State of California

DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

# Memorandum

To: CHAIR AND COMMISSIONERS
CALIFORNIA TRANSPORTATION COMMISSION

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Chief Financial Officer

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Subject: **REVIEW AND COMMENT ON THE PROPOSED 2015 TEN-YEAR STATE HIGHWAY OPERATION AND PROTECTION PROGRAM PLAN**

## SUMMARY:

In accordance with Streets and Highways (S&H) Code Section 164.6, the California Department of Transportation (Department) prepares a ten-year state rehabilitation plan every two years that identifies the rehabilitation and reconstruction needs of all highways and bridges on the State Highway System. Additionally, S&H Code Section 164.6 requires transmittal to the Governor and the Legislature by May 1 of each odd-numbered year.

## BACKGROUND:

The Department prepares a ten-year state rehabilitation plan every two years that identifies the rehabilitation and reconstruction needs of all highways and bridges owned by the state. Because the projects to implement the plan are primarily funded through the State Highway Operation and Protection Program (SHOPP), the plan is also referred to as the Ten-Year SHOPP Plan (Plan). The proposed 2015 Plan covers Fiscal Years (FY) 2015-16 through 2024-25. The plan provides input for the funding distribution in the fund estimate adopted by the Commission in August of each odd-numbered year. S&H Code Section 164.6 contains specific requirements as to the content of the plan, all of which are included in the attached document. Additionally, S&H Code Section 164.6 requires transmittal to the Governor and the Legislature by May 1 of odd-numbered years.

Attachment

# FINAL DRAFT
# 2015 TEN-YEAR STATE HIGHWAY OPERATION AND PROTECTION PROGRAM PLAN

**California Department of Transportation**

**Division of Transportation Programming**

**March 2015**

Caltrans

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# EXECUTIVE SUMMARY

The State of California and its partners have strategically invested in the State Highway System (SHS) for more than a century to develop the core of California's complex, multi-modal transportation system. Hundreds of billions of dollars have been applied to construct, maintain, and operate more than 50,000 state highway lane miles that include more than 13,000 bridges and other structures, providing transportation access to every region of the State. This system is the foundation of California's economy, the world's eighth largest, enabling the efficient movement of people, goods, and services throughout the State. Our remarkable economy and more than 38 million residents are dependent on the continued availability of safe, reliable, well maintained highways.

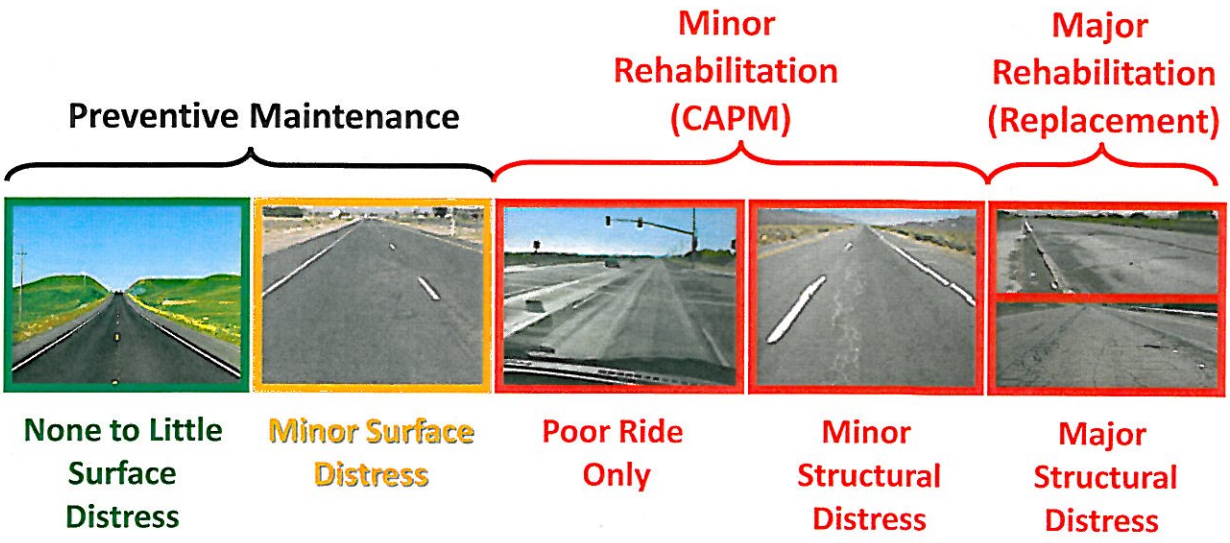
In order to keep the SHS functioning well, it is necessary to continually invest in maintaining, instituting safety improvements on, modernizing, and as needed, reconstructing highway facilities. Many of the highways and bridges that were built in the mid-20$^{th}$ Century are in need of substantial renovation and sometimes even replacement. Newer facilities also require regular attention to keep pavement, bridges, and other facilities in good condition and to respond to damage from natural disasters and vehicle collisions. Applying a "*fix-it-first*" perspective to the SHS prioritizes available funding to address these basic needs above devoting funding to expanding the capacity of the highway system, such as through the addition of new highway lanes. Most of the costs to respond to these system preservation needs are predictable and can be scheduled based on periodic facility inspections and assessments, while other costs, such as natural disasters, are unexpected and must be dealt with as they occur. An underlying assumption in keeping the SHS in good condition is that there is sufficient revenue available to fund the needed improvements and preventative maintenance activities. Absent such expenditures, the SHS will deteriorate and necessitate much more expensive remedies in the future and possibly force the closure of some facilities due to unacceptable conditions.

The California Department of Transportation (Caltrans) funds the management, preservation, and safety improvements of the SHS through the State Highway Operation and Protection Program (SHOPP) which receives state and federal funding generated by taxes and fees placed on vehicle fuels. The Fund Estimate, which provides a multi-year forecast of transportation revenues under current law, assumes approximately $2.3 billion each year dedicated to the SHOPP for these activities. In order to anticipate and schedule future needs, Caltrans develops a Ten-Year SHOPP Plan (this document) that identifies goal-based needs over a ten-year period, with the Plan updated every two years. The goals reflect desired performance criteria for all highway facilities such as roadways providing a specified pavement ride quality or bridges being in acceptable condition, and full achievement of those goals at the end of the ten-year period. This enables Caltrans to identify the most important projects to fund with available revenue. This Ten-Year SHOPP Plan identifies approximately $8 billion (escalated cost – adjusted for inflation and other factors) in goal-based needs for each year of the ten-year plan, leaving a projected funding shortfall of approximately $5.7 billion per year.

As highlighted in Governor Brown's proposed 2015-16 State Budget, California currently has many billions of dollars in deferred maintenance and rehabilitation for highway infrastructure due to long-term under-investment in system preservation. Compared with other states, California is ranked 45th in the United States by the Reason Foundation's *21st Annual Highway Report* for overall highway condition and performance. If additional revenue were available, Caltrans could target the funding to address the highest-priority goals to achieve the ten-year outcomes such as:

- Achieve 90% "good pavement" by reducing distressed lane miles to 10%,
- Achieve 95% bridge health index,
- Achieve 90% of culverts in good health, or
- Achieve 90% of ITS elements in operating condition.

Based on Caltrans' assessments of SHS pavement conditions, only 59 percent of all state highway lane-miles are in good condition, with 25 percent of lane miles requiring preventative maintenance treatments or minor rehabilitation, and approximately 16 percent of lane-miles in distressed condition that requires major rehabilitation. Preventative treatments such as seal coats or thin asphalt-concrete (AC) overlays are the least expensive preservation measures to implement and can generally be done fairly quickly. Minor rehabilitation, such as a thicker AC overlay or concrete panel replacement are more expensive and require a longer lead time to prepare the project for funding. And finally, major rehabilitation requires the removal of existing pavement and also possibly the removal of subgrade material to reconstruct the road base. Major rehabilitation also often necessitates the upgrading or replacement of other roadway features such as culverts and is far more expensive and takes much longer to develop and construct. They may also require expensive environmental and cultural resources mitigation due to impacts.



In the past, Caltrans personnel conducted manual, visual inspections of the SHS to determine pavement conditions. Due to the extensive length of the SHS (50,000 lane miles), worker safety considerations, and potential traffic distruptions caused by inspection activities, it was not possible to inspect every lane mile of the highway system. Instead, sample inspections were conducted at regular intervals along the outside lane of highways and then condition estimates were made for the entire highway based on those sample inspections. Recognizing the shortcomings of such an assessment methodology and the recent availability of dramatically improved assessment technologies, Caltrans invested in developing the Automated Pavement Condition Survey (APCS). APCS utilizes a specially developed vehicle that applies ground penetrating radar and photography to assess every lane mile of the SHS in its entirety and in great detail. California is currently the only state to have such a tool. The refined assessment enables Caltrans to optimize our ability to select the best pavement preservation strategy at the right time. This has helped to reduce the cost of projected pavement preservation funding needs.

Automatic Road Analyzer Vehicle

Example of Pavement Detail from APCS

State-owned bridges are an average of 43 years-old. Five hundred fifty-seven (557) bridges require major repair or rehabilitation, with an additional 369 bridges considered to be structurally deficient due to not meeting today's design standards. Culverts and intelligent transportation systems (ITS) have similarly significant preservation backlogs as pavement and bridges.

Culverts perhaps best exemplify the potentially severe consequences of not adequately caring for components of the transportation system that are out-of-sight but are critically important to the functioning and long-term viability of highways. The SHS includes many tens-of-thousands of culverts which drain rain water, streams, and rivers away from highways. Culverts require regular cleaning and sometimes reconstruction or upgrading. If a culvert becomes clogged or decays, or fails due to rust or other factors, and therefore fails to convey water away from the highway, the water may then flood the highway or erode highway foundations or adjacent slopes resulting in washouts of the road and its closure. Repairing such destruction is far more expensive than providing adequate funding to maintain and upgrade culverts.

**Table i**
**2015 TEN-YEAR GOAL-CONSTRAINED NEEDS PLAN**
**MAJOR CATEGORIES***
**(Unescalated)**

| Category | Annual Cost ($ Millions) | | |
|---|---|---|---|
| | Capital | Support | Total |
| MAJOR DAMAGE RESTORATION | $ 256.8 | $ 96.3 | $ 353.1 |
| COLLISION REDUCTION | $ 299.7 | $ 132.3 | $ 432.0 |
| MANDATES | $ 227.6 | $ 106.4 | $ 334.0 |
| MOBILITY IMPROVEMENT | $ 328.0 | $ 177.6 | $ 505.6 |
| MINOR PROGRAM | $ 90.0 | $ 60.0 | $ 150.0 |
| BRIDGE PRESERVATION | $ 1,327.3 | $ 567.0 | $ 1,894.3 |
| ROADWAY PRESERVATION | $ 1,958.5 | $ 640.9 | 2,599.4 |
| ROADSIDE PRESERVATION | $ 251.3 | $ 117.0 | $ 368.3 |
| FACILITY IMPROVEMENT | $ 123.4 | $ 51.1 | $ 174.5 |
| Support for Development of Project Initiation Documents | | | $ 103 |
| TOTAL UNESCALATED ANNUAL NEED | | | $ 6,914 |
| TOTAL ESCALATED NEED | | | $7,965 |

* Further detail is provided in Table 1 on Pages 11 and 12.

The 2015 Ten-Year Plan identifies a total of $80 billion to achieve the established goals within a ten-year period. This represents a 2 percent decrease in identified needs from the 2013 Ten-Year Plan. Transportation system components with significant needs include bridge preservation at $19 billion, roadway preservation – which includes pavement- at $26 billion, and Roadside Preservation at $3.7 billion. The increase in bridge preservation needs is driven by a combination of factors including growing rehabilitation needs, seismic retrofit needs, and the inclusion of a new class of bridge rails to replace existing rails to better meet crash standards. The decrease in pavement preservation needs is being driven by the reduced deterioration rate of the highway pavement resulting from increased investment in pavement preservation in recent years and improved pavement assessment tools as previously discussed. Absent the increased investment, pavement conditions would have deteriorated at a faster pace, resulting in an increased cost of identified needs over the ten-year Plan period.

Between 2013 and 2015, Caltrans invested an additional $600 million beyond the funding identified in the 2013 Ten-Year SHOPP Plan. Those funds were directed toward high priority pavement rehabilitation and traffic operations projects to improve the condition and efficiency of the SHS. The additional $600 million will rehabilitate 540 lane-miles of distressed pavement and replace 756 inoperable loop detectors. The additional projects, made possible by the Proposition 1B bid savings and prior transportation fund loan repayment, are currently in design or under construction and are expected to reduce future Ten-Year Plan needs as discussed above.

An additional factor in reducing the estimated funding need between the 2013 and 2015 Ten-Year SHOPP Plans for pavement was a reduced "deterioration rate". "Wear and Tear" on the pavement accumulates each year. As we fund pavement projects and projects go to construction, distressed lane miles are retired every year. The difference between accumulated wear and tear, and new pavement projects constructed is known as the "deterioration rate". In the 2013 pavement condition survey, the deterioration rate was assumed to be 1.5 percent of the system lane miles every year. Based on the analysis of the most recent pavement survey in 2014 and the past surveys, this deterioration rate was reduced to 0.75 percent. This new deterioration rate reduces the estimated funding level necessary to attain the pavement goal from $3.3 billion per year to $2.6 billion per year.

Projected State Highway Account funding available for the SHOPP is $2.3 billion a year, which is about thirty percent of the estimated goal-constrained need. Because funding is insufficient to preserve and maintain the existing transportation infrastructure, Caltrans will continue to focus available resources on the most critical categories of projects in the SHOPP (emergency, safety, bridge, and pavement preservation). Due to insufficient funding to meet the need, the percentage of lane-miles of highway pavement in a distressed condition will increase. In addition, there will likely be higher incidence of culvert failures, more frequent closure of roadside safety rest areas for urgent repairs, and higher incidence of emergency repair projects. In the absence of new revenue sources, the condition of the SHS will deteriorate.

Looking forward, Caltrans is transitioning to managing the SHOPP as part of an overall robust Asset Management Plan. As a piece of this implementation, Caltrans is actively developing project selection and decision methodologies to update SHOPP project selection. The updated methodologies will incorporate criteria tied to Caltrans' new mission and vision. Caltrans anticipates completion of the updated project decision methodologies in late spring of 2015. The decision framework will also respond to the need and priority of mandated projects, such as traffic safety and emergency restoration. Due to the planning effort involved in project selection, the Asset Management Plan will be fully implemented into the 2020 SHOPP. Prior to the 2020 SHOPP, Caltrans will be using the methodology to validate and refine project selection. Caltrans will be working with the California Transportation Commission as part of this implementation. This methodology is also a part of implementing recommendations made in the January 2014, State Smart Transportation Initiative (SSTI) report and the resulting Caltrans Improvement Project.

The Governor's proposed budget for fiscal year 2015-16 suggests several strategies for addressing highway preservation. Legislation associated with the budget proposes to utilize

unused capacity in high-occupancy lanes by authorizing conversion of those lanes to high-occupancy toll lanes – the associated toll revenue would fund preservation of those lanes. A longer-term effort proposed for funding in the budget, and directed by Senate Bill 1077 of 2014, is a demonstration program to explore a Road Charge alternative to the gasoline tax. That program is being developed under the leadership and staff of the California Transportation Commission with assistance by Caltrans. If successful and widely implemented, a Road Charge could maintain the buying power of transportation funding as cars become more fuel efficient and gas tax revenues decline. Importantly, the Governor has called on the Legislature and transportation stakeholders to work with the Administration to find new pay-as-you-go funding for highway preservation. Resulting revenue would be directed to the most critical of the unmet preservation needs.

# I. OVERVIEW OF THE SHOPP

## BACKGROUND AND PURPOSE OF THE SHOPP

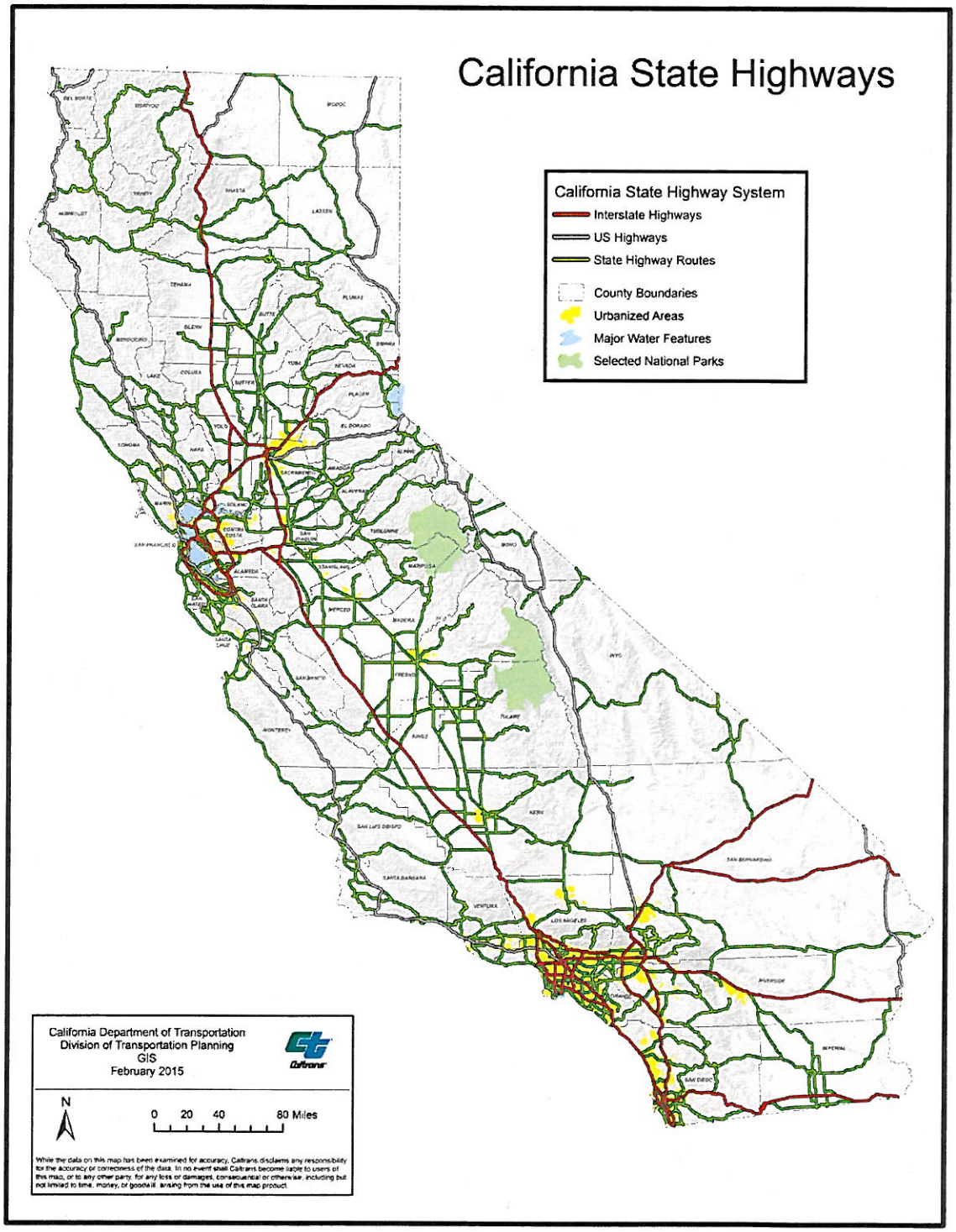
Caltrans develops and manages the State Highway Operation and Protection Program (SHOPP) as authorized in Government Code section 14526.5 and Streets and Highways Code Section 164.6 (see Appendices A and B for full text of both sections). The purpose of the SHOPP is to maintain and preserve the State Highway System (SHS) and its supporting infrastructure. Projects in the SHOPP are limited to capital improvements relative to maintenance, safety, and rehabilitation of State highways and bridges, capital improvements that do not add capacity to the system.

Section 164.6 requires that the Ten-Year SHOPP Plan be submitted to the California Transportation Commission not later than January 31 of each odd-numbered year for review and comment and that the Plan be transmitted to the Govenor and the Legislature not later than May 1 of each odd-numbered year.

## THE CALIFORNIA STATE HIGHWAY SYSTEM

The transportation system assets that comprise the California SHS includes nearly 50,000 lane miles of pavement and 13,075 bridges, 205,000 culverts and drainage facilities, 87 roadside rest areas, 30,000 acres of roadside landscaping and over 180,000 acres of non-landscaped roadside. The magnitude of the transportation system is illustrated in Figure 1. Also included in the transportation infrastructure are the additional support facilities, including maintenance stations, equipment shops, and transportation materials laboratories and testing facilities. Much of this system was built in the 1950s, 1960s, and early 1970s to serve California's growing population and economy. Many of the infrastructure assets have reached or are reaching the end of their service lives and are at an age where deterioration is accelerating at a faster rate than in previous decades , often requiring extensive rehabilitation and even reconstruction. Appendix D describes examples of some deficiencies on the SHS.

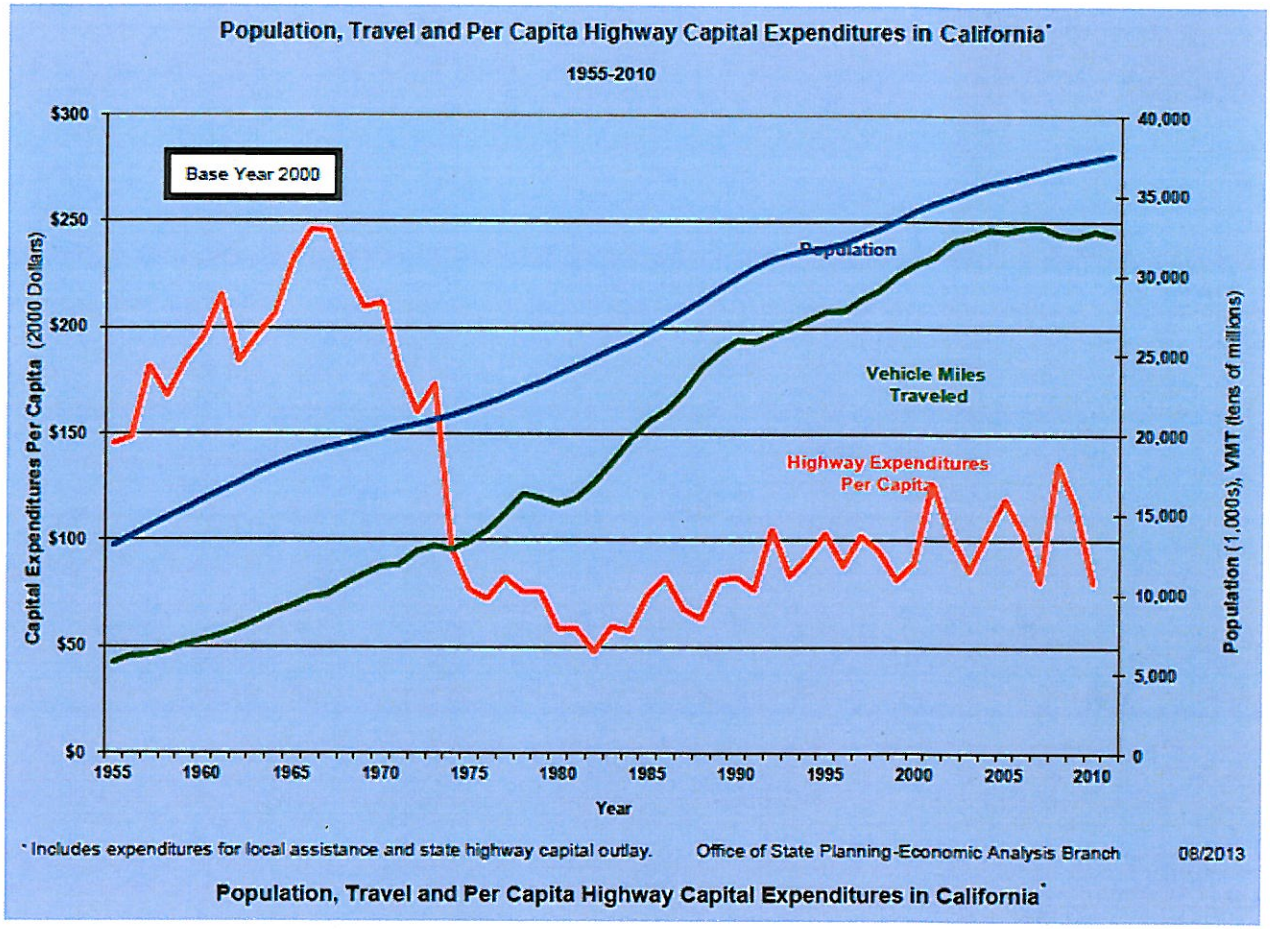
**Figure 1. The California State Highway System**



## OPERATIONAL DEMANDS

The demands placed upon transportation infrastructure continue to increase at a steady pace. Increasing travel combined with the advanced age of the transportation system is causing a faster rate of pavement and bridge deterioration, new vehicle collision concentration locations, and increasing hours of traffic congestion. The growth in vehicle miles traveled also increases the use of roadside assets, such as roadside safety rest areas and vista points. Shown below in Figure 2 is a chart depicting the increase in annual vehicle miles traveled as compared with investments in the SHS. Increased goods movement and the resulting increase in truck traffic

**Figure 2. Population, Travel, and Per Capita Highway Capital Expenditures in California**




are also expected to continue. The Federal Highway Administration, Office of Freight Management, estimates that the tons of freight transported by trucks in California will increase

from 1,108 million tons in 2012 to 1,657 million tons in 2040.[1] Much of the growth will occur in urban areas and over a relatively small set of interregional highways. This growth will continue to increase the rate of pavement deterioration and wear on bridges.

Caltrans provides for the needs of travelers of all ages and abilities in all planning, programming, design, construction, operations, and maintenance activities and projects on the State Highway System. Caltrans views all transportation improvements as opportunities to improve safety, access, and mobility for all travelers in California and recognizes bicycle, pedestrian, and transit modes as integral elements of the transportation system.

Caltrans develops integrated multimodal projects in balance with community goals, plans, and values. Addressing the safety and mobility needs of bicyclists, pedestrians, and transit users in all projects, regardless of funding, is implicit in these objectives. Bicycle, pedestrian, and transit travel is facilitated by creating "complete streets" beginning early in system planning and continuing through project delivery and maintenance and operations. Developing a network of "complete streets" requires collaboration among all Department functional units and stakeholders to establish effective partnerships.

## STRUCTURE OF THE SHOPP

The SHOPP has eight categories: major damage restoration, collision reduction, legal and regulatory mandates, mobility improvement, bridge preservation, roadway preservation, roadside preservation, and facility improvement.

These eight categories compose two major groupings, those that relate to its operational performance (major damage restoration, collision reduction, legal and regulatory mandates, and mobility improvement) and those that relate to the condition of the transportation system (bridge preservation, roadway preservation, roadside preservation, and facility improvement).

**Major Damage Restoration.**

The goal of the major damage restoration category is to respond to earthquakes, floods, fires, and other emergencies to restore the roadway to essential traffic within 180 days after major damage and full restoration to predisaster conditions within three years. Major damage restoration projects resulting from a federally declared disaster are eligible for federal reimbursement.

[1] "Freight Analysis Framework (FAF) 3.5," Office of Freight Management and Operations, Federal Highway Administration, U.S. Department of Transportation, 2015.

As expected, the level of major damage restoration varies annually in response to human-caused and natural disasters. In general, as the SHS ages, system assets are more vulnerable to the impact of damaging events and increases the cost to restore the affected SHS to predamage condition.

**Collision Reduction.**

The goal of the collision reduction category is improve traveler safety by reducing the number and severity of fatal and injury collisions and reduce highway worker fatalities to zero.

In the ten-year period from 2002 - 2011, the fatality rate for users of State highways, which includes bicyclist and pedestrians, decreased from 1.09 fatalities per 100 million vehicle miles traveled in the year 2002 to 0.66 fatalities per 100 million vehicle miles traveled in 2011. Fatalities reduced from 1,873 in 2002 to 1,167 in 2011. Though fatalities have reduced, they are still too high. In fiscal year 2012-13, Caltrans invested just over $100 million in projects specifically addressing safety. [2]

In addition to the goal of improving safety for travelers as described above, another important goal of the collision reduction category is to reduce highway worker fatalities to zero. For a highway worker, the risk of injury or fatality increases with the length of time the worker is exposed to traffic. Twenty Caltrans employee fatalities have occurred on-the-job since the year 2000, with many of them involving workers on foot, on the shoulder, or in close proximity to traffic. Improvements implemented through the Roadside Safety Improvements Program will significantly reduce worker exposure to traffic.

**Legal and Regulatory Mandates.**

The goal of the legal and regulatory mandates category is to comply with State and federal laws and regulations, such as the Porter-Cologne Water Quality Control Act (California Water Code, § 13000 et seq.) and evolving stormwater requirements, the Federal Clean Water Act (CWA) (33 U.S.C. 1251 et seq.), the Americans with Disabilities Act (ADA) of 1990 (P.L. 101- 336 [July 26, 1990], as amended by P. L. 110-325 [September 25, 2008]), and numerous hazardous waste remediation regulations and waste management, Federal Comprehensive Environmental

[2] California Department of Transportation Executive Fact Booklet, March 2014.

Response, Compensation, and Liability Act of 1980 (CERCLA) and Resource Conservation and Recovery Act of 1976 (RCRA), and the California Code of Regulations Titles 22 (Hazardous Waste Management), 26 (Toxics) and 27 (Solid Waste Management).

Caltrans' stormwater discharges are subject to National Pollutant Discharge Elimination System (NPDES) permit issued under the CWA, as delegated under the Porter-Cologne Water Quality Control Act to the State Water Resources Control Board (SWRCB). The Stormwater Program is currently mandated to achieve a minimum of 33,000 compliance units (CUs) over the next twenty years (1,650 CUs/year) to comply with the 84 Total Maximum Daily Loads (TMDLs), as well as ASBS permit requirements, and other water quality requirements. One CU is equivalent to one acre of Caltrans right of way treated for a given pollutant or pollutants in a TMDL watershed for which Caltrans has been identified as a responsible party. The current Caltrans NPDES Permit also requires retrofits for the location specific requirements and Areas of Special Biological Significance (ASBS) discharge areas.

Transportation facilities historically have been designed and constructed to collect, convey, and discharge stormwater run-off rapidly and efficiently for user safety and for the protection of property. Thus, the majority of the SHS was designed and built without water quality treatment devices for stormwater. These systems in many watersheds require the retrofitting of water treatment technology to meet the required pollutant load reductions.

The requirements of the stormwater regulations are dynamic in nature. The current needs (CUs) will continue to increase as new TMDLs are adopted and incorporated into subsequent Caltrans NPDES Permit cycles (every five years) or by reopening the current permit. The new TMDL requirements of the Caltrans NPDES statewide Permit were adopted on May 20, 2014. Caltrans will prioritize TMDLs for implementation of source control measures, best management practices and cooperative implementation. The TMDL prioritization will be completed in collaboration with State Water Resources Control Board and Regional Water Quality Control Boards to achieve maximum water quality benefit economically and efficiently.

Twenty-one of Caltrans' 87 Safety Roadside Rest Areas (SRRA) have been identified with water quality needs that have not been addressed and are not included in either another project or do not have a Project Initiation Document (PID) under development Non-compliance with water quality mandates and result in the closer of the offending SRRA. Preventing closures due to noncompliance with drinking water quality and wastewater treatment standards will maintain the traveler safety benefits provided by the SRRA System. Fatigue-related collisions decrease by a statistically significant amount downstream of rest area locations. The number of collisions due to fatigue tend to decrease immediately downstream of rest areas, while increasing after about 30

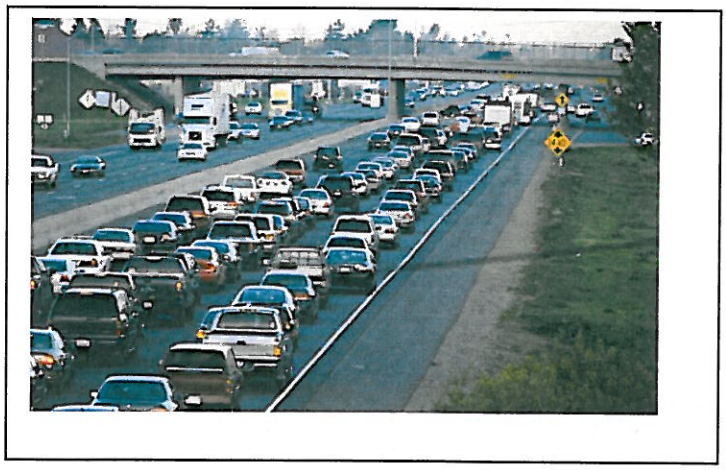
miles.[3] The closure of rest areas due to noncompliance with water quality standards could have serious traveler safety consequences.

Another significant legal requirement is retrofitting and updating the SHS to comply with ADA regulations. Much of the cost of updating the SHS to enhance accessibility to persons with disabilities will be borne by the SHOPP.

**Mobility Improvement.**

The goal of the mobility improvement category is to reduce congestion on, and restore productivity of, the SHS. Mobility improvements include operational improvements, transportation management systems, and commercial vehicle enforcement facilities and weigh-in-motion systems. These are projects that do not add capacity to the highway system.

Mobility improvements focus on reducing vehicle delay on the SHS. Daily vehicle hours of delay (DVHD) are defined as the travel time (in hours) to cover a given distance under congested conditions as compared to the travel time at 35 miles per hour, the speed used by Caltrans as a standard threshold for measuring delay. This indicator of congestion continues to increase.



As stated in the adopted 2014 State Transportation Improvement Program (STIP) Guidelines, operational improvements that do not expand the design capacity of the transportation system and are intended to address spot congestion are eligible for SHOPP funding. Regions may nominate these types of projects in their own Regional Transportation Improvement Programs (RTIPs) if timely implementation through the SHOPP is not possible.

[3] Rest Areas - Reducing Accidents Involving Driver Fatigue, UC Berkeley Traffic Safety Center, May 2009

## Bridge Preservation.

The goal of the bridge preservation category is to preserve all bridges on the SHS in a safe and economic manner so that no bridge failures occur.

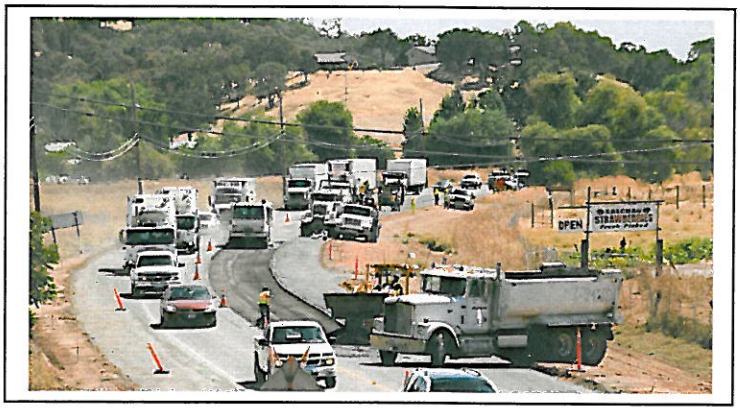
The SHS contains 13,075 bridges. The median age of these bridges is 43 years. Many of these bridges are reaching the end of their service life and are in need of rehabilitation and reconstruction.

Many of the bridges on the SHS are in distressed condition and in need of rehabilitation. Distressed condition is defined as a bridge with an identified replacement, rehabilitation, scour, or seismic need that must be addressed. The main goal of the bridge preservation programs is to prevent collapses, washouts, closures, and significant reductions of load carrying capacity due to structural deterioration, scour, or seismic vulnerabilities. This is achieved using a variety of strategies including replacements, rehabilitations, scour countermeasures, and seismic retrofitting.

The trend over the last five years is a net decrease in the number of distressed bridges.

## Roadway Preservation.

The goal of the roadway preservation category is to keep distressed roadway lane miles at a steady managed state. The historic goal of Caltrans has been to reduce the number of distressed lane miles of pavement to 5,000, or approximately 10 percent of the total system.




The percentage of distressed lane miles (those with poor structural condition or poor ride quality) is an indicator of the condition of the pavement on the SHS. Pavement distress is commonly associated with significant rutting, cracking, potholes, or other signs of deterioration. The 2013 Pavement Condition Survey reports 59 percent (29,534 lane-miles) of the SHS are in excellent condition, 25 percent (12,364 lane-miles) require pavement maintenance, and 16 percent (7,820 lane-miles) are distressed and require rehabilitation and reconstruction work.

The estimates in this report for pavement benefit from data obtained from the Pavement Management System (Pave-M.) The PaveM system is the Caltrans pavement network analysis tool. It uses "State of the Art" technology tools and stores High Definition photo imagery to collect the annual pavement condition survey which analyzes every mile of pavement. PaveM answers questions such as, "Where should projects be built to achieve best pavement performance levels?" or, "When should pavement preservation treatments be focused on priority routes to protect existing pavement investments?." As the annual pavement condition data is collected, better pavement performance prediction models will be developed for the many climate regions, traffic conditions and pavement types in California.

**Roadside Preservation.**

The goal of the roadside preservation category is to preserve the investment in roadsides, reduce the long-term maintenance costs of roadside infrastructure, improve worker and traveler safety, reduce deficient highway planting, comply with regulatory and legal mandates, improve capacity and operations at safety roadside rest areas and vista points, and provide safe stopping opportunities on the State Highway System.

Approximately 70 percent of the highway planting and irrigation inventory has deteriorated beyond the ability of maintenance forces to correct and no longer functions as intended. In the ten-year period from 2004 to 2014, due to improvements made to the freeway system, highway planting acreage has increased from 26,587 to 29,830. Due to limited funding for Highway Planting Rehabilitation, the level of deficient landscape has increased from 45 percent in 2004 to the current level of 70 percent.

Deteriorated landscape results in recurrent maintenance activities of excessive duration and frequency exposing maintenance worker to traffic. Deficient vegetation no longer performs as viable stormwater control, allows for weed growth and contains dying vegetation that increases fire risk, and does not provide for traveler safety by reducing glare and visual screening . The number of distressed acres of highway planting has increased from 13,000 to 20,000 acres in the past ten years. In addition, 75 percent of the safety roadside rest areas have capacity, or operational deficiencies. To mitigate the cost impact of the rising needs, Caltrans improved planting strategies to reduce project and overall life-cycle costs.

**Facility Improvement.**

The goal of the facility improvement category is to address worker safety, comply with ADA and California Division of Occupational Safety and Health (Cal/OSHA) regulations, and improve operational efficiency. The facility improvement category includes projects for improvements at equipment facilities, maintenance facilities, office buildings, and transportation materials laboratories and testing facilities.

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# II. TEN-YEAR COSTS AND PERFORMANCE OUTCOMES

## GOAL-CONSTRAINED NEEDS PLAN AND COST ESTIMATE

The total ten-year goal-constrained escalated need for the rehabilitation and operation of the SHS for the period from fiscal year 2015–16 through 2024–25 is $80 billion. This equates to an average annual cost of $8 billion per year. This is the escalated cost estimate for capital construction, right-of-way acquisition, and project development and construction engineering support. The goal-constrained needs do not address all the needs on the SHS.

The sole funding source for the SHOPP is the State Highway Account (SHA), funded primarily through excise taxes on gasoline and diesel fuel. SHA funding is declining as a result of reduced fuel consumption, limited federal funding resulting from the federal excise tax, and redirection of funding for highway maintenance.

The goal-constrained need developed by Caltrans represents the estimated cost to meet defined performance goals. For example, for pavements, the goal is to reduce the current level of distressed lane-miles of pavement on the state highway system down to 10 percent in ten years. Other elements of the SHOPP have similar performance goals. The goal-constrained needs plan is developed to meet the requirements contained in Streets and Highways Code section 164.6.

The following two tables present a summary of the total ten-year funding needs to achieve SHOPP goals and summarize Caltrans' constrained annual funding plan based on forecasted SHA funding. Table 1, titled 2015 Ten-Year Goal-Constrained Needs Plan, presents Caltrans' estimated cost of rehabilitation needs to achieve acceptable performance goals.

**Table 1**

**2015 TEN-YEAR GOAL-CONSTRAINED NEEDS PLAN**

**(Unescalated)**

| Category | Annual Cost ($ Millions) | | | Annual Performance Units |
|---|---|---|---|---|
| | Capital | Support | Total | |
| Emergency Damage Repair | $ 126.0 | $ 40.3 | $ 166.3 | TBD locations |
| Permanent Restoration | $ 88.0 | $ 42.0 | $ 130.0 | TBD locations |
| Roadway Protective Betterment | $ 42.8 | $ 14.0 | $ 56.8 | 9 locations |
| **MAJOR DAMAGE RESTORATION** | **$ 256.8** | **$ 96.3** | **$ 353.1** | |
| Safety Improvements | $ 149.0 | $73.0 | $ 222.0 | 294 fatal and injury collisions reduced |
| Collision Severity Reduction | $ 88.2 | $ 31.8 | $ 120.0 | 204 fatal and injury collisions reduced |
| Roadside Safety Improvements | $ 62.5 | $ 27.5 | $ 90.0 | 1,116 locations |
| **COLLISION REDUCTION** | **$ 299.7** | **$ 132.3** | **$ 432.0** | |

**Table 1 (cont.)**
**2015 TEN-YEAR GOAL-CONSTRAINED NEEDS PLAN**
**(Unescalated)**

| Category | Annual Cost ($ Millions) | | | Annual Performance Units |
|---|---|---|---|---|
| | Capital | Support | Total | |
| Relinquishments | $ 12.0 | $ 1.0 | $ 13.0 | TBD centerline miles |
| Railroad At-Grade Crossings | TBD | TBD | TBD | TBD location(s) |
| Hazardous Waste Mitigation | TBD | TBD | TBD | TBD location(s) |
| Stormwater | $ 193.6 | $ 77.4 | $ 271.0 | 1,100 acres treated |
| ADA Curb Ramp | $ 16.0 | $ 20.0 | $ 36.0 | 800 ADA units |
| ADA Pedestrian Infrastructure | $ 6.0 | $ 8.0 | $ 14.0 | 300 ADA units |
| **MANDATES** | **$ 227.6** | **$ 106.4** | **$ 334.0** | |
| Operational Improvements | $ 144.2 | $ 57.7 | $ 201.9 | 20,000 Reduced DVHD |
| Transportation Management Systems | $ 127.8 | $ 63.9 | $ 191.7 | 1,997 TMS replacement |
| Commercial Vehicle Enforcement Facilities and Weigh-in-Motion Systems | $ 56.0 | $ 56.0 | $ 112.0 | 14 WS/WIM rehabilitation |
| **MOBILITY IMPROVEMENT** | **$ 328.0** | **$ 177.6** | **$ 505.6** | |
| **MINOR PROGRAM** | **$ 90.0** | **$ 60.0** | **$ 150.0** | **TBD** |
| Bridge Rehabilitation | $ 260.6 | $ 99.0 | $ 359.6 | 37 bridges |
| Bridge Preventive Program | $ 33.1 | $ 10.8 | $ 43.9 | 181 bridges |
| Bridge Scour Mitigation | $ 32.2 | $ 16.4 | $ 48.6 | 5 bridges |
| Bridge Rail Replacement/Upgrade | $ 354.4 | $ 191.4 | $ 545.8 | 58,575 feet |
| Bridge Seismic Restoration | $ 353.4 | $ 137.8 | $ 491.2 | 72 bridges |
| Permit Requirements for Bridges | $ 293.6 | $ 111.6 | $ 405.2 | 20 bridges |
| **BRIDGE PRESERVATION** | **$ 1,327.3** | **$ 567.0** | **$ 1,894.3** | |
| Roadway Rehabilitation (3R) | $ 272.0 | $ 88.0 | $ 360.0 | 272 lane-miles |
| Roadway Rehabilitation (2R) | $ 572.0 | $ 160.0 | $ 732.0 | 775 lane-miles |
| Capital Preventive Maintenance | $ 727.0 | $ 181.0 | $ 908.0 | 2,077 lane-miles |
| Drainage System Restoration | $ 306.5 | $ 183.9 | $ 490.4 | 2,665 culverts |
| Signs and Lighting Rehabilitation | $ 81.0 | $ 28.0 | $ 109.0 | 2,375 signs |
| **ROADWAY PRESERVATION** | **$ 1,958.5** | **640.9** | **$ 2,599.4** | |
| Roadside Protection and Restoration | $ 24.8 | $ 11.2 | $ 36.0 | 58 locations |
| Roadside Rehabilitation | $ 140.0 | $ 62.5 | $ 202.5 | 2,000 acres |
| Roadside Rest Area Rehabilitation | $ 86.5 | $ 43.3 | $ 129.8 | 10 locations |
| **ROADSIDE PRESERVATION** | **$ 251.3** | **$ 117.0** | **$ 368.3** | |
| Equipment Facilities | $ 7.0 | $ 2.6 | $ 9.6 | 1 facility |
| Maintenance Facilities | $ 76.0 | $ 42.5 | $ 118.5 | 20 facilities |
| Office Buildings | $ 37.5 | $ 5.0 | $ 42.5 | 5 facilities in 10 years |
| Materials Labs and Testing Facilities | $ 2.9 | $ 1.0 | $ 3.9 | 1 facility |
| **FACILITY IMPROVEMENT** | **$ 123.4** | **$ 51.1** | **$ 174.5** | |
| **Support for Development of Project Initiation Documents** | | | **$ 103** | |
| **TOTAL UNESCALATED ANNUAL NEED** | | | **$ 6,914** | |
| **TOTAL ESCALATED NEED** | | | **$7,965** | |

*Note: Numbers may not add due to rounding.*

## FINANCIALLY-CONSTRAINED NEEDS PLAN AND COST ESTIMATE

The Ten-Year Financially-Constrained Needs Plan presents the estimated performance based on the anticipated funding available during the ten-year timeframe for the 2015 SHOPP Plan. This Financially-Constrained Needs Plan sets the framework for the 2016 SHOPP progamming cycle. The SHOPP projects programmed in the next cycle, which are limited and constrained to the amount identified in the next Fund Estimate, establishes the portfolio of SHOPP projects that Caltrans develops and delivers to construction in the next several years.

**Table 2**

**2015 TEN-YEAR FINANCIALLY-CONSTRAINED NEEDS PLAN**

**(Annual Estimates in 2014 Dollars)**

| Category | Annual Cost ($ Millions) | | | Annual Performance Units |
|---|---|---|---|---|
| | Capital | Support | Total | |
| Emergency Damage Repair | $ 75.8 | $ 24.2 | $ 100.0 | TBD locations |
| Permanent Restoration | $ 67.7 | $ 32.3 | $ 100.0 | TBD locations |
| Roadway Protective Betterment | ---- | ---- | $21.0 | 4 locations |
| **MAJOR DAMAGE RESTORATION** | **$ 143.5** | **$ 56.5** | **$ 221.0** | |
| Safety Improvements | $ 148.7 | $ 73.3 | $ 222.0 | 294 fatal and injury collisions reduced |
| Collision Severity Reduction | $ 88.1 | $ 31.9 | $ 120.0 | 204 fatal and injury collisions reduced |
| Roadside Safety Improvements | $ 62.2 | $ 27.8 | $ 90.0 | 1,116 locations |
| **COLLISION REDUCTION** | **$ 299.3** | **$ 132.7** | **$ 432.0** | |
| Relinquishments | ---- | ---- | ---- | TBD centerline miles |
| Railroad At-Grade Crossings | ---- | ---- | ---- | TBD locations |
| Hazardous Waste Mitigation | ---- | ---- | ---- | TBD locations |
| Stormwater | $ 66.8 | $ 23.2 | $ 90.0 | 400 acres treated |
| ADA Curb Ramp | $ 16.0 | $ 20.0 | $ 36.0 | 800 ADA Units |
| ADA Pedestrian Infrastructure | $ 6.0 | $ 8.0 | $ 14.0 | 300 ADA Units |
| **MANDATES** | **$ 88.8** | **$ 51.2** | **$ 140.0** | |
| Operational Improvements | $ 17.1 | $ 6.9 | $ 24.0 | 4,050 DVHD reduced |
| Transportation Management Systems | ---- | ---- | ---- | 0 new elements |
| | $ 57.1 | $ 28.6 | $ 85.7 | 639 replacement |
| Commercial Vehicle Enforcement Facilities and Weigh-in-Motion Systems | ---- | ---- | ---- | none |
| | $ 5.5 | $ 2.0 | $ 7.5 | 3 rehabilitation |
| **MOBILITY IMPROVEMENT** | **$ 79.7** | **$ 37.5** | **$ 117.2** | |
| **MINOR PROGRAM** | **$ 90.0** | **$ 60.0** | **$ 150.0** | **TBD** |

**Table 2 (cont.)**

**2015 TEN-YEAR FINANCIALLY-CONSTRAINED NEEDS PLAN**

**(Annual Estimates in 2014 Dollars)**

| Category | Annual Cost ($ Millions) | | | Annual Performance Units |
|---|---|---|---|---|
| | Capital | Support | Total | |
| Bridge Rehabilitation | $ 129.9 | $ 43.1 | $ 173.0 | 12 bridges |
| Bridge Preventive Program | $ 29.6 | $ 11.5 | $ 41.1 | 166 bridges |
| Bridge Scour Mitigation | $ 10.3 | $ 4.7 | $ 15.0 | 3 bridges |
| Bridge Rail Replacement/Upgrade | $ 20.7 | $ 7.9 | $ 28.6 | 14,446 feet |
| Bridge Seismic Restoration | $ 53.1 | $ 21.9 | $ 75.0 | 27 bridges |
| Permit Requirements for Bridges | $ 6.7 | $ 2.7 | $ 9.4 | 3 bridges |
| **BRIDGE PRESERVATION** | **$ 250.3** | **$ 91.8** | **$ 342.1** | |
| Roadway Rehabilitation (3R) | $ 112.1 | $ 35.9 | $ 148.0 | 112 lane-miles |
| Roadway Rehabilitation (2R) | $ 235.3 | $ 65.9 | $ 301.2 | 294 lane-miles |
| Capital Preventive Maintenance | $ 291.1 | $ 72.8 | $ 363.9 | 855 lane-miles |
| Drainage System Restoration | $ 26.1 | $ 15.6 | $ 41.7 | 227 culverts |
| Signs and Lighting Rehabilitation | $ 7.4 | $ 2.6 | $10.0 | 890 signs |
| **ROADWAY PRESERVATION** | **$ 672.0** | **$ 192.8** | **$ 864.8** | |
| Roadside Protection and Restoration | $ 3.5 | $ 1.5 | $ 5.0 | TBD locations |
| Roadside Rehabilitation | $ 4.5 | $ 2.5 | $ 7.0 | 60 Acres |
| Roadside Rest Area Rehabilitation | $ 7.9 | $ 3.1 | $ 11.0 | 3 locations |
| **ROADSIDE PRESERVATION** | **$ 15.9** | **$ 7.1** | **$ 23.0** | |
| Equipment Facilities | ---- | ---- | $10.0 | 1 facility |
| Maintenance Facilities | ---- | ---- | | |
| Office Buildings | ---- | ---- | | |
| Materials Labs and Testing Facilities | ---- | ---- | | |
| **FACILITY IMPROVEMENT** | **----** | **----** | **$10.0** | |
| **Support for Development of Project Initiation Documents** | | | **$34.8** | |
| **TOTAL UNESCALATED ANNUAL NEED** | | | **$ 2,335** | |

*Note: Numbers may not add due to rounding.*

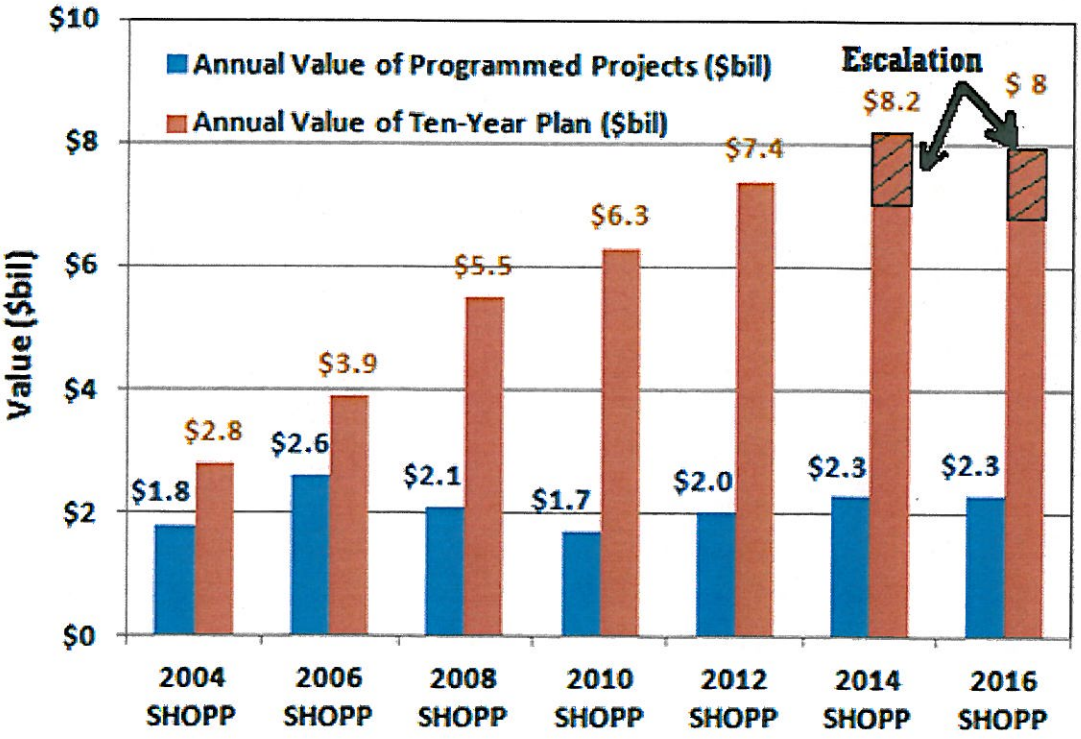
## TRENDS FOR SHOPP FUNDING

During the past five SHOPP programming cycles, the identified needs continued to grow while the available funding remained flat. Figure 3 displays the trend in the annual value of needs defined in prior ten-year plans versus the annual value of SHOPP projects in past programming cycles.

The increasing trend in the value of the ten-year need illustrated in the figure is a function of several factors. Factors include:

- Escalation of construction cost over time reduces the buying power of available funding and leads to higher costs in the future to accomplish the same work.
- Deferment due to lack of funding reduces the service life of infrastructure and leads to more costly rehabiliations and reconstruction costs when utimately undertaken
- Acceleration of the rehabilitation needs are a result of the advanced age of the state highway system, 80 percent of our roadways (40,000 lane-miles) were constructed about 40-50 years ago.

**Figure 3. Comparison of Needs vs. Programmed SHOPP ($ Billions)**



The functional life of the SHS is greatly affected by the ability to perform timely restoration work. The consequence of deferring necessary rehabilitation and restoration is a degraded system condition. This deferment results in lower operational performance and higher user operating costs (additional vehicle repair costs, increased fuel consumption, increased tire wear, and accelerated vehicle depreciation).

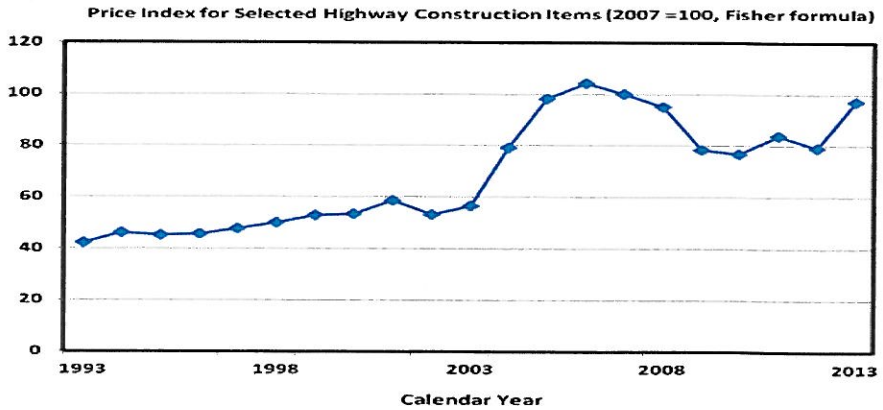
As funding for the SHOPP is insufficient to address the rehabilitation and reconstruction needs on the highway system, local fund sources will play a larger role in the future in meeting these needs. For example, when a non-SHOPP eligible capacity increasing project, such as a new interchange, is implemented with local fund sources, the rehabilitation of the adjacent pavement and bridge decks within the limits of the project may also become part of the scope of work funded by local sources.

Equally important when implementing new infastructure on the state highway system is accounting for the cost of maintenance over the life-cycle of the new improvements. Local fund will also be instrumental in this area.

In addition, there are also situations where a mutual benefit exists at both the state and local level to fund SHOPP-type pavement and bridge improvements. Implementing much needed rehabilation and reconstruction projects is easier when both state and local partners financially participate in the solution.

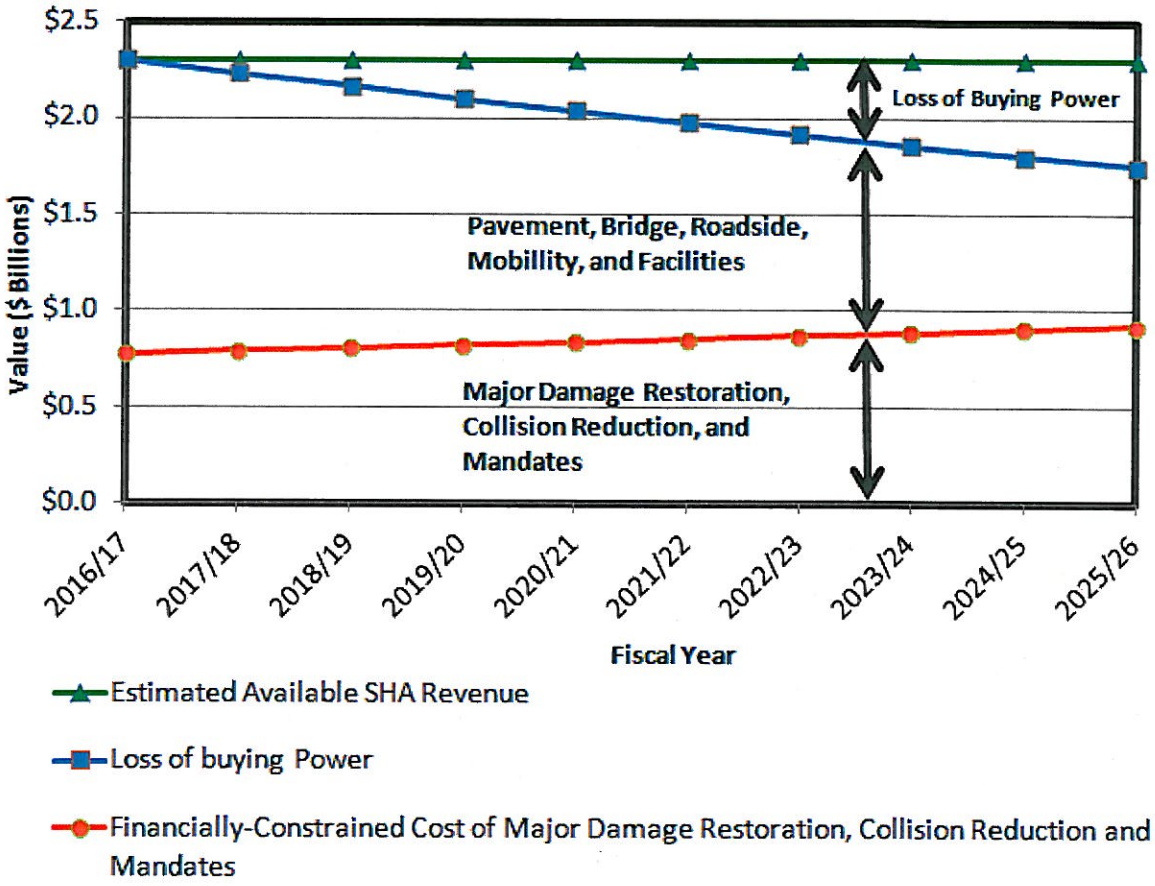
Furthermore, increasing construction costs reduce buying power of the limited SHOPP funding. The Highway Construction Cost Index for the two decades from 1993 to 2013 is shown on the chart in Figure 4. This index is a measure of the cost of key materials needed for highway and bridge construction over time. Highway construction costs increased at predictable rate in the decade between 1993 and 2003. From 2003 to 2007, construction costs escalated at rapid and unforeseen rates. Although costs have recently declined from peak levels in 2006 and 2007, they still are significantly above levels experienced in 2003. Escalating construction costs reduce buying power and further limit the ability of the SHOPP to effectively maintain and preserve the investment in the SHS.

**Figure 4. Highway Construction Cost Index**



In the ten-year horizon, the available SHA funding for the SHOPP is not expected to grow. With the passage of time, the buying power of the available funding will decline as a result of cost escalation. The result of this condition is that a larger percentage of available funding will be directed to meet major damage restoration, collision reduction, and regulatory mandates, leaving an ever declining value available for pavement, bridge, mobility, roadside, facility, and minor program needs. This condition is illustrated in Figure 5.

**Figure 5. Impact of Cost Escalation on the SHOPP**



## CONSEQUENCES OF CONSTRAINED FUNDING

Following is a description of the consequences of the funding limitation on each category of the SHOPP.

**Major Damage Restoration.** Need $353 million a year; $221 million a year available.

This funding is used to respond to emergencies and other sudden, unforeseen infrastructure needs. The need is based on average expenditures over the last ten years (excluding major disasters, which are assumed to qualify for federal aid).

The following are major consequences of the funding shortfall:

- Delays to construction of programmed projects in other SHOPP categories if additional emergency response funding is needed.
- Increases in the need for emergency repairs as SHOPP funding decreases.

**Collision Reduction.** Need $432 million a year; $432 million a year available.

Collision reduction programs are intended to reduce the numbers and severity of collisions that occur on the SHS. The safety improvement projects are selected based on collision history and a cost-benefit analysis that compares the associated savings of reduced collisions with the project cost. Typical projects include signal installation, curve improvements, median barrier installation, run-off-road-type collision reduction, traffic safety device installation within the clear recovery zone, wet pavement improvements, and worker safety improvements.

**Legal and Regulatory Mandates.** Need $334 million a year; $140 million a year available.

The mandates programs comply with various State and federal court orders, laws, and regulations for stormwater, hazardous waste, ADA compliance, and relinquishment of redundant SHS segments to local agencies. When regulatory requirements exceed available funding, the Department delays funding to lower priority projects to direct funds to respond to mandated requirements.

**Mobility Improvements.** Need $506 million a year; $117 million a year available.

The mobility improvement programs reduce congestion on the SHS by constructing auxiliary lanes, widening shoulders, and building commercial vehicle enforcement facilities and weigh-in-motion systems. These programs also enhance the existing transportation system by providing traveler information and managing traffic flow through real time traffic analysis, signalization projects, ramp metering, changeable message signs, highway advisory radio, and detection stations.

The following are major consequences of the funding shortfall:

- Increases in the total recurrent and nonrecurrent daily vehicle hours of delay (DVHD) from an estimated 712,300 DVHD in 2009 to an estimated 880,300 DVHD by 2019.
- The inability to maintain existing transporation system management elements risks serious declines in Caltrans ability to effectively monitor, and manage to reduce existing, and future traffic congestion.
- The inability of Caltrans to meet Federal requirements for highway travel data reporting due to failures of traffic data collection and monitoring equipment. (State apportionments are based travel data)
- Delays in construction of weigh-in-motion systems, negatively affecting the federal requirement to report annual weigh-in-motion information. (The penalty for failure to comply could result in a reduction of federal-aid highway funds apportioned to California by 10 percent for the fiscal year of the infraction)
- Closes commercial vehicle enforcement facilities (CVEF) as a result of mold damage, leaking roofs, inoperable heating systems, and failed septic systems, which will adversely affect workplace conditions for California Highway Patrol personnel.
- Unconstructed, closed or underfunctioning CVEF exposes travelers to drivers and trucks that do not meet licensing or inspection standards and pose potential hazards. In addition the SHS is at heightened risk for severe pavement degradation due to the inability to intercept trucks that exceed maximum weight standards.

Although only a small percentage of the mobility needs can be funded, other funding opportunities exist for these projects outside the SHOPP. The majority of mobility needs originate in high-density population centers and result from land-use planning decisions. Opportunities include local and measure funding in addition to the State Transportation Improvement Program (STIP). As stated in Section 13 of the adopted 2014 STIP Guidelines, these types of projects may be nominated for inclusion in the STIP if timely implementation through the SHOPP is not possible.

**Minor Program.** Need $150 million a year; $150 million a year available.

The minor program funding is used to respond to low-cost SHOPP needs in all areas. The minor program is an annual allocation for projects with construction contract values under $1 million.

**Bridge Preservation.** Need $1,894 million a year; $342 million a year available.

The bridge program helps preserve the 13,075 State highway bridges. The available funding in the SHOPP is insufficient to address the deterioration of the bridge inventory caused by structural aging and the effects of increasing traffic or to address seismic and scour vulnerability.

Major consequence of the funding shortfall will result in bridge rehabilitation or replacement needs increase from 893 bridges to 1,153 bridges (8.9 percent) over the ten-year period.

**Roadway Preservation.** Need $2,599 million a year; $865 million a year available.

The roadway programs preserve the 49,718 lane miles of State highways and 205,000 drainage culverts.

The following are major consequences of the funding shortfall:

- Sixteen percent of pavement on the SHS has deteriorated to the point where it needs to be reconstructed to get it back into acceptable condition.
- Increased cost to the traveling motorist. Motorists pay twice for poor pavement conditions, first for the additional vehicle maintenance and operating costs resulting from driving on pavement in poor condition and a second time for the higher costs to reconstruct highly degraded pavement.
- Increased risk of highway closures caused by culvert collapse.

**Roadside Preservation.** Need $368 million a year; $23 million a year available.

The roadside programs address worker and motorist safety, environmental commitments, and mandates for roadsides, highway planting, and roadside safety rest areas. Roadside SHOPP programs were significantly changed in 2013 to focus primarily on worker safety issues. It is not an aesthetics improvement program. Caltrans will not be able to address commitments to roadside safety and stewardship because of the funding shortfall.

The following are major consequences of the funding shortfall:

- Increases the number and duration of maintenance tasks on 19,000 acres of highway planting, resulting in increased worker exposure to traffic and increased risk of fatal and injury collision.
- Increases exposure to regulatory agency compliance fines and third-party lawsuits.
- Increases highway life-cycle and recurring maintenance costs caused by delays in the relinquishment of environmental mitigation sites to resource agencies.
- Delays the reduction of fatal and injury collisions caused by drowsy and distracted driving by not providing 5,000 car and long-vehicle parking spaces to the Safety Roadside Rest Area System.
- Increases the potential for roadside fires that may spread to adjacent wildlands and urban areas.
- Reduces Caltrans' ability to implement roadside design strategies to comply with the 2000 chemical reduction Environmental Impact Report.

**Facility Improvements.** Need $175 million a year; $10 million a year available.

The facility improvement programs preserve the 440 buildings that support the operations and maintenance of the SHS.

The following are major consequences of the funding shortfall:

- Increases the possibility of litigation and public agency citations for code violations in office buildings, materials laboratories and testing facilities, equipment shops, and maintenance facilities.

- Increases response times during winter operations because of delayed repairs to salt and sand storage facilities.

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# III. OTHER REQUIREMENTS

## STRATEGIES TO CONTROL COST AND IMPROVE EFFICIENCY

On August 1, 2014, the Department released revised project change management guidance to project delivery team. As a result of this new guidance, the Capital Outlay Support (COS) Program shall have consistent project cost control rules for State Transportation Improvement Program (STIP) and State Highway Operation and Protection Program (SHOPP) project support budgets.

The three primary goals of the policy are:

- The final cost of any component should be more than 80 percent and less than 120 percent of the approved component budget.
- The preliminary engineering, design, and right of way support component budgets shall be reviewed and updated prior to the programmed delivery year, prior to completion of the component, and before expenditures exceed 100 percent of the approved budget.
- The programmed construction support budget shall be reviewed and updated prior to California Transportation Commission approval of the construction capital allocation.

## SENATE BILL 486

In September 2014, Senate Bill 486 was approved by the Governor. Specific to the SHOPP, the bill requires Caltrans, in consultation with the Commission to:

- Prepare an asset management plan to guide development of the State Highway Operation and Protection Program (SHOPP) and requires Commission to adopt related targets and performance measures that reflect state policy goals and objectives. Vests with the Commission the authority to review and approve the final asset management plan.
- Provide specific project information in the SHOPP, including the capital and support budget for each project and the projected delivery date by project component.
- Report quarterly on the support budget and expenditures on major SHOPP projects.

The Department is currently developing processes and procedures in response to the recent legislative changes.

## STATE SMART TRANSPORTATION INITIATIVE

As a result of recommendations made in the January 2014, State Smart Transportation Initiative (SSTI) report, Caltrans is actively developing project programming criteria to update SHOPP project selection methodologies. The updated methodologies will incorporate several criteria, tied Caltrans new mission and vision, in order to optimize the use of the limited funds available for SHOPP projects. Caltrans is projecting completion of the updated project decision methodologies in spring of 2015. The decision framework will also recognize the need and priority of mandated projects, such as traffic safety and emergency restoration.

## RELATIONSHIP TO OTHER INITIATIVES

**2015 Five-Year Maintenance Plan.** Streets and Highways Code section 164.6 also requires Caltrans to prepare a five-year maintenance plan that addresses the maintenance needs of the SHS. Together, the 2015 Ten-Year SHOPP Plan and the 2015 Five-Year Maintenance Plan attempt to balance resources between SHOPP and maintenance activities in order to achieve identified milestones and goals at the lowest possible long-term total cost.

The Maintenance Plan prevents the deterioration and extends the life of the roadway, bridge, and drainage infrastructure that is in fair or good condition. The average cost for a SHOPP roadway rehabilitation project to treat one lane mile of pavement damage is $364,000 while the average cost for preventive maintenance is $98,000 a lane mile. Thus, preventive maintenance results in a benefit ratio of about 4:1. Similarly, the benefit ratio for structures is 12:1 ($720,000 for rehabilitation versus $60,000 for preventive maintenance), and 4:1 for drainage ($184,000 for rehabilitation versus $50,000 for preventive maintenance). Preventive costs are a combination of State forces and contract work.

Investing in preventive maintenance while the asset is in good to fair condition extends the service life and pushes out the need for future SHOPP rehabilitation. Table 3 summarizes the benefit ratios for preventive maintenance of roadway, structural, and drainage elements of the SHS.

**Table 3**

**COMPARISON OF PREVENTIVE MAINTENANCE VERSUS REHABILITATION COSTS***

| | Cost of Rehabilitation | Cost of Preventive Maintenance | Unit of Measure | Benefit Ratio |
|---|---|---|---|---|
| Roadway | $ 364,000 | $ 98,000 | Lane-mile | 4:1 |
| Structural | $ 720,000 | $ 60,000 | Bridge | 12:1 |
| Drainage | $ 184,000 | $ 50,000 | Culvert | 4:1 |

* Costs reported above are capital construction costs only.

# IV. CONCLUSION

As the roadways, bridges and ancillary infrastructure on the SHS age and near the end of their service lives, the demands of vehicle and truck traffic is accelerating the deterioration of these assets. Compounding this deterioration is the deferment, due to lack of funding, of necessary rehabilitation and restoration work to restore the transportation infrastructure to good operating conditions. The increased demands and deferred rehabilitation and restoration result in lower operational performance, higher user operating costs (additional vehicle repair costs, increased fuel consumption, increased tire wear, and accelerated vehicle depreciation), and ultimately require a higher overall investment when needed repairs to the system are eventually undertaken. Deferred funding for infrastructure such as signs, lighting, drainage, planting, mandate compliance and maintenance and office buildings over the past ten years has resulted in increased worker exposure to traffic due to the need for more frequent maintenance and preventable expenditures for Director's Orders. In addition, the ever-increasing cost of meeting legal, statutory, and regulatory mandates is a significant contributor to the ten-year needs.

The total ten-year goal-constrained escalated need for the rehabilitation and operation of the SHS for the period from fiscal year 2015–16 through 2024–25 is $80 billion. This equates to an average annual cost of $8 billion per year. This is the unescalated cost estimate for capital construction, right-of-way acquisition, and project development and construction engineering support. The goal-constrained needs do not address all the needs on the SHS.

Projected SHA funding available for the SHOPP is $2.3 billion a year, which is approximately a third of the estimated goal-constrained need. Because funding is insufficient to preserve and maintain the existing transportation infrastructure, Caltrans will continue to focus available resources on the most critical categories of projects in the SHOPP (emergency, safety, bridge, and pavement preservation). Even with this strategy, the percentage of lane miles of highway pavement in a distressed condition, which is pavement with significant rutting, cracking, potholes, or other signs of deterioration, is projected to increase during the next ten years. In addition, few maintenance facility, safety roadside rest area, highway planting, and mobility improvements will be made. In the absence of new revenue sources, the condition of the SHS will continue to deteriorate.

Looking forward, Caltrans is transitioning to managing the SHOPP as part of an overall robust asset management plan. As a piece of this implementation, Caltrans is actively developing project selection and decision methodologies to update SHOPP project selection. The updated methodologies will incorporate several criteria, tied to Caltrans new mission and vision, in order to optimize the use of the limited funds available for SHOPP projects. Caltrans is projecting completion of the updated project decision methodologies in spring of 2015. The decision framework will also recognize the need and priority of mandated projects, such as traffic safety and emergency restoration. The overall asset management plan is scheduled to complete in mid 2016 and due to the planning effort involved in project selection will be fully implemented into the 2020 SHOPP. Prior to the 2020 SHOPP, Caltrans will be using the methodology above to validate and refine project selections. Caltrans will be working with the California Transportation Commission as part of this implementation as required by the passage of SB 486. In addition, this methodology is also one-step in mitigating the impacts of limited resources and

a part of implementing recommendations made in the January 2014, State Smart Transportation Initiative (SSTI) report.

In summary, the SHOPP funds $2.3 billion of the $8 billion dollar need and Caltrans is in the process of transitioning to new methodologies for managing the SHOPP.

# APPENDIX A
# GOVERNMENT CODE SECTION 14526.5

(a) Based on the asset management plan prepared and approved pursuant to Section 14526.4, the department shall prepare a state highway operation and protection program for the expenditure of transportation funds for major capital improvements that are necessary to preserve and protect the state highway system. Projects included in the program shall be limited to capital improvements relative to maintenance, safety, and rehabilitation of state highways and bridges that do not add a new traffic lane to the system.

(b) The program shall include projects that are expected to be advertised prior to July 1 of the year following submission of the program, but which have not yet been funded. The program shall include those projects for which construction is to begin within four fiscal years, starting July 1 of the year following the year the program is submitted.

(c) The department, at a minimum, shall specify, for each project in the state highway operation and protection program, the capital and support budget, as well as a projected delivery date, for each of the following project components:

(1) Completion of project approval and environmental documents.

(2) Preparation of plans, specifications, and estimates.

(3) Acquisition of rights-of-way, including, but not limited to, support activities.

(4) Construction.

(d) The program shall be submitted to the commission not later than January 31 of each even-numbered year. Prior to submitting the plan, the department shall make a draft of its proposed program available to transportation planning agencies for review and comment and shall include the comments in its submittal to the commission.

(e) The commission may review the program relative to its overall adequacy, consistency with the asset management plan prepared and approved pursuant to Section 14526.4 and funding priorities established in Section 167 of the Streets and Highways Code, the level of annual funding needed to implement the program, and the impact of those expenditures on the state transportation improvement program. The commission shall adopt the program and submit it to the Legislature and the Governor not later than April 1 of each even-numbered year. The commission may decline to adopt the program if the commission determines that the program is not sufficiently consistent with the asset management plan prepared and approved pursuant to Section 14526.4.

(f) Expenditures for these projects shall not be subject to Sections 188 and 188.8 of the Streets and Highways Code.

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# APPENDIX B
# STREETS AND HIGHWAYS CODE SECTION 164.6

(a) The department shall prepare a ten-year state rehabilitation plan for the rehabilitation and reconstruction, or the combination thereof, by the State Highway Operation and Protection Program, of all state highways and bridges owned by the state. The plan shall identify all rehabilitation needs for the ten-year period beginning on July 1, 1998, and ending on June 30, 2008, and shall include a schedule of improvements to complete all needed rehabilitation during the life of the plan not later than June 30, 2008. The plan shall be updated every two years beginning in 2000. The plan shall include specific milestones and quantifiable accomplishments, such as miles of highways to be repaved and number of bridges to be retrofitted. The plan shall contain strategies to control cost and improve the efficiency of the program, and include a cost estimate for at least the first five years of the program.

(b) The department shall prepare a five-year maintenance plan that addresses the maintenance needs of the state highway system. The plan shall be updated every two years, concurrent with the rehabilitation plan described in subdivision (a). The maintenance plan shall include only maintenance activities that, if the activities were not performed, could result in increased State Highway Operation and Protection Program costs in the future. These activities may include roadway, structural, and drainage maintenance. The maintenance plan shall identify any existing backlog in these maintenance activities and shall recommend a strategy, specific activities, and an associated funding level to reduce or prevent any backlog during the plan's five-year period. The maintenance plan shall include specific goals and quantifiable accomplishments, such as lane-miles of highway to be repaved and the number of bridge decks to be sealed. The maintenance plan shall contain strategies to control cost and improve the efficiency of these maintenance activities, and include a cost estimate for the five years of the plan.

(c) The rehabilitation plan and the maintenance plan shall attempt to balance resources between State Highway Operation and Protection Program activities and maintenance activities in order to achieve identified milestones and goals at the lowest possible long-term total cost. If the maintenance plan recommends increases in maintenance spending, it shall identify projected future State Highway Operation and Protection Program costs that would be avoided by increasing maintenance spending. The department's maintenance division shall develop a budget model that allows it to achieve the requirements of this subdivision.

(d) The rehabilitation plan shall be submitted to the commission for review and comments not later than January 31 of each odd-numbered year, and shall be transmitted to the Governor and the Legislature not later than May 1 of each odd-numbered year. The maintenance plan shall be transmitted to the Governor, the Legislature, and the commission not later than January 31 of each odd-numbered year.

(e) The rehabilitation plan and the maintenance plan shall be the basis for the department's budget request and for the adoption of fund estimates pursuant to Section 163.

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# APPENDIX C

**Senate Bill No. 486**

CHAPTER 917

An act to amend Sections 14526 and 14526.5 of, to add Sections 14524.3, 14524.4, 14526.4, and 14526.6 to, and to repeal Section 14009 of, the Government Code, relating to transportation.

[ Approved by Governor September 30, 2014. Filed with Secretary of State September 30, 2014. ]

## SECTION 1.

The Legislature finds and declares all of the following:

(a) The state recently contracted with the State Smart Transportation Initiative (SSTI) to conduct an external assessment of the Department of Transportation and provide recommendations for improving the department's performance.

(b) The SSTI assessment called for reforms to modernize the department's mission, strengthen its performance, and help align the department with the state's policy goals.

(c) The regional transportation planning process is an inclusive, exhaustive process that moves from a longer-term vision, represented by the regional transportation plan, to a short-term list of specific projects in the regional transportation improvement program, which implements the long-term vision.

(d) The regional transportation planning process begins with the California Transportation Commission offering guidance and prescribing study areas for analysis and evaluation by the regional agencies, as well as providing guidelines for the preparation of the regional transportation plans.

(e) At the state level, the California Transportation Plan (state plan) is intended to guide long-term, inclusive planning for state transportation systems. The commission should provide guidance for the development of the state plan just as it does for regional transportation plans.

(f) An intensive effort is currently underway by the department to develop the next state plan by December 2015. Asking the commission to provide guidance now would be disruptive to that effort. However, the commission's guidance on the interregional transportation strategic plan (interregional plan), which is one of the elements of the state plan, would be helpful in the interim until development of the next state plan, when the commission's guidance should directly inform the development of the state plan.

(g) The interregional plan, updated based on the commission's guidance to reflect current state statutes, policies, goals, and objectives, can appropriately provide information regarding the

department's investments in the interregional transportation improvement program so that this program is more closely aligned with those state statutes, policies, goals, and objectives.

(h) Developing a process for the department to follow in development of the state's interregional and highway maintenance and operations programs similar to the regional transportation planning process can create a framework for the department to begin to address the flaws identified in the SSTI assessment such that the department can once again be aligned with the state's policy goals.

**SEC. 2.**

Section 14009 of the Government Code is repealed.

**SEC. 3.**

Section 14524.3 is added to the Government Code, to read:

***14524.3.***

Commencing with the update to the California Transportation Plan that is required on or before December 31, 2020, the commission may, in cooperation with the department, prescribe study areas for analysis and evaluation by the department and may establish guidelines for the preparation of the updates to the California Transportation Plan prepared pursuant to Section 65071.

**SEC. 4.**

Section 14524.4 is added to the Government Code, to read:

***14524.4.***

(a) On or before June 30, 2015, the department shall submit to the commission for approval an interregional transportation strategic plan directed at achieving a high functioning and balanced interregional transportation system. The plan shall be action oriented and pragmatic, considering both the short-term and long-term future, and shall present clear, concise policy guidance to the department for managing the state's transportation system.

(b) The interregional transportation strategic plan shall be consistent with the California Transportation Plan as updated pursuant to Section 65071.

**SEC. 5.**

Section 14526 of the Government Code is amended to read:

***14526.***

(a) Not later than October 15 of each odd-numbered year, based on the guidelines established pursuant to Section 14530.1, and after consulting with the transportation planning agencies, county transportation commissions, and transportation authorities, the department shall submit to the commission the draft five-year interregional transportation improvement program consisting of all of the following:

(1) Projects to improve state highways, pursuant to subdivision (b) of Section 164 of the Streets and Highways Code.

(2) Projects to improve the intercity passenger rail system.

(3) Projects to improve interregional movement of people, vehicles, and goods.

(b) Projects included in the interregional transportation improvement program shall be consistent with the state interregional transportation strategic plan prepared pursuant to Section 14524.4.
(c) Projects may not be included in the draft interregional transportation improvement program without a project study report or major investment study.
(d) Major projects shall include current costs updated as of November 1 of the year of submittal and escalated to the appropriate year, and shall be consistent with, and provide the information required in, subdivision (b) of Section 14529.
(e) Projects included in the draft interregional transportation improvement program shall be consistent with the adopted regional transportation plan.
(f) On or before November 15 of each odd-numbered year, the commission shall hold at least one hearing in northern California and one hearing in southern California to attempt to reconcile any objections by any member of the public or other stakeholder to the draft interregional transportation improvement program.
(g) The department shall consider the input received at the hearings conducted pursuant to subdivision (f) and shall develop a final interregional transportation improvement program. The final interregional transportation improvement program shall include a summary of the major comments received at the hearings and responses to those comments, and shall be submitted to the commission for approval not later than December 15 of each odd-numbered year.
(h) The commission shall, when approving the final interregional transportation improvement program pursuant to subdivision (g), evaluate the extent to which the program is consistent with funding priorities established in Section 167 of the Streets and Highways Code.

**SEC. 6.**

Section 14526.4 is added to the Government Code, to read:

***14526.4.***

(a) The department, in consultation with the commission, shall prepare a robust asset management plan to guide selection of projects for the state highway operation and protection program required by Section 14526.5. The asset management plan shall be consistent with any applicable state and federal requirements.
(b) The department may prepare the asset management plan in phases, with the first phase to be implemented with the 2016 state highway operation and protection program, and the complete asset management plan to be prepared no later than the 2020 state highway operation and protection program.
(c) In connection with the asset management plan, the commission shall do both of the following:
(1) Adopt targets and performance measures reflecting state transportation goals and objectives.
(2) Review and approve the asset management plan, including the final version of the first phase and the complete plan prepared by the department pursuant to subdivision (b).

(d) As used in this section, "asset management plan" means a document assessing the health and condition of the state highway system with which the department is able to determine the most effective way to apply the state's limited resources.

**SEC. 7.**

Section 14526.5 of the Government Code is amended to read:

***14526.5.***

(a) Based on the asset management plan prepared and approved pursuant to Section 14526.4, the department shall prepare a state highway operation and protection program for the expenditure of transportation funds for major capital improvements that are necessary to preserve and protect the state highway system. Projects included in the program shall be limited to capital improvements relative to maintenance, safety, and rehabilitation of state highways and bridges that do not add a new traffic lane to the system.

(b) The program shall include projects that are expected to be advertised prior to July 1 of the year following submission of the program, but which have not yet been funded. The program shall include those projects for which construction is to begin within four fiscal years, starting July 1 of the year following the year the program is submitted.

(c) The department, at a minimum, shall specify, for each project in the state highway operation and protection program, the capital and support budget, as well as a projected delivery date, for each of the following project components:

(1) Completion of project approval and environmental documents.

(2) Preparation of plans, specifications, and estimates.

(3) Acquisition of rights-of-way, including, but not limited to, support activities.

(4) Construction.

(d) The program shall be submitted to the commission not later than January 31 of each even-numbered year. Prior to submitting the plan, the department shall make a draft of its proposed program available to transportation planning agencies for review and comment and shall include the comments in its submittal to the commission.

(e) The commission may review the program relative to its overall adequacy, consistency with the asset management plan prepared and approved pursuant to Section 14526.4 and funding priorities established in Section 167 of the Streets and Highways Code, the level of annual funding needed to implement the program, and the impact of those expenditures on the state transportation improvement program. The commission shall adopt the program and submit it to the Legislature and the Governor not later than April 1 of each even-numbered year. The commission may decline to adopt the program if the commission determines that the program is not sufficiently consistent with the asset management plan prepared and approved pursuant to Section 14526.4.

(f) Expenditures for these projects shall not be subject to Sections 188 and 188.8 of the Streets and Highways Code.

## SEC. 8.

Section 14526.6 is added to the Government Code, to read:

***14526.6.***

(a) The department shall report to the commission quarterly, for projects which complete construction in the previous quarter, on the information outlined in subdivision (b) for all major state highway operation and protection program projects, as defined by the commission pursuant to subdivision (f) of Section 167 of the Streets and Highways Code.

(b) The department shall report to the commission on the approved capital and support budgets compared to expenditures at contract construction acceptance for all projects included in subdivision (a).

(c) The department shall develop, in consultation with the commission, a plain language performance report to increase transparency and accountability of the state highway operation and protection program.

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# APPENDIX D
# DESCRIPTION OF THE ELEMENTS IN EACH SHOPP CATEGORY

## MAJOR DAMAGE RESTORATION CATEGORY

The major damage restoration category has three elements: emergency opening, permanent restoration, and roadway protective betterments.

**Emergency Opening.** The primary purpose of this element is to reopen facilities damaged by and protect facilities imminently threatened by natural disasters, catastrophes, or events, such as storms, floods, fires, earthquakes, tsunamis (tidal waves), or volcanic action. Responses to human-caused disasters, such as large-scale civil unrest, explosions, and acts of war or terrorism, are also included.

Typical improvements include:

- Emergency road openings to temporary or permanent levels of traffic.
- Debris removal and demolition.
- Construction or operation of detours.
- Earthwork, blasting, or replacement of rock to protect facilities from additional damage or to remove an imminent threat.
- Repair or replacement of drainage facilities needed to forestall immediate threat of additional washout or erosion and replacement of traffic safety devices (guardrails, signals, etc.) lost as a result of catastrophic damage.

It is expected that emergency opening projects will restore the roadway to essential traffic within 180 days of the damage incident.

Typically, emergency opening projects are allocated under Commission Resolution G–00–11, authorizing Caltrans to allocate funds for emergency projects.

**Permanent Restoration.** The primary purpose of this element is to restore facilities to their predamage condition after the emergency opening phase is complete. To be considered as permanent restoration, the project must be tied to an identifiable event.

Typical improvements include:

- Final grading and earthwork.
- Full restoration of roadway and all appurtenances to predamage condition.
- Construction of permanent geotechnical, structural, and drainage fixtures.
- New alignments when the existing damaged alignment is no longer feasible.

It is expected permanent restoration projects will achieve construction completion within three years of the damaging incident.

**Roadway Protective Betterments.** The primary purpose of this element is to protect facilities from anticipated future catastrophic damage from natural events (storms, floods, landslides, etc.) or human-caused events.

Typical improvements include:

- Rock slope protection.
- Rock fall prevention (rock nets, etc.).
- Stabilization trenches.
- Slope corrections.
- Pumps and pumping stations at depressed sections.
- Retaining walls and soil nailing.
- Security improvements (capital improvements only).

## COLLISION REDUCTION CATEGORY

The collision reduction category has three elements: safety improvements, collision severity reduction, and roadside safety improvements.

**Safety Improvements.** The primary purpose of this element is to reduce the number or severity of collisions on the existing SHS. Project identification is based on the calculation of a Safety Index (SI).

Projects may be spot locations where collision history indicates a pattern susceptible to correction by a safety improvement.

Typical improvements include:

- Traffic signals (school zone signals included).
- Wet pavement corrections.
- Curve corrections.
- Shoulder widening.
- Left turn channelization.

This element also includes projects that meet the warrant for study program criteria and, following an analysis, that have been determined to improve safety by the installation of median barrier, soft barrier, or other safety improvement to address cross-median- or crossover-type collisions.

**Collision Severity Reduction.** The primary purpose of this element is to upgrade existing highway safety features within the clear recovery area of the roadbed that will lead to reduced collisions and severity of collisions.

Typical improvements include:

- Installation of new guardrail end treatments and crash cushions.
- Installation of rumble strips, glare screen, rock fall mitigation, and overcrossing pedestrian fencing.
- Clean Up the Roadside Environment (CURE) projects. CURE project goals are to remove, relocate, make breakaway, or shield objects within the clear recovery zone.
- Crosswalk safety enhancements.

The intent of this element is the proactive in enhancement of safety on the SHS. As such, this element is not subject to an SI analysis. Projects are prioritized based on the projected collision severity reduction benefits.

**Roadside Safety Improvements.** The primary purpose of this element is to reduce the frequency and duration of highway workers' exposure to traffic by providing features to reduce recurrent maintenance activities, provide safe access, and maintain traveler safety benefits provided by the SRRA System by preventing closures due to drinking and waste water quality noncompliance.

Typical improvements include:

- Relocating and clustering existing facilities to safe work locations.
- Minor pavement for areas beyond the gore, slopes adjacent to bridge structures, low-visibility areas, road edge, and narrow areas.
- Vegetation control treatment under guardrail and around sign posts, or providing low fuel alternative vegetation.
- Inert materials for slopes and low-visibility areas.
- Access gates, staircases, trails for light-duty vehicles, and maintenance vehicle pullouts.
- Upgrading safety railing, and spot location barriers and end treatments.
- Upgrading chain control areas.
- Upgrading drinking and waste water systems to comply with water quality mandates.

## LEGAL AND REGULATORY MANDATES CATEGORY

The legal and regulatory mandates category has four elements: relinquishments, stormwater mitigation, ADA curb ramps, and ADA pedestrian infrastructure.

**Relinquishments.** The primary purpose of this element is to provide funding for Legislative relinquishments of State highways to local agencies, relinquishments considered to be in the best interest of the State.

**Stormwater Mitigation.** The primary purpose of this element is to ensure that Caltrans' stormwater discharges to California and federal waters meet applicable water quality standards, construct control measures to achieve compliance units annually to meet the current National Pollutant Discharge Elimination System Permit (NPDES) requirements and other legal requirements.

**ADA Curb Ramps.** The primary purpose of this element is to construct curb ramps at existing crosswalks and other defined pedestrian pathways to make the path of travel accessible. It should be noted that Caltrans' actions to upgrade facilities consistent with ADA regulations are not limited to this funding category. Compliance with ADA regulations is incorporated into Caltrans' design standards.

**Hazardous Waste Mitigation.** The primary purpose of this element is to ensure that contaminated Caltrans facilities and other contaminated properties within SHS rights-of-way are mitigated to achieve compliance with federal and state regulatory requirements and enforcement orders. Activities include the removal and retrofit of Maintenance Station underground storage tanks, and the construction of contaminant removal, treatment and monitoring systems at contaminated sites.

**ADA Pedestrian Infrastructure.** The primary purpose of this element is to provide improvements to existing pedestrian infrastructure to make the path of travel accessible and comply with ADA regulations on all Caltrans-owned highways. Pedestrian infrastructure includes sidewalks, crosswalks, pedestrian bridges and tunnels, and pedestrian/traffic signals that facilitate the movement of pedestrians. This infrastructure also includes pedestrian pathways to Caltrans-owned facilities, such as vista points , safety roadside rest areas and park-and-ride lots.

## MOBILITY IMPROVEMENT CATEGORY

The mobility improvement category has three elements: operational improvements, transportation management systems, and commercial vehicle enforcement facilities and weigh-in-motion systems.

**Operational Improvements.** The primary purpose of this element is to improve traffic flow on existing State highways by reducing congestion and operational deficiencies at spot locations. As stated in section 13 of the adopted 2014 State Transportation Improvement Program (STIP) Guidelines, State highway operational improvements that do not expand the design capacity of the transportation system and are intended to address spot congestion are eligible for the SHOPP.

Typical improvements include:

- Interchange modifications (but not to accommodate traffic volumes that are significantly larger than for what the existing facilities were designed).
- Ramp modifications (acceleration-deceleration/weaving).
- Auxiliary lanes for merging or weaving between adjacent interchanges.
- Curve corrections and alignment improvement.
- Signals and intersection improvements.
- Two-way left-turn lanes.
- Channelization.
- Turnouts.
- Shoulder widening.

**Transportation Management Systems.** The primary purpose of this element is to improve traffic flow on existing State highways by addressing system-wide recurrent and nonrecurrent congestion through system management techniques.

Transportation management systems facilitate the real-time management of the SHS by providing vehicle collision and incident detection, verification, response, and clearance. These systems provide SHS status information to travelers.

Typical improvements include:

- Traffic detection.
- Changeable message signs.
- Closed-circuit television cameras.
- Ramp meters.
- Communications systems and highway advisory radio.
- Traffic signal interconnect projects.
- Traffic Management Centers, including necessary computer software and hardware.

**Commercial Vehicle Enforcement Facilities and Weigh-in-Motion Systems.** The primary purpose of this element is to provide for commercial vehicle enforcement facilities (commonly called weigh stations) and weigh-in-motion systems.

The weigh stations are needed to support the Commercial Vehicle Enforcement Plan. Truck safety, size, and weight regulations are enforced by the California Highway Patrol, reducing truck-related collisions or incidents and protecting State highways from premature damage.

The weigh-in-motion systems provide data for federally required data systems and special studies, design and maintenance strategies, size and weight policies, enforcement and planning strategies, and traffic and truck volume publications.

## BRIDGE PRESERVATION CATEGORY

The bridge preservation category has six elements: bridge rehabilitation, bridge preventive program, bridge scour mitigation, bridge rail replacement and upgrade, bridge seismic restoration, and transportation permit requirements for bridges.

**Bridge Rehabilitation.** The primary purpose of this element is to restore or replace structures when, due to deterioration or other causes, they become inadequate. Emphasis is placed on bridges with the most urgent needs and the highest cost-benefit ratios.

Included is work to meet standards as required under ADA and Cal/OSHA regulations and work required to restore or replace appurtenances attached to structures for use in maintenance, such as inspection walkways, movable scaffolds, and air and water service lines.

Major transportation structures include bridges, tunnels, tubes, drainage pumping plants, marine fenders, ferryboats, and the mechanical and electrical machinery associated therewith.

It is recognized that when bridges are replaced or rehabilitated it is sometimes appropriate to make some geometric and structural improvements. Therefore, approved improvements may be

considered as part of a restoration or replacement project, but the original need for the project must have been to restore or replace structures.

**Bridge Preventive Program.** The primary purpose of this program is to perform timely actions to delay major rehabilitation of structures. Projects funded by this program may include deck treatments, deck joints and seal repair/replacement, painting, and other preventive work.

This program is authorized under the 2015 Five-Year Maintenance Plan as an annual reservation under the 2016 SHOPP beginning July 1, 2016.

**Bridge Scour Mitigation.** The primary purpose of this element is to mitigate or replace bridges that are vulnerable to collapse from erosion of channel or streambeds beneath bridge foundations.

This element may also include any monitoring projects that are necessary to collect data that will show when the bridge becomes scour critical and requires further action.

**Bridge Rail Replacement and Upgrade.** The primary purpose of this element is to bring all noncrashworthy bridge rails up to current federal standards.

**Bridge Seismic Restoration.** The primary purpose of this element is to repair seismic deficiencies of existing bridges not identified in the Seismic Retrofit Phase I Program and bridges where site conditions have changed since the retrofit program.

**Transportation Permit Requirements for Bridges.** The primary purpose of this element is to upgrade low and weak bridges to allow safe and efficient movement of oversized or overweight vehicles and loads on major State highways.

### ROADWAY PRESERVATION CATEGORY

The roadway preservation category has four elements: roadway rehabilitation (3R), pavement rehabilitation (2R), capital preventive maintenance (CAPM) and drainage system restoration.

The historic goal of Caltrans has been to reduce the number of distressed lane miles of pavement to 5,000, or approximately 10 percent of the total system.

**Roadway Rehabilitation (3R) and Pavement Rehabilitation (2R).** The primary purpose of these two elements is to rehabilitate roadways that exhibit major structural distress. Both elements also address repair and/or enhancement of other important elements such as traffic safety systems, pedestrian/bicycle accessibility, curbs, dikes, and drainage facilities. 3R Projects, in addition to the above, also may replace and upgrade other highway appurtenances and facilities within the project limits that are failing, worn out or functionally obsolete such as geometric features. The determination of whether a segment of highway is to proceed as either a 2R or 3R Project is made by a safety screening.

A pavement or other appurtenance that is rehabilitated under these elements should provide minimum twenty years of service life with relatively low maintenance expenditures. Life cycle cost analysis is used to determine the optimum service life and pavement strategy. Rehabilitation, with its provision of extending the service life of the facility, is distinct from maintenance, which simply repairs or preserves the facility in a safe and usable condition.

Roadway rehabilitation projects must qualify for rehabilitation on the basis of existing Pavement Management System criteria.

**Capital Preventive Maintenance (CAPM).** The primary purpose of this element is to repair minor pavement distress and/or ride rougher than established maximums in order to extend the service life a minimum of five years. The Capital Preventive Maintenance must qualify on the basis of the existing Pavement Management System criteria. This task may also be used to correct major pavement distress as an intermediate fix until the full roadway rehabilitation project may be delivered. Other operational improvements, geometric corrections, widening is not typically added to a CAPM.

**Drainage System Restoration.** The primary purpose of this element is to provide for the replacement or in-place rehabilitation of culverts and highway drainage systems that have lost serviceability because of age, wear, or degradation. Upgrades or modifications of culverts and highway drainage systems to increase flow or improve drainage alignment are included. Projects to abandon culverts are also included.

## ROADSIDE PRESERVATION CATEGORY

The roadside preservation category has four elements: roadside protection and restoration, highway planting rehabilitation, safety roadside rest area rehabilitation, and new safety roadside rest areas.

**Roadside Protection and Restoration.** The primary purpose of this element is to comply with regulatory agency mandates, improve corridor functionality, reduce highway facility life-cycle costs, and improve worker safety. Compliance with Surface Mining and Reclamation Act of 1975 (Pub. Resources Code, § 2710 et seq.) and Storm Water Construction General Permit regulations are included. Rehabilitation of vista points and experimental or new features, treatments, and practices are included. Relinquishment of environmental mitigation sites, and fish and wildlife preservation and protection are also included.

**Roadside Rehabilitation.** The primary purpose of this element is to reduce the long-term maintenance costs of roadside infrastructure, provide for replacement, restoration, and rehabilitation of existing highway plantings to an economically maintainable state following damage by weather, acts of nature, or deterioration, and improve worker and traveler safety,

This element also provides for erosion control to comply with Caltrans' National Pollution Discharge Elimination System permit requirements, design of safety features for worker safety, and improvements for roadside appearance and coordination with community character.

**Safety Roadside Rest Area Rehabilitation.** The primary purpose of this element is to correct deficiencies and restore existing safety roadside rest areas to a safe condition.

Typical improvements include:

- Operational improvements.
- Capacity expansion (parking and comfort stations).
- Existing comfort station or other structural element rehabilitation or replacement.
- Compliance with Cal/OSHA regulations.Maintenance facilities, crew rooms, and office space for California Highway Patrol personnel.
- Electrical system upgrades.
- Ramp upgrades to current design standards.
- Relocation of existing safety roadside rest areas.
- Auxiliary facility construction where expansion and upgrading an existing site is not feasible.

## FACILITY IMPROVEMENT CATEGORY

The goal of the facility improvement category is to address worker safety, comply with ADA and Cal/OSHA regulations, and improve operational efficiency. The facility improvement category has four elements: equipment facilities, maintenance facilities, office buildings, and materials laboratories and testing facilities.

**Equipment Facilities.** The primary purpose of this element is to provide facilities needed for the support of the Division of Equipment's operations.

Typical improvements include:

- Resident mechanic facilities in maintenance stations, whether stand-alone or contiguous to a maintenance structure district shop's subshops.
- Headquarters shop.
- Equipment storage areas.

At maintenance stations and district facilities, mechanics repair and maintain Caltrans' fleet of equipment, such as trucks, pickups, loaders, and snowplows.

At the Headquarters location, in addition to repairs, the facility is primarily devoted to the fabrication of new replacement equipment for the fleet.

**Maintenance Facilities.** The primary purpose of this element is to provide facilities needed for the support of the Division of Maintenance's operations.

Typical improvements include:

- Rehabilitation of existing maintenance stations and construction of new ones.
- Installation of new fuel tanks and replacement of existing fuel tanks as part of a larger rehabilitation contract.

**Office Buildings.** The primary purpose of this element is to provide facilities needed for the support of State transportation activities, including all district and Headquarters office buildings.

**Materials Laboratories and Testing Facilities.** The primary purpose of this element is to provide facilities needed to conduct specialized laboratory, field-testing, and inspection services for all phases of transportation engineering work involving materials and manufactured products.

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# APPENDIX D
# EXAMPLE PHOTOGRAPHS

## EMERGENCY RESPONSE

Heavy rainfall can cause landslides that cover highways and require immediate response to provide access to communities on both sides of the closure.

Heavey rainfall can also cause the entire highway to collapse in mountainous terrain or along the ocean resulting in extended closeure of the highway.

## COLLISION REDUCTION

Such locations may benefit from metal beam guardrails, which can reduce the number and severity of run-off-road-type collisions.

This is an example of an older crash cushion. Such devices are being upgraded to newer, improved crash cushions to help ensure proper performance in the event of a collision.

This photo demonstrates the current condition of many areas adjacent to ramps. Paving these areas will eliminate the need for maintenance workers to be on foot to manually control weeds and pick up trash and debris. Eliminating or relocating signage, or converting to quick change posts in these areas also contribute to reducing worker exposure to traffic.

This photo demonstrates how vegetation control treatments under guard rail eliminates the need for a worker to be on foot to manually control weeds.

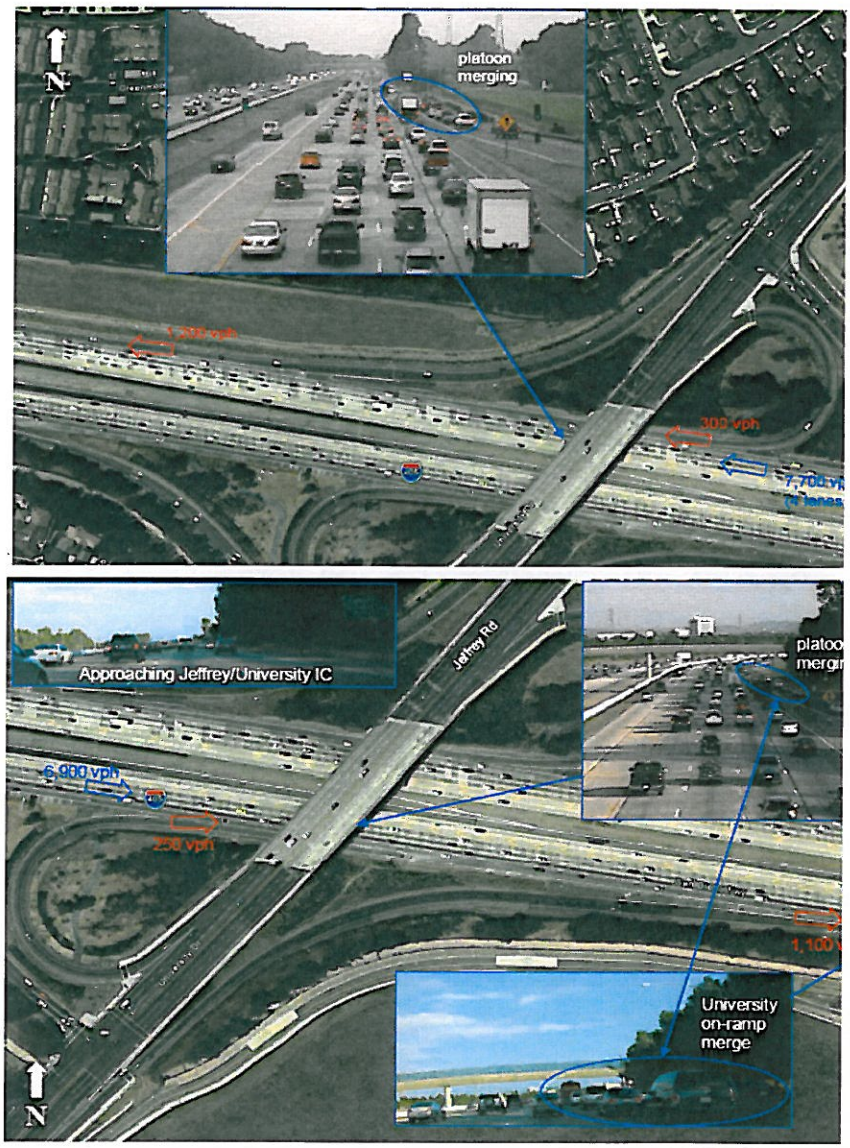
Clustering roadside facilities at safe locations away from traffic minimizes worker exposure to traffic.

## LEGAL AND REGULATORY MANDATES

Slopes along this section of highway have repeatedly eroded, resulting in sediment deposits in the Tuolumne River, affecting the quality of State waters. Although maintenance forces have attempted to repair and stabilize the slopes, erosion continues with significant rainfall. Stormwater mitigation projects are needed to reduce maintenance efforts and ensure compliance with the National Pollutant Discharge Elimination System permit.

This photograph demonstrates the condition of pedestrian walkway facilities along a State highway. This not only is a problem for pedestrians in general, but is also a barrier for those pedestrians with accessibility limitations.

## MOBILITY IMPROVEMENTS



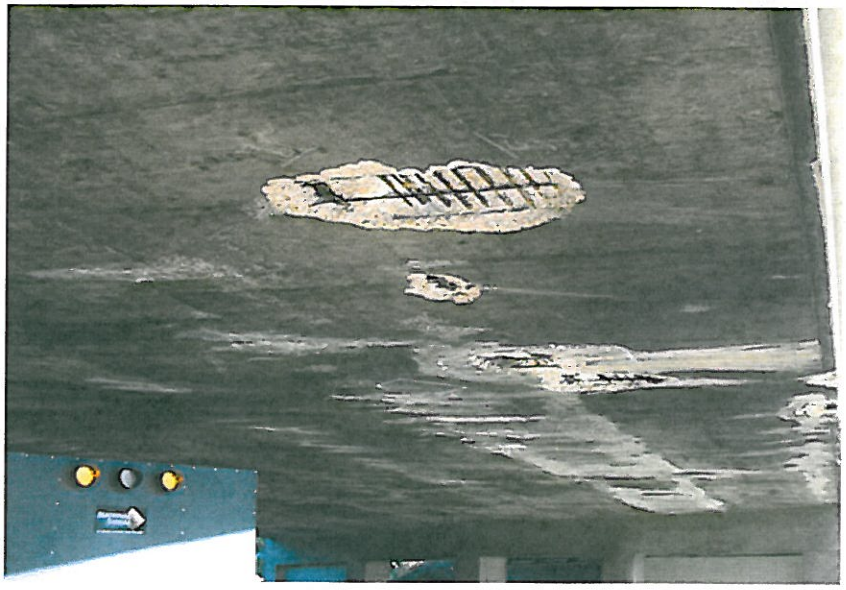

These are two bottleneck locations on Interstate 405 in Irvine. The platoon of vehicles merging onto the freeway is causing bottlenecks, which in turn cause delay on the mainline. The cumulative effect of multiple bottlenecks along a freeway segment can cause considerable delay in the corridor.

## COMMERCIAL VEHICLE INSPECTION

Weigh stations help the California Highway Patrol efficiently conduct commercial vehicle inspections and weight enforcement to reduce pavement damage and enhance traffic safety. Replacement and upgrading of weigh stations is one of many important functions of the SHOPP.

## BRIDGE PRESERVATION

Old concrete decks subject to many years of pounding by vehicle tires may fail as depicted in this photo. A proactive Bridge Program at Caltrans seeks to address bridge repair needs before they fail.



The concrete in this overcrossing structure has become severely deteriorated, leading to corrosion of the underlying reinforcing steel

## ROADWAY PRESERVATION

This is an example of severe corner cracking of Portland cement concrete pavement caused by loss of base support, heavy loading, and severe pumping. Maintenance forces have patched the failed pavement to keep the lane in service.

This is an example of severe fatigue cracking, also known as alligator cracking, on hot-mix asphalt concrete pavement. Maintenance forces have sealed the cracks to extend the service life of the pavement.

## ROADSIDE PRESERVATION

### Roadside Rehabilitation

Deteriorated landscapes increase the risk of erosion and roadside fires spreading to urban areas. Exposed soundwalls require regular graffiti removal, and weed-covered slopes require vegetation management to minimize the threat of fire, both requiring maintenance workers to be exposed to traffic.

## Safety Roadside Rest Areas

These photographs indicate the result of demand for truck parking spaces exceeding the number of available spaces at Safety Roadside Rest Areas. Parking lots are full beyond capacity, forcing truck drivers to park along ramp and mainline shoulders, causing safety concerns. Inadequate stopping opportunities may result in human waste and other biohazards being dumped along the roadside.

## FACILITY IMPROVEMENTS

Maintenance facilities throughout the State are outdated and in need of modernization.

# APPENDIX E
# SUBJECT-AREA AUTHORS

Technical content and estimates in this document are developed and approved by the following subject-area authors.

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# Mission

Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability

# Vision

A performance-driven, transparent and accountable organization that values its people, resources and partners, and meets new challenges through leadership, innovation and teamwork

# Goals

### *Safety and Health*

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

### *Stewardship and Efficiency*

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

### *Sustainability, Livability and Economy*

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

### *System Performance*

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

### *Organizational Excellence*

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

# Values

*Integrity • Commitment • Teamwork • Innovation*