2016

Annual 2016 CDOT Stewardship and Oversight Agreement Report

Colorado Department of Transportation

February 27, 2017

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2016 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

Nine (9) research reports were published in State FY2016 (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	2016 Actual
97	**Percent of recommendations implemented**	Percent of recommendations implemented or adopted within two years of final research report, using 5 years of data 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%	56
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	9
415	**Percent of annual fund spent on RD&T (professional services) activities**	Percent of annual fund spent on RD&T (professional services) activities	Research Work Plan and Report	State FY	Minimum 50%	98%

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 Actual
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	71
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	1785
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	1243
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	542
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	162

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. MAP-21 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, fleet, tunnels, culverts and rockfall mitigation sites. CDOT's TAMP includes all of the MAP-21 TAMP proposed requirements, which are listed below. It is an initial snapshot of CDOT's asset management program as of the time it was finalized.

MAP-21 requires that each DOT's TAMP include the following:

- Inventory and condition of pavement and bridges on the National Highway System
- Asset management objectives and measures
- Performance gap identification
- Life-cycle cost and risk management analysis
- A financial plan
- Investment strategies

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, 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 performance gap analysis identified 28 gaps, of which the top ten were recommended for work in Phase 2 of the project, which is almost complete. The top ten gaps in asset management at CDOT identified and their current status are:

- Developing and documenting the budget distribution, project selection and project tracking process: complete
- Integrating risk analysis into planning and programming processes: complete
- Developing strategies to manage project and program delivery risks: complete
- Establishing a framework to evaluate alternative strategies for agency risks: complete

- Analyzing budget tradeoffs across asset programs: complete
- Improving project scoping and optimization: complete
- Incorporating life-cycle analysis into decision-making: complete
- Clarifying the role of performance target-setting: complete
- Implementing a strategic management framework to reflect on progress: wrapping up
- Communicating the benefits of Transportation Asset Management: complete

Phase 2 began in July 2014 and the consultant efforts on these items were completed in March 2016.

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. Work is underway now to enhance the risk register by identifying additional risks along mitigation strategies.

Performance/Compliance Measures

CDOT has developed a Risk-Based Asset Management Plan to meet MAP-21 requirements. The Department is producing no performance measures.

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. Received approval via Local Hire SEP 14 to provide a local hiring program on Central 70. The current local hire goal is 760,000 hours. This included the completion of a comprehensive needs assessment conducted in the local hire geographic area.

2. Established an innovative incentive-based OJT graduate program to be utilized on Central 70 wherein additional incentives are provided to the contractor for having an OJT participant graduate and remain employed for a period of 6 months following graduation.

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

4. Achieved 62,478 OJT training hours, which exceeded goal of 50,000 by 24.96%.

5. Graduated 36 individuals from OJT training programs compared to 13 in 2015.

6. Increased number of individuals participating in OJT programs by 32.5%.

7. Completed 18 contract compliance reviews.16 reviews were subsequently determined to have been "In Compliance" by CDOT and 3 reviews are finalizing voluntary corrective action plans.

8. Completed ADA audits of all CDOT main office buildings, rest stops as well as Bustang stops. The findings are being reviewed and will be contained in the ADA Transition Plan.

9. LCPtracker Payroll Software was purchased and piloted on multiple projects. The feedback has been very positive. The system will also allow CDOT to conduct and store labor interviews in an electronic system to allow for increased proactive measures in determining non-compliance with payrolls. The software will be utilized by all projects advertised after January 1, 2017.

10. The Transportation Commission has approved a funding plan of $85 million over the next 5 years to address non-compliant curb ramps that will not be addressed through regular project delivery.

11. ADA Curb Ramp Inventory:
    a) Data has been collected on 24,515 curb ramps.
    b) CDOT has adopted PROWAG standards for curb ramps. Of the 24,515 data sets collected, 4,412 curb ramps are considered to be Functionally Accessible based on PROWAG standards.
    c) CDOT is currently researching the possibility of using a data application software to provide field staff the ability to update curb ramp data in the field and have the information uploaded into the database to increase efficiency.

12. Statewide ADA technical assistance provided:
    a) 280 consultations provided to Local Agencies and CDOT internal staff (phone/e-mail/desktop/in-field).

13. Exceeded our annual DBE goal of 12.15%, with 13.2% participation for federal fiscal year (FFY) 2016.

14. Established professional services and construction small business collaborative forums to increase transparency in CDOT process and improve communication on small business related issues.

15. Continued to recruit small business for on-line CDOT plan-sheet and small business network service and sponsored free BIDX accounts for qualifying DBE and ESB firms.

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

17. Adopted B2G Now software for compliance on professional services, innovative contracts and design-build. The software is also being used to assist Engineering Contracts with determining workload distribution.

18. Continued to improveConnect2DOT services and tracking of accomplishments toward performance measures

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

20. Updated civil rights section of CDOT's local agency manual.

21. Updated CDOT's DBE program manual.

22. Met with each CDOT major program area 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	2016 Actual
107	**DBE participation (as percentage) to date on Federal Aid Highway Program**	DBE Program	Transport	Federal FY **Semiannual Reporting**	12.15%	13.2
459	**# of DBE firms receiving supportive services/benefits**	DBE Supportive Services (DBE/SS)	Connect2DOT Program	Federal FY	100	77
313	**# of completed Contract Compliance Reviews**	Contractor Compliance (External EEO) Program	Google Drive	Federal FY	18	18
460	**# of OJT hours achieved**	On the Job Training (OJT) Program	Google Drive	Federal FY	50,000 hours	62,478 hours
461	**# of persons placed and employed (post-services)**	OJT Supportive Services (OJT/SS)	Google Drive	Federal FY	50	N/A
310	**# of completed STA reviews**	Title VI Program	Title VI Assessment	Federal FY	10	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: John Eddy
FHWA Manager: Shaun Cutting, Randy Jensen

The Contracts and Market Analysis Branch is responsible for preparing contracts for construction projects, professional consulting services, and intergovernmental agreements. The Branch also is charged with providing engineering cost estimates for projects before bidding, bid-collusion detection, materially unbalanced bid detection and AASHTOWare Project (formerly Trns*Port) software support. The programs in the Branch include Engineering Contracts, Consultant Audit, Engineering Estimates and Market Analysis and AASHTOWare Project Support (formerly Programs and Project Analysis).

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.

AASHTO Ware Project Support (formerly Programs and Projects Analysis) – The AASHTO Ware Project Support unit is responsible for user support with the AASHTOWare project suite of software used for construction project management, including training, technical assistance, and reporting.

Quality/Results

1. Contract performance (Engineering Contracts):
   - 147 construction contracts awarded ($633M) 98% of which were awarded within 30 days of bid opening. No issues of non-compliance to report.
   - 56 consultant selections, average processing time approximately 18.4 weeks. 52% of contracts executed within desired 17 weeks.
   - FY 2016: 885 task orders written, average processing time approximately 32 calendar days.
   - CY 2016: 746 task orders written (YTD), average processing time approximately 21 calendar days.

2. AASHTOWare Project Support Training (AASHTOWare Support):
   - 10 Payroll classes.
   - 16 SiteManager/web Trns*port classes.
   - Site Manager utilization reviews: No problems encountered or outstanding issues.

3. Overall Program Estimate Accuracy (EEMA):
   - FY 2016 Total Program Estimate: $459,046,850.86
   - FY 2016 Total Program Award: $449,744,534.04
   - Accuracy: -2.07% 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	2016 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, Chief Engineer Objectives	State FY	85%	78.7%
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**	55%	53.5%
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, Chief Engineer Objectives	State FY **Quarterly reporting**	95%	98%
246	**Percent of professional services contracts executed within set timeline**	Percent of professional services contracts executed* within 17 weeks (* executed defined by date of Advertisement to date of Controller Signature)	CMA Branch Work Plans, Chief Engineer Objectives	State FY	85%	52%

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 2016, CDOT received one EPA rating (EC2) for the completed US50 East Tier 1 Draft EIS. Although there were some environmental concerns identified, these were not rated as unsatisfactory or with any objection, and are an acceptable rating for this EIS.

2. Completion Time for Environmental Documents – During the 2016 calendar year, the following eight NEPA documents were finalized:
   - Two Environmental Impact Statements (EISs),
     - I-70 East Final EIS – (161 months)
     - US 50 East Tier 1 Draft EIS – (129 months) – (The FEIS and ROD are planned to be a combined document for streamlining)
   - Two Records of Decision (ROD),
     - I25 North ROD 2 – (13 months)
     - I25 North ROD 3 Crossroads Boulevard (3 months)
   - Two Environmental Assessments (EAs), and
     - 6th Avenue Parkway (Local Agency template EA) – (21 months)
     - US 50 West, Willis Blvd to McCulloch Blvd (template EA)- (14 months)
   - Two Findings of No Significant Impact (FONSI).
     - 6th Avenue Parkway – (6 months)
     - US 50 West, Willis Blvd to McCulloch Blvd – (3 months)

   Table 1 shows all 65 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 (1999-2016) 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	Thu 1/28/99	Tue 10/17/00	NA	Thu 5/3/01	27.16
I-25 North Colorado Springs	EA/FONSI	Mon 2/1/99	Mon 3/29/04	NA	Fri 9/10/04	67.33
SH 9	EIS/ROD	Tue 3/23/99	Fri 5/31/02	Thu 3/4/04	Mon 5/24/04	62.1
I-70 Mtn Corridor	EIS/ROD	Tue 1/25/00	Tue 8/10/10	Thu 2/24/11	Thu 6/16/11	136.77
I-25, 136th Ave Interchange	EA/FONSI	Thu 2/17/00	Wed 5/15/02	NA	Wed 1/8/03	34.72
Northwest Parkway, I-25 Interchange	EA/FONSI	Mon 4/3/00	Mon 2/12/01	NA	Wed 5/23/01	13.64
I-70 Eagle County Airport Interchange	EA/FONSI	Fri 4/14/00	Mon 8/30/04	NA	Thu 6/23/05	62.33
Woodmen Road	EA/FONSI	Wed 6/14/00	Fri 12/16/05	NA	Fri 12/14/07	90.05
I-25, 144th Ave Interchange, Adams County	EA/FONSI	Fri 7/7/00	Wed 1/12/05	NA	Fri 4/15/05	57.3
I-70, Hogback Parking Facility	EA/FONSI	Wed 7/19/00	Wed 2/14/01	NA	Mon 8/13/01	12.82
Nottingham Ranch Road (Post Blvd), I-70	EA/FONSI	Wed 8/2/00	Fri 1/11/02	NA	Fri 4/25/03	32.75
I-70, SH 58 Interchange	EA/FONSI	Mon 9/18/00	Wed 7/3/02	NA	Wed 9/1/04	47.47
South Simms St - US 285 Interchange	EA/FONSI	Mon 1/29/01	Thu 9/6/01	NA	Mon 4/1/02	14.04
SH 402, US 287 to I-25 Interchange	EA/FONSI	Mon 8/13/01	Mon 7/23/07	NA	Mon 1/14/08	77.1
Powers Blvd	EA/FONSI	Mon 10/29/01	Tue 5/4/10	NA	Tue 1/4/11	110.27
I-25, Crystal Valley/Dawson Ridge Pkwy	EA/FONSI	Tue 4/2/02	Mon 9/20/04	NA	Mon 2/28/05	34.95 a
SH 287 Reliever Route in Lamar	EA/FONSI	Thu 4/25/02	Thu 8/15/13	NA	Mon 11/10/14	150.64
SH 285, Foxton to Bailey	EA/FONSI	Fri 7/12/02	Wed 8/11/04	NA	Fri 6/3/05	34.75
Valley Highway	EIS/ROD	Tue 7/23/02	Tue 4/19/05	Thu 12/7/06	Thu 7/5/07	59.44
120th Ave Extension, SH 85 and Quebec	EA/FONSI	Mon 8/19/02	Tue 5/27/03	NA	Fri 8/1/03	11.41
US 34 Business Route, SH 257 to 71st Ave	EA/FONSI	Fri 10/11/02	Tue 9/13/05	NA	Tue 5/2/06	42.71
US 160 Durango to Bayfield	EIS/ROD	Tue 12/24/02	Tue 9/13/05	Fri 5/12/06	Tue 11/7/06	46.49
I-25 Through Pueblo	EIS/ROD	Mon 1/27/03	Fri 10/21/11	Thu 8/15/13	Thu 4/17/14	134.73
US 550, Improvements from State Line to CR 220	EA/FONSI	Wed 2/12/03	Wed 7/27/05	NA	Wed 12/21/05	34.29
I-70 East	EIS/ ROD	Tue 8/19/03	Wed 10/29/08	Mon 12/14/15	Thu 1/19/17	161.16

Project Name	Document Type	Project Start Date	EA/DEIS Signature	FEIS Signature	Decision Document Date	Duration
US 24, I-25 West to Manitou	EA/FONSI	Wed 8/27/03	Wed 5/16/12	NA	Wed 10/1/14	133.25
US 36	EIS/ROD	Tue 10/21/03	Mon 7/23/07	Fri 10/30/09	Thu 12/24/09	74.17
SH 121, Wadsworth Blvd/Grand Ave	EA/FONSI	Fri 11/28/03	Mon 5/9/05	NA	Wed 8/31/05	21.11
North I-25	EIS/ROD	Mon 12/22/03	Fri 10/31/08	Fri 8/19/11	Thu 12/29/11	96.3
SH 7, Cherryvale Rd to 75th St	EA/FONSI	Mon 3/1/04	Fri 5/30/08	NA	Mon 9/15/08	54.54
I-225, Colfax Avenue Interchange	EA/FONSI	Tue 3/9/04	Thu 10/20/05	NA	Fri 3/30/07	36.69
US 34 Madison Ave to Larimer County	EA/FONSI	Wed 9/1/04	Wed 4/4/07	NA	Fri 5/4/07	32.05
I-70, E-470 Interchange Complex	EA/FONSI	Fri 9/24/04	Tue 11/7/06	NA	Tue 7/10/07	33.5
DAR, US Army Pueblo Chemical Depot	EA/FONSI	Tue 10/26/04	Tue 1/16/07	NA	Mon 5/7/07	30.35
I-70/32nd Ave Interchange (Cabela's)	EA/FONSI	Tue 2/1/05	Mon 10/23/06	NA	Wed 2/28/07	24.89
South Broadway	EA/FONSI	Wed 6/1/05	Wed 3/26/08	NA	Wed 10/8/08	40.27
SH 88, Federal Blvd, Alameda Ave to 6th Ave	EA/FONSI	Mon 8/29/05	Wed 11/14/07	NA	Thu 2/28/08	30.02
I-25, SH 16, East Entrance to Fort Carson	EA/FONSI	Thu 2/2/06	Thu 7/12/07	NA	Thu 9/20/07	19.56
US 50 East	Ongoing Tier 1 EIS/Combined ROD	Fri 2/3/06	Fri 8/12/16	NA	NA	NA
I-70 East Eagle Interchange	EA/FONSI	Tue 7/18/06	Fri 9/3/10	NA	Tue 5/24/11	58.22
I-70, I-70B West	EA/FONSI	Tue 8/8/06	Wed 3/19/08	NA	Fri 8/8/08	24.03
56th Ave Quebec to Havana	EA/FONSI	Thu 4/12/07	Thu 9/4/08	NA	Thu 1/15/09	21.17
6th Ave/Wadsworth	EA/FONSI	Fri 6/1/07	Mon 6/29/09	NA	Fri 3/12/10	33.37
I-25, North Meadows Extension to US 85 and I-25	EA/FONSI	Mon 7/2/07	Tue 3/23/10	NA	Thu 3/17/11	44.52
I-70, Parachute West Interchange	EA/FONSI	Fri 8/24/07	Tue 1/5/10	NA	Tue 8/10/10	35.57
US 550/160 Supplemental EIS	EIS/ROD	Mon 10/1/07	Mon 10/3/11	Tue 7/3/12	Fri 5/15/15	91.5
South Bridge - Glenwood Springs	EA/Ongoing FONSI	Fri 12/14/07	Tue 10/8/13	NA	NA	NA
Central Park Blvd	EA/FONSI	Thu 7/3/08	Thu 6/4/09	NA	Mon 8/3/09	13.02
I-25 Dillon Drive	EA/FONSI	Thu 12/18/08	Wed 1/26/11	NA	Thu 7/28/11	31.3
I-25 Arapahoe Road	EA/FONSI	Wed 3/3/10	Wed 8/29/12	NA	Fri 3/15/13	36.43
Grand Ave Bridge	EA/FONSI	Mon 5/2/11	Sat 10/18/14	NA	Thu 5/28/15	48.89
Twin Tunnels	EA/FONSI	Thu 9/1/11	Thu 6/28/12	NA	Wed 10/17/12	13.55
I-25 North Revised ROD 2	Revised ROD	Mon 1/2/12	NA	NA	Thu 7/23/15	42.67

Project Name	Document Type	Project Start Date	EA/DEIS Signature	FEIS Signature	Decision Document Date	Duration
I-25 North Revised ROD 1	Ongoing/Revised ROD	Mon 1/2/12	NA	NA	NA	NA
SH 9 Iron Springs*	Template EA/FONSI	Wed 8/1/12	Tue 5/6/14	NA	Wed 12/17/14	28.54
C-470 I-25 to Kipling Revised EA	EA/FONSI	Tue 4/2/13	Fri 7/24/15	NA	Fri 11/20/15	31.63
I-76 and Bridge Street*	Template EA/FONSI	Wed 5/1/13	Wed 1/14/15	NA	Thu 8/13/15	27.42
Quebec EA	Ongoing Template EA	Tue 11/19/13	NA	NA	NA	NA
US 50 West, Ourcell Blvd. to Willis Blvd.**	Template EA/FONSI	Mon 12/16/13	Wed 6/4/14	NA	Thu 9/11/14	8.84
Federal Blvd, 7th to Howard Place**	Template EA/FONSI	Tue 2/11/14	Wed 10/8/14	NA	Wed 1/14/15	11.08
6th Ave Parkway Extension*+	Template EA/Template FONSI	Fri 9/19/14	Thu 6/16/16	NA	Tue 12/6/16	26.6
US 50 West, Willis Blvd to McCulloch Blvd.**	Template EA/FONSI	Thu 1/29/15	Tue 4/21/16	NA	Tue 8/17/16	18.61
I-25 North ROD 3	Revised ROD	1/2/12	NA	NA	6/15/16	53.46
Wadsworth Widening	Ongoing Template EA	4/25/16	NA	NA	NA	NA
I-25 North ROD 5: Vine St. Bridge Replacement	Ongoing ROD	6/1/16	NA	NA	NA	NA
Kipling and I70 Interchange	Ongoing Template EA	7/1/16	NA	NA	NA	NA
I-25 North ROD 4: SH 392 to SH 56	Ongoing ROD	7/1/16	NA	NA	NA	NA
I-25 North ROD 1 Reevaluation	Ongoing/Revised ROD	7/28/16	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 I-70 East Final EIS was signed on January 15, 2016. The EIS took approximately 161 months to complete due to no agreement on a preferred alternative and substantial public controversy. A ROD was signed on January 19, 2017 but was not counted in this annual report

The US 50 East Tier 1 Draft EIS was signed August 12, 2016. The 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 is anticipated in 2017.

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 documents that are being used at a corridor planning level instead of Tier 1 EISs. That being said though, the average time to a signed FEIS from the Notice of Intent is 87 months; the shortest has been the US 160

Durango to Bayfield EIS that took 41 months, the longest was the I-70 East that took 148 months (12.3 years). If you throw out the 3 EISs that took over 100 months (I-70 Mt. Corridor, I-70 East, and I-25 through Pueblo), the average time for EISs is about 62 months (a little over 5 years). **For**

ROD documents:

The average time to a ROD after the FEIS is signed is just under 6 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.

For the EA documents:

The 6th Ave Parkway EA was signed in June 2016, which was 21 months after the project started in September 2014. This project utilized the streamlined EA (EA Template), although the template is most applicable for simpler EAs with only one alternative in addition to the No Action Alternative. This format has enabled CDOT to notably streamline the EA process. This was the first template EA project that did conduct an Alternatives Analysis process, which added time and complexity to the schedule.

The US 50 West, (Willis Blvd to McCulloch Blvd) EA was signed in April 2016, which was 14 months after the project started in January 2015. This project was a product of a previous PEL.

Template EAs**:** This makes six completed projects that have used the template EA format since it was developed:

1. State Highway 9, Iron Springs, EA that Piloted the Template – 21 months, but was testing and refining the template and was a complicated project as well.
2. I-76 and Bridge Street EA – 20 months, was the second template EA and worked through some project complexities while CDOT was still determining how to best use the template. The templated FONSI was signed seven months later.
3. The US 50 West, Pueblo, EA began in December 2013 and was signed six months later in June 2014. The FONSI, which used the FONSI Template, was signed in September 2014, three months later. This NEPA study benefitted from a previous PEL decision making process.
4. The Federal Boulevard, 7th to Howard Place, EA began in February 2014 and was signed eight months later in October 2014 following a PEL. The template FONSI took three months and was signed in January 2015.
5. The 6th Ave Parkway Extension EA – 21 months, used a template EA. It was the first template EA project to address a virgin alignment and alternatives analysis. The template FONSI followed six months later.
6. The US 50 West, Willis Blvd to McCulloch Blvd. – 19 months, was the second EA to come out of the US 50 PEL. The template FONSI was signed for this Project just under four months later.

Traditionally, the average number of pages for an EA was about 160 pages. With the new template, this number has been reduced to an average of 103 pages for a CDOT-led project. The 6th Ave. Parkway EA, a local agency-led project, did not have a PEL prior to the EA being conducted was about 200 pages.

Additionally, the average time from project start to publication of a traditional EA was historically about 38 months. The average time for this year's two completed EAs were 20 months. Average number of months for recent signed EA using the Template EA = 14.8 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 US 50 (West Willis Blvd. to McCulloch Blvd.) FONSI was signed in August 2016, which was three months after the EA was signed. The FONSI also used a streamlined format (FONSI Template). The 6th Ave Parkway FONSI was signed in December 2016, approximately six months after the EA was signed.

FONSIs are being signed in 5.75 months from EA on average after the NEPA Manual was available: the shortest since the NEPA Manual was available was 1.7 months for Central Park Blvd FONSI, and the longest since the NEPA Manual was available was 7.4 months. Before the NEPA Manual was available, the average was 8 months; the longest was almost 26 months for the I-70/32nd Ave Interchange that was held up due to funding, and the shortest was in 2007 and was 1 month for US 34 Madison Ave to Larimer County.

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 2016 = 87. Older EISs are getting completed and no new EISs have been started in since 2007.

- Average number of months from FEIS to ROD = 6 (Not including the 34 month US550/160 ROD to the SEIS that had extenuating circumstances lengthening the process.

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 (Cat Exs)	
	Completed	Active
2012	189	470
2013	266	682
2014	217	757
2015	243	693
2016	326	456

Also during the 2016 calendar year, there were 326 Catexs completed which is more than in the previous 4 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 2016, there were456 active Cat Ex processes statewide for both federal and non-federal projects. This combined number of Cat Ex processes is representative of workload. Approximately 326 federal Cat Ex processes were completed, and an additional 23 non-federal Cat Ex clearances were completed in 2016 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

During the 2016 calendar year, there were six active EIS/ROD projects, and eight active EA/FONSI projects:

- Six of these were EIS/RODs. There were one ongoing EIS, US 50 East, and three ongoing RODs (North I-25 RODs 1 and 4, I-70 East) and two completed RODs (North I-25 RODs 2 and 3) statewide. At the end of the 2016 calendar year, one EIS, the I-70 East ROD, and the I-25 North RODs 1 and 4 are still active.

- There were a total of eight active EA/FONSI projects this year. Two of these EAs have been signed (US 50 West EA, 6th Ave Parkway EA). Two FONSIs were signed (US 50 West & 6th Ave Parkway). Four EAs were started this year (Wadsworth Widening, I-70 Kipling Interchange, Quebec Street, MLK FONSI, South Bridge EA [inactive EA]).

- 2016 showed a drop from the average number of EA/FONSI/EIS/ROD projects worked in any one year: 14 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: 11 for 2016 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

**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 = 20.
- 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. (US 50 West Pueblo EA, 6 months, Federal Blvd. 7th to Howard Pl EA 8 months, US 50 West Willis to McCullough Blvd 8 months.)

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. Percent on time for clearance actions by Environmental Programs Branch (EPB) – Performance was consistently higher than the target each quarter. Even though the number of requested clearance actions varies each quarter and each year, the Branch had 2,994 clearance action requests in 2016 (up from 2,156 in 2015). The percent on-time numbers were 98% (2016 was down slightly 1.4% from 2015 although the clearance request number is trending upward over time: there was a 39% increase from 2015, an 11% increase in 2014, a 30% increase in 2013, for a total increase of 35% in clearance requests over these three years alone). This is likely due to the increased credibility of staff, alignment of services with need, and the number of projects cleared.

5. 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.

6. Water Quality Measure – This CDOT Chief Engineer tracks this measure as one of his Chief Engineer Objectives due to the importance of this measure in overall compliance with stormwater permits. The result for this year is 86.6% but CDOT feels this is not really representative of what is being done on the projects. There was an error discovered during the year concerning the way the data was calculated and this has not been easy to fix. Each year was "penalized" for any outstanding findings from previous years so the data was not closed out at the end of the year that would allow each year to stand alone as evidenced by the falling numbers since 2013. A process has been use to "clean up" by hand, all these old finding records so that the year really reflects what is outstanding for that year. 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. The previous four years' performance include: FY 2011 was 84%; FY 2012 was 88%, FY 2013 was 92%, and FY 2014 was 91%. These numbers should improve for FY 2017 with the cleaned up numbers in the data base, with the Chief Engineer's memo following our EPA Audit regarding the importance of responding to these findings, as well as enforcing our specifications and with additional training that is on-going for CDOT and for contractors.

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	2016 Actual
625	**Completion time for NEPA 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 (see Table 1), 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 [Catex], EA, EIS) as added to previous years' data CatExs will only be shown as a number and not listed by name	Calendar Year **Quarterly reporting for EIS/ EAs Annual reporting for CatExs**	Track trend	The 2016 trend is fewer EA and 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	2016 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]	US 50 East Tier I – EC2 No EU rating received
102	**Percent on time for clearance actions by EPB**	Percent of the clearance actions sent from regions to EPB that were completed on time as negotiated with the regions	Environmental clearances, document and project reviews, and plan development/reviews completed by EPB prior to deadlines, quarterly	State FY Quarterly reporting	90%	98%

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 Actual
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	100%
99	**Water quality measure**	RECAT (or equivalent in new MS4 permit) findings resolved or addressed within 48 hours of midnight following the finding	Chief Engineer Objective	State FY	95% of findings resolved within 48 hours	86.6%

[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: 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 2015 in Denver. The purpose was to provide water quality and drainage related information to regions. Consisted of various presentations from CDOT Project Development, Environmental, Regions 1&3 and externally from various outside agencies, pipe manufacturer's and drainage consultants. Presentations included: Colorado Water Conservation Board (CWCB) – Kevin Houck - FEMA Floodplain, RESPEC Engineering – Bridge Scour POA-Update, Amber Williams CDOT Water Quality – Program Update, Ryan Sorenson CDOT, Project Development– PMAP update, Scott Hogan FHWA update, CDOT – Region 1 Hydraulics – Zak Humbles – Culvert Repair/Rehab Program, Hydro International - Phillip Taylor Stormwater Treatment Systems -'Where is Industry on Performance, Testing & Verification'.

2. Previous phase of Bridge Scour POA project involved the scour designs of approximately 35 mixed priority scour critical structures that are to be completed December 2016. Also included in this work are provisions for Shelf to Ad plan services and construction support related services for scour installations currently planned for implementation into projects for FY 17. A breakdown of projects and structures is as follows:
    - R1: Douglas County Scour project - structures (G-18-H, G-17-M, G-17-AN and G-17-AO) is in design with FIR/FOR in January and Ad in April 2017.
    - R2: K-18 BY/BZ on US 50 over Dry Creek is in design to go on shelf, I-13-I on US 24 over Agate Creek was completed construction in 10/2016, I-18-BG over Sand Creek is in design as part of US 24 Roadway project STM 0243-089,P-17-A/L are under design and to be incorporated into projects.
    - R3: US 40 Craig East bridge preventative maintenance project to include scour work on structures B-06-S/A-US 40 Craig East Project. A Bridge Scour POA was developed for B-06 A and it was determined to be scour critical. 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, H-04-Z on SH 65 over Plateau Creek the design completed and going to construction, H-03-L on I-70 over Plateau Creek is under design to be shelved.
    - R4: Eastern Scour package consisting of structures: B-26-E, B-27-A, B-27-E, C-26-A with designs completed and to be shelved. C-17-BL and C-17-F on I-25 along Little Thompson are under design with plans to be completed and shelved by end of year.

- R5: P-05-G on US 550 over the Animas River is under design with plans to be shelved, N-10-V on SH 160 over Rio Grande River is under design, P-01-G on SH 160 over San Juan river is under design with work to be completed by Maintenance, J-12-B, a 2-cell CBC on US 285 was just completed in construction for scour repair work, P-11-A on SH 17 along Conejos River was just completed in construction for scour repair work.

3. Supported the permanent flood recovery efforts for design and repair of structures in Region 4. Hydraulic Bridge Scour POA consultants are currently finishing up bridge scour designs to be incorporated into flood repair packages.

4. 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 will be plugged into RAMP projects for the coming year. The SAM list will be updated year end to reflect those changes.

5. Supported the Transportation Engineering Training Program (TETP) – Transportation Core Curriculum for the hydraulic training presentation in February 2016. Training was at Double Tree in Aurora and consisted of multiple specialty training classes. Hydraulics presentation took place on the Thursday afternoon.

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

7. Hydrau-Tech consultant was hired and came on board July 2016 to update the CDOT Drainage Design Manual. In progress of updating the manual. Holding monthly progress meeting with Hydrau-Tech, HDR and RESPEC.

8. Sponsored training with FHWA for a Watershed Modeling System (WMS) class in June 2016. Approximately 25 persons attended from CDOT and different outside agencies and consulting groups.

9. Participated in Domestic Scan for Bridge Scour Risk Management in San Diego July 25-29 2016. Peer exchange involved 18 states that made a 2 hour presentation and completed a detailed questionnaire. A report will be forth coming from NCHRP in 2017.

10. Co-sponsored with ACPA a Pipe Inspection demo in August 2016. The DEMO was conducted by John Fleckenstein with Highway Consultants. Approximately 30 persons from CDOT and different agencies around the Denver metro area attended.

Regions Activities:

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

12. 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	2016 Actual
236	**Update the Scour Plan of Action for all scour critical bridges**	The percentage of scour critical 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%	94.04%

2.7. ENGINEERING: PAVEMENT AND MATERIALS

Introduction

CDOT Manager: Bill Schiebel
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 90 students were trained in 13 two-day courses on SMM/LIMS with a overall course evaluation score of 4.65 out of 5. Approximately 70 Project Engineers were trained in 10 half-day classes on SMM/LIMS. Twelve people were trained in a half-day class on project scoping and design for low volume roads with overall course evaluation scores of 4.53 out of 5. Twenty-four students were trained in a two-day course on Pavement M-E Design with an overall course evaluation score of 4.57 out of 5. Other training provided by the Branch included Asphalt Mix Design training. 31 ACI certification/training courses and 4 Concrete Paving Inspector class was offered via the Colorado Ready Mixed Concrete Association and American Concrete Pavement Association with courses delivered in Grand Junction and Durango, as well. 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 the results of a CDOT/FHWA Joint Process Review on Design-Build Quality Assurance Program requirements for a new manual section detailing D-B QAP requirements and testing processes. 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 five times and identified and resolved issues. Significant improvements were made, including those for pavement smoothness, drilled caisson, piling, roadway embankment/excavation, soil nail, soil stabilization, thin asphalt surface treatments, Buy America construction contract requirements, and Pavement Design Manual changes to LCCA and pavement structure design procedures.

4. The CDOT, AZDOT, NMDOT, UTDOT Four Corners peer exchange meeting was conducted in May 2016. 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 94 tests in the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program (AAP). 18 proficiency samples were tested, with an average of 3.76 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, 2016.

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 331 people in asphalt, 516 people in concrete (479 in ACI, 37 paving inspection) and 223 people in soils. A total of 1,070 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 include full implementation of a new data loading software application with enhanced regression capabilities for analyzing pavement deterioration, adjustments to life expectancies on all asphalt highways to more accurately reflect observed pavement lifespans, and modified automated processes for better identifying pavement type on all highways. 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 2020.

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 June 30, 2016.

11. The Geohazards Program established full FAA authorization to continue UAS operations in support of geohazard and construction project site assessment and emergency response.

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 12 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 2016. The total number of approved WMA technologies now stands at 13 and contractors at 15.

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.

15. A Joint Process Review was completed entitled "Quality Assurance Procedures for Design-Build Projects" and addressed concerns for appropriate testing and acceptance practices across all D-B projects statewide. D-B quality assurance program guidance was approved by the MAC and added to the Design-Build and Field Materials Manuals.

16. In October, the second International and Western States In-Place Recycling Conference was sponsored by FHWA, Asphalt Recycling & Reclaiming Association, National Center for

Pavement Preservation, Texas A&M Transportation Institute and Colorado DOT. Over 125 participants attended including industry representatives, 10 state DOTs and three foreign countries. Attendees were provided tools and documents to implement their next projects.

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

Table 11 - Performance/ Compliance Indicators (Pavements and Materials)

SAP #	Indicator	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 Actual
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%	82%

Performance/Compliance Measures

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

Table 12 - Performance/ Compliance Measures (Pavements and Materials)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 Actual
254	**Percent of NHS pavements within Colorado with an 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%	55%

2.8. ENGINEERING: PLANNING

Introduction

CDOT Manager: Jeff Sudmeier, 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 lead 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 13- Performance/Compliance Measures (Planning)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 Actual
379, 380	**Work program progress**	Percent of funds encumbered or expended compared to the estimate for the fiscal year	Feedback on annual review and tracking of percent complete on projects Progress on the work program is in the FY Accomplishments Report	State FY	70% of planned amount	86.68%
10	**TPR coordination**	CPG and Rural PO	Contracts executed by deadline	Federal FY for CPG State FY for Rural PO	100% of contracts executed on time	100%
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	Calendar FY	120	110

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

Introduction

CDOT Manager: Neil Lacey (Design) and John Eddy (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 378 Change Orders submitted in FY2016. Of those 347 (92%) were complete as submitted, 31 (8%) needed revision, and zero (0%) needed supplemental documentation. There were four Major Change Orders requiring FHWA approval.

2. The Liquidated Damages table was revised in FY 2016. The next revision is scheduled for review in FY 2018, revised bi-annually.

3. There were 2 claims filed in FY 2016. 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	0	2
Claims Resolved FY16	1	0	1
Claims Carrying Over FY17	1	0	1

4. Dispute Status FY 2016

Status of FY16 Disputes		< $250,000	>$250,000
Disputes Open Beginning FY 16	11	2	9
New Disputes FY16	6	4	2
Disputes Resolved FY16	10	3	7
Disputes Carrying Over FY17	5	3	2

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. CDOT reported FY15 Value Engineering and Value Engineering Change Proposal (VECP) savings to FHWA in April 2016 and will submit the FY16 report when it is due.

8. No Post Construction Reviews were performed.

9. Three inter-regional reviews (IRR's) for FY 2016: Region 4 East hosted Region 1 Central on July 2, 2015, Region 3 Central hosted Region 4 North on November 11, 2015 and Region 3 East hosted Region 1 South on October 5, 2015.

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

11. Three Area Engineer/FHWA Program Delivery Team Leader meetings were held in FY 2016.

12. 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

13. Twenty-six construction projects and five maintenance project traffic control reviews were conducted in FY 2016, of which three were nighttime reviews. Statewide average construction and maintenance project scores were 94.7% and 100%, respectively. The final report was submitted to FHWA on October 28, 2015.

14. 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.

15. 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 14 - Performance/ Compliance Indicators (Design and Construction)

SAP #	Indicator	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 Actual
465	**Revisions under Advertisement**	Percent of projects that have one or more Revisions under Advertisement	CDOT Work Plan	State FY	Track trend	2016: 55% 2015: 45% 2014: 51% 2013: 45%
466	**Constructability reviews**	Number of projects that include a constructability review during the design phase	CDOT Work Plan	State FY	Track trend	2016: 0 2015: 0 2014: 5 2013: 3
323	**Number of major change orders**	Number of change orders which required FHWA approval	CDOT Work Plan	State FY	Track trend	2016: 4 2015: 5 2014: 0 2013: 3 2012: 4
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	2016: 374 2015: 278 2014: 314 2013: 309 2012: 327
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	2016: 0.19% 2015: 0.04% 2014: 0.06% 2013: 0.07% 2012: 0.02%
325	**Number of disputes filed each year**	Contract dollars disputed divided by total contract dollars	CDOT Work Plan	State FY	Track trend	2016: 0.20% 2015: 1.99% 2014: 0.23% 2013: 0.36% 2012: 0.14%

* Number of change orders with time/schedule impacts 101. Number of change orders requiring funding letters 21.

Performance/Compliance Measures

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

Table 15 - Performance/ Compliance Measures (Design and Construction)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 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%	100%
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	262

2.10. ENGINEERING: PROGRAM AND PROJECT DELIVERY – PROGRAM MANAGEMENT

Introduction

CDOT Manager: Jane Fisher
FHWA Manager: Shaun Cutting

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 2016 XPI was 0.97 and total expenditures were about $20 million less than planned, which is 3 percent below the Calendar Year 2016 Target. Actual expenditures were $716 million compared to a target of $737 million. This is within the ± 5 percent goal for the year and it is an improvement from Fiscal Year End 2016 results (XPI = 0.95).

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 continue 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:

- Timeframe dedicated to the establishment of targets was too compressed and guidelines were not fully flushed out.
- 2016 Fiscal Year and Calendar Year targets included a number of projects that did not have an identified source of construction funding (e.g. a portion of Region 4 flood related projects).
- Targets included projects with overly optimistic advertisement dates which when not met resulted in delays to construction expenditures.
- Contractor prepared drawdown data did not correlate well with actual expenditure data.
- Correction factors to the contractor provided drawdown data were not consistent among the regions and not tied to historical data.
- 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 $767M has been reduced by 10% to $690M. This value correlates with an XPI of 1.0. Moving forward, expenditure status will be tracked on a monthly basis (including rolling statistical projection of calendar year end expenditure results) and adjustments made with the goal of achieving a calendar year end XPI between 0.95 and 1.05. As further detailed in the market/economic risk section below, there is some cost risk associated with projects included in the target that have not yet been awarded (currently valued at $256M). These will be closely monitored over the next few months with the objective of minimizing the impact of this risk as much as possible.

Performance/Compliance Measures

The following performance measures demonstrate the health of the Program Management Program.

Table 16 - Performance/ Compliance Measures (Program Management)

SAP #	Indicator	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 Actual
555	**Expenditure Performance Index (XPI)**	XPI is actual program expenditures divided by anticipated program expenditures	Reported monthly	Calendar Year **Quarterly reporting**	1.0	0.97
662*	**Risk Adjusted Estimate at Completion (EACr)**	Bottom up forecast of construction expenditures based on project cash drawdown schedules	Evaluated monthly at Program Management Governance Committee	Calendar Year	EACr > calendar year spending target	NA
663*	**Schedule Performance Index at Risk (SPIar)**	Dollar value of at risk projects containing a red preconstruction schedule performance index (SPI), defined as a slope forecasted advertisement date past the late advertisement date	Evaluated monthly at Program Management Governance Committee	Calendar Year	SPIar < EACr calendar year spending target	NA

*EACr and SPIar were not used as indicators of annual Program Performance. Actual expenditures were reported monthly to project the end of year XPI. SPI for projects in preconstruction was evaluated monthly at the region/project level.

2.11. ENGINEERING: RIGHT-OF-WAY

Introduction

CDOT Manager: Neil Lacey and Christine Rees
FHWA Manager: William Haas

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 disposals are made in compliance with the legal requirements of the state and federal laws and regulations.

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 2016.
1.
2. There are numerous State ROW Manual changes that were updated as a result of changes in FY 2016, as well as continuous enhancements and clarification to existing material. The updated State ROW Manual was submitted to FHWA on October 15, 2015 in accordance with the every-5-year schedule agreed to by CDOT and FHWA. Certification of changes by FHWA is completed.

3. There were no requests for waivers.

4. The FHWA Annual Acquisition and Relocation Statistics report was submitted to the State and FHWA on or before November 12, 2016.

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

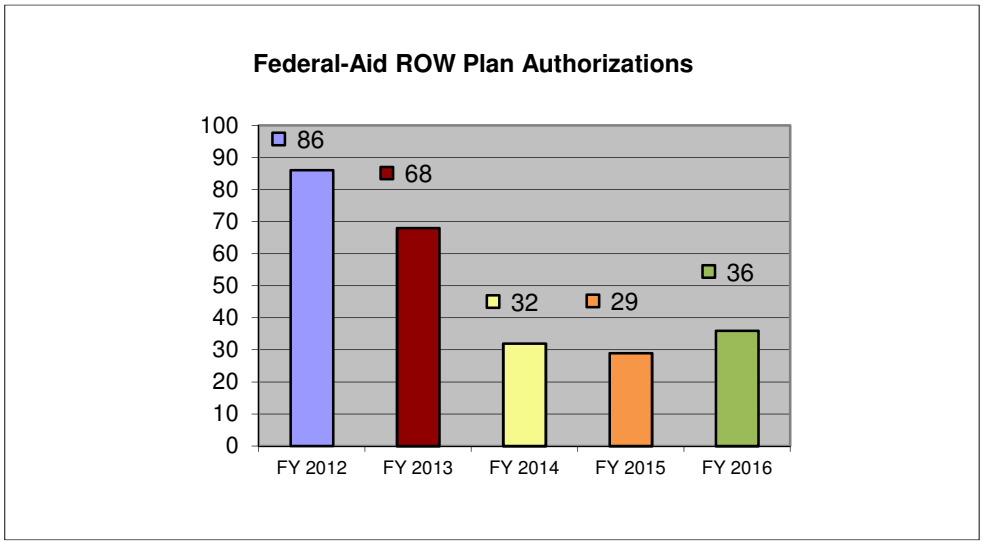
Table 17 - FY 2012-2016 CDOT Authorized 36 Plans for Federal Aid Projects

ROW Plans Authorized	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Federal Aid Projects with ROW	86	68	32	29	36

6. Ongoing monitoring regarding Uniform Act-based processes were 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 file prior to issuance of any funds.

7. CDOT authorized 36 ROW Plans for Federal Aid Participation projects and 27 ROW plans for non-participation projects, for a total of 63. (See Table 13. FY 2012-2016 CDOT Authorized 36 Plans for Federal-Aid Projects.)

Figure 1. FY 2012 – 2016 Federal Aid ROW Plan Authorizations



8. HQ ROW staff and region ROW staff continue to conduct systematic file reviews. Scheduled file reviews in FY 2016 included the review of Region 3 by Region 2 and Region 5 by Region 2. The results of the documented file reviews were satisfactory, and were provided to all of the region ROW Managers at their quarterly ROW Managers' meetings. In addition to the QC focus of this effort, best practices are shared and implemented by the regions, improving efficiencies and consistency statewide.

9. A four-day statewide Advanced Relocation under the Uniform Act staff training event was sponsored by the National Highway Institute and held in Lakewood, Colorado, October 18 – 21, 2016. In addition, CDOT facilitated a one-day training on April 27, 2016, for Right of Way Agents, Supervisors, Managers and Property Management. FHWA provided input for Region case-scenario presentations and shared best practices for the Program's newest innovations: Waiver Valuations prepared by Agents and the use of Incentive Payments. CDOT also discussed outreach efforts to encourage our local agency and agent consultant partners to use Waiver Valuations and Incentive Payments. Finally, CDOT provided ProjectWise Training at all the Regional offices throughout the State.

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

Table 18 - Performance/Compliance Indicators (ROW)

SAP #	Indicator	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 Actual
319	**Conditional clearances**	Percentage of Federal-aid projects with conditional ROW certifications	A list of conditional clearances	State FY	Track trend	0.57%
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	0.04%

SAP #	Indicator	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 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	77%
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:

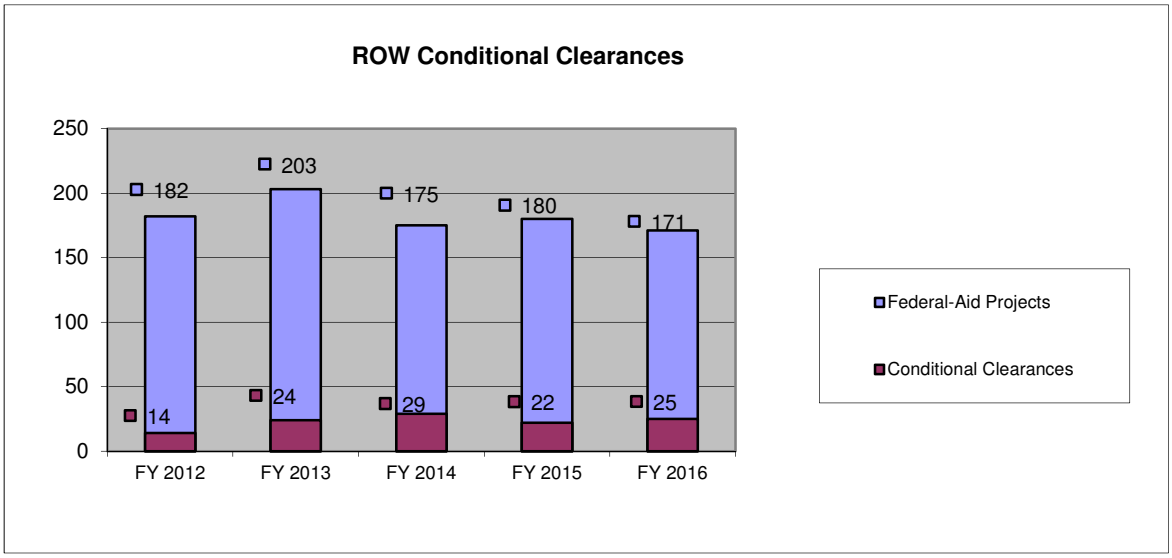
10. Conditional Clearances – Percentage of Federal Aid projects with conditional ROW certifications was 15%.

Table 19 - FY 2012 – 2015 Federal Aid Projects with Conditional Clearances

FY 2011 – 2016 Federal Aid Projects with ROW Conditional Clearances	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Federal Aid Projects with ROW	182*	203*	175*	180*	171*
Conditional Clearances (granted)	14	24	29	22	25
Percentage of Conditional Clearances	8%	12%	17%	12%	15%

* FY 2012, FY 2013, 2014, 2015 & 2016 Clearances include Local Public Agency (LPA) projects.

Figure 2. FY 2012 – 2016 Federal Aid Projects with ROW Conditional Clearances

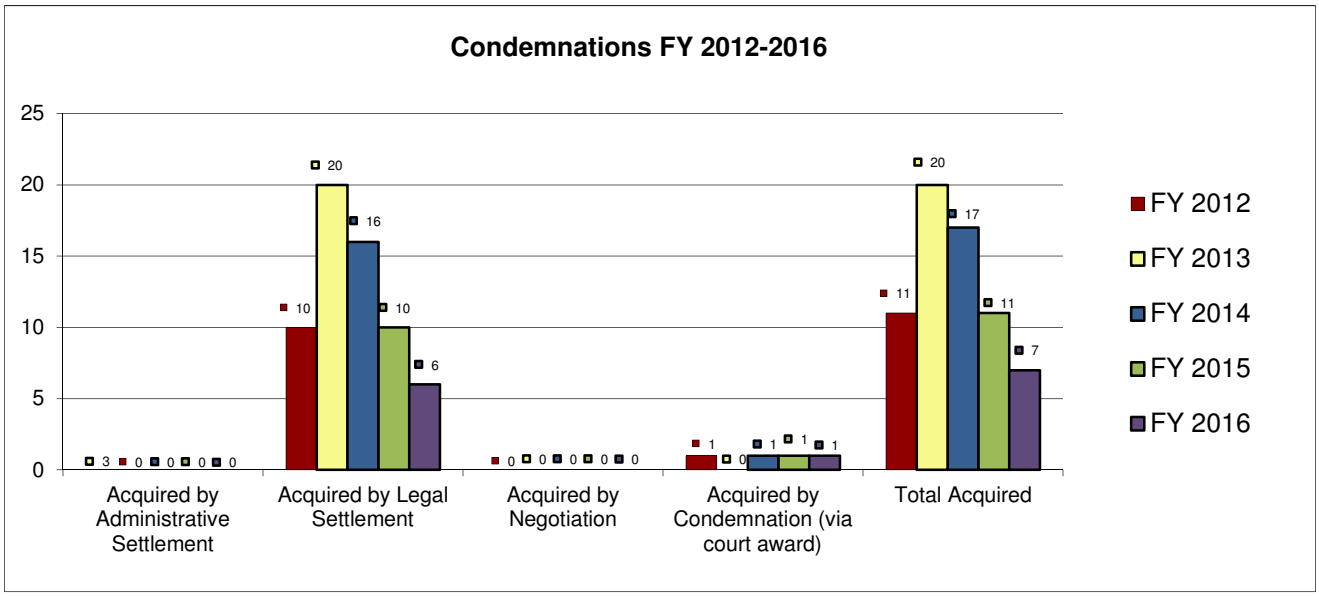


11. Condemnations – In FY 2016, 395 acquisitions were conducted. Six (6) of these acquisition cases were forwarded to the Office of the Attorney General for the initiation of condemnation proceedings. One (1) of said parcels was acquired by condemnation (via court award).

Table 20 - FY 2012 – FY 2016 Condemnations – Cases Settled

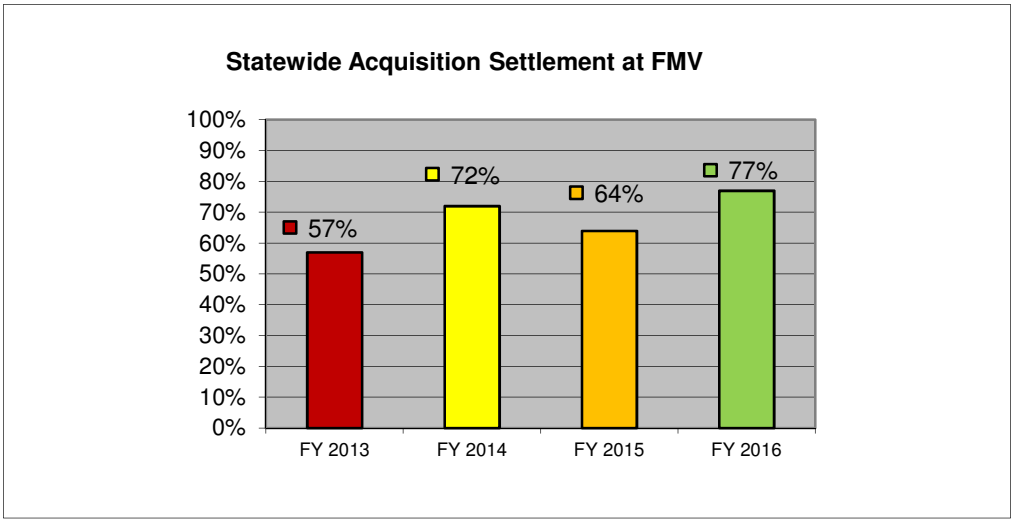
Condemnations – Cases Settled	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Total Number of Acquisitions (Acq)	215	264	264	197	395
Parcels Acquired by Region Administrative Settlement/Percentage of Total Acq	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
Parcels Acquired by Legal Settlement/Percentage of Total Acq	11 / 4%	20 / 8%	16 / 6%	10 / 5%	6 / .015%
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%	0 / 0%	0 / 0.5%	1 / 0.5%
TOTAL (Cases)	**11**	**20**	**17**	**11**	**6**

Figure 3. FY 2012 – FY 2016 Condemnations



12. Statewide acquisition settlement at FMV: 77%. 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 2013 – FY 2016 Settlement at FMV

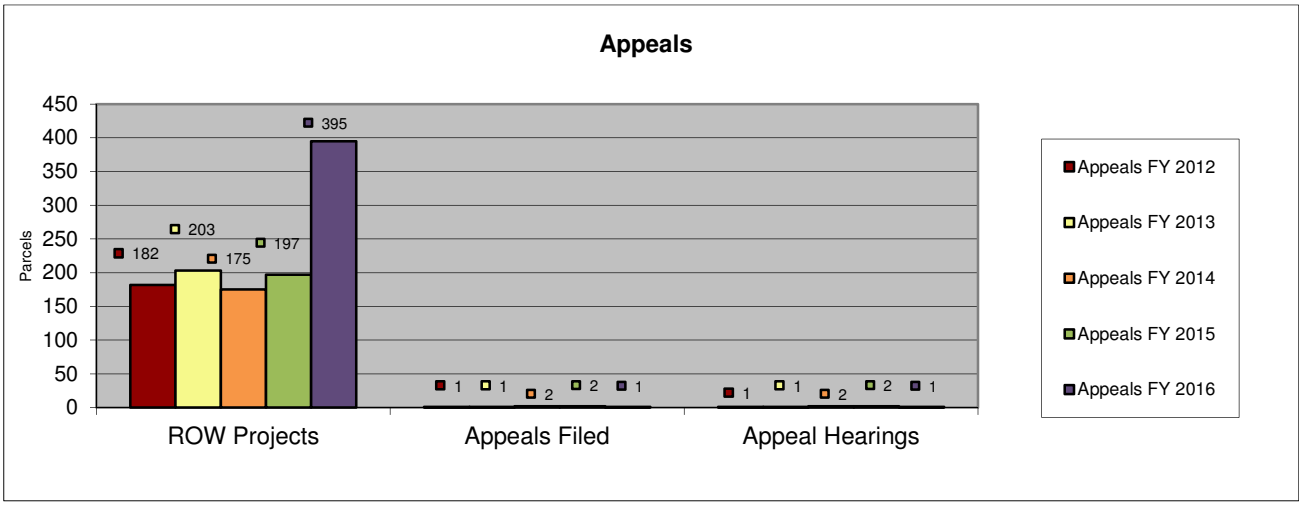


13. Appeals – 1 relocation appeal was filed.

Table 21 - FY 2012 – FY 2016 Appeals

Appeals	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Appeals Filed	1	1	2	2	1
Appeals that went to Hearings	1	1	2	2	1

Figure 5. FY 2012 – 2016 Appeals



Performance/Compliance Measures

The following performance measures demonstrate the health of the Right-of-Way program:

Table 22 - Performance/Compliance Measures (ROW)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 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	4.5

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 35%. Following are statewide results of said survey for FY2016.

Figure 6. 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. The scour plan-of-action for both On-System and Off-System bridges have been completed for those bridges that were identified as scour critical. Off-System bridges that did not have sufficient foundation information or lacked plans were left as scour critical. Any additional foundation investigations will be prioritized with the effort described in #3 below.

3. A new process has been developed for Off-System bridges to assess and document item #113. Structures will be prioritized based on risk for scour Plan of Action (POA).

4. Funds continue to be applied to On-System bridge preventative maintenance activities per the risk based asset management plan.

5. The Load and Resistance Factor Design (LRFD) Box Culvert Standard Plans have been completed and released.

6. The project at Smith Rd and I-70 is nearly completed. Highways for Life grant dollars used to collect data on the first Interstate multi-span structure to utilize Geosynthetic Reinforced Soil (GRS) abutments.

7. Staff Bridge personnel continue to support the Flood Recovery Office.

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.

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 23 - Performance/ Compliance Measures (Structures)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 Actual
411	**Decrease 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	2016: 150 2015: 153 2014: 168 2013: 182 2012: 204
214, 443, 701	**Structurally deficient state-owned bridges* and deck area**	Number of structurally deficient bridges* Structurally deficient deck area (sq. ft.) Percentage of structurally deficient deck area	Staff Bridge annual asset management reports	State FY	Downward trend over 5 years (always less than 10%)	2016: 175, 1.63M sf, 4.9% 2015: 186, 1.84M sf, 5.6% 2014: 197, 1.85M sf, 5.6% 2013: 215, 1.93M sf, 5.9% 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 Structurally deficient deck area (sq. ft) per NHS 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)	2016: 113, 1.33M sf, 4.5% 2015: 122, 1.53M sf, 5.2% 2014: 129, 1.50M sf, 5.1% 2013: 133, 1.54M sf, 5.1% 2012: 126, 1.47M sf, 5.9%
237	**Reduce the quantity 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	2016: 78,558[1] 2015: 55,159 2014: 53,830 2013: 49,262 2012: 48,533
467	**Decrease 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	2016: 59[2] 2015: 70 2014: 74 2013: 81 2012: 89
468	**Decrease the number of state-owned load restricted bridges***	Decrease the number of bridges* that are load posted or are restricting permitted loads.	Staff Bridge annual asset management reports	State FY	Downward trend	2016: 55[3] 2015: 85 2014: 88 2013: 94 2012: 103
664	**Bridge Inspection Metrics Report**	Percentage of the 23 metrics in non-compliance	FHWA's Metric Compliance Report	State FY	Downward trend or 0%	2016: 22% 2015: 17%

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 Actual
471	**Documentation supporting Item 113, Scour Critical Bridges, coding on Off-System bridges* over waterways.**	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	2016: 3807 2015: 273 2014: 269
472	**Perform new load ratings on state-owned bridges* that contain advanced deterioration**	Rerate bridges* with components that have significant section loss that are not repaired.	Staff Bridge annual asset management reports	State FY	Upward trend	2016: 21 2015: 3 2014: 1

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

[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 and Jon Caldwell
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 FY2016 federal funds were fully obligated. The number of projects closed during the year was 615. CDOT is among the best state transportation departments in regards to the number of days it takes to close a project, at 262 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 FY2016 were 0.1%; the FHWA goal is to be below 2%.

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

Table 24 - Performance/ Compliance Indicators (Financial Management)

SAP #	Indicator	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 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**	120	2016: 30% 2015: 31% 2014: 32% 2013: 35% 2012: 42%
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	123	2016: 82.85% 2015: 83.84% 2014: 83.18% 2013: 81.74% 2012: 88.24%

Performance/Compliance Measures

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

Table 25 - Performance/Compliance Measures (Financial Management)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 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; **(2)** If projects have not gone to construction, determine which were constructed under another project number; **(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; **(4)** Begin to move ahead by measuring projects at eight years for design and fifteen for ROW to ensure projects are constructed; **(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, 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 2016, 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 26 - FY 2016 MPA Performance

MPA	LOS Target	LOS Achieved
100 - Planning, Training & Scheduling	C	C
150 - Roadway Surface	C	B
200 - Roadside Facilities	C-	C
250 - Roadside Appearance	C-	D
300 - Traffic Services	C-	B-
350 - Structure Maintenance	C-	B
400 - Snow and Ice Control	B	B-
450 - Rest Areas, Buildings and Grounds	C-	C+
500 - Tunnel Maintenance	C-	C+
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 27 - Performance/Compliance Measures (Highway Maintenance)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2016 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 AND MANAGEMENT OPERATIONS (TSM&O)

Introduction

CDOT Manager: Ryan Rice and Lisa Streisfeld
FHWA Manager: William Haas

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.

2. Intelligent Transportation Systems/Technology Branch: Designs and implements 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, and fiber. 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. 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 to refine and report on monthly performance metrics. This Branch also produces corridor operational plans.

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, CDOT and Colorado State Patrol staff persons.

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, FHWA, and Denver Regional Council of Governments (DRCOG) conducted a day-long workshop to discuss current and future traffic incident management (TIM) capabilities in Colorado. Other good practices from around the country were also discussed. Using the concept of capability maturity frameworks developed by FHWA, the workshop helped Colorado assess the institutional capacity of TIM stakeholders to respond to and clear traffic incidents. The workshop resulted in a set of prioritized actions to enhance traffic incident management in Colorado

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 toll providers like American Automobile Association (AAA).

Performance/Compliance Measures

The Safety and Traffic Engineering Branch, the ITS 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.

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

Introduction

CDOT Manager: William 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 28 - Performance/ Compliance Indicators (Active Traffic Management and Operations)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2015 Actual[3]
386	**CDOT Courtesy Patrol Assists**[1]	Measure the number of CDOT Courtesy Patrol Assists	CTMS Software	Calendar Year	Track trend	2015: 11,634
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	2015: 17,190
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 511 Data collection	Calendar Year	Track trend	2015: • Total: 2,647,327 • CoTrip 1,566,299 sessions • 511 call-in: 1,081,028
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 511 Data collection (12 month average)	Calendar Year	Track trend	2015: • Total: 13,423 • CoTrip notifications sent: 6,813 • 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.

[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.

[3] 2016 data not available until mid - 2017. Therefore, this is 2015 data.

Performance/Compliance Measures

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

Table 29 - Performance/Compliance Measures (Active Traffic Management and Operations)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2015 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] 2016 data not available until mid - 2017. Therefore, this is 2015 data.

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

Introduction

CDOT Manager: Saeed Sobhi
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 2017-18, 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 7. ITS Corridor-Specific Congestion and Incident Data in Governor's Vision 2018 Dashboard (in Minutes)

Priority Area and WIGs	Outcome measure	Outcome baseline (June 2015)	Jun-16	Outcome target	Target date	Lead measure	Lead baseline	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Lead target	Target Date
Increase travel time reliability in two corridors: I-25 (from north C470 to south C470); I-70 (from Vail to C470)	Reduce Planning Time Index for NB I-25	2.46	2.4 (2016 Q1)	2.5	CY 2016	Reduce average incident clearance time on NB I-25	49	28	40	45	48	52	52	50	50	50	50	51	52	46	CY 2016
						Reduce average road closure time per event on NB I-25	48	39	40	42	36	30	22	14	14	21	27	30	35	55	CY 2016
	Reduce the Planning Time Index for SB I-25	2.56	2.45 (2016 Q1)	2.7	CY 2016	Reduce average incident clearance time on SB I-25	40	98	77	76	98	71	66	63	61	60	58	56	54	44	CY 2016
						Reduce average road closure time per event on SB - 25	51	125	83	97	59	38	30	23	17	26	29	29	31	52	CY 2016
	Reduce the Planning Time Index for WB I-70	1.4	1.95 (2016 Q1)	1.6	CY 2016	Reduce average incident clearance time on WB I-70	75	39	41	68	71	67	67	66	62	61	59	53	56	40	CY 2016
						Reduce average road closure time per event on WB I-70	215	39	41	155	103	73	55	38	39	38	37	37	52	149	CY 2016
	Reduce the Planning Time Index for EB I-70	1.68	1.77 (2016 Q1)	1.9	CY 2016	Reduce average incident clearance time on EB I-70	40	30	28	25	37	37	40	52	49	47	46	44	49	44	CY 2016
						Reduce average road closure time per event on EB I-70	161	26	28	20	24	24	23	19	17	19	22	22	43	250	CY 2016

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 30 - Performance/Compliance Measures (ITS)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2015 Actual
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] 2016 data is not available until 2017. Therefore, this is 2015 data.

2.18. TSM&O - TRAFFIC AND SAFETY ENGINEERING BRANCH

Introduction

CDOT Managers: Darrell Lingk and Charles Meyer
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, 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. For the first time in at least the last 10 years, Colorado saw urban fatalities surpass rural fatalities.

   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 31 - Change in Type of Fatalities – 2012-2015

	2012	2013	2014	2015	2014 to 2015 % Difference
Run off road crash fatalities	201	214	197	237	20%
Intersection related fatalities	112	118	128	153	20%
Speed related fatalities	162	150	152	217	43%
Unrestrained fatalities	161	181	156	188	21%
Impaired driving crash fatalities	155	176	137	156	14%
Overturning crash fatalities	91	76	83	102	23%
Motorcycle fatalities	79	87	94	106	13%
Aging road user (over 65) fatalities	76	77	69	86	25%
Pedestrian fatalities	72	50	63	64	2%
Head-on crash fatalities	41	46	51	51	0%
Rear-end crash fatalities	26	32	25	35	40%
Wildlife crash fatalities	2	7	6	7	17%

   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). 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. 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. The 2016 Colorado Road Safety Summit brought together the SHSP Emphasis Area Teams to review and update their implementation plans in response to these recent concerning trends, and these groups are now working from the updated SHSP implementation plans.

3. Highway Safety Improvement Program (HSIP) – In Colorado FY2016, the Branch delivered $38.8 million in HSIP funding to the Regions and Local Agencies around the state for 39 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 $137.2 million for an overall benefit cost ratio of 3.53. 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 2017 HSIP projects while compiling new projects for the FY 2018 though FY 2021 plan. Included in this planning was a December solicitation statewide to all Colorado's local agencies for new candidate projects.

4. Work Zone Safety and Mobility– The bi-annual WZSM Process Review was initiated in May 2016 and continued through 2016 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 Process Review Team is now finalizing recommendations, which will be forwarded to CDOT executive management and FHWA in early 2017.

   Work Zone Safety and Mobility Traffic Control Reviews continue to be conducted annually by Area Engineers visiting select projects throughout the state.

5. Crash Data – For 2015, the Branch has 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.

   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 2016 was DOR's development of a new database system called Colorado Driver License, Record, Identification and Vehicle Enterprise Solution (DRIVES). CDOT has been working with DOR to develop a new process for receiving crash data through the DRIVES system, scheduled to go live in February of 2017. Through the process of developing the new system, DOR has reviewed the policies and regulations associated with data sharing for the state. Currently, CDOT and DOR are working with the Attorney General and Governor's offices to examine state regulations and determine if CDOT will be permitted to continue receiving all fields from the crash form. While a majority of the fields will still be available, fields containing personal identifying information may be restricted. This may impact CDOT's ability to connect crash data with other data sources, such as toxicology and death certificates. It may also impact CDOT's behavioral programs such as advertising campaigns targeted towards communities where drivers are overrepresented in specific crash types. CDOT is committed to work towards solutions to these challenges and deliver the high quality data and analysis that has historically been provided. However, concern remains with CDOT about fulfilling completely its commitments under MAP21 and FAST to have a safety data and traffic information system and improve data collection.

6. 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. In Colorado FY 2016, the program delivered $3.3 million for 11 at-grade crossing projects and $1.7 million for a grade-separated crossing project.

7. 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.

8. 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

submit its statewide targets by the August 1, 2017 deadline. Once these targets are established (early 2017), the below table will be updated to reflect the new measures and targets.

Table 32- Performance/ Compliance Measures (Traffic and Safety Engineering)

SAP #	Measure	Description	Reporting Mechanism	Reporting Frequency	Target/ Baseline	2015 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 (464 for 2015)	2015:547 2014: 488 2013: 481 Increase: 59
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 (0.97 for 2015)	2015:1.085 2014: 0.996 2013: 1.024 Increase: 8.9%
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 (2,900 for 2015)	2015: 3209 2014: 3217 2013: 3215 Reduction: 0.25%
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 (6.18 for 2015)	2015: 6.362 2014: 6.567 2013: 6.845 Reduction: 3.12%
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%	39.1%
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	3.8 months
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	2015: 1.77 2014: 1.58 2013: 1.64 Increase: 0.19
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	2015: 262 2014: 248 2013: 269 Increase: 14

[1] Data is not official for a year after the end of the calendar year. Therefore, this is 2015 data.

SECTION 3. RISK RESPONSE STRATEGIES

Overview of the Risk Response Process

Each year, the Quality Improvement Council (QIC) identifies at least ten risks to the Federal-Aid Highway Program (FAHP) and develops a risk statement for each. In March, the risks are prioritized based on likelihood and impact. Additional considerations include resources available to review them and identified champions. A minimum of three CDOT/FHWA joint process reviews are chosen, and QIC champions develop risk response strategy recommendations by April of the following year. Reports outlining risk response strategy recommendations and other associated products 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 this process is available in the QIC Guidelines, which is available on the QIC SharePoint site.

The remainder of this section includes:

- Overview of joint process reviews and other risk response strategies being tracked from May 2016 through April 2017. The overview includes the risk statement, target outcome/expected products and contacts
- Risk response strategy recommendations finalized in 2016.
- Recommendations from 2011-2015 in which implementation is underway or completed.

CDOT/FHWA Joint Process Reviews (JPRs) (May 2015 - April 2016)

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 makingto 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. **LPA Oversight**
   - **Area of Risk and Likelihood/Impact:** If the Local Public Agency (LPA) projects are not administered in accordance with state and federal regulations, then projects could lose federal participation.
   - **Target Outcomes/Expected Products:** Increase in adherence to state and federal requirements, greater accountability by the local governments, and improved cooperation between local governments, CDOT, MPOs and TPRs
   - **Contacts:** CDOT: Neil Lacey, Steve Markovetz; FHWA: Shaun Cutting

4. **Risk-Based Cost Estimation**
   - **Area of Risk and Likelihood/Impact:** If improvements are made in the quality and accuracy of CDOT project cost estimates and project timelines on all projects, then the volume of change orders will drop, delays on projects will diminish, and regions will have a more refined cost estimate for budgeting purposes, thereby reducing the need to seek additional funds from the Transportation Commission for projects that exceed the original budget request. Another benefit is managing expectations by highlighting that unknowns can impact costs and schedules.
   - **Target Outcomes/Expected Products:** A formal process for Risk Based Cost Estimating.
   - **Contacts:** CDOT: Scott McDaniel, Neil Lacey, John Eddy, Richard Zamora; FHWA: Randy Jensen

5. **Permaneant Water Quality Program Mitigation Fund Approach**
   - **Area of Risk and Likelihood/ Impact:** The risk to delivering the Federal Aid Highway Program is in the form of compliance with CDOT's MS4 Permit. This is a brand new approach to an unsustainable problem of increased requirements by the EPA and no additional funding. CDOT has developed an innovative, cost-saving approach that needs to be successful. This program is in its first year of implementation so seeing if this approach is working or if it needs modification will be part of this review. The main risk is about the fund management and expenditure – there is already a process established for how this should work but it is untested for its effectiveness. The potential impacts/consequences of this risk includes non-compliance with our MS4 Permit and a consequence of reverting back to the old expensive, labor intensive program. The likelihood of the risk occurring is moderate due to the program approach being new and parts of it are yet undefined.
   - **Target Outcomes/Expected Products:** The review of this new process and its reporting requirements that require tracking of all funds spent, and stormwater runoff area treated in the urban areas, for the three independent permanent water quality (PWQ) projects being funded this year, and the CDOT priority projects receiving funds, as well as other funds spent on PWQ, to show that this mitigation effort is moving forward and working like it was planned to work. There will be a report of findings and recommendations as a result of this study that will include quantifiable target outcomes with benchmarks to evaluate against in the future.
   - **Contacts:** CDOT: Amber Williams and Jane Hann; CDOT: Randy Jensen

Other Risk Response Strategies (May 2015- April 2016)

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.
   - **Target Outcome/Expected Products:** Master Agreements and workflow of process.

- **Contacts:** CDOT: Neil Lacey; FHWA: Bill Haas

2. Capacity of Consultant Industry to Meet CDOT Demand

- **Area of Risk and Likelihood/ Impact:** There seems to be a shortage of construction consultant across the state. This is especially an issue for experienced project engineers and testers. Related, it is becoming more challenging for CDOT to use preferred consultants because they are too busy. Some regions are using their 5-year Non-Project Specific contracts quickly, and there may be ways to share contracts among regions.
- **Target Outcomes/Expected Products:** Better understand the problem by reviewing how "program" contracts are working, reviewing related Region 4 data, etc.
- **Contacts:** CDOT: John Eddy and Scott McDaniel; FHWA: Shaun Cutting

3. 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

4. SB16122 Project Closure

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

Joint Process Review Recommendations Finalized in 2016

Categorical Exclusions (CE) Review

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.
2. Present Categorical Exclusion training class at least twice or at the annual Face-to-Face Environmental Workshop.
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).
5. Consider developing procedures to not only help new employees with their responsibilities, but also provide information and steps for file and project transfer.

Design Build QA/QC Process (ALL COMPLETED)

1. Develop new guidance for testing roles, requirements and frequencies and testing under the D-B contracting method.
2. A new D-B Manual, to better detail the requirements of all facets of D-B project delivery, should be created. Updates are planned annually.

Other Risk Response Strategies Finalized in 2016

Contractor Performance Evaluation: CDOT developed a web-based survey to obtain feedback from contractor project managers related to performance standards on projects. Data has continually been analyzed and themes shared with industry representatives.

Risk Response Recommendations Being Implemented or Completed (2011-2015)

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

1. Identify CDOT unique and region unique records. **COMPLETED in 2016**
2. Standardize the retention process by clarifying and updating Procedure Directives 51.1 (Retention of Documents) 21.1 (Central Files Construction Project Filing System).
3. 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.
4. Prepare a records inventory to comply with C.R.S 24-80-102.7 requirements.
5. Update CDOT Records Management website. **COMPLETED**
6. 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)

1. Facilitate the standardization and creation of a R2 Finals Folder in Projectwise under Project Planning. **COMPLETED in 2016**
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.
5. Incorporate construction bulletin process into TEPT Training once complete.
6. Create and implement a tracking and evaluation process that includes metrics. **COMPLETED**

Bridge Rinsing (2013)

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.
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.

Water Quality (2011)

1. Implement a top down management approach for water quality that includes risk-based performance measures for environmental stewardship (2014 revision)
2. Specification changes limiting disturbance or increasing stabilization efficiency
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
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)
6. Chief Engineer's Mandatory Training Memo and Training Development and Delivery
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:
    - 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 –
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 2016

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

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. Anticipated signature in 2017.

- Federal Lands MOU – improved communication and NEPA processes for projects taking place on federal land - 2016.
- Every Day Counts 4 – 2017- 18

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): 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 (for NEPA and procurement/construction)
- C-470 (for procurement/construction)
- US 36 (for financing/construction)

CDOT Executive Director Shailen Bhatt is focused on the POCI list, I-70 Central (first ROD coming out of I-70 East), I-25 Colorado Springs Denver South Connection PEL, and the Road X initiative. I-70 Central is nearing a decision document expected in 2017. The I-25 PEL is underway and currently working through visioning and purpose and need. 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.