

2022



# STEWARDSHIP OVERSIGHT AGREEMENT ANNUAL REPORT

FHWA - COLORADO DIVISION  
CDOT



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

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# Section 1



U.S. Department of Transportation  
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# Section 1 | Purpose

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This report serves as the principal instrument by which the Colorado Department of Transportation (CDOT) informs the Federal Highway Administration (FHWA) of its performance across a number of mutually agreed upon indicators and measures associated with the administration of the Federal Aid Highway Program (FAHP). In 23 U.S.C. 106(g), Congress directs that the Secretary shall establish an oversight program to monitor the effective and efficient use of funds authorized to carry out the FAHP. This program includes FHWA oversight of the State's processes and management practices, including those involved in carrying out the approvals and related responsibilities assumed by the State under 23 U.S.C. 106(c). Congress defines that, at a minimum, the oversight program shall be responsive to all areas relating to financial integrity and project delivery.

The goal of this performance summary is to ensure that FHWA and CDOT are administering the FAHP in a cost-effective manner that maintains Colorado's national highway network, optimizes operations, improves safety, and provides for national security while protecting and preserving environmental resources.

Section 2 briefly introduces the various functional program areas, describes key activities accomplished in 2022, and provides tables summarizing CDOT's performance and compliance in each area. Performance/compliance measures, and their associated reporting frequencies and targets/baselines, were established in the May 2020 version of the FHWA-CDOT Stewardship and Oversight Agreement.

Section 3 describes risk response strategies that the CDOT and FHWA Quality Improvement Council (QIC) is currently focusing on and the status of recommendations in the implementation phase.

Section 4 is a list of additional accomplishments completed in recent years.

# Section 2



U.S. Department of Transportation  
**Federal Highway  
Administration**



**COLORADO**  
Department of Transportation

## 2.1 | Engineering: Civil Rights

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### INTRODUCTION

**CDOT Manager:** Marsha Nelson, Chief Equity Officer

**FHWA Manager:** Nikki Bumpers, Civil Rights Program Manager

The Civil Rights Program is responsible for all activities in CDOT related to civil rights programs and requirements under state and federal law. Civil rights programs are an integral part of all aspects of CDOT's ongoing activities. The Civil Rights Stewardship Agreement is a Quality Control and Quality Assurance (QC & QA) approach, which relies on joint FHWA/CDOT team reviews of program activities to accomplish oversight of the program. The plan shifts federal oversight from a project-by-project basis to a program-level basis. Staff from CDOT's Environmental Justice and Equity (EJE) Branch and the Division of Human Resources work in partnership with each Regional Civil Rights Manager and with the FHWA Civil Rights Specialist to review, evaluate, and improve CDOT's Civil Rights Programs. The partnership between CDOT and FHWA continues to be an important part of ensuring compliance with the letter and spirit of laws and regulations.

### QUALITY/RESULTS

Statewide activities conducted to accomplish elements in Quality Section:

#### Disadvantaged Business Enterprise (DBE) Program

- Exceeded FFY 2022 Disadvantaged Business Enterprise (DBE) goal of 11.89% with 11.91% overall DBE participation.
- The DBE Specification used for highway construction projects was updated (effective for projects advertised July 1, 2022) to align processes for CDOT-advertised and Local Agency-advertised projects. This added clarity regarding DBE monitoring and oversight in an effort to increase compliance and required the usage of the Civil Rights compliance monitoring system, B2GNow.

#### Emerging Small Business (ESB) Program

- To date, CDOT has leveraged the ESB Mentor-Protégé program to benefit:
  - 10 Teams
  - 19 Companies
  - 7 DBEs
  - 10 ESBs
  - 2 Protégés with prime contracts; \$838 K in total prime awards
  - 7 Protégés with subcontracts; \$2.1 M in total sub awards
  - \$1M paid to Protégé firms

- Actively working to restructure the ESB Mentor Protege program and increase awareness of the program and of active participants within CDOT regions and within CDOT specialty units. In the upcoming fiscal year, the EJE Branch is holding internal and external listening sessions to make enhancements to the Mentor Protege program.

### Outreach

- Hosted seven small business forums (three for professional services, three for construction, and one kickoff for 2022 that combined professional services and construction) to increase transparency in the CDOT process and improve communication on small business - related issues.
- CDOT hosted the first in-person event since 2019 when it held the Small Business Winter Social. This event allowed for attendees to network with others in the industry and was a platform for CDOT project staff to meet companies with demonstrated interest in working on their projects.
- Total attendees for CDOT small business events in 2022 was 415. This includes small business owners of professional services and construction firms actively working on CDOT projects and/or looking to start working with CDOT. These attendees also include CDOT project staff (HQ & Regions) as well as CDOT specialty units (i.e. Civil Rights, Planning, etc.).

### DBE Supportive Services Program

- Provided one-on-one assistance to 1,149 small businesses, including 274 DBEs and 167 ESBs
- Hosted 41 training classes for 1,017 attendees
- Delivered two Leading Edge for Transportation classes for 36 participants
- Weekly Bid Matching Email List Subscribers: 1,796
- Connect2DOT Email List Subscribers: 5,175

### Contractor Compliance

- Civil Rights-related specifications and contract language were updated in July 2022 to require the utilization of the B2GNow compliance system on Local Agency Professional Services contracts and construction projects for increased accuracy in reporting. This required an update to forms as well as guidance documents to ensure consistency.
- Two task forces were formed in an effort to more clearly outline compliance process roles and responsibilities. One task force was focused on the creation of process flowcharts for civil rights compliance elements on CDOT-advertised construction projects and professional services contracts. While the other documented the same information for Local Agency- advertised construction projects and professional services contracts.

This assists in documenting both the similarities and differences or the compliance processes and will be utilized as a training tool as the systems become mandated for Local Agency projects and contracts in the future. 40 process flowcharts were created through this detailed process.

- Contractor Compliance Training Sessions have long been part of CDOT's services provided to contractors and CDOT staff members. Through a virtual platform, CDOT provided the following training opportunities in FFY 2022:
  - Local Agency:
    - Professional Services Compliance on CDOT Local Agency Contracts (June 28) - we had almost 200 people attend
  - CDOT Contract Delivery
    - June 8, 9am - 11am: CDOT Certified Payrolls & LCPtracker
    - June 16, 11am - 12pm: CDOT On-the-Job-Training (OJT) Program & Compliance
    - June 23, 9am - 10am: DBE Program: Compliance on CDOT Construction Projects
    - June 30, 11am - 12pm: DBE Program: Certification, Codes, Counting & Changes
    - Aug 26, 9am - 11am: CDOT Certified Payrolls & LCPtracker
  - Completed 18 Contractor Compliance Reviews

#### On-The-Job Training (OJT) Program

- Achieved 114,264 On-the-Job Training (OJT) hours, which exceeded the goal of 50,000 hours.

#### OJT Supportive Services Program

- CDOT has issued an RFP for delivery of FY23 OJT Supportive Services in the format of six week NCCER courses and is slated to have a contract in place by mid-March 2023.
- 
- CDOT has fully expended federal FY18 and FY19 OJT/SS funds, bringing us another year closer to balancing annual allocations.

#### Title VI

- The Title VI E-learning was launched in CDOT's Learning Management System as a requirement for all CDOT staff. At the conclusion of FFY 2022, 88% of CDOT staff members had taken the training, which is one of the highest completion rates for a required training.
- CRBRC completed 6 subrecipient desk reviews for Title VI plans. The reviews were informal and will provide a training baseline for the newly hired Title VI program manager to become familiar with the program and processes.
- For FFY2022, the EJE Branch developed and completed a Title VI equity work plan with the FHWA Division Office Civil Rights Manager. The work plan reviewed Title VI contract

language regulatory compliance within CDOT's agreements and contracts. EJE team members collaborated with grant managers to review existing agreements and contracts, as well as worked with contract writers to incorporate required language in CDOT's templates.

- Restructured Title VI Implementation Plan to focus on specific program areas using deep-dive audits to review programs and recommend enhancements. This approach will assist CDOT in incorporating more equity-related initiatives into the agency using Title VI program compliance as an entry point to review programs, processes, and procedures.

The following performance measures demonstrate the health of the Civil Rights Program

Table - Performance/Compliance Measures (Civil Rights)

## PERFORMANCE MEASURES

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/Baseline	2021	2022
107	DBE participation (as percentage) to date on Federal Aid Highway Program	DBE Program	Transport	Federal FY	11.55%	11.77%	11.92%
459	# of DBE firms receiving supportive services/benefits	DBE Supportive Services (DBE/SS)	Connect2DOT Program	Federal FY	100	274	274
313	# of completed Contract Compliance Reviews	Contractor Compliance (External EEO) Program	Google Drive	Federal FY	18	18	18
460	# of OJT hours achieved	On the Job Training (OJT) Program	Google Drive/LCPtracker	Federal FY	50,000 hours	106,007 hours	114,264 hours
461	# of persons placed and employed (post- services)	OJT Supportive Services (OJT/SS)	Google Drive	Federal FY	50	None placed; 26 trained	None placed; 59 trained
310	# of completed STA reviews	Title VI Program	Title VI Assessment	Federal FY	6	10	6

1438	Complete workplace culture reviews to support AAP and inclusive excellence strategy	EDI	Quarterly AA Report	Federal FY	100%	100%	2/6
1439	Gather EEO, sexual harassment, ADA, and all Title VII investigation outcomes data	EEO/AA	Quarterly AA Report	Federal FY	100%	100%	Aggregate data on discrimination reports / findings gathered
	Implement EDI training to support Governor’s Executive Order D 2020175	EDI	Quarterly AA Report	Federal FY	75%	83%	Started and Continuous

## KEY LEARNINGS

A key learning opportunity over the past federal fiscal year for CDOT was that the alignment of the State Internal Affirmative Action/Equal Employment Opportunity (AA/EEO) Officer and internal EDI programs being placed in the Division of Human Resources was not the most effective structure for the programs. Therefore, the programs and associated positions are being transferred to the Environmental Justice and Equity Branch. This decision will allow the internal and external EDI programs to be in more alignment. It also places the AA/EEO position in a program reviewer role which will assist in the agency in aligning federal compliance requirements.

Throughout the COVID-19 pandemic, the EJE Branch has offered a variety of virtual training opportunities. CDOT also continued to host its quarterly Small Business Collaborative Forums for both the construction and professional services industries, although on digital platforms. Attendance increased as learning opportunities became available virtually. However, CDOT was faced with a new challenge: creating an engaging platform with interactive elements and on-demand content for attendees. One of the ways CDOT has been working to improve the virtual attendee experience is by trying different virtual meeting platforms and activities to increase networking activities and interactions. It has also become clear that both internal and external stakeholders have a desire to resume in-person training and forum sessions. The EJE Branch is evaluating the most effective way to begin incorporating that in the upcoming federal fiscal year. Along with this effort, the EJE Branch developed training materials that align specifically with outlined roles and responsibilities for the project compliance team. This ensures the

appropriate audiences receive targeted training information. The web pages on CDOT's external-facing website will be restructured with increased user experience based on these target audiences.

## **NEXT STEPS**

The CDOT Affirmative Action/Equal Employment Opportunity (AA/EEO) position and plan requirements as well as the internal EDI efforts have been transferred from the Division of Human Resources into the Environmental Justice and Equity Branch (effective January 2023). The EJE Branch plans to evaluate the current status of the programs and outline FFY 2024 goals in the upcoming plan.

The EJE Branch also recognizes the need to enhance Environmental Justice and equity-related initiatives in project delivery phases and is planning to focus on that area during the upcoming federal fiscal year to better engage with disproportionately impacted communities.

# 2.2 | Construction Engineering Services

## INTRODUCTION

**CDOT Manager:** Markos Atamo

**FHWA Manager:** Shaun Cutting

The functional group and assigned responsibilities for this section of the report are the Construction Engineering Services (CES) Group who prepares engineering cost estimates of construction projects prior to bidding in accordance with Federal rules and regulations, performs materially unbalanced bids, and prepares cost estimates for added work on active construction projects after their award.

## QUALITY/RESULTS

Overall Program Estimate Accuracy (EEMA):

- CY2022 Total Program Estimate (Design Bid Build projects): \$732.3M
- CY2022 Total Program Award (Design Bid Build projects): \$743.3M
- Accuracy: -1.6% of Engineer’s Estimate

## PERFORMANCE MEASURES

The following performance measures demonstrate the health of the Construction Engineering Services Program:

Table - Performance/Compliance Measures (Contracts and Market Analysis)

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/Baseline	2020	2021	2022
809	Overall program estimate accuracy (EEMA)	Accuracy of total Program Estimate as compared to total Program Award on ALL Design-Bid-Build projects	CMA Branch Work Plan	Calendar Year	+/- 3%	4.8%	4.6%	-1.6%
463	Percent of projects awarded within set percentage of Engineer’s Estimate	Percent of awarded low bids within +/- 10% of Engineer’s Estimate on ALL projects	CMA Branch Work Plans	Calendar Year	50%	45.5%	50.4%	44.5%

## KEY LEARNINGS

No key learnings were identified.

## NEXT STEPS

CDOT is in the process of implementing a new estimation tool – AASHTOWare, to help improve the accuracies of estimates.

## 2.3 | Engineering: Hydraulics

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### INTRODUCTION

**CDOT Manager:** Alfred (Al) Gross

**FHWA Manager:** Spencer Tucker

The Hydraulic program addresses statewide issues involving design of hydraulics structures that include bridges, culverts, inlets, manholes, channels/ditches, and water quality basins. The program is responsible for working with the Regions to ensure that hydrologic and hydraulic design is implemented consistently according to CDOT Drainage Design Manual standards and criteria. The program is also responsible for creating and reviewing drainage/water related policy and procedural directives along with relevant and applicable standards and specifications.

### QUALITY/RESULTS

#### Staff Branches Activities:

1. **Managed the Bridge Scour (Plan of Action) POA project.** A summary of CDOT's scour critical projects and structures is as follows: TO 14 included work on 42 structures of which included 19 designs and plan productions, 9 Shelf to Ad bridges (3 duplicates from designs) 1 bridge structure received construction support services and 16 involved updated scour analyses memos and TO 13 closeout services. Countermeasure designs included update scour analyses(updated hydrology, 1D to 2D modelling and updated scour analyses) matrix riprap, grouted boulders, drop structures, bend way weirs, debris deflectors, and micro pile structural solutions. In addition to design, consultant provided environmental permitting, water control issues, monitoring program, aiding in ROW acquisition, floodplain and construction support. Overall 3 structures were removed one that had scour countermeasures installed, one by updated analysis (hydrology, modelling and scour analysis) and last from an updated scour coding. Additional Item 113 scour coding's were written for 6 bridges that were originally coded as a 7 and were changed to 3. Two projects from TO 14 went to construction that included R3 I-70 Salt Washes 20923 and the R1 Wadsworth/I-70 Clear Creek bridges 21222. This information was taken from RESPEC's TO 14 annual summary report.

Developed a RFP effort for the Bridge Scour project which included putting together an 8 member panel of Region Hydraulic Engineers and 2 Staff Bridge senior Engineers. Work consisted of reading and interviewing proposals from 6 Engineering firms and then selecting two firms for the new scour contracts. Bridge Scour POA contracts for the two new scour consultants were awarded and they will start work in early 2023. A yearly summary report for TO 14 was completed and sent to FHWA and Staff Bridge.

- 2. Supported the Specifications and Standards Unit** - Worked on several drainage related standards and specifications details. Worked with the Staff Materials Branch (Ed Trujillo) in reviewing new drainage related products approvals that had been requested to be added to the CDOT Approved Products List. Started participating in a new aspect of the New Product Evaluation program that included involvement in the National Transportation Evaluation Program (NTPEP). Reviewed documents, attended seminar and workshops. Those included the NTPEP Webinar Series - Audit Program and NTPE CMP Evaluation.

Developed and provided a presentation on CDOT's Pipe Material Selection Guide to be presented at the Area Engineers RE visits in early '23. Neil and I presented on the Pipe Material Selection Guide at the PE III meeting in January '23. Reviewed Old Castle Drainage Details M&S Standard Plans with Staff Bridge and the Specifications and Standards unit.

- 3. Supported the Applied Research and Innovation Branch.** Attended meetings and reviewed documents and materials for several water/drainage related research projects. The research projects in 2021 included: *Post-Wildfire Peak Flow Data Collection and Modeling in Burn Scar Areas by USGS and Assessment of Post-Wild-Fire Debris Flow Hazard to Transportation Infrastructure in Colorado by CSU and R4 Hydraulics*. Worked with Dewberry Consultant on NCHRP 20-59 (53-A) Flood Cast research project that included the RHE's, Staff and Region Maintenance.
- 4. Supported the Transportation Engineering Training Program (TETP) Core Curriculum for the annual Hydraulic presentation.** R3 Hydraulic Engineer Stuart Gardner and myself conducted the presentation at the R1 KOA building on March 3 2022. In addition, John Ewy, the new Hydraulic RE in R1, is scheduled to participate in the 2023 class. Got late word that R5 Brian Campbell is interested and will attend in 2023 and then participate in 2024. But he must take Train the Trainer class and become familiar with the presentation materials. In addition we conducted two practice presentations with the group before the actual class.
- 5. Supported the Environmental Programs Branch** participated in various committees and meetings. Committees included; Water Quality Advisory Committee (WQAC) and the Permanent Water Quality Mitigation Pool Fund Committee. Attended meetings and reviewed documents for development of the new permanent water quality operation and manual template. Reviewed material for the rewording of the Water Right Portal Guidance Manual. Participated in the Dewatering and Water Diversion committee as well as the Permanent Water Quality During Construction sub task 4 & 5. Worked on a

panel to develop Diversion and Dewatering presentation material for the Area Engineers Residency RE Visits to be scheduled in early 2023.

6. **Participated in the Risk and Resiliency Working group.** Attended meetings, participated in seminars/workshops and reviewed reports.

7. **Supported 2d Quick Check Statewide Initiative**

The 2d Quick Check Phase 1 (Experimentation) effort concluded in March 2022. The initiative ultimately completed 46 individual analyses in the CDOT Project Pre-Construction Design scoping or pre-scoping phase with a 2D Quick Check, or 2dQC. The 16 In-house CDOT 2dQCs were supplemented with 30 more 2dQCs developed by private firms working under contract for Region 4, including AECOM, Ayres Associates, Jacobs Engineering, Muller Engineering, RS&H, and RESPEC. Short reports from each individual project were compiled into a Final Rollup Summary Report and shared with Region Hydraulic Engineers and Project Managers. In total, the 2dQC program identified \$22.4 million in quantifiable resiliency benefit, in addition to several innovative design and safety enhancements. Results, resources, and lessons learned were compiled by team members Kalli Wegren (PE I R4), Brian Varrella (PE II R4), and Brian Campbell (PE I R5). This 2dQC knowledge was shared through various internal, statewide, and national events including: Region 4 Base Course (March 2022), CDOT PE II Meeting (April 2022), FHWA 2D Hydraulic Model's Forum (April 2022), ACEC Denver Conference (April 2022), and the National Hydraulic Engineering Conference (August 2022). In September, Kalli Wegren and Brian Varrella also hosted a 3-hour training workshop for 2dQCs at the Colorado Association of Stormwater and Floodplain Managers (CASFM) Annual Conference. Outreach has led to the collaboration and partnership with several other communities, consultants, and DOTs including North Dakota, Kansas, North Carolina, Texas, and Idaho.

Of the \$425,760 project total budget, \$262,000 (61.5%) of funds were utilized by the consultant team, and the remaining \$163,760 (38.5%) budget was utilized by in-house analyses, reporting and operational overhead costs (or indirects). The return on investment (ROI) for projects compared to the quantifiable benefit discovery of \$22.4 million was 115:1, and the ROI was 43:1 for the total program (which accounts for indirects).

The 2D Quick Check Initiative was so successful that it is now moving to Phase 2 (Process Development) in 2023. In August of 2022, the 2dQC program was awarded \$82,500 of STIC funding to start Phase 2 and the charter was drafted by December 2022. Furthermore, 26 projects have been identified as eligible for a Phase 2 2dQC. Of the 26

projects, 2 of the 2dQCs have already been completed and 5 2dQCs were in analysis as of the end of the year. This information was prepared by Kalli Wegren R4 Hydraulic Engineer.

### **Region Activities:**

1. The CDOT Annual Hydraulic Meeting was held virtually April 27, 2022. It was a half day meeting that centered around discussion topics by Region Hydraulic Engineers (RHE's) followed by round table discussions based on an agenda of topics ranging from hydrology and hydraulics to various specific Region issues or concerns. Also attended the Annual PE II meeting in early October.
2. Office of Employee Development (OED) offered to again sponsor a water related training class in 2022 but there were very few classes offered remotely that were of interest. In addition, it did not make sense to sponsor a class at CDOT Headquarters as we could not provide enough participants. We would be liable for paying for the number of participants below the 20 minimum number.
3. Brian Campbell R5 RHE along with Brian Varrella R4 Hydraulic RE and Kalli Wegren R4 Hydraulic PE set up schedule and request for topics for 2023 Hydraulic Lunch & Learns. Wide variety of topics such as GIS and Risk & Resiliency and how it related to Hydraulics are good examples.
4. CDOT Project Support (Neil Lacey) continued to sponsor a corporate membership (\$400) for the Colorado Association of Stormwater and Floodplain Managers (CASFM). CDOT has approximately 35-40 members statewide from Hydraulics, Environmental and other specialty groups.

## PERFORMANCE MEASURES

The following performance measures demonstrate the health of the Hydraulics Programs:

**Table - Performance/Compliance Measures (Hydraulics)**

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/Baseline	2021	2021
1441	Update of the Scour Designs going to Construction for all Scour Critical Bridges	The percentage of scour critical on-system bridges worked on (NBI Item 113 Code: 2, 3 or U) in current year that went to AD or construction or after additional scour analysis were taken off list by re-coding Item113.	Consultant management reports	State FY	30%	31%	33%

## KEY LEARNINGS

Some of the RHE's voiced concerns that they cannot get approval to attend various workshops or conferences. The MHFD annual seminar and the CASFM conference are the two most important water related events to attend each year. The annual NHEC was held in Atlanta and two RHE's presented and attended the event. Headquarters sponsored one of the R4 RHE's to attend.

## NEXT STEPS

At the advice of Staff Bridge, Staff Hydraulics and consultants set up a new system to track scour structure repair costs and overall project costs associated with Bridge Scour POA project.

## 2.4 | Engineering: Pavement and Materials

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### INTRODUCTION

**CDOT Manager:**        **Craig Wieden**

**FHWA Manager:**       **Brian Dobling**

The Materials and Geotechnical Services Branch is responsible for ensuring quality in the products used for construction of the State transportation system. The Branch is responsible for the specifications, test procedures, and associated testing of materials to ensure compliance with CDOT standards and specifications and FHWA Regulations. The Materials and Geotechnical Services Branch includes Programs in the following areas: Soils/Geotechnical, Geohazards, Concrete and Physical Properties, Asphalt Pavements, Pavement Management, and Pavement Design. Due to the COVID Pandemic and restrictions that were put in place on in-person training and/or number of training attendees, some modifications to our typical processes were required. Updates below reflect those modifications where appropriate.

### QUALITY/RESULTS

1. The CDOT Soils and Geotechnical Program conducted 24 Western Alliance for Quality Transportation Construction (WAQTC) certification classes. This included certification sessions in Durango to provide service to Western Slope personnel. In those classes, 327 people attended and of those, 206 certificates were issued. This corresponds to an approximate 60% passing rate.
2. Through partnerships with industry (Colorado Asphalt Pavement Association [CAPA], American Concrete Pavement Association [ACPA], Colorado Ready Mixed Concrete Association [CRMCA], etc.), CDOT hosted numerous ACI certification courses and Concrete Paving Inspector courses at our Central Lab location and provided certified proctors for various LabCAT certifications courses over the year. 58 American Concrete Institute (ACI) certification/training courses were offered. Five Concrete Paving Inspector classes were offered via the American Concrete Pavement Association. 31 LabCAT certification courses and 10 Asphalt Inspector certification courses were offered via the Rocky Mountain Asphalt Education Center (RMAEC). Two meetings of the LabCAT Board of Directors were also held, as were two meetings of the WAQTC Board of Directors to review and discuss the Programs. A new Memorandum of Understanding was executed between CDOT and CAPA for them to continue administration of the LabCAT Certification Program through December 2027.

3. The CDOT Field Materials Manual (FMM) was updated and published by July 1, 2022, allowing continuity and guidance to CDOT projects. This manual is updated each year on July 1, and projects advertised after July 1 of that year are to utilize the newly published Manual. Another addendum to the CDOT Pavement Design Manual was issued rather than a full manual update. This addendum is to be utilized in conjunction with the 2021 Pavement Design Manual. The CDOT Laboratory Manual of Test Procedures is on a five-year update cycle. It was last updated in 2020, but revisions to the manual are posted in each successive year. Notable FMM improvements can be viewed in the 2023 Field Materials Manual, but included:

- FMM improvements included an update to each chapter for Documentation when using SMM/LIMS and language on the use of the Adobe Sign Form 473/474, updates to the Documentation for Design-Build Projects, and updates to the Special Notice to Contractors, OA Frequency Guide Schedules, and IA Schedule.
- Revised CP-11-8 Precast Structure Pre Approval and other CP-11 sections pertaining to Asphalt Binder, Emulsion, Cement, Fly Ash, Hydrated Lime, and Epoxy Coaters
- Updates to CP 54
- Added CP 79
- Significant work was completed related to forms updates, including CDOT Form 473/474 - Final Materials Certification, as well as other clarifications/edits to the Documentation Section of the Manual.
- Edited various sections of the Documentation for Design-Build Chapter
- Significant re-write of the Documentation for Maintenance & LA Chapters
- Updated the Special Notice to Contractors section, including:
  - Updates to Section 4 - Buy America Requirements for Iron and Steel
  - Updates to Section 5 - Buy America Requirements for Construction Materials
  - Updates to Section 5.2 - Buy America Waivers
  - Updates to Section 5.3 - Glass Bead for Pavement Marking.
- Clarified/updated numerous sections of the OA and IA Frequency Guide Schedules including:
  - Item 403 - Hot Mix Asphalt
  - Item 412 - Portland Cement Concrete Pavement
  - Item 601 - Structural Concrete
  - Item 602 - Reinforcing Steel
  - Item 606 - Guardrail
  - Item 609 - Curb and Gutter

4. The Materials Advisory Committee met six times to identify, discuss, and resolve Materials related issues. Notable improvements include edits to the Field Materials Manual, including:
  - Approval of an Environmental Product Declaration Protocol Document in support of Colorado House Bill 21-1303, which was published as Appendix O within the FMM - see item 17 below.
  - Materials specifications updates approved through the MAC and approved through the CDOT/CCA Specifications Committee can be viewed on the CDOT Specifications Page and included:
    - Revision of Section 601 - Class DF Concrete
    - Revision of Sections 101 and 106 - Environmental Product Declarations
    - Revisions of Sections 703 - Aggregate Gradation Requirements
    - Revision of Sections 106 and 412 - PCCP Thickness
    - Revision of 412 - Removal and Replacement of Concrete Pavement
5. The annual CDOT, Arizona Department of Transportation, New Mexico Department of Transportation Utah Department of Transportation Four Corners peer exchange meeting was held in Durango, Colorado in May 2022. A remote attendance option was also utilized to allow those individuals not comfortable/not allowed to travel to participate remotely. The meeting was facilitated by Dr. Jon Epps with the Texas Transportation Institute, with topics generally focused on cement/concrete, aggregates, asphalt binder/emulsion and asphalt mixtures, pavement design/selection, quality management and contracting/construction issues. The annual theme of this meeting is "Common Borders, Common Concerns" and "Shared Borders, Shared Solutions".
6. The Central Laboratory underwent and completed a biennial assessment in 2022 by AASHTO ReSOURCE, successfully maintaining our Lab Accreditation in 80 tests with the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program (AAP). This annual review consisted of a remote assessment by ReSource Staff. To help facilitate this, CDOT Central Lab staff worked diligently to upload all documents necessary to a shared Google Drive which allowed for a remote review of the pertinent documents. We are also now requiring staff to maintain appropriate accreditation documents in a "cloud based" environment so that it is readily accessible by any who need to access it.
7. The Central Laboratory quality review of each of the five Region Laboratories and remote testing facilities was conducted and reporting completed in June 2022. The 2022 inspection consisted of in-person reviews of each Region lab and equipment, as well as paperwork reviews and round robin testing/review.
8. The testing reports for the round-robin proficiency program with the Regions, consultants, and contractors were completed for asphalt, concrete compressive strength, aggregates, sulfates in soil, and soils materials.

9. The Pavement Management Technical Committee met six times during the year. Improvements made to the Pavement Management system are documented in the Technical Committee meeting minutes. Notable improvements from 2022 include a revised Chip Seal model, a Minor Rehabilitation treatment option for Low Volume roads, allowing committed projects to be selected for future treatments in the predictive model, and excluding highways that are not maintained by CDOT from being chosen by the construction program. Additionally, the FY 26 planned SUR treatments were finalized and approved as per our internal process, and the Surface Treatment Program Distribution for Regional Planning (FY 2027 and FY 2028) was submitted, approved, and documented in a Chief Engineer's Memorandum. In an effort to address interstate pavement conditions related to the Federal Performance Measures, a Quality Improvement Council - Joint Process Review titled "Improving how CDOT Manages Interstate Pavement Condition (HPMS) - DL versus NPMs" was completed resulting in recommended areas of improvement to the Drivability Life model to better align it with the National Performance Measures. CDOT HQ Pavement Management Program also continues to generate 1/10th mile reports using the Federal criteria on the raw data collected. This information is reviewed with the Region SUR Asset/Pavement Managers, and areas of concern are identified. This process led to the identification and delivery of a project consisting of a diamond grind on 24 miles of I-76 in Region 4 to help address federally "poor" interstate pavement conditions. Data collection conducted after the project was completed did show that all federally poor 1/10th mile segments within the length of the project had been addressed.
10. The Geohazards Program continued to provide project support and emergency response around the state to address the risk posed by geologic hazards. The Program provided ongoing design and construction support for resilience measures advertised and constructed in 2022 to manage debris flow hazards in Glenwood Canyon following the Grizzly Creek Fire. Programmed risk reduction efforts included design for embankment and rockfall mitigation projects, as well as construction of landslide and rockfall mitigation projects on SH 133 in Western Colorado. Hazard events mainly occurred in areas with existing mitigation systems. As a result, emergency response efforts primarily focused on debris clean up and repair of mitigation systems to their original functional condition. Affected systems included multiple rockfall barriers, attenuators, and mesh systems located throughout the state.
11. Partnering with Industry: The CDOT/American Concrete Paving Association (ACPA) Coop met four times to identify and resolve issues. CAPA and CDOT met four times in 2022 to discuss asphalt/materials related topics. A smoothness task force with both ACPA and CAPA participation was initiated and is focusing on improving our smoothness specification/criteria for both pavement types. The smoothness task force work will continue into 2023. Work also continued in 2022 on task force topics related to Concrete Pavement Repairs and Low Strength Evaluation. The Colorado Ready Mixed

Concrete Association and the Concrete & Physical Properties Program meet bi-monthly to discuss specification changes and administration of the ACI certifications. Industry partnerships generate and refine the finished implemented improvements that are listed under MAC accomplishments in item 4 above.

12. The use of CP-59 to document and approve WMA technologies and contractors continued in 2021. The total number of approved Warm Mix Asphalt (WMA) technologies stands at 11 and contractors at 13. Many contractors are approved for multiple WMA technologies.
13. LIMS (Laboratory Information Management System) - LIMS Support/Training continues through CDOT's Technology and Data Services, Engineering Software support group. A representative of this group continues to attend MAC meetings to provide updates. An effort led by the same group to evaluate engineering software systems has concluded. Our next LIMS system will be provided by Atser. Efforts related to the development of this program are underway with Materials Personnel involvement. CDOT's Materials Technician Certification continued through 2022 as an e-learning course through our Transportation Engineering Training Program (TETP). This e-learning Certification provides Materials Technicians an overview of what is expected from them as a Materials Technician on CDOT projects, including processes and resources, communication protocols/expectations, documentation requirements, and provides an overview/refresher of SMM/LIMS.
14. The Product Evaluation Program continues to implement changes and improvements to better the process used for approval of products. Coordination with various subject matter experts identified within specialty areas and use of Google drives to review documentation and sign the Form 595s (Product Evaluation Forms) has streamlined the process.
15. The Concrete/Physical Properties Program, continued programs for certifying Pavement Smoothness Testing Devices, and certification of Pavement Smoothness Operators in 2022. For 2022, 14 Profiling Equipment devices and 22 Profiling Operators were certified through the CDOT process in accordance with Colorado Procedure 78.
16. Buy America Updates - With passage of the Infrastructure Investment and Jobs Act (IIJA) which contained the Build America, Buy America (BABA) Act in November 2021, significant updates to the Buy America requirements for Federally Funded projects were required to be implemented on those projects advertising on or after November 10, 2022. The Materials & Geotechnical Services unit utilized information contained in the Office of Management and Budget (OMB) memo M-22-11 to develop and implement Buy America requirements for Construction Materials. This included revising the Buy America section of the CDOT Specifications, as well as significant edits to the Field Materials Manual Special Notice to Contractors section. See FMM updates under Item 4 above. This was successfully completed by the November 10, 2022 required date with a Materials Bulletin being issued Department wide to notify personnel of the FMM Special

Notice to Contractors update and issuance of the updated Buy America Specification since the update/publication occurred out of cycle with our standard FMM July 1 publication date. CDOT also partnered with our Transportation Engineering Training Program (TETP) to stand up a Buy America Training, focusing on the acceptance process/requirements for steel and iron products. This training is available for CDOT Staff, Consultants, and Contractors.

17. Environmental Product Declarations (EPDs) - with the passage and signing of Colorado House Bill 21-1303 in July 2021, CDOT was required to develop and implement an EPD collection effort for projects advertised after July 1, 2022. A multi-faceted team, consisting of CDOT Staff, Consultants, Subject Matter Expert, Academic, and FHWA staff, was formed and began meeting in January 2022 to work on criteria in support of the Bill. This effort was funded largely through an FHWA Demonstration Project, as well as with Research funding, made possible through CDOT participation in TPF 5(478). This team met many times over the first half of 2022 to discuss the Bill and approach to EPD collection with those industries that CDOT desired to collect EPDs from beginning on July 1, 2022. They included the Colorado Asphalt Pavement Association, the Colorado Ready Mix Concrete Association, the Colorado/Wyoming Chapter of the American Concrete Pavement Association, as well as the Concrete Reinforcing Steel Institute. When possible, both local and national representatives were engaged. This process enabled CDOT to develop and publish a specification requirement for EPD submittals, and an EPD Protocol Document in the CDOT Field Materials Manual by July 1, 2022. EPD workshops were conducted to provide information on the EPD program to both CDOT staff as well as Contractors/Industry members.

## QUALITY/RESULTS

The following performance measures demonstrate the health of the Pavement and Materials Program: Table - Performance/ Compliance Measures (Pavements and Materials)

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2020	2021 1
811	Percentage of pavements of the Interstate System in good condition	Percent of all Interstate pavement segments rated good under the criteria set by 23 CFR 490	Highway Performance Monitoring System (HPMS)	State FY	National Performance Measure Targets: 2023: 45% 2025: 47%	46.3 %	43.5 %
812	Percentage of pavements of the Interstate System in poor condition	Percent of all Interstate pavement segments rated poor under the criteria set by 23 CFR 490	Highway Performance Monitoring System (HPMS)	State FY	National Performance Measure Targets: 2023: 4% 2025: 3.5%	3.9%	3.9%
813	Percentage of pavements of the non- Interstate NHS System in good condition	Percent of all non- Interstate NHS pavement segments rated good under the criteria set by 23 CFR 490	Highway Performance Monitoring System (HPMS)	State FY	National Performance Measure Targets: 2023: 42% 2025: 43%	41.7 %	39.3 %
814	Percentage of pavements of the non- Interstate NHS System in poor condition	Percent of all non- Interstate NHS pavement segments rated poor under the criteria set by 23 CFR 490	Highway Performance Monitoring System (HPMS)	State FY	National Performance Measure Targets: 2023: 3.5% 2025: 3.5%	3.3%	3.1%

1 Data for the reporting year 2022 is not available until June 15th after the close of the reporting year. Therefore, data from 2021 is reported.

## KEY LEARNINGS

Additional updates and revisions to the Buy America Program were implemented, including an update to our specifications to expand Buy America to Construction Materials as part of the IJJA BABA Acts, and updates to the Special Notice to Contractors section of the Field Materials Manual.

Development of a Buy America E-learning course in conjunction with our Transportation Engineering Training Program (TETP) to expand on the steel and iron compliance aspect of Buy America. The course is available to CDOT personnel, consultant personnel, and Contractors.

Implementation of HB 21-1303 - the “Buy Clean Colorado Act”, which required development of a protocol document related to Environmental Product Declarations (EPDs) for eligible construction materials as outlined in the Bill, as well as a supporting specification to be used on projects on which EPD submittals would be required.

## NEXT STEPS

Asphalt Cement Cost Adjustment – Continue monitoring of the index trends and associated payments with the new specification to track the benefit to CDOT as well as those projects now bid that opt in or out of the AC adjustment specification.

Buy America – Continue education and work related to the expansion of the Buy America program associated with the IJJA BABA Act.

Formation of a task force to evaluate Life Cycle Cost Analysis Improvements and Alternate Bid process improvements.

Continued expansion of CDOT’s Environmental Product Declaration (EPD) effort, with plans to begin requiring EPD submittals for precast and structural steel elements.

Continued work on implementation of Balanced Mix Designs for HMA. A joint CDOT/Industry working group continues discussions on implementation and movement towards this effort.

# 2.5 | Engineering: Design and Construction

## INTRODUCTION

**CDOT Manager:** Neil Lacey (Design) and Markos Atamo (Construction)

**FHWA Manager:** Shaun Cutting

The Design Program Manager and Construction Area Engineers are responsible for assisting the five CDOT Regions to maintain uniform administration and management practices in construction, design, and contract administration. In addition, they are responsible for providing technical assistance to the Regions and various local agencies.

## QUALITY/RESULTS

1. There were 244 Change Orders submitted in FY2022. Of those 244, 224 (92%) were complete as submitted, 20 (8%) needed revision, and 0 (0%) needed supplemental documentation. There were 8 Major Change Orders requiring FHWA approval.
2. The Liquidated Damages table was revised this fiscal year and in place for FY 2022-23. The next revision is scheduled for review in FY 2024, revised bi-annually.
3. There were no claims filed in FY 2022.

Status of FY22 Claims		< \$250,000	>\$250,000
Claims Open Beginning FY22	6*	1	3
New Claims FY22	0	0	0
Claims Resolved FY22	0	0	0
Claims Carrying Over FY23	6*	1	3

4. Dispute Status FY 2022

Status of FY22 Disputes		< \$250,000	>\$250,000
Disputes Open Beginning FY 22	4	1	3
New Disputes FY22	2	1	1
Disputes Resolved FY22	2*	0	1
Disputes Carrying Over FY23	4	1	3

5. Four Joint CDOT/ Colorado Contractors Association (CCA) Specifications Committee meetings were held, and thirty-six standard special specifications were issued. There were eleven Findings in Public Interest (FIPI)
  - Field Materials Manual issued
  - CDOT M-E Pavement Design Manual issued

- Laboratory Manual of Test Procedures with revisions issued no Inter-Regional Reviews were performed for FY 2022. No Post Construction Reviews were performed this year. Limited Staffing, all three IRRs for FY 23 have been performed and the team is planning Post Construction Review for FY 23.
6. The Area Engineers and FHWA Area Engineers conducted Residency Visits with all of the regional design/construction residencies and traffic units.
  7. Three Area Engineer/FHWA Program Delivery Team Leader meetings were held in FY 2022.
  8. The Project Development and/or Contracts and Market Analysis Branches were represented at the following committee meetings:
    - CDOT/CCA Specifications Committee - 4 of 4 meetings
    - CDOT/ American Concrete Pavement Association (ACPA) Coop - 4 of 4 meetings
    - CDOT/ Colorado Asphalt Pavement Association (CAPA) Coop - 4 of 4 meetings
    - Project Development Advisory Committee (PDAC) - 4 of 4 meetings
    - Materials Advisory Committee (MAC) - 6 of 6 meetings
    - Local Agency Roundtable Team (LART) - 4 of 4 meetings
    - Resident Engineer Committee - 6 of 6 Meetings including the Annual PE II Meeting.
    - Water Quality Advisory Committee - 3 of 4 Meetings
  9. Nineteen construction projects and three maintenance project traffic control reviews were conducted in FY 22. Statewide average construction and maintenance project scores were 95.0% and 96.3%, respectively. The final report was submitted to FHWA on November 15, 2021.
  10. Three Construction Bulletins, four Design Bulletins and two Local Agency Bulletins were issued.
  11. The TETP conducted training courses in numerous subject areas (number of classes held): Alternative Delivery: Introduction to the Major Types of Project Delivery at CDOT VILT (1), Bridge Inspection Training (newly added - 4), Construction Project Administration (2), Construction Project Administration for Local Agencies (2), CPM Scheduling for Construction (2), Disputes and Claims Resolution (1), Interchange Planning and Design (1), Lighting Design Guide (1), Managing Contract Time (2), Project First Program (2), Reading Structural Plans (1), Transportation Core Curriculum (1), Utility Engineering Project Management Workshop (newly added - 1), Work Zone Safety and Mobility Workshop (newly added 2), Writing for Engineering Professionals (2). Fourteen (14) virtual instructor-led TETP courses were held in FY 2022. Twelve (12) in-person instructor-led TETP courses were held in FY 2022. In addition to the virtual training courses there were the following e-learning courses available:
    - Construction Budget Management for Project Managers & Engineers,
    - Construction Change Orders,
    - Construction Force Accounts,

- Construction Manual: Section 100,
- Construction Project Financials,
- CPM Scheduling: MS Project 2013,
- Guardrail Systems for Construction Engineers and Inspectors,
- Managing Contract Time,
- Plan Checking,
- Project Development Manual,
- Negotiation Fundamentals eLearning,
- Project Life Cycle Simulation, SAP Project Portal,
- Specifications Writing and Development,
- Survey Basics for Engineers, and
- Work Hour Estimation: Scope of Work.

TETP eLearnings released in FY22:

- Buy America Requirements for Iron and Steel
- Municipal Separate Storm Sewer System (MS4) Permit Overview
  - MS4 Overview for Engineering: Supplemental eLearning
  - MS4 Overview for Maintenance: Supplemental eLearning
- Professional Service Contracting (PSC) with Task Orders

## PERFORMANCE MEASURES

The following performance measures demonstrate the health of the Design and Construction Programs: Table 1 - Performance/ Compliance Indicators (Design and Construction)

SAP #	Indicator	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2022 Actual
328	Number of change orders approved by CDOT	Number of change orders which did not require FHWA approval	CDOT Work Plan	State FY Quarterly reporting	Track trend	244
345	Time to close a project from final acceptance to project closure in (Fiscal Management Information System (FMIS)	Average # of days to close a project	CDOT Work Plan	State FY Quarterly reporting	200 days	260 days

**Note SAP #345 additional prior year actuals are:**

- 2021: 321
- 2020: 280
- 2019: 394
- 2018: 415
- 2017: 443
- 2016: 374
- 2015: 278
- 2014: 314

## **QUALITY/RESULTS**

CDOT has lowered the average time to close projects through process improvements. There are still some projects that take longer to close, and we have not yet hit our goal of 95% of projects closed within 12 months of project acceptance.

## **NEXT STEPS**

Continue to assist in resolving any disputes within the projects as timely as possible. Teach and support the development of engineering training courses in order to support consistency and maintain knowledge throughout our design and construction staff.

# 2.6 | Engineering: Program and Project Delivery- Program Reporting and Transparency

## INTRODUCTION

**CDOT Manager:** Hilary Hawthorne, Steven Griffin (alt)  
**FHWA Manager:** Elizabeth Cramer

## QUALITY/RESULTS

PRTO continues to support consistent, and best, Project Management practices across CDOT. The office’s primary focus is to provide transparency to our capital construction program. PRTO tracks program delivery metrics at the statewide level such as on time project delivery and the Expenditure Performance Index (XPI) and reports the results of data analysis and data trending to the Regions for review and actions, if needed. The PRTO is continually working to determine the best metrics to guide decision making for program management. We are improving project management tools, gathering data, and working on the best methods for reporting outcomes.

PRTO is leading the initiatives described in the table below

Table – PMO Initiatives

Initiative	Description	Status	Benefits
Reporting	Continued development of Visual, easy-to-read reports that instantly aggregate and organize key program and project management data and metrics. Coordination with other CDOT teams to standardize reporting and make it more efficient, with a focus on helping CDOT communicate with our stakeholders.	Updated Monthly and new Dashboards and views are added and modified as needed. Participate with EDMAC and TUG to work towards consistency in reporting across CDOT.	Provides access to consolidated data in an easily accessible and understandable manner Track project and program progress Develop new reports for new funding Develop new reports to improve communication with our stakeholders.



<p>PMWeb System Production Support and Training</p>	<p>Project information system to support program and project management lifecycle, including multiple levels of CDOT stakeholders across functions, Regions, headquarters, and partner organizations (e.g., FHWA).</p>	<p>Development and refinement of PMWeb records will continue. Training and adoption are ongoing.</p>	<p>User friendly, one-stop shop for all project information, including updated project Scope, Schedule, and Budget Supports efforts to group and aggregate projects, identify program needs, prioritize projects and track funds. Provides access to easy-to-use metrics-based dashboards. Data from across the program and project lifecycle can be used to forecast expenditures. Increases efficiency of process workflows, collaboration, and data entry</p>
<p>Project Management Guidance for Preconstruction</p>	<p>Processes, guidance, tools, and requirements for project managers that are standardized across CDOT. Teaming with PMWeb and Project Delivery to ensure guidance is updated, consistent and available in one virtual location.</p>	<p>Update of the Project Development manual has been initiated. PMWeb website is being updated to provide guidance</p>	<p>Establishes standardized, consistent approach for managing projects across Regions Ensures accurate and consistent project data is maintained in PMWeb, critical to supporting accurate progress reporting and aggregating project data in dashboards</p>

Initiative	Description	Status	Benefits
<p>Project Management Tools Develop, Maintain, and Train</p>	<p>PRTO supports the following tools. Project Cost Planner Tool Change Order Price Analysis Tool CM Staffing tool Work Hour Estimation Construction Duration tool Project management website</p>	<p>Work Hour Estimation (delivering training) Construction Duration tool (being reviewed) Project management website (being updated)</p>	<p>Establishes standardized, consistent approach for managing projects across Regions Encourages PMs to utilize consistent processes for estimating cost and work hours in projects.</p>

## PERFORMANCE MEASURES

The following performance measures demonstrate the health of the Program Management Program. Table - Program Management Performance/Compliance Measures

PM #	Indicator	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2021	2022
555	Expenditure Performance Index (XPI)	XPI is actual program expenditures divided by annual target <sup>1</sup> for program expenditures.	Reported to PMO Governance	Monthly	0.95<XPI <1.05	0.88	0.85
1442	% Projects advertised by baseline Late AD date	Projects must be advertised by the Late AD Date set at the FIR milestone, in order to achieve planned construction expenditures for the CY	Reported to PMO Governance	Monthly	95%	93%	84
1443	% Projects closed on-time	Percent of projects closed and de-budgeted within 12 months of final acceptance	Reported to PRTO Governance	Monthly	95%	83%	90

<sup>1</sup>The CY22 annual target reflects planned expenditures as of 01/2022.

## KEY LEARNINGS

1. XPI achieved in 2022 was 85 percent, with total expenditures of \$841 million compared to a target of \$997M, or 10 percent lower than the desired range or 95%-105%. \$841M dollars is a record year of expenditures for the CDOT capital construction program. We believe the contracting industry capacity was pushed to the limit based on bid prices escalating and a record number of projects receiving no bids or bids being rejected for coming in too high. CDOT will take the industry ability to deliver and market prices into consideration when setting future year expenditure goals.
2. Many project advertisements were delayed due to the high bids we were receiving. Many project budgets needed to be adjusted to award the project to a contractor. This delayed other project advertisements. PMWeb is giving us better visibility of project design schedules and upcoming advertisements. We are also beginning to use PMWeb to implement change control allowing us to easily track if a project has a legitimate reason to delay advertisement.

3. PRTO worked with our region partners to create a better dashboard to communicate the duration and step of a project in the closure process. This allowed PRTO to help teams prioritize projects for closure as dates were approaching. A careful analysis of the closure process also allowed PRTO to help regions determine when a project was at risk of missing the 1-year deadline. PRTO intends to continue to the communication of risk projects throughout the next year.

## **NEXT STEPS**

PRTO will continue our adoption of the PMWeb system for project management with a focus on timely and accurate data management. We expect that reporting will need to be refined as we use the new data source. We will continue to evaluate the data to determine if there are areas of improvement available.

## 2.7 | Engineering: Right of Way

### INTRODUCTION

**CDOT Manager:** Christine Rees and Wesley Loetz (Alternate)

**FHWA Manager:** Jeff Bellen

A host of state and federal rules and regulations governs the acquisition of private real property for public use. The Right of Way (ROW) Program has overall responsibility for the acquisition of real property on Federal Aid projects. This responsibility includes assuring that acquisition and relocation activities are conducted in compliance with Federal and State legal requirements.

The ROW program is part of the CDOT Project Development Branch. The right of way phase of the project development process can be divided into four process categories or work activities:

- Survey
- Valuation (Appraisals/Review and Waiver Valuations)
- Acquisition
- Relocation

### QUALITY/RESULTS

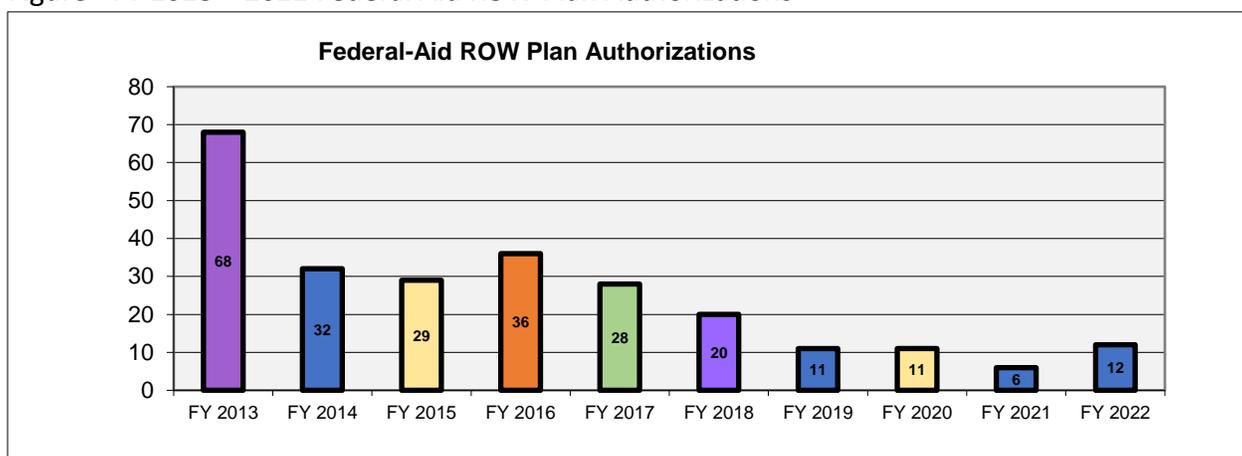
1. All the required actions on the FHWA ROW Required Actions List assigned to ROW were completed for fiscal year 2022.
2. CDOT's ROW Manual is updated every 5 years. A complete 5-year update to the ROW Manual was approved by FHWA on March 9, 2021, and put into effect by CDOT on April 1, 2021.
3. There were no requests for waivers.
4. In accordance with the Statistical Report requirement in 49 CFR Part 24 Appendix B, CDOT submitted the required annual statistical report to FHWA on December 9, 2022.
5. To better understand the data, a baseline of the number of Federal Aid projects with ROW is useful and shown below.

**Table - FY 2013-2022 CDOT Authorized ROW Plans for Federal Aid Projects**

ROW Plans Authorized	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	10 Year Avg.
Federal Aid Projects with ROW	68	32	29	36	28	20	11	11	6	12	25.3

6. Ongoing monitoring regarding Uniform Act-based processes was performed on every project for which federal participation was sought. All required forms were fully completed, and three or more levels of review were done on each acquisition and relocation prior to issuance of any funds. HQ ROW and Region staff adapted to the pandemic and associated work-from-home requirements with electronic signature processes for internal authorizations.
7. CDOT authorized 12 ROW Plans for Federal Aid Participation projects and 35 ROW plans for non- participation projects, for a total of 47. (See Figure FY 2013 – 2022 Federal Aid ROW Plan Authorizations).

Figure - FY 2013 – 2022 Federal Aid ROW Plan Authorizations



8. HQ ROW staff and Region ROW staff continue to conduct systematic file reviews. Review included, but was not limited to, a detailed review of relocation records on the US 34 & US 36 FLAP Estes Park Couplets project, 20298, by HQ ROW staff. The COVID-19 pandemic and associated restrictions precluded the possibility of field visits in FY 22. However, the ROW Program began implementing workflows in CDOT's electronic records management system called OnBase. The workflows allow for ROW acquisition files to be more accessible for review, reference, and comparison to ensure statewide consistency. Implementation efforts will continue into FY 23 with increased access and use by Region ROW staff and an expansion to include relocation documents.
9. The CDOT ROW Program provided virtual training to statewide ROW staff in the format first developed in FY 2020. Trainings were given periodically throughout FY 2022 and included various ROW topics by discipline, lessons learned, and discussion on current issues. HQ ROW continued to provide training and technical assistance to consultants, local agencies and CDOT Region ROW staff as requested. Additionally, from June 20-22, 2022, CDOT hosted a three (3) day class by the National Highway Institute (NHI) - Advanced Relocation under the Uniform Act.

## PERFORMANCE MEASURES

The following performance measures demonstrate the health of the Right of Way Program: CDOT will continue to track Conditional Clearance, Condemnation, Fair Market Value Settlement Rate, and Appeals statistics and compare against the prior 10 years to identify major deviations and trends.

Table - Performance/Compliance Measures (ROW)

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	10-Year Avg.	FY 2022
319	Conditional clearances	Percentage of Federal- aid projects with conditional ROW certifications	A list of conditional clearances	State FY	Track trend	20.7	26
320	Condemnations	Percentage of parcels acquired using condemnation	Uniform Act Relocation Assistance and Real Property Acquisition Statistical report as required by 49 CFR, Appendix B	State FY	Track trend	10.8	5
322	Fair market value settlement rate	The percentage of parcels settled at FMV	Calculation of the number of parcels that settled at FMV versus the total number of parcels acquired	State FY	Track trend	71%	72%
321	Appeals	The number of appeals filed each year	A list of appeals	State FY	Track trend	1.1	0
426	ROW Customer Service Survey	ROW appraiser and agent customer service rating	ROW customer service survey by Region	State FY	Achieve very good or better in all categories	4.28	4.12

Additional detail on the performance measures is provided below:

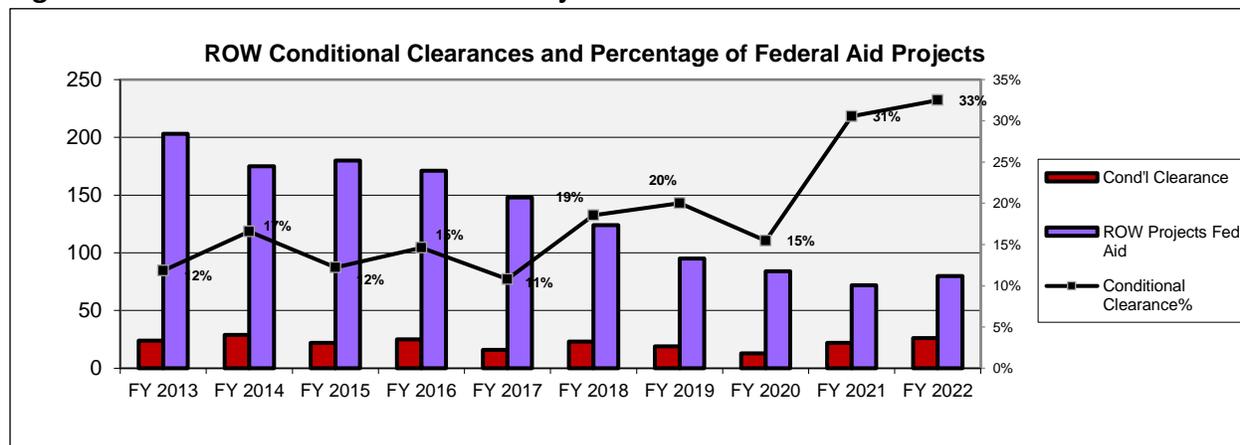
10. Conditional Clearances – Percentage of Federal Aid projects with conditional ROW certifications was 33%. While the percentage has increased significantly over prior years, the total number of conditional clearances remains near historical averages, so at least part of the change can be attributed to CDOT more readily closing Federal Aid projects.

Table - FY 2013 – FY 2022 Federal Aid Projects with Conditional Clearances

Federal Aid Projects with ROW Conditional Clearances	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	10-Year Avg.
Federal Aid Projects with ROW	203	175	180	171	148	124	95	84	72	80	133.2
Conditional Clearances (granted)	24	29	221	251	161	231	191	131	221	261	21.9
Percentage of Conditional Clearances	12%	17%	12%	15%	11%	19%	20%	15%	31%	33%	16%

<sup>1</sup> FY 2015, 2016, 2017, 2018, 2019, 2020, 2021 & 2022 Clearances include Local Public Agency (LPA) project

Figure - FY 2013 – FY 2022 Federal Aid Projects with ROW Conditional Clearances



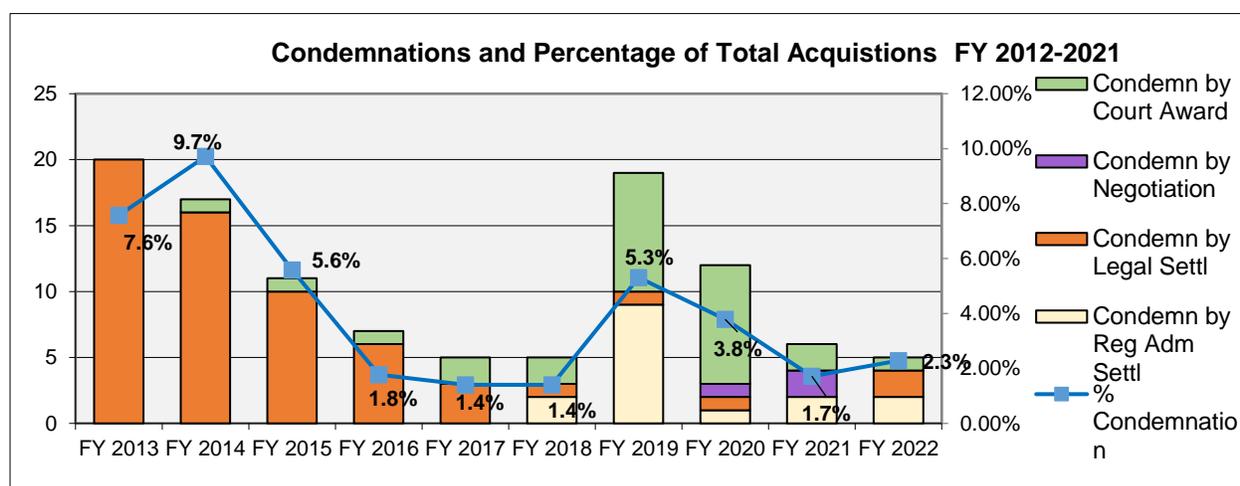
11. Condemnations – In FY 2022, 219 acquisitions were conducted. Five (5) acquisition cases were forwarded to the Office of the Attorney General for the initiation of condemnation proceedings. One (1) case resulted in acquisition by condemnation (via court award).

12.

Table - FY 2013 – FY 2022 Condemnations – Cases Settled

Condemnations – Cases Settled	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	10-Year Avg.
Total Number of Acquisitions (Acq.)	264	175	197	395	252	427	358	317	349	219	309
Parcels Acquired by Region Administrative Settlement / % of Total Acq.	0 / 0%	0 / 0.0%	0 / 0%	0 / 0%	0 / 0%	2 / 0.5%	9 / 2.5%	1 / 0.3%	2 / 0.6%	2 / 0.9%	1.6
Parcels Acquired by Legal Settlement / % of Total Acq.	20 / 7.6%	16 / 9.1%	10 / 5.1%	6 / 1.5%	3 / 1.2%	1 / 0.2%	1 / 0.3%	1 / 0.3%	0 / 0%	2 / 0.9%	6.8
Parcels Acquired by Negotiation / % of Total Acq.	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	1 / 0.3%	2 / 0.6%	0 / 0%	0.5
Parcels Acquired Using Condemnation (via court award) / % of Total Acq.	0 / 0%	1 / 0.6%	1 / .5%	1 / 0.3%	2 / 0.8%	2 / 0.5%	9 / 2.5%	9 / 2.8%	2 / 0.6%	1 / 0.5%	2.7
TOTAL (Cases) / % of Total Acq.	20 / 7.6%	17 / 9.7%	11 / 5.6%	7 / 1.8%	5 / 1.4%	6 / 1.4%	19 / 5.3%	12 / 3.79 %	6 / 1.7%	5 / 2.3%	11.7

Figure - FY 2013 – FY 2022 Condemnations

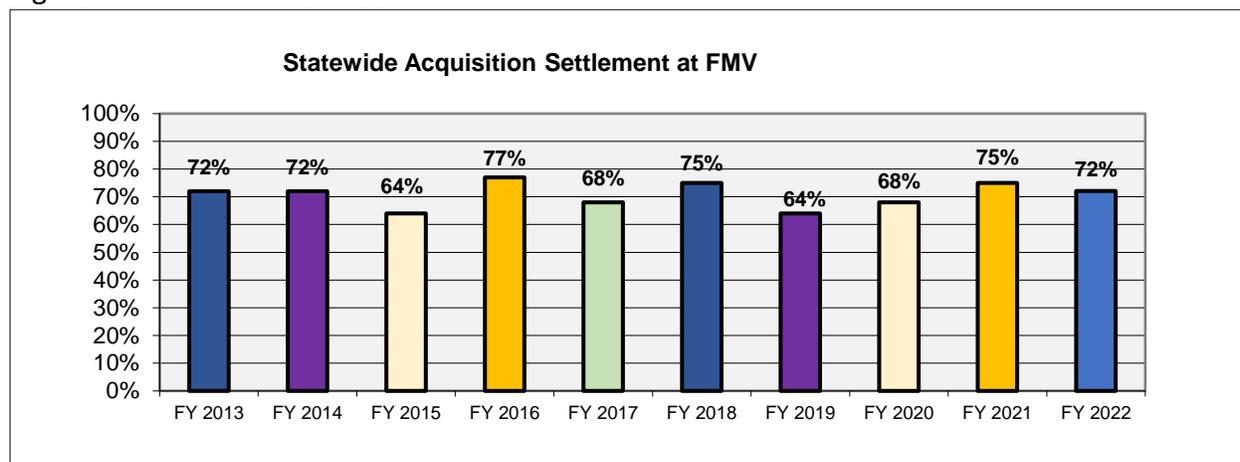


13. Statewide acquisition settlement rate at Fair Market Value: 72%. When including parcels that were acquired under the Voluntary ADA Acquisition Program, the acquisition settlement rate at Fair Market Value was 74%. Most of these additional acquisitions were below \$5,000 with offer amounts determined through streamlined procedures.

Furthermore, parcels that could not be acquired were removed from the project, so the acquired parcels are not included in the baseline statistic.

Tracking the settlement rate at Fair Market Value (FMV) is used as one gauge to assess the overall health of the CDOT ROW Program. Settlement rates are influenced by the strength and quality of the property rights valuations and the negotiation skills of the acquisition agents. The ROW Program's consistent settlement rate trend in the 60-75% range is interpreted as evidence that the property owners from whom CDOT acquires property rights have confidence in CDOT's valuation methods and outcomes used to determine the FMV. Similarly, the trend also indicates that the acquisition agents meeting and negotiating with the property owners are doing a very good job of explaining CDOT's valuation and acquisition processes, and then negotiating toward the final acquisition price.

Figure - FY 2013 – FY 2022 Settlement at FMV



Beginning in FY 18, CDOT ROW began tracking the FMV settlement rate at three different valuation thresholds to reflect the different valuation methods used and to provide additional context to the FMV Settlement Rate statistic. The three thresholds are: 1) FMVs under \$5,000 where the landowner does not have a right to obtain an appraisal at CDOT's expense; 2) FMVs between \$5,000 and \$25,000 where CDOT may perform waiver valuations, but the landowner is provided an option of obtaining an appraisal; and 3) FMVs above \$25,000 where CDOT will always perform appraisal and the landowner is provided an option of obtaining an appraisal. In FY 2022, the FMV settlement rate below \$5,000 was 81%, between \$5,000 and \$25,000 was 57%, and above \$25,000 was 36%.

**Table - FY 2013 – FY 2022 FMV Settlement Rates**

<b>FMV Settlement Rate</b>	<b>FY 2013</b>	<b>FY 2014</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>10-Year Avg</b>
FMV Settlement Rate below \$5,000	NA	NA	NA	NA	NA	82%	77%	86%	86%	81% <sup>2</sup>	82% <sup>1</sup>
FMV Settlement Rate between \$5,000 and \$25,000	NA	NA	NA	NA	NA	66%	48%	68%	68%	57% <sup>2</sup>	61% <sup>1</sup>
FMV Settlement Rate above \$25,000	NA	NA	NA	NA	NA	50%	34%	27%	43%	36% <sup>2</sup>	38% <sup>1</sup>
<b>TOTAL FMV Settlement Rate</b>	<b>72%</b>	<b>72%</b>	<b>64%</b>	<b>77%</b>	<b>68%</b>	<b>75%</b>	<b>64%</b>	<b>68%</b>	<b>75%</b>	<b>72%<sup>2</sup></b>	<b>74%<sup>1</sup></b>

<sup>1</sup>10-Year FMV Settlement Rates only reflect 5 years of data for the three valuation thresholds

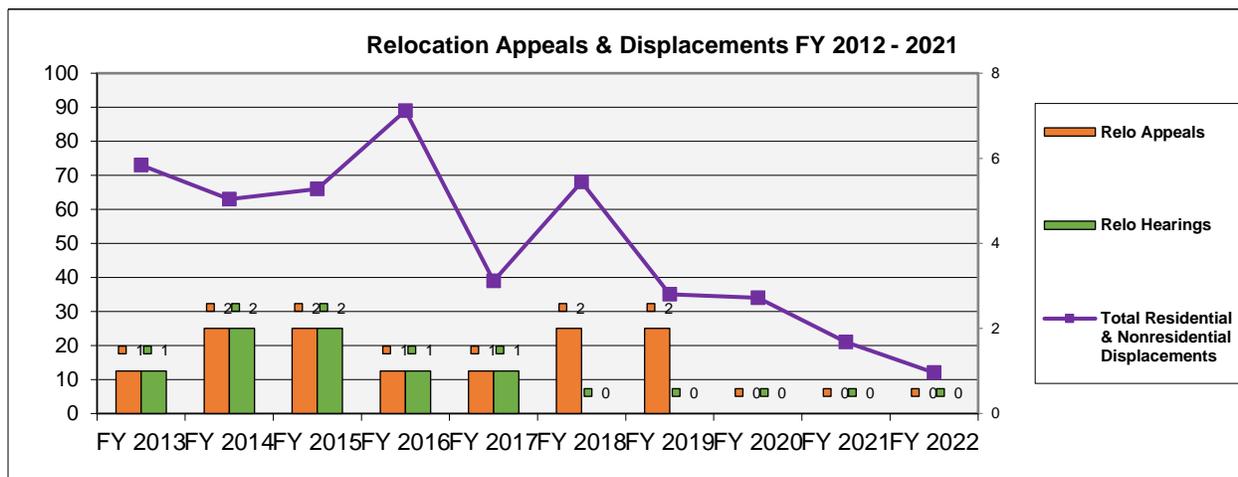
<sup>2</sup>FY 2022 FMV Settlement Rates including ADA Program: <\$5K — 81%; \$5K-\$25K — 57%; >\$25K — 36%; Total — 74%

14. Appeals – Zero (0) relocation appeals were filed.

**Table - FY 2013 – FY 2022 Appeals**

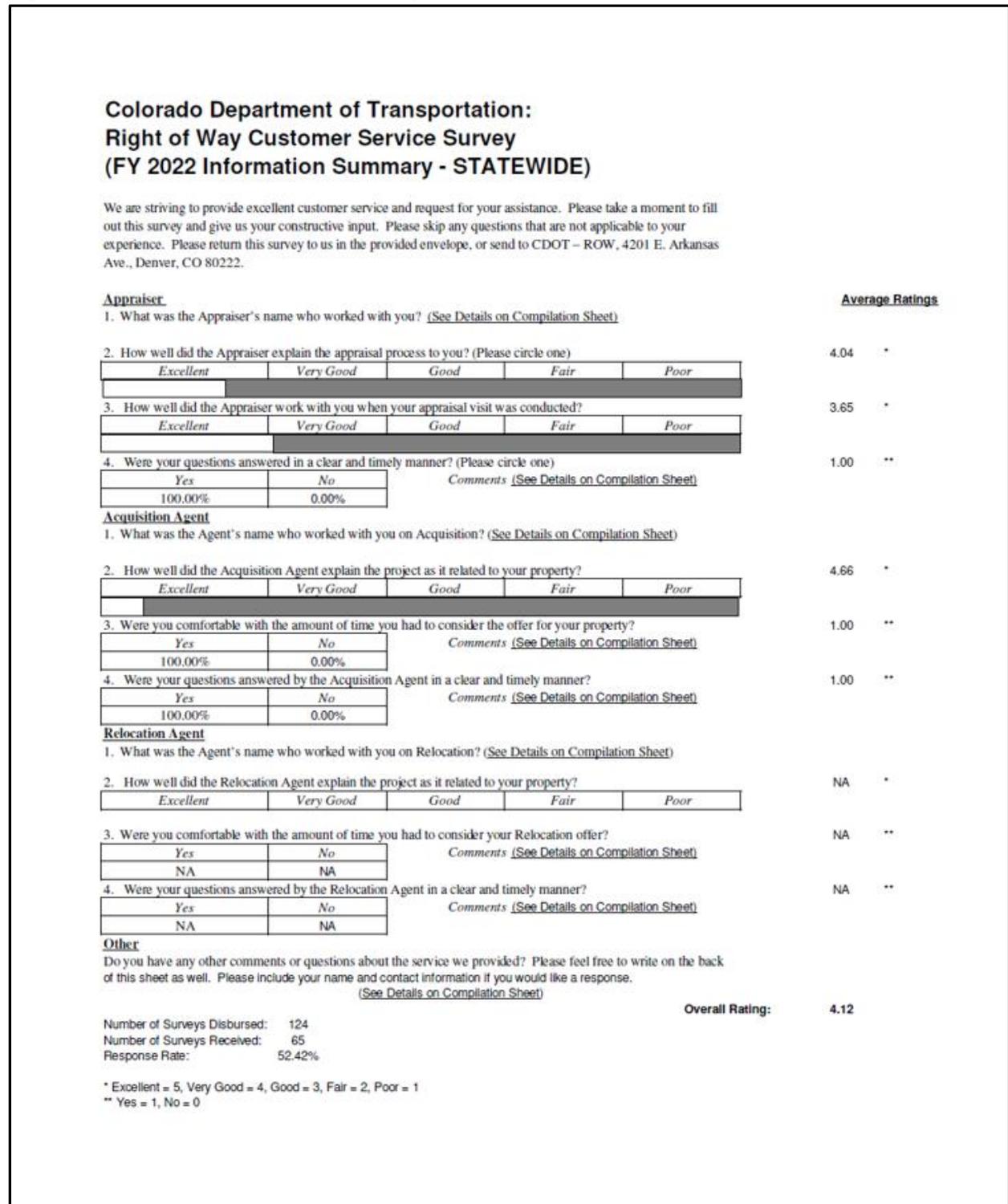
<b>Appeals</b>	<b>FY 2013</b>	<b>FY 2014</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY20 22</b>	<b>10-year Avg.</b>
Appeals Filed	1	2	2	1	1	2	2	0	0	0	1.1
Appeals that went to Hearings	1	2	2	1	1	0	0	0	0	0	0.7
Total Residential and Nonresidential Displacements	73	63	66	89	39	68	35	34	21	12	50

**Figure - FY 2013 – FY 2022 Appeals**

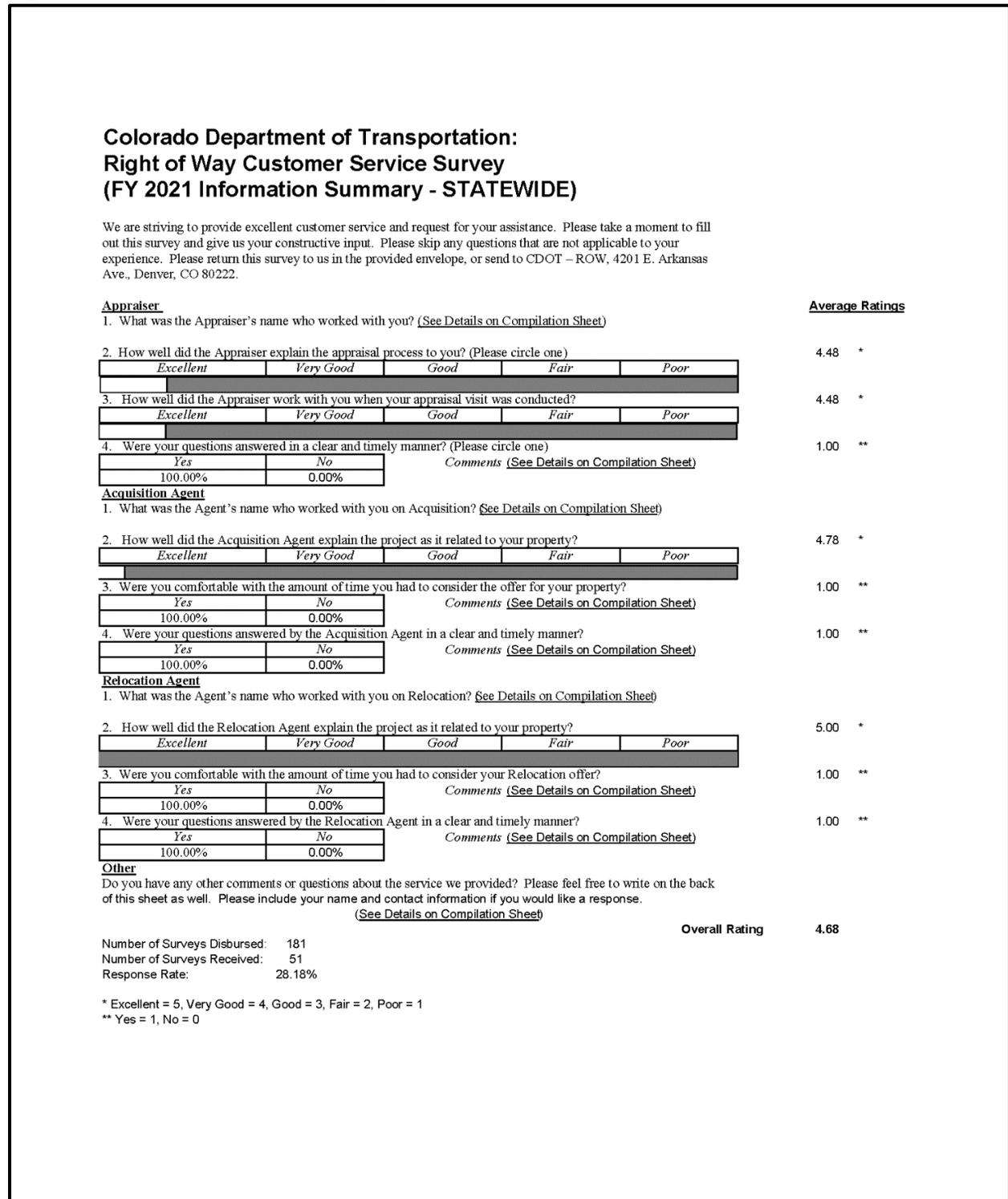


## ROW Customer Service Survey

Mid FY 2010, CDOT ROW began the process of surveying the public impacted by ROW acquisition and/or relocation. That survey was a Quality Assurance Review (QAR) effort and, although it was conclusive, CDOT has decided to continue these efforts to assure continued high-quality customer service to the public. For FY 2022, the rate of return on this survey was 52%. Following are statewide results of said survey for FY 2022 and FY 2021. In FY 2022, CDOT achieved very good or better in all categories, and an overall rating of 4.12, which was near the 10-year average of 4.28. Region ROW Managers are provided individual survey results on an annual basis.

**Figure - FY 2022 ROW Customer Survey**


**Figure - Prior ROW Customer Survey, FY 2021**



## KEY LEARNINGS

FY 2022 saw both a reduction in the total number of condemnations and consistency in the Fair Market Value Settlement rate with both figures being near or exceeding historic averages in the current year.

Due to a lower fair market value settlement rate in prior years for parcels valued above \$25,000, the ROW Program began ongoing analysis of administrative settlements at this level. Initial analysis suggests that over one-third of settlements are due to large differences in unit value between CDOT and owner appraisals. Other settlements have been caused by property-specific impacts. Overall, differences in opinion regarding damages and cost-to-cure considerations have not been a primary driver of settlements.

The ROW Program found that there was continued interest for virtually delivered training and enthusiasm, even after some staff returned to working in the office or on a hybrid schedule.

## NEXT STEPS

CDOT will continue to conduct its ongoing analysis of the Fair Market Value Settlement Rate at the higher valuation and look to address any findings within the CDOT appraisal program when necessary. If settlements are being reached above Fair Market Value to avoid condemnation proceedings, CDOT will continue to encourage the continuation of this practice and look for a corresponding continued reduction in the number of condemnations.

CDOT will continue to provide virtual training with a goal of at least one event per month. A current focus of the ROW Program is regular staff-level meetings of the specialty groups (survey, appraisal, and acquisition/relocation) to promote the sharing of ideas and best practices.

## 2.8 | Engineering: Structures

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### INTRODUCTION

**CDOT Manager:** Michael Collins

**FHWA Manager:** Spencer Tucker

Bridge and structural engineering is managed and supported by a centralized group within CDOT called Staff Bridge. Staff Bridge is responsible for working with the Regions to ensure structures are properly designed, constructed, and maintained throughout the state. Structures include major structures (bridges and culverts that span more than 20 feet); minor structures (culverts and bridges that span 4 to 20 feet); overhead sign structures; high mast luminaires and mast arm traffic signals; retaining walls; noise walls; and tunnels. The staff of the Structures program develops structural design requirements, standard structural details, and structural construction specifications. In addition, the Structures program evaluates structural products and materials. The Structures program provides the vital services of structure inspection, fabrication inspection, construction assistance, structure asset management, bridge load rating, and oversize overweight vehicle permit investigations.

### QUALITY/RESULTS

#### Staff Bridge Branch Activities:

1. The FHWA Colorado Division Bridge Engineer is invited to the monthly Staff Bridge (Bridge Rating Inspection and Records) BRIAR Meeting to discuss records, inspection, asset management, and ratings to review process and policy surrounding program management best practices and state/federal compliance. The FHWA Colorado Division Bridge Engineer is also invited to the biweekly Staff Bridge Unit Leader Meetings where issues with the Department's structures program and needed improvements are identified, process improvements are discussed, and process improvements are implemented with regards to design policy and branch direction.
2. Funds continue to be directed to On-System bridge preventative maintenance actions, bridge repairs requiring engineering, and bridge rehabilitations, per the CDOT Transportation Asset Management Plan.
3. Development of SIMSA began in 2018 which will expand the data collection to all structural assets, improve data collection quality and timeliness, be web-based and spatially driven, reduce paper usage, reduce inspection costs for savings reallocation to projects, and expand the access to structure data for CDOT personnel at all levels. Phase II of this project received Notice to Proceed in December 2021, with an expected completion of December 2023. Phase II is the final phase of the initial development for

SIMSA, and CDOT will be using the system as the production environment at the end of this development phase.

4. Staff Bridge continues to work with the CDOT Office of Financial Management and Budget (OFMB) and the Special Highway Committee (SHC) on Off-System Bridge Program process improvement to better manage off-system funding and awarded projects tracking from award to completion. Notable improvements in 2022 include the distribution of CDOT's m-standards for concrete box culvert design to offer a lower cost solution for bridge replacements and separate tracking for municipality and county funds.
5. Consultants have been selected to perform nondestructive evaluation of post-tensioned bridges and efforts have begun to implement the first task order.
6. Staff Bridge is working to complete all ratings of CDOT-owned structures on the reasonable access, and still working to complete the ratings of 12 Concrete Segmental PT bridges on the Interstate for Emergency Vehicles (EVs), and Specialized Hauling Vehicles (SHVs), with an expected completion date of December 2024. These efforts are reducing the risk of bridge overloading due to EVs and SHVs.
7. A more formal process for tracking construction-related issues with CDOT's structures across the state has been developed. These efforts include the development of a Joint Process Review with QIC started in 2020 and closed out in 2022, as well as three consultant contracts that are being utilized to develop a tracking database, construction inspection training, and augment Staff Bridge construction inspection staff capacity. FHWA has also supported CDOT in awarding support from the Resource Center. A draft tracking database has been developed and is currently under revision for implementation. Additionally, construction inspection training has been developed and the first class was hosted in December 2021, with five classes and over 200 students having performed as of February 2023.
8. Staff Bridge has begun to track projects in more detail to capture (a) construction milestones for new structures, (b) potential construction-related issues with structures (c) lifecycle costs for structures. This includes bi-weekly meetings with unit leaders to discuss updates with projects, as well as a new full-time position – the Statewide Bridge Project Portfolio Manager. The Statewide Bridge Project Portfolio Manager is responsible for tracking and communication regarding projects that include structures. The Statewide Bridge Project Portfolio Manager developed a tracking database and is revising the database alongside revising the process for developing the four-year list of bridge treatments.

9. A pilot project to define a new timber girder repair design that can be implemented at a statewide level to increase the longevity of CDOT's timber structures, improve load carrying capacity, and reduce the number of poor timber bridges is complete as of fall 2022. The Transportation Commission set aside funding to implement pilot projects in other regions and install the selected sister beam repair on select timber bridges around the state. The repair has been incorporated in treatment recommendations for split timber girder repair essential repair letters.
  
10. Per direction given in an FHWA memo issued on December 13, 2021 regarding Non-Destructive Testing of Fracture Critical Members Fabricated from AASHTO M244 Grade 100 (ASTM A514/A517) Steel, Staff Bridge identified five structures requiring further investigation as to the presence of butt welds on T1 steel members in tension. Staff Bridge is exploring options for material testing and/or non-destructive testing of any potential butt welds to determine the most cost-effective method to ensure the continued safety of these structures. Inspections are planned to occur mid- to late 2023.

**Region Activities:**

1. The Branch produces an essential repair tracking report. The essential repair finding spreadsheet is effective in tracking maintenance needs, identifying future structure project work, and the subsequent repairs.
  
2. Regions bridge maintenance continue to schedule essential repair work.
  
3. Regions have been allocated \$1M each to develop a Bridge Bundle Planning and Prioritization project, which will be used to position for grant opportunities and to ensure quick and efficient use of any federal, state, or stimulus funding that may be allocated for bridges. Region 1 wrapped up most work on their plan in December 2021 and has begun design work on high priority projects. Regions 2 and 3 have finalized their plans as of January 2023. Region 4 has repurposed existing prioritization plans and has begun scoping and design for the projects. Region 5's task order is underway to further develop a prioritization plan and position for grant funding.
  
4. Regional Bridge Maintenance Crews continue to perform preventative maintenance in bridge rinsing actions on the deck, bearings, drainage, and other critical elements to ensure the longevity of CDOT's bridges.
  
5. Region 3 completed pilot timber bridge repair projects in-house utilizing the new timber girder repair design.

## PERFORMANCE MEASURES

The following performance measures demonstrate the health of the Structures Program. CDOT updates the bridge<sup>1</sup> reporting data annually in April.

Table - Performance/ Compliance Measures (Structures)

PM#	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2021	2022
745, 746, 747	NHS bridges <sup>1</sup> and deck area in Poor condition (FHWA Definition)	Number of Poor bridges <sup>1</sup> per NHS Deck area of Poor bridge <sup>1</sup> per NHS Percentage of Poor deck area per NHS	Staff Bridge annual asset management reports	State FY	National Performance Measure Targets: 2020: 4% 2022: 4%	107 1.65M sf 5.08%	108 1.09M sf 3.43%
748, 749, 750	NHS bridges <sup>1</sup> and deck area in Good condition (FHWA Definition)	Number of Good bridges <sup>1</sup> per NHS Deck area of Good bridges <sup>1</sup> per NHS Percentage of Good deck area per NHS	Staff Bridge annual asset management reports	State FY	National Performance Measure Targets: 2020: 45% 2022: 44%	1,015 12.10 M sf 37.33%	991 12.12M sf 38.22%

<sup>1</sup>The term “bridge” is used in place of “major structures”, which includes all bridge and culvert structures carrying vehicular traffic and that span more than 20 feet along the centerline of the carried roadway.

Figure - NHS Bridge Condition by Deck Area

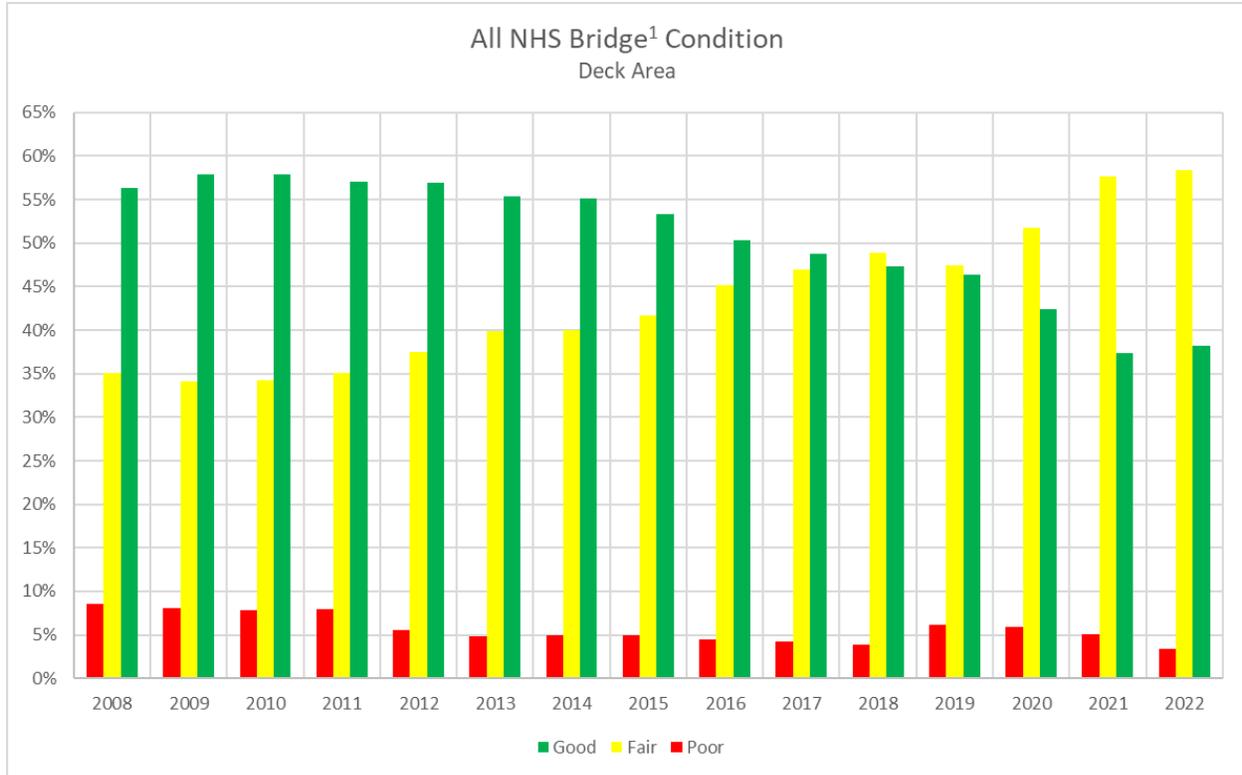
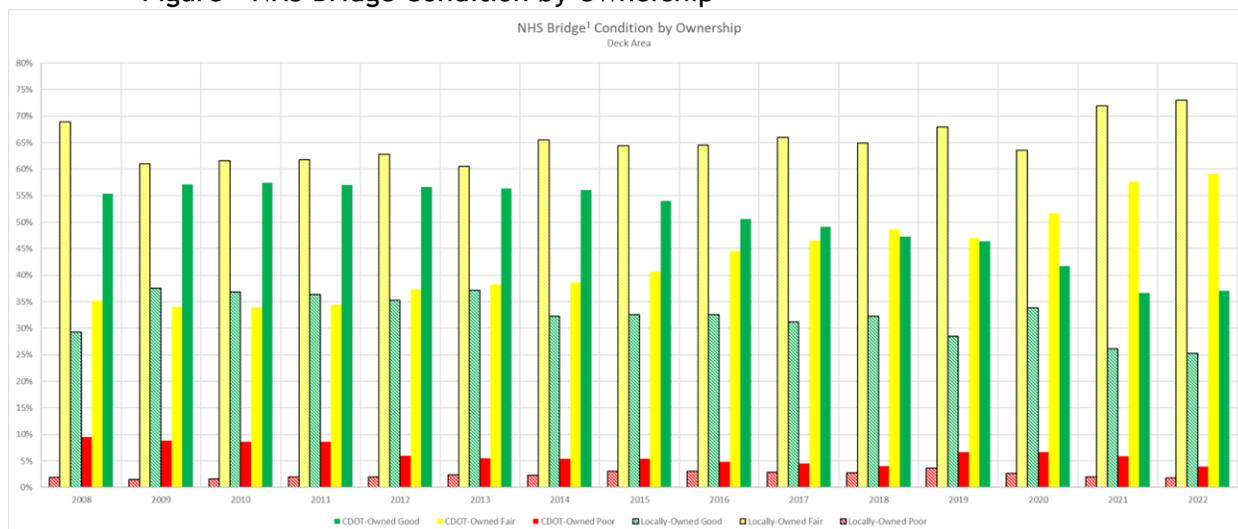


Figure - NHS Bridge Condition by Ownership



## KEY LEARNINGS

No key learnings were identified.

## NEXT STEPS

1. Finalize the formal process for tracking construction-related issues with CDOT's structures across the state.
2. Support region delivery of timber girder repairs, including design guidance and analysis as well as facilitating conversations regarding lessons learned and project successes.
3. Continue support of regional development of Bridge Bundle Planning and Prioritization, including data analysis and ongoing updates.
4. Implement tracking for open Essential Repair Findings with the goal of reducing the number of open ERFs.
5. Finalize plan to identify and appropriately test fracture critical members fabricated from AASHTO M244 Grade 100 (ASTM A514/A517) steel on five structures.
6. Continue work on load rating CDOT-owned and local agency owned bridges as funding becomes available.

## 2.9 | Engineering: Traffic Safety and Engineering Services

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### INTRODUCTION

**CDOT Manager:** San Lee  
**FHWA Manager:** Dahir Egal

The Traffic Safety and Engineering Services Branch (The Branch), in collaboration with the CDOT Office of Transportation Safety (OTS) and multiple other safety stakeholders, focuses on reducing fatalities and serious injuries resulting from crashes on the transportation system. The Branch is the steward responsible for developing, maintaining, and coordinating delivery of the Highway Safety Improvement Program (HSIP) (as defined by 23 CFR 924) for CDOT.

The Branch coordinates with the regional traffic engineers to plan and deliver HSIP funding to safety improvement projects along all public roadways statewide, including high-risk rural roads. The Branch is responsible for developing and maintaining the FHWA-mandated Strategic Highway Safety Plan (SHSP). CDOT has updated the plan in 2020, referred to as the Colorado Strategic Transportation Safety Plan (STSP). CDOT understands the importance of a vision of transportation safety and works with Colorado stakeholders to form that vision – Zero Deaths and Serious Injuries. CDOT continues to work with its stakeholders to implement the 2020-2023 STSP plan. FHWA and CDOT will ensure that STSP implementation efforts are developed and tracked for each emphasis area identified.

The STSP also provides a roadmap for development of the annual Colorado Highway Safety Plan (HSP). The HSP is a comprehensive program and project plan for addressing both behavioral and engineering safety issues. The HSP meets the annual safety program planning requirements of the NHTSA. The goal of the program is to reduce traffic deaths on Colorado’s highways. Primary focuses of the program, implemented by OTS, include reducing impaired driving related traffic deaths, motorcycle, and pedestrian fatalities, and increasing adult seat-belt use. Public information and outreach activities are coordinated through the program, as are training and education services and high visibility and enforcement (HVE). The OTS administers the state’s traffic safety program funded by the NHTSA.

The STSP also provides a basis for delivering HSIP funding. The Branch works with regional traffic engineers and local agencies to identify and construct cost-effective projects that improve safety on Colorado’s roadways. This is accomplished by assessing the nature and magnitude of safety problems on roadways in a region, county, or town and providing adequate information to support the development of an investment

strategy to resolve the problems. Finally, a cost-benefit analysis affirms that the regions select the most beneficial and cost-effective safety projects for implementation. Statistically based and consistent with the Highway Safety Manual (HSM), the Branch applies advanced safety performance functions (SPF) and diagnostic analysis to identify statewide locations of high crash concentrations with potential for crash reduction. Safety analysis is implemented through the HSIP as well as most types of projects delivered by the state by means of project-safety assessments done during the early planning and design phases.

The Branch also acts as the state's repository for statewide traffic crash information for safety analysis. It is typical for 100,000 or more crash events to be reported statewide in a calendar year. The Branch administers both the National Highway Traffic Safety Administration (NHTSA) and FHWA funding to improve the accuracy, completeness, timeliness, and availability of the data after receiving the statewide crash records from the Department of Revenue. The Branch serves on and carries out the strategic plan of the Statewide Traffic Records Advisory Committee (STRAC), made up of representatives from the Colorado Departments of Transportation, Revenue, Public Health and Environment, Human Services, Public Safety, and the Judicial Department. Crash data serves as the foundation for planning safety improvement projects and programs. State agencies rely on crash data to assess performance measures, which includes timeliness, accuracy, uniformity, integration, and accessibility of data suitable for problem identification and countermeasure analysis. CDOT puts forth significant effort to cultivate a crash data set that possesses these attributes. CDOT remains committed to improving its safety data and has established a goal to keep crash data processing backlogs to no more than six months.

## QUALITY/RESULTS

Traffic Fatalities – The mission of both the OTS and the Branch is to “reduce the incidence and severity of motor vehicle crashes and the associated human and economic loss.” In 2021, there were 691 traffic fatalities reported in Colorado. This is an 11 percent increase from 622 fatalities in 2020. While 2022 crash data is currently being verified and is not yet official, preliminary indications show that the number of fatalities (756) has increased at least nine percent from 2021. While CDOT has continued to deliver programs that engineer safer highways, educate the driving public, recommend traffic safety legislative enhancements, and conduct high-visibility enforcement of the State’s driving laws, fatalities and the fatality rate continued to increase.

Many of the most serious transportation safety challenges continue to be driver behavior related, most notably impaired driving and occupant protection (seat belts). Adverse driver and non-motorist behaviors are also leading to an increase in vulnerable user fatalities. In fact, fatalities to pedestrians, motorcyclists, and speed related continue to remain high or increase each year. The OTS aggressively addresses these challenges by supporting projects, programs, and other measures to educate the public and raise awareness. Public information programs

and high visibility enforcement have served to raise the awareness of the public of the risks of driving and their responsibilities as drivers. Grassroots organizations, state partnerships, and local community efforts also have had a significant impact.

Colorado Safety Targets		Time Period			
		2016-2020	2017-2021	2018-2022	2019-2023
	Baseline:	2014-2018	2015-2019	2016-2020	2017-2021
	Targets must be set by:	Jul-2019	Jul-2020	Jul-2021	Jul-2022
	Data / Results will be official:	Jan-2022	Jan-2023	Jan-2024	Jan-2025
Fatalities	Target	618.0	603.0	597.0	668.0
	Baseline	584.6	606.4	621.4	638.0
	Actual / Preliminary	621.4	638.0	659.6	
	Target Met?	No	No	No	
Fatality Rate	Target	1.143	1.113	1.093	1.262
	Baseline	1.126	1.146	1.185	1.208
	Actual / Preliminary	1.185	1.208	1.244	
	Target Met?	No	No	No	
Serious Injuries	Target	3,271.0	3,161.0	3,194.0	3,041.0
	Baseline	3,194.2	3,189.8	3,129.6	3,253.0
	Actual / Preliminary	3,129.6	3,252.4	3,370.4	
	Target Met?	Yes	No	No	
Serious Injuries Rate	Target	6.075	5.828	5.846	5.794
	Baseline	6.176	6.032	5.955	6.147
	Actual / Preliminary	5.955	6.146	6.344	
	Target Met?	Yes	No	No	
Non-motorized Users Fatalities and Serious Injuries	Target	670.0	551.0	571.0	548.0
	Baseline	555.2	558.8	542.4	548.4
	Actual / Preliminary	542.4	548.4	562	
	Target Met?	Yes	Yes	Yes	

Below is a snapshot of how certain fatality categories have changed from previous years.

**Table - Fatalities by Category (2017-2021)**

Traffic Fatalities by Category	2017	2018	2019	2020	2021
Off roadway crash (FHE)*	236	244	241	242	253
Intersection related*	190	210	188	196	205
Speeding related*	230	210	239	287	202
Unrestrained (excluding MC) <sup>+</sup>	233	221	200	208	229
Impairment related*	254	246	241	265	307
Rollover/Overturn (FHE; excluding MC)*	60	68	55	62	80
Motorcycle/Scooters <sup>+</sup>	103	103	103	140	137
Aging road user 65+ (all person types) <sup>+</sup>	113	110	115	65	109
Pedestrian (any event) <sup>+</sup>	92	90	76	93	94
Head-on crash (FHE)*	78	74	66	66	90
Rear-end crash (FHE)*	40	30	28	25	44
Live animal crash (FHE)*	5	2	2	5	2

\*Source: Fatal Analysis Reporting System (FARS)

+Source: CDOT Crash Data Fatal

Tracker FHE = First Harmful Event

MC = Motorcycles/Scooters

Note: some of the fatalities above are accounted for in multiple categories. Also speed reporting standards by CDOT have changed as of 2021 which does not necessarily indicate that speeding related fatalities have improved in that category as compared to prior years.

National Safety Performance Measures - Now in its fourth year of implementation, CDOT met with safety stakeholders and established 2018-2022 safety performance measure targets. Below is a table of the last four years so far for comparison.

**Table – Colorado Safety Targets, Actual vs. Target (4 Years)**

The above measures reflect the trend that Colorado is seeing general increases in these categories, and we expect to continue to see increases in the future. While all safety stakeholders in Colorado are striving to reduce crashes and fatalities, they have to be strategic and effective with limited resources. Noting that without significant changes in funding, legislation, population growth, VMT, or increased enforcement and education, these trends will continue. Agencies are striving to be strategic in their approaches and more prioritizing of effective strategies that will reduce crashes using network screening, project safety analysis and prioritization, and deployment of innovations and

technologies. Further, the automotive industry alone, and transportation partnerships with them hold promises for future years' reductions in crashes and fatalities. CDOT continues to work with the Metropolitan Planning Organizations (MPOs) to assist them in establishing their own safety performance targets, required by February 2023.

Strategic Transportation Safety Plan (STSP) – The 2020-2023 STSP update was issued in April 2020. This updated plan sets a visionary goal of zero deaths and serious injuries so all people using any transportation mode arrive at their destination safely. The effort to update this plan involved the engagement of hundreds of stakeholders across the state, in coordination with several other pertinent plans (Denver Regional Council of Governments [DRCOG] Vision Zero, Denver Vision Zero, and CDOT Statewide Plan). Implementation of the STSP strategies is anticipated to reduce the number and rate of fatalities and serious injuries in Colorado. The STSP Executive Committee has established a 15% reduction in fatalities and serious injuries as the performance target for the 2020 to 2023 period. The process for the new iteration of the STSP will start July 1, 2023. During this effort, the plan will be updated with engagement from statewide stakeholders to identify strategies and performance metrics for the 2024 to 2027 period.

Highway Safety Improvement Program (HSIP) – In State Fiscal Year (FY) 2022, CDOT delivered \$33.6 million in HSIP and state matching funding to the CDOT regions and local agencies around the state for 55 projects to address fatal and serious injury crashes related to infrastructure and the driver interaction (run off road, intersections, speed, and pedestrians). These projects have an estimated present value safety benefit of \$135.9 million for an overall benefit cost ratio of 4.05.

Colorado is currently subject to the Vulnerable Roadway User (VRU) special rule, requiring that Colorado obligates \$6.1M of VRU special rule funds by the end of Federal FY 2023. Colorado must also obligate \$13.4M of section 164 HSIP penalty funds by the end of Federal FY 2023.

The Branch and regions are currently budgeting State FY 2023 HSIP projects while planning new safety improvement projects through FY 2026. Examples of safety improvement projects include roundabouts, intersection improvements, guardrail upgrades, pedestrian crossings, traffic signal upgrades, interchange ramp improvements, wrong way driving treatments, variable speed signing, and access improvements. CDOT also has a state funded FASTER Safety Mitigation program that delivers approximately \$70 million annually in safety improvement projects along the state highway system.

Work Zone Safety and Mobility (WZSM) – The bi-annual WZSM Task Force issued its Process Review report to FHWA in April of 2020. The Task Force found that additional work is necessary in the areas of training and Smarter Work Zones. Training focuses on creating a new course designed to educate all design and construction stakeholders on CDOT's procedures regarding work zone safety and mobility. This course is to be piloted

in the spring of 2021. Smarter Work Zone strategies continue developing through partnerships with the CDOT regions. Pilot projects have been completed and CDOT will soon create safety standards and specifications in reference to this technology.

A breakthrough has occurred within CDOT divisions and ITS's new data hub will allow the transition from data collected in the field to be uploaded and distributed to public feeds. This process will kick-off due to a recent FHWA grant awarded to CDOT's MOI division. The original scope of this grant will focus on maintenance TMAs, but the data feed created in this endeavor can be universally applied. This will help achieve our goal to upload data and provide real-time information to the traveling public. CDOT will continue to participate in the national USDOT Joint Program Office (JPO) through the (Work Zone Data Exchange) (WZDX).

The Task Force has begun its new process to send survey questionnaires out to a much broader and larger audience. This has helped better define the Task Forces' efforts while also creating performance measurements for these efforts. CDOT has released a new procedural directive titled "*Traffic Control for Planned and Unplanned Work.*" While COVID 19 has hindered work zone traffic control reviews, CDOT Area Engineers made a plan to handle these reviews and unfortunately, not all proposed projects received a review this year. The Area Engineers still sent their required letter to FHWA, however with the information received.

Crash Data – The Branch continues to operate a public facing online crash data dashboard that is integrated with the state's Behavioral and Engineering Safety Data for Transportation (BESDT) database and application. This dashboard provides real time updates of Colorado crash totals from 2010 to the most recent crash data received from the Department of Revenue (DOR).

<https://www.codot.gov/safety/traffic-safety>

The BESDT database has implemented several upgrades in 2022 that continue to improve accuracy, completeness, timeliness, uniformity, accessibility and integration. National Highway Traffic Safety Administration (NHTSA) 405(C) grant funding will be requested to support this effort. The Branch continues to work closely with DOR regarding a number of issues with data sharing, data linkages, and various projects.

Rail Highway Grade Crossing Program – During FY 2022, CDOT apportioned Federal safety funds to approximately 15 individual safety projects entailing improvements to at-grade highway crossings. The program is responsible for maintaining a database of all active public railroad crossings within the State of Colorado. CDOT has developed a data collection tool to allow for more accurate and consistent data collection efforts along with the creation of a geo-database to host the data. This tool incorporates CDOT's hazard index calculation as identified by staff.

There are two Class I railroads: BNSF Railway and Union Pacific (UP) Railroad and there are no Class II railroads operating in Colorado. Additionally, there are 15 short-line railroads that provide local service with connections to the Class I railroads. Colorado has nine tourist railroad lines, which highlight Colorado's history and offer trips through Colorado's scenic outdoors. The two percent support funds used from the annual apportionment were utilized to maintain the inventory of all public railway-highway crossings in Colorado including the Hazard Index formula calculations.

In addition to funding projects with both the BNSF and Union Pacific Railroad Companies, CDOT has safety projects with four Class III railroad companies this year. The Class III railroad companies are Durango & Silverton Narrow Gage Railroad, Great Western Railway of Colorado, San Luis Central Railroad, and San Luis & Rio Grande Railroad Company.

#### Colorado Safety Legislation and Statutes

- a. Primary Seat Belt: Colorado does not have a primary seat-belt law.
- b. Repeat Offender Law: Colorado is not in compliance.
- c. Zero Tolerance Law: Colorado is in compliance.

Colorado Repeat Intoxicated Driver Requirements of 23 U.S.C. Section 164 – Due to changes in Colorado State Statutes, Colorado does not meet requirements of 23 U.S.C. Section 164 for mandatory minimum sentencing of imprisonment.

## PERFORMANCE MEASURES

The 2022 Colorado HSIP Report lists nearly all of the applicable safety performance measures through FHWA's web reporting system, including the required FHWA and NHTSA national safety performance measures: fatalities, fatality rate, serious injuries, serious injury rate, and non-motorized fatalities and serious injuries.

<https://safety.fhwa.dot.gov/hsip/reports/>

## KEY LEARNINGS

No key learnings were identified.

## NEXT STEPS

No next steps were identified.

## 2.10 | Financial Management

### INTRODUCTION

**CDOT Manager:** Bethany Nicholas

**FHWA Manager:** TBD

The Financial Management Program encompasses the entire Federal-aid program from the authorization of a project through expenditure, billing, and final closure. This includes all phases (right of way, utilities, preliminary engineering, and construction) of a capital project as well as non- infrastructure projects such as planning and research. Oversight is performed at Headquarters, Regional business offices, and during project site visits to ensure eligibility of Federal-aid funds.

### QUALITY/RESULTS

- While the average number of days to close a project has increased, it is still below the Target of 365 days.
- CDOT continues to outperform the goal of less than 2% of its annual apportionment value being inactive at any given time. This value will need to be monitored as we go forward due to the higher amounts of federal funding being received in the IIJA.

### PERFORMANCE MEASURES

The following performance measures demonstrate the health of the Financial Management Program: Table - Performance/Compliance Measures (Financial Management)

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2021	2022
1444	Federal Funds Inactive Relative to Annual Apportionment	Federal funds inactive should be no more than 1- 2%. 2% is the official FHWA target and 1% is the Colorado target.	PM	Federal FY	Less than 1% = Excellent Less than 2% = Good Greater than 2% = Poor	Q1: 0.9% Q2: 0.6% Q3: 0.4% Q4: 0.6%	Q1: 1.0% Q2: 0.6% Q3: 0.6% Q4: 0.3%
1445	Closure of federal aid projects (including non- construction in calendar days).	The average # of calendar days after the final federal expenditure/billing date to closure in Fiscal Management Information's Systems.	FMIS	Federal FY	Average not to exceed 365 days.	235 Days	205 Days

## KEY LEARNING

CDOT implemented a process to close projects in FMIS when there are projects that are on “Hold” in the state system. This status allows us to close projects in FMIS that meet one of the following criteria:

- Have more than 365 days between Pre-construction end and advertisement for Construction
- Projects that have been completed but are linked to an active project and on CDOT's side
- Projects that had federal funds in pre-construction but will not have federal funding in construction.

## NEXT STEPS

CDOT’s Division of Accounting and Finance are making a couple minor revisions to close out steps including automating the final project financial review with SAP downloaded information rather than hand typed information. Additionally, we are more proactively reviewing projects during the 1212 submission to see if Toll Credits or other methods for maximizing federal reimbursement can be used prior to starting the close out process to lessen the review time.

# 2.11 | Maintenance and Operations: Highway Maintenance

## INTRODUCTION

**CDOT Manager:** B.J. Jacobs  
**FHWA Manager:** Cohen Turner

CDOT has within its Central Office a Division of Maintenance and Operations (DMO), and an Asset Management unit. The Division of Maintenance and Operations has two primary functions:

- Providing policy and guidance for the state maintenance program; and
- Maintaining operational oversight for the administration of the maintenance program for the eight maintenance sections and five traffic sections. The Division provides a liaison contact that assists and oversees the successful completion of the Methods of Operations and Maintenance.

## QUALITY/RESULTS

The Asset Management unit is responsible for overseeing the collection of maintenance performance data through the MLOS performance-based budgeting system. The sources for the performance data comes from various locations including, but not limited to, Pavement Management, Staff Bridge, Night Inspections, and remote data collection. MLOS performance data is listed in the chart below:

**Table - FY 2020 MPA Performance**

MPA	2020 LOS Target	2020 LOS Achieved	2021 LOS Target	2021 LOS Achieved	2021 LOS Target	2021 LOS Achieved
100 - Planning, Training & Scheduling	N/A	N/A	N/A	N/A	N/A	N/A
150 - Roadway Surface	B-	B+	B	C+	B	B
200 - Roadside Facilities	B-	B+	B-	A-	B-	C+
250 - Roadside Appearance	B	C+	B+	B-	B+	C+
300 - Traffic Services	B-	A-	B+	D+	B+	B
350 - Structure Maintenance	B-	B+	A-	B+	A-	B+
400 - Snow and Ice Control	B	B	B+	C-	B+	A-
450 - Rest Areas, Buildings and Grounds	N/A	N/A	N/A	N/A	N/A	N/A
500 - Tunnel Maintenance	N/A	N/A	N/A	N/A	N/A	N/A
<b>Overall</b>	B-	B	B	C-	B+	B+

Maintenance met its overall targeted Levels of Service (LOS). The Roadside Facilities, Roadside Appearance, Traffic Services and Structure Maintenance MPAs targets were not met.

## PERFORMANCE/COMPLIANCE MEASURES

The following performance measures demonstrate the health of the Highway Maintenance Program:

**Table - Performance/Compliance Measures (Highway Maintenance)**

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target / Baseline	2019	2020	2021	2022
271	Maintain the transportation system at the adopted annual MLOS grade	Annual MLOS adopted target grades for maintenance Program Areas 150,200, 250,300, and 350	MLOS actual grades from annual survey	State FY	B-	B	B	B+	B+
270	Maintain the annual LOS snow mapping grade at the adopted annual grade	Annual LOS grade for snow and ice removal	MLOS Reporting	State FY	B	B	B-	B+	A-

## KEY LEARNINGS

N/A

## NEXT STEPS

N/A

## 2.12 | Maintenance and Operations: Intelligent Transportation System (ITS)

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### INTRODUCTION

**CDOT Manager:** Alan Scheidt, Emma Boff

**FHWA Manager:** Eva LaDow

The overall purpose of the ITS/Technology program is to use innovative technology and strategies to enhance and improve operations of the transportation system by implementing advanced traveler information, advanced traffic and incident management, and other applications that improve mobility and safety of the system for all travelers. Over the last decade, rapidly changing technology has influenced the implementation of operational applications and how technology can be used to improve operational effectiveness. Advances in wireless communications, higher quality, and higher volume of transportation data (a.k.a. “Big Data”), traveler information, and smarter roadways have significantly improved the capability of ITS to impact operations on a greater level. While at the same time the ability to deliver more sophisticated, focused, and real-time operational services. Some examples of these services and applications are: Adaptive Traffic Signal Control; Dynamic and Integrated Ramp Metering Access System Control; Advanced Traffic Management Systems; Advanced Traveler Information Systems; Active Traffic Management; Managed Lanes; Peak Period Shoulder Lanes; Variable Speed Limits (VSL); real-time video analytics cameras; weather stations; incident detection software; unmanned aerial systems; and others.

ITS is one of the primary, if not the foremost, transportation tools that can provide high levels of quantifiable and visible operational benefits on the entire transportation system more rapidly and at a lower cost than other traditional transportation applications, while providing a force multiplier on resource productivity. The goals are to improve safety, reduce traffic delays and congestion, and increase system reliability so that the transportation system can operate as effectively and efficiently as possible.

### QUALITY/RESULTS

On September 29th, 2021 the ITS Branch implemented new Advanced Traffic Management System, Advanced Traveler Information System and Video Management Systems. These new systems replaced an 18-year-old system that was outdated. These new systems did require a shift in perspective. It was critical that technology systems were consistent in order to operate properly. The SEA and the ITS Architecture are critical in the success and efficiency of these new systems.

At the same time, the ITS Branch also moved our Data into a hybrid storage environment, meaning that some data resides within our Data Centers and some in the Cloud. We are focusing on stabilizing the Data Lake to start predictive analytics. The ITS Branch has also developed and is in the process of implementing performance measures to evaluate and quantify specific activities and applications to ensure optimum effectiveness and applicability to similar operational situations.

To ensure continuous success and improve the level of technical advancements within CDOT, in fiscal year 2019-20, ITS developed the Joint Process Review on the Systems Engineering Analysis (SEA). In fiscal year 2020-21, a charter was kicked off to address the timeliness, quality, and ownership of SEA documentation and deliverables. In September 2021, the official SEA Process was launched CDOT wide. A post implementation survey was conducted in the Fall of 2022 across CDOT. The results indicated a dramatic increase in SEA awareness and understanding. The findings were shared with the QIC in December 2022. It was determined that the JPR could be closed and considered a success. Each month the SEA team tracks all projects that have submitted operations evaluations and cross references that these projects have also submitted their first SEA document. This report is helping track compliance as well as the percentage of projects at CDOT that are requiring a full SEA due to their technology elements. This has provided greater insight into the resources needed to support regional projects and the importance of institutionalizing consistent technology standards for success.

In 2022, we kicked off the Colorado specific ITS Architecture. High Level System Designs were drawn for common systems at CDOT such as Variable Message Signs, Variable Speed Limits, Cameras, External Communication. The ITS Branch is currently leading an effort to define Chain Stations. This effort included bringing together stakeholders from across the State to develop a high-level system design, functional requirements, and a project to retrofit chain stations. As part of the retrofit, all SEA documents will be completed and available for reuse by future efforts.

We implemented a new Fiber Development Team that focuses on the MOBILE NOW Act, that FHWA adopted rules on 12/3/2021. This Team also focuses on Public Private Partnerships and collaboration with broadband agencies and entities.

## PERFORMANCE/COMPLIANCE MEASURES

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline <sup>1</sup>
1450	Technology Availability	Measure the uptime of critical technology and fiber backbone	ITS Work Plan Performance Measures	Calendar FY	Track Trend
1451	Mean Time to Restore (MTTR)	How long it takes to restore the technology	ITS Work Plan Performance Measures	Calendar FY Semiannual reporting	Track Trend
489	Device Useful Life (UL)	Percentage of Useful Life of the technology	ITS Work Plan Performance Measures	Calendar FY	90%
1446	SEA Completion	Percent of projects that require a SEA	SEA Tool	Calendar FY	Track Trend

ITS Program: Table - Performance Measures (ITS)

<sup>1</sup> Data will not be available until 2022.

## KEY LEARNINGS

- Outages over the last year have helped identify how to repurpose vacant positions and fill critical needs with creative resourcing solutions.
- How important clear expectations and documentation is for SEA processes and deliverables,
- The SEA and the ITS architecture cannot succeed without each other,
- Updating the ITS architecture will go hand in hand with the ATMS project, and
- Training is needed for Project Managers to be successful in implementing technology projects.
- The increase in reliance on technology, software, and data, has increased the demand on resources to maintain the infrastructure both virtually and physically.

## NEXT STEPS

In fiscal year 2024, the ITS branch will focus on resiliency projects and developing the ITS Architecture for the state. . The ITS Architecture will be a major element to gain consistency and uniformity on a complex system, ensure technology is implemented that is useful, cost effective and contributing to the mission of CDOT and complimenting the success for the System Engineering Analysis process improvement.

## 2.13 | Maintenance and Operations: Real-Time Operations

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### INTRODUCTION

**CDOT Manager:** Ryan Tyler  
**FHWA Manager:** Eva LaDow

The Real-time Operations Services Branch is within the Division of Maintenance and Operations. The Real-time Operations Services Branch facilitates the Department's commitment to place a higher strategic emphasis on delivering statewide operations and to align and consolidate critical traffic incident, event, and regional operations functions with other traffic and traveler operational activities.

The Real-time Operation Services Branch administers the Statewide Operation Center Program, and directly oversees the Statewide Operation Center (Golden) and the Joint Operation Center (Pueblo). The other operation center is located in Region 3 (Hanging Lake Tunnel).

This past year, the Joint Operation Center in Pueblo was transferred back to the Real-time Operations Branch. The Traffic Incident Management Program and Safety Patrol were recently transferred to the Office of Emergency Management. However, for reporting purposes, the Safety Patrol statistics for the reporting period are included here.

### QUALITY/RESULTS

Not including the day-to-day operations work, some of the key program accomplishments in 2022 include:

#### **Operation Centers Program:**

- **Communication Protocols:** To increase consistent operational excellence, standardized communication protocols were developed that describe which service(s) the operation centers provide to the department.
- **CDOT Traffic Dispatch:** Began transition for all CDOT signal dispatch out of the operation centers.
- **New Systems Update:** Last year CDOT updated the Advanced Traffic Management System (ATMS), Advanced Traffic Information System (ATIS), and Video Management System. These new systems have integrated and advanced operations in a couple key areas: Situational Awareness improvements with field asset integration, and integrated 511 messaging automation.

### Traffic Incident Management (TIM) Program:

- Identified TIM training as a strategic objective and began working to support that effort with Colorado First Responder Task Force initiatives and product developments.
- Started the process to establish scheduled development of TIM Plans across the state to standardize core TIM principles and incident response procedures with all local TIM Teams.
- Hosted the 6th Annual TIM Conference as a combined in-person and virtual event for over 150 participants.
- Increased the number of Colorado first responders trained on SHRP2 TIM to 65.9%
- Facilitated and supported the execution of a mid-level management TIM Program workshop in August for 35 multi-agency participants.
- Worked to integrate Safety Patrol contractor GPS system for use by CDOT incident managers to support incident response and assist with management of Safety Patrol assets.
- The annual TIM Self Assessments were submitted to FHWA in November.

## PERFORMANCE MEASURES

The following performance measure demonstrates the health of the Real-Time Operations Program:

Table - Performance Measures (Real-Time Operations)

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/Baseline	Data
815	Interstate Level of Travel Time Reliability (LOTTR)	Percent of person- miles traveled on the Interstate that are reliable per federal requirements	Highway Performance Monitoring System (HPMS)	Calendar Year	National Performance Measure Targets: 2020: 81% 2022: 81%	2022: 83.4% 2021: 85.3% 2020: 91.5% 2019: 78.8% 2018: 77.8% 2017: 80.3% 2016: 81.1%
816	Non- Interstate NHS Level of Travel Time Reliability (LOTTR)	Percent of person- miles traveled on the Non- Interstate NHS that are reliable per federal requirements	Highway Performance Monitoring System (HPMS)	Calendar Year	National Performance Measure Targets: 2020: 64% 2022: 64%	2022: 94.9% 2021: 94.7% 2020: 94.3% 2019: 87.6% 2018: 86.5% 2017: 85.9% 2016: 64.1%

386	CDOT Safety Patrol Assists1	Measure the # of CDOT Safety Patrol Assists	ATMS Software	Calendar Year	Track trend	2022: 43,847 2021: 38,712 2020: 36,590 2019: 30,187 2018: 29,452 2017: 30,071
665	Non-CDOT Safety Patrol Assists2	Measure the # of non- CDOT Safety Patrol Assists on E-470	E-470 Highway Group Data	Calendar Year	Track trend	2022: 12,749 2021: 12,273 2020: 11,187 2019: N/A 2018: 12,920
666	Hits for CDOT Traveler Tools	Measure the number of hits for CDOT traveler tools that customers have accessed on CoTrip in order to identify trends to improve information consumption by the public	Google Analytics CoTrip Site	Calendar Year	Track trend	2022: Web 13,946,000 App: 1,972,618 2021: 14,787,302 2020: 5,982,222 2019: 5,647,068 2018: 9,794,945 2017: 2,741,671 2016: 3,116,098
667	Number of CDOT Push Notifications	Measure the number of CDOT communications pushed out (i.e., public email/text alerts) in order to identify trends to improve information consumption by the public	511 Data collection (Prior to 2019)  CARS (2019 and after)	Calendar Year	Track trend	2022: 47,010 2021: 27,946 2020: 19,549 2019: 23,633 2018: 15,66 2017: 18,035 2016: 18,251

1404	Number of Lane Miles Covered by TIMS Coalitions <sup>3</sup>	In coordination with Department of Public Safety and Colorado State Patrol, increase the number of lane miles covered by TIM coalitions	TIM Website Coloradotim.org	State Fiscal Year	2020: 8,928	2022: N/A 2021: N/A 2020: N/A 2019: 8,796 2018: 5,846
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<sup>1</sup>The CDOT Safety Patrol operates on selected routes such as: US 6, I-25, US 36, I-70, I-225 and C470 with varying coverage 7 days/week. The assists include, but are not limited to, the following services: protection and clearance of crashes, debris removal, and mechanical failure services (e.g., flat tire, fluid(s) transfer, jump- start). For 5 months this past year, there was expanded Safety Patrol coverage during the weekdays on the I-70 mountain corridor.

<sup>2</sup>The non-CDOT Safety Patrol includes the E-470 Highway Group’s courtesy patrol, with operational periods and services similar to CDOT’s Safety Patrol. N/A means no data was received.

<sup>3</sup>This metric was discontinued as the goal was accomplished.

## KEY LEARNINGS

Operation Centers:

1. We gain credibility with public messaging when we are tied in with the field about what’s happening on the roadway. The operational environment can be dynamic, and a key part promoting safety is handling the queue of traffic potentially coming into a closure point or incident. In this regard, our operation centers being a “one stop shop” for safety patrol, maintenance and traffic has been a forward leaning step.
2. We continue to finetune our new ATMS system to refine our products based on lessons learned and feedback (e.g. CoTrip enhancements to prioritize the display of road closures no matter what layer the user has selected, automatically display the road construction layer during non-winter months, etc).

TIM Program: Effective TIM Programs require active participation by all stakeholders, including CDOT.

## NEXT STEPS

1. To promote prompt and interoperable communications between the first responder community, focus on procuring a Computer Aided Dispatch software program for our operation centers.

2. Continue to reinforce moving from a “Champion” based TIM program, to an “Institutionalized” program.
3. Finalize CDOT Procedural Directive 1510.1 Integration of TIM Program to Highway Operations to better collaborate CDOT resources and services during incident response.

# 2.14 | Transportation Development: Applied Research and Innovation

## INTRODUCTION

**CDOT Manager:** Stephen Cohn

**FHWA Manager:** Aaron Bustow

The Research Development and Technology Transfer Program at CDOT conducts a program of high-quality, applied research, advancing solutions to the increasingly complex needs confronting Colorado's transportation future. The research projects selected drive improvements in quality of life and environment in Colorado by developing and deploying new or innovative methods, products, or materials in the planning, design, construction, and operation of transportation. The program also monitors and disseminates relevant transportation research conducted by other states and the NCHRP. To meet these goals, research must be timely, relevant, and valid when applied to priority real-world problems, as well as cost-effective and accurately documented and disseminated. Knowledge and technology must be appropriately transferred to practitioners to be effectively used.

## QUALITY/RESULTS

In State FY2022 ARIB updated our [Research Manual](#), documenting numerous clarifications and improvements to our processes and procedure. Among those is doubling of the cadence of Problem Statement evaluation, introduction of Research Areas of Emphasis, and increased use of digital project submission.

Fourteen (14) research reports were published in State FY2022 (July 2021 – June 2022) (<https://www.codot.gov/programs/research/pdfs>). Of these, 8 resulted from ARIB primary investigations, and 5 (\*'s) resulted from pooled fund projects where CDOT is the lead state. One project (Report #2022-03) resulted from an ARIB-related research project led outside of our Branch.

Report #	Title
2021-02	Rock Cut Blasting Aesthetics BMP Phase II
2021-03	Influence of the Mount Evans highway on alpine wetland hydrologic processes, permafrost and vegetation, Colorado Rocky Mountains
2021-04	Striping Materials Performance Curves - Life Cycle Analysis
2021-05*	Evaluating the Human-Automated Maintenance Vehicle Interaction for Improved Safety and Facilitating Long-Term Trust
2021-07	US 160 Dry Creek Wildlife Study

2021-08	In-Situ Monitoring of Infiltration-induced Instability of I-70 Embankment West of the Eisenhower-Johnson Memorial Tunnels, Phase III
2021-09*	Autonomous Traffic Mobile Attenuator (ATMA) Tabletop Exercise 2021 Summary Report
2021-10*	Infrasound Avalanche Monitoring: Enhanced monitoring in Little Cottonwood Canyon, Utah
2021-11	Evaluation of Hybrid Micropile A-Frame-Geosynthetic-Reinforced Wall with Steel Guardrail Barrier for MASH Loading
2022-01	A Literature Analysis to Determine Optimal Wildlife Crossing Structure Size
2022-02	Earth Pressure Assessment and Optimization of Type-7 GRS Walls – Earth Pressure for Type-7 GRS Wall
2022-03	Eastern Slope and Plains Wildlife Prioritization Study
2022-04*	ATMA Incident Response-CSU Data Report
2022-05*	Linking measurement from a differential emissivity imaging disdrometer (DEID) to storm-snow instabilities

## PERFORMANCE MEASURES

The following performance measures demonstrate the health of the Research Program:

**Table - Performance/Compliance Measures (Research)**

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2020 Actual	2021 Actual	2022 Actual
97	Percent of recommendations implemented	<p>Percent of recommendations implemented or adopted within two years of final research report, using 5 years of data.</p> <p>The research findings and recommendations will impact one or more of the following:</p> <ul style="list-style-type: none"> <li>improve design and construction methods,</li> <li>improve design and construction specifications,</li> <li>improve planning processes,</li> <li>impact maintenance practice,</li> <li>update manuals, initiate new programs, and provide new technology</li> </ul>	Research Work Plan and Report	State FY	35%-80%	55%	61%*	63%

412	Number of projects completed on schedule	The number of projects completed in the fiscal year on schedule	Research Work Plan and Report	State FY	10	7	11	13
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## KEY LEARNINGS

ARIB staff are intimately involved in managing research projects to successful conclusions. In FY2022 ARIB largely completed catch-up on previously slowed or stalled projects. A key accomplishment was also substantially revising our Research Manual. This now more accurately documents our processes and procedures and integrates the more recent changes that streamline and strengthen our program. As indicated by PM #412, work by ARIB resulted in publication of 13 new research reports that generate new knowledge, support CDOT work, and are available through TRID/TRIS to all other states and transportation researchers.

ARIB continues to explore changes to improve efficiency, stakeholder experience during the research cycle, and to target research toward areas that are most impactful. As the branch tests and updates practices for research project selection and for research management, Performance Measures should be monitored for unexpected changes.

\* ARIB adjusted the calculation methodology for PM # 97 starting in FY2021. Prior to that, projects where the implementation status is unknown were considered “not implemented”. Going forward, we exclude “unknown” projects from the calculation and will continue to update their status as it becomes known.

## NEXT STEPS

- Continue to monitor and update the implementation status of completed research projects.
- Continue to encourage implementation of completed research by project Champions.
- Continue to develop the Areas of Emphasis concept to ensure CDOT’s research portfolio addresses recognized priorities within the State.

## 2.15 | Transportation Development: Asset Management

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### INTRODUCTION

**CDOT Manager:** William Johnson, Performance and Asset Branch Manager  
Toby Manthey, Asset Management Program Manager

**FHWA Manager:** Aaron Bustow

CDOT's Performance and Asset Management Branch (PAMB) coordinates with FHWA, the Department's asset-program managers, CDOT Regions, and other agencies to manage 12 asset classes. PAMB empowers CDOT's strategic planning and decision-making by providing tools to measure, analyze, forecast, and communicate to staff and transportation stakeholders the performance of asset programs and investment decisions.

The Department's 12 asset classes are pavement, bridges, culverts, walls, traffic signals, intelligent transportation systems, tunnels, geohazards, road equipment, buildings, rest areas, and maintenance.

### QUALITY/RESULTS

CDOT in 2022 submitted its latest Transportation Asset Management Plan (TAMP). The document includes content required by FHWA, including current processes and plans for managing pavement and bridges, including those on the National Highway System (NHS). As of March 2023, CDOT FHWA determined the plan is consistent with requirements for asset management plans established by 23 U.S.C. 119 and 23 CFR part 515. In addition to the required content, CDOT included appendices that described processes for the 10 other asset classes in the Transportation Asset Management (TAM) Program.

The 2022 plan was CDOT's fourth asset management plan.

The Department employs a multi-level organizational structure to support asset management. At the highest level, the Transportation Commission formulates general transportation policy and makes recommendations to the Governor and General Assembly on issues related to transportation policy and CDOT's budgets and programs. At the middle level, the Transportation Asset Management Oversight Committee includes the Executive Director, Deputy Director, Chief Engineer, Chief Financial Officer, Chief of Staff, Director of the Division of Transportation Development, the Director of Project Support, and all Regional Transportation Directors. This committee makes decisions on asset management strategy, goals, and objectives. A Working Committee includes headquarters-level asset managers.

Finally, program developments are reported to Regional and Division staff in a regular briefing. The Working Committee and the Oversight Committee work together on the TAMP, asset management implementation, and emerging issues.

The Department’s infrastructure objective for all asset categories is “to preserve the transportation infrastructure condition to ensure safety and mobility at a least life cycle cost.”

## QUALITY/RESULTS

The Department has developed statewide targets for “national performance measures” for pavements and bridges on the Interstate and National Highway System. This process has included working collaboratively with MPOs in support of their target-setting activities. CDOT has included new two- and four-year pavement and bridge targets for these metrics in the Department’s 2022 asset management plan. CDOT also has long maintained internal metrics for all its asset classes, which are contained in the Department’s Policy Directive 14.

In addition, two new performance metrics for CDOT’s Transportation Asset Management Plan (TAMP) are shown below.

PM#	Measure	Description	Reporting Mechanism	Reporting Frequency	Target	Past Years	Actual
TBD	Certification of Transportation Asset Management Plan (TAMP) development processes	FHWA Certified TAMP development processes in effect? Yes.	FHWA letter to CDOT (Certification Decision)	FHWA certifies processes every four years (or whenever TAMP development processes are amended)	Target: Certified TAMP processes in effect	2020: Yes. 2021: Yes. (Certified TAMP processes in effect.)	2022: Yes. 2023: Yes, but awaiting new certification (Certified TAMP processes in effect.)
TBD	TAMP Consistency Determination	FHWA determination of whether CDOT has implemented a TAMP consistent with 23 U.S.C. 119 and 23 CFR part 515.	FHWA letter to CDOT (Annual Consistency Determination)	Annual	Target: Positive determination of TAMP implementation	2020 and 2021: Yes. Successful implementation of TAMP consistent with 23 U.S.C. 119 and 23 CFR part 515.	2022: Yes. Successful implementation of TAMP consistent with 23 U.S.C. 119 and 23 CFR part 515.

## KEY LEARNINGS

The asset management program has spent the previous year refining its 2022 TAMP, additionally the program set budgets for fiscal years 2026 and 2027. In addition, the program spent

significant time analyzing its performance relative to National Performance Measures (NPMs). The Department has developed a strategic project list to address its increasing share of Interstate pavement rated “Poor.”

## **NEXT STEPS**

The TAM Program in 2023 is shifting focus from refining its TAMP to refining its asset models. These efforts include refining the relationship between CDOT’s Drivability Life metric for pavement and the federal metrics for pavement condition. The Program also will continue to refine how it tracks investment according to federally defined work types for pavement and bridges. These investments are reported in an annual memo sent to FHWA for determining whether CDOT is managing its asset management program in accordance with the Department’s asset management plan.

In addition, the asset management program in 2023 is developing planning budgets for state fiscal years 2027-28.

# 2.16 | Transportation Development: Environment

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## INTRODUCTION

**CDOT Manager:** Jane Hann and Matt Muraro (Alternate)

**FHWA Manager:** Stephanie Gibson

The FHWA/CDOT Environment program is focused on avoiding, minimizing, and mitigating potential adverse impacts of the transportation system on the people and the environment of Colorado in accordance with the National Environmental Protection Act (NEPA) and other applicable environmental legislation, regulations, and policy direction. This is accomplished by ensuring:

- Environmental issues are identified early;
- Appropriate impact analyses are performed in a timely manner;
- Adequate documentation is submitted and reviewed as scheduled;
- Required authorizations are received from the governing entities for all projects and maintenance activities in accordance with the laws, environmental policies, letters of agreement and rules governing the environment; and
- Mitigation tracking is conducted.

Timely compliance with environmental requirements is critical for advancing projects. The Regions, with assistance from the Project Development Branch and the Division of Transportation Development (DTD), are charged with the responsibility of project development, construction, and maintenance of the Colorado transportation system in a manner that will preserve the social and natural environment.

## QUALITY/RESULTS

1. Updates to Performance Tracking Measures
  - No Changes
2. Completion Time for Environmental Documents
  - The completion time for major environmental documents, which include Environmental Assessments (EAs), Environmental Impact Statements (EISs) and Planning and Environmental Linkages Studies (PELs), completed in 2022 is displayed in the table below: Table 1: NEPA and PEL Projects Completed in 2022. Additionally, Appendix B contains all major NEPA projects that have occurred since 1999 and lists the length of time for each project.

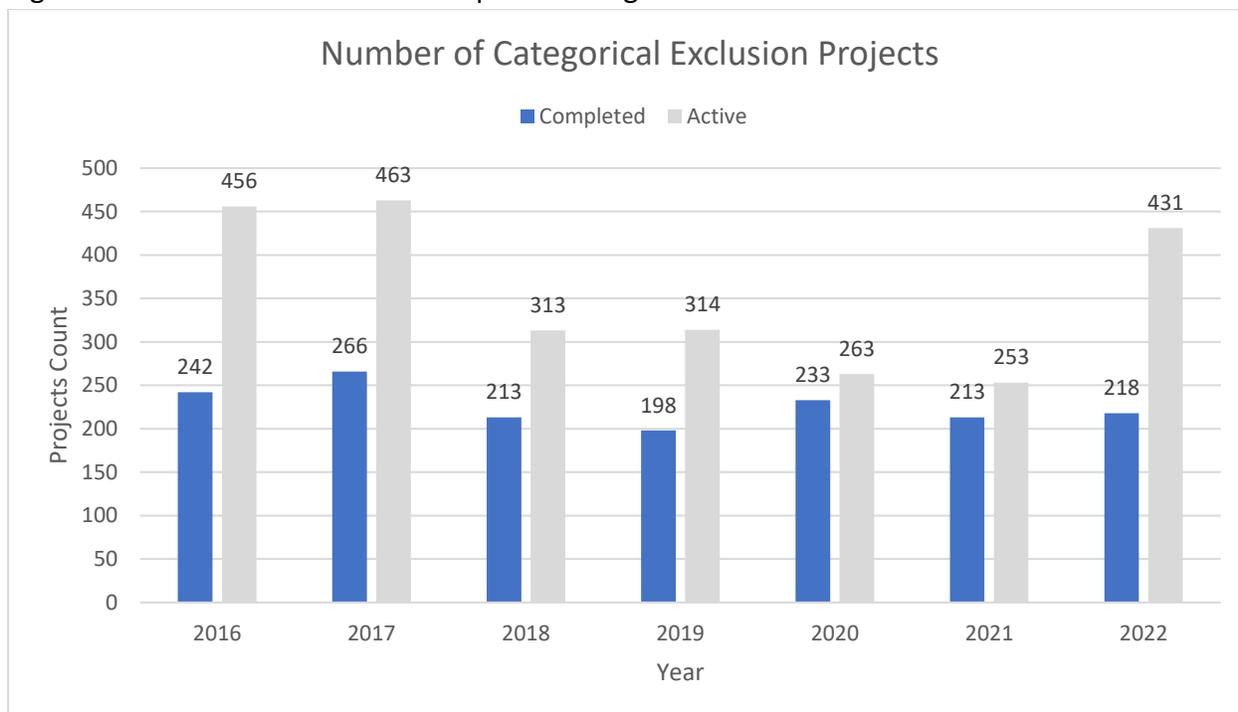
Table 1: NEPA & PEL Projects Completed in 2022

Document Type	Title of Document	Time to Complete
PEL Average Completion Time	Includes data from 5 prior years	22 months (average)
EIS Average Completion Time	No EISs were completed in 2022 so using the last time an EIS was completed for average calculation	152 months (average)
EA Average Completion Time	Includes data from 5 prior years	31 months (average)

### 3. NEPA Workload

- Each year, CDOT tracks the number of active and completed Categorical Exclusions (CatExs), EAs, EISs and PELs. The following figures display the number of active and completed CatEx and Major NEPA Projects.

Figure 1. Number of Active and Completed Categorical Exclusions



During the 2022 calendar year, there were 218 CatExs completed. Thirteen of those were Non-Programmatic CatExs. This is five more than the previous year. This is likely due to the slow project creation in 2020 and 2021 due to the Covid-19 pandemic. In addition to 218 completed CatExs, there were 431 active (federal and non-federal) NEPA projects of all levels statewide. This dramatic increase is likely due to increase in funding from the Bipartisan Infrastructure Law, the Inflation Reduction Act and Colorado Senate Bill 21-260.

Figure 2. Environmental Documentation Workload – Number of EA/EIS/PEL Projects Worked On

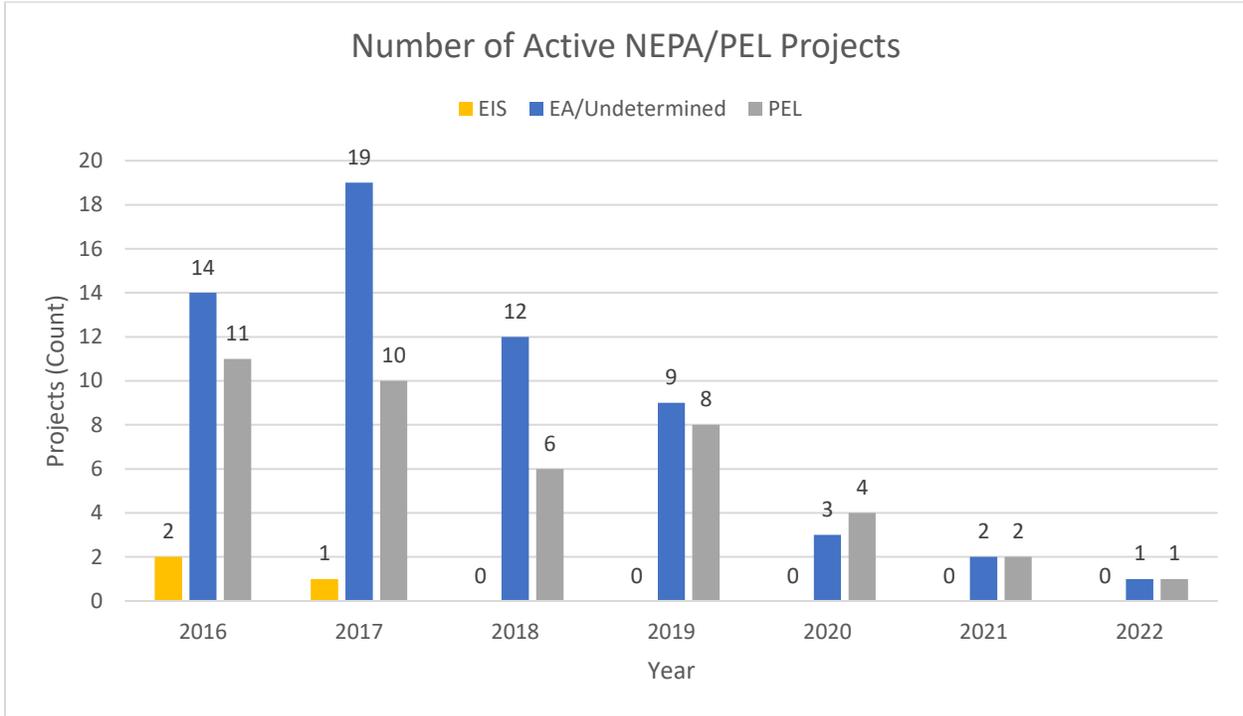


Figure 3. Environmental Documentation Workload – Number of EA/EIS/PEL Projects Completed

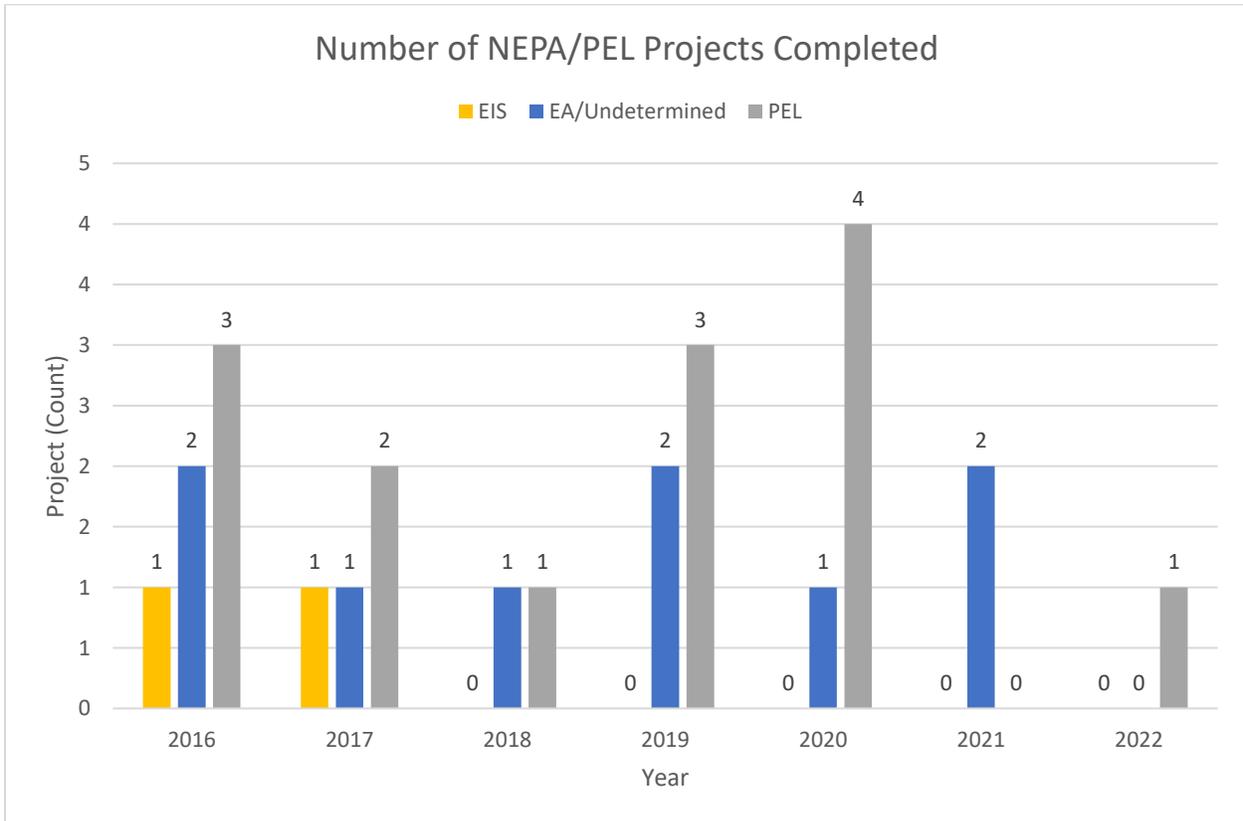
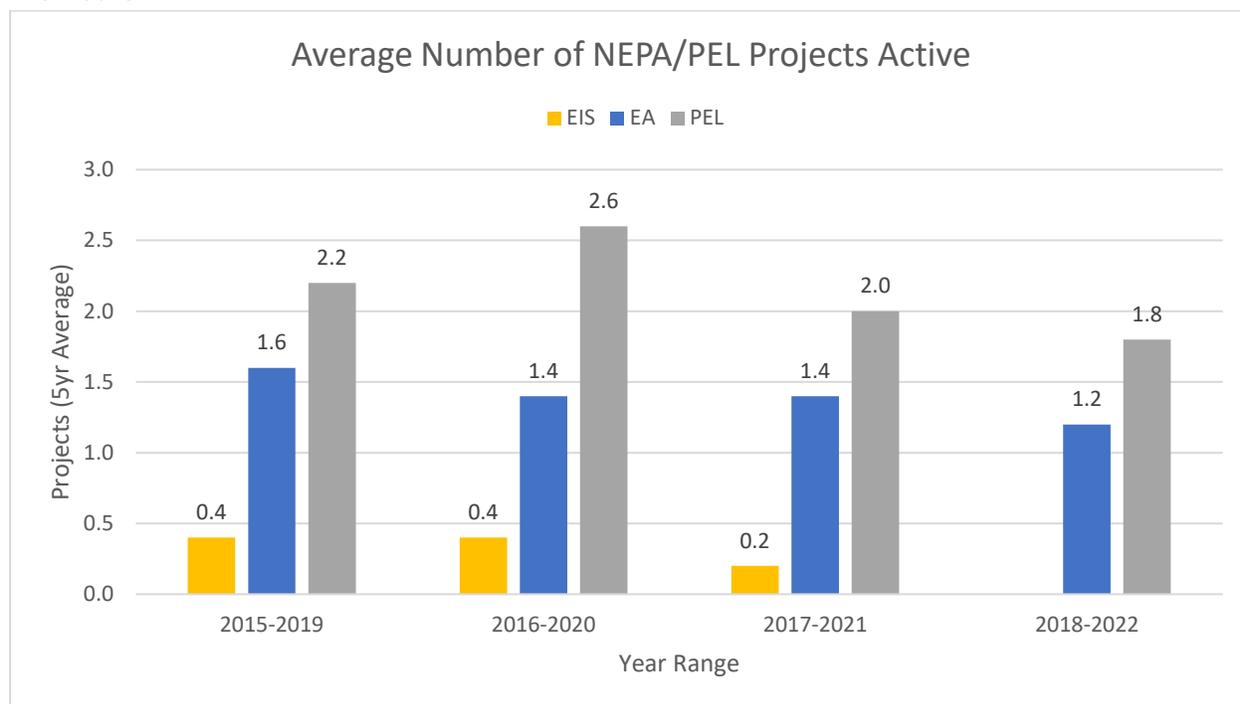


Figure 4. Environmental Documentation Workload – Five Year Average of EA/EIS/PEL Projects Worked On



### EIS/ROD

No EIS documents were completed in 2022. No new EIS documents have been started since 2007. Part of this has to do with the Planning and Environmental Linkages (PEL) studies that are being used at a corridor planning level instead of Tier 1 EISs. Tier 2 documents (EAs and CatExs) continue to be processed under the I-70 Mountain Corridor EIS and phased RODs are being processed for the I-70 East EIS and the I-25 North EIS.

### EA

At the end of the 2022 calendar year, there was one active EA project – I-270: Widening from I-76 to I-70. Floyd Hill was completed in 2021, and the FONSI was completed in 2022. No EAs were completed. There is a downward trend for both EA projects active and completed. Due to the changes in the CEQ regulations requiring that EAs be completed in 1 year, there are a number of projects that may become EAs that are in “early NEPA” prior to officially determining the class of action. Additionally, the CatEx Programmatic Agreement (PA) which was signed in 2021 allowed some projects that would have previously been EAs to proceed as CatExs.

## PEL

There was one active PEL study at the end of 2022 – South Powers Extension. This is a noticeable dip from years prior. This could be due to CDOT's focus on completing programmed projects in the 10-Year Plan. The five-year average has dropped from around eight active PEL studies for the past several years to two active PEL studies.

**Appendix A:** Environment Section, other Notable Regulations and Accomplishments contains more information on other accomplishments such as the timeline for when the NEPA Manual guidance was available, politics such as governors and their campaign platforms, and policies such as going after grants and partnerships that require NEPA documentation up front that could also affect the length of a NEPA document. This appendix is from 1999 to present day.

### 4. Water Quality Measure

Chronic, Severe and Recalcitrant findings are minimal due to CDOT's Regulatory Authority noted in subsection 208.09 of our specifications and the proactive approach it requires the contractor to address findings noted on CDOT's MS4 inspections. 208.09 has been an effective tool in improving the stormwater requirements and performance on construction sites as it requires the contractor to take action on non-compliance issues prior to a CDOT inspection occurring.

## PERFORMANCE MEASURES

The following performance measures (PMs) demonstrate the health of the Environment Program.

Table 2 - Performance/Compliance Measures (Environment)

PM#	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/Baseline	2022 Actual
625	Completion time for major environmental documents	Major environmental documents are defined as an EA, EIS, or PEL	A list of all EAs, EISs, and PELs completed in the calendar year, identifying the length of time along with a project description as added to previous years' data	Calendar Year	Track trend	CDOT completed one PEL document, which was completed in 28 months. No EA documents or EIS documents were completed this year.

104, 381, 382	Active and complete NEPA documents	Projects that were active at any point in the year, and projects for which NEPA actions were completed	A list or table indicating number of active and completed NEPA documents in the calendar year divided by class of action (Categorical Exclusion [CatEx], EA, EIS) as added to previous years' data	Calendar Year	Track trend	In 2022, CDOT had 433 active NEPA projects of all levels and completed 218 CatEx projects and one PEL.
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PM#	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/Baseline	2022 Actual
99	Water quality measure	Percentage of chronic, severe, chronic-severe, and recalcitrant construction stormwater inspection findings (for projects using 2019 specifications or newer)	Chief Engineer Objective	Calendar Year	0%	In 2022, CDOT had 0.64% chronic, 0.25% severe, 0.0% chronic-severe, and 0.0% recalcitrant stormwater inspection findings.

## KEY LEARNINGS

The environmental program continued to see workload and completion time for environmental documents as beneficial performance trackers. In 2022, CDOT had 431 active projects, and completed 218 CatEx projects, and 1 PEL.

Several notable legislative and rulemaking changes happened in 2022 on the federal level. The Council on Environmental Quality (CEQ) issued the Phase 1 Final Rule on April 20, 2022. The rule finalizes a narrow set of changes to generally restore regulatory provisions that were in effect for decades before the 2020 rule modified them for the first time. This revision directed NEPA documents to analyze cumulative impacts once again, emphasize the importance of public involvement, and allow states to create higher environmental standards and requirements than federal ones.

Additionally, the Infrastructure Investment and Jobs Act (also known as the Bipartisan Infrastructure Law or BIL) was adopted into law in November of 2021. The BIL secured a large amount of funding for infrastructure projects with an emphasis on direct recipient grants for local agencies. This will increase workload on FHWA which will impact the amount of assistance FHWA provides to CDOT.

To aid in the federal dashboard and shorter EA and EIS timelines codified in the BIL and the earlier CEQ regulations, CDOT created a class of action determination process, including a template form. For projects that are anticipated to require an EA or EIS, this will be filled out by environmental project managers when CDOT is ready to determine the class of action based on the P&N, alternatives, and environmental impacts. This will help determine the appropriate class of action and will standardize EA start dates as later in the NEPA process, giving projects more opportunity to meet federal timeline requirements (1-year for EAs, 2-years for EISs).

The Inflation Reduction Act of August 2022 provided funding to select materials and products with substantially lower levels of embodied greenhouse gas emissions as determined by EPA. It also set aside funding for transportation equity and environmental justice initiatives, including supporting access to transportation for low-income and historically marginalized communities.

The state level legislation and rulemaking changes are discussed in Appendix A, Environmental Section: Other Notable Regulations and Accomplishments.

## **NEXT STEPS**

The environmental program has outlined a goal for the upcoming year that will help with environmental review:

CDOT will revise its Form 128, which tracks environmental clearances for all projects, to include environmental justice. CDOT will update its NEPA process to analyze and document the reduction of greenhouse gas emissions associated with transportation in compliance with SB21-260 and using the 2023 CEQ NEPA Guidance on Consideration of Greenhouse Gas Emissions and Climate Change. Based on the first few projects going through the class of action determination process, the process will be reviewed and revised as needed.

## 2.17 | Transportation Development: Transportation Planning

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### INTRODUCTION

**CDOT Manager:** Marissa Gaughan, Multimodal Planning Branch Manager  
William Johnson, Performance and Asset Management Branch Manager  
Erik Sabina, Information Management Branch Manager  
Craig Hurst, Freight Mobility & Safety Branch Manger  
Darius Pakbaz, Deputy DTD Director

**FHWA Manager:** Bill Haas & Aaron Bustow

Four branches within the Division of Transportation Development (DTD) directly contribute to performance-based planning and programming as outlined in MAP-21, the FAST Act and continued under the IJJA: The Multimodal Planning Branch (MPB), the Freight Mobility & Safety Branch (FMSB), the Information Management Branch (IMB), and the Performance and Asset Management Branch (PAMB). Other DTD branches include the Environmental Programs Branch (EPB) and Applied Research and Innovation Branch (ARIB).

### QUALITY/RESULTS

For the state fiscal year 2022, DTD has accomplished many of its objectives within its work program, including an update to the statewide 10-year plan to meet the greenhouse gas planning standards and advance projects for funding in Fiscal Year 2023 - 2026.

Fiscal Year 2022 featured continued focus on the national performance measures targets and data. Additionally, the Department now has increased transparency of its performance efforts, including new dashboards showcasing performance targets and current conditions, and its Accountability Dashboard, making publicly available information on the construction projects being implemented from its 10-Year Plan.

## PERFORMANCE MEASURES

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target / Baseline	Past Years	2022 Actual
738	Percentage of FY DTD Budget Expended and Encumbered by End of SFY	Percent of funds encumbered or expended compared to the estimate for the fiscal year	Feedback on annual review and tracking of percent complete on projects  Progress on the work program is in the FY Accomplishments Report	State FY	70% of planned amount	2021: 74.70% 2020: 67.77% 2019: 79.64% 2018: 79.81%	<b>77.61%</b>

The following performance measures demonstrate the health of the Planning Program:

Table – Performance/Compliance Measures (Planning)

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target / Baseline	Past Years	2022 Actual
817	Truck Travel Time Reliability (TTTR) Index	The sum of maximum TTTR for each reporting segment divided by the total Interstate system miles per federal requirements	Highway Performance Monitoring System (HPMS)	Calendar Year	National Performance Measure Targets: 2023: 1.46 2025: 1.46	2021: 1.39 2020: 1.42 2019: 1.45 2018: 1.38 2017: 1.37 2016: 1.44 2015: 1.49	<b>1.45</b>
818	Peak Hours of Excessive Delay (PHED)	Annual hours of Peak Hour Excessive Delay (PHED) per capita for the Denver-Aurora Urbanized Area per federal requirements	National Performance Management Research Data Set (NPMRDS)	Calendar Year	National Performance Measure Targets: 2023: 15.8 2025: 17.4	2021: 11.7 2020: 8.7 2019: 16.9 2018: 18.9 2017: 17.8 2016: 15.6 2015: 16.3 2014: 16.6	<b>12.3</b>

819	Non-SOV Travel	Percent of Non- Single Occupancy Vehicle (SOV) Travel for the Denver-Aurora Urbanized Area per federal requirements	American Community Survey (United States Census Bureau)	Calendar Year	National Performance Measure Targets: 2023: 26.7% 2025: 27.7%	2021: 30.2% 2020: 27.3% 2019: 24.7% 2018: 24.2% 2017: 24.1% 2016: 23.9%	N/A <sup>1</sup>
N/A	Peak Hours of Excessive Delay (PHED)	Annual hours of Peak Hour Excessive Delay (PHED) per capita for the Fort Collins Urbanized Area per federal requirements	National Performance Management Research Data Set (NPMRDS)	Calendar Year	National Performance Measure Targets: 2023: 3.8 2025: 3.7	2021: 3.0 2020: 2.3 2019: 4.1 2018: 3.7 2017: 3.9	3.3
N/A	Non-SOV Travel	Percent of Non- Single Occupancy Vehicle (SOV) Travel for the Fort Collins Urbanized Area per federal requirements	American Community Survey (United States Census Bureau)	Calendar Year	National Performance Measure Targets: 2023: 25.3% 2025: 25.6%	2021: 29.3% 2020: 27.0% 2019: 25.1% 2018: 25.0% 2017: 25.0% 2016: 24.9%	N/A <sup>1</sup>
820-823	On-Road Mobile Source Emissions Reduction Benefit from CMAQ-funded Projects	Total Emissions Reduction Benefit per federal requirements from the following pollutants and precursors in kg/day: VOC, PM10, CO, & NOX	CMAQ Public Access System	Federal FY	National Performance Measure Targets: VOC 2023: 239 VOC 2025: 482 PM10 2023: 35 PM10 2025: 71 CO 2023: 2,672  CO 2025: 5,393 NOX 2023: 538 NOX 2025: 1,086	2021: VOC – 223.11 CO – 2826.53 NOx – 304.26 PM10 – 5.71  2020: VOC - 37.44 CO - 702.37 NOx - 54.89 PM10 - 2.15  2019: VOC - 88.56 CO - 542.66 NOx - 265.60 PM10 - 19.19  2018: VOC - 100.09 CO - 1152.51 NOx - 289.63 PM10 - 34.13  2017: VOC - 463.62	N/A <sup>2</sup>

						CO - 6720.58 NOx - 652.63 PM10 - 3.19	
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2022 data for the American Community Survey will not be available until December 2021  
 2022 data not available until after the submission deadline in May 2023.

## KEY LEARNINGS

The 10-year plan, and future statewide plans and/or plan updates will include updated performance levels to illustrate how implementation of the statewide plan is affecting these performance levels statewide and with MPO partners.

## NEXT STEPS

Next steps for the performance-based planning and programing program for the next year include:

- Continued implementation of the provisions of SB21-260, including the development of the Freight Mobility and Safety branch, incorporation of the Oversize/Overweight permits office, and hiring other key staff.
- Begin processes for analyzing data related to national performance measures in the infrastructure condition and system reliability goal areas. This will allow CDOT to set new targets for all measures in these two goal areas by the October 1 deadline.

## 2.18 | Transportation Development: Office of Innovative Mobility

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### INTRODUCTION

**CDOT Manager:** Kay Kelly, Chief of Innovative Mobility

**FHWA Manager:** Bill Haas

The Office of Innovative Mobility is dedicated to reducing pollution in our air and congestion on our roads by expanding multimodal transportation options and using traditional and emerging technologies. The Office of Innovative Mobility includes four divisions, each of which collaborates with internal and external stakeholders to advance its mission. The Electrification and Energy team works closely with the Colorado Energy Office and Colorado Department of Public Health & Environment to promote zero emission vehicle and infrastructure deployments for light, medium, and heavy-duty vehicles. The Mobility Technology team oversees connected and autonomous vehicle efforts that improve safety and expand mobility options with a focus on overarching policy and strategic investments that are preparing CDOT for the future of this emerging field. The Mobility Services group is exploring efforts to better utilize new mobility services such as ride hailing, e-commerce, and shared mobility to provide more options for all Coloradans, including vulnerable populations with specialized transportation needs as well as promoting innovation in traditional transportation demand management (TDM) strategies. The Office also includes the Division of Transit and Rail, which administers millions of dollars of State and Federal transit dollars, plans for, and constructs transit infrastructure and mobility hubs, awards transit grants to local governments and transit operators, and operates the Bustang family of services, a statewide interregional transit service.

### QUALITY/RESULTS

The Office of Innovative Mobility ensures quality control and assurance by developing an annual work plan and reports regularly to CDOT executive leadership and the Transportation Commission on the status of the various initiatives, performance metrics, and expenditures.

### PERFORMANCE MEASURES

The following performance measures will help assess the health of the Innovative Mobility Program. New performance measures have been added for the TDM Grant Program and several others under the Mobility Technology Division.

Table - Performance Measures (Innovative Mobility)



PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target / Baseline	2019	2020	2021	2022
-	CanDo Telework	Total funds awarded for the CanDo Telework	Grantees provide project end report	Calendar Year	Expend \$176k funds	N/A	\$123.8K	\$116.7K	N/A
-	Revitalizing Main Streets Initiative	Total funds awarded for the Revitalizing Main Streets Initiative	Grantees provide project end report	Calendar Year	Expend \$6.1 million funds	N/A	\$2.84M	\$28.4M	\$35M
	TDM Grants	Total funds awarded for the Transportation Demand Management Grant program	Grantees provide quarterly reports, project end report	Quarterly	Expend \$960,000 funds	N/A	N/A	\$1.01M	\$239,000
-	Number of EV Bus Grants Awarded Through VW Settlement	Number of EV Buses awarded through VW Settlement	VW Settlement Transit Program Grant Tracking	Calendar Year	Expend full \$30.6 million allocation	\$13.3M	\$16.2M	\$21.9M	\$21.9 M

PM #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target / Baseline	2019	2020	2021	2022
-	Total EV registrations in Colorado	Cumulative total number of EV registrations in Colorado	EvaluateCO dashboard	Monthly	940,000 by FY2030	19,256	32,730	49,272	75,542
-	Total zero-emission transit vehicles in Colorado	Cumulative amount of zero-emission transit vehicles in Colorado	EvaluateCO dashboard	Monthly	1,000 by FY2030	23	54	61	71
-	Percentage of total state highway miles within a 30-mile buffer of a publicly-accessible DC fast-charging station	The percentage of total state highway miles within a 30-mile buffer of a publicly-accessible DC fast-charging station	Charge Ahead Colorado Grants Tracking	Monthly	100% by FY2030	40%	46%	63%	70%



Number of Colorado Scenic & Historic Byways that are classified as Electric Byways	The number of Colorado Scenic & Historic Byways that are classified as Electric Byways	Charge Ahead Colorado Grants Tracking	Monthly	26 (100%) by FY2025	3	3	8	10
Total CDOT Connected Vehicles (CV)	Number of CDOT vehicles equipped with CV technology and/or vehicles contributing data to CDOT's Data Lake	Mobility Technology Program Tracking	Quarterly		NA	NA	84	84
Total CV roadside units (RSU) on the CDOT transportation network	Number of deployed CV RSUs	Mobility Technology Program Tracking	Quarterly		132	132	161	189
Total CV data collected from the Roadside Units (RSUs)	Basic safety messages (BSM) generated by CDOT's CV data and other vehicle data contributed to CDOT's Data Lake	RSU Manager	Quarterly		NA	NA	22,241,099	137,759,451
Total autonomous truck mounted attenuator (ATMA) miles	Number of miles driven in autonomous mode by CDOT's autonomous truck mounted attenuator (ATMA)	Mobility Technology/D M O Program Tracking	Quarterly		40	22	26	125

PM#	Measure	Description	Reporting Mechanism	Reporting Frequency	Target / Baseline	2019	2020	2021	2022
	Creation of work zone data exchange (WZDx) data feed Work Zone Data Exchange Project	Creation of the USDOT WZDx specification data feed	Public availability of the feeds	Annually		NA	NA	Feed is not publicly available (under development and should be available in Calendar Year 2022)	Feed is publicly available on the CoTrip Website and FHWA Registry. Version number 4.2

## PERFORMANCE MEASURES

OIM has many successful program areas and is using a combination of federal grants, state funds and VW Settlement funds to make an impact throughout the state. The federal BUILD Grant enhanced the OIM Technology program in 2021. Funds were used for installation of fiber optic lines on I-25 and I-76. These will provide the infrastructure to support connected vehicle communication in the future. The TDM grants, mobility hub construction, Connected Colorado mobile trip planning and ticketing platform and zero emission bus planning and capital awards are progressing as scheduled, with more funds to be expended in future years. 2022 saw the publication of the Colorado Clean Truck Strategy after nearly two years of stakeholder engagement as well as the scoping, development, submission, and approval of the Colorado National EV Infrastructure (NEVI) Plan. The Office of Innovative Mobility also conducted its first round of the new Innovative Mobility Grants program to address local project needs for TDM, E-Mobility Education & Awareness, ZEV Workforce Development, and CV grants, receiving 50 applications across all categories.

## NEXT STEPS

Colorado has seen continued progress on vehicle electrification, including multiple new monthly records for new EV registrations and the accelerated build-out of charging stations across the state, but there is still work to be done to reach our goals for Electrified Scenic Byways, transit vehicle deployments, and state highway coverage. In 2023, CDOT staff across OIM, the Division of Transit & Rail, and other divisions will release the first call for projects for the new Clean Transit Enterprise to further advance these efforts. In partnership with the Colorado Energy Office, CDOT will also issue the first request for applications to award NEVI and Community

Access Enterprise (CAE) dollars to fund the construction of DC Fast-Charging Plazas across the state. In addition, the Office will continue to work with partner agencies and stakeholders to implement the Colorado Clean Truck Strategy to tackle medium and heavy-duty vehicle emissions, including via studies in calendar year 2023 on planning for medium and heavy-duty zero emission vehicle infrastructure and improved freight operations to reduce congestion and greenhouse gas emissions. The Electrification program will also continue to support implementation of a new Community College curriculum for electric vehicle maintenance that was created in 2022 as part of CDOT's workforce development efforts. The Mobility Technology program will install additional fiber and roadside units to support connected vehicle communication and continue to make progress on the Work Zone Data Exchange project to improve safety. Lastly, the Mobility Services program is working towards the advancement of strategic TDM measures, including a pilot project to install micro mobility in one of Colorado State Parks.

Listed below are some potential performance metric options that are being considered by OIM for FY 22-23:

- Bustang - Advanced Driver Assistance Systems
- Statewide micro mobility trips
- VMT reduction through TDM Measures

# Section 3



U.S. Department of Transportation  
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# Section 3 | Risk Response Strategies

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## Overview of the Risk Response Process

One of the most important roles of the Quality Improvement Council (QIC) is evaluating and seeking improvements to existing Federal-Aid Highway Program (FAHP) related processes. By focusing on continual improvement, CDOT and FHWA can achieve strategic goals, better meet customer's needs and expectations, lead systemic improvement, assist with the deployment of innovative technologies, and provide a more focused technical assistance.

Each year, the QIC compiles a list of risks to implementing the FAHP, as well as opportunities to improve results or streamline processes. CDOT and FHWA leads explore the risks and make recommendations on how to address them. The QIC prioritizes which risks and opportunities to focus on based on the potential impact, likelihood, and resources available. This is called Joint Process Reviews (JPRs). There are two new JPRs and one existing JPR that will be closed out in the upcoming Federal Fiscal Year 2023. Consistent with previous years, the JPRs will follow the standard CDOT project charter to clearly communicate the purpose, sponsors, stakeholders, resources, data, deliverables, measures, and work plan. In addition, the QIC will maintain the JPR tracker for open JPRs, to track the progress of open JPRs to ensure accountability and transparency.

As JPRs are closed, the JPR lead will develop a final report that summarizes: 1) overview of risk; 2) general methodology (including project team); 3) key findings; and 4) specific recommendations for implementation.

### **Joint Process Reviews (JPRs) for Federal Fiscal Year (FFY) 2023**

#### **1. Incorporate Lean Process Improvement, Project Management and Change Management into all JPRs**

- **Problem Addressed:** Quicker implementation and overall success of JPRs
- **Approach:** Use CDOT's Lean continuous process improvement methodology to streamline the JPR process, use CDOT's project management process and support from CDOT's process improvement team and change management team to successfully, and more efficiently, implement and track JPRs.
- **Contacts:**
  - CDOT: Michelle Malloy & Gary Vansuch
  - FHWA: Elizabeth Kramer

## 2. Improve Buy America Compliance

- **Problem Addressed:** CDOT and FHWA are encountering challenges related to regulations related to Buy America compliance, especially steel. Failing to maintain compliance puts a significant amount of federal funding at risk for CDOT.
- **Approach:** Review specifications on relevant materials used in recent projects, verify if a Buy America issue exists. If not, file a final report. If an issue exists, make recommendations to address and develop a project to implement those recommendations.
- **Contacts:**
  - CDOT: Craig Wieden
  - FHWA: Brian Doblin & Ed Trujillo

## 3. Systems Engineering Analysis (SEA) for Intelligent Transportation System (ITS) Device Implementations

*Note: This is a carryover JPR that will be closed out in FFY 2023.*

- **Problem Addressed:** If projects do not have adequate SEA, projects may not function and operate as intended, the impact of federal-aid funds may not be maximized, and the benefits of projects to the traveling public may be compromised. In addition, CDOT is currently not meeting 23 CFR 940.
- **Approach:** This effort will bring CDOT back into compliance with Title 23 Code of Federal Regulations Part 940 (23 CFR 940), while also providing project managers the tools, templates and defined timelines for document submission and review to improve the navigation of the SEA process.
- **Contacts:**
  - CDOT: Emma Boff
  - FHWA: Bill Haas and Eva LaDow

# Section 4



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## Section 4 | Additional Accomplishments

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CDOT has been engaged with Federal Highway Administration (FHWA) during the past decade in the nationwide “Every Day Counts” (EDC) initiative, including the most-recent 2-year cycle of that, which is referred to as EDC-6.

EDC is designed to identify and deploy innovation aimed at reducing the time it takes to deliver highway projects, enhance safety, and protect the environment.

[https://www.fhwa.dot.gov/innovation/everydaycounts/edc\\_6/](https://www.fhwa.dot.gov/innovation/everydaycounts/edc_6/)

For the EDC-6 cycle, CDOT and CDOT’s customers – Colorado taxpayers and everyone who utilizes the Colorado transportation system – have benefited from the innovations and improvements generated by EDC-6. There are 7 initiatives within the umbrella of EDC-6; CDOT has actively participated in six of those.

### **1. Next-Generation TIM: Integrating Technology, Data, and Training Traffic Incident**

Colorado is actively engaged in learning from other states about TIM and implementing improvements that fit our unique Colorado environment. Using the FHWA “stage of implementation” scaling, we are currently at the “Demonstration” stage. Some key items of note:

A. A new vendor has assumed a role supporting the TIM Program and the CSCFRS and providing ongoing input on how to better mature the programs and expand to new areas. We developed and implemented programs to better support TIM including a process to identify and procure funding resources for local programs, as well as increased training to better utilize the TIM TeamWorkbook.

B. We continue to highlight the role of TIM Program and showcase successes that will help local programs improve. There are efforts in place to develop effective database to support performance measures within program. These localized or as needed reports can be provided at this time with work to develop a programmatic database still ongoing with the goal to provide statewide metrics in the future.

C. The CSP UAV program has demonstrated success in decreasing incident closures during serious events by using the UAVs. We are working to highlight and support this technology with other programs statewide. We are also working to identify funding and training to other programs and agencies.

### **2. Crowd sourcing for Advancing Operations**

Using the FHWA “stage of implementation” scaling, Colorado is currently at the “Institutionalize” stage for Crowd sourcing. Some key items of note:

EDC 6 presented CDOT with an opportunity to continue our work with using Crowdsourcing for Advanced Operations. Previous efforts were focused on proving the value of using Waze alerts and Here Live traffic data to improve dispatching situational awareness and incident response time. For the EDC 6 effort, the focus was refined, and we looked at using crowd sourced speed data as a performance metric for snow and ice operations. The EDC 6 Crowd sourcing team

organized peer exchanges and provided opportunities to share ideas with other DOTs. The benefits are apparent and CDOT is moving to adopt this technology into our operations.

### **3. e-Ticketing and Digital As-Builts**

Using the FHWA “stage of implementation” scaling, Colorado is currently at the “Demonstration” stage for UHPC. Some key items of note:

CDOT is continuing to explore eTicketing (e-T) systems available in the DOT-focused marketplace and what other state DOT’s are currently implementing/utilizing in this space. That has included that CDOT has:

- Collected and reviewed e-T information, guidance, research, and best practices
- Participated in e-T training
- Participated in e-T peer exchanges or workshops
- Building e-T support with internal and external partners, stakeholders, and vendors
- Requested e-T technical assistance; and
- Identified an e-T champion and implementation team

### **4. Targeted Overlay Pavement Solutions (TOPS)**

Using the FHWA “stage of implementation” scaling, Colorado is currently at the “Institutionalize” stage for several aspects of TOPS; and at the demonstration and assessment stage for other portions of the overall TOPS effort. Some key items of note:

CDOT is at many different stages of implementation given the wide ranges of TOPS innovations contained. Those institutionalized include Stone Matrix Asphalt and unbonded Concrete on asphalt. We have placed some of the TOPS innovation as demonstration projects and are also currently assessing others.

Those that we have placed as demonstration projects include:

- Enhanced friction overlay,
- asphalt rubber – dense graded only,
- OGFC, and
- unbonded concrete on concrete.

Those being assessed still include:

- crack attenuating mixtures and
- bonded concrete on asphalt.

Cost in many of these has been a concern due to smaller quantity and new technology/innovation (Crack attenuating mixtures, HFST and asphalt rubber). Costs to rehab/maintain is also a concern (bonded concrete on asphalt).

### **5. UHPC for Bridge Preservation and Repair**

Using the FHWA “stage of implementation” scaling, Colorado is currently at the “Assessment” stage for UHPC. Some key items of note:

Several state employees have done some online training on a couple of different opportunities over this period of time within the CDOT “Staff Bridge” organization. It has been noted that UHPC is getting better refinement through AASHTO guidelines, and it is CDOT’s belief that once

this becomes more “guided” it may increase the use of the product especially for repair type projects.

## **6. Virtual Public Involvement (VPI)**

Using the FHWA “stage of implementation” scaling, Colorado is currently at the “Assessment” stage for VPI. Some key items of note:

With any in-person public meetings CDOT has having, we ensure the materials presented/available at the in- person meeting are also easily accessible online- so we still incorporate that VPI aspect into our public meeting planning. That is necessary because simply going back to in- person only events would be backtracking.

In the Central Colorado Region of CDOT (often known as Region 1), at our latest public meeting in March 2023 we had our videographer attend to record the presentation. We then posted the video to CDOT’s YouTube and the project web page, along with the presentation slides and meeting materials. We also sent an email blast out to the stakeholder list, so people interested in learning more knew where to find the materials online. This in-person meeting above was well attended and appreciated. We definitely are seeing the appetite for more in- person events, and it is still important to incorporate VPI so we can reach a wider audience.

# Appendices

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# Appendix A | Environment Section: Other Notable Regulations and Accomplishments

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## Priority projects:

- T-REX construction - driven by Governor Owens/Tom Norton
- SH 85 and 120<sup>th</sup> extension signed in May 2003 - driven by Tom Norton
- US 36 - Quick Final EIS/ROD driven by Tiger Grant opportunity and Governor Ritter/Russell George
- I-70 Mountain Corridor Programmatic EIS rewrite driven by Governor Ritter/Russell George (finished up by Governor Hickenlooper/Don Hunt)
- Twin Tunnel East-Bound EA - driven by Governor Hickenlooper/ Don Hunt
- I-70 East EIS/ROD driven by Governor Hickenlooper/Shailen Bhatt
- I-25 South EA (aka The Gap) driven by Governor Hickenlooper

## Dropped projects:

- NW Corridor EIS (became Jefferson Parkway, a private enterprise)
- Gaming Area EIS

## Notable Initiatives and Accomplishments:

- First EA/EIS in this analysis started in 1999
- CDOT Environmental Stewardship Guide – 1<sup>st</sup> version in 2003, revised in 2005, and in 2017
- Desired State Task Force initiated in 2005 (initiated the idea for the NEPA Manual)
- Step-Up (precursor to Planning and Environmental Linkages [PEL]) – 2004-2007
- First PEL document drafted in 2007
- CDOT NEPA Manual – 1<sup>st</sup> Version in June 2007
- FHWA Non-Programmatic Environmental Review Summary developed in 2008
- CDOT NEPA Manual – 2<sup>nd</sup> version (total rewrite) in August 2008
- CDOT/FHWA/USACE NEPA/404 Merger Process and Agreement
- CDOT NEPA Manual – 3<sup>rd</sup> version in March 2013 with many updates and additions
- CDOT NEPA Manual – Version 4 released in October 2014 with many updates and additions
- EA Template was created, tested, and revised and was rolled out for general use after the signature on the SH9 Iron Springs EA in May 2014.
- PEL Handbook and Training Update 2015
- Pel Handbook Update 2022
- Federal Lands MOU – improved communication and NEPA processes for projects taking place on federal land - 2016.
- CDOT NEPA Manual Version 5 2017

- CDOT NEPA Manual Version 6 2020
- CDOT Environmental Stewardship Guide (updated for the first time in 12 years) 2017
- CDOT NEPA@CDOT Training
- Cat Ex Programmatic Agreement 2022 Update - updating the user agreement between FHWA and CDOT for administration of Cat Ex Program.

### **Politics and Transportation Priorities:**

1987-1999 – Governor Roy Romer was in office (Bill Jones was Executive Director for CDOT) – It was during his term that the idea for T-REX came about. A Major Investment Study (MIS) identifying the need for the later-named "TRansportation EXpansion" dubbed "T-REX" was signed in 1995 and a more refined MIS was signed in 1997. In 1998, the DRCOG 20-year plan was adopted that had T-REX at the top of the priority list.

1999-2007 – Governor Bill Owens was in office (Tom Norton was Executive Director for CDOT): In November 1999, Owens brought his transportation funding initiative to the ballot. Called TRANS, the \$1.7 billion bonding initiative accelerated future federal transportation dollars on 28 projects across the state. The keystone project on his campaign platform was the "TRansportation EXpansion" dubbed T-REX in 1999. T-REX combined road funding from TRANS with \$460 million of new light rail lines to expand a 19-mile stretch of Interstate 25 through the south Denver Metro Area. Through an innovative (one-of-the-first-of-its-kind) design-build concept that greatly reduced construction times, T-REX was finished in less than five years, 2001 - 2006, and came in under budget. Owens was re-elected in 2002 by the largest majority in Colorado history, after making transportation, education, and tax cuts the focus of his governorship.

The passage of Referendum C in 2005 was in large part due to a wide coalition of bi-partisan supporters, including those in the business and transportation sectors. Although Ref C does not provide direct funds for transportation, it does allow transportation revenue to flow through Senate Bill 1 and House Bill 1310. The year prior to this, Tom Norton supported many corridor EAs and EISs including completing the "beltway" around the greater Denver area.

An early version of Planning and Environmental Linkages called Strategic Transportation, Environmental and Planning Process for Urbanizing Places (STEP UP) ran from approximately 2004 through 2007 and allowed CDOT to witness first-hand how the PEL approach could streamline its transportation planning. CDOT and FHWA-CO incorporated lessons learned from STEP UP to create new PEL tools for the state and to strengthen their relationships with federal and state resources and regulatory agencies. The success of the pilot also became a motivating factor in formalizing the PEL approach for Colorado's statewide transportation planning.

2007-2011 – Governor Bill Ritter was in office (Russell George was Executive Director for CDOT): Governor Ritter’s campaign platform was based on the following statement, “As Governor, I will bring a fresh, balanced approach to how we invest in our infrastructure, plan for future growth and protect the environment. Simply stated, the process for funding our transportation system is antiquated and needs a 21st century overhaul.” In 2007, he convened a Blue Ribbon Transportation Finance and Implementation Panel to investigate how to better prioritize and implement our infrastructure needs. In 2009, the Transportation Environmental Resources Council, a collection of regulatory and governing agencies, signed a partnering agreement for collaborating on PEL efforts to help streamline the NEPA process on large corridors.

On March 2, 2009 - Gov. Bill Ritter signed into law the FASTER transportation bill that put an emphasis on safety and bridge projects. In March through May 2009, Governor Ritter also certified 5 different Transportation Recovery Funds rounds of funding (ARRA) including one targeting transit projects, bringing multi-modal projects to the front and center of the discussion. He also proposed helping other local ventures handle their aging infrastructure and used the passage of FasTracks in metro Denver and Go 1A in greater Colorado Springs as examples of broad coalitions that were successfully built to win voter support and address regional needs.

Governor Ritter pointed out the I-70 Mountain Corridor as an example of proper planning with the environment, citing the way I-70 gracefully snakes through Glenwood Canyon. He said that this project and its concerns for our natural settings should serve as a model as we look for 21st century solutions to congestion problems throughout the I-70 mountain corridor. We must design projects that improve mobility, honor the environment and protect the livability of adjacent communities. For this reason, he proposed to preserve a transit envelope as part of a long-term I-70 transportation solution. This put a priority on the I-70 Mountain Corridor NEPA process so that work could begin on this corridor.

US 36 improvements became a priority for Governor Ritter, so Colorado submitted for Urban Partnership funding in 2007. They did not get this funding but applied for and later received \$10 million in TIGER Grant funds in 2010. To help position this project for the TIGER Grant after losing the Urban Partnership funding, the Governor put a priority in completing the EIS for this corridor to help position US 36 for this other funding. Tolling is up and running on the corridor and construction continues on stretches near McCaslin Blvd.

2011 to 2015 – Governor John Hickenlooper was in office (Donald Hunt was Executive Director for CDOT): Governor Hickenlooper saw the I-70 West Mountain Corridor as a critical corridor that affects commerce, tourism, recreation, and overall economic development with year-round congestion problems and began actively looking for funding.

He supported FASTER legislation; there were 178 bridges that were 75 years old, stretches of highways that were 75-100 years old, and expanses of interstate that are approximately 50 years old. He looked to innovative Public Private Partnerships (P3) funding to help with some needed projects as well. On October 17, 2013, 44 partnership projects were selected as part of the Responsible Acceleration of Maintenance and Partnerships (RAMP) program, totaling \$580 million, to maximize and expand the statewide transportation system.

The governor put a high priority on the I-70 East (Central) EIS project, which had been ongoing for a number of years due to public controversy. This remains a high-profile corridor for CDOT, in part because of the aging viaduct that needs to be replaced, and a lot of resources and attention were placed on its completion by the Governor.

In September 2013, a large flooding event wiped out many major roadways in northwest Colorado. Governor Hickenlooper worked with CDOT to get access to all the areas isolated by the roadway damage with a promise to open all the damaged and closed highways by Dec 1<sup>st</sup> of the same year. This goal was met before Thanksgiving, with the understanding that the emergency repairs were temporary and that the permanent repairs would occur over the next several years. The intensity of this effort pulled resources off other projects, although the normal course of business was still expected to occur at the same time, just with a lower priority that might have delayed some of the other planning efforts going on around the state.

2015 to 2018 - Governor John Hickenlooper in office second term (Shailen Bhatt/Mike Lewis served as CDOT's Executive Directors): Governor Hickenlooper and FHWA had projects of significant interest. FHWA had Projects of Corporate Interest (POCI). The following projects were FHWA designated POCI:

- I-25: Colorado Springs Denver South Connection (PEL, NEPA, and construction)
- I-25 North (for implementation/construction)
- I-70 East (Procurement/construction)
- C-470 (for procurement/construction)
- US 36 (for financing/construction)

Additional projects on the I-70 Mountain Corridor, including the westbound Peak Period Shoulder Lane and improvements to Floyd Hill were a focus.

CDOT's decision making under NEPA was legally challenged twice in 2017. It was the first time in ten years since this has occurred.

- I-70 East lawsuit: In December 2018, CDOT reached a settlement with project opponents on their legal challenge. CDOT agreed to pay for a community health study and the planting of trees throughout nearby neighborhoods.

- C470 lawsuit: There was a decision for the C470 Kipling to I-25 NEPA challenge. In that case, the courts ruled that CDOT will need to update its noise guidance and reconfirm the model validation used for the C470 project, but the FONSI was not vacated. The judge revisited the Court’s decision in late 2018. The court decision was that CDOT should improve its explanation of how its noise methodology is applied and used. The court remanded the decision back to FHWA and CDOT without a specific deadline. As a result, CDOT is updating the Noise Guidance and Abatement Criteria.

2019 to present - Governor Jared Polis in office first term (Shoshana Lew serves as CDOT’s Executive Director):

In 2019, Governor Polis signed two Executive Orders (EO) that relate to EPB’s mission:

1. ‘Supporting a Transition to Zero Emission Vehicles’ that set the tone for an administration that advances the priority of improving air quality through reducing emissions.
2. Conserving Colorado’s Big Game Winter Range and Migration Corridor

In 2021 two state bills or requirements that affected the NEPA program were passed:

- Greenhouse Gas Pollution Reduction Roadmap (in response to HB19-1261) This roadmap required Colorado to reduce Greenhouse Gas emissions incrementally (26% by 2025, 50% by 2030, and 90% by 2050). Transportation was identified as the largest source of Greenhouse Gas pollution.
- Sustainability of the Transportation System (SB21-260): This bill created a new source of state funding for transportation projects as well as outlining new Greenhouse Gas, Air Quality, and Environmental/Equity requirements for ‘regionally significant projects.’

To comply with SB21-260, the Pollution Reduction Planning Standard, commonly referred to as the “GHG Planning Standard”, was adopted by the Transportation Commission in December of 2021. The GHG Planning Standard requires Regionally Significant Transportation Capacity projects to account for the impacts on statewide GHG pollution as part of the planning process. On May 19, 2022, the Transportation Commission voted to adopt GHG Mitigation Measures Policy Directive 1610 which established an ongoing administrative process and guidelines for selecting, measuring, confirming, verifying, and reporting on GHG Mitigation Measures. The Transportation Commission accepted CDOT’s 10 Year Plan and the GHG Transportation Report in September of 2022, which demonstrates compliance with the GHG Transportation Planning Standard.

# Appendix B | Major NEPA Projects: Historical Data

Note: "NUM!" refers to times that have not been calculated.

Note: Projects that are ~~struck through~~ have been either canceled, converted to different class of action, or are on hold.

	Region	Document Type	Start Date	EA or Draft EIS Signature	FEIS Signature Date	Decision Document Date	Total Duration (months)	Project Start to EA or Draft EIS Signature (months)	Draft EIS Signature to Final EIS Signature (months)	Project Start to Final EIS Signature (months)	Decision Document Duration (months)
1	I-225 North of Parker Road to North of 6th Ave	EA/ FONSI	1/28/1999	10/17/2000	NA	5/3/2001	27.00	20.00	#N/A	27.00	6.00
2	I-25 North Colorado Springs	EA/ FONSI	2/1/1999	3/29/2004	NA	9/10/2004	67.00	61.00	#N/A	67.00	5.00
3	SH 9	EIS/ ROD	3/23/1999	5/31/2002	3/4/2004	5/24/2004	62.00	38.00	21.00	62.00	2.00
1	I-70 Mtn Corridor	EIS/ ROD	1/25/2000	8/10/2010	2/24/2011	6/16/2011	136.00	126.00	6.00	136.00	3.00
4	I-25, 136th Ave Interchange	EA/ FONSI	2/17/2000	5/15/2002	NA	1/8/2003	34.00	26.00	#N/A	34.00	7.00
1	Northwest Parkway, I-25 Interchange	EA/ FONSI	4/3/2000	2/12/2001	NA	5/23/2001	13.00	10.00	#N/A	13.00	3.00
3	I-70 Eagle County Airport Interchange	EA/ FONSI	4/14/2000	8/30/2004	NA	6/23/2005	62.00	52.00	#N/A	62.00	9.00
2	Woodmen Road	EA/ FONSI	6/14/2000	12/16/2005	NA	12/14/2007	90.00	66.00	#N/A	90.00	23.00

4	I-25, 144th Ave Interchange, Adams County	EA/ FONSI	7/7/2000	1/12/2005	NA	4/15/2005	57.00	54.00	#N/A	57.00	3.00
1	I-70, Hogback Parking Facility	EA/ FONSI	7/19/2000	2/14/2001	NA	8/13/2001	12.00	6.00	#N/A	12.00	5.00
1	Nottingham Ranch Road (Post Blvd), I-70	EA/ FONSI	8/2/2000	1/11/2002	NA	4/25/2003	32.00	17.00	#N/A	32.00	15.00
1	I-70, SH 58 Interchange	EA/ FONSI	9/18/2000	7/3/2002	NA	9/1/2004	47.00	21.00	#N/A	47.00	25.00
1	South Simms St - US 285 Interchange	EA/ FONSI	1/29/2001	9/6/2001	NA	4/1/2002	14.00	7.00	#N/A	14.00	6.00
1	SH 402, US 287 to I-25 Interchange	EA/ FONSI	8/13/2001	7/23/2007	NA	1/14/2008	77.00	71.00	#N/A	77.00	5.00
2	Powers Blvd	EA/ FONSI	10/29/2001	5/4/2010	NA	1/4/2011	110.00	102.00	#N/A	110.00	8.00
1	I-25, Crystal Valley/Dawson Ridge Pkwy	EA/ FONSI	4/2/2002	9/20/2004	NA	2/28/2005	34.00	29.00	#N/A	34.00	5.00
2	SH 287 Reliever Route in Lamar	EA/ FONSI	4/25/2002	8/15/2013	NA	11/10/2014	150.00	135.00	#N/A	150.00	14.00
1	SH 285, Foxton to Bailey	EA/ FONSI	7/12/2002	8/11/2004	NA	6/3/2005	34.00	24.00	#N/A	34.00	9.00
1	Valley Highway	EIS/ ROD	7/23/2002	4/19/2005	12/7/2006	7/5/2007	59.00	32.00	19.00	59.00	6.00
1	120th Ave Extension, SH 85, and Quebec	EA/ FONSI	8/19/2002	5/27/2003	NA	8/1/2003	11.00	9.00	#N/A	11.00	2.00

2	US 34 Business Route, SH 257 to 71st Ave	EA/ FONSI	10/11/2002	9/13/2005	NA	5/2/2006	42.00	35.00	#N/A	42.00	7.00
5	US 160 Durango to Bayfield	EIS/ ROD	12/24/2002	9/13/2005	5/12/2006	11/7/2006	46.00	32.00	7.00	46.00	5.00
2	I-25 Through Pueblo	EIS/ ROD	1/27/2003	10/21/2011	8/15/2013	4/17/2014	134.00	104.00	21.00	134.00	8.00
5	US 550, Improvements from State Line to CR 220	EA/ FONSI	2/12/2003	7/27/2005	NA	12/21/2005	34.00	29.00	#N/A	34.00	4.00
1	I-70 East	EIS/ ROD	8/19/2003	10/29/2008	12/14/2015	1/19/2017	161.00	62.00	85.00	161.00	13.00
2	US 24, I-25 West to Manitou	EA/ FONSI	8/27/2003	5/16/2012	NA	10/1/2014	133.00	104.00	#N/A	133.00	28.00
1	US 36	EIS/ROD	10/21/2003	7/23/2007	10/30/2009	12/24/2009	74.00	45.00	27.00	74.00	1.00
1	SH 121, Wadsworth Blvd/Grand Ave	EA/FONSI	11/28/2003	5/9/2005	NA	8/31/2005	21.00	17.00	#N/A	21.00	3.00
4	North I-25	EIS/ ROD	12/22/2003	10/31/2008	8/19/2011	12/29/2011	96.00	58.00	33.00	96.00	4.00
4	SH 7, Cherryvale Rd to 75th St	EA/ FONSI	3/1/2004	5/30/2008	NA	9/15/2008	54.00	50.00	#N/A	54.00	3.00
1	I-225, Colfax Avenue Interchange	EA/ FONSI	3/9/2004	10/20/2005	NA	3/30/2007	36.00	19.00	#N/A	36.00	17.00

4	US 34 Madison Ave to Larimer County	EA/ FONSI	9/1/2004	4/4/2007	NA	5/4/2007	32.00	31.00	#N/A	32.00	1.00
1	I-70, E-470 Interchange Complex	EA/ FONSI	9/24/2004	11/7/2006	NA	7/10/2007	33.00	25.00	#N/A	33.00	8.00
2	DAR, US Army Pueblo Chemical Depot	EA/ FONSI	10/26/2004	1/16/2007	NA	5/7/2007	30.00	26.00	#N/A	30.00	3.00
1	I-70/32nd Ave Interchange (Cabela's)	EA/ FONSI	2/1/2005	10/23/2006	NA	2/28/2007	24.00	20.00	#N/A	24.00	4.00
1	South Broadway	EA/ FONSI	6/1/2005	3/26/2008	NA	10/8/2008	40.00	33.00	#N/A	40.00	6.00
1	SH 88, Federal Blvd, Alameda Ave to 6th Ave	EA/ FONSI	8/29/2005	11/14/2007	NA	2/28/2008	29.00	26.00	#N/A	29.00	3.00
2	I-25, SH 16, East Entrance to Fort Carson	EA/ FONSI	2/2/2006	7/12/2007	NA	9/20/2007	19.00	17.00	#N/A	19.00	2.00
2	US 50 East	Combined FEIS/ ROD	2/3/2006	8/12/2016	12/15/2017	12/15/2017	142.00	126.00	16.00	142.00	0.00
3	I-70 East Eagle Interchange	EA/ FONSI	7/18/2006	9/3/2010	NA	5/24/2011	58.00	49.00	#N/A	58.00	8.00
1	I-70, I-70B West	EA/ FONSI	8/8/2006	3/19/2008	NA	8/8/2008	24.00	19.00	#N/A	24.00	4.00
1	56th Ave Quebec to Havana	EA/ FONSI	4/12/2007	9/4/2008	NA	1/15/2009	21.00	16.00	#N/A	21.00	4.00
1	6th Ave/Wadsworth	EA/ FONSI	6/1/2007	6/29/2009	NA	3/12/2010	33.00	24.00	#N/A	33.00	8.00

1	I-25, North Meadows Extension to US 85 and I-25	EA/ FONSI	7/2/2007	3/23/2010	NA	3/17/2011	44.00	32.00	#N/A	44.00	11.00
3	I-70, Parachute West Interchange	EA/ FONSI	8/24/2007	1/5/2010	NA	8/10/2010	35.00	28.00	#N/A	35.00	7.00
5	US 550/160 Supplemental EIS	EIS/ ROD	10/1/2007	10/3/2011	7/3/2012	5/15/2015	91.00	48.00	9.00	91.00	34.00
3	South Bridge - Glenwood Springs	EA REEAVL/ FONSI	12/14/2007	10/8/2013	NA	10/1/2020	153.00	69.00	#N/A	153.00	83.00
1	Central Park Blvd	EA/ FONSI	7/3/2008	6/4/2009	NA	8/3/2009	13.00	11.00	#N/A	13.00	1.00
1	I-25 Dillon Drive	EA/ FONSI	12/18/2008	1/26/2011	NA	7/28/2011	31.00	25.00	#N/A	31.00	6.00
1	I-25 Arapahoe Road	EA/ FONSI	3/3/2010	8/29/2012	NA	3/15/2013	36.00	29.00	#N/A	36.00	6.00
1	Martin Luther King Blvd Extension	EA/ FONSI	8/16/2010	6/21/2017	NA	10/30/2017	86.00	82.00	#N/A	86.00	4.00
3	Grand Ave Bridge	EA/ FONSI	5/2/2011	10/18/2014	NA	5/28/2015	48.00	41.00	#N/A	48.00	7.00
1	Twin Tunnels	EA/ FONSI	9/1/2011	6/28/2012	NA	10/17/2012	13.00	9.00	#N/A	13.00	3.00
4	I-25 North Revised ROD 2	Revised ROD	1/2/2012		NA	7/23/2015	42.00	#NUM!	#N/A	42.00	42.00
4	I-25 North Revised ROD 1	Revised ROD	1/2/2012		NA	10/20/2017	69.00	#NUM!	#N/A	69.00	69.00
3	SH 9 Iron Springs	Template EA/ FONSI	8/1/2012	5/6/2014	NA	12/17/2014	28.00	21.00	7.00	28.00	7.00

1	C-470 I-25 to Kipling Revised EA	Template EA/ FONSI	4/2/2013	7/24/2015	NA	9/1/2015	28.00	27.00	1.00	28.00	1.00
1	I-76 and Bridge Street	Template EA/ FONSI	5/1/2013	1/14/2015	NA	8/13/2015	27.00	20.00	6.00	27.00	6.00
2	US 50 West, Purcell Blvd. to Willis Blvd.	Template EA/ FONSI	12/16/2013	6/4/2014	NA	9/11/2014	8.00	5.00	3.00	8.00	3.00
1	Federal Blvd, 7th to Howard Place	Template EA/ FONSI	2/11/2014	10/8/2014	NA	1/14/2015	11.00	7.00	3.00	11.00	3.00
1	6th Ave Parkway Extension	Template EA/ FONSI	9/19/2014	6/16/2016	NA	12/6/2016	26.00	20.00	5.00	26.00	5.00
2	US 50 West, Willis Blvd to McCulloch Blvd.	Template EA/ FONSI	3/18/2015	6/30/2016	NA	8/30/2016	17.00	15.00	2.00	17.00	2.00
4	I-25 North ROD 3	Revised ROD	3/7/2016		NA	6/15/2016	3.00	#NUM!	#N/A	3.00	3.00
1	Wadsworth Boulevard: 35th-44th Widening	Template EA/ FONSI	5/5/2016	4/1/2019	NA	9/1/2019	39.00	34.00	5.00	39.00	5.00
4	I-25 North ROD 5: Vine St. Bridge Replacement	Ongoing ROD	6/1/2016		NA	12/15/2017	18.00	#NUM!	#N/A	18.00	1415.00
1	Kipling and I70 Interchange	Template EA/ FONSI	7/1/2016	1/1/2019	NA	3/20/2019	32.00	30.00	2.00	32.00	2.00
4	I-25 North ROD 4: SH 392 to SH 56	ROD	7/1/2016		NA	4/27/2017	9.00	#NUM!	#N/A	9.00	9.00

1	I-25 US 36 to 104th	Ongoing Template EA	1/2/2017		NA		#NUM!	#NUM!	0.00	#NUM!	0.00
3	I-70 Vail Pass Auxiliary Lanes	Ongoing Template EA	7/17/2017	9/1/2020	NA		#NUM!	37.00	#NUM!	#NUM!	#NUM!
1	I-70 Floyd Hill	Ongoing Template EA	8/1/2017	7/9/2021	NA		#NUM!	47.00	#NUM!	#NUM!	#NUM!
4	North I-25 Segment 5/6	Ongoing ROD	8/1/2017		NA		#NUM!	#NUM!	#N/A	#NUM!	0.00
1	I-25, Monument to Plum Creek (Gap Project)	Template EA/ FONSI	12/9/2017	4/25/2018	NA	6/27/2018	#NUM!	4.00	2.00	6.00	2.00
1	88th Avenue: I-76 to SH 2	Template EA	10/1/2018	5/20/2021	NA	10/14/2021	36.00	31.00			4.00
1	I-270: Widening from I-76 to I-70	Ongoing Template EA	3/1/2020								



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