

California Transportation Plan 2050 • Strategic Plan 2020-2024 • Greenhouse Gas Emissions

# Mile Marker

A Caltrans Performance Report • Summer 2021

California Transportation Plan 2050



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## Director's Message



**Toks Omishakin**  
*Caltrans Director*

Recently, on multiple occasions, I moved my workspace outdoors and, with several Caltrans teammates, had the privilege to participate in collaborative restoration efforts for our beautiful state. The three-year, \$1 billion-plus [Clean California](#) initiative is part of Gov. Gavin Newsom's California Comeback Plan. This plan is providing Caltrans with the resources to carry out impactful measures that will make a bona fide difference through hands-on trash clean-up efforts. These actions will result in a healthier and more beautiful environment every Californian deserves.

On July 7, California's Day of Action, the enthusiasm was palpable as I joined Gov. Newsom, our maintenance crews, local officials, partners and stakeholders in this meaningful endeavor. Bag by bag, load by load, we began the process of removing unsightly, unhealthy and unsafe trash carelessly strewn up and down California's landscape. The results were spectacular.

When not properly disposed of, one person's trash — in an instant — belongs to us all. Each of us becomes a reluctant recipient of the hazards and risks that accompany litter. It increases the threat of fire, pollutes our waterways, endangers wildlife and is expensive to remove. The current conditions are simply unacceptable, and the Clean California initiative aspires to reverse this substandard status quo.

I am excited to be a part of such a massive undertaking; not just as Caltrans Director, but as a resident of California. An initiative that aims to deliver so many beneficial outgrowths is an initiative worth



Gov. Gavin Newsom and Caltrans Director Toks Omishakin chip in for Clean California.

embracing. There are no downsides to Clean California; in fact, this sweeping initiative benefits Californians on multiple levels. Following our organized, widespread increase of litter pickup and free dump days, I look

forward to watching the transformation in real time: from dirty and trash-riddled spaces to an attractive and appealing environment. In addition to improving our state aesthetically, the related health and sustainability components will pay dividends toward improving quality of life.

And I'm extremely pleased Clean California will generate approximately 11,000 new jobs over three years. These jobs include state employment and opportunities for at-risk youth, people experiencing homelessness and formerly incarcerated people. Clean California also has great potential to bring communities together, educate and foster pride in our state.

The camaraderie that existed among those picking up trash on that pivotal day — California's Day of Action — was not just a one-off. Rain or shine, Caltrans' ongoing efforts to upgrade public spaces throughout the state are underway. Pride is contagious, and when we all respect our surroundings — even just picking up a single piece of trash once a day — the results will be astonishing. A cleaner, healthier environment does not have to be a daydream. Sitting right in our sights is a valuable gift to ourselves, our loved ones and future generations: A Clean California.

Not only are we addressing immediate problems besetting our transportation system, such as trash-strewn roadsides, the Department is setting a course for future travel in California with the Caltrans

[2020-2024 Strategic Plan](#) and

the



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Caltrans' 2020-2024 Strategic Plan

[California Transportation Plan \(CTP\) 2050](#) , both unveiled earlier this year.

The CTP 2050 details the state's long-range transportation vision. It explains how we can improve mobility and accessibility while drastically reducing greenhouse gas (GHG) emissions related to transportation. The CTP 2050 strives to reduce the miles traveled by vehicles, advance equity in transportation planning and decisions, and improve the quality of life for all those who use the travel network.

A story in this issue of *Mile Marker* offers a more detailed look at the plan.

The 2020-2024 Strategic Plan, meanwhile, focuses on the shorter term but complements the broader transportation-system vision outlined in the CTP 2050. As explained in another *Mile Marker* article, strategic planning is a process that Caltrans uses to set a compelling course for the future, identify the necessary actions, and track performance measures.

We are committing to six goals through 2024 in support of these responsibilities. At the top of our list is, as always, is making the travel system safer. We also outline our coordinated strategies to achieve success in the critical areas of equity and livability, climate action, expanding the multimodal transportation network, stewardship and efficiency, and cultivating excellence.

We are a forward-looking department that has charted a course for a more sustainable and equitable future. This is a journey we are very much prepared for and excited to embark upon.

Thank you for supporting our short- and long-term vision, and enjoy this issue of *Mile Marker*.

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Mile Markers

## Mile Markers



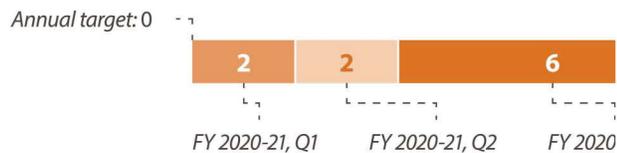
### Caltrans Strategic Plan Performance Objectives

With the launch of the new Caltrans 2020-24 Strategic Plan, development of performance objectives is well underway. Performance objectives are intended to gauge success at affecting the intended outcomes for each of the six Goals. This dashboard represents those performance objectives in which we have begun to track and report. Additional performance objectives will be shared in coming *Mile Marker* issues, once data tracking and targets have been fully developed for them.



#### Goal: Safety First

Maintain the number of on-the-job serious injuries for the fiscal year at zero, through June 30, 2021.



In fiscal year 2020-21, 13 on-the-job serious injuries occurred. An on-the-job injury or illness resulting in a fatality, inpatient hospitalization, amputation, or COVID-19 cases not counted in this performance objective.

>



## Goal: Cultivate Excellence

Increase the percentage of employees who take strategic training for the fiscal year to 90% or higher, by June 30, 2021.



This performance objectives shows the number of employees who have received training from their supervisor, and recorded it in the LMS.



## Goal: Enhance and Connect the Multimodal Transportation Network

Demonstrate the California Integrated Travel Program (Cal-ITP) in three regions, by 12/31/2021.

To increase the quality and quantity of transit data published by California's and regional partners explored passenger-counting technologies in July 2021 crucial for transportation planning purposes, and physical distancing due to benefit for riders to know real-time passenger crowding in trip planning. As of the target as stated, demonstrating the Cal-ITP in Santa Barbara, Sacramento



## Goal: Strengthen Stewardship and Drive Efficiency

Meet the goals of the State Highway System Management Plan for asset condition by 2027.

Asset Class	2020 Year End: Good and Fair	2027 Target: Good and Fair
Pavement	Class 1	99.3%
	Class 2	99.6%
	Class 3	99.6%
Bridges and Tunnels	96.6%	98.5%
Drainage (Culverts)	90%	90%
TMS	79%	90%

Caltrans is on track to meet or exceed targets by 2027 for pavement and culvert bridges rated in good condition is projected to rise, corrective actions need to be taken and poor targets are achieved. Caltrans will continue to monitor progress to be reported from the 2020/21 Performance Benchmark Report.

Increase the percentage of Disadvantaged Business Enterprise (DBE) contracting that achieves parity with presumptive groups, by 20% by June 30, 2021.



Caltrans Office of Civil Rights is focusing efforts to bring all presumptive group presumptive group is based on the 2016 disparity study weighted average in years. Given the office's virtual outreach, increase in certification, and other t are committed to meeting the targets. The FY 2021/22 target could change b: *\*Targets are not mandates, they are goals of the Department.*



**Goal: Lead Climate Action**

Increase the percentage of Caltrans fleet that are zero-emission vehicles (ZEVs) to 5%, by June 30, 2022.

As of 6/30/2021  
**3.24%**



Zero-emission vehicles include pure zero emission vehicles such as hydrogen battery electric vehicles (BEV). Plug-in hybrid electric vehicles (PHEVs) are co included in the Department's count of ZEVs. The percentage of ZEV vehicles i total number of ZEV fleet in-service count divided by the total self-propelled Department faces a few challenges to meet the goal of 20% ZEVs by 2025. Th technology and availability, fueling and charging infrastructure, and funding are not anticipated to increase as fast as in future years when the industry ar overcome these challenges.



**Goal: Advance Equity and Livability in all Communities**

Create an Accessibility Score by March 2022.

The Accessibility Score will rate the accessibility to public and active transpo affordable housing to employment and civic centers, and a high-quality pub tool(s) will be identified to determine a project or plan's accessibility score. A State Planning and Research funding through the Division of Transportation Accessibility evaluation tool(s) will be identified which determine a project o of work is being finalized for SP&R funding through DOTP. This work carries c Management Plan.

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Heading in a New Direction

## Heading in a New Direction



### California Transportation Plan 2050 Offers Roadmap to Cleaner, Fairer, Safer System Through Next Three Decades

The



Although 2050 is still almost three decades away, Caltrans and a coalition of transportation partners have introduced a plan that lays the groundwork for how California's transportation system should evolve and adapt with a changing state by that time.

[California Transportation Plan \(CTP\) 2050](#) details the state's long-range transportation vision and establishes a series of recommendations to

improve mobility and accessibility while reducing greenhouse gas (GHG) emissions related to transportation.

The product of far-reaching climate legislation, the CTP 2050 presents an ambitious vision of California's transportation future unconstrained by current policies and financial considerations, rather than focusing on individual projects or budgets. The goal of the plan is to create a roadmap for a travel system that, through the use of transportation and land use strategies, reduces emissions significantly by 2050 and is equitable, safe, sustainable, integrated and efficient for all.

Toward that end, the CTP 2050 has established eight goals to guide policy and budget decisions and transportation planning in the years ahead.

By 2050, the plan says California's transportation system is expected to support an estimated 45 million residents. They will need an integrated, sustainable network of mobility options that provide safe, convenient and reliable access to jobs, education, health care and other services that improve quality of life in all regions of the state. California must do this while also achieving its goal of reducing GHG emissions from transportation to 80 percent below 1990 emissions levels by 2050.

The CTP 2050 shows how California can dramatically reduce climate-changing emissions from the transportation sector and comply with an ambitious slate of climate legislation through strategies to support a vibrant economy and livable communities, such as:

- advancements in clean fuel technologies;
- continued shifts toward transit, shared mobility and nonvehicular travel;
- implementation of pricing strategies to influence travel behavior and reduce vehicle use;
- more efficient land use and development practices; and
- widespread acceptance of telework.

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## A transportation system for all Californians



The CTP 2050 also seeks to advance racial and economic justice. It proposes that new resources be directed to

marginalized and underinvested communities, and existing resources be evaluated with the goal of amplifying voices that have been historically excluded from the transportation decision-making process. The plan emphasizes the importance of engagement and careful planning to ensure

all Californians enjoy the benefits of transportation projects and are not subject to negative project impacts, particularly in historically underserved and underrepresented communities.

Improving engagement in transportation planning at the neighborhood level will help Caltrans better understand the travel needs and challenges for people in underserved communities. As a result, the department can improve transportation investments to limit those communities' exposure to pollution from the transportation system, provide expanded mobility options, and enhance access to jobs, education, healthy food and transit.

In the plan, Caltrans and its policy advisory committee partners identify eight goals — along with accompanying objectives and performance measures:

- **Safety** — Provide a safe and secure transportation system.
- **Climate** — Achieve statewide GHG emission reduction targets and increase resilience to climate change.
- **Equity** — Eliminate transportation burdens for low-income communities, communities of color, people with disabilities and other disadvantaged groups.
- **Accessibility** — Improve multimodal mobility and access to destinations for all users.
- **Quality of Life and Public Health** — Enable vibrant, healthy communities.
- **Economy** — Support a vibrant, resilient economy.
- **Environment** — Enhance environmental health and reduce negative transportation impacts.
- **Infrastructure** — Maintain a high-quality, resilient transportation system.

During development of the CTP 2050, California saw a sudden sharp dip in travel demand due to the COVID-19 pandemic. Caltrans saw a clear need to reevaluate many of the underlying assumptions about future travel in the scenarios analyzed through the CTP, even as the technical work on the plan was nearly complete. Higher levels of telework can be expected permanently, and the need for rapid broadband deployment has increased. Expanding access to transit and safe walking and bicycle paths were priorities for Caltrans before the arrival of COVID-19 and remain essential to achieving a sustainable recovery.

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## Cleaner air, less congestion, stronger economy

The plan foresees significant benefits if its recommendations are implemented.

The CTP provides a path toward achieving the state's GHG emissions target of 80 percent below 1990 levels by 2050. Correspondingly, vehicle miles traveled (VMT), the measure that Caltrans uses to gauge traffic impacts, could drop by 27 percent from a 2050 scenario based on current trends if



other modes of travel such as walking, bicycling, skating and public transit are supported. Trips taken using these options could jump

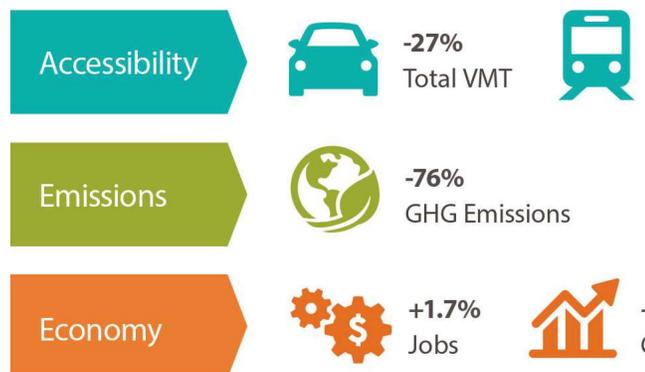
10 percent if projections are met, the plan says.

Transportation improvements also would strengthen the state’s economic standing, according to the CTP 2050, by creating jobs, improving access to workplaces and services, and ensuring that goods move efficiently between businesses, consumers and the global marketplace. The plan predicts robust investment in the transportation network could generate a half-million new jobs, boost the gross state product an additional \$1 billion and net California workers an additional \$33 billion in income.

Conversely, the CTP 2050 warns of increases in VMT of up to 35 percent by 2050 and further degradation of California’s transportation network without the right mix of system investments and land use decisions. In addition, the amount of time Californians spend stuck in traffic could double by 2050 without intervention.

The plan also describes how travel is changing, in ways that pose challenges and opportunity. Broadband and internet connectivity are allowing people to work, shop, learn, and obtain health services from home — a trend that accelerated during the COVID-19 pandemic. Vehicle electrification is already helping reduce transportation sector emissions, yet vehicle automation may make driving more appealing. Generational lifestyle differences, such as waning auto-ownership among youth populations, could change traditional travel modes, as will the waves of evolving data and information technology.

### Potential Benefits of CTP 2050 Plan



If the recommendations in the CTP 2050 plan were to be put in place, alongside upco could see marked improvements in the areas of environment, economy and accessib

## Implementing the plan will require diligence

Achieving the goals of the CTP 2050 will not be easy. The plan is ambitious and seeks to enhance the future transportation system of California. Through the process of CTP 2050 implementation, Caltrans must work with its partners to transition the policies within the document into plans, programs and projects.

The CTP 2050 recommendations are based on technical analysis that explored how socioeconomic trends, land use shifts, changes in travel preferences, and other factors will affect future transportation system performance, and impacts on emissions and economic growth. Plan projections are based on three performance modeling tools that analyzed travel demand, emissions generation, and economic trends.

The CTP is updated every five years according to state and federal law. Caltrans developed the plan over a two-year period that included extensive public outreach; engagement from state, local, and regional partners; research and analysis; and oversight from four committees and eight groups of subject matter experts.

The CTP 2050 also draws from, and unifies, Caltrans modal plans and other statewide transportation-related plans.

Following adoption of the CTP 2050, Caltrans is now developing an implementation element that outlines transportation agency responsibilities, implementation steps, and timelines. The implementation process will inform the next iteration of the CTP, which is expected to conclude in 2025.

**Source:** *California Transportation Plan 2050; Caltrans Division of Transportation Planning*

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## Driving Down Greenhouse Gas Levels



### Strategy to Reduce Vehicle Miles on Roadways Key to Meeting State Goals

Caltrans has an important role to play in fostering solutions that reduce transportation greenhouse gas (GHG) emissions, which are contributing to climate change impacts statewide. Caltrans is already reducing GHG emissions through operational efficiencies and sustainable management of the State Highway System.

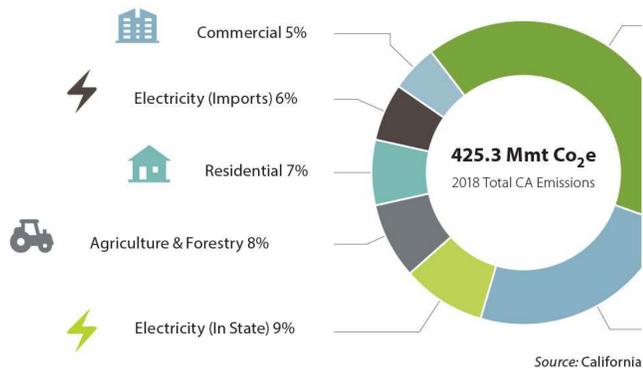
In its [GHG Emissions and Mitigation Report](#), Caltrans describes the actions taken to this point to reduce GHG emissions, quantifies the amount of GHG produced by its operations, and identifies future opportunities to further reduce emissions. The report also reviews the emission sources that Caltrans can control or influence.

Emissions from the transportation sector are the largest contributor to heat-trapping gases that alter climate patterns in California and nationally, according to the U.S. Environmental Protection Agency, California Air Resources Board and the GHG Emissions and Mitigation Report. The latest research forecasts that impacts from climate change in California will increase in severity and scale through the end of the century. Given current

emission trends, climate predictions include increased temperatures, more intense wildfire seasons, more frequent flooding, extended drought cycles, and rising sea levels.

According to the [Air Resources Board](#)'s most recent report, California sources emitted 425 million metric tons of GHGs in 2018. An estimated 89 million metric tons of those gases were generated by traffic on the Caltrans-managed State Highway System, the equivalent of 21 percent of the state's total GHG emissions. Factoring in an estimated 32 million metric tons from extracting and producing vehicle fuels, emissions from vehicle tailpipe sources in 2018 accounted for 41 percent of the state's total GHG emissions. The second largest contributor to the state's total GHG emissions is the industrial sector (24 percent), followed by electricity generation (15 percent).

2018 California GHG Emissions by Main Economic Sector



Caltrans can make the most impact in the transportation sector by helping the state r required by legislation and executive order, the report said.

## Vehicle miles tied to GHG emission increases

Although state climate policy anticipates that improving vehicle technology and fuel efficiency standards will help curb GHG emissions, the report emphasizes that major progress for cleaner air must come from reducing vehicle miles traveled (VMT) on state roadways.

The report asserts that Caltrans and other government and transportation entities can do a great deal to counter an increase in VMT and corresponding rise in GHG emissions. The State Highway System saw 195 billion vehicle miles of travel in 2016, which represented 57 percent of all VMT in the state that year. After declines in the early 2000s, statewide VMT and VMT per capita began growing again in 2013 due to increased passenger vehicle travel — a development that made compliance with state-mandated reductions in GHG more difficult, according to a recent Air Resources Board assessment.

Because Caltrans plans, builds, and operates most of the state's highway system, it has unique opportunities to influence on-road vehicle travel in the state. The GHG Emissions and Mitigation Report offers these strategies as most effective in reducing emissions:

- Revise planning, programming, and project development procedures to minimize highway capacity expansion projects that unintentionally encourage single-occupancy vehicle travel, which increases statewide VMT and GHG emissions.

- Promote and expand roadway pricing.
- Support transportation system improvements that provide multimodal and active transportation alternatives to shift travelers away from single-occupancy vehicle trips that account for the bulk of GHG emissions.

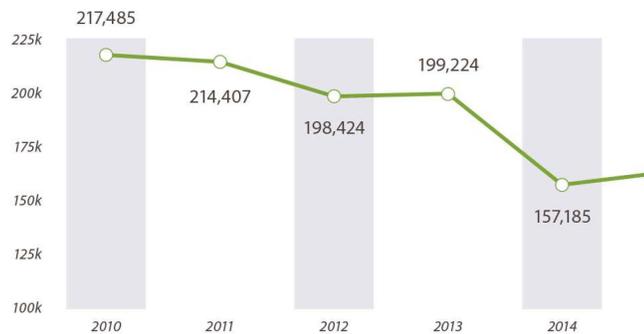
In addition to influencing users of the transportation system, the report identifies opportunities for Caltrans to reduce emissions through internal operations and contractors' materials and operations. The maintenance and operation of the State Highway System requires extensive resources such as paving materials, electricity for lighting, water for landscaping, and fuel for a large fleet of vehicles.

The report says using more energy-efficient and less carbon-intensive materials for roadway construction and maintenance appear to offer the highest potential for reducing operational GHG emissions.

### Internal measures to control carbon are not enough

Highway construction and maintenance projects accounted for 2.5 million metric tons of GHG emissions in 2017, or 0.6 percent of statewide emissions. Caltrans internal operations, such as fuel for the vehicle fleet, and facility and highway lighting, produced 120,000 metric tons of greenhouse gases in 2017, or 0.03 percent of the statewide total. Efficiencies and new technology adoption in those areas under direct Caltrans control have produced a 45 percent decline in GHG levels since 2010, the report noted.

Caltrans operational GHG emissions (in metric tons) from 2010 to 2014



While Caltrans has reduced its own carbon footprint in the last decade, adopting strategies to shift travel patterns on the state travel network presents the best approach to significantly lower VMT and GHG levels, the report asserts.

By promoting multimodal transportation options, ridesharing, and active transportation, Caltrans can manage demand for travel in single-occupancy vehicles. Within the transportation sector, about 70 percent of GHG emissions come from on-road passenger vehicles (i.e., light-duty vehicles). Another 21 percent comes from on-road heavy-duty vehicles (i.e., freight trucks and buses). The remaining sources of transportations emissions account for a relatively small fraction of the state's total GHG emissions.

The report emphasized that it is essential to address the emissions produced by vehicles on the State Highway System if the state is to meet the GHG and VMT reductions goal established under legislation and executive orders.

Opportunities to reduce highway-generated emissions include:

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### Minimizing induced vehicle travel

Although it seems counterintuitive, projects that expand highway capacity with the intent to relieve congestion in urban areas often exacerbate the problem by encouraging more vehicle trips. This phenomenon is known as induced travel. There is little evidence that even conventional traffic-reduction strategies such as high-occupancy vehicle lanes help counter overall VMT and GHG growth. Although some capacity-enhancing projects may yield benefits in reduced congestion or GHG, the report said careful planning and research is needed to quantify these impacts.

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### Implementing express lanes

A more directed approach to altering driver behavior has been the adoption of toll roads and express lanes. California now has 214 miles of express lanes, with more in the planning stage. Studies of areas that have adopted roadway pricing strategies have shown they can reduce traffic significantly, the report said, as travelers seek out less costly trip alternatives such as transit, ridesharing, bicycling and walking.

Equity concerns have been raised regarding roadway pricing, the report noted. To counter these equity issues, discounted pricing could be offered those who qualify, and some of the revenue raised through tolls could go toward improving transportation access in disadvantaged and low-income communities.

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### Adopting alternative travel modes and strategies

Caltrans has increasingly taken the lead on developing multimodal and active transportation plans that attempt to draw people out of their cars. Caltrans works with transportation partners on transit system improvements, land use planning, parking, and transportation demand strategies such as commute options, rideshare, carshare, and telework.

The Department uses a variety of internal planning tools and operational controls to reduce GHG and VMT. The Caltrans GHG Emissions and Mitigation Report presents a comprehensive overview of those efforts.

Caltrans also has published a series of

[Climate Change Vulnerability Assessments](#) in each of the 12 regional districts that identify segments of the State Highway System vulnerable to projected climate change impacts, including precipitation, temperature, wildfire, sea level rise, storm surge, and cliff retreat.

The Caltrans 2020-24 Strategic Plan includes climate action performance measures and targets, several of which relate to GHG reduction.

**Sources:** *Caltrans Greenhouse Gas Emissions and Mitigation Report; Caltrans Division of Transportation Planning; Caltrans Division of Environmental Analysis.*

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## Strategic Plan Broadens Caltrans Mission



### Safety, Equity, Environment Among Department's Priorities through 2024

[Caltrans' 2020-2024 Strategic Plan](#), released in March, commits to new core values, offers invigorated mission and vision statements, and sets fresh goals for one of the world's preeminent transportation organizations. The Caltrans plan also introduces a new element: strategic imperatives.

Strategic planning is a process that Caltrans uses to set a compelling course for the future, identify the actions necessary to arrive at the intended destination, and track performance measures as indicators of progress toward success.

The 2020-2024 plan declares that Caltrans' core values are engagement, equity, innovation, integrity and pride. Core values represent the traits and behaviors that Caltrans expects of its almost 22,000 employees.

The plan also unveils Caltrans' new mission statement: "Provide a safe and reliable transportation network that serves all people and respects the environment."

This new mission statement highlights the importance of safety, equity and the environment to the Department.

The plan  
also  
puts  
forth a  
vision



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statement that will serve as the overarching theme for the duration of the 2020-2024 plan: “A brighter future for all through a world-class transportation network.”

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As envisioned by Caltrans, “a world-class transportation network” will:

- Be safe, equitable, reliable, efficient, sustainable and resilient.
- Minimize the negative impacts to the environment and enhance the environment where possible.
- Help the economy thrive and give California residents options for their travel needs.



Additionally, three strategic imperatives serve as guiding principles for selecting the course that Caltrans will take to put the plan into action. These strategic imperatives will serve as a “checklist” before making pivotal decisions, asking:

1. Will the action(s) improve and expand community partnerships, especially in underserved communities?
2. Will these decisions align financial investments to deliver on State goals and Caltrans’ strategic outcomes while maintaining a fix-it-first approach and staying within existing funding frameworks?
3. Finally, do they reflect a commitment to equity?

Those broad imperatives serve as the principles behind the six goals developed to define Caltrans' strategic priorities. They are:



Safety first.



Cultivate excellence.



Enhance and connect the multimodal transportation network.



Strengthen stewardship and drive efficiency.



Lead climate action.



Advance equity and livability in all communities.

In developing the six goals, Caltrans drew from several sources that pointed to the opportunities and threats requiring the most attention. This effort began with an organizational risk assessment that replaced the customary analysis.

In addition, Caltrans relied on surveys of its transportation partners and its own workforce; aligned its conclusions with the California Transportation Plan 2050; and incorporated the priorities of Gov. Gavin Newsom, California State Transportation Agency Secretary David Kim and Caltrans Director Toks Omishakin.

For a national perspective, Caltrans consulted strategic plans from each state's Department of Transportation.

Each of the six goals includes a group of strategies that represent critical bridges between planning and implementation. A set of performance objectives are attached to each goal that quantifies how well the organization is achieving its desired outcomes, typically stated in terms of "number of" or "percentage of" change.

Performance objectives are not included in Caltrans' new Strategic Plan. This decision was made because the objectives are often adjusted or replaced over time, which would otherwise require a new version of the Strategic Plan to be published.

Instead, performance targets will be defined and tracked in the companion action plan for the Strategic Plan. The action plan is a document that displays how Caltrans is going to operationalize the Strategic Plan.

Caltrans' progress toward the targets set for the performance objectives will be listed in the "Mile Markers" dashboard section of the *Mile Marker*.

Caltrans' Division of Risk and Strategic Management began working on the 2020-2024 Strategic Plan in 2018, identifying Caltrans' opportunities and risks, and continued overseeing the plan's development.

For more information on Caltrans' 2020-2024 Strategic Plan, refer to the document available on the Caltrans website or email the Division of Risk and Strategic Management at [Strategic.Planning@dot.ca.gov](mailto:Strategic.Planning@dot.ca.gov) .

**Source:** Blair Thompson, Chief, Caltrans Division of Risk and Strategic Management.

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## Making Strides Toward Saving Lives

Safe System Approach Seeks to Eliminate Fatalities, Serious Injuries on Roadways



At Caltrans, safety is paramount. The department has developed various approaches to design, build, and operate roadways with an emphasis on safety. Yet transportation professionals and policy makers continue to grapple with increases in road traffic fatalities, injuries, and crashes in California and throughout the world.

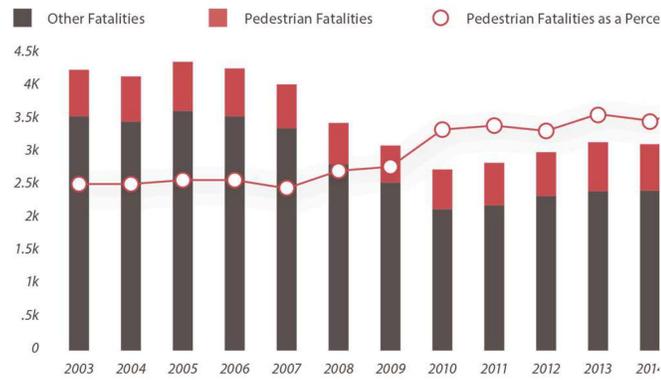
In California, fatality and serious injury numbers have continued to rise during the last decade. Based on the most recent figures available, 3,606 lives were lost (2019), with 16,158 persons (2018) seriously injured on California's roadways.

Those annual statistics represent one-year totals, but are not anomalies. On average, 10 people are killed in road traffic crashes each day in this state, of which more than two are our most vulnerable users: people who bike and walk.

This tragic toll isn't unique to California. In 2019, an average of more than 100 people lost their lives on U.S. roads each day. According to the Federal Highway Administration (FHWA), the number of pedestrians struck and killed in vehicle crashes in the past decade increased by more than 50 percent nationally.

Figure 1: Statewide Integrated Traffic Records System

Pedestrian Fatalities as a Percent of Total Fatalities



Year	Other Fatalities	Pedestrian Fatalities
2003	3,520	704
2004	3,436	684
2005	3,591	742
2006	3,521	719
2007	3,345	650
2008	2,814	620
2009	2,523	567
2010	2,119	601
2011	2,183	633
2012	2,313	653
2013	2,373	734
2014	2,393	709
2015	2,568	819
2016	2,904	933
2017	2,944	940
2018	2,820	978
2019	2,634	972

Further, people in communities of color are 50 percent more likely to become a fatality while walking or bicycling compared with all Americans, according to the Centers for Disease Control and Prevention.

The pedestrian percentage of total fatalities is on the rise, far outpacing the percentage of those who walk as their mode of transportation — an increasingly disproportionate safety impact for pedestrians in California. For example, in 2012, pedestrian trips made 16 percent of total trips, yet pedestrian fatalities represent nearly 25 percent of total fatalities, according to the CA Household Travel Survey.

Figure 2: Safety is an Equity Concern (Source: 2015 Safe Routes to School National Partnership)

## People Killed While Walking (by Income and Ethnicity)



Continuing Caltrans' commitment to protect the end users of the transportation system, the Department is adopting the Safe System approach to the design, building, maintenance and management of the transportation infrastructure of the State Highway System. Caltrans has formally committed to a Safe System approach by including it as part of the [2020-24 Strategic Highway Safety Plan](#) and [Caltrans 2020-24 Strategic Plan](#) (story in this issue), and the Division of Safety Programs is following up by drafting a Director's Policy aimed at affirming this safety strategy.

The Safe System approach aims to eliminate fatal and serious injuries for all road users by creating a forgiving transportation system and keeping impacts on the human body at tolerable levels. The Safe System approach is defined by six principles.

1. **Reduce death and serious injury to zero**
2. **Humans make mistakes**
3. **Humans are vulnerable**
4. **Responsibility is shared**
5. **Redundancy is crucial**
6. **Safety is proactive and reactive**

Making a commitment toward zero traffic deaths involves addressing all aspects of safety through the following five Safe System elements that, together, create an approach with layers of protection for road users: safe road users, safe vehicles, safe speeds, safe roads, and post-crash care.

In the U.S., the FHWA has released new safety policies and recommendations in support of Safe System. FHWA views California as a pilot state for the Safe System approach and Caltrans is positioning itself to be a national leader with a dedicated office devoted to traffic and pedestrian safety, and the adoption of programs that strengthen safeguards for all who depend on the State Transportation System.

## Case Study #1: Pedestrian Safety

One example of how Caltrans is moving toward the Safe System approach is its 2019 Pedestrian Systemic Safety Monitoring Program. This program incorporates a predictive (or systemic) approach into its modeling and analysis that showcases how proactive tools can be used to identify and mitigate risk in the transportation system to protect pedestrians. The foundation of the monitoring program is built on a systemic safety model developed by the [Safe Transportation Research and Education Center](#) at the University of California, Berkeley. It identifies locations with crash risk based on their contextual characteristics that match high crash locations, not crash history, and variables that include children, seniors and equity concerns.

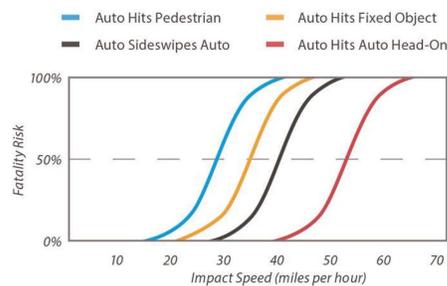
## Case Study #2: Developing a Safe System Approach to Setting Speed Limits

Another example of Safe System Approach implementation is a new Caltrans research effort centered around speed management based on the principle that humans are vulnerable.

Figure 3: Human bodies are vulnerable in crashes (Source: Roads and Traffic Authority of New South Wales)

People have a limited ability to tolerate crash impacts before death and serious injuries occur — a central tenet of the

Human Bodies are Vulnerable in Crashes



Safe System approach. The management of kinetic energy transfer to within survivable limits is fundamental to understanding how to design and operate the road system consistently within the Safe System philosophy. The Safe System approach focuses not just on vehicle speed, but on managing transfer of kinetic energy. Just a small increase in vehicle speed dramatically increases deaths and serious injuries.

Safe System is an integrated transportation approach designed to include all users of the system, stakeholders and industry. It's a vital step as Caltrans moves toward designing, building and managing a 21st century transportation system.

**Sources:** Rachel Carpenter, Chief Safety Officer; Caltrans Division of Safety Programs, U.S. Department of Transportation, Office of Safety.

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## Safety Concerns Extend to Our Animal Friends, Too

### Caltrans Creates Safer Passages for Wildlife in State Highway Zones



Under State Route 118 at Long Canyon, Caltrans has constructed a wildlife tunnel for animals to enter and depart. The wildlife passage, one of several along the Southern from the dangers along state highways. (*District 7 photograph*)

Mountain lions, opossums, frogs and butterflies are some of the species that Caltrans is going to great lengths to preserve and protect along the state's highway network. Here are some of those wildlife projects:

### Frog ladder/tube along SR 70, District 3

The November 2018 Camp Fire devastated the town of Paradise, consumed some 70,000 acres, and left many of the area's state-maintained roadways with clogged or damaged culverts. Caltrans crews repaired and replaced as many culverts as it could, as quickly as possible, to keep the roadways open from stormwater runoff and debris flows.

In June 2019, the U.S. Forest Service told Caltrans that it had found two adult female foothill yellow-legged frogs in a drainage inlet in the Feather River Canyon that were unable to access their upstream habitat. The foothill yellow-legged frogs have been protected by the California Endangered Species Act since late 2019.

The drainage inlet where the frogs were stranded was located at postmile 47.07 along State Route 70 near the Butte-Plumas County line. Many tributaries trickle down the hillside and pass under this stretch of the roadway, then continue flowing into the North Fork Feather River, an important breeding ground for the foothill yellow-legged frog. The river meets the frog's breeding needs in terms of substrate, flow requirements, amount of light, and temperature.

Originally an open-pipe culvert with an L-shaped design that allowed frogs to go upstream, this drainage was converted into a graded drainage inlet after the Camp Fire that prevented the animals from accessing upstream habitat. This frog species cannot climb smooth, wet vertical surfaces, so it could not get out of the new inlet.

Because Caltrans prioritizes wildlife welfare in its construction and maintenance operations, an environmental and hydraulics design team joined forces to solve the problem. Caltrans, working with the Forest Service and California Department of Fish and Wildlife, determined that a design solution needed six features: It had to be built and adjusted quickly, be easy to install, have traction for a claw-like feet, be environmentally friendly, and have a long lifespan and low maintenance costs.

The resulting "NMH" frog tube — named after District 3 hydraulics engineer Jesse Gilbert's three children, Nolan, Myra and Harmony — met those requirements. Materials were purchased at a hardware store and the ladder was constructed in the field. Soon, pictures taken by cameras placed in the passages showed frogs using the ladder. Months later, Caltrans installed the permanent frog tube and a mounted camera monitors wildlife activity.

An NMH frog ladder also has been installed at SR 70's postmile 46.07.

## SR 118 crossings in Ventura County, District 7

State Route 118 in Ventura County has posed one of the largest obstacles to wildlife movement within the Santa Monica-Sierra Madre



Caltrans biologist Sean Herron visits a passage site.

Connection, which links the coastal Santa Monica Mountains with the Santa Susana Mountains and the Sierra Madre Ranges of Los Padres National Forest.

With a grant from the California Natural Resources Agency, Caltrans addressed wildlife access problems at five wildlife-crossing locations of SR 118 in the Las Posas Valley.

Work on the project began almost a decade ago. In 2011 to 2013, with help from the National Park Service, Caltrans conducted a 22-month wildlife-mortality study of a 12.3-mile stretch from west of Somis to Moorpark. On average, the study found, 1.35 animals were killed every day. Rabbits, opossums and California ground squirrels were the most prevalent species killed by vehicles.

In all, the study identified seven key culvert crossings. Three underpasses on SR 118 accounted for 97 percent of the documented crossings by animals. These culvert crossings, the study determined, had walls that hindered animals' efforts to cross.

Caltrans and Park Service representatives met with the Federal Highway Administration, which provided alternatives for retrofitting culverts that would accommodate medium to large predatory animals such as bobcats, coyotes and mountain lions.

Caltrans and its partners in this project were awarded a \$349,600 state grant. Fences and ramps were installed to increase safe wildlife passage, and \$18,000 was set aside for National Park Service wildlife biologists for a post-construction follow-up.

The project is expected to preserve ecosystems, increase genetic diversity of populations that can more safely travel between the parklands, and increase wildlife's access to resources. By directing animals safely underneath highways, collisions with motorists also should be reduced.

### Liberty Canyon Wildlife Crossing, District 7



As was the case with other highway

Bears benefit from wildlife passages that in some way help them negotiate a culvert or tunnel beneath a road. (*District 7 photograph*)

developments of the time, wildlife crossings and habitat were not incorporated into the planning of US 101 when it was commissioned in 1926. The stretch near Malibu Canyon separated the Santa Monica Mountains in Los Angeles County and the Santa Susana Mountains in Ventura County. These ranges connect to the Simi Hills and the Los Padres National Forest, a region rich in wildlife diversity.

In 1979, the Santa Monica Mountains Comprehensive Plan identified a need for a “wildlife network” to counter the freeway’s deadly effects. With help from [advocacy groups](#) , Caltrans and partner agencies are working toward obtaining funding and final approvals for the construction of a 165-foot-wide, 200-foot-long wildlife crossing over Highway 101 and the adjacent Agoura Road at Liberty Canyon. If private and public funding goals are met, Caltrans may break ground on the project by the end of this year, with completion anticipated in 2023.

US 101 is recognized as one of the largest barriers to wildlife movement in Southern California. At its current size and traffic volume, the highway is nearly impassable for terrestrial and some aerial wildlife species. Researchers consider the multi-lane highway a physical and social barrier to genetic diversity for carnivores, including mountain lions, bobcats and coyotes. Other species that can use the wildlife crossing include mule deer, roadrunner, Western fence lizard, woodrat, wrentit, and Western toad. Project planners hope that a wide overcrossing, planted with native vegetation and nourished by natural light, will help encourage the movement of wildlife between coastal and inland ranges.

The Liberty Canyon Wildlife Crossing project introduces several innovations to plant native vegetation on the overpass. The project plans for a nursery near site to allow plants to acclimate prior to being transplanted. The project will also be the first in the district to include beneficial microfungi organisms for plant growth.

In addition to improving habitat connectivity, the proposed crossing is expected to reduce wildlife-vehicle collisions and will be placed at the highest-quality potential crossing area in Agoura Hills. Caltrans will install cameras to live images and video of the construction.

Caltrans is also considering wildlife crossings over US 101 at Conejo Valley and at Rocky Peak and Moorpark on State Route 118.

## Monarch butterfly habitat assessment, Central Coast

In the 1990s, hundreds of millions of monarchs made the epic flight each fall from the northern plains of the U.S. and Canada



Caltrans is working toward providing monarch butterflies with more of the type of vegetation they depend upon.

to forests in central Mexico, and more than a million monarchs overwintered on the California coast. Monarch conservation focuses on both the Eastern and Western monarch populations, which are divided by the Rocky Mountains. Western monarchs breed west of the Rocky Mountains and generally overwinter in coastal California, while the Eastern butterflies breed east of the Rockies and overwinter in central Mexico.

According to the annual Xerces Western Monarch Thanksgiving Count, volunteers counted fewer than 30,000 monarchs — less than 1 percent of the population’s historic size — in 2018 and 2019. In 2020, the population

dropped to less than 0.01 percent of the historic size, with volunteers counting less than 2,000 monarchs.

What can Caltrans, which oversees the state transportation system, do to further help the Western monarch population?

The answer is for Caltrans to manage its roadsides and rights-of-ways for monarch habitat with plantings of pollinator and nectar plants, such as milkweed, black sage and other native plants. A technical focus group from Caltrans' District 5 Landscape and Environmental divisions seeks to help the monarchs now and in the future.

The group seeks to identify monarch habitats in Caltrans right of way that can be preserved, areas with potential for restoration or improvement, and track any related progress through a partnership with the

[Monarch Joint Venture](#) .

Caltrans District 5 biologists can use the survey tool to assess the monarch habitat suitability on the right of ways. When determined suitable, projects can include low- to no-cost methods to preserve, improve or restore right-of-way conditions for monarch habitat and other pollinators. These measures can include planting nectar plants or supporting overwintering habitat near the coast where identified.

**Sources:** *Sarah-Jane Gerstman, biologist, and Jesse Gilbert, hydraulic engineer, Caltrans District 3; Celina Oliveri, environmental planner and biologist, District 7; Francois Appiah, senior environmental planner mitigation specialist, District 7; and Stephanie Herbert, biologist, District 5.*

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## Project Spotlight: Schuyler F. Heim Bridge



The original Commodore Schuyler F. Heim Bridge, foreground, has been demolished which cost more than a half-billion dollars, brings the Terminal Island connector up to date. (See [photographs](#))

### South State Span Replaced After Nearly 75 Years Linking to Busy Ports

The



Commodore Schuyler F. Heim Bridge was constructed from 1946 to 1948 by the U.S. Navy as a steel vertical-lift bridge. It is one of three bridges that

connect Terminal Island in Los Angeles to Long Beach and San Pedro.

But after years of distinguished service, the original Schuyler Heim Bridge had done its duty. It was time for a new span across the critically important passage.

The Schuyler Heim Bridge Replacement Project demolished the outdated manual, vertical-lift bridge and replaced it with a vertical fixed concrete box-girder bridge to meet current seismic standards. The new bridge opened to traffic in September 2020.

In addition to being seismically deficient, the old bridge no longer had the capacity to meet shipment demands of the ports of Long Beach and Los Angeles, which rank among the busiest terminals in the world.

[See the dedication video.](#)

The bridge project replaced the original six-lane bridge with a seven-lane bridge that includes a new southbound auxiliary lane and standard emergency 10-foot shoulders. The previous Schuyler Heim Bridge had three nonstandard 11-foot wide lanes in each direction with no shoulders. The new bridge features three standard 12-foot-wide lanes in each direction, as well as the shoulders.



The project required several permits and included more than 100

Retrofitting was an option, but it was deemed too costly.

environmental commitments with input from the state Regional Water Quality Control Board, U.S. Army Corps of Engineers, U.S. Coast Guard, Harbor Development, California Coastal Commission, California Department of Fish and Wildlife, and South Coast Air Quality Management District.

### Commodore Schuyler F. Heim Bridge



An average of 17,000 vehicles cross the Heim Bridge daily, with 57 percent attributed to truck traffic — or 9,700 trucks.



About 380 vessels cross under the Heim Bridge per month.



Over 27 million pounds of steel, 82,000 cubic yards of concrete and 28,000 feet of pile were used to construct the new Heim Bridge.

One of the greatest access challenges was to maintain traffic flow at all times amid ongoing

construction. Building the new bridge also posed a number of engineering and construction challenges. Chief among them was installing eight foundation piles close to 200 feet long in the same footprint of the existing bridge foundation.

The new Schuyler Heim Bridge is now providing a safe and reliable transportation network that serves all travelers, respects the environment, and supports goods movement to and from the ports and the region. The trucking industry now benefits from the new bridge, with a free-flowing path to Terminal Island.

**Sources:** *Dan Leon, Senior Transportation Engineer, Mike Francis, Supervising Bridge Engineer; Peter Jones, Public Information Officer, Caltrans District 7*

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## Project Spotlight: Echo Summit



The biggest challenge Caltrans faced in replacing the U.S Highway 50 bridge at Echo Summit was the installation of seven 96-foot-long girders. Thanks to innovations and project efficiencies, the expected schedule was met. *(District 3 photographs)*

### Caltrans Successfully Walked the Proverbial Tightrope on Scenic Tahoe Span Replacement

The U.S. Highway 50 Echo Summit bridge



The replacement project provided unique and cliffhanging obstacles.

Technically, it's referred to as the \$14.1 million

[U.S. Highway 50 Echo Summit Sidehill Viaduct Replacement Project](#) . The

original bridge was completed in 1939 at a cost of about \$25,000. It is less than 100 feet long and you may not know you're driving over it as you descend into the Tahoe Basin and view Lake Tahoe. The replacement project was necessary to meet current safety and seismic standards. The existing bridge had significantly deteriorated after more than 80 years of service.

However, replacing it presented several challenges. The largest challenge involved getting the seven 96-foot precast bridge girders installed on the side of a mountain with very limited shoulder room. Ultimately, Caltrans selected a 14-day full closure of U.S. 50 as the best option to get the work done.



The Echo Summit work was performed last September.



Safety concerns obviously were a big part of the project.

Closing Highway 50 — the only direct route into South Lake Tahoe — affects those who travel to, live and work in work in the popular vacation destination. The district remained in frequent contact with the city of South Lake Tahoe, Lake Tahoe Visitors Authority, El Dorado County and Lake Tahoe Chamber of Commerce

on full closure dates, and held weekly meetings to inform key stakeholders.

The district also held public meetings leading up to construction where local residents and businesses were informed that Johnson Pass Road would be available for them as a detour. Outreach leading up to and through the closure included an extensive media campaign that included print ads, radio and TV spots, daily social media updates and e-mail blasts.

The district issued more than 2,000 local passes from the Caltrans maintenance yard in Meyers near the job site for five days leading up to the closure. Staff in Placerville also issued passes. The passes allowed local residents and regular commuters to and from South Lake Tahoe to use Johnson Pass Road as a detour route to avoid the closure, saving them up to 90 minutes of additional travel time.

Contractor Q&D Construction based in Sparks, Nev., finished the work ahead of schedule in nine days.

South Lake Tahoe is one of the premier tourist destinations in the world, with millions of visitors every year and thousands of commercial truckers who travel Highway 50 to service area businesses. Replacing the bridge provides a safe structure and one that is expected to last another 80 years.



To limit the disruptions caused by a full closure of U.S. 50, Caltrans adopted an aggre

**Source:** *Steve Nelson, Caltrans District 3 Public Information Officer*

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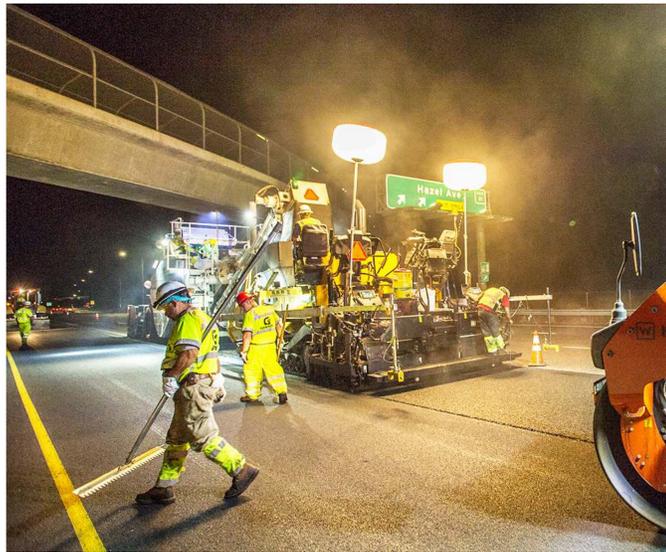
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Paving the Way for a More Efficient Travel System

## Paving the Way for a More Efficient Travel System



Caltrans works with its contractors at every stage to achieve efficiencies on projects t Highway System.

### Caltrans Finds \$340 Million in Cost Savings/Avoidances in Latest Fiscal Year

Caltrans continues to realize cost-saving efficiencies in its operation of the State Highway System, with savings reinvested in maintenance and rehabilitation needs across the state.

Caltrans identified \$340 million in cost savings and avoidances during the 2019-2020 fiscal year, outlined in its [annual report](#) required by SB 1, the Road Repair and Accountability Act of 2017. Of that amount, Caltrans listed \$174.3 million in new efficiencies achieved through improved operations and innovative methods. Recurring efficiencies, practices begun in previous reporting years, yielded an estimated \$20.5 million in cost reductions or savings. Another \$145 million in savings or costs avoided through additional measures was not counted toward the SB 1 efficiency goal, but listed nonetheless because the steps taken represent strategic efficient investments.

The landmark transportation funding law requires Caltrans to become more efficient with the taxpayer funds it spends, and find ways to save at least \$100 million each year.

Even though Caltrans has been



Caltrans has released its [2019-20 SB 1 Efficiencies Report](#) .

delivering projects more efficiently for many years, fiscal year 2017-18 was the first time that efficiency measures were monitored, quantified, and reported due to SB 1.

The first annual efficiencies report identified \$133 million in avoided or reduced costs, achieved through process improvements, new technology and innovative project delivery methods. The 2018-19 report listed \$233 million in implemented efficiencies.

The 2019-20 fiscal year was the third straight year that Caltrans exceeded the goal of \$100 million in annual savings set by SB 1. Caltrans reported 10 new and seven recurring efficiencies, and the savings wrought from those improvements will be reinvested in the maintenance and rehabilitation of the State Highway System.

The new efficiencies yielded \$174.3 million in estimated dollar savings achieved/avoided. Listed in order of savings, they are:

#### **Stormwater Mitigation — \$85.7 million**

Use of a particular kind of pavement along one stretch of highway allowed Caltrans to keep roadway pollutants from washing into the surrounding landscape during rainstorms and eliminated the need to install costly treatment devices along the right of way. A multiyear study conducted by Caltrans showed that the porous asphalt mix — known as open-graded friction course — captured contaminants that run off with water, as well as improved drainage, reduced road noise and increased driver visibility by reducing road spray. See sidebar story below for more details on this efficiency.

#### **Project Bundling — \$40.2 million**

Caltrans bundles projects to combine work types — including design, preservation, rehabilitation, or complete replacement — that can be tiered, have an overlap and involve similar scopes of work. In 2019-20, Caltrans bundled 30 projects at the construction stage into 14 contracts that cumulatively trimmed about \$40.2 million in potential costs.

## Long-Life



Part of the FixSac5 project through Sacramento will feature a new, longer-lasting, and money-saving, pavement.

### **Pavement — \$37 million**

An Interstate 5 rehabilitation project in Sacramento is benefitting from advances in pavement technology thanks to a longstanding partnership with the University of Davis Pavement Research Center. Using a new approach in materials and structure design, the [FixSac-5](#) project is rolling out a new road surface with a 60-year pavement life projected to save \$37 million over its anticipated lifespan.

### **Automated Machine Guidance — \$5 million**

This technology uses global positioning system (GPS) devices and rotating laser levels that allow bulldozers, blades, scrapers, and paving machines to achieve greater accuracy. In 2019-20, Caltrans completed 20 projects, an estimated combined volume of 3.5 million cubic yards of earthwork, using Automated Machine Guidance.

### **X-ray Fluorescence Technology — \$2.4 million**

Called XRF, this technology is housed in a handheld tool that evaluates total lead concentrations in seconds, providing a less costly alternative to laboratory analysis. XRF technology was used on 48 projects involving 1,638 boreholes, eliminating consultant costs.

### **Independent Assurance Program — \$1.8 million**

By consolidating the functions of a quality assurance program for construction projects, 11 fewer positions were needed.

### **On-Call Culvert Service — \$800,000**

Reducing the number of individual culvert lining projects into an on-call contract reduces in-house surveying and engineering support costs.

### **Unmanned Aircraft Systems — \$682,000**

Caltrans is increasingly using drone aircraft for surveys, bridge inspections, construction monitoring, emergency response, field investigations and media support. Drone missions on three major construction projects helped avoid costs.

### **Project Initiation Proposal Improvements — \$663,000; Program Supplement Agreements — \$10,000**

Caltrans' Lean Six Sigma process contributed to procedural improvements for both areas of work.



Caltrans purchased tablets for use by staff in the field.

## Recurring Efficiencies

Seven continuing practices are yielding cost reductions or resulting in money not spent, saving an estimated total of \$20.5 million for highway improvements, according to the efficiencies report. These include:

- highway lighting LED retrofits, \$6.4 million;
- high-reflective, more durable striping material, \$5.1 million;
- value engineering change proposals, \$4.2 million;
- mobile field devices, \$2.6 million;
- GPS devices in fleet, \$1.9 million;
- high-performance reflective signs, \$226,000; and
- bundling of advance mitigation credit purchases, \$52,000.

## Additional Efficiencies

In addition to new approaches, Caltrans continues to benefit from process improvements put in place in earlier years. The prior strategies yielded \$145.3 million in cost reductions/avoidance in FY 2019-20, the report said.

Chief among those efficiencies:

- Value analysis study, \$72.5 million. Eight projects in 2019-20 used this process that assigns teams of subject matter experts early in the project development cycle to analyze function, benefits and cost.
- Construction Manager/General Contractor, \$36.4 million. Contractors are brought in early in the project delivery process to work collaboratively with Caltrans on eliminating potential pitfalls, managing

costs and improving quality. Once Caltrans and the construction manager agree on a price for construction of the project, and the construction manager becomes the general contractor. Use of this process on two major highway projects in FY 2019-20 was credited with saving \$36.4 million thanks to construction-stage innovations.

- Streamlining National Environmental Policy Act (NEPA) review , \$21.8 million. By taking responsibility for NEPA reviews of projects, Caltrans expedites the preparation of associated documents and begins project construction earlier. No environmental protection standards are compromised during the process. Caltrans conducted a total of 151 NEPA reviews in 2019-20.

Other ongoing savings were recorded with reclaimed asphalt pavement, \$12.7 million; and cold in-place recycling of pavement, \$2 million.

**Source:** *SB 1 Efficiencies Report, 2019-20.*

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## Pavement Surface Traps Toxics, Saves Money

An



A handheld gauge measures the surface temperature of freshly laid pavement.

innovative type of pavement that traps road surface pollutants rather than allowing them to drain off is being credited for saving Caltrans more than \$85 million in the 2019-20 fiscal year.

Use of the pavement — known as [Open Grade Friction Course \(OGFC\)](#) — in a watershed area threatened by pollutants spared Caltrans from having to build expensive water treatment facilities to remove toxic metals and sediment from storm runoff.

The \$85.7 million in estimated cost savings was the largest of the efficiency measures identified in [Caltrans' report](#) on ways it has saved money or avoided operational costs in FY 2019-20.

Caltrans earlier conducted a multiyear statewide field study that confirmed OGFC pavement is effective at removing pollutants from stormwater runoff, in addition to improving drainage, reducing spray and splash that impair driver visibility, and lowering road noise. When stormwater carrying toxics flows through the voids of the porous OGFC pavement, the study found, pollutants are caught, and cleansed stormwater discharges from the pavement.

After the study was completed, the State Water Resources Control Board granted stormwater treatment credits for Caltrans' use of OGFC pavements in a 530-acre area where nearby waterways have been compromised by pollutants.

The state board's approval of credits for OGFC freed Caltrans from having to construct expensive roadside treatment facilities to contain toxics from tainted stormwater. On average, Caltrans spends about \$176,000 per acre in construction capital costs to treat stormwater runoff in its rights of way. When multiplied over a 530-acre area, the use of OFCG pavements saved more than \$93 million in treatment costs. Caltrans spent \$7.5 million in study costs, and reinvested \$85.7 million in other repair and rehabilitation projects on the State Highway System.

The innovative method of removing roadway pollutants before they reach California waters shows that Caltrans is committed to being a good environmental steward, and ensures water discharged from the State Highway System is treated properly.

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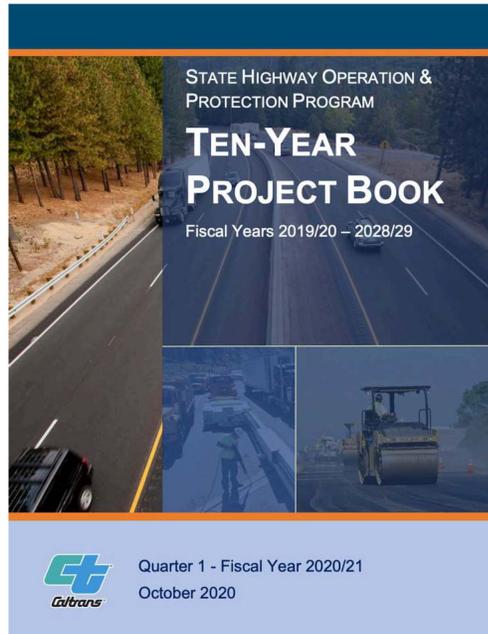
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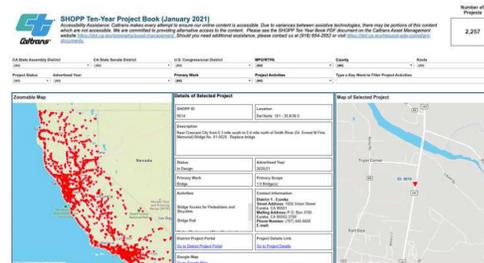
# Project Database Goes Virtual

## \$44.5 Billion's Worth of Planned Work Through 2028-29 Listed on Site

An



The 10-Year Project Book lists about \$44.5 billion's worth of planned projects.



GPS-enabled mapping gives unprecedented detail to project searches.

[online data dashboard](#) created by Caltrans as part of its asset management implementation efforts has opened up unprecedented public access and details on planned capital projects to improve the state transportation network in the next decade.

The 10-Year Project Book has gone virtual, listing \$44.5 billion's worth of transportation system projects that represent Caltrans' most ambitious effort to repair and rehabilitate the state-maintained travel system. The Project Book lists thousands of projects expected to be undertaken through 2028-29.

The massive scale of work is intended to improve the travel system to a condition that meets performance targets set by the Road Repair and Accountability Act of 2017, known as SB 1. To this point, Caltrans is achieving or exceeding most of those standards and is on track to meet the 2027 SB 1 goals.

While previous paper Project Books detailed individual projects planned in each of Caltrans' 12 regional districts, and costs, the Virtual Project Book takes the level of detail multiple steps further.

Using advanced mapping software, users can use the virtual version of the Project Book to search any one of the thousands of listed projects around the state. The GIS-enabled site gives various parameters that can be searched, including location, attributes such as postmile location and project identification number, particular category of asset to be improved, further project details including timelines and stages, along with a zoomable map and vicinity map.

Project pages also includes a Google Map link and districts' project portals.

The projects listed in the database are all part of Caltrans' fix-it-first program, known as the SHOPP (State Highway Operation and Protection Program). The virtual project book is intended to improve transparency and provide greater opportunity for public engagement on SHOPP projects.

**Source:** *Caltrans Asset Management*

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## Collaboration Dials Down Conflict

Partnership Program Pays Off for Caltrans and Its Construction Partners



Caltrans' Division of Construction is far from a solo act. A strong relationship between the department and the companies it contracts with to work on the transportation system is key to its success.

Today's State Highway System projects can be quite complex and susceptible to unresolved issues and claims. The Construction division seeks to minimize disputes by using its partnering program, which extends back to at least the early 1990s.

As outlined in the division's field guide, partnering is a way of conducting business in which two or more organizations make long-term commitments to achieve mutual goals. This requires changing relationships from adversarial to team-based.

Perhaps the biggest benefit Caltrans has reaped from its partnership program is a dramatic drop in the number of arbitrations used to settle contract disputes.

The basic components of Caltrans partnerships involve the establishment of trust and open communication among all participants, prompt attention given to issues and problems by field-level staff, shared identification of common goals and respect among parties, and a collaborative approach to resolve problems and issues.

In 1999, Caltrans and its contractors were involved in more than 60 arbitrations. Over the past three years, Caltrans credits its partnerships and dispute resolution with bringing down arbitrations to an average of 14 a year.

A decrease in arbitrations generally results in lower costs and can be attributed to early dispute resolution at lower project staff levels.

Caltrans also uses Value Engineering Change Proposals on projects, which allows contractors to propose a new way of doing work that provides a cost savings, time savings or reduces traffic congestion in a way that differs from the previous plan. The contractor plots a new process for part or most of the project, and reviews the proposed revisions with the Caltrans team. If the team finds the change proposal acceptable, the contractor and Caltrans share in the savings to the project.

Another advantage of partnering is through the early discussion and resolution of disputes or issues on a project. Catching and resolving problems early allows for change orders that make improvements before disagreements escalate to claims or arbitrations.

In the long term, early resolution of issues increases efficiency and ultimately lowers project costs. When disputes escalate to the arbitration stage, partnerships are strained by stress and distrust, in addition to higher costs for all parties involved.

Since 2012, facilitated partnering has been required on all Division of Construction projects with estimated costs greater than \$10 million and 100 or more working days scheduled. Further, partnering is encouraged for projects with an estimated cost of at least \$1 million. The use of a third-party partnering facilitator — with fees split 50-50 by Caltrans and its contractor — adds a level of accountability and leadership to the project team.

Last year, Caltrans celebrated its 20th annual Excellence in Partnering awards ceremony and recognized 26 projects. Eighteen projects logged “zero lost time” accidents, 21 were finished under or within budget, 24 had no claims, 25 were completed on schedule, and all 26 utilized a process called a dispute resolution ladder. The ladder establishes a process for elevating disagreements through stages to executive management.

Descriptions of the 26 gold and silver award-winning 2020 projects in four cost categories are listed below:

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#### Under \$10 million

**State Route 84 Cold-In-Place Recycling & Rubberized Hot Mix Asphalt project, North Region District 3** — This pavement project on State Route 84 in Yolo County utilized cold in-place recycling and repaired failed asphalt concrete areas. The final section of the roadway was capped with a rubberized hot mix asphalt overlay through the length of the project. Caltrans and its partner, DeSilva Gates Corp., anticipated that extensive pre-paving grinding would be needed, but after determining such an approach would be prohibitively expensive and time-consuming, the team collaborated to develop an alternate solution that resulted in a more effective approach and successful outcome.

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#### \$10 million to \$25 million

**The San Diego-Coronado Bay Bridge paint structural steel and build travelers project, District 11** — In addition to being painted, the famous span was modified to allow safer access to the underside of the bridge. The work involved extensive environmental constraints, multi-agency collaborations, and traffic and coastal zone challenges. Caltrans' partners were Abhe & Svoboda, Inc., the U.S. Coast Guard, the California Highway Patrol, and the San Diego and Coronado fire departments.

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\$25 million to \$50 million



The commute between Goshen and Visalia eased with the replacement of the State R replacement. *Photo by District 6*

**The State Route 99 Betty Drive interchange replacement project near Visalia, District 6** — The commute to and from Goshen and Visalia has eased with the replacement of the SR99/ SR99 Betty Drive Interchange. The North Goshen Overhead was widened, and now the interchange aligns with several county roads. A pumping plant was replaced, and new crash walls along the railroad were constructed.

Caltrans and its partner, Granite Construction Co., worked through a shortfall of roadway materials in the very early earth-moving stages of the project due to ground subsidence. A four-year drought had caused the ground level to sink an average of six inches throughout the project site, causing a shortfall in earth materials. Once the issue was identified, project team members from Caltrans and Granite came up with a solution that added no cost or time to the project.

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Greater than \$50 million

**Reconstruction of the U.S. Highway 101 and Broadway interchange project in Burlingame, District 4** — The work included realigning onramps and offramps and repaving the entire interchange. The project involved five major construction stages, each with multiple phases. Stakeholders needed to coordinate closely to keep the project on schedule and within budget with no major construction injuries, permit violations or claims.

The partnership developed between Caltrans and contractor during the project paid major safety dividends when a potentially disastrous mishap involving the collapse of a high-tension electrical tower occurred, closing the highway for 14 hours.

Despite the serious nature of the accident, no injuries occurred during the reopening of the highway and reconstruction. The partnership made it possible to address the immediate emergency and the resulting extensive property damage, financial issues and project delays.

The [2020 Excellence in Partnering ceremony](#) , which was conducted virtually, can be viewed on the Division of Construction's [Partnering webpage](#) .

**Source:** *Devin Porr, Partnering Program Manager, Division of Construction.*

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## New Laws Address Climate Change Impacts, Worker Safety



### Lawmakers, Governor Set State Transportation Priorities

Transportation-related bills dealing with climate change, active transportation and highway worker safety were among those approved by the Legislature and signed by the governor last year. The following are several significant new laws affecting Caltrans in 2021:

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#### AB 2800 — Climate Safe Infrastructure Working Group

*(Quirk)*

This bill makes the Climate-Safe Infrastructure Working Group permanent within the Natural Resources Agency. Caltrans is a member of the working group and has been proactive in planning for climate change effects on transportation facilities. This new law requires the group to continue to consider climate change impacts on state infrastructure and to support state agencies' consideration of related economic damages and financial liabilities.

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## AB 2285 — Move Over/Slow Down

*(Assembly Committee on Transportation)*

This bill expands an existing requirement for vehicles on freeways to move over or slow down for maintenance and emergency vehicles on all highways and local roads. This expanded application of the law to all public roads is intended to improve the safety of roadside vehicles, tow truck, and emergency personnel throughout California. This bill builds on the “move over or slow down” campaign by Caltrans, the Office of Traffic Safety, and the California Highway Patrol (CHP) to protect essential roadside workers.

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## SB 288 — Active Transportation Project Streamlining

*(Weiner)*

This bill exempts certain types of pedestrian, bicycle, transit, and utility relocation projects from environmental review under the California Environmental Quality Act (CEQA) until Jan. 1, 2023. Exemptions from CEQA review generally reduce the time and costs associated with delivering transportation projects. The bill also extends an existing statutory CEQA exemption for projects already included in approved bicycle transportation plans until Jan. 1, 2030.

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## SB 146 — COVID-19 Adaptations for Regional Transportation Plans

*(Beall)*

This bill temporarily authorizes metropolitan planning organizations to use digital and telephonic methods as alternative means for public engagement on the development of sustainable communities strategies in regional transportation plans until Jan. 1, 2023. State law otherwise requires metropolitan planning organizations to conduct at least two informational meetings in each county within the region for a proposed sustainable communities strategy or alternative planning strategy. This bill allows metropolitan planning organizations to continue regional transportation planning while observing current public health directives requiring physical distancing to reduce the spread of COVID 19.

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## AB 2731 — San Diego Old Town Center Redevelopment

*(Gloria)*

The bill authorizes the San Diego Association of Governments and the U.S. Navy to accelerate the preparation of an environmental analysis that satisfies National Environmental Policy Act and California Environmental Quality Act requirements to meet the federal time frame. The project intended to benefit from the accelerated environmental analysis aims to improve regional transit interconnectivity and support economic development near the San Diego International Airport. Ultimately, this bill is expected to improve mobility and provide multimodal transportation options in the San Diego urban core, while also creating mutually beneficial partnerships, supporting economic development, and preserving community engagement.

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SB 1231 — Endangered Species: Taking of Santa Cruz Long-Toed Salamander

*(Monning)*

This bill authorizes the Department of Fish and Wildlife to issue a permit to Caltrans to allow for construction within the habitat of the Santa Cruz long-toed salamander, a fully protected species, with appropriate mitigation and other measures in place. This will allow construction to move forward on the West Corridor project on State Route 156 in Monterey County.

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AB 2172, AB 2006, SB 921, SB 1459 — Highway Relinquishments

*(Petrie-Norris, Fong, Dahle, Caballero)*

These bills authorize Caltrans to relinquish almost 10 miles of state highway serving as local streets to localities interested in improving them to meet their needs once each city and Caltrans reach agreement, which also must be approved by the California Transportation Commission. The authority applies to State Route 133 in Laguna Beach, SR 184 in Kern County and Bakersfield, SR 174 in the city of Grass Valley, and SR 183 in Salinas.

**Source:** *Caltrans Office of Legislative Affairs*

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## With Shredded Tires, Pavement Is on a Roll

For the Fourth Straight Year, Caltrans Tops Its Crumb Rubber Requirements



The presence of crumb rubber from shredded old tires in hot-mix asphalt slows and extends the service life of asphalt pavements.

For the fourth year in a row, Caltrans exceeded the state requirement for how much crumb rubber — derived from used tires — it used in laying asphalt pavement.

According to its 2018 Crumb Rubber Report, the most recent available, Caltrans used an average of 16.38 pounds of crumb rubber modifier (CRM) per metric ton of all asphalt pavement applied that year, exceeding the usage baseline at least 11.58 pounds of CRM per metric ton of asphalt set in 2013.

The presence of crumb rubber in hot-mix asphalt slows and minimizes the development of cracks and extends the service life of asphalt pavements.

With a few exceptions, Caltrans has steadily increased the percentage of asphalt containing CRM for its projects since 2007, when state usage requirements were established. The latest data from 2018 shows Caltrans' CRM percentage at 46.4 percent, up from 45 percent in 2017 and 39.8 percent in 2016.

Use of CRM also diverts mountains of waste tires from being incinerated or clogging landfills. Caltrans estimates that in 2018, its consumption of crumb rubber diverted more than 5.5 million waste tires from landfills and tire stockpiles, 1 million more than the 4.5 million discarded tires diverted in 2017.

The total usage of asphalt containing CRM increased from 1.66 million metric tons in 2017 to 2.01 million metric tons in 2018, an increase of more than



Crumb rubber, seen being processed in an outside plant, has been part of Caltrans' pavement operations for nearly 15 years.

21 percent. This increase was primarily due to increased usage of asphalt containing CRM in the pavement preservation and rehabilitation categories.

The report found that the initial cost per metric ton of asphalt containing crumb rubber varies between 4.2 percent less and 8.3 percent more than the cost of conventional asphalt, depending on the project category. Research has shown that asphalt pavement containing crumb rubber overlays are cost-effective when used to resist reflective cracking, which occurs when fractured concrete under asphalt contributes to the top layer cracking as well.

Caltrans will continue to use engineering and pavement expertise to determine when and where asphalt containing crumb rubber is placed. Caltrans has a process for life-cycle cost analysis for various pavement treatments, and the Division of Maintenance uses an annual pavement condition survey to update and refine this process.

During construction, exceptions to using asphalt containing crumb rubber may be considered because of factors such as the availability of asphalt concrete, constructability, environmental considerations and cost.

Exceptions may cover the following situations:

- When hot mix asphalt project quantities are less than 1,000 metric tons, or staged construction operations require less than 1,000 metric tons per stage.
- When placed as a concrete pavement asphalt base.
- When the temperature is below 45 degrees Fahrenheit, when crumb rubber hardens and becomes difficult to apply.
- For roadways above 3,000 feet in elevation, where snow chains and truck traffic adversely affect the material's performance.
- When placed as a bond breaker between the asphalt and concrete pavement layers.

- When the project has a Caltrans federal permit requirement for stormwater treatment best management practices.

Crumb rubber usage requirements have been adjusted upward since being first adopted in 2007. That year, Public Resources Code section 42703 began requiring Caltrans to meet a CRM goal of 20 percent for asphalt paving. From 2007 through the 2018 report, Caltrans exceeded the CRM goal in every year but 2013 and 2014, which corresponded with a time when the minimum goal was raised from 25 percent to its present 35 percent.

**Source:** Gurinderpal (Johnny) Bhullar, *Pavement Reviewer, Caltrans Division of Maintenance.*

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