2017

# Annual 2017 CDOT Stewardship and Oversight Agreement Report

Colorado Department of Transportation

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# 2017 Annual CDOT Stewardship and Oversight Agreement Report

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# SECTION 1. PURPOSE

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.

The following program-level performance and compliance indicators derive from a number of functional units across CDOT. Section 2 briefly introduces the various functional program areas, describes key activities accomplished in 2014, and provides tables summarizing CDOT's performance and compliance in each area. Performance/compliance indicators and measures, and their associated reporting frequencies and targets/baselines, were established in the March 2015 version of the FHWA-CDOT Stewardship and Oversight Agreement. Indicators without a specific target or baseline are tracked in the "Quality/Results" section, and measures with a quantitative target/baseline are tracked in the "Performance/Compliance Measures" section.

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

# SECTION 2. CDOT PERFORMANCE BY FUNCTIONAL PROGRAM AREA

## 2.1. ENGINEERING: APPLIED RESEARCH AND INNOVATION

### Introduction

**CDOT Manager:** Amanullah Mommandi
**FHWA Manager:** Aaron Bustow

The Research Development and Technology Transfer program at CDOT aims to save Colorado money, time, and lives. The program strives to improve the state's quality of life and environment by developing and deploying new or innovative methods, products or materials in the planning, design, construction and operation of transportation. To meet this purpose, research must be timely, relevant and valid when applied to priority real-world problems, as well as cost-effective and accurately documented and disseminated. Technology must be appropriately transferred to practitioners to be effectively used.

### Quality/Results

Eleven (11) research reports were published in State FY2017 (https://www.codot.gov/programs/research/pdfs).

### Performance/Compliance Measures

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

**Table 1 - Performance/Compliance Measures (Research)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 97 | **Percent of recommendations implemented** | Percent of recommendations implemented or adopted within two years of final research report, using 5 years of data<br><br>The research findings and recommendations will impact one or more of the following: improve design and construction methods, improve design and construction specifications, improve planning processes, impact maintenance practice, update manuals, initiate new programs, and provide new technology | Research Work Plan and Report | State FY | 50% | 58% |
| 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 | 11 |
| 416 | **The annual number of classes scheduled by the LTAP Center** | The number of classes scheduled by the LTAP Center | Annual Report | State FY | 70 | 70 |
| 417 | **The annual number of people trained by the LTAP Center** | The number of people who attended classes offered by the LTAP Center | Annual Report | State FY | 1400 | 2106 |

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 473 | **The annual number of people attending training on the Front Range and Eastern Plains** | The number of people attending training from the Front Range and Eastern Plains | Annual Report | State FY | 1000 | 1291 |
| 474 | **The annual number of people attending training on the Western Slope** | The number of people attending training from the Western Slope | Annual Report | State FY | 400 | 680 |
| 475 | **The annual number of agencies attending training offered by the LTAP Center** | The number of agencies attending training offered by the LTAP Center | Annual Report | State FY | 100 | 135 |

# 2.2. ENGINEERING: ASSET MANAGEMENT

## Introduction

**CDOT Manager:** William Johnson
**FHWA Manager:** Randy Jensen

The Department's Performance and Asset Management Branch (PAMB) coordinates with the asset program managers, Regional and Division staff, and other agencies to comprehensively manage CDOT's assets. PAMB's mission is to empower the Department's strategic planning and decision-making by providing tools that effectively measure, analyze, forecast and communicate to staff and transportation stakeholders the performance of CDOT programs and investment decisions.

## Quality/Results

CDOT worked with a consultant to develop and complete its first Transportation Asset Management Plan (TAMP), known as the Risk-Based Asset Management Plan (RB AMP). The document was submitted to FHWA in April, 2014. The Fixing America's Surface Transportation Act (FAST ACT - FAST Act § 1106; 23 U.S.C. 119) requires that pavement and bridge be included in DOT TAMP's; however, the RB-AMP includes nine assets, including pavement and bridge. The additional assets are: maintenance, buildings, ITS, signals, fleet, tunnels, culverts, walls, and geohazards. CDOT's first TAMP is an initial snapshot of CDOT's asset management program as of the time it was finalized. The final federal rules for TAMPs (23 CFR 515 and 23 CFR 667) went into effect on October 2017. The new rules detail requirements for what shall be included in the TAMPs, and CDOT has started work on updating the RB AMP to better meet the new federal requirements. Additionally, the updated TAMP will incorporate myriad improvement to the TAM program that have been made since the first plan was developed.

The organizational structure supporting Asset Management at CDOT is multi-level. At the highest level there is the Transportation Commission which formulates general transportation policy, advises and makes recommendations to the Governor and the General Assembly on issues related to transportation policy and CDOT's budgets and programs. At the middle level there is an Oversight Committee comprised of the Deputy Director, the Chief Engineer, the Chief Financial Officer, the Director of the Division of Transportation Development, the Director of Project Support and a Regional Transportation Director, who are responsible for making decisions on asset management strategy, goals, and objectives. Lastly, a Working Committee includes asset managers and Regional and Division staff. The Working Committee and the Oversight Committee work together on the RB AMP, asset management implementation, and emerging issues. CDOT continues to advance on asset management matters due to the efforts of these groups.

The RB AMP states the Department's goal for asset management, which is: The overall goal of CDOT's asset management program is to minimize life-cycle costs for managing and maintaining the department's assets subject to acceptable levels of risk.

## Performance/Compliance Measures

CDOT is developing a version 2 of the Risk-Based Asset Management Plan to meet FAST Act requirements. The Department is currently in the process of developing targets and working collaboratively with the MPOs in support of their target setting activities.

# 2.3. ENGINEERING: CIVIL RIGHTS

## Introduction

**CDOT Manager:** Greg Diehl
**FHWA Manager:** Nicole Bumpers

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 Civil Rights & Business Resource Center (CRBRC) 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:**

1. Purchased Civil Rights Compliance software customizable to the specific project needs and requirements for Central 70. This will allow for greater transparency and enhanced compliance for Civil Rights goals on this high profile project.

2. Conducted 2 workforce roundtables with interested workforce agencies and union representatives to better understand the needs of the industry.

3. Achieved 52,694 OJT training hours which exceeded goal of 50,000.

4. Increased percentage ratio of female OJT training participants from 3.4% last year to 3.8% this year.

5. Completed 18 contract compliance reviews (26 contractors in total). 17 reviews were subsequently determined to have been "In Compliance" by CDOT and 1 is still finalizing a corrective plan.

6. Received FHWA Colorado Division approval on statewide ADA Transition Plan.

7. LCPtracker Payroll Software was implemented and is being used on all CDOT projects. This system has allowed CDOT the ability to provide enhanced transparency and streamlined consistency on payroll processes.

8. An ArcGIS software application (Survey123) was configured and is being utilized to collect real-time curb ramp upgrade measurements which has established a living ADA inventory database. To date 189 CDOT engineering staff members and consultants have been trained on the application.

9. ADA Curb Ramp Inventory: 4,661 (23%) of curb ramps are considered to be Functionally Accessible based on PROWAG standards.

10. Statewide ADA technical assistance provided:
    a) 137 consultations provided to Local Agencies and CDOT internal staff (phone/e-mail/desktop/in-field).

11. Achieved $38,449,103 (11.1%) in DBE participation (federal dollars) for federal fiscal year (FFY) 2017.

12. Hosted 8 small business forums (4 each for professional services and construction) to increase transparency in CDOT process and improve communication on small business related issues. The forums were attended by more than 150 unique individuals.

13. Implemented a new module in the B2GNow system to provide free online bid plans to all contractors, eliminating the need to sponsor BIDX accounts for qualifying DBE and ESB firms.

14. Focused on initiating several programs designed to improve our race-neutral small business program:
    a) Launched an application for a new pilot Mentor-Protégé program with the goal of having six firms begin the program at the start of 2018.
    b) Restricted certain projects under $1M for bidding only by ESB certified firms.
    c) Put a contract in place to begin offering bond guarantee opportunities for ESB certified firms.

15. Implemented new provisions and scoring processes for professional services contract selection and compliance.

16. Adopted B2G Now software for compliance on across contract delivery methods (design-bid-build, design-build, design etc.).

17. Continued to improveConnect2DOT services and tracking of accomplishments toward performance measures. Structured Center IC reporting to reflect performance and impact measures to ensure consistent reporting across the program.

18. Hosted I-70 East Project focused outreach events and educational webinars for small businesses.

19. Updated CDOT's DBE program manual.

20. Met with each of CDOT's major program areas to update Title VI annual accomplishments and goals report.

## Performance/Compliance Measures

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

**Table 2 - Performance Measures (Civil Rights)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 107 | **DBE participation (as percentage) to date on Federal Aid Highway Program** | DBE Program | Transport | Federal FY Semiannual Reporting | 12.15% | 11.1% |
| 459 | **# of DBE firms receiving supportive services/benefits** | DBE Supportive Services (DBE/SS) | Connect2DOT Program | Federal FY | 100 | 93 |
| 313 | **# of completed Contract Compliance Reviews** | Contractor Compliance (External EEO) Program | Google Drive | Federal FY | 18 | 26 |
| 460 | **# of OJT hours achieved** | On the Job Training (OJT) Program | Google Drive | Federal FY | 50,000 hours | 52,694 hours |
| 461 | **# of persons placed and employed (post-services)** | OJT Supportive Services (OJT/SS) | Google Drive | Federal FY | 50 | 8 |
| 310 | **# of completed STA reviews** | Title VI Program | Title VI Assessment | Federal FY | 6 | 6 |
| 462 | **# of completed sub recipient reviews** | ADA Title II Program | ADA Transition Plan | Federal FY | 10 | 10 |

# 2.4. ENGINEERING: CONTRACTING, ENGINEERING ESTIMATES AND OTHER PROJECTS

## Introduction

**CDOT Manager:** Markos Atamo
**FHWA Manager:** Shaun Cutting, Randy Jensen

The Engineering Contracts Unit contracts for construction and professional services in accordance with applicable Federal rules and regulations. The EEMA Unit prepares project engineering cost estimates, as required by federal regulations, and monitors bidding activity for materially unbalanced bids and collusion. The Engineering Applications Unit provides technical support on the AASHTOWare Project suite of software to statewide users.

The Branch includes the following functional groups and assigned responsibilities:

**Engineering Contracts Unit** – The Engineering Contracts unit provides two different types of services – construction contracting and professional services contracting. The construction contracting staff conducts the contracting process for construction projects including contractor prequalification, advertisement for bids, opening of paper and electronic bids, award and execution of the contract, and issuance of the Notice to Proceed (NTP) once signed by the Chief Engineer. The professional services contracting staff conducts the contracting process for professional services (engineers, architects, surveyors and industrial hygienists), including consultant prequalification, issuance of the Request for Proposals (RFP), facilitation of the selection process, contract negotiations, and execution of the contract.

**Engineering Estimates and Market Analysis** (EEMA) – The EEMA unit prepares engineering cost estimates of construction projects prior to bidding, performs materially unbalanced bid and bid collusion analyses on submitted bids, and prepares cost estimates for added work on active construction projects.

**Engineering Applications:** – The Engineering Applications Unit is responsible for user support for the AASHTOWare Project software used for pre-construction and construction project management, including training, technical assistance, and reporting.

## Quality/Results

1. Contract performance (Engineering Contracts):
   - 131construction contracts awarded ($519M) 95% of which were awarded within 30 days of bid opening.
   - 44 consultant selections, average processing time approximately 18.56 weeks. 52.98% of contracts executed within desired 17 weeks.
   - 847 task orders written, average processing time approximately 16 calendar days

2. Engineering Applications:
   - 226 software related incidents resolved.
   - 13 SiteManager classes conducted.
   - Site Manager utilization reviews: No problems encountered or outstanding issues.

3. Overall Program Estimate Accuracy (EEMA):
   - FY 2017 Total Program Estimate: $426,661,663.18
   - FY 2017 Total Program Award: $403,586,329.39
   - Accuracy: -5.41% of Engineer's Estimate

## Performance/Compliance Measures

The following performance measures demonstrate the health of the Contracts and Market Analysis Program:

**Table 3 - Performance/Compliance Measures (Contracts and Market Analysis)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 239 | **Percent of projects awarded without a justification letter and CE approval** | Percent of awarded low bids within +15% to -20% of Engineer's Estimate on projects over $500,000 | CDOT Branch Work Plan | State FY | 80% | 80.8% |
| 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 | State FY **Quarterly reporting** | 50% | 57.3% |
| 241 | **Percent of projects awarded within set timeline of bid opening (CDOT oversight and FHWA oversight)** | Percent of projects awarded within 30 days of bid opening | CMA Branch Work Plans | State FY **Quarterly reporting** | 95% | 95% |

# 2.5. ENGINEERING: ENVIRONMENT

## Introduction

**CDOT Manager:** Jane Hann and David Singer
**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 National Environmental Protection Act (NEPA) and other applicable environmental legislation, regulations and policy direction. This is accomplished by ensuring:

1. Environmental issues are identified early;
2. Appropriate impact analyses are performed in a timely manner;
3. Adequate documentation is submitted and reviewed as scheduled;
4. 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
5. 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. Environmental Protection Agency (EPA) Environmental Impact Statement (EIS) Ratings – In 2017, no EIS were rated by EPA.

2. Completion Time for Environmental Documents – During the 2017 calendar year, the following five NEPA documents were finalized:
   - One Environmental Impact Statements (EISs),
     - US 50 East Tier 1 Combined Final EIS and ROD – (142 months)
   - Three Records of Decision (ROD),
     - I-70 East ROD (12 months)
     - I25 North ROD 4 (6 months)
     - I25 North ROD 1 Revision 2 (17 months)
   - One Findings of No Significant Impact (FONSI).
     - Martin Luther King Blvd Extension (3 months). The FONSI was part of a Reevaluation on the original EA.

   Table 1 shows all 79 major NEPA projects that have occurred since 1999, and lists the length of time for each project. PELs are not added to this table at this time, but data from the PEL program is considered in the following discussion. CDOT's workload information (1999-2017) is shown in a different way through tables that follow.

**Table 4 – CDOT EAs and EISs from 1999 to Present**

| Project Name | Document Type | Project Start Date | EA/DEIS Signature | FEIS Signature | Decision Document Date | Duration |
|---|---|---|---|---|---|---|
| I-225 North of Parker Road to North of 6th Ave | EA/FONSI | 1/28/99 | 10/17/00 | NA | 5/3/01 | 27.16 |
| I-25 North Colorado Springs | EA/FONSI | 2/1/99 | 3/29/04 | NA | 9/10/04 | 67.33 |
| SH 9 | EIS/ROD | 3/23/99 | 5/31/02 | 3/4/04 | 5/24/04 | 62.1 |
| I-70 Mtn Corridor | EIS/ROD | 1/25/00 | 8/10/10 | 2/24/11 | 6/16/11 | 136.77 |
| I-25, 136th Ave Interchange | EA/FONSI | 2/17/00 | 5/15/02 | NA | 1/8/03 | 34.72 |
| Northwest Parkway, I-25 Interchange | EA/FONSI | 4/3/00 | 2/12/01 | NA | 5/23/01 | 13.64 |
| I-70 Eagle County Airport Interchange | EA/FONSI | 4/14/00 | 8/30/04 | NA | 6/23/05 | 62.33 |
| Woodmen Road | EA/FONSI | 6/14/00 | 12/16/05 | NA | 12/14/07 | 90.05 |
| I-25, 144th Ave Interchange, Adams County | EA/FONSI | 7/7/00 | 1/12/05 | NA | 4/15/05 | 57.3 |
| I-70, Hogback Parking Facility | EA/FONSI | 7/19/00 | 2/14/01 | NA | 8/13/01 | 12.82 |
| Nottingham Ranch Road (Post Blvd), I-70 | EA/FONSI | 8/2/00 | 1/11/02 | NA | 4/25/03 | 32.75 |
| I-70, SH 58 Interchange | EA/FONSI | 9/18/00 | 7/3/02 | NA | 9/1/04 | 47.47 |
| South Simms St - US 285 Interchange | EA/FONSI | 1/29/01 | 9/6/01 | NA | 4/1/02 | 14.04 |
| SH 402, US 287 to I-25 Interchange | EA/FONSI | 8/13/01 | 7/23/07 | NA | 1/14/08 | 77.1 |
| Powers Blvd | EA/FONSI | 10/29/01 | 5/4/10 | NA | 1/4/11 | 110.27 |
| I-25, Crystal Valley/Dawson Ridge Pkwy | EA/FONSI | 4/2/02 | 9/20/04 | NA | 2/28/05 | 34.95 a |
| SH 287 Reliever Route in Lamar | EA/FONSI | 4/25/02 | 8/15/13 | NA | 11/10/14 | 150.64 |
| SH 285, Foxton to Bailey | EA/FONSI | 7/12/02 | 8/11/04 | NA | 6/3/05 | 34.75 |
| Valley Highway | EIS/ROD | 7/23/02 | 4/19/05 | 12/7/06 | 7/5/07 | 59.44 |
| 120th Ave Extension, SH 85 and Quebec | EA/FONSI | 8/19/02 | 5/27/03 | NA | 8/1/03 | 11.41 |
| US 34 Business Route, SH 257 to 71st Ave | EA/FONSI | 10/11/02 | 9/13/05 | NA | 5/2/06 | 42.71 |
| US 160 Durango to Bayfield | EIS/ROD | 12/24/02 | 9/13/05 | 5/12/06 | 11/7/06 | 46.49 |
| I-25 Through Pueblo | EIS/ROD | 1/27/03 | 10/21/11 | 8/15/13 | 4/17/14 | 134.73 |
| US 550, Improvements from State Line to CR 220 | EA/FONSI | 2/12/03 | 7/27/05 | NA | 12/21/05 | 34.29 |
| I-70 East | EIS/ ROD | 8/19/03 | 10/29/08 | 12/14/15 | 1/19/17 | 161.16 |
| US 24, I-25 West to Manitou | EA/FONSI | 8/27/03 | 5/16/12 | NA | 10/1/14 | 133.25 |
| US 36 | EIS/ROD | 10/21/03 | 7/23/07 | 10/30/09 | 12/24/09 | 74.17 |

| Project Name | Document Type | Project Start Date | EA/DEIS Signature | FEIS Signature | Decision Document Date | Duration |
|---|---|---|---|---|---|---|
| SH 121, Wadsworth Blvd/Grand Ave | EA/FONSI | 11/28/03 | 5/9/05 | NA | 8/31/05 | 21.11 |
| North I-25 | EIS/ROD | 12/22/03 | 10/31/08 | 8/19/11 | 12/29/11 | 96.3 |
| SH 7, Cherryvale Rd to 75th St | EA/FONSI | 3/1/04 | 5/30/08 | NA | 9/15/08 | 54.54 |
| I-225, Colfax Avenue Interchange | EA/FONSI | 3/9/04 | 10/20/05 | NA | 3/30/07 | 36.69 |
| US 34 Madison Ave to Larimer County | EA/FONSI | 9/1/04 | 4/4/07 | NA | 5/4/07 | 32.05 |
| I-70, E-470 Interchange Complex | EA/FONSI | 9/24/04 | 11/7/06 | NA | 7/10/07 | 33.5 |
| DAR, US Army Pueblo Chemical Depot | EA/FONSI | 10/26/04 | 1/16/07 | NA | 5/7/07 | 30.35 |
| I-70/32nd Ave Interchange (Cabela's) | EA/FONSI | 2/1/05 | 10/23/06 | NA | 2/28/07 | 24.89 |
| South Broadway | EA/FONSI | 6/1/05 | 3/26/08 | NA | 10/8/08 | 40.27 |
| SH 88, Federal Blvd, Alameda Ave to 6th Ave | EA/FONSI | 8/29/05 | 11/14/07 | NA | 2/28/08 | 30.02 |
| I-25, SH 16, East Entrance to Fort Carson | EA/FONSI | 2/2/06 | 7/12/07 | NA | 9/20/07 | 19.56 |
| I-70 East Eagle Interchange | EA/FONSI | 7/18/06 | 9/3/10 | NA | 5/24/11 | 58.22 |
| I-70, I-70B West | EA/FONSI | 8/8/06 | 3/19/08 | NA | 8/8/08 | 24.03 |
| 56th Ave Quebec to Havana | EA/FONSI | 4/12/07 | 9/4/08 | NA | 1/15/09 | 21.17 |
| 6th Ave/Wadsworth | EA/FONSI | 6/1/07 | 6/29/09 | NA | 3/12/10 | 33.37 |
| I-25, North Meadows Extension to US 85 and I-25 | EA/FONSI | 7/2/07 | 3/23/10 | NA | 3/17/11 | 44.52 |
| I-70, Parachute West Interchange | EA/FONSI | 8/24/07 | 1/5/10 | NA | 8/10/10 | 35.57 |
| US 550/160 Supplemental EIS | EIS/ROD | 10/1/07 | 10/3/11 | 7/3/12 | 5/15/15 | 91.5 |
| Central Park Blvd | EA/FONSI | 7/3/08 | 6/4/09 | NA | 8/3/09 | 13.02 |
| I-25 Dillon Drive | EA/FONSI | 12/18/08 | 1/26/11 | NA | 7/28/11 | 31.3 |
| I-25 Arapahoe Road | EA/FONSI | 3/3/10 | 8/29/12 | NA | 3/15/13 | 36.43 |
| Grand Ave Bridge | EA/FONSI | 5/2/11 | 10/18/14 | NA | 5/28/15 | 48.89 |
| Twin Tunnels | EA/FONSI | 9/1/11 | 6/28/12 | NA | 10/17/12 | 13.55 |
| I-25 North Revised ROD 2 | Revised ROD | 1/2/12 | NA | NA | 7/23/15 | 42.67 |
| SH 9 Iron Springs* | Template EA/FONSI | 8/1/12 | 5/6/14 | NA | 12/17/14 | 28.54 |
| C-470 I-25 to Kipling Revised EA | EA/FONSI | 4/2/13 | 7/24/15 | NA | 11/20/15 | 31.63 |
| I-76 and Bridge Street* | Template EA/FONSI | 5/1/13 | 1/14/15 | NA | 8/13/15 | 27.42 |
| US 50 West, Ourcell Blvd. to Willis Blvd.** | Template EA/FONSI | 12/16/13 | 6/4/14 | NA | 9/11/14 | 8.84 |

| Project Name | Document Type | Project Start Date | EA/DEIS Signature | FEIS Signature | Decision Document Date | Duration |
|---|---|---|---|---|---|---|
| Federal Blvd, 7th to Howard Place** | Template EA/FONSI | 2/11/14 | 10/8/14 | NA | 1/14/15 | 11.08 |
| 6th Ave Parkway Extension*+ | Template EA/Template FONSI | 9/19/14 | 6/16/16 | NA | 12/6/16 | 26.6 |
| US 50 West, Willis Blvd to McCulloch Blvd.** | Template EA/FONSI | 1/29/15 | 4/21/16 | NA | 8/17/16 | 18.61 |
| I-25 North ROD 3 | Revised ROD | 1/2/12 | NA | NA | 6/15/16 | 53.46 |
| Wadsworth Blvd Widening, 35th to 44th | Ongoing Template EA | 4/25/16 | NA | NA | NA | NA |
| Kipling and I70 Interchange | Ongoing Template EA | 7/1/16 | NA | NA | NA | NA |
| Belleview and I-25 widening | Ongoing Template EA | 5/15/17 | NA | NA | NA | NA |
| I-25 US 36 to 104th | Ongoing Template EA | 1/2/17 | NA | NA | NA | NA |
| I-25, Monument to Plum Creek (Gap Project) | Ongoing Template EA | 1/9/17 | NA | NA | NA | NA |
| C470, Kipling to I70 | Ongoing Template EA | 10/2/17 | NA | NA | NA | NA |
| I-70 Floyd Hill | Ongoing Template EA | 8/1/17 | NA | NA | NA | NA |
| 56th and Pena Blvd | Ongoing Template EA | 3/20/17 | NA | NA | NA | NA |
| US 85 | Ongoing Template EA | 1/2/2017 | NA | NA | NA | NA |
| Quebec Street | Ongoing Template EA | 11/19/13 | NA | NA | NA | NA |
| I-70 Central | ROD | 1/19/2017 | NA | NA | NA | NA |
| US 50 East | Tier 1 Final EIS/Combined ROD | 2/3/06 | 8/12/16 | 12/11/2017 | 12/11/2017 | 142.00 |
| South Bridge - Glenwood Springs | EA/Ongoing FONSI | 12/14/07 | 10/8/13 | NA | NA | NA |
| I-25 North Revised ROD 1 | Revised ROD | 1/2/12 | 10/31/08 | 8/19/11 | NA | NA |
| I-25 North ROD 1 Reevaluation and Revision | Revised ROD | 7/28/16 | 10/31/08 | 8/19/11 | NA | NA |
| I-25 North ROD 4: SH 392 to SH 56 | ROD | 7/1/16 | 10/31/08 | 8/19/11 | NA | NA |
| I-25 North ROD 5: Vine St. Bridge Replacement | ROD | 6/1/16 | 10/31/08 | 8/19/11 | NA | NA |
| Palisade Curve | Ongoing Template EA | 11/1/17 | NA | NA | NA | NA |
| I-70 Vail Pass Auxiliary Lanes | Ongoing Template EA | 1/17/17 | NA | NA | NA | NA |

(*) Using the template EA

(**) Using the template EA off of a previous PEL study
(+) Using the template EA but 1st time with new alignment

**For the EIS documents:**

The US 50 East Tier 1 Combined Final EIS and ROD Draft EIS took approximately 129 months to be signed due to various changes in CDOT leadership, lower project priority, and competition for limited resources. The combined Final EIS/ROD was signed on December 11, 2017. It is the first combined Final EIS and ROD in Colorado. We are taking advantage of recent regulation promoting streamlining in NEPA decision making. It will be a good test to see the time savings available through the new streamlining technique.

No new EIS documents have been started since the NEPA Manual was made available. As we state later in this report, part of this has to do with the Planning and Environmental Linkage (PEL) documents that are being used at a corridor planning level instead of Tier 1 EISs. That being said, the average time to a signed FEIS from the Notice of Intent is 86 months.

**For ROD documents:**

The I-70 East ROD was signed on January 19, 2017. The ROD took 13 months for signature. The EIS took approximately 161 months to complete due to no agreement on a preferred alternative and substantial public controversy. The project is slated to begin construction early in 2018.

The North I-25 ROD 1 Revision was signed on October 20, 2017. The ROD Revision took approximately 69 months to complete. The time was longer than expected due to changes in design and revisiting the Final EIS Alternative and examining express lanes and different construction phases.

The North I-25 ROD 4 was signed on April 27, 2017. The ROD took nine months to complete. This ROD took less time than both the I-70 East and North I-25 ROD 1 Revision.

The average time to a ROD after the Final EIS is signed is just under 7 months; the shortest time for a ROD has been just under 2 months for the US 36 EIS, and the longest took 13 months for I-70 East. The slight increase in ROD signature time is due to a longer than expected North I-25 ROD 1 (69 months) that included reevaluations and a revision and the North I-25 ROD 2 (42 months). This is a not a standard practice and future RODs will likely not require this length of time. When the data is controlled for these outliers, the average time from Final EIS to ROD is approximately 4 months. Additional time savings are anticipated for the US 50 East Tier I Final EIS and ROD, which would decrease the average.

**For the EA documents:**
There were no EAs signed in 2017. A substantial reevaluation for Martin Luther King Blvd. Extension EA was signed in June 2017. This local agency project sat on the shelf since 2010 as City and County of Denver tried to identify funding for construction.

CDOT in partnership with FHWA, has institutionalized the Template EA. The first template EA was State Highway 9, which started in August 2012. Currently, CDOT has completed six template EAs. CDOT currently has 12 template EAs underway in 2016. The use of the template EA has steadily increased as more PEL studies have helped to improve decision making and provide better information that can be used in the template EA.

Additionally, the average time from project start to publication of a traditional EA was historically about 37 months. Since, there were no EAs signed in 2017, the average number of months for signed EAs using the Template EA remains 15 months. Note that this only includes the five EAs

after the template was created and does not include the SH 9, Iron Springs project, where the template was first tested as a pilot.

**For the FONSI documents:** The FONSI for the Martin Luther King Blvd Extension FONSI was signed in October 2017, which was approximately three months after the reevaluation for the EA was signed. The FONSI also used a streamlined format (FONSI Template).

FONSIs are being signed in 6 months from EA on average after the NEPA Manual was available: the shortest since the NEPA Manual was available was 1 months for C-470 (I-25 to Kipling St) Revised EA FONSI. It is important to note that since CDOT started using the template EA and template FONSI, the average time for a FONSI signature is approximately 4 months.

Past Completion Time data:

- There is a trend that shows a decrease in the number of months from the project start date to obtain a signed EA. The length of time for EAs in 1999 to 2009, from Project Start Date to EA Signature, was 38 months. CDOT's NEPA Manual – 2nd version had a total rewrite and was made available in August 2008. After this "NEPA Manual" date, the EAs were signed in and average of 21 months.

- Average number of months to obtain a Final EIS signature for projects started between 1999 and 2017 = 80. Older EISs are getting completed and no new EISs have been started in since 2007.

Average number of months from FEIS to ROD = 15* This number includes the 34 month US550/160 ROD to the SEIS that had extenuating circumstances lengthening the process and the North I-25 ROD 1 Revision that took approximately 70 months and the North I-25 ROD 2 that took approximately 42 months. If you control for both these outliers and their unique circumstances, the average number of months from Final EIS to ROD is approximately 9 months.

3. Number of Active and Completed NEPA Documents (and recent trends affecting workload analysis)

Each year, CDOT tracks the number of active and completed CatExs, EA/EISs and PELs. The following table displays the number of active and completed Categorical Exclusion for a given year.

**Table 5 – Number of Active and Completed Categorical Exclusions**

| Year | Categorical Exclusions (CatExs) | |
|---|---|---|
| | **Completed** | **Active** |
| **2012** | 189 | 470 |
| **2013** | 266 | 682 |
| **2014** | 217 | 757 |
| **2015** | 243 | 693 |
| **2016** | 326 | 456 |
| **2017** | 286 | 463 |

Also, during the 2017 calendar year, there were 286 CatExs completed which is 50 less than in in 2016, but approximately 38 more than the statistical average of 248 per year in the years since this statistic has been tracked. This is likely due to the ease of completing CatExs, especially if there was a PEL document that preceded the action, and that the allowable categories have expanded in regulation. In 2017, there were 463 active CatEx processes statewide for both federal and non-federal projects. This combined number of CatEx processes is representative of workload. Approximately 237 federal Cat Ex processes were completed, and an additional 49 non-federal Cat Ex clearances were completed in 2017 but are not included in the table above since FHWA is only interested in the federal actions.

**Table 6 – NEPA Workload – Number of Documents Worked on During Calendar Year**

| Year | EA/EIS/FONSI/ROD |
|---|---|
| 1999 | 9 |
| 2000 | 18 |
| 2001 | 17 |
| 2002 | 19 |
| 2003 | 23 |
| 2004 | 28 |
| 2005 | 28 |
| 2006 | 26 |
| 2007 | 27 |
| 2008 | 20 |
| 2009 | 16 |
| 2010 | 15 |
| 2011 | 14 |
| 2012 | 18 |
| 2013 | 13 |
| 2014 | 15 |
| 2015 | 8 |
| 2016 | 14 |
| 2017 | 19 |

During the 2017 calendar year, there were five active EIS/ROD projects, and 14 active EA/FONSI projects:

- Five of these were EIS/RODs. There was one ongoing EIS, US 50 East, and two ongoing RODs (North I-25 ROD 5 and I-70 East) and two completed RODs (North I-25 RODs 1 Revision and 4) statewide.
- There was a total of 14 active EA/FONSI projects this year. No EAs were signed in 2017. One FONSI was signed (Martin Luther King Blvd.). Nine EAs were started this year (I-25 South Gap, I-25: US 36-104$^{th}$, US 85: I-76-124$^{th}$, C470: Kipling to I70, Floyd Hill, 56$^{th}$ and Pena Blvd, Quebec Street, I-70: Vail Pass Auxiliary Lanes, Palisade Curves).
- 2017 showed a slight increase from the average number of EA/FONSI/EIS/ROD projects worked in any one year: 19 for 2016 vs. 18 (average). This number peaked in 2004/2005 at 28. There is a correlation in recent years between the decreasing number of EA/FONSI/EIS/ROD projects per year and the increase in the number of PELs: 12 for 2017 vs. 6 (average).

Planning and Environmental Linkages: In 2007, the first PEL document on Arapahoe Blvd. began (called Linking Planning and NEPA at that time, which was the precursor to PEL). Since that time, CDOT has tracked its workload related to this program.

**Table 7 – PEL Workload – Number of Active and Completed PELs During Calendar Year**

| Year | Active PELs | Completed PELs |
|---|---|---|
| 2007 | ** | 1 |
| 2008 | ** | 1 |
| 2009 | ** | 2 |
| 2010 | ** | 0 |
| 2011 | ** | 0 |
| 2012 | 5 | 1 |
| 2013 | 5** | 2 |
| 2014 | 7 | 3 |
| 2015 | 6 | 2 |
| 2016 | 11 | 3 |
| 2017 | 10 | 2 |

**Data was not being collected during these years to the level of detail necessary for table population.

- Average number of months to complete a PEL = 18.
- Average number of months to a signed EA using the Template EA if a PEL was completed prior to using the template and it was a CDOT-led project = 7.7 months. No EAs were completed in 2017.

Appendix A: Environment Section, Other Notable Regulations and Accomplishments to Compare for Track Trends contains more information on other accomplishments such as the timeline for when the NEPA Manual guidance was available, regulations such as FAST Act, 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.

4. Wetland impact and replacement ratios – CDOT has consistently achieved, and occasionally exceeded, the target of 100% replacement of wetlands impacted by its projects. This number includes jurisdictional as well as non-jurisdictional. Technically speaking, the Department is exceeding the minimum requirements imposed by the US Army Corps of Engineers due to FHWA guidance to mitigate for all wetlands, not just the USACE jurisdictional wetlands per EO 11990.

5. Water Quality Measure – CDOT's Executive Director tracks this measure as one of the quarterly Lead/Lag measures due to the importance of this measure in overall compliance with stormwater permits. The result for this year is 90.2% but CDOT feels this is not really representative of what is being done on the projects because some of this is from data entry error (e.g., PE did not know that they could put in an approved differed date or that a finding entry could be back dated to when it was actually accomplished). We will be moving to a more specification-based escalation process that more accurately reflects compliance, and with changes in the program also occurring next year that includes more specification changes and more collaborated statewide consistency, we expect that these numbers will start to show an improvement with specification (208.09 – Failure to Perform Erosion Control) compliance. Previous years' performance started at 84% in FY 2011 then around 90% after FY 2013. These numbers should improve for this next fiscal year because of the EPA Administrative Order on Consent requirement that CDOT deal more strongly with chronic non-compliance of contractors. This is what is planned for the 208.09 update that will give a little more time to address a finding but with strong consequences for those contractors that fail to meet the deadline.

The following performance indicators demonstrate the health of the Environment Program:

**Table 8 – Performance/Compliance Indicators (Environment)**

| SAP # | Indicator | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 625 | **Completion time for environmental documents** | The time to complete an EA from 45 days after the date of the initial Coordination Letter through the Finding of No Significant Impact (FONSI) date and the time to complete an EIS from Notice of Intent (NOI) to Record of Decision (ROD) | A list of all EAs and EISs completed in the calendar year, identifying the length of time along with a project description as added to previous years' data | Calendar Year **Quarterly reporting for EIS/ EAs** | Track trend | EA/FONSIs are still decreasing in time overall. While no new EISs have begun in over ten years, the existing ones are still taking a lot of time. |
| 104, 381-382 | **Active and completed 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 [CE], EA, EIS) as added to previous years' data | Calendar Year **Quarterly reporting for EIS/ EAs** | Track trend | The 2017 trend is a steady level of EAs and a significant decrease in EIS projects due to PEL and additional Catex usage. Historically high number of Catex projects continue for the fourth year. See Tables 1 & 2 |

## Performance/Compliance Measures

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

**Table 9 – Performance/Compliance Measures (Environment)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 424 | **Environmental Protection Agency (EPA) EIS ratings** | The rating that EPA provides on draft EIS documents | A list of Draft EIS documents completed in the calendar year identifying the EPA rating along with a project description | Calendar Year | 0, No EU ratings[1] | No EISs were reviewed by EPA in 2017. |
| 103 | **Wetland impact and replacement ratios** | Ratio of replacement area to impacted area (statewide aggregate) | Identify and document replacement ratio by calendar year | Calendar Year | A minimum of 1:1 wetland replacement | > 1:1 (2.645 acres of replacement area to 2.291 acres of impacted area) |

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 99 | **Water quality measure** | Increase the percentage of construction storm-water inspection findings responded to within 48 hours, or as this measure is modified/tracked for CDOT's 2015 Municipal Separate Storm Sewer System (MS4) Permit, Construction Program Description Document (PDD) as due 3/1/2017. | Chief Engineer Objective | State FY | 95% (or as modified per PDD 3/1/2017) | 90.2% |

[1] EPA rates EIS documents from best to worse as: LO (Lack of objections), EC (Environmental Concerns), EO (Environmental Objections), and EU (Environmentally Unsatisfactory) – the EU Rating means that the proposed action must not proceed as proposed; the others can proceed, some with modifications, but they can be mitigated.

# 2.6. ENGINEERING: HYDRAULICS

## Introduction

**CDOT Manager:** Alfred (Al) Gross
**FHWA Manager:** Matt Greer

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. Organized and conducted a one day annual meeting with all Region Hydraulic Engineers (RHEs) in April 2017 in Denver. The purpose is to provide water quality and drainage related information to Regions. Presentations were from CDOT Environmental, CDOT Region 4 and Colorado Division of Water Resources along with FHWA. Presentations included: Colorado Division of Water Resources – Jeremy Franz and Jeff Deatheridge – "From Rainfall to Groundwater, Colorado Division of Water Resources Does It All". RESPEC Engineering, "Bridge Scour POA Project Update", Amber Williams CDOT Hydrologic Resources –"CDOT Water Quality Update with extended discussion and Jeremiah Unger CDOT Water Quality – "Stormwater GIS Collection Efforts in MS4 Areas", Scott Hogan FHWA update, Brian Varrella CDOT R4 Hydraulics- No Rise – No Problem", and finally CDOT's AL Gross "Staff Hydraulics Update".

2. Bridge Scour POA project involves scour designs of approximately 15 projects and 40 scour critical structures that are to be completed (or carried over) in Task Order #8 for December 2017. A yearly Bridge Scour Project report will be completed and sent to FHWA and CDOT Staff Bridge. A breakdown of scour critical projects and structures is as follows:

    - R1: Douglas County Scour project #20923 - structures G-18-H, G-17-M, G-17-AN and G-17-AO are in design with FIR / FOR completed and AD scheduled for early spring of 2018. Challenges with ROW and Environmental delayed this project in 2017.

    - R2: I-18-BG was completed and repairs made in September 2017, K-18 BY/BZ had FIR/FOR in September and AD is scheduled for Dec. 2018, P-17-L is ready for construction in January 2018 while P-17-A plans are completed and ready to be shelved. L-14-C, L-14-D, L-16-R, K-16-V, K-16-T are part of a R2 North Scour Package. FIR was completed in August 2017 and FOR is scheduled for January 2018. I-17-EQ/EG was completed in fall 2017 with AD early 2018. K-18-EJ on SH 47 over Fountain Creek is a joint project with Fountain Creek Watershed Authority. Project consists of river restoration and bridge scour work. Contractor is on board and a value engineering process will start in late Nov./Dec. 2017 Project delivery method is design build and scheduled to be completed April/May 2018. J-18-M and J-18-BH/BN are developing Bridge Scour POA reports to determine if scour critical.

- R3: US 40 Craig East project (structures B-06-A and B-06-S) is still in design with ROWPR completed in September 2017 and FOR scheduled for Jan 2018 with AD late summer/fall 2018. Ran into challenges, which held up project with Environmental, ROW and Utilities. I-70 Big & Little Salt Washes is a stand-alone scour project for structures: H-02-FO, H-02-FP, H-02-FM, H-02-FN and is still in design. FOR was held in June 2017 and have just received comments from the region and BLN (independent consultant). Shelf date is scheduled in early 2018 with construction currently scheduled for fall 2019. Construction of scour countermeasures at structure H-04-Z was completed in August as part of project #20703. SH 65 over Plateau Creek H-03-S POA report completed and reviewed by R3. H-03-L and H-03-S scour work to be incorporated into Interchange project on I-70/SH 65 under Task Order 9. For I-05-V it was decided not to provide scour countermeasures as was scheduled to be replaced in near future. Will go with increased monitoring plan versus temporary scour mitigation measures.
- R4: Project with 4 bridges; A-28-M/N/O/P on US 385 over South Platte River near Julesburg, Co. had FOR in May 2017. Project is scheduled to go to AD on Nov. 30 with construction starting late fall/summer 2018. Structure G-25-F: RESPEC provided scour countermeasure design to DEA for inclusion in FOR plans in October. FOR scheduled for Jan. 2018. Project plans to go to shelf in early 2018 with AD fall of 2019. Structures I-22-O and I-22-A are included in project #21819. FOR scheduled for Dec.14 in Limon with AD October 2018.
- R5: N-10-V on SH 160 over Rio Grande River was put on hold but is back on with FIR meeting scheduled for Nov. 30 in Alamosa. P-01-G on SH 160 over San Juan River is under design with FIR held October 19 in Durango. AD is scheduled for September 2018. I-12-T over Arkansas River on US 24 just completed POA report and found not to be scour critical.

3. Supported and attended the Staff Bridge RAMP bi-monthly meetings. Involved coordinating and communicating with the RAMP team and regions to implement bridge scour work into region projects. There are multiple scour critical structure designs that were plugged into RAMP projects for 2017. The SAM list will be updated year end to reflect those changes.

4. Supported the Transportation Engineering Training Program (TETP) – Transportation Core Curriculum for the hydraulic training presentation that was conducted in February 2017.

5. Supported the Environmental Programs Branch by participating in various committees, meetings and helping to develop and conduct training. Committees included: Water Quality Advisory Committee and the Water Quality Mitigation Pool Committee as well as attending meetings for development of the new Permanent Water Quality chapter for the CDOT Drainage Design manual

6. Hydrau-Tech consultant worked throughout the year to update the CDOT Drainage Design Manual. Held monthly progress meeting with Hydrau-Tech, HDR and RESPEC. The project received a large number of comments and as a result added a number of new items that were not in the original scope of work. As such, the update to the manual was not finished and Hydrau-Tech will be brought back on board July 2018 to complete the work.

7. Attended training with FHWA for a SRH 2-D Modelling class that was offered in March and April 2017. Several persons attended from CDOT as well as consultants that are working on the Bridge Scour POA project.

8. Presented the Bridge Scour POA at the PE II meeting in October, presented at the School of Mines Hydrology and Engineering club in early November and presented at the Bridge Communication Day in mid-November.

**Regions Activities:**

9. Regions are working with the RAMP Staff Bridge and Staff Hydraulics group in coordinating their projects with bridge preventative maintenance and scour work.

10. Regions are working with Staff Bridge and Staff Hydraulics to coordinate the emergency repair work for minor structures.

## Performance/Compliance Measures

The following performance measures demonstrate the heath of the Hydraulics Program:

**Table 10 - Performance/Compliance Measures (Hydraulics)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 236 | **Update the Scour Plan of Action for all scour critical bridges** | The percentage of scour critical on-system bridges (NBI Item Code 113 Code 2, 3 or U) that have had plans of action updated after 2008 | Staff Bridge annual asset management reports | State FY **Quarterly reporting** | 100% | 97.9% |

# 2.7. ENGINEERING: PAVEMENT AND MATERIALS

## Introduction

**CDOT Manager:** Craig Wieden
**FHWA Manager:** Dahir Egal

The Materials and Geotechnical Branch is responsible for ensuring quality in the products used for construction and maintenance of the 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 Programs in this Branch include Soils/Geotechnical, Geohazards, Concrete and Physical Properties, Asphalt Pavements, Pavement Management, and Pavement Design.

## Quality/Results

1. Over 50 students were trained in 9 two-day courses on SMM/LIMS with an overall course evaluation score of 4.55 out of 5. Approximately 40 Project Engineers were trained in 6 half-day classes on SMM/LIMS. Other training provided by the Branch included Asphalt Mix Design training. 37 ACI certification/training courses and 4 Concrete Paving Inspector class was offered via the Colorado Ready Mixed Concrete Association and American Concrete Pavement Association. 22 LabCAT certification courses and 6 Asphalt Inspector certification courses were offered via RMAEC. 13 Soil and Embankment certification and Inspector certification courses were conducted by WAQTC, including one course delivered in Durango and one in Grand Junction. The Pavement Management Program provided one training session for Pavement Managers.

2. Three manuals were updated and improved. They include the Field Materials Manual (FMM), the Pavement Design Manual and the Laboratory Manual of Test Procedures. FMM improvements included enhancements to project documentation when using SiteManager. Developing a Pavement Management Manual under the new Drivability Life metric is a priority for the Pavement Management Program.

3. The Materials Advisory Committee met six times and identified and resolved issues. Significant improvements were made, including those for performance engineered concrete mixtures, pilot maturity meter for concrete acceptance, pipe backfill material, fly ash, drilled caisson, piling, roadway embankment/excavation, soil nail, soil stabilization, and thin asphalt surface treatments. Key MAC products from the Pavement Design Program include: Produced a final report on CDOT's projects using 10-year warranties. Completed the Regional reports on the findings and recommendations from the triennial audit of final materials documentation for CDOT and Local Agency projects. Updated CDOT's standard plans for Portland Cement Concrete Pavement. Developed a specification for Cold Central Plant Recycling of HMA. Pavement Design Manual changes to LCCA.

4. The CDOT, AZDOT, NMDOT, UTDOT Four Corners peer exchange meeting was conducted in May 2017. This meeting brought materials engineers from the Four-Corners state DOT's together for collaboration and problem-solving on shared technical issues.

5. The Central Laboratory maintained 90 tests in the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program (AAP). 16 proficiency samples were tested, with an average of 4.60 out of 5.0 rating.

6. The Central Laboratory quality review of each of the five Region Laboratories and remote testing facilities was conducted and reporting completed in May, 2017.

7. 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.

8. For those performing acceptance testing, certifications were completed for 423 people in asphalt (314 in LabCAT, 109 in asphalt inspection), 702 people in concrete (616 in ACI, 86 paving inspection) and 134 people in soils. A total of 1,259 people were certified. The lists of certified testers is updated and posted to the CDOT website.

9. The Pavement Management Technical Committee met five times during the year. Improvements made to the Pavement Management system are documented in the Technical Committee meeting minutes. Improvements for this year identification of bid items essential to preserving and rehabilitating pavement. These items are identified in a Division of Project Support Memorandum, which intends to curb the expenditure of Surface Treatment Program dollars on highway appurtenances that are not critical to pavement quality. A second Division of Project Support Memorandum was issued to identify the optimum distribution of Surface Treatment Program dollars to the Regions for FY21 and FY22. The Pavement Management Program successfully guided the statewide allocation of nearly $240M in Surface Treatment Funds and the compilation of CDOT's four-year surface treatment plan through the year 2021.

10. The Geohazards and Pavement Management Programs, in coordination with the CDOT Regions, finalized four-year project lists for the statewide Geohazards and Surface Treatment Programs by September 26, 2017.

11. The Geohazards program worked with the Tech Peak Team to establish UAS vendors that can be used statewide for UAS data collection.

12. Partnering with Industry: The Asphalt Industry Forum (AIF)/Colorado Asphalt Pavement Association (CAPA) and the CDOT/American Concrete Paving Association (ACPA) Coop each met 4 times to identify and resolve issues. The Pavement Design Program met with industry representatives seven (7) times to discuss enhancements to CDOT's Pavement Design Manual, including industry concerns and enhancements regarding CDOT's Life Cycle Cost Analysis (LCCA) procedures. Industry partnerships generate and refine the finished implemented improvements that are listed under MAC accomplishments in item 3 above.

13. The use of CP-59 to document and approve WMA technologies and contractors continued in 2017. The total number of approved WMA technologies now stands at 11 and contractors at

14. LIMS Implementation continues with full project implementation on all active construction projects. System and network improvements continue to document performance improvement of the system. A new chapter was issued in the 2016 Pavement Design Manual on low volume road scoping and treatment selection and training of Region staff conducted in September, 2016 and will be held again in March 2018.

15. A two-day Design-Build Project Quality Assurance Workshop was conducted September 27th and 28th with CDOT statewide project managers to improve the administration of materials testing and documentation on all future projects using these types of innovative contracting methods.

16. Developed and posted to the CDOT M&G Branch website 18 detailed low volume road project summaries. These summaries illustrate statewide examples of new project scoping and treatment methods to more cost effectively preserve our low volume pavement network. These documents are used across all regions to gather ideas on practices used by our various regional materials engineering programs.

17. CDOT hosted the Road Profiler User's Group (RPUG) in November 2017. This is a meeting of representative from FHWA, state DOTs, industry and academia. Topics covered include automated pavement distress collection, pavement friction measurement, surface texture characteristics, HPMS Performance measures and PROVAL software.

## Performance/Compliance Measures

The following performance measures demonstrate the health of the Pavement and Materials Program:

**Table 11 - Performance/ Compliance Measures (Pavements and Materials)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 254 | **Percent of NHS pavements within Colorado with an International Roughness Index (IRI) less than 95** | Percent of NHS pavements within Colorado that have a good ride quality as defined by an IRI less than 95 | Pavement Management System | State FY | 52% | 59% |
| 253 | **Percent of resurfacing projects matching recommendations of the Pavement Management Systems annual review** | Percent of resurfacing projects recommended by the Pavement Management System for each State fiscal year | Pavement Management Systems Work Plan | State FY | 80% | 88.6% |

# 2.8. ENGINEERING: PLANNING

## Introduction

**CDOT Manager:** Marissa Gaughan, Erik Sabina, William Johnson
**FHWA Manager:** Bill Haas

There are three Branches within the Division of Transportation Development (DTD) that directly contribute to performance-based planning and programming as outlined in MAP-21 and the FAST Act: the Multimodal Planning Branch (MPB), 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).

The MPB within DTD oversees the planning process that includes statewide and regional planning activities, as well as freight planning and bicycle/pedestrian planning. MPB administers and coordinates regional and statewide planning through the 15 Transportation Planning Regions (TPRs), of which there are five Metropolitan Planning Organizations (MPOs) and ten non-urban planning regions. In addition, MPB consults with two Indian Tribes and various federal land management, wildlife and regulatory agencies on the development of the long-range transportation plan. The MPB coordinates closely with CDOT Region staff, which led planning activities within their Region. The TPRs (MPOs and non-urban) develop long-range regional transportation plans, which are the basis for Colorado's long-range Statewide Transportation Plan (SWP). The five MPOs also develop transportation improvement programs (TIPs) and the non-urban planning regions participate in CDOT's Project Priority Programming Process (4P) to provide input on the Statewide Transportation Improvement Program (STIP). The Colorado Transportation Commission approves the SWP and the STIP, and the STIP is forwarded to FHWA/FTA for approval. The MPB is responsible for the administration of a number of funding programs, including Metropolitan Planning (Consolidated Planning Grant), Rural Planning, Safe Routes to School, National Highway Freight Program, Congestion Mitigation and Air Quality (CMAQ) Program, and Transportation Alternatives Program (TAP).

Highway information is prepared and submitted by the IMB within DTD. This Branch has two sections: GIS/Data Management and Mobility. The GIS/Data Management section is responsible for information management and data dissemination functions that contribute to the development of projects, transportation plans and state/federal reports. CDOT program areas are supported with GIS applications, planning information, data analysis, mapping services, database programming and data integration. They are also responsible for the inventory of the state highway system, Highway Performance Monitoring System (HPMS) and road mileage certification. The Mobility section is responsible for traffic data collection, processing, analysis and dissemination, as well as, management of special studies, travel demand modeling and technical support.

The PAMB collects and reports on performance in many areas of CDOT and prepares the CDOT Performance Plan and Transportation Deficit Report for the legislature. This branch leads several interdisciplinary work groups in order to set performance measures and targets, to ensure that data can be collected to support those measures and is of good quality, and to develop performance models to help predict future levels of performance based on expected revenues. In addition, PAMB coordinates data collection and reporting to support the SOA.

## Quality/Results

The annual DTD Work Program (State Planning and Research Work Program) follows the state fiscal year. As of June 30, 2016, FY 2016 obligations and expenditures were 39.36% and 47.32%, respectively. Both IMB and MPB have multi-year work program items so not all funds will be obligated or expended in any given year. All FHWA required items with a FY 2016 action were completed during the fiscal year.

DTD administers purchase orders with the state's non-urban TPRs and with those TPRs that include both MPO and non-urban areas. These purchase orders provide funds for TPR planning activities, and are used primarily as reimbursement for travel and meeting expenses related to the transportation planning process. All TPR purchase orders were executed on time this year, by the beginning of state FY 2016.

DTD also administers Consolidated Planning Grant (CPG) contracts with each of the state's five MPOs. A target has been established to fully execute new two-year CPG contracts by October 1, the start of the federal fiscal year. After implementing some new processes, contracts were executed earlier than was possible in the past. All CPG contracts were sent out for signature prior to the state of the federal fiscal year.

## Performance/Compliance Measures

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

**Table 12- Performance/Compliance Measures (Planning)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 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<br><br>Progress on the work program is in the FY Accomplishments Report | State FY | 70% of planned amount | 77.13% |
| 10 | **TPR coordination** | CPG and Rural PO | Contracts executed by deadline | Federal FY for CPG<br><br>State FY for Rural PO | 100% of contracts executed on time | 94.44% |
| 630 | **Accuracy and Timeliness of HPMS and other transportation data submitted** | Annual HPMS Report Card Score from FHWA HPMS Review | Annual HPMS Report Card Score | State FY | 120 | Not available due to updates to HPMS reporting structure for federal performance measure reporting and CDOT IT attack in Feb 2018 |

# 2.9. ENGINEERING: PROGRAM AND PROJECT DELIVERY - DESIGN AND CONSTRUCTION

## Introduction

**CDOT Manager:** Neil Lacey (Design) and Markos Atamo (Construction)
**FHWA Manager:** Shaun Cutting and Randy Jensen

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

## Quality/ Results

1. There were 463 Change Orders submitted in FY2017. Of those 463, 414 (89%) were complete as submitted, 49 (11%) needed revision, and zero (0%) needed supplemental documentation. There were 20 Major Change Orders requiring FHWA approval.

2. The Liquidated Damages table was revised and in place for the FY 2018-19. The next revision is scheduled for review in FY 2020, revised bi-annually.

3. There were 2 claims filed in FY 2017. The claims were filed only after the dispute resolution process was exhausted.

| Status of FY16 Claims | | < $250,000 | >$250,000 |
|---|---|---|---|
| Claims Open Beginning FY16 | 0 | 0 | 0 |
| New Claims FY16 | 2 | 1 | 1 |
| Claims Resolved FY16 | 2 | 1 | 1 |
| Claims Carrying Over FY17 | 0 | 0 | 0 |

4. Dispute Status FY 2017

| Status of FY16 Disputes | | < $250,000 | >$250,000 |
|---|---|---|---|
| Disputes Open Beginning FY 16 | 5 | 2 | 3 |
| New Disputes FY16 | 9 | 7 | 2 |
| Disputes Resolved FY16 | 11 | 7 | 2 |
| Disputes Carrying Over FY17 | 1 | 1 | 0 |

5. There are 15 active Certifications and 14 active statewide Finding in the Public's Interest (FIPIs).

6. Three Joint CDOT/ Colorado Contractors Association (CCA) Specifications Committee meetings were held and 40 standard special provisions and 11 sample project special provisions were issued. There were 6 standard plans issued.

7. No Post Construction Reviews were performed.

8. Two inter-regional reviews (IRR's) were conducted for FY 2017: Region 4 South hosted Region 1 North on November 6, 2017 and Region 1 West visits Region 3 Central on December 5, 2017.

9. The Area Engineers and FHWA Operation Engineers conducted Residency Visits with all of the regional design/construction residencies and traffic units.

10. Two Area Engineer/FHWA Program Delivery Team Leader meetings were held in FY 2017.

11. 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; temporarily focusing on the LA Manual update.
    - Resident Engineer Committee – 3 of 4 Meetings
    - Water Quality Advisory Committee – temporarily focusing on Permanent Water Quality project evaluation and funding and PWQ Drainage Design Manual.
    - Innovative Contracting Advisory Committee – 4 of 4 Meetings

12. Twenty-five construction projects and six maintenance project traffic control reviews were conducted in FY 2017, of which three were nighttime reviews. Statewide average construction and maintenance project scores were 95.8% and 93.2%, respectively. The final report was submitted to FHWA on October 3, 2016.

13. The status of implementation of Quality Assurance Reviews is:
    QARs have been replaced with Joint Process Reviews beginning in FY 2014. All prior remaining QARs have been completed and recommendations implemented.

14. Nine Construction Bulletins and 13 new and revised Design Bulletins were issued.

    The TETP conducted training courses in numerous subject areas (number of classes held): Transportation Core Curriculum (1), Intro to Context Sensitive Solutions (0), CPM Scheduling for Design and Construction (3), Design Work-Hour Estimation (0-refreshing the course), Construction Project Administration (4), Construction Project Administration for MTA (4), Reading Structural Plans (1), Applied Roadway Design (1), Managing Contract Time (1), CDOT Lighting Design (0), Disputes and Claims Resolution (1), Interchange Planning and Design (0),Cost Planner Tool Training and Risk Mgmt. (2), Clear Writing for Engineers Day 1 (1), Clear Writing for Engineers Day 2 (1), Clear Writing for Engineers Day 3 (1), Managing Projects (5). Train the Trainer (1). In addition to these instructor-led training courses there are four e-learning courses: Survey Basics for Engineers, Budget Management for Project Engineers, Plan Checking and Design Project Administration. 25 instructor-led courses were held in FY 2016.

The following performance indicators 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 | 2017 Actual |
|---|---|---|---|---|---|---|
| 465 | **Revisions under Advertisement** | Percent of projects that have one or more Revisions under Advertisement | CDOT Work Plan | State FY | Track trend | 2017: 39%<br>2016: 55%<br>2015: 45%<br>2014: 51%<br>2013: 45% |
| 466 | **Constructability reviews** | Number of projects that include a constructability review during the design phase | CDOT Work Plan | State FY | Track trend | 2017: 2<br>2016: 0<br>2015: 0<br>2014: 5<br>2013: 3 |
| 323 | **Number of major change orders** | Number of change orders which required FHWA approval | CDOT Work Plan | State FY | Track trend | 2017:20<br>2016: 4<br>2015: 5<br>2014: 0<br>2013: 3 |
| 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 | 2017:443<br>2016: 374<br>2015: 278<br>2014: 314<br>2013: 309 |
| 324 | **Number of claims paid out after Dispute Resolution Board (DRB) process followed** | Claim dollars disputed divided by total contract dollars | CDOT Work Plan | State FY | Track trend | 2017:0.03%<br>2016: 0.19%<br>2015: 0.04%<br>2014: 0.06%<br>2013: 0.07% |
| 325 | **Number of disputes filed each year** | Contract dollars disputed divided by total contract dollars | CDOT Work Plan | State FY | Track trend | 2017:0.27%<br>2016: 0.20%<br>2015: 1.99%<br>2014: 0.23%<br>2013: 0.36% |

* Number of change orders with time/schedule impacts 103. Number of change orders requiring funding letters 20.

## Performance/Compliance Measures

The following performance measures demonstrate the health of the Design and Construction Programs:

**Table 2 - Performance/ Compliance Measures (Design and Construction)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 464 | **Value Engineering (VE) Reviews** | The percentage of projects over $40 million in which a Value Engineering Assessment was completed | CDOT Work Plan | State FY | 100% | N/A - No Design-Bid-Build projects over $40M in FY17 |
| 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 | 360 days |

# 2.10. ENGINEERING: PROGRAM AND PROJECT DELIVERY – PROGRAM MANAGEMENT

## Introduction

**CDOT Manager:** Jane Fisher
**FHWA Manager:** Melinda Urban

## Quality/ Results

To ensure overall Program quality, the Program Management Office (PMO) tracked program delivery monthly at the statewide level using the expenditure performance index (XPI) to evaluate actual construction expenditure performance as compared to planned. The results of data analysis and trends are reported to the Regions on a monthly basis for review and actions, if necessary. Statewide data trends were reviewed and if necessary, actions were taken at the Governance level to adjust the portfolio of projects and meet Program goals.

The Calendar Year End 2017 XPI was 0.96 and total expenditures were about $30 million less than planned, which is 4 percent below the Calendar Year 2017 Target. Actual expenditures were $659.2 million compared to a target of $689.9 million. This is within the ±5 percent goal for the year.

The PMO focus is on providing value to the Regions who have responsibility for transportation project delivery. To ensure that PMO activities are aligned with Region needs, interactions occur at multiple levels on a regular basis, including:

- PM Governance (consists of RTDs),
- PMO Technical Advisory Committee (includes PE-III's from each Region),
- PMO Representatives (one per Region), and
- PM Representatives (one per Region).

Although CDOT achieved XPI within the target range, we continued to strive to improve performance in FY17. Lessons learned have been compiled and integrated into the planning process for establishment of Calendar Year 2017 expenditure target range. Some of the more significant lessons learned are as follows:

- An annual process of reviewing SAP data quality and completeness has been adopted.
- A substantial portion of the total variance between planned and actual construction expenditures was associated with CM/GC and design/build projects.

In response to the lessons learned a more systematic approach has been used in establishing the proposed 2017 Calendar Year Target Range. In summary, it included the following:

- Development and application of comprehensive guidance to address many of the lessons learned: (1) target will only includes projects with identified construction funding, (2) statistical modelling based on historic data will used to estimate construction expenditures, (3) consistent payment lags will be integrated in payment schedule unless a manager approves otherwise, (4) a consistent correction factor of 10 percent will be applied to total construction expenditure snapshot, based on historical data, and (5) management review and approval will be required of all expenditure data associated with CM/GC and Design/Build projects, etc.).
- Five rounds of monthly SAP data review and comment incorporation began in August to ensure that guidance was applied correctly and consistently.

- As indicated the total calendar year snapshot value of $766.5 M has been reduced by 10% to $655.4 M. This value correlates with an XPI of 1.0. Expenditure status was tracked on a monthly basis (including rolling statistical projection of calendar year end expenditure results) and adjustments were made with the goal of achieving a calendar year end XPI between 0.95 and 1.05.

## Performance/Compliance Measures

The following performance measures demonstrate the health of Program Management.

**Table 13 - Performance/ Compliance Measures (Program Management)**

| SAP # | Indicator | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 555 | **Expenditure Performance Index (XPI)** | XPI is actual program expenditures divided by anticipated program expenditures | Reported monthly | Calendar Year **Quarterly reporting** | 1.0 | 0.96 |

# 2.11. ENGINEERING: RIGHT-OF-WAY

## Introduction

**CDOT Manager:** Neil Lacey and Christine Rees
**FHWA Manager:** Brian Dobling

The acquisition of private property for public use is governed by a host of state and federal rules and regulations. 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 project development process can be divided into four process categories or work activities:

- Surveying;
- Valuation (Appraisals/Review and Waiver Valuations);
- Acquisition; and
- Relocation.

## Quality/Results

1. All of the required actions in the FHWA ROW Required Actions List assigned to ROW were completed for fiscal year 2017.

2. CDOT's ROW Manual is updated every 5 years, with the last complete update submitted to FHWA on October 15, 2015. Minor process updates were made in FY16 with prior approval from FHWA.

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 November 12, 2017.

5. To better understand QC data, a baseline of the number of Federal Aid projects with ROW is useful and shown below.

**Table 14 - FY 2013-2017 CDOT Authorized 28 Plans for Federal Aid Projects**

| ROW Plans Authorized | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 |
|---|---|---|---|---|---|
| Federal Aid Projects with ROW | 68 | 32 | 29 | 36 | 28 |

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.

7. CDOT authorized 28 ROW Plans for Federal Aid Participation projects and 17 ROW plans for non-participation projects, for a total of 45. (See Table 1. FY 2019-2017 CDOT Authorized 28 Plans for Federal-Aid Projects.)

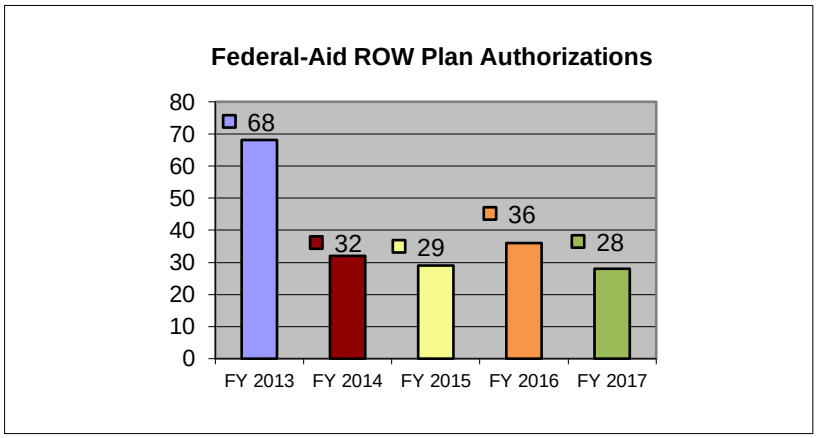



**Figure 1. FY 2013 – 2017 Federal Aid ROW Plan Authorizations**

8. HQ ROW staff and region ROW staff continue to conduct systematic file reviews. Scheduled file reviews in FY 2017 included the review of Region 1 by Region 2 and vice versa. In addition, HQ ROW staff reviewed closed acquisition and relocation files. All of the file reviews indicated that the proper processes were followed and that the files were complete. Results of the reviews were provided to region ROW Managers at the ROW Managers' meetings. In addition to the QC focus of this effort, the reviews allow best practices to be identified and shared, improving efficiencies and consistency statewide.

9. HQ ROW provided a one-day training for CDOT's consultant ROW agents and local agencies who perform ROW functions on FHWA reimbursable projects on October 18, 2016. The CDOT-sponsored training day was followed by a three-day NHI course - Advanced Relocation Under the Uniform Act. The NHI class was sponsored by CDOT, FHWA and participants' tuition. All four training days were held at FHWA's Lakewood, Colorado. HQ ROW staff, consulting agents and local agency staff participated. FHWA provided in-depth case-scenario examples to augment the NHI material, and HQ ROW staff shared best practices. HQ ROW staff also presented at the annual Denver CLE Eminent Domain Conference on April 19, 2017 and AASHTO's Sub-Committee on Right of Way during the first week of May 2017. HQ ROW presented survey, acquisition and relocation information to CDOT staff through the annual TETP statewide training program. Finally, HQ ROW continued to provide training and technical assistance to consultants, local agencies and CDOT region ROW staff as requested.

The following performance indicators demonstrate the health of the Right-of-Way Program:

**Table 15 - Performance/Compliance Indicators (ROW)**

| SAP # | Indicator | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 319 | **Conditional clearances** | Percentage of Federal-aid projects with conditional ROW certifications | A list of conditional clearances | State FY | Track trend | 16 |
| 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 | 2 |

| SAP # | Indicator | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 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 | 68% |
| 321 | **Appeals** | The number of appeals filed each year | A list of appeals | State FY | Track trend | 1 |

Additional detail on the performance indicators is provided below:

10. Conditional Clearances – Percentage of Federal Aid projects with conditional ROW certifications was 15%.

**Table 16 - FY 2013 – 2017 Federal Aid Projects with Conditional Clearances**

| FY 2013 – 2017 Federal Aid Projects with ROW Conditional Clearances | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 |
|---|---|---|---|---|---|
| Federal Aid Projects with ROW | 203* | 175* | 180* | 171* | 148* |
| Conditional Clearances (granted) | 24 | 29 | 22 | 25 | 16 |
| Percentage of Conditional Clearances | 12% | 17% | 12% | 15% | 11% |

* FY 2013, 2014, 2015, 2016 & 2017 Clearances include Local Public Agency (LPA) projects.

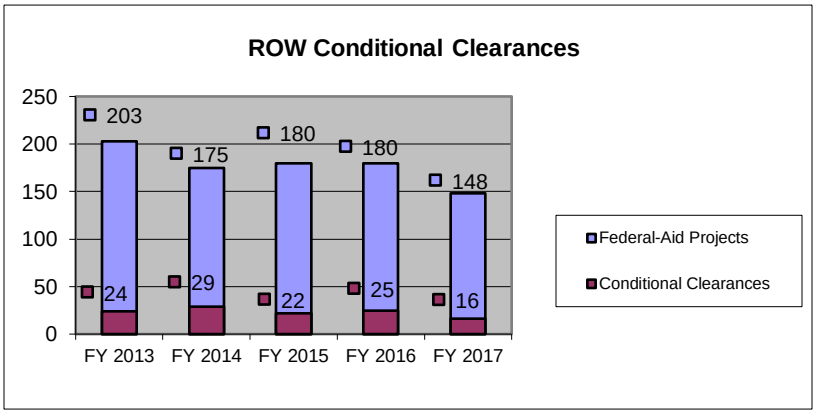



**Figure 2. FY 2013 – 2017 Federal Aid Projects with ROW Conditional Clearances**

11. Condemnations – In FY 2017, 252 acquisitions were conducted. Five (5) acquisition cases were forwarded to the Office of the Attorney General for the initiation of condemnation proceedings. Two (2) cases resulted in acquisition by condemnation (via court award).

**Table 4 – FY 2013 – FY 2017 Condemnations – Cases Settled**

| Condemnations – Cases Settled | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 |
|---|---|---|---|---|---|
| Total Number of Acquisitions (Acq) | 265 | 264 | 197 | 395 | 252 |
| Parcels Acquired by Region Administrative Settlement/Percentage of Total Acq | 0 / 0% | 0 / 0% | 0 / 0% | 0 / 0% | 0 / 0% |
| Parcels Acquired by Legal Settlement/Percentage of Total Acq | 20 / 8% | 16 / 6% | 10 / 5% | 6/ 1.5% | 3 / 2% |
| Parcels Acquired by Negotiation /Percentage of Total Acq | 0 / 0% | 0 / 0% | 0 / 0% | 0 / 0% | 0 / 0% |
| Parcels Acquired Using Condemnation (via court award)/Percentage of Total Acq | 1 /< 0.5% | 1 / 0% | 1 / .5% | 1 / 0.5% | 2 / 0.6% |
| **TOTAL (Cases)** | **20** | **17** | **11** | **7** | **5** |

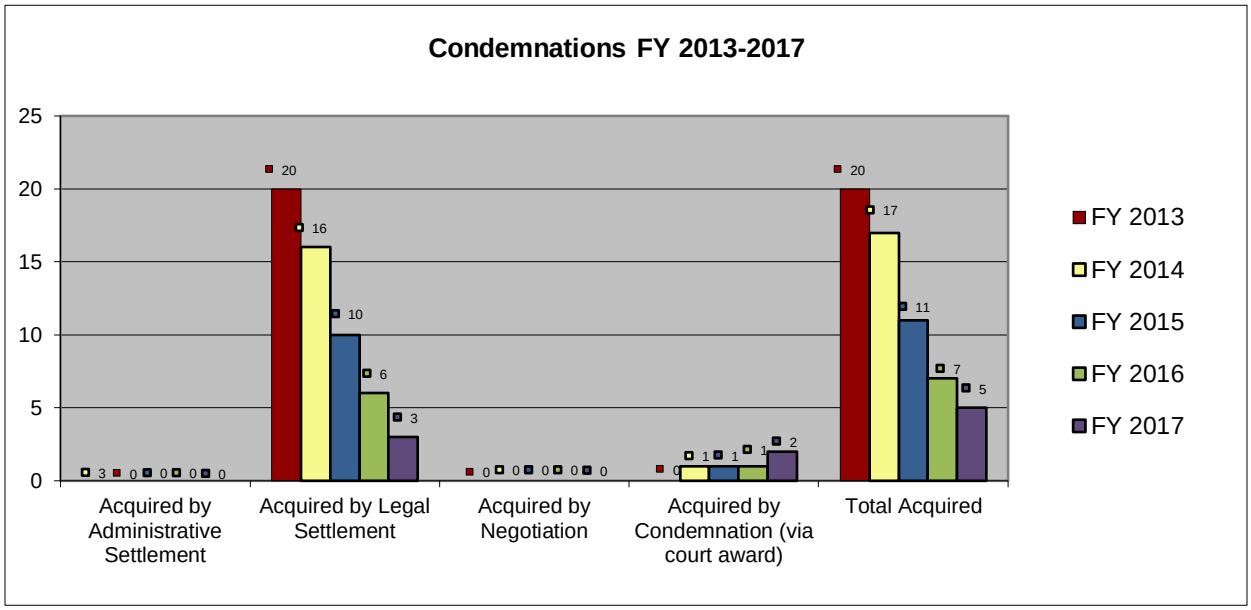
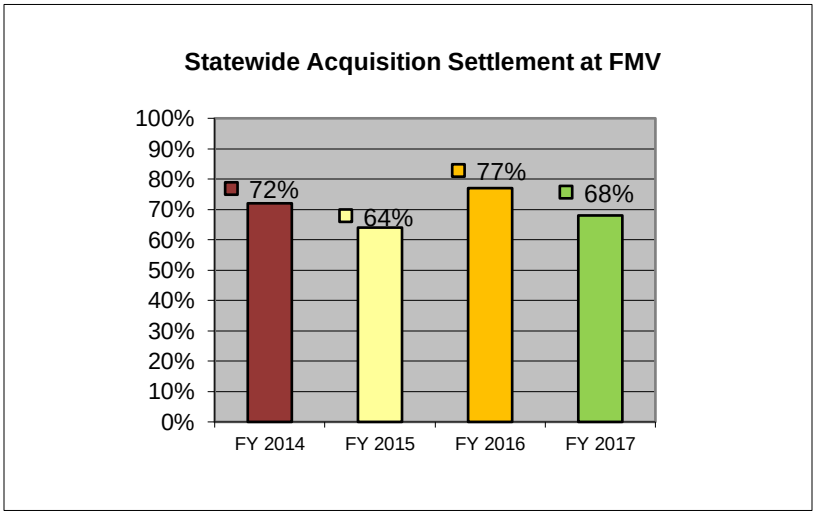



**Figure 3. FY 2013 – FY 2017 Condemnations**

12. Statewide acquisition settlement at FMV: 68%. Tracking the settlement rate at Fair Market Value (FMV) may be used as a 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 trend of settlement near the FMV is 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 4. FY 2014 – FY 2017 Settlement at FMV**

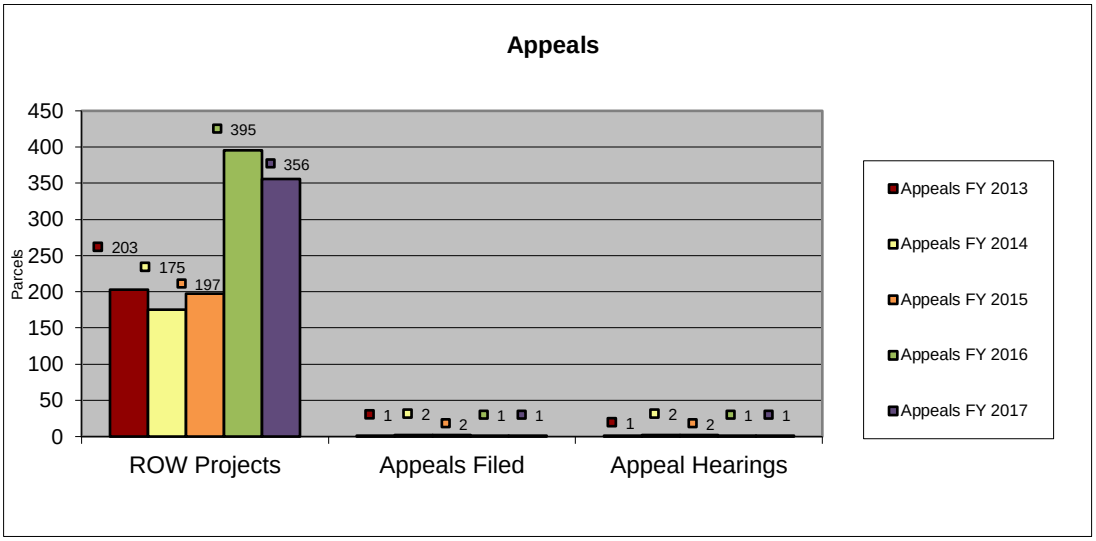



13. Appeals – One (1) relocation appeal was filed.

**Table 17 - FY 2013 – FY 2017 Appeals**

| Appeals | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 |
|---|---|---|---|---|---|
| Appeals Filed | 1 | 2 | 2 | 1 | 1 |
| Appeals that went to Hearings | 1 | 2 | 2 | 1 | 1 |

**Figure 5. FY 2013 – 2017 Appeals**




## Performance/Compliance Measures

The following performance measures demonstrate the health of the Right of Way Program:

**Table 18 - Performance/Compliance Measures (ROW)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 426 | **ROW customer survey** | ROW appraiser and agent customer service rating | ROW customer service survey by region | State FY | Achieve very good or better in all categories | 4.51 |

Additional detail on the performance measure is provided below:

14. 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 in order to assure continued high quality customer service to the public. To date, the rate of return on this survey is 40%. Following are statewide results of said survey for FY2017.

## Colorado Department of Transportation:
## Right of Way Customer Service Survey
## (FY 2017 Information Summary - STATEWIDE)

We are striving to provide excellent customer service and request for your assistance. Please take a moment to fill out this survey and give us your constructive input. Please skip any questions that are not applicable to your experience. Please return this survey to us in the provided envelope, or send to CDOT – ROW, 4201 E. Arkansas Ave., Denver, CO 80222.

**Appraiser** — **Average**

1. What was the Appraiser's name who worked with you? (See Details on Compilation Sheet)

2. How well did the Appraiser explain the appraisal process to you? (Please circle one) — 4.38

| *Excellent* | *Very Good* | *Good* | *Fair* | *Poor* |
|---|---|---|---|---|
| | | | | |

3. How well did the Appraiser work with you when your appraisal visit was conducted? — 4.45

| *Excellent* | *Very Good* | *Good* | *Fair* | *Poor* |
|---|---|---|---|---|
| | | | | |

4. Were your questions answered in a clear and timely manner? (Please circle one) — 0.98

| *Yes* | *No* |
|---|---|
| 97.50% | 2.50% |

*Comments* (See Details on Compilation Sheet)

**Acquisition Agent**

1. What was the Agent's name who worked with you on Acquisition? (See Details on Compilation Sheet)

2. How well did the Acquisition Agent explain the project as it related to your property? — 4.69

| *Excellent* | *Very Good* | *Good* | *Fair* | *Poor* |
|---|---|---|---|---|
| | | | | |

3. Were you comfortable with the amount of time you had to consider the offer for your property? — 1.00

| *Yes* | *No* |
|---|---|
| 100.00% | 0.00% |

*Comments* (See Details on Compilation Sheet)

4. Were your questions answered by the Acquisition Agent in a clear and timely manner? — 1.00

| *Yes* | *No* |
|---|---|
| 100.00% | 0.00% |

*Comments* (See Details on Compilation Sheet)

**Relocation Agent**

1. What was the Agent's name who worked with you on Relocation? (See Details on Compilation Sheet)

2. How well did the Relocation Agent explain the project as it related to your property? — 4.53

| *Excellent* | *Very Good* | *Good* | *Fair* | *Poor* |
|---|---|---|---|---|
| | | | | |

3. Were you comfortable with the amount of time you had to consider your Relocation offer — 1.00

| *Yes* | *No* |
|---|---|
| 100.00% | 0.00% |

*Comments* (See Details on Compilation Sheet)

4. Were your questions answered by the Relocation Agent in a clear and timely manner? — 1.00

| *Yes* | *No* |
|---|---|
| 100.00% | 0.00% |

*Comments* (See Details on Compilation Sheet)

**Other**

Do you have any other comments or questions about the service we provided? Please feel free to write on the back of this sheet as well. Please include your name and contact information if you would like a response.
(See Details on Compilation Sheet)

**Overall Rating** — **4.51**

Number of Surveys Disbursed: 239
Number of Surveys Received: 95
Response Rate: 39.75%

* Excellent = 5, Very Good = 4, Good = 3, Fair = 2, Poor = 1
** Yes = 1, No = 0

**Figure 6. FY 2016 ROW Customer Survey**

**Figure 7. FY 2016 ROW Customer Survey**

## Colorado Department of Transportation:
## Right of Way Customer Service Survey
## (FY 2016 Information Summary - STATEWIDE)

We are striving to provide excellent customer service and request for your assistance. Please take a moment to fill out this survey and give us your constructive input. Please skip any questions that are not applicable to your experience. Please return this survey to us in the provided envelope, or send to CDOT – ROW, 4201 E. Arkansas Ave., Denver, CO 80222.

**Appraiser** — **Average Ratings**

1. What was the Appraiser's name who worked with you? (See Details on Compilation Sheet)

2. How well did the Appraiser explain the appraisal process to you? (Please circle one) — 4.23 *

| *Excellent* | *Very Good* | *Good* | *Fair* | *Poor* |
|---|---|---|---|---|
| | | | | |

3. How well did the Appraiser work with you when your appraisal visit was conducted? — 4.14 *

| *Excellent* | *Very Good* | *Good* | *Fair* | *Poor* |
|---|---|---|---|---|
| | | | | |

4. Were your questions answered in a clear and timely manner? (Please circle one) — 1.00 **

| *Yes* | *No* |
|---|---|
| 100.00% | 0.00% |

*Comments* (See Details on Compilation Sheet)

**Acquisition Agent**

1. What was the Agent's name who worked with you on Acquisition? (See Details on Compilation Sheet)

2. How well did the Acquisition Agent explain the project as it related to your property? — 4.73 *

| *Excellent* | *Very Good* | *Good* | *Fair* | *Poor* |
|---|---|---|---|---|
| | | | | |

3. Were you comfortable with the amount of time you had to consider the offer for your property? — 1.00 **

| *Yes* | *No* |
|---|---|
| 100.00% | 0.00% |

*Comments* (See Details on Compilation Sheet)

4. Were your questions answered by the Acquisition Agent in a clear and timely manner? — 1.00 **

| *Yes* | *No* |
|---|---|
| 100.00% | 0.00% |

*Comments* (See Details on Compilation Sheet)

**Relocation Agent**

1. What was the Agent's name who worked with you on Relocation? (See Details on Compilation Sheet)

2. How well did the Relocation Agent explain the project as it related to your property? — 4.75 *

| *Excellent* | *Very Good* | *Good* | *Fair* | *Poor* |
|---|---|---|---|---|
| | | | | |

3. Were you comfortable with the amount of time you had to consider your Relocation offer? — 1.00 **

| *Yes* | *No* |
|---|---|
| 100.00% | 0.00% |

*Comments* (See Details on Compilation Sheet)

4. Were your questions answered by the Relocation Agent in a clear and timely manner? — 1.00 **

| *Yes* | *No* |
|---|---|
| 100.00% | 0.00% |

*Comments* (See Details on Compilation Sheet)

* Excellent = 5, Very Good = 4, Good = 3, Fair = 2, Poor = 1
** Yes = 1, No = 0

# 2.12. ENGINEERING: STRUCTURES

## Introduction

**CDOT Manager:** Behrooz Far
**FHWA Manager:** Matt Greer

The Structures program 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 luminaries, and traffic signal poles, 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 Branches Activities:**

1. The division bridge engineer participated in the Department's quarterly bridge inspection and asset management meetings and the biweekly Staff Bridge unit leader meetings. Issues with the Department's structures program and needed improvements are identified and addressed at these meetings.
2. A new process has been developed for Off-System bridges to assess and document NBI item #113 for the scour evaluation of bridges. 1130 bridges were analyzed through this approach and have scour documentation
3. Funds continue to be applied to On-System bridge preventative maintenance activities per the risk based asset management plan.
4. The data management program Bridge Management (BrM) has been upgraded to Enterprise version to help improve data quality, collection process, and streamline reporting our inspection data for the department moving forward.
5. Initialing the development of a new data management system which will help improve data collection quality and time, expand the data collection to all structural assets, reduce the usage of paper, web based and spatially driven, and expand the access for structure data to all CDOT personnel at all levels.
6. The Bridge Design Manual has been revised to the new LRFD design standards and will be mandatory to use by Jan 1, 2018
7. Staff Bridge is currently working with OFMB on a process improvement to better manage off-system funding and track awarded projects to meet completion deadlines.

Staff Bridge continually improving with FHWA NBIS metric evaluation by tracking bridge inspection frequency and maintaining schedule, implementing a new contract for the nondestructive evaluation of post tensioned bridge inspection. **Region Activities:**

8. The Branch has been working with maintenance personnel to complete implementation of the essential repair tracking report. This has included meeting with the maintenance superintendents and working with region personnel assigned to bridge maintenance. A web based essential bridge finding spread sheet is effective in tracking maintenance repairs and needs.

9. Regions and Staff Bridge coordination with RAMP Maintenance bridge projects.

10. Regions bridge maintenance scheduling essential repair work.

## Performance/Compliance Measures

The following performance measures demonstrate the health of the Structures Program. CDOT updates the bridge* reporting data annually in April.

**Table 19 - Performance/ Compliance Measures (Structures)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 411 | **The number of state-owned scour critical bridges*** | Reduce the number of scour critical bridges* per year over the last 5 years | Staff Bridge annual asset management reports | State FY | Downward trend | 2017: 152<br>2016: 150<br>2015: 153<br>2014: 168<br>2013: 182 |
| 214, 443, 701 | **Structurally deficient state-owned bridges* and deck area** | Number of structurally deficient bridges*<br>Structurally deficient deck area (sq. ft.)<br>Percentage of structurally deficient deck area | Staff Bridge annual asset management reports | State FY | Downward trend over 5 years (always less than 10%) | 2017: 172, 1.55M sf, 4.6%<br>2016: 175, 1.63M sf, 4.9%<br>2015: 186, 1.84M sf, 5.6%<br>2014: 197, 1.85M sf, 5.6%<br>2013: 215, 1.93M sf, 5.9%<br>2012: 238, 2.15M sf, 6.6% |
| 216, 442, 700 | **Structurally deficient bridges* and deck area on the NHS** | Number of structurally deficient bridges* per NHS<br>Structurally deficient deck area (sq. ft.) per NHS<br>Percentage of structurally deficient deck area per NHS | Staff Bridge annual asset management reports | State FY | Downward trend over 5 years (Always less than 10% per MAP-21) | 2017: 110, 1.27M sf, 4.2%<br>2016: 113, 1.33M sf, 4.5%<br>2015: 122, 1.53M sf, 5.2%<br>2014: 129, 1.50M sf, 5.1%<br>2013: 133, 1.54M sf, 5.1%<br>2012: 126, 1.47M sf, 5.9% |
| 237 | **Linear feet of state-owned bridge* expansion joints that are leaking** | Repair or replace joints noted as leaking or damaged per inspection reports | Staff Bridge annual asset management reports | State FY | Downward trend | 2017: 93,308<br>2016: 79,816<br>2015: 57,189<br>2014: 56,496<br>2013: 51,852 |
| 467 | **The number of bridges* over state highways with sub-standard vertical clearance** | Bridges* under 16'-0" represent an increased risk of vehicle impact and restrict commerce. Remove or mitigate where possible. | Staff Bridge annual asset management reports | State FY | Downward trend | 2017: 64<br>2016: 57<br>2015: 69<br>2014: 73<br>2013: 81<br>2012: 88 |

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 468 | **The number of state-owned load restricted bridges*** | Decrease the number of bridges* that require load posting or are restricting permitted loads. | Staff Bridge annual asset management reports | State FY | Downward trend | 2017: 59<br>2016: 55[3]<br>2015: 85<br>2014: 88<br>2013: 94 |
| 738 | **Percent of Off-System bridges* over waterways with documentation to support coding of Item 113, Scour Critical Bridges** | In order to justify item 113 coding, capture existing scour evaluation information or produce the scour evaluation where it is not available | Staff Bridge annual asset management reports | State FY | Upward trend or 100% | 2017: 90.9%<br>2016: 75.9% |
| 739, 740, 741 | **Stated-owned bridges* and deck area in Poor condition (FHWA Definition)** | Number of Poor bridges*<br>Deck area of Poor bridges*<br>Percentage of Poor deck area | Staff Bridge annual asset management reports | State FY | Downward trend | 2017: 173, 1.55M sf, 4.6%<br>2016: 175, 1.63M sf, 4.9%<br>2015: 186, 1.82M sf, 5.5%<br>2014: 199, 1.84M sf, 5.6%<br>2013: 213, 1.85M sf, 5.7%<br>2012: 237, 2.09M sf, 6.4% |
| 742, 743, 744 | **Stated-owned bridges* and deck area in Good condition (FHWA Definition)** | Number of Good bridges*<br>Deck area of Good bridges*<br>Percentage of Good deck area | Staff Bridge annual asset management reports | State FY | Upward trend | 2017: 1,568, 16.5M sf, 49.0%<br>2016: 1,592, 16.7M sf, 50.4%<br>2015: 1,661, 17.7M sf, 53.5%<br>2014: 1,704, 18.2M sf, 55.1%<br>2013: 1,713, 18.0M sf, 55.1%<br>2012: 1,712, 17.7M sf, 54.3% |
| 745, 746, 747 | **NHS bridges* and deck area in Poor condition (FHWA Definition)** | Number of Poor bridges* per NHS<br>Deck area of Poor bridges* per NHS<br>Percentage of Poor deck area per NHS | Staff Bridge annual asset management reports | State FY | Downward trend | 2017: 109, 1.26M sf, 4.2%<br>2016: 112, 1.32M sf, 4.5%<br>2015: 121, 1.50M sf, 5.1%<br>2014: 130, 1.49M sf, 5.0%<br>2013: 124, 1.46M sf, 4.8%<br>2012: 129, 1.96M sf, 7.9% |

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 748, 749, 750 | **NHS bridges* and deck area in Good condition (FHWA Definition)** | Number of Good bridges* per NHS<br><br>Deck area of Good bridges* per NHS<br><br>Percentage of Good deck area per NHS | Staff Bridge annual asset management reports | State FY | Upward trend | 2017: 1,234, 14.7M sf, 48.8%<br>2016: 1,251, 14.9M sf, 50.4%<br>2015: 1,297, 15.7M sf, 53.2%<br>2014: 1,346, 16.4M sf, 55.0%<br>2013: 1,400, 16.8M sf, 55.3%<br>2012: 1,173, 14.2M sf, 56.9% |

*The term “bridge” is used in place of “major structures”, which includes all bridge and culvert structures that span more than 20 feet along the centerline of the carried roadway.

[1] Accelerated increase in leaking expansion joints in 2016 due to changes in element condition state definitions.

[2] Prior to 2016 Tunnel structures were coded as bridges and included in this measure. Starting with 2016 Tunnel structures have been separated into their own program and are no longer included in the bridge inventory.

[3]Outdated load ratings were assessed in 2015 and re-rated to current standards, resulting in fewer load-restricted bridges.

# 2.13. FINANCIAL MANAGEMENT

## Introduction

**CDOT Manager:** Mike Krochalis
**FHWA Manager:** Andre Compton

The financial management process spans the entire Federal Aid program, from the authorization to proceed with preliminary engineering, through construction and debt retirement. Oversight is performed in the areas of accounting processes, both at the headquarters and regional business offices. Monitoring obligation limitation and discussions on Federal Aid financing tools available is provided in an advisory role. Review and input is provided to the audits performed by and for CDOT to ensure proper usage of Federal Aid funds.

## Quality/Results

1. In FY2017 federal funds were fully obligated. The number of projects closed during the year was 601. CDOT has successfully begun to address closing the $0 inactive projects on the quarterly inactive report resulting in an increase in average days to close, at 448 days. This is calculated by FHWA as the days between the last payment of federal funds and the FHWA closure signature. Inactive projects are still a focus; closing fully expended projects is a component of the inactive universe.

2. CDOT outperformed the inactive project goal. Inactive projects for FY2017 were 0.1%; the FHWA goal is to be below 2%.

The following performance indicators demonstrate the health of the Financial Management Program:

**Table 20 - Performance/ Compliance Indicators (Financial Management)**

| SAP # | Indicator | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 120 | **Determine if there is a trend of the local agencies using a larger share of federal funds or if the local agencies are constructing an increased number of projects** | Percent of projects authorized for construction this year executed by local agencies or sub-grantees | SAP | State FY **Quarterly reporting** | Track trend | 2017: 24%<br>2016: 30%<br>2015: 31%<br>2014: 32%<br>2013: 35% |
| 123 | **Amount of Federal Aid funds obligated versus total available per fiscal year** | Percent of STIP projects obligated in the same year promised | STIP Obligation Report | State FY | Track Trend | 2017: Not available due to CDOT IT attack in Feb 2018<br>2016: 82.85%<br>2015: 83.84%<br>2014: 83.18%<br>2013: 81.74% |

## Performance/Compliance Measures

The following performance measures demonstrate the health of the Financial Management Program:

**Table 21 - Performance/Compliance Measures (Financial Management)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 155 | **Number of Design and/or Right-of-Way (ROW) projects that were paid for with federal funds and have not advanced to the construction phase within the time limits in CFR 620.112(c) 1 and 2 (Design 10 yr., ROW 20 yr.)** | **(1)** Determine all projects that have completed Design or Right-of-Way but have not gone to construction;<br>**(2)** If projects have not gone to construction, determine which were constructed under another project number;<br>**(3)** If there are projects that have exceeded the CFR time limit, but a reasonable justification is made by CDOT and FHWA approves, the reason will be documented with a projected construction date. Otherwise FHWA will be entitled to a credit for the federal funds expended on the project;<br>**(4)** Begin to move ahead by measuring projects at eight years for design and fifteen for ROW to ensure projects are constructed;<br>**(5)** Data fields need to be populated in PSAM module of SAP to enable an automated reporting at any time | FMIS (Fiscal Management Information System) and CDOT systems for projects authorized as part of the annual project | State FY | Less than 5% | <1% |

# 2.14. HIGHWAY MAINTENANCE

## Introduction

**CDOT Manager:** Kyle Lester
**FHWA Manager:** Randy Jensen

CDOT has within its Central Office a Division of Highway Maintenance (DHM), and Asset Management Branch. The Division of Highway Maintenance 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

In FY 2017, the Asset Management Branch coordinated the review of 11,467 road survey segments, and post-storm surveys to establish the level of service provided. The target and achieved levels of service were:

**Table 22 - FY 2016 MPA Performance**

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

This year, CDOT was able to exceed its overall targeted Levels of Service (LOS), but did not meet the targeted LOS for Roadside Appearance and Snow and Ice.

## Performance/Compliance Measures

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

**Table 23 - Performance/Compliance Measures (Highway Maintenance)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 Actual |
|---|---|---|---|---|---|---|
| 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 | Statewide MLOS target achieved +/- one step | C+ |
| 270 | **Maintain the annual LOS snow mapping grade at the adopted annual grade** | Annual LOS snow mapping grade for snow and ice removal | MLOS reporting | State FY | Statewide MLOS target achieved +/- one step | B- |

# 2.15. TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS (TSM&O)

## Introduction

**CDOT Manager:** Ryan Rice and Lisa Streisfeld
**FHWA Manager:** Eva LaDow

CDOT created the Division of Transportation Systems Management and Operations (TSM&O) to align the core functional business areas that provide operational activities, programs, strategies, and services on a statewide basis. The mission of TSM&O is to "To systematically improve travel time reliability and safety on Colorado highways through technology, innovative programs and strategies, targeted traffic management activities, and safety improvements to maximize the return on investment of transportation funds."

TSM&O develops policies and implements innovative strategies to emphasize and integrate operations into CDOT's daily business. The Division of TSM&O consists of five branches, as described below:

1. Traffic, Safety and Engineering Branch: Responsible for developing and maintaining the Highway Safety Improvement Program, or HSIP, (as defined by 23 CFR 924) for CDOT and is focused on reducing fatalities, serious injuries, and the associated human and economic loss resulting from crashes on the transportation system. The Branch also acts as the state's repository for state highway traffic crash information. The Branch supports the TSMO Evaluation Process to help integrate operational and safety improvements during project during project scoping and construction.

2. Intelligent Transportation Systems/Technology Branch: Designs, constructs, operates, and maintains technology to enhance 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. Devices may include cameras, roadway weather information stations, fiber, variable message signs, and devices to support managed lanes and tolling operations. The Branch manages the operational database, known as COGNOS. The Branch also performs a collaborative role to ensure that technology applications assist and support ROADX projects as they are developed.

3. Active Traffic Management and Operations Branch: Serves as the Colorado Traffic Management Center (actively managing traffic conditions and implementing appropriate operational measures) and a traffic information center through dissemination of real-time statewide traveler information, which is done via the COTRIP website, 511 automated interactive voice response (IVR) phone system, Gov Delivery, Variable Message Signs (VMS) on the roadways (about 470 statewide) and coordination with other state and local Traffic Management Centers. The Branch assists in the development of all Traffic Incident Management Plans (TIMP) for the purpose of managing traffic operations in a coordinated manner among pertinent jurisdictions during an incident.

4. Corridor Management and Incident Command Branch: Focuses on improving highway operations and travel reliability. Two main programs are led by the I-70 Corridor Operations Manager and the I-25 Corridor Operations Manager, respectively. It manages the Courtesy Patrol-Motorist Safety Patrol and Heavy Tow to remove distressed vehicles from the highway.

This Branch communicates extensively with CDOT construction and maintenance staff, regional interstate coalitions, and local communities for improved incident, special event and work zone activities. In 2016, it expanded coverage areas into Regions 2 (to the south) and 4 (to the north) on the I-25 Corridor. Additionally, this Branch leads the efforts to conduct statewide training in traffic incident management (TIM).

5. Planning, Performance and Transportation Demand Management Branch: Works closely with the CDOT Division of Transportation Development (DTD), Performance and Asset Management Branch (DTD) to refine and report on monthly performance metrics. This Branch also produces corridor operational plans, provides operational data support to HPTE, the Regions, and DTD. The Branch prepares annual work plans, the 10-Year Development Plan and the TSMO Plan. Additionally, this Branch develops the State Transportation Demand Management Plan with close coordination with the DTD

The Branches work together very closely, and with CDOT Regions, Maintenance, Office of Emergency Management, Division of Transportation Development. TSM&O staff coordinate extensively with external stakeholders such as: Colorado State Patrol, cities, counties, Metropolitan Planning Organizations, and local law enforcement, to promote and foster systematic statewide operations and a new paradigm that emphasizes and places a priority on “Thinking Operations First”.

**Quality/Results**

To accomplish the elements identified above, TSM&O initiated and completed several programs and initiatives. The Traffic, Safety and Engineering Branch implemented the Highway Safety Improvement Program (HSIP) and completed the annual Strategic Highway Safety Plan. The ITS Branch added and upgraded several technological features on the interstate system. Together the Safety and ITS Branches conducted a LEAN process for the Operations Evaluation for upcoming construction projects with the traffic engineering staff from several regions.

The Active Traffic Management and Operations Branch conducted training to prepare the operators for the new managed/tolling lanes. Incident Commanders conducted Traffic Incident Management (TIM) training throughout the state. Attendees included city/county law enforcement, fire/EMS, and CDOT and Colorado State Patrol staff persons. The goal to train over 30% of all first responders by the end of calendar year 2017 will be met.

The ITS Branch is in process of implementing the Video Incident Detection Software. Cameras are currently monitoring cameras on 6th Ave, I-25 from 6th Avenue to Denver Technological Center, C-470 and I-70 from about Hidden Valley Interchange area all the way east to I-25. Data quality assessment and quality assurance is also in process for use of the new software. The Branch is in process of implementing the use of NCAR (the National Center for Atmospheric Research) data on weather and forecasted conditions. TSM&O also converted the bi-monthly Traffic Engineering meetings to TSM&O Coordination meetings with the regions and FHWA. A training component was added to the meetings to introduce staff members to new operational strategies. TSM&O Coordination meetings were held in Greeley, Poncha Springs, Grand Junction, and Denver to maximize communication and interaction.

CDOT and FHWA) conducted a day-long traffic incident management (TIM) workshop and awards ceremony (TIM CUP) highlighting both training and excellence in TIM service in Colorado. Other good practices from around the country were also discussed including a speaker from Tennessee Department of Transportation. The workshop helped Colorado assess the institutional capacity of TIM stakeholders to respond to and clear traffic incidents.

In 2016 and 2017, the Planning Performance and TDM Branch in cooperation with staff from the Colorado Traffic Management Center worked with the Division of Highway Maintenance to coordinate with the CDOT Public Information Office, the National Weather Service, the Colorado Avalanche Information Center and ITERIS (private weather provider/vendor to CDOT) to implement the FHWA Every Day Counts (EDC) Program called Pathfinder for impact based roadway condition messaging to the public.

All TSM&O Branches work with stakeholders, both within and outside of the department, to engage broad-based and representative participation. The Safety and Traffic Engineering Branch coordinates extensively with Colorado State Patrol with its 'Towards Zero Deaths Campaign' and with the regions for the implementation of the HSIP program. The Active Traffic Management and Operations Branch works directly with numerous stakeholders, including state and local traffic and transportation engineers and maintenance personnel, law enforcement, fire and emergency responders to develop corridor TIMPs and corridor-specific incident management scenarios to incorporate into Situational Awareness incident management systems. The Branch also works directly with FHWA as it pertains to the delivery of first-responder training to ensure federal standards are met. The Incident Commanders coordinate with local law enforcement, local EMS, Colorado State Patrol and other private tow providers like American Automobile Association (AAA). Another accomplishment was a partnership formed with State Farm Insurance to provide sponsorship to the Motorist Safety Patrol Program.

## Performance/Compliance Measures

The Safety and Traffic Engineering Branch, the ITS Branch, Planning Performance and TDM Branch, and the Active Traffic Management and Operations Branch have program responsibility to administer and report performance measures for the Division of TSM&O. Therefore, performance measures are shown in the sections for these branches below in their respective sections. Safety data includes injuries, fatalities, and mobility data includes planning time indices for I-25 and I-70 corridors and incident clearance times for both I-25 and I-70 corridors.

# 2.16. TSM&O – ACTIVE TRAFFIC MANAGEMENT AND OPERATIONS BRANCH

## Introduction

**CDOT Manager:** Ryan Tyler / Bill Miederhoff
**FHWA Manager:** Bill Haas

The role of the Active Traffic Management and Operations Branch serves as both a traffic information center (collecting and disseminating statewide traveler information) and as the Colorado Traffic Management Center (actively managing traffic conditions and implementing appropriate operational measures). The Active Traffic Management and Operations Branch was established to facilitate the Department's commitment to place a higher strategic emphasis on delivering statewide operations and to align and consolidate critical traffic incident, event and corridor management functions with other traffic and traveler operational activities.

The Active Traffic Management and Operations Branch is still responsible for the dissemination of real-time statewide traveler information, which is done via the COTRIP website, 511 IVR phone system, Gov Delivery, Variable Message Signs (VMS) on the roadways (about 470 statewide) and coordination with other state and local traffic management centers and multiple media outlets. The Active Traffic Management and Operations Branch assists in the development and continued implementation of all Traffic Incident Management Plans (TIMP) for the purpose of managing traffic operations in a coordinated manner among multiple jurisdictions during an incident. Two corridor managers have been assigned to the two highest-priority congested corridors: Interstate 25 (I-25) in the Front Range/Denver metro area and Interstate 70 (I-70) mountain corridor. In 2016, it expanded coverage areas into Regions 2 (to the south) and 4 (to the north) on the I-25 Corridor. Additionally, this Branch leads the efforts to conduct statewide training in traffic incident management (TIM). Staff provides first-responder training to law enforcement, fire and emergency responders, and is working with those stakeholders to develop corridor-specific incident management scenarios to incorporate into situational awareness incident management systems to facilitate and coordinate improved operational response, resources and efforts.

Another responsibility for the Active Traffic Management and Operations Branch is dispatching the Heavy Tow/I-70 Courtesy Patrol (focuses on I-70 Mountain Corridor) and the Mile-High Courtesy Patrol (focuses on Front Range Denver Metro Area). CDOT is tracking performance in the amount of assists and performance measures relating to quick clearance times, utilizing Colorado Revised Statute 42-4-1602 (Colorado's Move it Law). Directly dispatching the vehicles will also result in quicker response to incidents, better communication during the incident and higher levels of service provided.

## Quality/Results

To accomplish the elements identified above, the Active Traffic Management and Operations Branch works with numerous stakeholders, both within and outside of the Department, to engage broad-based and representative participation. Inside the Department, close coordination with the ITS Branch occurs. Stakeholders include state and local traffic and transportation engineers and maintenance personnel, state and local law enforcement, fire and emergency responders and county emergency response officials. In partnership with these stakeholders, CDOT develops corridor TIMPs and corridor-specific incident management scenarios to incorporate into situational awareness incident management systems. Active Traffic Management and Operations Branch works directly with FHWA as it pertains to the delivery of first-responder training to ensure federal standards are met. The Active

Traffic Management and Operations Branch is also responsible to ensure that federal guidelines pertaining to VMS message requirements are in compliance. The Active Traffic Management and Operations Branch is responsible for the development of procedures, processes and protocols concerning dissemination of traveler information to ensure quality and timeliness of the information.

The following performance indicators demonstrate the health of the Active Traffic Management and Operations Program.

**Table 24 - Performance/ Compliance Indicators (Active Traffic Management and Operations)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 YTD[3] |
|---|---|---|---|---|---|---|
| 386 | **CDOT Courtesy Patrol Assists**[1] | Measure the number of CDOT Courtesy Patrol Assists | CTMS Software /Incident Clear | Calendar Year | Track trend | 2017: 30,071<br>2016: 20,640<br>2015: 17,190 |
| 665 | **Non-CDOT Courtesy Patrol Assists**[2] | Measure the number of non-CDOT Courtesy Patrol Assists | E-470 Highway Group Data | Calendar Year | Track trend | 2017: 13,116<br>2016: 12,400<br>2015: 10,330 |
| 666 | **Hits for CDOT Traveler Tools** | Measure the number of hits for CDOT traveler tools that customers have accessed (i.e., CoTrip and 511 calls) in order to identify trends to improve information consumption by the public | Google Analytics CoTrip Site<br><br>511 Data collection | Calendar Year | Track trend | 2017:<br>• Total: 2,741,671<br>• CoTrip sessions: 2,070,000<br>• 511 call-in: 671,671<br><br>2016:<br>• Total: 3,116,098<br>• CoTrip sessions: 2,081,880<br>• 511 call-in: 1,427,110<br><br>2015:<br>• Total: 2,647,327<br>• CoTrip 1,566,299 sessions<br>• 511 call-in: 1,081,028 |

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2017 YTD[3] |
|---|---|---|---|---|---|---|
| 667 | **Number of CDOT Push Notifications** | Measure the number of CDOT communications pushed out (i.e., CoTrip notifications and 511 notes) in order to identify trends to improve information consumption by the public | Google Analytics CoTrip Site<br><br>511 Data collection (12 month average) | Calendar Year | Track trend | 2017:<br>• Total: 18,035<br>• CoTrip notifications sent: 8,110<br>• 511 notes sent: 9,925<br><br>2016:<br>• Total: 18,251<br>• CoTrip notifications sent: 7,826<br>• 511 notes sent: 8,250<br><br>2015:<br>• Total: 13,423<br>• CoTrip notifications sent: 6,813<br>• 511 notes sent: 6,610 |

[1] The CDOT Courtesy Patrol operates on selected routes such as: US 6, I-25, US 36, I-70 and C 470, Monday through Friday during morning and afternoon peak periods. The assists include, but are not limited to, the following services: accident, flat tire, fuel transfer, jump start, passenger transfer, and tow to drop site, used phone and water transfer. Jan 01 2017 patrol increased to 14hr coverage and south and north coverage expansion

[2] The non-CDOT Courtesy Patrol includes the E-470 Highway Group's courtesy patrol for the E-470 highway network. The assists include, but are not limited to, the following services: abandoned, customer resting, air, secure load, directions, telephone, drive off, flat tire, fluid, fuel, wave off, overheat, jump, mechanical, other, accident, incident, plaza security check and litter. Data is currently not available for Northwest Parkway.

## Performance/Compliance Measures

The following performance measure demonstrates the health of the Active Traffic Management Program.

**Table 25 - Performance/Compliance Measures (Active Traffic Management and Operations)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2016/2017 Actual[1] |
|---|---|---|---|---|---|---|
| 266 | **Percent of congested corridors implemented with incident management plans** | Congested corridors (v/c > 0.85 on interstates and freeways) implemented with incident management plans as a percentage of all identified congested corridors | ITS Work Plan Performance Measures | Calendar Year **Quarterly reporting** | 32% | 67% |

[1] 2017 data unchanged from prior year.

# 2.17. TSM&O - INTELLIGENT TRANSPORTATION SYSTEM (ITS)/ TECHNOLOGY

## Introduction

**CDOT Manager:** Wes Maurer
**FHWA Manager:** Tricia Sergeson

The overall purpose of the ITS/Technology program is to use innovative technology and strategies to enhance 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 impacted the implementation of operational applications and how technology can be used to improve operational effectiveness. Advances in wireless communications, Digital Short Range Radio (DSRC) connected vehicles, autonomous vehicles, higher quality and higher volume 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 and 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, Freeway to Freeway Ramp Metering, Personalized Traveler Information using-geo-fencing and targeted information, Active Traffic Management, Managed Lanes, Peak Period Shoulder Lanes, Variable Speed Limits, 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. 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

To accomplish the elements identified above, the ITS Branch works with numerous stakeholders, both within and outside of the department, to engage broad-based and representative participation. Working with these stakeholders the ITS Branch participated in the development of the Statewide Transportation System Management & Operations (TSM&O) Plan. The ITS Branch is also preparing to update the ITS Statewide Architecture in Fiscal Year 2018-19 (known as the Colorado SMART Mobility Plan), which will provide direction and identify priorities to ensure systematic implementation, technological integration and jurisdictional coordination. The ITS Branch has also developed, and is in the process of implementing, TSM&O performance measures to evaluate and quantify specific activities and applications to ensure optimum effectiveness and applicability to similar operational situations.

CDOT reports on corridor-specific congestion and incidents in the CDOT Performance Plan, which is shared with the state legislature. The information from the Governor's Vision 2018 Dashboard is below.

**Figure 8. ITS Corridor-Specific Congestion and Incident Data in Governor's Vision 2018 Dashboard (in Minutes)**

| Corridor | Direction | Time Frame | Measure Type | Goal for Calendar Year 2017 | Time ( minutes ) | | | | | | | | | | | | 2017 Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Jan-17 | Feb-17 | Mar-17 | Apr-17 | May-17 | Jun-17 | Jul-17 | Aug-17 | Sep-17 | Oct-17 | Nov-17 | Dec-17 | |
| I-25 Central Denver (C-470 to E-470) | Northbound | Weekday AM & PM peak hours | Lag | Achieve an actual average travel time of 50 minutes. | 50 | 49 | 48 | 49 | 51 | 52 | 50 | 51 | 48 | 64 | 50 | 48 | 51 |
| | | | Lead | Reduce the average incident clearance time to 51 minutes. | 23 | 23 | 32 | 35 | 43 | 39 | 49 | 47 | 57 | 42 | 56 | 48 | 43 |
| | Southbound | Weekday AM & PM peak hours | Lag | Achieve an actual average travel time of 50 minutes. | 49 | 49 | 45 | 49 | 51 | 53 | 49 | 50 | 49 | 50 | 50 | 50 | 50 |
| | | | Lead | Reduce the average incident clearance time to 47 minutes. | 25 | 21 | 23 | 29 | 34 | 35 | 40 | 46 | 67 | 61 | 39 | 41 | 40 |
| I-70 Mountain Corridor (Vail to C-470 ) | Eastbound | Sunday peak hours | Lag | Achieve an actual average travel time of 101 minutes. | 122 | 113 | 89 | 88 | 86 | 95 | 128 | 94 | 86 | 85 | 82 | 82 | 96 |
| | | | Lead | Reduce the average incident clearance time to 60 minutes. | 31 | 30 | 18 | 32 | 38 | 58 | 88 | 57 | 28 | 56 | 31 | 33 | 42 |
| | Westbound | Saturday peak hours | Lag | Achieve an actual average travel time of 95 minutes. | 112 | 101 | 87 | 89 | 87 | 86 | 96 | 86 | 87 | 86 | 90 | 91 | 92 |
| | | | Lead | Reduce the average incident clearance time to 43 minutes. | 37 | 32 | 41 | 19 | 54 | 86 | 125 | 53 | 108 | 38 | 56 | 41 | 51 |
| **Corridor** | **Direction** | **Time Frame** | **Measure Type** | **Goal for Calendar Year 2017** | **First responders trained in traffic incident management ( % )** | | | | | | | | | | | | **2017 Average** |
| | | | | | **Jan-17** | **Feb-17** | **Mar-17** | **Apr-17** | **May-17** | **Jun-17** | **Jul-17** | **Aug-17** | **Sep-17** | **Oct-17** | **Nov-17** | **Dec-17** | |
| Statewide | All | All | Lead | Increase the percent of first responders trained in traffic incident management (TIM Training) to 30% by the end of fiscal year 2018. | 20.0% | 22.1% | 22.7% | 23.2% | 24.2% | 26.5% | 26.9% | 27.2% | 27.2% | 28.8% | 28.9% | 31.0% | 31.0% |

## Performance/Compliance Measures

The following performance measures demonstrate the health of the ITS program. Some measures from the 2015 Stewardship and Oversight Agreement that reported on corridor-specific congestion and incidents were deleted due to complexity in reporting and duplication with reporting in the Governor's Vision 2018 Dashboard. This information is described in the Quality section above.

**Table 26 - Performance/Compliance Measures (ITS)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2016 Actual[1] |
|---|---|---|---|---|---|---|
| 352 | **Percent of identified congested corridors where ITS solutions implemented** | Congested corridors (centerline miles at the > 0.85 level) where ITS solutions have been implemented as a percentage of all congested corridors | ITS Work Plan Performance Measures | Calendar Year **Quarterly reporting** | 78% | 67% |
| 267 | **Percent of identified congested corridors with ramp metering implemented** | Congested corridors (v/c > 0.85 on interstates and freeways) with ramp metering implemented as a percentage of all identified congested corridors | ITS Work Plan Performance Measures | Calendar Year **Quarterly reporting** | 54% | 53% |

[1] 2017 data not available until 2018. Therefore, this is 2016 data.

# 2.18. TSM&O - TRAFFIC AND SAFETY ENGINEERING BRANCH

## Introduction

**CDOT Managers**: Charles Meyer and Julie Mile ham
**FHWA Manager**: Dahir Egal

The Traffic and Safety Engineering Branch (The Branch), in collaboration with the CDOT Highway Safety Office and many other safety stakeholders, is focused on reducing fatalities and serious injuries resulting from crashes on the transportation system and the associated human and economic loss and as such is the responsible steward for developing, maintaining, and coordinating delivery of the Highway Safety Improvement Program (as defined by 23 CFR 924) for CDOT.

The Branch administers the FHWA HSIP, which includes high-risk rural roads. They work with region 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 is employed to ensure that the most beneficial and cost-effective safety projects are selected for implementation by the regions.

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. This analysis is applied to the above HSIP programs as well as nearly every project in 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 state highway traffic crash information. On average, over 100,000 crash records are reported in a calendar year. The Branch administers both 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 STRAC (Statewide Traffic Records Advisory Committee), 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 mitigation projects and programs.

State agencies rely on crash data to meet the requirements of MAP-21, which includes timeliness, accuracy, uniformity, integration, and accessibility of data suitable for problem identification and countermeasure analysis. CDOT has put forth significant effort over the last year to cultivate a crash data set that possesses these attributes. CDOT remains committed to improving its safety data and has established a goal that crash data processing backlogs are kept to a minimum of no more than four months at all times.

The Office of Transportation Safety (OTS) administers the state's traffic safety program funded by the National Highway Traffic Safety Administration (NHTSA).

The OTS and the Branch are responsible for developing and maintaining the FHWA-mandated Strategic Highway Safety Plan (SHSP). This strategic safety plan is the roadmap for developing the annual Colorado Integrated Safety Plan (ISP). The ISP is a comprehensive program and project plan for addressing both behavioral and engineering safety issues. The ISP 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 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. The ISP also lists programs and projects for building and improving roadway infrastructure to improve roadway safety.

CDOT also understands the importance of the SHSP to Colorado's safety stakeholders around the state. The plan now reflects new priorities and, most importantly, a new vision and associated goals for Colorado in transportation safety. FHWA and CDOT will ensure that SHSP implementation efforts are developed and tracked for each emphasis area identified.

## Quality/Results

1. 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". Unfortunately, in 2015 and 2016, Colorado has seen a sharp increase in fatalities and serious injuries and marked increases in several categories of fatalities. 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 took a sharp increase in 2015, and again in 2016.This marked increase can in part be attributed to Colorado's popularity – increases in population, significantly in urban areas, and increases in VMT and registered vehicles. Consistently now, for the last three years, Colorado saw urban fatalities surpass rural fatalities, a historic trend change.

   Below is a snapshot of how fatalities have changed from the previous year in certain areas. Note: some of the fatalities below are accounted for in multiple categories.

   **Table 1 - Change in Type of Fatalities – 2012-2015**

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2015 to 2016 % Difference |
|---|---|---|---|---|---|---|
| Run off road crash fatalities | 202 | 221 | 201 | 240 | 235 | -2% |
| Intersection related fatalities | 112 | 118 | 128 | 153 | 200 | 31% |
| Speed related fatalities | 164 | 150 | 167 | 216 | 211 | -2% |
| Unrestrained fatalities | 158 | 176 | 157 | 188 | 186 | -1% |
| Impaired driving crash fatalities | 111 | 100 | 132 | 128 | 137 | 7% |
| Overturning crash fatalities | 91 | 76 | 73 | 102 | 97 | -5% |
| Motorcycle fatalities | 79 | 87 | 94 | 106 | 125 | 18% |
| Aging road user (over 65) fatalities | 76 | 77 | 69 | 95 | 109 | 15% |
| Pedestrian fatalities | 78 | 52 | 65 | 64 | 84 | 31% |
| Head-on crash fatalities | 41 | 46 | 56 | 51 | 57 | 12% |
| Rear-end crash fatalities | 26 | 32 | 24 | 35 | 40 | 14% |
| Wildlife crash fatalities | 1 | 4 | 6 | 5 | 3 | -40% |

   Many of the most serious transportation safety challenges continue to be driver behavior related - impaired driving and the lack of occupant protection compliance (seat belts). And these driver behaviors are leading to an alarming increase in vulnerable user fatalities. In fact, ¾ of the increase in fatalities from 2015 to 2016 were accounted for in pedestrians,

motorcyclists and bicyclists. All categories except head on fatalities increased from 2014 to 2015. 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. 2015 and 2016 have also shown marked increases in pedestrian and motorcycle fatalities as well.

2. National Safety Performance Measures - CDOT focused a significant effort on the development of safety performance measures throughout 2016 and into 2017 to comply with the Final Rule requirement to establish statewide safety performance targets by August 1, 2017. After several workshops, data analysis, and meetings with CDOT stakeholders and MPOs, CDOT established the following targets for CY14-18.

    Colorado Safety Targets - Five Year Averages for CY2014-2018
    Fatalities - 610
    Fatality Rate - 1.2
    Serious Injuries - 3350
    Serious Injury Rate - 6.79
    Non-motorized Users Fatalities and Serious Injuries - 586

    The above measures reflect the unfortunate trend that Colorado is seeing in increases in each of these categories, and expects to see into the future. While all safety stakeholders in Colorado are striving to reduce crashes and fatalities, they are having to be ever more strategic and effective with limited resources. Noting that without significant changes in funding, legislation, populations growth, VMT increase, increased enforcement, these trends will continue. However, agencies are striving to be more strategic in their approaches and more prioritizing of effectives strategies that will reduce crashes - for example, concerted data analysis, project safety analysis and prioritization, and deployment of innovations and technologies. Further, the automotive industry alone, and transportation partnerships with them hold promise for future years' reductions in crashes and fatalities.

    CDOT continues to work with MPOs to assist them in establishing their own safety performance targets, required to be done by February 2018.

3. Strategic Highway Safety Plan (SHSP) – The updated SHSP has been adopted by several state agencies. In 2015, Governor Hickenlooper joined state and national officials to announce Moving Colorado Towards Zero Deaths, which sets a bold and visionary goal of zero deaths for every individual, family and community using Colorado's transportation network. Moving Towards Zero Deaths is a core value of the state's new Strategic Highway Safety Plan, which provides innovative and data-driven approaches to improving highway safety. The plan leverages the success of safety programs statewide to decrease fatalities, serious injuries and crashes on Colorado's roadways.

4. Highway Safety Improvement Program (HSIP) – In Colorado FY2017, the Branch delivered $33.4 million in HSIP funding to the Regions and Local Agencies around the state for 37 projects to address the significant numbers of fatalities related to infrastructure and the driver interaction (run off road, intersections, speed, and pedestrians.) These projects are expected to have a safety benefit that has a present value of $70.1 million for an overall benefit cost ratio of 2.10. Examples of these projects include Median Cable Rail, Auxiliary Lanes, Rumble Strips, Roundabouts, Intersection Improvements, Signing and Pavement Marking Upgrades, Highway Lighting, Traffic Signal Upgrades, Interchange Ramp Improvements, Managed

Lanes, and Roadway Realignments. The Branch and regions are currently programming FY 2018 HSIP projects while compiling new projects for the FY 2019 though FY 2022 plan. Included in this planning is meeting the requirements for the High Risk Rural Roads (HRRR) Special Rule to obligate $2.8 million for HRRR in FY 2018.

5. Work Zone Safety and Mobility– The bi-annual WZSM Process Review was initiated in May 2016 and continues through 2017 with the work of the Work Zone Safety and Mobility Task Force. In conjunction with annual Work Zone Traffic Control Reviews, the Process Review Task Force surveyed work zone stakeholders to gauge the effectiveness of WZ policies, procedures, specifications and practices. The TF broke into four working groups to focus on strategies identified in 2016 as priorities - WZ Performance Monitoring and Measurement, WZ Coordination, WZ Training, and WZ Credibility, specifically speed limits. Work Zone Safety and Mobility Traffic Control Reviews continue to be conducted annually by Area Engineers visiting select projects throughout the state.

6. Crash Data – For 2015, the Branch consistently processed crash records and coded them into the CDOT database within 4 months of receiving them from DOR. During the year 2016, processing time for crash data has increased due to challenges with DOR's current system, being phased out for replacement in February 2017. All 2011 through 2015 records, both on- and off-highway system crash records, are processed and now available for analysis by statewide stakeholders. 2016 crash data was also released in October of 2017, however, with recently discovered gaps in records.

   CDOT started the migration of crash data into an oracle platform. This improves the stability of the database while also providing opportunities to start developing data linkages. The use of Oracle also allows for the implementation of projects identified by the Statewide Traffic Records Advisory Committee (STRAC) to improve accessibility, analysis, and displays of the data.

   In addition to the migration to a new database, a download of the additional fields available from Department of Revenue was added to the historical CDOT data. While CDOT had access in the past to these fields, it required querying the DOR database and linking the data with each project. This improvement systemically linked these fields, which reduces the amount of man-hours required in analyses.

   The most important development in 2017 was DOR's development of a new database system called Colorado Driver License, Record, Identification and Vehicle Enterprise Solution (DRIVES). CDOT worked with DOR to develop a new process for receiving crash data through the DRIVES system, which went live in February. CDOT and DOR worked together to establish a process that permitted CDOT to maintain access to all of the necessary fields to deliver the high quality data and analysis that has historically been provided. Due to challenges with the implementation of the new DRIVES system, CDOT experienced technical delays in obtaining crash records resulting in increased backlogs in the processing of crash records. CDOT has recently obtained significant numbers of records in the downloads and is identifying opportunities for reducing the new backlog of records.

7. Rail Highway Grade Crossing Program – As a result of the re-organization, the Rail Highway Grade Crossing Program was transferred to the Project Development Branch. The RR Program is revising its process for selecting RR crossing safety projects by redeveloping its hazard index and applying it to Colorado's 4,000 crossings.

8. Colorado Safety Legislation and Statutes

- Primary Seat Belt: Colorado does not have a primary seat-belt law.
- Drug Offender Driver License revocation: This actually comes from the Governor's Office to FHWA, not through OTS.
- Repeat Offender Law: Colorado is not in compliance.
- Zero Tolerance Law: Colorado is in compliance.

9. Colorado Repeat Intoxicated Driver Requirements of 23 U.S.C. Section 164 – Due to recent changes in Colorado State Statutes, Colorado does not meet requirements of 23 U.S.C. Section 164 for mandatory minimum sentencing of imprisonment. While NHTSA passed rule-making in September of 2016 giving flexibility to states to prove substantial compliance with 23 USC 164, CDOT will be unable to meet the deadline to provide such documentation and has again elected to shift and split federal safety funding.

## Performance/Compliance Measures

The following performance measures demonstrate the progress of the Traffic and Safety Engineering Program.

FHWA issued the first of several performance measures rulemakings in 2016 – Safety. As a result of that rule-making, MAP21 now requires three common measures for FHWA and NHTSA (fatalities, fatality rate, and injuries) with additional measures by FHWA, injury rate and non-motorized fatalities. CDOT has been working closely with FHWA and NHTSA to comply with the new rulemaking and submitted its statewide targets by the August 1, 2017 deadline.

**Table 2- Performance/ Compliance Measures (Traffic and Safety Engineering)**

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2016 Actual[1] |
|---|---|---|---|---|---|---|
| 338 | **Reduce the total number of fatalities** | Annual number of fatalities | Colorado Highway Safety Program Annual Report/Quarterly | Calendar Year **Quarterly reporting** | Reduce annual number of fatalities by 12 from previous year's goal (452 for 2016) | 2016:608<br>2015:547<br>2014: 488<br>2013: 481<br>Increase: 61 |
| 329 | **Reduce total fatalities per VMT** | Annual fatality rate per 100 million VMT | Colorado Highway Safety Program Annual Report | Calendar Year **Quarterly reporting** | Reduce annual fatality rate by 2.5% from previous year's goal (0.95 for 2016) | 2016: 1.169<br>2015:1.085<br>2014: 0.996<br>2013: 1.024<br>Increase: 7.7% |
| 355 | **Reduce total number of serious injuries** | Annual number of serious injuries | Colorado Highway Safety Program Annual Report | Calendar Year | Reduce annual number of serious injuries by 2.9% from previous year's goal (2,816 for 2016) | 2016: 2869<br>2015: 3217<br>2014: 3217<br>2013: 3215<br>Reduction: 10.8% |
| 335 | **Reduce the total serious injuries per VMT** | Reduce the total serious injuries per 100 million VMT | Colorado Highway Safety Program Annual Report | Calendar Year | Reduce the serious injury rate by 2.9% annually from previous year's goal (6.00 for 2016) | 2016: 5.516<br>2015: 6.378<br>2014: 6.567<br>2013: 6.845<br>Reduction: 13.5% |
| 336 | **Reduce alcohol-related fatal crashes** | Alcohol-related fatal crashes as a percentage of overall fatal crashes | Colorado Highway Safety Program Annual Report | Calendar Year | Less than 45% | 44.62% |

| SAP # | Measure | Description | Reporting Mechanism | Reporting Frequency | Target/ Baseline | 2016 Actual[1] |
|---|---|---|---|---|---|---|
| 376 | **Reduce crash data processing time** | Number of months crash data processing is backlogged | Colorado Highway Safety Program Annual Report/Quarterly | Calendar Year **Quarterly reporting** | Less than 6 months | 16 months (2017, 3rd Q) |
| 477 | **Rural road fatality rate** | Per MAP21, if rate increases over previous two year period, HSIP funds must be reallocated to rural roadways | Colorado Highway Safety Program Annual Report/Quarterly | Calendar Year | Reduce fatalities from previous two year average | 2016:1.74<br>2015: 1.77<br>2014: 1.58<br>2013: 1.64<br>Decrease:1.7% |
| 478 | **Older driver fatalities and serious injuries** | If older driver fatalities and serious injuries per capita for drivers and pedestrians over 65 increase over previous two years, state shall set strategies in SHSP to change trend | Colorado Highway Safety Program Annual Report/Quarterly | Calendar Year | Reduce fatalities and serious injuries from previous two year average | 2016:265<br>2015: 249<br>2014: 243<br>2013: 270<br>Increase: 6% |

[1] Data is not official for a year after the end of the calendar year. Therefore, this is 2016 data.

# SECTION 3. RISK RESPONSE STRATEGIES

## Overview of the Risk Response Process

Each year, the Quality Improvement Council (QIC) identifies risks to the Federal-Aid Highway Program (FAHP) and develops a risk statement for each. The risks are prioritized based on likelihood and impact. Joint process reviews are selected for risks that involve CDOT and FHWA and for which a clear path is not known. A team is identified to research the risk and develop recommendations. This is documented in a final report that provides a summary of: 1) overview of risk, 2) general methodology (including project team), 3) key findings, and 4) specific recommendations for implementation. The recommendations need to be clear and discreet enough that we can easily track them every quarter until they are completed. Final reports and are added to the QIC SharePoint Process Review Library, and QIC champions track the implementation status of these recommendations using the QIC SharePoint Process Review Status List.

The QIC can also identify other FAHP-related risks or opportunities to track that are not prioritized as joint process reviews because: they are not a CDOT/FHWA joint risk; they are in the process of developing specific products (as opposed to recommended implementation strategies); they represent an opportunity to improve the FAHP (as opposed to a risk to the FAHP); they are a lower priority risk due to a lower potential impact and/or likelihood; or resources are not yet available to commit to a detailed review. More information on these risks and opportunities is available the QIC SharePoint 2017 May - 2018 April Joint Process Reviews and Other Risk Response Strategies folder.

The remainder of this section includes:

- Overview of ongoing joint process reviews and other risk response strategies. The overview includes the risk statement, target outcome/expected products and contacts.
- Joint process review recommendations finalized in 2017 and completed activities for other risks and opportunities
- Recommendations from 2011-2016 in which implementation is underway or completed in 2017.

## Completed in 2017 - Joint Process Review Recommendations

**Local Public Agency (LPA) Program Review**

1A: Track lessons learned from pilot project to "defederalize" LA projects.
1B: Use consultants to supplement CDOT resources in overseeing projects.
1C: Emphasize the value of economies of scales by having a minimum project size or combining LPA projects.
2. Create a process that requires a minimum level of training prior to allowing the LPA to administer the federal aid project.
3. Develop an outward-facing, interactive web-based LPA manual with a focus on the audience being the LPAs.
4. Improve communication with LPAs and CDOT, between CDOT Regions and HQ, and between each Region, initially through a broad, inclusive approach to updating the LA Manual.
5. Pilot the sub recipient risk assessment mandated by 2 CFR 200 for the SRTS call for projects.

**Permanent Water Quality (PWQ) Mitigation Fund**

1. PWQ Program Manager track the application approvals, encumbrance and budget actions in one spreadsheet to ensure that projects are budgeted correctly. It is recommended this is done at least quarterly. Recommendation will be considered completed for QIC documentation purposes after one year of tracking.

2. PWQ Program Manager review project invoices and track expenditures and compare to the original application approvals. Recommendation will be considered completed for QIC documentation purposes after one year of tracking.
3. PWQ Program Manager request an audit be performed by CDOT Audit once projects begin expending money. Additionally, Audit may want to consider reviewing the PWQ Program Manager's process for tracking and reviewing the PWQ Program Pool. Recommendation will be considered completed for QIC documentation purposes after one audit.

**Risk Based Cost Estimating (2017) - COMPLETED**

1. Chief Engineer develop a policy establishing criteria for what projects will use risk based cost estimating (i.e. programmatic approach or select/determine which projects are to be subject to developing a risk based cost estimate). **COMPLETED in 2017**
2. CDOT develop a risk-based cost estimating template for the Regions to use on projects, based on what other states and CDOT Regions are currently using. **COMPLETED in 2017**
3. The Division will continue to pursue and promote opportunities for CDOT to participate in Peer Exchanges and learning opportunities with other states. **COMPLETED in 2017**
4. CDOT pilot the use of risk based cost estimating on a select group of projects and evaluate lessons learned and how this approach could be expanded (programmatic level vs. project level). **COMPLETED in 2017**
5. CDOT identify a risk based cost estimate champion in each Region that will help the PMO implement a formal program and will also help with the culture change. **COMPLETED in 2017**

## Completed in 2017 - Other Risk Response Strategies Completed and Opportunities

**1. Improving the Utility Clearance (RR) portion of the overall Project Development/Delivery Process**

- **Risk Statement:** The Utility Clearance (especially the railroad) portion is frequently mentioned as being long, cumbersome, and difficult. With the acceleration of project delivery, this situation is likely to deteriorate unless an improvement effort is undertaken.
- **Outcome/ Products:** Revamped CDOT Railroad Manual with updated processes and work flows for components such as Section 130, Railroad Agreements, BNSF At-Grade, UPRR At-Grade, Grade Separated, BNSF Utilities, UPRR Utilities, STIP Process, Quite Zone Process, RTD Process, and Alternate Delivery Methods. Developed a Master Agreement with BNSF and contract templates for construction and maintenance for non-Master Agreement projects. Shared lessons learned with other states at a SHRP2 meeting.
- **Contacts:** CDOT: Scott Hoftiezer, Neil Lacey; FHWA: Bill Haas

**2. Guardrail Ownership and Manual for Assessing Safety Hardware (MASH)**

- **Opportunity Statement:** It will benefit CDOT to make improvements in: training; controlling inventory for specific manufacturers guardrail systems on specific corridors or segments; working with manufacturers to improve their systems; providing clear guidance for when to upgrade to MASH or repair with NCHRP 350 compliant system; and update current database to track system installed on highway.
- **Outcome/ Products:** CDOT is developing a MASH Implementation Plan that outlines activities ranging from establishing a process to prioritize and upgrade or replace highway safety hardware, clarifying MASH compliance issues through policy memoranda and training.
- **Contacts:** CDOT: Neil Lacey, Charles Meyer, Larry Brinck, Kyle Lester; FHWA: Dahir Egal, Randy Jensen, Matt Greer

## Ongoing - CDOT/FHWA Joint Process Reviews (JPRs)

1. **Workzone Safety and Mobility**
   - **Area of Risk and Likelihood/Impact:** If work zone safety and operations is improved on projects in Colorado then the safety of the traveling public may be enhanced, project worker safety may be improved, public travel may be improved, public perception and compliance with work zones could be improved, and incidents may be avoided in work zones.
   - **Target Outcomes/Expected Products:** Results from this risk assessment should be lists of risks and impacts from work zone practices and mitigation strategies to minimize those risks and impacts. These lists should be prioritized for implementation. Measures of WZ safety and operations should also be proposed with a proposal to gather and report the measure data. Consideration should be given to CDOT's organizational structure to ensure this risk area is addressed regularly and adequately.
   - **Contacts:** CDOT: Charles Meyer; FHWA: Dahir Egal, Randy Jensen

2. **Process for Locally-Owned (Non-CDOT) Off-System NHS Bridge/Pavement**
   - **Area of Risk and Likelihood/Impact:** MAP-21 requires that state DOTs develop and implement a Transportation Asset Management Plan that, in part, defines the context for how performance target will be achieved for bridges and pavement on the National Highway System (NHS). The NHS in Colorado is approximately 90% CDOT owned (on-system) and 10% local agency owned (off-system). Performance is now being monitored at the state and MPO level, and there is a need to better understand the policy and investment decision making to ensure that performance targets are met at the state and MPO level.
   - **Target Outcomes/Expected Products:** Clarify risk and develop recommendations to fix it.
   - **Contacts:** CDOT: William Johnson; FHWA: Randy Jensen

3. **HPMS Data**
   - **Area of Risk and Likelihood/Impact:** An error between data collection and tracking has had a significant impact in making the program look less effective than it is.
   - **Target Outcomes/Expected Products:** Updated data collection process, which will involve database changes.
   - **Contacts:** CDOT: Erik Sabina and William Johnson; FHWA: Randy Jensen

## Ongoing - Risk Response Strategies and Opportunities

1. **Operational Traffic Analysis**
   - **Area of Risk and Likelihood/ Impact:** If we are not ensuring that projects are adequately studying traffic impacts from a project - both during construction phasing and long term, then unintended operational problems could result and state and federal dollars could be wasted with public and elected officials confidence in CDOT and FHWA negatively impacted.
   - **Target Outcomes/Expected Products:** Initial review to determine risk likelihood and impacts, including whether TSM&O or other efforts may already be addressing these needs.
   - **Contacts:** CDOT: Charles Meyer; FHWA: Shaun Cutting

2. **SB16122 Project Closure**
   - **Opportunity:** CDOT is in the midst of responding to requirements that projects be de-budgeted within one-year and that a risk-based performance audit be completed.
   - **Contacts:** CDOT: Neil Lacey and Steve Markovetz; FHWA: Andre Compton

## Risk Response Recommendations Being Implemented or Completed (2011-2016)

**Categorical Exclusions (CE) Review (2016)**

1. Update Form 128 and companion instructions on how to properly complete this form, including what to use as the CE Start Date and how to use the checkboxes and clearance dates. **COMPLETED in 2017**
2. Present Categorical Exclusion training class at least twice or at the annual Face-to-Face Environmental Workshop. **COMPLETED**
3. Consider developing a standard or model detailed file structure to improve the ability of others, besides the project manager, to locate specific project information.
4. During the update of the CE Agreement, review the evaluation criteria and simplify to make them more similar to the criteria contained in 23 CFR 771.117(e). **Completed in 2017**
5. Consider developing procedures to not only help new employees with their responsibilities, but also provide information and steps for file and project transfer.

**Improving the Process for Retention of CDOT's Core Documents (2015)**

1. Identify CDOT unique and region unique records. **COMPLETED**
2. Standardize the retention process by clarifying and updating Procedure Directives 51.1 (Retention of Documents) 21.1 (Central Files Construction Project Filing System).

3a. Develop and deploy Engineering Record Retention Training, including Unique Record Schedule Training for subject matter experts (SMEs) and Standard Retention Process Training for general staff.

3b. Prepare a records inventory to comply with C.R.S 24-80-102.7 requirements.

3c. Update CDOT Records Management website. **COMPLETED**

3d. Retain a consultant to assess the current state and evaluate any gaps in the CDOT records management plan and process and evaluate the multiple existing Enterprise Document Management System (EDMS) technologies in CDOT.

**Reducing the Time for Project Closure - Region 2 (R2) (2015) - COMPLETED**

1. Facilitate the standardization and creation of a R2 Finals Folder in Projectwise under Project Planning. **COMPLETED**
2. Develop and implement a communications and change management plan to create awareness and to provide knowledge, ability and reinforcement for employees impacted by the new R2 process. This involves outlining directions and key messages in a presentation. **COMPLETED**
3. Develop and implement a R2 Mentor Program to provide support to Project Engineers. **COMPLETED**
4. Release a construction bulletin that will instruct project engineers across the state to implement the use of a Project Notebook, electronic filing of the Form 325 and a standard location in Projectwise for finals documentation. **COMPLETED**
5. Incorporate construction bulletin process into TEPT Training once complete. **COMPLETED in 2017**
6. Create and implement a tracking and evaluation process that includes metrics. **COMPLETED**

**Bridge Rinsing (2013) - COMPLETED**

1. Develop a bridge rinsing procedure to hand remove dirt and debris, followed by a high pressure rinse to abutment and pier seats, girder ends above areas hand cleaned, and fracture critical chords on steel trusses. **COMPLETED**
2. Issue a General Statewide Rinsing Permit for rinsing structures. **COMPLETED**

3. Develop a process for selecting and prioritizing structures to be hand cleaned and rinsed on a developed frequency cycle. Also, rinsed structures will be tracked and bridge specific costs tabulated. **COMPLETED in 2017**
4. Expand the statewide rinsing program to include hand cleaning followed by a high pressure rinse in box girders, bridge posts and rail, and bridge elements in splash zones that include, but are not limited to, columns. **COMPLETED in 2017**

**Water Quality (2011) - COMPLETED**

1. Implement a top down management approach for water quality that includes risk-based performance measures for environmental stewardship (2014 revision) – **COMPLETED in 2017**
2. Specification changes limiting disturbance or increasing stabilization efficiency – **COMPLETED**
3. CDOT project engineers work with the Water Pollution Control Manager (WPCM) to develop cost effective ways to implement erosion/sediment control; implement the Lean process to reduce the cost to comply with water quality regulations; Directive from Executive Director – **COMPLETED**
4. Specification changes - Use of incentives/disincentives for contractors through performance measures as a reward/penalty for contract/permit/specifications compliance – **COMPLETED**
5. Identify and implement optimized staffing and identify strategies for improving maintenance support (2014 revision) – **COMPLETED in 2017**
6. Chief Engineer's Mandatory Training Memo and Training Development and Delivery – **COMPLETED in 2017**
7. Create a specification change to reset the disturbance limit of 34 acres to a number or control level that is reasonable and consistent with other program components - **COMPLETED**
8. Training and certification: – **COMPLETED in 2017**
    - Obtain management support for expansion of training
    - Develop and deliver training program
    - Require testing and minimum test scores for certification and
    - Implement two-day Erosion Control Supervisor Certification
9. Develop process addressing better seeding, fertilizing, and watering methods to enhance revegetation success – **COMPLETED**
10. CDOT needs to fund E/S Non-Project Specific (NPS) contractors and/or obtain better funding for CDOT Maintenance – **COMPLETED**
11. Funding liaison position at CDPHE – **COMPLETED**

# APPENDIX A. ENVIRONMENT SECTION - OTHER NOTABLE REGULATIONS AND ACCOMPLISHMENTS TO COMPARE FOR TRACK TRENDS 2017

**Priority projects:**

- T-REX construction - driven by Governor Owens/Tom Norton
- SH 85 and 120th 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 driven by Governor Hickenlooper

**Dropped projects:**

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

**Notable Regulation changes:**

- Public Highway Authority Law in 1987, which allows tolling
- SAFETEA-LU in 2005
- MAP-21 in 2012
- FAST Act in 2015

**Notable Initiatives and Accomplishments:**

- First EA/EIS in this analysis started in 1999
- CDOT Environmental Stewardship Guide – 1st version in 2003
- CDOT Environmental Stewardship Guide – 2nd version in 2005
- 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 – 1st Version in June 2007
- A recession hit in 2008 so new project numbers dropped off during and after this year
- FHWA Non-Programmatic Environmental Review Summary developed in 2008
- CDOT NEPA Manual – 2nd version (total rewrite) in August 2008
- CDOT/FHWA/USACE NEPA/404 Merger Process and Agreement
- Every Day Counts 1 – 2011-12, the first group of innovations, or EDC-1, was identified and these innovations were promoted through Every Day Counts during 2011 and 2012
- Every Day Counts 2 – 2013-14
- CDOT NEPA Manual – 3rd 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.
- MAP-21 resulted in new Categorical Exclusions being available to use with the intension of resulting in fewer EAs going forward.
- PEL Handbook and Training Update 2015
- Every Day Counts 3 – 2015-16

- Cat Ex Programmatic Agreement Update - updating the user agreement between FHWA and CDOT for administration of Cat Ex Program.
- Federal Lands MOU – improved communication and NEPA processes for projects taking place on federal land - 2016.
- Every Day Counts 4 – 2017- 18
- CDOT NEPA Manual Version 5
- CDOT Environmental Stewardship Guide (updated for the first time in 12 years)

**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 greatly 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 sees the I-70 West Mountain Corridor as a critical corridor that impacts commerce, tourism, recreation, and overall economic development with year-round congestion problems and began actively looking for funding.

He supports and believes in FASTER legislation; there are 178 bridges that are 75 years old, stretches of highways that are 75-100 years old, and expanses of interstate that are approximately 50 years old. He wants to prioritize the funding of key projects, while leveraging state dollars with federal funds to repair our important transportation infrastructure. He is looking 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 has been ongoing for a number of years due to public controversy. This is 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 have been placed on its completion by the Governor.

In September 2013, there was a large flooding event that 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 1st 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 of 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.

The Governor announced his intensions of running for another term in office and made the section of I-25 between Castle Rock and Monument a high priority on his campaign platform. He was reelected in November of 2014 for another 4 years, so this may be the next big project on the horizon for the state.

2015 to Present - Governor John Hickenlooper in office (Shailen Bhatt is CDOT's Executive Director/replaced by Mike Lewis): Governor Hickenlooper and FHWA have projects of significant interest. FHWA has Projects of Corporate Interest (POCI). The following projects are 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)

CDOT Executive Management Team has focused on implementing technological solutions because you can't build your way out of construction. EMT is also focused on the POCI list, I-70 Central (first ROD coming out of I-70 East), I-25 South Gap EA (Castle Rock to Monument), and the Road X initiatives. I-70 Central signed a ROD in January 2017. Construction on Phase 1 begins in early 2018. The I-25 South Gap EA is targeting a decision document in July 2018. Additional projects on the I-70 mountain corridor, including the westbound Peak Period Shoulder Lane and improvements to Floyd Hill were and are a focus for both former Executive Director Shailen Bhatt and current Executive Director Mike Lewis.

CDOT's decision making under NEPA was legally challenged twice in 2017. It was the first time in ten years since this has occurred. While resolution of the I70 East ROD is still outstanding to date, there was a decision for the C470 Kipling to I-25 EA and FONSI 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.

Building on CDOT's mindset that you can't build your way out of congestion, RoadX is Colorado's bold commitment to our customers to be a national leader in using innovative technology to improve our transportation system. It will be a rapid, fast-paced enterprise to frame how CDOT will build tomorrow—today. It will foster an environment where private industry has a direct pipeline to deploy technological solutions to transform an aging transportation system. As RoadX has progressed, CDOT has partnered with several private companies with pioneering technologies, including Panasonic, Virgin Hyperloop 1, and Arrivo.