



COLORADO
Department of
Transportation

Annual Report

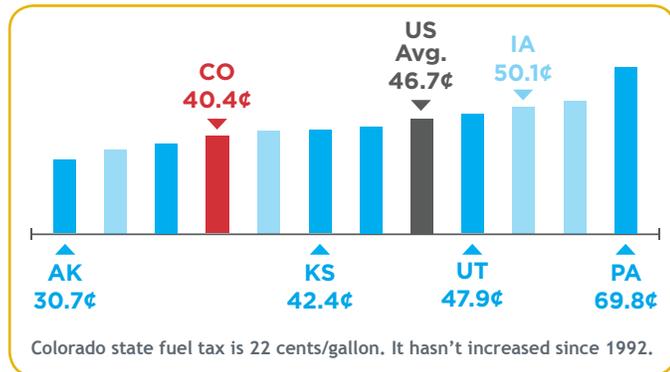
2017

WHAT CDOT DOES FOR YOU

Your Department of Transportation at a Glance

<p>MONITORS 278 of 522 AVALANCHE PATHS</p>	<p>MAINTAINS, & REPAIRS MORE THAN 23,000 HIGHWAY LANE MILES</p>	<p>SPENDS \$69 MILLION PER YEAR ON SNOW REMOVAL</p>	<p>KEEPS 35 MOUNTAIN PASSES OPEN YEAR-ROUND</p>	
<p>ADMINISTERS ABOUT \$11 MILLION IN FEDERAL GRANTS FOR TRANSIT OPERATORS</p>	<p>OVER SEES \$41 MILLION IN FEDERAL AVIATION GRANTS FOR AIRPORTS</p>	<p>MAINTAINS 3,447 BRIDGES</p>	<p>OVERSEES 28 BILLION ANNUAL VEHICLE MILES TRAVELED</p>	<p>MANAGES OVER \$5 MILLION IN FEDERAL GRANTS FOR SAFE DRIVING PROGRAMS</p>

Fuel Tax Amounts in Other States



Colorado has some of the most costly maintenance challenges, given the snow and ice control and extreme weather on our high mountain passes. Still, our fuel tax is lower than other states that have no mountain highways, such as Kansas and Iowa.

Transportation Funding is Limited

With 58 percent of our budget going towards maintaining our current system, it is essential that we are both efficient and effective with our funds. CDOT is accomplishing this in several ways:

- Analyzing and implementing methods to get more out of the existing system (use of shoulders during high-congestion periods)

- Being proactive and investing in preventive maintenance (crack-sealing and chip-sealing)
- Helping motorists make informed travel decisions (electronic roadside messaging, traveler apps)

These efficiencies are just a few examples of how CDOT is working to maximize our existing system. We will continue to analyze and implement more operational improvements as opportunities arise.



Region 2 maintenance crew work nighttime hours to upgrade guardrail along I-25 in Pueblo.

WHO CDOT IS

Our Mission

To provide the best multi-modal transportation system for Colorado that most effectively and safely moves people, goods, and information.

CDOT Values Get an Update

Every day, we work hard to live our six CDOT values. In 2017, we refreshed the definitions for three of them—Safety, Customer Service, and Respect—making the text more specific and action-oriented. See the updates and the full text of all of our core values below.

A Brief History of CDOT

- 1909:** The first highway bill was passed by forming a three-member Highway Commission to approve work and allocate funds.
- 1917:** The State Highway Fund was created and the State Highway Department (CDOH-Colorado Department of Highways) was formed.
- 1968:** Legislation reorganized matters related to highways and created the Division of Highways.
- 1991:** CDOH became Colorado Department of Transportation (CDOT).



Values 2017 →

SAFETY

We work together to achieve a high performing safety culture. We promote and apply consistent and sustainable safe work behaviors in everything we do.

PEOPLE

We value our employees. We acknowledge and recognize the skills and abilities of our coworkers and draw strength from our diversity and commitment to equal opportunity.

INTEGRITY

We earn Colorado's trust. We are honest and responsible in all that we do and hold ourselves to the highest moral and ethical standards.

CUSTOMER SERVICE

We strive to provide the highest level of customer satisfaction and experience. With a can-do attitude, we work together and with others to respond effectively to our customers' needs.

RESPECT

We treat everyone with respect. We are kind and civil with everyone, and we act with courage and humility.

EXCELLENCE

We are committed to quality. We are leaders and problem solvers, continuously improving our products and services in support of our commitment to provide the best transportation systems for Colorado.

MESSAGE FROM THE EXECUTIVE DIRECTOR



At the Colorado Department of Transportation, we exist to protect people's lives and promote our state's economic vitality. When we succeed, we provide the public freedom, connection and experience through travel. We believe we can fulfill our purpose by becoming the best department of transportation in the country.

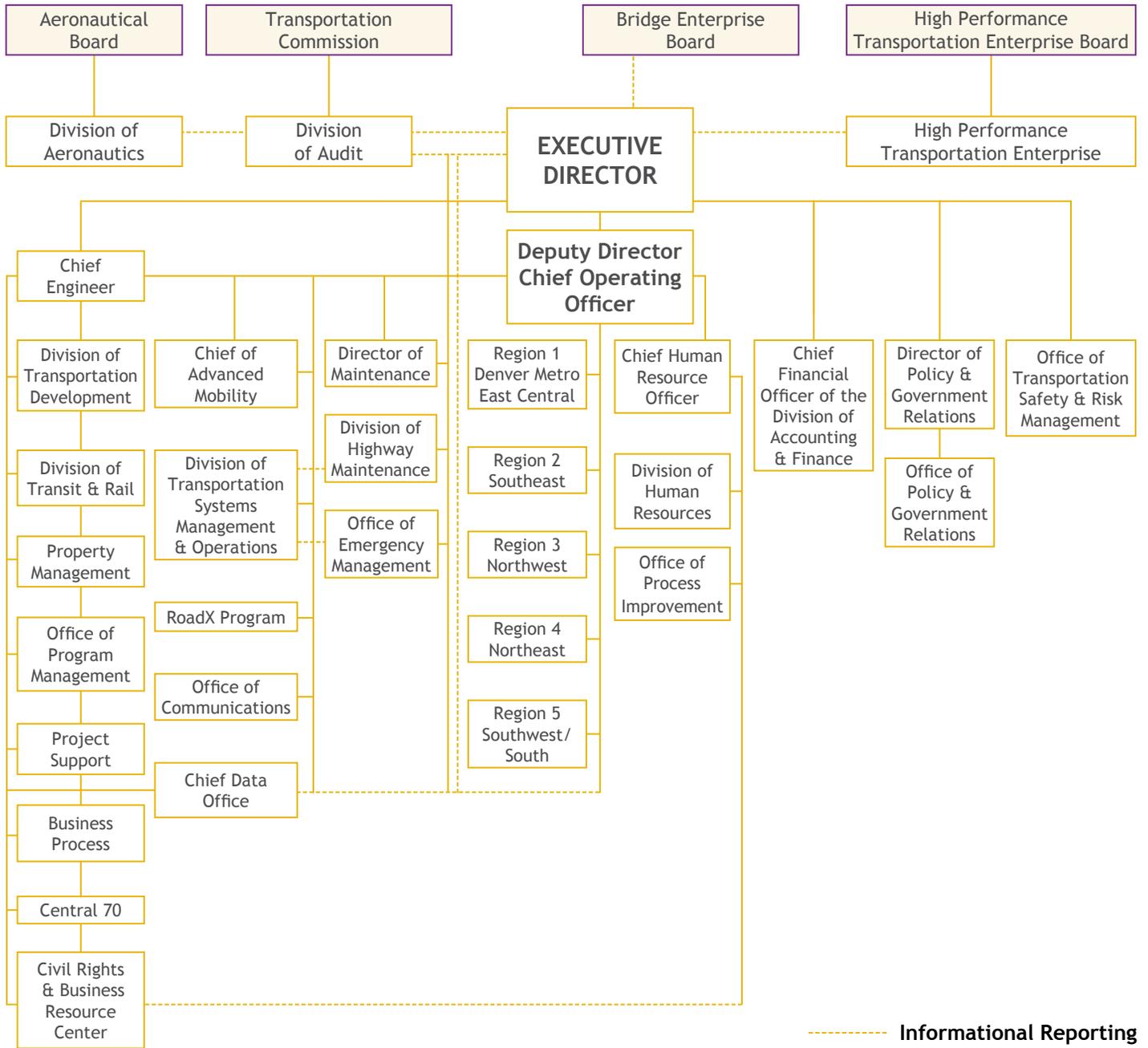
We've seen exceptional accomplishment at the Colorado Department of Transportation in recent years and 2017 was no exception. Despite CDOT facing ongoing budget shortfalls—nearly \$1 billion annually—we continually seek ways to best serve the traveling public in our state.

Some of our progress has occurred behind the scenes. We updated the definitions of our core departmental values to better guide our every action and decision. Our bridge engineers conducted approximately 1,600 inspections to help ensure our infrastructure is safe.

Other achievements were more visible. We completed the world's first commercial delivery by a self-driving truck and finished extensive safety and access improvements in El Paso County via the Cimarron Expressway.

Throughout the pages of this annual report, we present to you the highlights of our activities for the year. We hope you will see our pride, dedication and commitment to serve in everything we have undertaken.

HOW WE ARE ORGANIZED

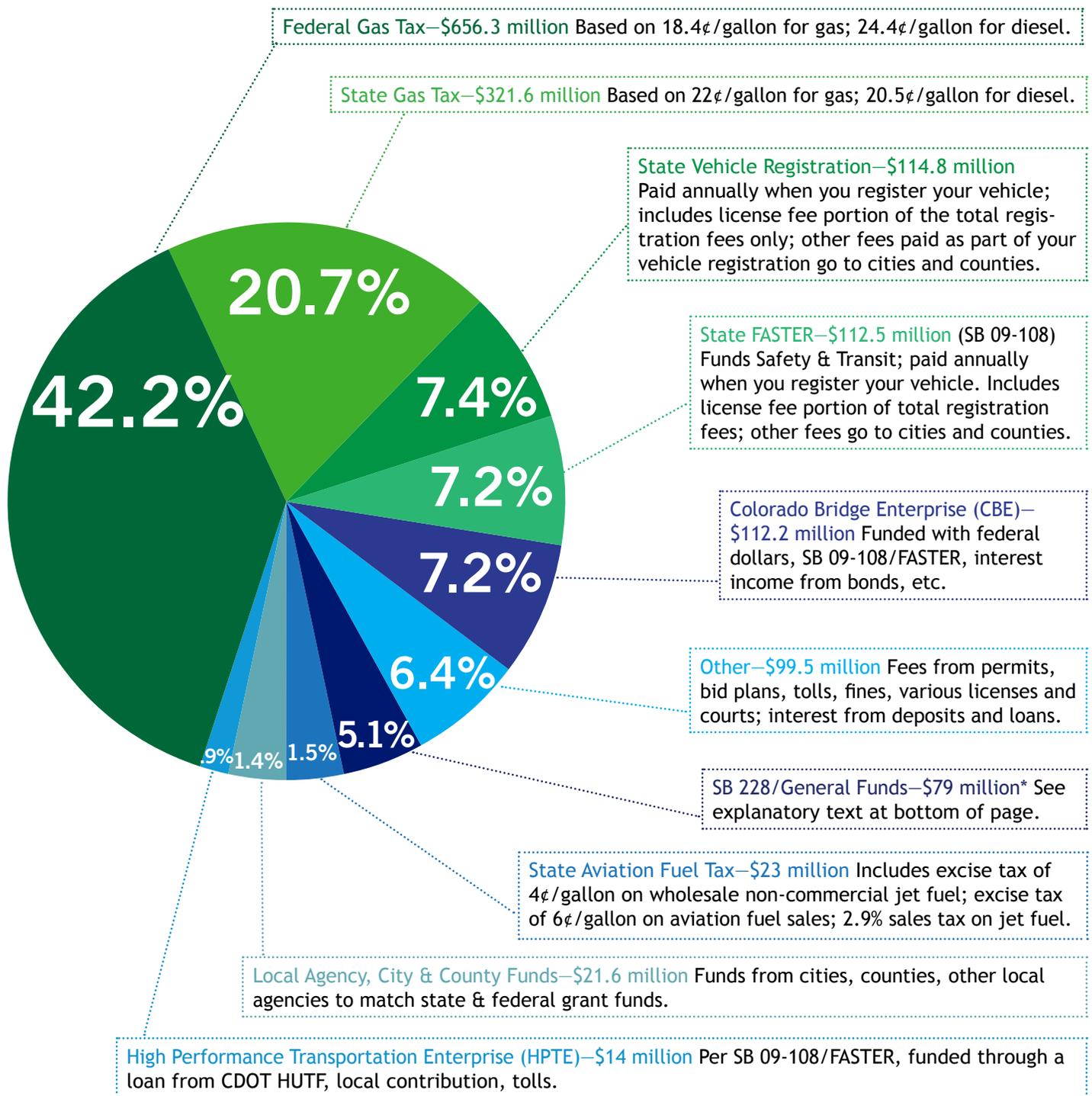


----- Informational Reporting
 ————— Direct Reporting

As of 1/2018



SOURCES OF CDOT FUNDING [TOTAL \$1.55 BILLION]



*In 2009 the General Assembly enacted Senate Bill 09-228, which:

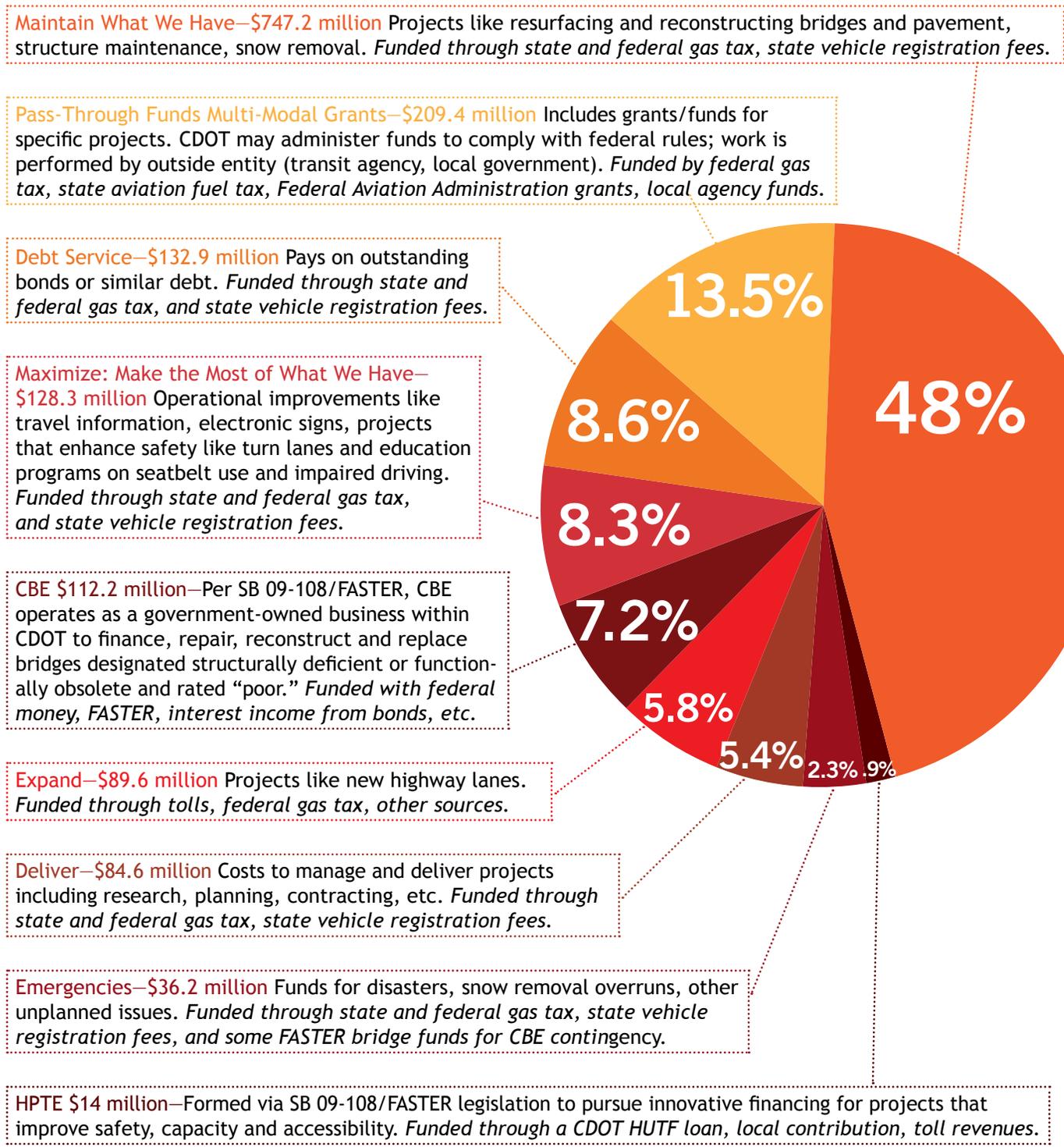
- Repealed a statutory limit on the annual growth of certain appropriations from the General Fund;
- Repealed S.B. 97-001, a conditional transfer of General Fund revenue of up to 10.35% of state sales and use tax receipts to the State Highway Fund;
- Repealed H.B. 02-1310, a conditional transfer of excess general revenue above the General Fund appropriations limit to the State Highway Fund and the Capital Construction Fund;
- Increased the statutory General Fund reserve contingent upon economic and fiscal conditions; and
- Authorized a five-year sequence of General Fund transfers to the State Highway Fund and the Capital Construction Fund contingent upon economic and fiscal conditions.

General Fund Transfers to Transportation

The bill authorized a five-year sequence of General Fund transfers to the State Highway Fund of up to 2.0% of gross General Fund revenues, under the following conditions:

- Transfers do not begin until the first fiscal year after the first calendar year in which statewide personal income grows by at least 5.0%, as measured by the U.S. Bureau of Labor Statistics.
- A TABOR refund under 3 percent of Colorado General Fund revenues is issued pursuant to Article X, Section 20 of the Colorado Constitution.

USES OF CDOT FUNDING [TOTAL \$1.55 BILLION]



* All figures on pages 6 and 7 are based on FY 2017–18 budget. Does not include \$127.4M of 2013 Flood Recovery Funds. State fiscal year is July 1–June 30.

* Funding Advancements for Surface Transportation and Economic Recovery or SB 09-108.

YOUR CDOT DOLLAR AND HOW FAR IT GOES

CDOT gets the majority of its funding from Colorado vehicle drivers—those of you who buy gas in Colorado and also register your vehicle in our great state. A portion of the state and federal fuel taxes you pay goes to CDOT, and the rest goes to cities and counties throughout the state.

Have you ever wondered how much you, as an individual driver, contribute annually to support the transportation system you use? To give you an idea, here are some

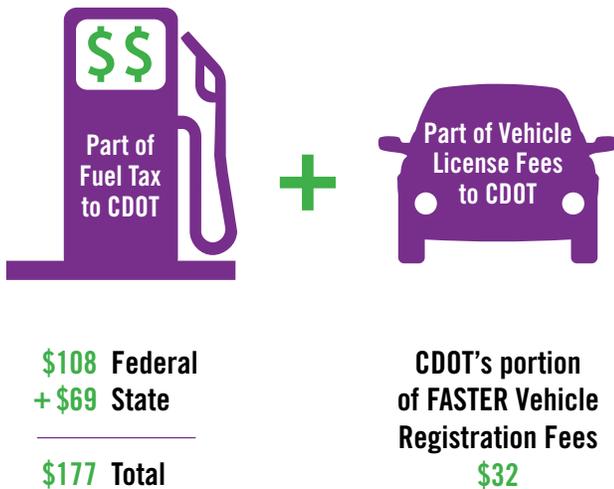
data: We know that the average Colorado driver travels about 13,859 miles per year. If we apply an average of 23 miles per gallon to that, we find that the average driver spends roughly \$20-25 a month to use Colorado’s roadways, likely less than your monthly phone bill.

We’ve illustrated here how a Colorado driver contributes to our state’s highway system and how we at CDOT use that revenue to maximize each dollar spent.

HOW CDOT RECEIVES FUNDS FROM YOU TO PAY FOR THE STATE HIGHWAY SYSTEM

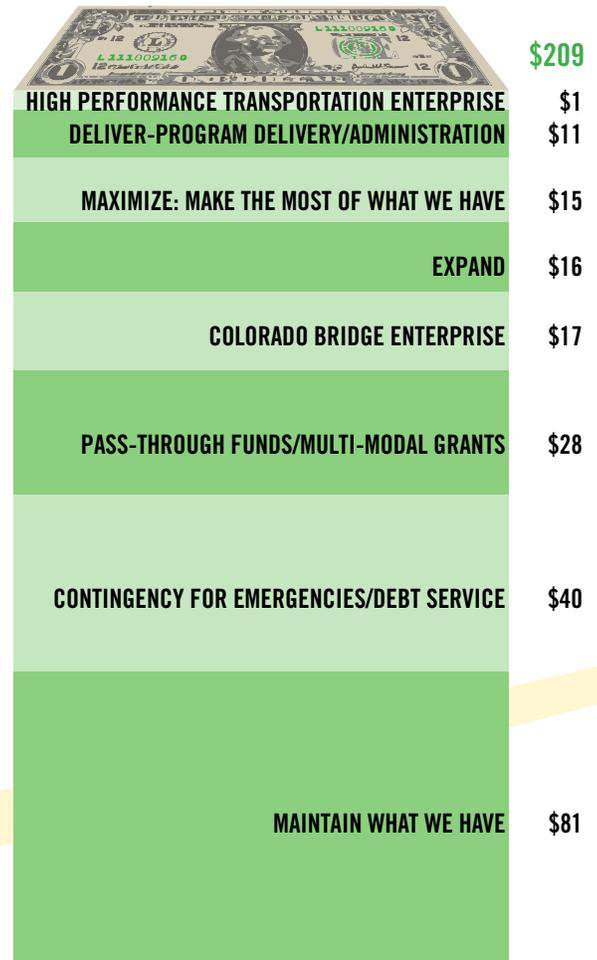
Based on Annual Vehicle Miles Traveled by Average Colorado Driver

\$209 Your Total Annual Contribution



HOW CDOT USED YOUR DOLLARS IN FISCAL YEAR 2017

Based on Annual Vehicle Miles Traveled by Average Colorado Driver



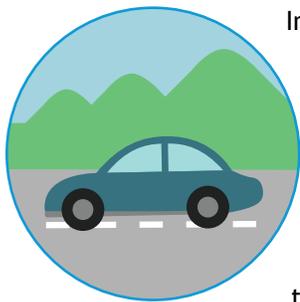
NOTE: The amounts estimated represent a breakdown of your average annual contribution if it were spent the way that CDOT spends its entire budget. Also note, these are only estimates. Your actual costs would depend on your vehicle, how much you drive, and other factors.

EXPLORING FUNDING OPTIONS

Colorado Road Usage Charge Pilot

CDOT is facing a nearly \$1 billion annual funding shortfall over the next 10 years. To address this, we are exploring various transportation funding alternatives. The gas tax is unable to meet the infrastructure investment needs of the transportation system due to decreased purchasing power, increased population, and more fuel-efficient and electric vehicles. A healthy, multimodal transportation system is critical in maintaining the quality of life Coloradans have grown to expect. In December 2017 we successfully completed our Road Usage Charge Pilot Program (RUCPP) Research Study, which explored how a pay-by-mile system compares to the current gas tax system, as well as its feasibility in Colorado.

The four-month pilot included 100 participants from 27 counties across the state. The pilot successfully tested RUC technology on vehicles with various fuel efficiency and fuel types—gas, hybrid and electric—and demonstrated the feasibility of three mileage-reporting methods, including one manual and two technology options. The pilot collected mileage data and simulated payments of a road usage charge while gathering feedback and ideas from the general public and participants through a series of surveys.



In summary, the pilot demonstrated RUC is technically feasible as an alternative transportation funding mechanism. Diverse transportation leaders are engaged and can now also provide guidance for future transportation policy discussions. The technology-based

systems were highly accurate and most convenient for users. Participants felt well-informed and were more content with the system through the pilot's variety of communications tools.

Next Steps We will conduct continued education and outreach; evaluation of key issues raised; continued research through a federal grant program; and continued collaboration through involvement with a consortium of western state departments of transportation. Please read more and calculate your own [Road Usage Charge](#).



Look for this icon on the [Road Usage Charge page](#) on the CDOT website to calculate your hypothetical charge.

Benefiting from Additional Funding from SB 17-267

Senate Bill 17-267, “Concerning the Sustainability of Rural Colorado,” authorizes lease-purchase agreements on state facilities totaling \$2 billion to be issued in equal amounts over four years, beginning in fiscal year 2018-19. CDOT will receive \$1.88 billion of these proceeds, with the remainder going towards state buildings. CDOT may use the proceeds for “Tier 1” projects in the 10-Year Development Program Plan, with at least 10 percent of the proceeds going towards transit. CDOT must also spend at least 25 percent on projects in counties with a population (as of July 2015) of 50,000 or less.

After the state covers payments for the capital construction proceeds, CDOT is responsible for the first \$50 million in lease payments related to state highway projects, with the remainder being paid by the General Fund or “any other legally available source.” After four years of lease-purchase agreements are executed, the repayment is expected to reach approximately \$150 million per year. Each lease-purchase agreement would have a term of twenty years. While CDOT’s minimum commitment is \$50 million per year, the potential exists for a maximum repayment amount of closer to \$150 million, if the legislature were to subsequently choose to transfer additional repayment liability to our department.

Ramping Down RAMP

Over the last five years, CDOT changed how it budgeted and expended funds for transportation projects. Using sound business practices, this effort—known as Responsible Acceleration of Maintenance and Partnerships (RAMP)—better coordinated project expenditures and available funding. RAMP’s five-year life span has now come to an end and we are returning to a pre-RAMP base level of advertisements, which we assume will be supplemented by SB 17-267 when that funding becomes available. Please read more about [RAMP](#).

BECOMING THE BEST DOT IN THE COUNTRY

Climbing the Three Peaks

As highlighted in [CDOT's 2017-18 Performance Plan](#), our strategic framework focuses on reaching the “summits” of our “Three Peaks” to become the best transportation department in the country for our customers. Our purpose is to provide freedom, connection and experience through travel. Our “Three Peaks” are detailed below, along with key 2017 accomplishments for each.

People Peak Growing and developing our team so everyone loves to come to work and others want to work for the best DOT in the county.

- Our I-70 Mountain Express Lane team (Region 1) won the first-ever **Governor's Elevation Award** for Superior Customer Service. Awards were judged by a panel of private sector judges from across the state.
- CDOT staff hosted the AASHTO (American Association of State Highway and Transportation Officials) TransComm meeting this summer in Denver. This annual meeting, which focuses on communications practices and initiatives, was a huge success and earned praise from multiple state agencies who participated.
- David Spector, director for our High Performance Transportation Enterprise (HPTE), won the prestigious P3 (Public-Private Partnership) **Entrepreneur of the Year Award** in Washington, D.C., from the American Road & Transportation Builders Association.

Healthy Multimodal System Peak Enhancing roads, bridges and multimodal operations to get customers where they need to go more safely, easily and confidently than ever before.

- With the Colorado Transportation Commission's funding commitment of \$2.5 million annually to the Colorado Safe Routes to School (CSRTS) program, we are developing a five-year strategic plan that will guide the program into the future.
- We are funding the first remote air traffic control tower (ATCT) demonstration project at the Northern Colorado Regional Airport in Loveland.

Leading-Edge Technology Peak Deploying leading-edge technology to keep people moving safely and reliably.

- We developed the nation's first Autonomous Impact Protection Vehicle to improve work zone safety. This is vital, considering there have been 26 incidents where a CDOT attenuator truck has been struck by the traveling public in the last four years alone.
- Our US 36 Express Lanes won the American Association of Transportation Officials' grand prize for “Best Use of Technology and Innovation,” and we received a \$10,000 check towards a charity or transportation-related scholarship of our choosing.



HPTE Director David Spector, right, won the American Road and Transportation Builders Association's (ARTBA) P3 Entrepreneur of the Year award.

PROTECTING & PROLONGING THE LIFE OF OUR ASSETS



A CDOT-triggered avalanche, seen here on US 6 over Loveland Pass, reduces the risk of a natural slide impacting travel.

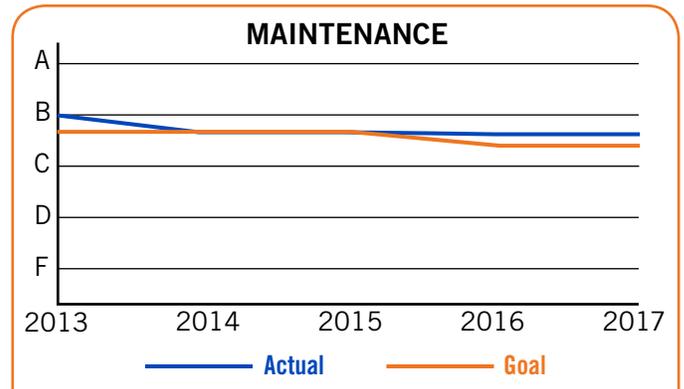
Maintaining Our System

Our Highway Maintenance Program accounts for about 20 percent of our annual budget. However, a total of 48 percent (FY 2017) is spent on projects designed to maintain our existing system, like pavement resurfacing or drainage upgrades.

Of the \$271.3 million spent on maintenance in FY 2017, about \$42.3 million went to roadway surface maintenance, \$77.8 million to snow and ice control, \$71.1 million to traffic devices (signs, striping, and signals). The remainder was spent on planning and scheduling, roadside appearance, bridges, buildings, equipment and our major I-70 tunnels/control centers (Hanging Lake Tunnel and Eisenhower/Johnson Memorial Tunnel).



CDOT Region 1 and 3 crews conducting Gazex maintenance on Berthoud Pass.



YEAR	2013	2014	2015	2016	2017
Long Range Goal	B-	B-	B-	C+	C+
Actual	B	B-	B-	B-	B-
Budget (in Millions)	\$242	\$249	\$263	\$261	\$263

The long-range goal was revised in 2013 to reflect budget and performance evaluation.

We spend about 30 percent of our maintenance budget on snow and ice control, which includes our avalanche program. There are more than 522 known avalanche paths in Colorado. Our crews regularly monitor and/or control at least 278 of them. The 2016-17 total seasonal snowfall was near or above average for most of the state. An abundance of snowfall in December and January compensated for a very dry fall and spring.

During the 2016-17 avalanche season there were 990 reported avalanches in paths that threaten our state highways, 141 avalanche hazard reduction missions, 389 triggered avalanches that covered 23,918 feet of the highway's centerline and 129 natural avalanches that covered 9,330 feet of centerline. There were 472 triggered avalanches that did not reach a highway.

The Gazex system we installed during the 2015-16 winter on US 40 at Berthoud Pass and US 6 on Loveland Pass operated for a second winter season. Gazex, triggered remotely, uses compressed gases to create a concussive blast to trigger a slide while traffic is stopped. This system makes our overall avalanche operations more efficient and effective. We plan to install this system on other avalanche-prone corridors.

PROTECTING & PROLONGING THE LIFE OF OUR ASSETS

Over the past fiscal year, our maintenance crews:

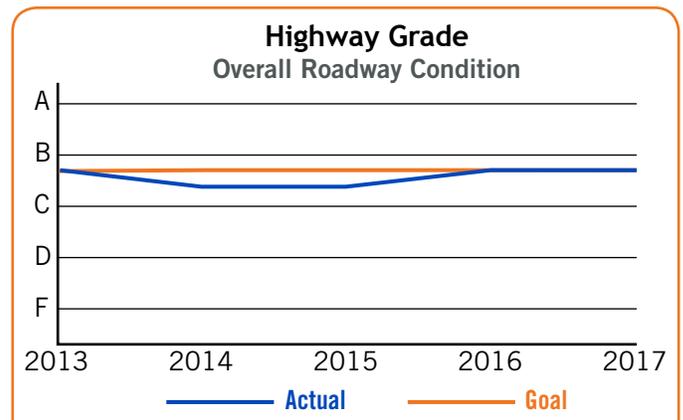
- Repaired and maintained more than 35,066 miles of roadway
- Used 216,580 tons of asphalt and 65,862 gallons of liquid asphalt
- Plowed, sanded, deiced 5.2 million miles of highway
- Striped more than 19,712 miles and installed 192,463 square feet of pavement markings
- Managed 304 hours of road closures due to snow
- Applied 202,662 tons of solid deicer and 12 million gallons of liquid deicer
- Repaired or installed 136,488 feet of snow fence
- Disposed of 68,680 cubic yards of trash with help from 9,414 Adopt-A-Highway volunteers; 8,218 bags of trash with the support of 57 corporate sponsors
- Replaced/repaired 48,068 signs and signposts
- Replaced/repaired more than 14.2 million linear feet of fencing

Preserving Our Roadways

Through our Transportation Asset Management Program, we strive to maximize the condition of an asset (roadway, bridge, tunnel, building, signal, etc.) for the least cost over its lifetime. This approach, required by the Federal Highway Administration, guides us in developing and implementing risk-based strategies to insure our limited funding is applied to the right project, for the right asset, at the right time.



After clearing the roads from a high country winter storm, huge snow blowers are at rest near the summit of CO 145 Lizard Head Pass in SW Colorado (Region 5, Dolores and San Miguel Counties).



YEAR	2013	2014	2015	2016	2017
Long Range Goal	B-	B-	B-	B-	B-
Actual	B-	C+	C+	B-	B-
Budget (in Millions)	\$357	\$395	\$401	\$411	\$413

Note: Grades are based upon the Drivability Life metric for pavement condition.

Possibly the most visible or obvious asset we maintain is roadway surface. We maintain 9,100-plus miles of state and US highways that people depend upon each day to be smooth and safe.

Work to improve or maintain our transportation assets over the past year have included:

US 40 (Colfax Ave.): Galapago Street to Colorado Boulevard, Denver County
Cost: \$6 million

Resurfacing and reconstruction of ADA (Americans with Disabilities Act) wheelchair accessible curb ramps.

US 287: Colonia to Park in Lamar, Prowers County
Cost: \$15.6 million

This multi-year project involves concrete reconstruction with safety and mobility upgrades including wheelchair accessible curb ramps and sidewalk corner “bump-outs” that calm traffic and reduce pedestrian crossing distance.

I-70: Beavertail Tunnel Lighting Replacement, Mesa County
Cost: \$5 million

Replaced 30-year-old lighting in the Beavertail Tunnels and made infrastructure repairs in the tunnel bores.

PROTECTING & PROLONGING THE LIFE OF OUR ASSETS



US 85 from Ault to the Wyoming state line was resurfaced.

US 85: Ault to Wyoming, Weld County
 Cost: \$20 million

Resurfaced and made safety improvements on US 85 from Ault to Wyoming state line. This project received the highest rating from the Colorado Asphalt Pavement Association. Safety improvements included widened shoulders, straightened curves and culvert repairs.

US 160/US 550: Durango, La Plata County
 Cost: \$6 million

Rehabilitated five miles of highway with a “diamond grind” process to prolong the life of the 18-year-old concrete pavement and enhance highway safety for all users. The project also involved concrete joint sealing, new pavement markings to accommodate a cycling lane, and ADA wheelchair accessible ramps at four intersections.

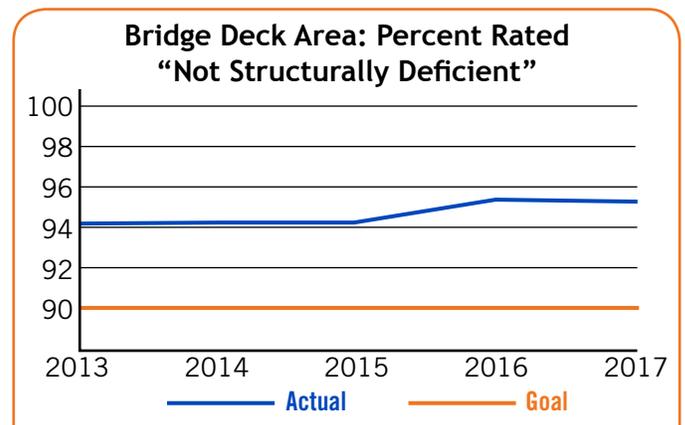
Addressing Our Bridges

As with our Surface Treatment Program, CDOT’s Bridge Preventive and Maintenance Program goals also include addressing risks to our state highway system identified through Asset Management. These risks include:

- Scour, meaning the bridge has a foundation that is at risk of failure due to erosion; this is the most common cause of bridge failure, and CDOT has 152 scour-critical bridges on our state highway system
- Bridge joints not in “good” condition; 28.46 percent of the total length of bridge joints in the state are in fair, poor or critical condition
- Unsealed or otherwise unprotected deck area, which currently includes 1,265 bridges or 12.6 million square feet of total deck area

- A vertical clearance lower than the minimum design requirement of 16 feet; such bridges are at risk of sustaining repeated hits from commercial vehicles; we have identified 64 such bridges
- A vertical clearance lower than the statutory minimum of 14.5 feet; we have identified 16 bridges below this limit
- Load-restricted bridges, whose current capabilities to support extra-legal highway loads (i.e., permitted overweight vehicles) are inadequate, meaning we are restricting commercial trucking movement throughout our state; we have identified 59 such bridges
- Load-posted bridges, which are bridges whose current capabilities to support legal loads are inadequate, restricting commercial trucking movement throughout our state; we have identified seven such bridges

To address these risks, our Bridge Division designs and prepares projects to be advertised to and constructed by contractors. Our bridge engineers are also ultimately responsible for bridge inspection both on and off the state highway system. Over the past fiscal year, they conducted approximately 1,600 inspections for structures on the state highway system and managed approximately 2,300 inspections for those off our system.



YEAR	2013	2014	2015	2016	2017
Long Range % Goal	90	90	90	90	90
Actual %	94.1	94.3	94.4	95.5	95.4
Budget (in Millions)	\$141	\$146	\$138	\$149	\$149

Budget figures include both CBE and CDOT Bridge funds.

PROTECTING & PROLONGING THE LIFE OF OUR ASSETS

Of the 201 bridges eligible for Colorado Bridge Enterprise funding (designated structurally deficient or functionally obsolete), 133 structures have been replaced or repaired, nine are under construction, 22 are either in design or have completed design and 37 are not yet programmed (as of December 2017).

Here is a sampling of bridge projects underway and/or completed in 2017:

I-70 and I-25: Bridge Preventative Maintenance, Denver County
Cost: \$5.5 million

Project replaced expansion joints and overlaid nine bridge decks with polyester concrete within the interchange ramps of I-70 and I-25 to improve durability and rideability. This preventative maintenance prolongs the life of the structures and minimize future maintenance costs.

I-25: Between City Center Drive and Ilex Street (the new Pueblo Freeway), Pueblo County
Cost: \$79 million

This project is replacing bridges on I-25 between Ilex Street and City Center Drive and rehabilitating several other bridges. Four structurally-deficient viaducts, built in 1959, are being replaced.

The new bridges span D Street, Thomas Phelps Creek Trail/UPRR right of way, Union Pacific Railroad tracks, and Gruma Drive. The rehabilitated bridges include I-25 over Indiana Avenue, Northern Avenue over I-25, Mesa Avenue over I-25, I-25 northbound over Santa Fe Avenue (US 50), and Santa Fe Avenue over the Arkansas River.

Other elements include the construction of the new D Street, utility relocations, drainage/water quality features, on- and off-ramps, retaining walls, sound walls, lighting, sidewalks, trails, curb and gutter, aesthetics and landscaping.

CO 82: Grand Avenue Bridge, Garfield County
Cost: \$75 million, including local funding

The Grand Avenue Bridge (GAB) project constructed a new vehicle bridge and pedestrian bridge. These are vital connections, crossing over I-70, Union Pacific Railroad tracks and the Colorado River. The new bridge, built to address the functional and structural deficiencies of its predecessor, is improving multimodal connectivity, emergency service response and its reliability as a critical transportation route.

By engaging in hundreds of individual contacts, conducting meetings with businesses and residents, creating alternative transportation demand management strategies, such as “walking school buses,” the Grand Avenue Bridge project communications team helped the community come together to survive an impactful reconstruction. This was evidenced by over 3,000 people coming to celebrate the early opening of the bridge.

I-25: Crossroads Boulevard Bridge, Larimer County
Cost: \$22 million

The I-25 Crossroads Boulevard bridge replacement project is replacing the bridges on I-25 at Crossroads Boulevard. The majority of the project is being funded through Responsible Acceleration of Maintenance and Partnerships (RAMP, now expired, see page 9) with contributions from the North Front Range Metropolitan Planning Organization.

CO 90: Bedrock Bridge, Montrose County
Cost: \$3.8 million

The new precast concrete bridge structure now provides several improvements over the old through-truss structure, including wider and higher clearances for oversized vehicles. The project team was faced with some unique challenges in meticulously dismantling this historic structure and keeping track of the steel beam pieces. Please see our [time lapse video](#) of bridge removal and construction.



Over 3,000 people came to celebrate the early opening of the new Grand Avenue Bridge in Glenwood Springs.

SAFER TRAVEL ON OUR ROADWAYS



US 40 rock downsizing and scaling operations help reduce the risk of rockfall on this road.

Reducing the Risks of Geohazards

Our Geohazards Program manages projects and responds to emergencies caused by rockfall events, rock slides, landslides, debris flows, embankment distress and sinkholes. By using a risk-based approach, the program aims to address these hazards on a highway corridor basis. The program works to systematically monitoring and mitigating specific sites within geohazard corridors to effectively reduce the risk of geohazards on the transportation system. The program budget was \$10 million for fiscal year 2017.

Efforts this past year included:

- Rockfall blasting on I-70 near Dumont
- Repairing significant rockfall fence damage in Glenwood Canyon
- Embankment repair on CO 133 near Paonia Reservoir
- Rock downsizing and scaling (pulling off hillside) close to US 40 near Steamboat Springs
- Remote sensing operations statewide

Transportation Safety Programs—Focusing on Both Road and Driver

The Traffic and Safety Engineering Branch (the Branch), in collaboration with the CDOT Highway Safety Office and many other safety stakeholders, is focused on reducing fatalities and serious injuries resulting from crashes on our roadways, as well as the associated human and economic losses. Staff administer the Federal Highway Administration’s (FHWA) Highway Safety Improvement Program (or HSIP, as defined by 23 CFR 924).

To address roadway safety issues, staff work with region traffic engineers and local agencies to identify and construct cost-effective projects that improve safety on Colorado’s roadways, ensuring the most beneficial and cost-effective safety projects are selected for implementation. Comprehensive crash data are used for planning all safety mitigation projects and programs.

The Office of Transportation Safety (OTS) focuses on driver safety. OTS administers the state’s traffic safety program (funded by the National Highway Traffic Safety Administration or NHTSA), which seeks to decrease impaired driving-related traffic deaths, and motorcycle and pedestrian fatalities, as well as increase seatbelt and car seat use. Public information and outreach activities are coordinated through the program, as are training and education services.



A safety awareness campaign banner addresses the rise in fatalities on Colorado roads, and reminds people to buckle up.

SAFER TRAVEL ON OUR ROADWAYS

The FHWA and CDOT ensure that the (federally mandated) Strategic Highway Safety Plan implementation efforts are developed and tracked.

Traffic Fatalities Unfortunately, in 2015 and 2016 Colorado saw a sharp increase in fatalities and serious injuries and marked increases in several categories of fatalities despite our continued delivery of programs that engineer safer highways, educate the driving public, recommend traffic safety legislative enhancements, and support high-visibility enforcement of the state’s driving laws. This increase can, in part, be attributed to Colorado’s increases in population, significantly in urban areas, and increases in our vehicle-miles traveled (VMT) and vehicle registrations. Consistently now, for the last three years, Colorado saw urban fatalities surpass rural fatalities, an historic trend change.

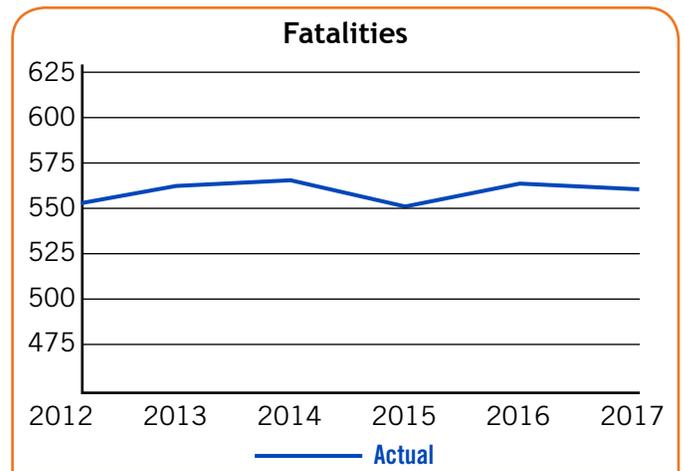
Many of the most serious safety challenges continue to be driver behavior-related (impaired driving, inattentive driving, or lack of seat belt use). These driver behaviors are leading to an alarming increase in vulnerable user fatalities; seventy-five percent of the increases in fatalities were pedestrians, motorcyclists and bicyclists. The OTS aggressively addresses these challenges by supporting projects, programs and other measures to educate the public and raise awareness.

National Safety Performance Measures CDOT focused a significant effort on the development of safety performance measures throughout 2016 and into 2017. After conducting workshops, data analysis and meetings with CDOT stakeholders and Metropolitan Planning Organizations (MPOs), we established the following targets a five-year average (using calendar years 2014-18).

Colorado Safety Targets/Five Year Averages 2014-18

- Fatalities: 610
- Fatality Rate: 1.2
- Serious Injuries: 3,350
- Serious Injury Rate: 6.79
- Non-Motorized Users Fatalities & Serious Injuries: 586

These numbers reflect the unfortunate trend that Colorado is seeing, with increases in each of these categories. While all safety stakeholders in Colorado are striving to reduce crashes and fatalities, we are all



YEAR	2012	2013	2014	2015	2016	2017
Fatalities	474	481	488	548	608	648*

*2017 figure is preliminary.

having to be more strategic and effective with limited resources. Without significant changes in funding, legislation, population growth, VMT or enforcement, these trends will continue. Agencies are striving to be more strategic in their approaches to reducing crashes, including concerted data analysis, project safety analysis and prioritization, and deployment of innovations and technologies. Further, the automotive industry and their transportation partnerships hold promise for reductions in crashes and fatalities in future years. Staff also worked with MPOs as they established their own safety performance targets.

Highway Safety Improvement Program (HSIP)

The Branch delivered \$33.4 million in HSIP funding to CDOT’s engineering regions, as well as local agencies statewide for 37 projects to address the significant numbers of fatalities related to infrastructure and driver interaction (run off road, intersections, speed and pedestrians.) These projects are expected to have a safety benefit that has a present value of \$70.1 million for an overall benefit cost ratio of 2:1. Examples of these projects include median cable rail, auxiliary lanes, rumble strips, roundabouts, intersection improvements, signing and pavement marking upgrades, highway lighting, traffic signal upgrades, interchange ramp improvements, managed lanes and roadway realignments.

SAFER TRAVEL ON OUR ROADWAYS

Work Zone Safety and Mobility (WZSM) The biannual WZSM Process Review, initiated in 2016 and continued through 2017, surveyed work zone stakeholders to gauge the effectiveness of work zone policies, procedures, specifications and practices. Area engineers continue to conduct WZSM Traffic Control Reviews each year, visiting select projects throughout the state.

Crash Data The Branch acts as the state's repository for state highway traffic crash information. On average, over 100,000 crash records are reported in a calendar year. We continue to improve upon how these data are collected from source agencies and input into our database. In 2017, a significant change in process was the Department of Revenue's development of a new database system called Colorado Driver License, Record, Identification and Vehicle Enterprise Solution (DRIVES). We now receive data through DRIVES and, together with DOR, we established a process that permits us to maintain access to all of the necessary fields to more efficiently and effectively deliver high quality data and analysis.

Rail-Highway Grade Crossing Program The program, part of our Project Development Branch, is revising its process for selecting railroad crossing safety projects by redeveloping its hazard index and applying it to Colorado's 4,000 crossings.

Colorado Safety Legislation and Statutes

- Primary Seat Belt: Colorado does not have a primary seat-belt law
- Drug Offender Driver License revocation: comes from the Governor's Office to FHWA, not through OTS
- Repeat Offender Law (regarding enhanced penalties for repeat offenses): Colorado is not in compliance
- Zero Tolerance Law (regarding underage drinking/driving): Colorado is in compliance

Some examples of safety-improvement projects underway last year included:

US 287 (Federal Boulevard): 120th Avenue South Resurfacing, Adams County
Cost: \$5 million

This project overlaid Federal Boulevard with new asphalt and installed ADA (Americans with Disabilities) curb ramps, curb/gutter and sidewalk replacement, signing and striping, and new signal lights at the intersection of Federal Boulevard and 98th Avenue.

I-25: Raton Pass Rockfall Mitigation, Las Animas County
Cost: \$2.7 million

This project mitigated the risk of rockfall on Raton Pass south of Trinidad, excavating and removing overhanging rocks to improve slope stability.

US 50: Blue Creek Reconstruction, Gunnison County
Cost: \$12.3 million

The work addressed a landslide area east of Montrose through shear piles installation (reinforced concrete drilled shafts), roadway reconstruction, widening and culvert work.

SH 14: Poudre Canyon Guardrail, Larimer County
Cost: \$600,000

The work installed guardrail at several locations that have a history of run-off-road crashes, added bridge rail at one location, and made highway delineator (reflective roadside markers) upgrades along the project length.



US 50 Blue Creek reconstruction addressed a major landslide issue.

SAFER TRAVEL ON OUR ROADWAYS

GOOD NEWS ON THE SAFETY FRONT

US 160: Wolf Creek Pass “Beware the Wolf” Education Campaign, Mineral County

Cost: N/A

CDOT Region 5 conducted a road safety audit of Wolf Creek Pass during the summer of 2016. The results from that audit helped identify potential safety issues and possible opportunities for future safety improvements on the pass. In the meantime, staff took the opportunity to launch a “Beware the Wolf” education campaign to urge roadway users, particularly commercial truck drivers, to be attentive to the road. The education campaign included a web page dedicated to Wolf Creek Pass, information flyers sent to trucking companies and associations, and weekly social media posts to support the roadway improvements (including warning signs) that have been made over the past several years. Visit the [campaign page](#) on our website.



Teen (Safety) Spirit

Thirty Metro Denver high schools received scented car fresheners to give to students to encourage participation in the *High Touch Safety Program* while also serving as a reminder to buckle up. The double-sided air fresheners featured contest rules and a seat belt-focused safety message.

The campaign, which celebrated the high school with the most Snapchats related to seat belts, empowered more than 28,000 students to be safer. George Washington High School won the *2017 Seat Belt Schooled Snapchat* contest.



An example of a social media graphic aimed at truckers using Wolf Creek Pass.

RELIEVING CONGESTION & ENHANCING MOBILITY

Transportation System Management & Operations

Optimizing the Travel Experience Providing safe and reliable travel conditions and options is key to maximizing travelers' mobility and allowing them to experience the freedom and connection provided by Colorado's multi-modal transportation network. For every minute a distressed vehicle remains stalled in a travel lane, four minutes are required for the facility to recover to normal traffic flow, which in turn magnifies congestion downstream on the corridor.

Safe and reliable travel on both rural and urban corridors is impacted by: (1) recurrent congestion due to insufficient roadway capacity and bottlenecks, and poor traffic signal timing; and (2) non-recurrent congestion, caused by unplanned and un-predicted traffic incidents and crashes, adverse weather conditions, work zones and special events. More than half of congestion can be attributed to these non-recurring events in urban areas and about 95 percent in rural areas. Even though these incidents and conditions may occur infrequently, their impact is significant when they do occur. Congestion impacts the economy by delayed delivery of freight, unreliable commutes to school and work, and frustrating travel conditions along popular recreational routes like our I-70 mountain corridor.

Our Division of Transportation Systems Management & Operations (TSMO), created in 2013, has a mission 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.

TSMO includes the Intelligent Transportation Systems (ITS) Branch, using technology to improve safety and reliability; the Safety & Traffic Engineering Branch, focused on reducing crashes on our system; the Colorado Traffic Management Center (CMTC) Branch, to address the real-time management of traffic, incidents and storms; and the Planning and Performance Branch, which develops and tracks key performance metrics.

TSMO uses a multitude of strategies to target issues that cause congestion in order to minimize their impact and enable the system to operate at the highest capability. Examples of these strategies include: traffic signal timing; ramp metering; alternative intersection

and interchange designs; traffic incident management planning; real-time travel time information; High-Occupancy Vehicle (HOV) and managed lanes; and much more. TSMO is also preparing the state transportation infrastructure under the RoadX program to be a leader in advancing connected vehicles and autonomous vehicle technology. Operational strategies underway include improvements to the fiber optic telecommunications network, our traffic operations centers, data collection and distribution, public communication of roadway conditions, highway striping, adaptive traffic signals, and innovative active traffic management systems.

The TSMO Evaluation TSMO now evaluates all of our projects using a safety assessment, an operations assessment and an ITS assessment to ensure that we provide the best product with the best use of taxpayers' money. Notably, through TSMO, we also remain committed to the safety of the traveling public, including first responders and our own highway workers. It is this focus on safety that highlights TSMO's many accomplishments in 2017.

Always a Safety Focus Our TSMO staff, along with Maintenance, Project Support, RoadX and our Chief Engineer, contributed significantly to the Governor's Task Force on Responder Safety Final Report, completed this past year and co-developed by the Colorado State Patrol. The report lays out a cross-agency vision and framework for changing the culture of Traffic Incident Management. The bottom-line goal is to bring all responding agencies together to create a multi-talented, more cohesive and unified team, saving lives together.



Newly built Traffic Incident Management training track.

RELIEVING CONGESTION & ENHANCING MOBILITY

To reinforce the Task Force, our TSMO team partnered with Douglas County and the Colorado State Patrol to develop the Traffic Incident Management (TIM) Training Track. The goal is to provide Colorado's first responders hands-on training to create "One scene. One culture. Save lives." The TIM Training Track will provide scenario-based training, as well as provide an environment for collaboration amongst the multiple disciplines and jurisdictions engaged in Traffic Incident Management. The TIM area is a quarter-mile-long concrete slab and cost \$1.5 million to construct. It includes typical barrier features and geometries that first responders work with on our highway system. Construction on the TIM Training Track began in November 2017 and will be completed early spring 2018.

Some additional safety-focused initiatives that TSMO completed in 2017 are:

- Led the efforts to achieve the goal of 30 percent of Colorado's 19,894 first responders completing the Federal Highway Administration's Traffic Incident Management classroom training
- Hosted the first annual Traffic Incident Management Conference and Awards Banquet to promote responder safety, TIM culture and best practices
- Launched a newly branded Safety Patrol on the Front Range to provide expanded coverage through an updated and dedicated fleet of tow and assist vehicles, newly sponsored by State Farm for \$500,000 per year; in 2017 (through November), the new services provided nearly 27,000 assists

The following are examples of projects across the state that were focused on addressing congestion and improving mobility on our roadways in 2017:

North I-25 Express Lanes: 120th Avenue to E-470/ Northwest Parkway, Adams & Broomfield Counties
Cost: \$78.4 million

The primary purpose of this project, expected to be completed by November 2018, is to add Express Lanes in both the north- and southbound directions from south of 120th Avenue to E-470/Northwest Parkway. This project will also add water quality features and sound walls, replace the Bull Canal Bridge with a concrete box culvert, and extend other bridge and tunnel features. The work will also widen inside and outside shoulders to address rear-end and side-swipe collisions.



The North I-25 Express Lanes project—shown above during construction—is expected to enhance mobility and increase safety.

C-470 Express Lanes: I-25 to Wadsworth Boulevard, Douglas County
Cost: \$204.3 million

The project adds two westbound Express Lanes from I-25 to Colorado Boulevard and one Express Lane from Colorado Boulevard to Wadsworth; it also adds one eastbound Express Lane along the length of the project between I-25 and Wadsworth. This involves widening C-470, reconstructing existing pavement, replacing the bridge over South Platte River and improving auxiliary lanes; the anticipated completion date is spring 2019.

US 50 Westbound: Burlington Northern Santa Fe Railroad to Purcell, Pueblo County
Cost: \$17.8 million

The project includes widening lanes, asphalt resurfacing, highway realignment, construction of a new bridge, construction of a third westbound lane, and intersection improvements at Pueblo Blvd.

I-70B: North Avenue Interchange in Grand Junction, Mesa County
Cost: \$7.3 million

The work included ramp reconstruction and construction of an additional eastbound lane between Rimrock Avenue and American Way; the project also resurfaced the highway, made improvements to signing, striping and lighting, and extended the bicycle/pedestrian trail along I-70B.

RELIEVING CONGESTION & ENHANCING MOBILITY



This project in Ridgway helped ease congestion through the historic downtown area and provided other enhancements.

I-25: Climbing Lane near Berthoud, Weld County
Cost: \$10.3 million

This project constructed a third climbing lane on southbound I-25, reducing congestion caused by inadequate passing opportunities. Work included highway resurfacing; bridge widening; and embankment and drainage improvements.

CO 62: “Ramp Up! Ridgway,” Ouray County
Cost: \$12.5 (Town of Ridgway contributions, grant from the Department of Local Affairs)

Work involved storm drainage and traffic capacity enhancements to ease congestion on CO 62 through town, as well as improvements of historic downtown, including paved side roads, new sidewalks and improved storm drainage. Work also included aesthetic features such as benches, street lighting and decorative crosswalks.

High Performance Transportation Enterprise

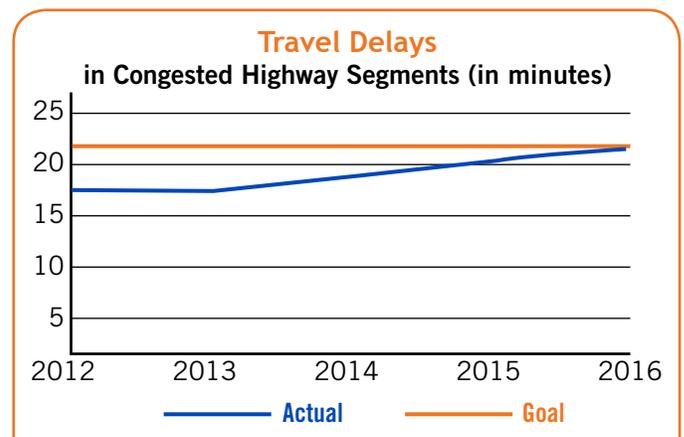
The High Performance Transportation Enterprise (HPTE)—a government-owned, independent business within CDOT—researches, identifies and implements innovative ways to finance specific transportation projects. In 2017, HPTE was recognized by key external stakeholders, with an impressive list of awards:

- ARTBA (American Road and Transportation Builders Association) Public-Private Partnership (P3) Entrepreneur of the Year: David Spector, Director HPTE

- Governor’s Elevation Award for Superior Customer Service: I-70 Mountain Express Lane
- Women’s Transportation Seminar (WTS) Colorado: Large Innovative Transportation Solution of the Year, I-70 Mountain Express Lane
- National Council of Public Private Partnerships (NCP3P) Service Project Award: US 36 Express Lanes
- American Association of State Highway and Transportation Officials (AASHTO) Grand Prize: Use of Technology and Innovation, US 36 Express Lanes
- AASHTO’s TransComm Public Awareness Campaign: “Three’s Free, HOV 2 to HOV 3”
- Federal Highway Administration (FHWA) Environmental Excellence Award: I-70 Mountain Express Lane
- Express Lanes were selected as one of the finalists for the Urban Land Institute (ULI) Colorado 2017 Impact Awards in the Inspire Category

Like CDOT divisions, the HPTE also focuses its efforts on reaching CDOT’s “Peaks.” In 2017, the Enterprise’s achievements have directly contributed to “Healthy Multimodal Systems,” specifically in the areas of maximizing project delivery and expanding travel options with Express Lanes.

Central 70 Kiewit Meridian Partners (KMP) was selected to be the Central 70 project developer, and HPTE will lead contract oversight during the operations period for the \$1.2 billion project, the largest



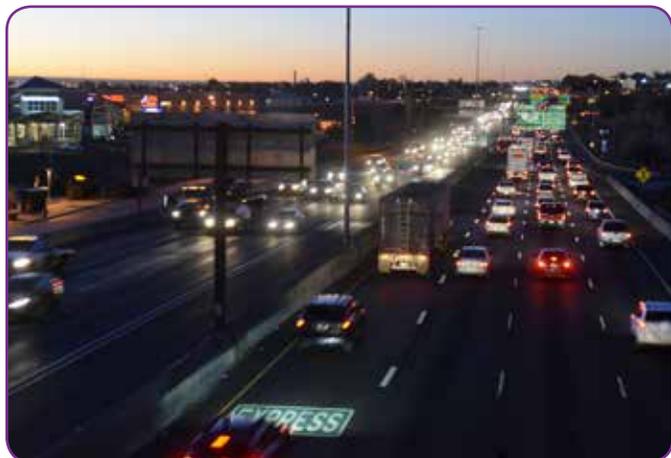
YEAR	2012	2013	2014	2015	2016*
Long Range Goal	22	22	22	22	22
Actual	17.2	17.1	18.6	20.4	21.9

*The most recent data available

RELIEVING CONGESTION & ENHANCING MOBILITY

infrastructure development project in CDOT's history. CDOT's Bridge Enterprise and HPTE boards completed a successful financial close of the project on December 21, 2017. Construction begins in 2018 and will take approximately four years to complete, ultimately saving CDOT millions of dollars over the term of the contract. With the success of the Central 70 and US 36 P3 projects, HPTE and Colorado have received international attention for innovative contracting and financing methods to deliver critical surface infrastructure projects.

C-470 The C-470 Express Lanes Project is located along 12.5 miles of C-470, between I-25 and Wadsworth Boulevard. This segment of the corridor currently sees over 100,000 daily motorists with those volumes projected to increase by 40 percent within 20 years. To address current and future congestion, this project includes reconstructing existing pavement, adding auxiliary lanes, improving on- and off-ramps and constructing new Express Lanes both west- and eastbound. In 2017, HPTE achieved two major financing milestones for C-470 on behalf of CDOT: (1) securing \$161.7 million in revenue bonds, the first bonds ever issued directly by HPTE; and (2) closing on a \$106.9 million federal Transportation Infrastructure Finance and Innovation Act (TIFIA) loan supporting the project. Together, these provide more than two-thirds of the funding needed and will be repaid from and secured by gross toll revenues generated by the C-470 Express Lanes. The project will open for tolling in the summer of 2019. Once open and operational, drivers along the corridor are expected to see up to 18 minutes in travel time savings during peak commute times.



I-25 southbound morning peak period travel.

I-70 Mountain Express Lane The I-70 Eastbound Mountain Express Lane (MEXL), opened for tolling in December 2015, runs 10 miles from Empire through the Veteran's Memorial Tunnel. It is a single, buffer separated lane operated during peak travel times only to deliver more consistent, faster speeds and reduced travel times for all lanes. The 2017 winter season was proof of the I-70 Eastbound Mountain Express Lane's capabilities:

- Corridor volumes increased by nine percent over the 2016 winter season
- Express Lane use increased by 111 percent
- Incidents in all travel lanes decreased by 22 percent
- Incident response times were four minutes quicker
- Toll revenue is meeting expectations

North I-25 Segment 2 (US36 to 120th) The North I-25 Express Lanes, from US 36 to 120th Avenue, opened for tolling in July 2016. The Express Lanes, one in each direction, were designed to fit within the existing highway footprint. In the morning peak period the southbound Express Lane provides direct connection with central I-25 into downtown Denver. Since opening, the lanes have been providing reliable commuter trips and reduced travel times for all vehicles, including CDOT's Bustang service (the regional express bus), which has documented 10-minute travel time improvements in the mornings.

Highlights from the first full year of operations for the I-25 North Segment 2 Express Lanes include:

- August 2017 saw the highest number of transactions in one month, with about one million toll and HOV transactions
- Travel speeds have improved, and previously congestion-prone areas function more smoothly
- Toll revenues continue to increase with traffic volumes, following seasonal fluctuations

These significant achievements for existing Express Lanes have helped push forward other Express Lane projects into construction and development, including I-25 North: 120th Ave. to E-470/Northwest Parkway; I-25 North: Johnstown to Ft. Collins; the westbound I-70 Mountain Express Lane; and the I-25 South "Gap" Project between Monument and Castle Rock.

SUPPORTING MULTIMODAL TRAVEL



Dallas Divide seen near CO 62 along the San Juan Skyway Scenic Byway.

Colorful Colorado: A Place to Cycle, Walk and Take in the Scenery

Our Bicycle/Pedestrian & Scenic Byways (BPSB) programs continue to move Colorado forward in providing multimodal options and improved traveler experiences. Here are just a few of the highlights from 2017:

Identifying Bike & Ped Movements To further understand bicycle and pedestrian transportation movement, CDOT has teamed up with STRAVA Metro to collect enhanced bicycling and walking trip information. STRAVA is a free mobile app and website that allows users to track their human-powered travels via GPS. STRAVA anonymously compiles route information so transportation planners and engineers can learn more about intersection wait times, origin/destination information and cycling and pedestrian counts. The data will be used to improve planning, safety and infrastructure for cyclists and pedestrians throughout Colorado. [Click here](#) to see the Colorado STRAVA Heat Map.

BPSB also completed an electronic pilot inventory project of the bicycle facilities in CDOT's Region 2 (southeast Colorado). The pilot was very successful and is now being replicated in our four other transportation regions. The information will be used for the development of our High Priority Bicycle Corridors and for supporting general planning and design decisions.

Making the Most of our Beautiful Byways System Colorado's Scenic and Historic Byways program underwent major changes this year with a transfer of many responsibilities from CDOT staff to the 15-member,

governor-appointed Byways Commission. While program staff remain our subject matter experts, they are no longer responsible for Commission staffing, meetings or individual byway mentoring. Their 2017 accomplishments included developing a three-year strategic plan that outlined three major goals: (1) maintain a Colorado Byways system that is second to none; (2) elevate the Colorado Byways system to become an important state asset for economic development and livability; and (3) ensure that each local byway is a fully functioning part of an excellent statewide system.

Providing Communities Safe Routes to School With the Colorado Transportation Commission's funding commitment of \$2.5 million annually to the Colorado Safe Routes to School (CSRTS) program, it was time to develop a five-year strategic plan that would guide the program into the future. Some of the goals include creating a user-friendly online application to make it easier for agencies to apply for funds; collecting better data to demonstrate the effectiveness of CSRTS; and supporting communities in their efforts to launch and sustain Safe Routes to School initiatives.



Before and after photos show Summit County's completed Safe Routes to School infrastructure project that created safer walking and biking lanes at Summit Cove Elementary school. A ribbon-cutting event was held in October 2017.

SUPPORTING MULTIMODAL TRAVEL

Enhancing Colorado's Downtown Streets Every street has an identity—it's where people live, shop and visit. But downtown streets are also often state highways, busy thoroughfares where creating enjoyable and inviting spaces that accommodates multi-modal travel comes with challenges. Together with the Colorado Department of Local Affairs and Department of Health and Environment, we produced a publication for communities, planners and engineers to better communicate the needs of the various transportation stakeholders. Our three agencies held workshops with communities across Colorado to start the dialogue about making their main streets more walkable and bikeable, an effort we'll continue in 2018.

Here are a few projects around the state that supported multimodal travel in 2017:

CO 30: Potomac Street to North Airport Boulevard, Arapahoe County
Cost: \$4 million

This project resurfaced CO 30 (US 6) from Potomac Street to North Airport Blvd., made ADA upgrades to sidewalks, installed pedestrian push buttons and completed minor bridge improvements.



Buena Vista, with US 160 as its main downtown thoroughfare, now has enhanced bicycle and pedestrian features, including this new push-button pedestrian crossing.



An aerial photo shows progress on US 24/Cimarron Street project.

I-25: US 24/Cimarron Street (Cimarron Expressway), El Paso County
Cost: \$114.5 million

Work included realigning I-25 to improve access and safety; constructing two I-25 bridges over Cimarron Street; new northbound on-ramp and southbound off-ramp bridges; and new bridges over Fountain Creek. The project also included new signals, lighting, an upper Fountain Creek channel (riverbed maintenance) and bike path improvements.

CO 9: Iron Springs Alignment, Summit County
Cost: \$20.6 million, including RAMP funding (see RAMP information, page 9)

This project involved realignment and widening of CO 9 between Frisco and Breckenridge, with recreation path improvements south of Frisco.

CO 60: US 287 to Milliken, Weld County
Cost: \$6 million

The project resurfaced the highway, along with ADA curb ramp construction, sidewalk improvements, and drainage, guardrail and bridge rail upgrades.

US 160/US 550: Downtown Durango, La Plata County
Cost: \$6 million

In addition to the concrete rehabilitation work, this project incorporated new multi-modal features throughout town, including new pavement markings to create bicycle lanes in both directions, as well as new ADA curb ramps at four intersections.

SUPPORTING MULTIMODAL TRAVEL



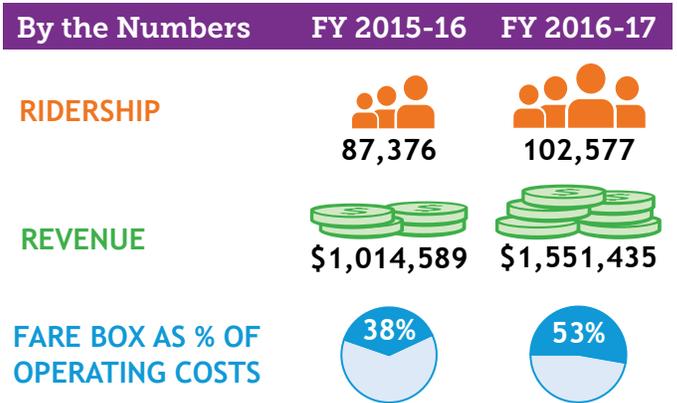
Photo courtesy of Summit Daily News.

Strengthening our Transit & Rail

CDOT's Division of Transit & Rail (DTR) was created by legislation in 2009, and works to integrate transit into Colorado's transportation system. The Bustang interregional express bus service, launched in 2015, continues its remarkable growth in ridership, fare revenue and fare box recovery. This success has resulted in additional service on the West Route, including a new Vail to Denver run, and a seasonal express run between Glenwood Springs and Denver during the winter.

On the North Route, an additional round trip was added from Denver to Fort Collins, and weekend service is now available on all Bustang routes. The collaborative RamsRoute service serving CSU continues to operate with full buses on Friday and Sundays during the academic year. Bustang to Broncos also met a financial break-even point, providing safe, economical transportation to and from Denver Broncos games for Front Range fans.

The Grants Unit for our Transit and Rail Division also had an exceptional year as staff managed over \$53 million in federal, state, and local funds impacting the local economy through grants in the past year.



The State Rail Plan is in the final stages of completion and will provide guidance for investing in future rail needs. Also, DTR is in the process of completing a Transit Asset Management Plan, a document that provides information about statewide infrastructure and maintenance needs. These two plans will be incorporated into the updates to our Statewide Transit Plan which began in 2018.



The Colorado Legislature created the Southwest Chief & Front Range Passenger Rail Commission in 2017, with a focus on saving the Amtrak Southwest Chief service and linking Amtrak with future expansions of RTD light rail/commuter rail service.

SUPPORTING MULTIMODAL TRAVEL



The Northern Colorado Regional Airport (FNL) in Loveland was chosen as the test facility for the Colorado Remote Tower Project, a monumental project funded by the Colorado Division of Aeronautics that will propel the Colorado and the National Airspace System into the next generation of air traffic control.

Division of Aeronautics: It's Not Just about the Roads

Remote Air Traffic Control—A Worldwide First Under the auspices of CDOT and the Colorado Aeronautical Board, and with an engaged and diverse statewide aviation community, our Division of Aeronautics supports multimodal travel by advancing a safe, efficient and effective statewide air and space system through collaboration, investment and advocacy. Aeronautics is partnering with the Federal Aviation Administration (FAA) to develop, deploy, test and certify the world's first remote air traffic control tower that will combine both radar/track-based aircraft position information and visual/camera information.

This next evolution in airport air traffic control technology is a necessity as the cost to design, construct, maintain and staff a traditional air traffic control tower (ATCT) continues to escalate to the point where many communities can no longer afford to fund them. Out of this need, the idea of a remote ATCT was born.

The Northern Colorado Regional Airport in Loveland (FNL) has been selected by our Division and the FAA as the site for the remote tower demonstration project, which is being funded by CDOT. FNL is the busiest

non-towered airport in Colorado, handling over 100,000 takeoffs and landings annually, with a diverse aircraft fleet mix ranging from small training helicopters to larger corporate jets and regional airline aircraft. The remote tower system to be implemented at FNL will employ existing and emerging technologies to provide air traffic controllers improved situational awareness of activities on the airport surface and in the local airspace from a remote location.

A system of video cameras will be employed on the surface to display the position of aircraft, ground vehicles and other objects, including animals, to the air traffic controller. Radar will provide a picture of the position of aircraft in the local airspace. Today's automation platforms will allow the visual and radar data to be combined and displayed to the air traffic controller, providing a much more comprehensive picture of the airport environs than those from a traditional ATCT. This program puts Colorado in the unique position of being a true technology pioneer in providing remote airport traffic services as an alternative to constructing a facility that will eventually become outdated and must be maintained and replaced at substantial cost. The remote tower solution at FNL will significantly enhance the airport's safety and efficiency for millions of dollars less than a traditional air traffic control tower.

Preliminary installation of the remote tower facility will be underway in the spring of 2018, and certification will likely occur in late 2019, after an exhaustive test program and safety analysis.

Economic Impact of Aviation in Colorado Also a key development in 2017, our Aeronautics Division kicked off the consultant selection for our 2018 state aviation system plan update, our key guiding document created in collaboration with FAA and our aviation system users to focus state, local and federal investments in our system of airports statewide. This effort will also include the highly anticipated 2018 Aviation Economic Impact update, which will quantify the value and contributions of our entire airport system.

SMART ROADS, SMART VEHICLES, SMART TRAVEL

Changing the Way We Approach Transportation Needs

It has been two years since we launched RoadX, our program through which we explore and implement 21st century technology and ingenuity to solve our infrastructure challenges. Since then, Colorado has become a leader in the nation through CDOT's recognition by the ITS World Hall of Fame as the *2017 Local Government of the Year* for RoadX.



Through RoadX, we were also selected as one of 10 global finalists to build *Hyperloop One*, magnetic levitation technology that can propel passenger or cargo pods up to 700 mph. We will be beginning the next phase of the feasibility study that examines transportation demand, economic benefits, proposed routes and potential strategies, regulatory environments and alignment with overall CDOT high-speed travel, rail and freight plans.

Here are some more examples of our 2017 achievements through RoadX:

- We partnered with OTTO (a self-driving tech company founded in 2016) to complete the world's first commercial delivery by a self-driving truck (OTTO/Uber Trucking).
- We deployed the world's first Autonomous Impact Protection Vehicle to protect work zones from distracted drivers.
- On I-70 through the Colorado Rockies, one of the most geographically challenging corridors in the nation, we partnered with HERE Technologies (which provides mapping and location data and related services, and will partner with Panasonic) to pursue cellular connected-vehicle technology to provide drivers with access to the most real-time data possible, helping them make more informed travel decisions (read more about this partnership on page 28).

- We will be making significant software and traffic sensor upgrades to the aging traffic management and ramp metering systems on I-25. This hyper-smart system, which will make its North American debut in Colorado, will better manage the flow of vehicles, which could have the same result as adding a new travel lane, but at a fraction of the cost.
- We partnered with the Colorado Innovation Network's (COIN) Imagine Colorado program to launch the RoadX Bicycle and Pedestrian Challenge. We're awarding up to \$500,000 to actionable technology concepts to improve bicycle and pedestrian safety.
- We are investigating a pilot project to develop a wireless technology enabling vehicles to charge their electric batteries while driving over a roadway at full speed. The Smart Powered Lanes pilot project could deploy this technology in live traffic for the first time in the U.S. on a segment of roadway in Colorado.

Visit the RoadX page on our website for updates on our projects in motion, partnerships and more. [Click here.](#)



This autonomous vehicle helps CDOT workers stay safe in work zones.

A CONNECTED VEHICLES ECOSYSTEM SUPPORTS CDOT'S MISSION

Panasonic, a global leader in smart and sustainable automotive and infrastructure technology solutions, is partnering with CDOT to build a connected transportation program in which real-time data would be shared across vehicles, infrastructure, and people to improve safety and mobility on the road.

Working with CDOT and other partners, Panasonic will focus first on connecting cars and the transportation system on I-70, one of the nation's most challenging corridors, as part of the state's RoadX program, with the aim of making roads crash-free, injury-free and delay-free.

“Panasonic is a worldwide organization that has shown a significant commitment to innovation and improving people's everyday lives. We are thrilled that they have chosen to partner with Colorado in bringing advanced technologies and strategies for smart transportation and smart cities. Not only does that position Colorado as one of the leading states in harnessing tomorrow's smart technology today, but it accelerates the benefits of such innovations to the residents and travelers of our state.”

—Governor John Hickenlooper



In a connected transportation system, vehicles “talk” and share data with each other, helping one know if the other has stopped, or is slowing down or has been in a crash. The infrastructure talks to vehicles, telling them if a sharp curve or construction zone is coming up. A connected transportation system also accelerates the advancement of autonomous vehicles by enabling the sharing of data and warnings instantaneously from connected vehicles, augmenting information collected from sensors and cameras.

With commitments from auto manufacturers to deploy connected vehicles and the rapid development of autonomous vehicles, Colorado expects to have more than 1.2 million connected vehicles on its roads by 2025. A strong after-market for connected vehicle and autonomous vehicle conversions could further push that beyond 4 million.

The data gathered and deployed through the Panasonic partnership will not only help the driver with critical safety warnings, it can be also used for mobility applications like smart truck parking and varying speed limits as needed. These data have the potential to help pinpoint where investments need to be made in road planning and safety, as well as optimizing winter maintenance. Please see the RoadX and Panasonic partnership video by clicking [here](#).

“Panasonic is using our nearly 40 years of experience in traffic management to help support safer and more efficient driving,” said Joseph M. Taylor, chairman and CEO of Panasonic Corporation of North America. “Our shared vision is of an integrated platform that will provide drivers with the most real-time data possible and enable them to make better decisions when traveling. This joint project with CDOT is a logical extension of Panasonic's ongoing public-private partnership with the state of Colorado, the city of Denver and Denver International Airport to develop Smart City solutions.”

PLANNING, RESEARCH & ENVIRONMENTAL STEWARDSHIP

Our Planning, Environmental and Research projects may not be as easily recognized by the public as a new traffic signal, a widened shoulder or a plowed road. But read on and you're sure to appreciate this snapshot of off-highway initiatives that have helped us save time, money and the environment as we support and enhance our 21st century transportation system.

Improving Tools for Planning & Budgeting Our Division of Transportation Development (DTD) and Division of Highway Maintenance lack spatial and non-spatial data about our roadway assets, which causes operational complications that affect our budgeting and planning. To address this, DTD is implementing the GIS Asset Data Collection Mobility System, which is reliable, secure, automated and web-accessible.

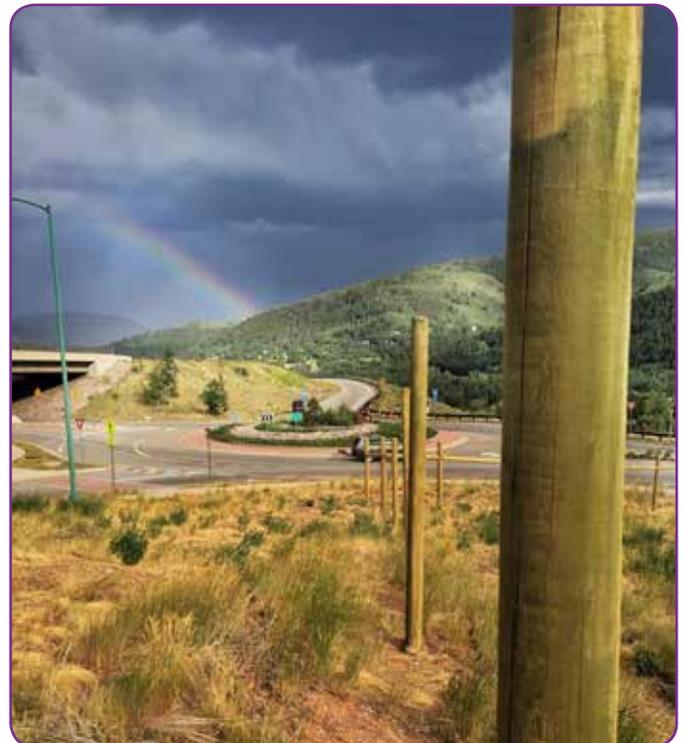
Streamlining Planning and Environmental Linkages (PEL) Studies Our Multimodal Planning Branch (MPB) and Environmental Programs Branch (EPB) identified Planning and Environmental Linkages (PEL) studies as a flexible tool for aligning CDOT planning processes with emerging technologies.

Modeling Noise Impacts on Wildlife Our staff are using a free GIS noise modeling tool to calculate noise propagation patterns and excess noise above ambient conditions. The wildlife noise model incorporated more environmental inputs than had been previously considered, allowing staff to accurately assess project noise impacts. The U.S. Fish and Wildlife Service has asked for the model to be used on future projects.

Customizing StreamStats for Colorado Drainage area and peak flow information are needed for bridge and culvert hydraulic design, but the web-based GIS StreamStats developed by the U.S. Geological Survey (USGS) was not customized for Colorado. With USGS technical help, our Applied Research and Innovation Branch staff customized StreamStats. This has enabled us to use three methods for calculating drainage areas and peak flows in one place, saves a great deal of time (10 minutes maximum, versus seven hours previously), and features high-quality color graphics.

Mapping Stormwater Infrastructure Our Environmental and Planning Branch led an effort to map CDOT's stormwater infrastructure using field equipment to collect location, identification, and elevation data on all infrastructure. Stormwater mapping enables better coordination within our own agency and with our partners (particularly in emergency situations), including the Colorado Stormwater Council and municipalities; it improves user experience; and it facilitates better interagency response and analysis.

Guiding Policy to Upgrade Our Rest Areas Our rest areas are aging and in need of significant investment to better meet motorists' safety, comfort, convenience and information needs. DTD staff are leading an effort to establish a rest area policy that will provide a vision for CDOT's rest area program, develop evaluation criteria, and guide investment decisions. New policy will also help us identify opportunities for rest area innovation and partnerships, such as sponsors for marketing rest areas as "Safe Phone Zones" where motorists can pull off the highway to use mobile devices.



Dotsero wildlife fence project in Region 3 improves safety for both people and wildlife.

PLANNING, RESEARCH & ENVIRONMENTAL STEWARDSHIP

Partnering to Improve Air Quality Colorado needs a Beneficiary Mitigation Plan for the state to receive its \$68.7 million portion of the Volkswagen Settlement environmental mitigation funds. The funds will include \$18 million in alternative fuel transit vehicle grants awarded through CDOT's Consolidated Call for Capital Projects. Our DTD staff assisted the Colorado Department of Public Health and Environment as that department (and others) drafted the Beneficiary Mitigation Plan. The Settlement partnership will allow CDOT to encourage and support the transition to alternative fuel and electric transit vehicles that will improve mobility, access and air quality.

Co-hosting a Wildlife and Transportation Summit CDOT and Colorado Parks & Wildlife co-hosted the inaugural Wildlife and Transportation Summit in June 2017. EPB staff supported our Transportation Regions 3 and 5 (on the Western Slope, where the majority of wildlife collisions occur) in their initiative by contributing funding, event planning and development of a statewide action plan. This event included diverse stakeholders from local, state, and federal agencies, the private sector, and several non-profit organizations. Participants developed themes, goals and action items to pursue regarding animal-vehicle collisions, highway safety and mitigation features (such as fencing, overpasses and underpasses). [Click here](#) for the Summit web page.



Participants of CDOT's inaugural Wildlife Summit tour one of our wildlife overpasses on CO 9 in Grand County.



A motion-activated camera captured this image of deer using a wildlife underpass.

CDOT

STRENGTHENING PARTNERSHIPS

FundX Pilot for Local Agency Partnerships

CDOT works with local agency partners to enhance the community's existing transportation system. For many of these, we administer federal funds (through the Transportation Alternatives Program) and provide oversight for many partnership projects. In 2017 we continued to monitor pilot projects we launched through our Local Agency Program, "FundX," to examine how these federal funds can be exchanged for state funds, and how we can streamline project delivery by reducing the burden of federal requirements.

The FundX pilot projects are at different stages of design and construction. While no final conclusions regarding the benefits of de-federalizing the projects can be drawn yet, we do anticipate significant benefits during the construction of some projects by way of reduced paperwork requirements related to federal civil rights documentation and the Buy America law. Other Departments of Transportation have successfully implemented these fund swaps, or exchanges, of federal-for-state funds in similar program areas.

Below is a sampling of partnership projects underway in FY 2017:

US 6: 19th Street Interchange, Jefferson County
Cost: \$25 million

The project added grade-separated intersections along the corridor and two new lanes to the CO 93 section, reducing morning peak travel congestion by 82.7 percent and afternoon peak congestion by 58 percent.

CO 96: Main and Rosita Street Improvements in Westcliffe, Custer County
Cost: \$1.3 million

This project included construction of sidewalks, added or upgraded wheelchair ramps, curb and gutter, lighting, storm drainage and asphalt paving.



Vail underpass Gore Creek trail project Region 3

I-70: Town of Vail Underpass, Eagle County
Cost: \$21.4 M

The project decreases interchange congestion and increases community mobility by providing another connection between the north and south frontage roads within Vail. The underpass also enhances multimodal transportation options within the Town of Vail.

Baseline Road: Bike-Ped Underpass, City of Boulder
Cost: \$5,275,000

This project constructed an underpass at Baseline Road just east of Broadway to provide pedestrians and bicyclists an easier and safer path to cross and connect to multi-use paths and bike lanes along Baseline.

US 24: Buena Vista Enhancement, Chaffee County
Cost: \$11 million

This project resurfaced US 24 through town; adding new curbs and sidewalks; improving drainage and storm sewers; and upgrading street lights. Intersection upgrades at US 24 and Main included a new signal with detection technology for emergency vehicles and improved left and right-turn pockets. The project also improved business access; added 22 parking spots; and designated bike lanes and defined pedestrian crosswalks for an improved multimodal environment.

HOW TO REACH US / GET INVOLVED

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Northwest Colorado (Region 3)	970.243.2368
Northeast Colorado (Region 4)	970.350.2368
Southwest Colorado (Region 5)	970.385.1423
CDOT Headquarters	303.757.9011
CDOT Website	codot.gov
Highway Information	coTrip.org
Road Conditions	511 (303.639.1111)

Division of Aeronautics 303.512.5259

David Ulane, Director

Colorado Aeronautical Board

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Ray Beck [Western Slope Governments]
Jeffrey Forrest, *Chair* [Eastern Plains Governments]
Joe Rice [Aviation Interests-at-Large]
Robert Olslagers, *Vice Chair* [Airport Management]
Chic Myers [Eastern Slope Governments]
John Reams [Western Slope Representative]

State Transportation Commission 303.757.9025

(Counties in each Commissioner's district are noted)
The state's transportation system is managed by CDOT under the direction of the Transportation Commission, which is comprised of 11 commissioners who represent specific districts. Each commissioner is appointed by the governor, confirmed by the senate, and serves a four-year term. To provide continuity, the commissioners' term expiration dates are staggered every two years.

District 1: Shannon Gifford,* *Vice Chair* (Denver)

District 2: Edward J. Peterson (Jefferson)

District 3: Luella D'Angelo (Douglas, Arapahoe)

District 4: Karen Stuart (Adams, Boulder)

District 5: Kathy Gilliland* (Larimer, Morgan, Weld)

District 6: Kathy Connell (Clear Creek, Gilpin, Grand, Jackson, Moffat, Rio Blanco, Routt)

District 7: Kathy Hall (Chaffee, Delta, Eagle, Garfield, Gunnison, Lake, Mesa, Montrose, Ouray, Pitkin, Summit)

District 8: Sidny Zink, *Chair* (Alamosa, Archuleta, Conejos, Costilla, Dolores, Hinsdale, La Plata, Mineral, Montezuma, Rio Grande, Saguache, San Juan, San Miguel)

District 9: Rocky Scott* (El Paso, Fremont, Park, Teller)

District 10: Bill Thiebaut (Baca, Bent, Crowley, Custer, Huerfano, Kiowa, Las Animas, Otero, Prowers, Pueblo)

District 11: Steven Hofmeister (Cheyenne, Elbert, Kit Carson, Lincoln, Logan, Phillips, Sedgwick, Washington, Yuma)

Herman Stockinger, *Secretary*

*Also serve on HPTE Board

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