location

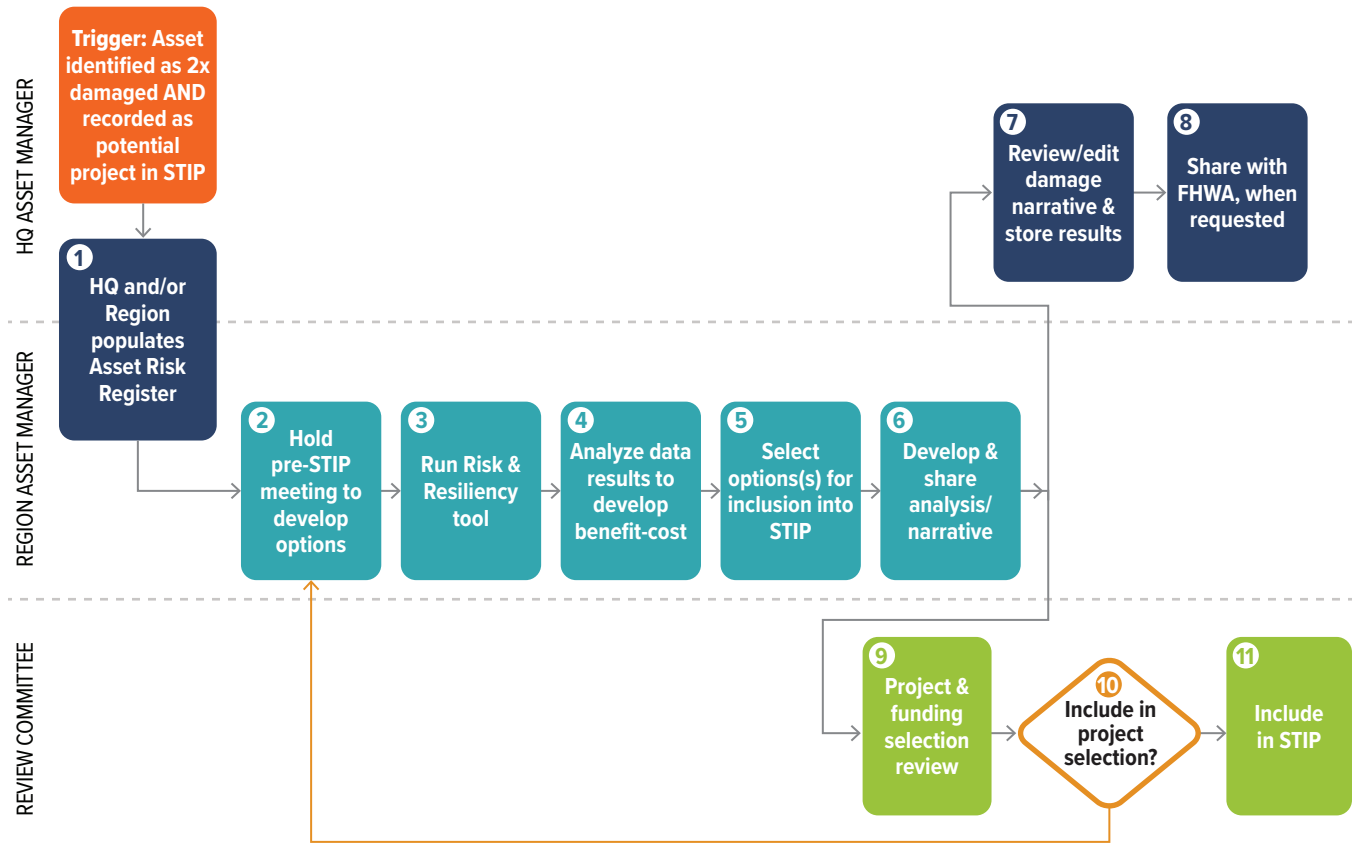
(see section 6.8.3). CDOT is working to identify corridors where other such incidents have occurred. Although there are few twice-damaged assets, the process of tracking events and developing analysis to identify areas of improvement and inform new projects has been established.

Going forward, CDOT expects this database will play a key role in new processes to determine whether actions to improve resiliency should be included when assets are due for maintenance, rehabilitation, or other treatments.

6.8.2 ASSESSING AND MITIGATING TWICE-DAMAGED ASSETS AT CDOT

As part of the resiliency program, CDOT plans to use data from past natural hazard events and predictive data from those same risks on the system to improve asset-management decisions. The process is being integrated into existing procedures and will allow CDOT to take a proactive approach to meet Part 667 requirements. Additionally, when resilience is built into a twice damaged asset, CDOT can remove that asset from future Part 667 reporting requirements. The process integrates into the Department-wide STIP planning process. A draft process map with step-by-step guidance for how CDOT assesses and mitigates twice-damaged asses is presented in **Figure 29**.

Figure 29 DRAFT Process Flow for Assessing and Mitigating Twice-Damaged Assets



SUPPORTING INFORMATION

1	The HQ Asset Manager or Region Asset Manager will access the risk register and identify any new entries. Then document all newly identified twice damaged assets.	Asset risk register
2	The Region Asset Manager will form a team and hold a pre-STIP meeting to fill-out CDOT form 1048 to develop resilient options and run the resilience cost worksheet. The outputs from this meeting will be used to identify and gather data needed to run the risk and resiliency tool (RnR).	Form 1048
3	The Region Team will run the RnR tool* for each option to create conceptual cost estimates.	RnR tool
4	The Region Team will analyze the risk reduction results from the risk & resiliency tool to establish a benefit-cost of the proposed mitigation.	RnR results
5	The Region Team will select one or more options for developing the initial cost estimate for including this project and resilient options into the STIP.	Cost Estimate
6	The Region Team will develop a narrative to report and share results with the HQ Asset Manager.	Narrative
7	The HQ Asset Manager will receive the results of the twice-damaged asset analysis, review and edit the narrative as required and share the narrative with FHWA when required. They will then prepare for any risk and resiliency Emergency Operations Center (EOC) or commission presentations.	Information from the Region
8		
9	After these steps are completed the Region Planner will include this project in the STIP.	STIP
10		
11		

* https://www.codot.gov/programs/planning/assets/risk-and-resiliency/risk-and-resiliency-tool_2022-01-20-1.xlsx

6.8.3 TWICE-DAMAGED ASSETS CASE STUDY: INTERSTATE 70 IN GLENWOOD CANYON

CDOT in 2020 and 2021 undertook a project to test and refine the process for assessing and mitigating twice-damaged assets.

Interstate 70A in Colorado, near milepost 124, has been the site of damaging rockfall events in 2016, 2010, and 2004. The 2004 and 2010 events both occurred at mile post 124.9, and both damaged the same bridge and retaining wall. The rockfall hazard at the site is above the westbound lanes but affects both directions of the Interstate, impacting geohazard, pavement, and bridge assets. CDOT performed an evaluation of the site, including the assets impacted.

The evaluation included an assessment of the threat likelihoods and three mitigation options to counter future rockfall events.

Following CDOT’s Risk and Resilience Analysis Procedure, CDOT assessed each option, considering the likelihood of future threats, consequence of



Work crews evaluating one of the large boulders from the 2010 incident.

threats to both the owner (CDOT) and users, and vulnerability to future events. These options were then compared to a no-action scenario. **Table 16** outlines the outcomes of analysis of each of the three mitigation efforts. Annual risk mitigation benefits were primarily (97%+) made up of benefits to the road user.

Table 16 Analysis of Mitigation Options for I-70A Glenwood Canyon

	Option	Annual Risk Mitigation Benefit	Annual Cost (Installation + maintenance + replacement)	Benefit/Cost Ratio (annual return on each \$ spent)	Expected Life
A	Rockfall Barrier A 105-foot 3,000 kJ rockfall barrier	\$2.30 million	\$19,000	121	20 years
B	Concrete Barrier A 270-foot concrete barrier fence extension	\$1.35 million	\$15,000	86	10 years
C	Attenuator A 175-foot attenuator	\$1.59 million	\$29,000	54	20 years

7. FINANCIAL PLAN



CDOT's budget allocation process is driven by function and performance. Funding is assigned to a specific budget category (or function) within CDOT. Funding levels reflect the contribution the function makes to achieving PD 14.0 performance management goals, as well as the National Performance Measure goal areas of asset management, safety, and mobility. The budget allocation process positions the Department to prioritize asset management investments based on investment dollars available.

7.1 LINKING REVENUE TO ASSET MANAGEMENT OUTCOMES

The intention of this financial plan is to provide an understanding of revenue sources and how they support the achievement of CDOT’s asset management performance targets, its asset management goal, as well as National Performance Measures. This is provided through consideration of:

- 1. CDOT Revenue.** The sources of revenue for CDOT and how these may vary (e.g., how much is derived from motor fuel tax or federal funding).
- 2. Revenue Allocation.** How CDOT divides up the revenue received and aligns this to achieving goals and objectives.
- 3. TAM Budget Process.** The funds available for the TAM program and how that is divided between asset classes.

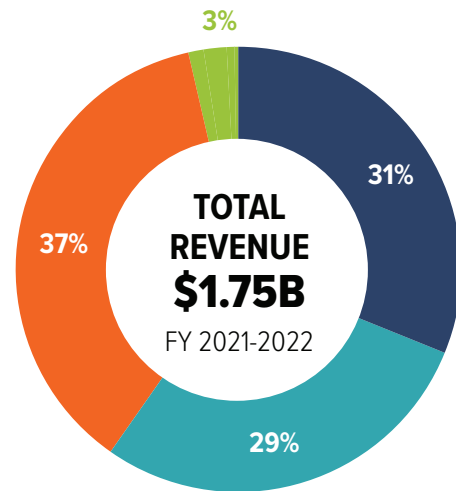
Also considered in this chapter is asset valuation as an indicator of whether investments are maintaining or improving value.

7.2 CDOT REVENUE

CDOT’s total revenue for FY 2021-22 is approximately \$1.75 billion, as presented in **Figure 30**. Colorado’s transportation system is financed by taxes and fees paid by users of the state and national transportation systems. CDOT receives revenue from five sources: state revenue, federal revenue, grants, miscellaneous sources (including sale of property, permits, and fines), and enterprise revenue.

The three primary revenue sources are as follows:

Figure 30 Summary of CDOT Revenue FY 2021-22



- \$546.8M** Highway User Tax Fund (HUTF) Revenue
- \$0M** General Fund
- \$500M** SB 17-267 Lease-Purchase Agreements
- \$642.2M** Federal Programs
- \$20M** Aeronautics
- \$31.9M** Miscellaneous
- \$7.7M** State Multimodal Funding
- \$1.9M** State Safety Education Funding
- \$200K** State Infrastructure Bank
- \$500K** Capital Construction Fund

Source: CDOT FY 2021–22 Final Budget Allocation Plan

Highway Users Tax Fund (HUTF)	<p>This fund comprises state-levied fuel taxes and fees associated with the operation of motor vehicles in the state. The State Treasurer distributes HUTF proceeds between CDOT, counties, and municipal governments, according to statutory formulas.</p> <p>CDOT HUTF revenue decreased substantially in 2020 and 2021 due to the impacts of the COVID19 pandemic. As shown in the table below, measures taken to reduce the spread of the virus resulted in a substantial drop in Vehicle Miles Traveled (VMT) throughout 2020 and early 2021. With the increased distribution of vaccines and corresponding rollback of restrictions (mid-2021 and 2022), the state’s VMT has been returning to pre-pandemic levels.</p>	<ul style="list-style-type: none"> » Motor Fuel Taxes—\$299.3M » FASTER Revenue—\$119.2M » FASTER Vehicle Fees and Vehicle Registration Fees—\$106.9M » Miscellaneous—\$21.4M
State Funding Programs	<p>Senate Bill (SB) 17-267 directed the State Treasurer to execute lease-purchase agreements on existing state facilities to generate revenue for priority transportation projects. 25 percent of the funding is to be spent in rural areas and at least 10 percent is to be spent on transit projects. (FY 2019-2022)</p> <p>SB 260 includes implementation of several new transportation fees and General Fund transfers, creates or modifies four state enterprises, and adds new planning and environmental study requirements. (FY2023)</p>	<ul style="list-style-type: none"> » Over the next five years state funding programs will contribute more than \$2B in revenue to priority transportation projects.
Federal Programs	<p>In addition to state sources of funding, CDOT relies on revenue from the federal government. Federal funding for highway and transit projects primarily comes from the federal Highway Trust Fund, which is funded with federal fuel taxes. In recent years, fuel taxes have been insufficient to fully fund the federal Highway Trust Fund, and it has been supplemented by transfers from the federal General Fund.</p>	

On November 15, 2021, President Biden signed into law the Infrastructure Investment and Jobs Act Public Law 117-58. The measure, also known as the Bipartisan Infrastructure Law (BIL), provides \$550 billion over fiscal years 2022-26 in new federal investment in infrastructure, including roads, bridges, mass transit, water infrastructure, resilience, energy, and broadband.

The analysis and numbers included in this TAMP include BIL. The processes described in this TAMP position CDOT to prioritize asset management investments based on the investment dollars available.

There are two state-owned enterprises that are critical to funding asset management at CDOT:

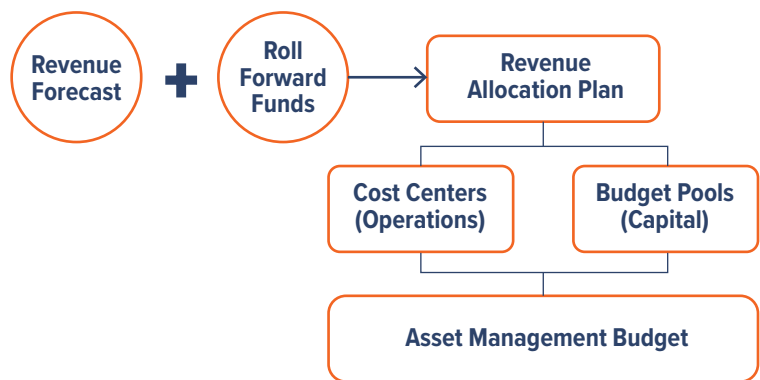
- » **The Statewide Bridge and Tunnel Enterprise (BTE)** repairs, rehabilitates, and replaces bridges in “Poor” condition. BTE finances the design, repair, or reconstruction of designated bridges on the State Highway System using revenue generated from an annual bridge-safety surcharge collected from vehicle registrations, which generates roughly \$125 million per year. SB 260 will increase this amount through a new Bridge and Tunnel Impact Fee anticipated to generate more than \$500 million over a decade. Due to its Enterprise status, the BTE can issue its own revenue bonds based on the authority granted by Article X, Section 20 of the Colorado constitution to accelerate replacements or improvements of poor bridges. Tunnels were added to BTE’s purview in 2021.
- » **The Colorado Transportation Investment Office (CTIO)** leverages innovative ways of financing transportation, such as public-private partnerships, the operation of concession agreements, and fee-based projects.

7.3 REVENUE ALLOCATION

CDOT’s Revenue Allocation Plan represents the amount of revenue the Department anticipates it will receive through the course of the fiscal year. The Revenue Allocation Plan is developed by allocating

anticipated revenues for the upcoming fiscal year to budget programs. These programs are established to serve a specific departmental function—geohazard mitigation, for example. Each of the budget programs included in the Revenue Allocation Plan are composed of either cost centers or budget pools (see **Figure 31**). In general, cost centers represent the operating portion of the Department’s budget, while budget pools represent the capital portion. In general, open projects from a prior fiscal year are paid for out of previously received revenues. The Revenue Allocation Plan represents new anticipated revenue that is available for operating expenses during the fiscal year, and for new capital projects.

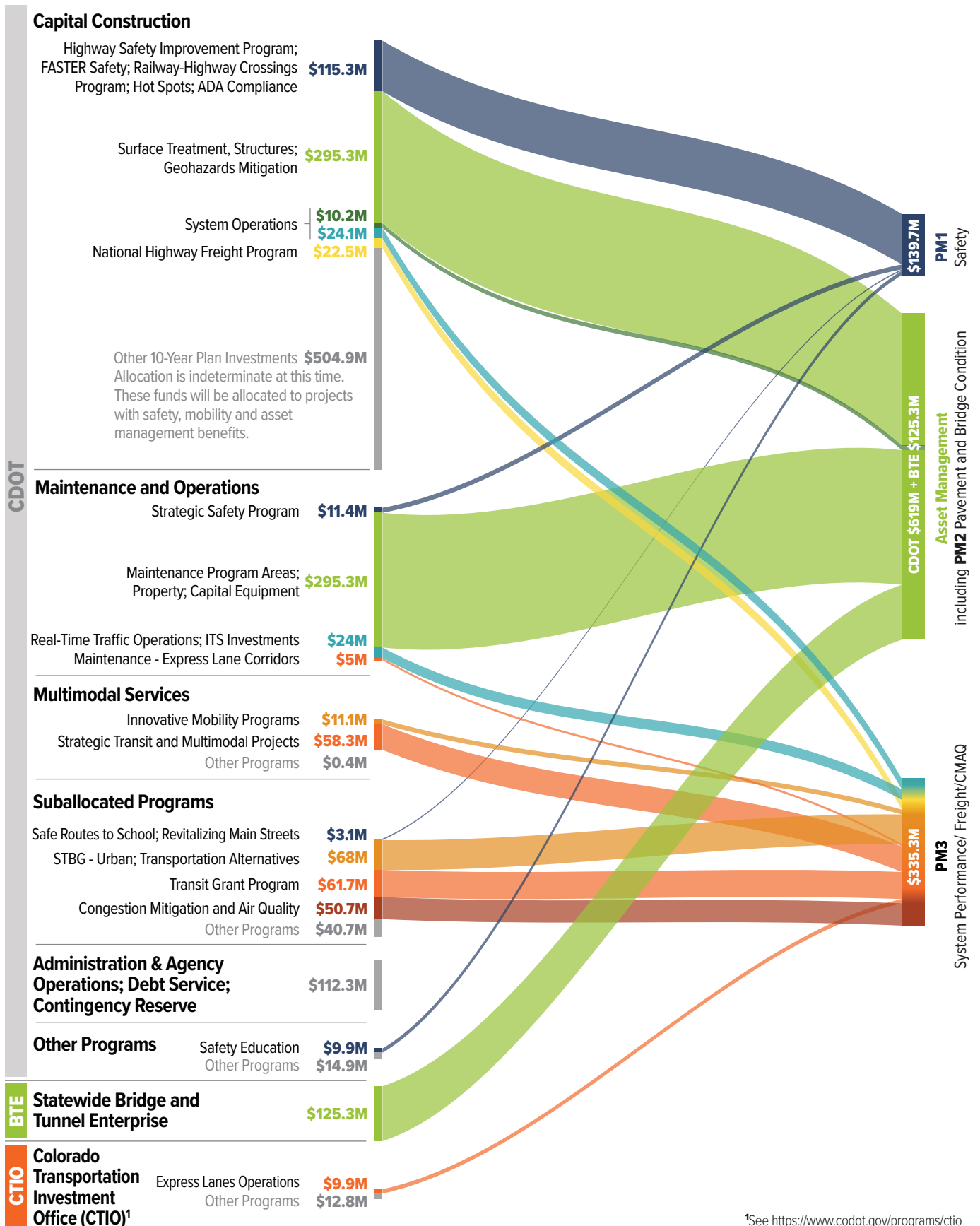
Figure 31 CDOT Budget Allocation Process



The budget for most of CDOT’s core and support functions is allocated and directed by the Transportation Commission. When assigning budgets, CDOT considers performance management goals (defined in PD-14.0) and the National Performance Measure goal areas of condition (asset management), safety, and system performance (mobility). Although funding is assigned to a specific budget category (or function), it is also recognized for the contribution it makes to achieving state and federal performance goals. **Figure 32** provides an illustration of the connection of the FY 2021-22 budget categories to National Performance Measures.

Figure 32 FY 2021-22 Budget Contributions to National Performance Measures

CDOT investment decision-making considers the contributions made to achieving National Performance Measure targets for asset management, safety, and mobility.



¹See <https://www.codot.gov/programs/ctio>

7.4 ASSET MANAGEMENT BUDGET ALLOCATION

The asset-management planning budget is split between the 12 asset classes using the process described in section 5.1.3. **Figure 33** presents the split for FY 2021-22, assuming the total planning budget is \$744 million, including the Statewide Bridge and Tunnel Enterprise.

7.5 INITIAL (NEW) CONSTRUCTION

CDOT’s asset management program is dedicated to funding the existing transportation system—not expansion projects. The Department’s investments in new pavement and bridge construction are funded outside of its asset-management program, through CDOT’s 10-Year Plan. The Department in 2019 began the process to build this 10-year vision, meeting with Coloradans in every county. Thousands of comments and ideas became the basis for a prioritized list of transportation projects. The resulting *10-Year Vision* document identified transportation improvements across the state, ranging from long-deferred resurfacing projects to large and complex projects.

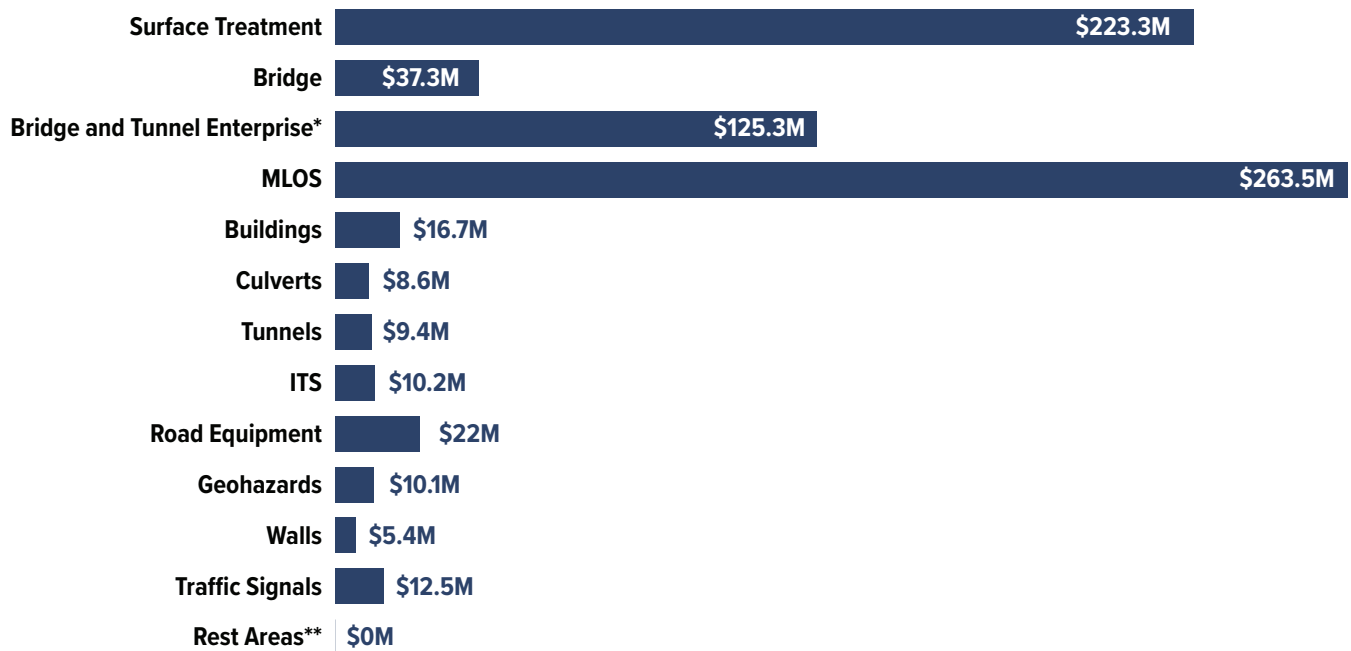
These projects can influence the performance outcomes that CDOT will achieve. Treatments to existing assets can enhance condition outcomes, and where these treatments are defined, they are incorporated in the AIMS model and reflected in predicted performance. Adding new assets creates additional asset management responsibility for CDOT. Although the new assets will not have a significant asset management impact in the timeframe of this TAMP, this ongoing commitment is considered during project planning.

Much of CDOT’s “new” revenue sources—including funding from state Senate Bills 260 and 267, and certain new funds from the Infrastructure Investment and Jobs Act—is dedicated to supporting projects in the plan, including new pavement and bridges. CDOT defines new construction for pavement and bridges as follows:

- » Pavement: New pavement construction includes capacity increases; pavement widening for capacity or safety reasons; and horizontal or vertical changes of pavement alignment.
- » Bridges: New bridge construction means building a bridge where no bridge existed before, or new interchanges.

Figure 33 Asset Management Funding Distribution by Asset, FY 2021-22

The majority (almost 90 percent) of asset management funding goes to maintenance levels of service, pavements (surface treatment) and bridges (bridge and BTE)



* Based on BTE forecast. Note not all BTE revenue is available for projects due to existing debt service obligations and operational costs.

** Rest Areas is not funded from asset management until FY 2023

To estimate the amount CDOT intends to spend on initial (new) construction for the next 10 years, CDOT's TAM program utilized the Department's 10-Year Strategic Project Pipeline. This document is maintained by the Multimodal Planning Branch and is mostly composed of projects that increase or enhance CDOT's system capacity in some way. The pipeline contains a mix of unfunded and funded projects. Due to the uncertain nature of the final years of pipeline funding, CDOT is unable to provide a forecast for new construction beyond FY24.

7.6 TAMP FINANCIAL PLAN—PAVEMENTS AND BRIDGES

CDOT develops a long-term financial plan for each asset class. This informs the AIMS model analysis and CDOT's budget-setting processes.

Table 17 provides the planned expenditure on pavements for the TAMP period of FY2022-31. The pavement financial plan includes anticipated funding for surface treatment (pavement program), maintenance levels of service and initial construction. Planning budgets for the pavement program have been set through FY2024-25. Most estimated budgets are held at FY2024-25 levels for subsequent years in the AIMS analysis and table below. Maintenance Levels of Service budgets are actual budgets and for FY 25 and beyond these numbers are escalated at 3% per year.

Table 17 Financial Plan for Pavement Assets (in Millions)

	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
Surface Treatment	\$223.3	\$224.61	\$225.61	\$229	\$229	\$229	\$229	\$229	\$229	\$229
Maintenance Levels of Service	\$40.4	\$41.6	\$40.7	\$41.9	\$43.2	\$44.5	\$45.8	\$47.2	\$48.6	\$50.1
Initial Construction	\$118.7	\$118.7	\$118.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	\$382.4	\$384.91	\$385.01	\$270.9	\$272.2	\$273.5	\$274.8	\$276.2	\$277.6	\$279.1

Bridge financial plan numbers are estimated using the same approach as for pavements and presented in **Table 18**. The bridge financial plan includes anticipated funding for Staff Bridge (bridge program), maintenance levels of service, Bridge and Tunnel Enterprise, and initial construction.

Table 18 Financial Plan for Bridge Assets (in Millions)

	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
Staff Bridge	\$37.3	\$37.3	\$38.3	\$38.3	\$38.3	\$38.3	\$38.3	\$38.3	\$38.3	\$38.3
Maintenance Levels of Service	\$5.4	\$5.2	\$5.0	\$5.1	\$5.3	\$5.4	\$5.6	\$5.8	\$5.9	\$6.3
BTE	\$97.77	\$54.24	\$86.17	\$84.90	\$117.12	\$76.43	\$116.25	\$121.38	\$124.07	\$128.66
Initial Construction	\$93.2	\$93.2	\$93.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	\$233.3	\$189.94	\$222.67	\$128.30	\$160.72	\$120.13	\$160.15	\$165.48	\$168.27	\$173.26

7.7 ASSET VALUATION

Asset valuation is a useful metric in understanding how asset management is preserving value through time. To that end, CDOT has taken steps to estimate the value of the agency's NHS pavement and bridges. CDOT has adopted a data-driven methodology that accounts for asset depreciation over time, going beyond current replacement value or straight-line depreciation. CDOT primarily uses a condition-based approach to calculate the value of bridges and pavements. This approach starts with asset value at construction cost or replacement value and discounts it by how much an asset is below the optimal condition. The approach also compares the remaining life of the asset to its initial service life.

Bridges are the largest asset class at CDOT by valuation. The value of the agency's NHS bridges in 2022 is estimated to be \$15.1 billion. Measured against a replacement value of \$28.7 billion, 49 percent of the value remains. The valuation analysis for bridges also considers obsolescence. An obsolescence factor is calculated based on an obsolescence age of 75 years and a linear increase in obsolescence relative to that age. The obsolescence factor reduces the value of the asset as shown by the formula below. A bridge built 75 years ago will have its condition-based value reduced by 50 percent.

Pavement is the second largest asset class at CDOT. The value of the agency's NHS pavement in 2022 is estimated to be \$10.7 billion. Measured against a replacement value of \$14.4 billion, 74 percent of the value remains.

Figure 34 provides a summary of current values for CDOT assets. For assets other than pavements and bridges these numbers are discussed further in Appendix A.

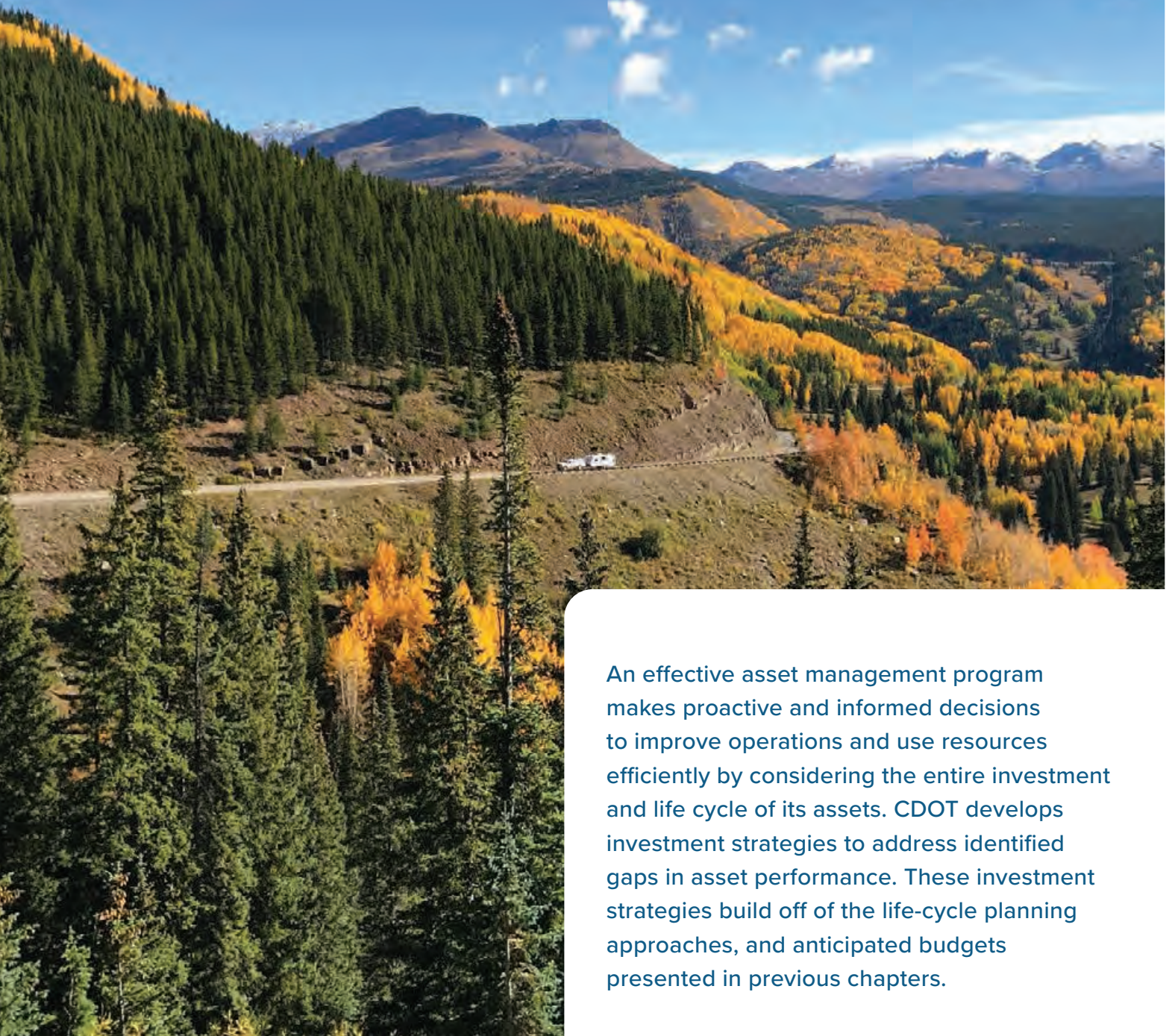
Figure 34 Current Asset Valuation



Bridge current value equation, including obsolescence

$$\text{Bridge current value} = \text{Replacement Value} \times (\text{Condition Rating}/9) \times (1 - 0.5 \times \frac{\text{year today-year built}}{75})$$

8. INVESTMENT STRATEGIES



An effective asset management program makes proactive and informed decisions to improve operations and use resources efficiently by considering the entire investment and life cycle of its assets. CDOT develops investment strategies to address identified gaps in asset performance. These investment strategies build off of the life-cycle planning approaches, and anticipated budgets presented in previous chapters.

8.1 PAVEMENT AND BRIDGE INVESTMENT STRATEGIES

CDOT uses its Asset Investment Management System (AIMS) model to assess various investment strategies and future outcomes. AIMS uses past performance data, deterioration curves for each asset, and treatment information (e.g., the cost and benefit of rehabilitating an asset) to predict an asset's future condition. Based on this, AIMS can also recommend asset treatments and optimize the budget allocation to create the best forecasted performance for the asset network.

The AIMS model determines an appropriate investment strategy by using asset treatments that generally align with the five FHWA specified work types:

1. Maintenance— A work type typically performed by the Maintenance Levels of Service (MLOS) asset class, which involves minor repairs on an asset.

2. Preservation—A work type designed to make an asset more durable to extend its life.

3. Rehabilitation—A work type that involves major repairs on an asset in poor condition.

4. Reconstruction—A work type in which the existing, original asset is torn down and replaced with a similar or identical structure.

5. Initial Construction—A work type where an entirely new asset is built where no asset existed before.

Pavement investment strategies are based on outputs from the AIMS model. The proposed investment strategies for pavement assets over the 10-year TAMP period are presented in **Table 19**.

Table 19 Pavement Investment Strategy FY 2022–31 (in Millions)

Work Type	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
Maintenance*	\$40.4	\$41.6	\$40.7	\$41.9	\$43.2	\$44.5	\$45.8	\$47.2	\$48.6	\$50.1
Preservation	\$6.94	\$28.99	\$14.09	\$7.30	\$33.02	\$27.44	\$32.15	\$24.51	\$22.29	\$22.29
Rehabilitation	\$216.36	\$195.62	\$208.85	\$221.70	\$195.98	\$201.56	\$196.85	\$204.49	\$206.71	\$206.71
Reconstruction	N/A	N/A	\$2.67	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Initial Construction	\$118.7	\$118.7	\$118.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	\$382.4	\$384.91	\$385.01	\$270.9	\$272.2	\$273.5	\$274.8	\$276.2	\$277.6	\$279.1

* Maintenance expenditure is from maintenance levels of service budget.
FY30 and FY31 data for preservation and rehabilitation work types are averages.

Bridge investment strategies consider outputs from AIMS and historical expenditures to estimate the least life-cycle cost. The proposed investment strategies for bridge assets over the 10-year TAMP period are presented in **Table 20**. These numbers include Staff Bridge, Maintenance Levels of Service, initial construction and Bridge and Tunnel Enterprise investments.

Table 20 Bridge Investment Strategy, FY 2022–31 (in Millions)

Work Type	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
Maintenance*	\$5.4	\$5.2	\$5.0	\$5.1	\$5.3	\$5.4	\$5.6	\$5.8	\$5.9	\$6.3
Preservation	\$19.39	\$22.15	\$22.96	\$16.76	\$19.08	\$20.92	\$24.20	\$38.15	\$38.30	\$31.88
Rehabilitation	\$7.02	\$15.15	\$15.34	\$21.54	\$1.73	\$0	\$20.08	\$0.15	\$33.12	\$32.39
Reconstruction	\$108.65	\$54.24	\$86.17	\$84.90	\$134.61	\$93.81	\$110.27	\$121.38	\$90.95	\$102.69
Initial Construction	\$93.2	\$93.2	\$93.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	\$233.3	\$189.94	\$222.67	\$128.30	\$160.72	\$120.13	\$160.15	\$165.48	\$168.27	\$173.26

* Maintenance expenditure is from maintenance levels of service budget.

The investment strategies shown for traditional asset management work types—maintenance, preservation, rehabilitation and reconstruction—represent CDOT's base asset management program, including the maintenance levels of service program and the Bridge and Tunnel Enterprise. These funding levels are the majority of the Department's investments in these work types, but the totals do not include some investments from CDOT's 10-Year Plan. The Department has not included such investments, as it is still developing the ability to systematically disaggregate them from larger projects and consistently track delivery.

9. PERFORMANCE GAP ANALYSIS



Performance-gap analysis compares existing conditions to target performance levels and suggests investment strategies for addressing identified gaps. A gap analysis should recognize that asset teams are attempting to achieve aspirational targets while also working within a fiscally constrained budget. An asset management program ensures that the Department's assets are used most efficiently, enhancing asset functionality by achieving the greatest benefit at the lowest cost while maximizing the asset's lifespan.

9.1 STATE OF GOOD REPAIR

CDOT defines state of good repair based on the measures presented in PD 14.0. For pavements and bridges, these are summarized in **Table 21**. It is also necessary to consider performance gaps for pavements based on FHWA's National Performance Measures. Two- and four-year targets for the National Performance Measures are also shown below.

Table 21 CDOT NHS State of Good Repair Definitions

Asset Class	PD 14.0 Performance Measure	PD 14.0 Target (State Of Good Repair)	FHWA National Performance Measure Targets (NHS only)
Pavement	Percent with high or moderate Drivability Life (DL)	80% high or moderate DL	2-Year target (2024) 45% Good, 4% Poor 4-Year target (2026) 47% Good, 3.5% Poor
Bridge	Percent deck area on NHS and State Highway System in good condition, and percent deck area in poor condition.	40% or more in good condition 10% or less in poor condition	2-Year target (2024) 36% Good, 4% poor 4-Year target (2026) 36% Good, 4% Poor

This TAMP considers several different parts of the highway network. These targets apply across each of these systems separately and together (e.g., the 80 percent high or moderate Drivability Life target for pavements applies to the Interstate, non-Interstate NHS, and the NHS as a whole.)

9.2 PAVEMENT GAP ANALYSIS

As part of the annual budget-setting process, CDOT forecasts various funding options and expected outcomes using its AIMS asset model.

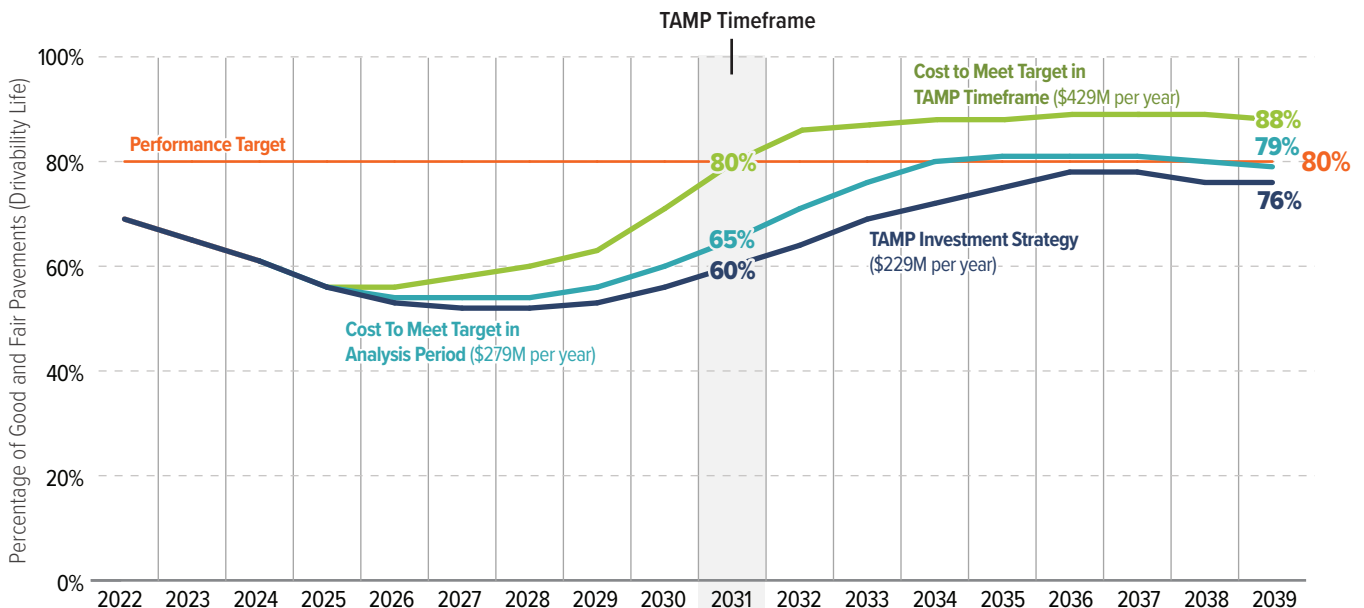
For pavements, planned projects are entered into AIMS by pavement segment. For the purposes of the TAMP, this was current as of November 2021.

Potential asset treatments (e.g., rehabilitations and replacements), including costs and condition benefits, are also supplied to AIMS. Adjustments to the treatment parameters (costs/benefits/triggers) are completed by CDOT on a periodic basis and updated in AIMS. Deterioration curves are used to predict future performance of each pavement segment. These deterioration curves are updated on an annual basis. The analysis is undertaken over a minimum period of 20 years.

Figure 35 presents the expected outcomes for both the proposed investment strategy and for an alternative scenario that enables the PD 14.0 (state of good repair) target to be met.

Figure 35 Effect of Funding Levels on Pavement Condition of Colorado State Highway System

Based on proposed investment levels, pavement condition is expected to fall until 2027 and then recover. Current funding will not achieve the performance target in the TAMP timeframe (2031). An additional \$50M per year would be required to meet the performance target by 2034.



From 2022 through 2025, this analysis uses budgets that have already been set. Therefore, funding scenarios only begin to differ after 2025. The large dip occurring up to 2025 is caused by the large percentage of lane miles with a base year Drivability Life of five or less, which in the model are classified as “Low Drivability” life. Early on (up to 2025) in the analysis, the Drivability Life for these lane miles deteriorates from five down to zero. The model analysis projects the dip to continue for the first nine years.

Under CDOT’s planned investments, pavement condition reaches 78 percent in 2036, short of the 80 percent target. To achieve the target over the analysis period would require an additional investment of \$50 million per year. To reach the target within the TAMP timeframe (by 2031) would require a significant additional investment of \$200 million per year from 2026-31. CDOT has also developed AIMS to be able to report FHWA National Performance Measure outcomes. **Figure 36** presents these results for the TAMP investment strategy.

For each portion of the highway system reported in **Figure 36**, there is a significant drop in pavements from good to fair condition over the TAMP period of 2022-2031. It is expected that this dip is similar in nature to the drop in Drivability Life shown in **Figure 35** and will be recovered over time. The model forecasts that the number of lane miles dropping to Poor is relatively low (and managed), so the proposed investment strategy will be to focus on preservation of Good and Fair segments.

The cost to address CDOT’s current backlog of Interstate pavement containing segments rated “poor” by federal standards, as well as addressing other significant pavement rideability issues on the Interstate, is about \$1.0-\$1.5 billion.⁸

9.3 BRIDGE GAP ANALYSIS

CDOT develops its bridge forecast by entering planned projects into the AIMS model. The model then begins recommending projects for the period that does not have planned projects, which is currently the period beyond 2025. **Figure 37** presents the expected outcomes for the proposed investment strategy. The modeled forecast uses bridge deterioration models developed in January 2022.

Analysis shows that a reduction in annual funding of \$10 million will mean that, over the long-term, CDOT will not meet the PD 14.0 performance target of 90% of bridges in good or fair condition. This investment approach and investment reduction is not planned. Analysis also shows that to maintain

the current condition level (96% of bridges in Good or Fair condition), an additional annual investment of \$200 million will be required. An investment approach that maintains current condition would exceed the current performance target and is not proposed based on competing budget demands.

Figure 38 presents the expected outcomes for different systems based on the planned investment strategy.

This analysis shows that there are no performance gaps within the 2022-31 timeframe of the TAMP, but the long-term analysis illustrates that continued investment is required to continue to achieve performance outcomes.

The cost to eliminate the backlog of poor bridges is approximately \$2.2 billion.

9.4 NHS GAP ANALYSIS

In addition to identifying physical-condition gaps (see previous sections), FHWA requires state DOT asset-management plans to identify gaps in the effectiveness of the NHS in providing for the safe and efficient movement of people and goods.

To align CDOT’s performance targets with its safety goals, the Department maintains a Strategic Transportation Safety Plan (STSP). The plan establishes a collaborative and shared mission for transportation safety in Colorado by identifying Colorado’s key safety needs for guiding investment decisions toward strategies and countermeasures with the highest potential to save lives and prevent injuries. CDOT, the Colorado Department of Health and Environment (CDPHE), the Colorado State Patrol (CSP), and the Colorado Department of Revenue (CDOR) are the lead agencies that direct the development of the STSP, considering input from other key stakeholders.

9.5 CLOSING GAPS

CDOT may alter its existing strategy by adjusting treatments, condition targets and other factors to help close performance gaps. The Department also analyzes funding relative to targets at its annual budget-setting workshop for asset management and may adjust funding recommendations should analysis warrant it. Additionally, the Transportation Commission each year is briefed on performance versus targets in PD 14.0 and may adjust funding to address gaps. Finally, the Life-Cycle Planning and Investment Strategies sections of this plan describe high-level CDOT investment strategies and methods for closing performance gaps.

⁸ This estimate includes \$830 million to address 537 total lane miles over 10 years. The estimate also addresses the risk of deterioration that is currently not accounted for in CDOT’s models. While this investment would address much of the current “poor” Interstate pavement, it would not prevent additional investments for maintaining in poor condition.

Figure 36 FHWA National Performance Measure for Pavement—Projected Condition Outcomes

NHS (Interstate and Non-Interstate) and State Highway System condition will stay relatively consistent until 2027. After 2027 the amount of good pavement will reduce by approximately 20 percent by 2031.

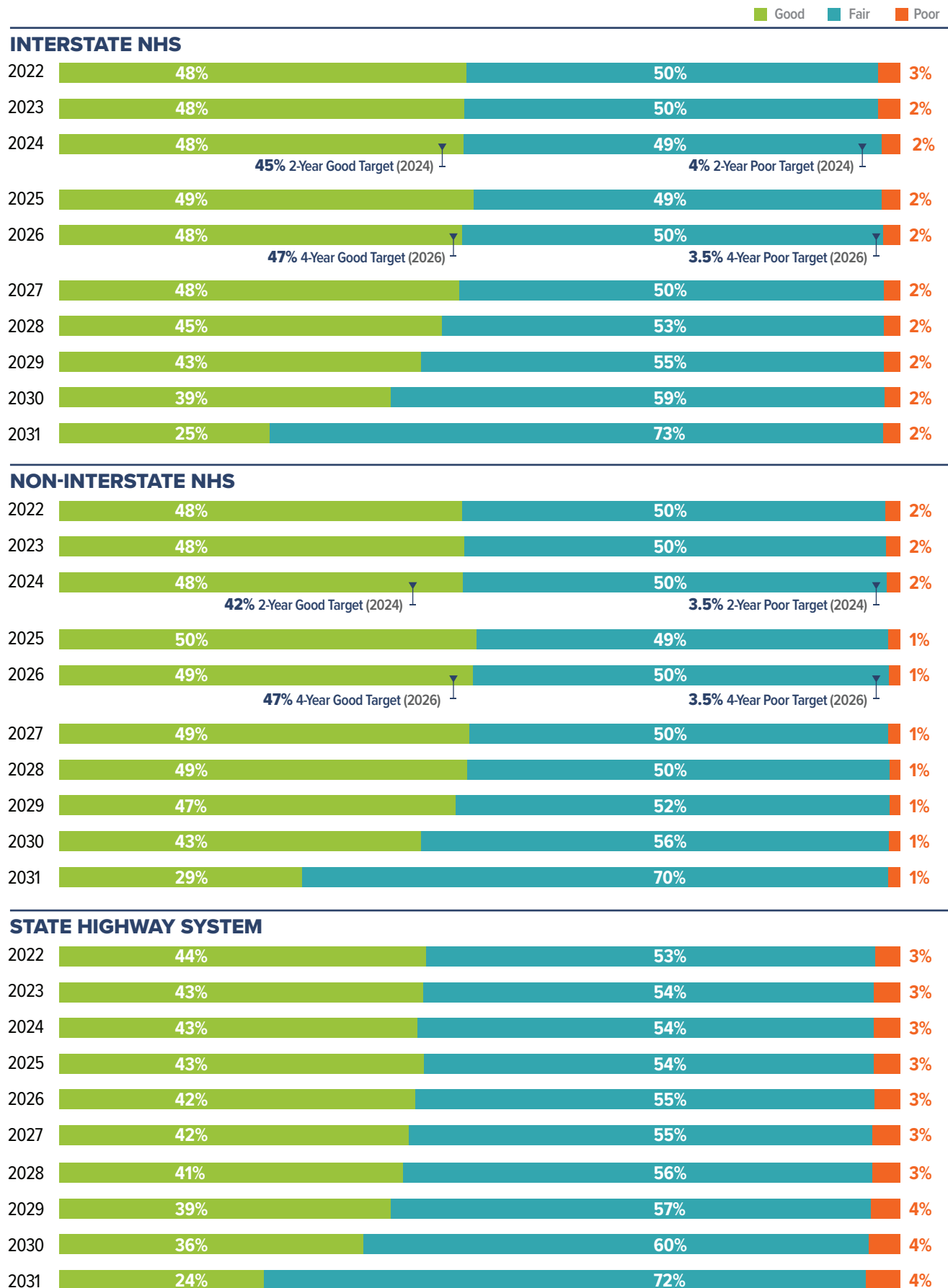


Figure 37 Bridge Condition Forecast, State Highway System

Based on proposed investment levels bridge condition is expected to stay relatively consistent through to 2033 and then begin to fall. Current funding will achieve the performance target.

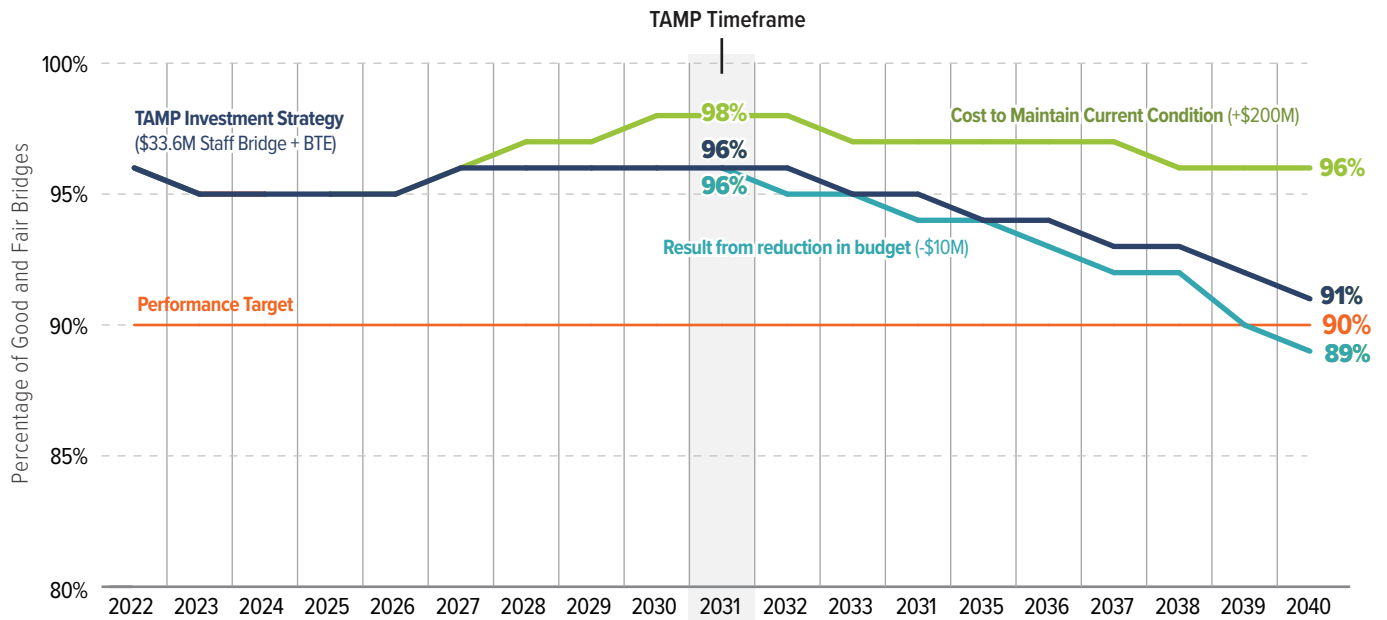
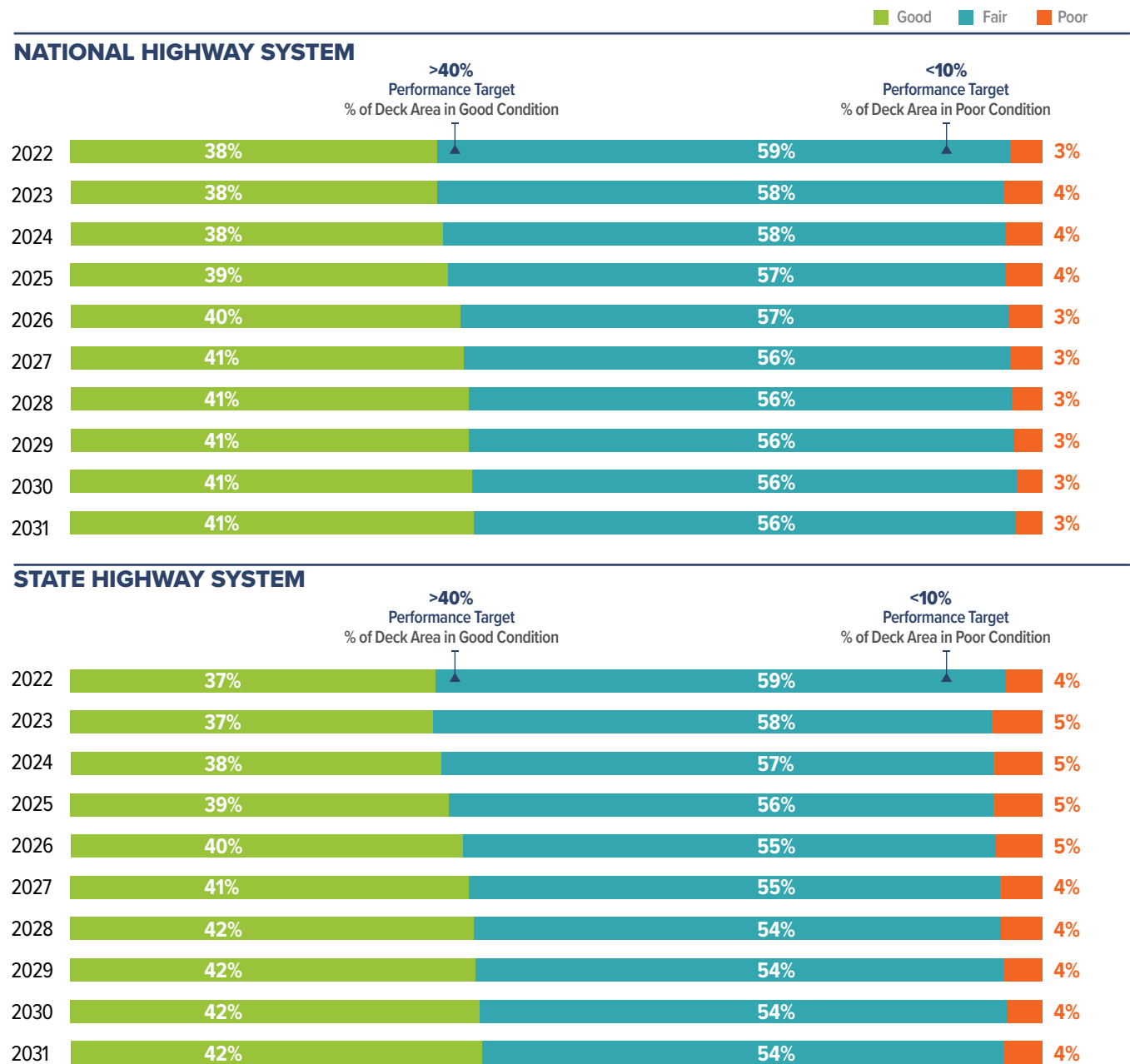


Figure 38 Bridge Condition Forecasts by Highway Category:

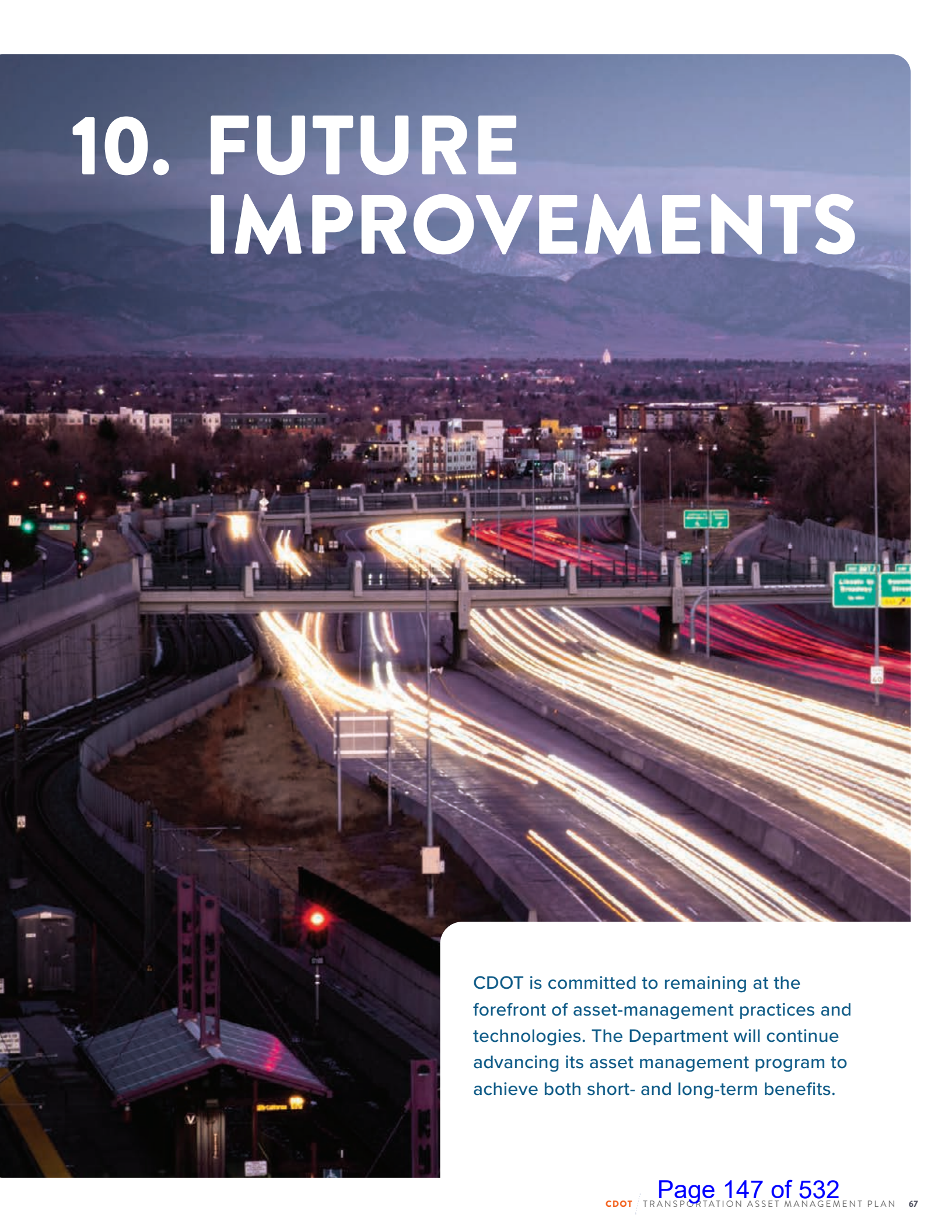
The percentage of Good bridge deck is expected to increase in the next 10 years. The percentage of Poor bridge deck is expected to be maintained at current levels. Performance targets will be met over the next 10 years.



1. FHWA National Performance Measure Targets:
 2-Year target (2024) 45% Good, 4% Poor
 4-Year target (2026) 47% Good, 3.5% poor

2. While the percentage of poor deck area on the NHS is expected to decline, challenges lie ahead in managing the aging population of structures. Specifically, the Department faces an extensive inventory of poor bridges in the Denver Metro area, and the large statewide inventory of fair structures will require high levels of consistent maintenance and investment to prevent them from falling into poor condition

10. FUTURE IMPROVEMENTS



CDOT is committed to remaining at the forefront of asset-management practices and technologies. The Department will continue advancing its asset management program to achieve both short- and long-term benefits.

10.1 CONTINUOUS IMPROVEMENT

CDOT's asset-management program strives for continuous improvement. The next two sections describe anticipated improvements to the pavement and bridge asset classes, and are followed by improvements planned for CDOT's overarching asset-management program.

10.2 PAVEMENT PROGRAM IMPROVEMENTS

Intended improvements to the pavement asset class address people, processes, and technology.

PEOPLE

CDOT anticipates a continued need over the 10-year TAMP period to maintain and improve training for headquarters and Region staff in operating the AIMS models—both the existing Drivability Life model and the National Performance Measures model.

PROCESS

Process improvement is a key aspect of advancing asset programs. The pavement management team is currently part of a Joint Process Review with FHWA entitled "Improving How CDOT Manages Interstate Pavement Condition." The objective of this review, conducted as part of CDOT's Quality Improvement Council (QIC), is to identify and document opportunities for refining cross analysis

of CDOT's Drivability Life metric/model and the National Performance Measure (NPM) for pavement. The review will identify possible solutions to bring Drivability Life and the NPM into closer alignment. CDOT anticipates implementing the recommendations over the next several years, provided funding and consultant support are available.

Another process improvement is encouraging Regions to consider incorporating more recycled materials into their surface-treatment projects when appropriate. The pavement management team is encouraging more of these materials through updates to the form it gives to Regions to develop annual treatment lists.

TECHNOLOGY AND ANALYSIS

Developing stronger forecasting and project-selection analyses through the AIMS model is an ongoing area of improvement. For example, the pavement team is implementing several improvements for the new fiscal year's model, such as:

- » Transverse crack lengths will be used in the model instead of transverse crack counts. Transverse crack lengths will more accurately represent the extent of such cracking on CDOT's highways.
- » The chip seal treatment has been revised so that more chip seals will be applied to CDOT's High and Moderate Drivability Life highways to maintain them in High and Moderate condition.
- » Changes to the model will allow minor rehabilitations on more lower-volume roads that have significant distress.



10.3 BRIDGE PROGRAM IMPROVEMENTS

As with the pavement program, intended improvements to CDOT's bridge program also address people, processes, and technology.

PEOPLE

CDOT anticipates a need over the 10-year TAMP period to train Staff Bridge and other staff to use its new System for Inspection and Management of Structural Assets (SIMSA) software, as well as to operate the AIMS model. SIMSA will provide easier access to CDOT's structure and inspection data for stakeholders such as MPOs, CDOT staff, and local-agency owners, while also streamlining the structure inspection and data-collection processes. Because the SIMSA platform is still under development, communicating the capabilities of the system to staff and other stakeholders will be an ongoing effort. It is expected that SIMSA development will be finalized in the next two to three years.

Separately, documentation is critical to ensuring knowledge transfer between staff, and CDOT has been making improvements to documentation of the AIMS model, including deterioration assumptions, individual model runs and their parameters, and more. These efforts will continue over the TAMP timeframe.

PROCESSES

The Staff Bridge unit and the Statewide Bridge and Tunnel Enterprise (BTE) are working to optimize life-cycle planning approaches. The Department intends to increase its efforts to research life-cycle treatments and their effects, including how treatments can increase resilience and address extreme weather events.

The Bridge and Tunnel Enterprise performs most of the bridge-replacement work in the state, and takes ownership of the CDOT bridges it addresses. The enterprise was formed in 2009, so most of its inventory has an average age of less than 10 years. Because the enterprise is Colorado's largest source of dedicated bridge funding, it has the opportunity to develop a fully funded plan to perform preventive maintenance treatments on its structures at the appropriate intervals. Implementing a comprehensive life-cycle plan that prioritizes asset management principles will maximize the return on investment for the enterprise's bridge replacement and rehabilitation projects by extending the service life of BTE-owned assets.

In another planned improvement, Staff Bridge has identified an opportunity to increase its coordination with the Department's long-range planning efforts. In doing so, it hopes to add value to projects and take advantage of economies of scale (e.g., shared costs of traffic control) by adding asset management treatments to projects that are not asset-management specific.

TECHNOLOGY AND ANALYSIS

Future process improvements will establish stronger forecasting capabilities and integrate more robust asset management practices into the Bridge program.

To that end, CDOT is collaborating with the University of Colorado Denver on developing the capability to forecast bridge deterioration through machine learning. The initial phase of this research has been completed and incorporated historical National Bridge Inventory, traffic, and weather data to forecast future bridge conditions. The next steps of this research will be to fine-tune the deterioration model and look at incorporating historical treatment data.

Separately, the SIMSA software will offer new technology and analysis capabilities that must be refined, including:

- » Consolidating bridge data (e.g., condition, inventory) for easy access and use throughout the Department, including serving as a platform to upload and access "as-built" plans.



- » Streamlining bridge inspection and inventory data collection and review for more accurate, up-to-date information.
- » Integrating with CDOT’s AIMS model so that data uploads (e.g., new condition and inventory data) to the model are easier than in the past.
- » Making bridge inspection and inventory data accessible to local agencies, including counties, municipalities, and MPOs.

10.4 TAM PROGRAM: TARGETED IMPROVEMENTS

As with the pavement and bridge programs, CDOT’s overarching Transportation Asset Management program focuses on continuous improvements and has identified future areas for enhancement. These areas are documented in **Figure 39** below. Improvements are categorized as short- mid- or long-term.

The items listed in this section will enable CDOT to enhance processes and further optimize asset investments. Continuous improvement will enable

achievement of the Department’s asset management performance goal of maintaining a high-quality transportation network by working to maintain a state of good repair for all assets and a highly traversable road network.

10.5 IMPLEMENTING THE TAMP

With careful planning and informed investment, new pavement can last for decades, and the service lives of bridges can stretch a century or longer. That means that the asset management decisions CDOT makes now are important not only for the traveling public of today, but tomorrow as well.

As with any plan, the success of this TAMP hinges on implementation. Delivering on the processes and investments outlined in this plan is critical to achieving the two- and four-year targets for National Performance Measures for pavement and bridges, as well as the longer-term asset forecasts contained herein. Successful implementation of this plan is an important step in establishing a legacy of sound transportation asset-management practices and a state of good repair for Colorado’s highways for generations to come.

Figure 39 Future Improvement Areas

	IMPROVEMENT AREA	OUTCOME ACHIEVED
SHORT TERM	Treatment-delivery tracking. Improve ability to track planned asset treatments from planning stage through project delivery, ideally through a transportation project-management system such as PM Web.	Improves understanding of the link between asset-management treatment selections and STIP project delivery.
	Risk integration. Integrate Risk and Resilience Program within the Performance and Asset Management Branch and continue to implement risk practices across the Department.	Improves risk and resilience communication and practices. Leads to more proactive management of threats.
	Process documentation. Build on the recent Policy Directive 1609.0, which documents core asset-management practices, with a new procedural directive and other documentation.	Manages risks from staff turnover and provides a starting point for further enhancement.
MID-TERM	Bridge and tunnel asset management. Improve life-cycle planning for these assets and further develop the recently created tunnels portion of the Bridge and Tunnel Enterprise.	Minimizes life-cycle costs and better prioritizes investments.
	Extreme weather and resilience. Enhance current approaches for integrating as part of lifecycle cost and risk management analyses.	Improves the ability for infrastructure to handle weather and climate threats.
	Life-cycle planning. Continue to enhance analyses from assets’ model (AIMS). For example, include a broader range of work types within the model.	Improves ability to estimate future funding needs and to prioritize asset treatments.
LONG TERM	Tradeoff analyses. Improve ability to perform multi-objective decision analysis (MODA) and cross-asset optimization for asset management decision making.	Improves understanding of alternative funding strategies.

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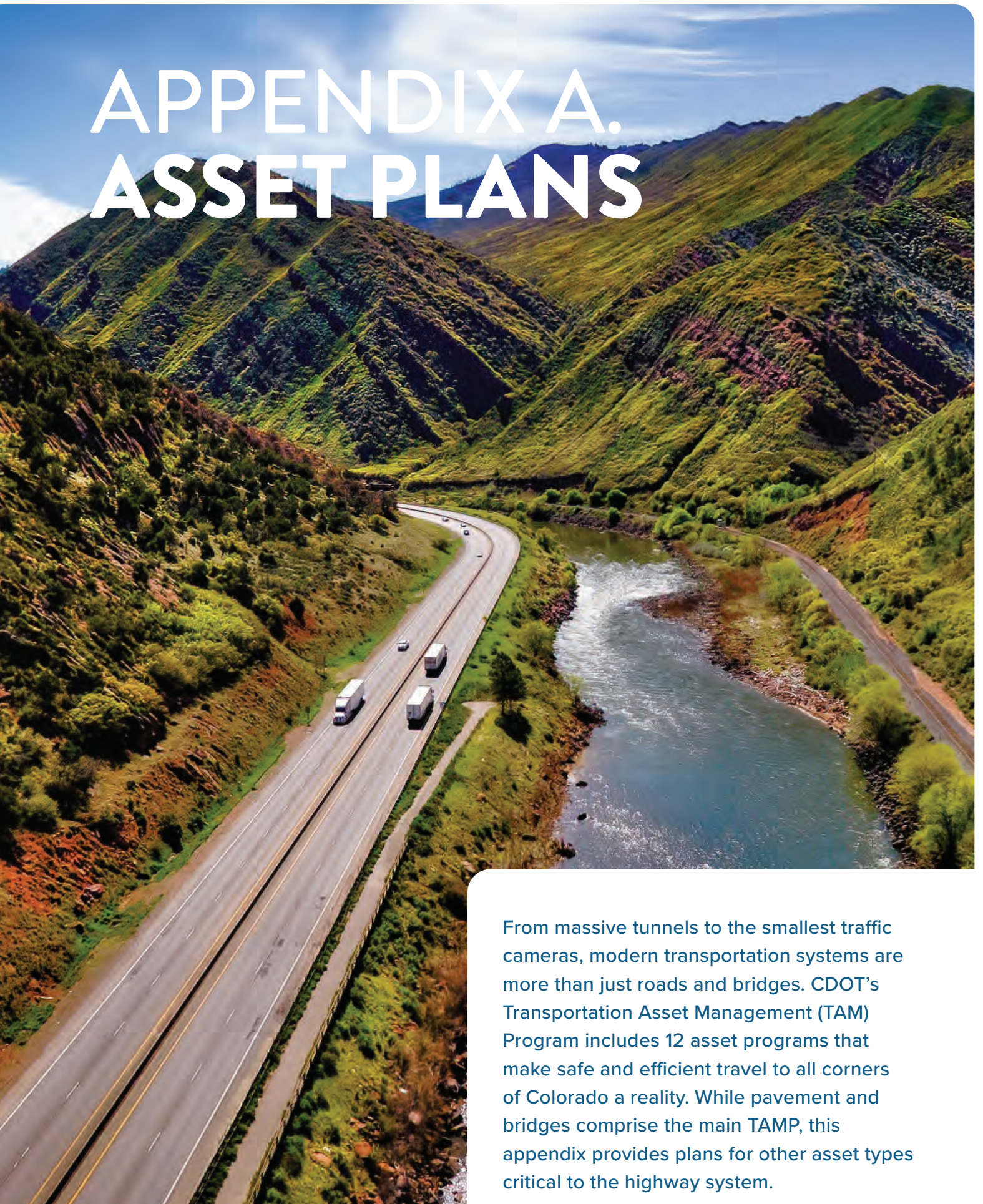
LIST OF ACRONYMS

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ACR	Add/Change/Remove
ADA	Americans with Disabilities Act (federal)
AIMS	Asset Investment Management System
ARPA	American Rescue Plan Act (federal)
ATMS	Advanced Transportation Management System
ATSPM	Automated Traffic Signal Performance Measures
BIL	Bipartisan Infrastructure Law (federal, also see IJJA)
BrM	AASHTOWare’s Bridge Management Database
BTE	Bridge and Tunnel Enterprise
C2C	Center-to-Center Communication
CAV	Connected and Automated Vehicle
CBE	Colorado Bridge Enterprise
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Health and Environment
CDOR	Colorado Department of Revenue
CSP	Colorado State Patrol
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality Improvement
COTAMUG	Colorado Transportation Asset Management User Group
CRV	Current Replacement Value
CS	Condition State
CSP	Colorado State Patrol
CTIO	Colorado Transportation Investment Office
CTMC	Colorado Traffic Management Center
CTMS	Corridor Trip Monitoring System
DL	Drivability Life
DMO	Division of Maintenance and Operations
DOT	Department of Transportation
DRCOG	Denver Regional Council of Governments
DTD	Division of Transportation Development
dTIMS	Deighton’s Total Infrastructure Management System
EMAC	Equipment Maintenance Advisory Committee
EPD	Environmental Product Declarations
ERF	Essential Repair Findings
ERP	Enterprise Resource Planning
ESAL	Equivalent Single Axle Load

FAST	Fixing America's Surface Transportation Act (2015) (federal)
FASTER	Funding Advancement for Surface Transportation and Economic Recovery (Colorado)
FHWA	Federal Highway Administration
FMCSR	Federal Motor Carrier Safety Regulation
FTA	Federal Transit Administration
GHG	Greenhouse Gas
GIS	Geographic Information System
HPTE	High-Performance Transportation Enterprise (Colorado)
HPMS	Highway Performance Monitoring System
HUTF	Highway Users Tax Fund (Colorado)
IJA	Infrastructure Investment and Jobs Act (2021) (federal, also see BIL)
IP	Internet Protocol
IRI	International Roughness Index
ISO	International Organization for Standardization
ITS	Intelligent Transportation Systems
LCP	Life-Cycle Planning
LCCA	Life-Cycle Cost Analysis
LOR	Level of Risk
LOS	Level of Service
NHS	National Highway System
OFMB	Office of Financial Management and Budget
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012) (federal)
MLOS	Maintenance Levels of Service
MODA	Multi-Objective Decision Analysis
MPA	Maintenance Program Area
MPB	Multimodal Planning Branch
MPO	Metropolitan Planning Organization
MTTR	Mean Time to Recovery
MUTCD	Manual on Uniform Traffic Control Devices for Streets and Highways
NBIS	National Bridge Inspection Standards
NHPM	National Highway Performance Measure
NHPP	National Highway Performance Program
NHS	National Highway System
NPM	National Performance Measure
NPMRDS	National Performance Management Research Data Set
NTIS	National Tunnel Inspection Specifications
OBU	On-Board Units
OEM	Office of Emergency Management
OFMB	Office of Financial Management and Budget
OTIS	Online Transportation Information System

PAMB	Performance and Asset Management Branch
PD 14.0	Policy Directive 14, Policy Guiding Statewide Plan Goals and Objectives
PD 1609.0	Policy Directive 1609.0, Transportation Asset Management
PM	Performance Measure
PMS	Pavement Management System
PPM	Property Program Manager
QMP	Quality Management Plan
RnR	Risk and Resilience (Tool)
ROW	Right of Way
RTD	Regional Transportation Director
RSL	Remaining Service Life
RSU	Roadside Unit
RWS	Road Weather Sensor
SAM	Structure Asset Management
SAMI	System for Asset Management and Inspection
SAP	Systems, Applications, and Products in Data Processing
SEA	Systems Engineering Analysis
SGA	Signal Asset Management
SGN	Statewide Traffic Signal Pool
SHS	State Highway System
SIMSA	System for Inspection and Asset Management of Structural Assets
SOV	Single Occupant Vehicle
SSA	Statewide Signal Asset Database
STBG	Surface Transportation Block Grant
STIP	Statewide Transportation Improvement Program
STP	Surface Treatment Program (Colorado)
STSP	Strategic Transportation Safety Plan (Colorado)
TAM	Transportation Asset Management
TAMOC	Transportation Asset Management Oversight Committee
TAMP	Transportation Asset Management Plan
TARE	Total Annualized Risk Exposure
TMC	Traffic Management Center
TPM	Transportation Performance Management
UPS	Uninterrupted Power Supply
VMT	Vehicle Miles Traveled
VMS	Variable Message Signs
VSF	Vehicle Storage Facility
WCI	Weighted Condition Index
WIG	Wildly Important Goal
ZEV	Zero-Emission Vehicle

APPENDIX A. ASSET PLANS



From massive tunnels to the smallest traffic cameras, modern transportation systems are more than just roads and bridges. CDOT's Transportation Asset Management (TAM) Program includes 12 asset programs that make safe and efficient travel to all corners of Colorado a reality. While pavement and bridges comprise the main TAMP, this appendix provides plans for other asset types critical to the highway system.

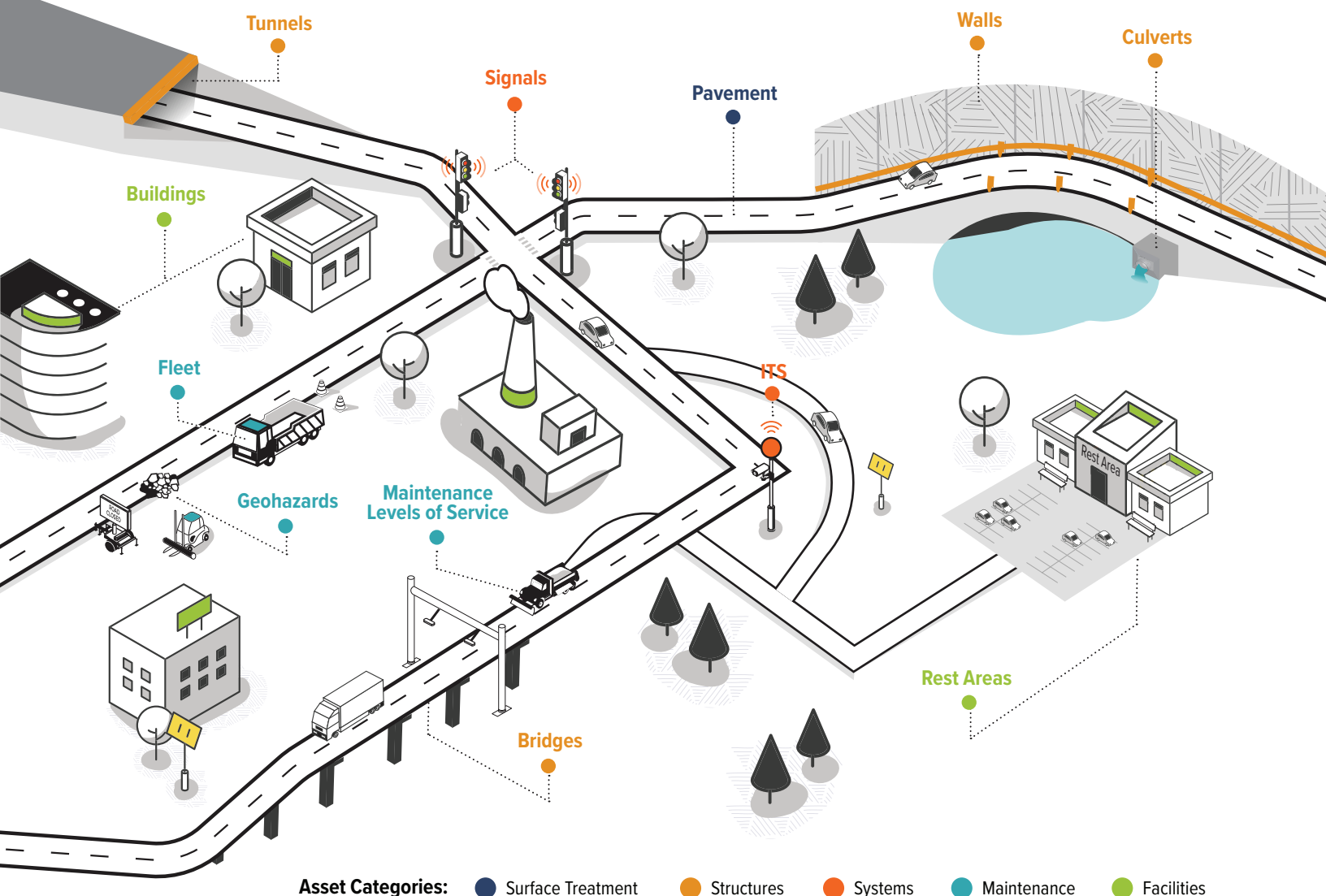
The 10 asset programs discussed in this appendix include:

-  **BUILDINGS**, which protect snow plows and other essential maintenance equipment, as well as provide office space.
-  **CULVERTS**, which provide drainage to keep highways clear of water and debris.
-  **FLEET/ROAD EQUIPMENT**, which includes snow plows and other equipment to maintain our highways, such as by removing snow and ice or striping the roadway.
-  **GEOHAZARDS ASSETS**, which keep travelers safe from rockfalls and landslides in the state's mountainous terrain.
-  **INTELLIGENT TRANSPORTATION SYSTEMS (ITS) DEVICES**, including cameras and wireless technologies, which help workers respond to accidents, provide critical traffic information, and more.

-  **MAINTENANCE LEVELS OF SERVICE**, which funds maintenance activities such as roadway striping, snow and ice removal, and more to ensure the highway system is safe and in a state of good repair.
-  **REST AREAS**, which provide safe and secure restrooms and other services to allow travelers to take a break on long journeys.
-  **TRAFFIC SIGNALS**, which ensure the safe movement of vehicles, protect pedestrians, and help prevent congestion.
-  **TUNNELS**, which safely connect the highway system and create efficient routes to ease passage across the Rocky Mountains and throughout the state.
-  **WALLS**, including retaining walls, bridge walls, and noise walls—that support roads and bridges and mitigate traffic noise.

The asset plans that follow describe the inventories, performance measures, strategies, policies, and procedures that help maintain the highway system. **Figure A-1** helps illustrate the role that each asset program plays in the system.

Figure A-1 CDOT Asset Programs at a Glance



STRUCTURE OF THE APPENDIX

Each asset plan that follows includes:

1. A brief introduction to the assets managed in the asset program.
2. Performance objectives, measures, and targets.
3. High-level documentation of the asset-program inventory and condition.
4. How the assets are planned for and managed throughout their life-cycles.
5. Major risks and how those risks are to be managed.
6. A financial plan for 2022-31 (10 years).
7. Most asset plans include an asset valuation, or a reason one was not included.
8. Investment strategies for the 10-year time horizon of the TAMP.
9. An analysis of the performance gap, if any, envisioned over the next 10 years if the Financial Plan does not provide sufficient funding to achieve performance targets.
10. Planned improvements to staffing, processes and technology.

MANAGING OTHER CDOT ASSETS

CDOT's TAM Program plays a critical role in helping achieve the Department's mission of providing a transportation system that effectively and safely moves people, goods, and information by ensuring the state of good repair of all assets across Colorado's transportation system. Asset management at CDOT generally follows an annual, cyclical process that begins with taking inventory of assets each year. Once the inventory is collected, CDOT begins developing new forecasts, determining new budgets and treatment lists, and delivering new projects for each asset program. **Figure A-2** illustrates how CDOT manages the 10 asset programs in this appendix.

POLICY DIRECTIVE 14.0 PERFORMANCE MEASURES

The asset plans follow goal areas established in CDOT's Policy Directive (PD 14.0) — asset management, safety, and mobility (see **Figure A-3**).

Each goal area contains multiple performance measures and targets that allow CDOT to evaluate statewide efforts in effectively managing the highway system. The targets are used to help determine funding levels for each of the 12 asset programs within CDOT's TAM Program.

Figure A-2 Asset Management Cycle at CDOT

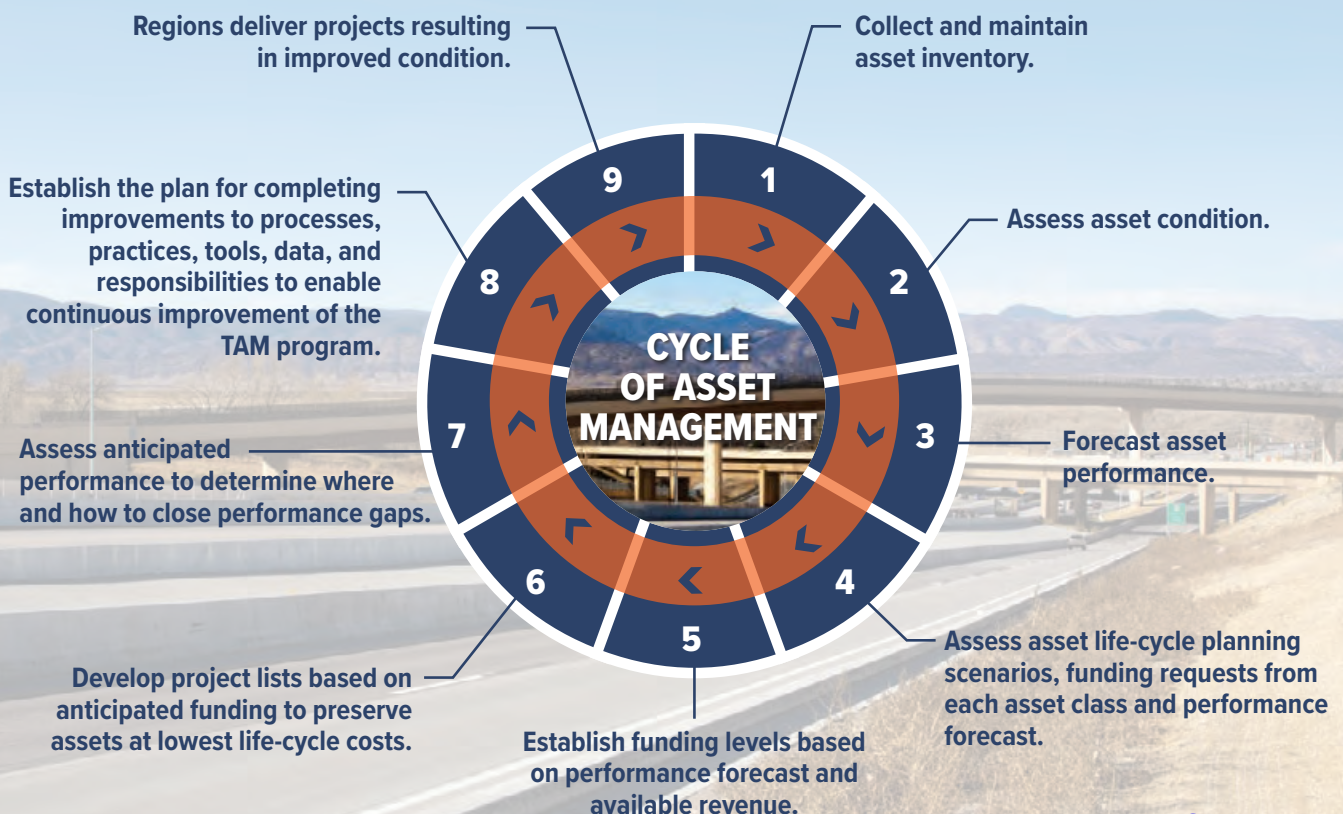


Figure A-3 PD 14.0 Goal Areas



Each asset program has at least one performance measure and target that generally relate to the assets' condition. In a few cases, the measure is related to an operational standard, such as overall maintenance

levels of service, or the level of service for snow and ice removal.

CDOT assets of all types are being managed to support the goal areas of safety and mobility. Examples include:

- » Reducing the risks from geohazards.
- » Removing snow and ice promptly.
- » Assuring that traffic signals are in working order.
- » Ensuring that ITS devices are available to support faster incident response and clearance, mitigate weather-related crash patterns, and provide critical traffic information to vehicle operators.

In general, sustaining all programs of roadway and roadway-related assets in a state of good repair helps ensure the reliability of the highway system as a whole.

Table A-1 presents the PD 14.0 performance targets and 2021 performance for the 10 asset programs described in this appendix. Within the table, green shading indicates that 2021 performance met the target, while red shading indicates the target was not met. Several asset programs employ additional performance metrics in the life-cycle management of their respective assets, as described in the individual asset plans.

Table A-1 CDOT Asset Management Metrics, Targets, and Performance

Asset	Measure	Target	2021 Performance (unless stated)
Buildings	Percentage of buildings with a letter grade of C or better	≥85%	49% ¹
Culverts	Percentage of culverts in Poor condition (have a culvert rating of 4 or less)	≤5%	5.4 %
Fleet	Average percentage of expended useful life for fleet vehicles	≤75%	69%
Geohazards	Percentage of hazardous road segments at or above risk grade B	≥85%	75%
Intelligent Transportation Systems	Average percent useful life expended of ITS equipment	≤90%	70%
Maintenance Levels of Service	MLOS grade for the state highway system	≥B-	C-
	LOS grade for snow and ice removal	≥B	C-
Rest Areas	Percentage of rest areas with a C grade or better	≥90%	63%
Traffic Signals	Percentage of signal infrastructure in Severe condition	≤2%	7%
Tunnels	Percentage of network tunnel length with all elements in equal or better condition that 2.5 weighted condition index	≥75%	39% (2020)
Walls	Percentage of CDOT-owned walls, by square foot, in Poor condition (have a rating of 4 or less)	≤2.5%	3.5%

¹ Change in condition grading implemented in 2020

TAM PROGRAM

Assets described in this appendix follow the organizational and governance structure for asset management described in Section 2 of the TAMP. The Transportation Commission sets the TAM Program's strategic direction—adopting performance metrics, targets, and annual planning budgets for all asset programs.

The TAM Program is part of the Performance and Asset Management Branch (PAMB) in CDOT's Division of Transportation Development (DTD). The core responsibilities of PAMB include asset management, as well as risk and resilience management, performance management, and economic analysis.

Each asset program in CDOT's Transportation Asset Management (TAM) Program is led by a designated statewide asset manager. The asset manager leads the creation of strategies to meet performance objectives, inventory and condition documentation, and life-cycle planning, budgeting, and programming. In many cases, the asset manager also leads life-cycle management and capital-project planning and delivery for their respective assets. For some assets, responsibility for these activities may be shared between more than one individual or group, and between CDOT Headquarters staff and CDOT Regions, as described in the individual asset plans.

PAMB works closely with the Headquarters-level asset managers for each of the 12 asset programs in formulating CDOT's asset-management program. This includes identifying budget needs and the life-cycle planning approaches described in the main TAMP and this appendix. That work is facilitated by a formal staff-level TAM Working Committee, consisting of the PAMB Manager, TAM Program Manager, and managers for the 12 asset programs. The TAM Working Committee assists CDOT in developing new asset-management processes and project lists, discussing asset-modeling systems, meeting FHWA asset management requirements, and addressing other issues raised by CDOT's TAM Oversight Committee (TAMOC).

The TAMOC consists of the Executive Director, Deputy Executive Director, Chief of Staff, Chief Engineer, Chief Financial Officer, Deputy Chief Engineer, Director of Transportation Development, Director of Project Support, and the five Regional Transportation Directors. The TAMOC meets monthly and is responsible for the initial² determination of how to distribute the TAM Cap (the total amount of funding for the TAM Program each year) among the 12 asset programs. The TAMOC also provides initial approval for performance metrics and

targets for each asset program. And at least two of three members of The TAMOC—the Executive Director, Chief Financial Officer or Chief Engineer—must approve TAM treatment lists.

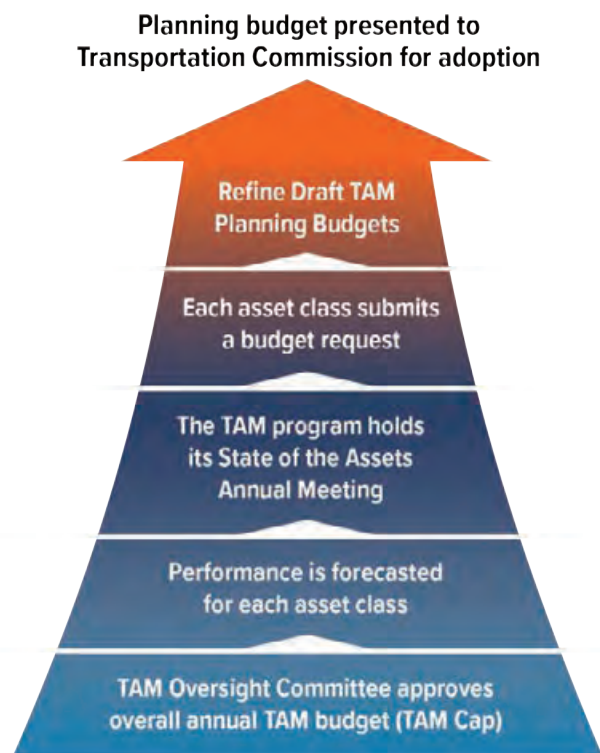
CDOT uses its Asset Investment Management System (AIMS) software to forecast asset performance. The program uses past performance data, deterioration curves for each asset, and treatment information to forecast an asset's future condition.

The AIMS analysis allows the TAM Program to compare different budget scenarios to determine how much funding an asset should receive—based on the effect that additional funding would have on performance. CDOT also uses the tool to compare the relative benefits of changes in funding allocations across asset programs. For a projected budget, CDOT uses the AIMS analysis results to determine the most cost-effective treatments and strategies that maximize network performance over the life of assets.

ANNUAL BUDGETING PROCESS

Processes described in the TAMP—including investment strategies and processes to establish planning budgets for CDOT's asset programs—lead toward development of a rolling, four-year program of asset management treatments, or a project list. This list represents the projects that CDOT intends to deliver for asset management. An update to the list is developed every year. **Figure A-4** outlines the planning budget process followed annually.

Figure A-4 *Planning-Budget Process*



² Planning budgets, metrics and targets receive final approval/adoption from the Transportation Commission.

ASSET INVENTORIES

The 10 asset programs in this appendix comprise inventories of thousands of individual assets. CDOT uses a variety of software and databases to record and track its assets and their condition, and in some cases, for project and maintenance work-management purposes. Some asset programs are subject to rigorous auditing processes to confirm and clarify inventories. In some cases, this has led to reclassification of what assets are included in inventories. **Table A-2** provides a summary of the total number of assets currently managed in each asset program.

Table A-2 Total Asset Inventory by Asset Program

Asset Program	Inventory
Buildings	1,009
Culverts	5,946
Fleet	3,219
Geohazards	3,437 1/10-mile segments
Intelligent Transportation Systems	2,146 devices; 1,541 network-gear items; 1,624 miles fiber; 31 ITS facilities
Maintenance Levels of Service	10.3 million ft. guardrail (metal, concrete, cable); 211,738 signs; 48,928 miles striping; 34,735 pavement markings; 27,736 high mast and roadway lighting poles; 46,305 attenuators/end treatments; 493,000 delineators; 58.5 million linear ft. fence
Rest Areas	26 rest areas; 117 ancillary structures
Traffic Signals	1,852
Tunnels	20
Walls	2,928; 14.0 million square ft.

CROSS-ASSET ROLES OF MLOS AND GEOHAZARDS

The MLOS and Geohazards programs have unique functions that set them apart from the 10 other asset programs. Those functions relate to specific aspects of life-cycle management across asset programs—including routine maintenance of some other asset programs in the case of MLOS, and for protecting other asset programs in the case of the Geohazards program.

MLOS

The Maintenance Levels of Service (MLOS) program, sometimes referred to as “Maintenance” within CDOT, has multiple roles. MLOS provides routine and preventive maintenance services for asset programs managed by others, including the Pavement (surface treatment), Bridges, Tunnels, Rest Areas, Buildings, Traffic Signals, and Geohazards programs. In addition, MLOS has operational responsibility for activities such as roadway striping and snow and ice removal. This includes managing patrols who staff snow plows to keep the roadways open.

The MLOS program’s two performance measures relate to the maintenance of the assets managed by others and to its snow and ice removal services.

There also are safety and traffic-related assets for which MLOS is totally responsible, including guardrails, signs, pavement striping, and roadway lighting. For these assets, MLOS manages the asset life cycle from installation/construction, through operation and maintenance, to disposal and replacement.

GEOHAZARDS

The Geohazards program is responsible for identifying and managing geologic risks to the highway system posed by rockfalls, embankment distress, landslides, debris flows, sinkholes, and failures of constructed soil slopes. The program implements risk-mitigation treatments on strategic highway segments and corridors, protecting pavement, bridges, and all the other asset programs potentially impacted by geohazards.

ASSET VALUATION FOR OTHER ASSET PROGRAMS

Asset valuation is the process of estimating the current monetary value of an agency’s assets. Knowing the value of assets helps transportation agencies understand the appropriate balance between maintaining well-performing assets and repairing or replacing deteriorating assets.

CDOT’s approach to assessing asset values can be summarized as follows:

asset value ≈ gross replacement cost, adjusted for age, quality/features, inflation, condition, obsolescence, and other factors.

Because asset values deteriorate during service due to age, use, damage, and obsolescence, current asset value is not equal to replacement cost.

The methodology for valuing asset programs differs by asset type:

- » Bridges, culverts, pavements, tunnels, and walls primarily use a condition-based approach.
- » Fleet, ITS, and signals primarily use linear depreciation.
- » Buildings use insured value.

Asset valuation is the process of estimating the current monetary value of an agency's assets.

Asset values deteriorate during service due to age, usage, damage, and obsolescence.

LIFE-CYCLE PLANNING

The plans for different asset programs reflect a range of life-cycle management approaches including:

- » **Condition-based:** The condition of an asset is measured and used to forecast performance, select treatments, and identify the onset of failure.
- » **Interval/age-based:** Asset performance data and/or manufacturers' life-expectancy estimates are used to establish a time interval representative of the service life beyond which the cost of asset failure outweighs the cost of replacement.
- » **Reactive:** Minimum acceptable condition thresholds are established to determine which treatment is performed to fix a problem after it has occurred.

RISK AND RESILIENCE APPROACH TO OTHER ASSETS

The major threats to each asset program are presented in the respective asset plans in this appendix.

CDOT's risk management approach, described in Section 6 of the TAMP, includes the management of risk across various levels—agency, programmatic, and project/asset. The approach also includes the development and management of risk registers, and decision-making that incorporates risk management and resilience. For asset management specifically, CDOT is refining processes to incorporate risk into treatment selection and prioritization.

For this TAMP, CDOT has reassessed the threats contained in the risk register for each asset program. One of the objectives of the development of the risk registers is to provide common definitions of consequences and consideration across all asset programs, to better understand scaling measures, and to capture vulnerabilities. The risk assessment methodology incorporates measures and a scoring rubric for the level of risk; likelihood of the event/occurrence; direct consequences for safety, mobility, asset damage, and other financial impacts; as well as the dollar value of the consequences and vulnerability.

FINANCIAL PLANS FOR OTHER ASSETS

The asset plans in this appendix present the financial plan for each asset class, by year

Section 7 of the TAMP (see page 52) documents the funding sources available to CDOT for all functions of the Department, including sources for the total budget, or "TAM Cap," of the overall TAM Program.

The Financial Plan sections of the asset plans in this appendix describe the funding sources available to achieve performance targets for each asset class. The TAM Cap is the largest consistent funding source for most asset classes.

In addition, Section 7 of the TAMP shows anticipated budgets for the next 10 years for each of the 12 asset programs. For the first four years of this period, the planning budgets have been adopted by the Transportation Commission. For years beyond fiscal year 2025, the budget shown is typically held at 2025 levels.

A-1. BUILDINGS



Buildings shelter some of CDOT's most critical assets but are also managed as an asset class in their own right. The Department's Buildings program manages more than 1,000 buildings statewide. Most of these structures safely store and maintain essential vehicles such as snow plows, as well as equipment and supplies, ensuring the Department is at-the-ready for snow storms and emergencies. Offices for administrative staff and laboratories for technicians are also included in this asset class.

CDOT's Buildings program employs a comprehensive asset-management process closely aligned with the process described in the Introduction to the Asset Plan Appendix on page A-1.

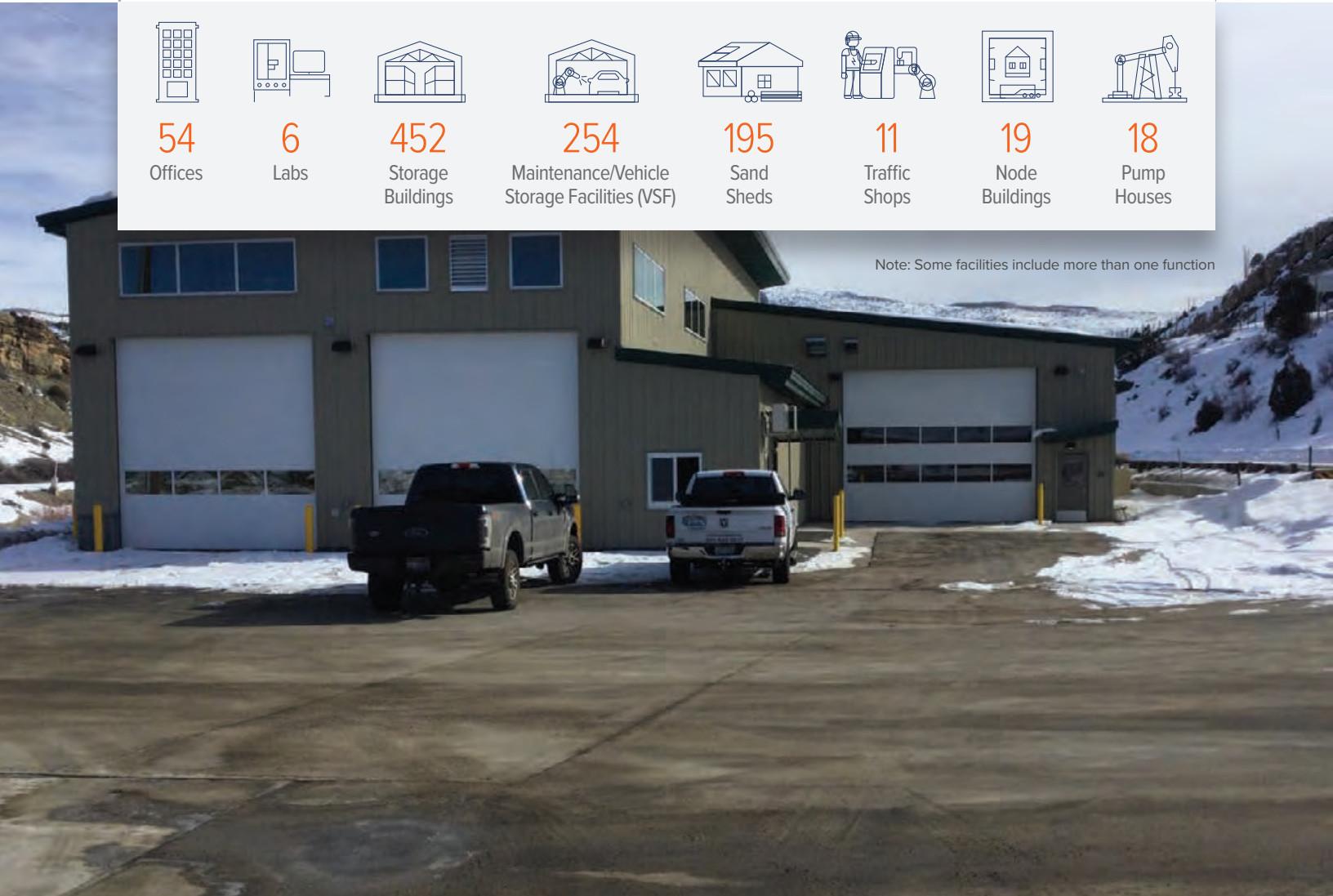
A majority of CDOT buildings are rapidly approaching or have approached the end of their service life, and therefore require replacement. Functionality is critical to the importance of these assets, and CDOT has refined its assessments of buildings to consider

functionality as well as condition. Should current funding levels of about \$16 million to \$17 million per year be sustained, CDOT models forecast a shortfall in the cost to meet the primary buildings performance target over the next decade (see **Figure A.1-8** of this asset plan). Planned investments, if funding is provided, will include major repairs; wash bay, lean-to, and addition projects; as well as nearly 30 replacement projects over the same period.

Figure A.1-1 Buildings Inventory at a Glance



Note: Some facilities include more than one function



PERFORMANCE MANAGEMENT

CDOT monitors buildings using its performance-management framework, using quantitative measures and targets. The Department uses performance information to inform funding decisions and to track how assets are supporting the agency’s strategic goals and transportation services provided to the public.

POLICY DIRECTIVE 14 PERFORMANCE MEASURE—BUILDINGS

The asset management program for buildings contributes to goal areas in Policy Directive 14.0 (PD 14.0)— asset management, safety, and mobility. CDOT buildings provide safe working conditions for employees and proper storage and maintenance for equipment that ensures the safety of highway users. Buildings support mobility in several ways. For example, maintenance-patrol buildings expedite snow-event response times, slow deterioration of equipment, and increase worker safety and efficiency. These benefits help ensure a quick return to normal traffic operations.

The PD 14.0 performance measure for maintaining buildings in a state of good repair is the percentage of assets with a letter grade of C or better, on an A to F scale. The letter grade considers building


performance; structural integrity; mechanical, electrical, and plumbing systems; as well as overall site condition. The process for assessing condition through letter grades is described in the Inventory and Condition section.

Table A.1-1 shows the PD 14.0 target and 2021 performance for buildings. Storage buildings, as well as employee housing, are excluded from the analysis. Storage buildings are assessed separately, for structural integrity.

CDOT considers buildings to be in a state of good repair if 85 percent are assessed at grade C or better.

The current (2021) percentage of buildings in condition grade C or better is 49 percent, well short of the target of 85 percent. See the Gap Analysis section of this Asset Plan for a discussion of this shortfall.

Table A.1-1 Performance Metric and Target for Buildings

BUILDINGS	Measure	Target	2021 Performance
	Percentage of Buildings with a letter grade of C or better	85%	49%

INVENTORY AND CONDITION

CDOT tracks the inventory of its buildings using a unique number for each building. This information is contained in CDOT’s Building Condition Dashboard, as well as in SAP, the Department’s financial system. Annually, the Department uses the Survey123 mobile application to assess building condition. An overall letter grade is assigned based on multiple criteria, including structural integrity and overall site condition.

INVENTORY

CDOT owns and maintains 1,009 buildings. These buildings include vehicle-storage facilities, maintenance shops, traffic shops, sand sheds, storage buildings, offices, and lab facilities. This inventory is shown in **Table A.1-2**. The totals exclude CDOT employee housing, which includes 93 employee housing units—apartments, houses, and duplexes—as well as mobile-home pads with power, gas, water, and sewer service. Housing is managed at the CDOT Region level.

Table A.1-2 Inventory of Building Assets

Building Type	Current Count
Lab	6
Maintenance/Vehicle-Storage Facilities	254
Office	54
Sand Shed	195
Storage Buildings	452
Traffic Shop	11
Node Buildings	19
Pump Houses	18
Buildings Total	1,009

Maintenance/Vehicle-Storage Facilities and Traffic Shops: These building types are typically heated, pre-engineered metal or concrete masonry unit (CMU) buildings with multiple vehicle storage bays for storage of essential equipment. Most have restrooms, and some have office and/or breakroom structures attached for maintenance staff administrative functions.

Sand Sheds: These buildings are typically pre-engineered metal buildings or hoop-framed canvas atop concrete walls. They have a large opening with roll-up overhead doors for functional offloading of sand into plow trucks and protection of sand from direct precipitation, thereby preventing runoff into environmentally sensitive areas.

Examples of Building Assets



The buildings inventory is managed using unique building numbers that are assigned by Property Management and tracked in the Buildings Dashboard and the SAP financial management system. Throughout the year, the buildings inventory is updated using CDOT's Property Master Change Form #1152. The Office of Risk Management and CDOT's Division of Accounting and Finance (DAF) are notified monthly of inventory changes. The risk office uses building data provided to update, add, or delete insurance coverage for buildings, and DAF uses the data to track building depreciation.

While the inventory presented in **Table A.1-2** excludes employee housing, for insurance purposes, all buildings, including employee housing, are included in the buildings inventory.

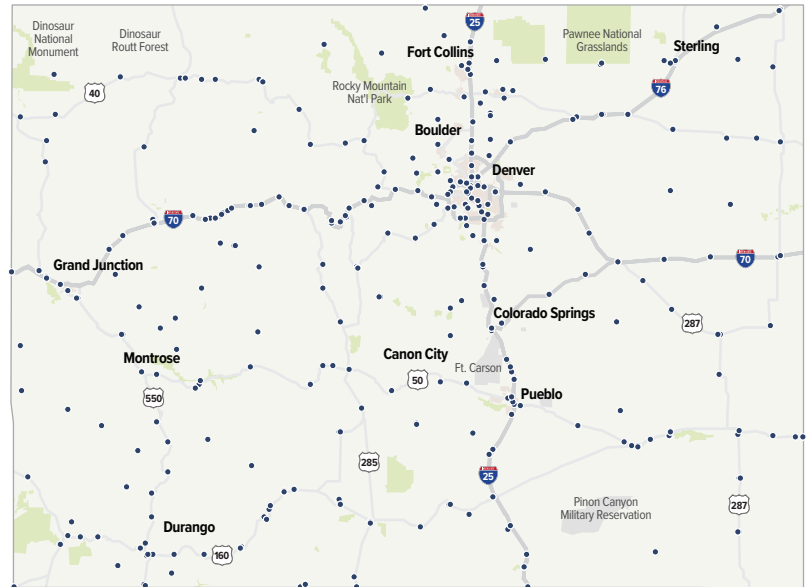
Figure A.1-2 presents the location of buildings, as shown in CDOT's Building Condition Dashboard.

ASSET HIERARCHY

To understand the performance of buildings assets, CDOT tracks the condition and/or functionality of the major systems and other components that comprise each building, including the information presented in **Figure A.1-3**.

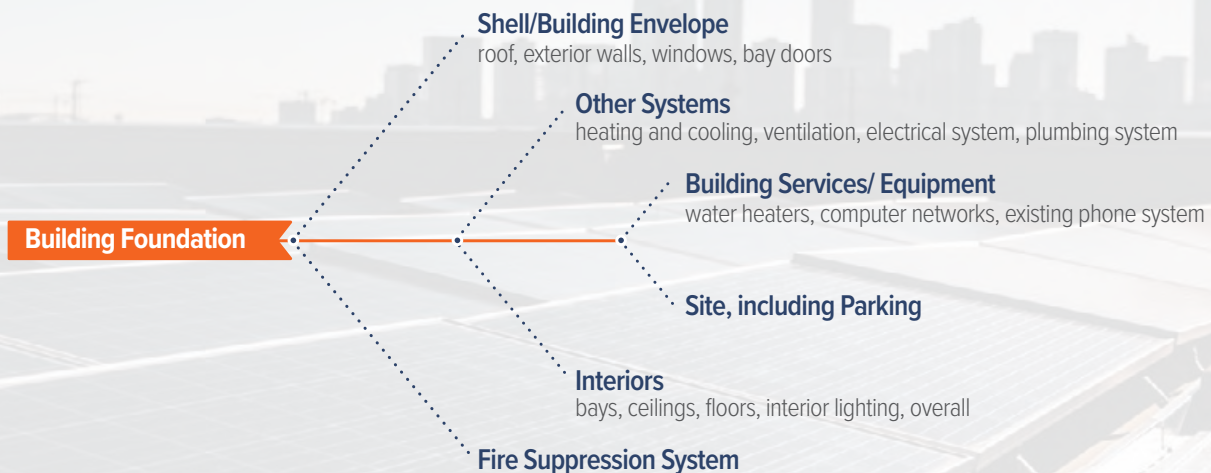
A building number is required for the State Office of Risk Management to insure any building and its contents.

Figure A.1-2 Buildings in the CDOT Buildings Inventory



The building foundation, components of the building envelope, and the fire-suppression system are all considered critical components. For traffic shops, vehicle-storage facilities, and maintenance facilities, radiant-heat systems and wash bays are also considered critical components.

Figure A.1-3 Asset Hierarchy



CONDITION

“Building condition” refers to the letter grade given to each building based on information gathered during an annual condition assessment. The annual assessment considers the building components by customized categories that are consistent with the building type and purpose. Categories can include structural, systems, compliance, component, building services, and site.

Depending on the building type, the component categories can include structural, systems, compliance, components, building services, serviceability, amenities, and site.

The category most important for each building type accounts for most of the grade.

Two dedicated staff members inspect each building annually, using a mobile application created by ESRI, using the Survey123 platform. The use of dedicated staff ensures consistency in the quality of condition ratings among the different buildings within the portfolio and over time.

The scores given to components within each category are added together to provide a category score. Each category score is then multiplied by its designated weight, and a letter grade is assigned to each category based on the weighted category score. The category scores are then used to calculate the building’s overall score. All scores are totaled and assigned a letter grade based on traditional scoring presented in Table A.1-3.

Figure A.1-4 illustrates the Buildings program’s condition-assessment methodology—how component scores are calculated and rolled up into category ratings (i.e., scores and grades), and how category ratings are rolled up into building ratings.

CONDITION TRENDS

While trends indicate that the condition of buildings was relatively stable through 2019, as shown in Table A.1-4, a change in how conditions were assessed led to a sharp drop between 2019 and 2021.

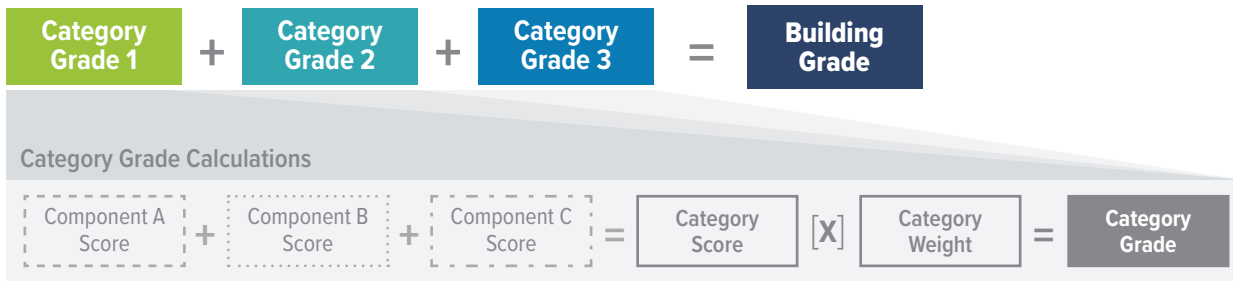
Table A.1-4 Buildings Condition Trends

Historical Performance % of Buildings Rated C or Better				
2017	2018	2019	2020 ¹	2021
83%	80%	80%	55%	49%

Table A.1-3 Definitions of Building Letter Grades

Grade	Score	Definition
A	90–100	Excellent—Condition appears new, no defects.
B	80–89	Good—Good condition, shows slight wear.
C	70–79	Average—Some noticeable wear.
D	60–69	Fair—Noticeable wear, needs repair.
F	59 and below	Poor—Extensive wear, needs to be replaced.

Figure A.1-4 Condition Assessment Methodology



1 Methodological change.

In 2021, the Buildings program implemented “syllabus”-type scoring in which one single category grade accounts for much of the overall grade, as follows.

- » **Vehicle-Storage Facilities/Maintenance/Traffic buildings**—70 percent of the score is dependent on the Service category grade and 30 percent on all other grades.
- » **Sand Sheds**—80 percent of the score is dependent on the Structural category score and 20 percent on all other grades.
- » **Offices**—45 percent of the score is dependent on the Structural score and 55 percent on all other grades.

For Vehicle-Storage Facilities, the Service category letter grade reflects how well these buildings

are protecting equipment assets. One singular component—size of the bays and bay doors—can render them non-functional.

For sand sheds, the greater weight given to the Structural category resulted in a sharp drop in the 2021 condition rating.

ASSET VALUE

CDOT estimated the value of its buildings assets in early 2022. The current replacement value is determined by the cost per square foot or vehicle bay. This replacement value is \$1.5 billion.

The risk/insured value was used to calculate current asset value. The estimated current value of buildings assets is \$570 million.



LIFE-CYCLE PLANNING

The Buildings program strives to sustain or improve the functionality of CDOT's buildings inventory. CDOT develops a maintenance plan for buildings with grades A to D. Buildings with a grade F are considered for replacement, demolition, or repurposing, rather than repair. An annual plan for maintenance, code reviews, and capital improvements leverages findings from an annual condition assessment, as well as treatment recommendations from CDOT's Asset Investment Management System (AIMS) model.

LIFE-CYCLE PLANNING

CDOT's uses a condition-based approach to the life-cycle management of buildings assets, and also incorporates functionality assessment.

Roughly half the buildings inventory—520 assets—are included in the AIMS analysis as a basis for financial planning and investment decisions. Those include vehicle-storage facilities, mechanics' buildings, traffic buildings, sand sheds, offices, and lab facilities. Excluded are employee housing, pump houses, node buildings, and storage. Storage buildings are non-heated buildings that maintenance staff have constructed, or prefabricated sheds that maintenance staff have purchased to store equipment and consumable items like mowers and fertilizer. Employee housing is funded outside of the Buildings program, through the Maintenance Levels of Service (MLOS) budget.

BUILDINGS LIFE-CYCLE MANAGEMENT APPROACH

The findings of the annual condition assessment described in the Inventory and Condition section of this Asset Plan informs the selection of appropriate treatments within the AIMS model. AIMS uses the current-condition rating of the asset—along with deterioration models specific to the type of building, its purpose, and its age—to develop treatment recommendations over a 20-year timeframe.

On an annual basis, the buildings Program Architect assesses the AIMS treatment recommendations to develop an investment-strategy list. The Architect

then undertakes a needs assessment for each project in the list to determine the most appropriate capital improvement. Once the needs assessment is complete, the investment strategy is updated by the Buildings Asset Manager for approval by the Director of Maintenance and Operations and the Property Program Manager. The approved investment strategy is included in the Annual Property Plan.

The modeling from AIMS also provides a roadmap of treatments projected to be needed for each building in the coming years. The modeling is updated annually, and treatments needed portfolio-wide can be estimated and programmed for the following years.

PROGRAM DECISION-MAKING

TREATMENT SELECTION

Treatments are used to correct the condition of an asset or to prolong its life. The AIMS modeling generates strategies composed of one or more treatments over the analysis period. While historic funding priorities have led to a preponderance of replacement projects, the number of treatments within the model has recently been expanded to provide more specific treatment recommendations that will maximize budget allocations and provide more accurate performance modeling. Treatments recommended for the next 10 years from the AIMS model ran in 2022 included:

- » **Major repair:** Any treatment that does not add square footage to a building. Can include restroom remodels, roof replacements, HVAC upgrades, etc.

- » **“Lean-to” additions:** Square footage added to maintenance buildings, vehicle-storage facilities, or traffic shops for offices, restrooms, or breakrooms.
- » **Additions:** Square footage added to the front or back of maintenance buildings, vehicle-storage facilities, or traffic shops to increase the size of vehicle bays. This treatment is only applied to buildings with bays at least 20’ wide. While the width of bays cannot be changed, the length can with certain construction types.
- » **Conversion to wash bay:** A treatment that changes a vehicle bay in a maintenance building, vehicle-storage facility, or traffic shop into a waterproof bay complying with National Electrical Manufacturer Association requirements for wet environments. Wash bays are used to wash and store essential equipment for proper maintenance.
- » **Replacement:** Reconstruction of an existing building on the same site.

The determination of which types of treatment activities are appropriate to each category of work is further governed by the Property Plan and Policy Directive 60.1 of the Office of the Chief Engineer/Property Management.

Maintenance & Repair

“Controlled maintenance” and “deferred maintenance” projects constitute between 15-20 percent of annual funds for the Buildings program.

Controlled maintenance includes corrective repairs or improvements that increase the safety or operating efficiency of a building and are necessary for health, life safety, and code compliance of A, B, and C rated buildings. Controlled maintenance funds are intended to maintain the building and prevent it from slipping to a lower letter grade.

Deferred maintenance projects are corrective repairs or improvements for existing facilities with a D rating meant to elevate the overall building condition and prevent the building from falling to an F rating. The Superintendent of each of CDOT’s eight Maintenance sections submits their priorities for these controlled and deferred maintenance projects that are then reviewed and approved by the Buildings Asset Manager, as shown in **Figure A.1-5**.

Figure A.1-5 Review-and-Approval Process for Controlled-and-Deferred Maintenance Projects



Rehabilitation, Reconstruction, and Replacement

Some 80 to 85 percent of funds for the Buildings program is allocated for capital improvements, such as rehabilitations, reconstructions, and replacements. This includes any site work needed to meet current environmental standards such as re-grading for proper drainage and installing stormwater treatment and storage devices like vegetated swales (drainage channels). Capital-improvement projects are established each fiscal year for the fiscal year five years beyond, thus resulting in a continuous five-year planning cycle. The process for developing a capital improvement project is shown in **Figure A.1-6**.

Figure A.1-6 Capital-Improvement Project: Development and Delivery



New Construction

The Buildings program is responsible for the construction of all CDOT buildings; however, funding for new buildings not included in the AIMS analysis does not come from the TAM Program. TAM program funding is intended to maintain and improve the existing inventory. Functional expansion of the inventory through the addition of new buildings that are not replacing one already in CDOT inventory, are funded through other means.

New Construction: CDOT Headquarters



CDOT's Headquarters (above), in the Sun Valley neighborhood, replaced CDOT's former headquarters building and Region 1 offices in 2018.

The types of asset management treatments undertaken by CDOT for buildings are classified according to FHWA work types in **Table A.1-5** below.

Table A.1-5 Buildings Life-Cycle Management Activities

Work Type	CDOT Activities	Indicative Costs
Maintenance (Reactive/Corrective)	<p>Corrective and Deferred Maintenance refers to corrective repairs or improvements that increase the safety or operating efficiency of a building and prevent deterioration to an F-condition rating. This includes projects such as:</p> <ul style="list-style-type: none"> » Carbon monoxide (CO) and nitrogen dioxide (NO2) sensor repair and replacement » Concrete apron repairs, panel replacement, and wing wall replacement » HVAC yearly service » Interior and/or exterior painting » Metal or fabric panel replacement » Minor electrical repairs » Minor room remodel » New hardware for doors » New flooring » New plumbing fixtures » New roofs » Overhead doors: Annual service, repairs, and panel replacements » Plumbing repairs » Rain gutters and snow guards » Roof repairs » Septic tank: Annual service, repair, and replacement (not pumping) » Upgrading of manual gate to an electric gate 	\$122/sq. ft.
Reconstruction	Reconstruction includes renovations of buildings that increase square footage, life expectancy, operating efficiency, or capacity. This work type also refers to renovations that add value to land and buildings with costs for design and construction exceeding \$50,000.	\$200-260/sq. ft.
Replacement	This work type refers to the complete replacement of existing buildings on CDOT-owned land due to program changes, functional obsolescence, or the complete deterioration of building conditions.	\$350/sq. ft.
New Construction	New construction refers to adding new buildings required due to functional expansion of maintenance patrols and other factors.	

RISK MANAGEMENT

The Buildings program manages risk across multiple levels—agency, programmatic, and project/asset. Section 6 of the main TAMP document provides more information about CDOT’s risk-management methodology and processes.

The Buildings program maintains a register of risks to its overall program and projects. Top risks are shown in **Table A.1-6**.

Table A.1-6 *Top Buildings Risks*

Risk Level	Threat/ Opportunity	Risk Score	Risk-Management Strategy
Program	Building-materials availability (or lack thereof), impacting costs and operations.	67.5 (T)5 x (C)2.7 x (V)5 ²	Tolerate
Program	Changing strategic direction, from leadership, both organization and government.	57.5 (T)5 x (C)2.3 x (V)5	Tolerate
Project	Changing functional needs for the buildings, for a new or different location (combining patrols). A building on an existing site is no longer functional on its current site.	52.8 (T)4 x (C)3.3 x (V)4	Tolerate



2 Risk Score = Likelihood (L) * Total Consequence and Consideration Score (C) * Vulnerability (V)

FINANCIAL PLAN

CDOT creates planning budgets for buildings and other asset-management programs four years in advance. For this financial plan, CDOT has carried forward fiscal year 2025 planning-budget levels for fiscal years 2026-31. These estimates, combined with CDOT’s life-cycle management approaches, inform the investment strategies intended to achieve system-wide asset performance goals while minimizing costs.

FUNDING SOURCES

The Buildings program receives a portion of the funds for CDOT’s overall Transportation Asset Management (TAM) Program to fund rehabilitation and reconstruction work types described in the Life-Cycle Planning section.

Additionally, CDOT’s Maintenance Levels of Service program funds routine maintenance, preservation

treatments, and repairs for buildings that do not require engineering. Those activities are part of the MLOS asset plan and its financial plan.

PLANNED FUNDING

CDOT estimates steady funding for buildings over the current decade. The TAMP 10-Year Financial Plan for buildings is shown in **Table A.1-7**.

Table A.1-7 Financial Plan for Building Assets (in Millions)

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
\$16.7	\$17.8	\$17.0	\$15.5	\$15.5	\$15.5	\$15.5	\$15.5	\$15.5	\$15.5



INVESTMENT STRATEGIES

CDOT forms asset-investment strategies based on its financial plan and life-cycle management strategies, which are designed to meet system-wide performance goals while minimizing life-cycle costs. Investment strategies delineate different types of work to be performed across CDOT’s buildings assets over a 10-year period.

BACKGROUND: DETERMINING INVESTMENT STRATEGIES

The development of investment strategies begins each year when the current building inventory and condition data are loaded into the AIMS model. The model then forecasts building scores and conditions for the next 20 years. AIMS then generates a list of possible strategies for each building. These strategies may include several rehabilitations, upgrades, additions, and replacement treatments, based on business rules created by CDOT. Finally, the model will return a set of strategies that optimizes the benefit for any given budget. In FY22, the model provided a set of treatment strategies and a performance forecast given annual budgets of \$15.5 million to \$17.0 million, as assumed in the Buildings Financial Plan.

PLANNED INVESTMENTS

CODE REVIEW COSTS

Less than one percent of the annual budget, \$125,000 annually or \$1.25 million over the next 10 years, will be dedicated to the cost of code reviews. This cost is expected to increase in the coming years.

MAINTENANCE & REPAIR

As described in the Life-Cycle Planning section, the building program funds routine maintenance, preservation treatments, and repairs for buildings.

CDOT anticipates about \$2.1 million annually, or \$21 million over the next 10 years, will be set aside for controlled-and-deferred maintenance.

Figure A.1-7 *Examples of Planned Capital Improvement Projects*



REHABILITATION, RECONSTRUCTION AND REPLACEMENT

Significant reconstruction investments are planned for several facilities over the next 10 years, including major repair projects, construction of a lean-to or addition, and construction of wash bays. Should all planned capital-improvement projects be built and construction costs begin to stabilize, between fiscal years 2023 and 2025, 14 buildings will be reconstructed and two buildings rehabilitated. These structures would cover 86 pieces of essential equipment that were previously uncovered, eliminate 20 grade F buildings, and improve two grade C buildings to grade A. If fiscal years 2026 and 2027

are funded as planned, the potential exists to reconstruct and consolidate 13 grade F buildings with 11 reconstructed buildings. This also would cover an additional 58 pieces of essential equipment and decrease the overall inventory by two buildings.



PERFORMANCE GAP ANALYSIS

CDOT’s AIMS model forecasts the performance of buildings annually, including any anticipated performance gaps. This analysis is based on asset condition, anticipated funding, the model’s recommended investment strategies, and other inputs. The Department’s ability to close performance gaps largely depends on receiving additional funding.

NEEDS AND PROJECTED CONDITION

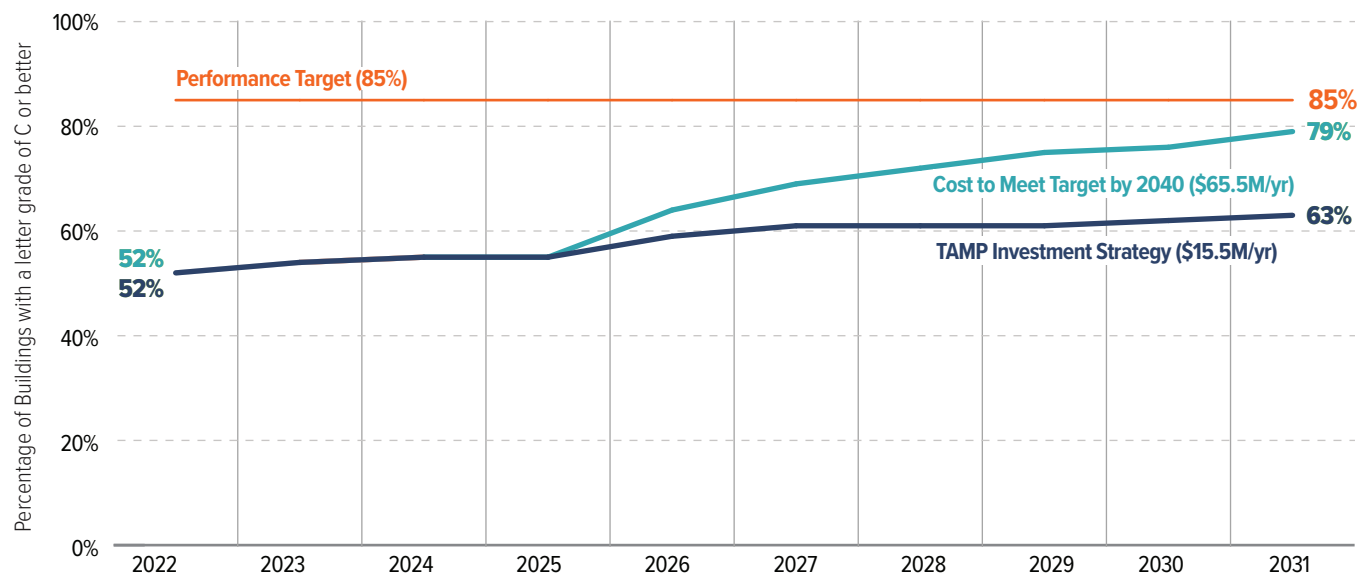
The AIMS model predicts the long-term performance of buildings given anticipated funding, as shown in the Financial Plan. Building ratings are deteriorated using deterioration models updated in 2021. Model inputs and outputs are reviewed by the Property Management Team on a regular basis. CDOT incorporates planned projects into the model assumptions, and the model recommends projects for periods with no planned projects.

Current funding levels, as contained in the Financial Plan, do not provide sufficient funding to meet the established PD 14.0 performance target for buildings. A significant increase in investment—as much as an additional \$50 million annually—would be needed to meet the target by 2040.

Figure A.1-8 shows the expected percentage of buildings with a grade of C or better over time, under funding levels described in the Financial Plan. The model predicts an upward trend in condition after a dip in fiscal year 2025, but performance still falls short of the target condition.

Figure A.1-8 Projection of Percentage of Buildings with a Grade of C or Better

The anticipated annual budget of \$15.5 million will not meet the performance target of ensuring that 85 percent of rest areas have a C grade or better. The annual cost of meeting the target by 2040 (outside the TAMP timeframe), is about \$65.5 million, or an additional \$50 million per year.



Most CDOT buildings were constructed during the initial development of the Interstate Highway System, in the mid-20th Century. In CDOT's inventory, the year of construction listed is often the year that CDOT acquired the building rather than the year it was built, meaning the building may be much older. Given the historical lack of consistent funding for the life-cycle management of buildings, the Buildings program's effort to bring its assets to a state of good repair has primarily taken a "worst-first" approach, focusing on structurally unsound buildings that are unsafe. This has resulted in a disproportionate number of replacement projects compared to more modest treatments.

The overall condition of buildings decreased in 2020 and 2021 due to a continuing shortfall in needed funding, as well as the more rigorous condition-rating methodology. Nevertheless, the projected trend toward improved conditions over the next 10 years is evidence that the approach is heading in the appropriate direction.

RISKS OF INSUFFICIENT FUNDING AND PERFORMANCE IMPACTS

Insufficient funding can result in reduced building functionality and impacts on operations. Potential outcomes are summarized in **Figure A.1-9**.

OPPORTUNITIES TO CLOSE THE GAP

CDOT is pursuing a range of strategies to ensure performance gaps are closed:

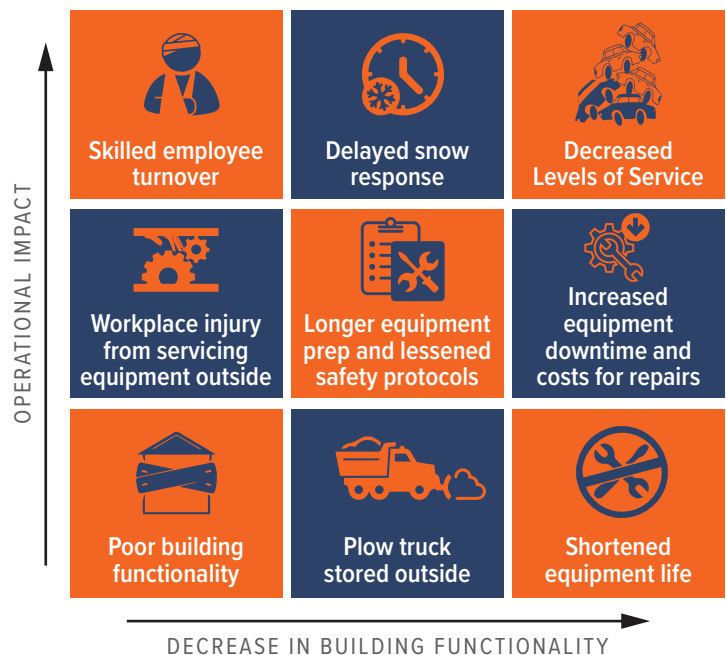
- » **Addressing construction cost increases**—Continue to efficiently deliver existing projects. Continue to prioritize new projects that provide the highest return on investment.
- » **Move to green buildings**—Prioritize green buildings with the highest benefit-cost ratio, to reduce operating costs and achieve environmental benefits/outcomes. Seek alternative funding sources for these buildings where possible.
- » **Labor cost increases**—Consider alternative delivery methods for economies of scale.

STRATEGIC USE OF ADDITIONAL REVENUE

Should CDOT receive additional revenue to fund the Buildings asset class, the Department's first priority is to eliminate any funding gaps related to achieving the PD-14 performance target. Once goals are achieved, the Department will reduce Poor backlog with a priority towards the most critical and/or vulnerable assets to improve system resilience. CDOT estimates the current "Poor" backlog for Buildings could be eliminated with about \$634 million.

Figure A.1-9 *Insufficient Funding Impacts on Building Functionality and Operations*

Without sufficient funding, CDOT may experience increased operational impacts like workplace injury and skilled employee turnover. CDOT may also experience a decrease in the functionality of buildings like decreased levels of service.



FUTURE IMPROVEMENTS

Intended asset-management improvements to the Buildings program address processes and technology.

PROCESS

Process improvement is a key aspect of maintaining and advancing the buildings asset-management program. The Buildings program will continue to refine the condition-rating scoring system to properly weight the categories and components of storage buildings, maintenance facilities and Vehicle-Storage Facilities.

TECHNOLOGY AND ANALYSIS CAPABILITIES

Future process improvements would establish a stronger forecasting capability and integrate more robust asset-management practices. CDOT's AIMS model for buildings, which forecasts future conditions and recommends buildings projects, has recently been improved and optimized. It now has more treatment options to allow for more targeted

investments and better forecasting. In particular, the model's treatment of vehicle-storage facilities has been improved and optimized to allow for treatment options beyond new construction. Staff is currently working to implement decision trees for offices to help maximize the benefit of a given budget.

The Buildings program also is undertaking a project with ESRI, the geographic-information system (GIS) software company, for storage of previous years' data. Currently, only the most recent assessment year's data is included in the program's dashboard. The build-out will include previous year's data to accurately show the deterioration of the buildings.

Ideally, the Buildings program would like to better link data in the SAP software and the dashboard to avoid the necessity of manual duplication of inventory records, although the program currently lacks the appropriate staff needed to undertake this effort.



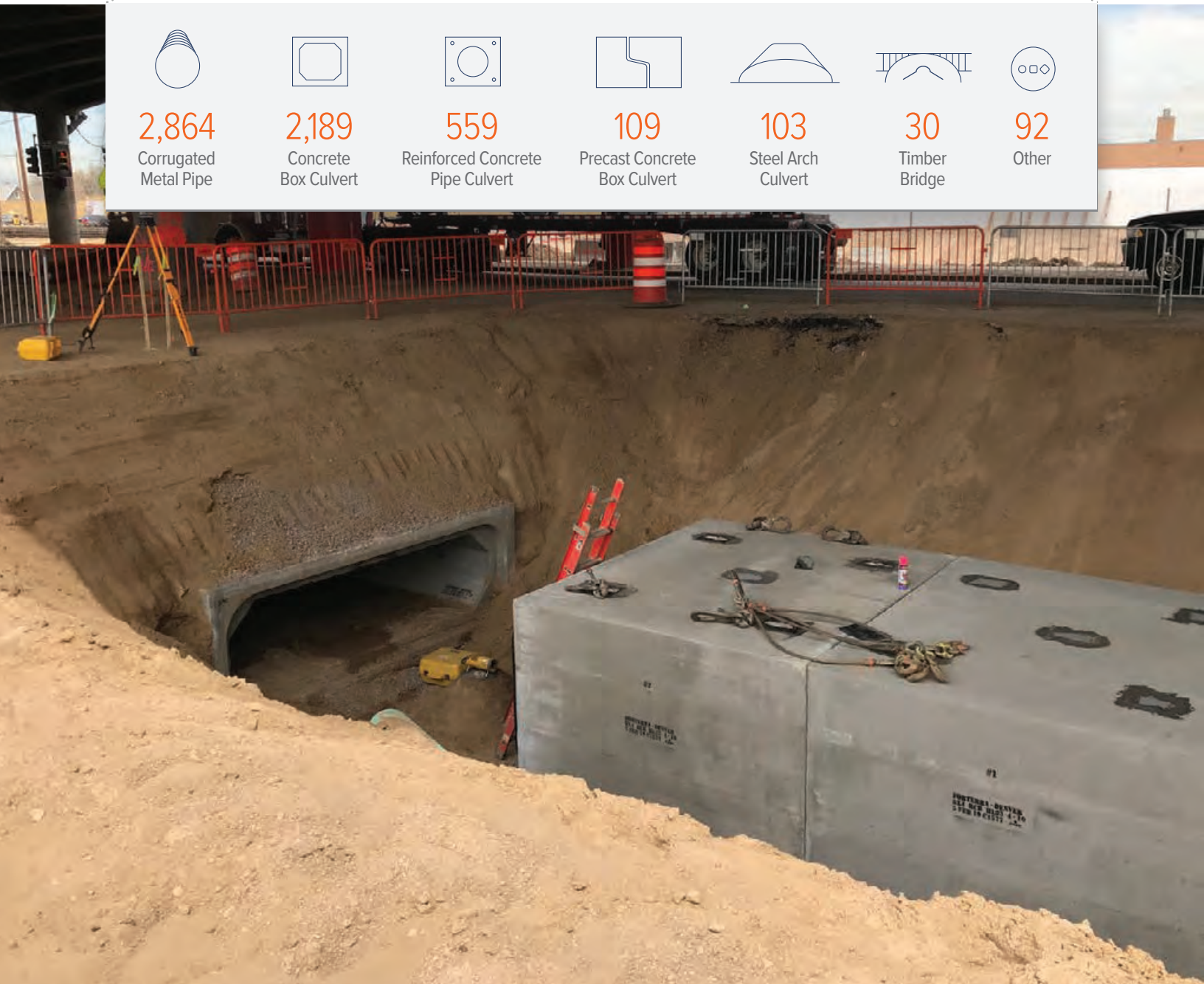
A-2. CULVERTS



The ease at which Colorado’s highway system snakes over mountains, valleys, and streams is facilitated by a network of culverts. These critical structures convey water beneath the roadway or carry the roadway over obstacles. Culverts are crucial to providing drainage during storm events, enabling safe traffic flow over waterways, preventing soil erosion, and even providing safe passage for wildlife. CDOT manages 5,946 culverts that are referred to within the Department as Minor Structures. Minor Structures are vehicular culverts or bridges with an opening of four to 20 feet along the direction of the roadway.

CDOT culverts are managed in alignment with the CDOT asset-management process described in the Introduction to the Asset Plan Appendix on page A-1. Since 2019, conditions of the Culvert asset class have remained stable and have been close to achieving CDOT’s performance target of 95 percent in Good or Fair condition. The current funding level is expected to sustain this level of performance for the next 10 years.

Figure A.2-1 *Culvert Assets at a Glance*



PERFORMANCE MANAGEMENT

The performance of culverts is monitored and managed as part of CDOT’s performance management framework through a series of quantitative measures and targets that inform funding decisions and track how well these assets are supporting the agency’s strategic goals and the transportation services provided to the public.

POLICY DIRECTIVE 14 PERFORMANCE MEASURE—CULVERTS

The asset management program for culverts (Culverts program) contributes to all Policy Directive 14 (PD 14.0) goal areas of asset management, safety, and mobility. Culverts provide a safe means of conveying water under a highway to avoid flooding or washout of the roadway. They ensure the orderly movement of traffic during rain and flood events by protecting roadways from being damaged or over-topped by water. Culverts reduce soil erosion as well as allow continuous water flows—enabling wildlife to move through these passageways safe from vehicle traffic. Culverts are designed to accommodate significant rain events, helping ensure that the highway system is resilient to extreme weather.

The specific performance measure in PD 14.0 for maintaining culverts in a state of good repair is the percentage of culverts in Poor condition. To determine culvert conditions, CDOT’s culverts are inspected according to National Bridge Inspection Standards

(NBIS) and receive Good, Fair, or Poor ratings. The process for assessing condition through NBI standards is described in the Inventory and Condition section of this Asset Plan. **Table A.2-1** shows 2021 performance compared to the PD 14.0 target for culverts.

CDOT considers its culverts to be in a state of good repair, only if 5 percent or less are rated Poor. The current (2021) percentage of culverts in Poor condition is 5.4 percent, just short of the target of 5 percent. The reason for this gap is described in the Performance Gap Analysis section of this Asset Plan.

OTHER PERFORMANCE MEASURES

In addition to the condition ratings, CDOT identifies Essential Repair Findings during inspection. These findings indicate conditions or advanced deterioration of key elements that require action because they have affected the current capacity, serviceability, and anticipated service life of the culvert element or structure.

Table A.2-1 CDOT Asset Management Metric and Performance Target for Culverts

CULVERTS		Measure	Target	2021 Performance
		Percent rated Poor	≤5%	5.4%

INVENTORY AND CONDITION

CDOT’s culvert inventory and condition information is collected through the culvert inspection program, which is managed by the Bridge and Structure Inspection Unit within CDOT’s Staff Bridge Branch. Consultant inspectors perform in-field inspections and enter inspection data into AASHTOWare’s Bridge Management (BrM) database via an online enterprise user interface. The Bridge and Structures Asset Management Unit within Staff Bridge is responsible for data management and reporting of the inspection data. CDOT performs NBIS component-level inspections as well as element-level inspections on culverts.

INVENTORY

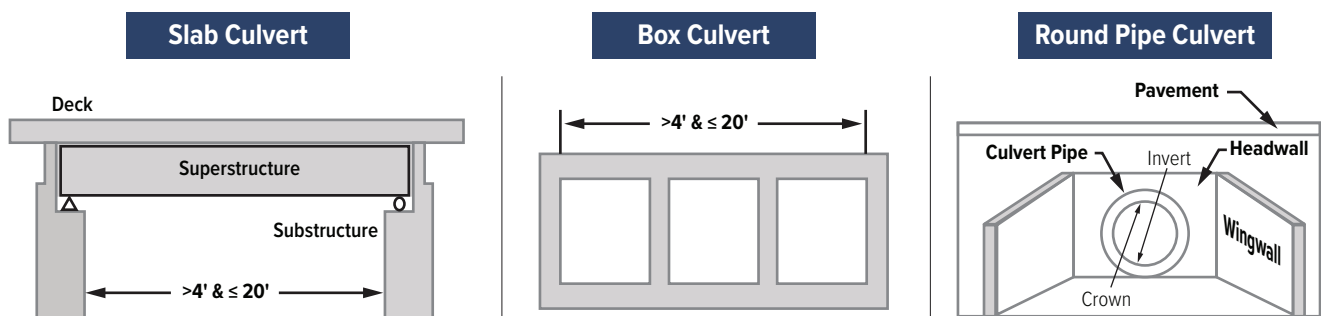
As of 2021, CDOT owns and maintains 5,946 culverts statewide, as presented in **Table A.2-2**. Culverts are constructed with different materials (e.g., concrete, steel, timber, etc.) and geometric shapes (e.g., box, arch, round, etc.) to take advantage of submergence and increase hydraulic capacity.

Figure A.2-2 shows schematic diagrams of different types of culverts, indicating how the total span is measured.

Table A.2-2 Inventory of Culvert Assets

Culvert Construction Type	Count
Corrugated Metal Pipe	2,864
Concrete Box Culvert	2,189
Reinforced Concrete Pipe Culvert	559
Precast Concrete Box Culvert	109
Arch Culvert	103
Timber Bridge	30
Other	92
Total	5,946

Figure A.2-2 Examples of Culvert Assets



Source: CDOT’s 2021 State of the Assets Presentation

ASSET HIERARCHY

To understand the performance of culvert assets, CDOT tracks the condition and/or functionality of the major elements and other components that comprise each culvert. **Table A.2-3** provides an overview of the relationship between different types of culverts and the components and elements that comprise each type.

Table A.2-3 *Culverts Asset Hierarchy*

Design Type	NBIS Components	Typical Elements	Typical Materials
Pipe culvert	» Culvert	» Culvert (barrel) » Headwalls » Wingwalls	» Steel » Concrete » Plastic
Box culvert	» Culvert	» Culvert (barrel) » Headwalls » Wingwalls	» Concrete » Masonry
Minor Bridge—Girder and deck structure	» Deck » Superstructure » Substructure	» Deck » Girders (superstructure) » Piers, abutments, pier caps (substructure)	» Timber » Steel » Concrete
Multi-barrel	» Culvert	» Culvert (barrel) » Headwalls » Wingwalls	» Any combination of the above

CONDITION

CDOT’s culvert inventory and condition information is collected through the Culverts program, which is managed by the Bridge and Structure Inspection Unit within the CDOT Staff Bridge Branch. Consultant inspectors perform inspections on culverts following the guidance outlined within the NBIS as defined in federal regulations (23 CFR 650 Subpart C). CDOT uses a four-year inspection frequency for culverts.

Inspectors rate the culvert’s overall condition on a scale from 0 to 9. Culverts are categorized as in Good, Fair, or Poor condition based on the numeric rating, as presented in **Figure A.2-3**.

Figure A.2-3 *NBIS Rating Scale*



level inspections and enter inspection data into AASHTOWare’s BrM database via an online enterprise user interface. Collected data includes an overall culvert rating (0-9), identification of condition states of individual elements, defects on a scale from 1–4, and location and ownership information. The Bridge and Structures Asset Management Unit within Staff Bridge is responsible for data management and reporting of the inspection data. The Staff Bridge Asset Management Engineer acts as asset manager for the Culverts program.

Creation of an Essential Repair Finding indicates conditions or advanced deterioration of key elements that has affected the current capacity, serviceability, and anticipated service life of the element or structure, requiring action to prolong the service life. Essential Repair Findings serve as the primary source for the culvert project-selection process. Approximately 100 new Essential Repair Findings are identified each year by Staff Bridge. ERF data is stored in spreadsheets on CDOT’s network folders. Inspectors identify Essential Repair Findings and then issue Essential Repair Letters.

Inspectors perform component- and element-

Typical findings that warrant an Essential Repair Finding notice include:

1. Perforations due to advanced corrosion in a corrugated metal pipe.
2. Deformation or movement of culvert pipe sections—concrete or steel.
3. Severe abrasion and deterioration of concrete.
4. Failed wingwalls and scour at the inlet or outlet of a culvert.
5. Silted-in culvert leading to a significant reduction of hydraulic capacity.

CONDITION TRENDS

Current conditions for CDOT’s culverts are summarized in **Table A.2-4**. As of 2021, CDOT has 5,626 (94.6%) out of 5,946 culverts in Fair or Good condition. There are currently 374 open Essential Repair Findings identified on the State Highway System.

Since 2017, the percentage of culverts in Good condition has been steadily declining, while the percentage in Fair condition has been steadily increasing, and the percentage in Poor condition has remained relatively constant. Open Essential Repair Findings saw a steady increase from 2016-19. However, from 2019-2021, the number of open Essential Repair Findings remained almost constant.

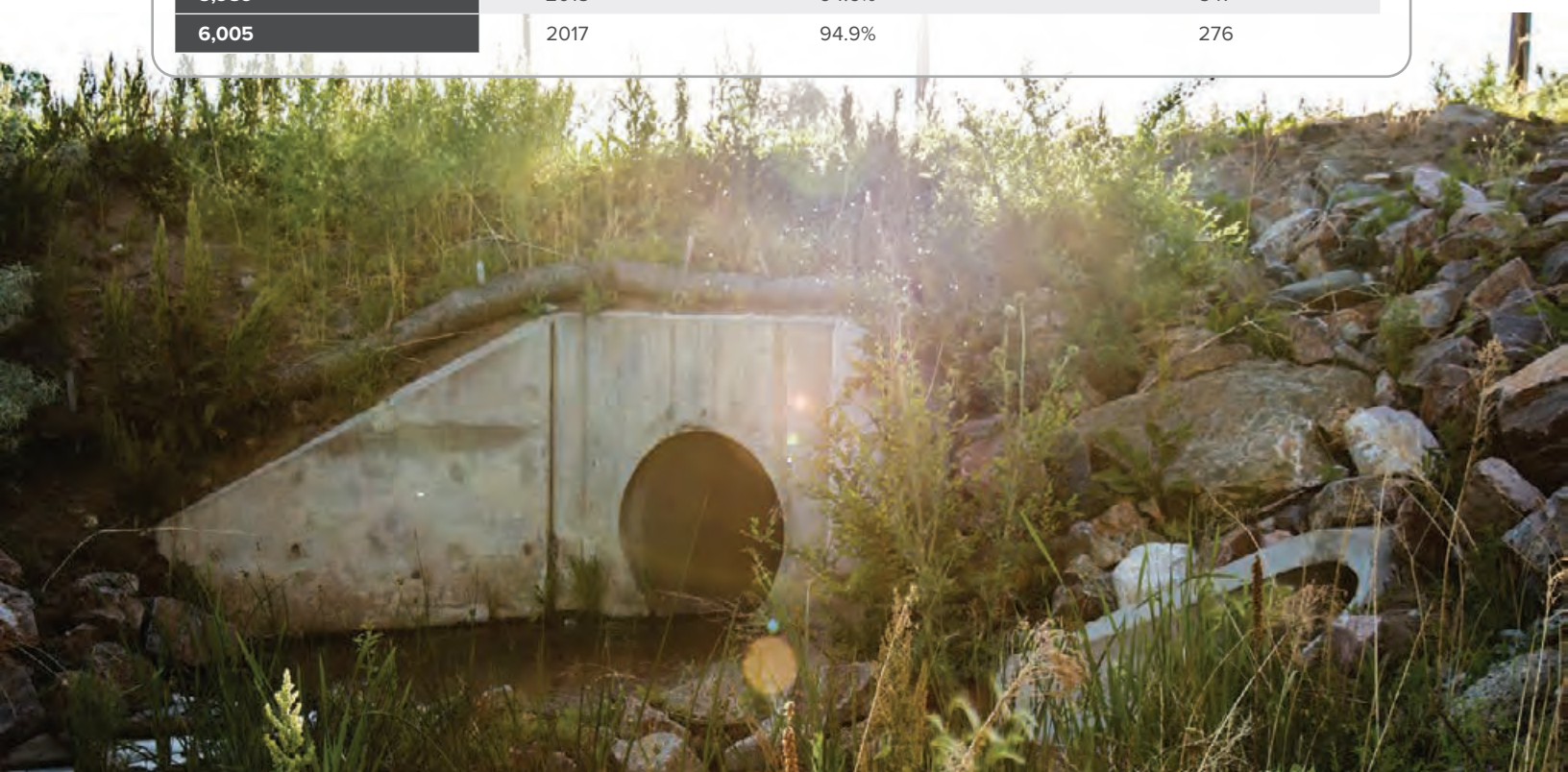
ASSET VALUE

CDOT undertook an assessment of asset value in 2022 for this document. The replacement value of culvert assets is determined by the culvert length multiplied by the unit cost (linear feet). This replacement value is \$3.02 billion.

To calculate current asset value, the replacement value is discounted to consider the current condition of the asset and an obsolescence factor. The obsolescence factor considers the current age of a culvert and an obsolescence age of 70 years. The current value of culverts is \$1.6 billion.

Table A.2-4 *Culvert Condition Trends*

Number of Culverts	Year	Percentage in Fair or Good Condition	Essential Repair Findings
5,946	2021	94.6%	374
5,937	2020	94.5%	375
5,956	2019	94.8%	375
5,989	2018	94.6%	347
6,005	2017	94.9%	276



LIFE-CYCLE PLANNING

CDOT analyzes its culvert inventory and inspection data to forecast investment needs and set work priorities. This process is known as life-cycle planning and accounts for the whole-life costs of planning, constructing, and maintaining culverts with consideration for minimizing long-term costs while preserving or improving the condition. CDOT performs major rehabilitation and reconstructions on culverts that have Essential Repair Findings or that are in Poor condition. Culverts in Good and Fair condition receive routine maintenance, as needed. CDOT's culvert-maintenance plan leverages findings from the annual condition assessment, as well as treatment recommendations from CDOT's asset model.

LIFE-CYCLE PLANNING

CDOT uses a condition-based approach to the life-cycle management of culverts. This means condition data is used to determine appropriate type and timing of work and to prioritize potential work within available budgets. CDOT performs cost-benefit analyses to determine the most cost-efficient treatment program and identify which culvert projects should be prioritized for maintenance.

The bulk of culvert life-cycle management consists of addressing culverts with Essential Repair Findings. This approach aims to reduce the backlog of culverts with Essential Repair Findings, thereby reducing the risk of culvert failure. The Culverts program is expected to include preservation strategies such as slip lining (i.e., lining existing pipe culverts with a smaller diameter pipe) once the backlog of Poor culverts is reduced to a manageable level. This level is defined as being when the number of Essential Repair Findings remedied is at or below the number of new Essential Repair Findings identified in the same year.

PROGRAM DECISION-MAKING

CDOT uses several different treatments to cost effectively address culvert deterioration. Culvert treatments can include activities such as slip-lining, reconstruction, or wingwall repair (e.g., concrete patching or resetting of a culvert wingwall) depending on the culvert condition and availability of funds. Culvert-treatment work types are defined as follows:

- » **Preservation** includes cleaning, brush clearing, and similar treatments that help the culvert function properly.
- » **Maintenance** includes scour repair and miscellaneous repairs. These treatments do not provide a change in culvert condition but do extend service life.
- » **Rehabilitation** includes slip lining, spray lining (i.e., lining a deteriorated pipe with a layer of protective material such as grout), and other repair treatments. These treatments restore culvert condition and extend service life. To receive a slip lining, a culvert cannot have begun collapsing. This treatment is considered a preservation or rehabilitation action, depending on the condition of the existing pipe.
- » **Reconstruction** consists of replacing the existing structure with a new structure. This results in a resetting of expectations regarding culvert condition and service life. Replacement is typically accomplished by excavating through the overlying pavement and placing a new structure, although new pipe installation methods that do not require digging an open trench may also be used. The most cost-effective approach is selected as part of the design process. Hydraulic analysis is required as part of the design process to make sure the final culvert is properly sized.
- » **Initial Construction** consists of construction of a structure where no structure has ever been built.

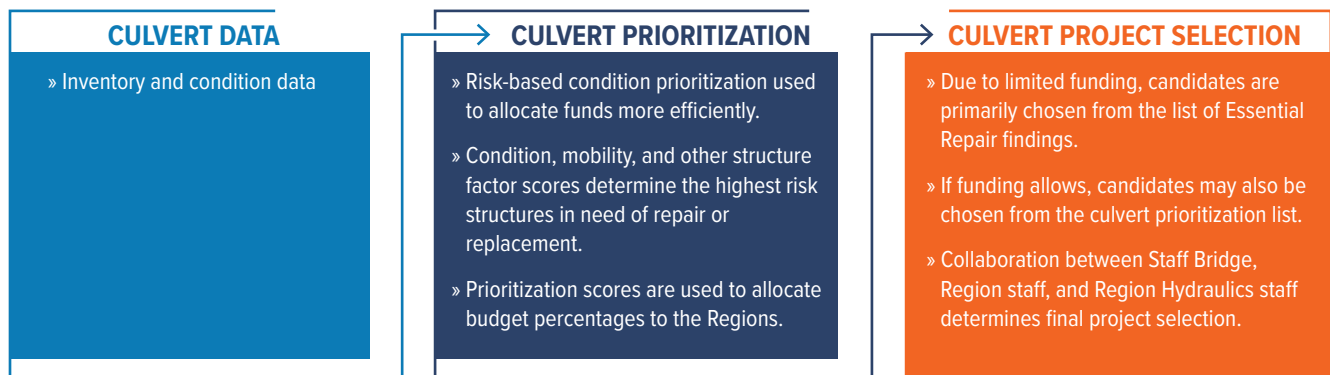
A list of culvert treatments and their approximate costs are shown in **Table A.2-5**.

Table A.2-5 *Culverts Life-Cycle Management Activities*

FHWA Work Type	Activity	Typical Cost
Preservation	Cleaning	<\$2,000 per culvert
Maintenance	Inspection	<\$2,000 per culvert
Rehabilitation	Slip line/Spray line	\$700 per linear foot
Reconstruction (replacement)	Replacement of an existing structure	\$4,300 per linear foot
Initial Construction	Construction of a structure where no structure has ever been built	Varies

The project-selection process for culverts (**Figure A.2-4**) is driven by culvert condition, with projects chosen primarily from the list of Essential Repair Findings. CDOT Regions are provided with the culvert-prioritization list annually and use the list to identify culvert projects for that year. Region staff attempt to bundle similar culvert treatments into single projects to improve efficiency where possible. Additionally, CDOT Regions' maintenance staff implement certain repairs such as cleaning, slip lining, or invert lining (i.e., lining of the culvert invert with protective material such as grout) as skills, time, and budget allows. Routine maintenance, preservation treatments, and repairs that do not require engineering are typically scheduled after notification of an Essential Repair Finding or if discovered during an in-field maintenance visit.

Figure A.2-4 *Culvert Prioritization and Project-Selection Process*



RISK MANAGEMENT

Aligned with CDOT’s risk management approach, the Culverts program manages risk across multiple levels—agency, programmatic, and project/asset. Section 6 of the TAMP provides more information about CDOT’s risk-management methodology and processes, including an explanation of elements comprising risk scores.

The Culverts program maintains a register of risks to its overall program and projects. The top risks are presented in **Table A.2-6**.

Table A.2-6 *Top Culverts Risks*

Risk Level	Threat/ Opportunity	Risk Score	Risk-Management Strategy
Project	Roadway washout from pipe failure.	51.8 (T)4 x (C)4.3 x (V)3 ¹	Treat—Inspections; identify "essential repairs" and add to critical-culverts list.
Project	Roadway settlement due to hydraulic piping/overtopping.	36 (T)4 x (C)3.3 x (V)4	Treat—Culvert replacement or an additional culvert to increase capacity.
Project	Culverts less than 48-inch diameter failing and closing road—not managed currently.	28.8 (T)3 x (C)3.2 x (V)3	Treat—Systematic inventory, clean, inspect, and repair.



FINANCIAL PLAN

CDOT sets planning budgets for its asset programs four years in advance. The plan below assumes that funding for the Culverts program will remain static for the foreseeable future, at the level most recently set (\$8.2 million for fiscal year 2025). These budget assumptions, combined with CDOT’s life-cycle management approaches discussed in the subsequent section, inform the investment strategies for culverts that CDOT plans to leverage to achieve system-wide asset performance goals while minimizing life-cycle costs.

FUNDING SOURCES

The culverts portion of the Transportation Asset Management (TAM) program supports the life-cycle management for culvert assets. Of the allocated funding, approximately \$1 million per year is used for inspections. Meanwhile, preservation and maintenance provided by the Maintenance Levels of

Service (MLOS) program is budgeted separately, in the MLOS Financial Plan.

PLANNED FUNDING

Table A.2-7 summarizes the projected funding levels for the Culverts program for fiscal years 2022-31.

Table A.2-7 Financial Plan for Culvert Assets (in Millions)

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
\$8.6	\$8.3	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2



INVESTMENT STRATEGIES

CDOT forms investment strategies based on its financial plan and life-cycle management strategies to achieve system-wide asset performance goals while minimizing life-cycle costs. The investment strategies delineate different types of work to be performed across CDOT's culvert assets over a 10-year period.

BACKGROUND: DETERMINING INVESTMENT STRATEGIES

The Department's investment strategies are informed by the AIMS asset model. Each year, the current culvert inventory and condition data are loaded into AIMS, and the model forecasts culvert conditions over the following 20-year period. AIMS also generates a list of alternative strategies for each culvert. The strategies include repair, rehabilitation, and replacement treatments based on business rules created by CDOT in the form of decision trees. The AIMS optimization function generates a set of strategies that maximizes the benefit for any given budget.

PLANNED INVESTMENTS

MAINTENANCE AND REPAIR

CDOT's maintenance crews conduct culvert maintenance activities that do not require engineering, including routine maintenance, preservation treatments, and repairs. Activities that do not require engineering are part of the MLOS asset plan including the MLOS financial plan and investment strategies.

REHABILITATION, RECONSTRUCTION, AND REPLACEMENT

CDOT's Culverts program performs routine inspection, repair, rehabilitation, reconstruction, and replacement of culverts that are not covered under the MLOS program.



PERFORMANCE GAP ANALYSIS

CDOT uses its AIMS model to forecast the performance of its culvert assets and any anticipated performance gaps annually. The results of this analysis inform the financial plan and investment strategies. Based on the most recent analysis, current funding will allow CDOT to remain close to achieving its performance target for culverts.

NEEDS AND PROJECTED CONDITION

CDOT's AIMS model predicts the long-term performance of culvert assets, constrained by anticipated annual budgets.

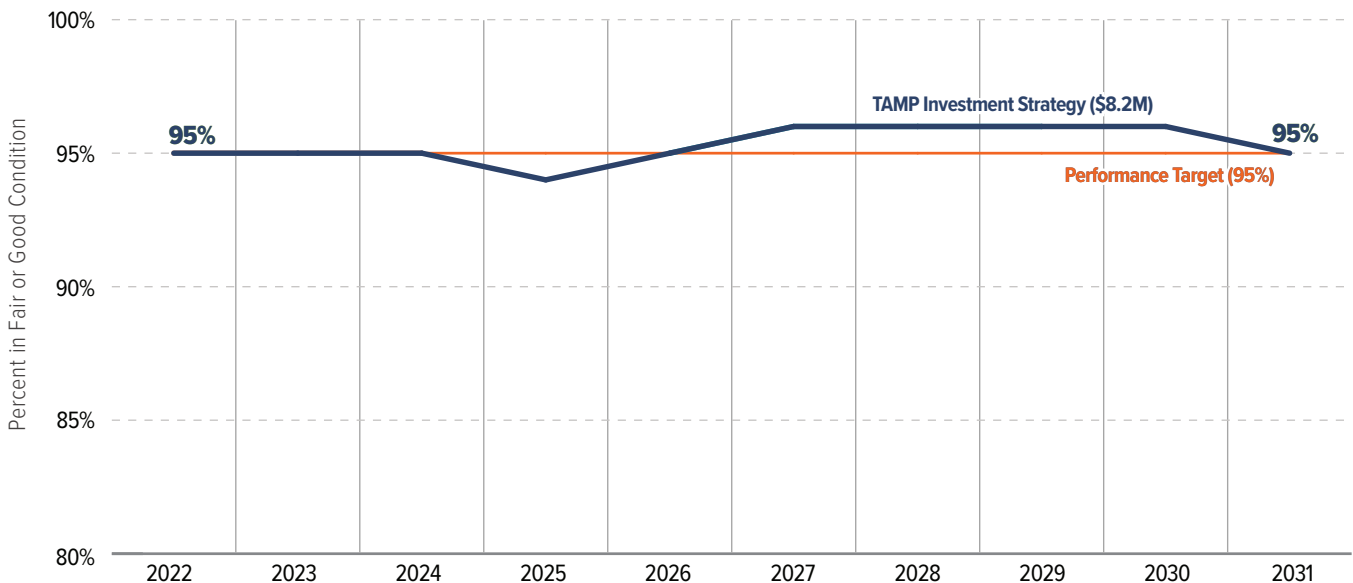
The model's forecast currently relies on deterioration assumptions developed in 2016. Additionally, CDOT has programmed the model to assume that budgets in the first few years of the forecast are spent on a planned list of actual, upcoming culvert projects ("committed projects"). In subsequent years of the

forecast, the model begins "spending" the budgets on projects selected by the model itself.

The model's forecast is based on the culvert Financial Plan, which dedicates about \$8.2 million per year to the Culverts program. This funding level provides sufficient funding to meet the PD 14.0 performance target until 2031, as shown in **Figure A.2-5**. To meet the target for the 10-years after 2031 requires an additional investment of \$2 million per year.

Figure A.2-5 Projection of Culvert Assets Performance

The anticipated annual budget of \$8.2 million will enable CDOT to meet the performance target of ensuring that 95 percent of culverts are in Good or Fair condition.



IMPACTS OF INSUFFICIENT FUNDING

Culverts are crucial to the resiliency of CDOT's highway system. As a result of insufficient funding, the following risks will increase:

- » **Safety and Mobility:** During rain and flood events, the drainage of the roadway will be poor and culvert failures are possible. This would result in highway closures, blocked access for commerce/emergency services, increased damage to pavements, and threats to public safety.
- » **Financial:** Delays in performing repair or rehabilitation of culverts leads to greater funding needs in the future.

OPPORTUNITIES TO CLOSE THE GAP

CDOT regularly evaluates asset investment strategies and funding levels, including a review of analyses from the AIMS model to determine the best strategies to meet condition targets. The Department may alter its existing strategy by adjusting treatments, condition

targets, and other factors to help close performance gaps when they exist. In addition, examples of recent efficiencies that may help close gaps include:

- » **Statewide Preventive Repair Prioritization:** This effort prioritized all culverts with open Essential Repair Findings that are good candidates for slip-lining or spray-lining treatments. The effort included preliminary hydraulic information to further verify highest priority candidates.
- » **Concrete Mat Invert Lining:** This new, cost-effective treatment enables repairs during early phases of culvert deterioration.

STRATEGIC USE OF ADDITIONAL REVENUE

Should CDOT receive additional revenue to fund the Culverts asset class, the Department's first priority is to eliminate any funding gaps related to achieving the PD-14 performance target. Once goals are achieved, the Department will reduce Poor backlog with a priority towards the most critical and/or vulnerable assets to improve system resilience. CDOT estimates the current "Poor" backlog for Culverts could be eliminated with about \$131 million.



FUTURE IMPROVEMENTS

Improvements to the Culverts program will address processes, and technology

PROCESS

Process improvement is a key aspect of maintaining and enhancing the Culverts program. CDOT intends to improve the capture of accurate inventory data and improve its ability to track the condition and disposition of culverts over time.

Other improvements include:

- » Increase efforts to bundle culvert treatments with Bridge and Surface Treatment projects to reduce culvert treatment costs through economy of scale.
- » Implementing rehabilitation techniques to extend the service lives of culverts in fair or poor condition, thereby delaying the need for costly replacements.
- » Continuing to improve the coordination between culvert asset management and resilience efforts to reduce the likelihood of overtopping or washouts during extreme weather events.

TECHNOLOGY AND ANALYSIS CAPABILITIES

As CDOT's culvert-management efforts mature, the Department will pursue ongoing improvements such as:

- » Similar to Bridges, SIMSA will incorporate culvert assets and will:
 - Consolidate culvert data (e.g., condition, inventory) for easy access and use throughout the Department, including serving as a platform to upload and access “as-built” plans.
 - Streamline culvert inspection and inventory data collection and review for more accurate, up-to-date information.
 - Integrate with CDOT's AIMS model so that data uploads (e.g., new condition and inventory data) to the model are easier than in the past.
- » Enhancing condition and performance-forecasting capabilities with improved performance models. The collaboration between UC Denver and CDOT to develop deterioration models using machine learning will include culvert deterioration models as well.



A-3. FLEET



CDOT’s “orange fleet” of snow plows—whether clearing ice and snow along urban corridors or at gateways to high-altitude recreation—may be the most popular symbol of services provided by the Department. These plows are just one part of the diverse Fleet (or Road Equipment) asset class, which helps ensure the safety and mobility of the traveling public by facilitating safe, timely, and efficient roadway operations, repairs, and improvements.

CDOT employs a comprehensive asset-management process for the Fleet program that is closely aligned with the process described in the Introduction to the Asset Plan Appendix on page A-1.

CDOT's large fleet of vehicles is managed by Fleet Services in CDOT's Division of Maintenance and Operations. These heavy-duty vehicles range in size and function from one-ton patrol vehicles to the snowplow trucks. The fleet allows CDOT to perform such functions as:

- » Basic road construction
- » Road maintenance, such as snow plowing and removal
- » Operations

The purchase prices of heavy-duty vehicles continue to rise significantly. The state's transition to electric

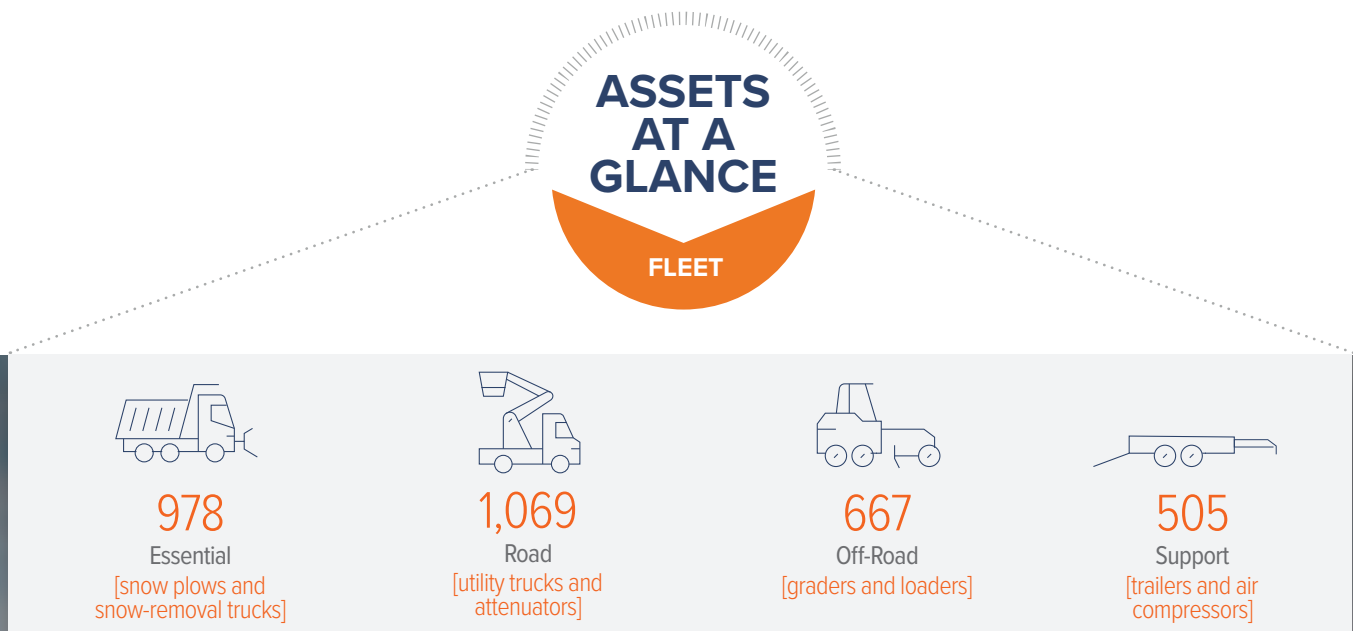
vehicles—already mandated for Colorado's light duty fleet—will contribute to additional rising costs.

As of April 2021, there were 3,219 units of rolling stock, not including attachments such as plows. Fleet assets can be categorized into four use categories:

- » Essential (snowplow trucks and snow removal trucks)
- » Road (utility trucks, and attenuators)
- » Off-Road (graders and loaders)
- » Support (trailers and air compressors)

Light-duty vehicles, such as pickup trucks, are leased through State Fleet Management, Division of Capital Assets, in the State's Department of Personnel and Administration, and are not included in this plan.

Figure A.3-1 *Culverts Assets at a Glance*



PERFORMANCE MANAGEMENT

The performance of fleet assets is monitored and managed primarily by evaluating the percentage of each vehicle’s “useful life” that has been expended. Additional performance measures, including percent life age, percent life usage, and maintenance cost, are also used to prioritize replacements.

POLICY DIRECTIVE 14.0 PERFORMANCE MEASURE

The asset-management program for fleet contributes to CDOT’s Policy Directive 14 (PD 14.0) strategic goal areas—safety, asset management, and mobility. Fleet assets are critical for providing the necessary equipment to perform basic traffic and maintenance functions safely and efficiently. Fleet assets enhance mobility throughout the state by providing critical equipment needed to complete road improvements and reopen closed roads. CDOT plows over six million lane miles each year to keep roads navigable.

The performance measure in PD 14.0 for judging the state of good repair of fleet assets is the average percentage of “useful life” expended. Useful life, which is specific to each vehicle and equipment type, is defined as the length of time that a vehicle or piece of equipment is expected to provide CDOT with adequate performance. The percentage of “useful life expended” is calculated by averaging the asset’s age as a percent of the typical replacement age, and the asset’s usage as a percentage of expected lifetime usage. A value of 100 percent indicates that a piece of equipment has reached its full useful life. Values greater than 100 percent indicate that a

vehicle or piece of equipment has exceeded its useful life. PD 14.0 sets the asset-management target for fleet assets as maintaining the average percentage of useful life expended of fleet assets at or below 75 percent. This is considered to be the level at which fleet assets are in a state of good repair.

Table A.3-1 shows the PD 14.0 target and 2021 performance for fleet assets.

OTHER PERFORMANCE MEASURES

MEASURES TO PRIORITIZE REPLACEMENTS

Additional performance measures are used to prioritize replacements. These include:

- » **Percent life age:** Each asset has an expected life in terms of age. By aging the asset each year and comparing the current age against the typical replacement age, the Percent Life Age is calculated.
- » **Percent life usage:** Each asset has an expected usage life in terms of total mileage or total hours of use. By comparing the annual hours or mileage used against the manufacturer’s life expectancy, the Percent Life Use is calculated.

Table A.3-1 Performance Metric and Target for Fleet Assets

FLEET	Measure	Target	2021 Performance
	Average percentage of useful life expended	75% or less	69%

Additionally, the average five-year maintenance cost for each asset is tracked and used in conjunction with the other performance measures to determine replacement eligibility.

ACCELERATED REPLACEMENT WITH ALTERNATIVE-FUEL VEHICLES

Colorado's Executive Order D 2015-013 directs the state's Greening Government Leadership Council to work with all executive state agencies and departments to reduce weather-normalized energy consumption by at least two percent annually. This includes goals and directives to reduce petroleum used by the state's various fleets. To achieve these goals, CDOT participates as a member of the State Fleet Sub-Council, a body charged with helping to:

- » Develop standard procedures and formulas for modeling and monitoring potential alternative-fuel vehicles and fuel reduction efforts that link acquisition and operations budgets.
- » Create a process that allows fleet coordinators to replace vehicles before standard retirement age with alternative fuel vehicles if replacement is cost-effective.
- » Evaluate alternative-financing options for vehicles, including leasing, energy-performance contracting, and other options that reduce costs.
- » Establish policies and procedures that promote the use of non-petroleum-fueled vehicles and fleet efficiencies, striving for the use of non-gasoline and non-diesel fuels for a minimum of 90 percent of the time, when cost-effective.



INVENTORY AND CONDITION

CDOT owns and maintains 3,219 units of rolling-stock¹ fleet assets that are divided into four categories: Essential, Road, Off-Road, and Support. CDOT tracks these fleet assets within the SAP Equipment Database, which includes data on age, utilization, and cost of maintenance that are used to determine each asset’s condition.

INVENTORY

Of the 3,219 vehicles in the fleet, 978 are classified as Essential vehicles, critical for important missions. These include snowplow trucks and other snow-removal vehicles (e.g., snowcats and snow blowers), as well as aerial-lift trucks for signal maintenance. The fleet asset inventory is provided in **Table A.3-2**.

Table A.3-2 Current Inventory and Condition of Fleet Assets

Asset Type	Current Count	Useful Life (Years)	Average Age (Years)	Percent Useful Life Expended
<i>ESSENTIAL</i>	978	15	12.00	80%
Snowplow Trucks	868	12	12.00	100%
Snowcats	5	15	10.4	70%
Others	105	15	9.1	60%
ROAD	1069	10	10.08	108%
One-Ton Trucks	377	10	9.6	96%
Mechanic Trucks	69	10	11.1	111%
Others	623	10	11.6	116%
<i>OFF-ROAD</i>	667	15	12.92	86%
Dozers	10	15	13.1	87%
Motor Graders	85	12	15.9	133%
Loaders	263	15	13.7	91%
Others	309	15	11.4	76%
<i>FLEET SUPPORT</i>	505	15	9.99	66%
Personnel Lifts (Scissor Lifts)	5	10	14.2	142%
Large Welders	8	15	20.5	137%
Others	492	15	9.7	65%
Total	3219	13.2	12.23	93%

¹ This number changes weekly, based on fleet turns and up-fit schedule.

CONDITION

The condition of fleet assets is measured by the average Percent Life. The Percent Life is based on the following factors:

Percent Life Age = Vehicle age (years) / Vehicle expected life (years)

Percent Life Usage = Vehicle actual usage (miles or hours) / Vehicle expected life usage (miles or hours)

The Percent Life is calculated by averaging the Percent Life Age and the Percent Life Use, with an additive factor based on the age of the equipment as follows:

- » If Percent Life Age \geq 200, then 50 points are added.
- » If Percent Life Age \geq 180, then 40 points are added.
- » If Percent Life Age \geq 160, then 30 points are added.
- » If Percent Life Age \geq 140, then 20 points are added.
- » If Percent Life Age \geq 120, then 10 points are added.

While the overall fleet is meeting the PD 14.0 target, equipment can still pose concerns. Indeed, certain vehicles are approaching or exceeding twice their expected useful life.

Vehicle and equipment age, usage (mileage), and maintenance costs are maintained in the fleet-asset database, which resides in CDOT's financial system (SAP). These data are imported into CDOT's Asset Investment Management System (AIMS) model to calculate condition.

For 2021, 68.7 percent of the useful life of the fleet had been expended. This is within the target of 75 percent or less. The condition of CDOT's fleet has slightly improved in recent years, from about 73 percent useful life expended in 2017, to about 69 percent in 2021.

ASSET VALUE

CDOT undertook an assessment of asset value in 2022. The current replacement value of fleet assets is determined by considering the acquisition value and inflation. This replacement value is \$452 million.

To calculate current asset value, the replacement value is discounted by the useful life, which is based on the average age of all fleet assets, plus two standard deviations of age. The current value of fleet assets is \$270 million.



LIFE-CYCLE PLANNING

The life-cycle management of fleet assets considers preservation, routine maintenance, rehabilitation and replacement.

FACTORS INFLUENCING FLEET PERFORMANCE

The lifespan of fleet assets is primarily based on age. As vehicles and equipment get older, performance and reliability decrease, putting them at risk of failure. As maintenance costs increase over time, it eventually becomes more cost-efficient to replace an asset rather than continue to repair it. The lifespan of fleet assets is also usage-based. Assets that are overused can expend their useful life quicker than assets used more conservatively. CDOT uses a combination of age and usage to determine eligibility for treatments. Different types of fleet assets will have different life spans because of these factors.

FLEET LIFE-CYCLE MANAGEMENT APPROACH

Fleet Services tracks vehicle and equipment age, utilization, and the cost of ownership and maintenance. It then stores these data in its SAP Equipment Database. Longer-term life-cycle decisions are supported by CDOT's Asset Investment Management System (AIMS) model. The model uses the data in the SAP system, along with deterioration curves based on manufacturers' recommendations and CDOT experience, as well as CDOT replacement criteria, to develop a recommended replacement list.

While the fleet asset-management program is focused exclusively on replacing heavy-fleet vehicles, Fleet Services also manages:

- » The maintenance and repair of the heavy fleet, including in-house repairs performed and funded through the Maintenance Levels of Service (MLOS) program. Fleet Services also manages outside repairs and setting specifications and scopes-of-work for purchasing repair services.

- » Fuel cards for CDOT employees to purchase fuel commercially or from CDOT's bulk-fuel tanks.
- » Purchasing bulk-fuel tanks for CDOT vehicles.
- » Purchasing new heavy-fleet equipment.
- » Requests for new light-fleet vehicles, which are funded through the State's Department of Personnel and Administration.

Fleet Services also manages light-fleet vehicles.

FLEET PROGRAM DECISION MAKING

TREATMENT SELECTION

The process for selecting treatments begins each year when vehicle and equipment age, usage (mileage), and maintenance costs are imported from the SAP system into the AIMS model to calculate needs. The only treatment type used by the model for fleet assets is vehicle replacement. The model generates specific replacement recommendations for each vehicle in the fleet, based on its expected life in terms of age and usage.

The model's analysis assumes that regular base maintenance or preservation activities are conducted per prescribed regimens. It does not account for such rehabilitation activities as replacement transmissions or new truck decks. While such activities are known to significantly extend vehicle life, the extent and schedule of such interventions is not sufficiently documented in a form that can be usefully inputted into the model.

Equipment usage is measured in terms of hours of use or miles driven. The percentage of useful life expended is calculated as the current readings (hours/miles) divided by the expected hours/miles at replacement. The performance measure used in the AIMS model is the "percentage of useful life

expended, dollar-weighted” which multiplies the percentage of life of the equipment that’s been expended by the replacement cost. Equipment replacement is generally triggered when the percentage of useful life expended exceeds 120 percent.

FLEET MANAGEMENT WORK TYPES

Preservation, Maintenance and Rehabilitation

Vehicles and equipment are assigned to Regional maintenance sections, but some loaning of equipment is done when required. For day-to-day vehicle maintenance, Fleet Services abides by the Federal Motor Carrier Safety Regulation (FMCSR). Through FMCSR Procedural Directive 9.2 and the Heavy Fleet Protocol, it is also required that Fleet Services perform routine maintenance. The Fleet Asset Manager develops the standards, which are then incorporated into CDOT protocol or policy and procedural directives. Preventive-maintenance work orders are monitored to ensure that they are completed. Operators check vehicles daily, and mechanics carry out annual safety inspections.

These activities are undertaken by the Maintenance Levels of Service (MLOS) program. Definitions for these items are included in **Table A.3-3**.

Reconstruction (Replacement)

CDOT replacement criteria are used to determine the optimum time to replace fleet equipment. CDOT wants to ensure that it is not maintaining equipment that has a high cost of maintenance compared to its replacement cost. The Department has found that vehicles and equipment can often reach 120 percent of expected useful life before reaching that threshold. CDOT uses the age and usage performance measures described in Section 3 (“Performance Management”), along with five-year maintenance costs, to evaluate if each vehicle or piece of equipment is eligible for replacement:

- » If percent life age is ≤ 60 percent and the five-year average maintenance cost is > 25 percent of equipment replacement cost, the asset is eligible for replacement.
- » If percent life age is ≤ 120 percent and the five-year average maintenance cost is > 30 percent of the replacement cost, then the asset is eligible for replacement.
- » If the percent life is ≥ 120 percent or the percent life age is > 120 percent, then the asset is eligible for replacement.

Once the AIMS model generates a replacement list, Fleet Services decision makers consult with stakeholders within CDOT’s Regions/sections to ensure operational needs are met. Sections can recommend adjustments. The Fleet Manager presents the adjusted replacement plan to the Director of Highway Maintenance for final approval.

Vehicle replacement is becoming increasingly challenging as the cost of vehicles rises. For example, inflationary costs of steel and labor have driven the cost of snowplows up 27 percent in the past year. In addition, existing state policy and the State Clean Truck Strategy now being developed are likely to reduce the number of vehicles that can be replaced within existing budgets by nearly half for several vehicle types. For example, battery-electric street sweepers are nearly twice as expensive as fossil fuel-powered street sweepers.

Besides planned cyclical replacements, the escalating cost of vehicles affects the ability to replace vehicles severely damaged in accidents. The fleet experiences an average of 200 accidents each year, with a budget impact of some \$1.5 million annually.

Expansion

The need for additional vehicles or equipment can be driven by government objectives and mandates, as well as by requests from CDOT Regions and sections. For example, CDOT’s Policy Directive 1502.1, Traffic Control for Planned and Unplanned Work, mandates that Fleet Services must supply Class 6 traffic-control trucks with truck-mounted attenuators for maintenance patrols.

Additionally, a Region or division may request an additional type of new vehicle or equipment or an increase in the number of existing pieces of equipment. A written request containing a justification, such as employee safety, is submitted by the Region or division to the Fleet Manager and must be approved by the Director of Highway Maintenance and CDOT’s Executive Director.

CDOT’s asset-management treatments for fleet are aligned with FHWA work types in **Table A.3.3**. The FHWA category of “initial construction” is not applicable to vehicles and equipment and has been replaced in the table by “expansion.” For the same reason, a “replacement” work type is used in the table instead of the FHWA “reconstruction” work type.

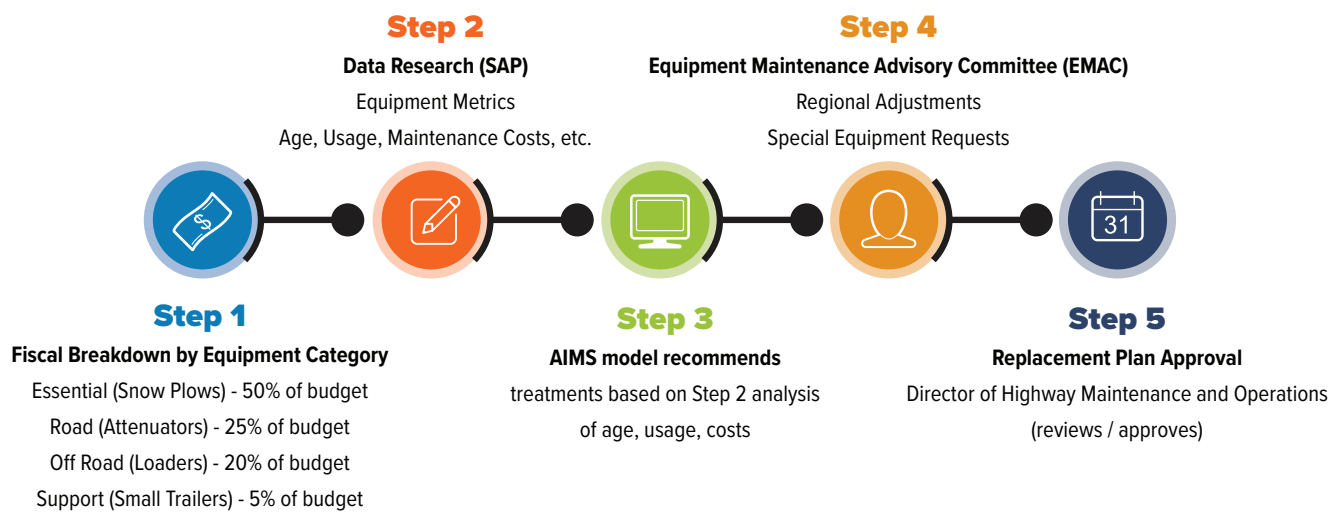
Table A.3-3 Fleet Life-Cycle Management Activities

Work Type	CDOT Activities
Preservation	Cleaning of equipment, performed by sections using operating funds.
Maintenance	Consists of oil changes, lube jobs, and minor and major repairs.
Rehabilitation	Consists of replacing rusted, cracked frame rails; removing excess rust and rebuilding truck beds; and repainting.
Replacement	Purchase of replacement vehicles or equipment.
Expansion	Purchasing additional or new vehicles.

PROJECT SELECTION AND DELIVERY

The project-selection process for fleet replacements is described below and shown in **Figure A.3-2**.

Figure A.3-2 Vehicle-Replacement Process



RISK MANAGEMENT

CDOT maintains an ongoing register of risks for fleet assets at the agency, program, and project levels. Section 6 of the TAMP provides more information about CDOT’s risk-management methodology and processes, including an explanation of elements comprising risk scores. Top risks are shown in **Table A.3-4**.

Section 6 of the TAMP provides more information about CDOT’s risk-management methodology and processes, including an explanation of elements comprising risk scores.

Table A.3-4 Top Fleet Program Risks

Risk Level	Threat/ Opportunity	Risk Score ²	Risk Management Strategy
Project	Impacts/crashes of traffic with fleet vehicles	58.7 (L)4 x (C)4.9 x (V)3	Well-lit vehicles, driver awareness, lessons learned
Project	Lack of parts availability (partly due to age and obsolescence) limiting number of vehicles in use	33 (L)5 x (C)3.3 x (V)2	More budget to allow for this

FINANCIAL PLAN

This asset plan shows planned funding for fleet assets from 2022-31. For the first four years of this period, official planning budgets have been adopted by the Transportation Commission. For fiscal year 2026 and beyond, annual budgets in this plan are held at fiscal 2025 levels.

FUNDING SOURCES

The budget for the Fleet program, which funds fleet replacements, is a portion of the overall Transportation Asset Management (TAM) program budget at CDOT. Vehicle maintenance is funded outside of the Fleet asset program, as part of the Maintenance Levels of Service (MLOS) program budget, and is included within the MLOS Financial Plan. Occasionally, but inconsistently, these sources may be supplemented by the proceeds from the auction of vehicles retired from the fleet.

PLANNED FUNDING

The 10-Year Financial Plan for the Fleet program is shown in **Table A.3-5**.

Table A.3-5 Financial Plan for Fleet Assets (in Millions)

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
\$22	\$21.5	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0

² Risk Score = Likelihood (L) * Total Consequence and Consideration Score (C) * Vulnerability (V)

INVESTMENT STRATEGIES

CDOT allocates a percentage of the total Fleet program budget to categories of equipment (i.e., Essential, Road, Off-Road, Support) based on priorities determined by the Director of Highway Maintenance. The AIMS model then generates a recommended-replacement list, based on the budget available to each category. This helps ensure that the model's recommendations support CDOT's objectives, not just identify and replace the greatest number of eligible assets.

BACKGROUND: DETERMINING INVESTMENT STRATEGIES

Each year the current fleet inventory and condition data are loaded into the AIMS model, and the model forecasts fleet performance under various budget scenarios. When the model's optimization process is complete, the model returns a recommended set of vehicles to be replaced by year (i.e., the fleet project list).

Purchasing additional vehicles (as opposed to replacing existing vehicles) is not evaluated in the AIMS model. Additions are evaluated based upon needs, such as the increase in maintenance that will be required due to adding additional lane miles to the highway network. MLOS Sections identify such needs and submit requests to the Director of Maintenance and Operations (DMO). The DMO and fleet asset manager evaluate the need and, if found satisfactory, a request is presented to the Transportation Commission for additional funds. There is no ongoing annual budget for fleet additions. Budget is requested as needed from the Transportation Commission, per Procedure Directive 9.2.

PLANNED FLEET INVESTMENTS

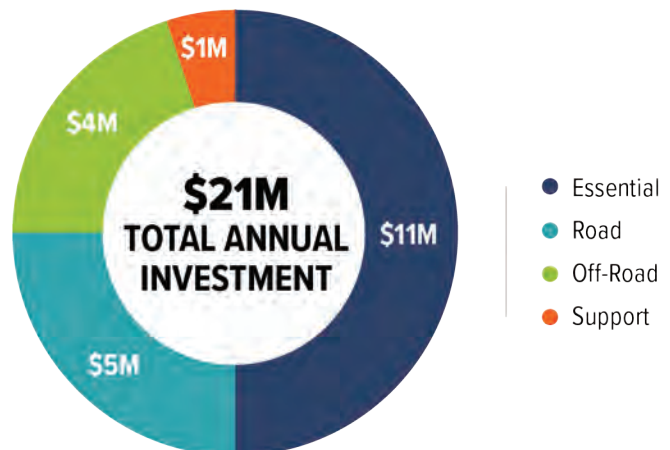
Preservation, Maintenance and Rehabilitation

These investments are the responsibility of the Maintenance Levels of Service (MLOS) Program.

Asset Management Replacements

When it comes to replacing fleet, CDOT expects to continue spending about 50 percent of annual fleet funding on the Essential vehicles category; about 25 percent on the Road vehicles category; 20 percent on the Off-Road fleet, and 5 percent on Support vehicles and equipment. (Refer to Table A.3-2 for examples of each category.) Approximate investments by vehicle category are shown in **Figure A.3-3**.

Figure A.3-3 Annual Investment by Fleet Category



Additional Near-Term Investments:

- » **Replacement of Fire Trucks at Key Tunnels**
The Transportation Commission allocated \$800,000 in additional funds to replace fire trucks at the Hanging Lakes Tunnel and Eisenhower and Johnson Memorial Tunnels in advance of the regular replacement cycle.
- » **Traffic-Control Trucks with Attenuators**
As noted earlier, Policy Directive 1502.1 mandates that each patrol must have one Class 6 traffic-control truck with a truck-mounted attenuator. CDOT is working to procure enough of these vehicles to meet this directive. Because 70 additional truck-mounted attenuators are needed and no additional funding was provided, a timeline for purchasing these vehicles has not been established yet.

- » **Low- or Zero- Emission Vehicles**
To reduce the environmental footprint of the fleet, new efficient vehicles are continuously incorporated. This includes a first-of-its-kind, plug-in battery-powered system for bucket trucks that meets the fleet’s operational needs with a smaller environmental footprint. For the next several years, 30 percent of the vehicle-replacement budget on average will be allocated to purchasing green vehicles.
- » **Electric Vehicle Charging Stations**
Planning for the equipment needs and locations of charging stations and their implementation is currently underway. This effort is being undertaken with resources outside of fleet asset-management funds.

PLANNED INVESTMENTS BY FHWA WORK TYPE

Table A.3-6 shows planned investments by work type for fleet assets.

Table A.3-6 *Planned Investments by FHWA Work Type*

Work Type	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Preservation	Included within the Maintenance Levels of Service Investment Strategy									
Maintenance										
Rehabilitation										
Replacement	\$21.5	\$21.5	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0
Expansion	\$0 planned									
TOTAL	\$21.5	\$21.5	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0	\$21.0



PERFORMANCE GAP ANALYSIS

Vehicle replacements consistent with planned funding levels in the Financial Plan are forecasted to result in the fleet asset class missing its performance target by the end of the TAMP time horizon. This trend is discussed below, along with potential ways to address the gap.

PROJECTED CONDITION

As noted earlier, vehicle costs continue to increase significantly, while budgets for the Fleet asset class are expected to remain at current levels under the Financial Plan. **Figure A.3-4** shows the expected condition of CDOT's fleet asset class over time under the Financial Plan, as well as an alternative scenario adding \$2 million annually. At current funding levels, the fleet will begin to miss its 75 percent or less performance target by the end of the TAMP time horizon of 2031. The additional \$2 million per year would be needed to ensure the fleet meets the target through 2032.

By 2030, Fleet Services estimates, significantly more funding will be required to address zero-emission vehicles (ZEVs) and electric vehicles. It is estimated that those vehicles will cost twice as much as vehicles with internal combustion engines.

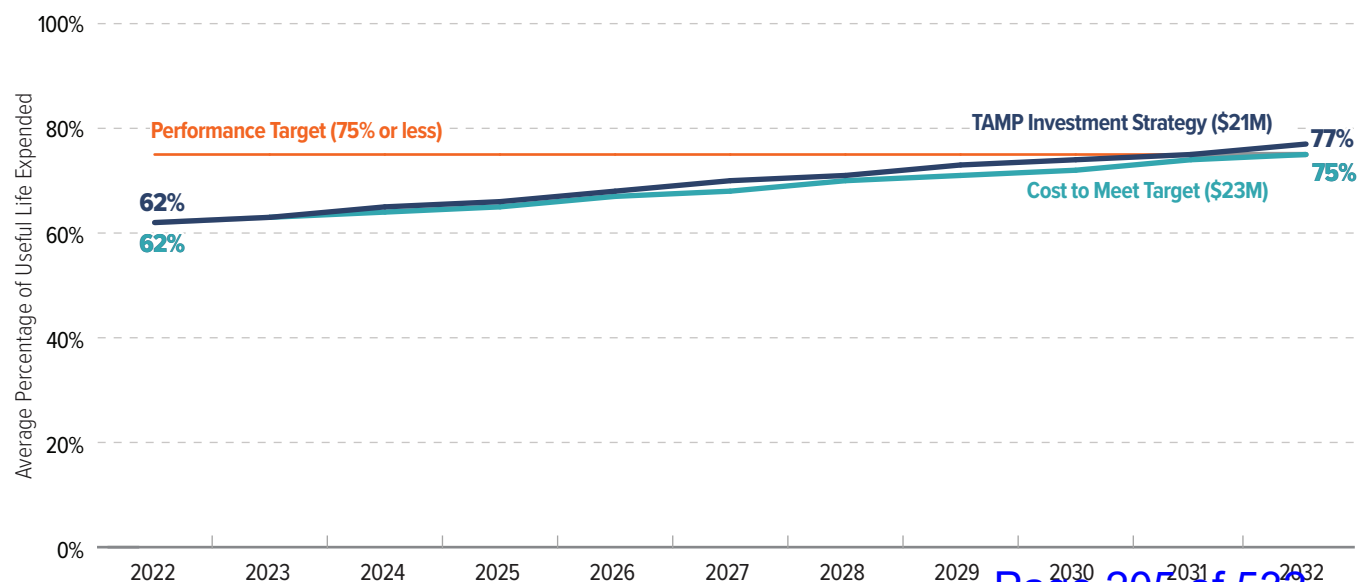
RISKS OF INSUFFICIENT FUNDING AND PERFORMANCE IMPACTS

Insufficient funding can result in delayed replacements and an older fleet, which in turn results in increased maintenance costs and lower reliability. Plows less than 14 years old have an average maintenance cost of about \$13,500 per year, while plows older than 15 years have an average maintenance cost of about \$21,000 per year. In addition to higher maintenance costs, an older fleet will have increased fuel costs. The fleet also will have increased out-of-service time, leading to reduced operational readiness and levels of service for highway users.

Moreover, insufficient funding is also likely to contribute to reduced parts availability, further limiting the number of vehicles in operation.

Figure A.3-4 Projected Performance of Fleet Assets

The anticipated annual budget of \$21 million will not enable CDOT to meet the performance target of ensuring that the average percent of useful life expended is less than 75%. The annual cost of meeting the target by 2032, is about \$23 million, or an additional \$2 million per year.



OPPORTUNITIES TO CLOSE THE GAP

Potential opportunities to close the performance gap besides additional funding include:

- » Improved inventorying, tracking, and performance reporting to enable more robust forecasting and management of the fleet.
- » Improved life-cycle analysis, including treatment recommendations, in the AIMS model.
- » Standardizing vehicle specifications across CDOT Regions.

CDOT has already begun to save costs by not insisting that vehicles be painted orange. More recent vehicles are ordered and left in their white color, which also increases their resale value when disposed of by CDOT.

STRATEGIC USE OF ADDITIONAL REVENUE

Should CDOT receive additional revenue to fund the Fleet asset class, the Department's first priority is to eliminate any funding gaps related to achieving the PD-14 performance target. Once goals are achieved, the Department will reduce Poor backlog with a priority towards the most critical and/or vulnerable assets to improve system resilience. CDOT estimates the current "Poor" backlog for Fleet could be eliminated with about \$300 million.



FUTURE IMPROVEMENTS

Intended asset-management improvements to the fleet address people, processes, and technology.

PEOPLE

CDOT's Maintenance Training Academy (MTA) is providing training to Regional Heavy Equipment Shop Supervisors on fleet maintenance management to improve the maintenance and preservation of fleet assets. The MTA also will provide training to all CDOT mechanics on the theory, safety, and maintenance of electric vehicles, which are expected to make up a larger percentage of the fleet going forward.

PROCESS

Process improvement is a key aspect of maintaining and improving the fleet asset class. Going forward, fleet asset managers will focus on continued improvements, such as:

- » Extensive repairs have been completed on certain pieces of equipment to extend their useful life. A mechanism needs to be developed in the SAP software and in the AIMS model to capture the expected increase in life, as well as the repair date. Currently these pieces of equipment are manually reset in the AIMS model, so that they do not show up in near-term replacement plans. An automated reset should be developed.
- » Other pieces of equipment need extensive repairs. CDOT has added a function to its AIMS model to consider such repair costs (e.g., engine repairs) and to determine if it is better to repair or replace the equipment.
- » The Fleet program is currently updating policy directives and protocols related to fleet and equipment management.

TECHNOLOGY AND ANALYSIS CAPABILITIES

Future technology and analysis improvements would establish a stronger forecasting capability and integrate more robust asset management practices.

Additionally, as part of CDOT's commitment to reduce its environmental footprint, the Fleet program continues to incorporate innovative new vehicles. This includes developing and testing a first-of-its-kind plug-in battery-powered system for bucket trucks that meets the operational needs of the fleet, only with a smaller environmental footprint. At the job site, the battery quietly and efficiently powers the truck's hydraulic lift and heating and cooling equipment—avoiding the need to idle the vehicle. Adding more green vehicles to the fleet will lower greenhouse gases and associated fuel costs. Incorporating zero-emissions vehicles into the fleet inventory and electrification of the fleet will be the focus of continuing improvements during the next 10 years.

Finally, the Fleet program is exploring the use of tools related to National Cooperative Highway Research Program Project 13-04 (Guide for Optimal Replacement Cycle of Highway Operations Equipment). These tools may give the program increased ability to produce and analyze different budgeting scenarios and replacement-cycle recommendations.

A-4. GEOHAZARDS



Colorado's mountainous terrain is particularly vulnerable to geologic hazards, both natural and man-made. CDOT's Geohazards Program identifies and manages geologic risks to Colorado's transportation system—falling rocks, landslides, sinkholes and others—by implementing risk-reducing treatments on strategic highway segments and corridors.

Geohazards are managed in alignment with the CDOT asset-management process described in the Introduction to the Asset Plan Appendix on page A-1. The state's transportation system is at risk from the following geohazard events and geotechnical asset failures:

- » Rockfall from natural slopes
- » Rockfall from constructed rock cuts
- » Rockslides
- » Embankment distress
- » Landslides
- » Debris flows
- » Sinkholes
- » Subgrade distress below the pavement section

CDOT has identified and inventoried about 4,000 highway segments (0.1-mile long) threatened by geohazards. These segments are identified through a previous geologic event. Geotechnical assets such as constructed embankments are included in the inventory, following failures or observed deformation.



WHY IS GEOHAZARD MANAGEMENT FOR HIGHWAYS IMPORTANT?

Geohazards pose safety and mobility threats to users and direct costs to CDOT. The Geohazard Management System’s asset management-based approach—in which CDOT uses data to rank and prioritize geohazards according to the severity of risk—is designed to lower the overall risk from geologic hazards, thus increasing safety, improving mobility for roadway users, and limiting damage to transportation assets (**Figure A.40-1**).

Figure A.4-1 *Examples of Geohazard-Affected Segments*



PERFORMANCE MANAGEMENT

Performance management for Geohazards is conducted by identifying a “Level of Risk” measure for each affected highway segment, calculated based on the likelihood of a future geological event and its associated costs.

POLICY DIRECTIVE 14.0 PERFORMANCE MEASURE

The asset management program for Geohazards (Geohazards program) contributes to all Policy Directive 14 (PD 14.0) goal areas of asset management, safety, and mobility. Geohazards result in safety threats: property damage, injury, and decreases in worker safety. Proper management is essential to ensure the safety of all transportation-system users. Geohazards cause frequent highway closures and delays. The Geohazard Management Plan is a tool to measure and manage the threat to CDOT performance from geohazards. It supports the CDOT Transportation Asset Management Plan by

providing additional guidance on detailed processes used within the Geohazards program.

The performance measure in PD 14.0 for managing geohazards is the percentage of identified hazardous road segments that receive a Level of Risk (LOR) letter grade of B or better. The LOR is based on the likelihood of a geohazard event occurring, coupled with the costs created by such an event with respect to safety, maintenance, and mobility. To determine the LOR grade for a segment, an annual risk cost is first determined by the equation shown in **Figure A.4-2**.

Figure A.4-2 Equation Calculating Annual Risk Cost for Geohazards



The Level of Risk letter grade is then determined as presented in **Table A.4-1**.


The PD 14.0 performance target for Geohazards is for 85 percent of identified hazardous road segments to receive a Level of Risk (LOR) letter grade of B or better. This condition is considered to be a state of good repair.

Table A.4-1 Geohazard Level-of-Risk Criteria

Level of Risk	Annual Risk Cost
A	< \$1,000
B	\$1,000 - \$5,000
C	\$5,000 - \$25,000
D	\$25,000 - \$50,000
F	> \$50,000

Table A.4-2 shows the PD 14.0 target and 2021 performance for the Geohazards Program. The program was not achieving its target.

Table A.4-2 Performance Metric and Target for Geohazards

	Measure	Target	2021 Performance
GEOHAZARDS	 Percentage of hazardous road segments with a Level-of-Risk grade B or better	85%	75%

FUTURE PERFORMANCE MEASURES

The Geohazards program is in the process of moving away from using LOR grades as a performance measure in favor of Total Annualized Risk Exposure (TARE). This measure will be incorporated into a more comprehensive risk-assessment model. The measure will be based on monetized risk instead of grade categories. The TARE measure will be calculated on a statewide and corridor basis. The new performance measurement framework is intended to improve CDOT’s ability to measure risk and assess trends.

As part of broader (multi asset) risk analysis CDOT also would like to apply the geological risk as part of a corridor-risk assessment including such prominent risks as wildfires, demographic changes, and shifts in the volume of traffic. This approach would also consider the risks to other assets, including bridges, culverts, and traffic devices.

MEASURES OF PROBABILITY AND COST

The Level of Risk for Geohazards is determined by the likelihood of a geohazard event occurring on a roadway segment and the associated costs of that event. **Table A.4-3** details how the likelihood of an event is determined, and **Table A.4-4** through **Table A.4-7** describe the estimated threat costs associated with various consequences.

Table A.4-3 Geohazard Event Probability

To determine the annual probability of an adverse event impacting safety, mobility or maintenance performance an annual average event frequency is calculated for historic events. This historical analysis is updated annually.

Condition	Typical Number of Hazard Events Reported Per Segment	Annual Probability
Excellent	0	0
Good	1	0.1
Fair	2	0.2
Poor	3	0.63

Table A.4-4 Safety Threat Levels and Associated Costs

36 years of historical accident data was used to assign a threat level and associated cost value for each segment.

Threat Level	Historical Accident Description	Threat Cost
Low	No Reported Accidents	\$0
Medium Low	1 to 20 Accidents	\$3,500
Medium	3 to 4 Accidents	\$10,500
Medium High	5 to 10 Accidents or Injury	\$91,600
High	More than 10 Accidents or Fatalities	\$6,297,000

Since 2014 improved event tracking has enabled more detailed information to be collected and from this a threat cost is assigned directly to each incident based on the costs shown in **Table A.4-5**. This actual number would replace the estimated segment cost described in **Table A.4-4**.

Table A.4-5 *Safety Threat Incident Costs*

Since 2014 when an actual incident occurs the segment safety threat-cost-per-incident is quantified using assigned costs for property damage, injury, or a fatality.

Incident Types	Cost
Property Damage	\$3,500 per vehicle
Injury	\$91,600 per incident
Fatality	\$6,297,000 per incident

The mobility-risk cost considers the average annual daily traffic (AADT) numbers and hours for full or partial closures to quantify the total cost of mobility disruptions expected for an event, shown in **Table A.4-6**.

Table A.4-6 *Mobility Threat Levels and Costs*

The mobility threat cost is estimated based on the anticipated length of disruption, an associated cost per vehicle and the segment AADT.

Threat Level	Measured Mobility Disruption Description	Assigned Threat Cost (per Vehicle)
Negligible	No closure – only work beyond travel lanes	\$0
Minor	Less than 1 hour of closure	\$10.50
Major	1 to 24 hours of closure	\$252
Critical	1 to 5 days of closure	\$1,008
Catastrophic	More than 5 days of closure	\$2,520

The maintenance cost is currently categorized in ranges, and this represents the total estimated cost to CDOT to respond to the event. This includes material for repair, and an estimate of the cost of time to complete the work.

Table A.4-7 *Maintenance Threat Levels and Costs*

Maintenance threat levels are based on estimated cost ranges. A maintenance threat cost is assigned based on an assigned value within each cost range.

Threat Level	Maintenance Cost Description	Assigned Threat Cost
Incidental	Costs are less than \$25,000	\$5,000
Minor	Costs range from \$25,000 to \$100,000	\$50,000
Major	Costs range between \$100,000 to \$500,000	\$200,000
Critical	Costs exceed \$500,000	\$1,000,000

Currently, the consequence side of the equation (**Figure A.4-2**) is calculated by adding the safety-risk cost, mobility-risk cost, and maintenance-risk cost.

INVENTORY AND CONDITION

CDOT identifies and inventories highway segments for which there are documented geohazard events, in 0.1-mile intervals. There are currently about 4,000 segments affected by geohazards.

INVENTORY

About 390 centerline miles, including 51 Interstate centerline miles, have a measured geohazard exposure. This represents four percent of the State Highway System.

The Geohazard inventory is stored in CDOT's Asset Inventory Management System (AIMS). The inventory of threatened highway segments includes the event count, safety impacts, road-closure impacts, and costs associated with cleanup efforts. The inventory grows as events occur and as data-collection methods improve. By late 2022, the Geohazards program intends to have the inventory also recorded in its Cambio system. Cambio is a geohazard risk-management software used to organize event tracking and to act as the Geohazards Program's work-management and project-management system. In addition, the Geohazards program is creating

an inventory of constructed geotechnical assets (e.g., embankments) of all conditions, not just those experiencing distress. The completed inventory will also include pavement subgrades experiencing distress. Retaining walls and bridge walls that act as geotechnical assets are managed by CDOT's Walls program (see A-149).

In addition to the highway segment and geotechnical asset inventory, the Geohazards program also is building an inventory of geohazard-mitigation devices along CDOT highways. The current inventory includes rockfall barriers (fences), with barrier type and location data noted for each installation. Efforts are under way to expand the inventory to all mitigation types, including draped mesh, anchored mesh, rock reinforcement, attenuators, landslide-stabilization elements, and catchment ditch systems. The expanded inventory is expected to be completed in 2023.



TYPES OF HAZARDS

Geological hazards that threaten the highway are varied. They include landslides, cut slopes, rockfall and rockslide events, debris flows, sinkholes, and embankment failures (**Figure A.4-3**).

Figure A.4-3 Types of Geological Hazards

This figure describes examples of different geological hazards that threaten highway segments in Colorado.

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">LANDSLIDES</p>		<p>Landslides can cause significant pavement cracking and can close or even destroy the roadway.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">CUT SLOPES</p>		<p>Cut slopes are constructed geotechnical assets. Continued maintenance can reduce rockfalls from deteriorating cut slopes.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">ROCKFALL</p>		<p>Rockfall from natural slopes can originate beyond the CDOT right of way. Like constructed slopes, natural slopes can deteriorate over time. Rockfalls from high natural slopes can significantly impact the roadway.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">EMBANKMENT</p>		<p>Embankment (constructed soil slope) failures occur as these slopes age. They can also threaten the integrity of guardrails in some cases.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">DEBRIS FLOW</p>		<p>The impact of debris flows on the roadway depends on the flow material, which in some cases moves with low energy and contains mostly mud. In other cases, the flow can contain large clasts that pose a threat to other assets in the path. Debris-flow likelihood increases in post-fire scenarios.</p>

SINKHOLE



Sinkholes are relatively uncommon in Colorado but can occur where the roadway intersects underground workings, such as abandoned railroad tunnels or underground mines.

CUT SLOPE ROCKSLIDE



Rockslides from cut slopes can occur when the cut alignment intersects rock structure unfavorably. Rockfalls are smaller than rockslides and feature failing discrete blocks. Rockslides involve entire sections of slopes.

NATURAL SLOPE ROCKSLIDE



Rockslides from natural slopes are caused by discontinuities in the rock that can fail and result in a mass of rock sliding and potentially damaging and disrupting the highway.

CONDITION

“Geohazard Condition” refers to the letter grade given to each hazardous roadway segment based on current condition, historical frequencies of geohazard events, and roadway characteristics that determine the likely consequences of a geohazard event in terms of safety, mobility, and maintenance. The current condition and historic frequencies determine the likelihood of an event occurring, and the condition along with roadway characteristics determine the likely costs. These data points are used by the Geohazards program to calculate the Annual Risk Cost and Level of Risk score, as described in Performance Management section of this Asset Plan.

CDOT typically reports performance for geohazards in terms of the percentage of hazardous road segments at or above a Level of Risk (LOR) grade B or higher.

The current (2021) percentage of segments with a grade of B or higher is 75 percent. This is below the target of 85 percent. **Table A.4-8** shows the number of sections currently at each LOR grade.

Table A.4-8 Current Condition of Hazardous Road Sections

Level of Risk Grade	Percentage of Segments
A	54%
B	21%
C	15%
D	7.5%
F	2.5%

LIFE-CYCLE PLANNING

The life-cycle management of geohazards preserves the highway system by evaluating and mitigating the risk of geohazard events through preventive maintenance and rehabilitation/re-engineering activities.

LIFE-CYCLE PLANNING

The Geohazards program effectively couples a risk-based asset-management strategy in the life-cycle planning of roadway assets. Roadway segments threatened by geohazards or failing geotechnical assets are first identified and included in the program's inventory, as described in Inventory and Condition section of this Asset Plan.

GEOHAZARDS LIFE-CYCLE PLANNING

Inspection and Analysis

The Geohazard Management System, a segment prioritization methodology, combines geologic, event history, and climate information with traffic and slope data to rank geohazards according to the probability and severity of the geohazard risk. Each of the identified segments is graded as to the extent (level) of the risk posed to it. The level of risk combines the probability of a geohazard event with its consequences, measured by the types of potential safety, maintenance, and mobility costs.

CDOT prioritizes sites for mitigation based on this system to mitigate the effects of geohazard events and geotechnical asset failures that have occurred, minimize their recurrence, and reduce the overall percentage of segments rated as potentially having higher annual risk costs.

The Geohazards Program intends to move toward an approach based on the geologic features likely to result in hazards on a corridor basis. The new focus places greater emphasis on management and maintenance treatments, as well as how the program can complement the asset management of other asset classes. This approach would extend the risk-assessment and management process to highway segments with a credible geohazard threat but no history of reported events.

Generation of Treatments

The Geohazard program begins its process for generating recommended projects from its asset model when segments, location, monetized risk value, and associated segment grades are imported into the AIMS model. This information, along with deterioration models, is used to develop a recommended treatments list for hazardous road segments. Treatments for geohazards are triggered in AIMS when segments reach a risk grade of C or worse. Moving forward, segment data will be tracked/calculated in Cambio and imported into AIMS.

There currently is only one treatment type in AIMS, which is generic "active mitigation," which is intended only for rockfalls. In future years, the Geohazards program expects to include several hazard/asset types in AIMS and two to three treatment types for each hazard/asset to provide more meaningful modeling of treatment options. The treatment-option range will be by work types (e.g., maintenance/minor/major/rebuild) rather than specific treatments, such as barriers or draped mesh.

PROGRAM DECISION-MAKING

TREATMENT SELECTION

On an annual basis, the AIMS modeling and analysis process is intended to generate strategies composed of one or more treatments over the analysis period. The Geohazards Program is working to include a larger variety of treatment types with more detailed and accurate costs for different geological hazards. Rockfall mitigation is the most common treatment type, particularly rockfalls from cut slopes, as rockfalls are the most common geologic hazard on state roadways.

DETERMINATION OF HIGH-RISK CORRIDORS

CDOT's geohazard project-selection process is designed to bundle projects within the same corridor to reduce risk on a corridor-wide level and efficiently allocate funding. The bundling process is conducted after the annual AIMS modeling, analysis, and budgeting process, and on an ongoing basis. Risk scores for road segments are aggregated to road corridors. These corridors are ranked based on several factors including density of geohazard risk, traffic volumes, and highway criticality. Corridors are selected based on average risk determined throughout the corridor, Region input, and activities underway within the corridor. CDOT has identified corridors with high geohazard risk, as presented in **Figure A.4-4**.

PROJECT SELECTION AND DELIVERY

After corridors are prioritized through risk levels and Region input, corridor management studies are conducted to ensure all credible geologic hazards have been identified and to determine the specific costs and benefits associated with relevant treatment options.

Corridor-management studies are the final step in the project-selection process. Factors such as geohazard event costs, event frequency, treatment applicability, constructability, mitigation effectiveness (percent mitigated), mitigation maintenance costs over time, and risk reduction are considered in the investment analysis. The studies also consider the ongoing costs associated with not treating hazard sites.

Geohazards program staff work with consultant partners to complete the corridor management studies. The information collected and generated is incorporated into present-worth analyses of treatment options to generate benefit-cost assessments of treatments over a 30-year or greater time period. As a final step, the studies summarize the benefit-cost results for all sites within the corridor and recommend treatment packages based on available budgets, risk-reduction targets, constructability, Region capacity for delivering projects, and other considerations. The Geohazards program then reviews the recommended treatment packages and works with Region Engineering personnel to select final sites for treatment and to deliver projects.

Figure A.4-4 Corridors with High Geohazard Risk



Figure A.4-5 depicts two hazardous road segments, along with potential treatments and the costs and benefits of each, which were derived from an investment study. The Geohazards Program uses such cost-benefit analyses to help choose treatments. The investment studies consider a 30-year or greater timeframe and include the life-cycle maintenance cost of the selected treatments—such as maintenance of fencing or steel-mesh slope covers—over that time.

Figure A.4-5 Geohazards Project Selection, Cost-Benefit Analysis Example

Benefit-cost analysis is utilized to compare different treatment options over a 50-year timeframe. The example illustrates the results from analysis of two segments on State Highway 133 and the green highlighting identifies the preferred options.



Beginning Mile Post	Ending Mile Post	Mitigated Benefit (50 year Present Worth)	Treatment Option	Risk Rating	Option Cost	Benefit / Cost Ratio
29.39	29.90		Do Nothing		\$69,304,005	
29.39	29.90	\$ 51,978,004	A – Buttress	75%	\$2,019,600	25.7
29.39	29.90	\$ 34,652,002	B – Brow excavation + netting	50%	\$4,199,200	15.9
29.39	29.90	\$ 34,652,002	C – Brow excavation + attenuator	50%	\$4,199,200	8.3
30.72	30.95		Do Nothing		\$8,891,526	
30.72	30.95	\$ 7,113,220	A – Rock reinforcement + netting	80%	\$1,132,960	6.8
30.72	30.95	\$ 7,113,220	B – Soil nail wall to increase catchment	80%	\$829,360	8.6
30.72	30.95	\$ 7,113,220	C – Attenuator	80%	\$1,821,600	3.9

Analysis and design activities undertaken by the Geohazards Program leads to the delivery of projects to help sustain the highway system in a state of good repair. Options for mitigating and repairing geohazards include regular maintenance activities conducted by maintenance crews, as well as proactive risk-reduction projects and maintenance activities performed by specialty contractors. The Geohazards program uses CDOT asset management funding to manage needed capital investments for treatments and geotechnical assets. Definitions of the geohazard work types are summarized below.

» **Maintenance and Repair:** For many geohazard mitigation options, regular maintenance activities—such as removing debris behind barriers and fences, cleaning shoulder ditches, patching steel

mesh on steep slopes, and repairing proprietary metal fence systems—are required. Maintenance crews, as part of the Maintenance Levels of Service (MLOS) program, generally perform cleaning of shoulder ditches and some embankment repairs. These crews also respond to emergency geohazard events, such as rockfalls and landslides, by clearing roadways. More specialized work, such as repairing mitigation infrastructure (e.g., rockfall netting), is generally performed by specialty contractors under the management of the Geohazards Program.

» **Rehabilitation/Reconstruction/Replacement:** Capital investments in treatments and geotechnical assets (other than walls) are managed by the Geohazards program using CDOT asset management funding. As noted earlier, work

management for these projects is supported by the Cambio system. After the preferred treatments for a corridor are selected, the Geohazards Program is responsible for managing and overseeing the design of the projects (the actual design work is generally performed by consultants). The program then works with CDOT's Regions, which provide the project managers for, and manage the construction of, the new treatments. Construction is generally performed by contractors. As part of the new Total Annualized Risk Exposure (TARE) performance-management framework, there will be a greater emphasis on the performance and life-cycle management of geotechnical assets, rather than the current focus on replacement.

» **Initial Construction:** The Geohazards Program has not, heretofore, had the ability to translate what is learned from the identification of failing geotechnical assets such as embankments into the improved design of new highway segments with the same features. Many embankments were created

before current CDOT design standards. In moving beyond the event-driven inventory and approach of the past, the Geohazards Program hopes to use the new data it collects on asset deterioration, and its analysis of root causes of failure, to inform a more comprehensive CDOT highway-design program. This more comprehensive design program is envisioned to incorporate geologic information—including the appropriate geohazard-avoidance mechanisms and best geotechnical asset design—in the construction or reconstruction of new roadway segments.

About 40 percent of the Geohazards Program's budget is devoted to operations/design and emergency response, with the remainder invested in mitigation treatments.

The types of geohazard-management treatments undertaken by CDOT are classified according to Federal Highway Administration (FHWA) work types in **Table A.4-9**.

Table A.4-9 Geohazards Treatments by Work Type

FHWA Treatment Work Type	CDOT Activities
Preservation/Routine Maintenance	Activities that prolong the life of the asset and do not require design or physically working on the asset itself. Examples are cleaning rockfall debris from catchment ditches to retain the designed catchment capacity, or cleaning culverts to prevent water from infiltrating into and destabilizing embankment slopes. These activities are typically, but not always, performed by the MLOS program.
Maintenance	Activities or repairs that prolong the life of the asset without improving its performance rating. Examples include rock scaling to remove loose rock from a deteriorating slope, installation or maintenance of drainage elements in landslides or embankments, and repair of previously installed mitigation elements such as rockfall barriers or draped wire mesh.
Rehabilitation	Major treatments intended to prolong the life and increase the performance of poorly performing assets. Examples include: rockfall barriers, draped wire mesh, attenuators, and/or rock reinforcement installed on rockfall-prone slopes; landslide stabilization using installed elements such as tie-backs, deep foundations, or lightweight fill; embankment stabilization using installed structural elements such as soil nails, deep patches, or micropiles; and debris-flow mitigation using constructed elements such as barriers, detention basins, or oversized culverts.
Reconstruction/Replacement	Complete replacement of a geohazard management asset, such as a rock slope or embankment. Example would be a sliver cut/layback excavation of an entire existing rock face using slope-stability blasting techniques to improve stability within the face and increase ditch catchment. Additional stabilizing elements such as shotcrete, rock anchors, or draped mesh may be installed along with the excavation as a part of this work.
Initial Construction	Construction of a rock cut slope, or earth embankment where none existed, as part of a capacity increase or realignment. For example, the proposed US 287 realignment would create new rock cuts, and these assets would be managed by the Geohazards Program. Exposure of the highway to new hazards on natural slopes as a result of expansion/capacity increases also qualifies as initial construction.

RISK MANAGEMENT

The Geohazards Program tracks and quantifies risk to the transportation system posed by geohazards. Risk is considered with regard to safety, mobility, and impacts to other asset classes. The program has been moving toward monetized risk as a metric to facilitate such decisions as the value of investments in preventive structures and treatments. Moving to a monetized risk approach will provide greater flexibility to identify locations at risk before a hazardous event occurs and improve CDOT’s ability to measure risk and assess trends. Section 6 of the TAMP provides more information about CDOT’s risk-management methodology and processes, including an explanation of elements comprising risk scores.

The Geohazards program maintains a register of risks to its overall program and projects. The top risks identified are shown in **Table A.4-10**.

Table A.4-10 Top Geohazards Risks

Risk Level	Threat	Risk Score ¹	Risk-Management Strategy
Multiple	Landslide causing loss of road and long-term mobility impacts/delays	56 (L)4 x (C)3.5 x (V)4	Treat or tolerate, depending on the area
Multiple	Rockfall incident with fatality	50.4 (L)3 x (C)4.2 x (V)4	Treat or tolerate, depending on the area
Multiple	Sinkholes resulting in road closure of at least several hours	48 (L)4 x (C)3 x (V)4	Tolerate
Multiple	Rockfall with loss of function/mobility for several days	46.8 (L)4 x (C)3.9 x (V)3	Treat or tolerate, depending on the area
Multiple	Severe weather event causing debris flows that damage pavement, culverts, or structures	46.8 (L)3 x (C)3.9 x (V)4	Tolerate
Multiple	Post-fire debris flows and resulting closures	44.4 (L)4 x (C)3.7 x (V)3	Treat or tolerate, depending on the area



¹ Risk Score = Likelihood (L) * Total Consequence and Consideration Score (C) * Vulnerability (V)

FINANCIAL PLAN

CDOT sets planning budgets for Geohazards and other asset programs four years in advance. Beginning in FY24, the Department estimates static annual funding levels for geohazards through FY31. These estimates, combined with CDOT’s life-cycle management approaches discussed in the previous section, inform the investment strategies CDOT plans to leverage to achieve system-wide asset performance goals while minimizing life-cycle costs.

FUNDING SOURCES

Funds for the Geohazards Program are derived from CDOT’s Transportation Asset Management program. Funding for geohazard preservation comes from the MLOS program and is included in the MLOS financial plan.

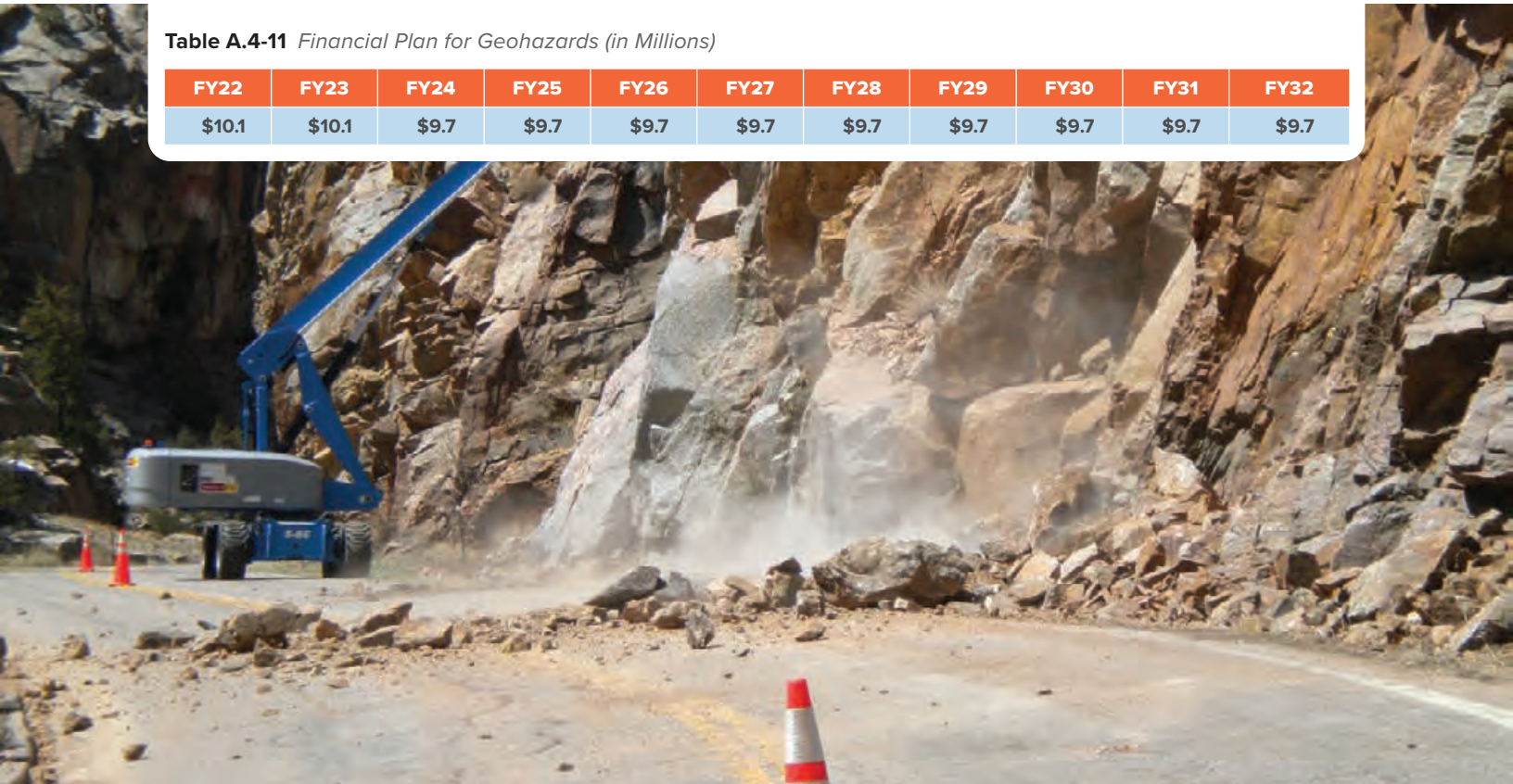
PLANNED FUNDING

The 10-Year Financial Plan for Geohazards is shown in **Table A.4-11**. The figures presented includes a \$2 million per year contingency for unplanned work, and \$2 million per year set aside for anticipated maintenance of slopes and mitigation systems.

For the first several years of this 10-year period, the budgets shown below have been adopted by the Transportation Commission as “planning budgets.” Beyond FY 2027, the budgets in **Table A.4-11** represent an assumption that Geohazards funding will remain at static levels for the time horizon of the TAMP.

Table A.4-11 Financial Plan for Geohazards (in Millions)

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32
\$10.1	\$10.1	\$9.7	\$9.7	\$9.7	\$9.7	\$9.7	\$9.7	\$9.7	\$9.7	\$9.7



INVESTMENT STRATEGIES

Future investment strategies for the Geohazards program will look much like current practice, assuming the steady-state funding presented in the Financial Plan. Investment strategies are at a high-level spelled out in the Geohazards Management Plan. Corridor-management studies then define the specific strategy as described in the Life-Cycle Planning section of this Asset Plan.

BACKGROUND: DETERMINING INVESTMENT STRATEGIES

The current draft of an update to the Geohazards Management Plan focuses on three investment strategies:

Strategy 1—Conducting preventive maintenance.

While maintenance for many geohazards and accompanying mitigation devices is performed reactively, some mitigation can be performed on regular intervals, such as scaling to reduce the amount of rockfall at specific locations.

Strategy 2—Assessing preventive maintenance cost-effectiveness to identify alternative mitigation methods.

Mitigation devices are evaluated on the need to repair the device or update the mitigation method. For example, if a concrete barrier used

to enhance a rockfall catchment ditch requires replacement more than once per year, an updated mitigation strategy might offer an alternative with similar or higher level of protection, such as installation of rockfall netting.

Strategy 3—Enhancing the Geohazards program to reflect an asset management approach. Examples include:

- » Provide a site-selection guideline that mitigates rockfall hazards identified in the Colorado Rockfall Hazard Rating System.
- » Manage existing geohazard assets constructed by previous projects or installed by CDOT Maintenance staff.

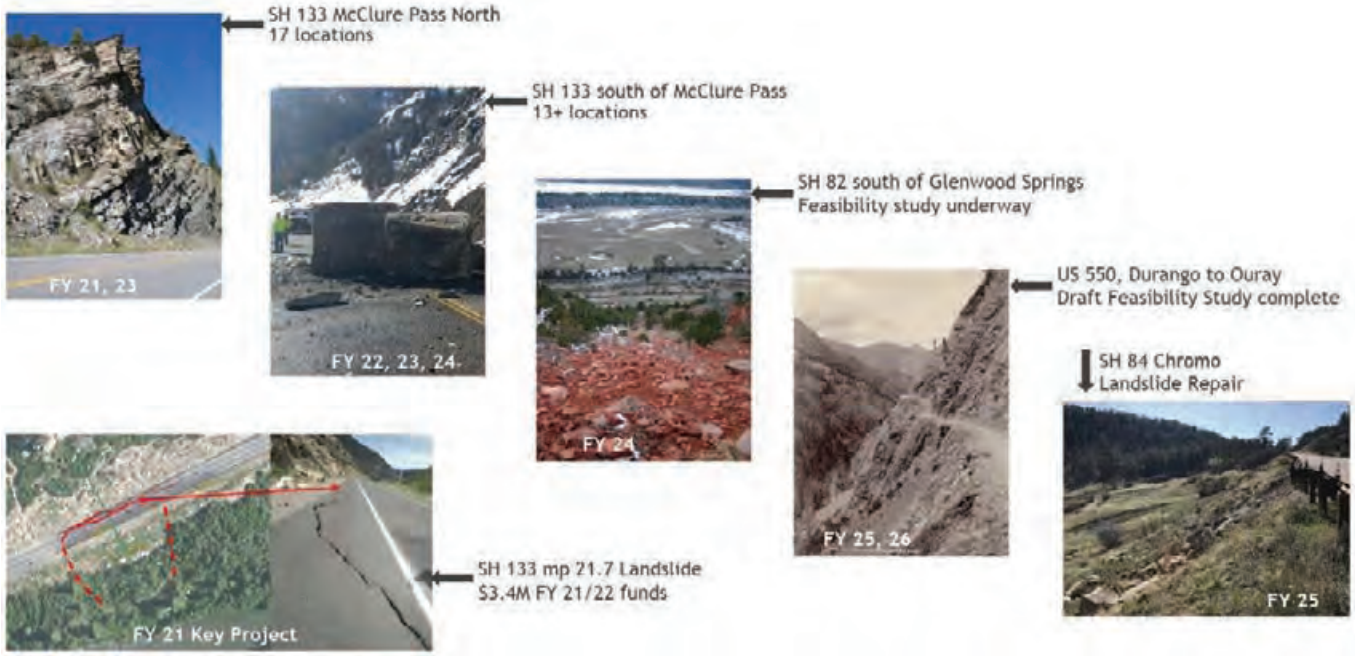


PLANNED INVESTMENTS

Potential investments by the Geohazards program are categorized by corridor and hazard type in corridor-management studies as described in the Life-Cycle Planning section of this Asset Plan. Nearly all the treatments will fall into the Rehabilitation work type described in **Table A.4-9**. Maintenance work is performed as part of CDOT's MLOS program. Reconstruction or replacement projects will be relatively rare.

Examples of projects planned and programmed for the next few years are shown below.

Figure A.4-6 Examples of Planned and Programmed Projects



PERFORMANCE GAP ANALYSIS

CDOT’s Asset Investment Management System (AIMS) model predicts the long-term performance of the Geohazards Program, given various funding scenarios. This allows CDOT to evaluate how different spending levels will impact performance. Planned spending is expected to result in a relatively stable condition rating, but the program is not forecasted to meet its performance target.

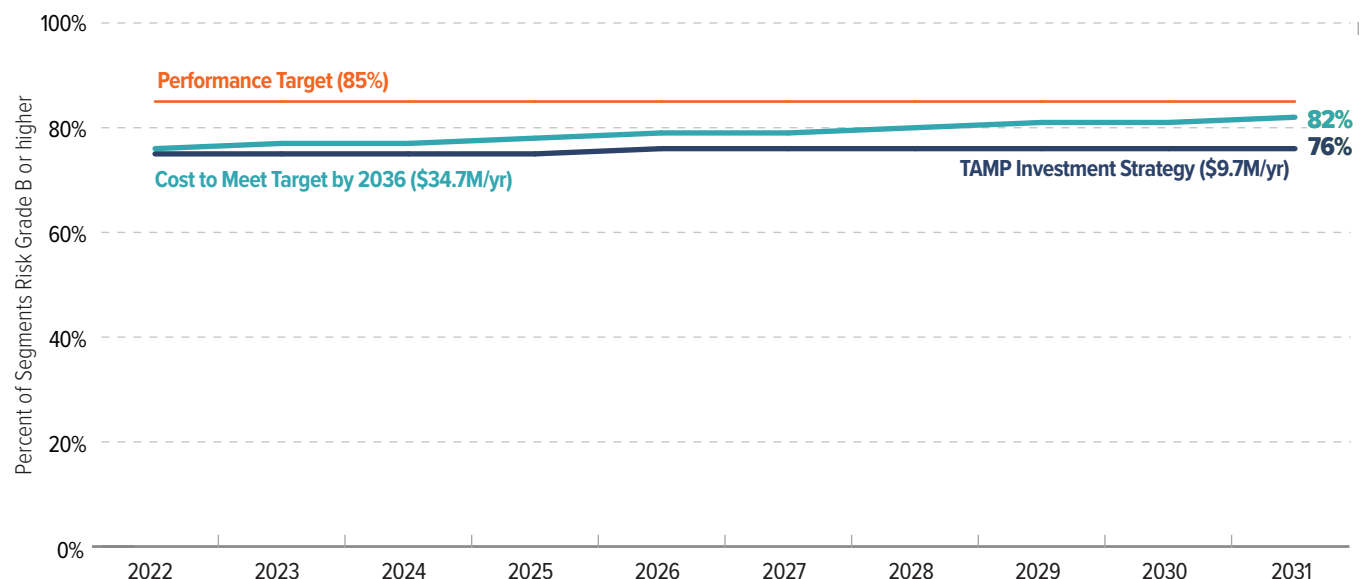
NEEDS AND PROJECTED CONDITION

CDOT’s AIMS model predicts the long-term performance of geohazards assets given the Financial Plan. The AIMS model predicts future condition and generates a list of alternative strategies for each segment. Various budget scenarios are then optimized to determine performance impacts and a recommended construction program. These scenarios assume that \$2 million per year of the Geohazards budget will be set aside as a contingency for unplanned work, and \$2 million per year will be set aside for anticipated maintenance of slopes and mitigation systems.

Geohazards are not forecasted to meet CDOT’s target under Financial Plan funding levels, but performance is expected to improve slightly over time. **Figure A.4-7** shows the expected percentage of hazardous road sections with a grade of B or better over time given the Financial Plan. As the graph shows, more than \$25 million in additional funding annually would be needed to achieve the target.

Figure A.4-7 Projection of Risk Grade for Geohazards

The anticipated annual budget of \$9.7 million will not meet the performance target of ensuring that the average percent of segments with a risk grade B or higher is greater than 85 percent. The annual cost of meeting the target by 2036, is about \$34.7 million, or an additional \$25 million per year.



RISKS OF INSUFFICIENT FUNDING

Insufficient funding for geohazards assets may result in:

- » Acceptance of a higher level of risk.
- » Transfer of geohazard risk to other asset classes and roadway users in the form of added repair and maintenance costs and service interruptions.
- » Decreased inspections and maintenance work, increases in construction time, and fewer proactive geohazard-mitigation projects.

- » Moving away from life-cycle planning focused on preventive maintenance toward increased reliance on emergency response.

The impact on other assets from geohazard events is illustrated in **Figure A.4-8**.

Figure A.4-8 *Impact of Geohazards on Other Assets*

As an example of geohazard impacts, landslides can result in service interruptions and create increased repair and maintenance costs for a range of CDOT asset classes.



OPPORTUNITIES TO CLOSE THE GAP

The Geohazards program intends to seek additional Risk and Resilience program funding to support faster cleanups following events, fewer delays for users, and less damage to other assets. In addition, the Geohazards program may provide design support to projects and other asset classes. This will help ensure that geohazard risk-reduction elements are built into those projects and into the ongoing management of other asset classes.

STRATEGIC USE OF ADDITIONAL REVENUE

Should CDOT receive additional revenue to fund the Geohazards asset class, the Department's priority is to eliminate any funding gaps related to achieving the PD-14 performance target. Once goals are achieved, the Department apply the processes described here to prioritize the most critical and/or vulnerable assets to improve system resilience. CDOT estimates the current backlog for Geohazards could be eliminated with about \$391 million.

FUTURE IMPROVEMENTS

Future improvements to geohazards management will address people, processes, and technology. This includes improving collaboration among personnel, moving from an event-based to a risk-based geohazards inventory, and improved data collection and analysis.

STAFF

The Geohazards Program intends to improve asset-management capabilities by fostering closer collaboration with Region Maintenance and Engineering personnel to facilitate more accurate and comprehensive event-data collection.

PROCESS

Because geohazard risk is not limited to sites where an event has taken place, the Geohazards Program plans to move from an event-based inventory to one that more holistically determines the risk to road segments. Key improvements to evaluating risk will include incorporating more data points, such as infrastructure type, infrastructure forecasting using rating data, weather information, and change-detection data. These data will help improve risk modeling.

Additionally, 0.1-mile road segments are inventoried by CDOT if they have had a geohazard event. However, conditions that cause an event on one segment may be present along nearby road segments as

well. Therefore, the Geohazards Program hopes to inventory all high-risk segments in the area of an event. The improved inventory would more accurately reflect the hazard area and provide greater accuracy and insight into the benefit of mitigation.

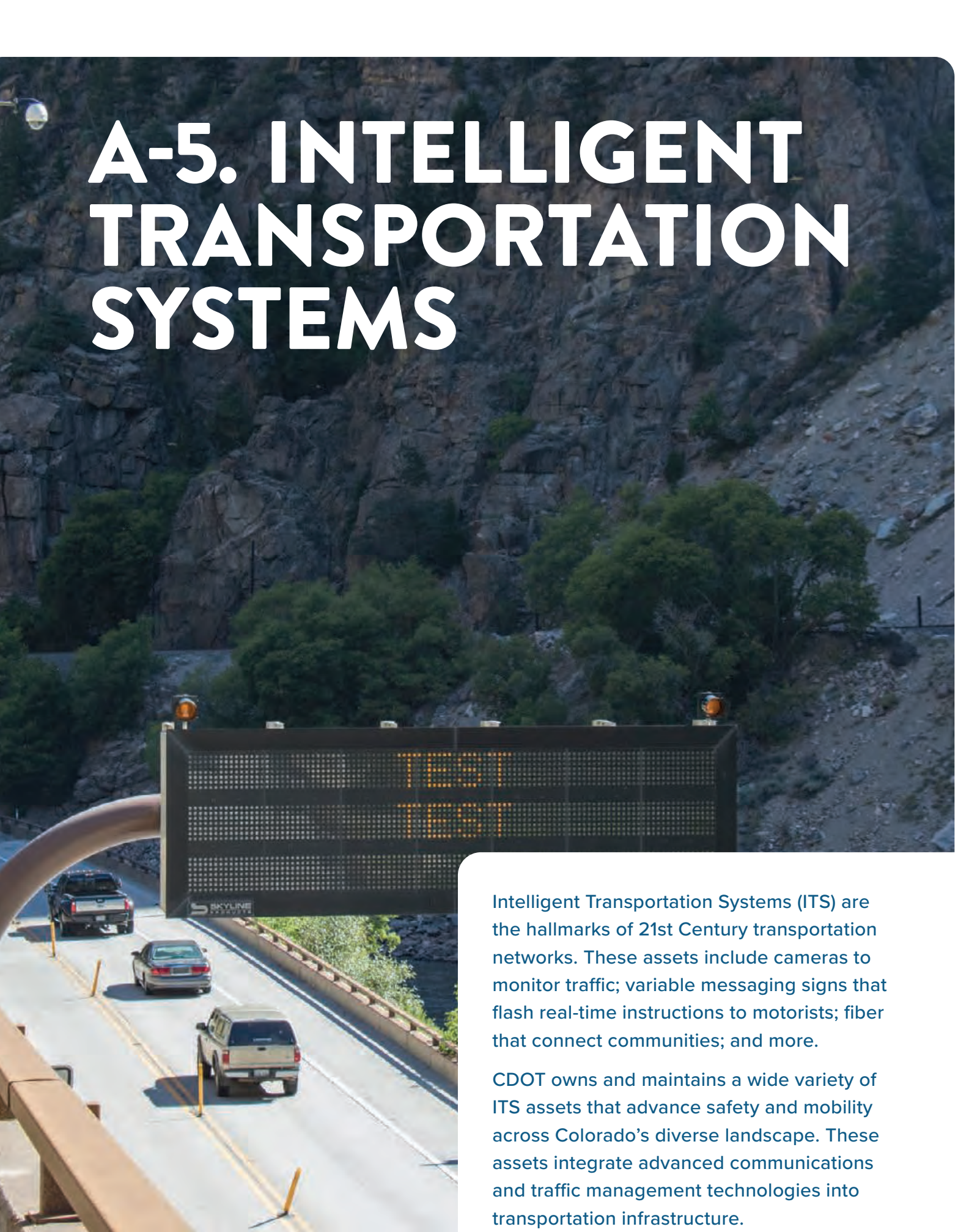
TECHNOLOGY AND ANALYSIS

Future technology and analysis improvements will establish improved data collection and forecasting, and integrate more robust asset management practices. The Geohazards Program will leverage new sources of data from technology such as remote sensing, enabling a shift from the current inventory that only tracks segments where a geohazard event occurred.

Additionally, the Geohazards Program intends to develop improved deterioration models for mitigation devices, geotechnical assets, and geohazards, and to measure the benefits of mitigation better. These improvements will enable CDOT to better forecast performance and choose mitigation projects.



A-5. INTELLIGENT TRANSPORTATION SYSTEMS



Intelligent Transportation Systems (ITS) are the hallmarks of 21st Century transportation networks. These assets include cameras to monitor traffic; variable messaging signs that flash real-time instructions to motorists; fiber that connect communities; and more.

CDOT owns and maintains a wide variety of ITS assets that advance safety and mobility across Colorado's diverse landscape. These assets integrate advanced communications and traffic management technologies into transportation infrastructure.

The Department employs a comprehensive asset-management process for the ITS asset class that is closely aligned with the process illustrated in **Figure A.5-1** on page A-1 of the Asset Plans Appendix.

Figure A.5-1 ITS Assets at a Glance



National Highway System (NHS)

Selected Asset Descriptions:

Blank Out Sign: Signs only active during certain time and conditions that display information to motorists such as road closures, detours, and prohibited turns.

Ethernet Switch: Network hardware that connect cabled devices so they can communicate with each other and to the internet.

Dense Wave Multiplexing: Optical technology that is used to increase the bandwidth of fiber networks.

Firewalls: A security device used to prevent or limit illegal access to private networks.

Router: A device that connects between networks, it routes packets from one location to another.

Server: A device that receives, stores and shares data.

Node: A building that houses connection points among network devices such as routers and switches that can receive and send data.

Colocation: A building that houses network gear that are the property of a third party but CDOT ITS has a dedicated space for network gear.

Fiber: Cable protected by conduit and made accessible with structures such as pull boxes and manholes.



PERFORMANCE MANAGEMENT

CDOT monitors and manages the performance of ITS assets as part of its performance management framework, using quantitative measures and targets that inform funding decisions and track how well these assets are supporting the agency’s strategic goals and services provided to the public.

POLICY DIRECTIVE 14 PERFORMANCE MEASURE—ITS ASSETS

CDOT’s asset management program for ITS helps meet goals for safety, asset management, and mobility established under Policy Directive 14 (PD 14.0). ITS assets are critical for collecting and communicating safety information to vehicles. This includes weather stations collecting data that can then be shared as a warning of dangerous conditions. They enhance mobility by providing critical data to inform vehicle operators with up-to-date traffic information, optimizing the speed of traffic through variable message signs or managing the amount of traffic entering freeways through ramp-metering devices.

The specific performance measure in PD 14.0 for maintaining a state of good repair of ITS assets is the average percent “useful life” expended of all ITS equipment. Useful life, which is specific to each device type, is defined as the length of time that a device is expected to provide CDOT with adequate data and information. The “percent useful life expended” of an ITS device is calculated by dividing the device age by the device life cycle. A value of 100 percent indicates that a piece of equipment has reached its useful life. Values greater than 100 percent indicate the equipment has exceeded its useful life.

Table A.5-1 shows the PD 14.0 objective target and 2021 performance for ITS assets.

For federal TAMP purposes CDOT defines state of good repair based on the measures presented in PD 14.0. The current (2021) average percent useful life expended of ITS equipment is 70 percent, which is within the target of 90 percent.

OTHER PERFORMANCE MEASURES

CDOT’s ITS Branch is gradually incorporating device functionality into its performance measures that help inform asset management investments. The branch defines functionality as the device’s primary purpose, and has created five functionality categories: regulatory, safety, mobility, data support, and system support.

As CDOT transitions into managing ITS assets by service packages¹, adopting metrics that measure the availability of systems (e.g., mean time to recovery, or MTTR) will assume greater importance in assessing asset performance.

Table A.5-1 Performance Metric and Target for ITS

		Measure	Target	2021 Performance
ITS		Average percentage of useful life expended	≤90%	70%

¹ A hierarchy of multiple assets and components (parts of assets) that deliver technology solutions.

INVENTORY AND CONDITION

CDOT tracks ITS assets and their useful life within the ITS Branch’s geographic information system (GIS). The ITS Branch maintains rigorous standards to ensure the accuracy and completeness of the inventory and conducts regular audits and cross-checks with other CDOT systems to prevent double counting. CDOT assesses condition of its ITS assets each year by evaluating the percent of useful life expended for each asset.

CDOT owns and maintains a total of:

- » 2,146 ITS devices
- » 1,532 pieces of ITS network gear
- » 1,624 miles of fiber cable
- » 31 ITS facilities

The ITS equipment inventory is presented in **Table A.5-2**. It excludes:

- » Ramp metering stations and automatic traffic recorders.
- » ITS equipment in the Eisenhower-Johnson Memorial Tunnel. Equipment is being replaced through 2022, and the new equipment will be included in the inventory thereafter.
- » ITS equipment on traffic signals.
- » Cabinets and switches—The ITS Branch intends to bring these assets into the ITS management system in the near future (see Section 10, Future Improvements).

Figure A.5-2 Examples of ITS Assets Inventory



Table A.5-2 Inventory of ITS Assets (2021)

ITS Asset Type	Count
Cameras	741
Side-Fire Radar	265
Weather Stations	134
Travel Time Indicators	162
Dynamic Message Signs	413
Weigh-in-Motion	13
Lane Usage Sign	289
Variable Speed Limit Signs	53
Variable Toll Signs	68
Blank-Out Signs	8
ITS Devices Subtotal	2,146
Ethernet Switches	1,452
Dense Wave Division Multiplexing	19
Firewall	10
Routers	18
Servers	33
ITS Network Gear Subtotal	1,532
Nodes	18
Data Center	1
Colocations	12
ITS Facilities Subtotal	31
Fiber	1,624 miles

The ITS asset inventory is maintained and managed in the ITS Branch’s Geographic Information System (GIS) (ArcGIS Pro) system. Work orders for maintenance and repair of ITS assets are issued and managed through CDOT’s SAP Enterprise Resource Planning (ERP) system². The ITS inventory is duplicated in SAP.

Inventory-management processes include multi-step workflows for documenting ITS assets through add/change/remove (ACR) form and for taking assets offline and restoring them to the inventory, as well as regular audits. These processes are critical to ensure that teams working in the field have accurate device information.

SERVICE PACKAGE ASSET HIERARCHIES

While the inventory presented in **Table A.5-2** counts each asset type as unique, ITS assets are managed as “service packages” to address a specific objective of the highway system. A service package is a hierarchy of multiple assets and components (parts of assets) that deliver technology solutions.

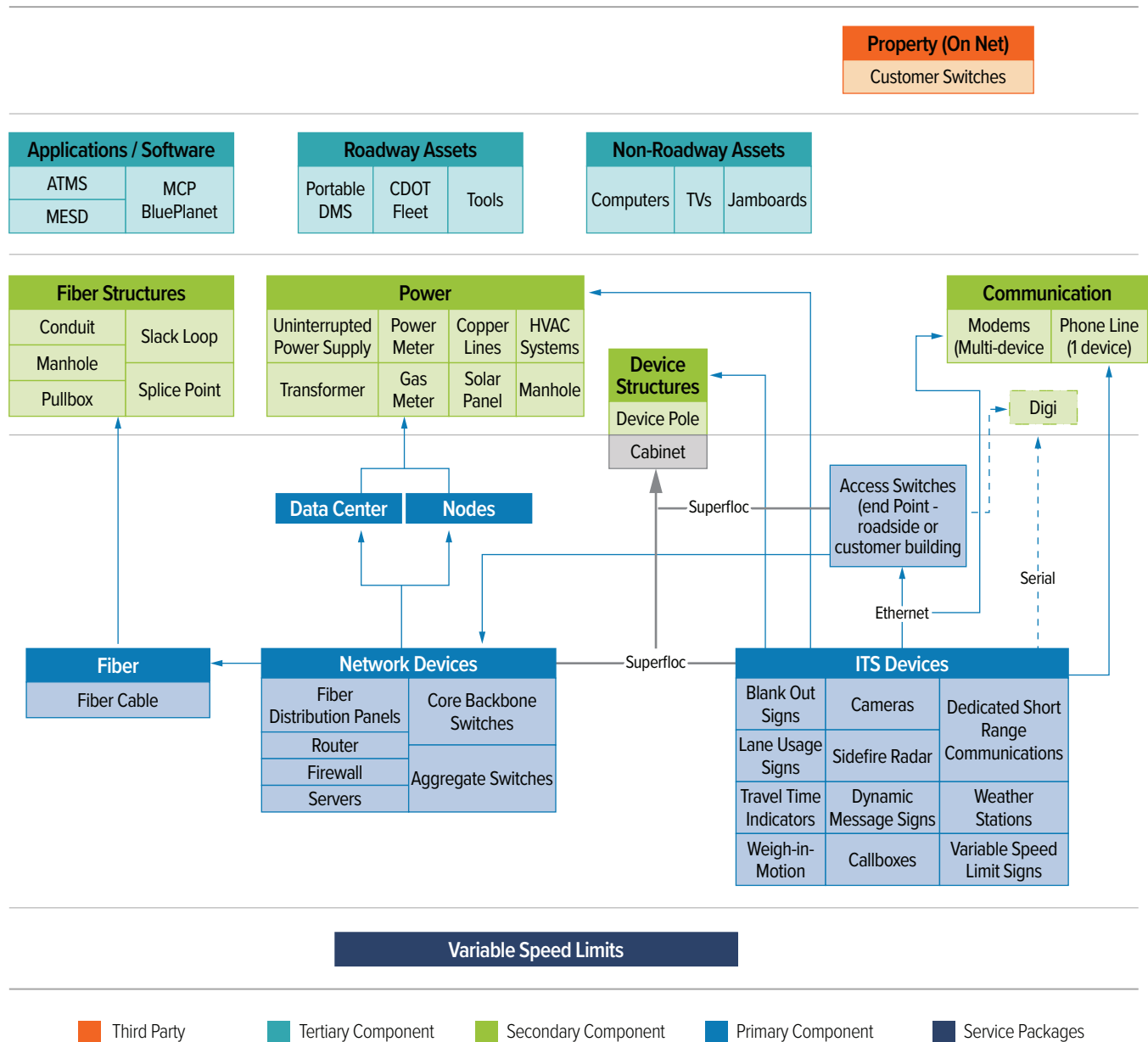
Service packages can improve efficiency. For example, an ITS sign can be used within different service packages depending on the intended function (e.g., speed control or hazard warning), and knowing the function(s) at the start of the asset’s life-cycle planning phase can reduce costs. An example of a service package would be deploying a variable speed-limit system along a corridor to mitigate weather-related crash patterns. The hierarchy of such a service package is illustrated in **Figure A.5-3** below and features a range of assets including cameras, Dynamic Message Signs, Weather Stations and others.



² SAP, an acronym for “Systems, Applications and Products in Data Processing,” is an Enterprise Resource Planning system that CDOT installed in 2006.

Figure A.5-3 Variable Speed-Limits Service Package: Asset Hierarchy

A Variable Speed Limit service package requires multiple assets. These include primary component assets including fiber, ITS and network devices. To support these devices, there are secondary and tertiary components (parts of the assets) critical to delivering the service package outcomes.



Selected Asset Descriptions:

MESD: Manage Engine Service Desk (ticketing application).

ATMS: Active Transportation Management System (application for operations centers to operate ITS device on the road).

MCP BluePlanet: An application for network monitoring.

DMS: Digital Message Sign

Federal regulations³ require the development of an ITS architecture that guides the development of ITS projects and programs, based on a Systems Engineering Analysis (SEA). The purpose of the architecture and the SEA is to ensure thoughtful spending on technology deployment at all transport agencies. Service packages can deliver the architecture outcomes and be the product of an SEA.

Because of the interrelationships of assets and components in a single service package “system,” the failure of a key component can have a domino effect, causing the entire system or service package to fail. Additionally, replacing an application used by CDOT’s traffic operations centers to operate and control technology service packages on highway corridors can impact multiple service packages. An example would be replacing CDOT’s Corridor-Trip Monitoring System, or CTMS, with a new Advanced Traffic Management System, or ATMS, application. While ITS investment decisions are structured consistent with the architecture and SEA, the ITS Branch must monitor the useful life of assets within each system at the component level and plan for component replacements accordingly.

CONDITION

CDOT uses the expended life of an ITS asset as a proxy for measuring the condition of the equipment. Each device type has a specific period of useful life, which is the length of time the device is expected to provide CDOT with adequate data to serve the public.

The Intelligent Transportation Systems Branch (ITS Branch) determines the useful life of an ITS asset. The determination is based on the manufacturer’s specification and considers recommendations from the ITS Branch’s maintenance personnel and the Federal Highway Administration’s (FHWA’s) list of ITS device life cycles. FHWA conducts state surveys and compiles the results to develop its device life-cycle list.

Additional considerations when determining useful life include:

- » Changing technologies such as software advances that may affect maintenance costs or the ability to assimilate data from the device.
- » Obsolescence.
- » General maintenance costs.
- » Geographic locations of the device (e.g., assets at 8,000 feet, where snow is likely, or at 4,500 feet on plains where high winds and snow occur, are more likely to require attention).

In some cases, ITS assets have been devolved from local authorities to CDOT control. For such assets, the ITS branch has begun assessing an asset’s age from the first time it was inventoried, either by CDOT or the original asset manager.

Each device’s percentage of expended life is calculated annually by dividing its age by its expected useful life. Based on this information, an average percentage of life expended is calculated for the entire ITS asset class. **Table A.5-3** presents current condition data for ITS assets.



Table A.5-3 Condition of ITS Assets (2021)

Asset Type	Count	Useful Life	Average Life Expended
Cameras	741	5	108%
Side-fire Radar	265	7	75%
Weather Stations	134	12	60%
Travel Time Indicators	162	7	92%
Dynamic Message Signs	413	20	36%
Weigh-in-Motion	13	7	120%
Lane Usage Signs	289	12	44%
Variable Speed Limit Signs	53	10	36%
Variable Toll Signs	68	10	56%
Blank Out Signs	8	7	74%
ITS Devices	2,146		70%
Ethernet Switches	1452	7	63%
Dense Wave Division Multiplexing	19	7	80%
Firewall	10	7	86%
Routers	18	7	54%
Servers	33	7	84%
ITS Network Gear	1,532		69%
Nodes	18	25	34%
Data Center	1	25	32%
Colocations	12	25	38%
ITS Facilities	31		34%
All Devices, Network Gear and Facilities			70%
Fiber	1,624 miles	20	Not currently tracked⁴



ASSET VALUE

CDOT in 2022 assessed the value of ITS assets. The current replacement value is \$133 million and is determined by acquisition value.

To calculate current asset value, the replacement value is discounted by the ratio between the age of the asset and the expended useful life of the asset. The current value of ITS assets is \$126 million.

A separate valuation was calculated for fiber-optic assets, which have a replacement value of \$325 million.

⁴ In most cases, CDOT relies on private partners for installation and maintenance. CDOT only has use of a portion of the fiber. Additionally, it is difficult to measure fiber condition, as its location underground hinders visual inspection.

LIFE-CYCLE PLANNING

The life-cycle management of most CDOT ITS assets is the responsibility of the ITS Branch of the Division of Maintenance and Operations. CDOT's approach to the life-cycle management of ITS assets is primarily age-based. This approach helps minimize asset failures and reduces uncertainty in funding needs.

LIFE-CYCLE PLANNING

The lifespan of ITS assets is primarily age-based—as assets age, performance and reliability can decrease, putting the assets at risk of failure. Environmental factors, such as harsh weather events and geographic location, can also affect asset performance. Moreover, assets may become obsolete as various ITS technologies advance. As a result of these factors, different types of ITS assets have different lifespans. An age-based approach to life-cycle planning can minimize asset failure and reduce uncertainty in funding needs.

ITS LIFE-CYCLE MANAGEMENT APPROACH

The performance measure for CDOT's age-based life-cycle strategy is the percentage of device life expended, as described in the Asset Inventory and Condition section of this Asset Plan. CDOT's Asset Investment Management System (AIMS) model uses this metric, along with cost data from CDOT's SAP financial software, to inform recommended treatments. These recommendations are currently limited to device replacements. The ITS Branch considers the recommended replacements in its life-cycle planning strategies and decision-making.

Through life-cycle planning, CDOT is able to project how ITS assets are expected to perform over the long term. The AIMS model forecasts the long-term performance of the ITS assets given the expected expended life of each asset type and the level of funding required to meet the PD 14.0 performance target. ITS devices and Ethernet switches are currently included in the AIMS modeling.

PROGRAM DECISION-MAKING

TREATMENT SELECTION

The ITS Branch uses the AIMS model to help develop annual treatment lists for a rolling four-year period. Treatments can become standalone projects or be bundled into projects encompassing multiple treatments.

Although the ITS Program is a statewide program, each year requests are sought from CDOT Regions regarding their needs for maintaining or acquiring new ITS assets.

Maintenance/Rehabilitation/Reconstruction

The ITS Branch performs preventive and reactive maintenance and repair of ITS assets. Maintenance activities include preventive maintenance, such as road weather sensor (RWS) calibration; day-to-day maintenance, such as camera cleaning; inspections and fiber locations; and emergency repairs (e.g., repairs to fiber outages).

In recent years, maintenance activities have received the majority of ITS asset management funding. Such activities include camera maintenance, testing and maintaining security systems, and more. Much of the ITS maintenance program is reactive (e.g., troubleshooting, emergency response), rather than proactive treatments that improve asset condition or extend asset life.

Reactive or corrective maintenance is particularly relevant to the ITS fiber-cable network. There is not an industry best practice for the proactive replacement of fiber cables or fiber-cable infrastructure. Often maintenance activities are driven by damages. Fiber cable damage can be minimized by having a robust fiber location program that accurately marks fiber cable's location before construction or maintenance activities begin.

Within the ITS Field Operations team, there is one full-time staff focused on fiber. This team manages a fiber location program, responds to fiber locate issues and fiber cuts, investigates outage causes, emergency repairs, new cable inspections, and fiber allocation requests.

CDOT tracks each device within its ITS Management database (contained in SAP financial software). Work orders are used in the performance of all maintenance activities to monitor and report device condition and maintenance costs.

ITS maintenance costs are increasing as new infrastructure is added (e.g., managed lanes). Because ITS works within constrained budgets, this means the amount of funding available for device replacement decreases.

Replacement

ITS receives funding from sources other than asset management to replace ITS infrastructure. Several years, in fact, there has been no funding available for proactive replacement through asset management.

Initial Construction

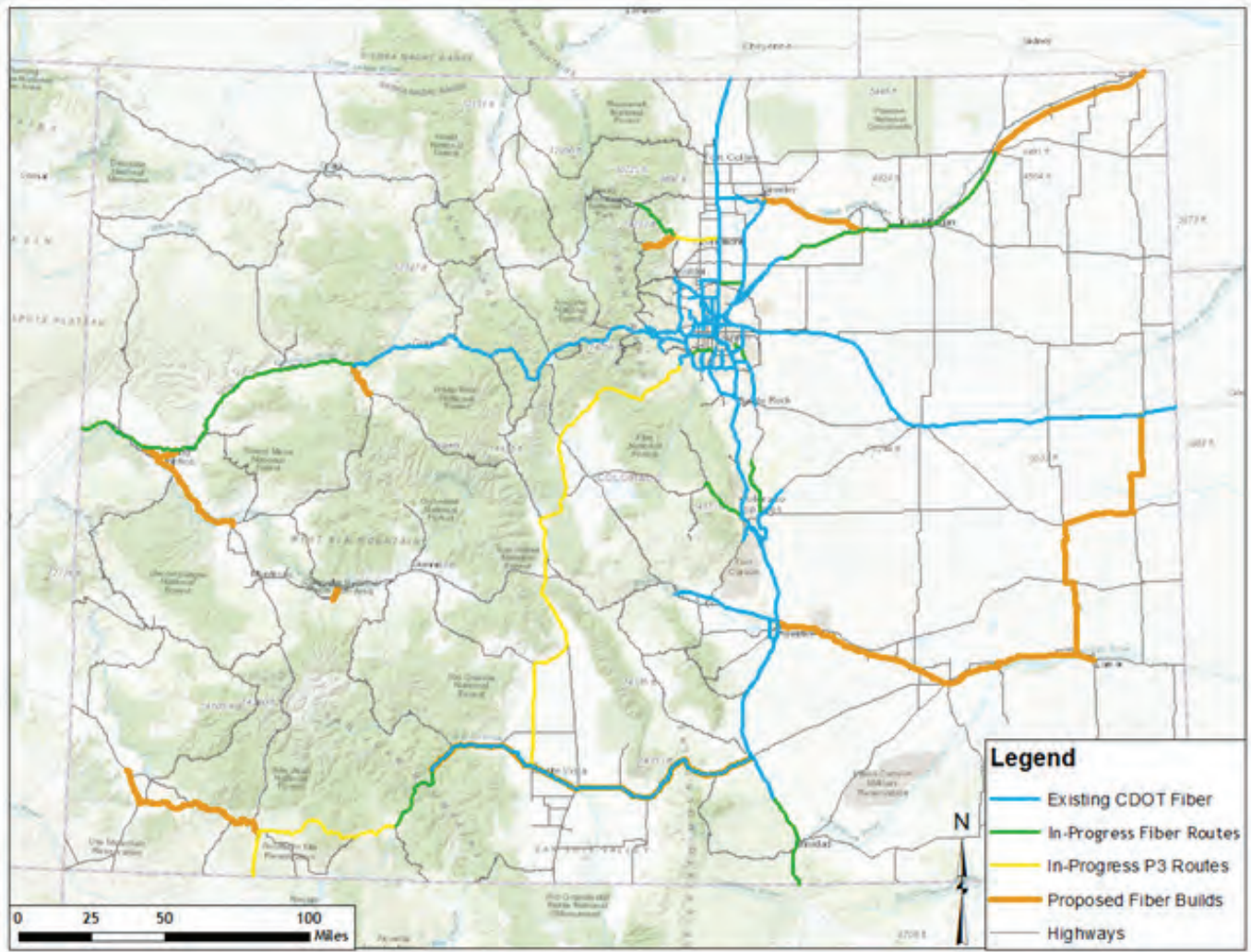
The ITS Branch does not plan or deliver new ITS devices. The ITS Branch assists with new construction projects by helping traffic planners and capital-project planners understand how to best deploy ITS technology and assets in such projects. CDOT's project-system engineering analysis process has been updated to require the evaluation of technology issues including longevity and responsibilities for power and software. This better positions CDOT to manage ITS assets after construction.

A planning effort led by the ITS Branch is expansion of the core fiber network (see **Figure A.5-4**). CDOT's primary fiber strategy has been to deploy fiber along all Interstate routes. The Department will reach the northern, western, eastern, and southern borders of the state with current fiber projects and aims to reach the northeastern corner of Colorado on Interstate 70 in a proposed project. Future strategic planning will identify corridors that can provide physical redundancy to Interstate corridors. This will increase the resiliency and reliability of CDOT's communication network.

Expansion of the fiber network through highway construction projects or standalone fiber-only projects in the coming years will improve situational awareness, operations, and safety on several rural and freight corridors. Fiber projects will also leverage existing opportunities for public-private partnerships (P3s), complete several traffic and maintenance goals for the Regions, and address ITS disaster-recovery initiatives.

Projects within communities that have little to no broadband services can improve equitable access and provide broadband resiliencies throughout the state.

Figure A.5-4 Fiber Network Expansion Plan



The types of ITS asset-management treatments undertaken by CDOT are linked to FHWA Work Types in **Table A.5-4** below.

Table A.5-4 *ITS Life-Cycle Management Activities*

Work Type	Activities
Preservation/ Preventive Maintenance	<ul style="list-style-type: none"> » Work that is preventive in nature and keeps devices functioning by proactively performing routine tasks that prolong asset life. » For primary service-package components, examples include: <ul style="list-style-type: none"> – Annual preventive maintenance or calibration of sidefire radars, weather stations, dynamic message signs, lane-usage signs, and variable tolling signs. – Splice audits or field-data collection of fiber cable. – Landscaping, monthly cleaning of nodes or data centers. » For secondary components, examples include: <ul style="list-style-type: none"> – Field-data collection for power copper lines. – Preventive maintenance of power HVAC units.
Maintenance	<ul style="list-style-type: none"> » Day-to-day tasks that are reactive to roadway conditions or activities near the ITS asset. Examples include: <ul style="list-style-type: none"> – Pre- and post-storm cleaning of cameras. – Locates of fiber cable. – Rodent control at nodes or data centers
Rehabilitation	<ul style="list-style-type: none"> » All tasks associated with troubleshooting an ITS asset that is “down” or malfunctioning. Examples include: <ul style="list-style-type: none"> – Troubleshooting and repairing camera malfunctions. – Sensor replacements at weather stations. – Splicing of fiber cable.
Reconstruction	<ul style="list-style-type: none"> » Major tasks related to emergency outages, damages, or repairs. Examples include emergency and extraordinary repairs of fiber cable.
Replacement	<ul style="list-style-type: none"> » Proactively replacing an existing asset based on useful-life reporting and planned replacement projects.
Initial Construction	<ul style="list-style-type: none"> » Any activity that grows the ITS asset inventory.

PROJECT SELECTION AND DELIVERY

The work types conducted by ITS asset managers are predominantly preservation, maintenance, repair and reconstruction or replacement.

To prioritize replacements, the ITS Branch compares AIMS model outputs and the replacement list received from each CDOT Region against the condition of a device requested for replacement, including age, expended life and the functionality of the devices. In this instance functionality assessments whether an asset is functionally obsolete (e.g. not supported by the CDOT ATMS system). If a device is past its useful life but functioning properly it wouldn't be the highest priority to replace.

Prioritization decisions are evolving to consider the relationships between assets or components and the service packages they support. For replacement and new device requests, the following factors are also currently considered: traffic issues and the potential results of implementing the device, requested project cost, available funds, need, and anticipated benefits. Additional considerations for selecting ITS projects or strategies include guidelines under federal transportation legislation (e.g., MAP 21 and the FAST Act) and CDOT policies and objectives.

The ITS Branch has begun documenting information to support decisions and timing of asset replacements, repairs, relocations or removals. Such decisions may be based on purpose (service package), use, reliability, and cost estimation.

RISK MANAGEMENT

The ITS Branch helps manage risk across multiple levels—agency, programmatic, and project or asset. Section 6 of the TAMP provides more information about CDOT’s risk-management methodology and processes, including an explanation of elements comprising risk scores.

RISK REGISTER

CDOT’s ITS program maintains a register of risks to its program and projects. Top risks are shown in **Table A.5-5**.

Table A.5-5 *Top ITS Assets Risks*

Risk Level	Threat	Risk Score	Risk-Management Strategy
Project	Vehicle strikes to ITS assets (e.g., variable message signs, signals, etc.)	150.0 (L)5 x (C)15 x (V)2	Treat by location, tolerate—repair, replace, collect damages
Project	ITS or traffic-control device failures, which can result in safety impacts	110 (L)5 x (C)11 x (V)2	Tolerate and respond
Project	Flood in a server room or field equip bldg, losing control of ITS devices, with no center-to-center ops redundancy, natural flood event	106.2 (L)3 x (C)11.8 x (V)3	Treat, use sensors in the floor, or tolerate



FINANCIAL PLAN

CDOT sets planning budgets for its asset classes four years in advance. The plan below assumes that asset-management funding for the ITS asset class will remain static for the foreseeable future, at the level set for fiscal 2027 (\$16.6 million, including \$1 million for planned device replacement). These budget assumptions, combined with CDOT’s life-cycle management approaches discussed in the subsequent section, inform the investment strategies for ITS that CDOT plans to leverage to achieve system-wide asset performance goals while minimizing life-cycle costs.

FUNDING SOURCES

The ITS asset management program supports the life-cycle management and treatment needs (e.g., maintenance, replacement, etc.) for ITS assets. ITS asset management funding is separated into three areas:

- » Agency operations which covers items like software, and utility bills.
- » ITS maintenance of approximately \$16M / year for day to day maintenance and emergency or extraordinary repairs
- » Capital replacement which is used for proactive replacements before more costly repairs are required. This makes up a relatively small but of the overall budget.

ITS also utilizes other funding sources outside asset management:

- » Expansion projects are funded through sources outside of the program. Asset Management funds also support the operation of ITS, such as fiber location, power-source costs, and communications costs.
- » Most device replacements occur as part of roadway-reconstruction projects. The ITS branch seeks to collaborate with other asset managers and incorporate ITS needs into “bundled” projects for other asset classes, such as tunnels and signals. This may reduce disruption to travel and reduce costs as traffic control and other expenses can be shared.

PLANNED FUNDING

The 10-Year Financial Plan for ITS (replacement only) is shown in **Table A.5-6**.

Table A.5-6 *Financial Plan for ITS Assets (in millions)*

	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Capital Replacement	\$4.8	\$0.0	\$0.0	\$1.0	\$1.0	\$1.0	\$1.0	\$1.0	\$1.0	\$1.0
ITS Maintenance	\$10.2	\$16.6	\$15.6	\$15.6	\$16.0	\$16.0	\$16.0	\$16.0	\$16.0	\$16.0

INVESTMENT STRATEGIES

CDOT forms investment strategies based on its financial plan and life-cycle management strategies to achieve system-wide asset performance goals while minimizing life-cycle costs. The investment strategies delineate different types of work to be performed across CDOT's ITS assets over a 10-year period.

HOW INVESTMENT STRATEGIES ARE DETERMINED

The Department's investment strategies are informed by the AIMS model. The AIMS model only considers asset management capital replacement funding and treatment options. ITS maintenance is considered within the model through the deterioration assumptions included in the model. Each year, the current ITS inventory and age data are loaded into the AIMS model, and a suggested treatment list is generated to maximize the benefit for any given budget.

PLANNED INVESTMENTS

Asset Management Replacement Projects—As noted earlier, funds for device replacement are limited in the near term. An average of about \$1 million per year is planned for proactive asset replacements annually during the time horizon of this TAMP. While the replacement cost of individual ITS assets can exceed \$300,000, most ITS assets are relatively low cost, with the majority being less than \$10,000. Some low-cost assets have relatively short useful lives, and some equipment may be replaced more than once during the period of the Financial Plan.

Major ITS System Project Investments—These investments are funded outside the asset management program.

EISENHOWER JOHNSON MEMORIAL TUNNEL TECHNOLOGY UPGRADE

This \$4.8 million project will upgrade ITS technology, such as cameras, lane-use signs, variable-message signs, and Ethernet equipment in this critical tunnel.



ITS CAMERA AND FIBER INSTALLATIONS STATEWIDE

This \$9 million initiative will install cameras on I-25 South, I-76 in Region 4, and US-85 north of Denver.



VARIABLE-MESSAGE SIGN INSTALLATIONS

This \$1 million initiative will install variable-message signs on SH-74 in Evergreen and EB US-285 near Conifer.



PERFORMANCE GAP ANALYSIS

CDOT uses its AIMS model each year to forecast the performance of ITS assets and any anticipated performance gaps. The results of this analysis inform the financial plan and investment strategies. The Department’s ability to close performance gaps largely depends on receiving additional funding.

NEEDS AND PROJECTED CONDITION

CDOT’s AIMS model forecasts the long-term performance of ITS assets, constrained by anticipated annual budgets. The Percent of Expended Life is deteriorated using straight-line deterioration, based on age and expected life. For example, a device regardless of age, would deteriorate 20% per year.

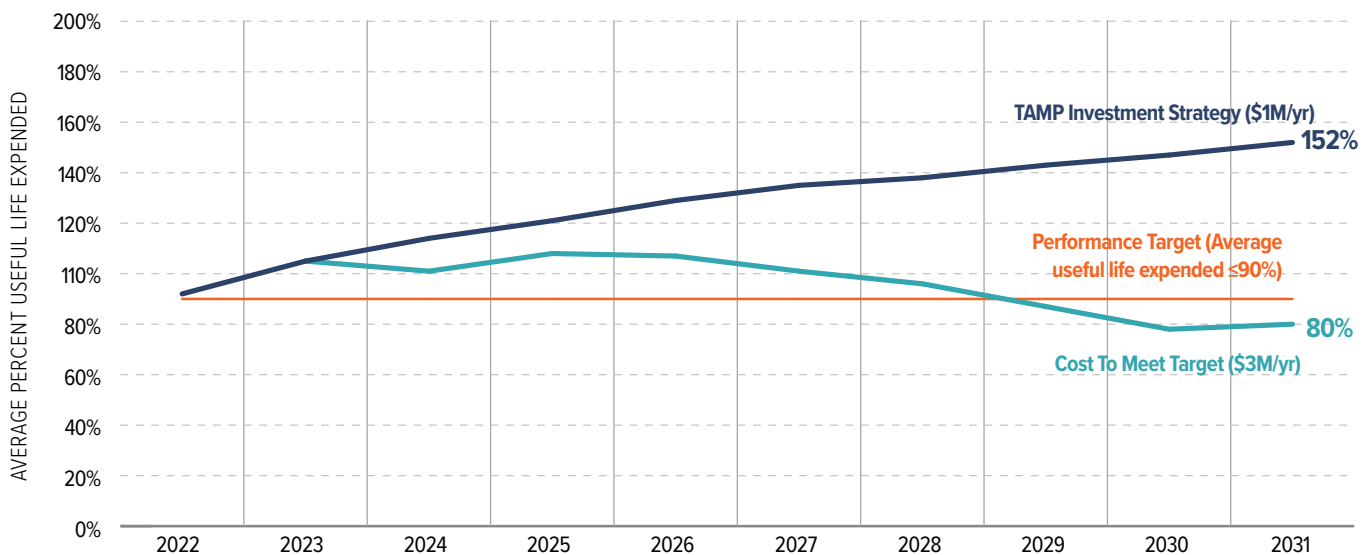
Planned investments will provide about \$1 million annually for proactive replacements over the next

10 years, which is insufficient to meet the PD 14.0 performance target. An increase of about \$2 million annually beginning in 2023 would bring the ITS asset class back within its target state-of-good-repair and sustain it through 2032.

Figure A.5-5 shows the average percent of life expended for CDOT’s ITS assets, as projected over time using planned funding levels. Under these amounts, ITS assets are projected to quickly begin missing the performance target of average expended life at or below 90%.

Figure A.5-5 Projected Performance of ITS Assets Over Time

The anticipated annual budget of \$1 million for proactive device replacement will not meet the performance target of ensuring that the average percent of useful life expended is at or below 90 percent. The annual cost of meeting the target by 2031, is about \$3 million, or an additional \$2 million per year.



*Target is less than 90% of useful life expended

PERFORMANCE IMPACTS OF INSUFFICIENT FUNDING

Funding shortfalls for ITS assets can increase the likelihood of malfunctions that compromise the reliability of ITS devices, such as variable-message signs. Insufficient funding also can lead to malfunctioning technology in CDOT's operations centers, or to inaccurate fiber inventories that increase accidental fiber cuts and damage. In sum, an underfunded, less reliable network can reduce safety and mobility and increase future costs.

OPPORTUNITIES TO CLOSE THE GAP

Limited opportunities exist to significantly close the anticipated performance gap besides additional funding. In the short run, funding shortfalls may be somewhat mitigated by technology deployments in capital-construction projects, improving utility-account management, and increasing the accuracy of the ITS asset inventory. Improved inventories, and performance reporting can all enable more robust management of the ITS asset class.

STRATEGIC USE OF ADDITIONAL REVENUE

Should CDOT receive additional revenue to fund the ITS asset class, the Department's first priority is to eliminate any funding gaps related to achieving the PD-14 performance target. Once goals are achieved, the Department will reduce Poor backlog with a priority towards the most critical and/or vulnerable assets to improve system resilience. CDOT estimates the current "Poor" backlog for Buildings could be eliminated with about \$20 million.



FUTURE IMPROVEMENTS

Planned improvements to ITS asset management address processes, technology, and staff.

PROCESS AND ANALYSIS IMPROVEMENTS

ITS asset managers are focused on continued process improvements. A foundation for these improvements is a more complete asset inventory. To that end, the ITS Branch intends to bring the following assets into its management system:

- » ITS assets in the Eisenhower-Johnson Memorial Tunnel, which are being replaced through calendar 2022.
- » Cabinets and switches on traffic signals.

Other areas of improvement include Systems Engineering Analysis (SEA) and ITS Architecture, and better performance reporting and planning for ITS Assets.

SYSTEM ENGINEERING ANALYSIS AND ITS ARCHITECTURE

As CDOT establishes the architecture for how assets communicate with each other (service packages), both installation and maintenance activities will become more efficient. For new construction, planners will be able to choose from a series of packages based on intended functionality, rather than deciding on individual assets in isolation.

As CDOT moves increasingly into managing ITS assets by service packages, a metric that measures the availability of systems (MTTR) and Service Level Agreements will assume greater importance in assessing performance.

BETTER PERFORMANCE REPORTING AND PLANNING

CDOT's ITS program is planning to implement new project-delivery processes to ensure technology is integrated thoughtfully and is improving the architecture and inventory of deployed service packages for better tracking and forecasting service impacts from device failures.

Currently, asset replacement is prioritized by age. In the future, replacements will be based on the reliability of the service packages that CDOT delivers and the risk of components failing, as differentiated by the function being served.

TECHNOLOGY IMPROVEMENTS

Planned technology improvements will focus on better integrating CDOT's GIS tools with its SAP financial system, avoiding duplication of inventory information and facilitating management of work orders.

STAFF IMPROVEMENTS

ITS is focusing on internal training and documentation to increase role redundancy to increase resiliency. Many ITS staff are experts on distinct components of the ITS system. The ITS program aims for staff to have colleagues who can act as backups in emergencies. This will require revisiting position descriptions and reference documentation within the branch and focusing on consistency and clarity in documentation and training.

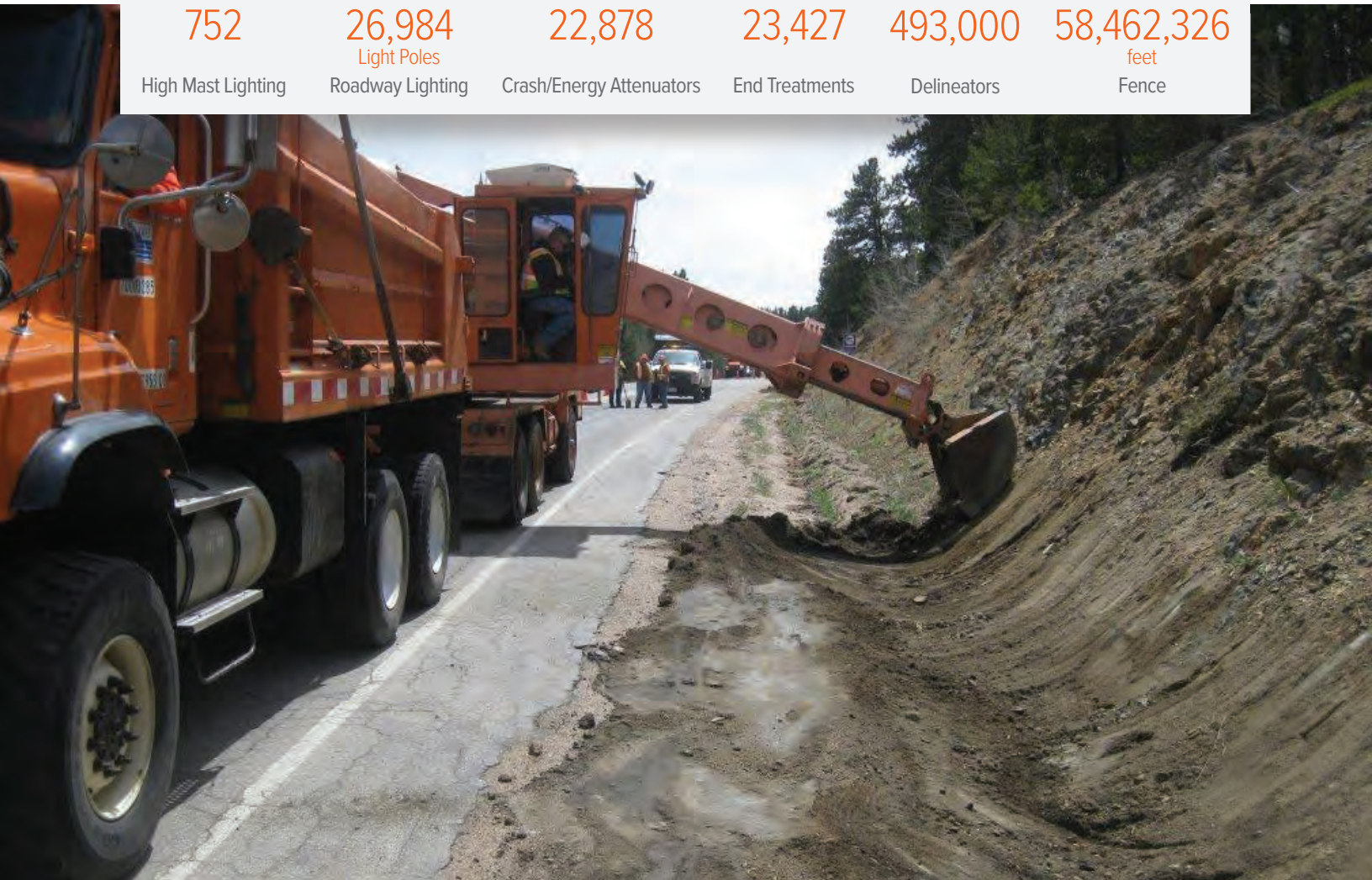
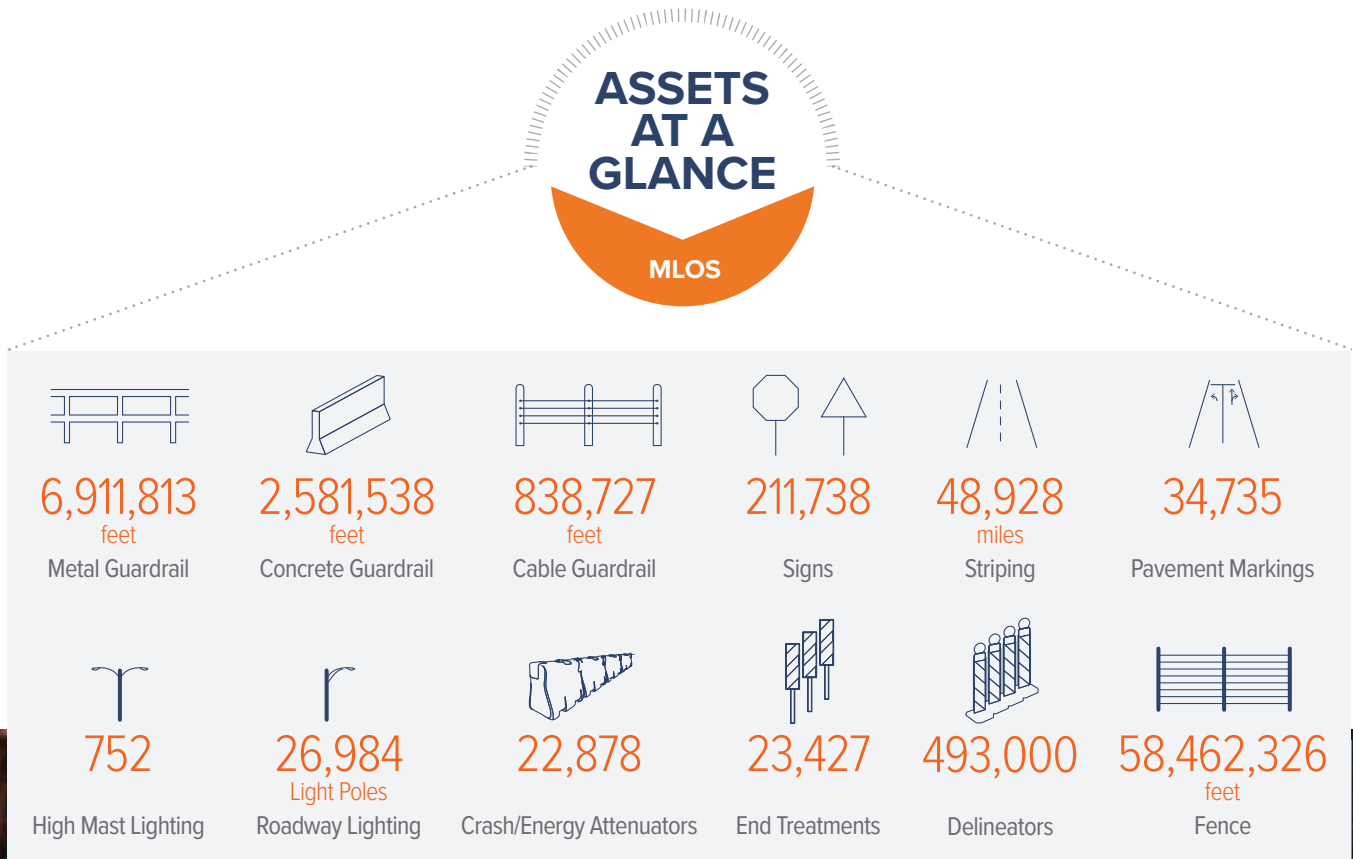
A-6. MAINTENANCE LEVELS OF SERVICE (MLOS)



Maintenance plays a critical role in CDOT's Transportation Asset Management (TAM) program. Maintenance Levels of Service (MLOS), considered an asset class within the program, provides preservation and maintenance services for pavement, bridges, culverts and many other assets managed by other programs. In addition, MLOS manages the life cycle of many safety- and traffic-related assets, such as signs, pavement markings, and roadway lights. Finally, MLOS provides major operational services, notably snow and ice removal from roadways, as well as mowing, noxious weed and vegetation control, and right-of-way landscaping.

Figure A.6-1 presents types of traffic and safety assets that MLOS maintains.

Figure A.6-1 MLOS Assets at a Glance



MLOS is the budget category for CDOT's Maintenance program, managed by the Division of Maintenance and Operations (DMO), which provides a broad range of asset maintenance and other services. The term "MLOS" also is used at times to refer to the actual maintenance program and its services. Through its maintenance services, MLOS contributes to improved safety and mobility for the traveling public and ensures that CDOT maximizes the value of its highway assets. When the need for premature asset rehabilitation and replacement is reduced, life-cycle costs are lower.

The Information Management Services Branch, part of CDOT's Division of Maintenance and Operations, develops and manages procedures and guidance for the MLOS program and maintains operational oversight for program administration.

There are nine MLOS Maintenance Program Areas (MPAs):

- » Snow and Ice Removal—Snow removal and avalanche mitigation.
- » Roadway Surface—Pothole filling, chip seals, paving, patching, etc.
- » Roadside Facilities—Ditches/streambeds cleaning, litter removal, rockslide response/cleanup, etc.
- » Roadside Appearance—Mowing and weeding.
- » Traffic Services—Striping, signs, guardrails, signals, roadway lighting, etc.
- » Structure Maintenance—Bridge repair and maintenance.
- » Equipment and Grounds—Rest areas, buildings, and equipment maintenance.
- » Tunnel Maintenance—Repairs, monitoring, and maintenance.
- » Planning/Training—Administration and employee training/certification.



PERFORMANCE MANAGEMENT

Performance of the maintenance program is monitored and managed as part of CDOT’s performance management framework through quantitative measures and targets. These metrics inform funding decisions and track how well the program is supporting the Department’s strategic goals and transportation services.

POLICY DIRECTIVE 14 PERFORMANCE MEASURES—MLOS

The asset management program for MLOS contributes to goal areas in Policy Directive 14.0 (PD 14.0)—asset management, safety, and mobility. The routine maintenance activities MLOS provides helps assets function and perform as intended throughout their life cycle. PD 14.0 includes specific performance measures for MLOS overall, as well as for Snow and Ice Removal. MLOS activities support the function of highway assets, as well as assets for which routine maintenance is MLOS’s sole responsibility. MLOS activities provide the maintenance and services needed to keep road users safe. These include maintaining street striping, signs, guardrails, and roadway lighting, and removing snow and ice. MLOS operations enhance mobility by providing maintenance and other services that keep road surfaces safe and navigable. On average, CDOT plows snow on over six million lane miles each year.

The PD 14.0 performance measure for MLOS is assessed using a report-card system of grading in which six of the nine Maintenance Program Areas (MPAs) are each given a grade. The following MPAs are considered performance-based, and are therefore used to determine an overall MLOS grade:

- » Snow and Ice Removal—Snow removal and avalanche mitigation.


- » Roadway Surface—Pothole filling, chip seals, paving, patching, etc.
- » Roadside Facilities—Ditches/streambeds cleaning, litter, rockslide response/cleanup, etc.
- » Roadside Appearance—Mowing and weeding.
- » Traffic Services—Striping, signs, guardrails, signals, roadway lighting, etc.
- » Structure Maintenance—Bridge repair and maintenance.

The remaining three MPAs are excluded from the overall MLOS grade because of the difficulty in developing an objective way to measure performance.

CDOT considers a letter grade of B- for maintenance of assets for which MLOS has partial life-cycle management responsibility to be a state of good repair. The goal for Snow and Ice Removal is a letter grade of B. Snow and Ice Removal, with its substantial impact on safety and mobility, is the largest expenditure category within MLOS.

Table A.6-1 shows the PD 14.0 targets and 2021 performance for MLOS.

Table A.6-1 CDOT Asset Management Metric and Performance Target for MLOS

		Measure	Target	2021 Performance
MLOS		Maintenance Levels of Service for the State Highway System	B-	C-
		Level of Service for Snow and Ice Removal	B	C

OTHER PERFORMANCE MEASURES

The metric for each Maintenance Program Area (MPA) is specific to each asset within each area. For example, the grading criteria for metal guardrails and cable rails, which are both within the Traffic Services MPA, are shown in **Table A.6-2**. Other examples are shown in **Figures A.6-3** and **A.6-4**.

Table A.6-2 Level of Service Criteria for Metal Guardrail and Cable Rail

Level of Service Grade	Percent Deficient (Metal Guardrail)	Percent Deficient (Cable Rail)	Level of Service Grade	Percent Deficient (Metal Guardrail)	Percent Deficient (Cable Rail)
A	0.0 - 2.5	0.0 - 0.5	D	10 - 15	3.0 - 5.0
B	2.5 - 5.0	0.5 - 1.0	F	>15	>5.0
C	5.0 - 10	1.0 - 3.0			

For Snow and Ice Removal, assessment of performance includes “time to bare pavement” and avalanche control. Several work units within CDOT contribute condition data used to determine MLOS performance grades. These units include Staff Bridge, Pavement Management, Property Management, and Traffic Safety. Surveys completed by maintenance employees also are used.



INVENTORY AND CONDITION

The Division of Maintenance and Operations takes a proactive approach to documenting and maintaining an accurate and up-to-date asset inventory, and to making such data accessible and historically continuous.

INVENTORY

The MLOS asset inventory resides in an ESRI database and is used in Maintenance’s Work Manager software system. The inventory is shown in **Table A.6-3**.

Table A.6-3 Safety- and Traffic-Related Maintenance Assets

Asset Type	Count
Metal Guardrail (linear feet)	6,911,813
Concrete Guardrail (linear feet)	2,581,538
Cable Guardrail (linear feet)	838,727
Signs	211,738
Striping (miles)	48,928
Pavement Markings	34,735
High-Mast Lighting	752
Roadway Lighting (Light Poles count)	26,984
Crash/Energy Attenuators	22,878
End Treatments	23,427
Delineators	493,000
Fence (linear feet)	58,462,326

Figure A.6-2 Examples of MLOS Assets



Table A.6-4 shows asset classes for which MLOS only has maintenance responsibilities. These assets are the subject of separate asset plans, which describe the systems in which the data resides for each asset class. Maintenance keeps a duplicate inventory of all assets that it maintains in the Maintenance ESRI database and Work Manager system.

Table A.6-4 Assets for which MLOS has Maintenance Responsibilities

Asset Class	Asset Type	Count
Pavement	Lane Miles of Pavement	23,016
Bridges	Bridges	3,464
Culverts	Culverts	5,946
Walls	Noise Walls	357
Signals	Traffic Signals	1,843
Buildings	Employee Housing Units	93
Rest Areas	Rest Areas and Ancillary Structures	140
Tunnels	Staffed and Unstaffed Tunnels	20
ITS	Devices, Network Gear, Fiber Cable Miles, Facilities	5,333
Fleet	Rolling Stock	3,123

For those assets for which MLOS provides maintenance services, but has no life-cycle management responsibilities beyond maintenance, the MLOS letter grade represents an aspect of asset condition. The condition of those assets is described in their respective asset plans. An example of how the maintenance levels for such assets is assessed is shown in **Table A.6-6**.

Table A.6-5 Example of MLOS Grading Scale for Traffic Services, Cable Rail

Performance Metric: Cable rail is deficient if posts are bent or damaged, have buildup, or there is slack in the ropes between posts. The number of feet of deficient cable rail is measured and is compared to the total measure of cable rail in the sample area.

Grade	Condition Description
A	Cable rail with less than .5% of damage.
B	Cable rail with damage between .5% and 1%.
C	Cable rail with damage between 1% and 3%.
D	Cable rail with damage between 3% and 5%.
F	Cable rail with damage greater than 5%. If an anchor is damaged, even if it is outside of the sample area, the entire cable rail is considered deficient.

CONDITION

Maintenance performance is measured by levels-of-service grades. These grades are aggregated to the Maintenance Program Areas (MPA) level and then to a statewide grade for MLOS.

In FY 2021, MLOS achieved a grade of C-. This grade is below CDOT's B- target and represents a deterioration from recent years, when MLOS achieved a B.

For traffic- and safety-related assets for which MLOS has overall management responsibility, and which generally fall within the Traffic Services MPA, the MLOS grade measures asset condition. (The same is true for fencing, which falls within the Roadside Facilities MPA along with other roadside assets for which MLOS only has maintenance responsibility.) In 2021, the MLOS letter grade for the Traffic Services MPA was D+. **Table A.6-5** describes the grading scale for the Traffic Services Cable Rail.

Table A.6-6 Example of MLOS Grading Scale for Pipes and Culverts.

Performance Metric: Pipe and culvert inlets and outlets are largely free of silt or other blockages. The percentage of inlets and outlets that are blocked.

Grade	Condition Description
A	Silt accumulation is less than 2%.
B	Silt accumulation is between 2% and less than 5%.
C	Silt accumulation is between 5% and less than 10%.
D	Silt accumulation is between 10% and less than 20%.
F	Silt accumulation is greater than 20%.

Source: Highway Maintenance Levels of Service Manual

LIFE-CYCLE PLANNING

Life-cycle planning responsibilities for MLOS are limited to traffic and safety-related assets and include reactive and interval/age-based approaches. The Information Management Services Branch, part of CDOT's Division of Maintenance and Operations, develops and manages procedures and guidance for the MLOS program and maintains operational oversight for program administration.

LIFE-CYCLE PLANNING

While MLOS maintains a wide variety of assets, its life-cycle planning responsibilities are limited to traffic and safety-related assets not managed by other asset classes.

Both reactive and interval/age-based life-cycle management approaches are used for different types of assets. For example, when damage is observed, individual signs and guardrails are repaired by the responsible maintenance patrol. On the other hand, Traffic personnel track replacement cycles and life cycles of signs and striping and program MLOS funds for replacement at the end of the life cycle.

PROGRAM DECISION-MAKING

The Information Management Services Branch maintains operational oversight for MLOS program administration, including development and implementation of procedures and guidance.

CDOT's Manual of Maintenance Procedures outlines the procedures performed by maintenance personnel.

HEADQUARTERS AND REGION ROLES

The MLOS maintenance and repair program for safety and traffic-related assets is managed by the Region Traffic Operations sections, with some assets being repaired by local Maintenance Patrols.

TREATMENT SELECTION

The following subsections provide examples of treatments MLOS performs.

Preservation/Maintenance and Repair: Maintenance and Traffic personnel perform preventive maintenance

and repair for most highway assets. Maintenance staff repair and replace all assets on CDOT roadways. Traffic staff focus on specific traffic-related assets



such as multi-post signs, striping, pavement markings, traffic signals, cameras, etc. When the needed repairs exceed funding levels, assets are prioritized based on condition and safety/operations benefits.

A significant portion of the work is performed by in-house crews, and some is performed by contractors through the procurement and contracting processes.

Work related to signals follows statewide guidance on signal preventive maintenance established by the Traffic sections.

A more detailed description of the types of maintenance and repair to traffic-related assets can be found in the Manual of Maintenance Procedures.

Aside from traffic-related assets, MLOS also performs preventive maintenance and repairs for rest areas and maintenance buildings. These treatments may address the appearance of exterior and interior walls and finishes, the functioning of interior utilities and fixtures, and the condition of the pavement and pavement markings on the grounds around these facilities.

Replacement: MLOS performs replacement activities for traffic- and safety-related assets under the Traffic Services MPA, as well as fencing under the Roadside Facilities MPA. Signs, striping, and pavement markings are replaced on a rotating basis to maintain minimum reflectivity levels. Maintenance workers inspect these assets visually at least four times a year. The Traffic section tracks replacement cycles and life cycles of striping and signs and programs MLOS funds for replacement at the end of their life cycle. For striping, useful life is location-dependent, and the Traffic sections determine the appropriate replacement cycle for each Region.

The FHWA Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) has minimum standards for sign and striping retroreflectivity.

Rehabilitation/New Construction: These work types are not undertaken by MLOS. Impact to MLOS is not currently taken into consideration when new capital projects are planned and/or executed.



RISK MANAGEMENT

MLOS maintains a register of risks at the program and project level. Section 6 of the main TAMP document provides more information about CDOT’s risk-management methodology and processes.

The top MLOS risks are shown in **Table A.6-7**.

Table A.6-7 Top MLOS Program Risks (2022)

Risk Level	Threat/ Opportunity	Risk Score	Risk-Management Strategy
Project	Burn areas produce post-fire debris flows, blocked culverts, loss of service.	21.0 (L)5 x (C)4.2 x (V)1 ¹	Monitoring and preventive maintenance
Project	Culverts less than 48-inch diameter failing and closing road.	16.0 (L)5 x (C)3.2 x (V)1	Inspection and repair
Project	Hazardous materials spill.	16.0 (L)5 x (C)3.2 x (V)	Tolerate and respond



¹ Risk Score = Likelihood (L) * Total Consequence and Consideration Score (C) * Vulnerability (V)

FINANCIAL PLAN

CDOT typically represents MLOS funding as part of the Transportation Asset Management program budget. For fiscal year 2026 and beyond, however, MLOS planning budgets will no longer be set in conjunction with other asset classes and are not subject to the TAM “Cap.” Instead, MLOS budgets will be determined closer to the year in which services are delivered to better reflect labor costs, materials costs, and other factors.

PLANNED FUNDING

The 10-Year financial plan for MLOS is shown in **Table A.6-8**. For the first four years of this TAMP period, these amounts have been set in “planning budgets” approved by the Transportation Commission. Beyond FY 2025, the table shows illustrative budget levels based on a 3 percent increase every year to account for inflation.

Table A.6-8 Financial Plan for MLOS (in Millions)

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
\$263.5	\$267.8	\$269.0	\$269.0	\$277.0	\$285.0	\$294.0	\$303.0	\$312.0	\$321.0



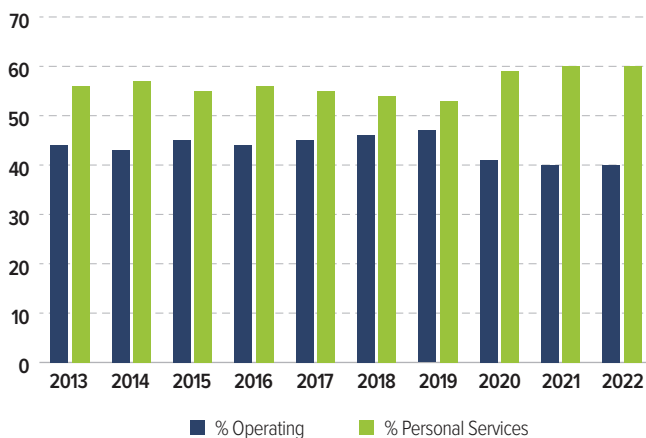
INVESTMENT STRATEGIES

CDOT strategically invests in maintenance areas of critical importance. The Department devotes well over half of its maintenance budget to its two largest Maintenance Program Areas: Snow and Ice Control and Traffic Services. Traffic Services includes life-cycle responsibility for a range of assets including signs and striping. Despite high costs, snow and ice removal is critical to safe and reliable travel across the state, and safe roadway conditions help preserve the state of good repair of roadway assets.

BACKGROUND: DETERMINING INVESTMENT STRATEGIES

The maintenance program in recent years has experienced sharp increases in wage and benefit costs, as well as materials costs rising at faster rates than annual budgets. The proportion of the MLOS budget allocated to personal services, such as salaries and benefits, has been growing, as shown in **Figure A.6-3**. Personal services now consume 60 percent of the MLOS budget, while 40 percent is consumed by operating expenses.

Figure A.6-3 Personal Services vs. Operating Costs in the MLOS Budget



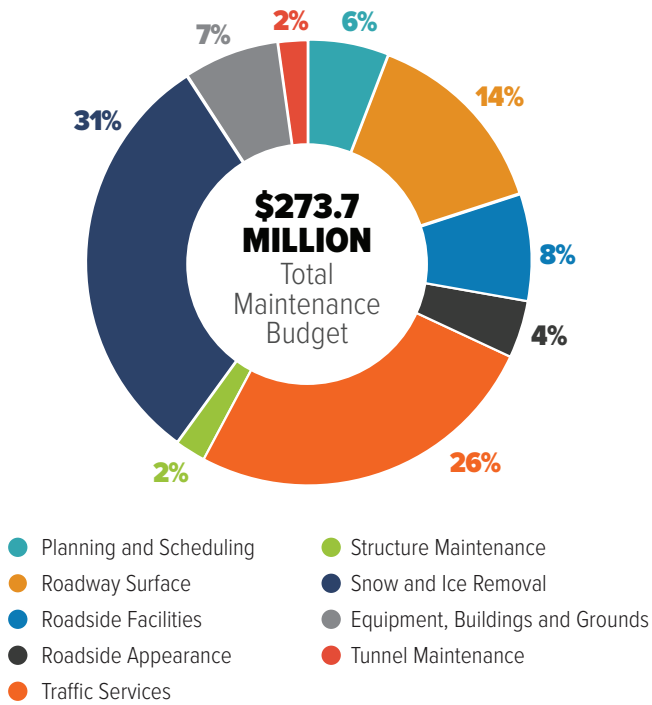
PLANNED INVESTMENTS

Maintenance budgets are not expected to increase significantly in the next 10 years. In this scenario, snow and ice control—one of the most critical maintenance activities in Colorado—will consume a larger share of the budget. Other investments are likely to continue at somewhat reduced levels in approximately the same proportions and amounts as current investments.



Figure A.6-4 shows the planned allocation of available financial resources among the nine MPAs for FY 2023.

Figure A.6-4 Maintenance Program Areas FY 2023 Budgets



PERFORMANCE GAP ANALYSIS

The MLOS program forecasts long-term maintenance performance given various budget scenarios, so that the impacts of funding levels on service levels can be evaluated. Spending at levels shown in the Financial Plan is predicted to result in MLOS falling below its performance target.

PROJECTED CONDITION UNDER DIFFERENT BUDGET SCENARIOS

The cost to achieve CDOT’s target of a B- for MLOS over the next 10 years is a deficit of \$765 million over 10 years, or \$76.5 million per year.

Figure A.6-5 shows the cost to achieve CDOT’s Level of Service objective for MLOS along with planned funding levels.

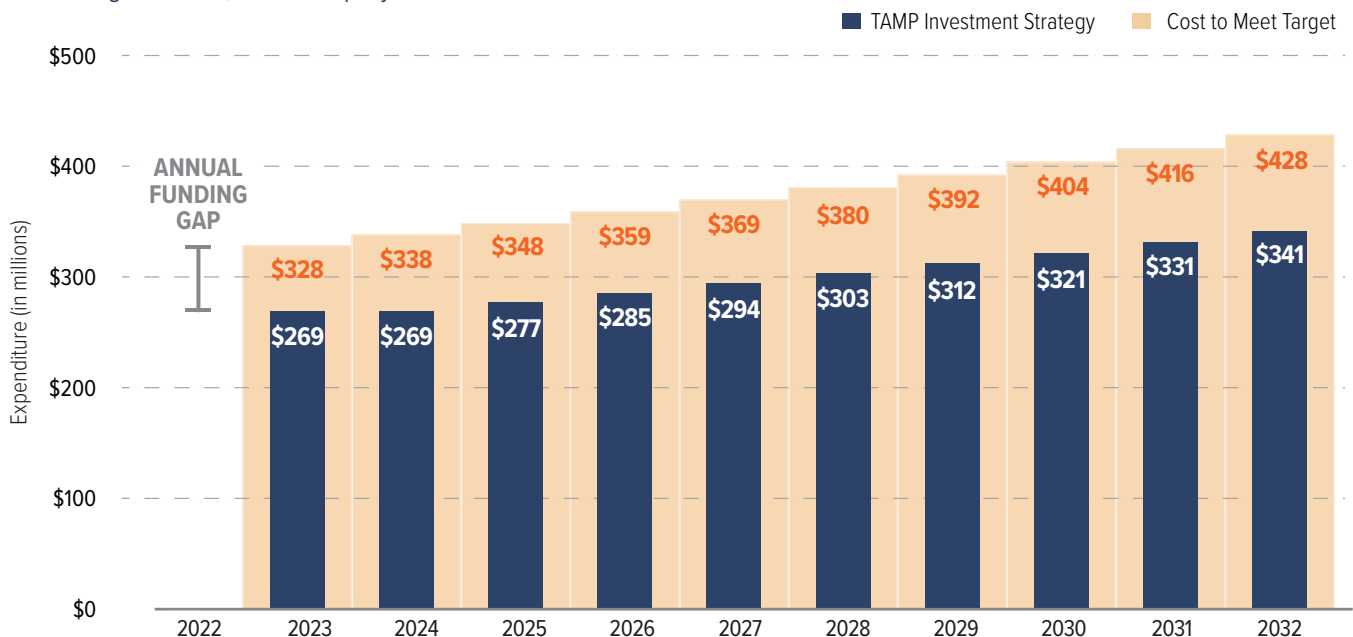
RISKS OF INSUFFICIENT FUNDING AND PERFORMANCE IMPACTS

Because CDOT places highest priority on snow and ice removal in the MLOS program, funding shortfalls are expected to have the greatest impact on other maintenance services and assets. Insufficient funding carries various risks, including:

- » **Life-Cycle Risk:** Insufficient maintenance leads to underperforming assets that can cause service disruptions and premature asset failure. Deterioration rates for other assets where MLOS provides preservation/maintenance actions will not perform as predicted if maintenance is reduced.

Figure A.6-5 Projected Budgets and Costs to Meet MLOS Performance Target (in millions)

The anticipated annual budget will not meet the performance target of a B- grade or better for MLOS. The additional cost of meeting the target is an average of about \$76.5 million per year.



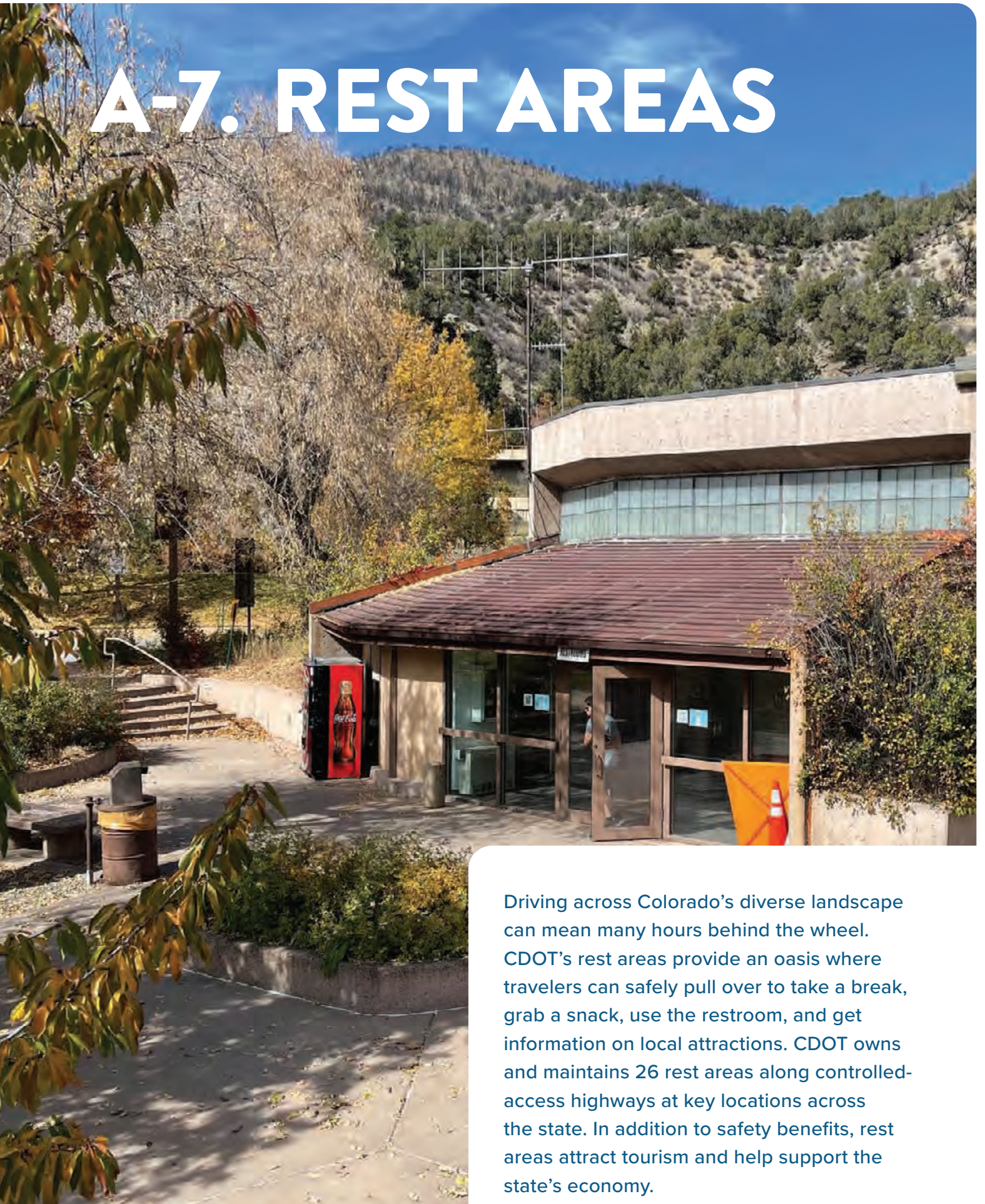
- » **Fiscal Risks:** Underfunding maintenance can increase costs by shortening the life of assets, and increasing corrective-maintenance needs, service interruptions, and failures.
- » **Public Perception Risks:** Deferred maintenance contributes to safety hazards and energy inefficiency and may negatively affect how the public views CDOT's stewardship of the highway system.

While the cost of living in Colorado has increased significantly in recent years, compensation for all state employees has not kept pace. Similarly, the

MLOS budget has not increased sufficiently to cover pay increases and rising materials costs, and the percentage of the budget dedicated to personal services versus operating costs has shifted. The personal services budget funds labor and benefits, while the operating budget funds materials such as deicing materials and asphalt. The Division of Maintenance and Operations has determined the MLOS budget should maintain a 50/50 split between personal services and operating budgets to ensure appropriate services levels are maintained. Maintaining this split will require an increase in planned MLOS budgets.



A-7. REST AREAS



Driving across Colorado’s diverse landscape can mean many hours behind the wheel. CDOT’s rest areas provide an oasis where travelers can safely pull over to take a break, grab a snack, use the restroom, and get information on local attractions. CDOT owns and maintains 26 rest areas along controlled-access highways at key locations across the state. In addition to safety benefits, rest areas attract tourism and help support the state’s economy.

CDOT's rest areas are managed in alignment with the asset-management process described in the Introduction to the Asset Plan Appendix on page A-1. Currently, 63 percent of rest areas have a condition grade of C or better—short of CDOT's 90 percent target. An additional annual investment of at least \$10 million beyond current funding would be required to achieve the target in the next 10 years.

Figure A.7-1 Rest Area Assets at a Glance



PERFORMANCE MANAGEMENT

The performance of rest areas is monitored and managed as part of CDOT’s Rest Area Property Management program through a series of quantitative measures and targets that inform funding decisions and track how these assets are supporting the Department’s strategic goals and the transportation services provided to the public.

POLICY DIRECTIVE 14 PERFORMANCE MEASURE—REST AREAS

The asset management program for rest areas contributes to all Policy Directive 14 (PD 14.0) goal areas: asset management, safety, and mobility. The performance measure in PD 14.0 for rest areas is the percentage of assets with a C grade or better, on an A to F scale. The letter grade considers overall rest area condition through visual assessment of individual elements such as building structure; building exterior appearance, including the condition of grounds, pavement and pavement markings; building interior condition and appearance; and overall site and building compliance with the Americans with Disabilities Act (ADA). The process for assessing condition through assignment of letter grades is described in the Inventory and Condition section of this Rest Area Asset Plan. **Table A.7-1** presents the PD 14.0 target and 2021 performance for rest areas.

For federal TAMP purposes, CDOT defines state of good repair based on the measures presented in PD 14.0.

CDOT considers its rest areas to be in a state of good repair if 90 percent are assessed at grade C or better. The current (2021) percentage of rest areas assessed at a C or better is 63 percent—short of the target. The reason for this performance gap is described in Performance Gap Analysis section of this Rest Area Asset Plan. One criteria for achieving a C grade is meeting ADA requirements. It is expected that all rest areas will be ADA compliant by the end of FY 2024.

Table A.7-1 CDOT Asset Management Metric and Performance Target for Rest Areas

	Measure	Target	2021 Performance
REST AREAS	Percentage of Rest Areas with a C grade or better	90%	63%



INVENTORY AND CONDITION

Dedicated CDOT staff assess the condition of each rest area annually with a letter grade based on multiple criteria, including structural integrity and overall site condition. The Department collects rest-area inventory and condition data using a mobile application and stores the data in its “buildings dashboard.” The use of dedicated staff helps remove subjectivity in the evaluations, maintaining consistency across the assets. CDOT assesses the performance of its rest areas portfolio by the percentage of rest areas achieving a C grade or better, as described in the Performance Management section.

INVENTORY

As of 2022, CDOT owns 26 rest areas statewide, including 117 ancillary structures, as shown in **Table A.7-2**. Ancillary structures are located within rest-area locations and can include storage sheds and picnic shelters. The 26 rest areas are assessed as one grade each, combining all ancillary equipment into a single rating. Rest areas are classified in different tiers based on their purposes, as shown in **Table A.7-3**.

Table A.7-2 *Inventory of Rest Area Assets*

Asset Type	Tier 1	Tier 2	Tier 3	Count
Rest Areas	7	13	6	26
Ancillary Structures	42	58	17	117
Total	49	71	23	143

Table A.7-3 *Description and Examples of Rest Area Tiers*

	Tier 1 rest areas provide the full range of amenities and services, including daily staffing. They are considered critically important, because they are located near key entrances to the state, its welcome centers and to Vail Pass.
	Tier 2 rest areas provide a medium range of services, including heat, potable water, flushable toilets, and maps and brochures about the state.
	Tier 3 rest areas provide access to basic services, such as vault or pit toilets, and have no running water or heat.

A map illustrating the locations of CDOT rest areas is shown in **Figure A.7-2**. Rest areas are represented by a CDOT pin icon.

Figure A.7-2 Rest Areas in CDOT's Building Inventory



ASSET HIERARCHY

Table A.7-4 provides an overview of the different tiers of rest areas and the features and levels of service provided at each. To understand the performance of rest area assets, CDOT tracks the condition and functionality of the major features and facilities that comprise each rest area.

Table A.7-4 Asset Hierarchy

Rest Area Tiering	Tier 1 Critically Important	Tier 2 Above Average	Tier 3 Basic
Key Entrance to State or Vail Pass	Yes	No	No
Daily Staffing	Yes	No	No
Internet Service	Yes	No	No
Separate Parking for Cars and Trucks	Yes	No	No
Air Conditioning	Yes	No	No
Kiosk Info with Maps/Brochures	Extensive	Mid-Range	No
Cell Service	Yes	Yes	No
Heat	Yes	Yes	No
Paved Parking	Yes	Yes	No
Potable Water	Hot & Cold	Hot & Cold	No
Picnic Tables	Yes	Yes	Maybe
Flush Toilets	Yes	Yes	Vault or Pit

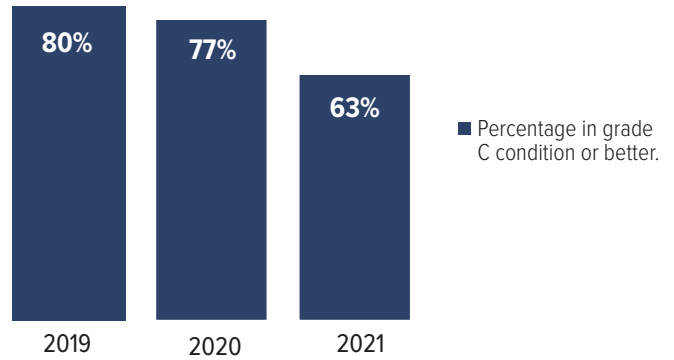
CONDITION

Rest area condition refers to the letter grade given to each rest area based on information gathered during the annual condition assessment. The assessment considers rest-area components by customized categories that are consistent with the rest area tiers. Rating elements include visual assessments of the condition of the building structure, building-exterior appearance, appearance of grounds, condition of pavement and pavement markings, building-interior cleanliness and appearance, and operation of utilities and fixtures. Rest areas are assigned a letter grade of A-F, as described in **Table A.7-5**.

CURRENT CONDITION AND HISTORICAL TRENDS

Sixty-three percent of CDOT’s 143 rest areas and ancillary structures have been assessed at letter grade C or better condition, as presented in **Figure A.7-3**. Rest areas were established as part of CDOT’s Transportation Asset Management (TAM) program in November 2018, and condition monitoring started in 2019. Deterioration has occurred since that time. Rest areas will be eligible for TAM program funding in FY 2023.

Figure A.7-3 Rest Area Condition Trends



ASSET VALUE

CDOT undertook an assessment of asset value in 2022 for this document. The current replacement value of rest areas is determined by using a unit cost for building square footage. This replacement value is \$134 million.

To calculate current asset value, the insurance value was used. The current insurance value of rest area assets is \$11 million.

Table A.7-5 Definitions of Rest Area Letter Grades

Letter Grade	Description
A	Most items are rated excellent or very good.
B	Most items are rated good or better with few or no serious deficiencies.
C	Most items are rated good or better with few serious deficiencies, with none in critical condition. The facility is ADA compliant.
D	Items are rated no higher than good, with some serious deficiencies, and a limited number of critical problems.
F	Items are rated no higher than good, with many in fair or poor condition, with serious or critical deficiencies.

LIFE-CYCLE PLANNING

CDOT analyzes its rest area inventory and inspection data to forecast investment needs and to set work priorities. This process is known as life-cycle planning and accounts for the whole-life costs of planning, constructing, and maintaining assets with consideration for minimizing cost while preserving or improving the condition. If a Rest Area is assigned a letter grade D or F, CDOT considers it for replacement, while rest areas with a letter grade C or better are considered for refurbishment. The rest area's treatment plan leverages findings from the annual condition assessment—as well as the recommendations from CDOT's Asset Investment Management System (AIMS).

LIFE-CYCLE PLANNING

CDOT uses a condition-based approach to the life-cycle management of rest areas. This means condition data is used to determine the appropriate type and timing of work, and to prioritize potential work within available budgets. CDOT performs cost-benefit analysis via its AIMS model to determine the most cost-efficient treatment program. Based on the results from the cost-benefit analysis, CDOT identifies which rest area projects should be prioritized for treatment.

The AIMS modeling and analysis process generates strategies composed of one or more treatments over the analysis period.

In early 2022, the Property Management team refined the useful life for all rest areas based on construction type which were used to modify deterioration assumptions in the AIMS model. In addition, an updated set of planned rest area projects were incorporated into the model assumptions. The model considers the following treatments for rest areas:

- » Rest area refurbishment, which is triggered when the rest area letter grade is a “C.”
- » Rest area replacement, which is triggered when the rest area letter grade is a “D” or an “F.”

This improved process will provide more specific recommendations that maximize budget allocations and provide more accurate modeling.

CDOT's Rest Area Property Management program leads effort to rehabilitate and replace rest areas and provide controlled and deferred funds to each Maintenance Section to perform routine maintenance, preservation treatments, and repairs that do not require engineering. The Maintenance Levels of Service program covers costs for cleaning; and for refilling and replacing cleaning supplies, toilet paper, paper towels and lightbulbs. Maintenance Levels of Service also pays for mowing, landscaping, plowing, and any other duties needed for day-to-day operation of the rest areas.

PROGRAM DECISION-MAKING

TREATMENT SELECTION

CDOT uses a number of treatments to address rest area deterioration. Rest area treatments can range from minor electrical repairs to roof replacements, to remodeling, to complete facility replacements. The treatment selected depends on the rest area condition and availability of funds. Definitions of rest-area treatment work types are summarized below. A list of rest area treatments and their typical costs are presented in **Table A.7-6**.

Controlled Maintenance: involves corrective repairs or improvements that increase the safety or operating efficiency of a building. These treatments are meant to prevent a building from slipping to a lower letter grade. Maintenance activities are necessary for health, life safety, and code compliance of A, B, and C-rated rest areas and fixed equipment necessary for the operation of rest areas. Examples include updating sinks or toilets to low-flow models or installing a new furnace. This, along with deferred maintenance, comprises about 15 percent of annual funds and includes cleaning and other preservation activities.

Deferred Maintenance: includes corrective repairs or improvements for rest areas with a D rating. These treatments are meant to elevate the overall rest area condition and prevent the rest area from falling to an F rating. Examples include replacing a roof or a minor remodel.

Rehabilitation: can include increases to the square footage, life expectancy, operating efficiency, or

capacity that add value to land and rest areas. Costs for the design and construction of these improvements generally exceed \$50,000, such as updating a sewage treatment system or a major remodel. These treatments increase life expectancy and improve operating efficiency.

Reconstruction: consists of replacement of an existing rest area on CDOT-owned land with a new rest area on the same land. It is usually the result of years of lack of funds for proper preservation and maintenance resulting in a rest area that is not able to be rehabilitated.

Initial Construction: consists of the development of land, including site infrastructure and construction of a new rest area on property recently purchased by CDOT or an existing CDOT-owned property that did not have a rest area on it before. Initial construction is funded by programs outside of CDOT's TAM Program, which pays to maintain the existing transportation system.

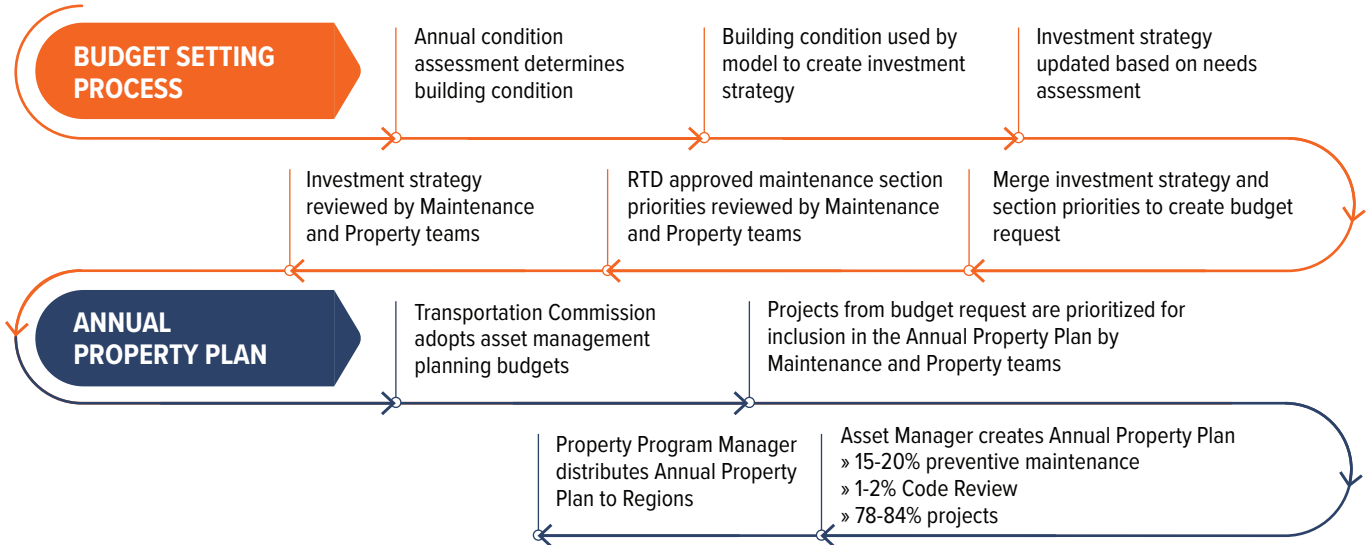
Table A.7-6 Rest Area Treatments and Typical Unit Cost

Work Type	Example Activity	Typical Unit Cost/Square Foot
Preservation and Preventive Maintenance	Updating sinks or toilets to low-flow models or installing a new furnace.	\$100
Maintenance	Includes interior and exterior painting, concrete apron repairs, new roofs, ventilation and air condition services, new flooring, new fencing, new plumbing fixtures, and other maintenance activities.	\$300
Rehabilitation	Updating a sewage treatment system or a major remodel.	\$700
Reconstruction (Replacement)	Tear down and replacement of existing structure due to program changes, functional obsolescence, or the complete deterioration of rest area condition.	\$2,300 (Tier 1 and Tier 2) and \$1,400 (Tier 3)
Initial Construction	Development of land, including site infrastructure and construction of a new rest area.	Varies



CDOT’s Rest Area Property Management program is responsible for managing the rest area conditions, including the determination of which types of treatment activities are appropriate to each category of work. This is further governed by the Property Plan and Policy Directive 60.1 (Property Management Funds Allocation). Treatment selection for rest areas is driven by annual condition assessment and AIMS model runs as presented in **Figure A.7-4**.

Figure A.7-4 Rest Area Prioritization and Project-Selection Process



RISK MANAGEMENT

The Rest Area program manages risk across multiple levels—enterprise, programmatic, and project/asset. Section 6 of the main TAMP document provides more information about CDOT’s risk management methodology and processes.

The Rest Area program maintains a register of risks to its overall program and projects. Top risks are presented in **Table A.7-7**.

Table A.7-7 Top Rest Area Risks

Risk Level	Threat/ Opportunity	Risk Score	Risk Management Strategy
Program	Building materials availability, impacting costs, and operations.	64.7 (T)5 x (C)2.6 x (V)5 ¹	Tolerate
Program	Construction cost escalations, year-over-year.	59.1 (L)5 x (C)2.4 x (V)5	Tolerate
Program	Changing strategic direction from leadership.	55 (L)5 x (C)2.2 x (V)5	Tolerate
Project	Limited construction industry capacity.	45.9 (L)5 x (C)1.8 x (V)5	Tolerate

¹ Risk Score = Likelihood (L) * Total Consequence and Consideration Score (C) * Vulnerability (V)

FINANCIAL PLAN

CDOT creates planning budgets for each asset class four years in advance. This asset plan includes an extrapolated financial plan for fiscal years 2023-31, including estimates of revenue and costs for meeting performance targets. CDOT estimates steady funding for rest areas for the next 10 years. The estimates below, combined with CDOT’s life-cycle management approaches, inform the investment strategies CDOT plans to leverage to achieve system-wide asset performance targets while minimizing life-cycle costs.

FUNDING SOURCES

Starting in FY 2023, the Rest Area program receives a portion of the funds for CDOT’s TAM Program to fund rehabilitation and reconstruction work types described in the rest areas Life-Cycle Planning section. Rest areas have only recently been included as part of the TAM Program.

CDOT’s Maintenance Levels of Service program funds routine rest area maintenance and operations. Those activities are part of the Maintenance Levels of Service asset plan and its financial plan.

PLANNED FUNDING

Table A.7-8 summarizes the projected funding levels for rest areas for the next 10 years.

Table A.7-8 *Financial Plan for Rest Areas (in Millions)*

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Not eligible	\$6.9	\$5.4	\$4.0	\$4.0	\$4.0	\$4.0	\$4.0	\$4.0	\$4.0



INVESTMENT STRATEGIES

CDOT forms investment strategies based on its financial plan and life-cycle management strategies identified to achieve performance targets while minimizing life-cycle costs. The investment strategies delineate different types of work to be performed across CDOT's rest area assets over a 10-year period.

BACKGROUND: HOW INVESTMENT STRATEGIES ARE DETERMINED

Each year the current rest area inventory and condition data are loaded into the AIMS model, and the model forecasts rest area conditions over the following 20-year period. AIMS then generates a list of alternative strategies for each rest area, composed of repair, rehabilitation, and replacement treatments. These strategies are based on business rules created by CDOT in rest area treatment decision trees. The model generates a set of strategies that maximize the benefit for any given budget.

PLANNED INVESTMENTS

MAINTENANCE AND REPAIR

CDOT's maintenance crews conduct routine rest area maintenance and operations. These activities are part of the Maintenance Levels of Service asset plan and its financial plan and investment strategy. Basic repairs are funded out of the controlled and deferred maintenance budget.

REHABILITATION, RECONSTRUCTION, AND REPLACEMENT

CDOT's Rest Area Property Management program performs routine inspections, and repairs that require engineering, rehabilitation, reconstruction, and replacement of rest areas. These activities are part of the program and its financial plan and investment strategy.



PERFORMANCE GAP ANALYSIS

CDOT uses its AIMS model to forecast the performance of its rest area assets and any anticipated performance gaps annually. The results of the analysis inform the financial plan and investment strategies. Based on the most recent analysis, current funding will not allow CDOT to achieve its performance target for rest areas within the next 10 years. CDOT's ability to close performance gaps largely depends on receiving additional funding.

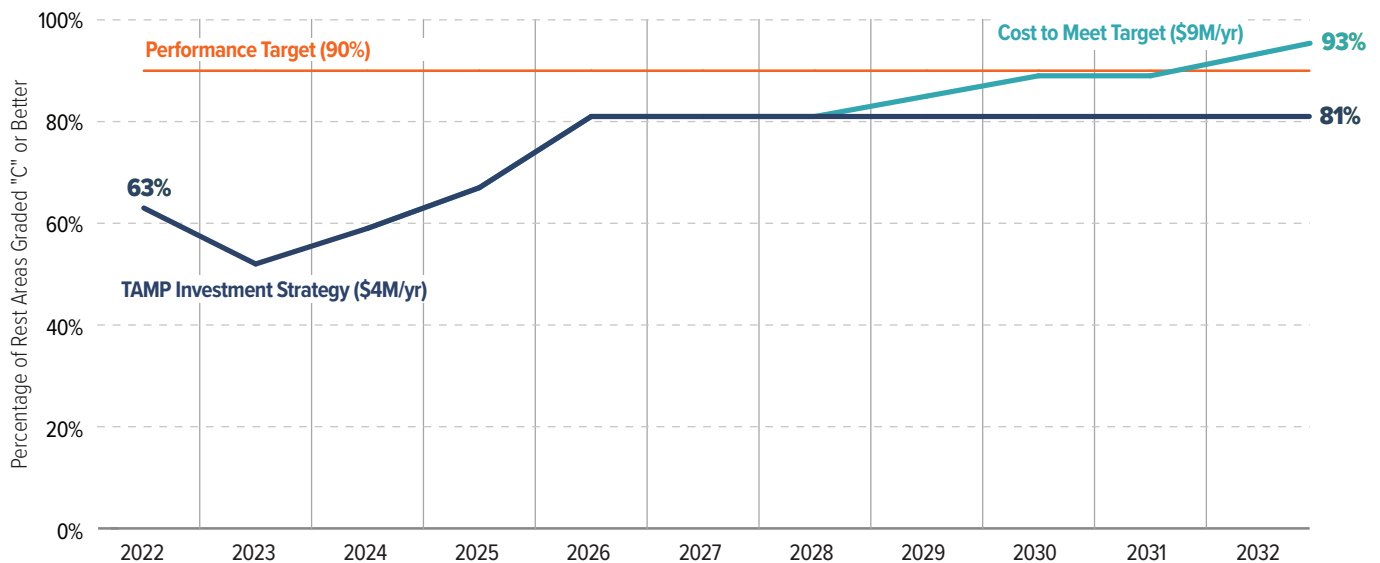
NEEDS AND PROJECTED CONDITION

CDOT's AIMS model predicts the long-term performance of rest area assets, constrained by the expected funding. The rest area ratings are deteriorated using deterioration models updated in 2022. These models are reviewed by the Property Management Team on a regular basis. Treatment costs used in the model are calculated using square-foot costs based on rest area's total area.

As previously mentioned, expected funding (\$4 million per year) is not sufficient to meet the PD 14.0 performance target, as presented in **Figure A-7-5**. An additional annual investment of at least \$5 million is required to achieve the target by 2032.

Figure A.7-5 Forecast of Rest Area Assets Performance

The anticipated annual budget of \$4 million will not meet the performance target of ensuring that 90 percent of rest areas have a C grade or better. The annual cost of meeting the target by 2031, is about \$9 million, or an additional \$5 million per year.



IMPACTS OF INSUFFICIENT FUNDING

Rest areas are crucial to the resiliency of CDOT's highway system. Well-managed rest areas provide a safe area for travelers to take a break from driving and to use needed facilities. These services and amenities reduce the likelihood of traffic collisions by helping to reduce driver fatigue and improve driver attention. The information provided at rest areas supports the effective use of CDOT's highway system. Rest areas also provide a location for disabled vehicles to safely wait for emergency assistance. These benefits support efficient travel and minimize delays on the highway system. Risks from insufficient funding for rest areas include impacts on roadway safety, health, public perception, and economic activities, as summarized below.

- » **Safety:** Attractive, strategically placed rest areas help drivers recover from fatigue by providing a safe place to stop and rest, have a snack, or use bathroom facilities before continuing their trips. Rest areas also mitigate distracted driving by providing motorists with a safe place to talk or text on their cell phone. Maintaining functioning and sanitary rest areas minimizes health risks for travelers.
- » **Public Perception:** Rest areas are often a first impression of how CDOT serves the people of Colorado. Rest areas serve as information centers for travelers to Colorado, both at entrances to the state and near resort areas. Rest areas provide information regarding trip planning, places to stay, special events, etc. As a result, they support the development of public trust in CDOT's infrastructure system and operations.

- » **Financial:** Well-maintained rest areas promote tourism and economic activity, and contribute to state revenues.

OPPORTUNITIES TO CLOSE THE GAP

CDOT regularly evaluates various investment strategies and funding levels, including a review of analyses from CDOT's AIMS model to determine the best strategy to meet condition targets. CDOT may alter its existing strategy by adjusting treatments, condition targets, and other factors to help close performance gaps. CDOT also analyzes funding relative to targets at its annual budget-setting workshop for asset management and may adjust funding recommendations should analysis warrant it. Additionally, the Transportation Commission each year is briefed on performance versus targets in PD 14 and may adjust funding to address gaps. The Life-Cycle Planning and Investment Strategies sections of this plan describe high-level CDOT investment strategies and methods for closing performance gaps for rest areas.

STRATEGIC USE OF ADDITIONAL REVENUE

Should CDOT receive additional revenue to fund the Rest Areas asset class, the Department's first priority is to eliminate any funding gaps related to achieving the PD-14 performance target. Once goals are achieved, the Department will reduce Poor backlog with a priority towards the most critical and/or vulnerable assets to improve system resilience. CDOT estimates the current "Poor" backlog for Rest Areas could be eliminated with about \$30 million.

FUTURE IMPROVEMENTS

Planned improvements to the Rest Areas program focus on people, processes and technology.

PEOPLE

CDOT has recently established a Rest Area Steering Committee, a collaboration between various CDOT departments, to continue developing rest area policy, planning, and more.

PROCESS

The Rest Areas program continues to train staff to ensure proper use of a mobile application used to assess rest areas. The resulting data is essential to complying with Colorado's 2018 Community Living Report, which requires CDOT's transportation system

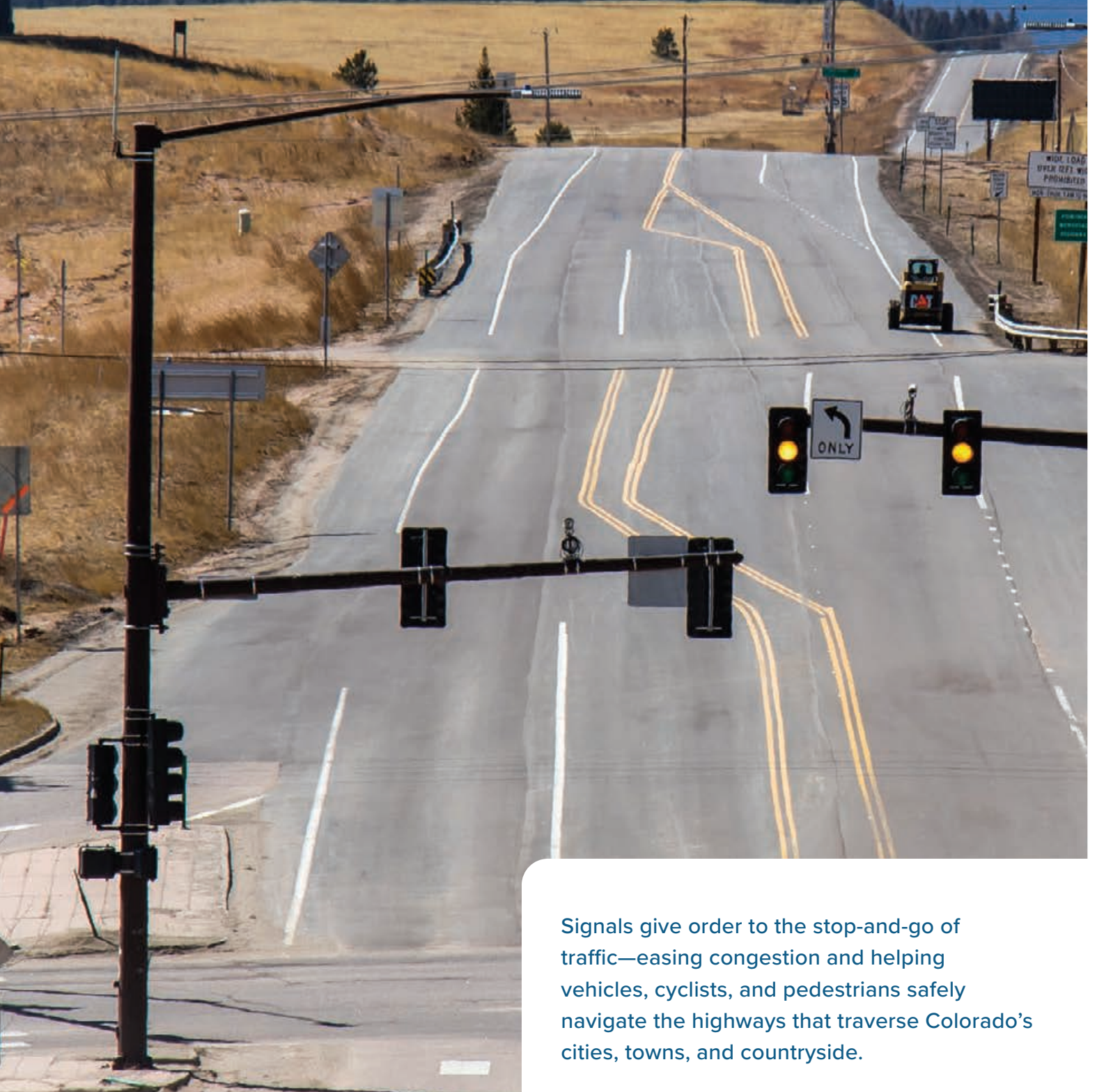
to meet the needs of all Coloradans. Rest Areas also are required to certify compliance with the Americans with Disabilities Act (ADA) annually. Therefore, collected data must be accurate and timely to allow the Department to fix deficiencies prior to certification.

TECHNOLOGY AND ANALYSIS

Rest Areas were added as an asset in 2018, so rest-area assessment data, such as condition scoring, remains in their infancy. Continual improvements to data collection and analysis will be needed to improve the AIMS model's forecasting capabilities for this asset class.



A-8. TRAFFIC SIGNALS



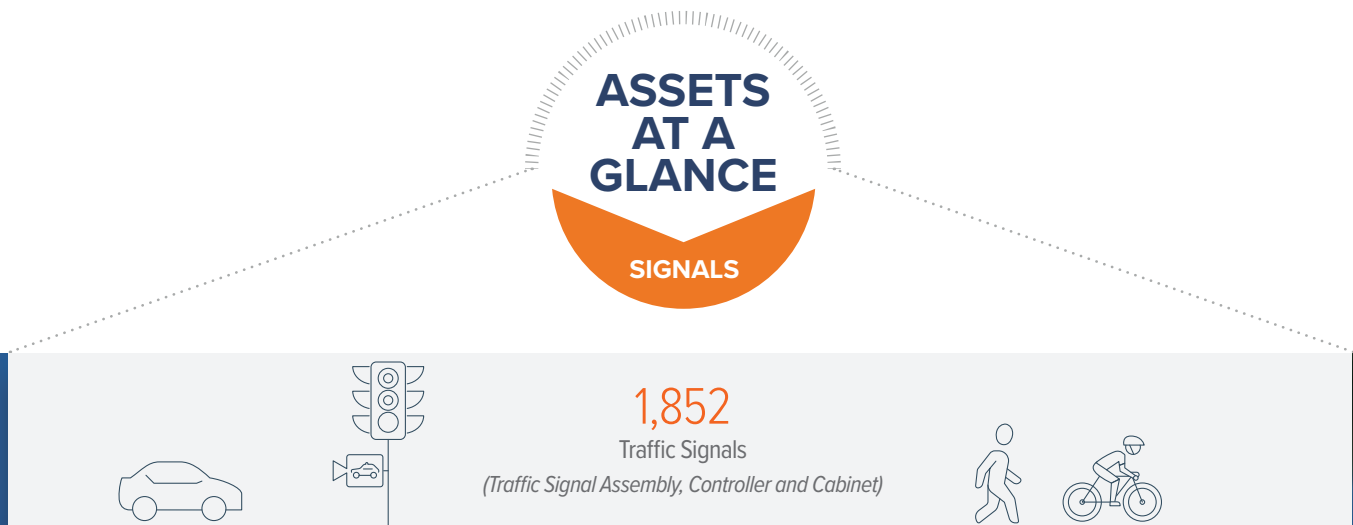
Signals give order to the stop-and-go of traffic—easing congestion and helping vehicles, cyclists, and pedestrians safely navigate the highways that traverse Colorado’s cities, towns, and countryside.

CDOT owns 1,852 traffic signals, nearly half of which are managed by local agencies. As the asset owner, CDOT maintains inventory and condition data on all of its traffic signals assets and uses that data to prioritize repairs and replacements. This prioritized approach allows CDOT to minimize signal down time and manage life-cycle costs, which include replacing signals assets at the end of their useful life spans.

More than 85 percent of the signals are in Good to Fair condition. However, 7 percent of signals are in Severe condition, short of the Department's target of 2 percent. CDOT is considering a range of activities to address performance gaps, including rehabilitating signals to postpone needed replacements, upgrading technology, performing targeted maintenance and repairs to extend asset life, and replacing signalized intersections with innovative solutions.

Traffic signals are managed under a comprehensive asset-management process closely aligned with the process illustrated in the Introduction to the Asset Plans Appendix on page A-1.

Figure A.8-1 *Traffic Signals Assets at a Glance*



PERFORMANCE MANAGEMENT

CDOT monitors and manages performance through routine assessments of its traffic signals and their primary components. The Department has established performance targets and measures for signals, focusing its budget and prioritizing work to achieve strategic goals and provide vital transportation services to the public.

POLICY DIRECTIVE 14 PERFORMANCE MEASURE—TRAFFIC SIGNALS

The primary performance measure for traffic signals is the percentage of signals in Severe condition. This target reflects Policy Directive 14 (PD 14.0) goal areas related to asset management, safety, and mobility. It represents the desired level of performance to be achieved given expected future funding.

Table A.8-1 presents the PD 14.0 target for traffic signals—that less than 2 percent of signal infrastructure should be in Severe condition. The current (2021) performance is 7 percent, or 5 percentage points from the target.

OTHER PERFORMANCE MEASURES

In addition to the percentage of traffic signals in Severe condition, CDOT considers technological or functional obsolescence to qualify signal components for replacements. This measure is primarily used in the prioritization of asset management and repair/replacement decisions.

Table A.8-1 CDOT Asset Management Metric and Performance Target for Signals

	Measure	Target	2021 Performance
SIGNALS	Percentage of traffic signals infrastructure in Severe condition	<2%	7%



INVENTORY AND CONDITION

CDOT's inventory of traffic signals and their condition is maintained within the Statewide Signal Asset (SSA) database and CDOT's SAP financial system. The statewide asset inventory is maintained in the SSA database, overseen by the Signal Asset Manager, in coordination with CDOT Region staff. The asset inventory is updated quarterly by Region staff and is reviewed annually by CDOT Headquarters for quality control.

INVENTORY

CDOT owns 1,852 traffic signals statewide. About 51 percent of these are managed by CDOT, and the remaining 49 percent are managed by local agencies under the Senate Bill 8 (SB 8) signal maintenance agreements. CDOT is responsible for the replacement of traffic signals it owns at the end of their useful life span, regardless of the managing agency. On average, about eight to 10 new traffic signals are constructed statewide annually. CDOT expects an annual growth in traffic signals inventory of about 0.5 to 1 percent in the future.

ASSET HIERARCHY

For asset management purposes, the inventory database for traffic signals consists of three primary components: traffic signal assembly, cabinets, and controllers. **Figure A.8-2** illustrates the elements of a traffic-signal system. Traffic signals are designed specifically for each location, so the type and number of specific elements vary for each signal.

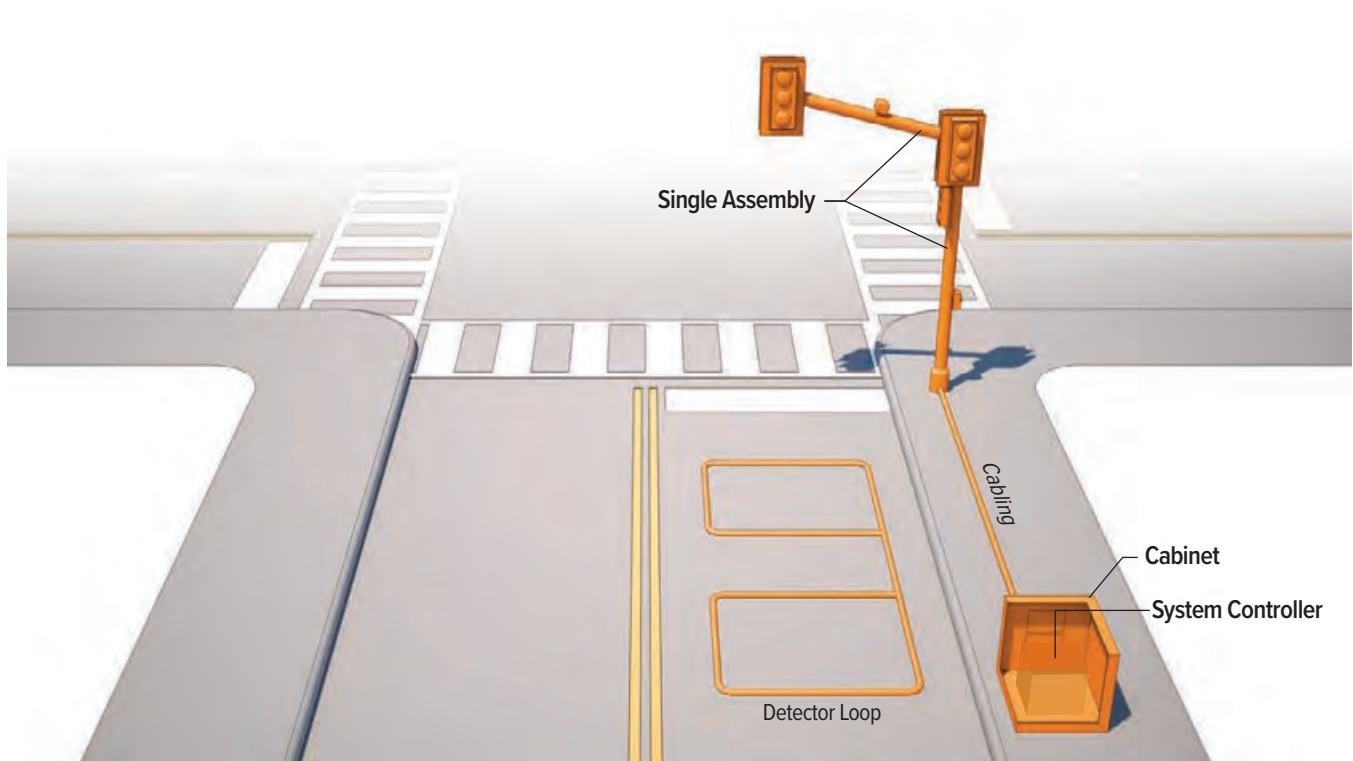
Traffic-signal assembly: The signal assembly comprises the underground and above-ground signal infrastructure at a traffic-signal intersection, including poles and mast arms, span wires, communication devices, electrical equipment, pedestrian poles and push buttons, advance warning signs, flashing beacons, signal heads, bicycle/pedestrian indications, and detection devices.

Controllers: A system controller, located within a cabinet along the roadway, manages the traffic-signal functions locally. Controllers can be networked together to manage the functions of multiple intersections. Controllers use inputs from vehicle detectors and pedestrian call boxes to monitor the operation of each intersection, coordinate signal timing between intersections, and detect errors in operation.

Cabinets: Cabinets are located at every traffic-signal intersection. The cabinet houses items such as the intersection controller, underground wiring and pull boxes, Uninterrupted Power Supply (UPS) equipment, back panel, electrical and electronic equipment, load switches, Internet Protocol (IP) devices, conflict monitor, circuit breakers, and power filters.

Figure A.8-2 Traffic Signal Elements

Traffic signals consist of three primary components—the traffic signal assembly, controllers, and cabinets. The cabling transfers data from the system controller to the signal assembly, and the detector loop detects vehicles passing or arriving at a certain point (e.g., approaching a traffic light).



CONDITION





CDOT begins rating the condition of a traffic-signal system at the component level, and then calculates a rating for the system using a four-level scale: Good, Fair, Poor, and Severe. The condition-rating system was established by the Statewide Traffic Signal Program in coordination with Region signal maintenance and operations staff. Several data sources are used to establish condition ratings, including signal maintenance records, structural-integrity data from signal pole and mast-arm inspections conducted by the Staff Bridge Branch, highway video logs collected

by the Division of Maintenance and Operations (DMO), signal-age data, and Region signal staff input.

Of these factors, the structural integrity information is given higher priority, followed by the Region maintenance staff input, and highway video logs. Information from these sources is weighted qualitatively to assign a condition rating to an asset.

Table A.8-2 summarizes the condition-rating approach used by CDOT to assess the performance of traffic signals based on asset age and condition.

Table A.8-2 Condition Ratings for Traffic Signals

Status	Assessment	Structure Age	Cabinet Age	Controller Age	Illustration of Asset Condition
Good	The signal is in new or near-new condition. No damage or operational problems reported. No major repairs identified during annual Maintenance Levels of Service (MLOS) survey or routine maintenance visits.	0-5 years	0-5 years	0-3 years	
Fair	The hardware infrastructure needs periodic preventive maintenance or repairs to keep the signal in operational status.	6-30 years	6-10 years	4-7 years	
Poor	The hardware infrastructure is near the end of its useful design life. Operational failures have increased due to wiring, aging, and support hardware problems. Preventive maintenance cannot reasonably extend asset life much longer. Functional or technological obsolescence is evident. Frequent maintenance visits to repair or replace aged or damaged components.	31-45 years	11-20 years	8-15 years	
Severe	Structural or technological obsolescence. Structural integrity issues identified by Staff Bridge structural inspections or by signal maintenance staff. Signal supported by span wire. For cabinets and controllers, the hardware infrastructure has reached or exceeded its intended design life and needs replacement.	>45 years	>20 years	>15 years	

CURRENT CONDITION

Table A.8-3 summarizes conditions of traffic signals, overall and by component. More than 85 percent of signals are in Good to Fair condition, based on overall condition.

Table A.8-3 Traffic Signal Condition, Overall and by Component

Asset Subcategory	Asset Condition			
	Good	Fair	Poor	Severe
Signal Assembly	36%	50%	8%	6%
Cabinets	73%	6%	7%	14%
Controllers	79%	3%	4%	14%
Overall Condition	36%	50%	8%	6%

CONDITION TRENDS

Table A.8-4 shows condition data for traffic signals from 2017-21. Conditions have improved by one percentage point over this period.

Table A.8-4 Traffic Signal Condition Trends

Measure	Target	2017	2018	2019	2020	2021
Percent of Signal Infrastructure in Severe Condition	2% or less	8%	7%	7%	7%	7%

ASSET VALUE

CDOT undertook an assessment of the asset value of signals in early 2022. The current replacement value, determined by current acquisition value, is \$1.3 billion. To calculate current asset value, the replacement value is discounted by the useful life of the assets, which is based on the average age of all signal assets, plus two standard deviations of age. The current value of CDOT’s traffic signals is \$722 million.

LIFE-CYCLE PLANNING

Traffic-signal components are designed to provide a service life of 30 years or more. CDOT leverages analysis of condition data to prioritize repairs and preventive maintenance activities that maximize service life and replacements. The combination of these strategies allows CDOT to cost effectively manage signal downtime and life-cycle costs.

LIFE-CYCLE PLANNING

CDOT uses a condition-based approach to the life-cycle management of traffic-signals assets. However, as noted by the condition ratings defined in **Table A.8-2**, condition is in part defined by assumptions about asset age relative to expected useful life. Regular inspections, in coordination with preventive and corrective maintenance, ensure continued functionality and help extend useful life to assure maximum return-on-investment from traffic-signals assets. CDOT attempts to use signal equipment until its expected end of life or when it is deemed a risk of assembly failure—as determined by various means and reflected in its condition rating—whereupon it is replaced.

CDOT is prioritizing replacement of all existing traffic-signals assets in Severe condition, followed by assets in Poor condition. In lieu of replacing an entire assembly, viable parts may be salvaged from retired assets and reused to keep other signal systems

operational. With this approach, CDOT is looking to mitigate the risk that Severe and Poor signals pose to mobility and traffic safety.

PROGRAM DECISION-MAKING

TREATMENT SELECTION

CDOT employs a variety of treatments to address signal conditions. Treatment decisions are made by CDOT Headquarters, in coordination with Region staff. CDOT uses its Asset Investment Management System (AIMS) model to determine budget needs and priorities for replacement.. Currently, the traffic-signal asset management budget only funds replacement of assets in Severe condition. CDOT is considering adding rehabilitation as a treatment type.

Non-replacement work types are undertaken through the Maintenance Levels of Service program. The treatments are linked to the Federal Highway Administration (FHWA) work types in **Table A.8-5** below, along with typical unit costs.

Table A.8-5 Traffic Signal Treatments and Unit Costs

Work Type	Treatments	Typical Unit Cost
Preservation	Preventive maintenance activities, including cleaning/vacuuming signal cabinets; wiping camera lenses; repairing detector damages; cleaning pull boxes; painting the poles/mast arms with anti-corrosive coating; etc.	<\$5,000
Maintenance	Functional (e.g., optimizing signal-timing plans), hardware (e.g., replacing malfunctioning equipment), and software treatments (e.g., software modifications/upgrades to provide additional features).	<\$5,000
Rehabilitation	Rebuilding parts, such as a pole or mast arm with section loss.	\$10,000 - \$25,000
Reconstruction (Replacement)	Replacing an asset in Severe condition due to structural and/or functional/ technological obsolescence.	Signal Assembly/ Intersection: \$650,000 Cabinets: \$15,000 Controllers: \$30,000
New Construction	A signal is constructed where warranted per the Manual on Uniform Traffic Control Devices (MUTCD) guidelines.	\$700,000 to \$750,000

Preservation (Preventive and Routine Maintenance)

Preventive and routine maintenance is performed with the purpose of reducing the frequency and severity of signal malfunctions, thereby extending the life of signal infrastructure, reducing life-cycle costs, and optimizing signal operations. CDOT Region signal supervisors oversee these activities, with in-house staff and consultants conducting the work.

Annual preventive maintenance checks are performed on every signal. During these visits, asset needs are identified and prioritized based on severity and available resources. Maintenance supervisors also review and prioritize citizen complaints from a safety and operations perspective to identify needed maintenance. The preventive and routine maintenance treatments are funded using the Maintenance Levels of Service (MLOS) budget.

Maintenance

Maintenance activities include repairing signal hardware that is located inside the cabinets, controllers, and wiring (both underground and overhead), including damage from rodent activity. In-house technicians and consultants identify needed repairs during preventive- and routine-maintenance visits. Repairs are prioritized by the Region signal supervisor based on available resources.

Functional maintenance activities focus on improvement rather than repair—including updating traffic-signal system databases and optimizing signal timing plans.

Hardware maintenance can include remedial, preventive, or modification-related activities:

- » Remedial hardware maintenance includes the immediate replacement of malfunctioning or failed equipment.
- » Preventive hardware maintenance involves checking equipment at scheduled intervals to minimize probability of failure.
- » Hardware modification relates to addressing design flaws or other changes needed to improve equipment.
- » Software maintenance includes debugging problems identified following system acceptance, or modification of software to provide additional features.

Maintenance activities are funded by the MLOS budget.

Rehabilitation

Rehabilitation activities include rebuilding traffic signal parts or components to restore them to a required functional condition and to improve longevity. The work includes surface preparation and painting of traffic-signal poles, mast arms, signal heads, luminaire arms, safety-lighting housings, pedestrian-button housings, back plates, cabinets, etc. Rehabilitation activities are funded by the MLOS budget.

Reconstruction (Replacement)

Reconstruction/replacement involves the removal of existing signal components and installation of a new system. CDOT Region staff are responsible for delivering signal-replacement projects, and the projects always involve replacing the entire signal assembly. The replacement projects are funded by the TAM Program through the Traffic Signal Asset Management (SGA) funding pool. A replacement project is triggered when a signal component reaches Severe condition. **Table A.8-2** provides the average age when the signal components are expected to be replaced.

CDOT's replacement projects are built to the latest standards and specifications, such as CDOT Maintenance & Safety (M&S) Standards; guidance in the Manual on Uniform Traffic Control Devices (MUTCD); guidance in the AASHTO Roadside Design Guide; Americans with Disabilities Act (ADA) requirements; and other applicable federal and state standards and guidelines.

New Construction

CDOT conducts “warrant analyses” to determine when construction of new traffic signals is warranted. This analysis is performed by CDOT Regions. New signal construction is typically funded by the Statewide Traffic Signal Pool (SGN), which is funded at about \$1.5 million annually. Because these funds are insufficient to build more than two signals annually, several intersections statewide are awaiting funding. The new assets are added to the statewide inventory, after which they are considered in asset-management analyses.

PROJECT SELECTION AND DELIVERY

The signals project-selection process begins when CDOT's Performance and Asset Management Branch uses the AIMS model to import traffic-signal data from the SSA database and to provide a recommended list of treatments. The database includes records

for key signal components, acquisition costs, installation costs, and condition assessments. The information is derived from other data sets, such as structural inspections, maintenance work-order history logged in CDOT's financial system (SAP), and visual assessments from video runs. The AIMS model allocates 80 percent of the available funding to signal assemblies, 10 percent to controllers, and the remaining 10 percent to cabinets.

The Signal Asset Manager reviews the AIMS model's output (AIMS generated treatment list) and provides this information to the Regions. Based on the AIMS

output, the Regions submit a desired list of capital replacement projects back to the Signal Asset Manager, including evaluation, prioritization, and recommendation. The Traffic Signal Asset Steering Committee and Region staff then collaborate to finalize the project list based on fiscal constraints set by the Transportation Commission. The Signal Asset Manager delivers the final project list to the Regions. Regions then implement and deliver approved eligible signals projects.



RISK MANAGEMENT

Aligned with CDOT’s overall risk-management approach, the Traffic Signals program manages risk across multiple levels—agency, programmatic, and project/asset. Section 6 of the overall TAMP provides more information about CDOT’s risk-management methodology and processes.

The Traffic Signals program maintains a register of risks to its overall program and projects. Top risks to the Traffic Signals program are presented in **Table A.8-6**.

Table A.8-6 *Top Traffic Signal Risks*

Risk Level	Threat/Opportunity	Risk Score	Risk-Management Strategy
Program	Changing federal and state laws, policies, standards, and specifications in the near future (e.g., Update to the Manual on Uniform Traffic Control Devices [MUTCD], ADA requirements, multi-modal considerations).	39.6 (L)5 * (C)3.9 * (V)2 ¹	Treat, tolerate—maintain existing infrastructure, replace/upgrade to the latest standards when asset treatment is required.
Project	Loss of communication due to fiber damage or utility-line damage (e.g., loss of power, fiber cuts).	37.4 (L)5 * (C)3.7 * (V)2	Treat by location. Tolerate—repair, replace, where required. Collect damages from utility operators.
Project	Signal components (cabinets, poles) damaged by vehicles.	37.4 (L)5 * (C)3.7 * (V)2	Treat, tolerate, terminate. Repair, replace based on post-event inspection.
Program	Increased construction costs and labor/material shortages.	36.0 (L)5 * (C)3.6 * (V)2	Treat, tolerate—maintain existing infrastructure, implement innovative project-delivery methods.



¹ Risk Score = Likelihood (L) * Total Consequence and Consideration Score (C) * Vulnerability (V)

FINANCIAL PLAN

CDOT sets planning budgets for traffic signals four years in advance. For the 10-year financial plan in this section, the Department assumes steady funding for the six years that follow these planning budgets. These funding estimates, combined with life-cycle management approaches discussed in the previous section, inform the investment strategies CDOT plans to leverage to achieve system-wide asset performance goals while minimizing life cycle costs.

FUNDING SOURCES

The Traffic Signal program manages two funding pools:

- » The Statewide Traffic Signal (SGN) pool delivers funding to each Region on an annual basis. These funds are designated specifically for new signal construction or signal system-related improvements.
- » The Statewide Signal Asset Management (SGA) pool delivers funding for capital replacement to each Region on an annual basis to address traffic signal infrastructure that is in Severe condition. The SGA pool funding is divided into six parts. Region 1 receives two parts, while Regions 2-5 receive one part each.

CDOT's FASTER Safety program may be used for projects that include repair or replacement of traffic signal boxes, controllers, assemblies, and other associated signal infrastructure. Other projects that

may receive the FASTER Safety funds include those replacing signal assets that are in deteriorating condition and do not meet current standards in the FHWA MUTCD, CDOT Maintenance & Safety Standards, and other regulations.

Preservation, maintenance, and rehabilitation activities are funded by the Maintenance Levels of Service (MLOS) budget.

PLANNED FUNDING

The Traffic Signal program develops a treatment list for each year of a rolling four-year period. Treatments ultimately become standalone projects or are bundled by staff into projects that may encompass multiple treatments. **Table A.8-7** shows the annual planned budget for traffic signals.

Table A.8-7 Financial Plan for Traffic Signal Assets (in Millions)

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
\$12.5	\$9.2	\$9.2	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2	\$8.2

INVESTMENT STRATEGIES

CDOT forms investment strategies based on its financial plan and life-cycle management strategies identified to achieve system-wide asset performance goals while minimizing life-cycle costs. The investment strategies delineate different types of work to be performed across CDOT's traffic signals assets over a 10-year period.

BACKGROUND: DETERMINING ASSET STRATEGIES

CDOT forecasts the condition of traffic signals using its AIMS model. The analysis predicts the condition of each signal component (i.e., assembly, controller, and cabinet) for a 20-year period, using deterioration assumptions developed within the Department. The model also generates a list of treatment strategies for each signal component. CDOT uses the model to run various budget scenarios to determine performance impacts and recommended construction programs. Each component is analyzed separately, with yearly budgets established for each component type.

PLANNED INVESTMENTS

The majority of traffic-signal investments are aimed at replacing signals in Severe condition. CDOT plans to invest a total budget of \$8.2 million annually, beginning in fiscal year 2025, to maintain traffic signals assets, with 5 percent of that total allocated for emergency replacements.



PERFORMANCE GAP ANALYSIS

CDOT uses a performance-driven approach to manage traffic signals. This section describes the projected performance of these assets given the planned funding and investment strategies described in the previous two sections. The section then compares projected performance against the performance target. CDOT’s ability to close performance gaps largely depends on receiving additional funding. For traffic signals, CDOT also is assessing additional opportunities to close performance gaps that focus on adjustments to life-cycle planning strategies.

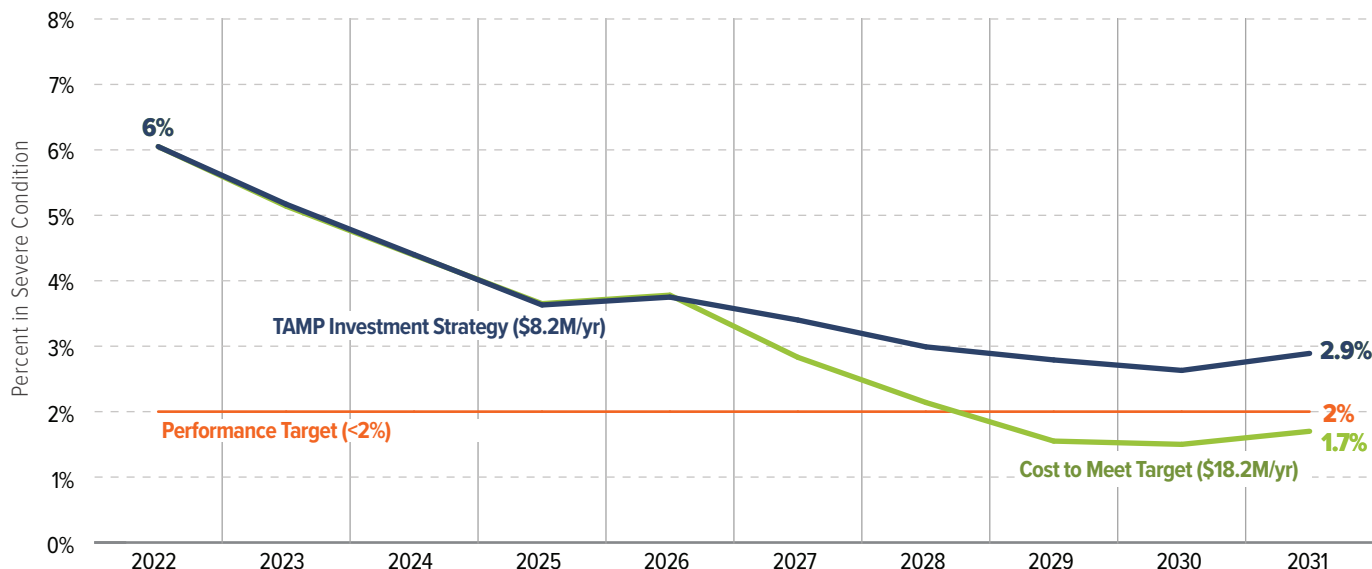
NEEDS AND PROJECTED CONDITION

CDOT’s AIMS model predicts the long-term performance of signals given expected funding. Signal components deteriorate in the model using step functions based on the expected life cycle of each component (i.e., assembly, controller, and cabinet). The components deteriorate from Good to Fair, then to Poor, and then to Severe based on the expected life of each component. The model assumes that 80 percent of planned budgets is dedicated to signal assemblies, while 10 percent is dedicated to cabinets, and 10 percent to controllers.

At planned funding levels (about \$8.2 million annually), traffic signals are not expected to meet the performance target of having no more than 2 percent of signals in Severe condition by 2031. As shown in **Figure A.8-3**, an additional \$10 million in annual budget is required to meet CDOT’s performance target by 2029 and sustain that state until year 2033. At that point in time, a significant number of signals owned by CDOT will begin reaching the end of their designed service lives. To sustain the targeted performance beyond 2033, an additional \$25-\$50 million in annual budget will be required to replace signals.

Figure A.8-3 Forecasted Percentage of Signals in Severe Condition

The anticipated annual budget of \$8.2 million will not meet the performance target of ensuring that less than 2 percent of traffic signals are in severe condition. The annual cost of meeting the target by 2031 is about \$18.2 million, or an additional \$10 million per year.



IMPACTS OF INSUFFICIENT FUNDING

Traffic signals are crucial to the resiliency of CDOT's highway system. As a result of insufficient funding, the following risks would be increased:

- » **Safety:** An increased number of signals in Severe condition could lead to increased signal downtime or structural failures, posing safety risks.
- » **Effectiveness:** With more assets in Poor and Severe Condition, CDOT may need to divert funding from planned work to address emergency repairs and replacements.
- » **Mobility:** More signal failures may increase travel delay, congestion, and conflicts between highway users.
- » **Cybersecurity:** Technologically obsolete signal equipment could lead to cybersecurity risks.
- » **Efficiency:** Signals in Poor or Severe condition could increase maintenance costs needed to achieve satisfactory asset condition.

OPPORTUNITIES TO CLOSE THE GAP

CDOT has reduced the number of traffic signal components in Severe condition in recent years. However, current funding is not expected to support achieving the performance target in the 10-year TAMP analysis period. Additionally, CDOT is expecting a significant number of traffic signals to reach the end of their design-service lives starting in 2033. To replace these systems as they reach their design lives, an estimated additional \$25 to \$50 million annually (over planned funding levels) is required. CDOT is exploring several strategies to close the existing performance gap:

- » Currently, traffic signal assemblies are being replaced or prioritized based on issues with structural integrity. The CDOT treatment types available for those assemblies are “replacement” or “rehabilitation.” The Department is identifying the traffic-signal assemblies needing rehabilitation. The

rehabilitation strategy may increase the useful life of signal assemblies, thereby pushing the needed replacement strategy into future years.

- » Signal cabinets and controllers are being replaced primarily due to technological obsolescence. Each location is being reviewed from an operations perspective, and technology upgrades are being performed where necessary.
- » Annual preventive maintenance activities ensure that components of traffic signal infrastructure are sufficiently serviced or tuned to prevent equipment failures, ensuring optimal operation, and extending the life of signal assets.
- » Routine maintenance ensures that signal concerns are addressed in a timely manner, including for emergency responses during equipment failures, to quickly restore the normal operation of traffic signals.

To address expected funding shortfalls in the 2030s, CDOT will evaluate several strategies, including:

- » Using targeted maintenance and repairs to extend the service lives of current signals, delaying the need for replacements.
- » Increasing funding for traffic signals earlier than 2033 to replace some assets before the end of their service lives.
- » Replacing signalized intersections with other designs, such as roundabouts, to reduce the number of signals in service.

STRATEGIC USE OF ADDITIONAL REVENUE

Should CDOT receive additional revenue to fund the Traffic Signals asset class, the Department's first priority is to eliminate any funding gaps related to achieving the PD-14 performance target. Once goals are achieved, the Department will reduce the Severe backlog with a priority towards the most critical and/or vulnerable assets to improve system resiliency. CDOT estimates the “Severe” backlog for Traffic Signals could be eliminated with about \$185 million.

FUTURE IMPROVEMENTS

CDOT plans several improvements to processes, technology, and analysis capabilities to increase the efficiency and effectiveness of the Traffic Signals program.

PROCESS

CDOT plans to improve its management processes for traffic signals over the next 10 years, including the following activities.

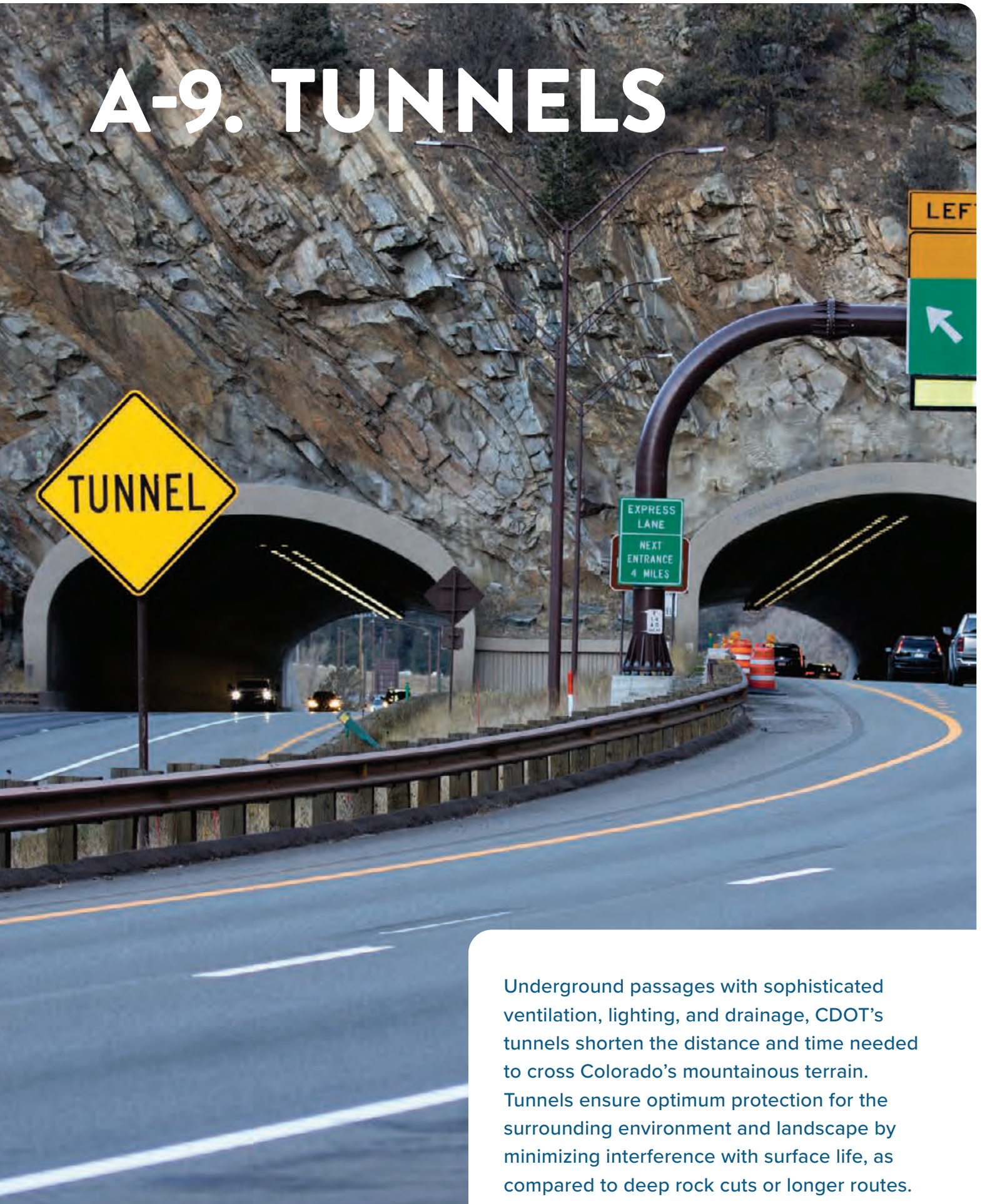
- » **Identification/classification of signal maintenance activities/costs:** Maintenance activities related to traffic signals assets are currently being charged to a one-mile section in SAP, CDOT's financial system. In the future, traffic signal assets and subcomponents will be identified in SAP so that the asset-related activities can be charged to a particular location. This will provide the granular information needed to make informed decisions on maintenance and repair/replacement activities. Work Manager, a web-based tool, is being piloted in some regions to efficiently log traffic-signal work orders.
- » **Automation of preventive maintenance data-collection process:** The data collection staff and technicians will be trained on the new approach, including how to log the condition data into the mobile application. This GIS-based application is being piloted in Region 1.

TECHNOLOGY AND ANALYSIS CAPABILITIES

Several planned improvements are being explored to enhance traffic-signal technology and to support the analysis process, as summarized below.

- » **Review of inputs in AIMS model:** In particular, the deterioration models should be continuously reviewed and updated. They could be enhanced to be equipment-type specific. The review of the deterioration curves should reflect the actual age when the signals become inoperable or when there is a safety issue.
- » **Automated Traffic-Signal Performance Measurement:** Following upgrades to the existing traffic signal infrastructure, CDOT is considering automating performance measurement by:
 - Updating old signal controllers to newer advanced transportation controllers (ATC).
 - Updating existing signal cabinets to ATC cabinets at the end of their useful life cycle.
 - Upgrading the Central Traffic Signal Control System statewide.
 - Establishing Center-to-Center Communication (C2C) between CDOT Regions and the Colorado Traffic Management Center (CTMC) to manage the signal systems after normal working hours, thereby providing 24/7 active management of the arterial corridors.
 - Implementing Automated Traffic Signal Performance Measures (ATSPMs) to proactively manage the operation and maintenance activities.
- » **Traffic Adaptive Technology:** The traffic signal infrastructure (signal timing) will be adapted to be based on the traffic measurement in real time, making traffic-signal operations more accurate and reliable.
- » **Future Connected-and-Automated Vehicle (CAV) Integration Capabilities:** The existing Intelight ATC signal controllers deployed in recent years have CAV integration capabilities. Additional instrumentation is required, such as on-board units (OBU), roadside units (RSU), communication devices, and field infrastructure, to deploy CAV technology on arterial corridors. A pilot project is underway in Region 1 primarily focused on a Snowplow Priority application, using CAV technology.
- » **Integration and Communication with Other Devices or Software:** CDOT is considering system-level integration with the recently deployed Advance Transportation Management System (ATMS) at the Colorado Traffic Management Center. The system brings together all transportation/traffic related applications and stakeholders to make data-driven decisions possible using system-wide data and analytics.

A-9. TUNNELS



Underground passages with sophisticated ventilation, lighting, and drainage, CDOT's tunnels shorten the distance and time needed to cross Colorado's mountainous terrain. Tunnels ensure optimum protection for the surrounding environment and landscape by minimizing interference with surface life, as compared to deep rock cuts or longer routes.

CDOT tunnels are managed in alignment with the CDOT asset-management process described in the Introduction to the Asset Plan Appendix on page A-1. While planned funding levels are expected to achieve a desired state of good repair for the next 10 years, as measured by CDOT's primary tunnels metric, significant modernization and other needs fall outside that metric. These needs will be met partly through new funding through the Statewide Bridge and Tunnels Enterprise, which added tunnels to its purview in 2021 (see page 23 of the main TAMP document).

Figure A.9-1 Tunnels Assets at a Glance



PERFORMANCE MANAGEMENT

The performance of tunnels is monitored and managed as part of CDOT’s Division of Maintenance and Operations, along with the Staff Bridge Branch. In 2021, the Statewide Bridge and Tunnel Enterprise also began contributing to the management of tunnels. Performance targets inform funding decisions and track how well these assets are supporting the agency’s strategic goals and the transportation services provided to the public.

POLICY DIRECTIVE 14 PERFORMANCE MEASURE—TUNNELS

The asset management program for tunnels contributes to all Policy Directive 14 (PD 14.0) performance areas. Tunnels are integral to the performance, resilience, and reliability of CDOT’s highway network. The PD 14.0 measure for maintaining tunnels in a state of good repair is the percentage of the network tunnel length with all elements in equal or better condition than 2.5 Weighted Condition Index (WCI). The process

for assessing tunnel condition is described in the Inventory and Condition section. **Table A.9-1** shows the PD 14.0 target and the 2020 performance for tunnels.

CDOT considers its tunnels to be meeting the performance target if 75 percent of the network tunnel length have all elements in equal or better condition than 2.5 WCI. The current (2020) performance is 39 percent.

Table A.9-1 CDOT Asset Management Metric and Performance Target for Tunnels

TUNNELS		Measure	Target	2020 Performance
		Percentage of the network tunnel length with all elements in equal or better condition than 2.5 WCI	75%	39%



INVENTORY AND CONDITION

The CDOT Staff Bridge Branch oversees the collection and management of CDOT’s tunnel inventory and condition information. The inventory is updated with condition information according to National Tunnel Inspection Specifications (NTIS) established under 23 CFR 650.¹

INVENTORY

As of 2020, CDOT owns and maintains 20 tunnels, with a total length of about seven miles, as documented in **Table A.9-2**. CDOT staff are continuously onsite at four of these tunnels to operate and maintain the facilities. Staffed tunnels represent about 70 percent of the total tunnel length under CDOT control.

Table A.9-2 Inventory of Tunnels Assets (2020)

Inventory Unit	Current Count	Length (ft.)
Staffed	4	25,906
Unstaffed	16	11,588
Total	20	37,494

Examples of Tunnel System Assets



¹ eCFR :: 23 CFR Part 650 -- Bridges, Structures, and Hydraulics

ASSET HIERARCHY

CDOT’s typical tunnel system consists of seven general classes of tunnel elements (see **Table A.9-3**). CDOT tracks the condition and/or functionality of major elements and other components that comprise each tunnel. Table A.9-3 provides an overview of the relationship between different elements and examples of each.

Table A.9-3 Tunnel Element Classes

Element Class	Examples of Elements
Structural	Tunnel liners, tunnel roof girders, columns/piles, cross passageways, interior walls, ceiling girders, and panels
Mechanical	Ventilation systems, tunnel drainage, emergency generator, and flood gate
Fire/Life Safety/Security	Fire detection and protection, emergency communications
Electrical	Electrical supply and distribution including emergency power
Lighting	Tunnel and emergency lighting
Civil	Wearing surface, traffic barrier, pedestrian railing, and roadway
Sign	Traffic guidance, pedestrian egress signs, variable-message boards, and lane signals

CONDITION

CDOT’s condition data aligns with National Tunnel Inspection program regulations. CDOT’s Staff Bridge Branch contracts with certified tunnel-inspection engineers to collect tunnel inspection data. Tunnel condition surveys and inspections are performed every 24 months and include geotechnical structure, structural elements, tunnel systems, and life-safety components. Condition assessment by professional engineers is critical for consistent and high-quality data collection. Inventory and condition data are reported to the Federal Highway Administration (FHWA) annually.

Inspection data is based on a 1-4 condition rating scale, also known as “Condition State,” as summarized in **Table A.9-4**. Condition data from inspections are used within performance models. Tunnel element age also is collected to predict the remaining life for assets, and the information is used in the performance model.

Table A.9-4 Condition-Rating Methodology for Tunnel Elements

Condition States	Assessment	Condition Category
State 1	No notable distress	Good
State 2	Isolated breakdowns or deterioration	Fair
State 3	Widespread deterioration or breakdowns without reducing load capacity	Poor
State 4	The condition warrants a structural review to determine the effect on strength or serviceability of the element or tunnel, or a structural review has been completed and the defects impact strength and serviceability of the element or tunnel	Severe

CONDITION TRENDS

As of 2020, 39 percent of the network tunnel length was in equal or better condition than 2.5 WCI, short of the PD 14.0 target of 75 percent, as shown in **Table A.9-5**.

In the table, condition numbers vary significantly from year to year. Some variance is due to changes within the Eisenhower-Johnson Memorial Tunnels (EJMT).

These tunnels are just over 1.5 miles long, account for 47% of the tunnel network length, and therefore annual changes in their condition have a significant impact on the overall tunnel-condition metric, which is heavily influenced by length. The EJMT is almost 50 years old and its infrastructure is aging. Repairs were undertaken prior to the 2018 results and further repairs have begun in 2022.

Table A.9-5 *Condition Trends for Tunnels*

Year	Percentage of network tunnel length with all elements in equal or better condition than 2.5 Weighted Condition Index (WCI)	Year	Percentage of network tunnel length with all elements in equal or better condition than 2.5 Weighted Condition Index (WCI)
2015	47%	2018	91%
2016	45%	2019	N/A
2017	66%	2020	39%

ASSET VALUE

CDOT undertook an assessment of asset value in 2022 for this document. The current replacement value of tunnels is determined by using a unit cost for tunnel elements. This replacement value is \$3.2 billion.

To calculate current asset value, the replacement value is adjusted by the condition rating. The current value of tunnel assets is \$2.8 billion.



LIFE-CYCLE PLANNING

CDOT analyzes its tunnel inventory and inspection data to forecast investment needs and to set work priorities. This process is known as life-cycle planning and accounts for the whole-life costs of planning, constructing, and maintaining tunnels. In doing so, the process aims to minimize long-term costs while preserving or improving condition. CDOT's tunnel-investment plan leverages findings from annual inspections, as well as treatment recommendations for the next 20 years from CDOT's asset model, to identify and prioritize treatments for tunnels.

LIFE-CYCLE PLANNING

CDOT uses a condition-based approach for the life-cycle management of tunnels. Condition data and remaining life is used to determine the appropriate types and timing of work and to prioritize potential work within available budgets. As part of the tunnel-maintenance program, CDOT performs cost-benefit analysis to determine treatment program priorities. Since tunnels are underground, their performance is significantly influenced by local geologic conditions. Unfavorable conditions, such as soft soils or rock with weak planes intersecting a tunnel, can impact tunnel design, construction, and long-term performance.

CDOT's Asset Investment Management System (AIMS) model supports life-cycle planning analysis. It begins by utilizing deterioration models to forecast the future condition for each tunnel element. The model then generates a list of possible treatment strategies for each tunnel element, consisting of rehabilitation and replacement treatments, for each analysis year. During the generation of strategies, the model's analysis does not consider the budget. The analysis begins to consider the budget once all alternative strategies have been generated and optimization begins. The model's optimization process then selects a set of treatments, within a given budget constraint, that maximizes the benefit to the network.

In addition to the AIMS model described above, CDOT performs a risk-based prioritization using a Multi-Objective Decision Analysis (MODA) tool. This MODA tool is a secondary filter on the

AIMS recommendations. This analysis assigns an effectiveness score to each treatment recommendation based on three measures:

- » Level of service: preservation, mobility, safety, economic vitality, security, and environment.
- » Cost-effectiveness: capital cost, remaining life, and annual cost-per-daily-vehicle.
- » Risk-based urgency: remaining life, condition, regulatory, compliance, and risk of unplanned events.

Each tunnel treatment is scored based on the three measures and rolled up to a total score. Priority is assigned to tunnels with the highest total scores. This then forms the Tunnel Prioritization list.

PROGRAM DECISION-MAKING

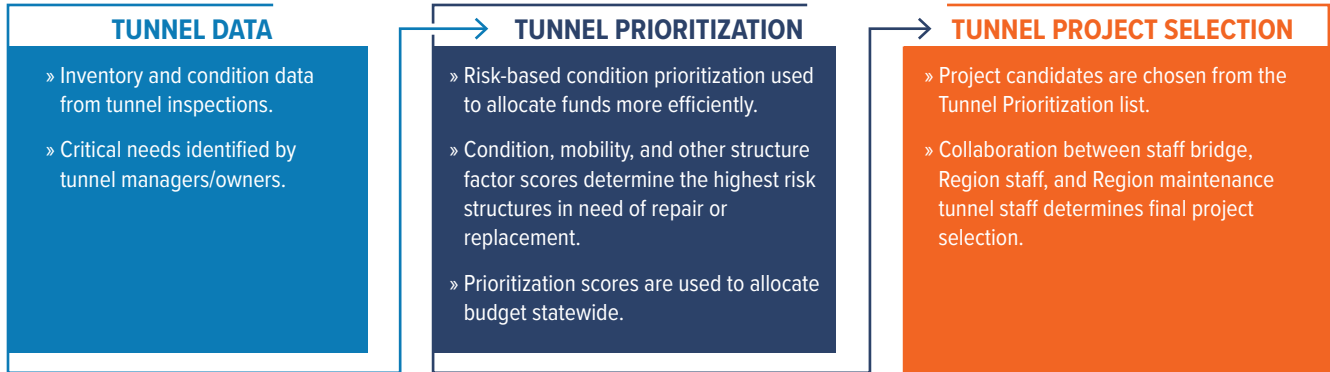
The project-selection process for tunnels is a collaborative process between the Tunnel Asset Manager, Office of Financial Management and Budget (OFMB), Region Business Office, Region Tunnel Maintenance, Regional Transportation Director, and the Region Program Engineer, among others. An overview of the process is shown in **Figure A.9-2**.

The Tunnel Asset Manager uses the AIMS model and tunnel-prioritization process described above to generate a candidate list of tunnel treatments. The candidate list is then shared with Region tunnel maintenance staff, the Resident Engineer, and the Region Program Engineer for consideration. Using

their feedback, the Tunnel Asset Manager then provides a final list to the Regional Transportation Director, assigning budgets and creating projects from the treatments. The Regional Transportation

Director is responsible for project delivery and tunnel operations. Due to limited funding, project candidates are primarily chosen from the Tunnel Prioritization list.

Figure A.9-2 Tunnel Project Prioritization and Selection Process



TREATMENT SELECTION

Treatments are used to correct the condition of an asset or to prolong its life. Treatments are the outcome of the life-cycle planning process. **Table A.9-6** identifies the type of treatment activities by FHWA work type.

Table A.9-6 Tunnels Life-Cycle Management Activities Undertaken

Work Type	Tunnel Treatment/Activity	Typical Unit Cost/ Square Foot
Preservation	Varies	\$100
Maintenance	Maintenance activities performed by MLOS or maintenance-services contracts	\$50
Rehabilitation	Removing and replacing parts of systems	\$250
Reconstruction (Replacement)	Major system replacements or upgrades.	\$500
Initial Construction	Construction of a new tunnel or adding lanes to an existing tunnel.	\$670



RISK MANAGEMENT

The Tunnels program manages risk across multiple levels—agency, programmatic, and project/asset. Section 6 of the main TAMP document provides more information about CDOT’s risk-management processes.

The Tunnels program maintains a register of risks to its overall program and projects. Top risks are presented in Table A.9-7.

Table A.9-7 *Top Tunnels Risks*

Risk Level	Threat/ Opportunity	Risk Score ²	Risk-Management Strategy
Project	System failure	116 (T)5 x (C)5.8 x (V)4	Inspections, maintenance plan
Project	Tunnel blockage/closure	110 (T)5 x (C)5.5 x (V)4	Scaling, incident management plan, CCTV, personnel, anti-icing



FINANCIAL PLAN

CDOT creates planning budgets for tunnels and other asset-management programs four years in advance. For this financial plan, CDOT has carried forward fiscal year 2025 budget levels for fiscal years 2026-31. These estimates, combined with CDOT’s life-cycle management approaches, inform the investment strategies intended to achieve system-wide asset performance goals while minimizing costs.

FUNDING SOURCES

The Tunnels program receives a portion of the funds for CDOT’s overall TAM Program to fund rehabilitation and reconstruction work types described in the Life-Cycle Planning section.

Separately, CDOT’s Maintenance Levels of Service (MLOS) program funds some maintenance activities for tunnels that do not require engineering. Those activities are part of the MLOS Asset Plan and its financial plan.

Bridge and Tunnel Enterprise funding has been included in the bridge financial plan and has not been included here.

PLANNED FUNDING

Table A.9-8 summarizes projected funding levels for the Tunnels program for fiscal years 2022-31.

Table A.9-8 Financial Plan for Tunnels (in Millions)

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
\$9.4	\$9.8	\$9.8	\$9.8	\$9.8	\$9.8	\$9.8	\$9.8	\$9.8	\$9.8

INVESTMENT STRATEGIES

CDOT forms investment strategies based on its financial plan and life-cycle management strategies. These approaches are intended to meet system-wide asset performance goals while minimizing life-cycle costs. The investment strategies delineate different types of work to be performed across CDOT’s tunnel assets over a 10-year period.

BACKGROUND: DETERMINING INVESTMENT STRATEGIES

Tunnel asset investment strategies center on safety, life cycle, condition, tunnel operation, and operational experience. The investment strategy is based on the

life-cycle planning and program-decision processes described in previous sections.

PERFORMANCE GAP ANALYSIS

CDOT uses its AIMS model to forecast the performance of tunnels and to identify potential performance gaps. The results of this analysis inform the financial plan and investment strategies. Based on the most recent analysis, current funding will allow CDOT to achieve its primary performance target for tunnels. The Department’s ability to avoid performance gaps depends on receiving continuous funding.

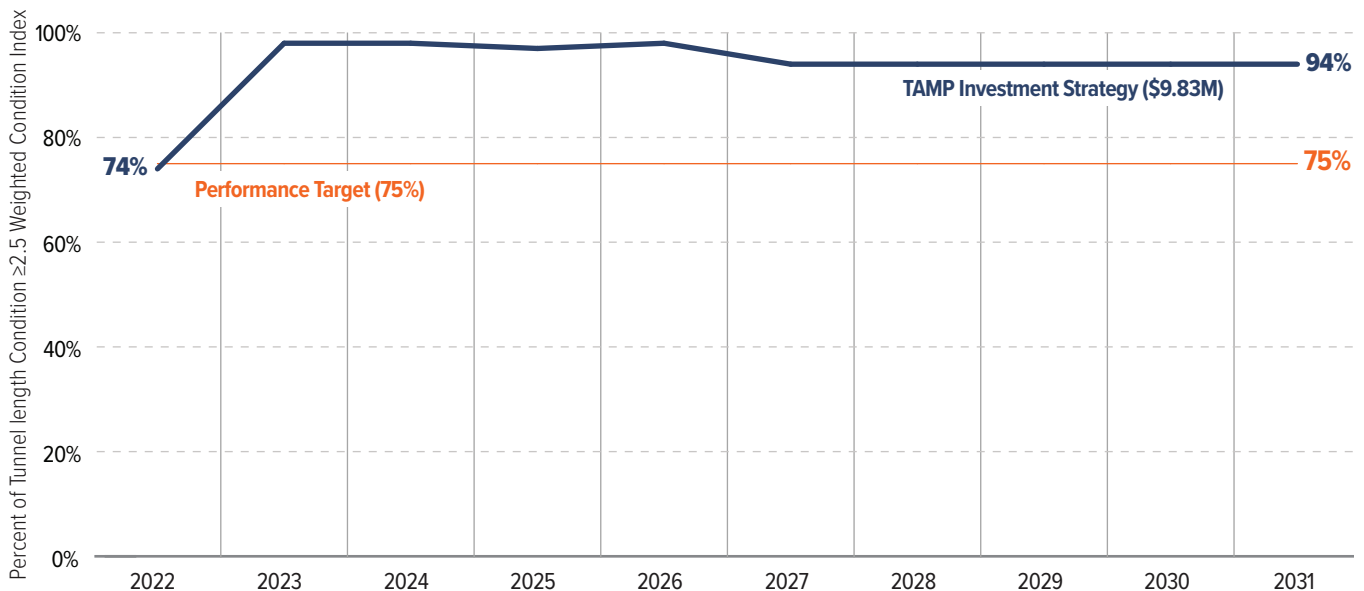
NEEDS AND PROJECTED CONDITION

CDOT’s AIMS model forecasts the long-term performance of tunnels given expected funding. Tunnel ratings are deteriorated using deterioration models developed in 2016. These models use “transition-probability matrices” (TPMs) for each tunnel element to identify when it transitions to the next condition state. Each year, once the quantity of elements in condition states 1-4 are known for a tunnel, the Weighted Condition Index for the tunnel element is recalculated.

CDOT’s planned budget levels for tunnels (\$9.8 million per year), are expected to be sufficient funding to meet the Policy Directive 14.0 performance target until 2031, as shown in **Figure A.9-3**. However, certain modernization and other needs are not reflected in this primary metric, which focuses on asset condition.

Figure A.9-3 Forecast of Tunnel Assets Performance

The anticipated annual budget of \$9.8 million will meet the performance target of ensuring that 75 percent of tunnel length has a weighted condition index ≥ 2.5 .



IMPACTS OF INSUFFICIENT FUNDING

Tunnels are crucial to the mobility, safety, and resilience of CDOT's highway system. As a result of insufficient funding, the following outcomes may be affected:

- » **Safety:** Traveling through mountainous terrain can be a high-risk activity because of narrow roads and sharp turns. Tunnels mitigate these high-risk situations, reducing the frequency and severity of collisions and run-off-the-road accidents.
- » **Economic:** Tunnels reduce travel time. If tunnels are not in service, highway users must take detours through mountainous terrain.
- » **Environmental:** Tunnels reduce the need for open cuts or longer cut-fill sections. They preserve the landscape and minimize damage to wildlife habitats.
- » **Public-Perception:** Through improved safety, improved user experience, and economic benefits, tunnels improve public trust in CDOT's infrastructure.

OPPORTUNITIES TO CLOSE THE GAP

CDOT regularly evaluates tunnels investment strategies and funding levels, including a review of analyses from its AIMS model to determine the best strategy to meet condition targets. CDOT may alter its existing strategy by adjusting treatments, condition targets, and other factors to help close performance gaps. CDOT also analyzes funding relative to targets at its annual budget-setting workshop for asset management. Additionally, the Transportation Commission each year is briefed on performance versus Policy Directive 14.0 targets and may adjust funding to address gaps. The Life-Cycle Planning and Investment Strategies sections of this asset plan describe high-level CDOT investment strategies and methods for closing performance gaps for tunnels. Based upon the investment strategies in this asset plan, CDOT projects no performance gap for the *primary* tunnels metric over the next 10 years.

STRATEGIC USE OF ADDITIONAL REVENUE

Should CDOT receive additional revenue to fund the Tunnels asset class, the Department's first priority is to eliminate any funding gaps related to achieving the PD-14 performance target. Once goals are achieved, the Department will reduce Poor backlog with a priority towards the most critical and/or vulnerable assets to improve system resilience. CDOT estimates the current "Poor" backlog for Tunnels could be eliminated with about \$150 million.



FUTURE IMPROVEMENTS

Intended asset management improvements to the Tunnels program address processes and technology.

PROCESS

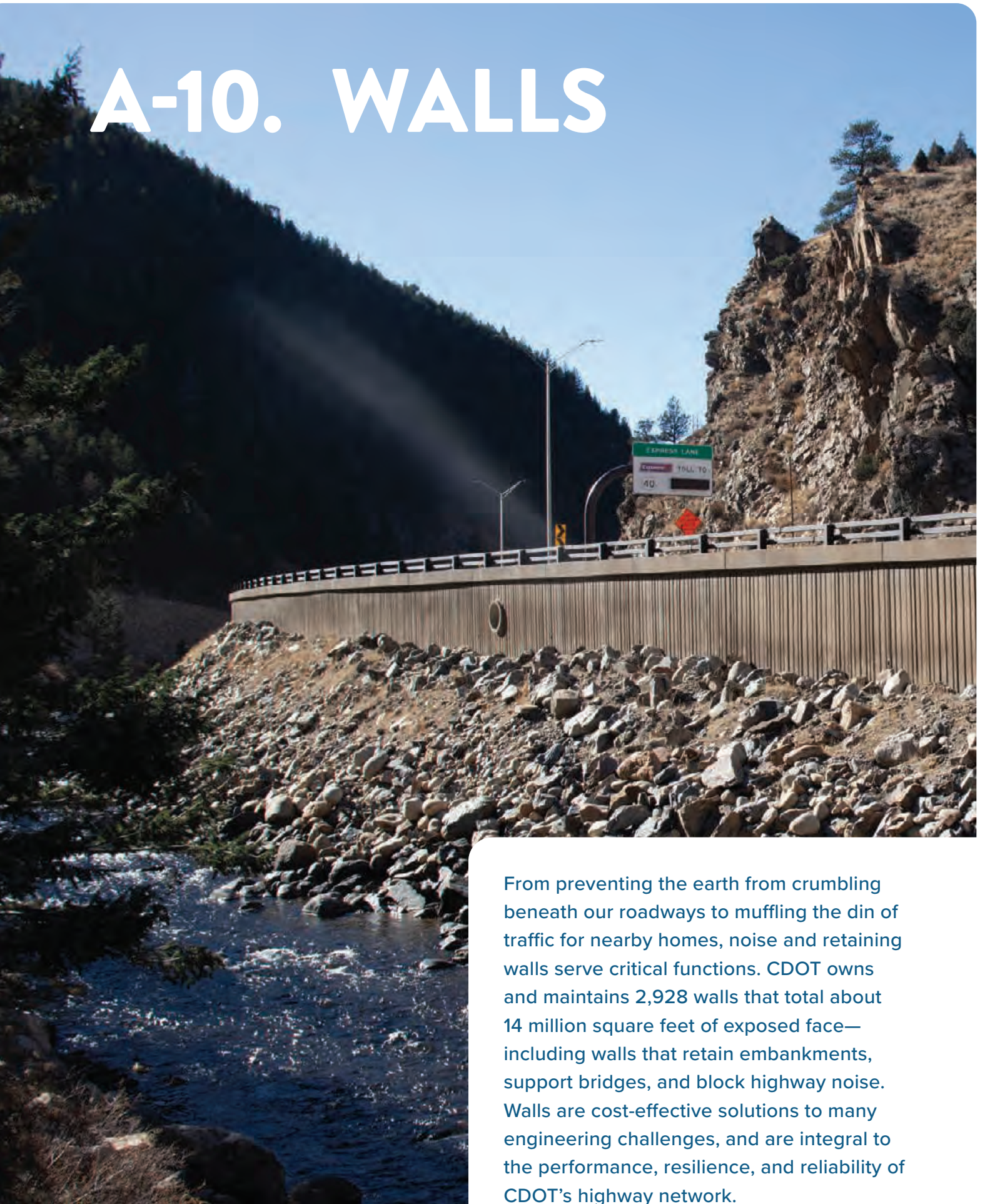
Process improvement is a key aspect of managing the Tunnels program. Staff will be working in the near term on further defining the roles and relationship between the tunnels asset management program and the Bridge and Tunnel Enterprise.

TECHNOLOGY AND ANALYSIS CAPABILITIES

Future analysis improvements include developing a stronger network forecasting capability via the AIMS asset model.



A-10. WALLS

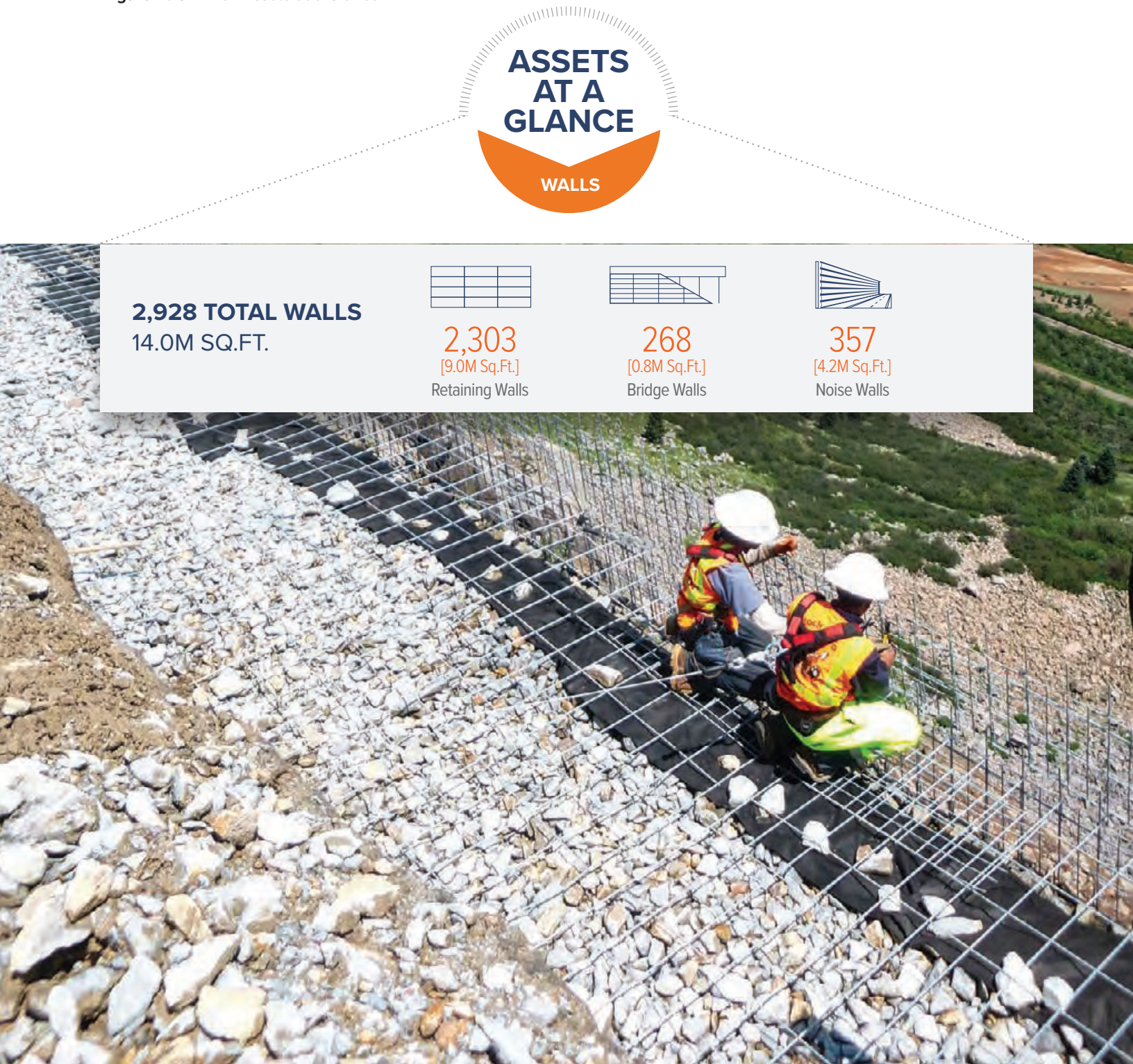


From preventing the earth from crumbling beneath our roadways to muffling the din of traffic for nearby homes, noise and retaining walls serve critical functions. CDOT owns and maintains 2,928 walls that total about 14 million square feet of exposed face—including walls that retain embankments, support bridges, and block highway noise. Walls are cost-effective solutions to many engineering challenges, and are integral to the performance, resilience, and reliability of CDOT's highway network.

CDOT's Staff Bridge Branch manages retaining walls that are at least four feet tall and within 45 degrees of being vertical and noise walls that are at least eight feet tall. This work is undertaken through the retaining and noise wall inspection and asset management program (Walls program). CDOT walls are managed in alignment with the CDOT asset-management process described in the Introduction to the Asset

Plans Appendix on page A-1. Since 2016, CDOT's wall conditions have remained relatively constant and have been close to achieving the Department's performance target. However, the current funding level is not expected to sustain this level of performance for the next 10 years. Achievement of the desired conditions is expected to require additional funding.

Figure A.10-1 Wall Assets at a Glance



PERFORMANCE MANAGEMENT

CDOT manages and monitors the performance of walls through a series of quantitative measures and targets that inform funding decisions and track the condition and relative risks for each wall.

POLICY DIRECTIVE 14 PERFORMANCE MEASURE—WALLS

The asset management program for walls contributes to the Policy Directive 14 (PD 14.0) goal areas of asset management, safety, and mobility. To determine wall conditions, CDOT’s walls are inspected following the same methodology detailed by the National Bridge Inspection Standards (NBIS) and receive Good, Fair, or Poor ratings. The specific performance measure for walls is the percentage of CDOT-owned walls, by square foot, in Poor condition (that is, with a rating of 4 or less). The PD 14.0 target is set at or below 2.5 percent of Poor wall area. The process for assessing condition is described in the Inventory and Condition section of this Asset Plan. **Table A.10-1** presents the PD 14.0 target and 2021 performance for walls.

OTHER PERFORMANCE MEASURES

In addition to condition rating, CDOT identifies Essential Repair Findings during inspections. Essential Repair Findings are deficiencies that can compromise the ability of the structure to safely remain in place and are deemed as requiring immediate identification, notification, correction, and follow-up.

Table A.10-1 CDOT Asset Management Metric and Performance Target for Walls

Asset	Measure	Target	2021 Performance
Walls	Percent (by square feet) in Poor condition	≤2.5%	3.5%

For federal TAMP purposes, CDOT defines the state-of-good-repair for walls based on the measures presented in PD 14.0.

INVENTORY AND CONDITION

CDOT’s wall inventory and condition information is collected through the Walls program, which is managed by the Bridge and Structure Inspection Unit within the CDOT Staff Bridge branch. CDOT hires consultants to perform field inspections of walls and enter inspection data into the System for Asset Management and Inspection (SAMI). SAMI consists of a Web-based data-management and reporting platform and a mobile-inspection application. The Bridge and Structures Asset Management Unit within the Staff Bridge branch is responsible for data management and reporting of the inspection data from SAMI.

INVENTORY

As of 2021, CDOT owns and maintains 2,928 walls totaling approximately 14 million square feet of exposed face, as presented in **Table A.10-2**. Walls are constructed with materials including concrete, steel, and timber. Materials vary based on application, desired aesthetics, and cost. **Figure A.10-2** provides example photographs of different wall types that CDOT manages.

CDOT’s inspection and asset management program for walls includes retaining walls that are at least four feet tall and within 45 degrees of being vertical and noise walls that are at least eight feet tall. This program excludes common walls like:

- » Traffic barriers less than four feet tall.
- » Slope protection that is more than 45 degrees from vertical.

- » Rock slope stabilization such as mesh, netting, anchors, or soil nails.

Additional details on the criteria and features for walls inspected by CDOT can be found in CDOT’s *Retaining and Noise Wall Inspection and Asset Management Manual*.¹

Table A.10-2 Inventory of Wall Assets

Wall Type	Current Count	Area (Square Feet, in Millions)
Retaining Wall	2,303	9.0
Bridge Wall	268	0.8
Noise Wall	357	4.2
Total Count	2,928	14.0

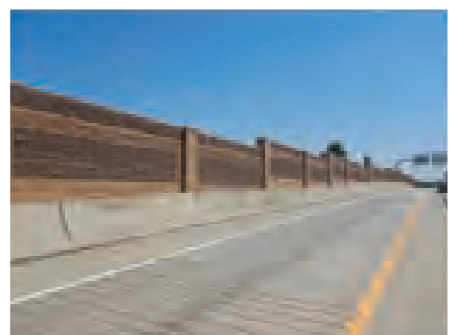
Figure A.10-2 Photographs of Retaining, Bridge, and Noise Walls



Retaining Wall



Bridge Wall






Noise Wall

¹ Retaining Noise Wall Inspection and Asset Management Manual

ASSET HIERARCHY

CDOT tracks the condition and/or functionality of the major elements that comprise each wall to better understand its performance. **Table A.10-3** provides an overview of the categories of walls and their respective construction types, elements, and materials.

Table A.10-3 Asset Hierarchy

	Structure Type	Common Construction Types	Elements	Typical Materials
	Retaining Wall	<ul style="list-style-type: none"> » Cantilever » Mechanically Stabilized Earth » Soil Nail » Bin 	<ul style="list-style-type: none"> » Wall Facing » Footing » Caisson » Anchor » Coping » Weep Hole 	<ul style="list-style-type: none"> » Timber » Masonry » Concrete » Steel
	Bridge Wall	<ul style="list-style-type: none"> » Mechanically Stabilized Earth » Cantilever 	<ul style="list-style-type: none"> » Wall Facing » Footing » Pile » Anchor » Coping » Weep Holes 	<ul style="list-style-type: none"> » Concrete » Masonry
	Noise Wall	<ul style="list-style-type: none"> » Post and Panel » Free Standing on Footing or Leveling Pad 	<ul style="list-style-type: none"> » Wall Facing » Caisson » Vertical Supports 	<ul style="list-style-type: none"> » Timber » Masonry » Concrete

CONDITION

CDOT's Walls program inspects all walls following the same methodology detailed by the National Bridge Inspection Standards for both component and element-level data. There is no federal mandate for the inventory and inspection of retaining or noise walls. CDOT Staff Bridge policy is that routine inspections for both retaining and noise walls be performed at a maximum interval of six years, and the maximum inspection interval for bridge walls should not exceed four years. Certain structures, deemed higher risk by the inspector, may require shorter inspection intervals.

Inspectors rate the wall's overall condition on a scale of 0 to 9, in which 0 represents a failed wall and 9 represents a wall in excellent condition. Inspectors also identify the condition states of individual elements on a scale from 1 to 4, in which 1 represents an element in Good condition, and 4 represents an element in Severe condition. While both sets of scores are collected and stored in SAMI, currently only the 0 to 9 overall condition scale is used for planning, performance management, budgeting, and project prioritization.

Using the overall condition rating, walls are categorized as being in Good, Fair, or Poor

condition based on the numeric rating, as shown in **Figure A.10-3**. The definitions for these ratings can be found in CDOT's *Retaining and Noise Wall Inspection and Asset Management Manual*.

Figure A.10-3 Overall Wall Condition Rating Scale



In addition to numerical condition ratings, inspectors identify deficiencies that can compromise the ability of a wall to safely remain in place and are deemed as requiring immediate identification, notification, correction, and follow-up. These deficiencies are noted as Essential Repair Findings. Common causes of Essential Repair Findings include freeze-thaw damage on mechanically stabilized earth walls;

bulging, rotation, or separation of wall panels; and failure of timber noise walls. Inspectors identify approximately 10 Essential Repair Findings for walls each year.

CONDITION TRENDS

As of 2021, CDOT owns and manages 14 million square feet of wall area. Out of these, 13.1 million square feet (96.5%) are in Fair or Good condition, as presented in **Table A.10-4**, and there were 15 open Essential Repair Findings on the state highway system. The percent of Good, Fair, and Poor walls has remained fairly constant since 2016.

ASSET VALUE

CDOT undertook an assessment of asset value in 2022 for this document. The current replacement value of walls is determined by using a unit cost for wall surface area. This replacement value is \$4.9 billion.

To calculate current asset value, the replacement value is adjusted by the condition rating. The current value of wall assets is \$3.5 billion.

Table A.10-4 Wall Condition Trends

Total Area (sq. ft. in millions)	Year	% in Fair or Good Condition	Essential Repair Findings
14.0	2021	96.5%	15
13.6	2020	96.2%	3
12.9	2019	95.8%	21
12.8	2018	95.8%	3
10.1	2017	96.7%	7
10.1	2016	95.8%	19



LIFE-CYCLE PLANNING

CDOT analyzes its wall inventory and inspection data to forecast investment needs and set work priorities. This process is known as life-cycle planning and accounts for the whole-life costs of planning, constructing, and maintaining walls, with consideration for minimizing long-term costs while preserving or improving the condition. Currently, the main driver for applying life-cycle strategies to wall assets is condition. CDOT leverages the findings from its annual condition-assessment report and employs various treatments to address the needs of walls in different conditions. Major rehabilitation and reconstruction restore walls that are identified as Essential Repair Findings or in Poor condition. Walls in Good and Fair condition receive routine maintenance, as needed.

LIFE-CYCLE PLANNING

CDOT uses a condition-based approach to the life-cycle management of a wall. This means condition data is used to determine the appropriate type and timing of work and to prioritize potential work within available budgets. CDOT identifies damaged walls that diminish the resiliency and reliability of the highway system and prioritizes these assets. Impacts of poorly functioning walls on CDOT's highway system are discussed in the section named Impacts of Insufficient Funding. CDOT prioritizes wall projects for maintenance to minimize such safety, mobility, environmental, public perception, public health, and asset management risks.

The Walls program maintains, repairs, rehabilitates, and replaces walls. Some design work is performed in-house, but most construction is performed by contractors. CDOT's Maintenance Levels of Service (MLOS) program delivers routine maintenance, preservation treatments, and repairs that do not require engineering.

The current program approach for managing wall assets is typically reactive in nature. CDOT's wall-maintenance program prioritizes addressing walls that pose substantial risks, (i.e., are identified with Essential Repair Findings). As a result, most repairs and wall maintenance are carried out in response to inspection findings. Examples of inspection findings

requiring repair include deterioration due to water, vehicle-impact damage, or observed deterioration reported by maintenance staff or periodic inspections.

PROGRAM DECISION-MAKING

CDOT uses several different treatments to address wall deterioration. Wall treatments can range from vegetation removal to patching or replacement, depending on the wall condition and availability of funds. Definitions of the wall treatment work types are summarized below. A list of wall treatments and their approximate costs are shown in **Table A.10-5**.

- » **Preservation** consists of activities that prolong the life of the structure without changing the condition rating (i.e., preventative maintenance). Examples include vegetation removal and drainage cleanout.
- » **Maintenance** includes patching and other repair treatments that do not have the potential to change condition but provide an expected extension of service life.
- » **Rehabilitation** includes repairs or replacements of portions of walls that provide a change in wall condition and expected extension of service life. Examples include replacing deteriorated blocks, resetting bulging or rotated concrete panels, or patching extensive cracks or spalls.

- » **Reconstruction** consists of replacing the existing structure with a new structure. This results in a resetting of wall condition and service life expectations. Typically, walls are not replaced in full unless the structure has failed somewhere along its length.
- » **Initial Construction** consists of construction of a structure where no structure has ever been built.

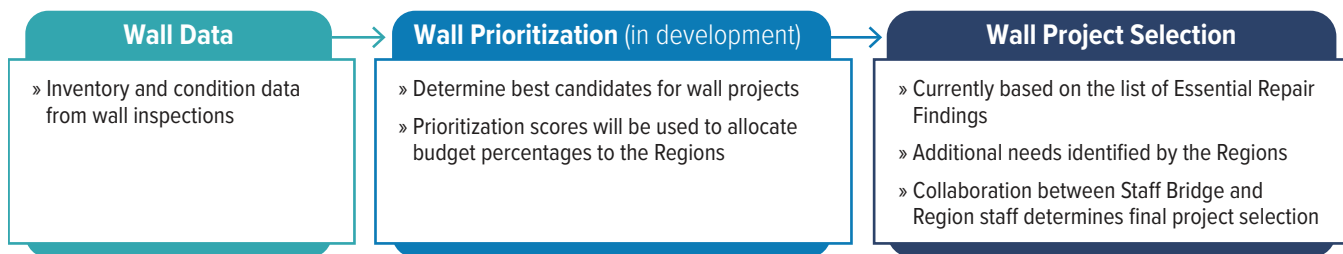
Table A.10-5 Wall Life-Cycle Management Activities

FHWA Treatment Work Type	Activity	Typical Costs/Square Foot
Preservation	Vegetation Removal	\$15
Maintenance	Patching	\$180
Rehabilitation	Replacing Deteriorated Blocks	\$250
Reconstruction (Replacement)	Replacement	\$300

TREATMENT SELECTION

Regions are provided with a prioritized list of walls annually, which helps them identify wall projects for that year. Projects are typically chosen from the open list of Essential Repair Findings. **Figure A.10-4** presents the project prioritization and project-selection process for walls.

Figure A.10-4 Walls Project-Prioritization and Selection Process



RISK MANAGEMENT

The Walls program manages risk across multiple levels—agency, programmatic, and project/asset. Section 6 of the main TAMP document provides more information about CDOT’s risk-management methodology and processes.

The Walls program maintains a register of risks to its overall program and projects. Top risks are presented in Table A.10-6.

Table A.10-6 *Top Walls Risks*

Risk Level	Threat / Opportunity	Risk Score	Risk-Management Strategy
Project	Catastrophic failure—mobility and safety impacts	20 (T)2 x (C)5 x (V)2	Treat
Project	Non-catastrophic failure—no mobility impacts	7.5 (T)1 x (C)2.5 x (V)3	Tolerate



FINANCIAL PLAN

CDOT establishes annual planning budgets for walls and other asset programs four years in advance. Estimates of revenue and costs for meeting performance targets are combined with CDOT’s life-cycle management approaches to inform decisions on the planning budget (financial plan). Delivery of the planning budget will contribute to CDOT’s efforts to achieve system-wide asset performance goals.

FUNDING SOURCES

The Walls program receives a portion of the funds of CDOT’s overall Transportation Asset Management (TAM) program to fund rehabilitation and reconstruction work types described in the Life-Cycle Planning section. Of this base funding, about \$1 million per year is used for inspections.

Meanwhile, preservation and maintenance provided by the Maintenance Levels of Service (MLOS) program is budgeted separately, in the MLOS Financial Plan. While the Walls and MLOS programs provide this base funding, wall projects can be funded by a variety of sources and programs.

PLANNED FUNDING

Table A.10-7 summarizes the projected funding levels for walls for the next 10 years. These estimates include \$1 million per year for inspections.

Table A.10-7 *Financial Plan for Walls (in Millions)*

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
\$5.4	\$5.8	\$5.7	\$5.7	\$5.7	\$5.7	\$5.7	\$5.7	\$5.7	\$5.7



INVESTMENT STRATEGIES

CDOT forms investment strategies based on its financial plan and life-cycle management strategies identified to achieve system-wide asset performance goals while minimizing life-cycle costs. The investment strategies delineate different types of work to be performed across CDOT's wall assets over a 10-year period.

BACKGROUND: DETERMINING INVESTMENT STRATEGIES

Investment strategies for managing walls are focused on minimizing the risk of failure (described in the Life-Cycle Planning section of this Asset Plan). For each damaged wall CDOT generates a list of treatment strategies. These strategies are composed of repair, rehabilitation, and replacement treatments for each wall, based on the annual condition-assessment report. CDOT prioritizes walls identified as Essential Repair Findings or in Poor condition for major rehabilitation work. Walls in Fair or Good condition receive routine maintenance, as budget permits.

PLANNED INVESTMENTS

Structures with one or more Essential Repair Findings are given a higher priority for programming for treatment. About 10 walls with such findings are programmed each year.

Maintenance and Repair. CDOT's maintenance crews conduct routine maintenance, preservation treatments, and repairs for walls that do not require engineering. Those activities are part of the Maintenance Levels of Service (MLOS) asset plan and its financial plan and investment strategy.

Rehabilitation, Reconstruction, and Replacement. CDOT's Walls program performs routine inspection, repair, rehabilitation, reconstruction, and replacement of walls that are not covered under the MLOS program. These activities are part of the Walls program and its financial plan and investment strategy.



PERFORMANCE GAP ANALYSIS

CDOT uses the Asset Investment Management System (AIMS) model to develop its annual forecast for the performance of its wall assets and any anticipated performance gaps. The results of the AIMS analysis inform the financial plan for the asset class. Based on the most recent analysis, current funding will not allow CDOT to achieve its performance target for walls. CDOT’s ability to close performance gaps largely depends on receiving additional funding.

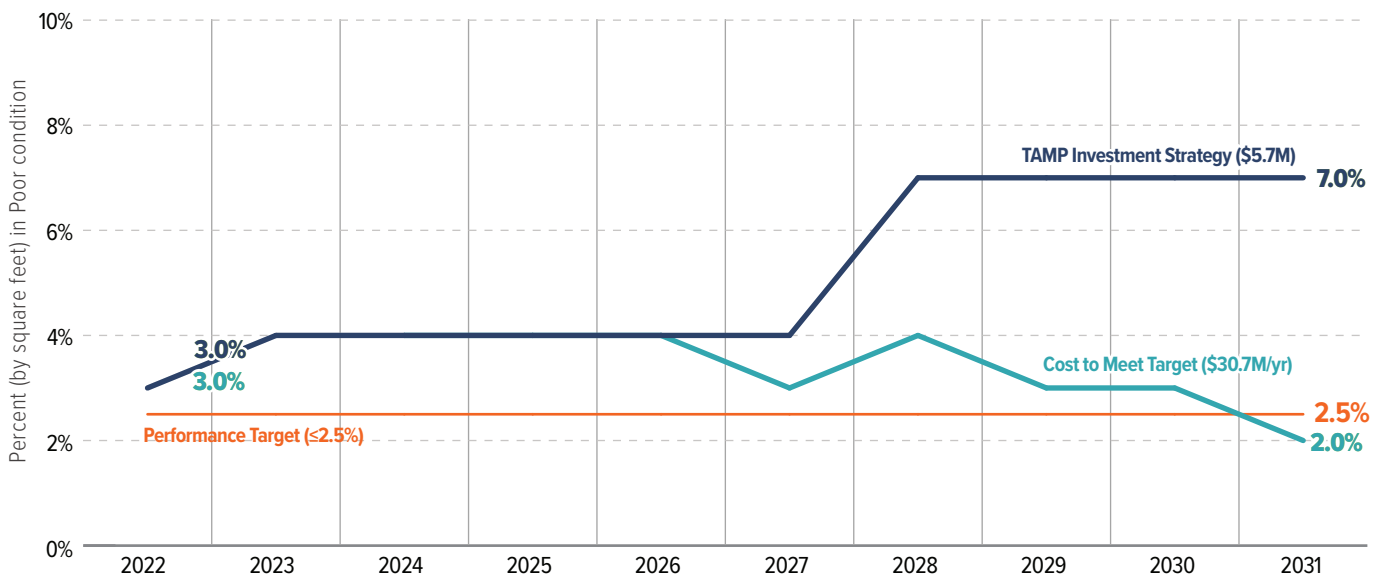
NEEDS AND PROJECTED CONDITION

CDOT’s AIMS model predicts the long-term performance of wall assets, as constrained by the financial plan for the asset class. The model projects condition ratings for walls using deterioration assumptions developed in 2016. Additionally, the model accounts for planned walls projects for the early years of the analysis, when many projects are known. For later years, the model recommends projects, as constrained by anticipated budgets.

The financial plan of investing \$5.7 million per year in walls does not provide sufficient funding to meet the established PD 14.0 performance target, as presented in **Figure A.10-5**. At least an additional \$25 million annual investment is required to achieve the performance target in the next 10 years.

Figure A.10-5 Forecast of Wall Assets Performance

The anticipated annual budget of \$5.7 million will not meet the performance target of ensuring that less than 2.5% of wall area is in poor condition. The annual cost of meeting the target by 2031 is about \$30.7 million, or an additional \$25 million per year.



IMPACTS OF INSUFFICIENT FUNDING

Walls are crucial to the resiliency of CDOT's highway system. As a result of insufficient funding, the following outcomes may occur.

- » **Safety and Mobility:** Damaged retaining walls that support roadways can reduce the roadway integrity and create risks of highway failure, resulting in partial or complete closures and subsequent detours. In the extreme case, a failed wall could pose a direct safety risk to highway users or local residents.
- » **Public Perception:** Noise walls and many retaining walls are visible to the traveling public. Damaged and deteriorating walls could negatively impact CDOT's public image. Damaged or failed noise walls can increase the noise and emissions pollution experienced by residential areas near the highway system.
- » **Asset Management:** Even small variations in funding levels can affect the long-term condition of walls. Failure to perform routine preventative maintenance results in more extensive or earlier rehabilitation treatments.
- » **Public Health:** Prolonged exposure to loud noise can lead to a wide array of health concerns, such as high blood pressure, heart disease, sleep disturbances, and stress. Noise walls reduce or lessen the likelihood of these impacts.
- » **Environmental:** Environmental benefits of retaining walls and bridge walls include erosion control and flood control, as well as reducing the footprint of the right of way (ROW).

OPPORTUNITIES TO CLOSE THE GAP

CDOT regularly evaluates investment strategies and funding levels to determine the best strategy to meet condition targets. Based on such reviews—which include a review of the current life-cycle planning approach—CDOT determines which issues lead to accelerated wall deterioration and prioritizes wall projects accordingly. CDOT may alter its existing strategy by adjusting treatments, condition targets, and other factors to help close performance gaps.

CDOT also analyzes funding relative to targets at the TAM Oversight Committee's annual budget-setting workshop for asset management. The Staff Bridge team can adjust funding recommendations, as well as treatment recommendations and priorities, to address targets. Staff Bridge also works with CDOT's Regions to understand funding that is used from outside the TAM budget to improve wall conditions. Additionally, the Transportation Commission is briefed each year on performance versus targets in PD 14.0 and may adjust funding to address gaps.

The Life-Cycle Planning and Investment Strategies sections of this Asset Plan describe the high-level CDOT investment strategies and methods for closing performance gaps for walls.

STRATEGIC USE OF ADDITIONAL REVENUE

Should CDOT receive additional revenue to fund the Walls asset class, the Department's first priority is to eliminate any funding gaps related to achieving the PD-14 performance target. Once goals are achieved, the Department will reduce Poor backlog with a priority towards the most critical and/or vulnerable assets to improve system resilience. CDOT estimates the current "Poor" backlog for Walls could be eliminated with about \$216 million.

FUTURE IMPROVEMENTS

Planned asset management improvements to the Walls program focus on processes.

PROCESS

Process improvement is a key aspect of maintaining and improving the Walls program and assets. CDOT intends to improve the accurate capture of inventory data and the Department's ability to track the condition and disposition of these assets over time.

CDOT aims to shift from risk-based, reactive wall management that emphasizes emergency repairs to a more proactive approach with a long-term view of the condition of the walls network. A more proactive approach would enable CDOT to focus on preservation, rehabilitation, and replacement before emergency repairs are needed. This more proactive approach is expected to reduce the life-cycle cost and minimize disruption.

The Department's updated wall-treatment prioritization program is in development, with the goal of using multi-objective prioritization to determine best candidates for wall projects and to allocate budget percentages to the Regions. One aspect of the planned approach involves routine maintenance activities intended to preserve wall assets and slow deterioration rates to obtain the anticipated life cycle.

TECHNOLOGY AND ANALYSIS

Similar to Bridges, SIMSA software will incorporate wall assets and will:

- » Consolidate wall data (e.g., condition, inventory) for easy access and use throughout the Department, including serving as a platform to upload and access "as-built" plans.
- » Streamline wall inspection and inventory data collection and review for more accurate, up-to-date information.
- » Integrate with CDOT's AIMS model so that data uploads (e.g., new condition and inventory data) to the model are easier than in the past.

These process improvements would integrate more robust asset management practices into the Walls program and improve the forecasting capabilities of the AIMS asset model.



APPENDIX B. POLICY DOCUMENTS





COLORADO

Transportation Commission

RELEASE MEMORANDUM

TO: All CDOT Employees

FROM: Natalie Lutz, Rules, Policies, and Procedures Administrator
Herman Stockinger, Transportation Commission Secretary

RE: New Policy Directive 1609.0 "Transportation Asset Management"

DATE: February 4, 2021

1. Name of New Policy Directive:
Policy Directive 1609.0 "Transportation Asset Management"

2. Date of Policy Directive this Directive Supersedes: New

3. Executive Summary:

On January 21, 2021, the Transportation Commission adopted the new Policy Directive 1609.0 "Transportation Asset Management" to articulate existing practices and processes of the Colorado Department of Transportation's (Department) Transportation Asset Management (TAM) program. The Policy Directive provides a high-level description of the TAM program, such as key definitions, principles, requirements for asset classes, a list of the program's asset classes, key program functions, and citations of related CDOT Policy Directives.

The purpose of asset management is "to achieve and sustain a state of good repair for Department assets over their life cycles at a minimum practicable cost."¹ The TAM program maintains 12 asset classes (e.g., bridges, pavement, culverts). The Policy Directive states that the addition or removal of an asset must be approved by the Transportation Commission. The Policy Directive continues by outlining key functions of the TAM program, including developing planning budgets and a four-year program of asset treatments (e.g., asset replacements, rehabilitations, preventive maintenance activities, etc.). The Transportation Commission ultimately adopts the planning budgets for the assets by resolution. Finally, the Policy Directive describes federal asset management requirements and related federal law and regulations.

4. Offices to Contact with Questions:

The Office of Policy and Government Relations at: 303.757.9441 or natalie.lutz@state.co.us
The Performance and Asset Management Branch at: 303.757.9815 or toby.manthey@state.co.us

5. Effective Date of New Policy Directive: January 21, 2021

¹ This approach aligns with the purpose of asset management in 23 CFR 515.9.



COLORADO DEPARTMENT OF TRANSPORTATION		<input checked="" type="checkbox"/> POLICY DIRECTIVE <input type="checkbox"/> PROCEDURAL DIRECTIVE
Subject Transportation Asset Management		1609.0
Effective 01.21.21	Supersedes New	Originating Office Division of Transportation Development Transportation Asset Management Program

I. PURPOSE

The purpose of this policy directive is to describe the structure, key functions and principles of the Transportation Asset Management (“TAM”) program at the Colorado Department of Transportation (“CDOT” or the “Department”). The directive also defines key terms used in the program.

II. AUTHORITY

§ 43-1-106(8)(a), C.R.S. Colorado Transportation Commission (“Commission”)

23 CFR § 515, *Asset Management Plans*

23 CFR § 490, *National Performance Management Measures*

III. APPLICABILITY

This policy directive applies to all CDOT employees and to all Asset Classes within the TAM program.

IV. DEFINITIONS

“Asset” means a physical object that is part of CDOT’s infrastructure; for example, a road, bridge, culvert, tunnel, or wall.

“Asset Class” generally means a set of fixed assets having similar characteristics and attributes that differentiate them from other assets by kind, type, or function. There are twelve (12) asset classes in CDOT’s TAM program. “Asset class” can also refer to a program whose activities maintain other infrastructure (e.g., Geohazards or Maintenance Levels of Service).¹

“Asset Management” refers to a strategic and systematic process of operating,

¹ CDOT’s Maintenance Levels of Service (MLOS) program is considered an asset class due to the close relationship of maintenance activities and the condition of pavement, bridges and other assets. The program also helps fund the replacement of maintenance assets such as signs, striping, delineators and fencing. Similarly, the Geohazards program funds activities that protect other assets, such as pavement, while also maintaining geohazards assets such as rockfall fencing.

maintaining, upgrading, and replacing physical assets effectively throughout their life cycle. It focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision making based upon quality information and well-defined objectives.²

“Planning Budget” refers to the budget levels planned for each asset in future years, before they become actual budgets. These levels are typically set four years in advance.

“Transportation Asset Management Cap (“TAM Cap”)” means the sum of the annual planning budgets for all assets in the TAM program.

“Transportation Asset Management Plan (“TAMP”)” refers to a document required by the Federal Highway Administration (“FHWA”) that includes asset performance measures, a financial plan, and other elements as described in federal law and regulation. The TAMP is designed to help improve or preserve the condition and performance of assets on the highway system.

“Transportation Asset Management (“TAM”) program” means a specific collection of CDOT asset programs that meet established criteria and help manage CDOT’s critical infrastructure assets. The program is coordinated by CDOT’s Division of Transportation Development (“DTD”). Individual asset classes are managed by various work units throughout the Department.

V. POLICY

A. CDOT TAM Principles and Purpose

The purpose of asset management is “to achieve and sustain a state of good repair for Department assets over their life cycles at a minimum practicable cost.”³ This approach assists CDOT in pursuing its mission by maintaining assets comprising the transportation system, ensuring the system is effective and safe.

The asset-management program focuses on maintenance, asset preservation and replacement. The program does not fund projects that increase the capacity of Colorado’s transportation system.

B. Requirements for Asset Classes

Asset Classes in the TAM program must meet criteria including the following:

1. Each Asset Class must maintain an inventory of its assets.

² This passage is based on a definition from the American Association of State Highway and Transportation Officials.

³ This approach aligns with the purpose of asset management in 23 CFR 515.9.

2. Each Asset Class must maintain a performance metric (e.g., “Good,” “Fair” and “Poor” condition ratings for bridges, or letter grades for buildings and rest areas.)
3. Each Asset Class must provide a target for their performance metric.
4. Each Asset Class must maintain an asset management system. These systems should have, at minimum, the ability to forecast condition; the ability to inform the selection of a performance target; and the ability to minimize the cost in achieving that performance target by recommending treatments or activities.
5. Each Asset Class must be able to distinguish annual maintenance activities, capital preservation, replacement activities, and expansion projects. Asset Classes should only fund annual maintenance, capital preservation and replacement activities.

C. Asset Classes in the TAM program:

The Commission has approved 12 Asset Classes in the TAM program and shall give final approval to the addition or removal of any Asset Class from the program. The 12 asset classes include:

1. Bridges
2. Buildings
3. Culverts
4. Geohazards
5. Intelligent Transportation Systems (“ITS”)
6. Maintenance Levels of Service (“MLOS”)
7. Pavement
8. Rest Areas
9. Road Equipment (Fleet)
10. Signals
11. Tunnels
12. Walls

D. Establishing TAM Planning Budgets and Approving Treatment Lists

Primary functions of the TAM program include establishing the following:

1. TAM Cap:
 - a. The total dollars dedicated to the TAM program for a given fiscal year. Typically set four years in advance.
2. Planning Budget:
 - a. The portion of the TAM Cap allocated for each Asset Class. Typically set four years in advance.

3. Treatment lists:

- a. Each Asset Class in the TAM program, except for MLOS, develops an annual list of treatments (e.g., asset replacements or rehabilitations). Treatments are typically submitted four years in advance and ultimately become standalone projects or are bundled by staff into projects that may encompass multiple treatments.

Both the TAM Cap and the planning budgets are developed by staff and adopted by resolution of the Commission. Treatment lists are developed by staff and are approved by CDOT executive management. The TAM Cap, Planning Budgets, and treatment lists are typically set four years in advance to provide predictability to CDOT's Transportation Regions and to construction stakeholders. Knowing the Planning Budgets four years in advance gives CDOT staff the time to plan, develop, and design projects, so that when the year arrives for construction funding to be allocated, projects are ready to be delivered.

The Commission supports CDOT's adherence to a procedural directive that outlines how the TAM Cap and the planning budgets are developed, and how treatment lists are approved and modified.

E. Asset Performance Metrics

1. The Commission has adopted PD 14.0 ("Policy Guiding Statewide Plan Goals & Objectives") to measure the success of the Department's efforts to improve in asset management and other goal areas. Performance targets for each Asset Class in the TAM program can be found in Appendix A of PD 14.0. The performance targets help implement the Statewide Transportation Plan by focusing transportation investments in the Statewide Transportation Improvement Program (STIP) and the annual budget.

F. Federal Asset Management Requirements

1. National Performance Measures for National Highway System ("NHS") pavement and bridge assets.

CDOT must comply with federal requirements (see 23 CFR § 490) to track and periodically report performance measures for NHS pavement and bridges and to periodically set targets for those measures. These metrics include:

- a. The percentage of Interstate pavements in good condition, and the percentage in poor condition.

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- b. The percentage of non-Interstate NHS pavement in good condition, and the percentage in poor condition.
- c. The percentage of NHS bridge deck area in good condition, and the percentage in poor condition.

States not meeting minimum condition levels for the bridge metrics, and the pavement metrics for Interstates, face penalties regarding their use of federal transportation funds, such as National Highway Performance Program funds.

2. Transportation Asset Management Plan (TAMP).

CDOT must comply with federal requirements (see 23 CFR § 515) to produce a Transportation Asset Management Plan (TAMP) or face penalties regarding the Department’s use of National Highway Performance Program funds. The plan must include a summary listing of NHS pavement and bridge assets in Colorado, regardless of ownership. The plan must span at least 10 years and must include investment strategies, a financial plan, and other elements described in federal code. The Federal Highway Administration (FHWA) requires the plans to be updated at least every four years.

G. Risk Policy Directive

For a description of CDOT’s approach to risk, including for asset management, see Policy Directive 1905.0—*Building Resilience into Transportation Infrastructure and Operations*.

H. Approving Final Asset Management Budgets and Project Changes

For processes related to approving final⁴ asset management program budgets and budget changes to asset management projects, see Policy Directive 703.0—*Annual Budget, Project Budgeting, and Cash Management Principles*.

VI. DOCUMENTS RELEVANT TO OR REFERENCED IN THIS POLICY DIRECTIVE

Policy Directive 14.0—*Policy Guiding Statewide Plan Goals & Objectives*

Policy Directive 703.0—*Annual Budget, Project Budgeting, and Cash Management Principles*

⁴ “Planning” budgets for asset management programs are adopted by the Commission, as mentioned earlier in this directive (1906.0). Planning budgets do not become final budgets for those programs until approved by the Commission as part of CDOT’s Annual Budget.

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Policy Directive 1905.0—*Building Resilience into Transportation Infrastructure and Operations*

23 CFR § 515—*Asset Management Plans*

23 CFR § 490—*National Performance Management Measures*

VII. IMPLEMENTATION PLAN

This Policy Directive shall be effective upon signature.

The Office of Policy and Government Relations shall post this Policy Directive on CDOT’s intranet as well as on public announcements.

VIII. REVIEW DATE

This directive shall be reviewed on or before January 2026.

Herman F. Stockinger III

Herman Stockinger
Transportation Commission Secretary

1/21/2020

Date of Approval

Resolution #TC-2021-01-07

Adoption of New Policy Directive 1609.0 “Transportation Asset Management”.

Approved by the Transportation Commission on January 21, 2021.

WHEREAS, § 43-1-106 (8)(a) C.R.S. gives authority to the Transportation Commission of Colorado (“Commission”) to formulate general policy with respect to the management, construction, and maintenance of public highways and other transportation systems in the state; and

WHEREAS, new Policy Directive 1609.0 “Transportation Asset Management” establishes the guiding framework of the Transportation Asset Management Program within the Colorado Department of Transportation (“Department”); and

WHEREAS, the purpose of asset management is to achieve and sustain a state of good repair for the Department’s assets over their life cycles at a minimum practicable cost; and

WHEREAS, asset management is a strategic and systematic process of maintaining assets comprising the transportation system and ensuring the system is effective and safe; and

WHEREAS, the Department maintains twelve (12) Asset Classes in the Transportation Asset Management Program, which include: Pavement, Bridges, Tunnels, Buildings, Road Equipment, Intelligent Transportation Systems, Rest Areas, Culverts, Walls, Signals, Maintenance Levels of Service, and Geohazards; and

WHEREAS, the Department must comply with federal requirements to track and periodically report performance measures for National Highway System pavement and bridges as set forth in Policy Directive 14.0 “Policy Guiding Statewide Plan Goals & Objectives”; and

WHEREAS, federal law requires the Department to develop a risk-based asset management plan for the National Highway System to improve or preserve the condition of the assets and the performance of the system; and

WHEREAS, the Commission supports the Department in pursuing its mission by efficiently allocating the Department’s resources across assets to maintain a high quality and safe system in compliance with federal law and regulations.

NOW THEREFORE BE IT RESOLVED, the Commission adopts the new Policy Directive 1609.0 “Transportation Asset Management”.

Herman F. Stockinger A A A

Herman Stockinger, Secretary
Transportation Commission of Colorado

1/21/2021
Date



COLORADO

Transportation Commission

RELEASE MEMORANDUM

TO: All CDOT Employees

FROM: Natalie Lutz, Rules, Policies, and Procedures Administrator
Herman Stockinger, Transportation Commission Secretary

RE: Updated Policy Directive 14.0 “Policy Guiding Statewide Plan Goals and Objectives”

DATE: December 14, 2020

1. Name of Updated Policy Directive:
Policy Directive 14.0 “Policy Guiding Statewide Plan Goals & Objectives”

2. Date of Policy Directive this Directive Supersedes: October 19, 2017

3. Executive Summary:

On November 19, 2020, the Transportation Commission adopted the updated Policy Directive 14.0 with revised performance goals and objectives to measure the success of the Department’s efforts to improve in safety, asset management, and mobility. The performance goal areas were changed to better guide the implementation of the new multimodal Statewide Transportation Plan. The revised performance goals also support the national goals for surface transportation in the Fixing America’s Surface Transportation (FAST) Act of 2015. Objectives in previous goal areas have been realigned into the new goal structure or have been modified.

Additionally, the updated Policy Directive aligns objectives with other key guiding policies such as the Greenhouse Gas Pollution Reduction Roadmap and HB19-1261 (“Climate Action Plan to Reduce Pollution”). Nine new defined terms were added to support the revised goal areas and other guiding policies, which include: Carbon Dioxide Equivalents, Colorado DOT Transit Asset Management Group Plan, Greenhouse Gas Emissions, State of Good Repair, Telecommuting, Transit Economic Requirements Model, Unlinked Passenger Trips, Vulnerable Users, and Zero-Emission Vehicles. Finally, Appendix “B” for the Department’s Transit Asset Management and Appendix “C” for Strategic Transportation Safety Plan (STSP) Tier 1 Strategies were included.

4. Offices to Contact with Questions:

The Office of Policy and Government Relations at: 303.757.9441 or natalie.lutz@state.co.us.
The Division of Transportation Development at: 303.757.9133 or darius.pakbaz@state.co.us

5. Effective Date of Updated Policy Directive: November 19, 2020



COLORADO DEPARTMENT OF TRANSPORTATION		<input checked="" type="checkbox"/> POLICY DIRECTIVE <input type="checkbox"/> PROCEDURAL DIRECTIVE
Subject Policy Guiding Statewide Plan Goals & Objectives		Number 14.0
Effective 11/19/2020	Supersedes 10/19/2017	Originating Office Division of Transportation Development

I. PURPOSE

This Policy Directive provides performance goals and objectives to measure the success of the Department’s efforts to improve in the following key areas:

- Safety,
- Asset Management, and
- Mobility.

The performance objectives and targets in these goal areas will help implement the Statewide Transportation Plan by focusing transportation investments in the Statewide Transportation Improvement Program (STIP) and the annual budget. The Transportation Commission will revise this Policy Directive, as needed, with updated performance objectives or targets.

II. AUTHORITY

- 23 United States Code (U.S.C.) 134, 135 and 450, PL 114-94 (“Fixing America’s Surface Transportation Act” or “FAST Act”)
- 23 Code of Federal Regulations (C.F.R.) Part 420 (Planning & Research Program Administration), 450 (Planning Assistance and Standards), and 490 (National Performance Management Measures)
- § 43-1-106(8)(a), C.R.S. Transportation Commission
- § 43-1-1103, C.R.S. Transportation planning
- Transportation Commission Rules Governing the Statewide Transportation Planning Process and Transportation Planning Regions (2 CCR 601-22; effective September 14, 2018)

III. APPLICABILITY

This Policy Directive applies to all CDOT Divisions and Regions.

IV. DEFINITIONS

“Carbon Dioxide Equivalents (CO₂e)” means the number of metric tons of CO₂ emissions with the same global warming potential as one metric ton of another greenhouse gas, and are calculated using Equation A-1 in 40 C.F.R. Part 98.

“Colorado DOT Transit Asset Management Group Plan” (Group TAM Plan) is the CDOT-sponsored asset management plan, required by the FTA’s Transit Asset Management (TAM) Rule, for 49 U.S.C. Chapter 53 funding recipients and subrecipients that own, operate, or

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manage capital assets in the provision of public transportation. The Group TAM Plan is a tool for guiding the prioritization of pass-through funds. Approximately 53 small urban and rural transportation providers participate in the current Group TAM Plan to maintain and/or improve the State of Good Repair (SGR) of transit assets.

“Drivability Life” is an indication in years of how long a highway will have acceptable driving conditions based on an assessment of smoothness, pavement distress, and safety. Drivability Life implements traffic based highway categories, and associated category drivability condition standards and allowed pavement treatments. Unacceptable driving condition is specific to each traffic based highway category and means drivers must reduce speeds to compensate for poor conditions, navigate around damaged pavement, or endure intolerably rough rides. The Risk-Based Asset Management Plan identifies three categories of Drivability Life: High (greater than 10 years of Drivability Life remaining); Moderate (4-10 years); and Low (3 or fewer years).

“Greenhouse Gas Emissions” in the scope of this directive refer to pollution from the transportation sector (though these emissions are not exclusive to this sector), and may refer to both start emissions and running exhaust emissions from vehicle tailpipes. These emissions are calculated and expressed in terms of CO₂e. Greenhouse gas or GHG included in this equivalency encompasses carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and other fluorinated greenhouse gases.

“Geohazards” are geologic hazards that affect the transportation system and include debris flow, embankment distress, landslides, rock fall, rockslides, and sinkholes.

“National Highway System” (NHS) is a federally designated system of roadways important to the nation's economy, defense, and mobility. The NHS includes Interstate highways as well as other roadways. Not all NHS roadways are part of the state highway system.

“Maintenance Levels of Service” (MLOS) is a qualitative measure describing operational conditions on the roadway. Overall, Maintenance Levels of Service is a combined grade for nine maintenance program areas. For snow and ice control, the LOS B level includes maintaining high levels of mobility as much as possible, and proactive avalanche control.

“Operations Levels of Service” (OLOS) is a qualitative measure describing operational conditions on the state highway system that is utilized to demonstrate travel-time reliability on the roadway. This measure is calculated during AM and PM weekday peak periods, then aggregated and reported monthly to track year-to-date performance. Operations Levels of Service are travel-time multipliers equated to a grading system of A through F. For example, an OLOS grade of C or better means that the time required to plan for a trip is 1.5 times the free-flow travel time, or less.

“Performance Measures” are the ways that direction towards a goal is measured.

“Performance Objectives” are the specific targets for a performance measure that an organization intends to meet to make progress towards a goal.

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“Revenue Service Miles” are the miles operated by transit vehicles when such vehicles are used for providing public transportation and there is an expectation of carrying passengers.

“Serious Injuries” are evident incapacitating injuries that prevent injured persons from walking, driving, or normally continuing the activities they were capable of performing before they were injured in traffic crashes.

“State of Good Repair” (SGR), as defined by the Federal Transit Administration (FTA), is the condition in which a capital asset is able to operate at a full level of performance.

“Telecommuting” is working at home or at an alternate location and communicating with the usual place of work using electronic or other means, instead of physically traveling to a more distant work site, as defined by the Transportation Research Board.

“Transit Economic Requirements Model” (TERM) is the FTA’s 5-point scale for subrecipients/transit providers to assess the condition of their transit facilities. A facility assessed below 3.0 is considered to be out of, or beyond, a state of good repair and should be prioritized for repair or replacement.

“Unlinked Passenger Trips” also referred to as ‘boardings,’ are a measurement of the number of passengers who board public transit vehicles. A passenger is counted each time they board a transit vehicle no matter how many vehicles they use from their origin to their destination.

“Vehicle Miles Traveled” (VMT) are a measurement of miles traveled by vehicles obtained by multiplying the Annual Average Daily Traffic (AADT) count by the length of the roadway segment.

“Vulnerable Users” are pedestrians and bicyclists.

“Zero-Emission Vehicles” are vehicles that produce zero or near-zero exhaust emissions of any criteria pollutant (or precursor pollutant) or greenhouse gas under any possible operational modes or conditions.

V. POLICY

1. Policy. It shall be the policy of CDOT that the Statewide Transportation Plan and statewide performance objectives stated herein will guide distribution of financial resources to meet or make progress toward objectives in three goal areas: safety, asset management, and mobility. The Transportation Commission should direct financial resources toward achieving the safety objectives within the first 4 years of the planning horizon (2021-2024), the asset management objectives within the first 10 years (2021-2030), and the mobility objectives within the first 10 years (2021-2030). Projects should be selected to support the goals and objectives and will be included in the Statewide Transportation Improvement Program (STIP). These performance objectives will guide annual budget decisions. Prior to funding new initiatives, the Transportation Commission will direct funds toward achieving the objectives in each area while recognizing constraints on some funding sources.

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2. Goals. PD 14.0 goals guides the implementation of the multimodal Statewide Transportation Plan and the performance objectives that measure attainment of these goals. The goals are:

- SAFETY – The future of Colorado is zero deaths and serious injuries so all people using any transportation mode arrive at their destination safely.
- ASSET MANAGEMENT – Maintain a high-quality transportation network by working to maintain a state of good repair for all assets and a highly traversable road network.
- MOBILITY – Reduce travel time lost to congestion and improve connectivity across all modes with a focus on environmental impact, operations, and transportation choice statewide.

Goals for PD 14.0 and 2045 Statewide Transportation Plan are in alignment with and complement the national goals for surface transportation in the Fixing America’s Surface Transportation (FAST) Act of 2015.

3. Performance Measures and Objectives. Performance measures describe how CDOT will evaluate statewide success, and performance objectives establish statewide achievement levels that are used to direct investment decisions during the different planning horizons for each goal area. Within CDOT’s Annual Budget, the budget categories that fund programs within the goal areas are the following: Construction, Maintenance & Operations, Multimodal Programs, Sub-allocated Programs, and Other Programs. Explanations of how the objectives will be measured are listed below with the appropriate goals.

a) SAFETY:

The highway safety objectives are aligned with the objectives of the 2020-23 Colorado Strategic Transportation Safety Plan (STSP), an extensive and cooperative planning effort by a multidisciplinary partnership of public agencies, private sector organizations, and advocacy groups representing transportation and safety interests statewide. This collaborative and data-driven process identifies achievable highway safety objectives for the planning horizon of 2021-24. These objectives (with the exception of objectives related to employee safety) apply to *all* roads in the State.

(1) Highway Safety

MEASURES:

- Vehicle crash rate per 100 million vehicle miles traveled (VMT)
- Traffic fatality rate per 100 million vehicle miles traveled (VMT)
- Traffic serious injury rate per 100 million vehicle miles traveled (VMT)
- Traffic fatalities and serious injuries involving vulnerable users (pedestrians and bicyclists)

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OBJECTIVES:

- Reduce the rate of vehicle crashes per 100 million VMT by eight percent (8%) over the next four years from current levels.
- Reduce the rate of traffic-related fatalities per 100 million VMT by fifteen percent (15%) over the next four years from current levels.
- Reduce the rate of traffic-related serious injuries per 100 million VMT by fifteen percent (15%) over the next four years from current levels.
- Reduce traffic-related fatalities and serious injuries involving vulnerable users (pedestrians and bicyclists) by fifteen percent (15%) over the next four years from current levels.

ASPIRATIONAL OBJECTIVES:

- Reduce traffic-related fatalities and serious injuries to zero for all users of Colorado’s multimodal transportation system.

(2) Employee Safety

MEASURES:

- On-the-Job injuries
- Vehicle crashes involving CDOT Employees

OBJECTIVES:

- CDOT is committed to ensuring a safe and healthy work environment for all of its employees through its fundamental mission of “Excellence in Safety.” CDOT also is committed to reducing on-the-job injuries and vehicle incidents involving CDOT employees.

(3) Safety Goal Area Considerations

- The safety goal area and objectives are aligned with the Colorado Strategic Transportation Safety Plan (STSP). Additionally, CDOT and the Transportation Commission support implementation of the STSP Tier 1 strategies. (See Appendix C for explanation of the Tier 1 strategies.)
- In addition to the statewide (all roads) metrics, Staff will provide annually to the Transportation Commission additional highway safety data. Examples include:
 - Urban and rural safety data
 - Safety data on the state highway system
 - Safety data for freight transportation
- CDOT and the Transportation Commission provide the lead on transportation safety efforts in Colorado.

b) ASSET MANAGEMENT:

The asset management objectives for highway related assets are intended to be achieved or maintained over the first ten years of the planning horizon (2021-30). The

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objectives identified align with the Department’s Risk-Based Asset Management Plan, a federally-required plan that outlines risk-mitigation, identifies performance gaps, and lists a financial plan over the planning horizon. Additionally, the objectives related to highway asset management are used to help determine funding levels for each of the twelve assets within CDOT’s asset management program.

The majority of transit assets in Colorado are not owned, operated, or maintained by CDOT. Rather, CDOT passes through federal and state funds to assist subrecipients with transit asset acquisition, construction, and refurbishment projects. Thus, it is the Department’s responsibility to oversee subrecipients’ participation in the required planning and reporting processes, to guide the prioritization of pass-through funds to maintain and/or improve the state of good repair of transit assets, and to fulfill annual reporting and targeting requirements.

Performance measures and objectives for transit assets were established by the Federal Transit Administration (FTA) in its 2016 Transportation Asset Management (TAM) Rule and incorporated into the 2018 Group TAM Plan. As required, the Group TAM Plan covered a four-year planning horizon and will be updated no later than the fall of 2022. The TAM Rule also outlined annual reporting requirements about the state of good repair of transit assets and requires CDOT, as the Group TAM Plan sponsor, to set annual performance targets across several asset class types. See Appendix B for a more detailed discussion of this process.

The CDOT-owned Bustang and Bustang Outrider fleet vehicles (operated by subrecipients/contractors) are not subject to the TAM Rule reporting requirements but Staff will use the FTA performance measures for consistency in tracking and reporting.

(1) Highway Pavement

MEASURES:

- Pavement condition of the Interstate System
- Pavement condition of the National Highway System (NHS), excluding Interstates
- Pavement condition of the state highway system

OBJECTIVES:

- Achieve or maintain eighty percent (80%) high or moderate Drivability Life for Interstates based on condition standards and treatments set for traffic volume categories.
- Achieve or maintain eighty percent (80%) high or moderate Drivability Life for the National Highway System, excluding Interstates, based on condition standards and treatments set for traffic volume categories.
- Achieve or maintain eighty percent (80%) high or moderate Drivability Life for the state highway system based on condition standards and treatments set for traffic volume categories.

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(2) Bridges

MEASURES:

- Bridge deck area on the National Highway System in good condition
- Bridge deck area on the National Highway System in poor condition
- Bridge deck area on the state highway system in good condition
- Bridge deck area on the state highway system in poor condition
- Asset management program metrics related to bridge lead metrics, risk metrics, and freight movement metrics (See Appendix A for additional bridge metrics)

OBJECTIVES:

- Achieve or maintain the percent of National Highway System total bridge deck area in good condition at or above forty percent (40%).
- Achieve or maintain the percent of National Highway System total bridge deck area in poor condition below ten percent (10%).
- Achieve or maintain the percent of state highway system total bridge deck area in good condition at or above forty percent (40%).
- Achieve or maintain the percent of state highway system total bridge deck area in poor condition below ten percent (10%).
- Meet asset management program objectives related to bridge lead, risk and freight movement metrics (See Appendix A for additional bridge objectives).

(3) Maintenance

MEASURES:

- Overall Maintenance Levels of Service (MLOS) for the state highway system
- Level of Service (LOS) for snow and ice removal

OBJECTIVES:

- Achieve or maintain an overall MLOS B minus grade for the state highway system.
- Achieve or maintain a LOS B grade for snow and ice removal.

(4) Other Highway Assets

MEASURES:

- Asset management program metrics for other highway assets (See Appendix A for metrics for buildings, Intelligent Transportation Systems (ITS) equipment, fleet, culverts, geohazards, tunnels, traffic signals, walls, and rest areas)

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OBJECTIVES:

- Meet or maintain asset management program objectives related to other highway assets (See Appendix A for buildings, ITS equipment, fleet, culverts, Geohazards, tunnels, traffic signals, walls, and rest areas objectives).

(5) Transit Assets: Small Urban & Rural Agency Assets

MEASURES:

- Rolling Stock: Percentage of revenue vehicles within an asset class that have either met or exceeded their useful life benchmark (ULB).
- Facilities: Percentage of facilities within an asset class rated below a 3.0 on the FTA TERM 5-point scale.

OBJECTIVES:

- Achieve or maintain performance of rolling stock and facilities to less than or equal to the percent performance calculated by the FTA for report year 2019. See Table 2 in Appendix B.

(6) Transit Assets: Bustang & Bustang Outrider Assets

MEASURES:

- Rolling Stock: Percentage of revenue vehicles within an asset class that have either met or exceeded their useful life benchmark (ULB).

OBJECTIVES:

- Achieve or maintain performance in each asset class that have either met or exceeded their ULB at no more than ten percent (10%).

c) MOBILITY:

The mobility goal area is intended to be achieved in the planning horizon from 2021 to 2030. A portion of the objectives within the goal area are aligned with the Greenhouse Gas Pollution Reduction Roadmap, detailing early action steps the state can take toward meeting near-term greenhouse pollution reduction targets, and HB19-1261 – *Climate Action Plan to Reduce Pollution*, statutorily required goals to reduce 2050 greenhouse gas pollution by ninety percent (90%) from 2005 levels. Some objectives within the goal area help increase reliability of the state highway system and increase the use of multimodal travel statewide.

(1) Reliability and Congestion

MEASURES:

- Operations Levels of Service (OLOS)
- Incident Clearance Time
- Vehicle Miles Traveled (VMT) and Vehicle Miles Traveled per Capita

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OBJECTIVES:

- Achieve or maintain an Operations Levels of Service (OLOS) grade of C or better for eighty percent (80%) or greater of the state highway system.
- Achieve or maintain an annual average incident clearance time of twenty (20) minutes or less for highways covered by CDOT Safety Patrol and Heavy Tow vehicles.
- Manage congestion on our roads by reducing Vehicle Miles Traveled (VMT) and VMT per capita by ten percent (10%) on or before 2030, relative to current levels.

(2) Environmental Impact

MEASURES:

- Greenhouse gas (GHG) pollution from the transportation sector (in Carbon Dioxide Equivalents - CO₂e)
- Zero-emission vehicle (ZEV) registrations
- Percent and quantity of state transit fleet that are zero-emission vehicles
- Percent of state highway miles within a thirty-mile buffer of direct-current (DC) fast-charging stations
- Percent of Scenic and Historic Byways classified as electrified byways

OBJECTIVES:

- CDOT will work collaboratively with other state agencies and local partners to reduce statewide GHG pollution from the transportation sector by twenty-six percent (26%) by 2025, fifty percent (50%) by 2030, and ninety percent (90%) by 2050 relative to 2005 statewide GHG pollution levels.¹
- Collaborate with other state agencies to increase electric vehicle registrations to support a future fleet of at least nine-hundred forty thousand (940,000) light-duty zero-emission vehicles by 2030.²
- Work with other state departments, transit agencies, and electric utilities to meet the transit vehicle goals specified the state’s 2020 Electric Vehicle Plan to convert the state transit fleet to one-hundred percent (100%) zero-emission vehicles by 2050, with an interim target of at least one-thousand (1,000) zero-emission vehicles by 2030.³
- Collaborate with other state agencies, local governments, and private companies to increase the percentage of total state highway miles within a thirty-mile travel buffer of direct-current (DC) fast-charging stations from forty percent (40%) in fiscal year 2020 to one-hundred percent (100%) by 2030.⁴
- Coordinate with other state agencies, the Colorado Scenic & Historic Byways Commission, local governments, and individual site hosts to increase the number of Colorado Scenic & Historic Byways classified as electrified byways from three (3) currently to twenty-six (26) by the end of fiscal year 2025.⁵

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OBJECTIVE NOTES:

1. CDOT will focus on the transportation greenhouse gas reduction elements of the Greenhouse Gas Pollution Reduction Roadmap, specifically vehicle electrification, VMT reduction, and the closer integration of greenhouse gas reduction measures and considerations in the planning, environmental, construction, and maintenance/operations elements of the project lifecycle. Other state agencies will simultaneously work to tackle issues related to the electricity generation, buildings, oil & gas, and agricultural sectors for a holistic statewide approach.
2. The Colorado Energy Office (CEO) will lead this effort in collaboration with CDOT, Colorado Department of Public Health and Environment (CDPHE), Colorado Department of Revenue (DOR), and other key stakeholder agencies while also coordinating with automakers, dealerships, utilities, nonprofit entities, and the general public to achieve this ambitious target by 2030. CDOT’s role is to support and amplify this work, not to lead it.
3. CDOT is uniquely positioned to provide unified leadership in the transit electrification space given its statewide perspective and access to state, federal, and Volkswagen Settlement grant funding. CDOT will work to educate transit agencies on their options, support their fleet transition planning, and offset some of the incremental costs of going zero-emission. However, agencies themselves will play the central role in adopting new vehicle options when and where they make sense for their organizations and their riders.
4. CEO will lead this effort to ensure that sufficient public charging infrastructure is available through a combination of public and private investments. The State of Colorado does not intend to own or operate its own charging sites (beyond those at public facilities) but can provide grant support to ensure coverage in areas of the state that are not yet economically advantageous for private companies to serve. CDOT provides support for this effort through mapping, modeling, and data analysis that helps to identify prime locations while also funding limited infrastructure buildout along scenic byways, state parks, and other key areas of the rural charging network.
5. CDOT will play a coordinating role between the CEO, the Colorado Tourism Office, and the Scenic & Historic Byways Commission to educate individual byway groups on the benefits and opportunities associated with electric vehicle charging infrastructure while directing them to existing state grant and utility incentive programs to help facilitate this emerging market.

(3) Multimodal Options

MEASURES:

- Percentage of Coloradans commuting to work with multimodal options, including telecommuting
- Bustang bus service ridership

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- Unlinked transit passenger trips for Colorado small urban and rural transit agencies

OBJECTIVES:

- Increase the percentage of Coloradans commuting to work using multimodal options, including those using telecommuting options, to thirty-five percent (35%) in 2030.
- Restore Bustang (I-25 and I-70 corridors) bus service ridership to pre-COVID-19 levels by the end of FY 2020-21 and grow it five percent (5%) per year thereafter. A pre-COVID-19 level is defined as June 2021 ridership being equivalent to June 2019 ridership, knowing that an equivalent annual number is not attainable while COVID-19 is currently affecting service. June 2019 ridership was 19,189 passengers for the month, with a FY 2018-19 total annual ridership of 238,000 riders.
- Increase unlinked passenger trips from small urban and rural transit agencies proportional to population growth levels from 2019 levels.

(4) Mobility Goal Area Considerations

- Staff will provide additional data for the mobility objectives when updates to PD 14.0 objectives are presented annually to the Transportation Commission. Examples include:
 - Operations Levels of Service (OLOS) grades in rural areas.
 - Operations Levels of Service (OLOS) grades in urban areas.
 - Operations Levels of Service (OLOS) grades for Colorado Freight Corridors.
- CDOT and the Transportation Commission will coordinate and collaborate with internal and external CDOT partners in efforts to achieve mobility goals in Colorado. Through this collaborative approach, CDOT will take actions to fulfill the goals outlined within the Administration’s Greenhouse Gas Pollution Reduction Roadmap.
- VMT, GHG pollution levels, EV adoption, and multimodal options objectives will be aligned with the goals outlined in the Administration’s Greenhouse Gas Pollution Reduction Roadmap and HB19-1261 (Climate Action Plan to Reduce Pollution).

VI. DOCUMENTS REFERENCED IN THIS POLICY DIRECTIVE

Appendix “A” CDOT Asset Management Metrics and Performance Targets

Appendix “B” CDOT Transit Asset Management

Appendix “C” Strategic Transportation Safety Plan (STSP) Tier 1 Strategies

[Administration’s Greenhouse Gas Pollution Reduction Roadmap](#)

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[CDOT’s Risk-Based Asset Management Plan](#)

[CDOT Transit Asset Management Group Plan](#)

[Colorado Strategic Transportation Safety Plan \(STSP\)](#)

[HB19-1261 \(Climate Action Plan to Reduce Pollution\)](#)

[Statewide Transportation Plan \(2045\)](#)

VII. IMPLEMENTATION PLAN

The Division of Transportation Development, with the Division of Accounting and Finance, the Division of Maintenance and Operations, and the Office of Innovative Mobility, and in collaboration with other CDOT Divisions and CDOT Regions, will implement this Policy Directive. The Transportation Commission will direct funds to budget categories to support accomplishment of the objectives. The Division of Transportation Development will report annually on performance of the transportation system to track progress toward objectives, before the submission of the Department’s annual budget. At a minimum, the Division of Transportation Development will review and update or reaffirm this Policy Directive with each Plan update cycle in collaboration with the Office of Policy and Government Relations, Division of Accounting and Finance, Division of Maintenance and Operations, Office of Innovative Mobility and other CDOT Divisions and CDOT Regions.

The Office of Policy and Government Relations shall post this Policy Directive on CDOT’s intranet as well as on public announcements.

VIII. REVIEW DATE

This directive shall be reviewed on or before December 2022.

Herman F. Stockinger III

 SECRETARY, TRANSPORTATION COMMISSION

11/19/2020

 Date of Approval

Subject	Number
Policy Guiding Statewide Plan Goals and Objectives	14.0

Appendix “A”
CDOT Asset Management Metrics and Performance Targets

Asset	Objective	Objective Target	2019 Performance
Pavement	Achieve or maintain 80% high or moderate Drivability Life for Interstates based on condition standards and treatments set for traffic volume categories	80%	88.3%
	Achieve or maintain 80% high or moderate Drivability Life for the National Highway System, excluding Interstates, based on condition standards and treatments set for traffic volume categories	80%	84.0%
	Achieve or maintain 80% high or moderate Drivability Life for the state highway system based on condition standards and treatments set for traffic volume categories	80%	80.4%
Bridge Asset Condition	Achieve or maintain the percent of National Highway System total bridge deck area in good condition at or above 40%	40%	46.4%
	Achieve or maintain the percent of National Highway System total bridge deck area in poor condition below 10%	10%	6.1%
	Achieve or maintain the percent of state highway system total bridge deck area in good condition at or above 40%	40%	46.4%
	Achieve or maintain the percent of state highway system total bridge deck area in poor condition below 10%	10%	6.3%
Bridge Lead, Risk, and Freight Metrics	Percentage of expansion joints in fair, poor, or severe condition (by length) on CDOT-owned bridges	26% or less	37.6%
	Percentage of CDOT-owned bridge deck area that is unsealed or otherwise unprotected	35% or less	36.8%
	Percentage of CDOT-owned bridges over waterways that are scour critical	5.0%	6.2%
	Percentage of bridge crossings over Interstates, U.S. Routes and Colorado state highways with a vertical clearance less than the statutory maximum vehicle height of 14 feet-6 inches	1.0%	2.1%
	Percentage of bridge crossings over Interstates, U.S. Routes and Colorado state highways with a vertical clearance less than the minimum design requirement of 16 feet-6 inches	18.0%	20.3%
	Percentage of CDOT-owned bridges with a load restriction	0.9%	2.2%
MLOS	Achieve or maintain an overall MLOS B minus grade for the state highway system	B-	B
	Achieve or maintain a LOS B grade for snow and ice removal	B	B
Buildings	Achieve or maintain an average statewide letter grade for CDOT-owned buildings at or above 85% C or better	85%	80%
ITS	Maintain or decrease the average percent useful life of ITS equipment at or below 90%	90%	82%
Fleet	Maintain or decrease the average percent useful life of CDOT fleet vehicles at or below 75%	75%	69%
Culverts	Maintain or decrease the percent of culverts in poor condition (have a culvert rating of 4 or less) at or below 5%	5%	5.2%
Geohazards	Achieve or maintain the percent of geohazard segments at or above risk grade B at or above 85%	85%	77%
Tunnels	Achieve or maintain the percent of network tunnel length with all elements in equal or better condition that 2.5 weighted condition index at or above 75%	75%	91%
Traffic Signals	Maintain or decrease the percent of signal infrastructure in severe condition at or below 2%	2%	7%
Walls	Maintain or decrease the percent of CDOT-owned walls, by square foot, in poor condition (have a rating of 4 or less) at or below 2.5%	2.5%	4.2%
Rest Areas	Achieve or maintain an average statewide letter grade for CDOT rest areas at or above 90% C or better	90%	61%

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Appendix “B” CDOT Transit Asset Management

The Federal Transit Administration’s (FTA) October 1, 2016 Transit Asset Management (TAM) Rule established new asset management planning and reporting requirements for 49 U.S.C. Chapter 53 funding recipients and subrecipients that own, operate, or manage capital assets in the provision of public transportation. The TAM Rule requires transit providers to develop a TAM Plan to prioritize and guide investments in transit assets to keep the transit system in a State of Good Repair (SGR), and requires Departments of Transportation (DOTs) to sponsor a Group Plan for all Tier II transit providers (those without fixed-guideway and/or with less than 100 vehicles operating during peak service) who wish to participate. The Colorado DOT Transit Asset Management Group Plan (Group TAM Plan) was completed in the Fall of 2018 and covered a four-year planning horizon. The Group TAM Plan included a capital asset inventory of over \$500 million and a prioritized project list of vehicle, equipment, and facilities projects of over \$118 million through 2022.

The TAM Rule also outlined annual reporting and targeting requirements about the SGR of transit assets. It requires transit providers to report to FTA the number and type of active assets in each asset class every year. Once reporting is finalized, FTA calculates the percentage performance for the report year¹ and then CDOT, as the Group TAM Plan sponsor, sets realistic and achievable performance targets for each asset class for the next report year.

All active transit assets are required to be reported to FTA, regardless of the original funding source. There are 24 possible rolling stock asset class vehicle types, though the small urban and rural fleet currently includes just 11 of those vehicle types. It has been CDOT practice for nearly four years to prioritize pass-through funds to vehicle/project types that fall within six rolling stock asset classes, to vehicles with Americans with Disabilities Act (ADA) accessibility. In 2019, those vehicles made up around 93% of the rolling stock fleet, as emphasized in Table 1.

For the purposes of annual reporting, FTA defined equipment as non-revenue vehicles, narrowing down the types of reportable equipment to just two asset classes. Because of the practice of prioritizing pass-through funds towards ADA-compliant vehicles, CDOT has not awarded any pass-through funds for that type of equipment project in the last several years. As such, for PD 14.0 reporting purposes, Staff will focus rolling stock performance reporting on the six rolling stock asset classes—over-the-road-bus, bus, cutaway, minivan, aerial tramway, and van—and the two facilities asset classes, since those are the asset categories and classes that are impacted by CDOT’s pass-through funds. Additional asset classes may be added in future PD-14 revisions if Staff believes that to be beneficial or necessary. Table 2 shows the performance measured by FTA in report year 2019², which Staff will use as baseline performance for annual reporting to the Transportation Commission.

¹ The FTA report year for CDOT and the small urban and rural agencies runs January 1 through December 31.

² State FY 2019-20

Appendix “B”
CDOT Transit Asset Management (Continued)

Table 1. Small Urban & Rural Transit Assets: Number of Assets per Asset Class, Report Year 2019		
Asset Category	Asset Class	# of Assets
Rolling Stock	AB – Articulated Bus	1
	AO – Automobile	48
	BR – Over-the-road Bus	41
	BU – Bus	444
	CU – Cutaway	317
	MV – Minivan	142
	OR – Other	24
	SB – School Bus	1
	SV – Sports Utility Vehicle	10
	TR – Aerial Tramway	68
	VN – Van	144
Equipment	Automobiles	43
	Trucks and Other Rubber Tire Vehicles	41
Facilities	Passenger/Parking Facilities	43
	Administrative/Maintenance Facilities	46

Table 2. Small Urban & Rural Transit Assets: Percent of Asset Class Beyond SGR, Report Year 2019		
Asset Category	Asset Class	Performance (%)
Rolling Stock	BR – Over-the-road Bus	17.95%
	BU – Bus	24.81%
	CU – Cutaway	24.61%
	MV – Minivan	23.85%
	TR – Aerial Tramway	83.82%
	VN – Van	13.79%
Facilities	Passenger/Parking Facilities	2.78%
	Administrative/Maintenance Facilities	8.89%

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Appendix “C”

Strategic Transportation Safety Plan (STSP) Tier 1 Strategies

- A. Name a Safety Champion to Lead a Proactive Safety Program**
Name a safety champion to lead an inclusive safety program with the responsibility, resources, and authority to advance safety strategies and monitor effectiveness. This strategy will provide a focused approach to championing, coordinating, and implementing safety programming. *CDOT will lead implementation with support from Colorado State Patrol (CSP), Colorado Department of Public Health & Environment (CDPHE), and Colorado Department of Revenue (CDOR).*
- B. Build a Safety Advocacy Coalition**
Build a safety coalition of advocacy groups and state and local agencies to function as a lobbying and advocacy group. This group will work toward revisions to laws and policies at all phases of development and enforcement. This strategy will increase the visibility of key safety issues in policy discussions and create a central forum for strengthening relationships among participants and decision-makers in safety initiatives. *CDOT will lead implementation with support from CSP and CDPHE.*
- C. Institutionalize Safety Roles and Responsibilities**
Establish agreements that define the ways agencies and organizations work together to deliver safety programs, including roles and responsibilities. These will be formal mechanisms such as a memorandum of understanding. Less formal arrangements may be appropriate at local levels. *CSP and CDOT will lead implementation with support from CDPHE and CDOR.*
- D. Coordinate with Existing Safety Programs**
Coordinate the development and implementation of safety programs, incorporating strategies among agencies at the state and local level (example existing programs include CDOT’s Whole System, Whole Safety Program, and regional and local Vision Zero programs). This strategy will improve the reach and impact of the state’s safety programs and avoid duplication of safety program development efforts. *CDOT will lead implementation with support from CSP.*
- E. Promote Consistent Safety Messaging**
Coordinate the efforts of safety agencies and advocacy groups to develop consistent public-facing safety messaging to be distributed to audiences across the state. This strategy will create greater public safety awareness through consistent messaging. *CDOT Highway Safety Office and CDOT Office of Communications will lead implementation with support from CSP, CDPHE, and CDOR.*
- F. Develop Education Campaigns for High-Risk Behaviors**
Develop outreach campaigns aimed at high-risk groups, such as aggressive, distracted, and impaired drivers, with the goal to enhance and coordinate efforts among statewide education platforms. Occupant protection education campaigns will also be included within this strategy. *CDOT Highway Safety Office and CDOT Office of Communications will lead implementation with support from CSP, CDPHE, and CDOR.*
- G. Provide Transportation Safety Education to Students and Families**
Establish a culture of safety among young people by expanding existing and developing new transportation safety education programs that engage them over many years. One aim of this strategy is to develop a comprehensive curriculum that can be used for education statewide, including education on how to be a safe pedestrian and bicyclist. *CSP and CDOT will lead implementation with support from CDPHE.*
- H. Prioritize Transportation Safety Funding**
Increase the importance of safe infrastructure and transportation in transportation funding decisions. Educate funding decision-makers on the importance of safety and how funds could be used to make improvements. *Colorado Transportation Commission will lead implementation with support from CDOT, CSP, CDPHE, and CDOR.*

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Appendix “C”

Strategic Transportation Safety Plan (STSP) Tier 1 Strategies (Continued)

- I. Prioritize Safety in Transportation Planning, Facility Design, and Project Selection**
 Review policies and processes of roadway planning, design, and project selection to determine what role safety plays in decision-making. This includes updating existing planning and design guidelines and standards to integrate enhanced safety measures. *CDOT and CSP will lead implementation with support from CDPHE.*
- J. Educate Decision-Makers on the Effectiveness of Occupant Protection Laws**
 Research and document the benefits of occupant protection laws, such as seatbelt use, helmet use, and restrictions on personal device use. Using available data, this strategy aims to educate legislators, commissioners, and other decision-makers on the benefits of such laws to aid in the development of new policies. *CDOT will lead implementation with support from CDPHE, CSP, and CDOR.*
- K. Increase Requirements for New and Renewal Driver Licensing**
 Expand the graduated driver licensing (GDL) system to increase education and practice requirements for new drivers to obtain a license, and develop appropriate testing requirements to verify driver competency with increased age. *CDOR will lead implementation with support from CSP and CDPHE.*
- L. Establish a Framework for Streamlining Data Management**
 Improve data gathering, reporting, storage, linkage, processing, analyses, and dissemination throughout the state for traffic records databases following the FHWA measures of quality: timeliness, accuracy, completeness, uniformity, integration, and accessibility. The databases will provide more uniform confidence in crash mitigation for agencies at both the state and local level. *CDOT will lead the implementation with support from Statewide Traffic Records Advisory Committee (STRAC), CSP, and CDPHE, as directed by the newly formed leadership group that will be a liaison between the Executive Directors of the partner agencies and STRAC.*
- M. Prioritize and Promote Proven Safety Toolbox Strategies**
 Educate state and local traffic engineers on existing, known, and, effective safety toolbox strategies in transportation facility design, construction, and operation. This strategy will promote inclusion of proven strategies in design practices and development of Local Road Safety Plans by local agencies. *CDOT will lead implementation with support from CSP.*
- N. Implement Systemic Infrastructure Safety Improvement Strategies**
 Build on existing safety implementation projects and programs. Identify and implement the most effective wide-scale systemic safety mitigation strategies in conjunction with implementing hot-spot improvement projects. Examples of these strategies include, but are not limited to, rumble strips, median barriers, and fully protected left-turn phasing. *CDOT will lead implementation with support from local city and county transportation departments as well as CDOT Region Traffic Engineers.*
- O. Increase Education On and Implementation of Data-Driven and Automated Enforcement**
 Increase implementation of data-driven enforcement for speeding and red-light running at high-crash locations. Educate decision-makers on the effectiveness of automated enforcement as a safety enhancement rather than as a revenue generator. *CDOT will lead implementation with support CSP.*

Resolution #TC-2020-11-11

Adoption of updated Policy Directive 14.0 “Policy Guiding Statewide Plan Goals & Objectives”.

Approved by the Transportation Commission on November 19, 2020.

WHEREAS, the Colorado Transportation Commission (the Commission has statutory authority pursuant to § 43-1-106(8)(a) C.R.S. to formulate policy concerning transportation systems in compliance with 23 U.S.C. § 134, 135, and 450; PL 114-94 (“Fixing America’s Surface Transportation Act” or “FAST Act”)) and its regulations; and to undertake transportation planning under § 43-1-1103 C.R.S; and

WHEREAS, a statewide plan is part of the state and federally required statewide transportation planning process; and

WHEREAS, Policy Directive 14.0 states that the policy will be brought forward for consideration by the Commission as goal areas, objectives, and metrics are revised; and

WHEREAS, the Commission annually reviews Policy Directive 14.0 to determine if there is a need to modify goal areas, performance metrics, or objectives; and

WHEREAS, Policy Directive 14.0 has been revised to include the new goal areas of safety, asset management, and mobility; to revise the language of the goals; to update definitions within the Policy Directive; to revise, change, and add new performance objectives and metrics in each goal area; to reflect direction from CDOT executive management, the Transportation Commission, and the Governor of Colorado; and to align with performance objectives in the Colorado Strategic Transportation Safety Plan (STSP), the multi-agency Greenhouse Gas Pollution Reduction Roadmap, and the CDOT Transit Asset Management Group Plan, among other efforts; and

WHEREAS, over the past several months, the Commission reviewed and concurred with the proposed changes to Policy Directive 14.0; and

WHEREAS, Policy Directive 14.0 does not limit the Commission’s flexibility to make funding decisions and to consider new and different information not contemplated in this Directive.

NOW THEREFORE BE IT RESOLVED, that the Commission adopts the updated Policy Directive 14.0 “Policy Guiding Statewide Plan Goals & Objectives” as reflected in Attachment A to this resolution.

Herman F. Stockinger AAA

Herman Stockinger, Secretary
Transportation Commission of Colorado

11/19/2020

Date



TO: CDOT Personnel

FROM: Stephen Harelson, Chief Engineer

CC:

- William Johnson, Performance and Asset management Branch Manager
- Toby Manthey, Asset Management Program Manager
- Britton Stocks, Asset Management Analyst
- CDOT Headquarters Asset Managers

DATE: May 12, 2022

RE: Processes to Change Treatments on Approved Asset-Management Treatment Lists

Purpose:

CDOT's Transportation Asset Management (TAM) program requires 11 of the Department's 12 asset classes¹ to submit an annual list of treatments.² Treatments are typically submitted four years in advance of the intended project-delivery year. This is intended to provide sufficient time for project planning and delivery. However, due to the extended time between creation of the lists and delivery of the treatments, there often are substantial changes to treatments, including the addition or removal of entire treatments. The purpose of this memo is to document change processes for each asset class, including roles and responsibilities. This will help ensure that changes to the treatment list are consistent with CDOT's performance goals, are approved by the relevant authority, and are properly documented.

Background:

The Colorado Transportation Commission (TC) adopted "*Policy Directive (PD) 1609.0: Transportation Asset Management*" in January 2021. The directive laid out in broad terms the policies and procedures of the TAM program. To expand upon that effort, the TAM program is drafting *procedural* directive 1609.1. This memo will serve as an appendix to the procedural directive.

¹ The Maintenance Levels of Service (MLOS) asset class does not submit an annual treatment list.

² Treatments form the basis of construction projects. A single treatment may be delivered as a standalone project or may be bundled with other treatments to make a larger project.

PD 1609.0 established that a primary function of the TAM program is to develop “planning budgets” for each of the asset classes four years in advance. The program also develops annual lists of treatments for all asset classes (excluding Maintenance Levels of Service, or MLOS). Like the planning budgets, these lists are typically developed and approved four years in advance of project delivery to facilitate planning.

Historically, treatment lists have been approved as a snapshot of treatments at a particular moment in time (four years in advance). The lists are approved by two of the following: the Executive Director (or designee), the Chief Engineer and the Chief Financial Officer.

However, the lists should ultimately exist as “living documents” that are updated as changes are made to treatments. The TAM program is therefore establishing specific processes for each asset class to approve changes. These processes are tailored to each class and create an approving authority who accepts or rejects proposed changes, ensuring that updates align with performance goals. This general process was presented to and agreed upon by the Regional Transportation Directors in mid-2020 and was discussed in the TAM Oversight Committee in 2021 and 2022.

In addition to the treatment-change processes outlined below, each asset class maintains an appeals process. If a change request is denied by the approving authority/designee (typically the headquarters asset manager), Regional Transportation Directors can submit an appeal form to the Chief Engineer for final determination. The exception to this is the Fleet asset class, for which appeals are routed to the Director of Maintenance and Operations.

Details:

Documented below are the change processes for asset management treatment lists, by asset class:

1. Pavement:

- **Approval process:** Submission of official form³ to approving authority or designee(s). Supporting documentation, such as Pavement Justification Reports and pictures of pavement cores, may be submitted directly to the Approving Authority on the date that the official form is submitted. The Approving Authority has 30 days to complete the review from the “Date Change Requested” on the official form.
- **Approving Authority:** Materials and Geotechnical Services Manager — Craig Wieden
- **Approving Designee:** Pavement Management Services Manager — Laura Conroy

³ The approving authority listed in this section will supply the official form.

- **What changes are applicable:** Adding treatments not on the original treatment list.⁴ Removing a treatment from the original treatment list that was a model match.⁵ Changing to a more substantial level of pavement treatment from the original treatment list. Changes to treatment limits that cause a treatment to no longer satisfy the model-match criteria. Increases in pre-advertisement planned-treatment budget that exceed planned-treatment unit cost estimate by more than 50 percent without an increase in length, and/or results in the treatment length being reduced by 33 percent or more.
- **Changes not Requiring Approval:** Moving approved treatments to a different list year. Performing a lesser level of treatment than the approved treatment. Increasing the length of a treatment without increasing the budget. Delivering a treatment at a decreased planned treatment budget.
- **Frequency of approval:** As they arise.
- **Publication of Changes:** Annual update to four-year TAM treatment list.

2. Bridge:

- **Approval process:** Asset manager or unit leader makes updates to Bridge Structure Asset Management (SAM) plan.
- **Approving Authority:** HQ Asset Manager—Natasha Butler.
- **Approving Designee:** HQ Asset Manager — Jessica Martinez, Region 1 Unit Leader — Tristan Siegel, Region 2 Unit Leader — Joel Johnson, Region 3 Unit Leader — Sam Abraham, Region 4 Unit Leader — Ali Harajli, Region 5 Unit Leader — Trever Wang.
- **What changes are applicable:** Change to treatment type or treatment budget, addition of an entirely new treatment, or removal of a treatment from approved TAM treatment list.
- **Frequency of approval:** As changes arise.
- **Publication of Changes:** Treatment changes included in snapshot of updated Bridge SAM Plan every six months, and in annual update to four-year TAM treatment list.

3. Culverts:

- **Approval process:** Asset manager or unit leader makes updates to Culverts Structure Asset Management (SAM) Plan.
- **Approving Authority:** HQ Asset Manager—Natasha Butler.
- **Approving Designee:** HQ Asset Manager — Jessica Martinez, Region 1 Unit Leader — Tristan Siegel, Region 2 Unit Leader — Joel Johnson, Region 3 Unit

⁴ The original list is the list submitted to the TAM program by the headquarters asset manager, and then approved by CDOT executives (i.e., two of the following: Chief Engineer, Chief Financial Officer, Executive Director or designee).

⁵ As defined by Pavement Management criteria.

Leader — Sam Abraham, Region 4 Unit Leader — Ali Harajli, Region 5 Unit Leader — Trever Wang.

- **What changes are applicable:** Change to treatment type or treatment budget, addition of an entirely new treatment, or removal of a treatment from approved TAM treatment list.
- **Frequency of approval:** As changes arise.
- **Publication of Changes:** Annual update to four-year TAM treatment list.

4. Walls:

- **Approval process:** Asset manager or unit leader makes updates to Walls Structure Asset Management (SAM) Plan.
- **Approving Authority:** HQ Asset Manager—Natasha Butler
- **Approving Designee:** HQ Asset Manager — Jessica Martinez, Region 1 Unit Leader — Tristan Siegel, Region 2 Unit Leader — Joel Johnson, Region 3 Unit Leader — Sam Abraham, Region 4 Unit Leader — Ali Harajli, Region 5 Unit Leader — Trever Wang.
- **What changes are applicable:** Change to treatment type or treatment budget, addition of an entirely new treatment, or removal of a treatment from approved TAM treatment list.
- **Frequency of approval:** As changes arise
- **Publication of Changes:** Annual update to four-year TAM treatment list.

5. Buildings:

- **Approval process:** Submission of official change-request form to the approving authority or designee.⁶
- **Approving Authority:** Marcella Broussard and John Lorme.
- **Approving Designees:** Asset Managers — Hope Wright or David Fox
- **What changes are applicable:** Deleting/adding a treatment from the treatment list or shifting a treatment from one fiscal year to another.
- **Frequency of approval:** As they arise.
- **Publication of Changes:** Annual update to four-year TAM treatment list.

6. Rest Areas:

- **Approval process:** Submission of official change-request form to the approving authority or designee.⁷
- **Approving Authority:** Marcella Broussard and John Lorme.

⁶ The approving designees listed in this section will supply the official form.

⁷ The approving designees listed in this section will supply the official form.

- **Approving Designees:** Asset Managers — Hope Wright or David Fox
- **What changes are applicable:** Deleting/adding a treatment from the treatment list or shifting a treatment from one fiscal year to another.
- **Frequency of approval:** As they arise.
- **Publication of Changes:** Annual update to four-year TAM treatment list.

7. Tunnels:

- **Approval process:** Submission of official change-request form⁸ to the approving authority or designee.
- **Approving Authority (for treatment modifications):** Asset Manager — Tyler Weldon
- **Approving Designees (approving authority for treatment additions or subtraction of entire treatment and designee for treatment modifications):** Chief Engineer — Steve Harelson
- **What changes are applicable:** Addition or subtraction of the entire treatment. Changes in budget, scheduled year, and scope of the treatment.
- **Frequency of approvals:**
 - i. Treatments on the tunnels list can be added and subtracted upon approval by the Chief Engineer, annually and biannually, at a date to be designated by the tunnels asset manager. Requests for emergency additions can be made to the Chief Engineer at any time.
 - ii. Requests to change treatment budgets can be made at any time.
 - iii. Requests to delay and advance a treatment year can be made at any time.
- **Publication of Changes:** Annual update to four-year treatment list.

8. Fleet:

- **Approval process:** Submission of official change-request⁹ form to the approving authority or designee. The request form is submitted to the Fleet Manager, who routes the form to the Director of Maintenance and Operations for approval.
- **Approving Authority (except for “in lieu of” changes):** DMO Director — John Lorme. The DMO Director approves the changes and an annual updated replacement plan.
- **Approving Authority for “in lieu of”¹⁰ changes:** Asset Manager — Howard Ray or Heavy Fleet Administrator — Robert Brogdon.

⁸ The “approving authority for treatment modifications” listed in this section will supply the official form.

⁹ The HQ fleet asset manager listed in this section will supply the official form.

¹⁰ An “in lieu of” change is when a different vehicle than was in the replacement plan is replaced. The replaced vehicle must be the same class-code as the vehicle originally targeted for replacement in the plan.

- **What changes are applicable:** Any changes to equipment-class code, out-of-cycle replacements, and “in lieu of” changes.
- **Frequency of approvals:** Annually before the updated replacement plan is approved by the Director of Maintenance and Operations.¹¹
- **Publication of Changes:** Annual update to four-year TAM treatment list.

9. Signals:

- **Approval process:** Submission of official change-request form¹² to the approving authority or designee.
- **Approving Authority:** Asset Manager — Nitin Deshpande
- **Approving Designees:** Professional Engineer II — Benjamin Acimovic
- **What changes are applicable:** Addition or subtraction of entire treatments. Significant¹³ changes in budget, scheduled year, and scope of the treatment.
- **Frequency of approval:** As they arise.
- **Publication of Changes:** Annual update to four-year TAM treatment list.

10. ITS:

- **Approval process:** Submission of official change-request form¹⁴ to the approving authority or designee.
- **Approving Authority:** ITS Branch Manager and Superintendent — Bob Fifer
- **Approving Designees:** Asset Manager — Allie Axley or Administrator III — Tammy Feltis
- **What changes are applicable:** Changes of more than \$10,000 to a single replacement.
- **Frequency of Approval:** As they arise.
- **Publication of Changes:** Annual update to four-year TAM treatment list.

11. Geohazards:

- **Approval process:** Submission of official change-request form¹⁵ to the approving authority or designee.
- **Approving Authority:** Geohazards Asset Manager — Robert Group
- **Approving Designee:** Senior Engineering Geologist — Nicole Oester

¹¹ In lieu of changes can be made throughout the year. Other changes must be made annually before replacement plan approval by the Director of DMO.

¹² The approving authority listed in this section will supply the official form.

¹³ As defined by the asset manager.

¹⁴ The approving designee listed in this section will supply the official form.

¹⁵ The approving authority listed in this section will supply the official form.

- **What changes are applicable:** Changes to treatment locations, treatment types, or addition of treatment elements from other asset classes.
- **Frequency of approval/request:** Treatment list changes may be proposed at any time if they are related to a change in the deterioration rate of a geohazard asset. Any other changes should be proposed and approved at least six months before the fiscal year in which the treatment will be delivered to accommodate potential funding transfers between Regions.
- **Documentation Process:** Official form and column in the treatment list marking the change.
- **Publication of Changes:** Annual update to four-year TAM treatment list.



MEMORANDUM

TO: THE BRIDGE AND TUNNEL ENTERPRISE BOARD OF DIRECTORS
FROM: PATRICK HOLINDA, BRIDGE AND TUNNEL ENTERPRISE MANAGER
JEFF SUDMEIER, CHIEF FINANCIAL OFFICER
NEAL RETZER, REGION 1 TUNNEL RESIDENT ENGINEER
DATE: NOVEMBER 16, 2022
SUBJECT: EISENHOWER-JOHNSON MEMORIAL TUNNEL JOINT WORKSHOP

Purpose

This workshop is intended to provide a progress update on the delivery of projects which will address the existing maintenance and repair backlog at the Eisenhower Johnson Memorial Tunnel (EJMT) facility and to inform the Bridge and Tunnel Enterprise Board of Directors (Board) of upcoming budgetary needs.

Action

No approval action is being requested this month. Staff are requesting Board feedback on proposed Bridge and Tunnel Enterprise (BTE or Enterprise) funding contributions in advance of the budget supplement request for the Plenum Liner project planned for December 2022.

Background

In a January 2022 workshop, Staff reviewed the portfolio of projects needed to address the existing maintenance and repair backlog at EJMT with the Board. It was communicated that the completion of these projects was a primary goal of the SB21-260 legislation and that the total cost of the project portfolio was estimated at \$150M. \$53M in strategic funds were allocated to the project portfolio at the time, leaving a significant funding gap. Subsequently, the Board acted on Resolution #BTE-2022-06-05 in June 2022 committing up to \$100M in bridge and tunnel impact fee and bridge and tunnel retail delivery fee (bridge and tunnel fees) revenues to EJMT, eliminating the funding gap, and allowing planning for all projects in the EJMT portfolio to begin. The Board was also informed that the bridge and tunnel fees are BTE’s only revenue streams that can be allocated to tunnel projects based on the statute. The Enterprise’s existing bridge safety surcharge is solely intended to fund bridge projects.

Since this time, CDOT has made significant progress advancing the projects that were funded with the \$53M allocation of strategic funds. A high-level summary of these projects and a status update is provided in the table below. A more detailed summary of the projects is available in the attached presentation.

Project Description	Total Project Budget	Status
Drainage, Plumbing, Heat Trace	\$ 34,742,480.00	In Construction
Grout Bed Repair/Wall Panel Resets	\$ 2,017,549.00	Construction Complete
Service Areas Repair	\$ 6,317,712.00	Design Complete
Property Management	\$ 2,500,000.00	In Construction
ITS Project	\$ 6,000,000.00	In Construction
Plenum Liner (Design Only)	\$ 555,000.00	Design Complete
Total	\$ 52,132,741.00	



Details

Based on planning-level cost estimates, the total cost to complete the projects advanced with strategic funds was originally estimated at approximately \$52M. Using current cost estimates and known costs for projects that have started or completed construction, the total cost estimate has increased to over \$81M, resulting in a shortfall of approximately \$29M due to cost escalation. Additionally, due to the specialized nature of tunnel projects, there is a limited pool of contractors who are qualified to complete this type of work, which could be amplifying the impacts of cost escalation.

To manage cost escalation, the tunnel residency modified the delivery plan for these projects with the goal of maintaining the delivery schedule for several critical scope items using the \$53M budget. Ultimately, the construction phase for the Plenum Liner project was delayed after the only bid received was rejected due to a 300% variance between the engineer’s estimate and the bid. Additionally, the generator replacement and fan motor rewind were removed from the Drainage, Plumbing, and Heat Trace project to reduce cost. Staff are now planning to advance these two projects, which have a total cost of approximately \$30M, through BTE.

As shown below, a reprioritization of the remaining BTE-funded EJMT projects was performed and the Plenum Liner and Generator Replacement and Fan Motor Rewind projects are currently ranked as the 1st and 2nd remaining priorities, respectively. With the addition of these two projects to the BTE program, the total estimated cost of the BTE-funded EJMT projects would increase to approximately \$150M, which exceeds the original Enterprise commitment of up to \$100M. \$30M of the increase can be attributed to the addition of the two projects to BTE’s scope as described above, and the remaining \$20M increase is projected based on the most recent project cost estimates. There is no increase to the total BTE funding commitment being requested at this time. The need for an increase will be re-evaluated as these projects advance into the design phase and cost estimates are refined. Additionally, staff will continue to re-evaluate program goals and employ value engineering to identify opportunities for cost savings when possible.

Priority	Project Description	Total Estimated Cost
1	<i>Plenum Liner (Construction) – Added to BTE</i>	\$ 21,000,000.00
2	<i>Generator Replacement, Fan Motor Rewind – Added to BTE</i>	\$ 8,687,840.00
3	South Tunnel Motor Upgrades	\$ 28,000,000.00
4	LED Lighting Upgrade	\$ 44,800,000.00
5	East Berm Culvert Repair	\$ 11,200,000.00
6	Water Treatment Plant	\$ 5,600,000.00
7	Foaming System	\$ 2,240,000.00
8	Ceiling Fireproofing & Repair	\$ 28,000,000.00
9	Elevator Repair - On Hold	\$ 1,120,000.00
	Total	\$ 150,647,840.00

The current bridge and tunnel fee revenue forecast supports BTE’s ability to advance the construction phase of the Plenum Liner project and the design phase of the Generator Replacement and Fan Motor Rewind project based on the tunnel residency’s proposed project delivery schedules. It should be noted that while forecasts indicate that there are bridge and tunnel fee revenues available to complete these projects, fee collections recently began in FY 2022-23 (July 2022) and the fees are collected incrementally on a schedule that increases annually. Due to these factors, there is currently limited contingency in the funding pool for these projects and other previous program commitments. Additionally, these are newly created fees so there is no historic data to inform the revenue forecast, which indicates that there is a heightened possibility of a variance between forecast and actual revenue collections.



BTE will continue to closely monitor revenue collections and manage the program to maintain a minimum cash balance equal to 20% or greater of forecast annual bridge and tunnel fee revenues in accordance with recommendations from the Department of Revenue. If a modified revenue forecast, or the rate of revenue collections indicate that there may be a revenue shortfall, BTE will return to the Board to review options to mitigate the potential deficit and maintain the project delivery schedules.

It should also be noted that CDOT and BTE previously assessed the need for financing to accelerate EJMT tunnel projects; however, the amount of concurrent work that can be performed at EJMT is limited by various factors, such as the interconnectedness of the tunnel's complex mechanical, electrical, plumbing, and ITS systems, limited work and staging areas, and short construction seasons. As such, staff will continue to evaluate potential opportunities to accelerate projects, but it is currently anticipated that the delivery schedule for EJMT projects can be accommodated using projected bridge and tunnel fee revenues without the need for financing.

Next Steps

- 1) Staff will return to the Board in December with a budget supplement request to fund the construction phase of the Plenum Liner project.
- 2) Staff will continue to monitor revenue collections to ensure that there is adequate funding available to accommodate planned construction expenditures.
- 3) Staff will return with a future budget supplement to fund the design phase for the Generator Replacement and Fan Motor Rewind project.
- 4) Staff will continue to re-evaluate program goals and employ value engineering to identify opportunities for cost savings when possible.

Attachments

Eisenhower Johnson Memorial Tunnel TC/BTE Board Joint Workshop Presentation





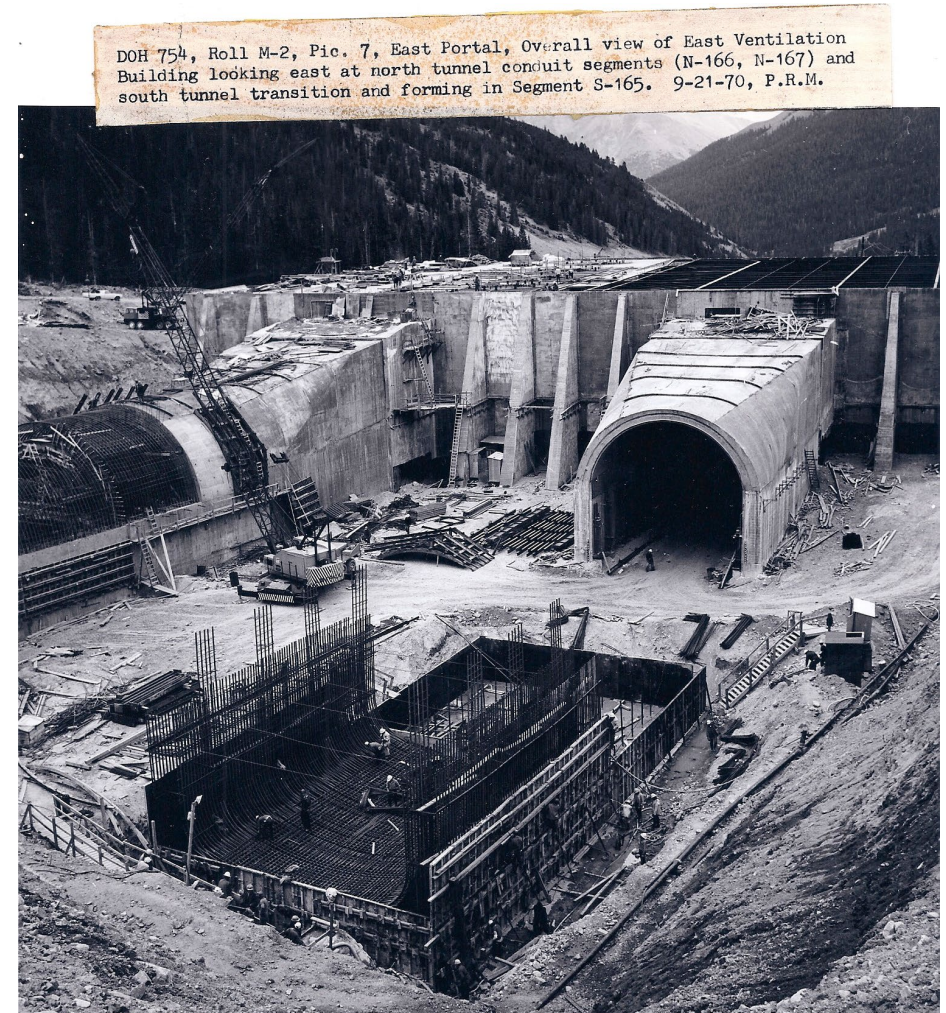
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Eisenhower-Johnson Memorial Tunnel TC/BTE Board Joint Workshop

November 16, 2022
[Page 355 of 532](#)

1. EJMT Program Overview
2. Status Update for Current SB260 Projects (funded through \$53M one-time allocation)
3. Prioritization of Future Projects (funded through BTE revenues)
4. Other Project Considerations
5. BTE Funding Discussion
6. Next Steps



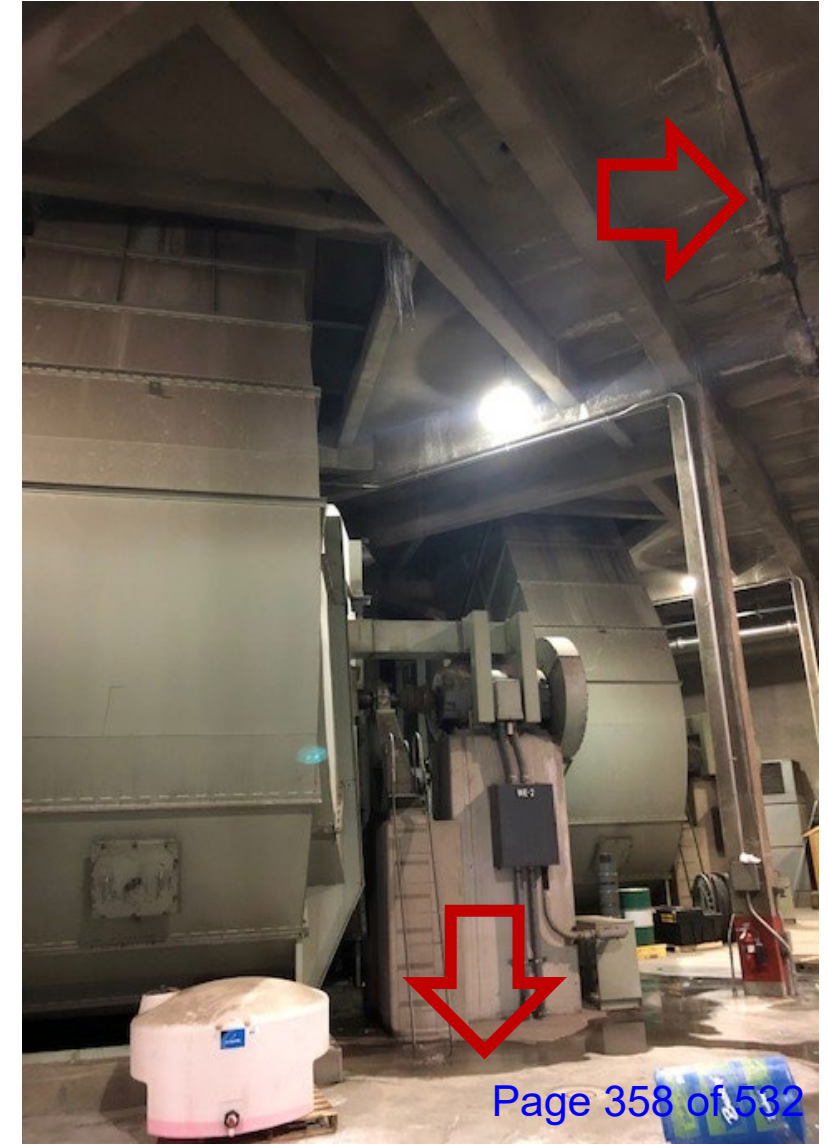


EJMT Program Overview

- BTE and CDOT have identified the EJMT repair and maintenance backlog as the most significant area of need in the tunnel asset class
- Addressing these outstanding needs is a primary goal of SB260
- EJMT needs are captured in the CDOT 10-year project pipeline and funded through two primary sources:
 - \$53M has been funded through SB260 (one time allocation)
 - \$100M in funding was committed by the BTE Board in June 2022
- The new SB260 bridge and tunnel impact and retail delivery fees are expected to create over \$500M in new revenues over the next 10 years for this purpose

What is the criteria for these projects?

- Safety
- Damaging rest of Tunnel
- Sudden/Prolonged Closures





SB260 Project Status Update

Project Description	Total Project Budget	Advertisement Schedule	Delivery Method	Design Status (% complete)	Construction Status (% complete)
Drainage, Plumbing, Heat Trace	\$ 34,742,480.00	Awarded	Design Build	65%	See below
Drainage, Plumbing, Heat Trace				65%	10%
Water Treatment Plant				65%	0%
Grout Bed Repair/Wall Panel Resets	\$ 2,017,549.00	Awarded	Design/Bid/Build	100%	100%
Service Areas Repair	\$ 6,317,712.00	1/12/2023	Design/Bid/Build	95%	0%
Fire Extinguisher Cabinets				95%	0%
Service Areas Repair (guardrail, drainage, etc.)				95%	0%
Automated Portal Deicing				95%	0%
Tunnel Sensor Upgrades				95%	0%
Property Management	\$ 2,500,000.00	Awarded	Design/Bid/Build	100%	See below
East and West Roof Repair				100%	75%
Vehicle Bay Boiler Upgrades/Ventilation				100%	100%
ITS Project	\$ 6,000,000.00	Awarded	Design/Bid/Build	100%	10%
Plenum Liner (Design Only)	\$ 555,000.00	Bids Rejected	Design/Bid/Build	95%	0%
Total	\$ 52,132,741.00				



SB260 Projects Planned vs. Actuals

Project Description	Planning Estimate (09/2021)	Current Estimate (11/2022)	Estimated Funding Gap	Change Proposed to Address Funding Gap	Estimated Cost to BTE to Eliminate Funding Gap
Drainage, Plumbing, Heat Trace	\$ 24,300,000.00	\$ 43,387,480.00	\$ 19,130,320.00		
Drainage, Plumbing, Heat Trace	\$ 15,000,000.00	\$ 34,742,480.00	\$ 13,742,480.00		
Water Treatment Plant	\$ 6,000,000.00				
Generator Replacement	\$ 500,000.00	\$ 8,687,840.00	\$ 5,387,840.00	Move to BTE Projects	\$ 8,687,840.00
600 HP Fan Motor Rewind	\$ 2,800,000.00				
Grout Bed Repair/Wall Panel Resets	\$ 2,000,000.00	\$ 2,017,549.00	\$ 17,549.00		
Service Areas Repair	\$ 7,150,000.00	\$ 6,317,712.00	\$ (832,288.00)		
Fire Extinguisher Cabinets	incl. above	incl. above			
Service Areas Repair (guardrail, drainage, etc.)	incl. above	incl. above			
Automated Portal Deicing	incl. above	incl. above			
Tunnel Sensor Upgrades	incl. above	incl. above			
Property Management	\$ 2,500,000.00	\$ 2,500,000.00	\$ -		
East and West Roof Repair	incl. above	incl. above			
Vehicle Bay Boiler Upgrades/Ventilation	incl. above	incl. above			
ITS Project	\$ 6,000,000.00	\$ 6,000,000.00	\$ -		
Plenum Liner	\$ 10,500,000.00	\$ 21,000,000.00	\$ 10,500,000.00		
Liner Repair (Both Tunnels)	\$ 10,000,000.00	\$ 21,000,000.00	\$ 11,000,000.00	Move to BTE Projects	\$ 21,000,000.00
Structural Inspection Findings	\$ 500,000.00	\$ -	\$ (500,000.00)	Completed through other project	
Total	\$ 52,450,000.00	\$ 81,222,741.00	\$ 28,772,741.00		\$ 29,687,840.00



Reprioritized BTE EJMT Projects List

PRIORITY	PROJECT DESCRIPTION	TOTAL ESTIMATED COST
1	<i>Plenum Liner (Construction only)* - Added to BTE</i>	\$ 21,000,000.00
2	<i>Generator Replacement, Fan Motor Rewind - Added to BTE</i>	\$ 8,687,840.00
3	South Tunnel Motor Upgrades	\$ 28,000,000.00
4	LED Lighting Upgrade	\$ 44,800,000.00
5	East Berm Culvert Repair	\$ 11,200,000.00
6	Water Treatment Plant	\$ 5,600,000.00
7	Foaming System	\$ 2,240,000.00
8	Ceiling Fireproofing & Repair	\$ 28,000,000.00
9	Elevator Repair - On Hold	\$ 1,120,000.00
		\$ 150,647,840.00

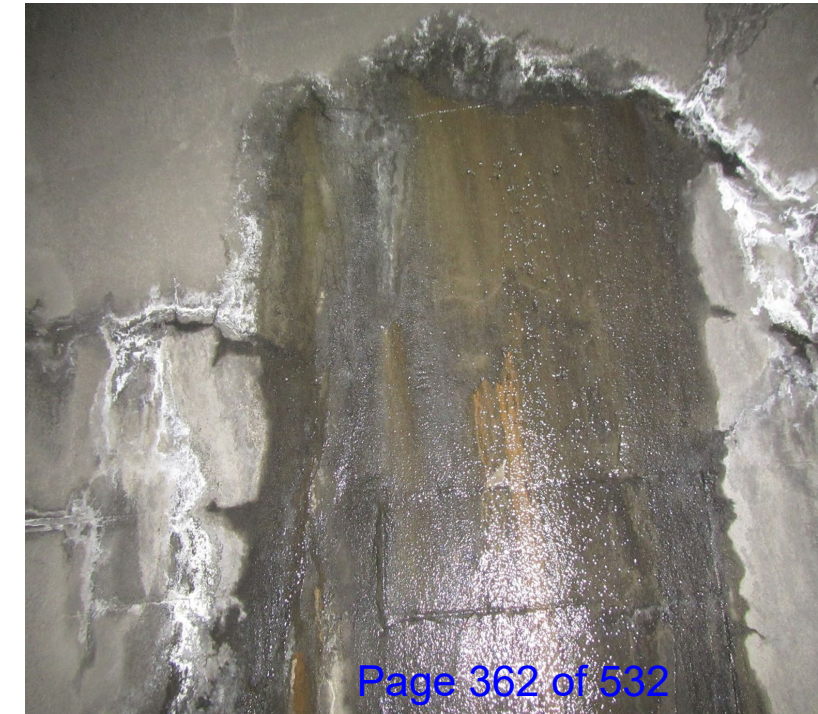
*Note: Prioritizing the Plenum Liner may potentially shift all projects out one construction season

- In June 2022, BTE committed up to \$100M to projects at EJMT
- Current cost estimates indicate a potential \$20M increase to the original \$100M in scope assigned to BTE
- Moving the Plenum Liner and Generator Replacement/Fan Motor Rewind to the BTE will increase cost to the program by an additional \$30M



EJMT Plenum Liner Project

- Meets all SB260 selection criteria (especially damage to other elements) and is the top outstanding priority
- Project advertised with bids opened on 7/22
- Low and only bid of \$30M was rejected
- Construction cost estimated at \$21M based on previous bid and contractor engagement





Generator Replacement/Fan Motor Rewind

- Replaces both original natural gas generators with single diesel generator
- Increases capacity by 4x and improves safety during emergencies
- Motor rewinds in North tunnel make them more compatible with recent technology upgrades (they are also due for rebuild/rewind)
- Approximate \$8.7M cost





Other Considerations for EJMT Projects

- Will project delivery impact freight movement or the traveling public?
 - Impacts are expected to remain minimal with most lane closures at night
- Will these projects mitigate known risks?
 - In some cases, like the drainage, plumbing, and heat trace project - yes!
 - In other cases, like the plenum liner - follow up projects may be required
- Is an emergency or contingency pool needed for unknown risks?
 - Historically, there hasn't been a need and the projects being completed will significantly reduce EJMT's risk profile
 - In emergency situations, M&O typically responds, and Engineering works identify a long-term solution
- Have safety improvements/electric vehicles been considered?
 - These items are under review by the Hazmat evaluation teams
 - Recommendations such as a foaming system, ceiling fireproofing and PA system are on the BTE project list



Key Funding Considerations



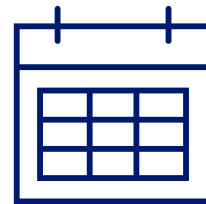
Based on the statute and limitations on other existing BTE revenue sources, the bridge and tunnel fee revenues are the only BTE funding source available for tunnel projects.



Revenues for the bridge and tunnel fees will be collected incrementally and the fee schedule is phased in over time.



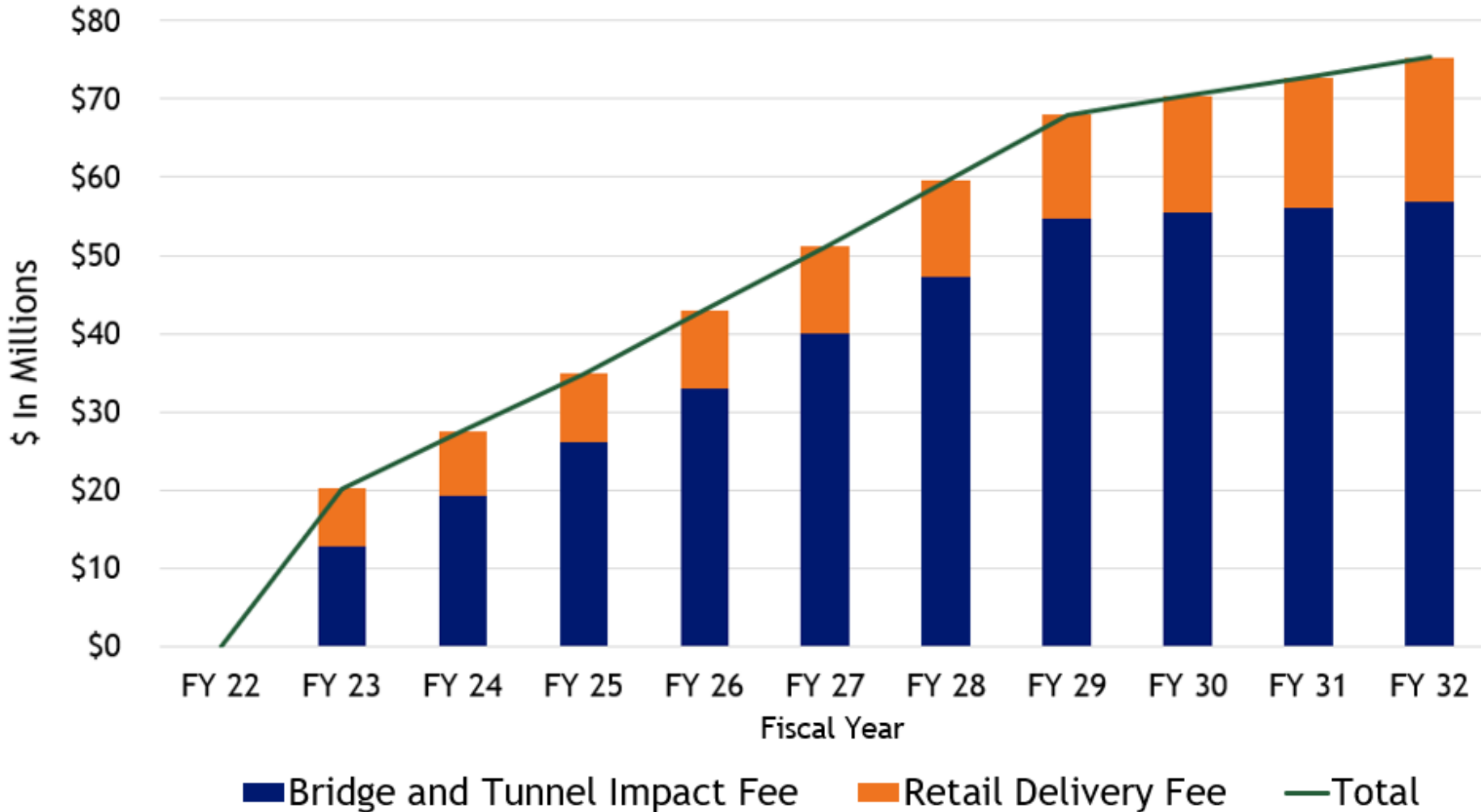
There is no historical data to inform the revenue forecast for the bridge and tunnel fees so variance between the forecast and actual collections is possible.



Tunnel projects are being strategically scheduled based on availability of bridge and tunnel fee revenues and the capacity to deliver projects concurrently.



Bridge and Tunnel Fee Revenue Forecast



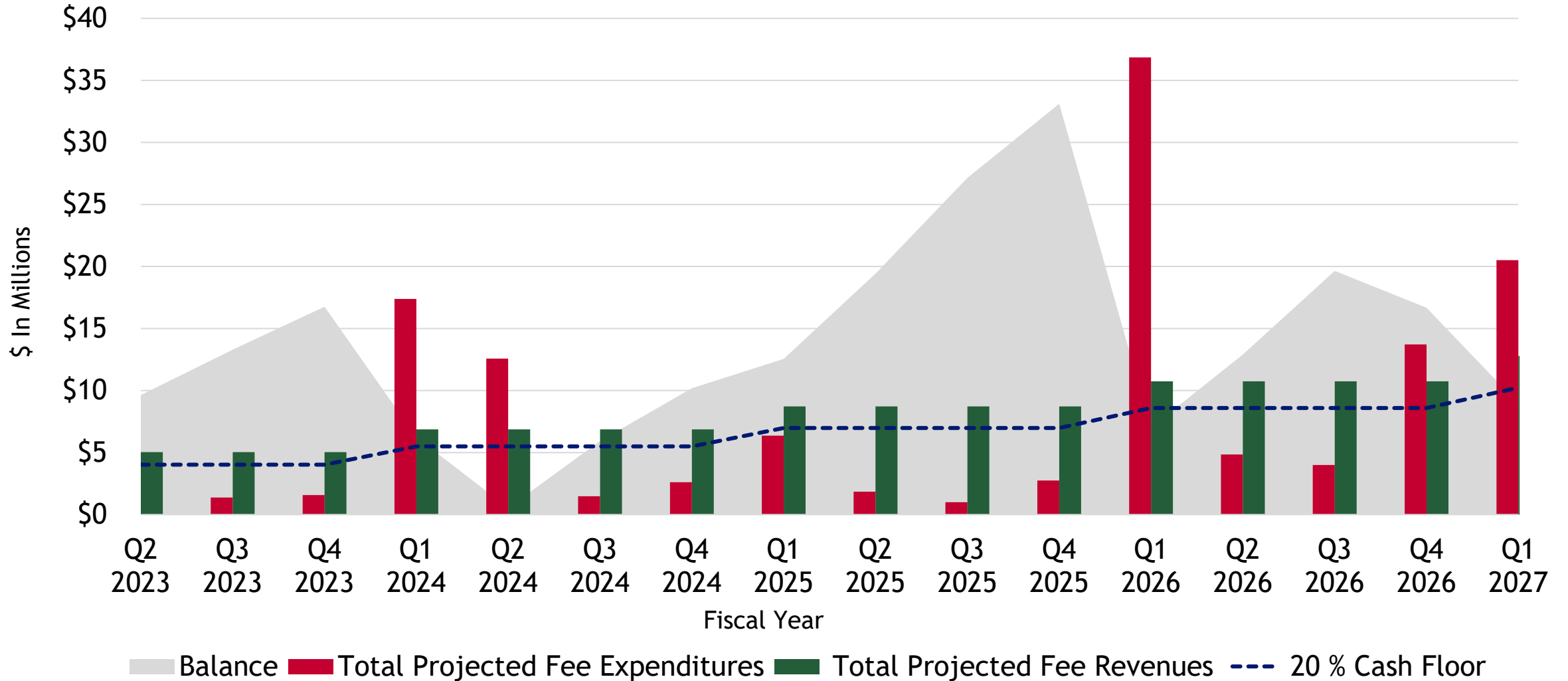
Total Fee Revenue \$522M

Total Bridge and Tunnel Impact Fee Revenue \$401M

Total Retail Delivery Fee Revenue \$121M



Forecasted Bridge and Tunnel Fee Revenues and Expenditures





Next Steps

- Staff will return to the Board in December with a budget supplement request to fund the construction phase of the EJMT Tunnel Plenum Liner Project
- Staff will continue to monitor revenue collections to ensure that there is adequate funding available to accommodate planned construction expenditures
- Staff will return with future budget supplement requests for additional high priority EJMT projects
 - Design funding request for the Generator Replacement/Fan Motor Rewind is anticipated in early 2023
 - Estimated Design Cost of \$750K
- Staff will continue to re-evaluate program goals and employ value engineering to identify opportunities for cost savings when possible



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Thank you for your time!
Questions or comments?





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Freight Mobility & Safety Branch

2829 W. Howard Place
Denver, CO 80204-2305

Memorandum

TO: The Transportation Commission
FROM: Rebecca White, Director, Division of Transportation Development
Craig Hurst, Manager, Freight Mobility & Safety Branch
DATE: November 17, 2022
SUBJECT: Freight, Regional & Interstate Mobility Committee

Purpose

The Freight Mobility and Safety Branch has advanced several key studies and initiatives throughout 2022 that will improve safety, mobility and efficiency of goods movement. Important accomplishments highlighted this quarter include:

1. Share a research based study to evaluate the opportunity and potential impacts of an inland port in the metro Denver area.
2. Deploying a playbook to guide local municipalities and planning partners regarding best practices in designing, coordinating and implementing truck parking partnerships.
3. Distributing state designated National Highway Freight Program funds through an inclusive, strategic, and outcome-driven process.

Action

No voting action is required.

Background

Three important accomplishments from 2022 support safety, advance efficiency and improve mobility for freight movement across Colorado. We are proud to share more details about them with you.

First, CDOT recently completed a high-level study to evaluate the opportunity and potential impacts of an inland port in the state of Colorado. Inland ports are consolidation and intermodal centers that offer significant efficiency benefits to shippers, receivers, and consumers. Benefits include cost savings, operational improvements, and reduced travel and congestion over the highway network that offers the potential for reductions in energy consumption and greenhouse gas emissions. A consortium



of public and private partners are interested in understanding the feasibility of an inland port surrounding Denver International Airport. CDOT sponsored this study to understand market conditions and trends, and Denver’s competitive position.

Second, a truck parking playbook has been published. This resource provides local municipalities and planning partners guidance regarding best practices in designing, coordinating and implementing truck parking partnerships. Truck parking in Colorado is a significant and ongoing challenge that will require innovative solutions, partnerships, and coordination among public agencies and private businesses. Releasing this guidebook shares important tips to others regarding CDOT as a leader in creating solutions for truck parking, specifically through partnership. We were proud to kick off the playbook with a ground breaking in late September of 2022 showcasing the Town of Bennett, Loves Truck Stop and CDOT’s partnership to build an additional 114 truck parking spots in an essential segment of a vital freight route.



Third, the National Highway Freight Program (NHFP) is a dedicated source of funds for freight transportation improvements across the nation. Each state is designated an annual allocation, and Colorado’s allocation is distributed to projects across CDOT regions. Initial project selection for fiscal years 2022 & 20223 funding has been completed by CDOT. Freight Advisory Committee members provided oversight to the award process and input regarding projects selected. A total of 18 projects received funding for this period. Projects funded include:

- Corridor safety and operational improvements on key freight routes across the state,
- Bridge and structure studies to prioritize future bridge and structural investments, and
- Technology operations projects looking to advance safety through tools.



Next Steps

Staff looks forward to providing an update on this work at the next Commission Freight Subcommittee meeting.

Attachments

- FMSB_TC Nov22 REVISED





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Freight Mobility and Safety Branch

Recent and Ongoing Studies and Initiatives

**Colorado Transportation Commission
Freight, Regional, and Interstate Mobility Committee**

November 2022

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Discussion Items



**Inland Port
Feasibility Study**



**Truck Parking
Playbook**



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1

Inland Port Feasibility Study

What is an Inland Port?



Multimodal freight and logistics hub with a concentration of infrastructure, assets, and businesses



Congestion Reduction

Emissions and Energy Efficiencies

Operating Cost Savings

Economic Development and Job Centers

Customs and Brokering Efficiencies

Community and Land Use Conflict Reductions

Colorado Inland Port Feasibility Study

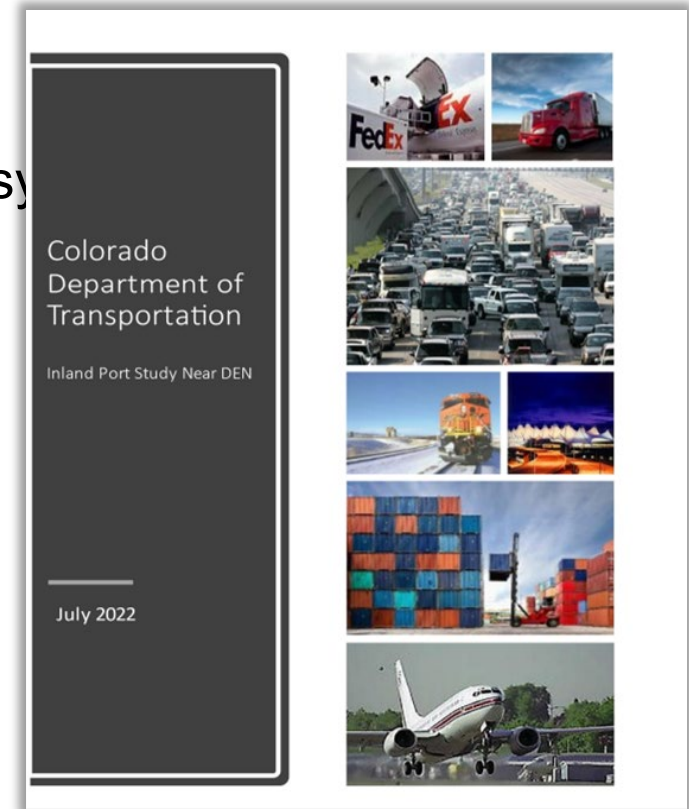


Why is CDOT involved?

- Gather insights into future development surrounding DEN
- Support freight and logistics industry in Colorado
- Understand potential impacts and implications on state transportation system

What did the study consider?

- Case studies and national best practices
- Existing conditions and trends
- Transportation demand forecasts
- Development readiness considerations



Inland Port Development Case Studies



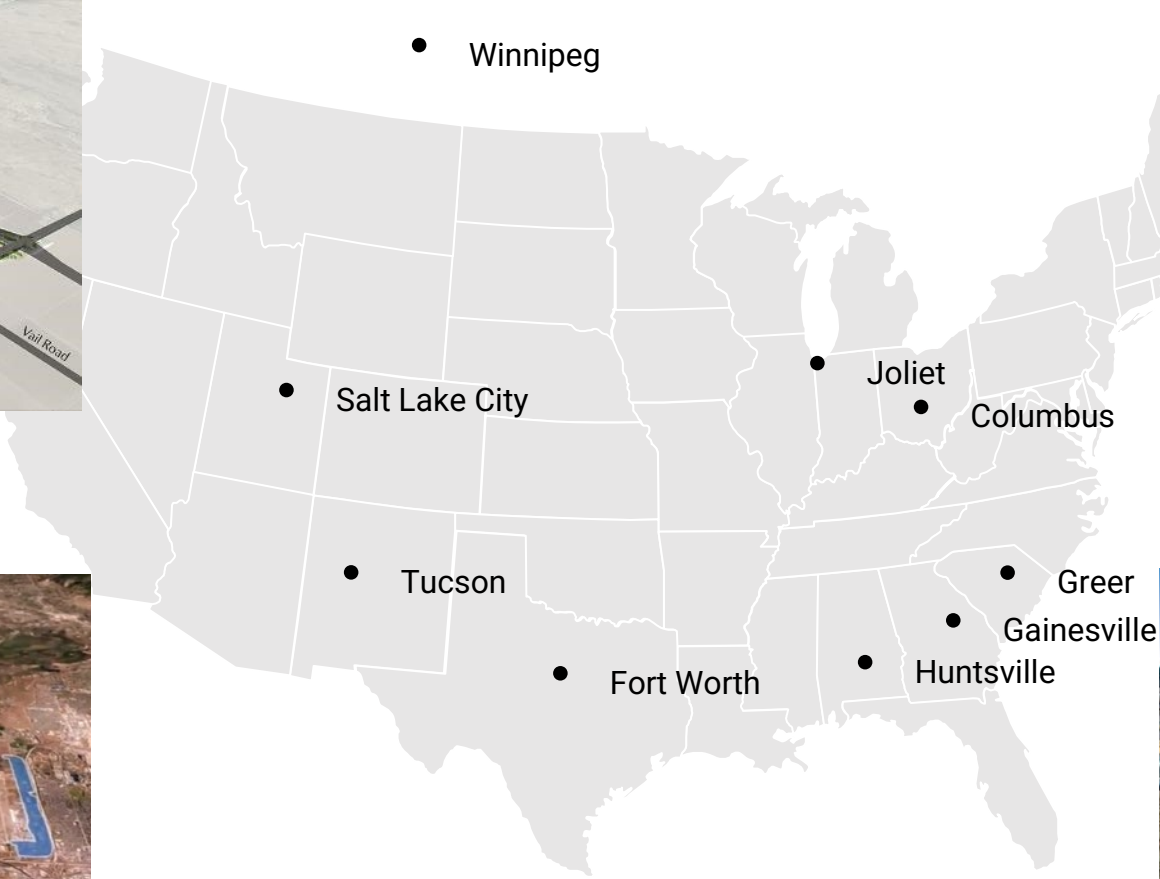
Tucson Logistics Park



Alliance Texas Logistics Hub



Salt Lake City



Kansas City Smart Port



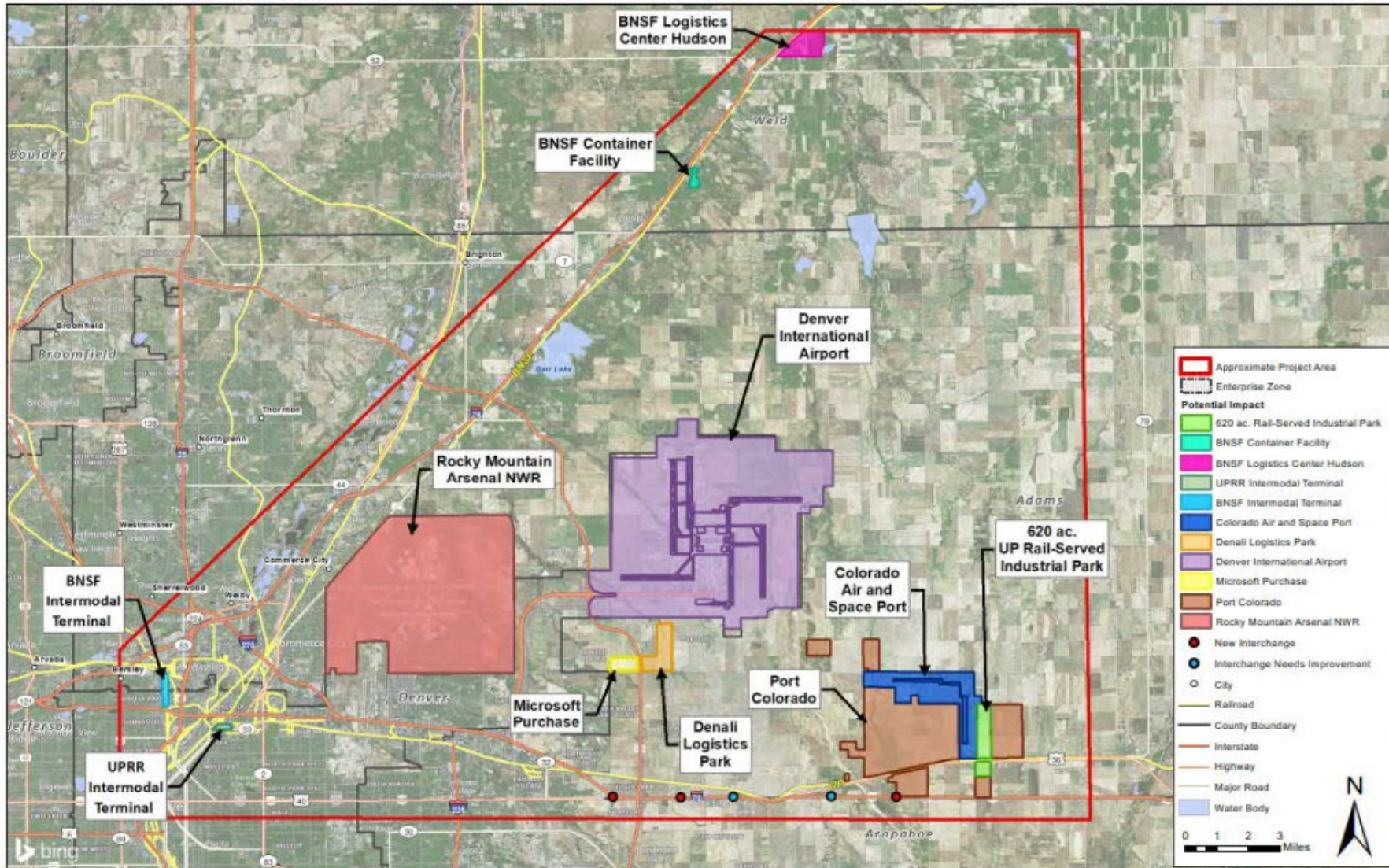
Best Practice Findings



- **Significant support** from state, regional, and local governments is necessary
- **Independent governance** or authority ownership and management is common
- **Diverse funding strategies** including federal and local grants, state investments, and operating revenues is relied on
- **Concentration of multimodal infrastructure** including highway, rail, and air assets is critical
- **Anchor distribution tenants** and broad commodity trade is key to building clusters
- **Access to skilled workforce**, economic development incentives, and supporting businesses important
- **Available land** and transportation system capacity is crucial



DEN Area of Opportunity



- 4 interstates and 3 major highways
- BNSF logistics center and intermodal facilities
- UP rail-served industrial parks
- DEN air cargo facilities
- Colorado Air and Space Port
- 21,000-acre Aerotropolis concept
- 16,000 acres of non-aviation property within DEN
- Rapid industrial, commercial and residential development

Denver Market Conditions



National Trends

- E-commerce driving distribution demand
- Congestion increasing near existing coastal seaports and national intermodal centers
- National vision for multimodal freight systems to advance economic development and sustainability
- Industry and government focus on sustainability and energy efficiency

Regional Trends

- 40% growth in freight tonnage moving through Denver metro by 2040
- 4.3 million residents in metro area by 2040

Local Trends

- Freight-oriented development already occurring in DEN area
- Major residential and commercial developments planned



DEN Inland Port Readiness Considerations



- **Public Policy**

- Current focus on energy and emissions and economic development favors coordination
- Coordinated planning among local governments already occurring

- **Transportation System**

- Current fragmented land use and development will increase congestion, delay, reliability issues
- Access and improvements to highway and rail networks necessary

- **Supporting Infrastructure**

- Skilled labor market available; access for workers needs to be planned
- State and local economic development incentives available

Observations & Next Steps



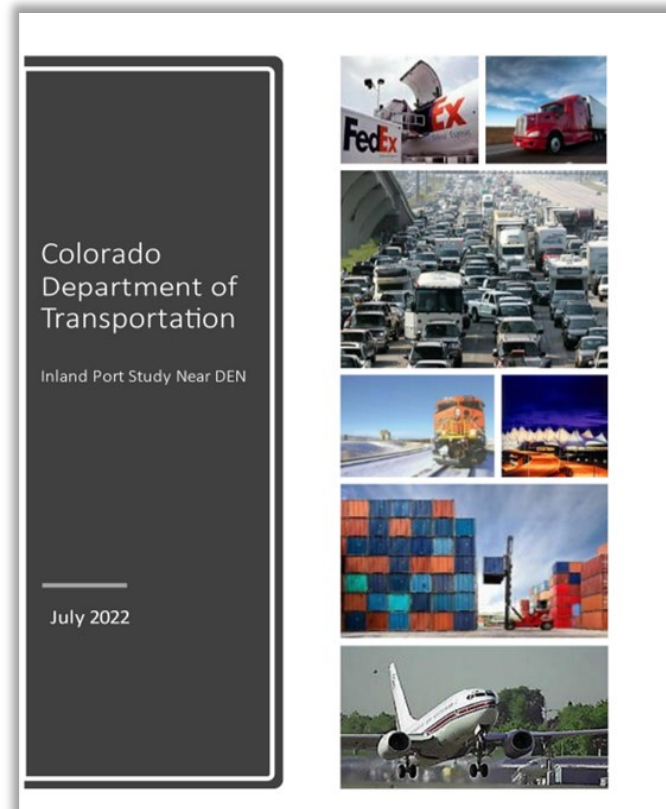
Observations in the Market

- Development in the study area resembles inland ports elsewhere in the country.
- Growth expected is in the sectors typical of inland ports:
 - warehouse and distribution facilities including e-commerce that thrive on good highway networks
 - advanced manufacturing firms capitalizing on access to world markets by air and rail links to ports.
 - employment growth

Next Steps

Continue to monitor progress and work with planning partners (Region 1, transportation management organizations, local municipalities) to evaluate opportunities and challenges.

Questions?





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2

Truck Parking Playbook

How Did We Get Here?

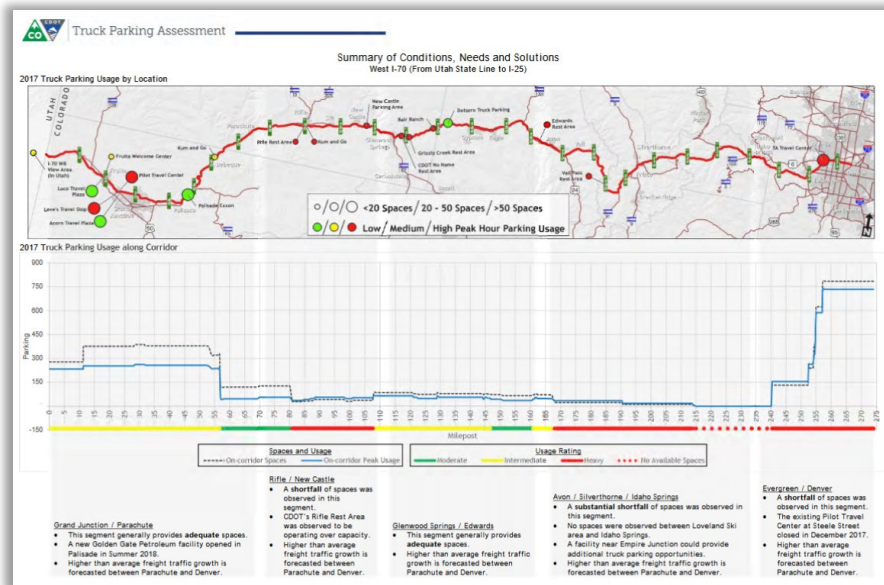


Truck Parking Study, 2019:

- Completed first statewide inventory of truck parking conditions and needs
- Coordinated with partners and stakeholders to identify challenges and opportunities

Truck Parking Playbook, 2022:

- Outlines challenges and hurdles, but also covers strategies that can lead to a successful project
- Intended as a living document that will be updated as we develop successful strategies



Identifying Challenges and Opportunities



Challenges

- Limited parking areas near major urban destinations
- Need for safe, convenient, accessible facilities
- Need for emergency operations parking
- Federal regulations governing hours of service
- Continued growth and demand for truck movements

Opportunities

- NHFP funding available
- CDOT rest area program
- Public-private partnerships
- Federal priority

CDOT Considerations for Parking Capacity Expansion Projects:

- Long-term maintenance costs on anything that we build
- We do not want to compete with the private sector; CDOT is not in the concessionaire business
- Land and right of way is often unattainable
- Local land-use and zoning challenges

Truck Parking & Emergency Operations



- Exploring strategies to make locations available in major emergencies or weather events that close major roadways
 - Fairgrounds, auction yards, distribution centers, and other facilities
- Pre-storm planning with supporting communication strategies
- Coordinating with local governments and businesses



Nobody wants a truck stop in their backyard, but does it need to be?

- We have very limited options to solve capacity issues once development occurs.
- We need to ask our municipal partners to take a closer look at their land-use and zoning regulations to mitigate later challenges.

Addressing the challenge with solutions:

- New developments should be solving third-party truck parking issues before issues are created.
- Multi-family developments have minimum parking requirements; can this approach be mirrored for commercial industrial developments that generate freight traffic
- Local land use & developers can work together to reduce costs and solve the problem in a safe and thoughtful location.

How Are We Doing It?



Building Partnerships

- We have used the data and lessons that we learned in our Truck Parking Assessment to begin to look for a partnership for our Phase 2 that is focused on project delivery.
- Our goal was to look for opportunities to develop a Public-Private Partnership (P3) in areas identified as high need.



Our “P3-Like” Solution



- The Town of Bennett, Co reached out to CDOT’s Freight team expressing interest in working together to solve capacity needs.
- We worked with them to incentivize growth at the local Love’s facility.
- We signed a memorandum with the Town, agreeing to pay for the design of a bridge needing improvements. The town made intersection improvements, and Love’s is adding spaces





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Questions?





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Craig Hurst

Manager, Freight Mobility & Safety Branch

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Freight Mobility & Safety Branch



MEMORANDUM

TO: THE TRANSPORTATION COMMISSION
FROM: Kay Kelly, Chief, Office of Innovative Mobility
Rebecca White, Director, Division of Transportation Development
Ashley Nysten, Assistant Director of Mobility Technology
Craig Hurt, Manager, Freight Office
DATE: November 16, 2022
SUBJECT: Innovative Mobility Committee Meeting

Purpose: This memorandum provides an overview of the content to be covered in the joint Office of Innovative Mobility and Freight committee meeting.

Action: Informational briefing only. No action required.

Background: Since 2019, the connected vehicle (CV) program has been led by and housed within the Office of Innovative Mobility (OIM). The CV program provides periodic annual updates on progress and status of the CV program. At the July 2021 Transportation Commission workshop, the OIM team presented the current progress of the program, featuring the production ecosystem of CDOT's CV data that provides Colorado drivers information on changing roadway conditions, work zones and other traffic alerts to improve safety and mobility. Today's presentation will feature a brief status update of the CV program to date and future roadmap plans, particularly the freight use case.

An integral component of the next phase of the CV program is linkage to other critical divisions and programs, in which CV use cases and applications may offer critical safety and efficiency benefits.

The CV and Freight teams have been planning and designing a connected freight concept over the last year and are at a point that is optimal to present the concept to the Transportation Commission as an update. The project features connection between the CV program's work zone data exchange data feed, directly to freight operators to inform the operators of the dynamic and ever-changing nature of our work zones. The project features a one-year research period to evaluate the effectiveness and efficacy of the alerts to improve safety in our work zones.

Next Steps: Please feel free to follow up with OIM staff if you have any questions or comments.

Attachments: CDOT CV and Freight Program Presentation





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Joint Workshop - OIM and Freight Committees Connected Vehicle Program - Freight Project

November 16, 2022



Presentation Agenda

- **Connected Vehicle Program Refresher, Update and Major Accomplishments**
- **Freight Focus area**
- **Discussion/Questions**



Connected Vehicle Tech Refresher: What are Connected Vehicle technologies?

**Simple answer:
A vehicle that can communicate with other systems!**

There are different communication methods and protocols for vehicles to communicate with surrounding systems that transportation organizations can deploy and use.

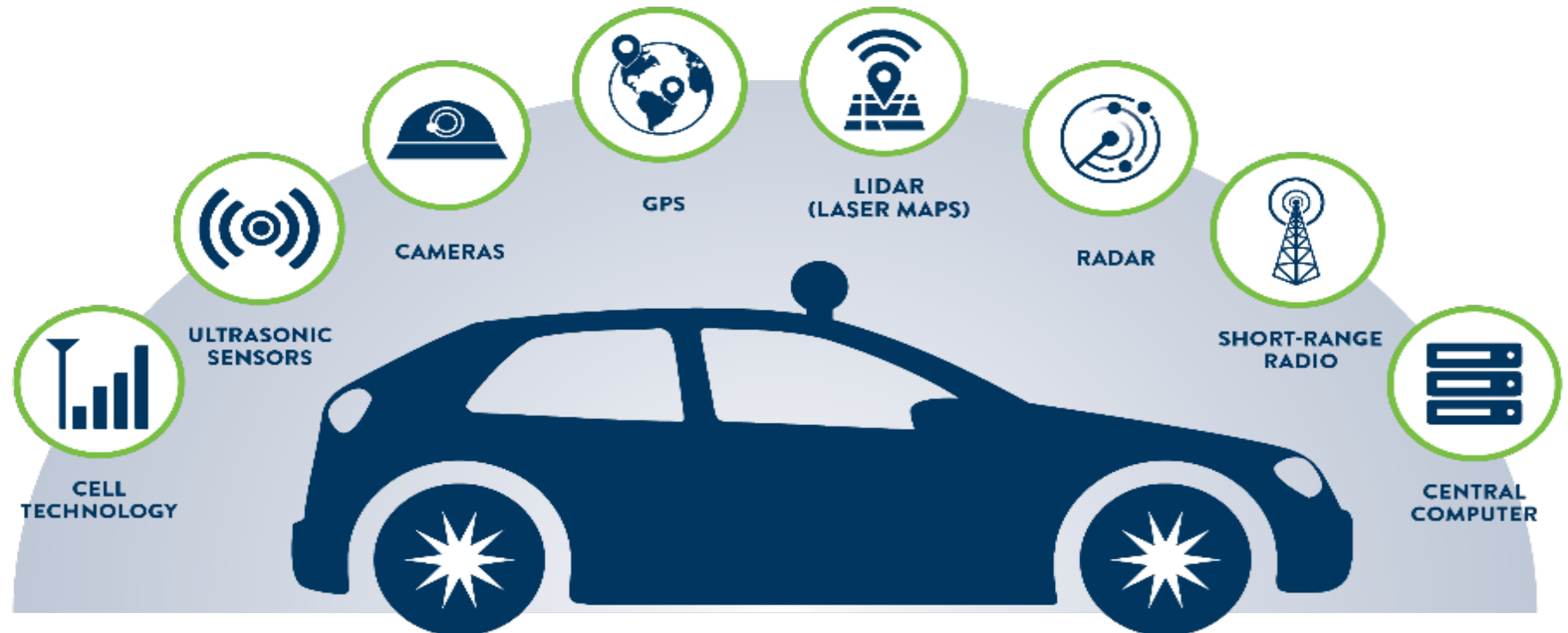


Image Source: Minnesota DOT CAVx Office



Sample of Active CDOT CV Use Cases

Communicating Worker's Presence



ABS events to detect spot weather



Traffic signal priority for snowplow operation





Connected Vehicle Program Refresher at CDOT

2015 - 2019

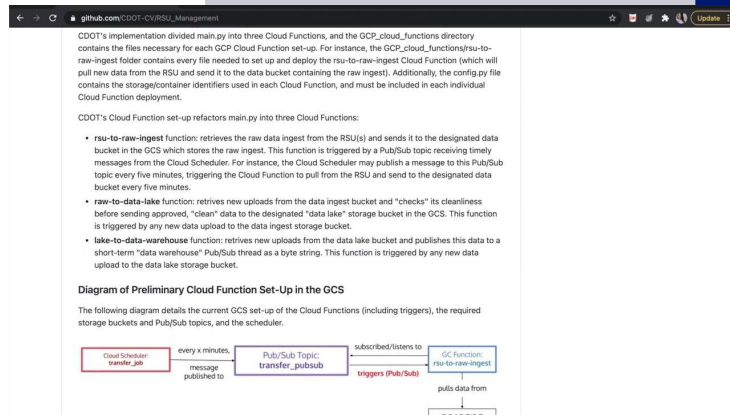
- CV system completely external to CDOT
- Little control/access to our devices and data
- Little opportunity to improve capacity
- System changes = cumbersome and time consuming
- \$\$\$

2019 - 2021

- CV system moved internal to CDOT
- Fully functional, open source ecosystem - leveraged system built by WyDOT and other state DOTs
- Greater system capacity (scaling, data mgt, device mgt, latency, flow, troubleshooting)
- Cloud connected data sources
- Increased staff capability
- Workforce Development

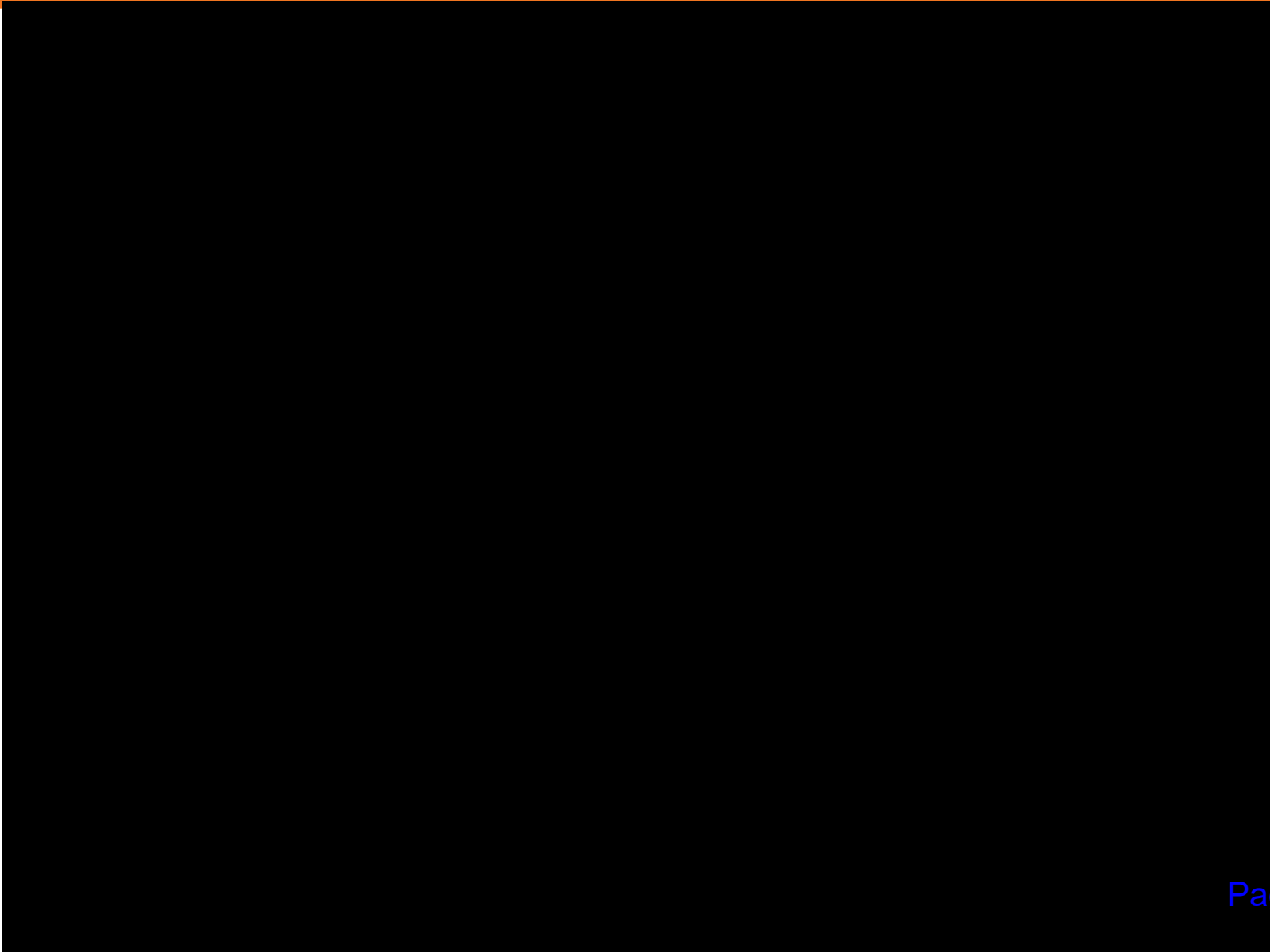
2022 - Current

- Operational in CDOT's systems
- Security enhancements and Intersection functionality
- Ready for 400+ RSUs
- RSU/OBU grant program
- Data sharing
- **Linkage and support to other CDOT programs**





CV Program - In operation and action!





Work zone data integration

Merging of planned and real-time work information to more accurately communicate the real-time, dynamic nature of our work zone.

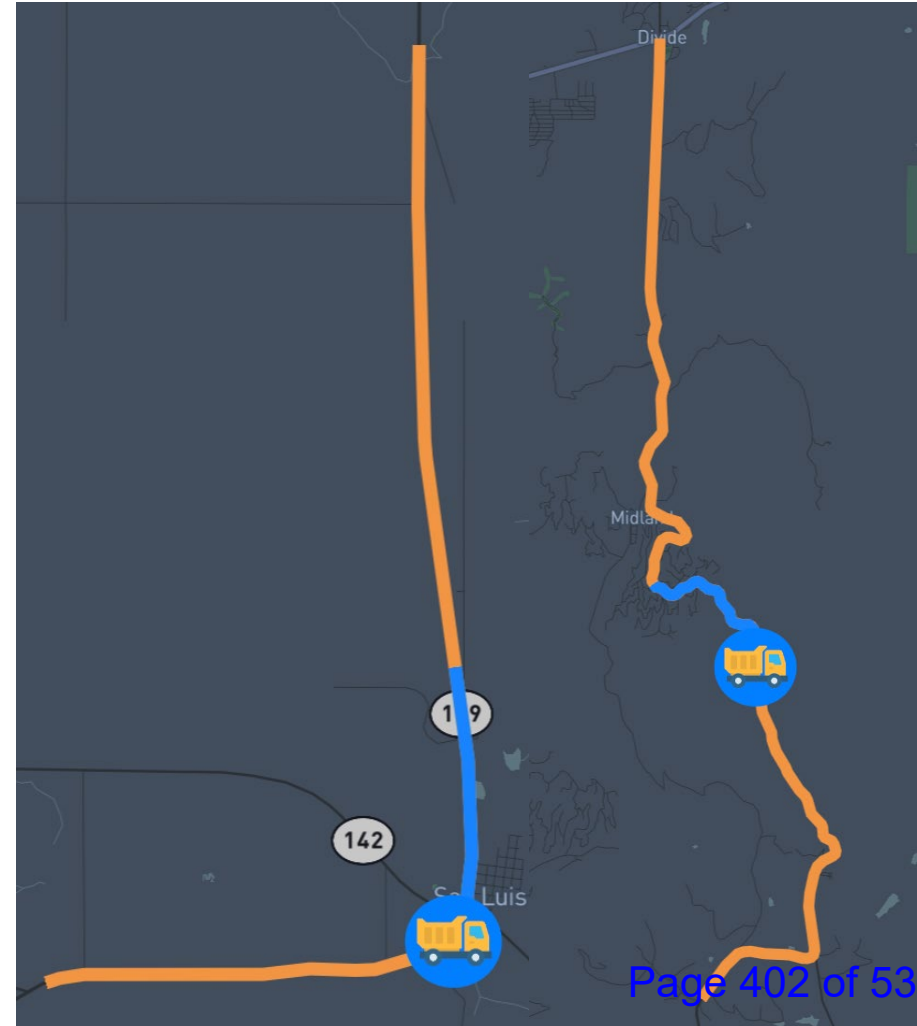
(Picture right)

Leveraging WZDx and hooks to real-time hub to update maintenance and work zones based on work zone vehicle positioning

Orange line = planned work zone

Blue line = actively present work zone vehicle and workers

This information is published, in real-time and communicated back out via our traveler information system and roadway management system





Connected Freight Pilot Concept

Delivering dynamic work zone information to freight operators in a timely manner offers immediate safety benefits

- Advance warning and notification for the drivers to respond in a safer manner

Activities over the past year have focused on identifying possible solutions for a connected freight concept (in-house message delivery, vendor supplied, or a hybrid).

CV and Freight Teams have worked together to evaluate the options and see value in a hybrid approach.



Next phase of CV to link to other programs - proposing a focus on Freight!

Pursue timely notification to freight vehicles in a connected vehicle concept

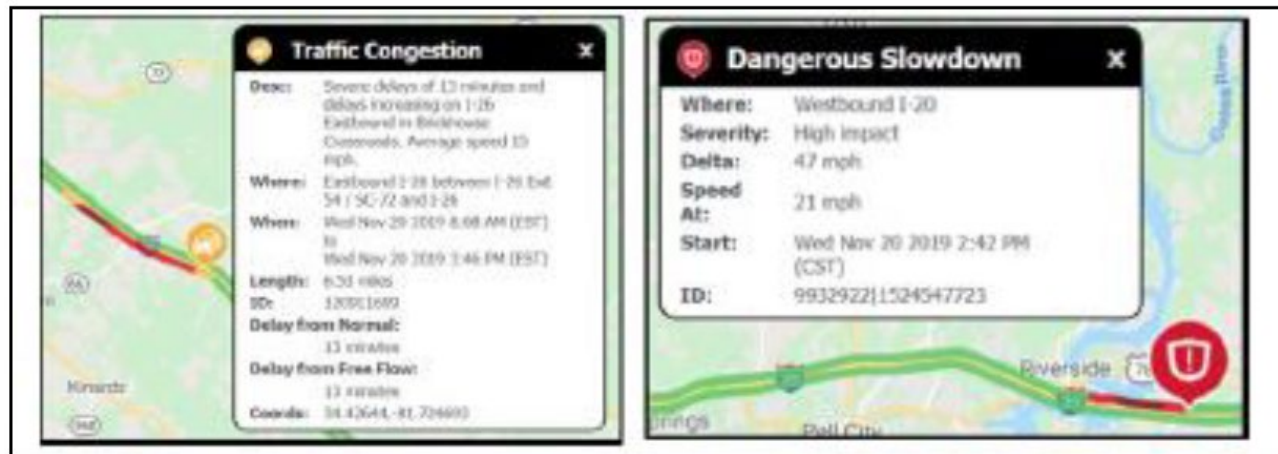
Focus:

- Work Zone Alerting to freight vehicles in CDOT work zones (planned and real-time work zone information)
- Work zone notification, automated queue warnings, emergency broadcasting
- Targeted roadways: I-70, I-25, I-76, US 50 and US 160
- Alert logging and reporting, historical insights provided to CDOT





How will this work?



Examples of Congestion and Dangerous Slowdown Messages



OIM and Freight team will report back with the research findings

Two component research evaluation: general evaluation and evaluate driver reaction.

- General evaluation and value of the timely information
- Human factors evaluation of the in-cab messaging (how did the driver respond to the alert, does the alert response change over time, etc)



Team believes the findings will indicate how delivery of timely information translates to safety on the roadway. Potential future pathways/research objectives to include timely information delivery impacts to fuel/energy economy, routing, and more in-depth human factors research on the effectiveness of the alerts for operators.



COLORADO

Department of Transportation

Thank you!

Questions and Discussion

Kay Kelly, Chief of
Innovative Mobility

kay.kelly@state.co.us

Ashley Nylén, PMP
Assistant Director for
Mobility Technology

ashley.nylen@state.co.us

Rebecca White, Director,
Transportation Development
Division

rebecca.white@state.co.us

Craig Hurst,
Manager, Freight Office

craig.hurst@state.co.us

DRAFT Transportation Commission (TC) Meeting Notes

Workshops – Wednesday, October, 19, 2022, 1:30 pm – 5:00 pm

Recording (YouTube): TC workshop 10/19: <https://youtu.be/28q-gsdXJIM>

Call to Order, Roll Call

All eleven Commissioners were present: Commissioners Don Stanton (TC Chair), Gary Beedy (TC Vice Chair), Karen Stuart, Kathleen Bracke, Mark Garcia, Lisa Tormoen Hickey, Barbara Vasquez, and Eula Adams, Yessica Holguin, Kathy Hall and Terry Hart.

1. Budget Workshop (Jeff Sudmeier and Bethany Nicholas)

Purpose & Action: To review the Proposed FY 2023-24 Annual Budget, set for approval in November 2022. The Division of Accounting and Finance (DAF) is requesting TC review of the Proposed FY 2023-24 Annual Budget Allocation Plan, and feedback to the Department in preparation for the approval of the Proposed FY 2023-24 Annual Budget Allocation Plan in November 2022. Staff will return in February 2023 to present the draft Final Budget Allocation Plan and the TC will be asked to adopt the final budget in March 2023.

Discussion:

- The debt service rates will not change throughout the 30-year plan as this is built into the plan at the onset.
- Three new line items related to the 10-Year plan are added totalling \$128.2M:
 - Capital Asset Management: \$68M
 - Capital Mobility: \$51.9M
 - Multimodal: \$8.4M
- Even with these additions, the plan still averages about \$325 million per year which was the original estimate.
- The approved FY24 budget was \$269M and will increase to \$278M to adjust for salary increases and funding for the employee housing stipend program. Further adjustments may be required for both of these items.
- Still to come:
 - Decision items which the TC will have an opportunity to review during the February 2022 Budget Workshop.
 - Administration Budget: There will likely be additional adjustments throughout the legislative budget process.
 - Maintenance Reserve and Contingency Funds may be reduced in the Final Budget.
- Timeline and Next Steps:
 - DAF will update the Administration Budget based on the final statewide common policies in November 2022 as well as present the FY 2023-24 Annual Budget Allocation Plan, both for TC approval.
 - The proposed budget may be updated in January 2023.
 - The TC will be asked to review and approve any decision items of \$1M or more in February 2023.
 - The TC will be asked to adopt and review the final FY 2023-24 plan in March 2023.
- FY21-22 Revenue Reconciliation includes \$19.7M in Inflexible Revenues and \$17.3M in Flexible Revenues
- Higher than expected revenues mainly came from the tax revenue associated with higher fuel cost.
- CO received \$102M through FHWA Redistribution.
- There is no formally established budget but the balance reserve is generally kept at about \$40M.

- Next steps:
 - November 2022: Staff will adjust budget allocation for the TC Program Reserve
 - November 2022: Staff will present a package of proposed budget amendments to utilize a portion of the TC Program Reserves for critical initiatives.
 - January 2023: Staff will provide an update on December's revenue forecast.
 - March 2023: the TC will be asked to adopt and review the final budget

2. Commission Tour of North I-25 with Elected Officials

The TC left CDOT HQ directly after the Budget Workshop, and went to the Thornton Park and Ride (PnR), the Wagon Road PnR, a future project site at SH 7 and I-25, had lunch at the CDOT building in Firestone, then visited the Berthoud PnR (TC group was first bus to use it, even though it was not completed) and the TC toured this project in progress, then visited the Loveland/Centerra PnR, drove through the new port of entry, and turned around at Prospect Road to return to CDOT HQ.

During the trip, Jessica Myklebust, Regional Transportation Director (RTD) of CDOT Region 1, and Heather Paddock, CDOT RTD of Region 4, and their staff provided participants with educational information about the projects and the project needs. Commissioners were able to ask questions and discuss the community needs/wants as well with the elected officials present.

Regular Meeting - Thursday, October 20, 2022, 9:00 am to 10:30 am

1. Call to Order, Roll Call

Eleven Commissioners were present: Commissioners (TC Chair) Don Stanton (TC Vice Chair), Gary Beedy, Karen Stuart, Terry Hart, Yessica Holguin, Kathleen Bracke, Mark Garcia, Lisa Tormoen Hickey, Eula Adams, Kathy Hall and Barbara Vasquez

2. Public Comments - None.

3. Comments of the Chair and Individual Commissioners

- The Commissioners mainly discussed the recent I-25 North road trip taken on a Bustang bus, and noted how impactful and beneficial the trip was.
- Many noted that the road trip helped them gain a better understanding of the I-25 corridor and the needs of the surrounding local communities.
- Commission Chair, Don Stanton, noted the need to work to improve safety for the various types of vehicles and travelers that share the roadway system.
- Commission Vice Chair, Gary Beedy, spoke about issues regarding the conflict between passenger vehicles and freight vehicles, including trains.

4. Executive Director's Management Report (Shoshana Lew)

- CDOT has a heavy construction season coming.
- Director Lew attended the groundbreaking for the Floyd Hill project yesterday.
- The I-25 North TC roadtrip pointed to local community needs and helped to identify better approaches for coordination with the local communities.
- CDOT is working on approaches to attract maintenance staff and to hire staff in general.
- Working on the Eisenhower Johnson Memorial Tunnel where maintenance improvements are being implemented.

5. Chief Engineer's Report (Steve Harelson)

- Acknowledged departure from CDOT of Andrew Knapp, a wonderful engineer from Region 3, who did notable work on Glenwood Canyon.
- Vanessa Halladay, Region 1 Environmental Manager who contributed to key environmental work on I-70 WBPSL, and Central 70.
- For research funds, CDOT twice a year reviews research proposals. Regarding material performance and sustainability, a new technique to use recycled plastic as binding agent for pavement is exciting, also safety and environmental impacts relate to this finding.
- The Chief Engineer Book of the Month is an ig nobel 2022 award winner for their economic category. See: <https://arxiv.org/pdf/1802.07068.pdf> to access this 30-page report.

6. Colorado Transportation Investment Office (CTIO [Formerly HPTE]) Director's Report (Nick Farber)

- CTIO Board of Directors (BOD) paid off the I-25 North project 2016 Bank of America loan of \$23.6M. This is the CTIO's first major loan to pay off, with more work forthcoming that will require more funds such as tolling equipment, etc. Commissioners asked about savings on interest and other benefits of this payoff.
- The CTIO BOD approved the scope of work for the pilot agreement to allow CTIO to implement Toll Enforcement Rules adopted by the BOD back in June and went into effect in August. This agreement is the result of the passage of HB 22-1074 to enforce usage of Mountain express toll lanes (ETLs). The hope is to be up and running with enforcement by the beginning of 2023. The business rules to be discussed next week in more detail with the BOD.
- Gave the TC a CTIO overview presentation, and also provided a similar presentation to the Statewide Transportation Advisory Committee (STAC). The North Front Range Metropolitan Planning Organization (NFRMPO) - requested more CTIO involvement in their projects. Also see the need to potentially meet with the MPOs - in particular, Pikes Peaks Area Council of Governments (PPACG) and the Denver Regional Council of Governments (DRCOG). CTIO plans to meet with NFRMPO on this very soon.

7. FHWA Division Administrator's Report (Andy Wilson)

- On the FHWA BIL/IIJA webpage interested parties can sign up for notifications on updates.
- Three Rebuilding America's Infrastructure with Sustainability and Equity (RAISE) grants were awarded in Colorado - \$4.8M - Alamosa Rio Grande Intermodal Transportation Center/Pedestrian Bridge; Pueblo Westside Connector received \$16.8M; and another \$24.2M was awarded to the Westword 3 Project - Grand Junction, Rifle, and Glenwood Springs Mobility Hub improvements.
- \$750K for Bridge Planning will go to the Fillmore Street Bridge Improvements.
- \$100M of INFRA grant money was awarded to the I-70 Floyd Hill Project.
- County Commissioner Wheelock has trust with CDOT which demonstrates that the collaboration has been very effective.
- More grants are coming - large and small bridges and MEGA projects.
- A continuing resolution for federal authorization will end on December 16, and FHWA Colorado received the formula obligation limit of almost \$129M.

8. Statewide Transportation Advisory Committee (STAC) Report (Vince Rogalski)

- STAC met on October 6th.
- Heard of INFRA grant award of \$100M for Floyd Hill.
- Use of PM Web product - for better reporting of project tracking and status.
- Transportation related bills that impact CDOT during legislative update were presented.
- Adding transit agencies as eligible TPR members is a concern with STAC members. Need more clarity on how this will all work.

- STAC election occurred for the next two-year term. Kristin Stephens and Keith Baker were other candidates. Vince was elected for another two-year term as Chair, and Heather Sloop was elected as Vice-Chair.
- The Office of Innovative Mobility announced Transportation Demand Management (TDM) and Electrification Solution grants presented with a call potentially starting on October 24, with a webinar on November 9, and applications due December 9.
- Highway Users Tax Fund (HUTF) explained by Jeff Sudmeier, CDOT Chief Financial Officer
- A Bridge and Tunnel Enterprise Overview was presented by Patrick Holinda.
- A CTIO overview was presented to the STAC by Nick Farber.
- Next meeting is scheduled for November 3. Vince plans to attend the future STAC meetings in-person.

9. Discuss and Act on Consent Agenda

A Motion by Commissioner Hickey to approve, and seconded by Commissioner Vasquez, passed unanimously.

- a) Proposed Resolution #1: Approve the Regular Meeting Minutes of September 15, 2022 (Herman Stockinger)
- b) Proposed Resolution #2: IGA Approval >\$750,000 (Steve Harelson)
- c) Proposed Resolution #3 Adoption of Policy Directive 1900.0 Noise Mitigation Policy (Herman Stockinger and Sari Weichbrodt)

10. Discuss and Act on Proposed Resolution #4: Budget Supplement of FY 2023 (Jeff Sudmeier and Bethany Nicholas)

A Motion by Commissioner Garcia to approve, and seconded by Commissioner Beedy, passed unanimously.

11. Meeting Adjourned: 10:14 am



COLORADO
Department of Transportation
Office of the Chief Engineer

Engineering Contracts
2829 W. Howard Place, Ste. 339
Denver, CO 80204-2305

Memorandum

TO: Transportation Commission

FROM: Lauren Cabot

DATE: November 3, 2022

SUBJECT: Intergovernmental Agreements over \$750,000.00

Purpose Compliance with CRS §43-1-110(4) which requires intergovernmental agreements involving more than \$750,000 must have approval of the Commission to become effective. In order stay in compliance with Colorado laws, approval is being sought for all intergovernmental agencies agreements over \$750,000 going forward.

Action CDOT seeks Commission approval for all IGAs contracts identified in the attached IGA Approved Projects List each of which are greater than \$750,000. CDOT seeks to have this approval extend to all contributing agencies, all contracts, amendments and option letters that stem from the original project except where there are substantial changes to the project and/or funding of the project.

Background CRS §43-1-110(4) was enacted in 1991 giving the Chief Engineer the authority to negotiate with local governmental entities for intergovernmental agreements conditional on agreements over \$750,000 are only effective with the approval of the commission.

Most contracts entered into with intergovernmental agencies involve pass through funds from the federal government often with matching local funds and infrequently state money. Currently, CDOT seeks to comply with the Colorado Revised Statutes and develop a process to streamline the process.



Next Steps Commision approval of the projects identified on the IGA Project List including all documents necessary to further these projects except where there are substancial changes to the project and/or funding which will need reapproval. Additionally, CDOT will present to the Commission on the Consent Agenda every month listing all of the known projects identifying the region, owner of the project, project number, total cost of the project, including a breakdown of the funding source and a brief description of the project for their approval. CDOT will also present any IGA Contracts which have already been executed if there has been any substantial changes to the project and/or funding.

Attachments IGA Approved Project List



Resolution # TC-22-11-17

Authorizing CDOT to execute Intergovernmental Contracts, Amendments, and Option Letters over \$750,000 of the projects specified below.

Approved by the Transportation Commission on November 17, 2022.

WHEREAS, pursuant to Colorado law at Section 43-1-110(4), C.R.S. the executive director or the chief engineer shall represent the department in negotiations with local governmental entities concerning intergovernmental agreements (IGAs) between the department and local governmental entities to implement the provisions of this article. No IGAs involving more than \$750,000 shall become effective without the approval of the commission.

WHEREAS, CDOT seeks to have the commission approve IGAs contracts identified in the attached IGA Approved Projects list each of which are IGAs greater than \$750,000.

WHEREAS, CDOT seeks to have this approval extend to all contributing agencies, all contracts, amendments and option letters that stem from the original project except where there are substantial changes to the project and/or funding of the project; and

WHEREAS, the Transportation Commission acknowledges that it has reviewed the IGA summary in the consent packet, which included all information necessary; and

WHEREAS the Transportation Commission has determined that the projects will serve the public interest and/or convenience of the traveling public and that the approval of the projects described in the report will serve the purpose(s) of the project; and

NOW THEREFORE BE IT RESOLVED, the Transportation Commission hereby declares that the public interest and/or convenience will be served by approving the contracts identified in the attached IGA Approved Projects list and CDOT is authorized to execute all documents necessary to further these projects except that substantial changes to the project and/or funding will need to be reapproved.

Herman Stockinger, Secretary
Transportation Commission of Colorado

Date

November 2022- IGAs > \$750,000

Region	Project Number(s)	Agency	Contract Value	Federal \$	State \$	Local \$	Description
R1	25160	Georgetown	\$1,052,638.00	\$842,110.00	\$0.00	\$210,528.00	Georgetown Gateway – Argentine St North OLA Total funds \$1,052,638.00 Fed/Local, 80/20.
R2	25070	Colorado Springs	\$1,959,933.00	\$1,763,940.00	\$0.00	\$195,933.00	Garden of the Gods Intersection Improvement OLA Total funds \$1,959,933.00 90/10 Fed/LA
	25101	Pueblo	\$1,500,000.00	\$1,350,000.00	\$0.00	\$150,000.00	Pueblo Lake Ave & Orman Ave Roundabout OLA Total funds \$1,500,000.00 90/10 Fed/LA
	25165	Woodland Park	\$1,950,000.00	\$1,462,500.00	\$0.00	\$487,500.00	Woodland Park SH 67 Improvements OLA Total budgeted funds = \$1,950,000.00, 75/25 Fed/LA
R4	25331	Dacono	\$1,000,000.00	\$0.00	\$800,000.00	\$200,000.00	Dacono Forest Ave Improvements OLA Total funds \$1,000,000.00 80/20 Fed/LA
R5	25303	Montezuma County	\$2,016,269.00	\$1,980,317.00	\$35,952.00	\$0.00	Montezuma County Shared Path between Mancos & Cortez OLA Total funds \$2,016,269.00 Fed/State 98.22/1.78



MEMORANDUM

TO: THE TRANSPORTATION COMMISSION
FROM: STEPHEN HARELSON, P.E. CHIEF ENGINEER
DATE: NOVEMBER 17, 2022
SUBJECT: ABANDONMENT SH 95 (SHERIDAN BLVD)
MILE MARKER 14.0 TO 14.24 AND MILE MARKER 14.34 TO 14.5

Purpose

CDOT Region 1 is proposing an abandonment of 0.4 linear miles of SH 95 to the north and south of US 36, from mile marker 14.0 to 14.24 and from mile marker 14.34 to 14.5.

Action

CDOT Region 1 is requesting a resolution approving the abandonment of 0.4 linear miles of SH 95 to the north and south of US 36, from mile marker 14.0 to 14.24 and from mile marker 14.34 to 14.5.

Background

Region 1 and the City of Westminster have agreed to terms to be included in an IGA for this portion of SH 95 to be abandoned to the City. The City Council signed Resolution #13 on March 28, 2022, declaring the City's intention to take ownership of the abandoned portion of SH 95 prior to execution of the IGA. CDOT will retain all US 36 ROW, but the SH 95 roadway will no longer be considered a state highway and will be treated as a local street overpass. The City of Westminster will assume all surface maintenance responsibilities.

Colorado Revised Statute 43-2-106 (1)(a) provides that the Transportation Commission may determine that a State Highway, or portion thereof, no longer functions as a state highway, and with the agreement of each affected county or municipality, the state highway, or portion thereof, can be abandoned to the affected county or municipality. The Code of Federal Regulations 23.620.203 allows CDOT to relinquish portions of highway right of way to other government agencies for continued highway use.

Next Steps

Subject to the concurrence to proceed with relinquishment of highway right of way by the Transportation Commission, CDOT and the City of Westminster will proceed with signing an IGA, and CDOT will execute a quitclaim deed that will include a reversion provision stating that if the property that is the subject of the quitclaim deed is not used for transportation purposes, title to such property will automatically revert back to CDOT.

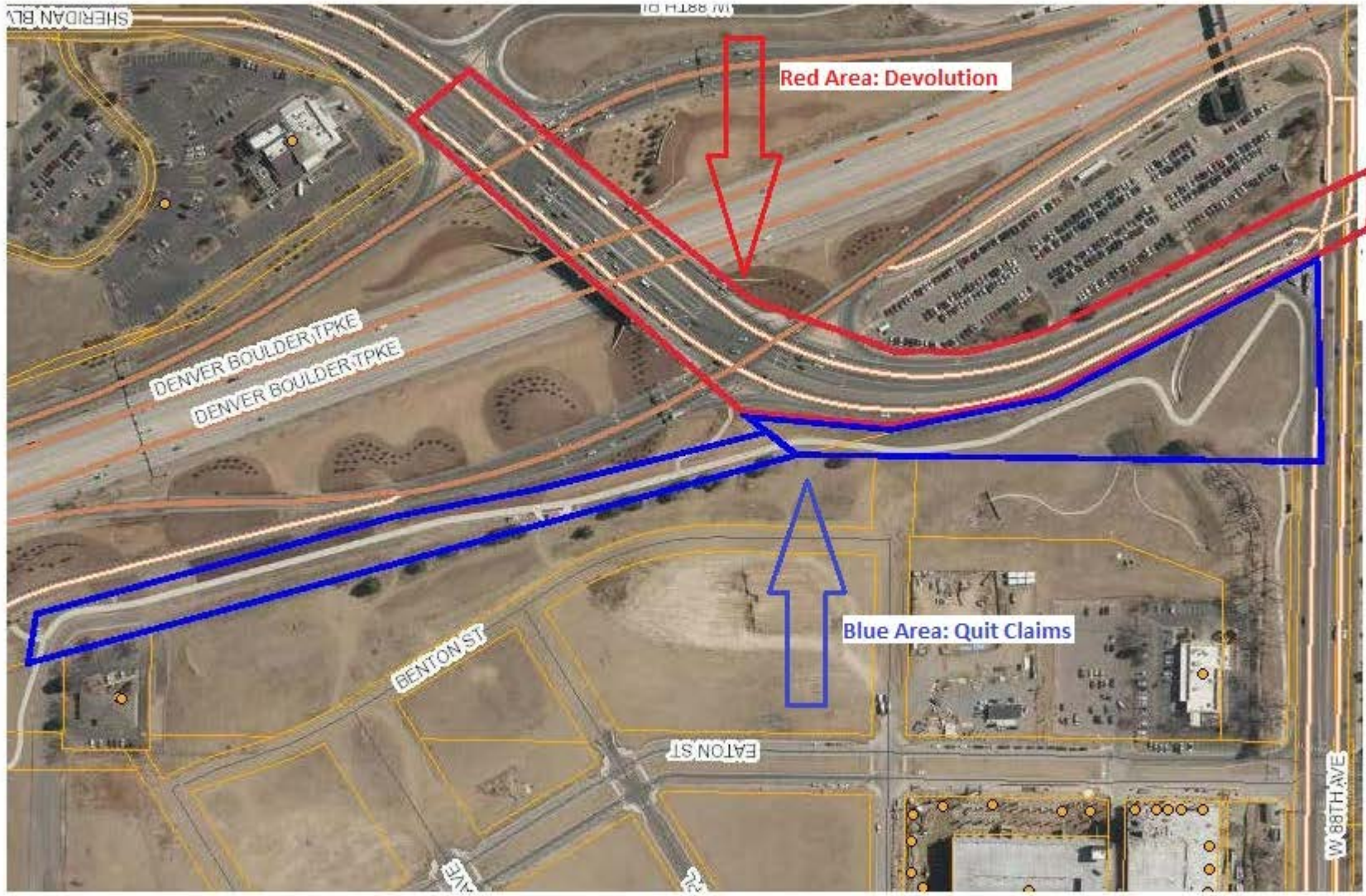
Attachments

Proposed Resolution
Exhibit Depicting the Parcels



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MEMORANDUM

TO: THE TRANSPORTATION COMMISSION
FROM: STEPHEN HARELSON, P.E. CHIEF ENGINEER
DATE: NOVEMBER 17, 2022
SUBJECT: DISPOSAL: I-25 & BROADWAY
(PARCELS 6-EX, 615C-EX, 605-EX, AND PE605-EX)

Purpose

CDOT Region 1 is proposing to dispose of Parcels 6-EX, 615C-EX, 605-EX, and PE605-EX, comprising a total of 12,142 sq ft (0.278 acres) of right of way that is no longer needed for transportation purposes.

Action

CDOT Region 1 is requesting a resolution, in accordance with C.R.S. 43-1-210(5), approving the disposal of 12,142 sq ft (0.278 acres) of right of way that is no longer needed for transportation or maintenance purposes.

Background

Parcels 6-EX, 615C-EX, 605-EX, and PE605-EX were purchased the under project NH_0252-299_11584 between 2001 and 2004. The City and County of Denver is reconstructing South Broadway at I-25 for the purpose of improving safety and access [Project STU M320-127 (23373)]. The City has requested CDOT convey Parcels 6-EX, 615C-EX, 605-EX, and PE605-EX for nominal value for public use in accordance with C.R.S. 43-2-210(5).

The Code of Federal Regulations 23.710.403 allows CDOT to dispose of property for less than fair market value to other governmental agencies for continued non-proprietary public use.

Next Steps

Upon approval of the Transportation Commission, CDOT will execute quitclaim deeds to convey Parcels 6-EX, 615C-EX, 605-EX, and PE605-EX to the City and County of Denver for nominal value, pursuant to the provisions of the C.R.S, 43-1-210(5) and 23 CFR 710.403. The deeds will include a reversion provision stating that if the property that is the subject of the quitclaim deed is not used for transportation purposes, title to such property will automatically revert back to CDOT. The deeds will be recorded in the office of the Denver County Clerk and Recorder.

Attachments

Exhibits Depicting the Disposal Property



BROADWAY STATION
(RTD I-25/
BROADWAY
PARK-N-RIDE)

W. KENTUCKY AVENUE

SB I-25 OFF RAMP
SB I-25 ON RAMP

ACOMA STREET

W. EXPOSITION AVENUE

615C-EX

605-EX

PE605-EX

S. BROADWAY (SB)

PROPOSED HIGH
MAST LIGHT

S. BROADWAY (NB)

E. OHIO AVENUE

6-EX





MEMORANDUM

TO: THE TRANSPORTATION COMMISSION
FROM: STEPHEN HARELSON, P.E. CHIEF ENGINEER
DATE: SEPTEMBER 15, 2022
SUBJECT: DISPOSAL SH 95 & US 36, PARCELS 4-EX AND 72REV-EX

Purpose

CDOT Region 1 is proposing to dispose of Parcel 4-EX and Parcel 72Rev-EX comprising 205,091 sq ft (4.708 acres) of right of way that is no longer needed for transportation or maintenance purposes.

Action

CDOT Region 1 is requesting a resolution, in accordance with C.R.S. 43-1-210, approving the disposal 205,091 sq ft (4.708 acres) of right of way that is no longer needed for transportation or maintenance purposes.

Background

CDOT acquired Parcel 4-EX for Project F 036-1(14) and Parcel 72Rev-EX for Project T170-1(0), both for the construction of the Denver-Boulder Turnpike (US 36). The City of Westminster maintains the US 36 Bikeway on Parcel 72Rev-EX and a stormwater and flood control facility on Parcel 4-EX.

CDOT would like to dispose Parcels 4-EX and 72Rev-EX to the City of Westminster for nominal value, as they are no longer needed for transportation or maintenance purposes. Disposing of these parcels will clarify responsibilities and relieve CDOT of the burden of maintaining them.

The Code of Federal Regulations 23.710.403 allows CDOT to dispose of property for less than fair market value to other governmental agencies for continued non-proprietary public use.

Next Steps

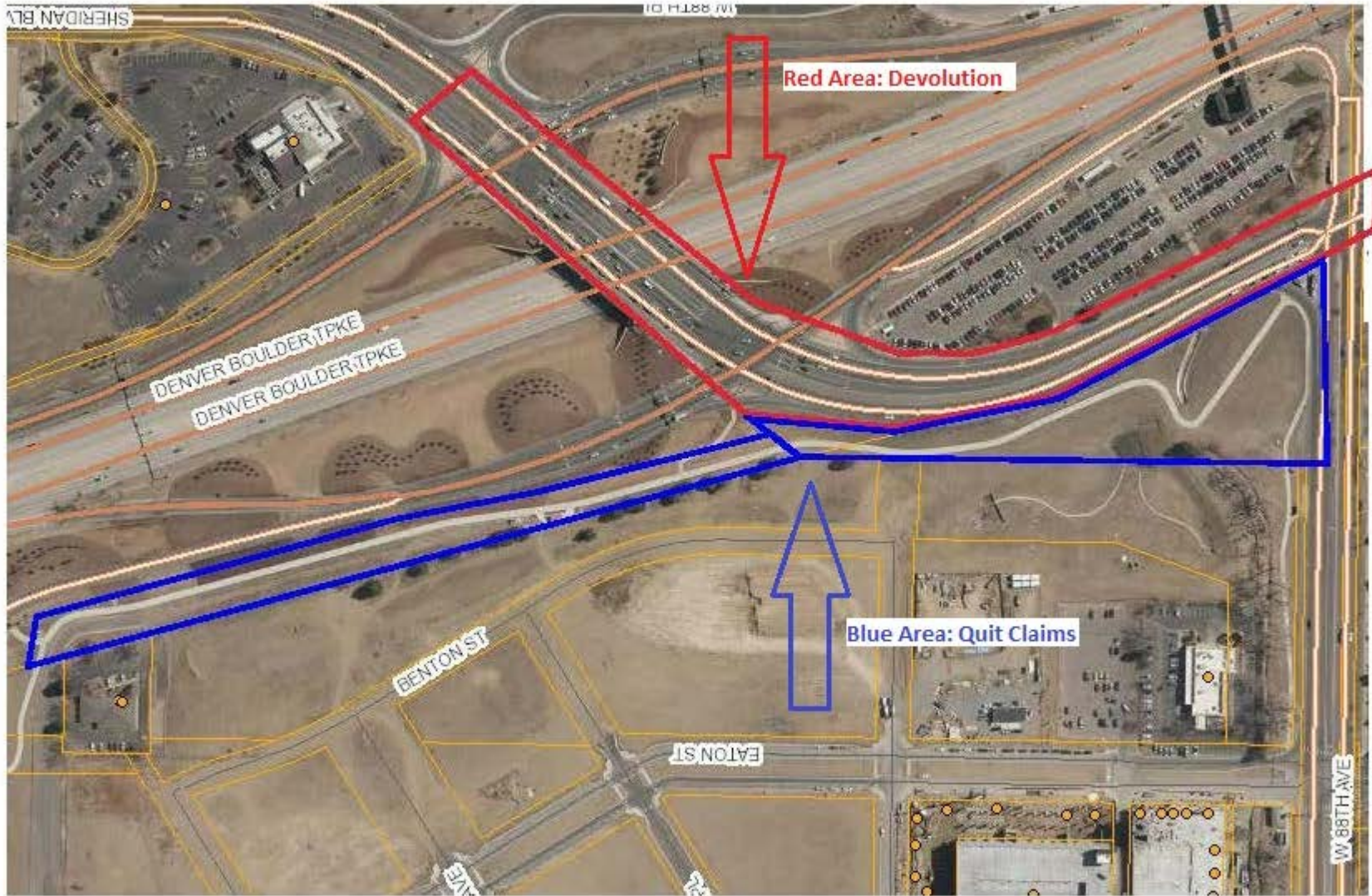
Upon approval of the Transportation Commission, CDOT will execute quitclaim deeds to convey Parcel 4-EX and Parcel 72Rev -EX to the City of Westminster for nominal value, pursuant to the provisions of the C.R.S, 43-1-210(5) and 23 CFR 710.403. The deeds will include a reversion provision stating that if the property that is the subject of the quitclaim deed is not used for transportation purposes, title to such property will automatically revert back to CDOT. The deeds will be recorded in the office of the Jefferson County Clerk and Recorder.

Attachments

Exhibits Depicting the Disposal Property



E



Red Area: Devolution

Blue Area: Quit Claims

N

S

W



MEMORANDUM

TO: THE TRANSPORTATION COMMISSION
FROM: STEPHEN HARELSON, P.E. CHIEF ENGINEER
DATE: NOVEMBER 17, 2022
SUBJECT: REGION 2 MAINTENANCE SITE EXCHANGE AND RELOCATION

Purpose

CDOT Region 2 is proposing to exchange property in Pueblo, where a CDOT maintenance site is currently located, for another site approximately one mile from the current location, that will include a newly constructed maintenance facility.

Action

CDOT Region 2 is requesting a resolution approving the exchange and relocation of the existing CDOT Maintenance Site in Pueblo.

Background

The current maintenance site is located at the Northwest corner of US50 and SH45 in Pueblo. A developer owns the adjoining properties and wishes to acquire CDOT's property for inclusion in their own. In exchange for the current site, the developer will construct a new maintenance facility for CDOT approximately one mile west of the current facility. Once the new facility is constructed and fully functional to CDOT standards, the old facility will be declared excess, and the property will be deeded to the developer. Both properties will be appraised to ensure an equal exchange, and no CDOT funds will be used in the transaction.

CDOT has completed an extensive study and review to ensure the area where the current maintenance site is located will not be needed for future transportation purposes. This review included a traffic impact study and a preliminary design of an interchange. The exchange and relocation of the subject property will have no effect upon the operation, use, maintenance, or safety of the highway facilities. This exchange and relocation will benefit CDOT, as CDOT will have a new facility, with an extended lifespan, that is operationally equivalent to the existing location, located only a short distance away.

Next Steps

Upon approval of the Transportation Commission, CDOT will proceed with the execution of the contract for the exchange and relocation of the subject property in accordance with C.R.S. 43-1-210(5).

Attachments

Exhibits Depicting the subject areas (existing site and exchange)
Draft contract to be approved by the State Controller



EXCHANGE AGREEMENT

This Exchange Agreement (“Agreement”), is hereby made and entered into this _____ day of _____, 2022, by and among Wild Horse Land and Holdings, LLC, a Colorado limited liability company (hereinafter referred to as “WLH”), and the Colorado Department of Transportation (hereinafter referred to as “CDOT”). Collectively, WLH and CDOT shall be referred to as “the Parties”.

RECITALS

A. CDOT is the owner and in possession of certain real property located at 4105 North Pueblo Blvd. in the City of Pueblo, County of Pueblo, State of Colorado, described in **Exhibit A** and illustrated as Parcel 1-EX – CDOT Exchange Property on **Exhibit B** attached hereto and incorporated herein by reference, hereinafter referred to as the “CDOT Pueblo Boulevard Maintenance Site” or “CDOT Exchange Property”. The CDOT Pueblo Boulevard Maintenance Site is an improved transportation maintenance facility on approximately 3.97 acres. Existing infrastructure upon the CDOT Pueblo Boulevard Maintenance Site that is appurtenant to CDOT conducting business as a transportation agency includes an eight-bay building with two of the bays as wash bays, four offices for the patrols, a six-tank containment for liquid deicers, 1500-ton sand shed along with a security fence and power gate at the entrance (collectively, the “Improvements”).

B. WLH is the owner and in possession of certain real property in the County of Pueblo, State of Colorado, generally depicted on **Exhibit C** attached hereto, hereinafter referred to as the “Wildhorse Vacant Land Site” or “WLH Exchange Property”. The Wildhorse Vacant Land Site is approximately 7.5 acres in size

C. WLH desires to acquire the CDOT Pueblo Boulevard Maintenance Site in exchange for the conveyance to CDOT of the Wildhorse Vacant Land Site with replacement Improvements constructed upon it as more fully described herein.

D. CDOT's Chief Engineer has determined that if WLH constructs the replacement improvements and related site improvements and appurtenances to current CDOT standards on the Wildhorse Vacant Land Site as required by this Agreement, and if WLH conveys the appropriate property interests to CDOT, then the CDOT Pueblo Boulevard Maintenance Site will no longer be needed by CDOT for state transportation or any other purposes.

E. CDOT enters into this Agreement pursuant to Sections 43-1-105, 43-1-106 and 43-1-210, C.R.S. as amended.

NOW, THEREFORE, the Parties hereby agree as follows:

ARTICLE I

DEFINITIONS AND ATTACHMENTS

1.1 Definitions. For the purposes of this Agreement, the following definitions shall apply:

The State – The State of Colorado.

CDOT – The Department of Transportation, State of Colorado.

Chief Engineer – The Chief Engineer for the Colorado Department of Transportation, under the authority of Title 43, C.R.S., including Sections 43-1-110 and 43-1-111, C.R.S., as amended.

Regional Transportation Director – The Department's representative, who is responsible for construction, maintenance and safety activities within the geographical jurisdiction established by CDOT.

Transportation Commission – The State of Colorado Transportation Commission.

FHWA – the Federal Highway Administration within the U.S. Department of Transportation.

CDOT Pueblo Boulevard Maintenance Site (AKA CDOT Exchange Property) – A parcel of real property that is owned by CDOT in Pueblo, Colorado, as described in Exhibit A and illustrated on Exhibit B, which is attached hereto and incorporated herein by reference.

Wildhorse Land and Holdings, LLC or “WLH” – a limited liability company registered in Colorado.

Wildhorse Vacant Land Site (AKA WLH Exchange Property) – A parcel of real property that is owned by Wildhorse Land and Holdings, LLC in the City of Pueblo, Colorado, generally depicted on Exhibit C.

1.2 Attachments. The Recitals above and following documents are hereby incorporated as terms and conditions of this Agreement.

- A.** Exhibit A – Description of the CDOT Exchange Property.
- B.** Exhibit B – Illustration of the properties subject to this Agreement.
- C.** Exhibit C – Depiction of Wildhorse Vacant Land Site.
- D.** Exhibit D – Depiction of “Excess Right of Way.”

ARTICLE II

PROPERTY EXCHANGE PROVISIONS

2.1 The Parties shall exchange the CDOT Pueblo Boulevard Maintenance Site for the Wildhorse Vacant Land Site as provided herein following the complete, satisfactory construction and performance of the replacement improvements on the WLH site, the issuance of a Certificate of Occupancy by the City of Pueblo, and CDOT's approval and acceptance of such construction and performance pursuant to the Plans as determined by CDOT. The construction and performance by WLH shall be subject to inspection and written approval by CDOT prior to any obligation to exchange properties and property interests under this Agreement. Such approval shall not be unreasonably withheld by CDOT. It is considered reasonable to be within CDOT's discretion to require that all structures, appurtenances, and improvements be completed in a good and workmanlike manner and in accordance with the plans and specifications to be approved as provided herein. All City zoning, subdivision, and other land use approvals must be completed prior to conveyance.

2.2 If CDOT approves the performance by WLH in accordance with the Plans and Specifications in Exhibit C, the Parties shall exchange the CDOT Exchange Property with the WLH interests to be conveyed to CDOT in the New Building not later than sixty (60) days following reception by WLH of written notice of such approval and acceptance by CDOT.

2.3 Upon satisfactory completion by WLH of all conditions precedent, as reasonably determined by CDOT, CDOT shall convey title to the CDOT Pueblo Boulevard Maintenance Site to WLH by quit claim deed without warranties, pursuant to Section 43-1-210, C.R.S., as amended.

2.4 Based on final updated appraisals of the two properties – CDOT's maintenance site Exchange Property appraised in "as is" condition as improved – and WLH's Exchange Property appraised "as if" it is a platted site improved with new replacement maintenance facilities that meet CDOT requirements for the exchange – WLH will pay CDOT the difference in value if WLH's Exchange Property is appraised lower than CDOT's Exchange Property. In the event the WLH Exchange

Property is appraised higher than CDOT's Exchange Property, WLH will donate the difference in value to CDOT and will not receive compensation for the value disparity. CDOT does not have funding for the exchange and will not pay any difference in value.

ARTICLE III

CONTINGENCIES

3.1 Annexation and Platting. WLH has completed a petition for annexation of its property to the City of Pueblo. The Parties' obligations hereunder are contingent upon the annexation requirements of the WLH property into the City of Pueblo and the Wildhorse Vacant Land Site being platted as a separate lot in the City of Pueblo, all of which will be done by WLH at its expense. All City zoning, subdivision and other land use approvals must be completed by WLH for the replacement property prior to conveyance.

3.2 Replacement Improvements. WLH, at its expense, will prepare plans and specifications for the replacement Improvements (the "Replacement Improvements") on the Wildhorse Vacant Land Site (the "Plans") consisting of:

- a. WLH shall contract with one of CDOT Property Management's contracted Multiple Project Architect and Engineering firms ("A/E Consultants") to develop construction documents ("CDs") and construction Specifications for all structures, appurtenances and improvements to the Wildhorse Vacant Land Site based on CDOT's Prototype Drawings and Specifications for the Maintenance Facility, Sand Shed and containment, etc. (collectively, "Improvements"), attached hereto as Exhibit "C," such improvements being of a size equivalent to those existing on the CDOT Pueblo Boulevard Maintenance Site. The replacement site will include a drainage study and plans to mitigate any drainage or soil requirements.
- b. Eight (8) Bay Vehicle Storage Facility, plus four (4) office spaces, with associated break area and restrooms, based on CDOT's current Prototype, using one of the 6 CDOT pre-approved Pre-Engineered Metal Building Manufacturers listed on the Prototype Drawings and

Specifications. Each vehicle bay shall be 20'x50' or 1000 sf to accommodate CDOT's current vehicle sizes.

1. One (1) 50' x 80 Sand Shed based on the current prototype that will contain 1500 tons of sand .
 2. One (1) six-tank Secondary Containment Unit based on the current prototype.
 3. Paved road providing direct access to Wildhorse Road
 4. The site will be paved and/or improved with gravel or road base similar to the existing CDOT Maintenance Site and include landscaping as required by the City.
 5. Site utilities, including, but not limited to water, sewer, electricity, telephone, data and natural gas, of a size or phase equivalent to those currently serving the facilities at the CDOT Pueblo Boulevard Maintenance Site.
 6. Relocation of the six (6) containment tanks for liquid deicers currently on the CDOT Pueblo Boulevard Maintenance Site. In the event any tanks are damaged during relocation, WLH agrees to replace any such damaged tank with a new tank of equal size and specifications. Because they will be relocated, these tanks will not be included in the appraisal of either CDOT's or WLH's Exchange Property, except that the appraiser may consider the relocation cost in the WLH appraisal.
- c. All plans and specifications, construction methods and materials used by WLH shall be subject to inspection and approval by CDOT's Region Transportation Director or authorized designee and must conform to all applicable current standards contained within the following publications:
1. City and County zoning, permitting, building and inspection requirements.
 2. National Electrical Safety Code - published by the Institute of Electrical and Electronic Engineers
 3. International Building Code – published by the International Code Council
 4. All such publications are incorporated herein by this reference as conditions of this Agreement, to the extent applicable.

- d. WLH shall use CDOT's approved A/E Consultants for the following design services, at their expense for:
 - 1. All surveying, civil, structural, mechanical, plumbing, and electrical design services needed to develop the CDs and Specifications.
 - 2. CDOT will provide WLH a list of CDOT Property Management A/E Consultants.

- e. During development of CDs and Specification for all Improvements, WLH shall require the A/E Consultant to comply with the city and county's "Development Review Process" and all Building Codes as required by the Pueblo "Buildings Permit/Inspection Department".

- f. WLH is solely responsible for all applicable Permitting Review Fees or applicable fees. WLH shall determine which permits apply to the work. WLH shall obtain and pay for all permits, applications and fees, including, but not limited to zoning, subdivision or any other land use requirements, and building or inspection requirements.

- g. CDOT's Architect will approve the site layout for all Improvements at the Wildhorse Vacant Land Site prior to development of CDs and Specifications.

- h. CDOT's Architect will review all plans and specifications, developed by the A/E Consultant at both the completion of the Design Development ("DD") phase and at the 99% CD phase, prior to code review submission.

- i. WLH shall incorporate all edits and modifications to DDs and CDs required by CDOT's Architect.

- j. Prior to the start of construction at the Wildhorse Vacant Land Site, WLH will provide to CDOT documentation that CDs are code compliant.

- k. WLH shall not construct improvements on the Wildhorse Vacant Land Site absent CDOT's prior approval of all CDs and Specifications. Upon approval of CDs and Specifications, construction shall not be unreasonably withheld, conditioned or delayed.
- l. Relocation to the Wildhorse Vacant Land Site of the six containment tanks for liquid deicers currently on the CDOT Pueblo Boulevard Maintenance Site.
- m. A site plan for the Wildhorse Vacant Land Site showing location of the Replacement Improvements which will also include a security fence, power gate and proposed paving substantially equivalent to that currently existing at the CDOT Site.
- n. WLH will submit the Plans to CDOT for its approval, which approval will not be unreasonably withheld. Once approved, these will be the "Approved Plans."

3.3 Title. Either Party may obtain a title commitment to the property it is proposed to receive and may notify the other Party of any objections to title. The other Party may then either satisfy the objection(s) to the objecting Party's reasonable satisfaction, or decline to take any action with respect to the objection(s), in which case the objecting Party may either waive its objection(s) or terminate this Agreement.

3.4 Environmental. Either Party may, at their expense, perform a Phase I Environmental Assessment of the other Party's site, and if indicated in the Phase 1 Assessment, a further Phase II Assessment (along with the right to enter the property involved to conduct the Phase II Assessment). If the Assessment involved indicates the presence of hazardous substances on the site involved, the Party owning the site may propose a remediation plan reasonably acceptable to the other Party, or decline to take any action, in which case the other Party may either elect to terminate this Agreement or accept the site involved in its "AS IS" condition.

3.5 Appraisals. Within 120 days after the date of this Agreement, CDOT will obtain appraisals of the CDOT Pueblo Boulevard Maintenance Site in its "As Is" condition and of the Wildhorse Vacant

Land Site appraised “As If” it is a single platted lot improved with transportation maintenance facilities, related site improvements and appurtenances as specified by CDOT. WLH will provide within 30 days of this agreement a detailed preliminary cost estimate to CDOT of the cost to construct the Replacement Improvements on the WLH Exchange Property, which information CDOT will provide its appraiser in support of the WLH property appraisal in its future developed condition. Within 90 days after CDOT’s approval of the final site development plans pursuant to Section 3.2(n) above, CDOT will update its appraisals of both Exchange Properties in their “As Is” (CDOT) and “As If” (WLH) condition. WLH will provide CDOT an updated total cost estimate for the Replacement Improvements per the CDOT-approved plans and, if available, contractors’ bids for the work, in support of CDOT’s updated appraisal of the WLH Exchange Property “As If” improved to CDOT’s specifications. If these Appraisals are not satisfactory to WLH, it may notify CDOT of this fact prior to expiration of the Contingency Period, in which case either Party may terminate this Agreement. WLH will reimburse CDOT for the cost of all related appraisals at the time of closing. The final appraisals will otherwise be used for purposes of implementing Section 2.4 above.

3.6 Contingency Period. If the contingencies in this Article III have not been satisfied or otherwise resolved within twelve (12) months after the date of this Agreement, either Party may thereafter elect to terminate this Agreement.

ARTICLE IV

REPLACEMENT IMPROVEMENTS

4.1 Construction. Upon satisfaction of the contingencies contained in Article III, WLH will commence construction of the Replacement Improvements in accordance with the Approved Plans at its sole expense using a contractor of its choice. WLH shall use the A/E Consultant for the following construction administrative services, at WLH’s expense, for:

- a. Limited construction observations, and review of metal building, structural, civil, and mechanical, electrical and plumbing (“MEP”) related submittals.

- b. WLH shall construct all Improvements (identified in Section II.A above) at its sole expense, in a good and workmanlike manner and in accordance with the terms of this Agreement.
- c. WLH is responsible for obtaining and documenting all inspections as required by Pueblo's "Buildings Permit/Inspection Department" during construction of all Improvements.
- d. WLH shall be solely responsible for the overall construction management. CDOT shall not be responsible for directing the means and methods of construction.
- e. CDOT's representative, including Property Management Staff and the Region 2 Maintenance Superintendent and his/her assigns, shall be allowed access to the Wildhorse Vacant Land Site at all times following the date of execution of this Agreement for the purpose of inspection of work and materials.

4.2 Contractor's Insurance. WLH will require its general contractor and any subcontractor working on the Replacement Improvements to carry the following insurance:

- a. Workers Compensation Insurance as required by Colorado state statutes, and Employer's Liability Insurance covering all of the contractor's employees acting within the course and scope of their employment.
- b. Commercial General Liability Insurance written on ISO occurrence from CG 00 01 10/93 or equivalent, covering premises operations, fire damage, independent contractors, products and completed operations, blanket contractual liability, personal injury, and advertising liability with minimum limits as follows:
 - 1. \$1,000,000 each occurrence;
 - 2. \$2,000,000 general aggregate;

3. \$1,000,000 products and completed operations aggregate; and

4. \$50,000 any one fire.

c. Automotive Liability Insurance covering any auto (including owned, hired and non-owned autos) with a minimum limit as follows: \$1,000,000 each accident combined single limit.

d. The Colorado Department of Transportation shall be named as additional insured on the Commercial General Liability and Automobile Liability insurance policies and the Completed Operations Endorsement CG 2010 11/85, CG 2037, or equivalent.

4.3 Application and Permit Fees.

a. Construction Related Application Fees. WLH shall be solely responsible for all permits required for the performance of the work with respect to the Replacement Improvements. WLH shall determine which permits, applications and fees apply to the work. WLH shall obtain and pay for all such permits, applications and fees.

b. WLH shall be solely responsible for all applications for and all costs of procuring connection to and/or transfer of all public utilities to the structures and other appurtenances in the Replacement Improvements. WLH shall connect or transfer all such utilities prior to the exchange.

4.4 Time of Completion.

WHL shall have 365 calendar days from the Effective Date of this Agreement to complete the Plans and Specifications and to begin construction of all Improvements on the Wildhorse Vacant Land Site.

a. WLH agrees to commence construction of the Replacement Improvements within 120 days after the contingencies in Article III ("Contingencies") have been satisfied or waived. WLH agrees to Substantially Complete all Replacement Improvements at the Wildhorse

Vacant Land Site within 365 calendar days from the date the Plans and Specifications are accepted by CDOT and contingencies have been satisfied or waived. Additionally, WLH agrees to finally complete the Project from Substantial Completion to Final Acceptance within 30 calendar days after Substantial Completion. WLH shall perform the Work with due diligence to completion.

- b. WLH will provide timely notice to CDOT's Architect to schedule a pre-substantial completion walk through ten days prior to the Substantial completion date. CDOT's Architect will compile a list of outstanding items to be completed, repaired or reconstructed and provide to WLH prior to Final Acceptance.

4.5 Warranty After Completion of Construction. WLH shall warrant the structures, appurtenances, and improvements made upon the Wildhorse Vacant Land Site against defects in materials and/or workmanship for a period of one (1) year subsequent to the satisfactory completion of the:

- a. Replacement Improvements and acceptance of the completed Replacement Improvements by CDOT. Upon timely notice by CDOT, WLH and CDOT will conduct a walk-through on month eleven (11) on the Wildhorse Vacant Land Site prior to the expiration of the one-year warranty period.
- b. WLH will complete any remaining necessary reconstruction or repairs to the Replacement Improvements prior to the expiration of such one-year period, provided that such repairs are actually a warranty issue and are not as a result of ordinary wear and tear or of CDOT's negligence or misuse of the Replacement Improvements. If a reconstruction or repair cannot be completed within such period, WLH will provide CDOT with written notice of the extended completion date.
- c. If WLH does not complete the reconstruction or repair by the extended completion date, the procedure set forth in the following sentence shall apply: If, for any reason, WLH does

not complete necessary reconstruction or repair to the Replacement Improvements under this warranty within a reasonable time period after being notified by CDOT (one business day for an emergency or thirty (30) days for a non-emergency), CDOT shall have the right to contract directly for the necessary reconstruction or repair to the Replacement Improvements, and to invoice WLH and receive timely reimbursement within thirty (30) days after submittal of a request for reimbursement to WLH.

ARTICLE V

COMMITMENTS ON THE PART OF WLH

5.1. Construction Provisions.

a. WLH shall contract with one of CDOT Property Management's contracted Multiple Project Architect and Engineering firms to design and construct all the structures, appurtenances, and improvements upon the Wildhorse Vacant Land Site in accordance with the Approved Plans. The design and construction of the foregoing shall comply with the Approved Plans, construction methods, and materials required by this Agreement and approved by CDOT.

b. All plans and specifications, construction methods and materials used by WLH shall be subject to inspection and approval by CDOT's Region Transportation Director or authorized designee and must conform to all applicable current standards contained within the following publications:

National Electrical Safety Code - published by the Institute of Electrical and Electronic Engineers.

International Building Code – published by the International Code Council.

All such publications are incorporated herein by this reference as conditions of this Agreement, to the extent applicable.

ARTICLE VI

COMMITMENTS ON THE PART OF CDOT

6.1. Removal of Infrastructure from the CDOT Pueblo Boulevard Maintenance Site. CDOT shall remove at its own expense the following existing items from the CDOT Pueblo Boulevard Maintenance Site, all of which are illustrated on Exhibit B, on or before 120 calendar days following closing of the exchange, as hereinafter defined under Article VII:

1. Concrete loading ramp.
2. Trash dumpsters.
3. Two portable sheds.
4. Fueling facilities and related appurtenances.
5. Existing fencing.
6. Remaining tanks and equipment.

ARTICLE VII

TRANSFER OF TITLE

7.1. Transfer of Title from WLH to CDOT - Upon CDOT's inspection, approval and acceptance of the Wildhorse Vacant Land Site with Replacement Improvements completed, WLH shall convey to CDOT the Wildhorse Vacant Land Site by special warranty deed.

7.2. Transfer of Title from CDOT to WLH - Simultaneous with the closing and transfer of title in accordance with Section 1 above, CDOT shall convey to WLH title to the CDOT Exchange Property by quit claim deed without warranties, pursuant to Section 43-1-210, C.R.S., as amended. The transfer of title by CDOT to WLH shall be subject to any and all existing easements and utilities of record.

ARTICLE VIII

GENERAL PROVISIONS

- a. CDOT has the right to terminate this Agreement, upon 30 days written notice, without any obligation or liability, if WLH does not commence construction of the Replacement Improvements upon the Wildhorse Vacant Land Site within 120 days but not later than 180 calendar days after the waiver or satisfaction of the contingencies in Article III, unless delayed by CDOT.
- b. This Agreement is limited to the terms and conditions expressly contained herein. The exchange of properties that this Agreement contemplates is subject to the satisfactory completion by WLH of all terms and conditions of this Agreement prior to such exchange. Should WLH fail to satisfactorily complete the work or to comply with all terms and conditions of this Agreement, as reasonably determined by CDOT, then CDOT shall have the right to exercise any remedy available at law or in equity.
- c. This Agreement is intended as the complete integration of all understandings between the Parties. No prior or contemporaneous addition, deletion, or other amendment hereto shall have any force or effect whatsoever, unless embodied herein in writing. No subsequent novation, renewal, addition, deletion, or other amendment hereto shall have any force or

effect unless embodied in a written Agreement executed and approved pursuant to State Fiscal Rules.

d. This Agreement contains all understandings between the Parties with respect to the costs that relate to the exchange of the CDOT Pueblo Boulevard Maintenance Site and the Wildhorse Vacant Land Site and the construction of the Replacement Improvements upon the Wildhorse Vacant Land Site.

e. The term of this Agreement shall be through the satisfactory completion of the work on the Wildhorse Vacant Land Site by WLH no later than December 31, 2024, and acceptance by CDOT of the work, except to the extent the terms of this Agreement expressly provide that certain obligations of the Parties continue.

f. All communications relating to the day-to-day activities under this Agreement shall be exchanged between CDOT's Region 2 Resident Engineer, CDOT's Architect III, and the representatives of WLH, as identified below. All other notices and communications in writing required or permitted hereunder shall be deemed to have been given when delivered personally to the respective representatives of CDOT and WLH set forth below, three (3) business days after such notice of communication has been deposited in the United States Mail, property addressed and with first-class postage fully prepaid. Until changed by notice in writing, all such notices and communications shall be address as follows:

If to CDOT:

CDOT Region 2
Right of Way Manager
5615 Wills Blvd., Suite A
Pueblo CO 81008

If to WLH:

Warren Dean
Wild Horse Land and Holdings, LLC
P.O. Box 64140
Colorado Springs CO 80962

Copy to:

CDOT Property Management
Program Manager
2829 West Howard Place
Denver CO 80204

Warren Dean
Wild Horse Land and Holdings, LLC
6 South Tejon Street, #660
Colorado Springs CO 80903

Notice of change of designated representatives and address shall be treated as any other notice.

g. WLH shall comply with all applicable Federal, State, and local requirements in the performance of the work.

h. This Agreement shall extend to and be binding upon the Parties hereto, and their respective successors and assigns.

i. WLH shall perform its duties hereunder as independent contractors. Neither WLH nor any of its employees shall be or shall be deemed to be agents or employees of the State. WLH shall pay when due all required employment taxes and income tax withholding, shall provide and keep in force worker's compensation (and show proof of such insurance) and unemployment compensation insurance in the amounts required by law, and shall be solely responsible for the acts of contractor, its employees and agents.

j. Amendments to this Agreement shall be in writing and signed by the parties hereto.

k. Should any conflicts occur between this Agreement and the attachments or exhibits hereto, then the terms of this Agreement document shall prevail. Notwithstanding the foregoing, to the extent there are any conflicts between this Agreement and any Addendum, then the terms of any such Addendum shall control.

l. WLH represents and warrants it has taken all actions that are necessary or that are required by its procedures, bylaws, or applicable law, to legally authorize the undersigned signatories to execute this Agreement on behalf of WLH, and to bind it to its terms.

m. The properties that are the subject of this Agreement are not connected to any Federal-Aid or Title 23 project; therefore, FHWA approval of or consent to this Agreement is not required.

The execution of this Agreement by CDOT, and CDOT's obligation to proceed under its terms, conditions and obligations, is expressly contingent upon and subject to formal ratification, confirmation and consent of the State of Colorado Transportation Commission. In the event such ratification, confirmation and consent is not given within ninety (90) days following CDOT's execution of this Agreement, this Agreement shall automatically terminate, and the Parties shall thereafter be released from all terms, conditions and obligations hereunder.

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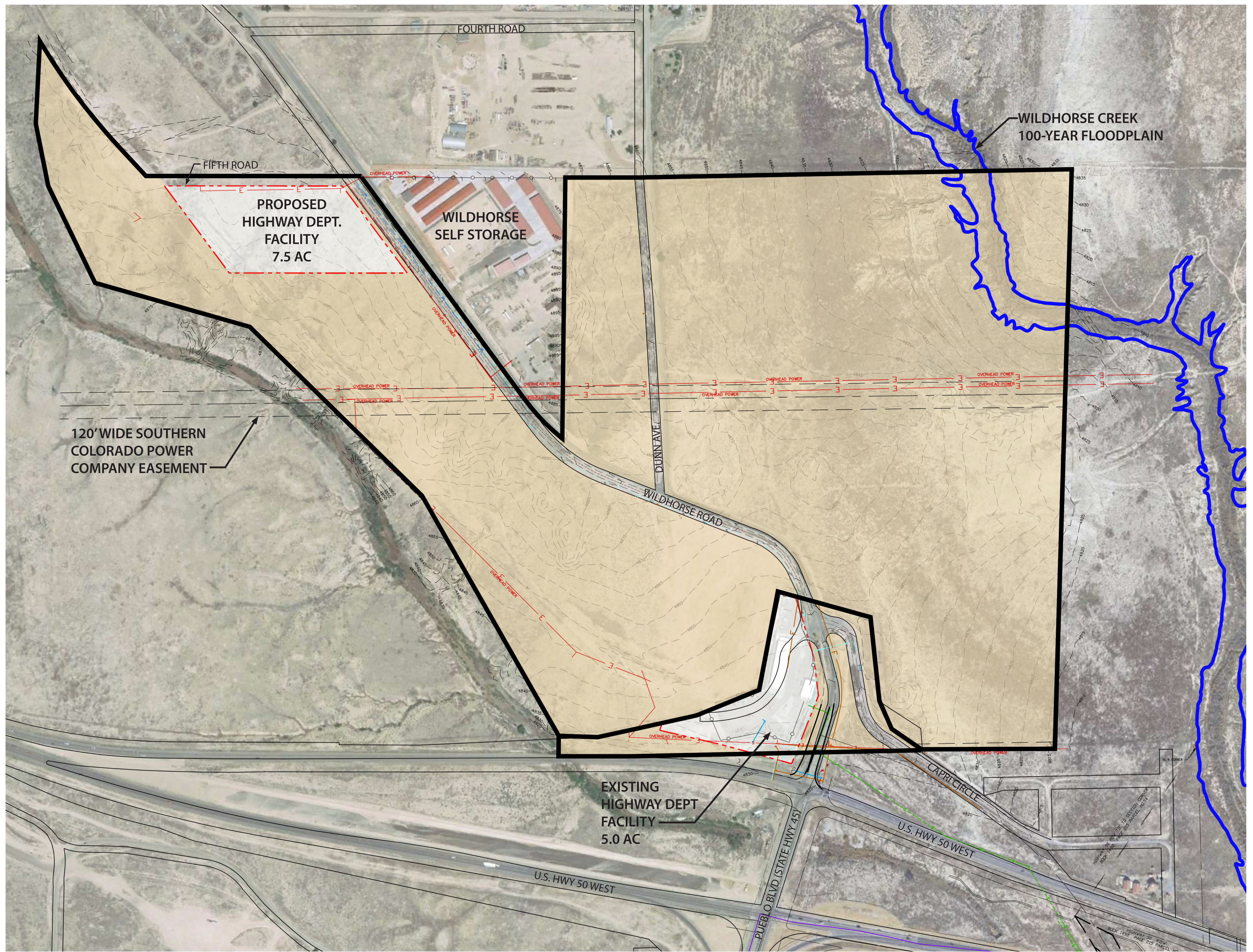
Dated as of the day and year first above written.

SIGNATURE PAGE

THE PARTIES HERETO HAVE EXECUTED THIS AGREEMENT

Each person signing this Agreement represents and warrants that the signer is duly authorized to execute this Agreement and to bind the Party authorizing such signature.

<p>ATTEST: WILD HORSE LAND AND HOLDINGS, LLC, a Colorado Limited Liability Company</p> <p>_____</p> <p>By: Warren Dean, Manager</p> <p>Date: _____</p>	<p>STATE OF COLORADO Jared S. Polis, Governor Department of Transportation Shoshana M. Lew, Executive Director</p> <p>_____</p> <p>By: Stephen Harelson, P.E., Chief Engineer</p> <p>Date: _____</p>
	<p>In accordance with §24-30-202, C.R.S., this Agreement is not valid until signed and dated below by the State Controller or an authorized delegate.</p> <p>STATE CONTROLLER Robert Jaros, CPA, MBA, JD</p> <p>By: _____ Office of the State Controller, Controller Delegate</p> <p>Effective Date: _____</p>

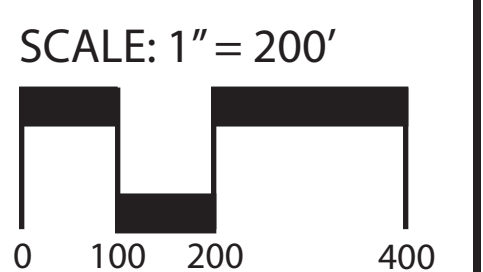


WILDHORSE CROSSING

Pueblo, Colorado

Property with
CDOT Parcels

FEBRUARY 8, 2021





COLORADO
Department of Transportation
Office of Policy and Government Relations

2829 W. Howard Place
Denver, CO 80204-2305

MEMORANDUM

DATE: November 4, 2022
TO: Transportation Commission
FROM: Herman Stockinger, Deputy Executive Director and OPR Director
Kristi Graham-Gitkind, Chief Human Resources Officer
Sari Weichbrodt, Rules, Policies, and Procedures Advisor
SUBJECT: Adopting Updated Policy Directive 600.0 “Equal Employment Opportunity and Affirmative Action”

Purpose

This memorandum provides a summary of the proposed changes to Policy Directive 600.0 “Equal Employment Opportunity and Affirmative Action” for its adoption by the Transportation Commission.

Action

To pass a resolution adopting the updated Policy Directive 600.0 “Equal Employment Opportunity and Affirmative Action.”

Background

Policy Directive 600.0 “Equal Employment Opportunity and Affirmative Action” was last updated in 2014 and was due for review in 2019. The Directive affirms the commitment of the Colorado Department of Transportation (CDOT) to maintain employment practices that are free from discrimination and harassment in full compliance with all applicable state and federal laws.

Details

Several new state laws have been passed since this Directive was last updated, including the Colorado Anti-Discrimination Act and the Colorado Equal Pay for Equal Work Act. Consequently, the proposed changes align the Directive with legal authority, provide clarity about CDOT’s obligation to investigate allegations of discrimination, harassment, and retaliation, and affirm CDOT’s commitment to hiring an inclusive workforce reflective of Colorado’s diversity.

Next Steps

CDOT will continue to comply with all state and federal employment laws regarding fair and equitable employment, diversity, and non-discrimination.

Attachments

Attachment A: Redlined Version of Policy Directive 600.0
Attachment B: Clean Version of Policy Directive 600.0



COLORADO DEPARTMENT OF TRANSPORTATION		<input checked="" type="checkbox"/> POLICY DIRECTIVE <input type="checkbox"/> PROCEDURAL DIRECTIVE
Subject		
EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION		600.0
Effective 2022/22/14	Supersedes 01/22/1406/18/08	Originating Office Division of Human Resources

I. PURPOSE

To ensure that ~~the Colorado Department of Transportation's~~ the Colorado Department of Transportation's (CDOT) maintains employment practices that are free from discrimination and harassment. ~~no person, such as a member of the public, applicant, or employee, shall, on the grounds of race, color, religion, gender (including sexual harassment), sexual orientation as defined in § 24-34-401 (7.5), C.R.S., national origin, age, genetic information, political affiliation, organizational membership, veteran's status, disability, marriage to a co-worker, pregnancy, or because such person has opposed any unlawful discriminatory practice or other non-job related factor, be excluded from participation in, be denied the benefit of, or be subjected to discrimination or harassment in hiring or employment practices.~~

II. AUTHORITY

Executive Director, § 43-1-105, C.R.S.

[Colorado Anti-Discrimination Act:](#)

[Employment Practices: C.R.S. § 24-34-401 et seq.](#)

[Persons With Disabilities - Civil Rights: C.R.S. § 24-34-801 et seq.](#)

Title VII of the Civil Rights Act of 1964, 42 U.S.C. § 2000e
(<http://www.eeoc.gov/laws/statutes/titlevii.cfm>)

[Americans with Disabilities Act, 42 U.S.C. § 12101 et seq.](#)

Rehabilitation Act, 29 U.S.C. § 791
(<http://www.eeoc.gov/laws/statutes/rehab.cfm>)

Age Discrimination [in Employment](#) Act of 1975, 29 U.S.C. § 621
(<http://www.eeoc.gov/laws/statutes/adea.cfm>)

The Equal Pay Act, 29 U.S.C. § 206(d)
(<http://www.eeoc.gov/laws/statutes/epa.cfm>)

Subject EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION	Number 600.0
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The Genetic Information Nondiscrimination Act, 42 U.S.C. § 2000ff
(<http://www.eeoc.gov/laws/statutes/gina.cfm>)

The Civil Rights Act of 1991, 29 CFR 1614
(<http://www.eeoc.gov/laws/statutes/cra-1991.cfm>)

Colorado Equal Pay for Equal Work Act, C.R.S. § 8-5-101 et seq.
https://leg.colorado.gov/sites/default/files/2019a_085_signed.pdf

Federal Highways Administration
Title 23 Code of Federal Regulations (CFR), Part 230 – Subpart C, Appendix A Part II
<https://www.fhwa.dot.gov/legregs/directives/fapg/cfr0230d.htm>

Federal Transit Authority
(49 CFR Part 21)
<https://www.transit.dot.gov/regulations-and-guidance/civil-rights-ada/eo-guidance>

§ 24-34-401, et seq., C.R.S.

III. APPLICABILITY

This ~~directive~~ Directive applies to all ~~divisions~~ Divisions, ~~branches~~ Branches, ~~regions~~ Regions and ~~offices~~ Offices of ~~CDOT~~ the Colorado Department of Transportation (“CDOT” or “Department”) with regard to applicants and employees. For purposes of this Policy Directive, “employees” includes all employees, including management level, as well as temporary employees and ~~volunteers, and applicants.~~

IV. POLICY

~~It is the policy of CDOT to provide equal opportunity in employment and to prohibit discrimination in employment based on the above mentioned factors.~~
It is CDOT’s policy to provide equal employment opportunities without regard to race, creed, color, religion, sex, sexual orientation, gender identity, gender expression, national origin, age, disability, marital status, veteran status, genetic information, pregnancy, or any other protected characteristic under applicable law. This policy relates to all phases of employment, including, but not limited to, recruiting, employment, placement, promotion, transfer, demotion, reduction of workforce and termination, rates of pay or other forms of compensation, and selection for training.

All CDOT employees and applicants for employment have the right to raise allegations of discrimination and harassment without fear of reprisal. Employees and applicants for employment who believe they have been subjected to unlawful discrimination or retaliation for opposing discrimination, or hindered from participating in the complaint process, are encouraged

Commented [1]: “political affiliation” and “organizational membership” were in the 2014 version, but those are not protected classes (they’re 1st amendment), so deleting from the EEO/AA policy on advice of the AG.

Subject EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION	Number 600.0
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to promptly contact their Regional Civil Rights Office, HR Employee Relations, or the EEO/AA Officer. If a formal complaint is filed and accepted, there will be a prompt, thorough, and impartial investigation, and we will keep confidential, to the greatest extent allowed by law possible, the facts of these investigations.

Commented [2]:
Added this section to reflect that we are obligated to investigate EEO complaints.

CDOT serves citizens in every community throughout the state. We believe that we best serve the public when we more accurately reflect the public being served. Through effective outreach, recruitment, hiring, promotion, employee development, and equitable treatment, we work toward an inclusive workforce that reflects Colorado’s diversity. As a recipient of federal funds, CDOT will develop affirmative action plans as directed by applicable laws and Executive Orders.

Commented [3]: Stating our federal affirmative action obligation.

We are committed to the principles of equal opportunity and a workplace that ensures that employment practices are consistent with the purpose of Title VII of the Civil Rights Act of 1964, the Colorado Anti-Discrimination Act, and all civil rights laws that mandate the elimination of all employment discrimination. It is the responsibility of every person within CDOT to incorporate and implement actions of equal opportunity in the workplace.

CDOT supports the rights of employees to exercise all available rights under applicable civil rights laws and does not tolerate retaliation against employees who engage in a protected activity. Any employee or program issue related to this EEO policy should be addressed to the Regional Civil Rights Office, Employee Relations Legal (ER/L), or the Affirmative Action Officer.

V. IMPLEMENTATION PLAN

A. This Policy Directive shall be effective upon approval by the Transportation Commission.

B. It shall be implemented by the Division of Human Resources, Affirmative Action Officer in the Office of Employee Relations / Legal at CDOT Headquarters.

C. The Office of Policy and Government Relations shall post this Policy Directive on CDOT’s intranet as well as on public announcements.

VI. REVIEW DATE

This Policy Directive shall be reviewed on or before October January 2027/19.

Secretary, Transportation Commission

Date of Approval

COLORADO DEPARTMENT OF TRANSPORTATION		<input checked="" type="checkbox"/> POLICY DIRECTIVE <input type="checkbox"/> PROCEDURAL DIRECTIVE	
Subject EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION			600.0
Effective	Supersedes 01/22/14	Originating Office Division of Human Resources	

I. PURPOSE

To ensure that the Colorado Department of Transportation (CDOT) maintains employment practices that are free from discrimination and harassment.

II. AUTHORITY

Executive Director, § 43-1-105, C.R.S.

Colorado Anti-Discrimination Act:

Employment Practices: C.R.S. § 24-34-401 et seq.

Persons With Disabilities - Civil Rights: C.R.S. § 24-34-801 et seq.

Title VII of the Civil Rights Act of 1964, 42 U.S.C. § 2000e
(<http://www.eeoc.gov/laws/statutes/titlevii.cfm>)

Americans with Disabilities Act, 42 U.S.C. § 12101 et seq.

Rehabilitation Act, 29 U.S.C. § 791
(<http://www.eeoc.gov/laws/statutes/rehab.cfm>)

Age Discrimination in Employment Act of 1975, 29 U.S.C. § 621
(<http://www.eeoc.gov/laws/statutes/adea.cfm>)

The Equal Pay Act, 29 U.S.C. § 206(d)
(<http://www.eeoc.gov/laws/statutes/epa.cfm>)

The Genetic Information Nondiscrimination Act, 42 U.S.C. § 2000ff
(<http://www.eeoc.gov/laws/statutes/gina.cfm>)

The Civil Rights Act of 1991, 29 CFR 1614
(<http://www.eeoc.gov/laws/statutes/cra-1991.cfm>)

Colorado Equal Pay for Equal Work Act, C.R.S. § 8-5-101 et seq.

Subject	Number
EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION	600.0

https://leg.colorado.gov/sites/default/files/2019a_085_signed.pdf

Federal Highways Administration

Title 23 Code of Federal Regulations (CFR), Part 230 – Subpart C, Appendix A Part II

<https://www.fhwa.dot.gov/legsregs/directives/fapg/cfr0230d.htm>

Federal Transit Authority

(49 CFR Part 21)

<https://www.transit.dot.gov/regulations-and-guidance/civil-rights-ada/eo-guidance>

III. APPLICABILITY

This Directive applies to all Divisions, Branches, Regions and Offices of CDOT with regard to applicants and employees. For purposes of this Policy Directive, “employees” includes all employees, including management level, as well as temporary employees and volunteers.

IV. POLICY

It is CDOT’s policy to provide equal employment opportunities without regard to race, creed, color, religion, sex, sexual orientation, gender identity, gender expression, national origin, age, disability, marital status, veteran status, genetic information, pregnancy, or any other protected characteristic under applicable law. This policy relates to all phases of employment, including, but not limited to, recruiting, employment, placement, promotion, transfer, demotion, reduction of workforce and termination, rates of pay or other forms of compensation, and selection for training.

All CDOT employees and applicants for employment have the right to raise allegations of discrimination and harassment without fear of reprisal. Employees and applicants for employment who believe they have been subjected to unlawful discrimination or retaliation for opposing discrimination, or hindered from participating in the complaint process, are encouraged to promptly contact their Regional Civil Rights Office, HR Employee Relations, or the EEO/AA Officer. If a formal complaint is filed and accepted, there will be a prompt, thorough, and impartial investigation, and we will keep confidential, to the extent allowed by law, the facts of these investigations.

CDOT serves citizens in every community throughout the state. We believe that we best serve the public when we more accurately reflect the public being served. Through effective outreach, recruitment, hiring, promotion, employee development, and equitable treatment, we work toward an inclusive workforce that reflects Colorado’s diversity. As a recipient of federal funds, CDOT will develop affirmative action plans as directed by applicable laws and Executive Orders.

We are committed to the principles of equal opportunity and a workplace that ensures that employment practices are consistent with the purpose of Title VII of the Civil Rights Act of

Subject	Number
EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION	600.0

1964, the Colorado Anti-Discrimination Act, and all civil rights laws that mandate the elimination of employment discrimination. It is the responsibility of every person within CDOT to incorporate and implement equal opportunity in the workplace.

V. IMPLEMENTATION PLAN

- A. This Policy Directive shall be effective upon approval by the Transportation Commission.
- B. It shall be implemented by the Division of Human Resources.
- C. The Office of Policy and Government Relations shall post this Policy Directive on CDOT’s intranet as well as on public announcements.

VI. REVIEW DATE

This Policy Directive shall be reviewed on or before October 2027.

Secretary, Transportation Commission

Date of Approval



COLORADO
Department of Transportation
Office of Policy and Government Relations

2829 W. Howard Place
Denver, CO 80204-2305

MEMORANDUM

DATE: November 4, 2022
TO: Transportation Commission
FROM: Herman Stockinger, Deputy Executive Director and OPR Director
San Lee, State Traffic Engineer
Esayas Butta, Traffic Standard, Specification & Policy Unit Manager
Yesenya Saucedo Paez, Engineer-in-Training
Sari Weichbrodt, Rules, Policies, and Procedures Advisor
SUBJECT: Adopting Updated Policy Directive 1500.0 “Guide Signing Policy”

Purpose

This memorandum provides a summary of the proposed changes to Policy Directive 1500.0 “Guide Signing Policy” for its adoption by the Transportation Commission.

Action

To pass a resolution adopting the updated Policy Directive 1500.0 “Guide Signing Policy.”

Background

Policy Directive 1500.0 “Guide Signing Policy” was last updated in 2018 and was due for review in 2022. The Directive instructs the Colorado Department of Transportation (CDOT) to establish and maintain a Manual to formalize CDOT’s oversight of guide sign regulation in accordance with the Manual on Uniform Traffic Control Devices.

Details

The updated Directive requires only minor, non-substantive changes to make it current for 2022. The updated Directive confirms CDOT’s commitment to regulating guide signs in accordance with the Manual on Uniform Traffic Control Devices.

Next Steps

CDOT will continue to maintain a Manual and oversee guide sign regulation in compliance with all relevant laws.

Attachments

Attachment A: Redlined Version of Policy Directive 1500.0



COLORADO DEPARTMENT OF TRANSPORTATION		<input checked="" type="checkbox"/> POLICY DIRECTIVE <input type="checkbox"/> PROCEDURAL DIRECTIVE
Subject Guide Signing Policy		Number 1500.0
Effective 04/19/18	Supersedes 04/19/18 07/03/2012	Originating office Traffic & Safety & Engineering Branch

I. PURPOSE

To demonstrate support for the practices and procedures set forth in the Guide Signing Policies and Procedures ~~Manual~~ (the "Manual") as amended. The purpose of the Manual is to provide a consistent practice by which the Colorado Department of Transportation (CDOT or Department) regulates guide signs. The goal of this practice is to strike the appropriate balance between the needs of local governments, individual businesses, motorists and passengers, minimize sign "pollution" and comply with federal and state law governing outdoor advertising and the design and application of highway guide signing.

II. AUTHORITY

The Transportation Commission pursuant to § 43-1-106(8)(a) C.R.S.

§ 42-4-104 C.R.S.

23 CFR 655 Subpart F

23 U.S.C. 109(d) and 402(a)

~~23 U.S.C. 655.603(a)~~

III. APPLICABILITY

This Policy Directive applies to all ~~divisions~~Divisions, ~~regions~~Regions, ~~offices~~Offices and ~~branches~~Branches of CDOT.

IV. POLICY

The Transportation Commission of Colorado supports ~~the~~ CDOT's adherence to the "Manual ~~of~~on Uniform Traffic Control Devices" (MUTCD), which contains the standards and guidelines for the design and installation of highway signing. In accordance with the MUTCD, ~~the~~ CDOT is responsible for selecting messages to be used on guide signs, supplemental guide signs, and other informational signs of interest to the traveling public.

In order to meet the goals stated above, and in conformance with state and federal law and the appropriate standards set forth in the MUTCD, CDOT has implemented and shall continue to update the ~~Guide Signing Policies and Procedures~~ Manual. This Manual reflects the means by which the Transportation Commission implements CDOT's oversight of guide sign regulation.

Subject Guide Signing Policy	Number 1500.0
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V. IMPLEMENTATION PLAN

1. This ~~policy~~Policy directive~~Directive~~ shall be effective immediately and implemented ~~through the Guide Signing Policies and Procedures Manual~~ by the Traffic Safety & ~~Traffic~~ Engineering Branch and ~~region~~Region traffic~~Traffic engineers~~Engineers. The Office of Policy and Government Relations shall post this Policy Directive on CDOT's ~~PDs webpage~~intranet as well as on CDOT's public announcements.

2. The ~~Safety &~~ Traffic Safety & Engineering Branch will disseminate this Policy Directive to the ~~region~~Region traffic~~Traffic engineers~~Engineers and alert them to the revised version of the ~~Guide Signing Policies and Procedures Manual~~, highlighting any specific changes to the Manual, which The Manual will be made available on the CDOT ~~internet~~website.

~~3. Thereafter, whenever the Guide Signing Policies and Procedures Manual is updated, the Safety & Traffic Engineering Branch will alert the region traffic engineers to this fact, and to the specific change in the Manual.~~

VI. REVIEW DATE

This ~~policy~~Policy directive~~Directive~~ shall be reviewed on or before ~~February~~October 2022~~2027~~.

Herman Stockinger, III
Transportation Commission Secretary

Date of Approval



MEMORANDUM

TO: THE TRANSPORTATION COMMISSION
FROM: JEFF SUDMEIER, CHIEF FINANCIAL OFFICER
BETHANY NICHOLAS, BUDGET DIRECTOR
DATE: NOVEMBER 17, 2022
SUBJECT: FIFTH BUDGET SUPPLEMENT - FY 2022-2023

REGION 2

\$1,250,845 - Surface Treatment, Construction Bridge - SH 207A MANZANOLA AND SH 266A ROCKY FORD - Additional funds are needed to award. This project readvertised and the price of the bid items for asphalt contributed to the overall bid being more over CDOT's engineer's estimate for the project. Funds will come from the Region 2 Surface Treatment pool.

SH 207A MANZANOLA AND SH 266A ROCKY FORD
Budget Components by Phase, Funding Program, Fiscal Year

Phase of Work	Funding Program	Original Budget	Funding Request				Revised Budget	Expended To-Date
			Previous Adjustments	Current Request	Total Adjustments	Total Adjustment		
Right of Way	Surface Treatment	\$1,432	\$0	\$0	\$0		\$1,432	\$1,432
	Total ROW	\$1,432	\$0	\$0	\$0	0%	\$1,432	\$1,432
Design	Surface Treatment	\$162,343	\$0	\$0	\$0		\$162,343	\$133,268
	Total Design	\$162,343	\$0	\$0	\$0	\$0	\$162,343	\$133,268
Miscellaneous	Construction Bridge	\$99,999	\$0	(\$77,331)	(\$77,331)		\$22,668	\$22,141
	Total Miscellaneous	\$99,999	\$0	(\$77,331)	(\$77,331)	\$0	\$22,668	\$22,141
Construction	Surface Treatment	\$6,267,689	\$0	\$1,173,514	\$1,173,514		\$7,441,203	\$0
	Construction Bridge	\$452,836	\$0	\$77,331	\$77,331		\$530,167	\$0
	Total Construction	\$6,720,525	\$0	\$1,250,845	\$1,250,845	\$0	\$7,971,370	\$0
	Total Project	\$6,884,300	\$0	\$1,250,845	\$1,250,845	18%	\$8,157,813	\$134,699

Per Policy Directive 703.0, this project is being included in the Budget Supplement as the change is greater than 15% and \$500,000 from the Original Construction Budget.



**Transportation Commission Program Reserve Fund Reconciliation
Fifth Supplement FY 2023 Budget**

See Budget Amendment Slides for the November Program Reserve balance.

**Transportation Commission Contingency Reserve Fund Reconciliation
Fifth Supplement FY 2023 Budget**

Transaction Date	Transaction Description	Amount	Balance	Reference Document
June-22	Balance 12S21		\$33,005,416	
July-22	Balance 1S23		\$32,405,631	
September-22	Balance 3S23		\$32,135,631	
October-22	Balance 4S23		\$32,135,631	
	Correction to prior month I-70 Glenwood Canyon Repayment	\$ (454,477)		Various
November-22	Pending Balance 5S23		\$31,681,154	

**Transportation Commission Maintenance Reserve Reconciliation
Fifth Supplement FY 2023 Budget**

Transaction Date	Transaction Description	Amount	Balance	Reference Document
June-22	Balance 12S22		\$6,993,697	
July-22	Balance 1S23		\$12,000,000	
August-22	Balance 2S23		\$12,000,000	
September-22	Balance 3S23		\$12,000,000	
October-22	Balance 4S23		\$12,000,000	
	No Pending Requests			
November-22	Pending Balance 5S23		\$12,000,000	

FY 2022-2023 Contingency Reserve Fund Balance Projection		
October		
TC Contingency Balance (Emergencies)		\$32,135,631
<i>Pending Requests:</i>		
Correction prior month I-70 Glenwood Slide Match Return		(\$454,477)
Pending November		
TC Contingency Reserve Balance		\$31,681,154
<i>Projected Outflow:</i>		
	Low Estimate	High Estimate
	\$0	\$0
<i>Projected Inflow:</i>		
	Low Estimate	High Estimate
I-70 Glenwood Canyon Slides Remaining Repayments	\$0	\$8,520,000
Projected FY 2022-2023 YE Contingency Balance	\$31,681,154	\$40,201,154
TCCRF Surplus (Deficit) to Reach \$25M Balance July 1, 2023	\$6,681,154	\$15,201,154

FY 2022-2023 Program Reserve Fund Balance Projection
See Budget Amendment Slides for the November Program Reserve balance.



FY 2022-2023 Maintenance Reserve Fund Balance Projection		
October TC Maintenance Reserve Balance	\$12,000,000	
<i>Pending Requests:</i>		
No Pending Requests	\$0	
Pending November TC Maintenance Reserve Fund Balance	\$12,000,000	
<i>Projected Outflow:</i>		
	Low Estimate	High Estimate
	\$0	\$0
<i>Projected Inflow:</i>		
	Low Estimate	High Estimate
	\$0	\$0
Projected FY 2022-2023 YE Maintenance Reserve Balance	\$12,000,000	\$12,000,000



Colorado Bridge and Tunnel Enterprise Board
Meeting Minutes
October 20, 2022

PRESENT: Yessica Holguin, District 1
 Don Stanton, District 2
 Eula Adams, District 3
 Karen Stuart, Chair, District 4
 Kathleen Bracke, District 5
 Barbara Vasquez, District 6
 Kathy Hall, Vice Chair, District 7
 Mark Garcia, District 8
 Lisa Hickey, District 9
 Terry Hart, District 10
 Gary Beedy, District 11

AND: Staff members, organization representatives, and broadcast publicly

An electronic recording of the meeting was made and filed with supporting documents in the Transportation Commission office.

In October, the Bridge and Tunnel Enterprise Board of Directors approved:

- Regular Meeting Minutes of September 15, 2022
- Bridge & Tunnel Enterprise 4th Budget Supplement for FY'23



MEMORANDUM

TO: THE BRIDGE AND TUNNEL ENTERPRISE BOARD OF DIRECTORS
FROM: JEFF SUDMEIER, CHIEF FINANCIAL OFFICER
PATRICK HOLINDA, BRIDGE AND TUNNEL ENTERPRISE MANAGER
DATE: NOVEMBER 17, 2022
SUBJECT: BRIDGE AND TUNNEL ENTERPRISE FISCAL YEAR 2023-24 FINAL PROPOSED ANNUAL BUDGET

Purpose:

This month the Bridge and Tunnel Enterprise Board of Directors (Board) is being presented with a Statewide Bridge and Tunnel Enterprise fiscal year (FY) 2023-24 Final Proposed Annual Budget for Special Revenue Fund (C.R.S 43-4-805(3)(a) 538) (Fund 538) for review and approval.

Action:

The Board is being asked to review and approve a FY 2023-24 Final Proposed Annual Budget.

Background:

In coordination with the Office of Financial Management and Budget (OFMB), Bridge and Tunnel Enterprise (BTE) is presenting a FY 2023-24 Final Proposed Annual Budget. BTE will present a final budget in February 2023 for Board comment and return in March 2023 for approval of a final FY 2023-24 budget.

Details:

Estimated Bridge and Tunnel Enterprises revenues for FY 2023-24 are \$151.9 million. This total includes \$27.5 million in forecast revenues from the Bridge and Tunnel Impact Fee and Retail Delivery Fee authorized by the passage of Senate Bill (SB) 21-260 Sustainability of the Transportation System. It is important to note that BTE is forecasting a loss of the US Treasury Subsidy for Build America Bonds (subsidy) that it has received annually since the Series 2010A bonds were issued. There is possibility that the subsidy will be restored; however, this outcome would require the passage of new legislation at the federal level. To offset the forecast deficit, BTE and Federal Funds shares of debt service for the Series 2010A bonds will be increased proportionally in accordance with the Memorandum of Understanding between the Federal Highway Administration and Colorado Department of Transportation Accounting for Colorado Bridge Enterprise Program Build America Bonds (BABs) Debt Service Reimbursements executed on 12/16/2010. The CDOT final proposed annual budget being brought for adoption this month does not currently reflect this change, but CDOT and BTE will ensure that it is reflected accurately on both the CDOT and BTE final FY 2023-24 budgets that will be brought forth for adoption in March.



Overall projected revenues have been allocated to the following budget categories in the proposed FY 2023-24 budget for Fund 538:

- *Line 21: \$1,759,000 for Administrative & Operating Activities.* Funding in the category is used for expenses related to staff compensation, program support and financing programs. The proposed budget reflects a shift from external consultant support to full time employees as the program brings on more internal staff to support the program. Staff is currently working to refine the level of consultant staffing needed to support the continued integration of tunnels into BTE, development and implementation of enhancements to BTE’s asset management program, and other ongoing program management activities. As the plan is finalized, staff will update this category to reflect any changes related to the administration of the program in the final budget presented in February.
- *Line 25: \$48,000 for Support Services.* Support services funding allows BTE to provide supplemental staffing or services on an as-needed or short-term basis thereby enabling BTE eligible projects and the BTE program to meet required schedules. An example of an activity performed under this category is scoping work, which is the process of evaluating BTE eligible structures to establish a scope of work for an upcoming project, developing an initial cost estimate, identifying potential project risks, and recommending a course of action to streamline project delivery and maximize return on investment. Most recently this funding was used to support CDOT with the development of a grant application for the I-270 Critical Bridges project on an accelerated timeline.
- *Line 29: \$825,000 for Maintenance.* BTE is responsible for paying CDOT to perform routine maintenance of all BTE bridges on its behalf. Major activities include snow removal, sweeping and trash removal. The FY 2023-24 budget allocation has been determined using factors such as the age and level of maintenance required for the existing population of BTE bridges well as structures that are forecasted to be transferred from CDOT to BTE.
- *Line 33: \$0 for Bridge Preservation.* In FY 2012-13 a Pilot Preservation Agreement (Agreement) was executed between the legacy Bridge Enterprise (BE) program and CDOT to initiate a Pilot Bridge Preservation Program. Per the Agreement, BE would be budgeting \$100,000 for exploring preservation techniques on BE bridges. Currently, BTE has a prior year bridge preservation budget balance available to use and will not be allocating any additional funding in FY 2023-24. In past years, BTE has used these funds to participate in various efforts with CDOT including:
 - A parolee preventative maintenance program with CDOT maintenance;
 - A study of Floyd Hill, (structure F-15-BL) with CDOT Staff Bridge Branch, including purchasing sensors and monitoring equipment to obtain data regarding bridge stability in order to determine if there is any action required to keep the existing structure in service; and
 - A pilot project with Staff Bridge Branch to develop a new split timber stringer repair specification with the goals of: evaluating the potential of the repair specification to meet BTE goals for structure rehabilitations, reducing future maintenance costs by eliminating emergency repairs due to progressive failure, and increasing the load carrying capacity of the existing structures to remove load restrictions on key freight corridors throughout the state.
- *Line 38: \$48,653,354 for Debt Service and Availability Payments.* Funding in this category includes payments for the Series 2019A refunded bonds, the Series 2010A bond issuance and the BTE share of the Central 70 availability payment for FY 2023-24.
- *Line 42: \$100,569,031 for the Bridge and Tunnel Enterprise Construction Program.* This funding will be used to program projects based on the BTE Four-Year Plan and Statewide Transportation



Improvement Plan (STIP). Requests to allocate this funding to individual BTE projects will be brought before the Board of Directors via the monthly budget supplement process.

Options and Recommendation:

1. Review and approve the BTE Fiscal Year 2023-24 Final Proposed Annual Budget. - **STAFF RECOMMENDATION**
2. Review and approve BTE Fiscal Year 2023-24 Final Proposed Annual Budget with requested changes.
3. Do not approve.

Next Steps:

In the next several months, OFMB and BTE program staff will be finalizing the budget. Key tasks will include reviewing updated FY 2023-24 revenue projections and updating revenues as necessary, accurately reflecting any additional changes to the status of the subsidy and new federal share of funds for the 2010A bonds, aligning both the final BTE budget with the CDOT narrative budget and one-pager, and reviewing all allocations. Staff will return to the Board in February 2023 with a final budget for Board comment and in March 2023 for approval and adoption of a final budget.

Attachment:

Attachment A: Bridge and Tunnel Enterprise Fiscal Year 2023-24 Final Proposed Annual Budget



Attachment A: Bridge and Tunnel Enterprise Fiscal Year 2023-24 Final Proposed Annual Budget

Bridge and Tunnel Enterprise Fiscal Year 2023-24 Final Proposed Annual Budget Statewide Bridge and Tunnel Enterprise Special Revenue Fund (C.R.S 43-4-805(3)(a) 538)			
Line Item	Budget Item	Estimated Revenues	Proposed Allocations
1	Estimated Fiscal Year 2023-24 Revenue		
2	FASTER Bridge Safety Surcharge Fee	\$ 109,000,000	
3	Bridge & Tunnel Impact Fee	\$ 19,260,000	
4	Bridge & Tunnel Retail Delivery Fee	\$ 8,219,585	
5	Interest Earnings	\$ 1,530,000	
6	US Treasury Subsidy for Build America Bonds		
7	Federal Funds for 2010A Bond Debt Service	\$ 13,744,800	
8	Central 70 Conduit Issuer Fee	\$ 100,000	
9	Total Estimated Revenue	\$ 151,854,385	
10			
11	Estimated Allocations		
12	Administrative & Operating Activities (Cost Centers B8800-538 and B88AD-538)		
13	Bridge and Tunnel Enterprise Staff Compensation		\$ (656,000)
14	Bridge and Tunnel Enterprise Program Support		\$ (900,000)
15	Attorney General Legal Services		\$ (50,000)
16	Annual Audit		\$ (35,000)
17	Travel Expenses		\$ (4,000)
18	Operating Expenses		\$ (4,000)
19	Trustee Fee		\$ (10,000)
20	Other consulting		\$ (100,000)
21	Total Administrative & Operating Activities		\$ (1,759,000)
22			
23	Support Services (Cost Center B88SP-538)		
24	Additional Project and Program Support Services		\$ (48,000)
25	Total Support Services		\$ (48,000)
26			
27	Maintenance (Cost Center B88MS-538)		
28	Routine Maintenance on Bridge and Tunnel Enterprise Structures		\$ (825,000)
29	Total Maintenance		\$ (825,000)
30			
31	Preservation (Cost Center B88BP-538)		
32	Bridge and Tunnel Preservation		\$ -
33	Total Preservation		\$ -
34			
35	Debt Service and Availability Payments (B88AP-538)		
36	2010A and 2019A Bond Debt Service		\$ (17,181,000)
37	Central 70 Availability Payment		\$ (31,472,354)
38	Total Debt Service and Availability Payments		\$ (48,653,354)
39			
40	Construction Program		
41	Funding for Bridge and Tunnel Enterprise Projects		\$ (100,569,031)
42	Total Construction Program		\$ (100,569,031)
43			
	Total Fund 538 Revenues	\$ 151,854,385	
	Total Fund 538 Allocations		\$ (151,854,385)
	Remaining Unbudgeted Funds		\$ -





MEMORANDUM

TO: THE TRANSPORTATION COMMISSION
FROM: JEFF SUDMEIER, CDOT CHIEF FINANCIAL OFFICER
DATE: NOVEMBER 16, 2022
SUBJECT: MONTHLY CASH BALANCE UPDATE

Purpose

To provide an update on cash management, including forecasts of monthly revenues, expenditures, and cash balances in Fund 400, the State Highway Fund.

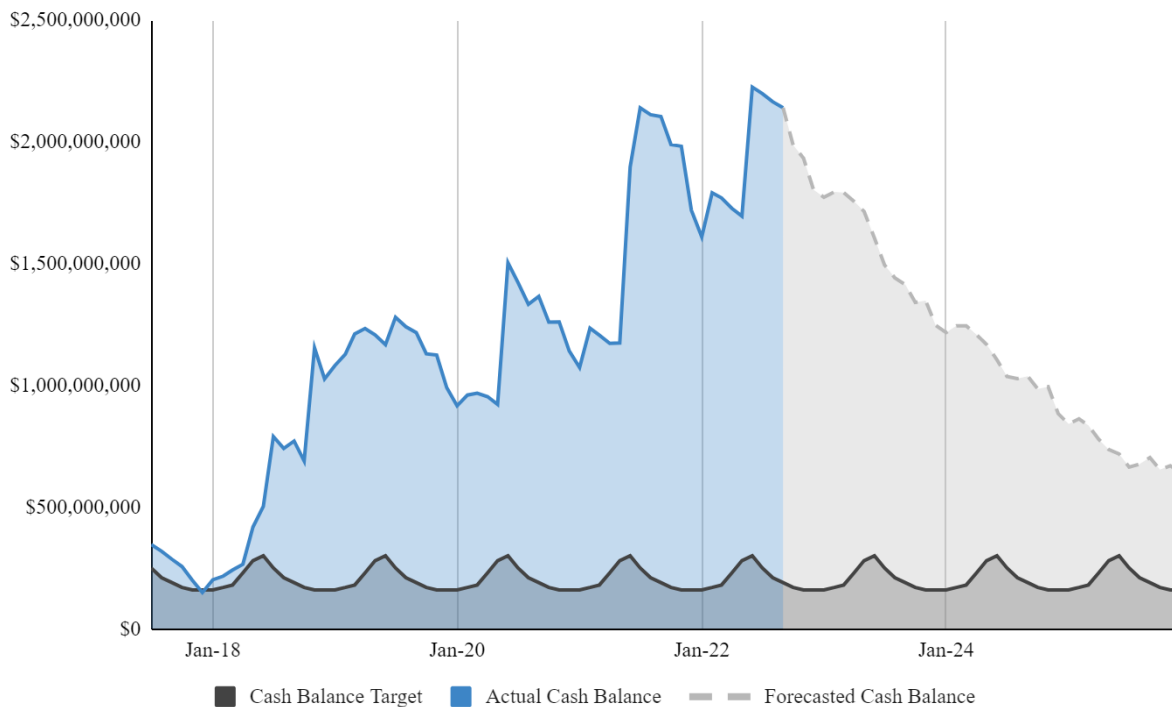
Action

No action is requested or required at this time.

Background

Figure 1 below depicts the forecast of the closing Fund 400 cash balance in each month, as compared to the targeted minimum cash balance for that month (gray shaded area). The targeted minimum cash balances reflect the Transportation Commission’s directive (Policy Directive #703) to limit the risk of a cash overdraft at the end of a month to, at most, a probability of 1/1,000 (1 month of 1,000 months ending with a cash overdraft).

Figure 1 – Fund 400 Cash Forecast





Summary

The actual closing cash balance for September 2022 was \$2.12 billion; \$1.90 billion above that month’s cash minimum cash balance target of \$190 million. September’s cash balance consists of \$703.6 million in the State Highway Fund and \$1.41 billion in the Senate Bill 267 trustee account. The forecasted cash balance for September 2022 was \$25.6 million higher than the actual cash balance due to higher than expected FHWA reimbursements.

The large cash balance results from the additional revenues listed in the section below.

Cash Revenues

The cash balance forecast is limited to the State Highway Fund (Fund 400 and affiliated funds and trustee accounts), and does not include other statutory Funds including the Multimodal Mitigation and Transportation Options Fund and Funds associated with the following Enterprises:

- Colorado Transportation Investment Office
- Statewide Bridge and Tunnel Enterprise
- Clean Transit Enterprise
- Nonattainment Area Air Pollution Mitigation Enterprise

The State Highway Fund revenue forecast includes revenues from:

- **Highway Users Tax Fund** - This primarily includes Motor Fuel Taxes, Vehicle Registration Fees, Road Usage Fees, and Retail Delivery fees.
- **Miscellaneous State Highway Fund Revenue** - This revenue includes proceeds from the sale of state property, interest earned on the money in the cash fund, the issuance of oversize/overweight permits, and revenue from various smaller sources.
- **SB 17-267** - This bill directed the State Treasurer to execute lease-purchase agreements on existing state facilities to generate revenue for priority transportation projects. A summary of this revenue can be found in the table below.
- **Other Legislative Sources**- This includes revenue transferred from the General Fund to the State Highway Fund through legislation passed by the Colorado General Assembly. A summary of this revenue can be found in the table below.

Cash balances will be drawn down closer to the target balances over the course of fiscal years 2022, 2023, and 2024 as projects funded with SB 17-267 and other legislative sources progress through construction.

Legislative Initiatives	2019	2020	2021	2022	2023
SB 21-267	\$424,154,455	\$559,809,594	\$620,559,397	\$624,425,703	\$0
SB 18-001	\$346,500,000	\$105,000,000	\$0	\$0	\$0
SB 19-262	\$0	\$60,000,000	\$0	\$0	\$0
SB 21-110	\$0	\$0	\$30,000,000	\$0	\$0
SB 21-260	\$0	\$0	\$182,160,000	\$170,000,000	\$6,748,728
SB 22-176	\$0	\$0	\$0	\$0	\$6,500,000
SB 22-180	\$0	\$0	\$0	\$40,000,000	\$0
SB 21-265	\$0	\$0	\$0	\$124,000,000	\$0





Cash Payments to Construction Contractors

The current forecast of payments to construction contractors under state contracts (grants paid out under inter-government agreements for construction are accounted for elsewhere in the expenditure forecast) from Fund 400 is shown in Figure 2 below.

Figure 2 – Forecasted Payments - Existing and New Construction Contracts

	CY 2017 (actual)	CY 2018 (actual)	CY 2019 (actual)	CY 2020 (actual)	CY 2021 (actual)	CY 2022 (forecast)	CY 2023 (forecast)	CY 2024 (forecast)
\$ millions								
Expenditures	\$642	\$578	\$669	\$774	\$615	\$850	\$800*	\$800*

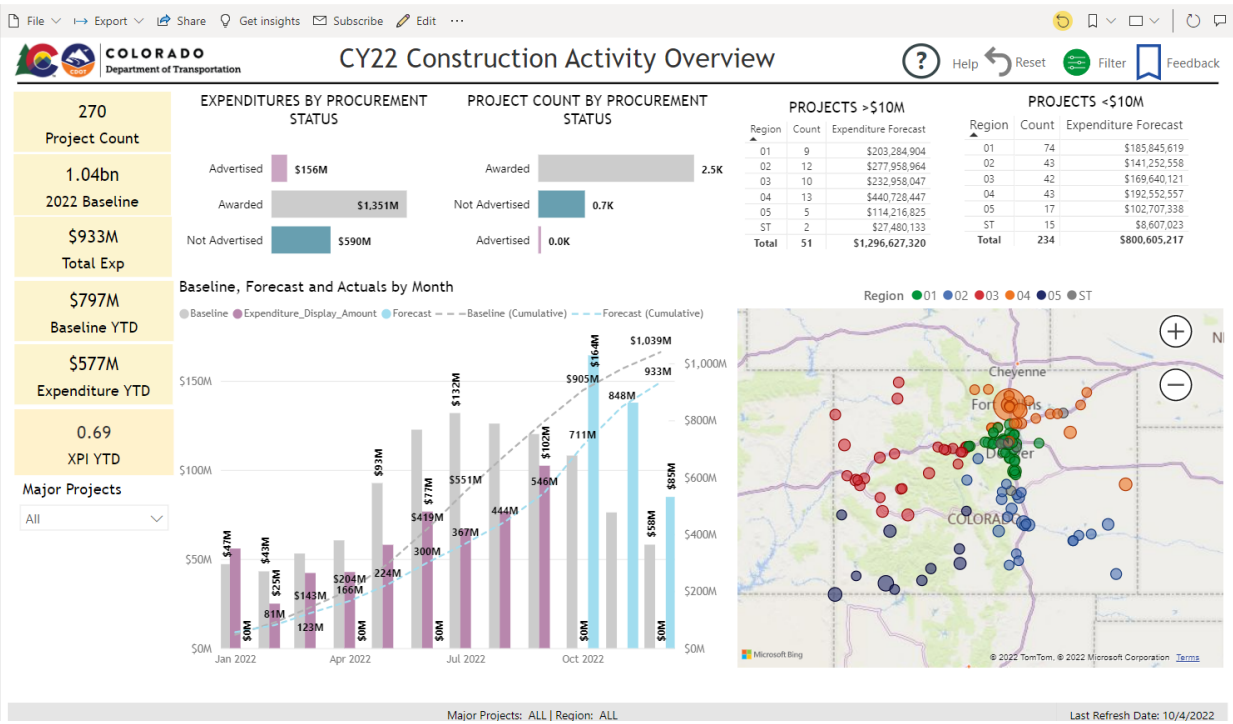
**This is preliminary information based on the 10-Year Plan update which was considered by the Transportation Commission for approval in September. This information will be updated as additional project schedule detail becomes available.*

Figure 3 details CY22 baseline, forecast, and actual expenditures for the State Highway Fund (see Figure 2 above) as well as Bridge and Tunnel Enterprise. CDOT sets the CY baseline in January each year, using the best estimates, forecast, and schedule information available at the time.

Including Bridge Enterprise, CY 22 expenditures are forecasted to total \$933 M. As of September month end, actual expenditures total \$577 M, which corresponds with an Expenditure Performance Index (XPI) of .69 (actual expenditures vs. baseline). Figure 3 also outlines the number of projects planned to incur construction expenditures in CY22; a listing of CY22 baseline and project count by procurement status (awarded, not advertised and advertised); and count of projects by region that have CY22 forecast greater than \$10 million dollars and less than \$10 million dollars.

Figure 3 - CY 22 Construction Activity Overview







DATE: November 4, 2022
TO: Transportation Commission
FROM: Amber Blake, Director, Division of Transit & Rail
Colette DeSonier, Asst. Director, Transit Administration Branch
Jan Rowe, Asst. Director, Transit Programs Branch
Jennifer Phillips, Asst. Director, Bus Operations Branch
Brian Metzger, Asst. Director, Transit Planning and Delivery Branch
David Singer, Asst. Director, Passenger Rail Branch

SUBJECT: DTR Programs Report - Q1 July 1, 2022 thru Sept 30, 2022

Purpose

This memo provides the Transportation Commission with a Q1 SFY23 update on the Division of Transit and Rail (DTR) Program Activities, with data reflective of the SFY quarter ending September 30, 2022.

Action

For information only. No action needed.

Background

DTR has seized the opportunity of a new fiscal year to develop a more intentional and purposeful informational report to share with the Transportation Commission and other DTR/CDOT Stakeholders. This Memo provides an overview of the programs conducted within DTR, and includes financial, ridership and programmatic data.

DTR strives to ensure that this informational report provides transparency and accountability of all program activities, demonstrating that we are good stewards of public funding and are providing essential transit support to the communities in Colorado. While public transportation comes in many forms, it can be defined as a system that moves people from one location to another in an efficient, affordable manner; it includes buses, trains (including high-speed and light rail), and is designed as an alternative to automobile travel and to reduce unnecessary walking time. Transit systems may operate within a city or connect one (or more) city to another. The benefits of public transportation are amplified when the systems are planned, engineered, and operated with interconnectivity, high-quality user experience and efficiency as a priority.

DTR ensures compliance with the various transit related Procedural/Policy Directives (PDs) 704, 1608.1 and 1605. *Note: DTR is currently reviewing each of the PDs to update them to represent the current state as they have not been updated in some time and things have changed from a transit program standpoint with funding, program activities and federal/state oversight.*

DTR is required to adhere to FTA Circular 5010.1E, which requires that CDOT, as a recipient of FTA funds, provide Federal Financial Reports (FFR's) and Milestone/Progress Reports (MPR's). This information is a joining activity assembled by members of the Division of Transit & Rail (DTR), the HQ Business Office (HQBO) and the Office of Financial Management & Budget (OFMB).

Details

DTR administers various state and federal funding sources and grant opportunities to meet the needs of the communities throughout Colorado, and support CDOT's Mission "To enhance the quality of life and the environment of the citizens of Colorado by creating an integrated transportation system that focuses

on safely moving people and goods by offering convenient linkages among modal choices.”

Program Administration

State Funds Update

The table below represents the available State funds in DTR’s portfolio. The table provides current year allocation, prior year roll forward, current available balance, planned and current budgeted to project amounts.

FASTER Funding						
Allocation Timeline	Funding	Current Year Allocation Amount	Prior Year Roll Forward	Balance	Planned	Budgeted
Annual Budget (FY23-FY26)	FASTER	\$15M total				
		\$5M Regional Transit	\$5,451,460	\$13,708,700	\$10,451,459	\$7,566,492
		\$2.5M Statewide Transit	\$14,098,397	\$16,564,366	\$3,793,540	\$793,540
		\$2.3M Regional Bus Operations	\$2,854,291	\$0	\$2,854,291	\$2,854,291
		*\$4.3M Bustang Operations	N/A		N/A	N/A
		*\$1M DTR Administration	N/A		N/A	N/A
Senate Bill Funding						
Allocation Timeline	Funding	Current Year Allocation Amount	Prior Year Roll Forward	Balance	Planned	Budgeted
4 years (FY19-FY22) Project List	Senate Bill 267	\$0	\$84,483,750	\$84,483,750	\$500,000	\$500,000
(FY16) Project List	Senate Bill 228	\$0	\$4,816,387	\$4,816,387	\$0	\$0
(FY23) Three Pilot Program \$10M for three years with \$30M upfront	*Senate Bill 180	\$30,000,000	\$0	\$30,000,000	\$0	\$0
Multi Modal Funding						
Allocation Timeline	Funding	Current Year Allocation Amount	Prior Year Roll Forward	Balance	Commitments	Budgeted
1 year (FY23)	*MMOF State Funds	\$805,066	\$0	\$805,066	\$0	\$0
1 Year (FY23)	*MMOF ARPA	\$35,121,000	\$0	\$35,121,000	\$0	\$0
Fare Box Revenue						
Allocation Timeline	Funding	Current Year Amount	Prior Year Roll Forward	Balance	Commitments	Budgeted
N/A	Regional Commuters Fares	N/A	\$0	\$2,100,359	\$3,558,613	\$3,558,613
N/A	Bustang Bus Replace	N/A	\$0	\$2,699,289	\$0	\$0
N/A	Bustang Reserve Fund	N/A	\$0	\$1,125,000	\$0	\$0
Miscellaneous Revenue						
Allocation Timeline	Funding	Current Year Allocation Amount	Prior Year Roll Forward	Balance	Commitments	Budgeted
1 year (FY19)	Volkswagon Settlement Fund	\$0	\$7,562,207	\$7,562,207	\$0	\$0
*Resides in Administration and Operating and not in Projects						

Notice of Funding Availability (NOFA) 2023 Federal and State Transit Funding Super Call for Planning, Administration/ Operating, Mobility Management, and Capital Projects

The Colorado Department of Transportation’s (CDOT) Division of Transit and Rail (DTR) issued the 2023 Call for Projects on July 5, 2022. The 2023 NOFA closed on September 30th, 2022, a total of 117 total applications requesting \$56.7M in state/federal funding were received. The table below illustrates the applications and funds requested. These applications are currently under review.

2023 Application Type	No.	Total Federal/State Requested
Expand existing fleet/service	6	\$1,213,654.00
FASTER/FTA Facility/Capital Equipment	11	\$25,466,478.00
Vehicle Application	25	\$11,036,029.00
FASTER Large UZA_Set Aside	2	\$2,247,268.00
5310 MM	9	\$1,543,782.00
5310 Operating (Rural)	9	\$1,391,441.00
5311 (Expanding/New Service)	8	\$2,396,883.00
5311 (Baseline funding)	35	\$9,892,140.00
5304 Planning	7	\$489,124.00
ZEV	3	\$86,400.00
Settlement Program	2	\$971,026.00
Total	117	\$56,734,225.00

Additional Transit Funding/Contracting (As of 10/30/2022)

- DTR in conjunction with CDOT Regions and TPRs will be responsible for administering approximately \$20M in MMOV Transit Funding during FY23, resulting in 25 grant agreements.
- DTR in conjunction with our Local Agency partners will be responsible for administering \$4.8M in CDS - FTA Funding during FY23, resulting in 4 grant agreements.
- DTR in conjunction with our Local Agency partners will be responsible for administering \$47.3M in 5339c Funding during FY23, resulting in 5 grant agreements.

National Transit Database Reporting for 2021

CDOT's annual report to the National Transit Database (NTD) for CY2021 was completed on July 7, 2022. The annual report package includes expenditure and asset reporting for FTA 5311 subrecipients and certain FTA 5310 small urban and rural subrecipients. In CY2021, rural transit operators provided 13,075,221 trips across Colorado.

Transit Planning and Delivery

SB228 (See attachment A)

Senate Bill 228 (SB 228) provided CDOT with \$200M in new revenue in FY 2016, \$79M in FY 2017, and \$79M in FY 2018. At least 10% (approximately \$35.8M = \$20M + \$7.9M + \$7.9M) must be dedicated to transit. The SB 228 program must be used for strategic, TC-approved projects with statewide or regional significance.

Attachment illustrates progress on projects funded with SB 228.

SB267 (See Attachment B)

The state legislature provided new transportation funding through Senate Bill 17-267 (SB 267). SB 267 provides \$192M for strategic transit capital projects over four years beginning in FY 2019. SB 267 gives authority to the Colorado Transportation Commission to designate and select projects and requires that a minimum of 25% of SB 267 funds be spent in rural counties with fewer than 50,000 residents.

Attachment B illustrates progress on projects funded with SB 267.

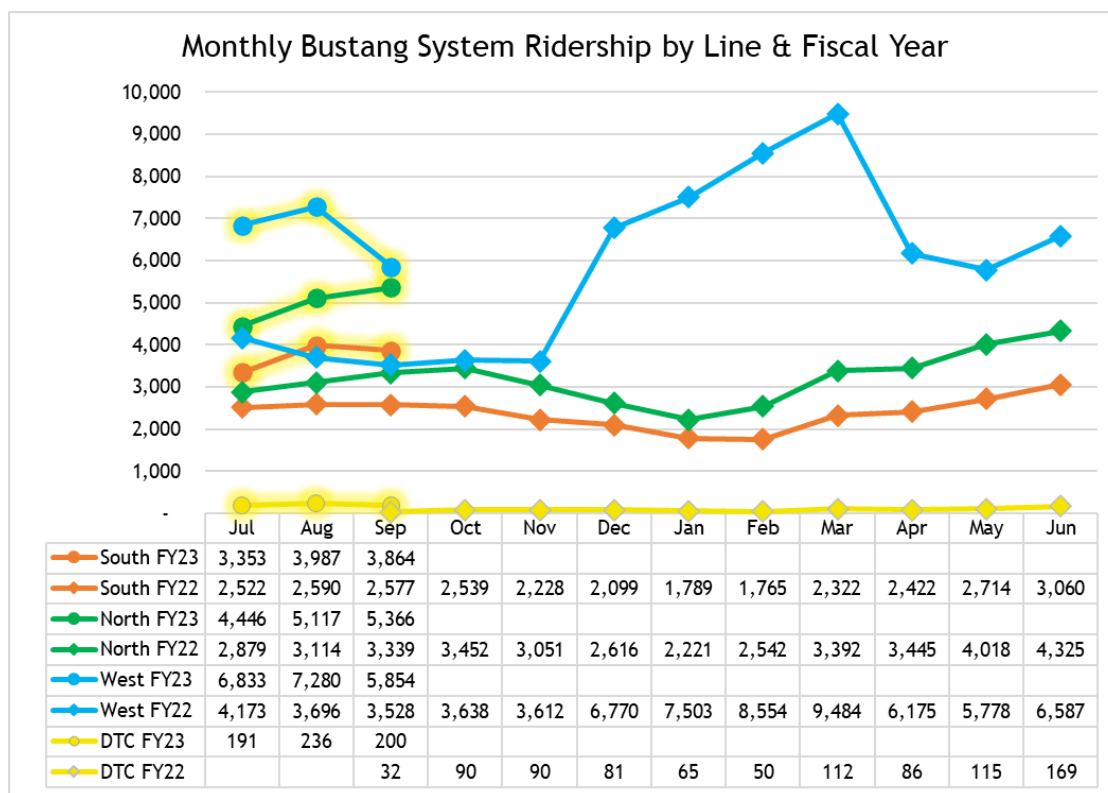
Bus Operations

The Bustang family of services comprises Bustang, Outrider and Pegasus bus services. Bustang serves the I-25 and I-70 corridors and links major transit systems together thereby offering the traveling public reliable transit service along the highest traveled corridors in the state. Bustang Outrider serves is a regional bus network designed to connect rural Colorado that is operated through partnerships with local transit providers. Pegasus is CDOT's newest service utilizing small vans to provide frequent, affordable and reliable peak period transit service.

Bustang

Ridership

Bustang core system ridership continued to improve year-over-year in the first quarter thanks to continued improvements in the COVID-19 pandemic and a 50%-off fare promotion that was offered for July and August. System-wide ridership increased by 64% over Q1 FY2022, and core system-wide load factor increased from 24% to 33%. The Q1 FY2023 farebox recovery ratio for the Bustang core system was 23%, an improvement of 21% (four percentage points) over Q1 FY2022. For a complete breakdown of the financials, please see below table.



Service expansion launched on September 6, 2022 that included additional trips on the North, South and West Lines. Presently, the expansion includes two weekday trips in each direction on the North Line and South Line, as well as an extension of one daily Denver–Avon trip to Denver–Grand Junction in each direction daily on the West Line. While the service expansion initially included an additional two weekend trips in each direction on the North Line & South Line and an additional daily trip in each direction between Denver and Grand Junction on the West Line, these routes were paused until further notice on October 13. A pause was necessary to eliminate repeated route cancellations and improve system reliability due to CDOT's contractor experiencing an unexpected coach operator shortage.

On-Time Performance

During the quarter, the Bustang system departed on-time on more than 97% of all trips. An on-time departure is defined as no earlier than scheduled departure and no more than 10 minutes later than scheduled. On-time performance for individual lines was as follows:

- West Line: 97%
- North Line: 98%
- South Line: 97%
- DTC Line: 98%

Farebox Revenue and Farebox Ratio

This first quarter Bustang experienced increases in ridership which can be attributed to the half price fare promotion as well as continued recovery from the COVID pandemic. Revenue also increased but at a lower amount due to the half price fare during July 1 through September 5, 2022. Farebox recovery ratio declined due to the half price fares, increased fuel costs and a contractually required modest increase in the fee per revenue mile.

	Q1 FY22	Q1 FY23	Difference Q1 FY23 vs. Q1 FY22	% Difference	Jul-22	Aug-22	Sep-22
Bustang System							
Revenue Riders	28,450	46,727	18,277	64%	14,823	16,620	15,284
Load Factor	24%	32%	+8 pts	33%	32%	34%	28%
Revenue	\$ 331,381	\$ 388,463	\$ 57,082	17%	\$ 104,658	\$ 122,937	\$ 160,868
Cumulative Avg. Fare	\$ 11.65	\$ 8.31	\$ (3.33)	-29%	\$ 7.06	\$ 7.40	\$ 10.53
Farebox Recovery Ratio	29%	23%	+4 pts	-20%	20%	23%	26%
South Line							
Revenue Riders	7,689	11,204	3,515	46%	3,353	3,987	3,864
Load Factor	17%	23%	+6 pts	33%	23%	25%	21%
Revenue	\$ 84,189	\$ 54,143	\$ (30,046)	-36%	\$ 14,567	\$ 17,075	\$ 22,501
Cumulative Avg. Fare	\$ 10.95	\$ 4.83	\$ (6.12)	-56%	\$ 4.34	\$ 4.28	\$ 5.82
Farebox Recovery Ratio	24%	13%	-11 pts	-46%	12%	13%	14%
North Line							
Revenue Riders	9,332	14,929	5,597	60%	4,446	5,117	5,366
Load Factor	21%	30%	+9 pts	47%	30%	33%	28%
Revenue	\$ 102,249	\$ 79,767	\$ (22,483)	-22%	\$ 21,490	\$ 25,244	\$ 33,033
Cumulative Avg. Fare	\$ 10.96	\$ 5.34	\$ (5.61)	-51%	\$ 4.83	\$ 4.93	\$ 6.16
Farebox Recovery Ratio	39%	23%	-16 pts	-40%	21%	23%	26%
West Line							
Revenue Riders	6,981	19,967	12,986	186%	6,833	7,280	5,854
Load Factor	40%	52%	+12 pts	30%	54%	58%	45%
Revenue	\$ 125,688	\$ 251,548	\$ 125,860	100%	\$ 67,771	\$ 79,608	\$ 104,170
Cumulative Avg. Fare	\$ 17.55	\$ 12.60	\$ (4.95)	-28%	\$ 9.92	\$ 10.94	\$ 17.79
Farebox Recovery Ratio	27%	30%	+3 pts	14%	26%	31%	34%
DTC							
Revenue Riders	32	627	N/A*	N/A*	191	236	200
Load Factor	2%	5%	N/A	N/A	5%	5%	5%
Revenue	\$ 347	\$ 3,005	N/A	N/A	\$ 830	\$ 1,011	\$ 1,165
Cumulative Avg. Fare	\$ 10.84	\$ 4.79	N/A	N/A	\$ 4.34	\$ 4.28	\$ 5.82
Farebox Recovery Ratio	3%	3%	N/A	N/A	3%	3%	4%

*DTC Route only operated for two weeks in Q1 FY22; year-over-year comparison not provided.

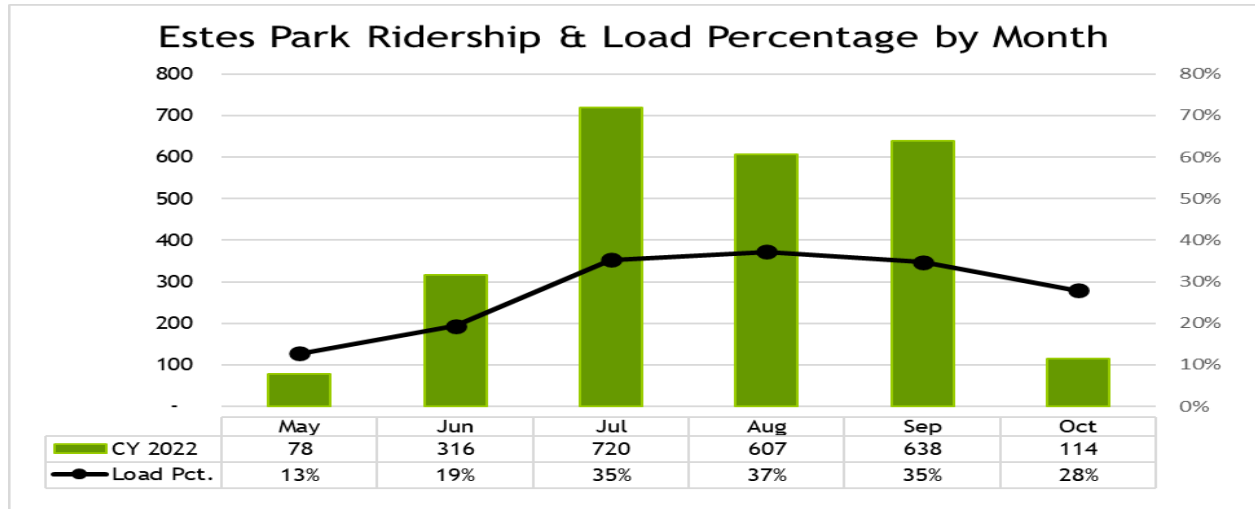
Quarterly Safety/Collisions

During the quarter, Bustang was involved in four preventable and one non-preventable collisions. This puts Bustang at a preventable collision rate of 1.24 per 100,000 operating miles. The service operator will refocus their training and collision avoidance procedures and will implement a stronger re-training and safety program with an emphasis on behind-the-wheel skills training for operators to decrease the current rate of collisions per 100,000 operating miles. Staff will closely monitor the program for compliance, successful implementation, and the reduction of preventable collisions.

<u>Date</u>	<u>Bus #</u>	<u>Line</u>	<u>Location</u>	<u>Comment</u>	<u>Preventable?</u>
7/6/2022	38002	South Line	Colorado Springs	MCO made contact with fixed object while turning	Yes
7/6/2022	38001	South Line	Colorado Springs	MCO made contact with POV who had right of way	Yes
7/7/2022	38023	West Line	I-70 & Pecos	MCO rear-ended by POV	No
7/31/2022	38009	North Line	Golden yard	MCO made contact with another MCO while backing-up	Yes
8/31/2022	38000	South Line	Golden yard	MCO made contact with POV while backing-up	Yes

Bustang Seasonal Services

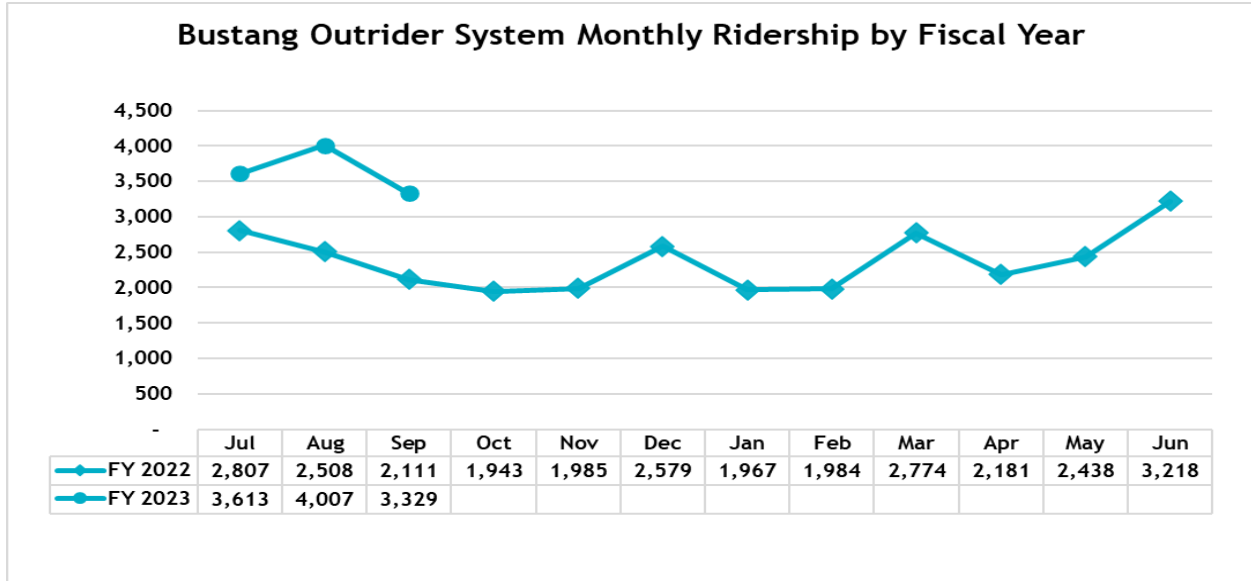
The bulk of the seasonal Bustang to Estes Park service fell within the first quarter of this fiscal year. Nearly 2,500 paying customers used the service this season, which ran on Saturdays and Sundays from Memorial Day Weekend through October 2, 2022. Bustang to Estes Park was able to drop passengers off at the Bear Lake Park & Ride within Rocky Mountain National Park for the first time thanks to a partnership with the National Parks Service. Customers' Bustang to Estes Park tickets served as their timed entry permits to the Bear Lake Road corridor, making the service an attractive option to experience Rocky's natural beauty without having to deal with the hassles of navigating the timed entry system and fighting to find parking.



Other seasonal services that resumed operation in the first quarter include the popular Bustang to Broncos service and the RamsRoute. Bustang to Broncos provides roundtrip, reserved-seat service between stops on the North & South Lines and Empower Field at Mile High for every Broncos home game. North & South Line Bustang to Broncos service averaged 93% passenger load for the first two regular season games. A pilot Bustang to Broncos service along the I-70 mountain corridor began this season, and staff continue to evaluate stop and vehicle selection during the pilot. RamsRoute provides roundtrip, reserved-seat service during the academic year between Colorado State University and Denver, and it averaged 50 percent passenger load in the first quarter.

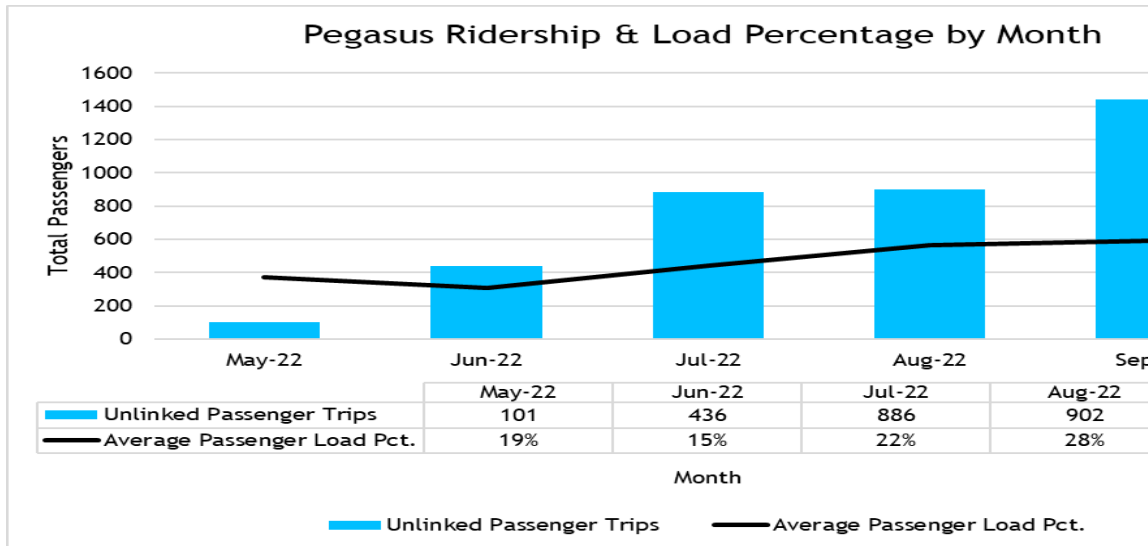
Outrider

Outrider continues to experience ridership growth as well, and passenger counts now exceed pre-COVID levels. In FY 22 Quarter 1, total passenger count was 7,426. Passenger count for FY 23 Quarter 1 is 10,949. This is an increase of 47%. Bus Operations staff is now meeting regularly with SRDA staff to support and improve their operations and vehicle maintenance program.



Pegasus

Pegasus continued to see solid ridership increases throughout the first quarter, its first full quarter of operation. Overall customer feedback remains positive, and throughout the first quarter service was timely and consistent.



Attachments

Attachment A: SB 228 Update

Attachment B: SB 267 Update

Purpose

The purpose of this memo is to provide an update on SB 228 transit projects approved for Years 1, 2, and 3 through the reporting period ending October 30, 2022.

Action

Informational only, no action required.

Background

Senate Bill 228 (SB 228) provided CDOT with \$200M in new revenue in FY 2016, \$79M in FY 2017, and \$79M in FY 2018. At least 10% (approximately \$35.8M = \$20M + \$7.9M + \$7.9M) must be dedicated to transit. The SB 228 program must be used for strategic, TC-approved projects with statewide or regional significance.

In August 2016, the Transportation Commission approved \$20M in commitments toward a list consisting mainly of Park-n-Ride investments around the state, and bus purchases for rural regional services now branded as “Bustang Outrider”. Two of the earlier projects were withdrawn, and the funds were reprogrammed.

In November 2017, the Commission approved \$9.9M in projects which consisted of bus purchases, match for rail improvements, and funds for local agency capital purchases (\$7.9M Year 2 funds, +\$2.0M re-programmed from Year 1 funds). In August 2018, the Commission approved \$10.9M in projects which consisted of bus purchases, local agency capital purchases, and Park-n-Ride investments.

In March 2019, the Transportation Commission committed the final \$2.5M in funds to the Bustang Fleet replacement fund.

Details

SB 228 Project Update

The following table provides a brief description of each project and its current status. A more detailed schedule is included as an attachment.

SB 228 YEAR 1		
Project	Description	Status
Program and Construction Management (\$2.0 M)	Consultant assistance for project development and program/construction management for the SB 228 transit projects.	COMPLETED
Winter Park Express Platform (\$1.5 M)	Project to construct the Winter Park Express platform and related railroad improvements. CDOT partnered with Winter Park Resort, Amtrak and the UP.	COMPLETED
Bus Purchases (\$2.5 M)	Purchase of branded over-the-road coaches for Outrider.	COMPLETED
Centerra-Loveland Mobility Hub (\$5.0 M)	Part of a much larger project to build managed lanes from Loveland to Ft. Collins. Includes a center median Bustang station and a new Park-n-Ride at Kendall Parkway and I-25. The station is now known as the Centerra-Loveland Mobility Hub.	Construction in progress. Anticipated completion Fall 2023.
Woodmen Road Park-n-Ride Replacement (\$3.0 M)	Relocation and construction of the primary Bustang bus stop and Park-n-Ride in Colorado Springs.	PLANNING Project was moved to program year FY24. Individual Task Order issued to AECOM to provide design development.
San Miguel County Park-n-Ride (\$1.5 M)	Design and construction of a new Park-n-Ride outside of Telluride that will serve local and regional transit services.	COMPLETED

SB 228 YEAR 1		
Frisco Transit Center - Phase 1 (\$2.5 M)	Rehabilitation and expansion of a transit center in Frisco which serves local routes, Bustang, Greyhound, and private car rental businesses.	COMPLETED
Rifle Park-n-Ride (\$2.0 M)	Relocation and expansion of a Park-n-Ride to better serve local and regional transit, and future Bustang service.	WITHDRAWN City officials encountered obstacles in working with the property owner of the preferred site and providing funds for off-site improvements associated with the Park-n-Ride. The funds were re-programmed for Year 2 projects.

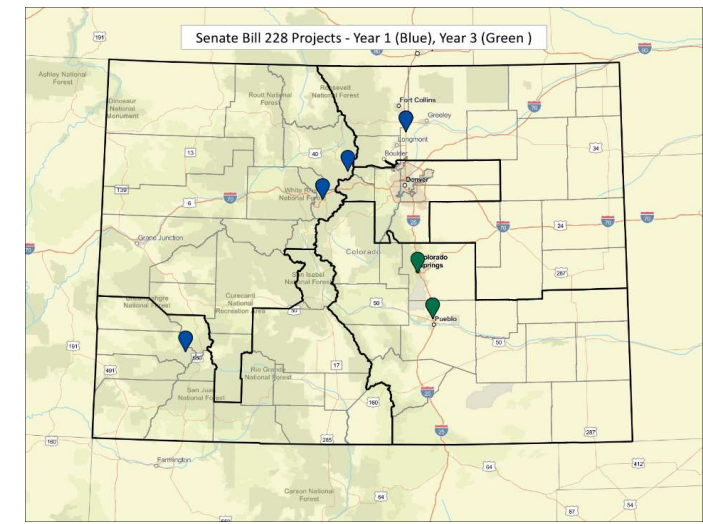
SB 228 YEAR 2		
Project	Description	Status
Bus Purchases (\$2.4 M)	Four coaches to expand Bustang service to Grand Junction and meet system demand in other parts of the state.	COMPLETED
TIGER 9 Match (\$1.0 M)	CDOT portion of local matching funds for TIGER 9 Southwest Chief for route restoration and repair.	The TIGER 9 application was successful. The FRA agreement was executed in August. Most of the rail re-lay work in Colorado and Kansas was complete by October, with switches and crossings still to go. New Mexico segment starts at a later date.
Local Agency State of Good Repair (\$6.5 M)	Funds available for local transit agency capital needs (bus replacements, transit stops, etc.).	To date, \$5.8 M has been awarded to local capital projects. Additional awards planned for Years 4 and 5 of the Local Agency State of Good Repair program.

SB 228 YEAR 3		
Project	Description	Status
Bus Purchases (\$3.2 M)	Five coaches to expand Bustang service. Two for the Bustang West line, one for the Bustang North line, and two in support of the South I-25 Gap Project.	COMPLETED
Local Agency State of Good Repair (\$3.5 M)	Funds available for local transit agency capital needs (bus replacements, transit stops, etc.). Funds will be drawn down over a two-year period.	To date, \$5.8 M has been awarded to local capital projects. Additional awards planned for Years 4 and 5.
Pueblo Mobility Hub - Design (\$0.5 M)	A Park-n-Ride in North Pueblo to accommodate intercity, regional, and local transit services.	Site analysis, public outreach and equity analysis being performed. Preliminary design in progress.
Tejon Park-n-Ride (\$0.5 M)	Minor improvements to CDOT owned Park-n-Ride to better accommodate intercity and local transit services.	COMPLETED
Bustang Fleet Replacement Fund (\$2.5 M)	Funds Bus Replacement budget for approximately 2 years.	TC approved funding in May 2019. Money was deposited into the bus replacement fund.
Program and Construction Management (\$0.7 M)	Consultant assistance for project development and program/construction management for the Front Range Passenger Rail effort.	COMPLETED

Strategic Transit Projects (SB 228) - Transit Program Roadmap

Senate Bill 09-228 (SB-228) provided \$35.8M for transit projects starting in Fiscal Year 2015-16.

This program roadmap allows the Division of Transit and Rail to see remaining key dependencies between major milestones, communicate the linkage between the strategy and the planned prioritized work, and provide a high-level view of upcoming milestones and decision points. Project locations are displayed on the project map to the right.

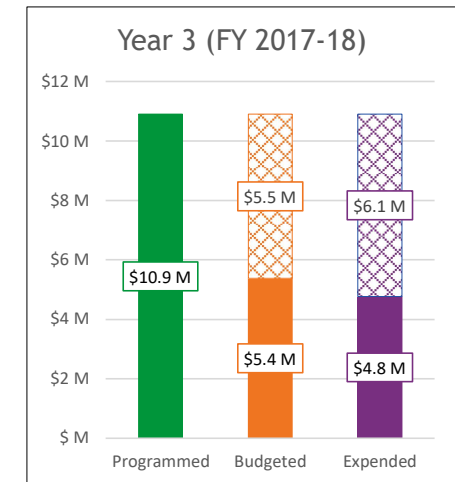
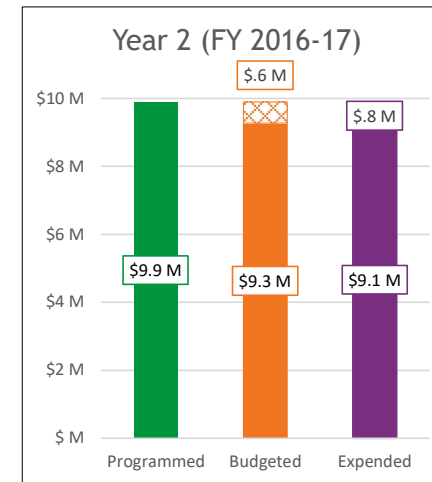
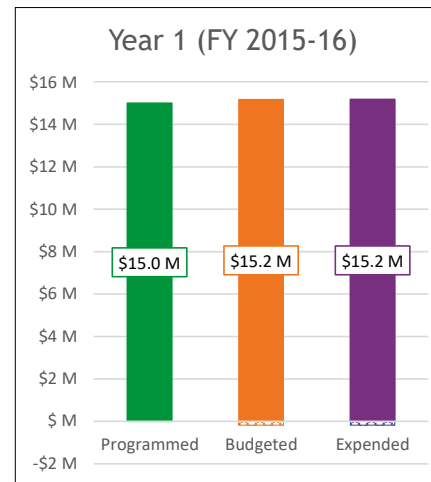


Senate Bill 228: Year 1 Allocation (\$22.5M Total, \$9.8M Complete)																		
Programmed	Project Description	Region	2022				2023				2024				2025			
			Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
\$2.0 M	Program and Construction Management (SB 228 and SB 267)	All	COMPLETED															
\$1.5 M	Winter Park Express Platform	3	COMPLETED															
\$2.5 M	Bus Purchases	Various	COMPLETED															
\$6.5 M	Centerra-Loveland Mobility Hub	4	[Gantt chart showing project progress from 2022 to 2025]															
\$6.0 M	Woodmen Road Park-n-Ride Replacement	2	[Gantt chart showing project progress from 2022 to 2025]															
\$1.5 M	San Miguel County Park-n-Ride	5	COMPLETED															
\$2.5 M	Frisco Transit Center - Phase 1	3	COMPLETED															
\$0.0 M	Rifle Park-n-Ride	3	WITHDRAWN															

Senate Bill 228: Year 2 Allocation (\$9.9M Total, \$6.5M Complete) *Includes \$7.9M from Year 2 plus \$2.0M from Year 1																		
Programmed	Project Description	Region	2021				2022				2023				2024			
			Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
\$2.4 M	Bustang Capital Needs	Various	COMPLETED															
\$1.0 M	TIGER 9 Match	2	IN PROGRESS															
\$6.5 M	Local Agency State of Good Repair	Various	IN PROGRESS															

Senate Bill 228: Year 3 Allocation (\$10.9M Total, \$3.5M Complete) *Includes \$7.9M from Year 3 plus \$3.6M from Year 1																		
Programmed	Project Description	Region	2021				2022				2023				2024			
			Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
\$3.2 M	Bus Purchases	Various	COMPLETED															
\$3.5 M	Local Agency State of Good Repair	Various	IN PROGRESS															
\$0.5 M	North Pueblo Mobility Hub	2	[Gantt chart showing project progress from 2022 to 2025]															
\$0.5 M	Tejon Park-n-Ride	2	COMPLETED															
\$2.5 M	Bustang Fleet Replacement Fund	Various	IN PROGRESS															
\$0.7 M	Program and Construction Management (Front Range Passenger Rail)	All	COMPLETED															

Legend	
[Red Box]	Planning
[Green Box]	Design / Environmental Clearance / ROW Acquisition
[Blue Box]	Procurement
[Orange Box]	Construction / Delivery
[Purple Box]	Cash Contribution
[Hatched Box]	Program Management Activities
[Yellow Box]	Quarterly TC Meeting Report
[Green Box with X]	Bar Charts: Unprogrammed
[Orange Box with X]	Bar Charts: Unbudgeted
[Purple Box with X]	Bar Charts: Unexpended



Attachment B: SB 267 Status Update FY23 Q1

Purpose

The purpose of this memo is to provide an update on SB 267 transit projects approved for Years 1-4 through the reporting period ending October 30, 2022.

Action

Informational only, no action required.

Background

The state legislature provided new transportation funding through Senate Bill 17-267 (SB 267). SB 267 provides \$192M for strategic transit capital projects over four years beginning in FY 2019. SB 267 gives authority to the Colorado Transportation Commission to designate and select projects and requires that a minimum of 25% of SB 267 funds be spent in rural counties with fewer than 50,000 residents.

The strategic transit project portfolio, including project type, location, match requirements, etc., and the project selection criteria and ratings, were presented to the Transit and Rail Advisory Committee, the Statewide Transportation Advisory Committee, and the Transportation Commission in 2019. The Transit and Rail Advisory Committee and Transportation Commission also provided guidance on the project portfolio composition, favoring a mix of CDOT and partner capital projects, while still providing enough funding through the Capital Call for local agencies to make strategic investments to their transit infrastructure.

A list of proposed strategic transit projects covering Years 1 through 4 was presented to the Statewide Transportation Advisory Committee, the Transit and Rail Advisory Committee and the Transportation Commission in October and November 2019. This list included several previously approved projects, proposed CDOT and partner transit facility projects (50% match required), and allocations for remaining funds to be distributed to local agencies through upcoming Capital Calls (20% match required). On December 19, 2019, the Transportation Commission approved the complete SB 267 Transit Program for Years 1-4, totaling \$192M.

Senate Bill 267 provides four years of funding totaling \$210M for strategic transit investments, however, the funding is approved on a year-by-year basis. Through Q1 2019, Year 1 funds totaling \$42M had been received. Year 2 funds of \$50M were received at the end of Q2 2020, increasing available funding to \$92M. The bond sale in Year 2 garnered an extra \$6.0 M for the Transit program which brought the funding total to \$98M. Year 3 funds of \$50M were received in Q2 2021. The bond sale in Year 3 garnered an extra \$12.0M for the Transit program which brought the funding total to \$160.0M.

Funding for Year 4, an additional \$47M, was approved by the transportation commission in September of 2022 which brought the total transit program funding to \$207M. Additional information regarding this projects will be included in the next report.

Details

CDOT's Region and Division staff, as well as partner and local agency staff, will continue to advance the approved SB 267 projects. Progress resulting from this collaborative effort will be reported to the Transit & Rail Advisory Committee and the Transportation Commission throughout the duration of the program. The following table provides updates on individual SB 267 transit projects through June 30, 2022:

SB 267 YEAR 1		
Project	Description	Status
Bijou Street Storage & Maintenance Facility (\$3.00 M)	Design and construction of a new 10-bay Bustang facility located at the Region 2 Vehicle Storage Facility in central Colorado Springs.	COMPLETED
Cripple Creek Admin & Operations Facility Design (\$0.12 M)	Design of a new administrative/ operations facility that will provide a space for the transit division.	COMPLETED

Attachment B: SB 267 Status Update FY23 Q1

SB 267 YEAR 1		
Project	Description	Status
Prowers County Bus Barn & Office Extension (\$0.11 M)	Construction of office space extension on existing bus storage facility.	In construction.
Southwest Chief Thru-car Study - CRISI Grant Match (\$0.05 M)	CDOT portion to fund study to offer thru-car service on Southwest Chief to Pueblo and Colorado Springs. Total match money & grant totals \$450M.	COMPLETED
Frisco Transit Center - Phase 2 (\$3.44 M)	Construction of Phase 2 of the Frisco Transit Center. Serves Summit County's service to Leadville, Fairplay, Breckenridge, and Keystone.	COMPLETED
RFTA Glenwood Maintenance Facility - Phase 3/7 (\$2.98 M)	Site work incl. building and foundation demolition, roadway realignment, earthmoving, and retaining walls construction. Scope revisions pending.	Construction is expected to begin Summer 2022 and complete in Spring 2024.
Winter Park Transit Maintenance Facility - Phase 1 (Design) (\$0.20 M)	Phase 1 - Design of a new transit storage, maintenance, and admin facility located in a rural area.	COMPLETED
Winter Park Transit Maintenance Facility - Phase 2 (\$2.60 M)	Phase 2 - Construction of a new transit storage, maintenance, and administration facility located in a rural area.	In Construction
Arterial Transit and Bike/Pedestrian Improvements on I-70 Business/US 6 Corridor (\$1.5 M)	Arterial Transit & Bike/Ped Improvements combined with highway improvements.	Preliminary design in progress.
RFTA Aspen Maintenance Facility Improvement - Phase 9 (\$1.00 M)	Replacement of existing underground fuel tanks with new, double-walled tanks and monitoring systems, to reduce the risk of leak or spill.	COMPLETED
Summit County Transit Operations Center (Design) (\$0.43 M)	Design of a larger, upgraded facility necessary to accommodate all Summit Stage buses, support vehicles and offices.	COMPLETED
Firestone-Longmont - Phase 1 (\$6.72 M)	Design of interim configuration to expand the existing Park-n-Ride from 116 existing spaces to around 280 proposed spaces. Serves Bustang to Fort Collins and Denver.	Project expected to be put out to advertisement September 2022.
Firestone-Longmont Mobility Hub (\$2.50 M)	Land purchase, design and construction for ultimate center-median configuration to be constructed as part of North I-25 Segment 4.	Project expected to be put out to advertisement September 2022.
Centerra-Loveland Mobility Hub (\$6.0 M)	Construction of center median Bustang station and Park-n-Ride. Part of Region 4 I-25 Segment 7 Managed Lanes project.	Construction in progress. Anticipated completion in Spring 2024.
Berthoud Mobility Hub (\$5.00 M)	Design and initial construction for ultimate center-loading express Bustang station constructed as part of North I-25 Segment 6.	Construction in progress. Anticipated completion in late Fall 2023.
SH 119 BRT (\$2.0 M)	Contribution in support of RTD's FasTracks commitment to provide BRT between Boulder and Longmont.	Design in progress.

Attachment B: SB 267 Status Update FY23 Q1

SB 267 YEAR 1		
Project	Description	Status
Poncha Springs Crossroads Welcome Center Improvements (\$0.00M)	Expansion and renovation of existing parking and transit facility adjacent to existing visitor center. At intersection of US 285 & US 50.	Project has been withdrawn.
SMART Administrative & Maintenance Facility (\$1.86M)	Purchase of Existing Real Property including buildings.	COMPLETED

SB 267 YEAR 2		
Project	Description	Status
Revitalizing Main Streets Program (\$26.00 M)	Contribution for design and construction of BRT elements. Total funding offered is \$77.50 M (includes highway \$).	Region 1 to manage this project. Awards have been made for full or partial funding of 30 projects located in 9 jurisdictions.
Burnham Yard - CRISI Grant Match (\$15.00 M)	Match toward CDOT purchase of decommissioned rail yard from UP to move consolidated main line eastward to accommodate various highway and rail expansion projects.	COMPLETED
Lone Tree Mobility Hub (\$2.00 M)	Site selection, design, and construction of a new transit station Lone Tree.	Preliminary design complete. Project was awarded an additional \$8M from DRCOG. \$20M project can proceed once Charles Schwab parcel deal is worked out.
Bustang Fleet Purchases (Region 1) (\$0.63 M)	Fleet purchases to support service at Castle Rock and/or Lone Tree.	Project has been approved by TC.
Idaho Springs Park-n-Ride (\$0.30 M)	Expanded Park-n-Ride with interchange improvements and slip ramps on I-70.	Preliminary design in progress. Multiple scenarios were presented to the town council. Funding remains an issue.
Colorado Springs Transit Center (\$3.50 M)	Contribution to the construction of a new Downtown Transit Center at the northeast corner of Nevada Ave & Pikes Peak Ave that serves as a hub for Mountain Metro Transit local bus operations; Bustang and Greyhound intercity bus operations; taxis and TNCs; bikeshare; and pedestrians. Includes City-owned public parking & private residential, commercial and office development on upper floors.	Preliminary design in progress.
North Pueblo Mobility Hub (\$6.0 M)	ROW purchase, design and construction of new mobility hub in Pueblo with 100 spaces.	MHAP delivered to Region 2. ROW acquisition and design to proceed after ROW acquisition is complete.
South Central Storage and Maintenance Facility (\$0.20 M)	Land purchase, design and construction of new bus storage and maintenance facility for Trinidad would house SCCOG Transit and Phase 3 Outrider from Trinidad to Pueblo.	Preliminary design in progress. Hoping to have an OLA (outlined agreement) in place by Fall 2022.
Gunnison Valley RTA Storage Facility (\$1.70 M)	Design of new bus storage facility in Crested Butte for Mountain Express, GVRTA, and Bustang storage.	In construction.

Attachment B: SB 267 Status Update FY23 Q1

SB 267 YEAR 2		
Project	Description	Status
Montrose Multimodal Transit Center (All Points Transit) (\$3.235 M)	Design and construction of a new multimodal transit center in Montrose for All Points Transit. Will also accommodate San Miguel Authority for Regional Transportation, and Outrider.	RFP for design is being prepared. New 5339b is expected to be submitted with the Spring call. Total estimate is \$12.5M.
Grand Junction Mobility Hub (\$0.08 M)	Grant application, design, and construction of a new mobility hub in downtown Grand Junction.	Preliminary design in progress.
Western Slope Storage and Maintenance Facility (\$0.00 M)	Land purchase, design, and construction of new Bustang storage and maintenance facility near Montrose.	WITHDRAWN
Bustang Fleet Purchases (Region 4) (\$1.25 M)	Fleet purchases to support service at Firestone-Longmont Mobility Hub.	Project has been approved by TC.
Estes Park Transit Improvements (\$1.03 M)	Visitors Center/Transit Center Parking at US 36 & US 34.	Title VI approved. Site has been selected. Town of Estes Park has multiple staffing needs that are hindering progress.
Firestone-Longmont - Phase 1 (Design) (\$0.10 M)	See description in Year 1 list.	See status in Year 1 list.
Durango Transit Capital Improvements (\$2.00 M)	Upgrade transit stops along US 550 to include ADA-compliant curb ramps, sidewalk cross slopes, and landings.	RFP for design to be issued Summer 2022.
Pagosa Springs/Archuleta Multimodal Facility (\$1.08 M)	This new facility will be ADA compliant, open to the public and store vehicles under shelter.	RFP for construction expected November 2022.
Buena Vista Park-n-Ride and Intermodal Facility (\$0.60 M)	Park-n-Ride and Intermodal Facility in Buena Vista (Gunnison-Denver Outrider Route).	Scoping in progress.
Bustang Outrider Improvements (\$2.97M)	Stops, shelters and minor roadway/sidewalk upgrades at numerous locations throughout Colorado.	Design standards have been developed. Scope development and refinement of each location is in progress.

SB 267 YEAR 3		
Project	Description	Status
Lone Tree Mobility Hub (\$8.00 M)	See description in Year 2 list.	See status in Year 2 list.
Idaho Springs Mobility Hub (\$4.10 M)	See description in Year 2 list.	See status in Year 2 list.
Bustang Fleet Purchases (Region 1) (\$3.80 M)	See description in Year 2 list.	See status in Year 2 list.
I-25 and SH 7 Interchange Mobility Hub (\$14.0 M)	Design and construction of slip ramps and a park-n-ride at the I-25 and SH 7 intersection.	Design consultant selected and project kickoff held July 2022.
Bustang Heavy Maintenance Facility (\$0.50 M)	Design and construction of heavy maintenance equipment facility shared by Bustang and Region 1's maintenance fleet.	Planning in progress. Property needs to be found to host facility.

Attachment B: SB 267 Status Update FY23 Q1

SB 267 YEAR 3		
Project	Description	Status
Castle Rock Mobility Hub (Design) (\$10.77 M)	Site selection, design, and construction of a new transit station near Castle Rock.	Site selection exercise to be re-performed under individual Task Order. Stakeholder meeting with Town of Caslte Rock set for early August 2022.
I-70 Bustang Pegasus Park-n-Rides (\$2.0M)	Construction of interim Park-n-Rides as part of the upcoming Floyd Hill improvements and service planning for Bustang Pegasus routes along I-70	El Rancho site has been selected. RFP for design expected August 2023.
North Pueblo Mobility Hub (\$4.90 M)	See description in Year 2 list.	See status in Year 2 list.
Pueblo Administrative and Maintenance Facility (\$2.18M)	Relocate and construct a facility for Pueblo Transit, with parking available for use by Bustang/Outrider. Match funds to leverage FTA 5339 funds.	City applied for 5339(b) funds but was not approved. Project needs approximately \$18M more in funding.
South Central Storage and Maintenance Facility (2.43M?)	See description in Year 2 list.	See status in Year 2 list.
Colorado Springs Transit Center (\$2.50 M)	See description in Year 2 list.	See status in Year 2 list.
Bustang Fleet Purchases (Region 2) (\$1.25 M)	Fleet purchases to support service at North Pueblo	Project has been approved by TC.
Southwest Chief Track Improvements - BUILD Grant Match (\$1.0 M)	CDOT portion of Southwest Chief track improvements - Rail replacement, turnouts and grade crossing replacements on La Junta Subdivision between Kansas and Colorado.	Project is nearly complete.
Woodmen Road Mobility Hub (\$6.0 M)	Expansion and/or relocation of Woodmen Road Bustang stop and mobility hub in Colorado Springs.	Scoping in progress. Project will have individual Task Order with AECOM.
Fairplay Mobility Hub (\$4.0 M)	Design and construction of new mobility hub and parking facility to connect Outrider routes along US-285. This location will serve Summit Stage in the future.	Scoping in progress. Next steps are for stakeholder meeting with town. Project will have individual Task Order with AECOM.
Monument Park-n-Ride (Preconstruction) (\$0.50 M)	Design and construction of ADA improvements at Monument Park-n-Ride/Mobility Hub.	Scoping in progress.
Snowmass Transit Center (\$4.50 M)	New transit center at the central ski mountain area. This new facility will replace two transit centers built in 1969 and 1987, and will include approximately 150 parking spaces, on-route chargers for RFTA buses, and electric vehicle chargers for the public.	Project is over budget. Town received 5339(b) funding. \$3M gap in budget vs. estimate. Value engineering and scope reduction exercises are taking place.
Montrose Multimodal Transit Center (All Points Transit) (\$2.99 M)	See description in Year 2 list.	See status in Year 2 list.
Gunnison Valley RTA Storage Facility (\$0.90 M)	See description in Year 2 list.	See status in Year 2 list.

Attachment B: SB 267 Status Update FY23 Q1

SB 267 YEAR 3		
Project	Description	Status
Grand Junction Mobility Hub (\$0.50 M)	See description in Year 2 list.	See status in Year 2 list.
Region 3 Outrider Storage in Montrose (\$0.50 M)	Storage for 2 to 4 Outrider buses in Region 3 Maintenance Yard.	Withdrawn.
Firestone-Longmont Mobility Hub Access Improvements (\$2.00 M)	Design and construction of a full movement intersection to allow for left turns out of the park-n-ride.	These funds were intended to cover the new signal but are now going to cover the budget overrun.
Firestone-Longmont - Phase 2 (ROW) (\$1.0M)	See description in Year 1 list.	See status in Year 1 list.
Berthoud Mobility Hub (\$1.00 M)	See description in Year 1 list.	See status in Year 1 list.
Bustang Fleet Purchases (Region 4) (\$1.25 M)	See description in Year 2 list.	See status in Year 2 list.
Centerra-Loveland Mobility Hub (\$0.50 M)	See description in Year 1 list.	See status in Year 1 list.
Harmony Road Park-n-Ride Expansion (Preconstruction) (\$0.50 M)	Design to expand the existing Park-n-Ride at I-25 and Harmony in Fort Collins.	Scoping in progress. Project will be handled with an individual Task Order with AECOM.
Salida Transit Capital Improvements (\$0.48 M)	Design and construction of two bus stops, a protected pedestrian crossing, and pedestrian/ADA walkways along US 50 in Salida.	City has contract with a consultant to produce a preliminary design.
Buena Vista Park-n-Ride and Intermodal Facility (\$0.44 M)	See description in Year 2 list.	See status in Year 2 list.
Poncha Springs Outrider Improvements (\$0.08 M)	Outrider stop improvements at Poncha Springs.	Project has been approved by TC.
Bustang Outrider Improvements (\$0.48 M)	See description in Year 2 list.	See status in Year 2 list.

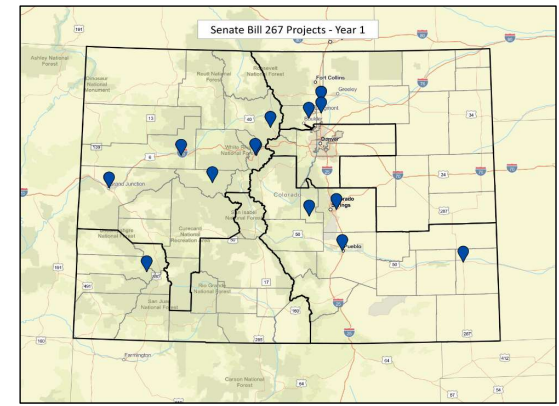
Next Steps

The Division of Transit and Rail will continue to work on preconstruction activities as well as participate in project meetings through construction and provide quarterly updates to the Transit and Rail Advisory Committee and the Transportation Commission.

Strategic Transit Projects (SB 267) - Transit Program Roadmap

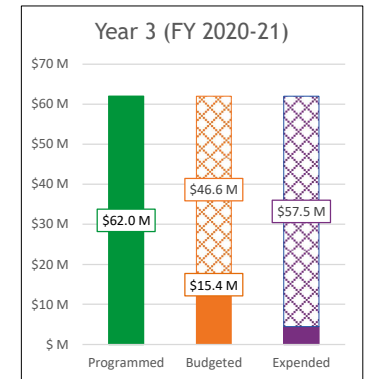
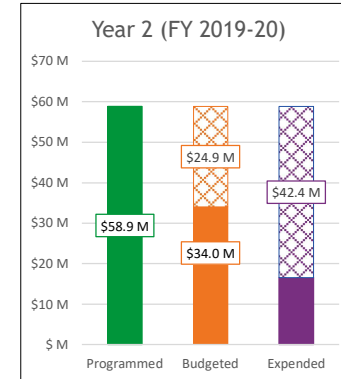
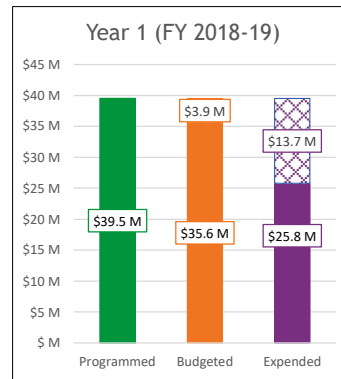
Senate Bill 17-267 (SB-267) provided up to \$188 M for transit projects starting in Fiscal Year 2018-19, with an additional \$10M to date from bond sale proceeds. As of this report, the first three fiscal years (\$148 M) have been released.

This program roadmap allows the Division of Transit and Rail to see remaining key dependencies between major milestones, communicate the linkage between the strategy and the planned prioritized work, and provide a high-level view of upcoming milestones and decision points. Project locations are displayed on the Year 1, 2 or 3 map to the right.



Programmed	Project Description	Region	2022				2023				2024				2025			
			Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
\$3.00 M	Bijou Street Storage and Maintenance Facility	2	COMPLETED															
\$0.12 M	Cripple Creek Administration and Operations Facility (Design)	2	COMPLETED															
\$0.11 M	Prowers County Bus Barn Office Extension	2																
\$0.05 M	Southwest Chief Thru-Car Study - CRISI Grant Match	2	COMPLETED															
\$3.44 M	Frisco Transit Center - Phase 2	3																
\$2.98 M	RFTA Glenwood Maintenance Facility - Phase 3/7	3																
\$0.20 M	Winter Park Transit Maintenance Facility - Phase 1	3	COMPLETED															
\$2.60 M	Winter Park Transit Maintenance Facility - Phase 2	3																
\$1.50 M	Arterial Transit and Bike/Pedestrian Improvements on I-70 Bus./US 6 Corridor	3																
\$1.00 M	RFTA Aspen Maintenance Facility Improvement - Phase 9	3	COMPLETED															
\$0.43 M	Summit County Transit Operations Center Design and Engineering	3	COMPLETED															
\$25.08 M	Firestone-Longmont Mobility Hub	4																
\$6.00 M	Centerra-Loveland Mobility Hub	4																
\$5.00 M	Berthoud Mobility Hub	4																
\$2.00 M	SH 119 BRT	4																
\$0.00 M	Poncha Springs Crossroads Welcome Center Improvements	5	WITHDRAWN															
\$1.86 M	SMART Purchase of Existing Real Property for Admin & Maintenance Facility	5	COMPLETED															

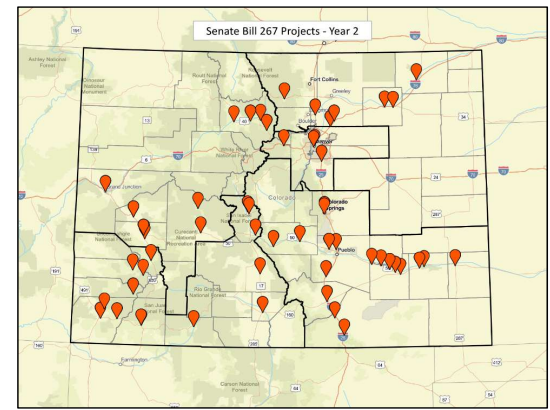
Legend	
	Planning
	Design / Environmental Clearance / ROW Acquisition
	Procurement
	Construction / Delivery
	Cash Contribution
	Program Management Activities
	Quarterly TC Meeting Report
	Bar Charts: Unprogrammed
	Bar Charts: Unbudgeted
	Bar Charts: Unexpended



Strategic Transit Projects (SB 267) - Transit Program Roadmap

Senate Bill 17-267 (SB-267) provided up to \$188 M for transit projects starting in Fiscal Year 2018-19, with an additional \$10M to date from bond sale proceeds. As of this report, the first three fiscal years (\$148 M) have been released.

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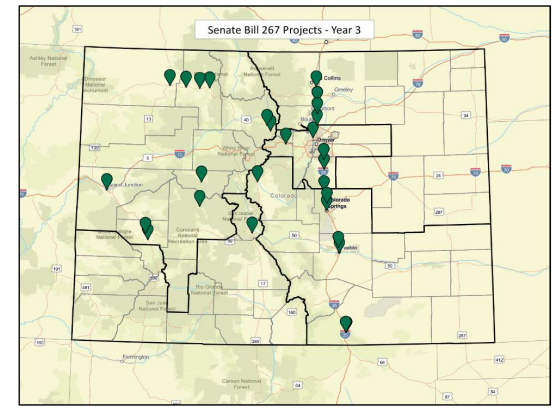


Senate Bill 267: Year 2 Allocation																		
Programmed	Project Description	Region	2022				2023				2024				2025			
			Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
\$26.00 M	Revitalizing Main Streets Program	1	IN PROGRESS															
\$15.00 M	Burnham Yard - CRISI Grant Match	1	COMPLETED															
\$2.00 M	Lone Tree Mobility Hub	1	[Gantt chart bars]															
\$0.63 M	Bustang Fleet Purchases (Region 1)	1	[Gantt chart bars]															
\$0.30 M	Idaho Springs Mobility Hub	1	[Gantt chart bars]															
\$8.00 M	Colorado Springs Transit Center	2	[Gantt chart bars]															
\$6.00 M	North Pueblo Mobility Hub	2	[Gantt chart bars]															
\$0.60 M	Outrider Improvements at Lamar, Fort Lyon, Las Animas, La Junta, Swink, Rocky Ford, Wagonwheel, and Fowler	2	[Gantt chart bars]															
\$0.20 M	South Central Storage and Maintenance Facility	2	[Gantt chart bars]															
\$0.20 M	Outrider Improvements at Colorado City Corners, Walsenburg and Aguilar	2	[Gantt chart bars]															
\$0.16 M	Outrider Improvements at Canon City and Cotopaxi	2	[Gantt chart bars]															
\$0.08 M	Outrider Improvements at Pueblo West	2	[Gantt chart bars]															
\$0.08 M	Outrider Improvements at Tejon Park-n-Ride	2	[Gantt chart bars]															
\$0.80 M	Gunnison Valley RTA Storage Facility (Design)	3	COMPLETED															
\$0.30 M	Outrider Improvements at Fraser, Granby, Kremmling and Hot Sulphur Springs	3	[Gantt chart bars]															
\$0.25 M	Outrider Improvements at Montrose, Delta and Gunnison	3	[Gantt chart bars]															
\$0.25 M	Montrose Multimodal Transit Center (All Points Transit)	3	[Gantt chart bars]															
\$0.08 M	Grand Junction Mobility Hub	3	[Gantt chart bars]															
\$1.25 M	Bustang Fleet Purchases (Region 4)	4	[Gantt chart bars]															
\$1.03 M	Estes Park Transit Improvements	4	[Gantt chart bars]															
\$0.24 M	Outrider Improvements at Brush, Fort Morgan and Hudson	4	[Gantt chart bars]															
\$0.10 M	Firestone-Longmont Mobility Hub Phase 1 (Design)	4	COMPLETED															
\$0.08 M	Outrider Improvements at Sterling	4	[Gantt chart bars]															
\$0.08 M	Outrider Improvements at Lochbuie	4	[Gantt chart bars]															
\$2.00 M	Durango Transit Capital Improvements	5	[Gantt chart bars]															
\$1.08 M	Pagosa Springs/Archuleta Multimodal Facility	5	[Gantt chart bars]															
\$0.60 M	Buena Vista Park-n-Ride and Intermodal Facility	5	[Gantt chart bars]															
\$0.40 M	Outrider Improvements at Durango, Mancos, Cortez, Dolores, and Rico	5	[Gantt chart bars]															
\$0.25 M	Outrider Improvements at Placerville, Ridgway and Telluride	5	[Gantt chart bars]															
\$0.25 M	Outrider Improvements at 3 locations between Alamosa and Buena Vista	5	[Gantt chart bars]															

Strategic Transit Projects (SB 267) - Transit Program Roadmap

Senate Bill 17-267 (SB-267) provided up to \$188 M for transit projects starting in Fiscal Year 2018-19, with an additional \$10M to date from bond sale proceeds. As of this report, the first three fiscal years (\$148 M) have been released.

This program roadmap allows the Division of Transit and Rail to see remaining key dependencies between major milestones, communicate the linkage between the strategy and the planned prioritized work, and provide a high-level view of upcoming milestones and decision points. Project locations are displayed on the Year 1, 2 or 3 map to the right.



Senate Bill 267: Year 3 Allocation																		
Programmed	Project Description	Region	2022				2023				2024				2025			
			Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
\$8.00 M	Lone Tree Mobility Hub	1	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$6.03 M	Idaho Springs Mobility Hub	1	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$3.80 M	Bustang Fleet Purchases (Region 1)	1	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$8.10 M	I-25 and SH 7 Interchange Mobility Hub	1	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.45 M	Bustang Heavy Maintenance Facility	1	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.30 M	Castle Rock Mobility Hub (Design)	1	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$4.00 M	El Rancho Pegasus Park-n-Ride	1	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$6.00 M	I-70 Bustang Pegasus Park-n-Rides	1	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$4.90 M	North Pueblo Mobility Hub	2	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$2.18 M	Pueblo Administrative and Maintenance Facility	2	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$2.43 M	South Central Storage and Maintenance Facility	2	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$2.50 M	Colorado Springs Transit Center	2	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$1.25 M	Bustang Fleet Purchases (Region 2)	2	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$1.00 M	Southwest Chief Track Improvements - CRISI Grant Match	2	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.60 M	Woodmen Road Mobility Hub	2	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.50 M	Fairplay Mobility Hub	2	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.10 M	Monument Park-n-Ride (Preconstruction)	2	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$4.50 M	Snowmass Transit Center	3	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$2.99 M	Montrose Multimodal Transit Center (All Points Transit)	3	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$1.90 M	Gunnison Valley RTA Storage Facility	3	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.00 M	Grand Junction Mobility Hub	3	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.50 M	Region 3 Outrider Storage in Montrose	3	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.32 M	Outrider Improvements at Steamboat Springs, Milner, Hayden and Craig	3	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.16 M	Outrider Improvements at Winter Park and Tabernash	3	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$1.00 M	Berthoud Mobility Hub	4	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$1.00 M	Firestone-Longmont Mobility Hub	4	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$2.00 M	Firestone-Longmont Mobility Hub Access Improvements	4	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$1.25 M	Bustang Fleet Purchases (Region 4)	4	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.50 M	Centerra-Loveland Mobility Hub	4	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.50 M	Harmony Road Park-n-Ride Expansion	4	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.30 M	Northern Colorado Maintenance Facility	4	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.48 M	Salida Transit Capital Improvements	5	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.44 M	Buena Vista Park-n-Ride and Intermodal Facility	5	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$0.08 M	Outrider Improvements at Poncha Springs	5	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
\$2.30 M	Program and Construction Management	All	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	



MEMORANDUM

TO: COLORADO TRANSPORTATION COMMISSION
FROM: HANNAH L. REED, FEDERAL GRANTS COORDINATOR IN OPGR
DATE: NOVEMBER 16TH, 2022
SUBJECT: UPDATE TO TRANSPORTATION COMMISSION ON SUBMITTED, IN PROGRESS, AND FORTHCOMING GRANT APPLICATIONS TO IJJA DISCRETIONARY PROGRAMS

Purpose

To share progress on submitted applications, and current and future coordination of proposals to anticipated federal discretionary programs under the Infrastructure Investment Jobs Act (IIJA).

Action

Per PD 703.0, when the department intends to apply for grants with a match consisting of previously approved funding, no action is necessary by the Commission, but we provide the Commission with the projects we intend to pursue.

If the match requires an additional commitment of funds not already approved by the Commission, or Bridge & Tunnel Enterprise (BTE), staff brings the projects to the Commission as an action item, with the additional funding being made contingent on a successful application and grant award.

Background and Details

RECENTLY SUBMITTED

The following discretionary grant programs for FY22 have already closed:

1. REBUILDING AMERICAN INFRASTRUCTURE with SUSTAINABILITY and EQUITY (RAISE)
 - Two applications were submitted by CDOT
 - MOVE: Westward Three mobility hub project in Region 3
 - **\$24.24M AWARDED!**
 - 6th & Wadsworth interchange reconstruction in Region 1
 - A third was submitted with CDOT's strong support
 - US 119 Safety and Mobility project in Region 4
2. MULTIMODAL PROJECTS DISCRETIONARY GRANT PROGRAM (MPDG)
 - Three applications were submitted by CDOT
 - Floyd Hill to Veterans Memorial Tunnels Improvements Project in Region 1
 - **\$100M AWARDED!**
 - MOVE: W3 (resubmission) in Region 3
 - US 40 Passing Lanes & Red Dirt Hill Improvements in Region 3
 - w/collaboration from Grand County
 - Three more were submitted with CDOT's strong support
 - US 50 Safety Highway Improvements for Freight and Travel (SHIFT) in Region 2
 - Submitted by Otero County
 - I-76 Phase IV Reconstruction and Repavement Project in Region 4
 - Submitted by Morgan County w/Weld County support
 - US 160 Safety and Mobility Improvement Project in Region 5
 - Submitted by La Plata County
3. 5339(b) and 5339(c): Bus and Bus Facilities and the Low or No Emission Vehicle programs, respectively

- CASTA and FHU Consulting coordinated 20 applications from 15 different entities. CDOT submitted all applications under the State DUNS/UEI
 - Only 5339b
 - Montrose Multi-Modal Transit Center in Region 5
 - Town of Estes Park Electric Trolley Facility Construction in Region 4
 - Glenwood Springs Bus Shelter Replacement Project in Region 3
 - Mountain Express Bus Storage, Maintenance, and Operations Facility in Region 3
 - Mountain Village Phase 2 Maintenance Shop Remodel in Region 5
 - RFTA 12 Diesel Buses Replaced with 10 CNG Buses and 2 Diesel Buses in Region 3
 - a. **\$5.7M AWARDED!**
 - Rifle Gateway Park-n-Ride: Relocation & Expansion in Region 3
 - a. **AWARDED via MOVE: W3**
 - SMART Vehicle Replacement and Fleet Expansion Project in Region 5
 - a. **\$2.6M AWARDED!**
 - Winter Park Transit Maintenance Facility - Phase II in Region 3
 - Only 5339c
 - ECO Transit's E-Bus Replacement Project in Region 3
 - Both
 - Breckenridge two Diesel/Hybrid bus Replacements and E-Bus Barn Rehabilitation in Region 3
 - Steamboat Springs Transit Bus Replacement and Overhaul Project in Region 3
 - a. **\$2.4M AWARDED!**
 - Summit County 100% Electric, Fleet Storage, Charging and Operation Transit Facility in Region 3
 - a. **\$34.8M AWARDED!**
 - Vail 2 Battery Electric Buses and Associated Charging Infrastructure in Region 3
 - a. **\$1.8M AWARDED!**
 - Via Mobility Services Bus Facility Replacement Supporting a Zero-Emissions Fleet Transition in Metro Denver in Region 1 & 4
4. NATIONAL SCENIC BYWAY PROGRAM (NSBP)
- DTD Colorado Byways Team received 26 project proposals from local agencies statewide. Three eligible and competitive applications were submitted by CDOT:
 - Alpine Loop and Silver Thread Facilities, Safety, and Recreation Upgrades in Regions 3 & 5
 - Scenic Highway of Legends Wayfinding and Interpretive Materials Implementation in Region 2
 - Mount Evans Collaborative Renaming, Re-signing, and Educational Emphasis in Region 1
5. TRANSIT-ORIENTED DEVELOPMENT PLANNING PROGRAM (TOD)
- CDOT supported the City of Longmont on an application for the 1st & Main Mobility Hub and TOD opportunities surrounding the site
6. BRIDGE INVESTMENT PROGRAM (BIP)
- Planning subprogram:
 - Pre-Scoping Bridge Bundle in Region 1
 - Timber Replacement in Region 3
 - Railroad Overpasses in Region 3
 - Large Bridge subprogram:
 - I-270 Critical Bridge Bundle in Region 1
 - "Other" Bridge subprogram:
 - I-76 Phase V in Region 4
 - US 160 Florida River Bridge in Region 5

- Y6 BPM in Region 5
 - 6th & Wads Interchange in Region 1
 - Resubmission
7. SAFE STREETS & ROADS FOR ALL (SS4A)
 - As a state entity, CDOT was ineligible to submit our own proposal to this opportunity, but we supported the applications of the following local partners:
 - Grand Valley MPO
 - Montrose County
 - City of Fort Collins
 - City of Glenwood Springs
 8. Enabling Middle Mile Broadband
 - CDOT submitted a \$119M proposal to build 7 new middle mile fiber corridors across the state
 - Region 3: 46 miles of fiber between Grand Junction and Delta
 - Region 2: 119 miles of fiber between Pueblo and Lamar.
 - Region 2 & 4: 119 miles of fiber Lamar to Burlington.
 - Region 4: 37 miles of fiber between Greeley and Wiggins
 - Region 4: 60 miles of fiber from Sterling to the Nebraska State Line.
 - Region 4: 5 miles of fiber between Boulder and Longmont.
 - Region 5: 115 miles of over pull fiber from South Fork to Walsenburg.
 9. RAILROAD CROSSING ELIMINATION (RCE)
 - A planning application to study the elimination of two at-grade highway-rail crossings on US 34 in Region 4
 - CDOT also provided letters of support for two local applications in Fort Collins
 10. RECONNECTING COMMUNITIES PILOT PROGRAM (RCP)
 - CDOT co-sponsored a planning proposal with Trinidad to mitigate the impacts of the I-25 viaduct that divides the City.

IN PROGRESS

CDOT is actively pursuing the following discretionary grant program(s) for FY22:

1. CONSOLIDATED RAIL INFRASTRUCTURE & SAFETY IMPROVEMENTS (CRISI)
 - Reconfiguring the rail crossing over Lasalle Rd, at the intersection of US 50 / 550 and Lasalle, as a result of constructing a new left turn lane on US 50 in Region 3
2. STRENGTHENING MOBILITY and REVOLUTIONIZING TRANSPORTATION (SMART)
 - CDOT-led ATMA proposal with MN DOT, OK DOT, and WI DOT as subrecipients
 - I-25 Coordinated and AI-based Ramp Metering System in Region 1
3. FTA's ADVANCED DRIVER ASSISTANCE SYSTEMS (ADAS)
 - Install ADAS into three of CDOT's Bustang fleet
4. THRIVING COMMUNITIES PROGRAM (TCP): Technical assistance, planning, and capacity building support to advance transportation and community revitalization activities that benefit disadvantaged populations and communities.
 - CDOT has the option to apply as an entity that provides technical assistance (i.e. a "Capacity Builder"), but can only provide these services to agencies designated by USDOT through the Thriving Communities Program. These will be small to mid-size entities from anywhere in the country and CDOT cannot use funding to provide any local support not approved by USDOT.

NEW & FORTHCOMING OPPORTUNITIES

The following discretionary programs have either recently released, or are expected to release in the near future, Notices of Funding Opportunities (NOFO). CDOT is interested in pursuing eligible and competitive projects or partnerships for each program:

1. RAISE 2023: The NOFO for the FY23 cycle of RAISE is anticipated before the end of November 2022. CDOT intends to revise and resubmit eligible project proposals that did not receive funding in FY22.

2. PROMOTING RESILIENT OPERATIONS for TRANSFORMATIVE, EFFICIENT, and COST-SAVING TRANSPORTATION (PROTECT): Funding to make existing transportation assets more resilient to extreme weather events and other natural disasters. The formula funding for this program was announced in Summer 2022; it is anticipated that the discretionary program will be announced before the end of 2022, or early in 2023.

Next Steps

SMART applications are due Nov. 18th, 2022.

ADAS applications are due Nov. 22nd, 2022.

CRISI applications are due Dec. 1st, 2022.

Quarterly Status Report

July 2022 through September 2022



PREPARED BY:



IN CONSULTATION WITH:



COLORADO
 Department of Transportation
 Statewide Bridge Enterprise

DATE: October 24, 2022

TO: Colorado Transportation Commission (TC)
Colorado Transportation Investment Office (CITO) Board of Directors (formerly the Colorado High Performance Transportation (HPTE))
Colorado Bridge and Tunnel Enterprise (BE) Board of Directors

FROM: Robert Hays, Project Director, Central 70 Project

SUBJECT: Quarterly Update

PROJECT PROGRESS

This memo summarizes the status of the Central 70 Project across the following areas:

- Status of Design and Construction
- Status of Pre-Development Budget
- Status of Community Commitments

ACTION

No actions are requested at this time. This memo is for information purposes only.

BACKGROUND

Per the Amended and Restated Central 70 Project Intra-Agency Agreement (IAA) dated September 14, 2021, the Central 70 Project Director shall provide quarterly updates to the Transportation Commission, Colorado Bridge and Tunnel Enterprise (BE) Board of Directors, and the Colorado High Performance Transportation Enterprise (HPTE) Board of Directors through Final Acceptance.

MATTERS REQUIRING POLICY INPUT

None at this time.

COMPLETED MILESTONES THIS QUARTER

July 2022 through September 2022

- Completed Denver Fire Department (DFD) commissioning of the EB I-70 Cover and received final DFD approvals for the Cover.
- I-70 eastbound (EB) traffic switch into final configuration under the EB Cover occurred the weekend of July 15.
- I-70 westbound (WB) traffic switch into final configuration the weekend of August 26. This was the final full closure of I-70 for the project.

- Completed removal/relocation of temporary Cover systems equipment and infrastructure (cross passage doors, wall panels barrier, lighting, speakers and cameras) installed to support I-70 bi-directional traffic in WB Cover
- Completed Stone Matrix Asphalt (SMA) paving for both EB and WB I-70 from Colorado to Brighton Boulevards.
- Began I-70 far east pavement overlays from I-225 to Chambers Road.
- Completed finishes for the I-70 Bridge over Brighton Boulevard.
- Continue punch list item work for all segments, including the Airport Node building.
- Continued work on the I-70 median barrier and overhead sign structures west of Colorado Boulevards.
- Continued installation of the Intelligent Transportation Systems (ITS) devices east of Sand Creek and permanent fiber optic cabling from Node 1 to the Airport Road Node building.
- Opened Swansea Elementary Playground (Planning Area 1) and turned over to Denver Public Schools for use of the facility prior to school opening August 22.
- Continued garden roof assembly waterproofing on the Cover Top.
- Continued to work on all remaining Cover Top items, including turf field, fencing, lighting, amphitheater, shade structures, and splash pad.
- Began landscaping on Cover Top and at Swansea Elementary School.
- Continued construction of East 46th Avenue South between Brighton and Colorado Boulevards, including roadway, walls, utilities, and drainage.
- Continued miscellaneous work in the Brighton East and West ponds.
- Continued working on various stormwater retention pond certifications from Brighton Boulevard to Peoria Street.
- Completed the drainage crossing under the Regional Transportation District (RTD) and Union Pacific Railroad (UPRR) tracks at Colorado Boulevard.
- Demobilized the UPRR field trailer and began site restoration.
- KMP submitted the Notice of Completion for Denver Rock Island Railroad (DRIR), BNSF and UPRR crossings on the Project.
- Completed remaining work at the Safeway property adjacent to the Colorado Boulevard on-ramp to EB I-70.
- Continued installation and testing of Express Lanes tolling infrastructure and equipment.
- Continued York pond excavation and roadway reconstruction work.
- Continue miscellaneous work on local streets and intersections between Colorado and Brighton Boulevards.
- Continue I-70 ITS device integration with the CDOT ITS group.
- Started Corrective Action Request (CAR-032) enhancements at the Pump Station.

UPCOMING MILESTONES

October 2022 through December 2022

- Achieve Milestones 5B (EB I-70 between Brighton Boulevard to Dahlia Street, UPRR Phase 6, WB I-70 SMA Paving) and 6 (Cover Top, 46th Avenue South).
- Open Cover Top Park and amenities to the public, including CCD Community Building.
- Demobilize from various construction staging yards within the project limits and complete site restoration.
- Complete final I-70 striping.
- Complete final profile grinding of I-70 pavement for smoothness.
- Begin 70-day Electronic Toll Collection (ETC) Tolling equipment burn-in.
- Open East 46th Avenue South from Brighton Boulevard to Colorado Boulevard.
- Complete Colorado and York ponds.
- Complete remaining Milestone punch list items throughout the Project.
- Continue landscaping corridor wide.
- Develop the substantial completion punch list.

LAWSUIT UPDATE

All lawsuits associated with the Project to date have been resolved.

As part of the settlement agreement with the Sierra Club plaintiffs (Sierra Club, Elyria and Swansea Neighborhood Association, Chaffee Park Neighborhood Association, and Colorado Latino Forum), CDOT funded a health study of the Elyria-Swansea neighborhoods. The Colorado Department of Public Health and Environment (CDPHE) is leading this effort on behalf of the State. CDPHE signed a contract with ENVIRONS and Colorado State University (CSU) to conduct the study in March 2022 and the study is underway. Meetings are being held monthly at the CSU Spur at the National Western Complex.

ISSUES

Milestone 1 was previously achieved by KMP on December 9, 2019. The Enterprises issued a change order to KMP to correct drainage and cross slope issues on I-70 east of I-225 and this work is nearing completion, with only minor elements remaining to complete. KMP continues to work on remaining Milestone 1 punch list items with an anticipated completion in Fall 2022.

KMP continues to work towards Milestone Completion for Milestones 5B (completion of EB I-70 between Brighton Boulevard to Dahlia Street, UPRR Phase 6, and WB I-70 SMA paving) and 6 (completion of Cover Top and 46th Avenue South). KMP continues to work on a variety of items for each Milestone and punch list development is underway. The construction of the York South Pond is driving the schedule for completion of MS5B and may impact KMP's ability to meet the MS5B completion deadline of October 28, 2022. KMP is evaluating options to accelerate this work.

The Federal Emergency Management Agency (FEMA) approval of the Letter of Map Revision (LOMR) for the Sand Creek overflow channel is currently driving the completion date for

Substantial Completion. KMP submitted the LOMR documents to the flood plain administrator (City and County of Denver) for review on September 30, 2022. Upon approval by the flood plain administrator, the documents will be sent to FEMA for review and approval. As this entire process typically takes a year, KMP and the Enterprises are working with the City and County of Denver on options to accelerate this process. The Enterprises will continue to monitor the status of the LOMR review and its impacts on the Substantial Completion deadline (February 16, 2023).

The Enterprises, KMP, and the City and County of Denver continue to work through design and submittal comments on the Cover Top from Denver Parks and Recreation (DPR) and other City entities. All parties continue to work together making progress towards resolution of these comments. The Change Order for the DPR requested modifications to the Cover Top irrigation has been executed. The Enterprises are currently negotiating pricing with KMP on changes requested by the City and County of Denver Tech Services on the Closed Circuit Television (CCTV) system for the Cover Top.

KMP continues to work with Jorgenson (the Operations and Maintenance (O&M) Contractor) on updating various management plans and submittals required for the Operating Period. The Enterprises continue to monitor and have regular discussions with KMP regarding the status of the Operating Period submittals and plans.

COVID-19 continues to be monitored by the Enterprises but has not impacted the project schedule at this time. KMP has indicated that some supply chain issues with miscellaneous project elements exist, but KMP has been able to either identify alternate suppliers or accommodate extended procurement timeframes within the project schedule to date. KMP has recently indicated that procurement of some Cover amenities such as bike racks, shade structure translucent panels, and benches are currently a challenge. The Enterprises continue to monitor this situation

Supervening Events (SE) are summarized in the table below (shading indicates the SE is closed). KMP withdrew the three remaining open SEs during this Quarter and there are no open SEs as of the date of this report.

SEN #	Description	Date Received from KMP	Type of SEN	Status
1	UPRR Agreement Delay, Request for Extension to Detailed Supervening Event Submission	04/25/2018	Comp Event	Resolved with 2 nd Amendment to the Project Agreement
2	UPRR Phase 0 Work Delay	03/23/2018	Comp Event	Resolved with 2 nd Amendment to the Project Agreement
3	UPRR Work Performance Schedule	03/23/2018	Delay Relief Event	Withdrawn by KMP

SEN #	Description	Date Received from KMP	Type of SEN	Status
4	Section 232 Steel and Aluminum Tariffs	08/13/2018	Relief Event	Resolved with 2 nd Amendment to the Project Agreement
5	Swansea Asbestos Containing Material	07/07/2018	Comp Event	Change Order was executed on 09/03/2019
6	AP-83 Asbestos Containing Material	10/10/2018	Comp Event	Withdrawn by KMP
7	Sand Creek Bridge	11/20/2018	Comp Event	Change Order was executed on 05/06/2020
8	UPRR Crossing Diaphragm Spacing	12/17/2018	Delay Relief Event	Closed. Included in 2021 Memorandum of Settlement
9	Structure E-17-FX Viaduct	12/17/2018	Comp Event	Withdrawn by KMP
10	UPRR Transverse Plate Welding	02/22/2019	Delay Relief Event	Closed. Included in 2021 Memorandum of Settlement
11	UPRR Underside Plate Welding	02/22/2019	Delay Relief Event	Closed. Included in 2021 Memorandum of Settlement
12	UPRR Drip Plates	02/22/2019	Comp and Relief Event	Withdrawn by KMP
13	UPRR Bearings	02/22/2019	Comp and Relief Event	Withdrawn by KMP
14	UPRR Impact Loading	02/22/2019	Delay Relief Event	Closed. Included in 2021 Memorandum of Settlement
15	UPRR Rebar Detailing	02/22/2019	Delay Relief Event	Closed. Included in 2021 Memorandum of Settlement
16	Severe Weather Event - Bomb Cyclone	03/27/2019	Relief Event	Withdrawn by KMP
17	UPRR Shoring	03/28/2019	Comp Event	Closed. Included in 2021 Memorandum of Settlement
18	UPRR Shoring Unexcused RR delay	03/28/2019	Delay Relief Event	Closed. Included in 2021 Memorandum of Settlement
19	AP-102 Hazardous Material	03/27/2019	Comp Event	Withdrawn by KMP
20	Reserved			Not submitted to Enterprises
21	UPRR Steel Notes	05/02/2019	Comp Event	Closed. Included in 2021 Memorandum of Settlement
22	UPRR Steel Notes Relief	05/02/2019	Delay Relief Event	Closed. Included in 2021 Memorandum of Settlement
23	Recognized Hazardous Material (RHM) 46 th and Steele Southwest Gore Asbestos	05/29/2019	Comp Event	Withdrawn by KMP

SEN #	Description	Date Received from KMP	Type of SEN	Status
24	UPRR Crossing Diaphragm Spacing	06/14/2019	Comp Event	Closed. Included in 2021 Memorandum of Settlement. Related to SE Event 8
25	UPRR Transverse Plate Welding	06/19/2019	Comp Event	Closed. Included in 2021 Memorandum of Settlement. Related to SE Event 10
26	UPRR Underside Plate Welding	06/28/2019	Comp Event	Closed. Included in 2021 Memorandum of Settlement. Related to SE Event 11.
27	Reserved			Not submitted to Enterprises
28	Reserved			Not submitted to Enterprises
29	UPRR Impact Loading	06/28/2019	Comp Event	Closed. Included in 2021 Memorandum of Settlement. Related to SE Event 14.
30	UPRR Rebar Detailing	06/28/2019	Comp Event	Closed. Included in 2021 Memorandum of Settlement. Related to SE Event 15.
31	UPRR Drainage Review	08/22/2019	Comp Event	Closed. Included in 2021 Memorandum of Settlement.
32	UPRR Drainage Review	08/22/2019	Delay Relief Event	Closed. Included in 2021 Memorandum of Settlement. Related to SE Event 31.
33	UPRR Unreasonableness	08/22/2019	Comp Event	Closed. Included in 2021 Memorandum of Settlement.
34	UPRR Unreasonableness	08/22/2019	Delay Relief Event	Closed. Included in 2021 Memorandum of Settlement. Related to SE Event 33.
35	Fire Department Review	12/26/2019	Delay Relief Event	Closed. Included in 2021 Memorandum of Settlement.
36	Fire Department Review	12/26/2019	Relief Event	Closed. Included in 2021 Memorandum of Settlement. Related to SE Event 35.
37	Discovery of Recognized Hazardous Material – Dahlia & Stapleton Asbestos-Containing Material (ACM)	01/31/2020	Comp Event	Withdrawn by KMP
38	Enterprises' Failure to Grant and Extension of Time	04/14/2020	Comp Event	Closed. Included in 2021 Memorandum of Settlement.
39	Swansea School Asbestos Containing Material – Phase 2	05/04/2020	Comp Event	Change Order was executed on 09/13/2021.

SEN #	Description	Date Received from KMP	Type of SEN	Status
40	Shutdowns, Suspensions, Disruptions and Other Impacts Related to COVID-19	05/21/2020	Comp Event	Withdrawn by KMP
41	Shutdowns, Suspensions, Disruptions and Other Impacts Related to COVID-19	05/21/2020	Force Majeure, Delay and Relief Events,	Withdrawn by KMP
42	Discovery of Recognized Hazardous Material – 46 th & Jackson RHM	06/15/2020	Comp Event	Withdrawn by KMP
43	Discovery of Recognized Hazardous Material – 46 th & Pilot ACM	07/30/2020	Comp Event	Withdrawn by KMP
44	RHM – E 46th S between Milwaukee and Steele ACM	04/20/2022	Comp Event	Withdrawn by KMP
45	RHM – I-70 and Coliseum	05/16/2022	Comp Event	Withdrawn by KMP
46	Swansea Underground Storage Tank	06/15/2022	Comp Event	Withdrawn by KMP

SCHEDULE STATUS

KMP reported that the Project is 94.6% complete through September 2022. Design is 100% complete and construction is 94.1%.

Revised Baseline Schedule 6 (RBS6) is the current project schedule. The Critical Path of the Project continues to be driven by the preparation, submittal, and approval of the Letter of Map Revisions for the Sand Creek Overflow channel, with the anticipated FEMA approval in February 2023 driving Substantial Completion. See earlier discussion on the status of the Sand Creek LOMR.

For Milestone 5B, KMP completed cover systems testing and commissioning for both EB I-70 and the final configuration of WB I-70. EB I-70 traffic was placed into final configuration in the lowered section in July and WB I-70 traffic was placed in final configuration in August. Punch list development and closure is on-going. KMP continues to work on miscellaneous items, including the Colorado South and York South ponds, that are driving the completion date of this Milestone.

KMP provided notice of completion to all three railroads (DRIR, BNSF, and UPRR) this period and punch list work continues.

Construction continues west of Brighton Boulevard, with barrier removal and replacement,

and sign structure foundation and structure installation. Sign structure construction is planned to complete in October. Landscaping is underway throughout the corridor, with irrigation and planting ramping up in September.

Construction continues on the cover top. Irrigation installation and lightweight fill placement continued in September. Multi-use field installation is planned for October.

Tolling equipment and integration by ETC continued this period and system testing is anticipated to commence in November.

Punch list work associated with Milestones 1 and 2B nears completion. Work associated with Change Order 081 east of Peoria Street is nearly complete, with barrier placement and pavement striping remaining to be completed in October 2022.

Following completion of this work, the Substantial Completion punch list will be developed, with Substantial Completion scheduled to complete in February 2023.

The table below provides a summary of the current status of the project Completion Milestones.

Event	Baseline Date	Forecast Date	Status
Commercial Close	11/21/2017	NA	Completed 11/21/2017
Financial Close	12/21/2017	NA	Completed 12/21/2017
NTP1	02/09/2018	NA	Completed 02/09/2018
NTP2	06/01/2018	NA	Completed 07/10/2018
NTP3 (Snow and Ice Control Services)	07/01/2018	NA	Completed 07/18/2018
Payment Milestone 1 (Sand Creek Bridge to Chambers Road)	12/09/2019	NA	Completed 12/09/2019
Milestone 2A* (WB I-70 between Monaco and Colorado; outside bridge decks complete)	11/10/2020	N/A	Completed 11/05/2020
Milestone 2B* (Sta 2091+00 (Dahlia Street) to Sand Creek Bridge)	09/29/2021	N/A	Completed 09/29/2021
Payment Milestone 3* (UPRR Phase 4B, switch SY-112 to new bridge)	10/17/2020	N/A	Completed 10/17/2020
Payment Milestone 4A* (UPRR Phase 5)	09/26/2021	N/A	Completed 09/26/2021

Payment Milestone 4B* (Viaduct Demolition)	12/20/2021	N/A	Completed 09/29/2021
Payment Milestone 5A* (Cover Girders, EB Colorado Off-Ramp, EB I-70 Mass Excavation)	03/25/2022	N/A	Completed 03/25/2022
Payment Milestone 5B* (EB I-70 between Brighton Boulevard to Dahlia Street, UPRR Phase 6, WB I-70 SMA Paving)	10/28/2022	10/28/2022	0 days
Payment Milestone 6* (Cover Top, 46 th Avenue South)	11/23/2022	11/23/2022	0 days
Complete Intelligent Transportation System(s) (ITS)/Tolling Testing/Integration	02/15/2023	11/29/2022	78 days
Substantial Completion	02/16/2023	02/16/2023	0 days
Final Acceptance	07/29/2023	07/29/2023	0 days
Design/Build Phase Close-out**	01/29/2024	12/25/2023	0 days
*Modified as part of the Fourth Amendment to the Project Agreement. ** Completion of Final project documentation.			

BUDGET STATUS

The project budget reflects the 2022 Annual Update to the Financial Plan that was approved by FHWA in April 2022.

Enterprises Costs Estimate	Amount
Environmental Phase	\$40.7M
Procurement Phase	\$83.7M
Delivery Phase	\$53.1M
Miscellaneous Enterprise Reserve*	\$1.2M
ROW Phase	\$116.7M
Utility Phase	\$34.7M
Enterprises Construction Contingency	\$45.9M
Enterprises Construction Total	\$378.4M

*Included in Delivery Phase Amount

Included in the funds listed in the above table, the Enterprises have established an Enterprises' Construction Contingency (funded by the Department and the Colorado Bridge and Tunnel Enterprise) to cover additional costs due to Supervening Events and Change Orders during the construction phase of the Project. Per the Project Agreement, the Enterprises have the option of paying KMP for changes via a lump sum payment or by adjusting the annual availability payment. The current balance of this contingency fund is provided in the table below.

The Enterprises previously reallocated funds from cost underruns in the Utility and Delivery Phases of the Project to supplement the Project Contingency. The Utility Phase of the Project

realized cost savings due to the Burlington Northern Sante Fe (BNSF) and UPRR railroad agreement (RRA) actual construction costs being lower than originally estimated. As the BNSF and UPRR RRA work, for which the Enterprises were responsible to pay the railroads directly, has completed, the Enterprises elected to reallocate \$11M from the unused Utility Phase funds to cover project contingency overruns. The Utility Phase still maintains an unused balance of over \$1M that will not be reallocated until the UPRR and BNSF final invoices are settled. In addition, the Miscellaneous Enterprise Reserve from the Delivery Phase is also anticipated to have remaining funds available at Substantial Completion based on actual costs to date. The Enterprises continue to monitor these cost underruns in the Utility and Delivery Phases as the Project approaches Substantial Completion. The Project has sufficient budget to cover all identified costs.

Contingency	Amount (in millions)
Enterprises Change Order/Supervening Event Initial Contingency	\$45.9M
Enterprises Transfer of Unused Funds from Utility and Delivery Phases to Change Order/Supervening Contingency	\$11.0M
Executed Change Orders – Previous	\$26.8M
Executed Change Orders – Current Quarter	\$1.42M
Settlement Agreement	\$7.6M
2021 Settlement Agreement (Base)	\$12.5M
2021 Settlement Agreement (Incentive)	\$2.5M
Remaining Enterprises Change Order/Supervening Event Contingency Balance	\$6.1M

CONTRACT CHANGE NOTICES

As of September 30, 2022, the Enterprises have executed (121) Change Orders, issued (75) Enterprise Change Notices, received (37) KMP Change Notices, issued (31) Directive Letters, received (43) Supervening Event Notices, received (41) Preliminary Supervening Event Submissions, and received (23) Detailed Supervening Event Submissions. The change orders executed to date have had a net cost of \$28.2 million to the Project.

No claims have been filed by KMP against the Project.

QUALITY

KMP is responsible for implementation and maintenance of an effective quality program to manage, control, document and ensure KMP compliance with all obligations and requirements in the Central 70 Project Agreement. The Enterprises implement the quality oversight program to monitor KMP’s quality program but are not responsible for implementation of KMP’s quality program. However, the Enterprises retain the responsibility for acceptance of the work based on the assessment and test results of the quality oversight program summarized below.

Owner Verification Testing: Other than as detailed in the Enterprises' Quality Report to the Federal Highway Administration (FHWA), the Enterprises' Owner Verification Testing (OVT) program has statistically verified and validated that all materials placed by KMP are in full conformance with Project Agreement requirements.

Independent Assurance Testing (IAT): The Enterprises' IAT program tests each OVT and Independent Quality Control (IQC) tester for each test procedure at least once per year. The Enterprises have determined that all Owner Verification and KMP IQC testers are qualified to test on the Project through September 2022.

Construction Verification Inspections (CVI): The Enterprises' CVIs evaluate KMP compliance with Project Agreement (PA) requirements by assessing a risk-based percentage of their Construction Work. All non-conforming work identified by the Enterprise is resolved through KMP's nonconformance report closure process. From July 2022 through September 2022, the Enterprises' conducted 103 CVIs, yielding an 86 percent overall conformance percentage. For the entire project through September 2022, the Enterprises' have conducted 2,798 CVIs, yielding a 95 percent overall conformance percentage. KMP continues to perform well for permanent construction work such as Electrical/ITS, Structures, Walls, Roadway, Earthwork, Cover, and Utilities. All nonconforming construction work identified by either KMP or the Enterprises has been properly addressed through the Nonconformance Reports (NCR) process.

Project Management Process Audits: The Enterprises' Project Management Process Audits evaluate KMP compliance with the PA and processes prescribed in KMP's approved Management Plans. From July 2022 through September 2022, the Enterprises' conducted 25 process audits, yielding a 49% percent overall conformance percentage (excluding civil rights audits). For the entire Project through September, the Enterprises' conducted 740 process audits, yielding an 88 percent overall conformance percentage (excluding civil rights audit). The low conformance percentage for the quarter is due to the Enterprises' beginning to audit Operating Period processes such as the O&M Quality Management Plan. The Enterprises anticipate that the conformance percentage will rise as KMP refines their new processes going into the Operating Period. Notable and outstanding process quality issues for this reporting period are presented below. This list includes all of the open Corrective Action Requests (CAR).

Element	Process	Issue	Status
Construction Quality Management	Cover MEP Systems – Requirements Traceability Matrix (RTM)	On 06/03/2021 the Enterprises requested that KMP develop a corrective action plan to address systemic Nonconforming Work related to Schedule 10, Section 12.22 traceability and management of the Cover MEP System requirements.	In August 2021, the Department Approved KMPs corrective action plan to address this issue. To close the CAR, KMP must demonstrate successful implementation of the plan by holding successful Pre-Activity Meetings and submitting test scripts/results for the Cover MEP work on the south bore. The Department expects that this will remain open until late fall 2022. OPEN
Construction Quality Management	As-Built Verification for Invert Elevations of Drainage Structures	KMP found that multiple drainage structures along the Fixed Firefighting Suppression drainage system were out of tolerance, leading to negative flow. In September 2021, KMP notified the Department that they do not have records verifying the invert elevations for all the other drainage structures that they had placed on the Project.	In September 2021, the Department Approved KMPs corrective action plan to address this issue. KMP plans to go back and re-survey all invert elevations for previously placed structures. They will also revise the PC Drainage checklist to ensure that they document invert elevations before building on top of the structures. As of September 2022, KMP has finished surveying the remaining inverts but has not yet submitted as-builts and nonconformance information to the Department. The Department expects that this will remain open until Substantial Completion OPEN
Operations and Maintenance	Operations and Maintenance Quality Management Plan (OMQMP)	KMP issued a corrective action to address the OMQMP and discrepancies between what was detailed in the plan and what has been implemented in the field. This Corrective Action was developed in response to various deficiencies in implementation observed in the field.	For Closure, KMP needs to resubmit the OMQMP and then properly implement the plan for a quarter. The Department accepted the revised OMQMP, but KMP has not implemented the plan consistently. The Department expects that this Corrective Action will remain open until Substantial Completion OPEN

Element	Process	Issue	Status
Construction Quality Management	ITS Fiber Splicing	In February 2022, KMP notified the Department of damaged ITS fiber for the new CDOT backbone. This was the second instance of damaged backbone on the Project. The damage was caused by careless splicing procedures. This CAR is to document process changes with splicing and protection of finished fiber.	KMP has described the plan to revise splicing procedures and protect fiber in the Quality and ITS Task Force meetings. The Department Approved the Corrective Action Plan in May 2022. This will remain open until we receive passing test results for the splice. KMP must not have any repeat instances. The Department expects that this Corrective Action will remain open until October 2022. OPEN
Construction Quality Management	Cover Systems Communications	In June 2022, the Department requested KMP to investigate the root cause and develop a corrective action plan to address active Head-to-head Cover Systems going offline. From the start of May 2022 and into June 2022, the Jorgensen CTMC Operators sent approximately fourteen emails describing Cover System communication issues.	In July 2022, KMP developed the corrective action plan to start tracking each communication-loss/system-glitch reported by the Jorgensen CTMC operators. Each individual item received a root cause analysis. KMP then looked at all issues holistically to determine if there is a system-wide health issue. Prior to the switch into the south side cover, KMP concluded that these issues were individual issues and not a system-wide issue. As of September 2022, KMP still needs to close some individual work orders prior to closing the corrective action. Also, KMP needs to show within their management plans that they are performing root cause analysis of these issues throughout the 30-year Term. The Department expects that this Corrective Action will remain open until Substantial Completion OPEN

Element	Process	Issue	Status
Construction Quality Management	Non-conformance Reports	In July 2022, KMP issued this corrective action to address recent delays in issuing NCRs in response to Department issued NCNs and developing dispositions for NCRs within five days of NCR generation	KMP quickly resolved this issue by training the new staff on the Project to comply with Quality Management Plan. KMP did not repeat issues for the rest of July and into August, so the Corrective Action was closed. CLOSED
Construction Quality Management	Pump Station Failure	On August 7, 2022, a significant rain event resulted in deep standing water on I-70 mainline between Columbine and York from 7:00 PM to 9:40 PM. The pumps did not automatically start as designed.	KMP immediately began investigating the root cause of the pumps not automatically starting as designed. KMP found that there were two main contributing factors: (1) incorrect water level set points, (2) inactive backup water level sensor. KMP is continuing to develop robust operational and procedural improvements within their Corrective Action Plan. The Department anticipates that KMP will finalize the plan by October 2022. All corrective actions will be complete and verified prior to Substantial Completion. OPEN

Design Verification Reviews (DVR): The Enterprises’ DVRs evaluate KMP compliance with PA requirements by assessing KMP’s design plans and other deliverables. From July 2022 through September 2022, the Enterprises’ conducted 32 DVRs yielding a 99 percent overall conformance percentage. For the entire Project, the Enterprises conducted 1,348 reviews, yielding an 86 percent overall conformance percentage. All noncompliant design identified by the Enterprises is resolved prior to KMP releasing the plans for construction. Additionally, KMP and the Enterprises issue NCRs for design issues that are identified during performance of construction work. The nonconforming design is then resolved prior to construction acceptance. Since there has not been any known noncompliant design incorporated into the permanent work, there are not any notable design issues identified by the Enterprises and/or KMP for this reporting period.

MAINTENANCE/TRAFFIC ISSUES

The focus of routine maintenance work for this reporting period included drainage, pavement, shoulder, slope and fence repair; litter, trash and sweeping cycle; vegetation control; sign maintenance; traffic services inspections; metal guardrail maintenance; graffiti removal; energy attenuator repair; CTMC/tunnel operations; and resolution of any safety critical or hazardous defects which occurred during the reporting period.

The construction assessment team has been performing weekly assessments of the Maintenance of Traffic (MOT)/Method(s) of Handling Traffic (MHT) setups. Any issues are being communicated with and addressed by KMP.

SAFETY ISSUES

KMP had zero recordable events for this quarter, keeping the total at 12 for the project. “Play of the Day” meetings are held daily, and safety topics are discussed with the crews. KMP performs after-incident investigations and discusses root cause and preventative measures for each incident. KMP continues to perform “Safety Adventures” where a discipline goes and audits an operation daily and discusses their findings during the “Play of the Day” meeting. These include best practices, lessons learned and issues that were found.

Safety Patrol responded to 843 events during this reporting period. This total includes 154 crash/incidents.

CIVIL RIGHTS STATUS

Small Business Disadvantaged Business Enterprise (DBE)/Emerging Small Business (ESB) Goals

Design Status through the 3rd Quarter of 2022: KMP’s DBE goal for the design is 11.6% (\$6.65 million). KMP has commitments to DBE design firms of 14.3% (\$8.23 million) and payments to DBE design firms of 13.8% (\$7.93 million); the commitment amount exceeds the KMP DBE goal for the design period. KMP’s ESB goal for the design period is 3.0% (\$1.72 million). KMP has commitments to ESB design firms of 9.85% (\$5.61million) and payments to DBE design firms of 9.68% (\$5.55 million); the commitments and payments exceed the ESB goal for design for the Project.

Construction Status through the 3rd Quarter of 2022: KMP’s DBE goal for the construction is 12.5% (\$95.9 million). KMP has commitments to DBE construction firms of 17.69% (\$135.7million) and payments of 17.62% (\$135.2million); this exceeds the KMP DBE goal for the construction period. KMP’s ESB goal for the construction period is 3.0% (\$23 million). KMP has commitments to ESB construction firms of 10.29% (\$79 million) and payments of 8.48% (\$65.1 million); this exceeds KMP’s ESB goal for construction for the Project.

Workforce Development Program and Goals

The WORKNOW program combines construction workforce training and supportive service programs into one coordinated program. The Central 70 Project is a founding partner of WORKNOW. For further information on the WORKNOW Program please go to: <https://worknow.org/accomplishments-to-date/>

KMP and its subcontractors have enrolled local hires for both professional services and construction. They have enrolled 796 local hires to date. This quarter, Local Hire hours increased to 1,459,183 with more than 50% of those hours completed by New Hires. KMP has met their Local Hire Goal and based on hours reported in LCPtracker, and has met the Goal for the Local Hire Incentive.

KMP has enrolled 287 On-the-Job Training (OJT) participants since inception. To date, 453,238 OJT hours have been reported. Based on the number of hours reported, the OJT Goal of 200,000 hours has been met. Currently KMP is working toward meeting the Substantial Completion Graduate Incentive. KMP has reported 30 Graduated Retained Apprentices, with another 21 Graduated Apprentices that are pending fulfillment of the 6-month retention requirement.

KMP has enrolled 282 On-the-Job Training (OJT) participants since inception. To date, 332,236.90 OJT hours have been reported. Based on hours reported, the OJT Goal of 200,000 hours has been met.

MITIGATION/COMMUNITY COMMITMENTS STATUS

As of the date of this report, all the identified Record of Decision (ROD) mitigation measures are either in progress or completed. The Department is currently working with the stakeholders on developing an approach to fulfill the Historic Creative Mitigation for the Project.

The ROD included 146 mitigation commitments to be completed as part of the project. The mitigation commitments are being completed in conjunction with the construction work and are being tracked by the Enterprises and KMP in the Monthly Environmental Status Report (ESR). This Project is unique in that the core feature of the project—lowering the highway and constructing a Cover/park that will link the two sides of the community back together—was developed to address Environmental Justice (EJ) concerns that arose from original highway construction back in the 1960s.

In addition to the Cover and park, the Central 70 Project includes other unique EJ mitigations such as the recognition of the importance of the Swansea Elementary School as a community center. These mitigations include two new early childhood education classrooms, a new heating and air conditioning (HVAC) system, new exterior windows and doors, a relocated and

renovated main entrance and administration offices, and a new playground at the Swansea Elementary School. The table below provides the status of the EJ mitigations.

Mitigation	Status	Notes
Targeted assistance to crucial businesses to remain in the neighborhood.	Complete	Assistance was provided to all businesses that were displaced by the project per the Uniform Act. All impacted businesses have been completed and reestablished in their new location per the Uniform Act. KMP will continue the Community Outreach for businesses within the project area.
Provide funding to assist displacees with financial counseling and procurement of financing.	Complete	Funding has been provided through Community Resources and Housing Development Corporation (CRHDC)
Provide before, during, and after environmental sampling to assure the project has not caused re-contamination of residential properties.	Complete	Pre-construction soil sampling on seven residential properties was completed in June 2018. During construction soil sampling on seven residential properties was completed in August 2020.
Mitigate noise and dust impacts by providing residents living adjacent to the project new storm windows, furnace filters, and air conditioning units.	Complete	Assessments and installations of improvements were completed on 03/14/2019. Ongoing warranty work and energy credits will continue through the Construction Period.
Fresh Food Access – Provide \$100,000 to Denver Office of Economic Developments Globeville Elyria-Swansea (GES) Healthy Food Challenge.	Complete	The Enterprises transferred funds to the City and County of Denver in early November 2018; an initial report was received by the Enterprises in July 2019.
Provide \$2M in funding to support affordable housing in Elyria and Swansea neighborhoods.	Complete	The Enterprises transferred funds to Brothers Redevelopment in late November 2018; quarterly reports began in 2019.
Monetary Incentive for Managed Lanes	In Progress	HPTE finalizing details of GES low income program.
Swansea Elementary Phase 1	Complete	Retrofit school building with new classrooms, windows, doors, and HVAC system
Swansea Elementary Phase 2	Complete	Modify outdoor areas around school to provide playground, parking, and access roads during construction period.
Swansea Elementary Phase 3	Complete	Construct temporary outdoor features including playground, parking, and access roads.

Mitigation	Status	Notes
Swansea Elementary Phase 4	In Progress	Design is complete. KMP began construction in late March 2022 along with the Cover Top. The playground was opened prior to school starting in August 2022 and the multi-use field is anticipated to open by the end of the year.

COMMUNITY ENGAGEMENT

The Enterprises, supported by KMP, is responsible for communicating with citizens, the media, public officials and other stakeholders regarding the Project.

Public Information (PI) efforts continue to take a two-pronged approach by focusing outreach with commuters and residents through various social media outlets, ongoing presentations and check-in calls. The Public Information team also continues using various outreach tools to alert the public about upcoming traffic and construction impacts.

The PI team is planning a park opening appreciation event to thank the community for its patience throughout the four years of construction. This event will happen in early December 2022.

In August, the team held an event to celebrate the opening of the new Swansea Elementary School playground. Baked goods and donated frisbees with student artwork illustrating how students “envision themselves playing on the new playground” were distributed during this celebration.

Chips & Chat will remain virtual through the end of the year due to the greater number of people who participate virtually compared to those who attended in person before COVID-19.



MEMORANDUM

TO: THE BRIDGE AND TUNNEL ENTERPRISE BOARD OF DIRECTORS
FROM: PATRICK HOLINDA, BRIDGE AND TUNNEL ENTERPRISE MANAGER
DATE: NOVEMBER 17, 2022
SUBJECT: BRIDGE AND TUNNEL ENTERPRISE Q1 FY2023 QUARTERLY REPORT

Purpose

The Bridge & Tunnel Enterprise (BTE) staff has prepared this quarterly program report to provide the BTE Board of Directors an update of recent program activities. Summarized below are the elements contained in the report. The report is also available in its entirety at:
<https://www.codot.gov/programs/BridgeEnterprise/QuarterlyReports/FY2023-quarterly-reports>.

Action

This report is for informational purposes only; no action is requested from the Board.

Background

SB21-260 and the Creation of the Statewide Bridge and Tunnel Enterprise

The modification of the Enterprise in accordance with SB21-260 continued throughout the first quarter of FY2023. With updates to key Policy and Procedural Directives and a resolution to impose the new SB21-260 bridge and tunnel fees approved in the previous quarter, BTE was able to focus its efforts on supporting the Department with the delivery of the CDOT 10-Year Plan (10-Year Plan). During the first quarter, staff presented several critical workshops and resolutions to the Board. The September BTE 10-year Plan workshop provided the Board with an overview of the Enterprise’s role in the delivery of the 10-Year Plan and the program’s current financial forecast. This workshop also outlined the Enterprise’s capacity to fund BTE eligible strategic projects and reviewed legislative proposals to provide BTE with additional funding flexibility to deliver a more robust preventative maintenance program and optimize bridge bundling and delivery.

FY2022 Bridge Improvement Program (BIP) Discretionary Grant Opportunity

In June 2022, the U.S. Department of Transportation (USDOT) released a Notice of Funding Opportunity (NOFO) for the Bridge Improvement Program (BIP). The BIP provides grants, on a competitive basis, to improve bridge condition and the safety, efficiency, and reliability of the movement of people and freight over bridges. CDOT staff, with BTE support, performed an evaluation to identify projects with the highest probability of award based on the selection criteria outlined in the NOFO. The NOFO established three BIP funding categories: (1) Planning Grants for planning, feasibility analysis, and revenue forecasting associated with the development of a project that would subsequently be eligible to apply for assistance under the BIP, (2) Large Bridge Projects with total eligible project costs of greater than \$100 million, and (3) Bridge Projects with total eligible project costs of \$100 million or less. The BTE eligible 10-Year Plan projects detailed below were identified as top candidates for application submission.

BTE Eligible Structures included in BIP Applications

Major Project	# of Structures	Region	Deck Area	BTE Funding Committed
Region 1 Bridge Pre-Scoping	17	1	123,170	\$1.3 M
I-270 Critical Bridges	6	1	71,147	\$57.5 M
US 160 Safety & Mobility	1	5	3,541	\$10.0 M
6 th Ave. & Wadsworth Blvd.	1	1	21,065	\$20.0 M



Floyd Hill to Veterans Memorial Tunnels INFRA Grant Award

During the quarter, FHWA announced that CDOT and the Floyd Hill Project were awarded a \$100M grant through the Infrastructure for Rebuilding America (INFRA) program. The project is now fully funded through the grant, strategic SB17-267/SB21-260 funding, and innovative financing by BTE and CTIO.

Program Progress

In Q1 FY2023, staff continued to make progress addressing the state’s “Poor” bridge population and modifying the Enterprise in accordance with SB21-260. A summary of these activities and other program progress updates are provided below.

Structures Funded for Construction in Q1 FY2023

Structure ID	Region	County	Facility Carried over Featured Intersection	Phase	Budget
N-17-AD	2	Huerfano	I-25 ML over US 160, RR Spur	Const.	\$20.13M

Structures that Completed Construction in Q1 FY2023

New Structure ID	Old Structure ID	Region	County	Facility Carried over Featured Intersection
G-17-AI	G-17-A	1	Douglas	US 85 ML over Sand Creek
H-17-CT	H-17-CH	1	Douglas	I-25 ML over County Road
	H-17-CI			

Active Project Portfolio

The BTE program continues to deliver near historic levels with a robust active project portfolio consisting of 31 bridge projects that will rehabilitate or replace 79 BTE eligible structures and address approximately half a million square feet of eligible poor-rated bridge deck area statewide.

Program Schedule Update

The overall program Schedule Performance Index (SPI) for Q1 FY2023 increased to 1.01, primarily due to the performance of completed projects, while the active project SPI increased to 1.08. An active project SPI above 0.90 generally indicates that projects in the program’s active project portfolio are being executed efficiently. These key performance indicators are used by program staff to monitor projects that have the potential to fall behind their baseline schedule. The program overall and active monthly SPI for Q1 FY2023 is listed below.

Month	Overall SPI	Active SPI
July	1.00	1.00
August	1.00	1.00
September	1.01	1.08

Budget and Encumbrance Balances

BTE staff continues to coordinate with Region staff to de-budget projects that are substantially complete in accordance with the SB 16-122. Since June 30, 2022, the budget and encumbrance balances have increased by \$1,333,307, primarily due to the addition of the Ilex project, which is currently in the dispute resolution process.

Program Financial Information

As of Q1 FY2023, actual year-to-date BTE revenues were \$38.1M, which is \$8.7M above the FY2023 revenue budget of \$29.4M, when applied to the FY2023 revenue budget of \$109.0M.

Attachments

Attachment A: Q1 FY2023 Quarterly Report





STATEWIDE BRIDGE & TUNNEL ENTERPRISE QUARTERLY REPORT



COLORADO
Department of Transportation
Statewide Bridge and Tunnel Enterprise

Q1 FY2023 #46
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INTRODUCTION

This report is the 46th Quarterly Report published in support of the Statewide Bridge and Tunnel Enterprise (BTE). This Report outlines the progress and accomplishments associated with the BTE Program for work completed during July, August, and September of 2022; which coincides with the first quarter of the Colorado Department of Transportation's (CDOT) 2023 Fiscal Year (Q1 FY2023). Detailed information regarding the Funding Advancement for Surface Transportation and Economic Recovery (FASTER) legislation, Sustainability of the Transportation System (SB21- 260) legislation, program developments and activities, bond programs, previous significant milestones and achievements can be found in the Program Annual Newsletters and Quarterly Reports and are viewable on the Bridge and Tunnel Enterprise page on CDOT's website at <https://www.codot.gov/programs/BridgeEnterprise>.

The following is an itemization of significant Q1 FY2023 BTE activities, some of which are discussed in further detail later in the report:

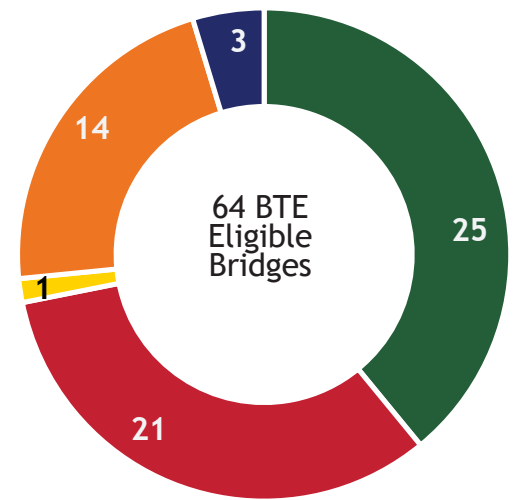
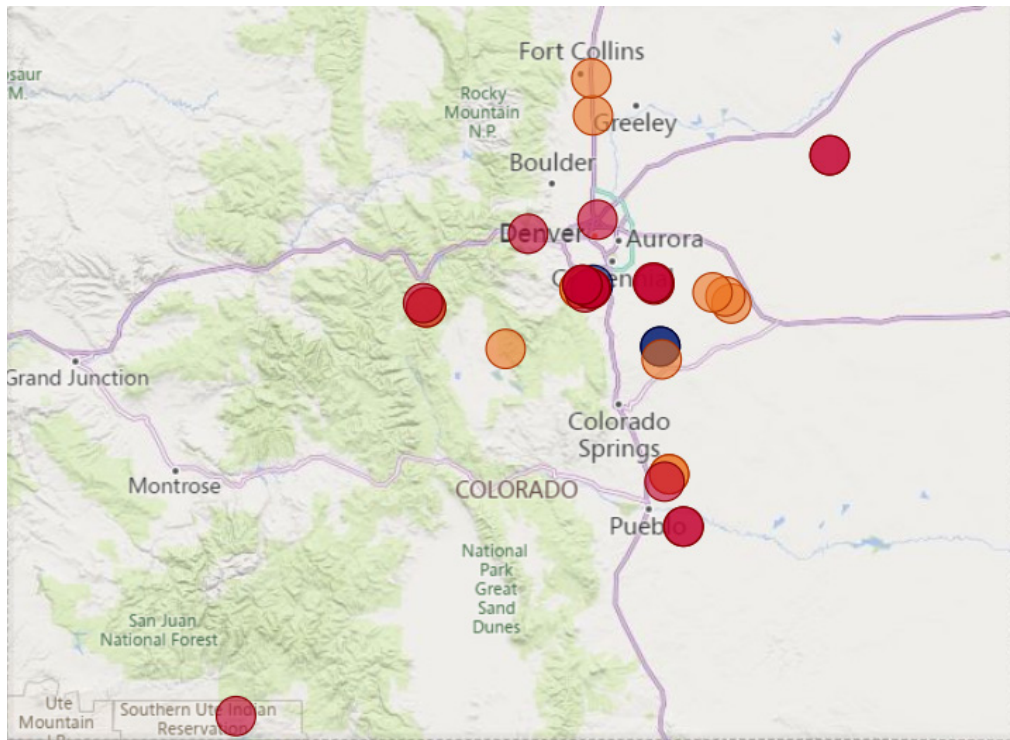
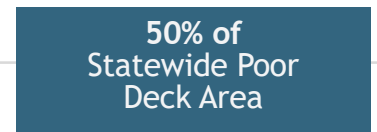
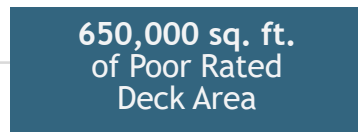
- Drafted and finalized the 45th Bridge and Tunnel Enterprise Quarterly Report (Q4 FY2022)
- Drafted and finalized the FY2022 Bridge and Tunnel Enterprise Annual Newsletter
- Received Board approval for the 1st Budget Supplement of FY2023 to:
 - Increase the construction phase budget for US 285 ML over Middle Fork South Platte River (H-13-A) in Park County
 - Increase the construction phase budget for SH 64 over Strawberry Creek and White River (D-04-G & D-03-A) in Rio Blanco County
 - Increase the construction phase budget for the Eastern Plains Timber Bridge Construction Package #2 (C-22-K & D-24-O) in Morgan and Washington counties, respectively
- Received Board approval for the 2nd Budget Supplement of FY2023 to:
 - Establish the construction phase budget for I-25 ML SB over US 160 ML, RR Spur (N-17-AD) in Huerfano County
- Received Board approval for the 3rd Budget Supplement of FY2023 to:
 - Increase the design phase budget for US 40 ML over Draw (I-24-N) in Lincoln County
- Received Board approval of a resolution committing BTE matching funds for the USDOT FY2022 Bridge Investment Program Discretionary Grant Opportunity in each of the three categories:
 - Large bridge project to replace six eligible structures as part of the I-270 Critical Bridges Project
 - Project planning to advance 17 eligible structures under the Region 1 Bridge Pre-scoping Project
 - Small bridge project to replace one eligible structure, US 160 over Florida River (P-05-B) as part of the US160 Safety and Mobility Project, Elmore's Corner
- Supported CDOT with the resubmittal of a RAISE grant application for the US 6 and Wadsworth Boulevard Interchange Project, including BTE eligible F-16-O, for the USDOT FY2022 Bridge Investment Program Discretionary Grant Opportunity.
- Received Board approval of a resolution recognizing the newly elected Officers of the BTE Board of Directors for FY2023:
 - Chair - Director Don Stanton
 - Vice Chair - Director Gary Beedy
 - Secretary - Herman Stockinger
- Conducted statewide regional outreach to collect information needed to update the BTE Bridge Prioritization Plan.
- Drafted, finalized, and distributed the July 2022 BTE Bridge Prioritization Plan (previously advanced to the Q4 FY2022 Quarterly Report for expedited distribution).
- Continued the process of modifying the Enterprise to include tunnel scope and prioritize CDOT 10-Year Plan projects in accordance with SB21-260.
- Supported CDOT with the ongoing development of the 10-Year Plan and evaluated strategies to leverage BTE funding to advance planned projects with BTE eligible scope items.
- Performed maintenance on the program baseline cost estimates including monitoring and planning for increased commodity, material, and labor price inflation and adjusting program forecasts as necessary.
- Performed status updates for various program metrics including: major achievements, total program financial performance, and status of BTE eligible structures.
- Completed monthly updates to the program schedule for work completed in July, August, and September of 2022, and conducted the regularly scheduled Schedule Change Control Board meeting.
- Continued efforts to de-budget excess funds on projects with completed phases and reallocate savings to other BTE projects.
- Continued refinement of programmatic risk management tools, which include the Cost and Schedule Risk Assessments tools and the Risk-Informed Financial Planning Model.

PROGRAM HIGHLIGHTS

SB21-260 and the Statewide Bridge and Tunnel Enterprise

The modification of the Enterprise in accordance with SB21-260 continued throughout the first quarter of FY2023. With updates to key Policy and Procedural Directives and a resolution to impose the new SB21-260 bridge and tunnel fees approved in the previous quarter, BTE was able to focus its efforts on supporting the Department with the delivery of the CDOT 10-Year Plan (10-Year Plan). During the first quarter, staff presented several critical workshops and resolutions to the Board. The September BTE 10-Year Plan workshop provided the Board with an overview of the Enterprise’s role in the delivery of the 10-Year Plan and the program’s current financial forecast. This workshop also outlined the Enterprise’s capacity to fund BTE eligible strategic projects and reviewed legislative proposals to provide BTE with additional funding flexibility to deliver a more robust preventative maintenance program and optimize bridge bundling and delivery. A summary of the BTE eligible 10-Year Plan scope and current project status is provided below.

CDOT 10-Year Plan Projects and BTE Eligibility



- Remaining
- In Design
- Design Complete
- In Construction
- Complete

During the quarter, collections began for the recently imposed bridge and tunnel fees. Preliminary data indicates that the fee collection rate is in alignment with current revenue forecasts. It is estimated that the new fees will bring approximately \$522M of additional revenue into the program over the 10-Year phase in period. BTE will utilize this revenue to support the delivery of the 10-Year Plan by allocating funding to address critical bridges and tunnels identified in the plan with the goals of increasing the safety, efficiency, and reliability of Colorado’s transportation network. Additional information on the progress of BTE eligible strategic projects, such as the I-70 Floyd Hill to Veterans Memorial Tunnels Improvement Project, I-270 Critical Bridges Project, and EJMT Repair Projects, can be found below.

FY2022 Bridge Improvement Program (BIP) Discretionary Grant Opportunity

In June 2022, the U.S. Department of Transportation (USDOT) released a Notice of Funding Opportunity (NOFO) for the Bridge Improvement Program (BIP). The BIP provides grants, on a competitive basis, to improve bridge condition and the safety, efficiency, and reliability of the movement of people and freight over bridges. CDOT staff, with BTE support, performed an evaluation to identify projects with the highest probability of award based on the selection criteria outlined in the NOFO. The NOFO established three BIP funding categories: (1) Planning Grants for planning, feasibility analysis, and revenue forecasting associated with the development of a project that would subsequently be eligible to apply for assistance under the BIP, (2) Large Bridge Projects with total eligible project costs of greater than \$100 million, and (3) Bridge Projects with total eligible project costs of \$100 million or less. The BTE eligible 10-Year Plan projects detailed below were identified as top candidates for application submission.

Table 1. BTE Eligible Structures included in BIP Applications

Major Project Name	# of Structures	Region	Deck Area (sq. ft.)	Funding Committed
Region 1 Bridge Pre-Scoping	17	1	123,170	\$1.3 M
I-270 Critical Bridges	6	1	71,417	\$57.5 M
US 160 Safety & Mobility	1	5	3,541	\$10 M
6th Ave. & Wadsworth Blvd.	1	1	21,065	\$20 M



Image 1. I-70 ML WB over West 20th Ave (F-16-HK)

Region 1 - Bridge Pre-Scoping Project - Planning Category

The Region 1 Bridge Pre-scoping Project will plan for the reconstruction of 38 bridges throughout CDOT Region 1, 17 of which are eligible for BTE funding. These bridges have been identified as high priority structures by Region 1 staff due to safety and mobility risks associated with the condition of the bridge decks and the intensive level of maintenance that is required to keep these bridges in service. Completion of this pre-scoping project will accelerate the delivery of the Regionwide Bridge Maintenance and Repair Project which is in the CDOT 10-Year Plan.

I-270 Critical Bridges Project - Large Bridge Project Category

The I-270 corridor provides a vital connection from I-70 to I-25. Approximately 100,000 vehicles per day utilize this corridor to bypass the friction of downtown Denver to move goods, services, information, and people from the eastern edge of the city to north of the city. Over time, the frequency and severity of planned and unplanned (emergency) bridge deck repairs on the I-270 corridor have increased due to potholes and deck deterioration on these structures. The I-270 Critical Bridges Project will replace eight total bridges, six of which are BTE eligible, on I-270 between York Street and Vasquez Boulevard to improve safety and operations in this segment of the corridor.



Image 2. I-270 ML WB over S. Platte River (E-17-ID)



Image 3. US 160 ML over Florida River (P-05-B)

US 160 Safety & Mobility, Elmore's Corner - Bridge Project Category

The US 160 Elmore's Corner East project will correct operational and safety challenges that have been identified along US 160 from the intersection of US 160 and SH 172 to the intersection of US 160 and La Plata County Road 225. The general purpose of the project, as outlined in the 2006 Final Environmental Impact Statement (EIS), is to increase travel efficiency/capacity to meet current and future needs, improve safety for the traveling public by reducing the number and severity of accidents, and to control access to the interstate. The total project length is approximately 2.6-miles. BTE eligible structure, US 160 ML over Florida River (P-05-B), is within the project limits and will be reconstructed to improve safety for the traveling public by addressing the substandard geometry of the existing bridge and incorporating a wildlife underpass as specified in the EIS.

6th Ave. and Wadsworth Blvd. Project - Bridge Project Category

This proposed interchange improvement project will meet current design and safety standards, improve safety and mobility, and improve multi-modal travel options at the US 6 and Wadsworth Blvd. interchange and along Wadsworth Blvd. The traffic flows resulting from the existing configuration of the US 6 and Wadsworth Blvd. interchange has not allowed the roadway to keep pace with increasing traffic and multi-modal travel demands. Within the projects limits is the BTE eligible bridge, US 6 ML over SH 121 ML (F-16-O). The bridge was constructed in 1972 and currently has a poor-rated deck and superstructure, which require frequent planned and unplanned (emergency) repairs.



Image 4. US 6 ML over SH 121 ML (F-16-O)

Floyd Hill to Veterans Memorial Tunnels INFRA Grant Award

During the quarter, FHWA announced that CDOT and the Floyd Hill Project were awarded a \$100M grant through the Infrastructure for Rebuilding America (INFRA) program. The project is now fully funded through the grant, strategic SB17-267/SB21-260 funding, and innovative financing by BTE and CTIO. More detailed information on the project status and how the project will improve safety and mobility can be found in the Project and Program Updates section of this report.



Image 5 & 6. I-70 ML over US 6, Clear Creek Proposed Preferred Alternative Renderings

PROGRAM PROGRESS UPDATES

In Q1 FY2023, staff continued to make progress addressing the state’s “Poor” bridge population and modifying the Enterprise in accordance with SB21-260. A summary of these activities and other program progress updates are provided below.

During this period, the BTE Board approved a budget supplement to establish the construction phase for one structure. The structure, I-25 ML SB over US 160 ML, RR Spur (N-17-AD), is a top tier structure in the July 2022 BTE Bridge Prioritization Plan. Over the last decade, the structure has required significant maintenance resources to stay in operation. Maintenance projects often require time consuming and costly coordination with the railroad for each mobilization. Reconstruction of the bridge will improve safety and operations of the I-25 corridor through southern Colorado by eliminating the need for planned and unplanned (emergency) repairs to the existing bridge and allowing for the construction of a deceleration lane from I-25 southbound to US 160 that meets current design standards.

Table 2. Structures Funded for Construction in Q1 FY2023

Bridge ID	Region	Facility Carried over Featured Intersection	County
N-17-AD	2	I-25 ML SB over US 160, RR Spur	Huerfano



Image 7 & 8. Full-depth Deck Repairs to I-25 ML SB over US 160 ML, RR Spur (N-17-AD)

Table 3. Structures with Construction Funding Increases Approved in Q1 FY2023

Bridge ID	Region	Facility Carried over Featured Intersection	County
H-13-A	2	US 285 ML over Middle Fk. S. Platte River	Park
D-03-A	3	SH 64 ML over White River	Rio Blanco
D-04-G		SH 64 ML over Strawberry Creek	
C-22-K	4	US 6 ML over UPRR; Platte; Beaver Canal	Morgan
D-24-O		US 34 ML over Draw	Washington



Image 9. US 285 ML over Middle Fk. S. Platte River (H-13-A)



Image 10. SH 64 ML over Strawberry Creek (D-04-G)

During Q1 of FY2023 three structures completed construction, itemized below.

Table 4. Structures that Completed Construction in Q1 FY2023

New Bridge ID	Original Bridge ID	Region	Facility Carried over Featured Intersection	County
G-17-AI	G-17-A	1	US 85 ML over Sand Creek	Douglas
H-17-CT	H-17-CH	1	I 25 ML over County Road	Douglas
	H-17-CI	1		



Image 11 & 12. US 85 ML over Sand Creek (G-17-AI)



Image 13 & 14. I-25 ML over County Road (H-17-CT)

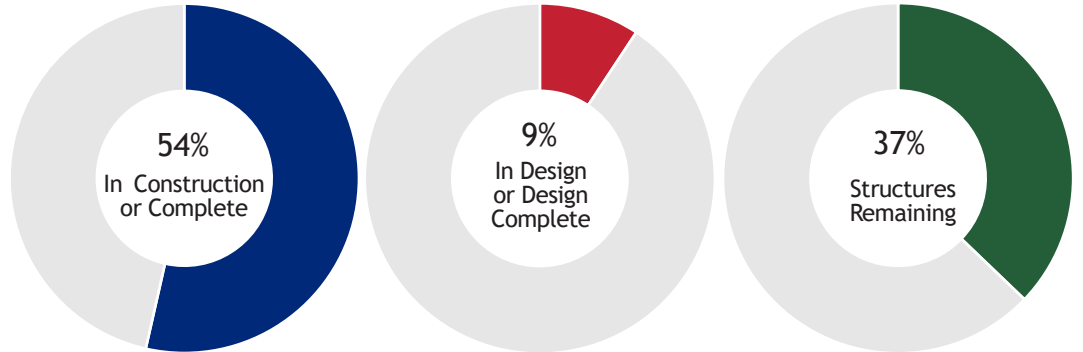
BTE Eligible Bridge Structure Statistics

Q1 FY2023 Project Status Updates

Table 5. Project Status of BTE Eligible Structures as of Q1 FY2023

Project Status	Q1 FY2023 # of Structures
Remaining	152
In Design	30
Design Complete	8
In Construction	41
Complete	178
Total	409

- 4 structures completed design (E-16-LT/LU, D-03-A, and D-04-G)
- 1 structure started construction (F-12-AT)
- 3 structures completed construction (G-17-A & H-17-CH/CI)

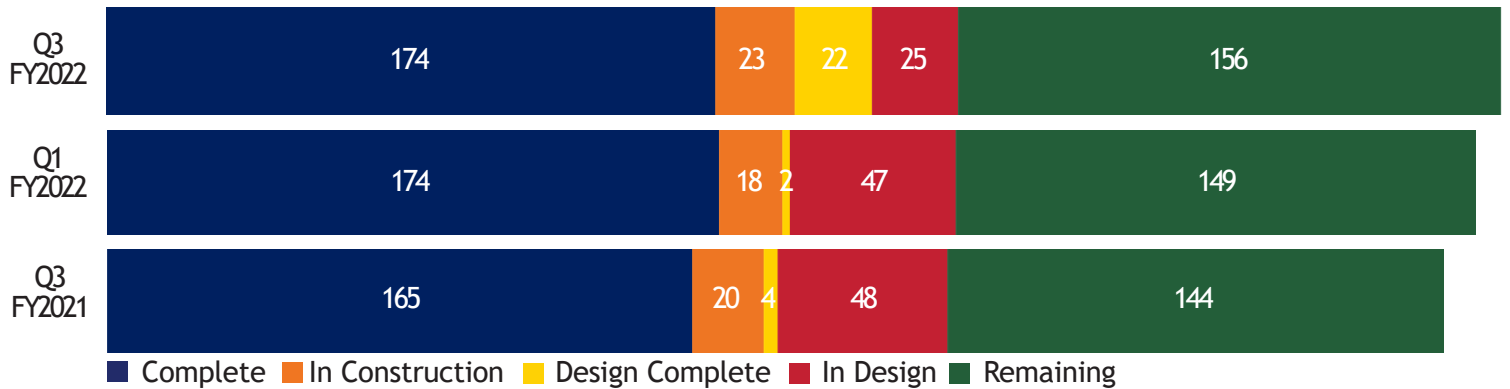


◦ 2.1 M square feet of “poor” rated deck area has been addressed since program inception statewide

Figure A. Current Status of BTE Eligible Bridge Structures



Figure B. Historic Status of BTE Eligible Bridge Structures



Active Project Portfolio

The BTE program continues to deliver near historic levels with a robust active project portfolio consisting of 31 bridge projects that will rehabilitate or replace 79 BTE eligible structures and address approximately half a million square feet of eligible poor-rated bridge deck area statewide. The map below provides the locations of all active BTE projects.

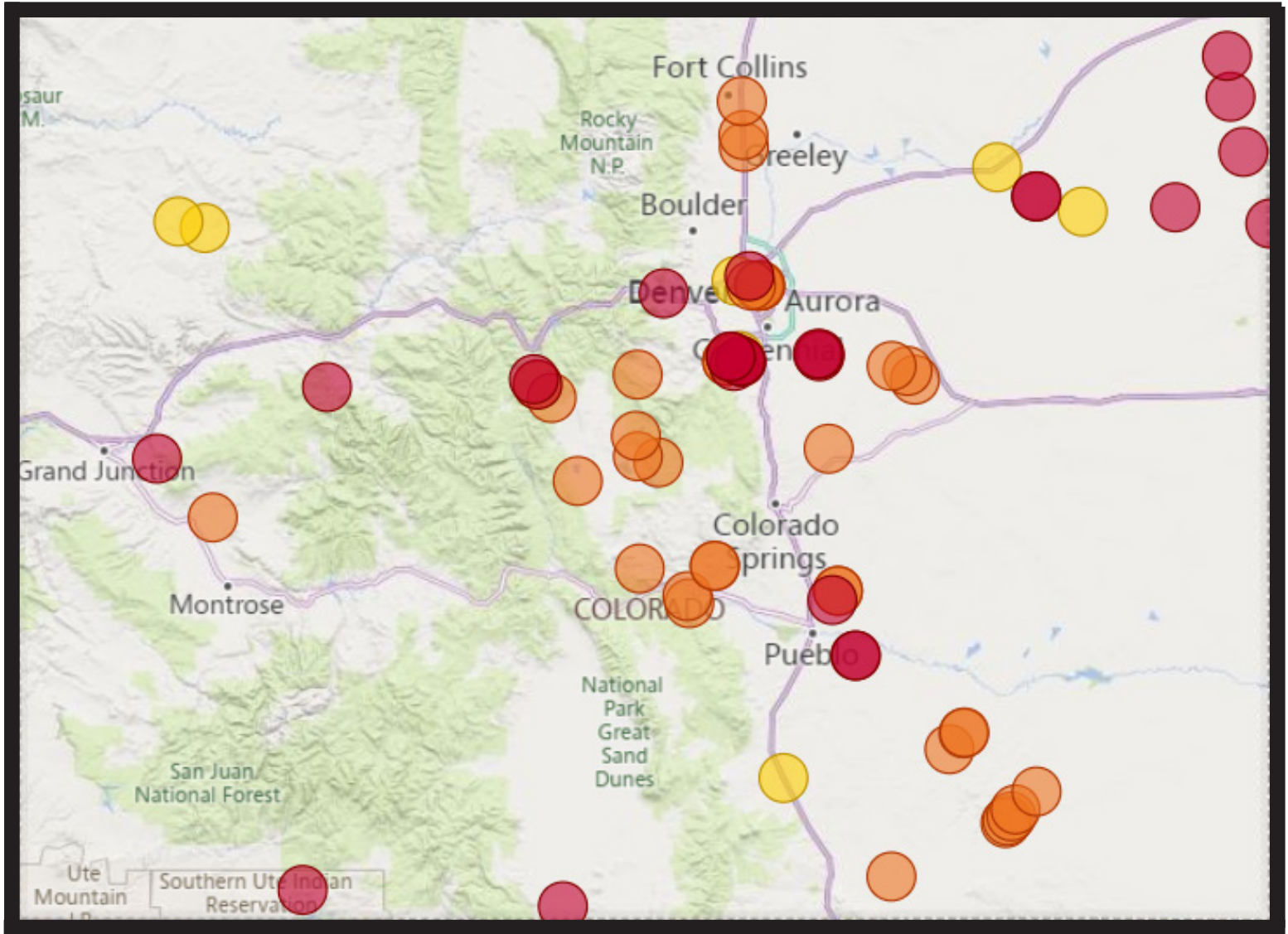


Image 15. BTE Active Project Portfolio

Status: ● In Design ● Design Complete ● In Construction

Program Schedule

The overall program Schedule Performance Index (SPI) for Q1 FY2023 increased to 1.01, primarily due to the performance of completed projects, while the active project SPI increased to 1.08. An active project SPI above 0.90 generally indicates that projects in the program's active project portfolio are being executed efficiently. These key performance indicators are used by program staff to monitor projects that have the potential to fall behind their baseline schedule. The program overall and active monthly SPI for Q1 FY2023 is listed to the right.

Table 6. Overall and Active Project SPI by Month

Month	Overall SPI	Active SPI
July	1.00	1.00
August	1.00	1.00
September	1.01	1.08

The overall SPI for the BTE Program is 1.01, which is well above the 0.90 BTE Program goal.

Central 70 Project

The BTE Eligible portion of the Central 70 project includes approximately 8.5 miles of I-70 between Brighton Blvd. and I-270 in Denver. Six BTE eligible structures were addressed by the project, including “the Viaduct” (I-70 over US6, UPRR and CCD St.). These structures represented nearly 30% of BTE’s statewide eligible bridge deck area. Additionally, “the Viaduct” was identified as one of the 30 worst bridges in the state when the Enterprise was created in 2009 and was the last of the 30 worst bridges to be addressed. The demolition of the Viaduct has officially removed nearly 570,000 sq.ft. of poor-rated bridge deck area and significantly reduced the statewide percentage of poor deck area on the National Highway System (NHS).

In Q1 FY2023, BTE staff continued to coordinate with the Central 70 project team to refine the BTE program models and track project progress. The following activities occurred during this quarter:



Image 16. Construction on the Cover Top

- Completed Denver Fire Department (DFD) commissioning of the EB I-70 Cover and received final DFD approvals for the Cover.
- I-70 eastbound (EB) traffic switch into final configuration under the EB Cover occurred the weekend of July 15.
- I-70 westbound (WB) traffic switch into final configuration the weekend of August 26. This was the final full closure of I-70 for the project.
- Completed removal of temporary systems equipment and infrastructure (cross passage doors, wall panels barrier, lighting, speakers and cameras) installed to support I-70 bi-directional traffic in WB Cover.
- Completed finishes for the I-70 Bridge over Brighton Blvd.
- Continued installation of the Intelligent Transportation Systems (ITS) devices east of Sand Creek and permanent fiber optic cabling from Node 1 to the Airport Road Node building.



Image 17. Construction on Central Park Blvd.

- Opened Swansea Elementary Playground (Planning Area 1) and turned over to Denver Public Schools for use of the facility prior to school opening August 22.
- Continued garden roof assembly waterproofing on the Cover Top.
- Continued to work on remaining Cover Top items, including turf field, fencing, lighting, amphitheater, shade structures, and splash pad.
- Began landscaping on Cover Top and at Swansea Elementary School.
- Continued construction of East 46th Ave. South between Brighton and Colorado Blvd., including roadway, walls, utilities, and drainage.
- Continued miscellaneous work in the Brighton East and West ponds.
- Continued working on various stormwater retention pond certifications from Brighton Blvd. to Peoria Street.

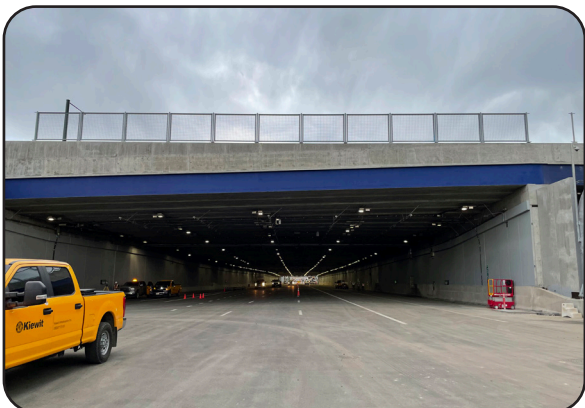


Image 18. EB I-70 Covered Lanes

- Completed the drainage crossing under the Regional Transportation District (RTD) and Union Pacific Railroad (UPRR) tracks at Colorado Blvd.
- Demobilized the UPRR field trailer and began site restoration.
- KMP submitted the Notice of Completion for Denver Rock Island Railroad (DRIR), BNSF and UPRR crossings on the Project.
- Completed remaining work at the Safeway property adjacent to the Colorado Blvd. on-ramp to EB I-70.
- Continued installation and testing of Express Lanes tolling infrastructure and equipment.
- Continued York pond excavation and roadway reconstruction work.
- Continue miscellaneous work on local streets and intersections between Colorado and Brighton Blvd.
- Continue I-70 ITS device integration with the CDOT ITS group.

Region 2 CBC Program

In Q1 FY2020, CDOT/BTE was awarded a \$12.5M discretionary grant through the USDOT Competitive Highway Bridge Program (CHBP) for the replacement of 14 BTE eligible structures. The Region 2 Concrete Box Culvert and Corrugated Metal Pipe Program (R2B2) is a design-build project that will address the original 14 BTE eligible structures that were included in the grant application as well as three additional nearby BTE eligible structures in rural areas of southern Colorado. The structures are located along key corridors and their replacement will assist with rural mobility as well as enhance statewide connections to interstate commerce, particularly for the movement of agricultural goods and access to tourist destinations through the elimination of load restricted routes.

Program Updates

- Four structures were Released-for-Construction, two structures are at 100% design, four structures are at 30% design, four structures are nearing 30% design, and three structures are at a planning level
- Project completion scheduled for FY2025
- Aluminum Box Culverts (ALBC) have been procured and are being assembled on site



Image 19 & 20. Installation of an Aluminum Box Culvert at US 9 over Mack Gulch (J-15-G)

Region 4/1 Rural Bridge Replacement Program

The Eastern Plains Bridge Replacement Program addresses seven BTE eligible structures and three non-eligible structures throughout Eastern Colorado in CDOT Regions 4 and 1. These bridges provide critical rural mobility and play a key role in the movement of agricultural and resource products in the State. Maintenance needs of the bridges has greatly increased in recent years and the average age of the existing bridges is approaching 80 years. The project is utilizing construction manager/general contractor (CM/GC) contracting and will be delivered in multiple packages of similar structures located in close geographic proximity to gain efficiencies during design and construction.

Program Updates

- Package #1 is in construction (80% complete)
- A construction agreed price has been negotiated for Package #2 and notice-to-proceed for construction is scheduled for Q2 FY2023
- 30% (FIR) level design is complete for Package #3
- Long lead time procurement is being leveraged as a proactive measure to avoid potential project delays and cost overruns due to supply chain disruptions and inflation

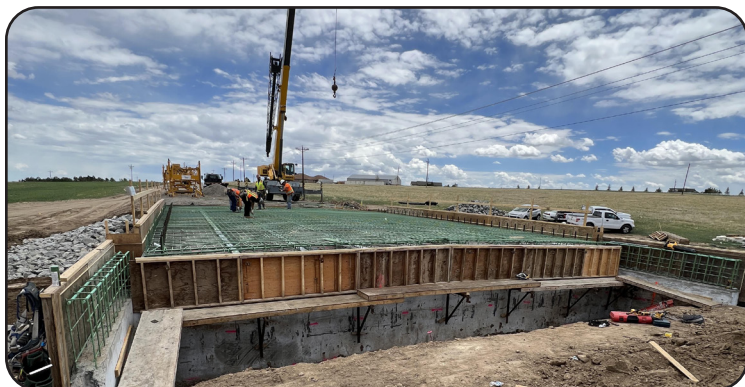


Image 21 & 22. Bridge Deck Rebar and Pre-cast Bridge Approach Installation on US 36 ML over Draw (F-19-E)

I-70 Vail Pass Safety and Operations Improvement

CDOT/BTE was awarded \$60.7M through the FY2020 USDOT INFRA Discretionary Grant Program to advance the I-70 Vail Pass Safety and Operations Improvement Project. The BTE program was leveraged to improve the competitiveness of the grant applications by increasing the state funding match and showing participation of multiple stakeholders. The project includes: the reconstruction of the BTE eligible westbound and eastbound structures over Polk Creek, construction of an eastbound auxiliary lane, shoulder widening, curve modifications, re-construction of a truck ramp, dynamic message signs, wildlife underpasses and fencing, and a variable speed limit system.

Project Updates

- The BTE Board approved an increase to the maximum BTE funding commitment to add the westbound structure (F-12- AT) to the project scope
- The BTE Board approved a resolution to increase the maximum BTE funding commitment from \$61.5M to \$93.5M to account for cost escalation due to inflation
- Construction of F-12-AT started in Q1 FY2023 and is scheduled to continue through December 2023
- The eastbound bridge (F-12-AS) will be delivered in Package #5 and is scheduled to reach final design in July 2023, with construction scheduled to start in April 2024



Image 23 & 24. Drilled Shafts and Setting Rebar Cage Abutments for Pier 2 at I-70 WB over Polk Creek (F-12-AT)

Floyd Hill

This corridor improvement project includes the replacement of two BTE eligible structures, F-15-BL, which carries traffic westbound on I-70 over Clear Creek and US 6 at the base of Floyd Hill, and F-15-BM, the ramp to US 6 from I-70 westbound. The project scope includes plans to eliminate the historic westbound bottleneck at the top of Floyd Hill, curve flattening and safety improvements, interchange and greenway improvements, wildlife safety mitigation including wildlife crossings and fencing, and an east bound climbing lane for heavy commercial and slow-moving vehicles. During the quarter, FHWA announced that CDOT and the Floyd Hill Project were awarded a \$100M grant through the Infrastructure for Rebuilding America (INFRA) program. The project is now fully funded through the grant, strategic SB17-267/SB21-260 funding, and innovative financing by BTE and CTIO.

Project Updates

- CM/GC was approved by the Transportation Commission as the project delivery method
- A \$260M BTE funding commitment was approved by the Board
- With the award of a \$100M grant through the Federal INFRA program, it was officially announced that the project is fully funded!



Image 25 & 26. I-70 ML over US 6, Clear Creek (F-15-BL)

BUDGET AND ENCUMBRANCES

Bridge and Tunnel Enterprise staff continues to coordinate with the CDOT Region staff to de-budget projects that are substantially complete in accordance with SB 16-122. Table 7 shows the encumbrance and budget balances as of September 30, 2022, by Region, for projects that have been substantially complete for more than six months. On April 24, 2020, the Chief Engineer and Chief Financial Officer announced guidance regarding project debudget and closure. This guidance has defined substantial completion as project final acceptance.

Table 7. Projects Substantially Complete Over Six Months Aging Encumbrance and Budget Balances

Region	Encumbrances (\$)	Budget Balances (\$)	Projects	Phases
1	-	-	0	0
2	1,543,407	400,179	2	3
3	-	-	0	0
4	22,291	27,205	1	1
5	-	-	0	0
Total	1,565,698	427,384	3	4
% of Total Current Program	0.96%	0.32%	9.1%	6.6%
Previous Quarter (Q4 FY2022)	585,656	74,119		
Difference	980,042	353,265		

One project, Ilex, has been added to the list which has caused a large increase to the encumbrance and budget balances. Ilex along with I-25 over Butte Creek are both in the dispute resolution process which has delayed the de-budgeting process. Since June 30, 2022, the budget and encumbrance balances have increased by \$1,333,307.

Removed/Closed Out	Additions
None	I-25 over Ilex, Bennet

FINANCIAL INFORMATION

The following is a program overview of financial statistics as of September 30, 2022.

- The program has multiple funding sources including proceeds from the 2010 Build America Bond program, FASTER bridge fee dollars (collected yearly revenues from vehicle registrations), bank loan, and other funds which are primarily Federal. In FY 2023, BTE has begun budgeting Bridge & Tunnel Impact and Retail Delivery Fee revenues which are programmed for CDOT 10-Year Plan projects.
- From program inception (life-to-date) through September 30, 2022, a total of approximately \$1,689.1M has been budgeted (all funding sources), and Expenditures and Encumbrances are \$1,391.1M and \$162.8M (all funding sources), respectively. Reference Table 8 below for details by funding source.
- For comparison purposes, the totals from the previous quarterly report (Q4 FY2022) are reported in the far-right column.
- \$307.9M of 2010 BABs Bond proceeds and interest earnings available have been expended.

Table 8. Program Financial Statistics as of September 30, 2022 (\$ in Millions)

	Build America Bonds 2010 A Proceeds	FASTER Bridge	Bank of America Loan	Other Funds	Total Q1 FY2023	Total Q4 FY2022
Budget	\$307.9	\$1,241.4	\$40.7	\$99.1	\$1,689.1	\$1,659.5
Expenditures	\$307.9	\$972.0	\$40.7	\$70.5	\$1,391.1	\$1,381.9
Encumbrances	\$0.0	\$155.9	\$0.0	\$6.9	\$162.8	\$129.4

The Bridge and Tunnel Enterprise program currently consists of 200 funding-eligible structures; including 89 structures budgeted with bond funds. The structure count has remained the same since Q4 FY2022. The current programmed amount for these 200 structures is approximately \$1,937.1M. Table 9 below provides an itemization of current funding sources for the Bridge Enterprise program.

Table 9. Program Financial Statistics as of September 30, 2022 (\$ in Millions)

Build America Bonds	FASTER Bridge	Other Funds	Bond Interest	Tunnel Fees	Total
\$298.1	\$1,389.3	\$116.9	\$9.8	\$123.0	\$1,937.1

The Program Allocation Plan¹ tracks BTE projects programmed since the beginning of the Bond Program by funding source, preconstruction activity and construction activity. In addition, the Program Allocation Plan includes programmed projects that have yet to be budgeted, beginning with FY2023 through FY2026, and includes budget adjustments that have not been posted as of September 30, 2022. Projects that were budgeted prior to the Bond Program are shown in summary at the bottom of the third page as Pre-Bond Projects. The program life-to-date (LTD) total liabilities for the BTE program are \$1,937.1M, an increase of \$4.1M from the \$1,933.0M total liability reported on June 30, 2022. No new projects were added to the Allocation Plan since last quarter.

The Four-Year Quarterly Cash Flow Projection² depicts all current available BTE cash balances, forecast revenues, and forecast expenditures for currently programmed projects. BTE liabilities and the timing of milestone payments for the Central 70 project and several 10-Year Plan projects are defined by the Amended and Restated IAA between CDOT, HPTE, BTE and updated milestone forecasts are incorporated in the cash flow. This forecast model also considers Resolution BE 15-8-2 which sets parameters for the use of BTE funds during the construction period of the Central 70 project. In addition, the forecast contains the Capital Performance (Availability) Payment, which grows at 2% per year. Also, the cash flow now includes Bridge and Tunnel fees that were established by SB21-260. Collection of these fees began in FY2023 (July 2022).

Bridge and Tunnel Enterprise has forecast the cash balance to decrease by approximately \$184.0M, mostly due to the Central 70 project during the period of the Four-Year Cash Flow (October 2022 through September 2026), down to \$7.3M. To date, Central 70 Milestone Payments 2A and 3, 2B, 4A, 4B and 5A have been made. In accordance with Resolution BE-17-11-1, the contingency for the BTE share of potential supervening events has been included in the cash drawdown forecast. This contingency was budgeted through a budget supplement at the May 2022 Board meeting.

BTE is actively managing project schedules and evaluating financing opportunities for CDOT 10-Year Plan projects to maintain a \$25M cash floor. BTE will closely monitor estimates, project timing and revenues and will adjust the programmed projects to maintain a positive cash balance. In accordance with the Amended and Restated IAA, and updated milestone payments, the final milestone and substantial completion payments are both scheduled in January 2023.

¹ Reference Appendix A for the Program Allocation Plan

² Reference Appendix B for the Four-Year Quarterly Cash Flow Projection

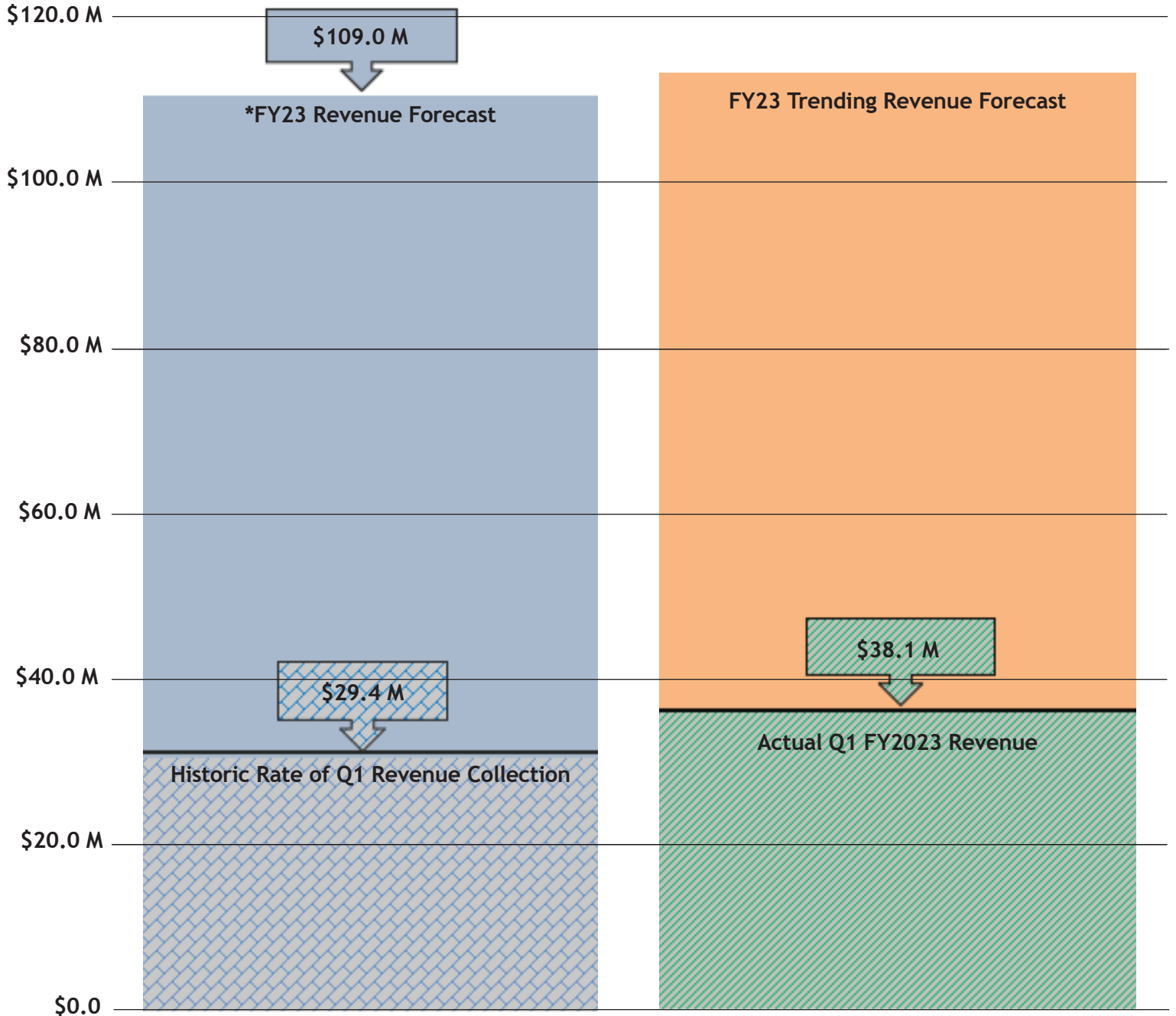
As of Q1 FY2023, actual YTD BTE revenues were \$38.1M, which is \$8.7M above the FY2023 revenue budget of \$29.4M, when applied to the FY2023 revenue budget of \$109.0M. This information is shown below in Figure C.

Figure C. Forecast vs Actual FASTER Revenue Comparison



COLORADO
 Department of Transportation
 Statewide Bridge and Tunnel Enterprise

Statewide Bridge & Tunnel Enterprise
 Forecast vs Actual Revenue Comparison



*Information Provided by the Office of Financial Management and Budget



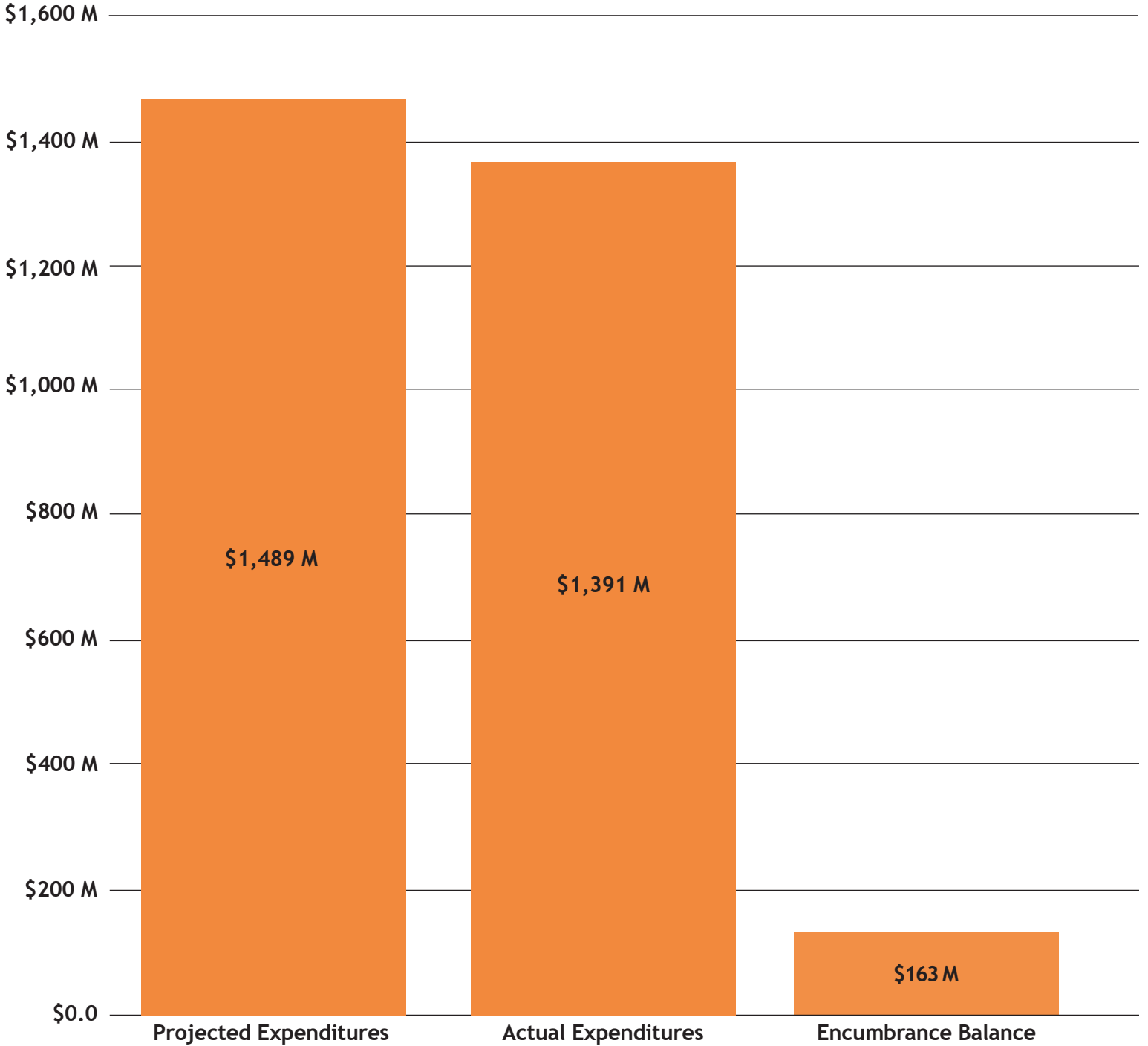
The total program financial performance graph (Figure D) depicts actual expenditures and encumbrances against projected expenditures, inception to date (ITD). Projected expenditures are forecast at \$1,489M on September 30, 2022, an increase of \$68M since June 30, 2022. Actual LTD expenditures as of September 30, 2022 are \$1,391M, as compared to \$1,382M on June 30, 2022, an increase of \$9M or 0.65%. The current encumbrance balance is \$163M, an increase of \$34M since June 30, 2022, primarily due to the encumbrance of forecast Central 70 expenditures in FY23.

Figure D. Total Program Financial Performance



COLORADO
 Department of Transportation
 Statewide Bridge and Tunnel Enterprise

Statewide Bridge & Tunnel Enterprise Program Performance
 ITD - As of September 30, 2022





Location	Project Accounting Number	Count	Original Bridge Number	Region	Pre-Construction				Construction				Project Total All Funds	Pre-Construction Start Date	Ad Date	Construction Start Date	Completion Date		
					Total Other Funds	Total FASTER Funds	2010 Bond Proceeds	Bond Interest	Total Pre-Construction All Funds	Total Other Funds	Total FASTER Funds	2010 Bond Proceeds						Bond Interest	Total Construction All Funds
SH 120 ML over RR, ARKANSAS RIVER	18013	1	K-16-K	2	-	468,198	-	-	468,198	-	653,545	4,833,271	-	5,486,816	5,955,014	07/09/10	05/25/12	10/08/12	06/27/14
US 350 ML over DRAW	18177	1	M-21-D	2	-	449,681	-	-	449,681	-	-	1,509,477	-	1,509,477	1,959,158	02/01/11	08/25/11	10/19/11	05/18/12
US 24 ML over BLACK SQUIRREL CREEK	18203	1	H-18-A	2	-	288,894	-	-	288,894	-	-	2,993,733	-	2,993,733	3,282,627	06/01/10	09/09/11	11/15/11	08/17/12
CUCHARAS	18250	1	O-16-A	2	-	176,063	-	-	176,063	-	-	-	-	-	176,063	12/01/10	-	-	-
SH 12 PURGATOIRE RIVER	18251	1	P-17-H	2	-	150,662	-	-	150,662	-	-	-	-	-	150,662	12/01/10	-	-	-
CUCHARAS & SH 12 PURGATOIRE RIVER COMBINED CONST.	18640	0	O-16-A & P-17-H	2	-	-	-	-	-	-	-	2,132,692	-	2,132,692	2,132,692	-	10/20/11	02/24/12	11/15/12
US 160 ML over CAT CREEK	18321	1	O-26-L	2	-	340,422	868	-	341,290	-	-	-	-	-	341,290	02/01/11	-	-	-
US 160 ML over DRAW	18321	1	O-25-I	2	-	-	-	-	-	-	-	-	-	-	-	02/01/11	-	-	-
US 160 ML over N FK Sand Arroyo	18321	1	O-25-H	2	-	-	-	-	-	-	-	-	-	-	-	02/01/11	-	-	-
Combined	18321	0	-	2	-	-	-	-	-	-	12,034	3,543,166	-	3,555,200	3,555,200	-	12/15/11	03/29/12	12/13/12
SH 101 ML over DRAW	18178	1	M-24-B	2	-	268,899	-	-	268,899	-	-	-	-	-	268,899	02/01/11	-	-	-
SH 101 ML over Purgatoire River - R2	18435	1	L-24-F	2	-	-	132,413	-	132,413	-	-	-	-	-	132,413	02/01/11	-	-	-
COMBINED CONST. SH 101 ML over DRAW and over PURGATOIRE RIVER	18722	0	M-24-B & L-24-F	2	-	-	-	-	-	-	-	3,731,491	-	3,731,491	3,731,491	-	11/23/11	03/29/12	10/31/12
SH 266 ML over HOLBROOK CANAL	18179	1	L-22-O	2	-	722,726	-	-	722,726	-	-	-	-	-	722,726	12/01/10	-	-	-
FT. LYON STORAGE CANAL	18179	1	L-22-E	2	-	-	-	-	-	-	-	-	-	-	-	12/01/10	-	-	-
SH 71 ML over FT. LYON CANAL	18440	1	L-22-K	2	-	200	743,798	-	743,998	-	-	-	-	-	743,998	07/15/11	-	-	-
COMBINED CONST. HOLBROOK & FT. LYON CANAL & STORAGE CANAL	18627	0	L-22-O, E & K	2	-	-	799,497	-	799,497	-	32,953	5,486,885	-	5,519,838	6,319,335	-	09/22/11	08/20/12	03/07/13
US 50 ML over BNSF RR	18155	1	L-28-C	2	-	1,553,259	106,079	-	1,659,338	-	6,166,545	1	-	6,166,546	7,825,884	02/01/11	07/17/14	02/23/15	07/01/16
US 50 ML over DRAW	18155	1	L-27-S	2	-	-	-	-	-	-	-	-	-	-	-	02/01/11	07/17/14	02/23/15	07/01/16
US 350 ML over DRAW	18461	1	O-19-J	2	-	-	299,217	-	299,217	-	-	2,105,844	-	2,105,844	2,405,061	10/15/10	09/20/12	12/03/12	06/18/13
SH 239 ML OVER IRRIGATION CANAL	18461	1	P-19-AD	2	-	-	-	-	-	-	-	-	-	-	-	10/15/10	09/20/12	12/03/12	06/18/13
US 350 ML over PURGATOIRE RIVER	18208	1	O-19-H	2	-	493,712	-	-	493,712	-	34,143	3,153,661	-	3,187,804	3,681,516	10/15/10	02/21/13	04/29/13	04/11/14
SH 120 ML over DRAW, UP RR	18370	1	K-16-S	2	-	505,078	755,829	-	1,260,907	-	4,106,291	312,427	-	4,418,718	5,679,625	03/15/11	06/19/14	10/28/14	01/08/16
I-25 ML over Indiana Ave.	19206	0	L-18-M & L-18-W	2	-	123,988	108,191	-	232,179	-	-	-	-	-	232,179	10/15/12	-	-	-
Northern Ave. over I-25 ML	19207	0	L-18-AQ	2	-	132,619	2,000	-	134,619	-	-	-	-	-	134,619	10/15/12	-	-	-
I-25 over Ilex, RR, Bennet	17666	0	K-18-CL	2	7,547,800	599,222	1,908,484	-	10,055,506	-	-	-	-	-	10,055,506	06/01/11	-	-	-
I-25 over Ilex, RR, Bennet	17666	0	K-18-CK	2	-	-	-	-	-	-	-	-	-	-	-	06/01/11	-	-	-
I-25 ML over Indiana Ave.	19205	1	L-18-M	2	-	-	-	-	-	-	3,271,797	10,000	-	3,281,797	3,281,797	-	03/06/14	04/01/15	10/29/16
I-25 ML over Indiana Ave.	19205	1	L-18-W	2	-	-	-	-	-	-	771,562	10,000	-	781,562	781,562	-	03/06/14	04/01/15	10/29/16
Northern Ave. over I-25 ML	19205	1	L-18-AQ	2	-	-	-	-	-	-	3,918,686	10,000	-	3,928,686	3,928,686	-	03/06/14	04/01/15	10/29/16
Mesa Ave over I-25 ML	19205	1	L-18-AU	2	-	-	-	-	-	-	3,527,195	10,000	-	3,537,195	3,537,195	-	03/06/14	02/10/15	10/18/16
I-25 ML NBND over US 50 ML	19205	1	K-18-AX	2	-	-	-	-	-	-	3,469,192	10,000	-	3,479,192	3,479,192	-	03/06/14	02/10/15	10/19/16
US 50 BUS EBND over Arkansas River	19205	1	K-18-R	2	-	-	-	-	-	-	5,000,941	11,983	-	5,012,924	5,012,924	-	03/06/14	02/10/15	10/19/16
I-25 over Ilex, RR, Bennet	19205	1	K-18-CL	2	-	-	-	-	-	1,300,757	38,489,977	100,000	-	39,890,734	39,890,734	-	03/06/14	02/10/15	12/27/18
I-25 over Ilex, RR, Bennet	19205	1	K-18-CK	2	-	-	-	-	-	-	-	-	-	-	-	-	03/06/14	02/10/15	12/27/18
Sub-Total Ilex					-	-	-	-	-	1,300,757	58,449,350	161,983	-	59,912,090	59,912,090				
I-25 Frontage Road over Pine Creek	19123	1	I-17-O	2	-	-	168,125	-	168,125	-	-	-	-	-	168,125	10/15/12	-	-	-
US50 ML over Draw Cotopaxi-Texas Creek	19304	1	K-14-J	2	-	-	342,596	-	342,596	-	1,452,992	-	-	1,452,992	1,795,588	10/30/12	06/12/14	03/01/15	08/15/15
SH69 ML over Milligan Arroyo	19055	1	M-16-P	2	-	3,460	385,840	-	389,300	-	-	-	-	-	389,300	12/19/12	03/01/18	05/29/18	06/26/19
	22320				-	37,260	-	37,260	-	-	3,598,764	-	-	3,598,764	3,636,024				
I-25 Bus Route over Sull Creek	19054	1	N-17-C	2	-	3,876	558,109	-	561,985	-	-	1,910,242	-	1,910,242	2,472,227	12/19/12	10/24/13	02/17/14	09/03/14
SH160 ML over Smith Canyon	19053	1	P-23-A	2	-	-	373,691	-	373,691	-	1,775,780	-	-	1,775,780	2,149,471	12/19/12	02/05/15	05/26/15	10/30/15
SH71 over ARKANSAS RIVER	21012	1	L-22-L	2	-	254,704	-	-	254,704	-	6,517,636	-	-	6,517,636	6,772,340	05/13/15	08/30/18	12/10/18	11/15/19
SH71 over ARKANSAS RIVER	24738	0	L-22-LL	2	-	19,200	-	-	19,200	-	739,465	-	-	739,465	758,665				
SH 96 over Rush Creek	21011	1	K-17-F	2	-	344,896	-	-	344,896	-	2,275,375	-	-	2,275,375	2,620,271	07/29/15	03/29/18	07/16/18	12/14/18
I-25 over CO RD640, Butte Creek	20407	1	N-17-BN	2	-	-	-	-	-	-	-	-	-	-	-	10/23/17	08/08/18	10/15/18	11/24/20
I-25 over CO RD 103, Butte Creek	20407	1	N-17-S	2	-	542,082	-	-	542,082	-	10,190,732	-	-	10,190,732	10,732,814				
I-25 over US 160 ML, RR Spur	22350	1	N-17-AD	2	-	1,536,185	-	-	1,536,185	-	20,132,600	-	-	20,132,600	21,668,785	11/06/17	02/04/21	04/05/21	12/02/22
I-25 SB over Draw	22823	1	K-18-U	2	-	102,986	-	-	102,986	-	2,531,140	-	-	2,531,140	2,634,126	11/05/18	12/05/19	04/07/20	10/30/20
US 285 over South Fork South Platte River	22865	1	H-13-G	2	-	473,405	-	-	473,405	-	4,757,550	-	-	4,757,550	5,230,955	01/01/19	12/01/20	06/01/20	11/30/21
SH 71 over HIGHLINE CANAL	23005	1	M-22-N	2	-	333,687	-	-	333,687	-	1,667,723	-	-	1,667,723	2,001,410	06/01/19	05/07/20	02/23/21	11/30/21
SH 101 over DRAW	23006	1	M-24-A	2	-	235,942	-	-	235,942	-	-	-	-	-	2,693,061	06/01/19	05/07/20	09/17/20	03/04/21
SH 101 over DRAW	23007	1	M-24-I	2	-	190,050	-	-	190,050	-	2,457,119	-	-	2,457,119	190,050	06/01/19	05/07/20	09/17/20	03/04/21
US 24 over DRAW	22995	1	H-19-C	2	-	215,998	-	-	215,998	-	1,883,400	-	-	1,883,400	2,099,398	03/29/19	10/01/20	01/01/21	09/30/21
I-25 SB over S. ACADEMY BLVD.	23605	1	I-17-GR	2	-	-	-	-	-	-	-	-	-	-	-	10/01/19	09/01/20	02/15/21	12/28/22
I-25 NB over S. ACADEMY BLVD.	23605	1	I-17-GQ	2	-	1,724,900	-	-	1,724,900	-	24,343,746	-	-	24,343,746	26,068,646				



Location	Project Accounting Number	Count	Original Bridge Number	Region	Pre-Construction				Construction				Project Total All Funds	Pre-Construction Start Date	Ad Date	Construction Start Date	Completion Date		
					Total Other Funds	Total FASTER Funds	2010 Bond Proceeds	Bond Interest	Total Pre-Construction All Funds	Total Other Funds	Total FASTER Funds	2010 Bond Proceeds						Bond Interest	Total Construction All Funds
R2 CHBP Grant - Design thru Procurement	23558	14		2	2,129,040	369,885			2,498,925	10,345,960	42,371,288			52,717,248	55,216,173	01/01/20	01/01/21	05/01/21	12/31/22
R2 Non-Grant - Design thru Procurement	23559	3		2	-	788,320			788,320	-	11,392,604			11,392,604	12,180,924	01/01/20	01/01/21	05/01/21	12/31/22
US 285 at SH 9	24052	1	H-13-A	2							5,848,800			5,848,800	5,848,800				
US 6 ML over EAGLE RIVER	18160	1	F-09-H	3	155,656	150,986	-	-	306,642	-	-	4,201,213	-	4,201,213	4,507,855	09/28/10	05/19/11	07/20/11	05/18/12
US 50 SERVICE RD over GUNNISON RVR SR	18193	1	J-09-C	3	143,514	-	203,584	-	347,098	-	-	2,369,188	-	2,369,188	2,716,286	06/01/10	06/23/11	08/29/11	08/31/12
US 50 SERVICE RD over GUNNISON RVR SR	18193	1	J-09-D	3	-	-	-	-	-	-	-	-	-	-	-	06/01/10	06/23/11	08/29/11	08/31/12
I 70 SERVICE RD over COLORADO RIVER SR	18162	1	F-08-F	3	146,819	-	1,805,747	-	1,952,566	-	-	7,966,405	-	7,966,405	9,918,971	04/06/11	09/02/12	09/04/12	09/30/13
Historic Eagle County Bridges Book	19325	0	F-08-F	3	-	22,062	-	-	22,062	-	-	-	-	-	22,062	-	-	-	-
US 40 ML over E FORK ELK RIVER	18138	1	C-09-C	3	-	-	1,517,178	-	1,517,178	-	-	4,117,918	-	4,117,918	5,635,096	04/01/11	12/13/12	02/28/13	11/19/13
I 70 ML EBND over US 6, RR, EAGLE RIVER	18159	1	F-11-AC	3	1	-	1,779,324	-	1,779,325	-	12,457,996	500,000	-	12,957,996	14,737,321	04/01/11	03/06/14	07/19/14	05/05/17
I 70 ML WBND over US 6, RR, EAGLE RIVER	18159	1	F-11-AB	3	-	-	-	-	-	-	-	-	-	-	-	04/01/11	03/06/14	07/19/14	05/05/17
SH 82 ML over I 70 ML COLORADO RVR,RR	18158	1	F-07-A	3	75,569	30,684,256	10,537,357	-	41,297,182	1,853,821	57,561,362	-	-	59,415,183	100,712,365	05/11/11	07/01/15	01/01/16	10/30/18
PEDESTRIAN BRIDGE over COLORADO RVR	21122	0		3	-	-	-	-	-	5,492,960	9,298,894	-	-	14,791,854	14,791,854	05/11/11	07/01/15	01/01/16	10/30/18
US 34 over NORTH FORK COLORADO RIVER	21010	1	D-13-A	3	-	872,718	-	-	872,718	-	5,954,412	-	-	5,954,412	6,827,130	06/08/17	11/07/18	04/01/19	09/15/20
I-70 WBND over Colorado River	21007	1	F-05-L	3	231,182	26,919	-	-	258,101	-	-	-	-	258,101	258,101	08/12/15	02/01/18	04/02/18	12/15/18
	22359					40,876			40,876		3,077,349			3,077,349	3,118,225				
I-70 EBND over US6,RR, Eagle River	21008	1	F-10-L	3	225,184	26,104	-	-	251,288	-	-	-	-	251,288	251,288	08/12/15	01/11/18	03/16/18	08/20/18
	22360					50,226			50,226		3,145,365			3,145,365	3,195,591				
I-70 WBND over Colorado River Overflow	21009	1	G-03-Q	3	410,959	47,567	-	-	458,526	-	-	-	-	458,526	458,526	08/12/15	01/04/18	03/26/18	08/15/18
	22170					63,961			63,961		3,200,030			3,200,030	3,263,991				
US 6 ML over CASTLE CREEK	22576	1	F-09-K	3	-	44,909	-	-	44,909	-	3,824,079	-	-	3,824,079	3,868,988	07/01/19	05/02/19	07/22/19	12/14/19
I-70 over FOREST SERVICE ROAD	22712	1	F-13-S	3	-	1,843,855	-	-	1,843,855	-	15,074,746	-	-	15,074,746	16,918,601	08/09/18		04/28/21	07/22/22
SH 92 ML over GUNNISON RIVER	22943	1	I-05-V	3	-	882,698	-	-	882,698	-	13,569,821	-	-	13,569,821	14,452,519	03/18/19	10/22/20	11/04/21	02/04/23
SH 64 over STRAWBERRY CREEK	23061	1	D-04-G	3	-	522,710	-	-	522,710	-	13,675,787	-	-	13,675,787	14,198,497	08/31/20	01/03/22	03/01/22	10/27/23
SH 64 over WHITE RIVER		1	D-03-A																
I-70 over US 6,US 24, RR, EAGLE RIVER	23217	1	F-11-AD	3	-	435,013	-	-	435,013	-	-	-	-	435,013	435,013				
I-70 EBND VAIL PASS	23929	1	F-12-AS	3	-	6,887,500	-	-	6,887,500	-	36,800,000	-	-	36,800,000	43,687,500	12/01/20			
I-70 WBND VAIL PASS		1	F-12-AT	3	-	-	-	-	-	22,957,340	25,385,379	-	-	48,342,719	48,342,719				
US 6 over Elk Creek	24493	1	F-06-A	3	-	526,600	-	-	526,600	-	3,777,257	-	-	3,777,257	4,303,857	06/01/21			
US 24 ML over DRAW	18003	1	G-22-J	4	-	-	-	-	-	799,863	-	244,857	-	1,044,720	1,044,720	04/01/08	12/16/10	05/02/11	08/24/11
US 287 ML over DRAW	17804	1	B-16-AE	4	1,401,692	85,153	139,160	-	1,626,005	-	-	2,338,640	-	2,338,640	3,964,645	04/15/10	05/12/11	07/25/11	05/01/12
SH 14 ML over COALBANK CREEK	18451	1	B-17-L	4	-	1,398,233	249,641	-	1,647,874	-	-	3,358,015	-	3,358,015	5,005,889	12/16/10	11/01/12	04/01/14	09/30/15
I 25 SERVICE RD over LITTLE THOMPSON RIVER SR	18053	1	C-17-BN	4	941,887	-	-	-	941,887	-	-	1,782,003	-	1,782,003	2,723,890	02/01/11	04/05/12	09/04/12	04/12/13
US 34 ML over N FRK REPUBLICAN RIVER	18432	1	D-28-B	4	-	781,069	-	-	781,069	-	-	2,693,477	-	2,693,477	3,474,546	11/23/10	04/26/12	06/25/12	12/14/12
SH 66 ML over ST VRAIN River	18224	1	D-17-AK	4	-	-	1,311,071	-	1,311,071	-	-	4,228,779	-	4,228,779	5,539,850	02/01/11	09/06/12	11/05/12	06/18/14
I-70 FRONTAGE ROAD over DRAW	18610	1	G-21-B	4	-	-	348,714	-	348,714	-	-	1,012,700	-	1,012,700	1,361,414	09/05/11	11/16/12	01/28/13	05/23/13
SH 14 ML over CACHE LA POUDDRE RIVER	18085	1	B-16-D	4	1,395,490	351,788	753,947	-	2,501,225	611,742	9,946,160	-	800,000	11,357,902	13,859,127	07/14/09	06/19/14	09/22/14	11/20/15
US 85 ML over UPRR Nunn Bridge	18669	1	B-17-C	4	-	-	1,254,778	-	1,254,778	-	3,053	6,009,722	-	6,012,775	7,267,553	06/24/11	01/10/13	03/17/13	06/13/14
SH60 over SOUTH PLATTE RIVER	21146	1	C-17-B	4	-	1,109,585	-	-	1,109,585	-	8,500,249	-	-	8,500,249	9,609,834	06/17/15	06/21/18	10/01/18	11/01/19
I-25 ML over County Road 48	20999	1	B-16-EU	4	-	943,689	-	-	943,689	-	6,464,893	-	-	6,464,893	7,408,582	06/01/16	02/14/19	05/22/19	1/27/20
Prospect Road over I-25	22248	1	B-16-AM	4	-	3,061,209	-	-	3,061,209	-	18,483,966	-	-	18,483,966	21,545,175	11/01/17		10/10/18	07/14/21
I-25 ML over DRAW (Hillsboro)	22482	1	C-17-EL	4	-	22,086	-	-	22,086	-	3,582,614	-	-	3,582,614	3,604,700	11/01/17		06/27/18	11/30/24
SH59 over I-70 (Emergency)	22566	1	G-25-K	4	-	270,966	-	-	270,966	-	6,235,225	-	-	6,235,225	6,506,191	04/16/18		04/27/18	10/10/18
US 34 ML over N FRK REPUBLICAN RIVER	22962	1	D-27-G	4	-	561,694	-	-	561,694	-	3,002,218	-	-	3,002,218	3,563,912	03/01/19	04/01/20	06/29/20	11/18/20
US 34 OVER REPUBLICAN RIVER	22963	1	D-28-P	4	-	-	-	-	-	-	3,712,057	-	-	3,712,057	3,712,057	04/27/20		04/27/20	01/27/21
TIMBER BRIDGE EASTERN PLAINS	23010	7	Various	4	-	4,426,200	-	-	4,426,200	-	-	-	-	4,426,200	4,426,200	02/01/20			
TIMBER BRIDGE EASTERN PLAINS: PKG 1	24367		3 of 7	4	-	238,856	-	-	238,856	-	10,752,321	-	-	10,991,177	10,991,177		09/21/21	12/06/21	10/28/22
TIMBER BRIDGE EASTERN PLAINS: PKG 2	24405		2 of 7	4	-	-	-	-	-	-	8,523,775	-	-	8,523,775	8,523,775				
TIMBER BRIDGE EASTERN PLAINS: PKG 3			2 of 7	4	-	-	-	-	-	-	8,000,000	-	-	8,000,000	8,000,000				
US 40 ML over DRAW	24224	1	I-24-N	4	-	549,510	-	-	549,510	-	13,000,000	-	-	13,000,000	13,549,510	01/01/21			
Holyoke Bundle	22529	4	Various	4	-	1,805,820	-	-	1,805,820	-	12,700,000	-	-	12,700,000	14,505,820	06/01/21			
SH 145 ML over LEOPARD CREEK	18231	1	L-04-B	5	-	-	506,177	-	506,177	47,559	-	3,301,616	-	3,349,175	3,855,352	02/01/11	03/15/12	05/15/12	05/30/13
SH 62 ML over UNCOMPAGHGRE RIVER	18323	1	L-05-B	5	-	1,012,619	268,923	-	1,281,542	3,380	-	6,519,674	-	6,523,054	7,804,596	02/01/11	02/09/12	04/24/12	05/30/13
SH90 over DOLORES RIVER	20817	1	K-01-C	5	-	965,694	-	-	965,694	-	4,977,169	-	-	4,977,169	5,942,863	01/30/15	11/09/15	12/05/16	08/18/17
US 50 over AGATE CREEK	22436	1	K-11-G	5	-	-	-	-	-	-	1,526,757	-	-	1,526,757	1,526,757	03/29/18	03/29/18	06/18/18	10/08/18
US 285 over RIO CONEJOS OVERFLOW	23089	1	P-12-A	5	-	192,900	-	-	192,900	-	5,240,000	-	-	5,240,000	5,432,900	04/17/19		11/01/23	03/01/24
Design for Future Years						3,120,000			3,120,000						3,120,000				
PRE-BOND PROJECTS		16		All	2,338,990	85,383													



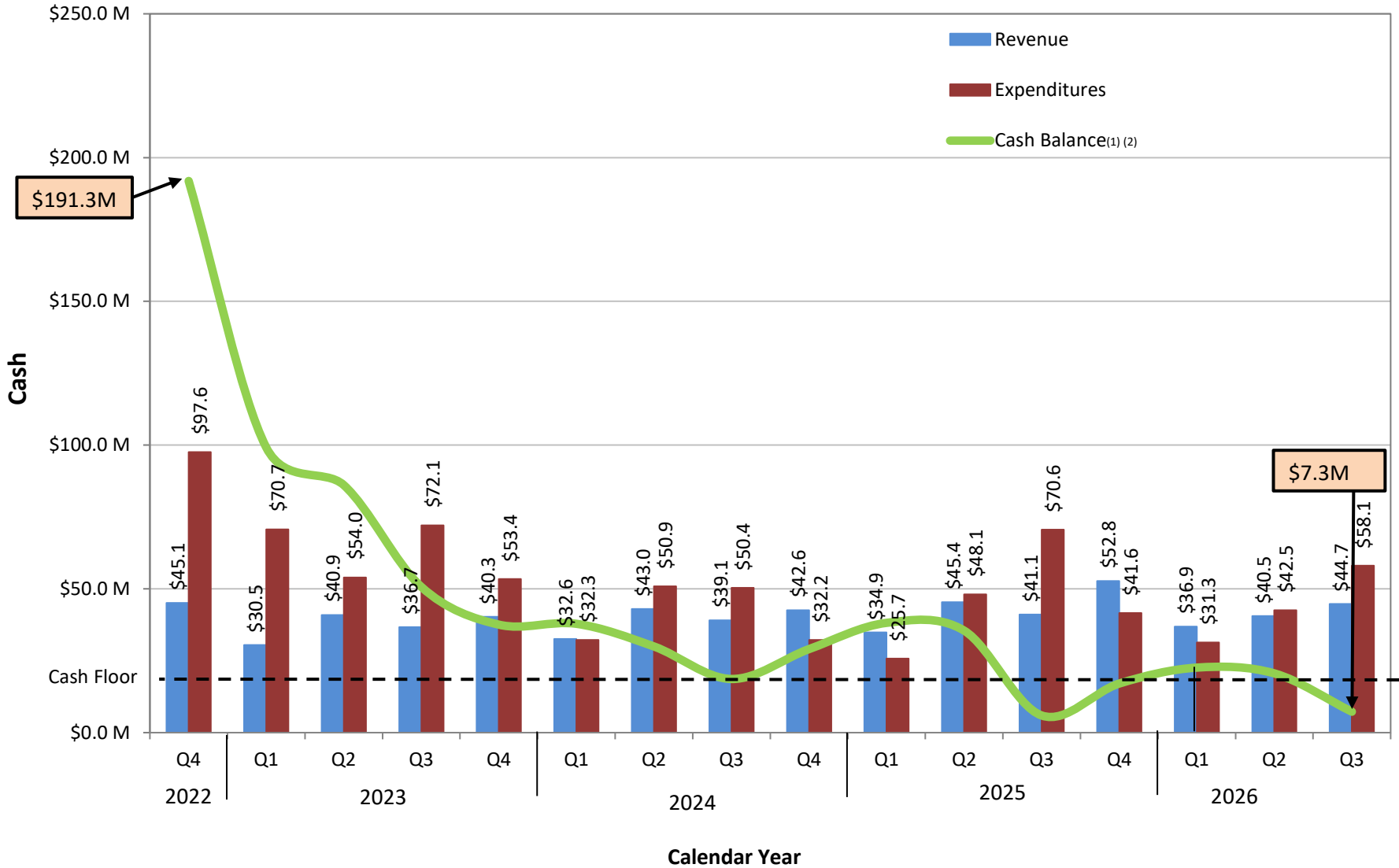
Program Funding by Source Summary											
Sources:	Pre-Construction					Construction					Total All Funds
	Other	FASTER	Bond	Bond Interest	Total	Other	FASTER	Bond	Bond Interest	Total	
Federal	\$ 7,236,019	\$ -	\$ -	\$ -	\$ 7,236,019	\$ 31,571,599	\$ -	\$ -	\$ -	\$ 31,571,599	\$ 38,807,618
State	\$ 925,518	-	-	-	925,518	143,827	-	-	-	143,827	\$ 1,069,345
Local	\$ 25,139,799	-	-	-	25,139,799	11,163,136	-	-	-	11,163,136	\$ 36,302,935
FASTER	\$ -	299,605,947	-	-	299,605,947	-	1,023,236,288	-	-	1,023,236,288	\$ 1,322,842,235
Bank of America Loan	\$ 12,030,650	-	-	-	12,030,650	28,668,324	-	-	-	28,668,324	\$ 40,698,974
2010 Bonds	\$ -	-	52,835,939	-	52,835,939	-	-	245,307,666	-	245,307,666	\$ 298,143,605
Bond Interest	\$ -	-	-	546,911	546,911	-	-	-	9,279,210	9,279,210	\$ 9,826,121
Future Funds	\$ -	-	-	-	-	-	-	-	-	-	\$ -
Total	\$ 45,331,986	\$ 299,605,947	\$ 52,835,939	\$ 546,911	\$ 398,320,783	\$ 71,546,886	\$ 1,023,236,288	\$ 245,307,666	\$ 9,279,210	\$ 1,349,370,050	\$ 1,747,690,833

APPENDIX B: FOUR YEAR QUARTERLY CASH FLOW PROJECTION



COLORADO
 Department of Transportation
 Statewide Bridge and Tunnel Enterprise

Statewide Bridge and Tunnel Enterprise Four Year Quarterly Cash Flow Projection



(1) Cash balance line includes the use of \$172.3M of preconstruction activities for the Central 70.
 (2) Estimated impact to cash Central 70 project for milestone and availability payments from the most recent financial model