Director's Message

Caltrans and our contractor partners came through with flying colors in response to the storms that drenched our state this winter.

In just a couple months, we endured the worst pummeling in the last 20 years. Although it is too soon for a final tally, we know the repair cost will far exceed one-half billion dollars.

Meteorologists are calling this weather phenomenon an atmospheric river. For most of the state, these storms brought a welcome end to a long drought, but they also washed away any notion that we have a sustainable infrastructure to carry us into the next half-century. The consequences of deferred maintenance and underinvestment are now on stark display.

During the emergency, Californians were able to witness the very best of their Department of Transportation. Our staff worked around the clock for weeks at a time, braving storms that wreaked havoc around the state. During this time, workers responded to more than 300 damage sites, including incidents ranging from a road collapse so large that it swallowed an unoccupied fire truck, to massive mudslides that buried sections of a major highway several feet deep.

I would like to acknowledge that emergencies are not the only time our people shine. Each year, our snow crews routinely deal with white-out conditions to keep the mountain passes open to travelers and commerce (page 24).

Likewise, our staff's work during inclement weather is not the only example of the great work being accomplished across the state. A great deal of deliberation and effort went into the draft, "Toward an Active California, State Bicycle + Pedestrian Plan," released in February (page 14). I'm also proud of the people who completed 217 Project Initiation Documents last year to better estimate project costs early in the process (page 30), and those who worked to evaluate 18 key rail crossings so the Legislature could consider investments in safety and freight efficiency (page 32).

I would like to acknowledge that emergencies are not the only time our people shine. Each year, our snow crews routinely deal with white-out conditions to keep the mountain passes open to travelers and commerce.

I also can point to a decade's worth of effective and productive work resulting from the voters' passage of Proposition 1B, a $19.9 billion bond package (page 8). Or the long-awaited completion of the Willits Bypass, which not only improves efficiency and safety, but taught us valuable lessons on working with our community partners (page 34).

We are working effectively with contractors large and small to confront the insect crisis that has claimed more than 100 million trees and continues its tragic march through our conifer forests as a result of the ongoing drought in the past several years (page 19).

The same can-do spirit that carried us through this record-setting winter is hard at work every day, in every Caltrans building and vehicle. We shine in a crisis because of the things we do every day. MM

Malcolm Dougherty, *Director of Caltrans*

Cover: *Caltrans is in the midst of what may be a decades-long effort to clear dead, dying or hazardous trees within the state highway system right of way, including these trees along U.S. Highway 50 near Pollock Pines in El Dorado County. The drought-weakened trees are unable to produce enough sap to ward off hungry beetles, a situation that has already killed more than 100 million conifers,* *See story, page 18.*

Caltrans Mile**Markers**

Performance Goals

Safety and Health

Provide a safe transportation system for workers and users, and promote health through active transportation and reduced pollution in communities.

Fatalities	2012	2013 *	Goal
Auto Fatalities per 100 Million Miles	0.67	0.67	Less than 0.5
Pedestrian Fatalities	187	257 **	Reduce 10% Annually
Bicycle Fatalities	26	30 **	Reduce 10% Annually

* *2014 data will be available mid-March 2017*

Programmed vs. Allocated Active Transportation Funds to Date			
	Fiscal Year	% of Programmed Funds Allocated	Goal
First Call for Projects	2014-15	99%	100%
	2015-16	41%	
Second Call for Projects	2016-17	30%	100%
	2017-18	N/A	
	2018-19	N/A	

Other Safety and Health Markers	Previous Reporting	Most Recent	Goal
Percentage of Active Transportation Projects Awarded Within Six Months	94% | 2016-17, Q1	**82.5%** | 2016-17, Q2	100%
Employee Work-Related Injuries/Illnesses per 200,000 Hours Worked ǂ	6.60 | 2016-17, Q1	**6.35** | 2016-17, Q2	5.45
Number of Injuries For Autos, Bicycles and Pedestrian Modes of Travel	76,006 | 2012	**77,222** | 2013 **	Reduce 5% Annually
Worker Fatalities in Work Zones	1 | 2015	**1** | 2016	0 Per Calendar Year

** *An average of the most recent five years of collision data up to 2013.*

ǂ *Includes Cal/OSHA reportable and non-reportable injuries/illnesses. Incident rate represents 12 months of data for each quarter.*

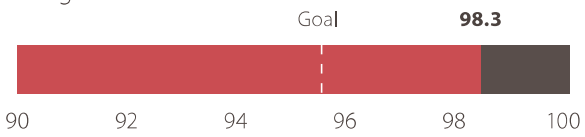
Caltrans Mile**Markers**

Performance Goals

Stewardship and Efficiency

Money counts. Responsibly manage California's transportation-related assets.

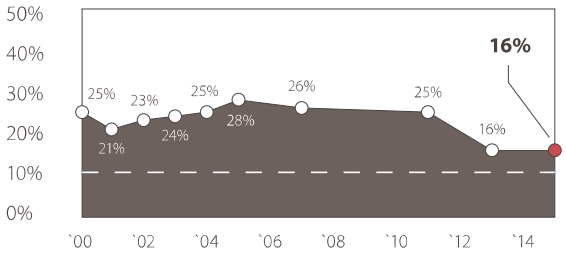
Bridge Health Index **



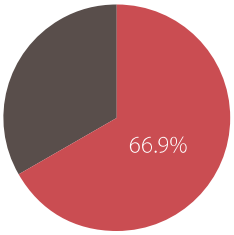
Goal	2014-15	2015-16
Better than 95 rating by 2020	97.4	**98.3**

Pavement Health Index **

Goal: less than 10% distressed by FY 2024-25

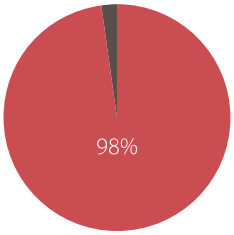


Percentage of Intelligent Transportation Systems in Working Order **



Goal	90% by 2020
July-Sept. 2016	68.3%
Oct-Dec. 2016	**66.9%**

Planned Projects Delivered in Fiscal Year



Goal	100%
2014-15	98%
2015-16	**98%**

*** This data was compiled using a measurement that is expected to be replaced by a new rating system in early 2017.*

Information Technology Projects	2016-17, Q1	2016-17, Q2	Goal
Advantage System Analysis Uptime	88%	**99.51%**	99% by 2020
Network Analysis Uptime	99.29%	**98.56%**	99.5% by 6/30/18
Response to Employee IT Requests Within Two Hours	36.8%	**38.2%**	40% by 6/30/18

Annual Percentage of Research Projects With Implementable Solutions	2015-16 (first reporting)	2016-17 Goal	2020 Goal
Caltrans Research	**50%**	55%	75%
University Transportation Centers (UTC) Research	**20%**	24%	40%
National Cooperative Research	**10%**	12%	20%

Caltrans Mile**Markers**

Performance Goals

Stewardship and Efficiency

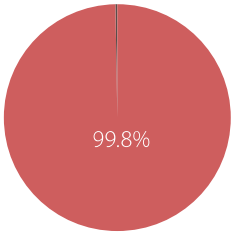
Money counts. Responsibly manage California's transportation-related assets.

Encroachment Permits Approved or Denied Within 30 Days *

Goal	95%
2016-17, Q1	73%
2016-17, Q2	**78%**

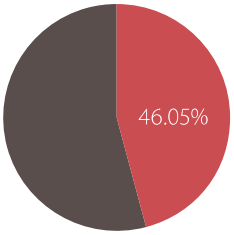
** District 6 is conducting a LEAN 6 Sigma Pilot Project to improve processing time*

Percentage of Online Single-Trip Permit Requests Handled in Less Than Two Hours



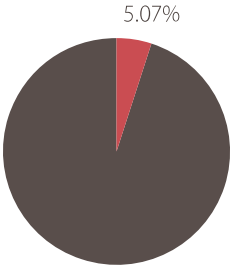
Goal	90%
2016-17, Q1	94.1%
2016-17, Q2	**99.8%**

Contract and Procurement Dollars Awarded to Small Businesses Annually



Goal	25%
2014-15	25%
2015-16	**46.05%**

Contract and Procurement Dollars Awarded to Disabled Veteran Business Enterprises Annually



Goal	5%
2014-15	5%
2015-16	**5.07%**

Other Stewardship and Efficiency Markers	Previous Reporting	Most Recent Reporting	Goal
Federal Funds Used in Year of Availability (Annually)	100%	**100%** | 2015-16	100%
Americans with Disabilities Act (ADA) Expenditures Programmed (Annually)	No Previous	**$39.8 Millon** | 2015-16	$35 Million
Number of Lane Miles of State Highway System Relinquished (Annually)	0 Lane Miles | 2014-15	**52.85 Lane Miles** | 2015-16	50 Lane Miles

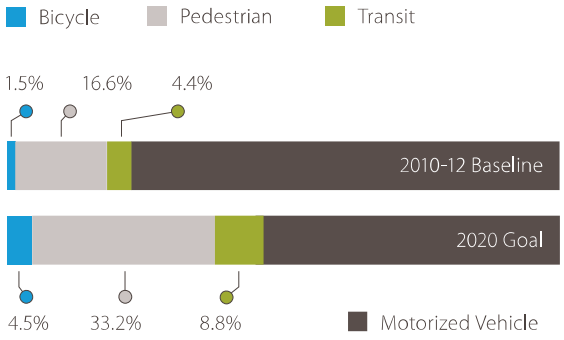
Caltrans Mile**Markers**

Performance Goals

Sustainability, Livability and Economy

Make long-lasting, smart mobility decisions that improve the environment, support a vibrant economy, and build communities, not sprawl.

Percentage of Trips



Vehicle Miles Traveled Per Capita, Statewide Average*

Goal	By 2020, 15% lower than 2010 baseline
2010 Baseline	8,779
2014	**8,639 | -1.6%**

* *Most Recent Caltrans Data Available. Latest numbers reflect updated information.*

Greenhouse Gas Emissions from Caltrans Operations *(in metric tons)*

Goal	By 2020, 15% lower than 2010 baseline
2010 Baseline	214,983
2015	**164,173 | -23.6%**

System Performance

Utilize leadership, collaboration and strategic partnerships to develop an integrated transportation system that provides reliable and accessible mobility for travelers.

Complete Streets Implementation	Previous Reporting	Most Recent Reporting	Goal
Percentage of Projects That Include Complete Streets Features	33% | 2015 (Baseline)	**27%** | 2016	68% by 2020
Number of Complete Streets Features on State Highway System	1,264 | 2015 (Baseline)	**1,543** | 2016	1,613 by 2020
Percentage of Fully Implemented High-Focus Action Items From Action Plan 2.0	36% | 2015 (Baseline)	**36%** | 2016	100% by 2018

Other System Performance Markers	Previous Reporting	Most Recent Reporting	Goal
Accurate Reporting of Traveler Information (Travel Times, Construction Activity, Incidents, and Adverse Weather)	93.7% | 2014-15	**94.0%** | 2015-16	85%
Provide Real-Time Multimodal System Information Available to the Public (Number of Corridors)	3 | 2016-17, Q1	**3** | 2016-17, Q2	2
Completed Corridor Implementation Plans	3 | 2016-17, Q1	**3** | 2016-17, Q2	2
Number of Corridors With Integrated Corridor Management Implementation	2 | 2016-17, Q1	**2** | 2016-17, Q2	1

Caltrans Mile**Markers**

Performance Goals

System Performance

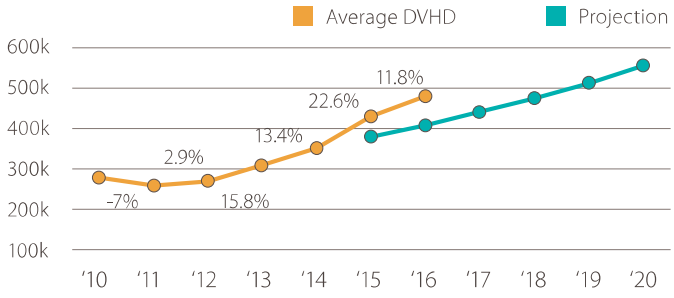
Utilize leadership, collaboration and strategic partnerships to develop an integrated transportation system that provides reliable and accessible mobility for travelers.

Travel Time Reliability

R Reliable **M** Moderately Reliable **U** Unreliable

	2015-16 (Q4)	2016-17 (Q1)	2020 Goal
Highway 57	**M**	**U**	One-tier improvement from baseline
I-110	**R**	**R**	
I-80	**U**	**M**	
I-210	**M**	**M**	

Average Growth in Daily Vehicle Hours of Delay (DVHD) vs. Projection



Goal	Reduce to an 8% rate of growth by 2020

Average All-Stations On-Time Performance for Intercity Rail	2016-17, Q1	2016-17, Q2	Goal
Capitol Corridor	95.7%	**93.2%**	90%
Pacific Surfliner	87.6%	**85.9%**	90%
San Joaquin	87.4%	**83.9%**	90%
End Station On-Time Performance for Intercity Rail	**2016-17, Q1**	**2016-17, Q2**	**Goal**
Capitol Corridor	94.1%	**90.0%**	90%
Pacific Surfliner	78.0%	**76.2%**	90%
San Joaquin	84.0%	**82.5%**	90%

Daily Vehicle Hours of Delay (Top Four Integrated Corridors)	2016-17, Q1 (Year Over Year)	2016-17, Q2 (Year Over Year)	Goal
Highway 57	-15.82%	**-17.38%**	Less Than 6% Increase Annually
I-110	13.61%	**1.65%**	Less Than 6% Increase Annually
I-80	12.46%	**8.57%**	Less Than 6% Increase Annually
I-210	6.93%	**10.23%**	Less Than 6% Increase Annually

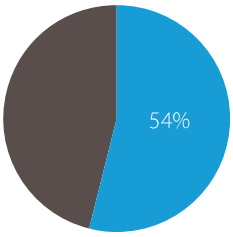
Caltrans Mile**Markers**

Performance Goals

Organizational Excellence

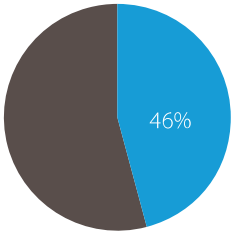
Be a national leader in delivering quality service through excellent employee performance, public communication and accountability.

Stakeholders Who Gave Positive Feedback About the *Mile Marker* in Annual Survey



Goal	5% annual improvement from 2015 baseline
2015	External 43%, Internal 37%
2016	**External: 54% Internal: 49%**

Stakeholders Who Feel That Department Communication, Professionalism, and Service Levels Have Improved



Goal	5% annual improvement from 2015 baseline
2015	External 36% Internal 32%
2016	**External: 46% Internal 37%**

Other Organizational Excellence Markers	2015	2016	Goal
Employees Who Indicate That They Work in a Positive Environment	50%	**57%**	5% annual increase
Abusive Conduct Prevention Trainings Provided Per Year	37%	**81%**	100% every 2 years
Caltrans Employees Who Agree That Employees Are Encouraged to Try New Ideas	40%	**47%**	75% 2016 goal, then achieve and maintain through 2020
External Survey Respondents Who Said Caltrans Doing a Good or Excellent Job in Meeting Their Needs	40%	**61%**	75%
Caltrans Employees Who Rate Caltrans Management as Open and Honest in Communications	44%	**51%**	5% annual increase
Mile Marker Publications Produced on Quarterly Schedule	4	**4**	4
Positive Responses to Ethics Questions on Employee Survey	79%	**81%**	5% annual increase
Increase in the Number of Partners Who Agree or Strongly Agree That Caltrans is a Collaborative Partner	40%	**50%**	75% 2016 goal, then maintain or improve through 2020
Increase in Employees Serving on Research and Policy Committees to Further National Engagement	38	**44**	7% increase for 2016, then maintain or improve through 2020
Documented LEAN 6 Sigma Process Improvements (Cumulative)	19	**36**	30 internal improvements by 2016 with 15 each subsequent year
Number of Caltrans Employees Trained as LEAN 6 Sigma Green Belts	13	**14**	Train 10 yearly
Eligible Employees Who Have Completed Leadership and Development Training Programs, per Fiscal Year	52% | 2016-17, Q1	**53%** | 2016-17, Q2	85% by 2015 with a 2.5% annual increase to 90% in 2017

Proposition 1B: A Decade of Progress

Transportation Bond Program Approved by Voters in 2006 Funding Projects Large, Small

Caltrans photo by Samer Momani

Newly built Wilshire Boulevard onramps and offramps in downtown Los Angeles connecting with Interstate 405 are part of the massive I-405 Sepulveda Pass Widening Project. Proposition 1B contributed $730 million to fund a portion of the work intended to ease congested conditions.

The Proposition 1B bond program approved by California voters in 2006 is winding down, leaving a legacy of improvements that have strengthened interlocking parts of the state transportation system.

A total of $19.925 billion in general obligation bonds was made available for transportation-related projects through Proposition 1B, the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006. About 90 percent of that money has been allocated over the last 10 years, helping finance more than 2,200 projects that range from a simple wooden bus shelter in Auburn to a multi-year widening project on Interstate 405 in Los Angeles, one of the most congested freeways in the nation.

Proposition 1B invested in transportation corridors deemed high priorities. Those included upgrades of State Route 99, trade route infrastructure and port security, school bus retrofit and replacement, passenger rail improvements, highway-railroad grade separations and crossings, seismic projects for bridges, and other projects dedicated to highway safety and rehabilitation, local roadway improvements and congestion relief.

The California Transportation Commission (CTC) and Caltrans oversee most Prop. 1B bond programs, and allocate funds. Commissioners recently were updated on the status of the construction work and remaining funds in specific program accounts. *See following story on individual programs, highlights.*

Improvements to the state and local transportation grid are the most obvious benefit of the bond measure, but Prop. 1B has produced other benefits, including:

- The hundreds of millions spent on project planning and construction provided a tremendous economic boost in California at a time when it was needed most. Soon after the passage of Prop. 1B in November 2006, the country plunged into a deep and damaging recession. The infusion of bond money around the state helped the construction industry through a difficult economic period, and saved or created many jobs.

- Because of the soft economy, construction bids came in lower than expected, and money for projects went further.
- Administration costs for projects were kept low. Although the bond's provisions allowed up to 3 percent for administering projects, the CTC challenged staff to keep overall costs at 2 percent or below, and that level has been maintained.
- On a related note about accountability, bonds were only sold when money for specific projects were needed. Bond funds were not stockpiled ahead of the actual need, a significant improvement from past practices.
- Prop. 1B funds have been used to leverage other available revenue sources. California received a total of $2.6 billion from the federal American Recovery and Reinvestment Act of 2009 that financed infrastructure work around the country during the depth of the Great Recession. Several major projects, such as the Caldecott Tunnel 4th Bore project in the Bay Area, the I-405 Sepulveda Pass Widening Program in Los Angeles, and the Otay Mesa Port-of Entry Interchange in the San Diego area received financing through Prop. 1B and Recovery Act sources.

Through Prop. 1B, smaller transit agencies around the state were able to complete long-awaited projects or upgrade aging, inefficient equipment. Caltrans sought to address transportation needs in every part of the state and achieve a rural-urban balance of projects.

But overseeing a statewide slate of programs brought its share of challenges.

The wide variety of transportation projects submitted for funding under Prop. 1B added to the complexity of the review process. The CTC and Caltrans' Transportation Programming staff had to deal with multiple jurisdictions, and agencies of varying sizes, from very small rural offices to large urban departments, each with different rules and practices.

The transit system upgrades through Prop. 1B also conform to the policy objectives set forth in Caltrans' 2015-20 Strategic Management Plan. The projects in total will contribute to a safe and integrated transportation system for workers and users, reduce pollution in communities, promote healthy transit alternatives, and foster sustainability, livability and economic strength in communities.

Of the $15.625 billion in Prop. 1B funds under the control of the CTC or Caltrans, only about $530 million remains unallocated. (The state's Department of Finance, Air Resources Board, and Office of Emergency Services manage or monitor other Prop. 1B programs.) The money remaining in each of the specific program's budget will be distributed on a competitive basis. MM

Source: *Caltrans Transportation Programming; Program Manager Bruce De Terra, Office Chief Rambabu Bavirisetty, Proposition 1B Specialist Doris Alkebulan; Division of Rail and Mass Transportation.*

The Caldecott Fourth Bore Project eliminated a longstanding bottleneck on State Route 24 between Oakland and eastern Contra Costa County. Prop. 1B funds helped pay part of the $417 million cost.

A new transit center at Diablo Valley College in Pleasant Hill (Contra Costa County) was built through Prop. 1B, one of the many smaller projects throughout the state that received bond funding.

Overview of Proposition 1B Programs

Major Corridors, Public Transit, Rail, Bridges, Local Projects, Ports Receive Help

Corridor Mobility Improvement Account (CMIA)

$4.5 billion was set aside to improve travel conditions on heavily traveled routes in the state, the bulk of the work done in Los Angeles-San Diego and the Bay Area-Sacramento metropolitan regions. Of the 90 projects that received CMIA funding, 70 are complete, with 13 more listed as 95 percent finished.

Prop. 1B money was used to create a total of 307 miles of new high-occupancy vehicle (HOV) lanes, 292 miles of new mixed flow and auxiliary lanes, 24 new or reconstructed interchanges, and numerous other operational improvements.

The upgrades improve travel times and safety for drivers.

The Public Transportation Modernization Improvement and Service Enhancement Account (PTMISEA)

Public transit projects and equipment received a $3.6 billion share of Prop. 1B funds. Allocations have been made to 1,200 projects around the state, and 744 have been completed, according to Caltrans' Division of Rail and Mass Transportation that administers the program.

The largest allocations went to the San Francisco Municipal Transportation Agency, due to receive a total of almost $308 million in Prop. 1B funds for its $1.6 billion Central Subway project, and the Los Angeles County Metropolitan Transportation Authority expected to receive a total of $128-138 million in bond funds for five transit projects.

The bond money also allowed smaller transit agencies to complete long-awaited projects such as transit stations or upgrades to their aging, inefficient fleet of vehicles.

Trade Corridors Improvement Fund (TCIF)

Routes deemed vital commerce arteries in the state benefitted from $2 billion in Prop. 1B funds, augmented by $500 million from the State Highway Operation and Protection Program (SHOPP), $5.4 billion in matching funds from the federal American Recovery and Reinvestment Act of 2009, and other sources. The goal of the TCIF was to improve freight system connectivity, efficiency and commerce flow along key trade corridors.

There are 94 projects on the TCIF list, with 41 completed, 51 under construction, and two unallocated. Most projects were clustered around ports. In Southern California, 11 seaport projects were initiated ($1.8 billion), 32 railroad crossing grade separations ($2.41 billion), 17 highway projects ($1.32 billion), and 12 railroad projects ($458 million). For Northern California, four seaport projects ($629 million), 12 highway projects ($617 million), three railroad projects ($130 million), and one railroad crossing grade separation ($42 million) were funded.

State Route 99

The aging highway that links the Central Valley received $1 billion in Prop. 1B money for projects that improve safety, freight movement and air quality, and reduce congestion. Twenty-three projects, from Bakersfield to Los Molinos, near Red Bluff, were green-lighted. A total of 54 new lane miles were built to widen the original two-lane sections of 99, five interchanges were upgraded, 11 miles of expressway with intersecting roads were brought up to freeway status, and all remaining at-grade highway/local road intersections were eliminated in the San Joaquin Valley and Sacramento County.

The Tahoe City Transit Center, opened in 2012, was allocated almost $385,000 through Prop. 1B's Public Transportation Modernization Improvement and Service Enhancement Account (PTMISEA).

State-Local Partnership Program (SLPP)

A total of $1 billion was made available through the SLPP as a matching-funds source for local transportation projects. The program helped finance 257 projects in 27 counties, mostly through a formula that allocated 52 percent of available funds for local transit, 29 percent for state highways, and 19 percent for local roads and grade separation projects.

State Transportation Improvement Program (STIP)

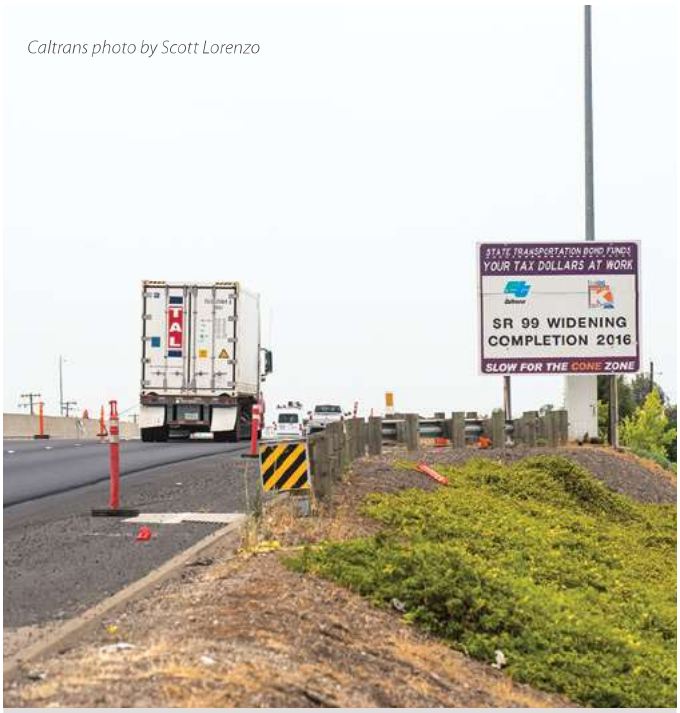
Prop. 1B provisions directed $2 billion in augmentation funds to the multiyear program for state highway improvements, intercity rail and regional highway upgrades.

State Highway Operation and Protection Program (SHOPP)

The bond set aside $500 million to augment the SHOPP.

Intercity Rail Improvement Program

$400 million was dedicated for passenger rail improvements on state-sponsored rail corridors or urban/commuter routes. Nineteen projects have been financed since 2007, resulting in 30 miles of new track and 14 enhanced grade crossings, improvements to three passenger stations, purchase of 22 locomotives and 58 passenger railcars, and replacement of an aging railroad bridge.



Highway 99 that cuts through the Central Valley received $1 billion in Prop. 1B funds to finance 23 projects along its length from Kern to Tehama counties, including this stretch of 99 near Manteca.

Highway Railroad Crossing Safety Account

Prop. 1B paid for approximately $254 million of the $1.14 billion cost to construct eight grade separations and make safety improvements at 13 other crossing locations around the state.

Traffic Light Synchronization Program (TLSP)

As of September 2016, $250 million was allocated for 81 projects with the goal of improving motorist safety and reducing air pollution. Seventy-four light-synchronization projects have been completed.

Local Bridge Seismic Retrofit

$125 million of Prop. 1B money provided the match that was part of a $1.52 billion expenditure to upgrade earthquake-vulnerable bridges in the state. To date, 378 bridges are part of the overall retrofit project, with 301 completed, 22 in construction and 55 in the design stage. MM

Source: *Caltrans Transportation Programming, Division of Rail and Mass Transportation*

New Funds for Active Transportation

Program Promotes Hundreds of Projects That Encourage Biking, Walking

Caltrans photo by Thomas Ritter

The Active Transportation Program funds projects that encourage Californians to walk and bike for everyday trips. Los Angeles Metro promotes its Bike Share program, with bikes conveniently located next to this Metro Rail station.

More than 500 projects are in various stages of delivery for a statewide program initiated in 2014 to encourage active modes of transportation — namely biking and walking. The first of those projects are beginning to cross the finish line, with several dozen more expected to be completed by year's end.

The Active Transportation Program (ATP), signed into law in 2013, funds projects in two- or three-year funding cycles. The projects now being completed are from Cycle 1 (2014-15-16). Cycle 2 (2017-18-19) projects are being allocated and design has begun on many of them.

The California Transportation Commission (CTC) — responsible for approving funding for the program — is closing in on finalizing the 2017 ATP (Cycle 3), which will cover a two-year funding period (2020-21). At the December meeting, the Commission awarded $131.8 million for 44 statewide projects and $26.3 million for 10 small Urban & Rural projects.

In March, the CTC is expected to award an additional $105 million for the nine largest projects selected by metropolitan planning organizations. Between December 2016 and March 2017, the CTC is expected to award $263.5 million for Cycle 3. At least one-quarter of ATP funds are designated to disadvantaged communities.

The CTC's adoption of Cycle 3 is not authorization to begin work on projects. Rather, it means the CTC can begin to allocate funding for those projects in March, pending technical changes and corrections that must be made before final approval is granted in May.

The ATP consolidated several federal and state transportation programs, including the Transportation Alternatives Program, Bicycle Transportation Account, and State Safe Routes to School, into a single program with a focus to make California a national leader in active transportation. The ATP is administered by the Caltrans Division of Local Assistance, Office of Active Transportation and Special Programs.

The bicycle and pedestrian projects funded by the ATP not only encourage increased use of active modes of transportation, they support sustainable communi-

The bicycle and pedestrian projects funded by the ATP not only encourage increased use of active modes of transportation, they support sustainable communities and healthier, low-carbon travel choices.

ties and healthier, low-carbon travel choices — ensuring that disadvantaged communities fully share in the program's benefits. The ATP also strives to enhance public health, in part by reducing childhood obesity through programs for safe routes to schools.

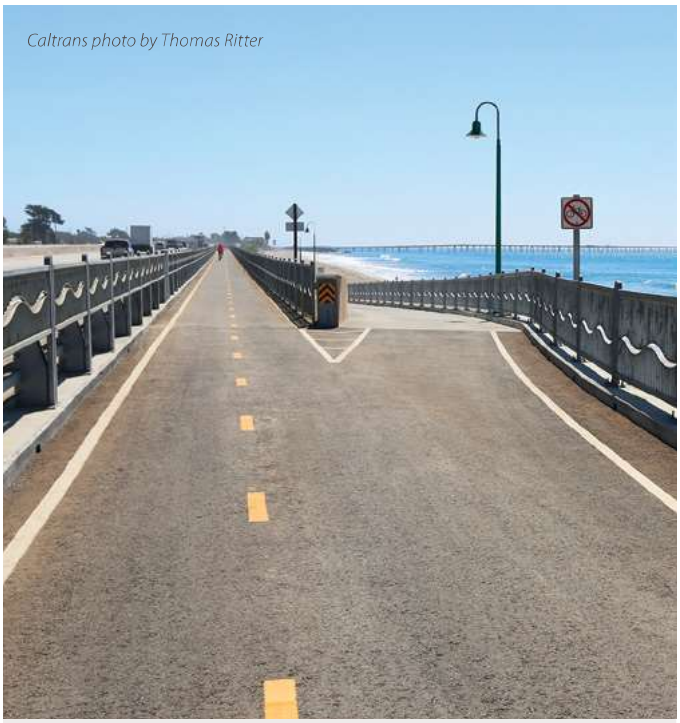
The number of ATP applications Caltrans receives for each cycle far outweigh available funds, so each project is given a score based on the project's potential for increased walking and biking, among other factors.

A $7.2 million project in Chico received one of the largest allocations in December and is a good example of how many ATP projects focus on connectivity throughout a community using a combination of paths, sidewalks and technology. It will fund bike paths connecting downtown, Chico State University, a junior high, a high school, a regional hospital, adjacent neighborhoods and existing converted railroad to bike trail. The existing traffic signals will be outfitted with pedestrian signal crossing equipment, updated detection equipment and associated traffic signal timing plans and pedestrian refuge islands at uncontrolled crossings. Appropriate Americans with Disabilities Act (ADA) ramps and sidewalks will be included.

In the Small Urban & Rural Projects category, $6.8 million was allocated for pedestrian and bicycle trails at the Ventura/Santa Barbara county line, filling a gap between established bike paths that are part of the California Coastal Trail. The project will construct a bike/pedestrian bridge over railroad tracks.

Another project in the small urban/rural category will construct 1.31 miles of a 12-foot-wide multiuse trail in Mendocino County to connect the north and south segments of the Fort Bragg Coastal Trail, part of both the Pacific Coast Bikeway and the California Coastal Trail, for a continuous, safe 6.3-mile multiuse facility through western Fort Bragg. The ATP will fund $766,000 of the $1.5 million project. MM

Source: *Active Transportation Program Managers Teresa McWilliam and Ted Davini*



The bike path and pedestrian undercrossing at La Conchita, along U.S. Highway 101 in Ventura County, were completed in 2014.

Active transportation is a way of life in the city of Davis in Yolo County, which has improved many intersections for bicyclists' safety.

A Big Push for Walking and Biking

Draft Plan Lays Out a Path to Improve Safety, Mobility, Local Economies

Bicyclists and joggers make good use of the Whittier Greenway Trail in Los Angeles County. Caltrans has released a draft of the first statewide bicyle and pedestrian plan, which lays out a path to help more Californians be less reliant on motor vehicles.

Caltrans has released the draft of its first state bicycle and pedestrian plan, identifying policies and actions that the department and its partners might take to double walking trips and triple bicycling between 2010 and 2020.

The draft report, "Toward an Active California," was open for public comment following its release in February through early March. The plan is expected to be completed in April.

The plan lays out a path to achieve Caltrans' walking and bicycling goals set by the department's 2015-2020 Strategic Management Plan (SMP), and seeks to fulfill the six goals outlined in the California Transportation Plan 2040 (CTP 2040).

Those goals are:

- **Improving multimodal mobility and accessibility for all;**
- **Preserving the multimodal transportation system;**
- **Supporting a vibrant economy** (in part by reducing auto ownership and health care costs, fostering support of local businesses by residents and tourists);
- **Improving public safety and security** (reducing the number, rate and severity of bicycle and pedestrian-involved collisions);
- **Fostering livable communities and promote social equity** (investing in disadvantaged communities that are most dependent on walking, biking and transit); and
- **Practicing environmental stewardship** (reducing vehicle miles of travel and the use of carbon-based fuels, and supporting more compact development that lends itself to active transportation).

The plan reinforces Caltrans' goal of creating a sustainable transportation system through further reductions of greenhouse gas emissions, supporting a trend that is well underway. According to Caltrans' California Household Survey, Californians increased bicycling from 0.8 percent to 1.5 percent of all trips and increased walking from 8.4 percent to 16.6 percent between 2000 and 2010.

Making It Happen

"Toward an Active California" includes four objectives — safety, mobility, preservation and social equity — each with multiple actions to bring the plan to reality. Aside from Caltrans' ever-present emphasis on safety, the mobility objective is the core of the plan — increasing walking and bicycling in California.

To do that, Caltrans and its partners could develop local and regional networks of high-quality bicycle and pedestrian facilities for all ages and abilities, integrating them with plans for multimodal transportation systems and services that include rail and transit — which aligns with Caltrans' Complete Streets Program.

The plan also pushes for developing consistent, high-quality data on bicycle and pedestrian travel and facilities to chart progress and trends. Low-stress or physically separated bicycle and trail routes are described as having "statewide significance for tourism, recreation and utilitarian transportation" and "promote bicycling and walking for everyday transportation, recreation, improved health, and active living."

The "preservation" objective focuses on setting the standards for the condition of the infrastructure and maintenance, while the "social equity" objective focuses on working with disadvantaged communities to help meet their active transportation needs.

Paying for It

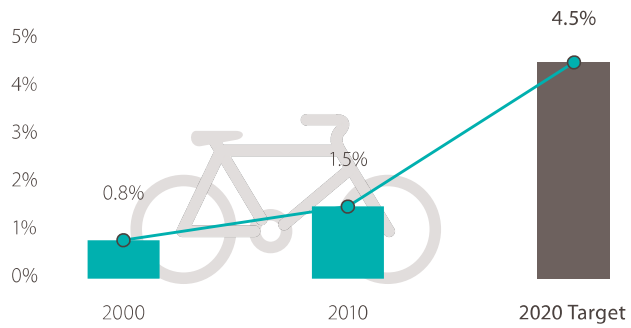
Based on limited data, it's believed that tripling the number of bicycle trips for workday commutes — not including recreational riding — will require "at least $4 billion" across the state.

The plan notes that pedestrian needs are harder to estimate, although the city of Los Angeles alone has identified $1.4 billion in desired pedestrian upgrades, at $190,000 per centerline mile of road. Based on that formula, the plan estimates "overall pedestrian infrastructure needs across the state are likely to be at least $60 billion."

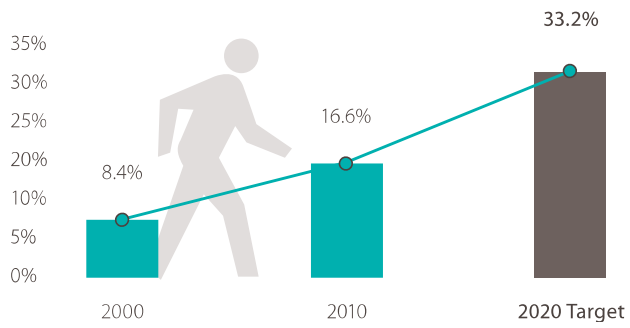
Additional investments will be required for education, training, planning, data and additional dedicated staff. The plan is expected to refine cost estimates when it is finalized this spring. MM

Source: "Toward an Active California, State Bicycle + Pedestrian Plan," Draft, February 2017

Bicycling Nearly Doubled From 2000–10



Walking Nearly Doubled From 2000–10*



5Bicycling Fatalities, Crashes; 2005–14**

37	Bicyclists Involved in Crashes Per Day
2.5	Bicyclist Fatalities per Week

Walking Fatalities, Crashes; 2005–14**

38	Pedestrians Involved in Crashes Per Day
2	Pedestrian Fatalities per Day

** Data from 2010-2012 California Household Travel Survey. Figures are as a percent of all trips. ** Data from SWITRS, 2005-2014 and Strategic Highway Safety Plan*

Crumb Rubber Use Really Rolling

Caltrans Repurposed More Scrap Tires From Landfills into Paving Projects

Caltrans photo by Sri Balasubramanian

Increasingly, used tires that used to clog landfills, or, worse, be dumped along roadsides are being ground into particles and used by Caltrans as asphalt blending material. This crumb rubber modifier, CRM for short, made up 41 percent of the total asphalt paving material used in 2015.

For Caltrans, the rubber really did meet the road in 2015. The department exceeded a legislative goal to use more asphalt containing crumb rubber in its road paving projects last year after falling short in the previous two years, and in the process diverted more than 4.6 million waste tires from landfills and tire stockpiles in calendar year 2015.

California law (Public Resource Code section 42703(a)(3)) requires Caltrans to incorporate a set amount of crumb rubber modifier (CRM) into its asphalt paving projects. The legislation is part of a larger effort to recycle more of the 40 million-plus used tires generated each year in the state, most of which end up as waste in landfills.

In 2015, Caltrans used 4,175,289 metric tons of asphalt paving material, of which 1,722,802 metric tons contained CRM — 41.3 percent of the total amount used, according to the 2015 Crumb Rubber Report prepared by Caltrans. The law specifies that Caltrans must use at least 11.58 pounds of CRM per metric ton of hot-mix asphalt, which would require about 35 percent of its total asphalt pavement material contain CRM.

When the report is approved by the California State Transportation Agency (CalSTA), CalSTA will submit it to Legislature.

The 41.3 percent CRM usage mark is the highest in recent history for Caltrans, and equates to 14.56 pounds of CRM per metric ton, or a total of 60.8 million pounds of pulverized tire rubber used in 2015. The 41.3 percent CRM mix represents a big jump from 2014, when the ratio was 26.7 percent, and 22.9 percent in 2013.

After those years' results fell short of the 35 percent CRM goal, Caltrans in early 2015 required the use of rubberized hot mix asphalt (RHMA) for the surface layer of all asphalt paving projects statewide.

Not only is Caltrans' CRM use is removing millions of unsightly and potentially toxic tires from the public exposure — every mile of RHMA asphalt diverts an estimated 150 tires from landfills — this kind of material also helps extend highway durability. The crumb rubber mixed with the asphalt adds elasticity to the pavement surface, helping resist cracking from temperature changes and propagating cracks from bottom layers.

There are limitations to the use of RHMA. Because of its flexibility and cost, the mix is only viable when placed as the top 2 to 3 inches of pavement overlay on the surface. It is not viable as material in the bottom layers. It also does not perform as well when placed at temperatures of 45 degrees or lower since the crumb rubber in RHMA hardens in those conditions and is difficult to work with, or in elevations of 3,000 feet or higher, where chain wear and truck traffic adversely affect the material's performance.

RHMA also is a more expensive material than conventional asphalt. Costs range from 3 percent to 33 percent higher, depending on the type of project. It is generally not utilized for smaller pavement projects requiring 1,000 metric tons or less of material because of the cost of setting up a crumb rubber blending facility for the project.

But the higher cost is offset when RHMA is used to resist cracks from being reflected from the bottom layers because the thickness of RHMA required to mitigate reflective cracking is about half the thickness of conventional asphalt.

To better track the department's commitment to crumb rubber-fortified highways in the future, Caltrans is requiring:

- A review of all pavement projects that incorporate crumb rubber for the next three years to predict CRM usage in the future.
- A tally of the amount of CRM used for each asphalt paving project, to ensure the department continues meeting its requirement of crumb rubber in its asphalt pavement projects.
- Pavement condition surveys over the next three years to compare the lifespan and duration of conventional asphalt with RHMA overlays.
- Update of the Highway Design Manual, to allow the use of conventional asphalt for the surface layer by exception only, and make RHMA the de-facto material for road surface.
- Exploring the opportunity to incorporate a small amount of CRM into asphalt binders used in asphalt paving materials. MM

Source: *2015 Crumb Rubber Report; Srikanth N. Balasubramanian, Chief, Caltrans Office of Asphalt Pavements*

Top left: *In the waste tire conversion process, old tires are sent through through an initial shredding machine where the rubber is split into big chunks.* ***Bottom left:*** *Multiple shredding machines work in tandem to reduce the rubber into smaller and smaller pieces.* ***Right:*** *The finely shredded product, now in particle form, is ready to be shipped in super sacks, background. Caltrans diverted about 4.6 million tires from landfills in 2015.*

Caltrans photo by Steven Hellan

Clearing Out the Deadwood

Caltrans Responds to Massive Tree Die-Off Along State Highway System

By the end of last year, a prolonged drought and bark beetle infestation had killed a staggering 102 million trees in California's vast midsection, and the damage appeared to be spreading northward in a slow-moving catastrophe that will last for years to come.

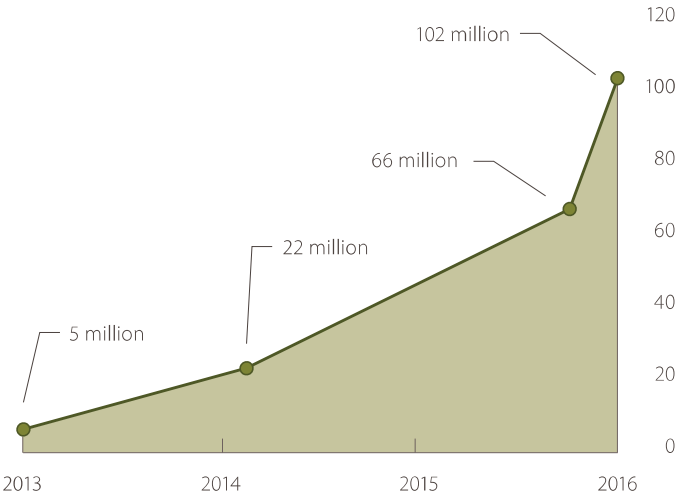
Through Dec. 31, 2016, Caltrans and its contractors had cleared almost 50,000 trees from the state highway system right of way.

The die-off began in 2013, when parched trees, mostly conifers, fell victim to a plague-like infestation of bark beetles. The trees could not generate sufficient sap that would ordinarily fend off the beetles. The insects multiplied rapidly, nourished by the ever-growing supply of stressed and vulnerable trees. It became a vicious cycle of vulnerability, infestation and death. Most of the pines that were lost were 60 to 120 feet tall, with many at least 100 years old. About 150 oaks and cedars were more than 200 years old.

When Gov. Edmund G. Brown Jr. declared a state of emergency in October 2015, Caltrans joined with 76 other agencies, local governments and stakeholders to form a Tree Mortality Task Force.

With Caltrans' help, the task force has removed 423,000 trees in 10 counties through the end of the 2016.

Tree Mortality, 2013-2016

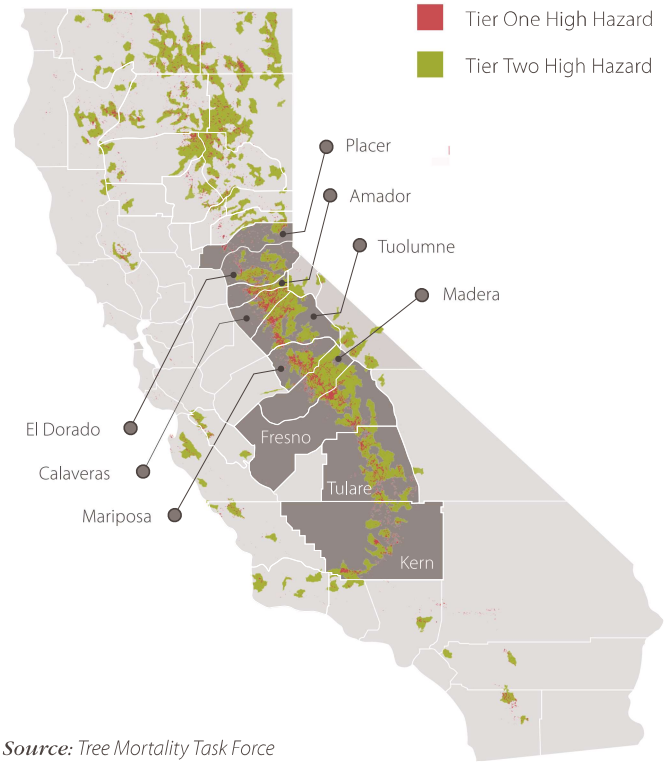


The number of trees in California that have died as a result of drought and a bark beetle infestation has risen sharply since 2013, with many more expected to succumb in the next decade despite heavy winter precipitation.

Certified arborists and licensed foresters in December 2016 assess the job ahead of them in the forest along Highway 50 in El Dorado County. Caltrans and its contractors had removed almost 50,000 trees from the state highway system right of way by the end of last year.

Task force members still have an enormous and growing challenge ahead. This disaster will likely continue to unfold for another decade as trees continue to die.

10 High-Hazard Counties



Source: *Tree Mortality Task Force*

Ten counties starting in Placer County and extending along the Central Sierra into Kern County have been identified as high-hazard zones for tree mortality. Each county has a disaster declaration and a task force to help address the risks from tree mortality.

Botanists estimate a two-year lag between the time a section of forest is infested and trees begin to die. The infestation is too widespread to use pesticides, so the only hope for the trees at this point is an end to the drought. But even as drought gives way to a wet winter, many more trees are expected to die.

According to the U.S. Forest Service, it takes more than a year of average or above-average precipitation before trees can produce enough resin to repulse attacks of the western pine (bark) beetle. Precipitation itself doesn't alter the life cycle of the beetle, although it does alleviate the extreme stress on entire vegetation profile caused by the extended drought.

Caltrans is now reviewing a contract to perform a statewide survey and create an inventory of dead and dying trees that could be ready for bid by April. A survey may begin in July to update the tree count in advance of a next round of emergency removal contracts.

Why Caltrans is involved

Creating a roadside buffer zone to protect motorists aligns with Caltrans' 2015-2020 Strategic Management Plan (SMP) that lists safety as a top organizational goal. The removal of dead trees to head off traffic problems fits another SMP objective of preserving or improving transportation system performance. Caltrans' participation in the task force also reinforces the SMP's sustainability, livability and

The impacts on California's transportation network due to tree mortality will be varied. The increased frequency of wildland fires, increased runoff due to soil erosion and fallen trees are some of the typical hazards that may impact highways.

economic goals by reducing the risk of wildfire and harmful pollution.

The impacts on California's transportation network due to tree mortality will be varied. The increased frequency of wildland fires, increased runoff due to soil erosion, and fallen trees are some of the typical hazards that may impact highways.

Caltrans tree crews began identifying and removing dead trees along state right of way in early 2013. By the fall of 2015, it became apparent to the department's Maintenance Division supervisors that Caltrans tree crews in the 10 impacted counties could not keep up with the number of trees requiring removal.

To remove trees as quickly as possible and bring in smaller contractors for the job, the scope of dead tree removal work was limited to single routes, 25-40 miles in length, or a combination of routes with fewer than 5,000 targeted trees. Caltrans currently has 25 active contracts totaling $78.81 million for hazardous tree removal, and the department expects to spend an additional $150-$200 million in the next two to three years, even with normal precipitation in the Sierra.

If the California beetle infestation parallels Colorado's recent experience in the Rocky Mountain forests, the state can expect a 10-12 year period of tree mortality before the infestation returns to normal levels. Total costs for Caltrans alone are expected to rise to as much as $500 million should the die-off continue for another decade.

Bark beetles, inset photo, bore tunnels into trees, cutting off their food supply that eventually results in their death. The voracious beetles attack stressed trees that are unable to produce enough resin to fend them off. The dead and dying trees along roads pose a danger to passing travelers.

What happens to all of those dead trees

Caltrans' priority in the state's forests is to protect travelers and the roadway system, but the department also must dispose of all diseased or dead trees after they are downed. Most of the trees cannot be sold as lumber because they are diseased or too dry to process, but the department has found other uses, such chipping and spreading for erosion control, use as firewood, or simply leaving some of the felled trees in place for use as habitat, a practice encouraged by forest managers.

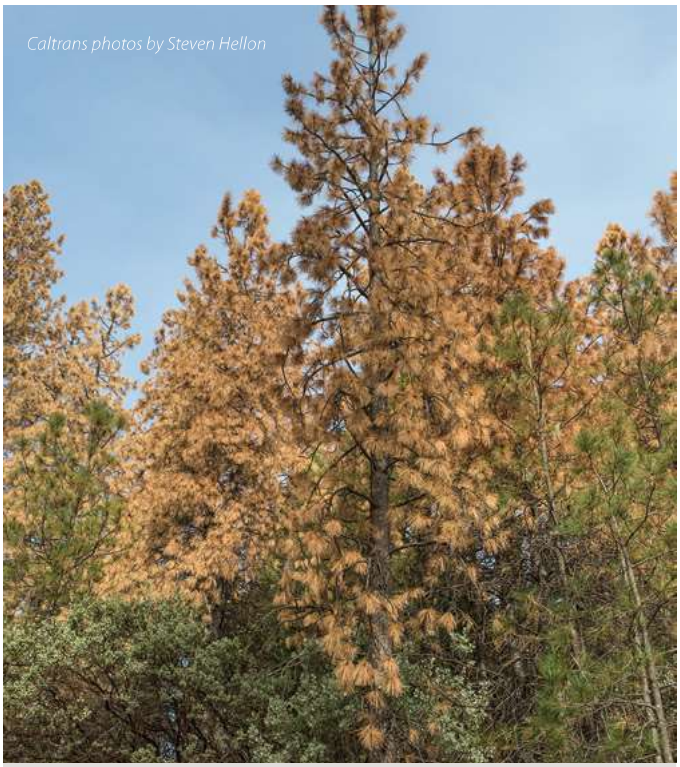
But some of the downed trees are used in a way that saves money, generates energy and helps the environment. Trees can be hauled to biomass energy plants if the cost can be offset by a credit provided by a plant's fuel buyer based on demand for material. Logs are chipped to a specific size and burned, converting "chips to watts" (energy) that's fed into the electric system grid. Biomass plants credit Caltrans $500 for a typical 80-cubic-yard load of wood chips, which is deducted from contractors' payments in most cases.

Caltrans' priority in the state's forests is to protect travelers and the roadway system, but the department also must dispose of all diseased or dead trees after they are downed.

Although the governor declared an emergency, the department must still comply with state and federal laws that protect the environment, and individual Caltrans districts are required to follow internal environmental clearance protocols before emergency work begins. For example, only certified arborists and licensed foresters can be hired to identify and target trees, so contractors doing the work only remove those specimens. MM

Source: *Caltrans Senior Landscape Architect Lisa Ann Worthington; Tree Mortality Task Force*

Caltrans photos by Steven Hellon



It will take a year of average or above-average rainfall before trees can regain enough strength to ward off the beetles that are killing them and turning California's forests brown.

A forester carries the main tool of his trade as he helps clear dead trees along U.S. Highway 50 in El Dorado County. Many of the cleared trees are sent to biomass plants to generate electricity.

Tree Mortality Response by the Numbers

7.7 million	Number of acres in California showing signs of tree mortality
102 million	Number of dead trees in California's forests, as of November 2016
100 million	Number of those trees that are conifers
2 million	Number of those trees that are oaks
423,000	Total number of trees removed, as of Dec. 31, 2016
49,652	Number of trees removed by Caltrans, as of Dec. 31, 2016
72,129	Number of trees within 100 feet of centerline of state highway identified as dead, dying or hazardous and expected to be removed by Caltrans by the end of 2017, based on current survey
$78.8 million	Amount allocated to remove those 72,129 trees
103 million	Amount of board-feet of lumber from trees removed
1,300	Number of campgrounds affected

Source: *State of California Tree Mortality Task Force; Caltrans Division of Maintenance*

Only certified arborists and licensed foresters can be hired to identify and target trees, so contractors doing the work only remove those specimens. Above, contractors remove trees in December 2016 along U.S. Highway 50 in El Dorado County, near Pollock Pines.

Winter Operations Keep 'Em Moving

Program to Clear Critical Routes Has Gotten a Snowy Workout This Season

Caltrans photo courtesy of District 10

A Caltrans snow blower clears massive drifts that built up on Highway 88 in Alpine County after a series of major storms deluged the state in January. The effort is part of Caltrans' Winter Operations Program that seeks to keep state roadways clear and safe during bad weather.

After a historic dry period, winter returned with a fury to California this season. Caltrans' Winter Operations Program was ready for the challenge to keep motorists and commerce moving on state highways.

In fact, Caltrans deployed more and better equipment for this winter's onslaught than ever before. The department also used newer technologies to minimize the environmental impact of snow and ice removal operations.

The mission of the department's Winters Ops Program, as it's called, is critically important, and that was no more apparent than when a series of major storms pounded California in January and February. Caltrans crews responded quickly and worked around the clock as heavy snow, rain and high winds impacted roadways around the state.

Making sure there's enough people and equipment to clear the roads during and after major weather events is a year-round undertaking for Caltrans. Winter Ops also help fulfill several key goals of Caltrans' 2015-2020 Strategic Management Plan; namely, by improving travel time reliability, contributing to freight system efficiency and the overall economic health of California, and using "green" strategies to protect the environment.

Caltrans' Office of Emergency Management and Infrastructure Protection (OEMIP), under the Maintenance Division, oversees the Winter Ops Program and coordinates weather preparation plans with the Caltrans districts that receive snowfall. The program is fully operational between November and April of the following year.

Because conditions vary so widely in the state, each district's winter preparation plan is different. For coastal or interior regions, contingencies for flooding and mudslide/landslide events take precedence based on historic weather trends. Low-lying highways susceptible to flooding, high tides and slides are identified in advance.

The challenge of higher-elevation highways

It's the mountainous parts of the state, however, that present a unique challenge to keep traffic flowing when bad weather arrives. The Caltrans dis-

tricts with higher-elevation highways have a longer winter checklists than their low-land counterparts: snow and ice clearance, staffed chain control, road de-icer/abrasives applications, avalanche monitoring and response, rock slide and erosion patrols, flood traffic control and monitoring, and other weather-related events.

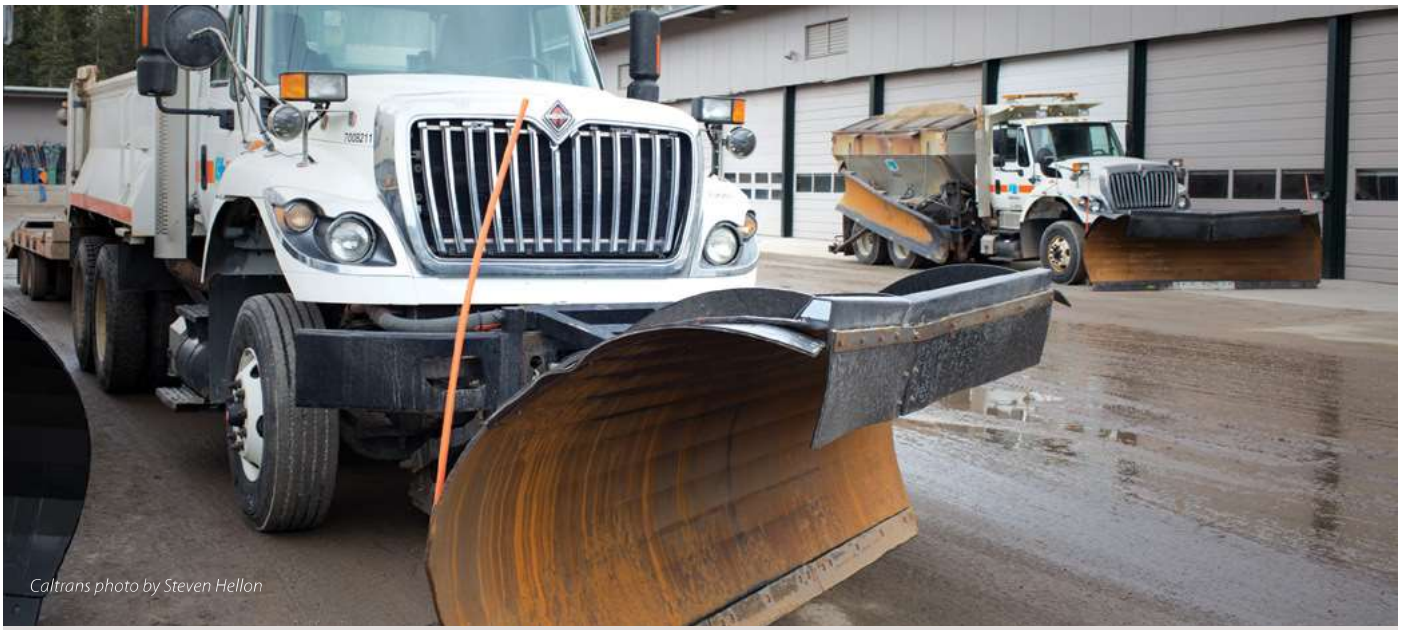
Caltrans spent $18.5 million in the 2015/16 fiscal year on snow removal efforts as part of its Winter Ops Program. The size and scope of the job is enormous: About one-fifth of Caltrans total inventory of 50,000-plus lane miles in California are classified as winter routes (a total of 9,060 lane miles), and some of those highways that traditionally see the stormiest weather are also among the most heavily traveled and economically important corridors in the state. The portion of Interstate 5 known as the Grapevine linking Southern and Central California, and Interstate 80 and Highway 50 crossing the Sierra Nevada, considered the state's primary trans-Sierra routes, are critical passages for interstate commerce that can't afford to be shut down for long.

To keep higher-elevation roadways clear, Caltrans has assembled a formidable snow and ice fighting arsenal. It starts with trained workers: The Maintenance Division has more than 5,000 field employees who are called upon to respond to weather-related events at any time. Seasonal workers also are hired to bolster the department's cold-weather workforce. However, because of an improved economy, coupled with a wave of retirements, maintaining adequate staffing — especially during periods of bad weather — is challenging.

Snow removal vehicles made, modified in-house by Caltrans

Caltrans has a massive inventory of snow-clearing machines and heavy equipment — an array that includes more than 1,250 snow plows of different sizes, almost 200 road graders that can push aside tons of ice and snow, 70-plus snow blower vehicles, seven rotary ice breakers recently purchased to cut through compacted ice on road surfaces, and specialized trucks that spread materials such as salts, abrasives such as sand or lava rock cinders, or salt brine to reduce ice buildup or give better traction on highways.

The department, through its Division of Equipment, also introduces new, customized equipment each year to upgrade snow and ice fighting efforts. Caltrans' main equipment shop in Sacramento builds many vehicles from the ground up ahead of the winter season, turning out specialized plows able to clear more snow from the roads — definitely



Snowplows were in a waiting position at Caltrans' Kingvale Maintenance Station off Interstate 80 in anticipation of a predicted major storm in early December. Caltrans has a large inventory of vehicles and machinery for snow and ice removal, and tests out new equipment every winter.

a timely addition for this winter — and outfitting existing vehicles with new safety features to better protect workers in dangerous conditions. Each district also has its own equipment shops that keep snow-fighting machinery and related gear in top working order.

Road treatments such as de-icing agents and grit materials are a costly but necessary expense to keep ice from building up and creating potentially deadly driving conditions. About $5.23 million was spent on those materials in 2015-16. Caltrans has been working actively to reduce the environmental impact from salts or abrasives, either by using more effective natural products in smaller amounts, or employing newer technology such as road temperature gauges on vehicles so treatments can be applied more selectively.

Caltrans also strives to keep de-icing materials and abrasives from escaping and settling in the surrounding environment. At yard storage sites, straw bales and storm wattle tubes are placed around materials stockpiles to contain any runoff. In especially sensitive areas, such as roads near Lake Tahoe, drains outfitted with special filters catch much of the salt/sand mixture carried away by melting runoff, which is then collected by Caltrans crews. In addition, snow that collects along treated roads is swept following storms and brought to facilities with holding ponds to separate the grit and salt.

High-tech gives heads-up on conditions ahead

Evolving technology also has aided travel time reliability for motorists who encounter adverse weather conditions. Caltrans delivers highway condition updates through its Intelligent Transportation System network that includes 834 changeable message signs, 2,333 closed circuit cameras accessible on the public website, and 182 highway advisory radio stations. Before they leave their home, drivers can get online updates via Caltrans' QuickMap app about their chosen route and adjust plans accordingly, or, once on the road, receive information on the conditions ahead. It's all part of Caltrans' mission to provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

Another important part of Caltrans' preparations ahead of anticipated severe weather is use of the service known as DOTSWAN, short for the Department Of Transportation Severe Weather Alert Notification. Through DOTSWAN, reports from the National Weather Service about potentially dangerous systems are compiled by OEMIP's Emergency Operations Branch and distributed to the department's executives and affected Caltrans districts that can take action.

The department has always tracked the effectiveness of its snow removal operations statewide through a Snow Level of Service (LOS) program. In the past, only snow and ice impacts were considered. Starting with the 2016 winter season, the department is moving to an all hazards approach that will address a wider range of weather-related calamities such as flooding, slides and wind. MM

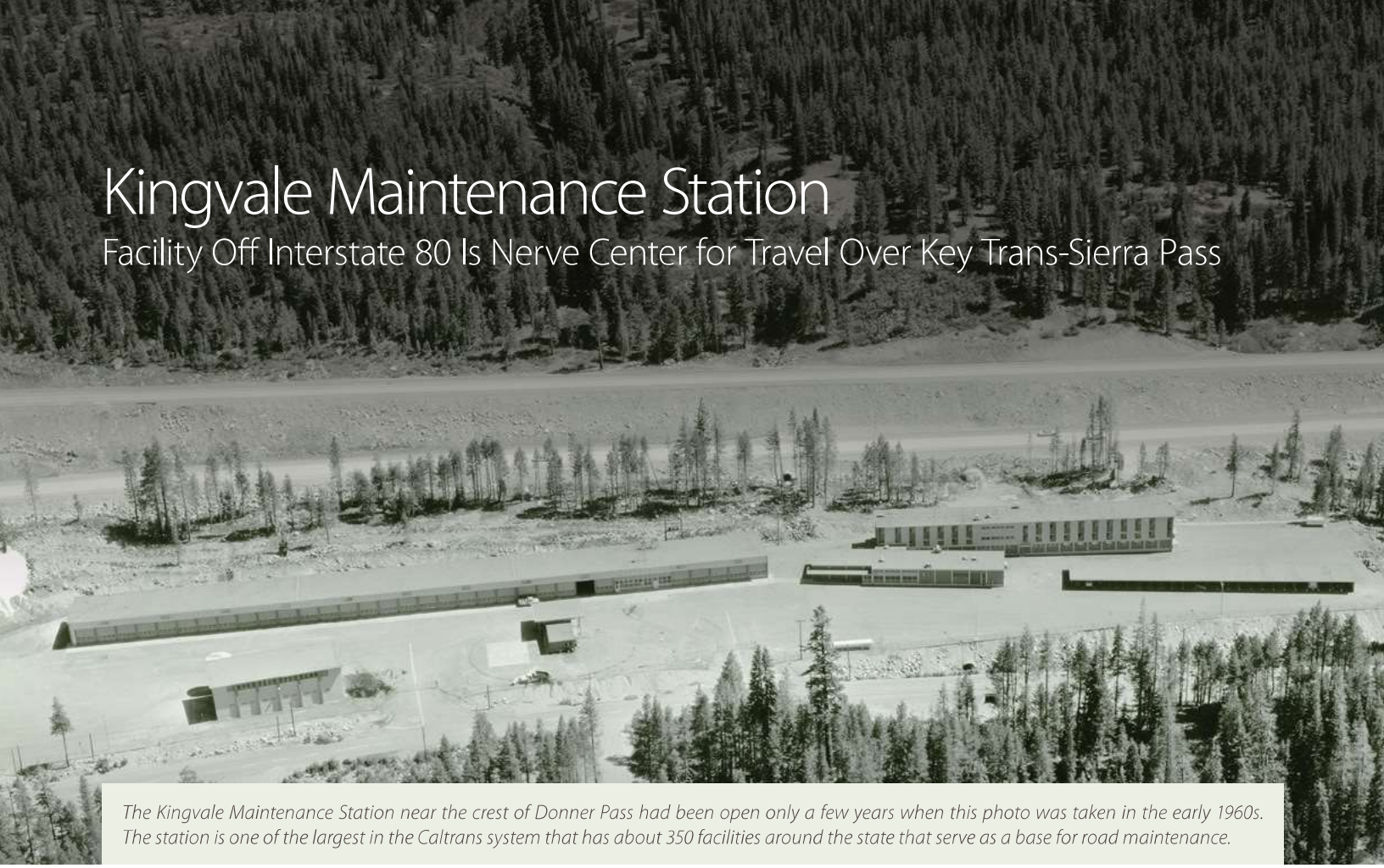
Source: *Division of Maintenance, Office of Emergency Management and Infrastructure Protection, Winter Operations Chief Chris Smith, Branch Chief David Frame*

Winter Operations Program Facts

$18.5 mil	Annual Snow & Ice Budget
9,060	Lane Miles of Winter Routes
5,000-Plus	Caltrans Employees Who Respond to Weather Events
1,025	Snow Plows
238	Wing Plows
2	Tow Plows
193	Graders
77	Snow Blowers
2	"Epoke" Spreaders
7	Ice Breakers

Kingvale Maintenance Station

Facility Off Interstate 80 Is Nerve Center for Travel Over Key Trans-Sierra Pass



The Kingvale Maintenance Station near the crest of Donner Pass had been open only a few years when this photo was taken in the early 1960s. The station is one of the largest in the Caltrans system that has about 350 facilities around the state that serve as a base for road maintenance.

No place better demonstrates Caltrans' winter readiness than its Kingvale Maintenance Station on Interstate 80 near the Donner Pass, where an average of 430 inches of snow fall each year.

Busy I-80 not only links the Bay Area and Sacramento Valley to the frosty playgrounds of Lake Tahoe and northern Nevada, it's also an important freight route, carrying some $4.7 million of goods and commerce every hour.

The Kingvale Maintenance Station, like the other 350-plus maintenance stations that Caltrans operates in California, represents the department's commitment to improving the performance of the state transportation system, as outlined in the 2015-2020 Strategic Management Plan. By keeping roads clear during times of adverse weather and other conditions, the maintenance stations do their part to improve travel time reliability that's a key part of the overall system performance goal while maintaining the safety of workers and the traveling public.

The Kingvale Maintenance Station, opened in 1962, tends about 20 miles of highway between the city of Truckee and Yuba Gap to the west. As many as 100 workers take 12-hour shifts, around the clock, during a major storm. The station's 82-room dormitory can accommodate and feed 160 people.

The Donner Pass area and its typically deep snows offers an excellent testing ground for new snow-clearing equipment. This winter, for example, crews have been trying out a "tow-plow" that essentially doubles the lane-clearing capacity of a standard heavy-duty plow, clearing two lanes at once.

A newer generation of de-icing equipment is also getting a workout by Kingvale crews this heavy winter. The Epoke spreader can treat highways with ice-melting brine solution, salts, and abrasive materials not possible before with earlier models of de-icing equipment. Also, a new model of "pusher" truck that shoves stalled big rigs to safety – and keeps millions of dollars of commerce moving over Donner Pass – is stationed at Kingvale as part of a partnership with the California Trucking Association and California Highway Patrol.

Kingvale station features two massive repair and storage bays, each stocked with full array of tools,


Caltrans photo by Peter Asano


Caltrans photo by Steven Hellon


Caltrans photo by Steven Hellon

Although the times and equipment have changed at Caltrans maintenance stations, the mission of keeping roads clear and safe has not. ***At left****, the Kingvale communications center in the 1960s relied on intercoms and phone switchboard, a far cry from today's high-tech center, where,* ***top right****, Jenny Vigarino, dispatcher clerk, seated, and Dispatch Supervisor Laurie James work.* ***At right****, snowplows are chained up, ready to go.*

parts and equipment to keep the snow-clearing effort moving. The bays' heated floors serve multiple, critical purposes: to melt ice off the vehicles returning from the snowy roads, keep vehicle brakes from freezing, and modulate temperatures inside as vehicles pull in and out of the facility. Covered enclosures nearby are stocked and replenished with tons of salts and sand for use as road de-icer and traction control.

Another building on the grounds serves as Caltrans' snow communications hub for the I-80 corridor. The Kingvale Communication Center (KSCC) coordinates Caltrans radio traffic, operates the Changeable Message Sign system, and feeds information to the Caltrans website's QuickMap feature.

In keeping with its location and elite reputation, "Kingvale University," dubbed "Snowfighter University," was established many years ago at the maintenance station to train Caltrans workers from around the state in the latest snow-clearing techniques.

No doubt those skills have been put to good use during this drought-busting season. MM


Caltrans photo by Peter Asano

How things have changed: Back in the early days of the Kingvale operation, it obviously was OK to smoke while working. The facility opened in 1962 along one of the Sierra's snowiest sections.

Planes Need Safe Pavement, Too

Caltrans Inspections, Funding Help Airports Meet State, Federal Guidelines

In the last fiscal year, Caltrans awarded $5.4 million to help local agencies leverage more than $262 million in federally funded grants to maintain runways and other critical infrastructure at California's large inventory of airports and hospital heliports.

There are 244 public-use airports in California. Last year, Caltrans inspected 225 of them. The state also is home to 165 hospital heliports, of which Caltrans last year inspected 147.

During inspections, Caltrans checks compliance with Federal Aviation Administration (FAA) and state regulations for minimum airport design standards and safety. Facilities are evaluated for obstructions, markings, lighting and a host of other safety considerations.

Caltrans works with FAA and airport authorities to ensure public-use airports and hospital heliports are maintained in satisfactory to good condition based on state and federal safety and design standards.

Inspections also play a key role in determining where scarce resources can be invested. Airport pavement, like highway pavement, deteriorates over time, and preventive maintenance saves money since repair is much less expensive than replacement.

Pavement surveys are funded by FAA grants that may be administered by Caltrans. MM

Source: Caltrans Division of Aeronatics

Caltrans inspects all 244 public-use airports in California for compliance with Federal Aviation Administration and state regulations for minimum airport design standards and safety.

Caltrans Aviation by the Numbers	
Public-use airports	244
Hospital heliports	165
State aviation safety officers	6
State-owned aircraft	2
State airport grants awarded for state fiscal year 2015-16	$5.4 Million
Federal aviation grants awarded to California airports for federal fiscal year 2016	$262.2 Million
Total California Aeronautics Account revenue for fiscal year 2015-16	$5.9 Million

Source: *Division of Aeronautics Aviation in California Fact Sheet (April 2014).*

Aviation Safety Inspections

Type	2010 11	2011 12	2012-13	2013 14	2014-15	2015-16
Airport (AP)	164	170	203	182	210	225
Heliport (HP)	90	90	114	127	126	147
Total AP and HP	254	260	317	309	336	372
FAA form 5010	147	152	172	155	182	193

Source: *Division of Aeronautics*

Drilling Down on Costs

Project Initiation Documents Provide Reality Check Before Construction

Caltrans photo by Steven Hellon

Annette Clark, division chief for the Office of Program and Project Planning, reviews a Project Initiation Document with transportation engineer Pritpall Bhullar, center, and PID Workload Management Branch Chief Jonathan Camp.

Caltrans develops Project Initiation Documents (PIDs) to identify project scope, cost and schedule as accurately as possible before programming transportation funds.

PIDs are essential to successful project delivery because they optimize transportation funds by ensuring that only feasible projects move into capital project development. PIDs provide engineering details of a project, and are performed after the initial planning stage, when maintenance and preservation needs are determined, and prior to the programming stage that determines funding amounts and timing.

According to the PID Program's 2015-16 annual report, the initial planning stage project cost estimates for 217 State Highway Operation Protection Program (SHOPP) projects totaled $2.1 billion, while project cost estimates in the completed PID was $3.9 billion, seen in the table on the next page. The difference in initial and completed PID estimates of $1.8 billion demonstrates the importance of PIDs in minimizing cost overruns and project delays during the delivery process.

Most PIDs are performed for SHOPP projects, which make up the majority of overall Caltrans projects in this era of "fix-it-first" funding. For 2015-16, Caltrans delivered 242 PIDs that forecast $7.16 billion in future project costs, which include 25 State- and local-sponsored projects for the State Transportation Improvement Program (STIP) and other non-SHOPP funding sources.

The PID Program explores new approaches and process improvements to enhance cost efficiencies, balancing intelligent risk with sound engineering judgment. The program has used two main techniques to streamline its cost estimates: the Small Capital Value Projects (SCVP) template and the Project Initiation Report (PIR) template. Use of the simplified SCVP template was originally intended to reduce PID development costs for all low-risk, non-complex candidate projects. The PIR template creates more consistency by consolidating multiple PID formats into a single template and improves analysis of complex projects.

Although the PID Program has achieved savings by using the SCVP, Caltrans is seeing negative im-

The PID Program explores new approaches and process improvements to enhance cost efficiencies, and balance intelligent risk with sound engineering judgment.

pacts to scope, cost and schedule in later phases of project development. Beginning this year, Caltrans will begin moving away from the less-detailed and less-robust SCVP technique and toward the more-preferred PIR method as the department shifts to a comprehensive "asset management" investment program to help prioritize its multi-objective projects and better address risks.

Caltrans is required to implement its Transportation Asset Management Plan by 2020, directed by the Moving Ahead for Progress in the 21st Century Act (MAP-21) guidelines that require most projects incorporate sustainable, multimodal features beyond the traditional focus on motorized vehicles. For example, a PID for a project that would have earlier focused on bridge work may now also address pavement, bike access and fish passage. By combining several SHOPP projects into one larger project, Caltrans may achieve economies of scale by reducing the number of PIDs needed.

Likewise, the PIDs developed for the 2018 and 2020 SHOPP cycles must consider complete streets elements such as sidewalks or bike lanes. This effort requires additional analyses and extensive collaboration with local and regional agencies to develop projects that consider all modes of transportation.

Also in the new reporting year, Caltrans PIDs will be required to consider climate change and include greenhouse gas estimates. The PID Program is using the Federal Highway Administration Infrastructure Carbon Estimator Tool during PID development to quantify life-cycle greenhouse gas emissions for SHOPP projects. This tool allows users to create preliminary estimates of emissions using planning-level data. MM

Source: Nieves Castro, Assistant Division Chief, Delivery; and Annette Clark, Chief, Office of Program and Project Planning

Summary of Completed SHOPP PIDs, by Program (FY 2015-16)

SHOPP Program	Number of PIDs Completed in Fiscal Year 2015 16	Estimated Total Project Cost, at Pre PID ($M)	Total Cost for Programming, in Completed PID ($M)
Bridge	26	$164	$264
Collision Reduction	98	$364	$580
Mandates	12	$54	$98
Mobility	15	$61	$75
Roadway/Roadside	48	$512	$868
Emergency*	13	$982	$2,012
Facilities	3	$40	$43
Relinquishment	1	$0	$0
Asset Management Pilot	1	$5	$5
Total	217	$2,182	$3,945

**Includes one project estimated at $910 million and a completed PID estimate of $1.81 billion. This project will be programmed over multiple SHOPP cycles, with $125 million going into the 2018 SHOPP cycle.*

High-Risk Railroad Crossings Graded

Report Outlines How Improvements Could Enhance Safety, Reduce Emissions

Caltrans photos by Scott Lorenzo

A locomotive rolls through the railroad crossing at Cutting Boulevard in Richmond, an intersection identified as being at a high risk of accidents based on recent statistics. Safety improvements to lessen the chance of collisions with vehicles or pedestrians are planned.

Caltrans prepared a Railroad Crossing Evaluation Report for the Legislature to examine potential improvements to safety, reduction of greenhouse gas emissions, and improvements to intercity rail passenger service and ridership that could be achieved through investments to grade crossings at key intersections along the state's three rail routes — the Capitol, San Joaquin and Pacific Surfliner corridors.

The report evaluated and identified intersections with a high risk of accidents, as defined in the Federal Railroad Administration's (FRA) Web Accident Prediction System with a predicted collision risk of 0.15 or greater. Based on that previous accident history and other factors, the FRA predicted the annual collision rate for each of the 18 crossings ranging from 0.15 to 0.28 percent — the probability that a collision between a train and a highway vehicle will occur at the crossing in a year.

In all, 18 grade crossings were evaluated: 10 in Southern California, five in Central California, and three in Northern California.

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Each of the 18 sites were evaluated on the level of improvement that could be achieved from suggested safety measures and the reduction of greenhouse gases. The cost of recommended upgrades are also factored in. Planned improvements to particular crossings, or studies now underway, are listed in the report as well.

The formal report with the details can be found at www.dot.ca.gov/reports-legislature.htm. MM

Source: *Caltrans Railroad Grade Crossing Evaluation Report*

Railroad Crossing	Planned Improvements
■ **Rosecrans-Marquardt grade crossing**, *Santa Fe Springs, Los Angeles County*	The Los Angeles Metropolitan Transportation Authority is now conducting a study to realign Rosecrans and adjacent roadways. The study will include recommendations for a grade separation and construction of a third track. In addition to safety benefits, the report states more than 5,000 metric tons of greenhouse gases could be reduced annually if idling vehicles were no longer forced to wait for passing trains.
☐ **Cutting Boulevard grade crossing**, *Richmond, Contra Costa County*	This crossing is currently scheduled for at-grade safety improvements funded by the Federal Highway Administration (FHWA) Highways (Section 130) Program.
■ **Washington Street grade crossing**, *San Diego, San Diego County*	At-grade safety could be improved by installing quad and pedestrian gates.
☐ **La Palma Avenue grade crossing**, *Anaheim, Orange County* ☐ **Grand Avenue crossing**, *Santa Ana, Orange County* ☐ **Vineland Avenue grade crossing**, *Burbank, Los Angeles County* ☐ **7th Street**, *Hanford, Kings County* ☐ **11th Avenue**, *Hanford, Kings County* ☐ **Bellevue Avenue**, *Atwater, Merced County*	The installation of quad gates at these crossings could prevent vehicles from driving around the barricades as trains pass.
■ **Grand Avenue**, *Carlsbad, San Diego County* ■ **Los Nietos Road**, *Santa Fe Springs, Los Angeles County* ■ **Ferry Street**, *Martinez, Contra Costa County* ■ **Mission Avenue**, *Oceanside, San Diego County* ■ **Hesperian Boulevard**, *San Leandro, Alameda County* ■ **Kansas Avenue**, *Guernsey area, Kings County*	These crossings are currently scheduled for at-grade safety improvements funded by the Federal Highway Administration (FHWA) Highways (Section 130) Program.
☐ **Church Avenue**, *Fresno, Fresno County*	The California High-Speed Rail Authority is constructing a grade separation at this location.
■ **Grape Street, Hawthorn Street**; *San Diego, San Diego County*	On these parallel streets one block apart, grade separation recommended to lower intercity/commuter tracks to same level as light-rail tracks that share railbed. Study planned.

The Cutting Boulevard grade crossing in Contra Costa County, looking east and west in these two photos, is one of three Northern California locations that the Caltrans report concludes would likely benefit from safety upgrades. The work on this intersection will be funded through the Federal Highway Administration. The Capitol Corridor and San Joaquin Corridor passenger rail lines are among the trains that use this track.

PROJECT SPOTLIGHT

Willits Bypass: The Wait is Over

Six Decades After It Was First Proposed, North Coast Route Becomes Reality

Caltrans photos by Scott Lorenzo

The southbound U.S. Highway 101 bridge spans State Route 20 at the new southern interchange of the Willits Bypass. Note the unique redwood cone pattern designed just for this project. These redwood cones adorn all the concrete structures of the bypass, which opened in November 2016.

The Willits Bypass, first envisioned more than 60 years ago, had become to many living along California's North Coast a mythical tale, like Bigfoot, something you only hear stories about but never see for yourself. Until ground was broken for construction in the fall of 2012, many locals believed it would never be completed.

U.S. Highway 101 is considered the lifeline of the northern California coastal range. For decades, travelers through the city of Willits experienced delays that would often reach 30-60 minutes or more during summer. The purpose of the Willits Bypass is to ease congestion for interregional traffic along this important trucking and tourism corridor.

After being shelved numerous times due to funding shortages in the 1960s and 1970s, the project was revived by the California Transportation Commission (CTC) in 1988 — only to be put on hold due to funds diverted to seismic retrofit projects.

But after many challenges, construction did begin and the bypass saw its first vehicles on November 3, 2016.

Funding issues

After getting past the funding shortages due to the seismic retrofit projects, Caltrans moved forward on an environmental document, with the final document completed in 2006. Funding for construction from the CTC seemed to be automatic after so many years of work, but when Caltrans brought the project to the CTC in early 2007, the economy was starting to falter, and highway funding shortages were looming on the horizon.

The CTC told Caltrans that funding for Northern California projects was too competitive at that time to pay for the full proposed four-lane bypass, but was more feasible if the project was divided into two phases. Staff quickly drew up such plans, held a public meeting to gain local support and returned to the CTC. Funding for Phase 1 of the Willits Bypass was allocated, for two lanes over the full length of the project.

Lesson learned: Large, expensive projects are getting harder to fund, so breaking them up into prioritized phases, or sections, may be the only way to get them funded over time.

Protests

While some in the community voiced concerns about the scope of the bypass, or whether it was really needed, organized protests did not begin until after the 2012 groundbreaking. The first of these protests, the so-called "Boot Print" tours, trespassed onto various areas within the footprint of the bypass. These protests gradually faded after construction began.

Tree sitters then began to occupy trees within the bypass construction area in January 2013, about one month before tree and brush removal began. The protests continued through the summer, until there were no more trees along the project route to occupy.

Other actions initiated by the protesters included chaining themselves to equipment and blocking trucks on the highway, while others chained themselves to the trucks or gathered at the local construction office to block employee access.

However, a strong show of support for the bypass also emerged, by those who backed construction of a new route. Counter-protests were sometimes staged on behalf of the bypass at the same time as rallies against it.

Due to the ongoing protests, CHP maintained a large presence on this project, paid for through the Construction Zone Enhanced Enforcement Program (COZEEP). This program is normally used to enhance work zone safety by reimbursing CHP to provide off-duty officers with vehicles to be present at each end of a work zone. Six officers within the six-mile project area were assigned around the clock to discourage trespassers, among them specially trained officers to safely remove tree sitters.

Lessons learned: COZEEP can be used rather than hiring private security for construction projects; it is important to provide safe access for media; and tree sitters may climb more than trees!

Cow vandalism?

While installing water lines on mitigation parcels for grazing cattle, a team of archeologists worked a day or two ahead of the trenching crew, looking for any potential cultural areas to avoid. They found an area that contained a concentration of chert, or stone flakes, left behind when Native Americans made stone tools. They used tall survey stakes to clearly mark the Environmentally Sensitive Area (ESA) so the trenching crew would avoid the site.

What the archeologists did not realize was there were cattle in another part of that field. The cattle wandered over to the survey stakes and did what bovines tend to do: they rubbed up against the stakes to scratch themselves, knocking them to the ground, and trampled them into the grass.

The trenching crew, assisted by a tribal monitor looking for any artifacts brought to the surface, had already trenched through the area when one of the stakes was spotted on the ground. Work stopped, and local tribes were notified of the mistake. Caltrans staff discussed the issue with the tribal monitor, and it was agreed that since no artifacts had been dug up, work should proceed with pipe laying and backfilling.

Lessons learned: The quick reporting to the local tribes kept the situation from escalating, but when local media found out about the mistake, there was initial disbelief about the cattle. However, the issue was resolved because Caltrans was truthful early, owned the mistake, and explained the changes implemented so it would not happen again.

Falsework collapse

It would be difficult to talk about Willits Bypass challenges without mentioning the falsework collapse that injured several workers. Falsework is the temporary structure that supports the concrete forms until the concrete hardens and the bridge can support itself.

The 1.1-mile-long viaduct is the type of challenging project that every structural engineer wants in their work history. Built in eight frames, or segments, its foundations rest on friction piles (steel

These columns, or bents, rise over 20 feet to support the 1.1 mile viaduct. In all, 64 of these columns support the viaduct's roadway.

Mitigation and relinquishment work will be completed over the next few years.

piles that do not extend into the bedrock) due to the very deep soils in that area of the valley. Designed to withstand large earthquakes, the viaduct crosses two local roads, several waterways and a 100-year floodplain.

On January 22, 2015, a section of falsework collapsed as it was being loaded with wet concrete.

Caltrans concluded that the falsework was not installed as shown on the approved falsework drawings provided by the contactor, that certification by the contractor's Engineer of Record's designated representative may have been ineffective, and that the collapse was rapid with no prior indicators of an emerging loss of stability.

Recommendations included:

- revising the Standard Specifications regarding delegation of certification of the falsework and timing of certification;
- evaluating the need for horizontal forces to be positively restrained; and
- providing internal training for reviewing best practices in design, construction and inspection of the falsework.

Late design change minimizes delays

The bypass was scheduled to be a three-season project, breaking ground in the fall of 2012 and opening to traffic in the fall of 2015. However, after the first season it was clear that the protests had delayed the project schedule a full year, and the completion was changed to the fall of 2016.

After the second construction season, the continuing protests, a lawsuit against the project, and a temporary suspension of Caltrans' permit by the U.S. Army Corps of Engineers, it seemed the bypass would not open until fall 2017.

Another reason for the second year of delay was due to the original design of the north interchange. The bridge foundations were designed to require a full 300 days of settlement from the time the fill was placed before the bridges could be constructed. This lowered the cost for pilings, and was considered to be a good tradeoff when the original schedule allowed for the long settlement.

Facing approximately $10-12 million in costs for a second year of delay, Caltrans' construction staff brainstormed with design staff to see if the foundations could be quickly redesigned to reduce the settlement time, saving significant time and money. Plans were modified to reduce the settlement time from 300 days to just 30, a change order for about $3 million was initiated, and steel friction piles ordered. This change did add increased risk due to potential settlement issues, but paid off by paring the project delay to one year.

Challenges will continue

The main Willits Bypass project has been completed, but there are several related projects still in progress. Mitigation and relinquishment work will be completed over the next few years. The main mitigation project is the largest of its kind ever to be designed and constructed by Caltrans. To make up for the approximately 40 acres of wetlands permanently impacted during construction of the bypass, as well as another 20 acres temporarily impacted, more than 2,000 acres of land were purchased to create and rehabilitate wetlands, improve riparian areas along creeks, remove non-native invasive plants, and replant almost 800,000 native species. After the mitigation is completed, the work will be monitored for 10 years to assure success. There are sure to be more challenges waiting to be met, and still more to be learned from this project. MM

Source: District 1 Chief Public Information Officer Phil Frisbie Jr.

From the Archives

Then Gov. Ronald Reagan, left, was on hand for the dedication of the San Diego Coronado Bay Bridge on Aug. 3, 1969, linking the mainland to the resort city. Then San Diego Mayor Frank Curran joined Reagan at the ceremony. The bridge marked an end to the ferry service that brought visitors to Coronado.