

2015

# Annual 2015 CDOT Stewardship and Oversight Agreement Report

Colorado Department of Transportation

April 11, 2016

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# 2015 Annual CDOT Stewardship and Oversight Agreement Report

## TABLE OF CONTENTS

<b>SECTION 1. PURPOSE.....</b>	<b>5</b>
<b>SECTION 2. CDOT PERFORMANCE BY FUNCTIONAL PROGRAM AREA .....</b>	<b>6</b>
2.1. Engineering: Applied Research and Innovation.....	6
2.2. Engineering: Asset Management.....	9
2.3. Engineering: Civil Rights.....	11
2.4. Engineering: Contracting, Engineering Estimates and Other Projects.....	14
2.5. Engineering: Environment .....	16
2.6. Engineering: Hydraulics .....	24
2.7. Engineering: Pavement and Materials.....	26
2.8. Engineering: Planning .....	29
2.9. Engineering: Program and Project Delivery - Design and Construction .....	31
2.10. Engineering: Program and Project Delivery – Program Management.....	34
2.11. Engineering: Right-of-Way .....	35
2.12. Engineering: Structures.....	41
2.13. Financial Management.....	44
2.14. Maintenance and Operations .....	46
2.15. Transportation Systems and Management Operations (TSM&O).....	48
2.16. TSM&O - Traffic and Safety Engineering Branch.....	50
2.17. TSM&O - Intelligent Transportation System (ITS)/ Technology.....	55
2.18. TSM&O – Active Traffic Management and Operations Branch .....	57
<b>SECTION 3. RISK RESPONSE STRATEGIES .....</b>	<b>60</b>
<b>APPENDIX A. ENVIRONMENT SECTION - OTHER NOTABLE REGULATIONS AND ACCOMPLISHMENTS TO COMPARE FOR TRACK TRENDS 2013 .....</b>	<b>66</b>

## LIST OF TABLES

Table 1 - Performance/Compliance Measures (Research) .....	7
Table 2 - Performance Measures (Civil Rights) .....	13
Table 3 - Performance/Compliance Measures (Contracts and Market Analysis).....	15
Table 4- Number of Completed NEPA Documents Compared to Number of Active NEPA documents ...	21
Table 5 - Performance/Compliance Indicators (Environment).....	22
Table 6 - Performance/Compliance Measures (Environment).....	23
Table 7 - Performance/Compliance Measures (Hydraulics).....	25
Table 8 - Performance/ Compliance Measures (Pavements and Materials) .....	28
Table 9- Performance/Compliance Measures (Planning).....	30
Table 10 - Performance/ Compliance Indicators (Design and Construction) .....	33
Table 11 - Performance/ Compliance Measures (Design and Construction) .....	33
Table 12 - Performance/ Compliance Measures (Program Management) .....	34
Table 13 - FY 2011-2015 CDOT Authorized 29 Plans for Federal Aid Projects.....	35
Table 14 - Performance/Compliance Indicators (ROW) .....	36
Table 15 - FY 2011 – 2015 Federal Aid Projects with Conditional Clearances.....	37
Table 16 - FY 2011 – FY 2015 Condemnations – Cases Settled.....	38
Table 17 - FY 2011 – FY 2015 Appeals.....	39
Table 18 - Performance/Compliance Measures (ROW) .....	40
Table 19 - Performance/ Compliance Measures (Structures) .....	42
Table 20 - Performance/ Compliance Indicators (Financial Management) .....	44
Table 21 - Performance/Compliance Measures (Financial Management) .....	45
Table 22 - FY 2015 MPA Performance.....	46
Table 23 - Performance/Compliance Measures (Maintenance and Operations) .....	47
Table 24- Change in Type of Fatalities – 2012-2014.....	51
Table 25- Performance/ Compliance Measures (Traffic and Safety Engineering) .....	54
Table 26 - Performance/Compliance Measures (ITS) .....	56
Table 27 - Performance/ Compliance Indicators (Active Traffic Management and Operations) .....	58
Table 28 - Performance/Compliance Measures (Active Traffic Management and Operations) .....	59

## LIST OF FIGURES

Figure 1 – CDOT EAs and EISs from 1999 to Present.....	20
Figure 2. FY 2011 – 2015 Federal Aid ROW Plan Authorizations.....	36
Figure 3. FY 2011 – 2015 Federal Aid Projects with ROW Conditional Clearances .....	37
Figure 4. FY 2011 – FY 2015 Condemnations .....	38
Figure 5. FY 2012 – FY 2015 Settlement at FMV.....	39
Figure 6. FY 2011 – 2015 Appeals .....	39
Figure 7. FY 2014 ROW Customer Survey.....	40
Figure 8. ITS Corridor-Specific Congestion and Incident Data in Governor’s Vision 2018 Dashboard .....	56

## **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**

In calendar years 2014 and 2015 the Research Branch completed several research projects and were also the lead state for a pooled fund project called TPF 5(260) – Next-Generation in Transportation Construction Management.

Here is a list of all the reports that were published. The actual reports are available on the research website <https://www.codot.gov/programs/research/pdfs>.

- Design of Mechanically Stabilized Earth Wall Connections and End of Walls Subjected to Seismic Loads (Report # 2014-01)
- Performance of Thin Bonded Epoxy Overlays on Asphalt and Concrete Bridge Deck Surfaces (Report # 2014-02)
- Internal Curing of High Performance Concrete Using Lightweight Aggregates and Other Techniques (Report # 2014-03)
- Development of Risk-Based Decision Methodology for Facility Design (Report # 2014-04)
- Thermal Mapping (Report # 2014-05)
- Evaluation of Bridge Deck Sealers (Report # 2014-06)
- Full Closure Strategic Analysis (Report # 2014-07)
- Accelerated Bridge Construction Utilizing Precast Pier Caps on State Highway 69 over Turkey Creek, Huerfano County, CO (Report # 2014-08)
- CDOT Rapid Debris Removal Research Project (Report # 2014-09)
- Years to First Rehabilitation of Superpave Hot Mix Asphalt (Report # 2014-10)
- Benefit-Cost Analysis of CDOT Fixed Automated Spray Technology (FAST) Systems (Report # 2014-11)
- Use of Waste Tires (Crumb Rubber) On Colorado Highways (Report # 2014-12)
- Hot Mix Asphalt Crack Sealing and Filling Best Practices Guidelines (Report # 2014-13)
- Feasibility Study of Developing and Applying a Standard Set of Bridge Plans for Shortening Project Development Time (Report # 2014-14)
- Assessment and Placement of Living Snow Fences to Reduce Highway Maintenance Costs and Improve Safety (Report # 2015-01)
- Assessment of CDOT Revegetation Practices for Highway Construction Sites (Report # 2015-02)
- Life Cycle Cost Analysis Rehabilitation Costs (Report # 2015-03)

- Best Practices for Full-Depth Reclamation Using Asphalt Emulsions (Report # 2015-04)
- Monitoring Wildlife-Vehicle Collisions: Analysis and Cost-Benefit of Escape ramps for Deer and Elk on US Highway 550 (Report # 2015-05)
- Feasibility Study of Developing and Creating a Standardized Subset of Bridge Plans (Report # 2015-06)
- Evaluating The Effects of Concrete Pavement Curling and Warping on Ride Quality (Report # 2015-07)
- Potential Impacts of Solar Arrays on Highway Environment, Safety and Operations (Report # 2015-08)

**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	Target/Baseline	2015 Actual	Reporting Frequency
97	<b>Percent of recommendations implemented</b>	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 practices, update manuals, initiate new programs, and provide new technology	Research Work Plan and Report	50%	61%	State FY
412	<b>Number of projects completed on schedule</b>	The number of projects completed in the fiscal year on schedule	Research Work Plan and Report	10	13	State FY
415	<b>Percent of annual SPR funds spent</b>	Percent of annual funds spent on RD&T (professional services) activities	Research Work Plan and Report	Minimum 50%	68%	State FY
416	<b>The annual number of classes scheduled by the LTAP Center</b>	The number of classes scheduled by the LTAP Center	Annual Report	70	71	State FY
417	<b>The annual number of people trained by the LTAP Center</b>	The number of people who attended classes offered by the LTAP Center	Annual Report	1,400	1,720	State FY
473	<b>The annual number of people attending training on the Front Range and Eastern Plains</b>	The number of people attending training from the Front Range and Eastern Plains	Annual Report	1,000	1,057	State FY
474	<b>The annual number of people attending training on the Western Slope</b>	The number of people attending training from the Western Slope	Annual Report	400	663	State FY

FHWA Colorado Division and Colorado Department of Transportation  
FINAL 2015 Stewardship and Oversight Agreement Annual Report

<b>SAP #</b>	<b>Measure</b>	<b>Description</b>	<b>Reporting Mechanism</b>	<b>Target/ Baseline</b>	<b>2015 Actual</b>	<b>Reporting Frequency</b>
475	<b>The annual number of agencies attending training offered by the LTAP Center</b>	The number of agencies attending training offered by the LTAP Center	Annual Report	100	136	State FY

## 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 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 are expected to wrap up 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:** Megan Jensen

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. Revised the CRBRC website to improve public access to CDOT's civil rights programs. The website can be accessed at [www.coloradodot.info/business/civilrights](http://www.coloradodot.info/business/civilrights). The website also includes a page in Spanish that notifies the public of its rights against discrimination and provides information about requesting ADA and language accommodations. Links to the discrimination complaint form and procedure were included on the website which continues to provide the Relay Colorado information for access by individuals with hearing impairments.
2. Served 138 participants in the On-the-Job Training Supportive Services (OJT/SS) Program and 100 program participants were placed in entry-level, OJT or apprenticeship positions. This represents an increase of 37% of total participants and a 20% increase in placements compared to 2014.
3. 240 participants enrolled in the OJT program which is a 147% increase from 2014.
4. New tracking systems were identified and utilized for OJT participant hours. CDOT is now able to track OJT participant hours on a consistent basis and has established a real-time tracking mechanism for more accurate reporting.
5. With the updated tracking system we were able to verify 13 OJT program participants graduated in 2015. This information was not previously tracked as it could not be verified.
6. Completed 19 contract compliance reviews. 16 reviews were subsequently determined to have been "In Compliance" by CDOT and 3 reviews are finalizing voluntary corrective action plans.
7. Exceeded our annual DBE goal of 10.25%, with 10.44% participation for federal fiscal year (FFY) 2015. Conducted goal setting process for overall annual goal for FFY 2016-2018 resulting in a goal of 12.15%. Conducted goal setting for I-70 East Project resulting in an 11.6% goal for design and a 12.5% goal for construction.

8. Hosted trainings through Connect2DOT program to educate small businesses on how to navigate new consultant prequalification process.
9. 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.
10. Developed new draft provisions for ESB and DBE incentives and compliance in consulting process.
11. Continued to expand Connect2DOT services to SBDC locations throughout Colorado.
12. Hosted I-70 East Project focused outreach events and educational webinars for small businesses.
13. Conducted two staff trainings on DBE certification for CDOT and UCP staff members.
14. Hosted Title VI training for over forty attendees including CDOT staff and FHWA subrecipients.
15. Met with each CDOT major program area to update Title VI annual accomplishments and goals report.
16. Completed an ADA subrecipient survey to identify subrecipient current compliance and potential training needs. Coordinated a training with FHWA on ADA transition plans and compliance requirements for subrecipients scheduled to take place in March 2016. CDOT provided 3 trainings to subrecipients on the ADA topic of “Designing Pedestrian Facilities for Accessibility”.
17. AASHTOWare Civil Rights and Labor Compliance system implementation:
  - a) Continued quarterly workshops for implementation of Civil Rights and Labor (CRL) module.
  - b) Participated in set up and testing of CRL modules.
18. ADA Curb Ramp Inventory Project:
  - a) Data has been collected on 19,632 curb ramps.
  - b) CDOT has adopted PROWAG standards for curb ramps. Of the 19,632 data sets collected, 2,616 curb ramps are considered to be PROWAG compliant.
  - c) CDOT is currently establishing an “as-built” data form to gather real-time curb ramp geometrics for inventory database.
19. Statewide ADA technical assistance provided:
  - a) 580 consults (phone/e-mail/desktop).
  - b) 8 assessments (in-field).

**Performance/Compliance Measures**

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

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

<b>SAP #</b>	<b>Measure</b>	<b>Description</b>	<b>Reporting Mechanism</b>	<b>Target/ Baseline</b>	<b>2015 Actual</b>	<b>Reporting Frequency</b>
107	<b>DBE participation (as percentage) to date on Federal Aid Highway Program.</b>	DBE Program	Transport	10.25%	10.44%	Federal FY <b>Semiannual reporting</b>
459	<b># of DBE firms receiving supportive services/benefits</b>	DBE Supportive Services (DBE/SS)	Connect2DOT Program	30	78	Federal FY
313	<b># of completed Contract Compliance Reviews</b>	Contractor Compliance (External EEO) Program	SharePoint	18	19	Federal FY
460	<b># of OJT hours achieved</b>	On the Job Training (OJT) Program	Access DB	7,000 hours	121,702	Federal FY
461	<b># of persons placed and employed (post-services)</b>	OJT Supportive Services (OJT/SS)	AIMS CC IGA	40	100	Federal FY
310	<b># of completed STA reviews</b>	Title VI Program	Title VI Assessment	6	6	Federal FY
462	<b># of completed sub recipient reviews</b>	ADA Title II Program	ADA Transition Plan	5	8	Federal FY

## 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):
  - 165 construction contracts awarded (\$517.8 million), 90% of which were awarded within 30 days of bid opening. No issues of non-compliance to report.
  - 22 consultant selections, 77% of contracts executed within desired 17 weeks.
  - FY 2015: 876 task orders written, processing time approximately 26 calendar days.
  - CY 2015: 1,028 task orders written, processing time approximately 28 calendar days.
2. AASHTOWare Project Support Training (AASHTOWare Support):
  - 9 Payroll classes.
  - 8 SiteManager/web Trns\*port classes.
  - Site Manager utilization reviews: No problems encountered or outstanding issues.

3. Overall Program Estimate Accuracy (EEMA):
- FY 2015 Total Program Estimate: \$519,510,956.29
  - FY 2015 Total Program Award: \$517,825,743.18
  - Accuracy: -0.33% 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	Target/Baseline	2015 Actual	Reporting Frequency
239	<b>Percent of projects awarded without a justification letter and CE approval</b>	Percent of awarded low bids within +15% to -20% of Engineer's Estimate on projects over \$500,000	CDOT Branch Work Plan, Chief Engineer's Objectives	85%	79.9% <sup>1</sup>	State FY
463	<b>Percent of projects awarded within set percentage of Engineer's Estimate</b>	Percent of awarded low bids within +/- 10% of Engineer's Estimate on ALL projects	CMA Branch Work Plans	55%	63.5%	State FY Quarterly reporting
241	<b>Percent of projects awarded within set timeline of bid opening (CDOT oversight and FHWA oversight)</b>	Percent of projects awarded within 30 days of bid opening	CMA Branch Work Plans, Chief Engineer's Objectives	95%	90.6%	State FY Quarterly reporting
246	<b>Percent of professional services contracts executed within set timeline</b>	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's Objectives	85%	77%	State FY

<sup>1</sup> This percentage reflects a new threshold of \$500,000 (as compared to the \$250,000 threshold in the 2015 Stewardship and Oversight Agreement) to be consistent with revised policy requiring justification letters when low bid exceeds engineer's estimate by a minimum of 50% for projects under \$500,000.

## 2.5. ENGINEERING: ENVIRONMENT

### Introduction

**CDOT Manager:** Jane Hann and Tom Boyce  
**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.

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 – CDOT continues to work on one Draft EIS, US 50 East, and one Final EIS, I-70 East, during this calendar year. There were no Draft EISs completed this calendar year to which EPA ratings are given.
2. Completion Time for Environmental Documents – During the 2015 calendar year, the following documents were finalized:
  - Zero Environmental Impact Statements (EISs),
  - One Record of Decision (ROD),
  - Two Environmental Assessments (EAs), and
  - Three Findings of No Significant Impact (FONSI) were finalized.

For the ROD document: The US 550/160 ROD was signed on 5/15/15. With the Final SEIS signed on 7/3/12. This ROD took 2 years and 10 months, or 34 months, to complete. This ROD took a longer time than normal due to the threat of litigation and the need to work with the stakeholders to find a solution that would solve most of the transportation needs.

For the EA documents: The I-76 Bridge Street EA was signed in January 2015, which was 20 months after the project started in May 2013. This project utilized the streamlined EA (EA Template). It is most applicable to simpler EAs with only one alternative in addition to the No Action Alternative. This format has enabled CDOT to notably streamline the EA process. The timeline for this EA was longer than the other templated EAs that took 7 months to complete; it could be that this particular document took longer than two previous templated EAs because it was a local agency led project and there was no PEL conducted prior to the EA, as was done for the other EAs.

This makes four completed projects that have used the template EA format since it was developed. 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. The Federal Boulevard, 7th to Howard Place, EA began in February 2014 and was signed 8 months later in October 2014. Prior to both EAs, a PEL study had been conducted on each corridor that provided background information and basic information on resources and impacts and could have helped shorten the timeline for these template EAs.

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 57 pages for a CDOT-led project which shortened the review time of these documents. The local agency-led project that did not have a PEL prior to the EA being conducted was about 200 pages so the time savings for this use of the template was reduced. Additionally, the average time from project start to publication of a traditional EA is about 49 months. The average time for the above EA was 10.3 months (up from a 7 month average when a PEL preceded the EA and the project was a CDOT-led project). The State Highway 9, Iron Springs, EA is not included in the time line because it was pilot testing and refining the template EA format and also had more complicated circumstances, including needing to discuss and disclose impacts for a non-traditional No Action Alternative (previously selected alternative from a ROD), United States Forest Service (USFS) coordination, and natural resource analysis needs with limited survey windows. This took 21 months. A common theme that is beginning to develop is local agency-led projects are taking more time and are longer even when using CDOT approved templates.

For the FONSI documents: The FONSI for the I-76 Bridge Street EA was signed in August 2015, which was eight months after the EA was signed. The FONSI also used a streamlined format (FONSI Template). Two others were signed during 2015. The Federal Blvd, 7<sup>th</sup> to Howard Place, FONSI began after the EA was completed in October 2014 and was signed three months later in January 2015. The SH 82, Grand Ave Bridge, FONSI, which began after the EA was completed in October 2014, was signed in May 2015, seven months later.

Figure 1 below shows the EAs and EISs, 60 in all, that have occurred since 1999. The figure lists the length of time for each project and graphically displays projects that occurred simultaneously. PELs are not added to this chart at this time, but data from the PEL program is considered in the following discussion. The bullets below summarize the observations regarding this data.

- Regarding Workload: The number of EAs/EISs ongoing each year from 1999 were 9 in 1999, 18 in 2000, 17 in 2001, 19 in 2002, 23 in 2003, 28 in 2004, a different 28 (some were completed and some were added from the previous year's list) in 2005, 26 (+1 PEL) in 2006, 27(+3 PELs) in 2007, 20 (+3 PELs) in 2008, 16 (+3 different PELs) in 2009, 15 in 2010, 14 in 2011, 10 (+4 PELs) in 2012, 11 (+6 PELs) in 2013, 16 (+7 PELs) in 2014, and 11 (+8 PELs) in 2015 (this shows as 11 projects instead of the total in Table 4 below due to some of the decision documents worked on were either active in the same year as the EA was signed, or were multiples of the same project such as I-25 North RODs 1 and 2.).
- When SAFETEA-LU came into existence in 2005, there were 28 EAs/EISs in process, 18 of these were completed in the next 2 years. Four new EAs were also started that year.
- In 2007, the first PEL document began (called Linking Planning and NEPA at that time, which was the precursor to PEL). After that, no new EISs have been started. This could be because these large studies are now being initiated under the PEL process. Between 2007 and 2009, 4 PEL projects were completed. There was a two year hiatus after that,

then in 2012 4 PELs were started, in 2013 2 were started, in 2014 5 were started, and in 2015 several more were added to total a high of 8 active PELs in this year.

- In 2010, the first Every Day Counts Initiative was proposed by FHWA. One of the streamlining ideas for getting legal assistance and FHWA HQ help on documents that had been under study for 11 years was applied to the I-70 Mountain Corridor Draft Programmatic EIS. The Draft Programmatic EIS was revised and completed that year and the Final Programmatic EIS was completed the next. Since then, other outstanding long-term EISs have been completed with the oldest active long-term EIS, I-70 East that was started in 2003, is scheduled for completion in 2016. At that point, only one EIS will be active, US 50 East, which was started in 2006 but was put on hold due to workload while other studies were completed.
- Average number of EA/FONSI/EIS/ROD/PEL projects worked in any one year = 20 (above this average occurred collectively between 2003 and 2008, and again in 2014 due to a high number of PELs during this year, but the number of EA/FONSI/ EIS/ROD documents worked in a year is dropping since a high in 2004/2005 which peaked at 28 active documents to the mid-to-low teens and is currently at 11 for 2015, which includes 6 projects having EA and/or FONSI, 5 projects having EIS and/or RODs, and 8 PELs active during the year.)
- Average number of months to a FONSI = 41. The trend from 2001 to 2015 has been a decrease in the number of months to a signed FONSI from approximately 50 months to approximately 20 months. (Average number of months to a FONSI from 1992 to 2001 = 44.)
- Average number of months to a Final EIS signature for projects started between 1999 and 2015 = 75; but without the I-70 Mountain Corridor EIS that was 128 months, the I-25 through Pueblo EIS that was 108 months, and the US 550/160, which took 91 months, the average number of months for the other Final EISs was 56 months, although that trend is slightly increasing as time goes on.
- Average number of months from FEIS to ROD = 6.5 (Not including the 34 month US550/160 ROD to the SEIS that had extenuating circumstances lengthening the process.)
- Average number of months to a completed PEL = approximately 20.
- Average number of months to a signed EA using the Template EA = 10.3 months. Note that this only includes the three EAs after the template was created and does not include the pilot project SH 9, Iron Springs, where the template was revised.
- 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 months.

Priority projects that shortened timeframes:

- T-REX construction driven by Governor Owens/Tom Norton
- SH 85 and 120<sup>th</sup> extension signed in May 2003 = 9 months, also 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 Tunnels East-Bound EA= 13 months, driven by Governor Hickenlooper/Don Hunt

Appendix A: Environment Section, Other Notable 2013 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 SAFETEA-LU, 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.

FHWA Colorado Division and Colorado Department of Transportation  
FINAL 2015 Stewardship and Oversight Agreement Annual Report

Figure 1 – CDOT EAs and EISs from 1999 to Present

Task Name	Document Type	Start	EA/EIS Signature Date	FEIS Signature Date	Document Decision Date*	Add New Color	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
I-225 North of Parker Road to North of 6th Ave	EAFONSI	Thu 1/29/99	Tue 10/17/00	NA	Thu 5/3/01																
Northwest Parkway, I-25 Interchange	EAFONSI	Mon 4/3/00	Mon 2/12/01	NA	Wed 5/23/01																
I-70, Hogback Parking Facility	EAFONSI	Wed 7/19/00	Wed 2/14/01	NA	Mon 8/13/01																
South Simms St - US 285 Interchange	EAFONSI	Mon 1/29/01	Thu 9/6/01	NA	Mon 4/1/02																
I-25, 136th Ave Interchange	EAFONSI	Thu 2/17/00	Wed 5/15/02	NA	Wed 1/8/03																
Nottingham Ranch Road (Post Blvd), I-70	EAFONSI	Wed 8/2/00	Fri 1/11/02	NA	Fri 4/25/03																
120th Ave Extension, SH 85 and Quebec	EAFONSI	Mon 8/19/02	Tue 5/27/03	NA	Fri 8/1/03																
SH 9	EIS/ROD	Tue 3/23/99	Fri 5/31/02	Thu 3/4/04	Mon 5/24/04																
I-70, SH 58 Interchange	EAFONSI	Mon 9/18/00	Wed 7/3/02	NA	Wed 9/1/04																
I-25 North Colorado Springs	EAFONSI	Mon 2/1/99	Mon 3/29/04	NA	Fri 9/10/04																
I-25, Crystal Valley/Dawson Ridge Pkwy	EAFONSI	Tue 4/2/02	Mon 9/20/04	NA	Mon 2/28/05																
I-25, 144th Ave Interchange, Adams County	EAFONSI	Fri 7/7/00	Wed 1/12/05	NA	Fri 4/15/05																
SH 285, Foxton to Bailey	EAFONSI	Fri 7/12/02	Wed 8/11/04	NA	Fri 6/3/05																
I-70 Eagle County Airport Interchange	EAFONSI	Fri 4/14/00	Mon 8/30/04	NA	Thu 6/23/05																
SH 121, Wadsworth Blvd/Grand Ave	EAFONSI	Fri 11/28/03	Mon 5/9/05	NA	Wed 8/31/05																
US 550, Improvements from State Line to CR 220	EAFONSI	Wed 2/12/03	Wed 7/27/05	NA	Wed 12/21/05																
US 34 Business Route, SH 257 to 71st Ave	EAFONSI	Fri 10/11/02	Tue 9/13/05	NA	Tue 5/2/06																
US 160 Durango to Bayfield	EIS/ROD	Tue 12/24/02	Tue 9/13/05	Fri 5/12/06	Tue 11/7/06																
I-70/32nd Ave Interchange (Cabela's)	EAFONSI	Tue 2/1/05	Mon 10/23/06	NA	Wed 2/28/07																
I-225, Colfax Avenue Interchange	EAFONSI	Tue 3/9/04	Thu 10/20/05	NA	Fri 3/30/07																
US 34 Madison Ave to Larimer County	EAFONSI	Wed 9/1/04	Wed 4/4/07	NA	Fri 5/4/07																
DAR, US Army Pueblo Chemical Depot	EAFONSI	Tue 10/26/04	Tue 1/16/07	NA	Mon 5/7/07																
Valley Highway	EIS/ROD	Tue 7/23/02	Tue 4/19/05	Thu 12/7/06	Thu 7/5/07																
I-70, E-470 Interchange Complex	EAFONSI	Fri 9/24/04	Tue 11/7/06	NA	Tue 7/10/07																
I-25, SH 16, East Entrance to Fort Carson	EAFONSI	Thu 2/2/06	Thu 7/12/07	NA	Thu 9/20/07																
Woodmen Road	EAFONSI	Wed 6/14/00	Fri 12/16/05	NA	Fri 12/14/07																
SH 402, US 287 to I-25 Interchange	EAFONSI	Mon 8/13/01	Mon 7/23/07	NA	Mon 1/14/08																
SH 88, Federal Blvd, Alameda Ave to 6th Ave	EAFONSI	Mon 8/29/05	Wed 11/14/07	NA	Thu 2/28/08																
I-70, I-70B West	EAFONSI	Tue 8/8/06	Wed 3/19/08	NA	Fri 8/8/08																
SH 7, Cherryvale Rd to 75th St	EAFONSI	Mon 3/1/04	Fri 5/30/08	NA	Mon 9/15/08																
South Broadway	EAFONSI	Wed 6/1/05	Wed 3/26/08	NA	Wed 10/8/08																
56th Ave Quebec to Havana	EAFONSI	Thu 4/12/07	Thu 9/4/08	NA	Thu 1/15/09																
Central Park Blvd	EAFONSI	Thu 7/3/08	Thu 6/4/09	NA	Mon 8/3/09																
US 36	EIS/ROD	Tue 10/21/03	Mon 7/23/07	Fri 10/30/09	Thu 12/24/09																
6th Ave/Wadsworth	EAFONSI	Fri 6/1/07	Mon 6/29/09	NA	Fri 3/12/10																
I-70, Parachute West Interchange	EAFONSI	Fri 8/24/07	Tue 1/5/10	NA	Tue 8/10/10																
Powers Blvd	EAFONSI	Mon 10/29/01	Tue 5/4/10	NA	Tue 1/4/11																
I-25, North Meadows Extension to US 85 and I-25	EAFONSI	Mon 7/2/07	Tue 3/23/10	NA	Thu 3/17/11																
I-70 East Eagle Interchange	EAFONSI	Tue 7/18/06	Fri 9/3/10	NA	Tue 5/24/11																
I-70 Mtn Corridor	EIS/ROD	Tue 1/25/00	Tue 8/10/10	Thu 2/24/11	Thu 6/16/11																
I-25 Dillon Drive	EAFONSI	Thu 12/18/08	Wed 1/26/11	NA	Thu 7/28/11																
North I-25	EIS/ROD	Mon 12/22/03	Fri 10/31/08	Fri 8/19/11	Thu 12/29/11																
Twin Tunnels	EAFONSI	Thu 9/1/11	Thu 6/28/12	NA	Wed 10/17/12																
I-25 Arapahoe Road	EAFONSI	Wed 3/3/10	Wed 8/29/12	NA	Fri 3/15/13																
I-25 Through Pueblo	EIS/ROD	Mon 1/27/03	Fri 10/21/11	Thu 8/15/13	Thu 4/17/14																
US 50 West, Pueblo	EAFONSI	Mon 12/16/13	Wed 6/4/14	NA	Thu 9/11/14																
US 24, I-25 West to Manitou	EAFONSI	Wed 8/27/03	Wed 5/16/12	NA	Wed 10/1/14																
SH 287 Reliever Route in Lamar	EAFONSI	Thu 4/25/02	Thu 8/15/13	NA	Mon 11/10/14																
SH 9 Iron Springs	EAFONSI	Wed 8/1/12	Tue 5/6/14	NA	Wed 12/17/14																
Federal Blvd, 7th to Howard Place	EAFONSI	Tue 2/11/14	Wed 10/8/14	NA	Wed 1/14/15																
US 550/160 Supplemental EIS	EIS/ROD	Mon 10/1/07	Mon 10/3/11	Tue 7/3/12	Fri 5/15/15																
Grand Ave Bridge	EAFONSI	Mon 5/2/11	Sat 10/18/14	NA	Thu 5/28/15																
I-76 and Bridge Street	EAFONSI	Wed 5/1/13	Wed 1/14/15	NA	Thu 8/13/15																
C-470 I-25 to Kipling Revised EA	EAFONSI	Tue 4/2/13	Fri 7/24/15	NA	Fri 11/20/15																
I-70 East	Ongoing EIS	Tue 8/19/03	Wed 10/29/08	NA	NA																
I-25 North Revised ROD 2	Ongoing/Revised ROD	Mon 1/2/12	NA	NA	NA																
I-25 North Revised ROD 1	Ongoing/Revised ROD	Mon 1/2/12	NA	NA	NA																
US 50 East	Ongoing EIS	Fri 2/3/06	NA	NA	NA																
South Bridge - Glenwood Springs	EA/Ongoing FONSI	Fri 12/14/07	Tue 10/8/13	NA	NA																
6th Ave Parkway Extension	Ongoing EA	Fri 9/19/14	NA	NA	NA																
Sterling S Curve	Ongoing EA	Fri 8/1/14	NA	NA	NA																

3. Number of Active and Completed NEPA Documents –The following table displays the number of active and completed NEPA documents for a given year.

**Table 4– Number of Completed NEPA Documents Compared to Number of Active NEPA documents**

Year	Categorical Exclusions (Cat Exs)		Environmental Assessments (EAs)		Findings of No Significant Impacts (FONSI)s		Environmental Impact Statements (EISs)		Records of Decision (RODs)	
	Completed	Active	Completed	Active	Completed	Active	Completed	Active	Completed	Active
2012	189	470	3	7	1	0	2	6	1	0
2013	266	682	2	7	1	3	1	3	0	1
2014	217	757	4	9	4	7	0	2	1	2
2015	243	693	2	4	4	5	0	2	1	3

During the 2015 calendar year, there were 10 active EA/EIS projects:

- Five of these were EIS/RODs. There were two ongoing EISs (I-70 East and US 50 East) and three ongoing RODs (North I-25 ROD 1 and North I-25 ROD, and the US 550/160 ROD 2) statewide. At the end of the 2015 calendar year, both EISs and both I-25 North RODs are still active. The US 550/160 ROD was signed on May 15, 2015.
- There were a total of nine active EA/FONSI projects this year. Two of these EAs have been signed (I-76 and Bridge Street and C-470 I-25 to Kipling Revised EA); two EAs are still active (Sterling S Curve and 6<sup>th</sup> Ave Parkway Extension). Four FONSI)s were signed (Federal 7<sup>th</sup> to Howard, Grand Avenue Bridge, I-76 and Bridge Street, and C-470 I-25 to Kipling FONSI)s). One FONSI was active but not yet signed (South Bridge in Glenwood Springs). One EA from last year was downgraded to a Cat Ex so is not reported in these numbers this year (US 287 over BNSF). No EAs were started this year.

Also during the 2015 calendar year, there were 693 active Cat Ex processes statewide for both federal and non-federal projects. This combined number of Cat Ex processes is representative of workload. Approximately 243 federal Cat Ex processes were completed, and an additional 41 non-federal Cat Ex clearances were completed in 2015 but are not included in the table above since FHWA is only interested in the federal actions. The data for the total number of active federal/non-federal projects is based on the ratio of federal projects to workload from 2014. This assumption is used in lieu of actual numbers because data compilation was difficult for those projects in process.

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 2,156 clearance action requests in 2015. The percent on-time numbers were 99.4% (2015 was down 29% from 2014 although the clearance request number is trending upward over time: there was an 11% increase in 2014, and 30% increase in 2013, for a total increase of 41% in clearance requests over those two years alone). This all happened with 11 major NEPA documents that came in for review during the 2015 when the NEPA Program Manager was reassigned to the I-70 East Project so document review could not be handled as focused and efficiently. Additionally, the training evaluation scores have been 84% for 2015, comparable for the last year where the average was 89%. There is an ever increasing amount of information jammed into a 2-day course which might

be frustrating for some students. CDOT is attempting to deal with this through the development of continued education classes that will reinforce parts of this training program.

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.
  
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 toward the end of the year concerning the way the data was calculated. 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 started to “clean up” all these old finding records so that the year really reflects what is outstanding for that year. We expect the overall response numbers to better show an improvement once that is complete. 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 2016 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 5 - Performance/Compliance Indicators (Environment)**

SAP #	Indicator	Description	Reporting Mechanism	Target/Baseline	2015 Actual	Reporting Frequency
625	<b>Completion time for environmental documents</b>	The time to complete an EA from 45 days after the date of the initial Coordination Letter through the Finding of No Significant Impact (FONSI) date and the time to complete an EIS from Notice of Intent (NOI) to Record of Decision (ROD)	A list of all EAs and EISs completed in the calendar year identifying the length of time along with a project description as added to previous years data	Track trend	EA/FONSIs are still decreasing in time overall but the EIS/RODs are still taking a lot of time	Calendar Year <b>Quarterly reporting</b>
104, 381-382	<b>Active and completed NEPA documents</b>	Projects that were active at any point in the year, and projects for which NEPA actions were completed	A list or table indicating number of active and completed NEPA documents in the calendar year divided by class of action (Categorical Exclusion [CE], EA, EIS) as added to previous years data	Track trend	The 2015 trend is an increasing trend again from a low in 2012 of active NEPA documents except for CE and EIS numbers which are decreasing slightly	Calendar Year <b>Quarterly reporting</b>

## Performance/Compliance Measures

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

**Table 6 - Performance/Compliance Measures (Environment)**

SAP #	Measure	Description	Reporting Mechanism	Target/ Baseline	2015 Actual	Reporting Frequency
424	<b>Environmental Protection Agency (EPA) EIS ratings<sup>1</sup></b>	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	0, No EU ratings <sup>1</sup>	No Draft EISs completed	Calendar Year <b>Quarterly reporting</b>
102	<b>Percent on time for clearance actions by EPB</b>	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	90%	99.4%	State FY <b>Quarterly reporting</b>
103	<b>Wetland impact and replacement ratios</b>	Ratio of replacement area to impacted area (statewide aggregate)	Identify and document replacement ratio by calendar year	A minimum of 1:1 wetland replacement	1:1	Calendar Year
99	<b>Water quality measure</b>	RECAT (or equivalent in new MS4 permit) findings resolved or addressed within 48 hours of midnight following the finding	Chief Engineer Objective	95%	86.6%	State FY

<sup>1</sup> 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 internally from CDOT Environmental, Landscape and Research and externally from various pipe manufacturer's and drainage consultants. Presentations included: Colorado Water Conservation Board (CWCB) – Hydraulics, RESPEC Engineering – Water Rights, CDOT Water Quality – NDRD update, RESPEC Engineering – Bridge Scour POA project update, CDOT Research – Hydraulic Projects, ACPA – Culvert Pipe Post Installation, CDOT – Project Wise-Hydraulics, CDOT – Critical Culvert Projects.
2. Previous phase of Bridge Scour POA project involved the scour design of approximately 25 high priority, 8 medium priority and 1 low priority scour critical structures that were completed September 2015. The next phase of the project began in October 2015 and involves scour design and analysis for approximately 22 medium and low priority structures. 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 16.
3. Supported the permanent flood recovery efforts for design and repair of structures in Region 4. Staff Hydraulic Bridge Scour POA consultants are currently finishing up bridge scour designs to be incorporated into flood repair packages for Region 4. Scour critical structure designs that have been plugged into R4 flood repair packages include: A-17-AD, D-16-DA and A-28-M/N/O/P.
4. Supported the RAMP Staff Bridge bi-monthly meetings. Involved coordinating and communicating with the RAMP team and regions to implement bridge preventative and bridge scour work into region projects. Scour critical structure designs we have plugged into RAMP projects include: F-20-BL/BM, G-26-B/T, J-12-B, P-11-A, I-13-I, G-16-An, G-17-AO, G-17-M, G-18-H and H-04-Z.
5. Supported Applied Research and Innovation Branch by participating in multiple research involving water and drainage related projects. Current projects include: Debris and Flood Early Warning System, Eastern Colorado Crest Stage Network, Real-Time Bridge-Scour Monitoring and Scour Evaluation. Future projects include: Streamgauge Flood Warning System, Post-

flood Peak Discharge and Stage Documentation, and finally Enhancement to StreamStats-Additional Basin Characteristics.

6. Supported the Transportation Engineering Training Program (TETP) – Transportation Core Curriculum for the hydraulic training.
7. 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.
8. Developing Scope of Work and Independent Cost Estimate for the update of the CDOT Drainage Design Manual. Hopefully getting consultant onboard in next couple months to help with the manual update effort.

**Regions Activities:**

9. Regions are working with the RAMP Staff Bridge and Staff Hydraulics group in coordinating their projects with bridge preventative maintenance and scour work.
10. Regions are working with Staff Bridge and Staff Hydraulics to coordinate the emergency repair work for minor structures.

**Performance/Compliance Measures**

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

**Table 7 - Performance/Compliance Measures (Hydraulics)**

SAP #	Measure	Description	Reporting Mechanism	Target/Baseline	2015 Actual	Reporting Frequency
236	<b>Update the Scour Plan of Action for all scour critical bridges</b>	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	100%	93%	State FY Quarterly reporting

## 2.7. ENGINEERING: PAVEMENT AND MATERIALS

### Introduction

**CDOT Manager:** Bill Schiebel  
**FHWA Managers:** Donna Harmelink

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. There were 10 courses offered and nine courses delivered. Over 45 students during 8 classes were trained in the use of SiteManager Materials with an overall score of 4.60 out of 5.0 and 25 students in one class were trained in Pavement ME Design. Other training included QC/QA for HMA and PCCP, New Tester Training and Materials for Managers. 27 ACI certification/training courses and 1 Concrete Paving Inspector class was offered via the Colorado Ready Mixed Concrete Association. Also, 32 LabCAT certification courses and 6 Asphalt Inspector certification courses were offered via RMAEC. 11 Soil and Embankment certification and Inspector certification courses were conducted by WAQTC. The Pavement Management Program provided five training sessions for pavement managers, two sessions in Region 2, one session in Region 3, one session in Region 5, and one session at Headquarters.
2. Three manuals were updated and improved. They include the Field Materials Manual, the Pavement Design Manual and the Laboratory Manual of Test Procedures. Developing a Pavement Management Manual under the new Drivability Life metric is a priority for the Pavement Management Technical Body.
3. The Materials Advisory Committee met five times and identified and resolved issues. Numerous specification and procedural improvements were part of the effort.
4. The CDOT, AZDOT, NMDOT, UTDOT Four Corners peer exchange meeting was conducted in May 2015. This meeting brought materials engineers from the Four-Corners state DOTs together for collaboration and problem-solving on shared technical issues.
5. The Central Laboratory maintained 102 tests in the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program. Twenty eight proficiency samples were tested, with an average of 3.85 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 reported on June 12, 2015
7. The reports of the round-robin proficiency testing with the regions, consultants and contractors were completed for asphalt, concrete compressive strength, sulfates in soil, and soils.

8. For those performing acceptance testing, certifications were completed for 370 people for asphalt materials, 754 people for concrete materials and 165 people for soils. A total of 1289 people were certified. This list of certified testers is updated on a quarterly basis.
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 recalibration of treatment costs, benefits, and triggers. With the 2015 reports and software, Pavement Management has completed the transition from Remaining Service Life to Drivability Life.
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, 2015
11. The scope of the Rockfall Program was modified to include rockslides, landslides, debris flow, sink holes and embankment distress. With the increase in scope the program name was changed to the Geohazards Program, which is incorporated into CDOT's Asset Management Structure. Performance measures and targets are being developed with the goal of full implementation in 2016.
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. Monthly meetings are held with ACPA and CAPA to discuss industry concerns and enhancements regarding CDOT's Life Cycle Cost Analysis procedures. Completed task force and specification efforts include Performance Based Concrete, Updated Cement, Fly Ash and Pozzolans, CP 52 Note 1 – Asphalt Mix Design.
13. The use of CP-59 to document and approve Warm Mix Asphalt (WMA) technologies and contractors continued in 2015. The total number of approved technologies now stands at 13 and contractors at 13.
14. LIMS Implementation continues with the recent completion of the first year of full project implementation. System and network improvements continue to address performance of the system. Pavement Mechanistic Empirical Design was fully implemented for all designs in 2015. A new chapter was issued in the July 1 Pavement Design Manual on low volume road scoping and treatment selection.
15. A Joint Process Review was initiated entitled "Quality Assurance Procedures for Design-Build Projects" to address recent and historic concerns for appropriate testing and acceptance practices across all D-B projects statewide. Draft documents were created through a task group to add new D-B quality assurance program guidance to the Design-Build and Field Materials Manuals. Materials Advisory Committee approval and final issue of the new guidance will occur in early 2016.
16. In August 2014, the 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 180 participants attended including industry representatives, 18 state DOTs and four foreign countries. Research problem statements were created from the conference findings produced through the input from attendees during workshop breakout sessions focused on each type of in-place recycling method. CDOT Research was initiated in September 2015 to determine cold

in-place recycled layer dynamic modulus and planning was initiated for a 2016 In-Place Recycling Conference.

### **Performance/Compliance Measures**

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

**Table 8 - Performance/ Compliance Measures (Pavements and Materials)**

<b>SAP #</b>	<b>Measure</b>	<b>Description</b>	<b>Reporting Mechanism</b>	<b>Target/ Baseline</b>	<b>2015 Actual</b>	<b>Reporting Frequency</b>
254	<b>Percent of National Highway System (NHS) pavements within Colorado with an IRI less than 95</b>	Percent of NHS pavements within Colorado that have a good ride quality as defined by an IRI less than 95	Pavement Management System	52%	56.9%	State FY
253	<b>Percent of resurfacing projects matching recommendations of the Pavement Management Systems annual review</b>	Percent of resurfacing projects recommended by the Pavement Management System for each state fiscal year	Pavement Management Systems Work Plan	80%	83.3%	State FY
255 & 259-263	<b>Percent of surface treatment funds planned for pavement preservation within each region</b>	Percent of surface treatment funds planned for pavement preservation within each region (per Chief Engr Policy Memo 18)	Pavement Management Systems Work Plan	5%	Statewide =11.1% R1 = 7.2% R2 = 8.4% R3 = 9.8% R4 = 4.5% R5 = 33.2%	State FY

## **2.8. ENGINEERING: PLANNING**

### **Introduction**

**CDOT Manager:** Jeff Sudmeier, Erik Sabina, William Johnson  
**FHWA Manager:** Bill Haas

There are 3 Branches within DTD that directly contribute to Performance Based Planning and Programming as outlined in MAP-21. They are the Multimodal Planning Branch (MPB), the Information Management Branch (IMB), and the Performance and Asset Management Branch (PAMB).

The Multimodal Planning Branch (MPB) within DTD oversees the planning process that includes both statewide and regional planning activities. 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 TPRs (MPOs and non-urban) develop long-range regional transportation plans, which are the basis for Colorado's long-range Statewide Transportation Plan. 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 prioritize projects for the Statewide Transportation Improvement Program (STIP). The Colorado Transportation Commission approves the Statewide Transportation Plan and the STIP, and the STIP is forwarded to FHWA/FTA for approval. The MPB is also responsible for administering the Bike/Pedestrian programs and the Safe Routes to School and non-infrastructure Congestion Mitigation and Air Quality (CMAQ) programs.

Highway information is prepared and submitted by the Information Management Branch within DTD. This Branch has two sections: GIS 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.
- The Mobility section is responsible for traffic data collection, processing, analysis and dissemination. They are also responsible for the inventory of the state highway system, Highway Performance Monitoring System (HPMS) and road mileage certification, 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 make sure data can be collected to support those measures and is of good quality, and develops performance models to help predict future levels of performance based on expected revenues.

### **Quality/Results**

The DTD Work Program follows the state fiscal year. As of June 30, 2015, FY 2015 obligations and expenditures for MPB, IMB and PAM combined were 43.23% and 22.46%. 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 2015 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 2015.

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. This was not possible this year due to the shutdown of FMIS. However, all steps that could be completed prior to FMIS coming back online were completed and contracts are now in progress.

### Performance/Compliance Measures

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

**Table 9- Performance/Compliance Measures (Planning)**

SAP #	Measure	Description	Reporting Mechanism	Target/ Baseline	2015 Actual	Reporting Frequency
379, 380	<b>Work program progress</b>	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	90% of planned amount	65.69%	State FY
10	<b>TPR coordination</b>	CPG and Rural PO	Contracts executed by deadline	100% of contracts executed on time	100%*	Federal FY for CPG  State FY for Rural PO
630	<b>Accuracy and Timeliness of Highway Performance Monitoring System (HPMS) and other transportation data submitted</b>	Annual HPMS Report Card Score from FHWA HPMS Review	Annual HPMS Report Card Score	120	122.5	State FY

\*Federal FY 16 CPG contracts have been delayed due to the FMIS 5 shutdown and upgrade but all steps that could be completed prior to FMIS coming back online were completed and contracts are now in progress.

## 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 283 Change Orders submitted in FY 2015. Of those 266 (94%) were complete as submitted, 14 (5%) needed revision, and three (1%) needed supplemental documentation. There were six 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 8 claims filed in FY 2015. The claims were filed only after the dispute resolution process was exhausted.

Status of FY15 Claims		< \$250,000	>\$250,000
Claims Open Beginning FY15	1	1	0
New Claims FY15	8	7	1
Claims Resolved FY15	9	8	1
Claims Carrying Over FY16	0	0	0

4. Dispute Status FY 2015

Status of FY15 Disputes		< \$250,000	>\$250,000
Disputes Open Beginning FY 15	16	15	1
New Disputes FY15	14	5	9
Disputes Resolved FY15	7	4	3
Disputes Carrying Over FY16	11	2	9

5. There are 4 active Certifications and 13 active statewide Finding in the Public's Interest (FIPs).
6. Four Joint CDOT/ Colorado Contractors Association (CCA) Specifications Committee meetings were held and 54 standard special provisions and 21 sample project special provisions were issued. There were 6 standard plans issued.
7. CDOT reported FY14 Value Engineering and Value Engineering Change Proposal (VECP) savings to FHWA in January 2015 and will submit the FY15 report when it is due.

8. No Post Construction Reviews were performed.
9. Two inter-regional reviews (IRR's) for FY 2015: Region 2 hosted Region 5 on 8/26/2014 and Region 1 hosted Region 3 on 9/17/2014.
10. The Area Engineers and FHWA Operation Engineers conducted 26 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 2015.
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
  - Resident Engineer Committee – 3 of 4 Meetings
  - Water Quality Advisory Committee – 4 of 4 Meetings
  - Innovative Contracting Advisory Committee – 6 of 6 meetings; starting January 2016, meetings will be quarterly since subcommittee work is in process.
13. Twenty-two construction projects and nine maintenance project traffic control reviews were conducted in FY 2015, of which one was a nighttime review. Statewide average construction and maintenance project scores were 91.1% and 92.0%, respectively. The final report was submitted to FHWA on October 14, 2014.
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. Seven Construction Bulletins and nine 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 (1), CPM Scheduling for Design and Construction (3), Design Work Hour Estimation (1), Construction Project Administration (4), Reading Structural Plans (1), Applied Roadway Design (1), Managing Contract Time (2), CDOT Lighting Design (1), Disputes and Claims Resolution (1), Interchange Planning and Design (1), Pipeline Model & Cost Planner Training (2), Clear Writing for Engineers Day 1 (4), Clear Writing for Engineers Day 2 (4), 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. 32 instructor-led courses were held in FY 2015.

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

**Table 10 - Performance/ Compliance Indicators (Design and Construction)**

SAP #	Indicator	Description	Reporting Mechanism	Target/ Baseline	2015 Actual	Reporting Frequency
465	Revisions under Advertisement	Percent of projects that have one or more Revisions under Advertisement	CDOT Work Plan	Track trend	2015: 45% 2014: 51% 2013: 45%	State FY
466	Constructability reviews	Number of projects that include a constructability review during the design phase	CDOT Work Plan	Track trend	2015: 0 2014: 5 2013: 3	State FY
323	Number of major change orders	Number of change orders which required FHWA approval	CDOT Work Plan	Track trend	2015: 5 2014: 0 2013: 3 2012: 4	State FY
328	Number of change orders approved by CDOT	Number of change orders which did not require FHWA approval	CDOT Work Plan	Track trend	2015: 278 2014: 314 2013: 309 2012: 327	State FY Quarterly reporting
324	Number of claims paid out after DRB process followed	Claim dollars disputed divided by total contract dollars	CDOT Work Plan	Track trend	2015: 0.04% 2014: 0.06% 2013: 0.07% 2012: 0.02%	State FY
325	Number of disputes filed each year	Contract dollars disputed divided by total contract dollars	CDOT Work Plan	Track trend	2015: 1.99% 2014: 0.23% 2013: 0.36% 2012: 0.14%	State FY

### Performance/Compliance Measures

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

**Table 11 - Performance/ Compliance Measures (Design and Construction)**

SAP #	Measure	Description	Reporting Mechanism	Target/ Baseline	2015 Actual	Reporting Frequency
464	Value Engineering (VE) Reviews	The percentage of projects over \$40 million in which a Value Engineering Assessment was completed	CDOT Work Plan	100%	100%	State FY
345	Time to close a project from final acceptance to project closure in FMIS	Average # of days to close a project	CDOT Work Plan	200 days	297 days	State FY Quarterly reporting

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

### Introduction

**CDOT Manager:** Jane Fisher  
**FHWA Manager:** Shaun Cutting

### Performance/Compliance Measures

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

**Table 12 - Performance/ Compliance Measures (Program Management)**

SAP #	Indicator	Description	Reporting Mechanism	Target/ Baseline	2015 Actual	Reporting Frequency
555	<b>Expenditure Performance Index (XPI)</b>	XPI is actual program expenditures divided by anticipated program expenditures	Reported monthly	1.0	0.94	Calendar FY <b>Monthly</b>
556	<b>XPI by Surface Treatment Asset Category</b>	XPI is actual program expenditures divided by anticipated program expenditures	Reported monthly	1.0	1.34	Calendar FY <b>Monthly</b>
557	<b>XPI by Bridge - On System Asset Category</b>	XPI is actual program expenditures divided by anticipated program expenditures	Reported monthly	1.0	1.48	Calendar FY <b>Monthly</b>
558	<b>XPI by Bridge Enterprise Asset Category</b>	XPI is actual program expenditures divided by anticipated program expenditures	Reported monthly	1.0	0.63	Calendar FY <b>Monthly</b>
559	<b>XPI by FASTER Safety Mitigation Asset Category</b>	XPI is actual program expenditures divided by anticipated program expenditures	Reported monthly	1.0	1.87	Calendar FY <b>Monthly</b>

## 2.11. ENGINEERING: RIGHT-OF-WAY

### Introduction

**CDOT Manager:** Neil Lacey and Christine Rees  
**FHWA Manager:** Megan Jensen

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 2015.
2. There are numerous State ROW Manual changes that were updated as a result of changes in FY 2015, 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 pending.
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, 2015.
5. To better understand the QC data, a baseline of the number of Federal Aid projects with ROW is useful and shown below.

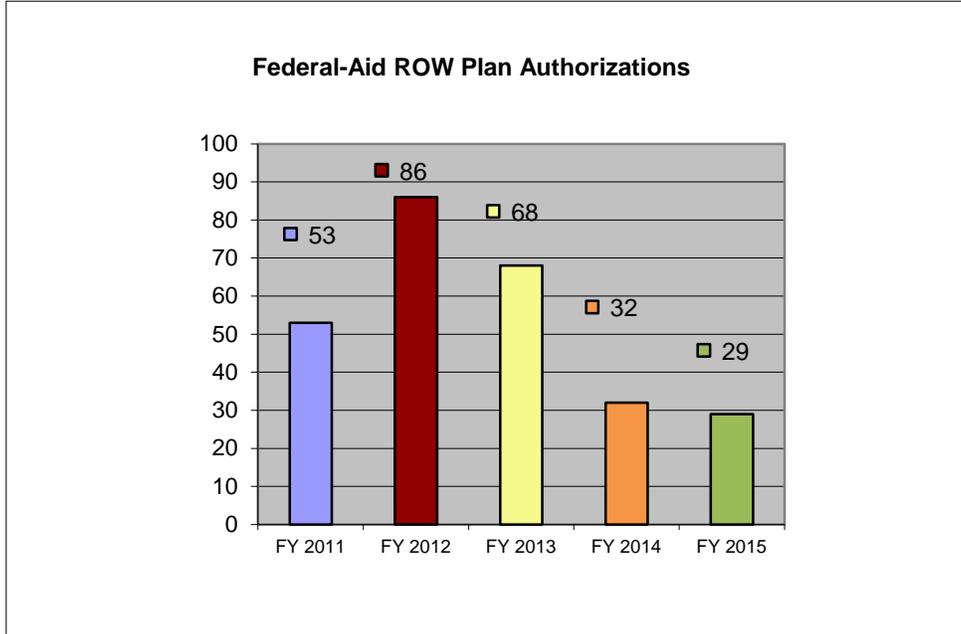
**Table 13 - FY 2011-2015 CDOT Authorized 29 Plans for Federal Aid Projects**

<b>ROW Plans Authorized</b>	<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013</b>	<b>FY 2014</b>	<b>FY 2015</b>
Federal Aid Projects with ROW	53	86	68	32	29

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.

- CDOT authorized 29 ROW Plans for Federal Aid Participation projects and 29 ROW plans for non-participation projects, for a total of 58. (See Table 13. FY 2011-2015 CDOT Authorized 29 Plans for Federal-Aid Projects.)

Figure 2. FY 2011 – 2015 Federal Aid ROW Plan Authorizations



- HQ ROW staff and region ROW staff continue to conduct systematic file reviews. Scheduled file reviews in FY 2015 included the review of Region 2 by Region 3, Region 1 by Region 5, and Region 5 by Region 1. 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.
- A statewide staff training event was held in Aurora, Colorado October 20 – 21, 2015. In addition to participation by all of the ROW specialties from all of the CDOT regions, CDOT’s Procurement, Contract and Market Analysis and Property Management groups also participated to provide training. The acquisition-relocation firms on CDOT’s Qualified Agent list were also invited to participate in the development and provision of training during one full day of the training event.

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

Table 14 - Performance/Compliance Indicators (ROW)

SAP #	Indicator	Description	Reporting Mechanism	Target/ Baseline	2015 Actual	Reporting Frequency
319	Conditional clearances	Percentage of Federal-aid projects with conditional ROW certifications	A list of conditional clearances	Track trend	12%	State FY

SAP #	Indicator	Description	Reporting Mechanism	Target/ Baseline	2015 Actual	Reporting Frequency
320	<b>Condemnations</b>	Percentage of parcels acquired using condemnation	Uniform Act Relocation Assistance and Real Property Acquisition Statistical Report as required by 49 Code of Federal Regulations, Appendix B	Track trend	0.5%	State FY
322	<b>Fair market value settlement rate</b>	The percentage of parcels settled at FMV	Calculation of the number of parcels that settled at FMV versus the total number of parcels acquired	Track trend	64%	State FY
321	<b>Appeals</b>	The number of appeals filed each year	A list of appeals	Track trend	2	State FY

Additional detail on the performance indicators is provided below:

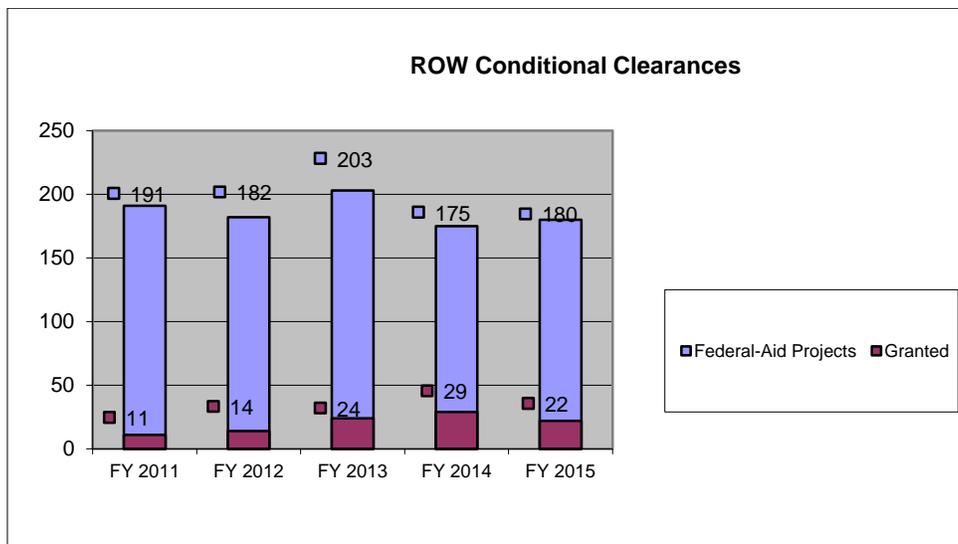
10. Conditional Clearances – Percentage of Federal Aid projects with conditional ROW certifications was 12%.

**Table 15 - FY 2011 – 2015 Federal Aid Projects with Conditional Clearances**

FY 2011 – 2015 Federal Aid Projects with ROW Conditional Clearances	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
Federal Aid Projects with ROW	191*	182*	203*	175*	180*
Conditional Clearances (granted)	11	14	24	29	22
Percentage of Conditional Clearances	6%	8%	12%	17%	12%

\* FY 2011, FY 2012, 2013, 2014 & 2015 Clearances include Local Public Agency (LPA) projects.

**Figure 3. FY 2011 – 2015 Federal Aid Projects with ROW Conditional Clearances**

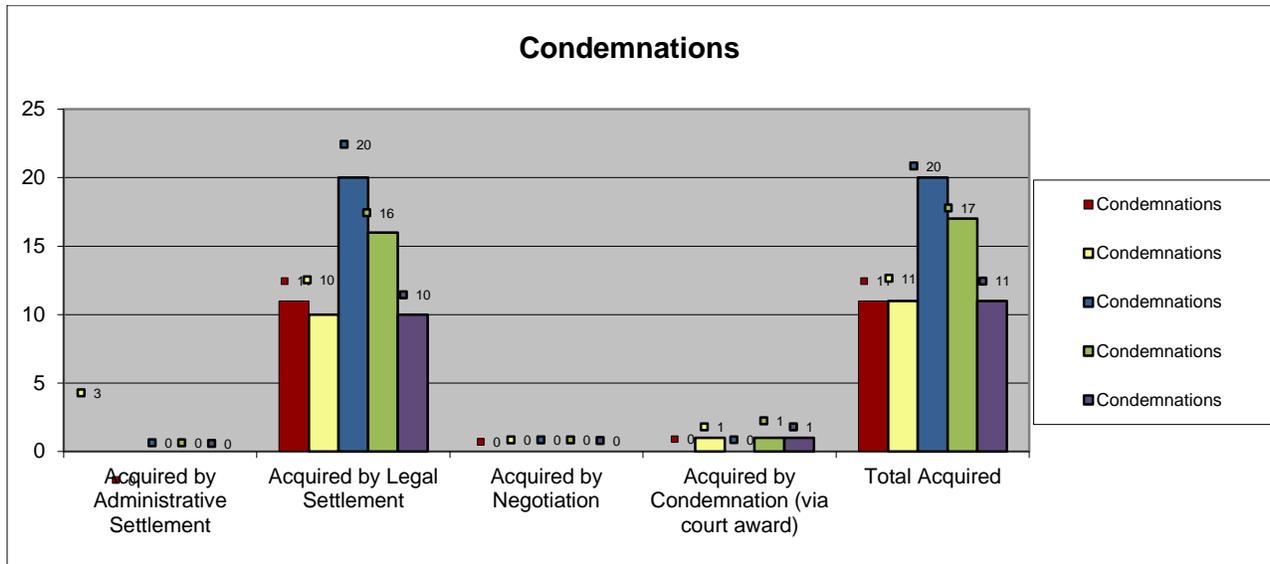


11. Condemns – In FY 2015, 197 acquisitions were conducted. Eleven (11) of these acquisition cases were forwarded to the Office of the Attorney General for the initiation of condemnation proceedings. One (1) of said parcels was acquired by condemnation (via court award).

**Table 16 - FY 2011 – FY 2015 Condemns – Cases Settled**

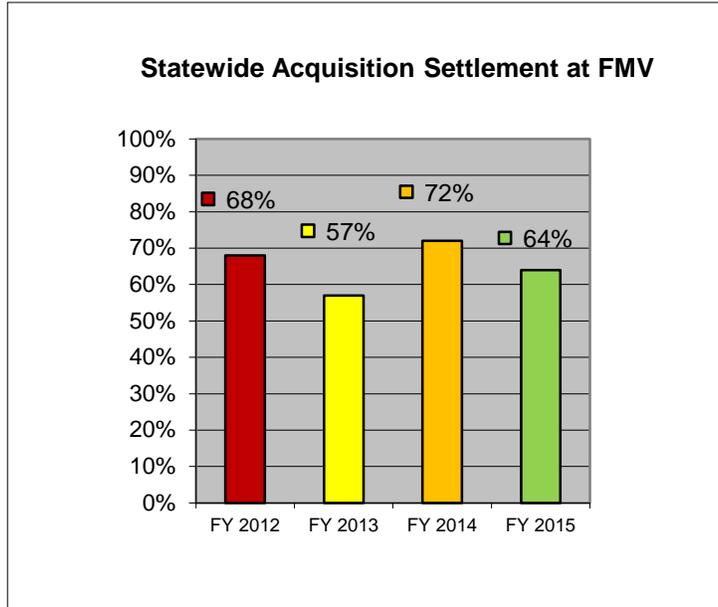
Condemns – Cases Settled	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
Total Number of Acquisitions (Acq)	215	215	264	264	197
Parcels Acquired by Region Administrative Settlement/Percentage of Total Acq	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
Parcels Acquired by Legal Settlement/Percentage of Total Acq	11 / 5%	10 / 4%	20 / 8%	16 / 6%	10 / 5%
Parcels Acquired by Negotiation /Percentage of Total Acq	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
Parcels Acquired Using Condemns (via court award)/Percentage of Total Acq	0 / 0%	1 / < 0.5%	/ 0%	0 / 0%	1 / 0.5%
<b>TOTAL (Cases)</b>	<b>11</b>	<b>11</b>	<b>20</b>	<b>17</b>	<b>11</b>

**Figure 4. FY 2011 – FY 2015 Condemns**



12. Statewide acquisition settlement at FMV: 64%. 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 5. FY 2012 – FY 2015 Settlement at FMV

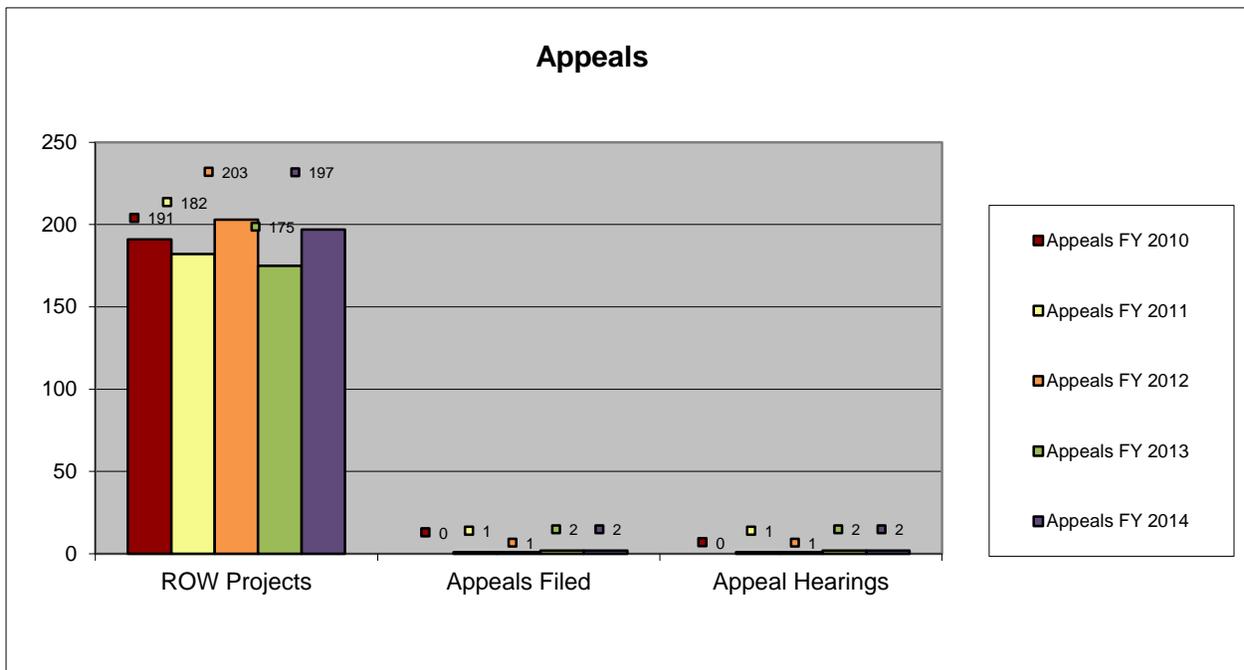


13. Appeals – 2 relocation appeals were filed.

Table 17 - FY 2011 – FY 2015 Appeals

Appeals	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
Appeals Filed	0	1	1	2	2
Appeals that went to Hearings	0	1	1	2	2

Figure 6. FY 2011 – 2015 Appeals



## Performance/Compliance Measures

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

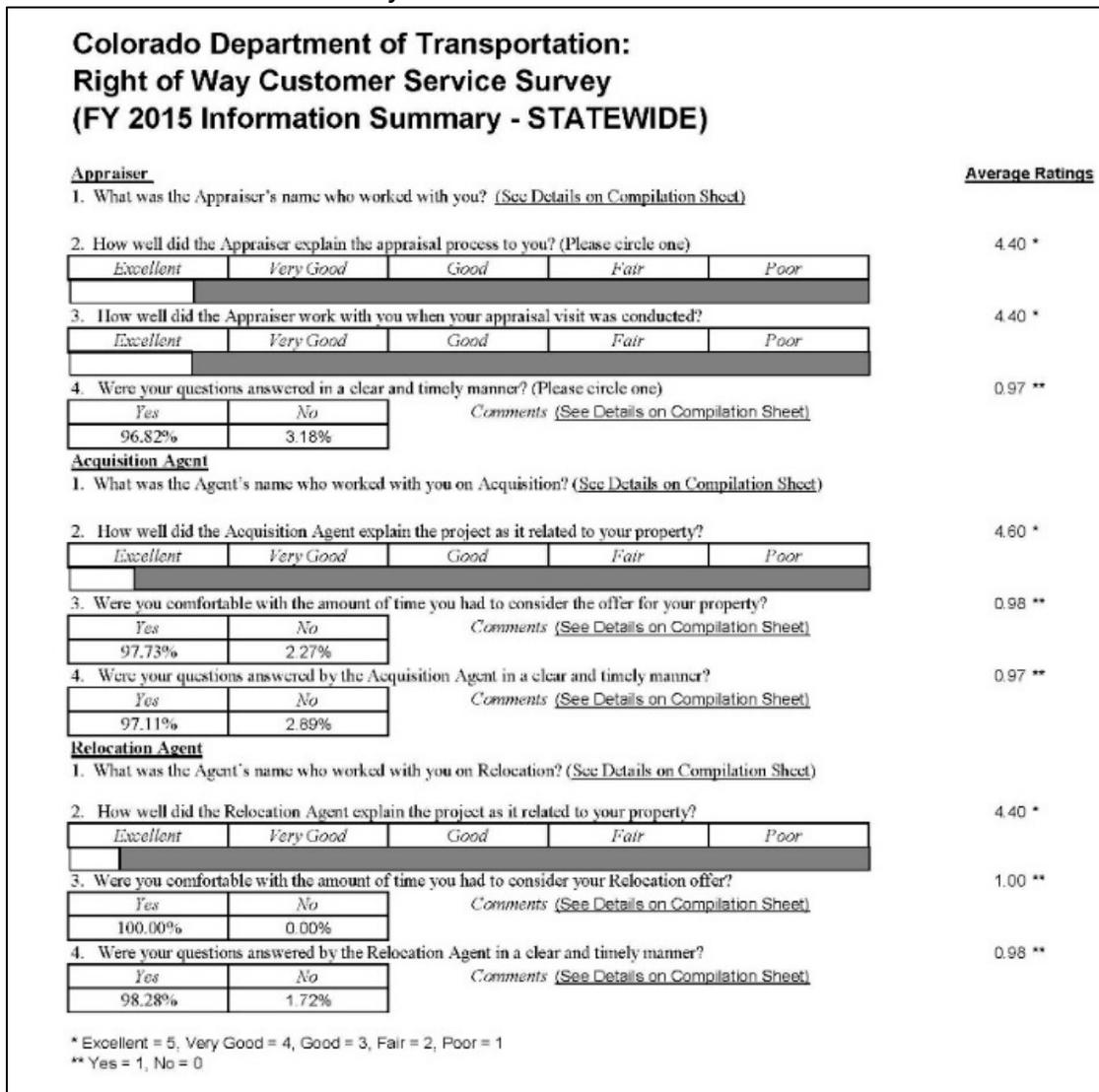
**Table 18 - Performance/Compliance Measures (ROW)**

SAP #	Measure	Description	Reporting Mechanism	Target/Baseline	2015 Actual	Reporting Frequency
426	ROW customer survey	ROW appraiser and agent customer service rating	ROW customer service survey by Region	Achieve very good or better in all categories	4.4	State FY

Additional detail on the performance measure is provided below:

- 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 an impressive 47%. Following are statewide results of said survey for FY2015.

**Figure 7. FY 2014 ROW Customer Survey**



## **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: bridges, culverts that span more than 20 feet, culverts 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 19 - Performance/ Compliance Measures (Structures)**

SAP #	Measure	Description	Reporting Mechanism	Target/ Baseline	2015 Actual	Reporting Frequency
411	<b>Decrease the number of scour critical bridges</b>	Reduce the number of scour critical bridges per year over the last 5 years	Staff Bridge annual asset management reports	Downward trend	2015: 153 2014 - 168 2013 - 182 2012 - Not Det. 2011 - Not Det.	State FY
214, 443, 701	<b>Structurally deficient bridges and deck area</b>	Number of structurally deficient bridges  Structurally deficient deck area (sq. ft)  Percentage of structurally deficient deck area	Staff Bridge annual asset management reports	Downward trend over 5 years (Always less than 10%)	2015: 186, 1.87M sf, 5.6% 2014: 199, 1.87M sf, 5.6% 2013: 214, 1.92M sf, 5.9% 2012: 238, 2.16M sf, 6.6% 2011: 251, 2.77M sf, 8.5%	State FY
216, 442, 700	<b>Structurally deficient bridges and deck area on the NHS</b>	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	Downward trend over 5 years (Always less than 10% per MAP-21)	2015: 123, 1.57M sf, 5.3% 2014: 131, 1.52M sf, 5.1% 2013: 133, 1.54M sf, 5.1% 2012: 126, 1.47M sf, 5.9% 2011: 130, 2.04M sf, 8.2%	State FY
238	<b>Reduce the backlog of essential repair activities recommended by Staff Bridge</b>	Percent of pending essential repairs based on the number of high priority (orange & yellow) repair recommendations pending	Staff Bridge annual asset management reports	15% or less	30%	State FY Quarterly reporting
237	<b>Reduce the quantity of bridge expansion joints that are leaking</b>	Repair or replace joints noted as leaking or damaged per inspection reports	Staff Bridge annual asset management reports	Downward trend	2015: 55,813 2014: 54,021 2013: 51,640 2012: 48,436 2011: 48,494	State FY
467	<b>Decrease the number of structures with sub-standard vertical clearance</b>	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	Downward trend	2015: 57 2014: 58 2013: 51	State FY

*FHWA Colorado Division and Colorado Department of Transportation  
FINAL 2015 Stewardship and Oversight Agreement Annual Report*

<b>SAP #</b>	<b>Measure</b>	<b>Description</b>	<b>Reporting Mechanism</b>	<b>Target/ Baseline</b>	<b>2015 Actual</b>	<b>Reporting Frequency</b>
468	<b>Decrease the number of load restricted bridges</b>	Decrease the number of structures that are load posted or are restricting permitted loads	Staff Bridge annual asset management reports	Downward trend	2015: 4 2014: 4 2013: 87	State FY
470	<b>Bridge Inspection Metrics Report</b>	Percentage of the 23 metrics in compliance	FHWA's Metric Compliance Report	100%	87%	State FY
471	<b>Documentation supporting the Item 113, Scour Critical Bridges, coding on all bridges over waterways</b>	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	Upward trend	2015: 273 2014: 269	State FY
472	<b>Perform new load ratings on bridges that contain advanced deterioration</b>	Rerate structures with components that have significant section loss that are not repaired	Staff Bridge annual asset management reports	Upward trend	2015: 0 2014: 6	State FY

## 2.13. FINANCIAL MANAGEMENT

### Introduction

**CDOT Manager:** Louie Barela 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 FY2015 federal funds were fully obligated. The number of projects closed during the year was 466. CDOT is among the best state transportation departments in regards to the number of days it takes to close a project, at 246 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 FY2015 were 0.1%; the FHWA goal is to be below 2%.

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

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

SAP #	Indicator	Description	Reporting Mechanism	Target/ Baseline	2015 Actual	Reporting Frequency
120	<b>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</b>	Percent of projects authorized for construction this year executed by local agencies or sub-grantees	SAP	Track trend	2015: 31% 2014: 32% 2013: 35% 2012: 42%	State FY <b>Quarterly reporting</b>
123	<b>Amount of Federal Aid funds obligated versus total available per fiscal year</b>	Percent of STIP projects obligated in the same year promised	STIP Obligation Report	Track trend	2015: 83.84% 2014: 83.18% 2013: 81.74% 2012: 88.24%	State FY

### Performance/Compliance Measures

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

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

SAP #	Measure	Description	Reporting Mechanism	Target/Baseline	2015 Actual	Reporting Frequency
155	<b>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)</b>	<ul style="list-style-type: none"> <li>(1) Determine all projects that have completed Design or Right-of-Way but have not gone to construction;</li> <li>(2) If projects have not gone to construction, determine which were constructed under another project number</li> <li>(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;</li> <li>(4) Begin to move ahead by measuring projects at eight years for design and fifteen for ROW to ensure projects are constructed;</li> <li>(5) Data fields need to be populated in PSAM module of SAP to enable an automated reporting at any time</li> </ul>	FMIS (Fiscal Management Information System) and CDOT systems for projects authorized as part of the annual project	Less than 5%	1%	State FY

## 2.14. MAINTENANCE AND OPERATIONS

### Introduction

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

CDOT has within its Central Office a Division of Highway Maintenance, and a Staff Maintenance 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 2015, the Staff Maintenance Branch coordinated the review of 1,744 road survey segments, and post-storm surveys to establish the level of service provided. The target and achieved levels of service were:

**Table 22 - FY 2015 MPA Performance**

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

This year, CDOT was able to achieve its overall targeted Levels of Service (LOS), but did not meet the targeted LOS for Structure Maintenance.

### **Performance/Compliance Measures**

The following performance measures demonstrate the health of the Maintenance and Operations Program:

**Table 23 - Performance/Compliance Measures (Maintenance and Operations)**

<b>SAP #</b>	<b>Measure</b>	<b>Description</b>	<b>Reporting Mechanism</b>	<b>Target/Baseline</b>	<b>2015 Actual</b>	<b>Reporting Frequency</b>
271	<b>Maintain the transportation system at the adopted annual MLOS grade</b>	Annual MLOS adopted target grades for Maintenance Program Areas 150, 200, 250, 300, 350, 400, 450, and 500	MLOS actual grades from annual survey	Statewide MLOS target achieved +/- one step	B-	State FY
270	<b>Maintain the snow and ice service MLOS grade at the adopted annual grade</b>	Annual MLOS grade for snow and ice removal	MLOS reporting	Statewide MLOS target achieved +/- one step	B	State FY

## 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.
3. Active Traffic Management and Operations Branch: Serves as a 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 350 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 Courtesy 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. It will expand coverage areas into Regions 2 and 4 on the I-25 Corridor in March/April of 2016.
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.

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 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 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 bimonthly 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 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. Real-Time Branch 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 AAA.

### **Performance/Compliance Measures**

The Safety and Traffic Engineering Branch and the ITS 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 two branches below.

## **2.16. 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) is 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 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”. One measurement of traffic fatalities is the number of fatalities that occur per 100 million vehicle miles traveled (VMT). 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, the fatality rate has decreased slightly from 2013 (1.02) to 0.996 in 2014, but slightly above the 0.96 in 2010 and 2011. While fatalities remain lower than the past decade, reduction has leveled and is slightly increasing over the past three years (474 fatalities in 2012, 481 fatalities in 2013, and 488 in 2014). Trends in 2015 show an 8% increase to date from 2014.

Below is a snapshot of how fatalities have changed from the previous year in certain areas. Over the past year, the SHSP stakeholders reviewed such trends and recommended emphasis areas based upon these trends or concerns about these areas in Colorado. Note: some of the fatalities below are accounted for in multiple categories.

**Table 24- Change in Type of Fatalities – 2012-2014**

	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2013 to 2014 % Difference</b>
Run off road crash fatalities	201	214	197	-8%
Intersection related fatalities	112	118	128	8%
Speed related fatalities	162	150	152	1%
Unrestrained fatalities	161	181	156	-14%
Impaired driving crash fatalities	155	176	137	-22%
Overturning crash fatalities	91	76	83	9%
Motorcycle fatalities	79	87	94	8%
Aging road user (over 65) fatalities	76	77	69	-10%
Pedestrian fatalities	72	50	63	26%
Head-on crash fatalities	41	46	51	11%
Rear-end crash fatalities	26	32	25	-22%
Wildlife crash fatalities	2	7	6	-14%

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), despite significant reductions from 2013. 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.

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 new campaign includes a new partners program that certifies safety initiatives administered by community allies to reach zero deaths. The partner certification provides the zero deaths seal to any organization that meets certain criteria, including the implementation of a program that addresses at least one SHSP emphasis area.
3. Highway Safety Improvement Program (HSIP) – In Colorado FY 2015, the Branch delivered \$47.3 million in HSIP funding to the Regions and Local Agencies around the state for 49 projects to address the significant numbers of fatalities related to infrastructure and the driver interaction (run off road, intersections, speed, and pedestrians.) These projects will have a safety benefit of \$95.9 million over their service life for an overall benefit cost ratio of 2.09. 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 Realignment. The Branch and regions are currently programming FY 2016 HSIP projects while compiling new projects for the FY 2017 through FY 2020 plan.
4. Work Zone Safety and Mobility Process Review – The WZSM Process Review was completed in December 2014. 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 made a number of recommendations, one of which is to establish a separate ongoing task force to oversee and follow up on implementation of the Process Review findings. That task force has been regularly meeting throughout 2015 to target strategies to improve work zone mobility and safety.
5. Crash Data – For 2015, the Branch has consistently processed crash records and made them available in under 4 months of receiving them from DOR. All 2011 through 2015 records, both on- and off-highway system crash records, are processed and now available for analysis by statewide stakeholders.

CDOT completed a 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.

6. CDOT Re-organization – CDOT underwent re-organization in July 2013, placing the HSIP program in a newly created Division – the Transportation Systems Management and Operations Division. Because operations and safety are so integral to each other, the synergies of these two programs working together is promising for improving both system performance and safety.
7. Rail Highway Grade Crossing Program – As a result of the re-organization, the Rail Highway Grade Crossing Program was transferred to the Project Development Branch. The RR Program is revising its process for selecting RR crossing safety projects by redeveloping its hazard index and applying it to Colorado’s 4,000 crossings. Currently the program has \$13M contracted and/or under construction in grade-separation and at-grade crossing improvements.
8. Work Zone Safety and Mobility – Traffic Control Reviews – These reviews continue to be conducted annually by Area Engineers visiting select projects throughout the state. Their findings are used to improve WZ standards, specifications, practices and policies.
9. 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.
10. 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. On November 6, 2015 CDOT received notice of noncompliance and associated penalty. CDOT is currently developing a response to NHTSA and FHWA regarding the penalty provisions.

### **Performance/Compliance Measures**

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

As application of MAP-21 becomes clearer, performance measures will be updated to be in alignment with recommendations of MAP-21 and the AASHTO Standing Committee on Performance Measures recommendations for program measures. For example, MAP21 requires three common measures for FHWA and NHTSA (fatalities, fatality rate, and injuries) with an additional measure by FHWA, injury rate. MAP-21 will further define injury – whether it is only serious injuries or will also include non-incapacitating injuries. Nonetheless, see below table for progress in 2014.

**Table 25- Performance/ Compliance Measures (Traffic and Safety Engineering)**

SAP #	Measure	Description	Reporting Mechanism	Target/ Baseline	2014 Actual <sup>1</sup>	Reporting Frequency
338	<b>Reduce the total number of fatalities</b>	Annual number of fatalities	Colorado Highway Safety Program Annual Report/Quarterly	Reduce annual number of fatalities by 12 from previous year's goal (476 for 2014)	2014: 488 2013: 481 Increase: 7	Calendar Year <b>Quarterly reporting</b>
329	<b>Reduce total fatalities per VMT</b>	Annual fatality rate per 100 million VMT	Colorado Highway Safety Program Annual Report	<sup>2</sup> Reduce annual fatality rate by 2.5% from previous year's goal (0.99 for 2014)	2014: 0.996 2013: 1.024 Reduction: 2.73%	Calendar Year <b>Quarterly reporting</b>
355	<b>Reduce total number of serious injuries</b>	Annual number of serious injuries	Colorado Highway Safety Program Annual Report	<sup>2</sup> Reduce annual number of serious injuries by 2.9% from previous year's goal (2,987 for 2014)	2014: 3217 2013: 3215 Increase: 0.1%	Calendar Year
335	<b>Reduce the total serious injuries per VMT</b>	Reduce the total serious injuries per 100 million VMT	Colorado Highway Safety Program Annual Report	<sup>2</sup> Reduce the serious injury rate by 2.9% annually from previous year's goal (6.35 for 2014)	2014: 6.567 2013: 6.845 Reduction: 4.06%	Calendar Year
336	<b>Reduce alcohol-related fatal crashes</b>	Alcohol-related fatal crashes as a percentage of overall fatal crashes	Colorado Highway Safety Program Annual Report	Less than 45%	41.7%	Calendar Year
376	<b>Reduce crash data processing time</b>	Number of months crash data processing is backlogged	Colorado Highway Safety Program Annual Report/Quarterly	Less than 6 months	3.6 months	Calendar Year <b>Quarterly reporting</b>
476	<b>Implement proven safety countermeasures</b>	Countermeasure Index Reporting score	Colorado Highway Safety Program Annual Report/Quarterly	3 or better	5	Calendar Year <b>Quarterly reporting</b>
477	<b>Rural road fatality rate</b>	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	Reduce fatalities from previous two year average	2014: 1.58 2013: 1.64 Reduction: 0.06	Calendar Year
478	<b>Older driver fatalities and serious injuries</b>	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	Reduce fatalities and serious injuries from previous two year average	2014: 248 2013: 269 Reduction: 21	Calendar Year

<sup>1</sup> Data is not official for a year after the end of the calendar year. Therefore, this is 2014 data.

<sup>2</sup> These performance measures were changed from those in the 2015 Stewardships and Oversight Agreement in order to align with the SHSP and be consistent with MAP21 for FHWA and NHTSA.

## **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 affect 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 the CDOT Mobile App including push notification, geo-fencing and targeted information, Active Traffic Management, Managed Lanes, Peak Period Shoulder Lanes, Variable Speed Limits, real time cameras, weather stations, 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, and will co-sponsor the TSM&O Region Implementation and TSM&O Corridor Plans. 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 8. ITS Corridor-Specific Congestion and Incident Data in Governor’s Vision 2018 Dashboard

Priority Area and WIGs	Outcome measure	Outcome baseline (Jan. - Jun. 2015)	Dec. 2015	Outcome target	Target date	Lead measure	Lead baseline	July 2015	Aug. 2015	Sept. 2015	Oct. 2015	Nov. 2015	Dec. 2015	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	2.47	2.50	CY 2016	Reduce average incident clearance time on NB I-25	49	48	48	47	50	49	51	46	CY 2016
						Reduce average road closure time per event on NB I-25	48	46	47	47	49	48	50	55	CY 2016
	Reduce the Planning Time Index for SB I-25	2.56	2.62	2.70	CY 2016	Reduce average incident clearance time on SB I-25	40	40	40	41	43	41	44	44	CY 2016
						Reduce average road closure time per event on SB I-25	51	49	48	47	48	46	47	52	CY 2016
	Reduce the Planning Time Index for WB I-70	1.40	1.6	1.60	CY 2016	Reduce average incident clearance time on WB I-70	75	65	62	59	59	57	71	40	CY 2016
						Reduce average road closure time per event on WB I-70	215	200	196	187	187	178	163	149	CY 2016
	Reduce the Planning Time Index for EB I-70	1.68	1.9	1.90	CY 2016	Reduce average incident clearance time on EB I-70	40	37	71	64	62	65	74	44	CY 2016
						Reduce average road closure time per event on EB I-70	161	149	147	136	132	130	124	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 26 - Performance/Compliance Measures (ITS)

SAP #	Measure	Description	Reporting Mechanism	Target/Baseline	2014 Actual <sup>1</sup>	Reporting Frequency
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	78%	68%	Calendar FY Quarterly reporting
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	54%	51%	Calendar FY Quarterly reporting

<sup>1</sup> Data is not available until late 2015. Therefore, this is 2014 data.

## 2.18. 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 a 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 350 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. Three incident management commanders and an I-70 Mountain corridor manager focus on the two highest-priority congested corridors that were identified in the Front Range/Denver metro area: Interstate 25 (I-25) and Interstate 70 (I-70). 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 incident 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. They include indicators moved from the ITS section, slightly modified indicators to be more meaningful, and new indicators.

**Table 27 - Performance/ Compliance Indicators (Active Traffic Management and Operations)**

SAP #	Measure	Description	Reporting Mechanism	Target/Baseline	2015 Actual	Reporting Frequency
386	<b>CDOT Courtesy Patrol Assists<sup>1</sup></b>	Measure the number of CDOT Courtesy Patrol Assists	CTMS Software	Track trend	11,634	Calendar Year
665	<b>Non-CDOT Courtesy Patrol Assists<sup>2</sup></b>	Measure the number of non-CDOT Courtesy Patrol Assists	E-470 Highway Group Data	Track trend	17,190	Calendar Year
666	<b>Hits for CDOT Traveler Tools</b>	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	Track trend	Total: 2,647,327  CoTrip 1,566,299 sessions  511 call-in 1,081,028	Calendar Year
667	<b>Number of CDOT Push Notifications</b>	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)	Track trend	Total: 13,423  CoTrip notifications sent: 6,813  511 notes sent: 6,610	Calendar Year

<sup>1</sup> 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.

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

## Performance/Compliance Measures

The following performance measure demonstrates the health of the Active Traffic Management Program. It was moved from the ITS section.

**Table 28 - Performance/Compliance Measures (Active Traffic Management and Operations)**

SAP #	Measure	Description	Reporting Mechanism	Target/ Baseline	2014 Actual <sup>1</sup>	Reporting Frequency
266	<b>Percent of congested corridors implemented with incident management plans<sup>1</sup></b>	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	32%	67%	Calendar Year <b>Quarterly reporting</b>

<sup>1</sup> Data is not available until late 2015. Therefore, this is 2014 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 2015 through April 2016. The overview includes the risk statement, target outcome/expected products and contacts (non-QIC member leads are in italics).
- Risk response strategy recommendations finalized in 2015.
- Recommendations from 2011-2014 in which implementation is underway or completed.

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

#### **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

#### **Process for Locally-Owned (Non-CDOT) Off-System NHS Bridge/Pavement**

- **Area of Risk and Likelihood/Impact:** MAP-21 requires that state DOTs develop and implement a Transportation Asset Management Plan that, in part, defines the context for how performance target will be achieved for bridges and pavement on the National Highway System (NHS). The NHS in Colorado is approximately 90% CDOT owned (on-system) and 10% local agency owned (off-system). Performance is now being monitored at the state and MPO level, and there is a need to better understand the policy and investment decision making to ensure that performance targets are met at the state and MPO level.

- **Target Outcomes/Expected Products:** Clarify risk and develop recommendations to fix it.
- **Contacts:** CDOT: William Johnson; FHWA: Randy Jensen

### Design Build QA/QC Process

- **Area of Risk and Likelihood/Impact:** Not providing independent verification on Design Build (D-B) projects where the contractor is responsible for quality assurance (QA) does not follow the federal process. There is a high risk that materials will not be in compliance with specifications if there is no independent corroboration of quality results. There is a need to ensure that an effective materials quality assurance program is included and administered on Design-Build projects where acceptance relies on contractor's formal QC.
- **Target Outcomes/Expected Products:** A new statewide process to be developed and approved by FHWA to use on D-B projects with contractors doing formal QA. New Design Build and Field Materials (D-B and FMM) Manual guidance on the D-B Quality Assurance Plan (QAP) requirements for use on all projects using the contractor's formal QC results for acceptance. Likely products include:
  - D-B Manual guidance on development schedule, design team and specialty members
  - FMM guidance on materials finals documentation for D-B
  - Specification templates for QAP on D-B projects
  - Guidance on software used for managing test data
  - Post-JPR audits of future D-B projects to document progress
  - Clarification on independent assurance testing (IAT) for D-B projects
- **Contacts:** CDOT: *Jay Goldbaum, Nabil Hadad, Neil Lacey, Bill Schiebel*; FHWA: *Monica Pavlik, Shaun Cutting*

### 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

### 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

### Categorical Exclusions (CE) Review

- **Area of Risk and Likelihood/Impact:** This review is intended to verify that the CE projects were properly classified as programmatic through the physical examination of the project files and supporting documentation. It is also intended to review documentation practices for non-programmatic CEs. It will cover how CEs are processed and documented in each region.

- **Target Outcomes/Expected Products:** Periodic reviews are required by FHWA. A Joint Process Review with CDOT will satisfy one of these reviews. Specific expectations include:
  - Evaluate the process associated with the past years' categorical exclusion projects.
  - Gather information for PA Update
  - Gather information for NEPA Manual update
  - Gather information for CE training (under development)
  - Gather information for using consultants in the CE process
- **Contacts:** Jane Hann, David Singer, Sean Brewer; FHWA: Stephanie Gibson, Tricia Sergeson, Bill Haas

### **Other Risk Response Strategies (May 2015- April 2016)**

#### **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

#### **Contractor Performance Evaluation**

- **Risk Statement:** In the absence of evaluation criteria and processes, the risk is that contractors feel no pressure to meet high enough performance standards on projects. Without having an evaluation process in place and applying performance data, poor performing contractors remain eligible to continue doing work for CDOT. Projects may be subject to inferior workmanship and lesser sustainability.
- **Target Outcome/Expected Products:**
  - Develop contract performance evaluation.
  - Develop processes which better utilize performance evaluation results.
  - Develop clearer procedures ensuring better use of suspension/debarment authorization, where appropriate.
- **Contacts:** CDOT: *Mark Straub, Frank Kinder*, John Eddy; FHWA: Randy Jensen

### **Joint Process Review Recommendations Finalized in 2015**

#### **Contractor Capacity for Increased Low Volume Road Thin Treatments ALL COMPLETED**

1. Develop new and/or improved Thin Lift Treatment Specifications through the current Task Force, taking into account local aggregate sources to minimize project costs.
2. Revise the Pavement Design Manual in order to improve treatment selection.
3. Promote awareness through regular and routine industry partnering around future CDOT thin surface treatment projects and new direction for low volume roadways.

#### **Bridge Asset Management ALL COMPLETED**

1. Document eligibility criteria, prioritization and process for selecting bridges for inclusion in the 4-year asset management plan. Determine process for bridges that are selected and not funded.
2. Develop criteria and performance metrics that reflect the Risk-Based Asset Management Plan (RBAMP) and define how funding approvals relate.

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

1. Facilitate the standardization and creation of a R2 Finals Folder in Projectwise under Project Planning.
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 in 2015**
3. Develop and implement a R2 Mentor Program to provide support to Project Engineers.
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. **COMPLETED in 2015**
6. Create and implement a tracking and evaluation process that includes metrics. **COMPLETED in 2015**

### **Improving the Process for Retention of CDOT's Core Documents**

7. Identify CDOT unique and region unique records.
8. Standardize the retention process by clarifying and updating Procedure Directives 51.1 (Retention of Documents) 21.1 (Central Files Construction Project Filing System).
9. 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.
10. Prepare a records inventory to comply with C.R.S 24-80-102.7 requirements.
11. Update CDOT Records Management website. **COMPLETED in 2015**
12. 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.

### **Other Risk Response Strategies Finalized in 2015**

#### **Infrastructure Failure - Tunnel Inspections**

CDOT and FHWA developed a risk response for this risk. If CDOT is not in compliance with the Tunnel Inspection Program requirements then internal integrity and safe operation of the tunnels may be at risk. It will also be more difficult to program maintenance needs that are costly via the tunnel management system.

The following tasks were completed:

- Updated inspection standards were developed in the National Tunnel Inspection Standards (NTIS) and Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manuals, which were released in July 2015..
- A contractor was hired to:
  - Develop an inventory and inspection of the tunnels in the state of Colorado (CDOT established its tunnel inventory and submitted the required data to FHWA in 2015)
  - Develop a risk based asset management plan for tunnels (likely will be developed in 2017), and
  - Recommend a web based data management system compatible with the AASHTOWare Bridge Management version 5.x databases.
- A determination was made that a performance goal will be based on fire life safety.

FHWA will evaluate the tunnel inspection program similar to the bridge inspection program in approximately 2018 after the NTIS is implemented. Formal tunnel inspection training will take place in the next two years.

#### **Intergovernmental Agreements (IGA) Process Improvement**

- **Area of Risk and Likelihood/Impact:** Completing IGAs takes a long time and can be a bottleneck for projects.
- **Target Outcomes/Expected Products:** Recommendations to improve the time to release IGA drafts and standardization of the IGA process. The goal is to reduce the elapsed time for IGAs by 25%.
- **Contacts:** CDOT: Gary Vansuch

#### **Risk Response Recommendations Being Implemented or Completed (2011-2014)**

##### **Expenditure Based STIP - Cash and Program Management (2014) ALL COMPLETED**

1. Incorporate risk analyses into the forecasts of reasonably available revenues.
2. Establish a financial planning process, called the staging area, in which all aspects of funding projects are planned before they are executed including the allocation of funds to projects, the programming of project in the Statewide Transportation Improvement Program (STIP), the allotment of funds to projects in the department's appropriations and the encumbrance of funds.
3. Develop and publish the STIP as a cash-based, eight-year STIP, allocating revenues to projects and programs in the STIP based on forecasts of cash expenditures.
4. Cease using the STIP as CDOT's principal budgeting tool and use the staging area to program projects that, once funding can be reasonably anticipated, may be added to the metropolitan planning organization's transportation improvement plan and the STIP. Streamline the STIP update and amendment processes as the STIP's role as a programming document allows.
5. Manage projects within a rolling four-year budget.
6. Streamline program, project and budget reviews and approvals put before the Colorado Transportation Commission as outlined in the draft Policy Directive 703.0.
7. Encumber only the cash to be spent in one year under a highway construction contract that is expected to span two or more years.
8. Manage cash towards target balances by controlling cash expenditures, starting with limits on the value of construction contracts that are let in each month.

##### **Risk Based Asset Management Plan (2014) ALL COMPLETED**

1. Develop and document the budget distribution, project selection and project tracking process
2. Integrate risk analysis into planning and programming processes
3. Develop strategies to manage project and program delivery risks
4. Establish a risk framework to evaluate alternative strategies
5. Analyze budget tradeoffs across programs
6. Improve project scoping and optimization
7. Incorporate life-cycle analysis into decision-making
8. Clarify the role of target-setting
9. Implement a strategic management framework to reflect on progress
10. Communicate the benefits of Transportation Asset Management

##### **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
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 – **COMPLETED**
10. CDOT needs to fund E/S Non-Project Specific (NPS) contractors and/or obtain better funding for CDOT Maintenance - **COMPLETED**
11. Funding liaison position at CDPHE – **COMPLETED**

## **APPENDIX A. ENVIRONMENT SECTION - OTHER NOTABLE REGULATIONS AND ACCOMPLISHMENTS TO COMPARE FOR TRACK TRENDS 2013**

### **Priority projects:**

- T-REX construction - driven by Governor Owens/Tom Norton
- SH 85 and 120<sup>th</sup> extension signed in May 2003 - ~~9 months~~ also 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 - ~~13 months~~ driven by Governor Hickenlooper/ Don Hunt

### **Delayed projects:**

Not yet evaluated but workload played a factor in some, especially in R2, where some got put on hold. Others had issues with the local agencies, such as the C-470 EA – I25 to Kipling, US550/160 Supplemental EIS, and I-70 East EIS - all where the preferred alternative was not agreed to.

### **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

### **Notable Initiatives and Accomplishments:**

- First EA/EIS in this analysis started in 1999
- CDOT Environmental Stewardship Guide – 1<sup>st</sup> version in 2003
- CDOT Environmental Stewardship Guide – 2<sup>nd</sup> 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 – 1<sup>st</sup> 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 – 2<sup>nd</sup> version (total rewrite) in August 2008
- PEL 56<sup>th</sup> Ave completed in 2008
- PEL Arapahoe Road (start 2005, draft in 2007, completed with new checklist in February 2009)
- PEL Parker Road (start September 2007 – end February 2009)
- PEL Federal Blvd, West 5<sup>th</sup> Avenue to West Howard Place, completed in October 2009
- CDOT NEPA Manual – Minor update to fill placeholders in the 2008 version accomplished in Dec 2009, added Style Guide and Generic Environmental Scope of Work – still considered Version 2
- Every Day Counts 1 – 2010, 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 – 2012
- CDOT NEPA Manual – 3<sup>rd</sup> version in March 2013 with many updates and additions
- PEL studies - 2013-2014, 4 new projects started, none of which have been completed

- EAs - 2013-2014 an additional 4 EAs were started
- PEL studies post 2014 – 10 future PELs planned (but not necessarily funded)
- CDOT NEPA Manual – Version 4 released in October 2014 with many updates and additions
- MAP-21 resulted in new Categorical Exclusions being available to use with the intension of resulting in fewer EAs going forward.

### **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 Mtn 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 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 1<sup>st</sup> of the same year. This goal was met before Thanksgiving, with the understanding that the emergency repairs were temporary and that the permanent repairs would occur over the next several years. The intensity of this effort pulled resources off 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 intentions 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 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-25 South PEL, and the Road X initiative. 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 the Colorado Department of Transportation (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.