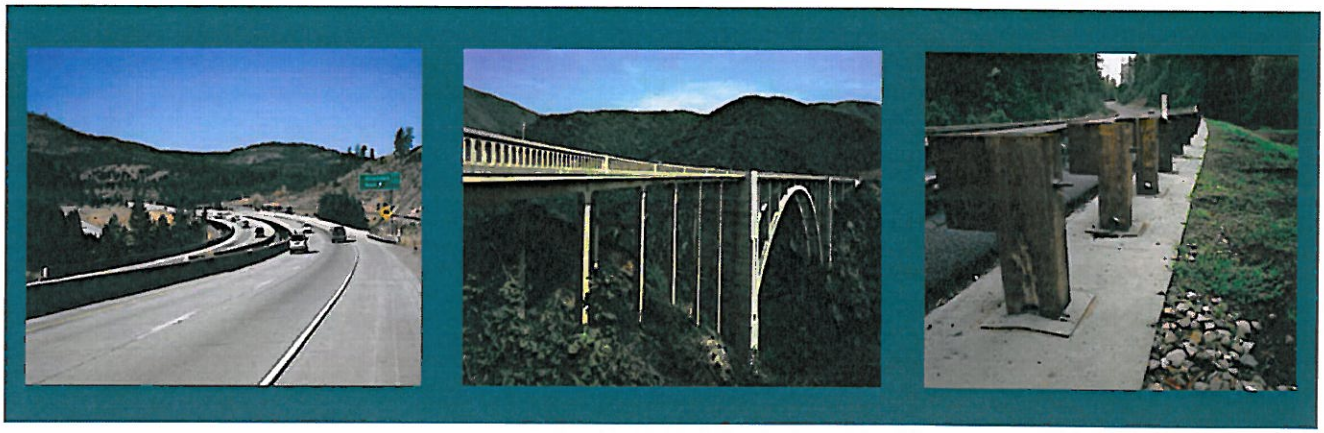
FINAL 2013 TEN-YEAR STATE HIGHWAY OPERATION AND PROTECTION PROGRAM PLAN



Prepared by the

California Department of Transportation
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March 5, 2013

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EXECUTIVE SUMMARY

The California Department of Transportation (Caltrans) is responsible for maintaining and operating the approximately 50,000 lane-mile State Highway System (SHS), the backbone of California's transportation infrastructure. Caltrans monitors the condition and operational performance of the SHS through periodic inspections, traffic studies, and system analysis. Caltrans uses information obtained through these activities to prepare the Ten-Year State Highway Operation and Protection Program Plan (SHOPP Plan) as required by Government Code section 14526.5 and Streets and Highways Code section 164.6. The SHOPP Plan provides input for the funding distribution in the State Transportation Improvement Program (STIP) Fund Estimate. Streets and Highways Code section 164.6 requires the SHOPP Plan to include identified needs for a ten-year period based on quantifiable accomplishments and a cost estimate for at least the first five years.

The goal-constrained need developed by Caltrans represents the estimated cost to meet reasonable 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 (5,000 lane-miles) in 10 years. Other elements of the SHOPP have similar performance goals as described in the following table. The goal-constrained needs plan is developed to meet the requirements contained in Streets and Highways Code section 164.6.

The total ten-year goal-constrained need for the rehabilitation and operation of the SHS for the period from FY 2014–2015 through FY 2023–2024 is $82 billion. This equates to an average annual cost of $8.2 billion per year. This is the escalated cost estimate for capital construction, right-of-way acquisition, and project development and construction engineering support.

	Inventory	2013 TEN-YEAR SHOPP GOAL-CONSTRAINED NEEDS			
		Average Annual Capital Cost ($ Million)	Average Annual Support Cost ($ Million)	Total Average Annual Cost ($ Million)	Performance Goal
Major Damage Restoration	N/A	$287	$110	$397	Restore damage within 180 days
Collision Reduction	N/A	$343	$152	$495	Reduce collision trend by 10 percent. Reduce roadside worker fatalities to zero. Retain safe stopping locations
Mandates	N/A	$342	$146	$488	Comply with laws and regulations
Mobility Improvement	N/A	$384	$247	$631	Reduce daily vehicle hours of delay (DVHD) by 10 percent
Minor Program	N/A	$103	$69	$172	N/A
Bridge Preservation	12,924 bridges	$1,041	$449	$1,490	Reduce to 3 percent of bridges distressed (400 bridges)
Roadway Preservation	49,518 lane miles	$3,037	$750	$3,786	Reduce to 10 percent of system distressed (5,000 lane miles)
Roadside Preservation	29, 830 acres	$258	$129	$387	Reduce to 20 percent of acres distressed (6,000 acres) and mandate compliance at 580 locations
	87 rest areas				Implement immediate safety and mandate needs at all existing locations and address capacity needs for safety
Facility Improvement	440 facilities	$142	$64	$206	Rehabilitate 22 facilities
Support for development of planning documents			$ 118	$ 118	
			TOTAL	**$ 8,170**	Note: All costs are escalated.

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 are 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 investment when needed repairs to the system are eventually undertaken. Deferred funding for infrastructure such as signs, lighting, drainage, planting, mandate compliance, and maintenance over the past 10 years has resulted in increased worker exposure to traffic due to the need for more frequent maintenance and preventable expenditures for emergency repairs.

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.

Projected SHA funding available for the SHOPP is $2 billion a year, which is 25 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). The strategy to focus the limited resources on the highest priority needs is illustrated in the financially-constrained needs plan. 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, there would be higher incidence of drainage culvert failures, more common closure of rest areas for urgent repairs, and higher incidence of emergency repair projects. In addition, few maintenance facility, highway planting, and mobility improvements will be made. In the absence of new revenue sources, the condition of the SHS will continue to deteriorate.

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.

THE CALIFORNIA STATE HIGHWAY SYSTEM

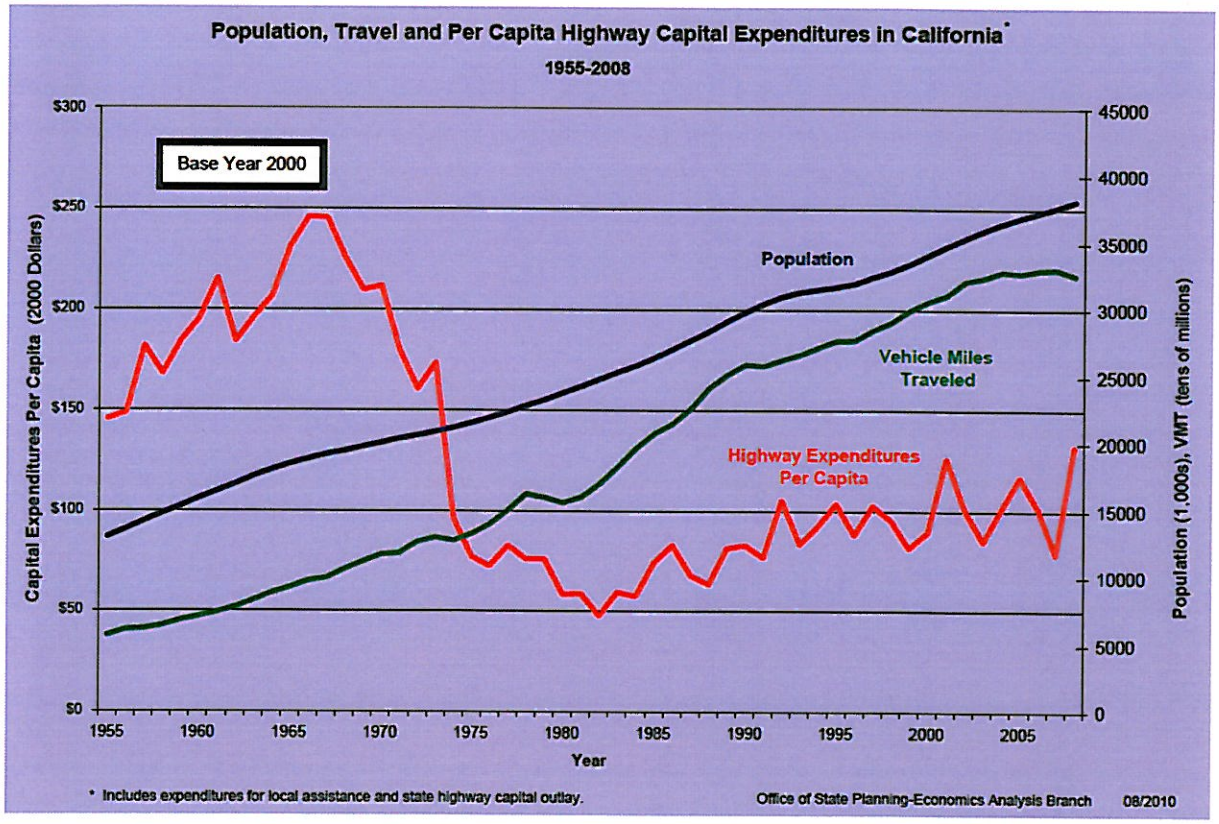
The transportation system assets that comprise the California SHS includes nearly 50,000 lane miles of pavement and 13,000 bridges, 205,000 culverts and drainage facilities, 87 roadside rest areas, 30,000 acres of roadside landscaping and over 180,000 acres of non-landscaped roadside. The magnitude of 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. Appendix D describes examples of some deficiencies on the SHS.

Figure 1. The California State Highway System

OPERATIONAL DEMANDS

The demands placed upon the transportation infrastructure continue to increase at a steady pace. The 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 safety roadside rest areas and vista points. Shown below in Figure 2 is a chart depicting the increase in annual vehicle miles traveled as compared with the investment in the SHS

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



Increased goods movement and the resulting increase in truck traffic are also expected to continue. The Federal Highway Administration, Office of Freight Management, projects the tons of freight moved on California highways in 2040 will increase by more than fifty percent over 2011 volumes, increasing from 850 million tons in 2011 to 1,416 million tons in 2040.[1]

[1] "Freight Analysis Framework," Office of Freight Management and Operations, Federal Highway Administration, U.S. Department of Transportation, 2011.

Much of the growth will occur in urban areas and on the fifty-year-old Interstate Highway System. This growth will continue to increase the rate of pavement deterioration and wear on bridges.

STRUCTURE OF THE SHOPP

The SHOPP has eight categories: (1) major damage restoration, (2) collision reduction, (3) legal and regulatory mandates, (4) mobility improvement, (5) bridge preservation, (6) roadway preservation, (7) roadside preservation, and (8) 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.

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 2001 - 2010, the fatality rate for users of State highways, which includes bicyclist and pedestrians, decreased by 39 percent. For the same period, the fatality rate for users of freeways decreased by 40 percent and the fatality rate for users of nonfreeways decreased by 36 percent. Although there are many factors involved, collision reduction improvements implemented through the SHOPP have contributed significantly to these reductions. An analysis of completed projects in the collision reduction category shows a 31.84 percent reduction of fatal collisions and a 5.7 percent reduction of injury collisions, with fatalities reduced by 39.6 percent and injuries reduced by 9.8 percent.[2]

Seventy-four percent of the safety roadside rest areas do not meet water quality mandates. Preventing closures due to noncompliance with drinking water quality and wastewater treatment standards will maintain the traveler safety benefits provided by the Safety Roadside Rest Area 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 suddenly increasing after about 30 miles.[3]

In addition to the goal of improving safety for travelers described above, a second 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. Ninety Caltrans employee fatalities have occurred since 1972: 45 percent involved workers on foot, on the shoulder, or within 30 feet of vehicle traffic. Improvements implemented through the Roadside Safety Improvements program will significantly reduce worker exposure to traffic.

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[2] "2011–2012 Highway Safety Improvement Program Annual Report," California Department of Transportation, Business, Transportation and Housing Agency, August 2012.

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

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 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). Caltrans discharges are required to conform with Regional Water Quality Control Board Basin Plans, including total maximum daily load requirements (TMDLs), which ensure impaired water bodies will meet water quality standards. Caltrans is stakeholder for 71 TMDLs and increasingly will be subject to additional TMDL regulations as more are adopted statewide.

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.

In addition, the California Ocean Plan, enforceable under the Porter-Cologne Water Quality Control Act, prohibits the discharge of wastes into Areas of Special Biological Significance (ASBS). Caltrans has approximately 77 direct discharge points within seven ASBS areas along the state's coastline, which will likely require future retrofit treatment of discharge water to preserve "natural" water quality.

The water quality requirements for Caltrans are dynamic in nature and are becoming more prescriptive over time. The new Caltrans NPDES statewide Stormwater Permit was adopted on September 19, 2012, and has an effective date of July 1, 2013. Though not all the details have been settled, the Permit has extensive location specific requirements. Caltrans and the State Water Resources Control Board have worked towards finding efficiencies in implementing these mandates. Rather than doing everything-everywhere, as the strict interpretation of the Permit indicates, focus has been on effective and efficient ways to implement water quality improvements that make the most efficient use of limited resources. A number of principal themes have developed, such as focusing on life-cycle cost over the water quality benefit derived, level of effort and prioritization where Caltrans efforts can make a difference. These cost containment strategies mitigate some of the risk of non-compliance, but not all.

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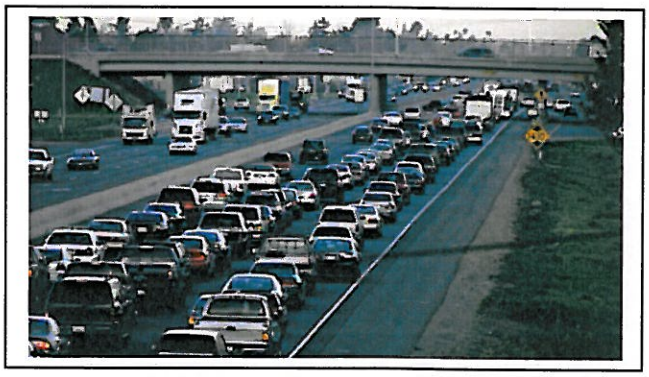
Another significant legal requirement is retrofitting and updating the SHS to comply with ADA regulations. Much of the cost of updating the SHS to enhance accessibility to persons with disabilities will be borne by the SHOPP.

Mobility Improvement.

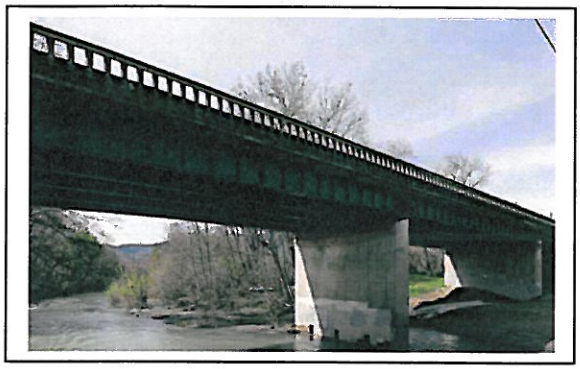
The goal of the mobility improvement category is to reduce congestion on, and restore productivity of, the SHS. Mobility improvements include operational improvements, transportation management systems, and commercial vehicle enforcement facilities and weigh-in-motion systems. These are projects that 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 2012 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.

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 12,924 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 increase 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 2011 Pavement Condition Survey reports 53 percent (26,132 lane miles) of the SHS are in excellent condition, 22 percent (11,053 lane miles) require pavement maintenance, and 25 percent (12,333 lane miles) are distressed and require rehabilitation and reconstruction work. Currently 18.3 percent of the vehicle miles travel on the interstate are on distressed pavement.

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 65 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 10-year period from 2002 to 2012, 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 2002 to the current level of 65 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 12,000 to 19,000 acres in the past ten years. In addition, 72 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.

II. TEN-YEAR COSTS AND PERFORMANCE OUTCOMES

GOAL-CONSTRAINED NEEDS PLAN AND COST ESTIMATE

The total ten-year goal-constrained need for the rehabilitation and operation of the SHS for the period from FY 2014–2015 through FY 2023–2024 is $82 billion. This equates to an average annual cost of $8.2 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 2013 Ten-Year Goal-Constrained Needs Plan, presents Caltrans' estimated cost of rehabilitation needs to achieve acceptable performance goals.

Table 1

2013 TEN-YEAR GOAL-CONSTRAINED NEEDS PLAN

(Escalated)

Category	Annual Cost ($ Millions)			Annual Performance Units
	Capital	Support	Total	
Emergency Damage Repair	$144.4	$46.2	$190.6	TBD locations
Permanent Restoration	$100.9	$48.1	$149.0	TBD locations
Roadway Protective Betterment	$41.3	$16.0	$57.3	7 locations
MAJOR DAMAGE RESTORATION	**$286.6**	**$110.4**	**$397.0**	
Safety Improvements	$170.5	$84.0	$254.5	300 fatal and injury collisions reduced
Collision Severity Reduction	$101.0	$36.6	$137.6	190 fatal and injury collisions reduced
Roadside Safety Improvements	$71.7	$31.5	$103.2	1,116 locations
COLLISION REDUCTION	$343.1	$152.1	$495.2	

Table 1 (cont.)

2013 TEN-YEAR GOAL-CONSTRAINED NEEDS PLAN

(Escalated)

Category	Annual Cost ($ Millions)			Annual Performance Units
	Capital	Support	Total	
Relinquishments	$13.8	$4.6	$18.3	12 centerline miles
Railroad At-Grade Crossings	$1.1	$0.0	$1.1	TBD location
Hazardous Waste Mitigation	$1.1	$0.0	$1.1	TBD location
Stormwater	$300.5	$109.7	$410.2	3,495 acres treated
ADA Curb Ramp	$18.3	$22.9	$41.3	800 ADA units
ADA Pedestrian Infrastructure	$6.9	$9.2	$16.1	300 ADA units
MANDATES	**$341.7**	**$146.4**	**$488.1**	
Operational Improvements	$165.3	$66.1	$231.4	20,000 DVHD reduced
Transportation Management Systems	$94.0	$76.1	$170.1	529 new elements
	$61.3	$38.1	$99.4	1,573 replacement
Commercial Vehicle Enforcement Facilities and Weigh-in-Motion Systems	$29.5	$31.0	$60.4	2 new locations
	$33.8	$35.5	$69.4	12 rehabilitation
MOBILITY IMPROVEMENT	**$383.91**	**$246.81**	**$630.7**	
Minor Program	$103.1	$68.8	$172.0	**TBD**
Bridge Rehabilitation	$228.4	$102.7	$331.1	42 bridges
Bridge Preventive Program	$34.7	$12.4	$47.1	166 bridges
Bridge Scour Mitigation	$33.4	$15.0	$48.4	7 bridges
Bridge Rail Replacement/Upgrade	$425.9	$178.8	$604.7	61,920 feet
Bridge Seismic Restoration	$269.3	$121.2	$390.4	67 bridges
Permit Requirements for Bridges	$49.5	$18.8	$68.3	11 bridges
BRIDGE PRESERVATION	**$1,041.1**	**$448.9**	**$1,490.0**	
Roadway Rehabilitation (3R)	$458.5	$137.6	$596.1	400 lane miles
Roadway Rehabilitation (2R)	$962.9	$240.7	$1,203.7	1,050 lane miles
Capital Preventive Maintenance	$1,224.3	$245.3	$1,469.6	3,050 lane miles
Drainage System Restoration	$298.1	$94.0	$392.1	2,255 culverts
Signs and Lighting Rehabilitation	$92.9	$32.1	$125.0	2,375 signs
ROADWAY PRESERVATION	**$3,036.7**	**$749.7**	**$3,786.4**	
Roadside Protection and Restoration	$28.4	$12.8	$41.3	58 locations
Highway Planting Rehabilitation	$152.5	$71.7	$224.1	1,900 acres
Roadside Rest Area Rehabilitation	$10.8	$5.2	$15.9	6 locations
New Safety Roadside Rest Areas	$66.0	$39.2	$105.2	4 locations
ROADSIDE PRESERVATION	**$257.7**	**$128.9**	**$386.6**	
Equipment Facilities	$8.0	$3.0	$11.0	1 facility
Maintenance Facilities	$86.8	$48.7	$135.5	20 facilities
Office Buildings	$43.0	$10.3	$53.3	5 facilities in 10 years
Materials Labs and Testing Facilities	$4.6	$1.8	$6.4	4 facilities in 10 years
FACILITY IMPROVEMENT	**$142.4**	**$63.9**	**$206.2**	
Support for development of planning documents			**$ 118**	
TOTAL ANNUAL NEED			**$ 8,170**	

Note: Numbers may not add due to rounding.

The three areas of significant change between the 2011 and 2013 SHOPP Plan are in the goal-constrained needs estimated for collision reduction, ADA compliance, and highway planting preservation.

Needs for collision reduction have declined as a result of reductions in recent fatal and injury collision statistics. In 2010, California's traffic fatalities decreased 11.9 percent, reaching their lowest level since the federal government began recording traffic fatalities in 1975. Taking into account the downward trend in collision fatal and injury collision statistics and the inclusion of safety enhancements in other STIP and SHOPP projects, the total estimated needs for collision reduction are lower.

In addition, needs for ADA compliance have been adjusted downward following the lawsuit settlement and field assessment of infrastructure access barriers. The estimate in the prior plan was based on a possible "worst case" court decision that could have required Caltrans to improve all of its 60,000 access barriers within ten years as opposed to the annual commitment of funding required in the settlement which allows the improvements to be made over a much longer timeframe.

Finally, the estimated needs of highway planting preservation decreased as planting strategies have improved to achieve lower project costs and overall life-cycle costs.

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 2013 SHOPP Plan. This Financially-Constrained Needs Plan sets the framework for the 2014 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

2013 TEN-YEAR FINANCIALLY-CONSTRAINED NEEDS PLAN

(Annual Estimates in 2012 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	----	----	----	0 locations
MAJOR DAMAGE RESTORATION	**$ 143.5**	**$ 56.5**	**$ 200.0**	
Safety Improvements	$ 148.7	$ 73.3	$ 222.0	300 fatal and injury collisions reduced
Collision Severity Reduction	$ 88.1	$ 31.9	$ 120.0	190 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	----	----	----	0 centerline miles
Railroad At-Grade Crossings	----	----	----	0 locations
Hazardous Waste Mitigation	----	----	----	0 locations
Stormwater	$ 66.8	$ 23.2	$ 90.0	1,163 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	----	----	----	0 DVHD reduced
Transportation Management Systems	----	----	----	0 new elements
	$ 24.6	$ 11.1	$ 35.7	266 replacement
Commercial Vehicle Enforcement Facilities and Weigh-in-Motion Systems	----	----	----	0
	$ 5.5	$ 2.0	$ 7.5	3 rehabilitation
MOBILITY IMPROVEMENT	**$ 30.1**	**$ 13.1**	**$ 43.2**	
Minor Program	**$ 90.0**	**$ 60.0**	**$ 150.0**	**TBD**

Table 2 (cont.)

2013 TEN-YEAR FINANCIALLY-CONSTRAINED NEEDS PLAN

(Annual Estimates in 2012 Dollars)

Category	Annual Cost ($ Millions)			Annual Performance Units
	Capital	Support	Total	
Bridge Rehabilitation	$ 129.9	$ 43.1	$ 173.0	39 bridges
Bridge Preventive Program	$ 29.6	$ 11.5	$ 41.1	166 bridges
Bridge Scour Mitigation	$ 13.7	$ 6.3	$ 20.0	10 bridges
Bridge Rail Replacement/Upgrade	$ 17.1	$ 6.5	$ 23.6	13,745 feet
Bridge Seismic Restoration	$ 53.1	$ 21.9	$ 75.0	27 bridges
Permit Requirements for Bridges	$ 6.7	$ 2.7	$ 9.4	11 bridges
BRIDGE PRESERVATION	**$ 250.1**	**$ 92.0**	**$ 342.1**	
Roadway Rehabilitation (3R)	$ 91.5	$ 27.5	$ 119.0	90 lane-miles
Roadway Rehabilitation (2R)	$ 201.2	$ 50.3	$ 251.5	250 lane-miles
Capital Preventive Maintenance	$ 262.1	$ 52.4	$ 314.5	750 lane-miles
Drainage System Restoration	$ 5.2	$ 2.5	$ 7.7	61 culverts
Signs and Lighting Rehabilitation	----	----	----	0 signs
ROADWAY PRESERVATION	**$ 560.0**	**$ 132.7**	**$ 692.7**	
Roadside Protection and Restoration	----	----	----	0 locations
Highway Planting Rehabilitation	----	----	----	0 acres
Roadside Rest Area Rehabilitation	----	----	----	0 locations
New Safety Roadside Rest Areas	----	----	----	0 locations
ROADSIDE PRESERVATION				
Equipment Facilities	----	----	----	0 facilities in 10 years
Maintenance Facilities	----	----	----	0 facilities in 10 years
Office Buildings	----	----	----	0 facilities in 10 years
Materials Labs and Testing Facilities	----	----	----	0 facilities in 10 years
FACILITY IMPROVEMENT	**----**	**----**	**----**	
Support for development of planning documents			**$ 28.0**	
TOTAL ANNUAL NEED			**$ 2,028**	

Note: Numbers may not add due to rounding.

TRENDS FOR SHOPP FUNDING

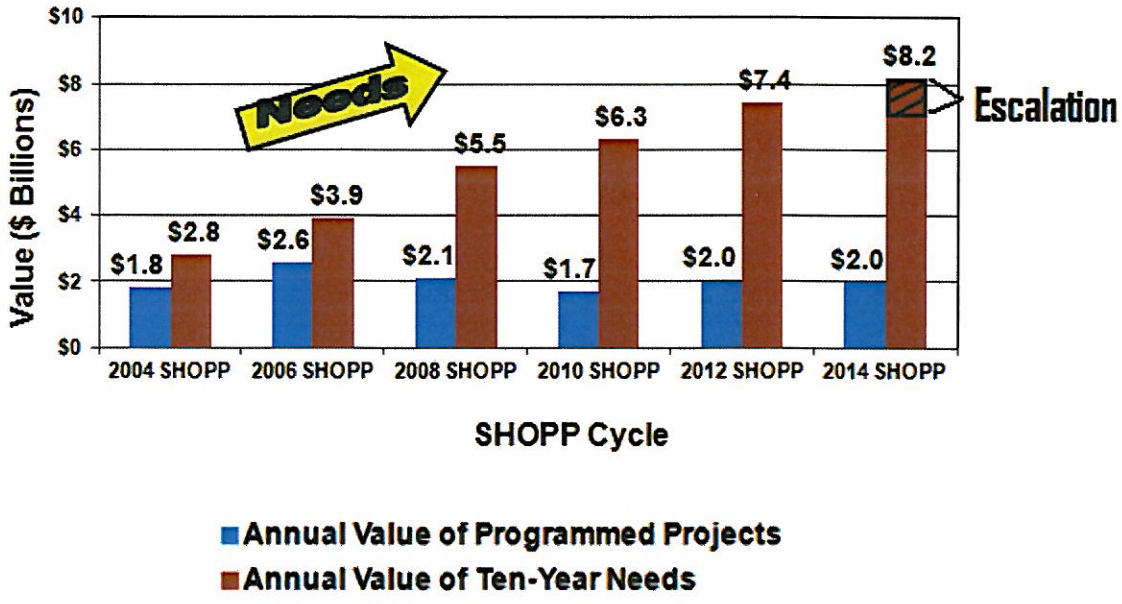
During the past five SHOPP programming cycles, the identified needs continued to grow while the available funding remained flat. Figure 3 displays the trend in the annual value of needs defined in prior ten-year plans versus the annual value of SHOPP projects in past programming cycles.

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.

The gap between the needs and available funding continues to widen.

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).

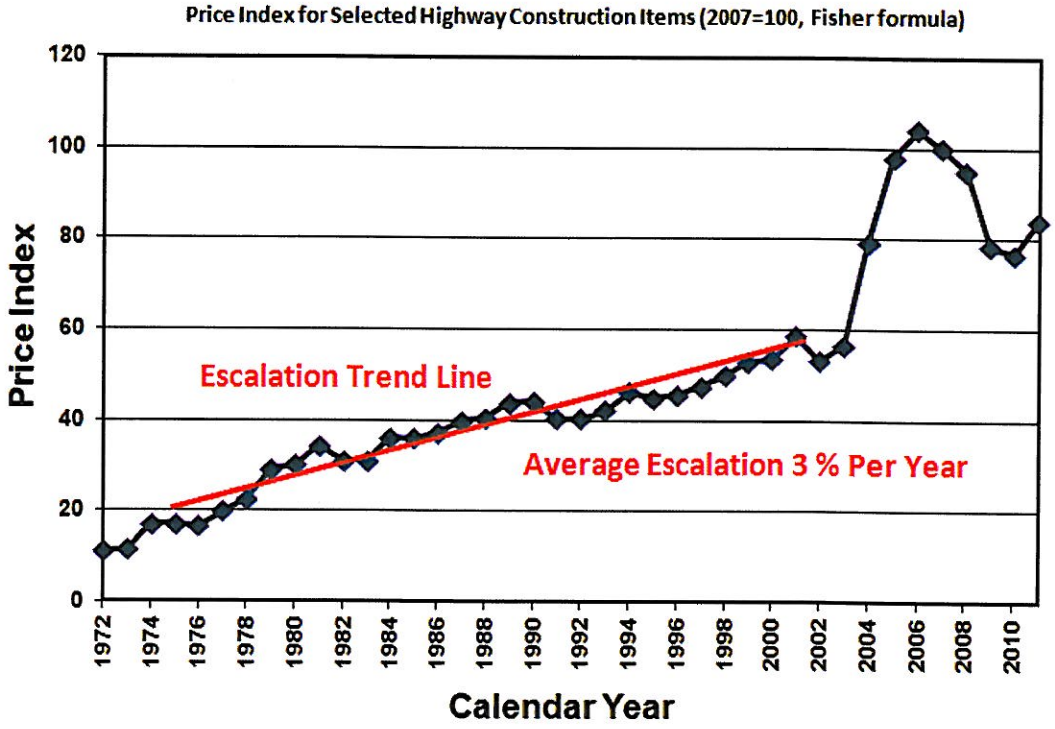
As funding for the SHOPP is insufficient to address the rehabilitation and reconstruction needs on the highway system, local fund sources will play a larger role in the future in meeting these needs. For example, when a non-SHOPP eligible capacity increasing project, such as a new interchange, is implemented 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.

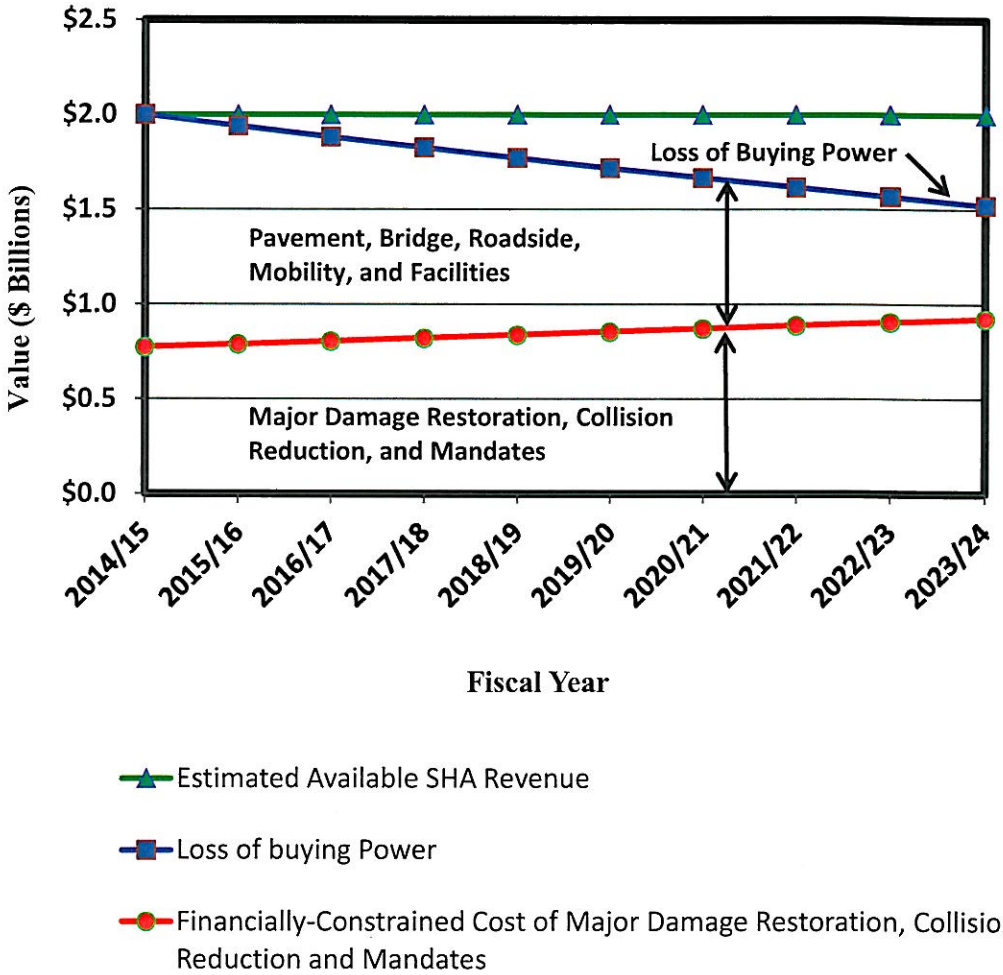
Furthermore, increasing construction costs reduce buying power of the limited SHOPP funding. The Highway Construction Cost Index between 1972 and 2011 is shown on the chart in Figure 4. This index is a measure of the cost of key materials needed for highway and bridge construction over time. Highway construction costs increased at predictable and steady rate averaging three percent per year between 1972 and 2000. 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



Note: Estimated Available SHA Revenue assumes continued diversion of weight fees.

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 $397 million a year; $200 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 $495 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 $488 million a year; $140 million a year available.

The mandates programs comply with various State and federal court orders, laws, and regulations for stormwater, ADA compliance, and relinquishment of redundant SHS segments to local agencies.

The funding shortfall ultimately delays compliance with the Federal CWA and other laws, resulting in the risk of non-compliance and subsequent enforcement actions. Violation of the CWA and the Porter-Cologne Water Quality Act and their implementing permits and regulations may result in substantial administrative civil penalties, regulatory enforcement actions, and citizen's suits. Though penalties for violating the CWA may include both fines up to $50,000 a day for each violation and imprisonment, typically, an enforcement action requires compliance and levy penalties typically at three times the cost of initial compliance. Further, the loss of credibility with regulatory agencies causes additional delay to deliver projects and increases in project costs, thus impacting the delivery and stewardship goals of Caltrans Strategic Plan. The current plan funds only 21 percent of the known TMDLs needs and none of the needs for ASBS.

Through successive draft Caltrans permits, the State Water Resources Control Board has worked diligently to minimize liability exposure stemming from the new Permit. The risk of non-compliance is partially managed through focusing Caltrans efforts on effective and efficient ways to implement water quality improvements that make the most efficient use of limited resources, i.e. life-cycle cost over the water quality benefit derived, level of effort and prioritization where Caltrans efforts can make a difference. Thus the risk of regulatory enforcement has been reduce, but the CWA allows citizen lawsuits.

Currently Caltrans is facing the following legal and regulatory mandates:

- Revised NPDES Permit adopted by the SWRCB on September 19, 2012, with extensive new requirements.
- The USEPA October 26, 2010 Order for Compliance issued to Caltrans.
- The U.S. District Court, Central District of California, Civil Action No. 93–6073 ER(JRx) Stipulation and Order, affecting District 7 in Los Angeles and Ventura Counties.

At the constrained funding level for ADA improvements, Caltrans commits only to the minimum required funding level for the 2010 ADA lawsuit settlement. If funding levels are further reduced for ADA needs, Caltrans will be in violation of the 2010 settlement agreement and will face additional lawsuits and liability.

Mobility Improvements. Need $631 million a year; $43 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 foscal 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 2012 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 $172 million a year; $150 million a year available.

The minor program funding is used to respond to critical low-cost SHOPP needs in all areas. The minor program is an annual allocation for projects with construction contract values under $1 million. The minor program most recently has been used for modest investments for underfunded programs, including mobility improvements, pavement preservation, and drainage improvements.

Bridge Preservation. Need $1,490 million a year; $342 million a year available.

The bridge programs preserve 12,924 of the 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 $3,786 million a year; $693 million a year available.

The roadway programs preserve the 49,518 lane miles of State highways and 205,000 drainage culverts.

The following are major consequences of the funding shortfall:

- Twenty-five percent (one out of every four lane miles) 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 $387 million a year; no funding is available except through the minor program

The roadside programs address worker and motorist safety, environmental commitments, and mandates for approximately 221,000 acres of roadsides, 29,380 acres of highway planting, and 87 safety roadside rest areas. Roadside SHOPP programs were significantly changed in 2003 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 $206 million a year; no funding is available except through the minor program.

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.

III. OTHER REQUIREMENTS

PROCESS IMPROVEMENTS

Caltrans continues to define and implement process improvements to expedite the delivery and enhance the management of projects and programs. Some of these improvements already have been implemented, yielding positive results.

Programming SHOPP Capital Outlay Support. Beginning with the 2008 SHOPP, capital outlay support is a programmed element of each SHOPP project. Capital outlay support is programmed for each phase of the project (environmental, design, right-of-way, and construction). Programming capital outlay support enhances the ability to manage the entire project budget to maximize the anticipated project outcomes.

Support Estimate for Development of Planning Documents. Annual resource estimates for the development of project initiation documents has recently evolved to a workload-based methodology. Caltrans' PID Program develops and submits a zero-based budget annually through the Budget Change Proposal (BCP) Process to the Department of Finance. All resources identified in PID BCPs must be tied to available funding in the SHOPP (i.e. financially-constrained plan). Caltrans uses the financially-constrained needs plan in the 10-Year SHOPP Plan as the basis for both PID workload needs and development. This coordination assures the PID budgets and resources are consistent with the 10-Year SHOPP Plan.

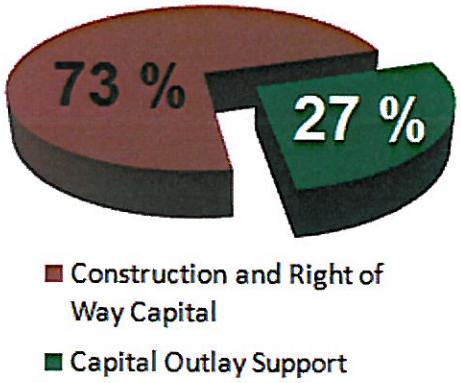
Ten-Year Plan Development Process. The process for developing the needs identified in this plan for the ten-year horizon has improved through implementation of the following actions:

- Standardized the process used to determine the cost for meeting the goal by reviewing construction and support cost for completed projects
- Compared and contrasted changes for performance goals and cost between the 2011 and 2013 Plans.
- Ensured the projected needs identified in the financially-constrained plan are focused on the highest priority areas.
- Ensured the workplan for pre-programming development of project initiation documents is consistent and coordinated with this plan.

Capital Outlay Support. The needs estimated in this report are broken down into two components, capital outlay and support. Support covers the cost of environmental studies and preliminary engineering, development of contract plans, specifications, and estimates, development and negotiation of all permits and agreements, right of way and utility engineering, and construction engineering and contract administration. As displayed in Figure 6, a little over a quarter of the funds for SHOPP projects are used for support for these essential tasks, while the majority, nearly three-quarters, is for capital outlay.

This segregation of capital and support is somewhat different in comparison to non-public works projects. In many non-public works capital projects the cost of construction includes both the capital cost of construction along with construction contract administration and construction project management.

Figure 6. Support and Capital



The support estimates included in this plan are derived from historical project expenditure data. Since the SHOPP covers a wide range of project types, from straightforward and non-controversial pavement overlays to technically complex traffic operations projects, the support costs for different types of projects varies.

Caltrans, as part of the effort for continuous improvement, has implemented several initiatives to enhance the management of project support. These include:

- Support costs added to Caltrans' Contracts for Delivery
- Increased emphasis on managing project delivery tasks (scope, schedule, capital costs and support costs)
- Replacing management and information systems (E-FIS and PRSM)
- Developing additional performance measures for managing support
- Incorporating support cost changes into change management processes

INNOVATIONS

Design-Build Contracting. The design-build method of procurement authorized under Senate Bill 4 in 2009 is being evaluated for the purposes of exploring whether the potential exists for reduced project costs, expedited project completion, or design features that are not achievable through the traditional design-bid-build method. A demonstration program will allow for a careful examination of the benefits and challenges of design-build contracting on a limited number of projects.

Eight projects, six funded whole or partially through the SHOPP are currently authorized design build projects. Two additional SHOPP projects will be recommended for design-build before the end of fiscal year 2012-13. As contained in the legislation, the Commission, may utilize the design-build method of procurement for up to 10 state highway, bridge, or tunnel projects

AUTHORIZED STATE DESIGN-BUILD PROJECTS

Project Title *	Description	Route(s)	Cost (million)	Funding
LA Metro Express Lanes Project	Express Lanes on I-10, from I-605 to Alameda Street and I-110 from Adams Boulevard to 182nd Street in Los Angeles County	10 & 110	$69.30	Other
Direct Connector	Construct direct connector between I-10 & I-605 in Los Angeles County	10 & 605	$78.80	SHOPP
Roadway Rehabilitation	Rehabilitate pavement on State Route 99 from South Madera Overcrossing to Avenue 16 Overcrossing in Madera County	99	$37.40	SHOPP
Ramp Metering	Install and implement ramp metering at 29 locations on US 101 in San Mateo County	101	$12.40	SHOPP
Devore Interchange	Widen and provide truck bypass lanes through the I-15 / I-215 Interchange	15 & 215	$365.70	Partial SHOPP
Braided Ramps	Construct braided branch connections between the SR 180/41 and the SR 180/168 freeway to freeway interchanges	180	$69.50	SHOPP
Gerald Desmond Bridge	Replace Gerald Desmond Bridge	710	$750.00	Partial SHOPP
I-805 North HOV/BRT Project	Construct HOV/BRT lanes from just north of State Route 52 (SR-52) to just north of Mira Mesa Boulevard	805	$125.00	Other

Project Resourcing and Schedule Management. Caltrans is currently implementing an upgraded enterprise-wide project management scheduling tool. The successful implementation of this tool will enable Caltrans to make better project decisions on a timely basis, thus ensuring a more efficient use of resources.

Pavement Management System. Caltrans is creating a new pavement management system (PaveM). The baseline of this pavement structure inventory will consist of geographic coordinates that locate layer thicknesses and material types continuously along network and the geographic coordinates of non-pavement fixed assets such as bridges, ramps, and county lines.

Ground Penetrating Radar (GPR) technology will be used as the tool for data collection of continuous layer thicknesses. Global Navigation Satellite System (GNSS) technology will be used as the primary tool for data collection of geographic locations. Coring and soil sampling will be used as the primary tool for data collection of layer material type.

The overall objectives of this project are as follows:

- Create a baseline, lane-based pavement structure inventory consisting of layer thicknesses and material types for the entire state highway network;
- Obtain the geographic coordinates of the locations of the pavement structures; and
- Obtain the geographic coordinates of non-pavement fixed assets on the network, such as bridges, ramps, county lines, etc.

The data collected by will be used by the Caltrans to establish fixed management roadway sections for network and project level PaveM operations.

Virtual Design Construction. Virtual Design Construction software tool creates an integrated framework and set of methods linking design-construction modeling to organizational, scheduling, and finance data. This framework enables projects to find integrated solutions to complex interrelated problems. Virtual Design Construction supports:

- Visualization of the project for project management and public outreach
- Better communication and planning tools
- More informed decisions on alternatives and construction staging
- Clash detection
- Reduced project costs, reduced waste, decreased project delivery time
- Opportunity to effectively use project special data for owner-operator activities including Maintenance and Operation and Asset Management

See-Through Bridge Rails. Caltrans initially developed See-Through Bridge Rails in consideration of the California Coastal Act of 1976, which protected the natural beauty of California's coastline and enlisted all public agencies to do the same. See-Through Bridge Rails minimize the impairment of views from the bridge and create aesthetically pleasing views of the bridge from public areas. Numerous designs are already deployed, ready to deploy, and under consideration for approval by the Federal Highway Administration (FHWA).

Rapid Rehab. Highway maintenance and rehabilitation activities often cause congestion, introduce safety concerns, and require lengthy lane closures. Transportation agencies face the challenge of providing the needed level of service and safety, both for the traveling public and for workers in work zones, while minimizing disruptions for local communities and adjacent businesses. Current practices to develop designs, construction schedules, and traffic management options are limited and time consuming. Rapid Rehab, formerly called CA4PRS, is a robust schedule and traffic analysis tool that aids planners and designers by determining the most efficient and economical highway rehabilitation or reconstruction strategies. It can quantify the impact of work zone closures in terms of traffic delay time and user cost, taking into account alternative pavement designs, lane-closure tactics, and contractor logistics.

Safety Edge. Roadway departures account for 53 percent of fatal crashes. When a tire drops off a paved surface, a driver can have difficulty re-entering the roadway if the pavement edge is nearly vertical—especially if the height difference is significantly more than two inches. When the errant driver tries to steer back onto the roadway, the vertical edge can create a "tire scrubbing" condition that may result in over-steering, which in turn is likely to result in loss of control of the vehicle. Caltrans is working with the FHWA's Every Day Counts "Accelerated Technology and Innovation Deployment" initiative to help deploy the Safety Edge, a proven procedure to shape the edge of the pavement at 30 degrees from horizontal during the paving process. When compared with the conventional hot-mix asphalt paving process that results in a vertical edge, the Safety Edge improves pavement density at the edge and the shape eliminates the tire scrubbing that can result in collisions, overturned vehicles, or crashes. This wedge is typically built using a commercially available shoe that attaches to the screed near the end gate on the resurfacing equipment.

Safety edge:

- Improves pavement density at the edge, creating a stronger interface between the pavement and the graded material
- Eliminates tire scrubbing
- Reduces tort liability
- Reduces maintenance expense
- Can be implemented with no significant added cost
- Shoe technology is commercially available, inexpensive, and reusable

Warm Mix Asphalt. Hot mix asphalt production has many adverse consequences, including high energy consumption to maintain workable temperatures, and hazardous asphalt fumes that endanger workers at the plant and during construction. Asphalt-mix producers seek energy-efficient, environmentally friendly, and worker–friendly methods. Additionally, highway agencies need ways to improve upon the limits of hot mix asphalt, including improving mix compaction, extending the construction season, and permitting longer haul distances. Caltrans strongly recommends the use of warm-mix asphalt (WMA) on paving projects throughout California because of its many proven improvements over hot-mix asphalt (HMA). WMA technology, in use in Europe since 1995, allows the mixing and placement of asphalt mix at temperatures significantly lower than those used with conventional HMA. WMA technologies reduce the viscosity of the asphalt mix and provide complete aggregate coating at temperatures of 35 to 100°F (20 to 55°C) lower than HMA.

Warm mix asphalt:

- Conserves fuel.
- Lowers emissions of volatile organic compounds, carbon monoxide, carbon dioxide, nitrogen oxides, and particulates.
- Reduces workers exposure to asphalt fumes at the plant and during construction.
- Improves workability of WMA at lower temperatures, resulting in easier raking and better compaction of the mix.
- Better compaction leads to higher in-place density, which reduces permeability and binder hardening due to aging, resulting in improved performance in terms of cracking resistance and moisture sensitivity.
- Paving can be completed with WMA under cooler conditions than those associated with HMA, allowing for an extended paving season, longer haul distance tolerance, and night paving operations.
- Additional benefits include the elimination bumps when paving over rubber crack sealant, improved workability of the polymer modified mixes, improved joint construction, and the ability to use greater amounts of reclaimed asphalt pavement.

Corridor Focus. Most of the major roadways in the state were constructed 40 to 50 years ago and are now in need of major rehabilitation and reconstruction. An example is Interstate 80 in Northern California. Interstate 80 begins at an interchange with U.S. Route 101 in San Francisco, and then crosses the San Francisco-Oakland Bay Bridge into Oakland. It then heads northeast through Vallejo, Sacramento, and the Sierra Nevada mountains before crossing into Nevada. Through a focused effort and dozens of projects, much of the significant rehabilitation and reconstruction needs on this route have been addressed and are either complete or currently in construction. Funding sources included SHOPP, Recovery Act, Proposition 1B, and Grant Anticipation Revenue bonds. Completion of rehabilitation work through a short-term concentrated effort reduces motorist delay and provides pavement and bridges that will last for many more years with only routine preventive maintenance.

Partnership. Several large projects in the state were jointly funded by the SHOPP (for the rehabilitation component) and from other sources for the capacity improvements. Performing all necessary work at once captures savings from the economy of scale associated with a larger project and minimized traveler delays. Projects on Interstate 80 and 580 in Northern California and the ongoing design-build project in Southern California for the replacement of the Gerald Desmond bridge are examples of successful partnerships in action.

In addition to partnering with others, Caltrans has also been successful in obtaining grant funding to leverage the limited SHOPP funds. Grant funds from the federal Forest Highways program were obtained recently to fund the improvements on Route 36 in Humboldt County. Route 36 also serves as a designated federal forest highway. These improvements are currently in the environmental phase with the majority of the project delivery effort undertaken by the federal government. In addition, Caltrans routinely seeks and is often successful at obtaining grant funds from the Office of Traffic Safety to fund guardrail and crash cushion upgrade projects. These funds also leverage the limited SHOPP dollars available to implement collision severity reduction projects.

RELATIONSHIP TO OTHER INITIATIVES

2013 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 2013 Ten-Year SHOPP Plan and the 2013 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 $360,000 while the average cost for preventive maintenance is $90,000 a lane mile. Thus, preventive maintenance results in a cost-benefit ratio of about 4:1. Similarly, the benefit ratio for structures is 12:1 ($720,000 for damage rehabilitation versus $60,000 for preventive maintenance), and 4:1 for drainage ($108,000 for damage restoration versus $27,000 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 cost-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	Cost-Benefit Ratio
Roadway	$360,000	$90,000	Lane mile	4:1
Structural	$720,000	$60,000	Bridge	12:1
Drainage	$108,000	$27,000	Culvert	4:1

*Costs reported above are capital construction costs only.

The annual baseline funding for the Maintenance Plan is $412.1 million. This level of investment is projected to produce future SHOPP cost avoidance of approximately $2.7 billion: $936 million for pavement, $1.65 billion for bridges, and $115 million for drainage. The Maintenance Plan implements this recommendation by including $234 million of roadway projects to preserve 2,100 lane-miles of pavement annually, $155 million of bridge projects to preserve 728 bridges annually, and $23 million of drainage projects to preserve 262 culverts annually.[4]

[4] "2013 Five-Year Maintenance Plan," California Department of Transportation, February 2013.

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 10 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 need for the rehabilitation and operation of the SHS for the period from FY 2014–2015 through FY 2023–2024 is $82 billion. This equates to an average annual cost of $8.2 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.

Projected SHA funding available for the SHOPP is $2 billion a year, which is 25 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). 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.

APPENDIX A

GOVERNMENT CODE SECTION 14526.5

14526.5.

(a) 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 which do not add a new traffic lane to the system.

(b) The program shall include projects which 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 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.

(d) The commission may review the program relative to its overall adequacy, level of annual funding needed to implement the program, and the impact of those expenditures on the state transportation improvement program. The commission shall approve and submit the program to the Legislature and the Governor not later than April 1 of each even-numbered year.

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

APPENDIX B

STREETS AND HIGHWAYS CODE SECTION 164.6

164.6.

(a) The department shall prepare a 10-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 10-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.

APPENDIX C

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 stormwater mitigation projects that arise from judicial and regulatory orders, and implement improvements that comply with Caltrans' National Pollution Discharge Elimination System permits.

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.

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 2012 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 2007 Five-Year Maintenance Plan as an annual reservation under the 2008 SHOPP beginning July 1, 2008.

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.

Highway Planting 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.

New Safety Roadside Rest Areas. The primary purpose of this element is to provide for new, conveniently spaced stopping opportunities as an integral part of the SHS where the traveler may stop, rest, relax, obtain travel information, and return to the highway more alert and driving safely.

Partnerships and joint development of safety roadside rest areas with the private sector or public agencies are included.All land, structures, landscaping, utilities, and other facilities, such as restrooms, office and storage space, tables, drinking fountains, telephones, motorist information, and trash receptacles, are included.

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.

APPENDIX D

EXAMPLE PHOTOGRAPHS

EMERGENCY RESPONSE

Heavy rainfall in January 2010 caused extensive damage to highways throughout California. A large landslide damaged State Route 96 near Eureka.

The Station Fire ravaged the Los Angeles County roadside late summer 2009, causing damage along State Route 2. The area took a second hit from storms in January 2010.

COLLISION REDUCTION

This picture shows a location in need of metal beam guardrail, which reduces the number and severity of run-off-road-type collisions.

This is an example of an older and obsolete crash cushion on a State highway. It does not meet current crash-test guidelines and needs to be upgraded to a State-approved crash cushion to ensure proper performance in the event of a collision.

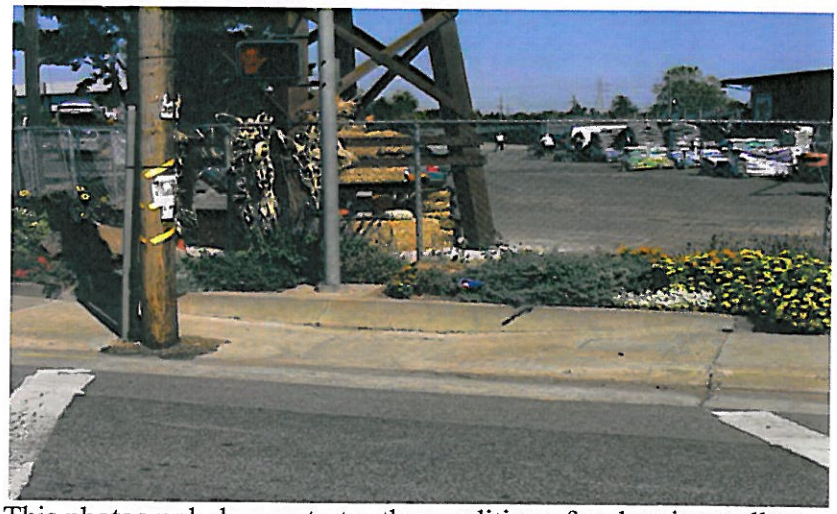
This photo demonstrates the current condition of many areas adjacent to ramps. Paving these areas will eliminate the need for maintenance workers to be on foot to manually control weeds and pick up trash and debris. Eliminating or relocating signage, or converting to quick change posts in these areas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

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

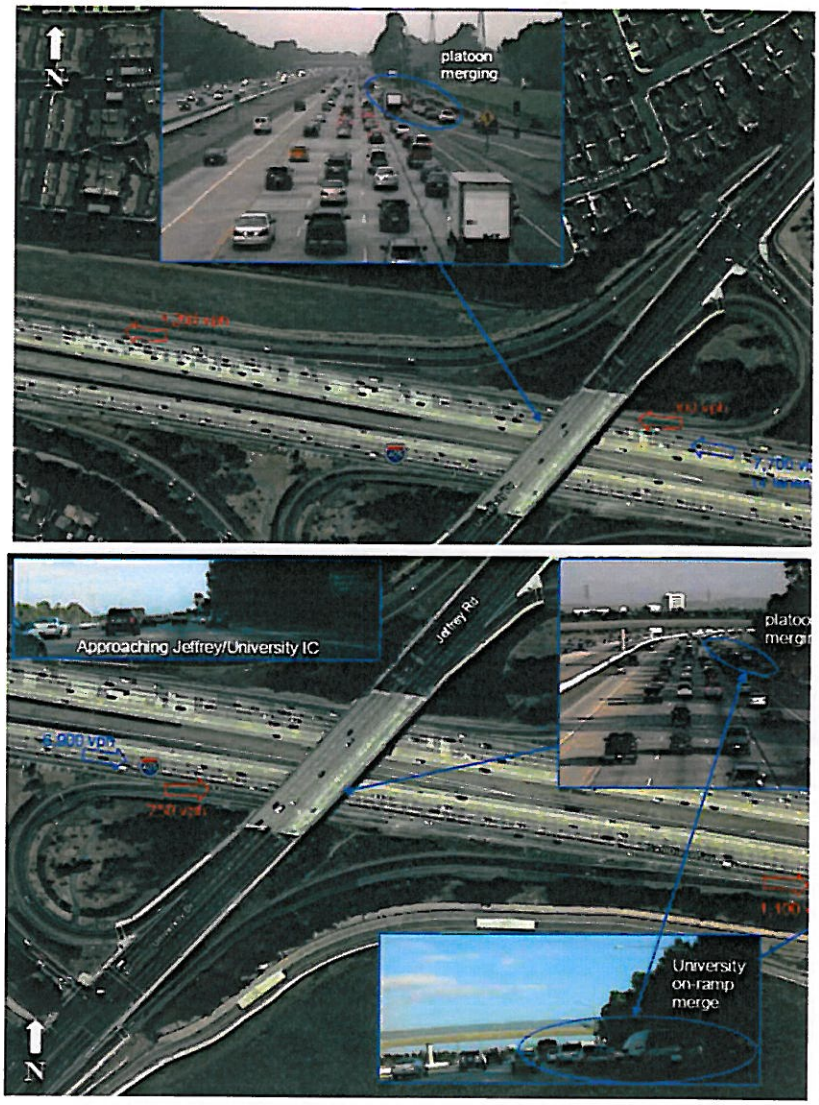
LEGAL AND REGULATORY MANDATES

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 also is a barrier for those pedestrians with accessibility limitations.

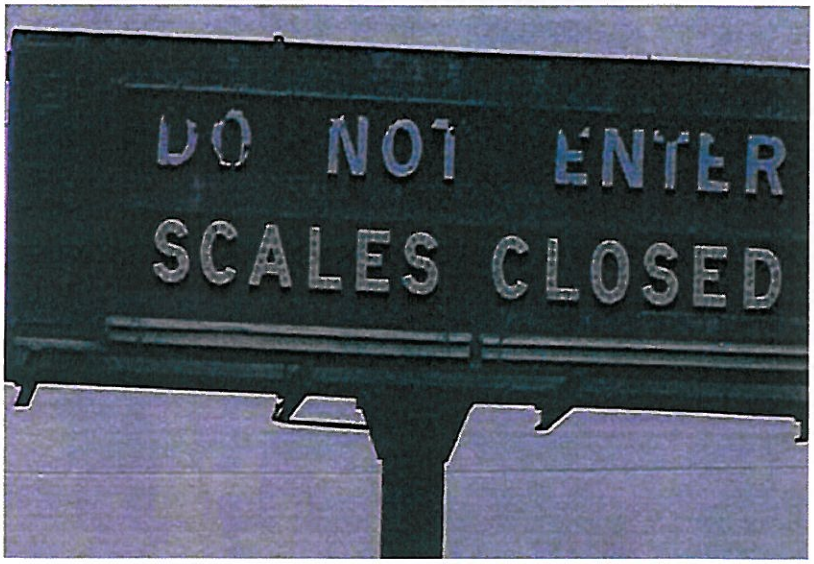
MOBILITY IMPROVEMENTS



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. Similar effects are being experienced in several freeway corridors across the State.

COMMERCIAL VEHICLE INSPECTION

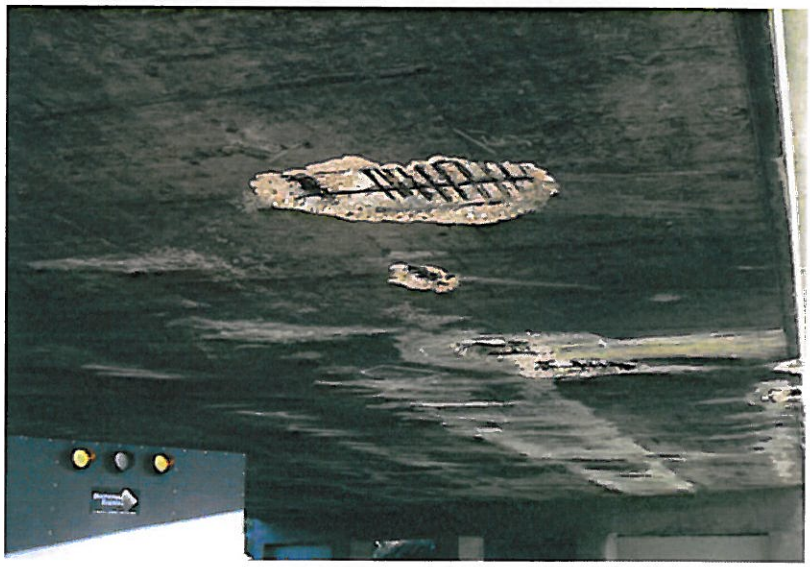
Weigh stations help the California Highway Patrol efficiently conduct commercial vehicle inspections and weight enforcement to reduce pavement damage and enhance traffic safety. The pavement at this weigh station located on Interstate 5 near Santa Nella is in a severe state of disrepair. Similar conditions can be found at other weigh stations.



The sign at this weigh station located on Interstate 5 near Castaic has deteriorated and is in need of replacement.

BRIDGE PRESERVATION

A seven-foot-long hole opened up in the concrete deck of the bridge on Interstate 5 in San Diego County at the Oceanside Boulevard structure in February 2009.



The concrete in the Temple Street 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

Highway Planting 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 inadequate truck parking 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 result in human waste and other biohazards dumped along the roadside.

FACILITY IMPROVEMENTS

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

APPENDIX E

UNESCALATED 2013 TEN-YEAR GOAL-CONSTRAINED NEEDS PLAN

UNESCALATED 2013 TEN-YEAR GOAL-CONSTRAINED NEEDS PLAN

(Annual Estimates in 2012 Dollars)

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	$ 36.0	$ 14.0	$ 50.0	7 locations
MAJOR DAMAGE RESTORATION	$ 250.0	$ 96.3	$ 346.3	
Safety Improvements	$ 148.7	$ 73.3	$ 222.0	300 fatal and injury collisions reduced
Collision Severity Reduction	$ 88.1	$ 31.9	$ 120.0	190 fatal and injury collisions reduced
Roadside Safety Improvements	$ 62.5	$ 27.5	$ 90.0	1,116 locations
COLLISION REDUCTION	$ 299.3	$ 132.7	$ 432.0	
Relinquishments	$ 12.0	$ 4.0	$ 16.0	12 centerline miles
Railroad At-Grade Crossings	$ 1.0	$ 0.0	$ 1.0	TBD location
Hazardous Waste Mitigation	$ 1.0	$ 0.0	$ 1.0	TBD location
Stormwater	$ 262.1	$ 95.7	$ 357.8	3,495 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	$ 298.1	$ 127.7	$ 425.8	
Operational Improvements	$ 144.2	$57.7	$ 201.9	20,000 DVHD reduced
Transportation Management Systems	$ 82.0	$ 66.4	$ 148.4	529 new elements
	$ 53.5	$ 33.2	$ 86.7	1,573 replacement
Commercial Vehicle Enforcement Facilities and Weigh-in-Motion Systems	$ 25.7	$ 27.0	$ 52.7	2 new locations
	$ 29.5	$ 31.0	$ 60.5	12 rehabilitation
MOBILITY IMPROVEMENT	$ 334.9	$ 215.3	$ 550.2	
Minor Program	$ 90.0	$ 60.0	$ 150.0	TBD
SUBTOTAL OPERATIONAL PERFORMANCE	$ 1,272.3	$ 632.0	$ 1,904.3	

UNESCALATED 2013 TEN-YEAR GOAL-CONSTRAINED NEEDS PLAN (cont.)

(Annual Estimates in 2012 Dollars)

Category	Annual Cost ($ Millions)			Annual Performance Units
	Capital	Support	Total	
Bridge Rehabilitation	$ 199.2	$ 89.6	$ 288.8	42 bridges
Bridge Preventive Program	$ 30.3	$ 10.8	$ 41.1	166 bridges
Bridge Scour Mitigation	$ 29.1	$ 13.1	$ 42.2	7 bridges
Bridge Rail Replacement/Upgrade	$ 371.5	$ 156.0	$ 527.5	61,920 feet
Bridge Seismic Restoration	$ 234.9	$ 105.7	$ 340.6	67 bridges
Permit Requirements for Bridges	$ 43.2	$ 16.4	$ 59.6	11 bridges
BRIDGE PRESERVATION	**$ 908.2**	**$ 391.6**	**$ 1,299.8**	
Roadway Rehabilitation (3R)	$ 400.0	$ 120.0	$ 520.0	400 lane miles
Roadway Rehabilitation (2R)	$ 840.0	$ 210.0	$ 1,050.0	1,050 lane miles
Capital Preventive Maintenance	$ 1,068.0	$ 214.0	$ 1,282.0	3,050 lane miles
Drainage System Restoration	$ 260.0	$ 82.0	$ 342.0	2,255 culverts
Signs and Lighting Rehabilitation	$ 81.0	$ 28.0	$ 109.0	2,375 signs
ROADWAY PRESERVATION	**$ 2,649.0**	**$ 654.0**	**$ 3,303.0**	
Roadside Protection and Restoration	$ 24.8	$ 11.2	$ 36.0	58 locations
Highway Planting Rehabilitation	$ 133.0	$ 62.5	$ 195.5	1,900 acres
Roadside Rest Area Rehabilitation	$ 9.4	$ 4.5	$ 13.9	6 locations
New Safety Roadside Rest Areas	$ 57.6	$ 34.2	$ 91.8	4 locations
ROADSIDE PRESERVATION	**$ 224.8**	**$ 112.4**	**$ 337.2**	
Equipment Facilities	$ 7.0	$ 2.6	$ 9.6	1 facility
Maintenance Facilities	$ 75.7	$ 42.5	$ 118.2	20 facilities
Office Buildings	$ 37.5	$ 9.0	$ 46.5	5 facilities in 10 years
Materials Labs and Testing Facilities	$ 4.0	$ 1.6	$ 5.6	4 facilities in 10 years
FACILITY IMPROVEMENT	**$ 124.2**	**$ 55.7**	**$ 179.9**	
SUBTOTAL SYSTEM CONDITION	**$ 3,906.2**	**$ 1,213.7**	**$ 5,119.9**	
Support for development of planning documents			**$ 103.0**	
TOTAL ANNUAL NEED			**$ 7,127**	

APPENDIX F

COMMISSION COMMENTS

Memorandum

To: CHAIR AND COMMISSIONERS

CTC Meeting: March 5, 2013

Reference No.: 4.21
Action

From: BIMLA G. RHINEHART
Executive Director

Subject: **COMMISSION COMMENTS ON THE 2013 TEN-YEAR SHOPP PLAN**

RECOMMENDATION

Staff recommends that the Commission accept the updated 2013 Ten-Year State Highway Operation and Protection Plan (Ten-Year SHOPP Plan), and direct staff to work with the Department to include any additional comments in the Final 2013 Ten-Year SHOPP Plan, to be provided to the Commission to transmit to the Governor and the Legislature by May 1, 2013, as required by Streets and Highways (S&H) Code section 164.6.

BACKGROUND

As required by S&H Code Section 164.6, the Department presented the draft 2013 Ten-Year Plan at the January 8, 2013 meeting for Commission review and comments.

The draft Plan has been updated with Commission and staff comments including a discussion on the local funding for the SHOPP; specific examples of improving existing processes to eliminate waste; and providing and quantifying the benefits of innovations, efficiencies and reforms that result from developing and using new technologies and products.

Find the updated Plan at: **http://www.dot.ca.gov/hq/transprog/SHOPP/shopp_prior_doc.htm**

The Plan is the Department's State Highway Operation and Protection Program (SHOPP) strategy to protect the State Highway System (SHS). The SHS includes nearly 50,000 lane miles of pavement, 12,924 bridges, 205,000 culverts and drainage facilities, 87 roadside rest areas, and 29,830 acres of roadside landscaping. There are also 440 support facilities, including equipment shops, maintenance stations, and transportation materials laboratories and testing facilities.

Total 2013 Ten-Year SHOPP Plan unescalated need is $71 billion. Projects to implement the Plan are primarily funded through the SHOPP. The Plan projects $2 billion per year for the SHOPP which is 28% of the $7.1 billion annual need. The Department focuses available resources on the most critical categories of projects in the SHOPP (safety, bridge, and pavement preservation). Even with this focus, the SHS will continue to deteriorate in the absence of sufficient funding.

The Plan shows that the 12,924 bridges have a median age of 43 years and 7% (893) are in distressed condition; that 65% of roadside landscaping is deficient and no longer performs as viable stormwater control; that 72% of safety roadside rest areas have deficiencies; and that 25% (12,333 lane miles) of the pavement is distressed and requires rehabilitation and reconstruction work.

Increased goods movement and the resulting increase in truck traffic are also expected to continue. The Federal Highway Administration projects that the tons of freight on California highways will increase from 850 million tons in 2011 to 1,416 million tons in 2040.

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