

California Department of Transportation



2009 Five-Year Maintenance Plan

January 2009

TABLE OF CONTENTS

REQUIREMENTS OF SENATE BILL 1098	1
EXECUTIVE SUMMARY	2
FIVE-YEAR MAINTENANCE PLAN.....	3
BACKLOG STATUS AND STRATEGIES TO CONTROL COSTS / IMPROVE EFFICIENCIES.....	8
Pavement	8
Drainage.....	12
MAINTENANCE PROGRAM BUDGET MODEL	14
ANALYSIS OF ALTERNATIVE LEVELS OF INVESTMENT	17
Eliminate Backlog in Ten Years	17
Pavement	17
Bridge and Drainage.....	18
Eliminate Backlog in Five Years	19
Pavement	19
Bridge and Drainage.....	19
CONCLUSION/RECOMMENDATION	22
APPENDICES	
Appendix 1 - Streets and Highways Code, Section 164.6	23
Appendix 2 - SHOPP Elements	25

List of Figures

Figure 1: Five-Year Safety, Preservation, and Service Distribution.....	4
Figure 2: Five-Year Maintenance Program OE Dollar Expenditures.....	5
Figure 3: Five-Year Maintenance Program PY Expenditures	5
Figure 4: Preventive Maintenance Cost Effectiveness Chart.....	7
Figure 5: Highway Lane Mile Distribution.....	8
Figure 6: Pavement Maintenance Funding Over Last Three Years.....	9
Figure 7: Accomplishments through Pavement Preservation	9
Figure 8: Accomplishments through Bridge Preventive Maintenance	11
Figure 9: Drainage Preservation and Culvert Inspection Accomplishments	13

List of Figures

Table 1: Comparison of Preventive Maintenance vs. Rehabilitation Costs.....	6
Table 2: Pavement Cost Estimate – Annual 2008/09 Baseline.....	17
Table 3: Five-Year Overall Pavement Funding Plan	18
Table 4: Eliminate Backlog in Ten Years – Annual Cost, Backlog, and State Highway Operation and Protection Program Avoidance Details	19
Table 5: Eliminate Backlog in Five Years – Annual Allocation, Backlog, and State Highway Operations and Protection Program Avoidance Details.....	21

REQUIREMENTS OF SENATE BILL 1098

Senate Bill (SB) 1098, Chapter 212, Statutes of 2004, requires the California Department of Transportation (Department) to prepare a Five-Year Maintenance Plan (Plan) that addresses the maintenance needs of the State highway system. The bill also requires the Department to attempt to balance available resources between maintenance and more expensive rehabilitation projects. (A copy of SB 1098 is contained in Appendix 1.)

SB 1098 requires that the Plan include the following:

- , Only maintenance activities that, if the activities were not performed, could result in increased State Highway Operation and Protection Program (SHOPP) costs in the future.
- , Strategies, specific activities, and funding to reduce or prevent backlog over the five years of the Plan.
- , Specific goals and quantifiable accomplishments.
- , Cost control and efficiency strategies.
- , Cost estimate for the five years of the Plan.
- , SHOPP cost avoidance from implementation of the Plan.
- , A budget model in line with the requirements of this legislation.

EXECUTIVE SUMMARY

The purpose of the Plan is to identify investments in preservation strategies that delay or eliminate the need for major, costly rehabilitation or replacement projects that seriously impact the mobility of users of the State transportation system.

Preservation is the most cost-effective means of protecting the State's infrastructure investment. When implemented, the 2009 Plan will minimize the deterioration and extend the life of structural and drainage facility inventories as much as possible, but does not arrest the deterioration of Good (non-distressed) pavement.

Due to the rising costs of construction materials and energy, overall construction costs have increased an average of 7 percent per year, over the last ten years. In contrast, bid prices were less than estimated due to the recent downturn in the housing market, resulting in an increase in the number of bidders competing for Department construction contracts. Bid prices are expected to increase somewhat over the next two years, as construction costs will drive contractors' estimates higher and profit margins continue at a minimum. Overall, pavement and bridge project bids averaged 18 percent below construction cost estimates last fiscal year (FY), resulting in the Department being able to do more work than originally planned.

The Department accomplished the objectives of the 2007 Plan by contracting for over the targeted 2,700 lane miles of pavement preservation projects. The Structures-related goal of addressing the maintenance needs for 560 bridges was exceeded by contracting for 696 bridges. Even though the growth of bridge maintenance needs increased through the end of FY 2007/08 to 2,713, the continuing level of funding is projected to drop that number to 2,541 bridges by the end of FY 2008/09. At current investment levels, it is expected to take approximately eight years to reduce the number of bridges with backlogged major maintenance needs to approximately 10 percent of the inventory (1,260 bridges with backlogged needs). Finally, the annual goal for culvert inspections was also exceeded last year.

The 2009 Plan recommends no funding changes for pavement, bridge, or drainage maintenance programs. However, it does recognize a forecasted decrease in the number of lane miles of pavement rated as Good, which is partly due to the annual funding level for pavement preservation in the FY 2008/09 SHOPP being significantly reduced from that of previous years.

FIVE-YEAR MAINTENANCE PLAN

The Department is responsible for approximately 50,000 lane-miles of the State highway system. This includes maintaining roadway (pavement), structures (bridges), drainage systems, landscaping, signs, and other highway features. In addition, the Department spends considerable resources on non-inventory roadside activities such as litter and graffiti removal.

Streets and Highways Code section 167 (a) establishes the priority for expending State transportation funds from the State Highway Account.

167. (a) Funds in the State Highway Account in the State Transportation Fund shall be programmed, budgeted subject to Section 163, and expended to maximize the use of federal funds and shall be based on the following sequence of priorities:

- (1) Operation, maintenance, and rehabilitation of the state highway system.
- (2) Safety improvements where physical changes, other than adding additional lanes, would reduce fatalities and the number and severity of injuries.
- (3) Transportation capital improvements that expand capacity or reduce congestion, or do both.
- (4) Environmental enhancement and mitigation programs.

The Department prioritizes the efforts for its programs and offices through its mission, *Caltrans Improves Mobility Across California*, and goals. The Department's Maintenance Program activities have three main categories: Safety, Preservation, and Service (defined below). The distribution of maintenance activities across these three areas for the past five years are shown in Figure 1.

- , **Safety** of the traveling public, the Department's workers, and private contractors working on the State highway system is a high priority. The focus of this effort is to ensure timely response to accidents and weather-related situations, and to ensure that highway features designed to enhance safety are maintained in proper working order.
- , **Preservation** focuses maintenance and preservation efforts on protecting California's multibillion dollar investment in its State highway system. This effort is intended to ensure system reliability and extend the useful life of the pavement, bridges, drainage systems, and other highway infrastructure elements, such as landscaping and rest areas.

- , **Service** involves maintaining and preserving highway assets in such a way that they enhance the State's environment and quality of life. This effort includes maintaining thousands of acres of landscape and roadside vegetation, and removal of litter, debris, and graffiti.

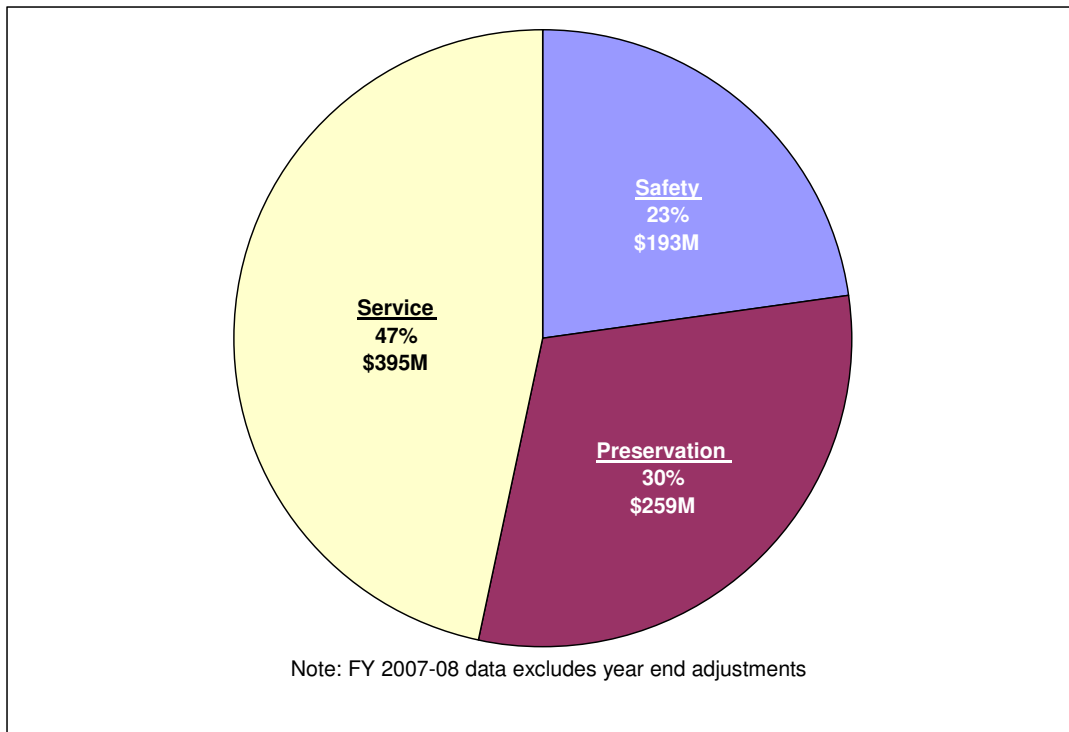


Figure 1: Five-Year Safety, Preservation, and Service Distribution

Over each of the past four years, the Department spent an average of \$984 million dollars in operating expenses (OE) and approximately 5,600 person years (PYs), to perform various maintenance activities (see Figures 2 and 3). These levels of expenditure have not kept pace with the growth of maintenance and preservation needs resulting from increases to the physical inventory and the aging of the State highway system.

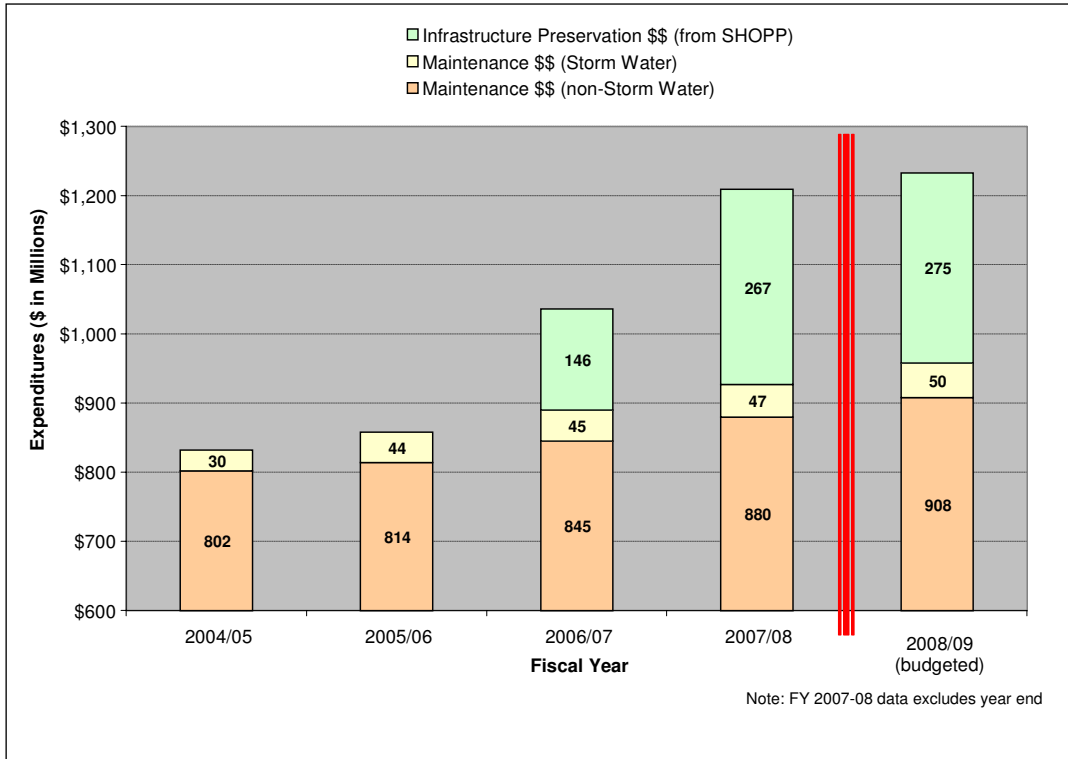


Figure 2: Five-Year Maintenance Program OE Dollar Expenditures

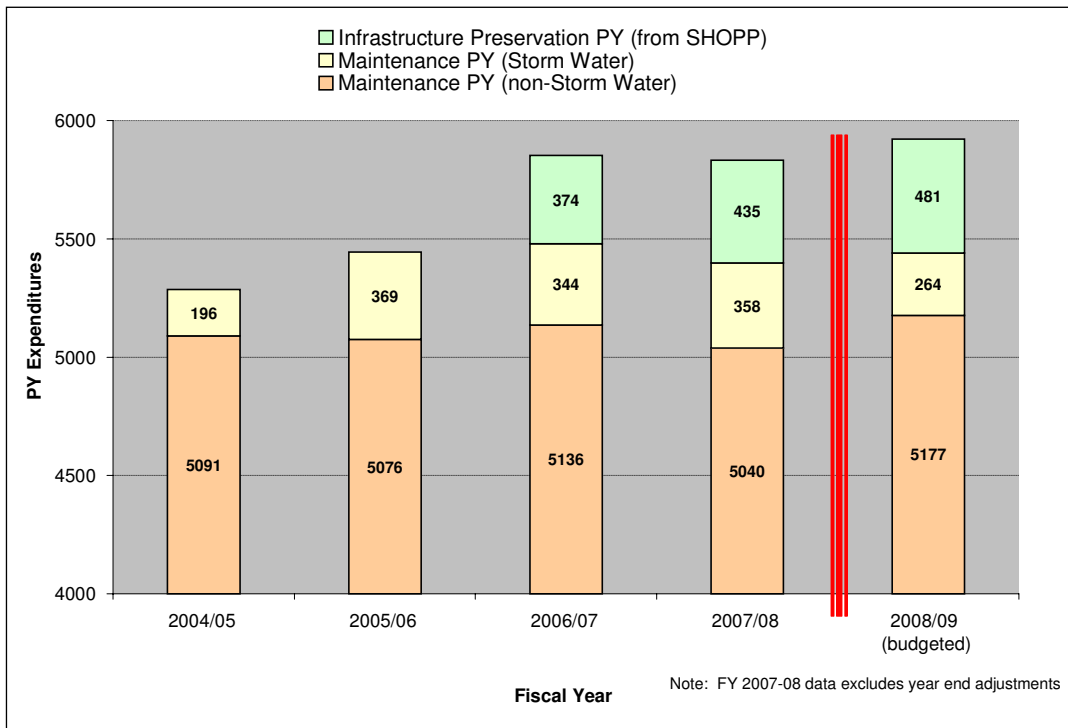


Figure 3: Five-Year Maintenance Program PY Expenditures

The 2009 Plan identifies specific strategies that minimize increases in SHOPP needs by preserving facilities and delaying the need for rehabilitation, reconstruction, or replacement. These preservation activities include overlaying thin pavement, sealing surfaces, replacing slabs, repairing bridge joints, bearings, and damaged concrete, sealing bridge decks, completing full inspection of the drainage system, and repairing culverts, inlets, and outlets to allow water to flow easily. These services will be provided mostly through contract services augmented by work done by State forces. The 2009 Plan does not include landscape preservation.

In addition to funding the major maintenance, rehabilitation, replacement, and reconstruction of pavement, bridges, culverts, and landscaping, the SHOPP also funds emergency response, collision reduction projects, mandates, various minor projects, mobility improvements, and building facility improvements (see Appendix 2, SHOPP Elements). Changes in maintenance strategies identified in the 2009 Plan will not reduce current SHOPP needs for pavement preservation. They are, however, expected to slow the growth rate of SHOPP needs.

Preservation is the most cost-effective means of protecting the State’s infrastructure investment. The 2009 Plan extends the useful life of a portion of Good pavement, and the life of all structural and drainage inventory. The average cost for one lane mile of SHOPP capital maintenance (CapM) pavement projects in FY 2007/08 was \$442,055. The average cost of pavement preservation through the maintenance program was \$90,141 per lane mile. Thus, pavement preservation and preventive maintenance have a cost-benefit ratio of about 5:1 over the least cost category of SHOPP projects. Similarly, the cost-benefit ratio for bridges is 12:1 (\$720,000 for minor-damage rehabilitation versus \$64,500 for preventive maintenance) and 2:1 for drainage (\$115,000 for rehabilitation versus \$56,000 for preventive maintenance). Preventive costs are a combination of contract services augmented by work done with State forces. Table 1 displays these cost-benefit ratios.

Table 1: Comparison of Preventive Maintenance versus Rehabilitation Costs

Component	Cost of Rehabilitation	Cost of Preventive Maintenance	Unit of Measure	Cost Benefit Ratio
Pavement	\$ 442,000	\$ 90,000	Lane Mile	5:1
Structural	\$ 720,000	\$ 60,000	Bridge	12:1
Drainage	\$ 115,000	\$ 56,000	Culvert	2:1

Figure 4 shows the relationship of preservation over that of replacement, rehabilitation, or reconstruction. It illustrates that for every \$1 invested in preserving pavement, bridge, or drainage systems, the State saves \$5, \$12, or \$2 respectively. It costs many times that amount to allow a facility to degrade and repair it later. Keeping an asset in good health costs less than restoring it; good roads actually cost less.

A facility's condition ranges from Good to Poor. Using pavement as an example, Good is a pavement condition that only requires preservation treatments, such as thin overlays or surface seals; Fair is a pavement condition that requires a minimal amount of structural repair, such as localized base repair and thick overlays to convert it to a Good condition; and Poor is a pavement condition that requires major rehabilitation or total replacement to convert the pavement to Good.

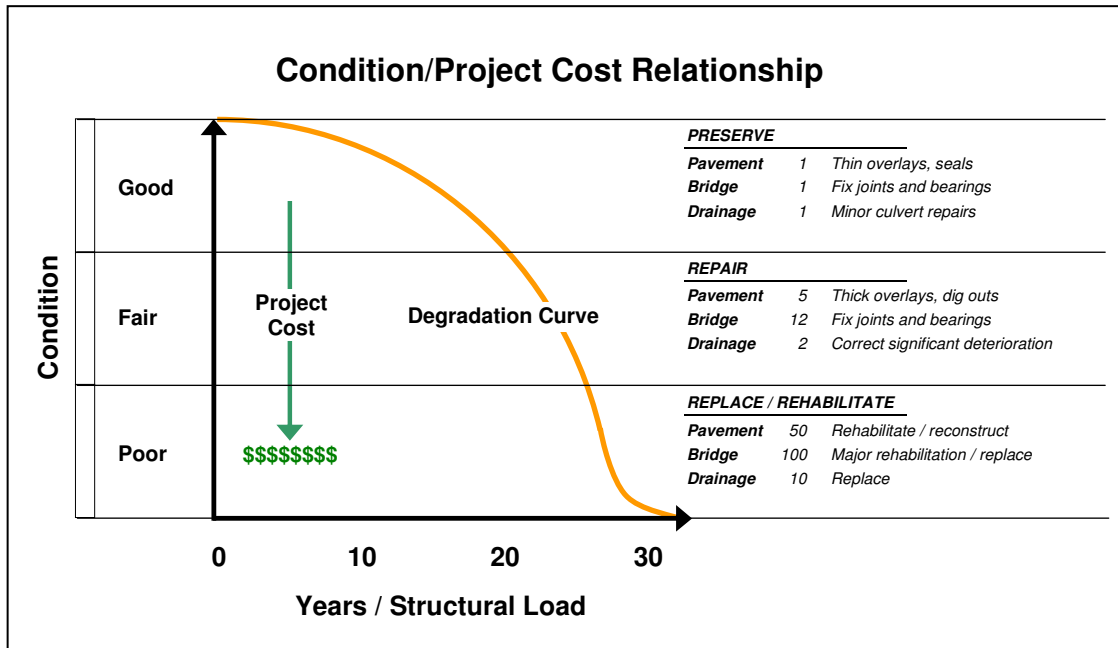


Figure 4: Preventive Maintenance Cost-Effectiveness Chart

BACKLOG STATUS AND STRATEGIES TO CONTROL COSTS / IMPROVE EFFICIENCIES

Pavement

The State highway system includes approximately 50,000 lane-miles of pavement with a replacement value of over \$1.2 trillion. Pavements have become almost equally split between urban and rural (see Figure 5), and are classified as either flexible (asphalt concrete) or rigid (cement concrete). This is important because urban lane miles have grown and urban projects are more expensive to develop and build than rural projects.

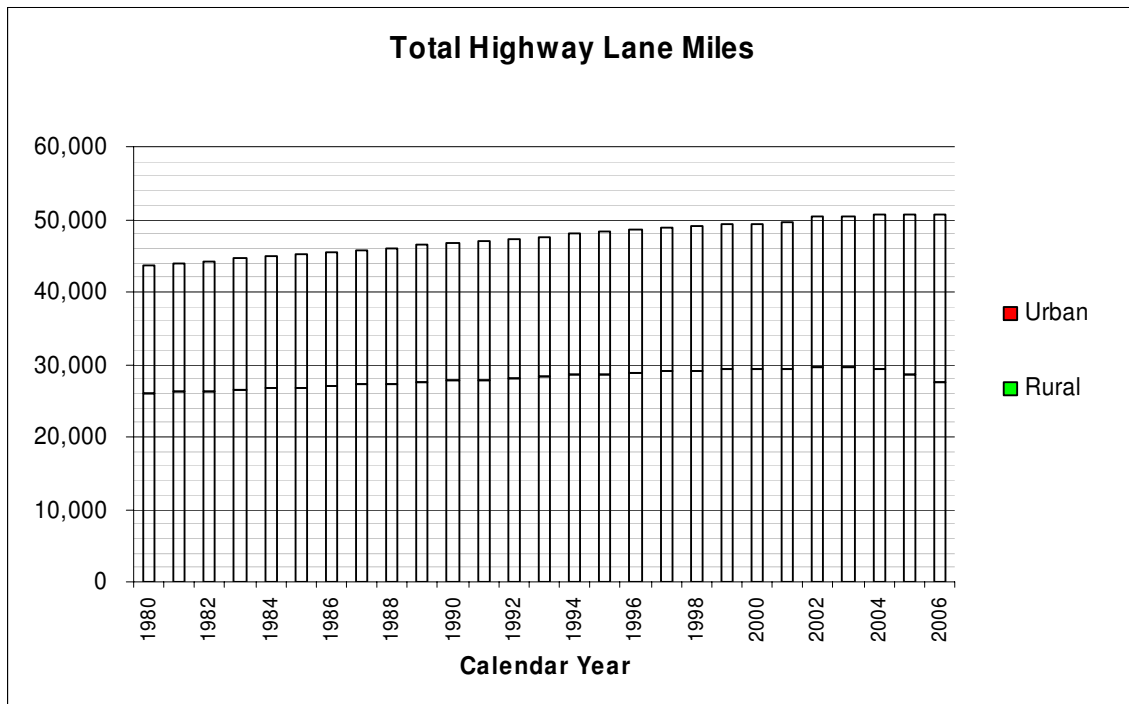


Figure 5: Highway Lane Mile Distribution

Pavement preservation is based on site-specific conditions, such as pavement type, age, surfaces, and subsurface condition, traffic volume, location, and climate. Strategies include replacing damaged slabs in rigid pavements, sealing cracks, grinding, and resurfacing. Pavement maintenance employs a mix of both low-cost and high-cost strategies ranging from \$50,000 to \$200,000 per lane mile. Typically, maintenance strategies extend a pavement's useful service life from five to seven years, depending on existing pavement condition, climate, and average daily truck traffic. Preservation and preventive maintenance treatments are applied to pavements that have a Good condition rating; current best practice for pavement management is to treat Good pavement at least once every five to seven years to most economically extend its useful life.

The investment in pavement preservation has increased over the last three years (see Figure 6). The 2007 Plan authorized a \$234 million total investment in pavement maintenance contracts and a reduced percentage in State support services (from 16 percent of capital to 12 percent).

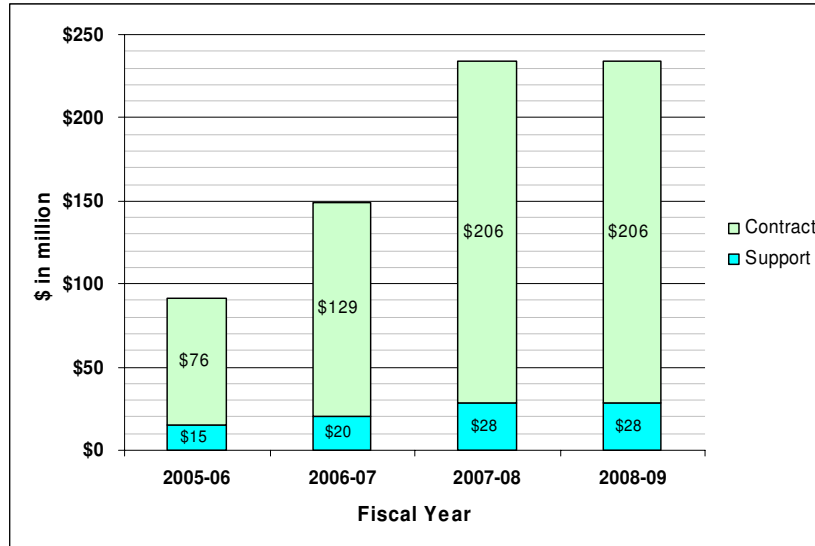


Figure 6: Pavement Maintenance Funding Over Last Three Years

The amount of pavement that was preserved over the last three years has increased accordingly (see Figure 7). At the current \$234 million funding level, approximately 2,700 lane-miles of pavement will be treated in FY 2008/09.

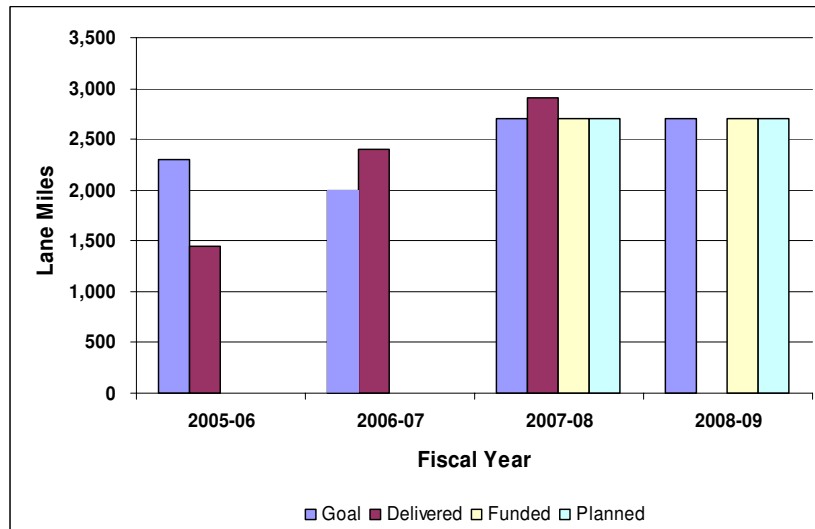


Figure 7: Accomplishments through Pavement Preservation

The Department established a goal in the 2007 Plan to keep 80 percent of the pavement inventory in Good condition, needing only preservation or maintenance treatment. The goal was revised to 70 percent in FY 2007/08 after recognizing that 70 percent was the current state and limited funding prevented increasing that goal to 80 percent.

Besides the degradation of a facility's condition (shown in Figure 4), a major factor affecting the amount of work that funding can provide is escalating construction costs. Due to the rising costs of materials and energy, construction costs have increased an average of 7 percent per year over the last ten years and are forecasted to continue to increase at least 6 percent per year after the housing market recovers. Currently the price of paving asphalt is slightly over \$600 per ton, double that of last year. These cost increases have been at least partially offset by the current bidding environment, which has resulted in lower than anticipated project bids.

Bridge

The Department's structural assets include more than 12,600 State highway bridges. The Department's objective is to manage the bridge inventory safely and economically to limit operational restrictions and prevent sudden closure or collapse. Major structural rehabilitation caused by lack of preventive maintenance is more costly and has the potential to cause significant long-term disruptions to mobility.

The 2007 Plan authorized a total investment in bridge maintenance of \$155.1 million for bridge maintenance/paint crews, major maintenance contracts, and contract support costs. The investment in bridges was projected to result in a reduction of the backlog of bridges with major maintenance needs by approximately 172 bridges per year. The resources identified in the 2007 Plan became available on July 1, 2008, and the benefits from that funding have not been fully realized at this time.

At the beginning of FY 2008/09, the number of bridges with backlogged major maintenance needs was 2,713. That number is expected to drop to 2,541 bridges by the end of FY 2008/09. The goal of the bridge maintenance program is to reduce the number of bridges with backlogged major maintenance needs to approximately 10 percent of the inventory (1,260 bridges) over time. At the current investment levels, it is expected to take approximately eight years to achieve the desired levels.

Bridge maintenance program accomplishments and expenditures are tracking closely with previous Plan projections. The growth of the backlog of bridge maintenance contract needs has flattened out through the end of FY 2006/07 as projected in the 2005 Plan. The Department is optimistic that the projected reductions identified in the 2007 Plan will be realized at the current funding levels.

The timely preventative maintenance made possible by the funding authorized by previous Plans has begun to slow the progression of bridges requiring major rehabilitation in the SHOPP. For FY 2006/07, the bridge program recorded a 25 percent reduction in new SHOPP recommendations from historic levels. This decrease in

SHOPP recommendations is a welcome trend and demonstrates that the objectives of the previous Plan are being realized.

In light of the positive developing trend in the bridge maintenance program, along with constrained funding availability, the Department is recommending that the investment in bridge maintenance remain at current levels for the 2009 Plan.

The Department is also pursuing numerous activities to maximize efficiencies and control the costs of bridge preservation. Among these are the use of new materials that last longer and are easier to apply (epoxy paints, polyester concretes, corrosion resistant rebar, and design details). The Department is implementing policies to ensure new projects are constructed with cost-effective and easily maintainable elements. In addition, the Department is reviewing the activities of other state departments of transportation on an ongoing basis to ensure that the best business practices are employed in California.

California is recognized as a worldwide leader in the management of bridge infrastructure. The Department employs highly-trained licensed civil engineers to perform regularly scheduled inspections and identify site-specific maintenance and rehabilitation needs. The Department prioritizes these needs using a variety of methods that include techniques to optimize preservation expenditures and minimize life-cycle costs, while maintaining safe and reliable bridges.

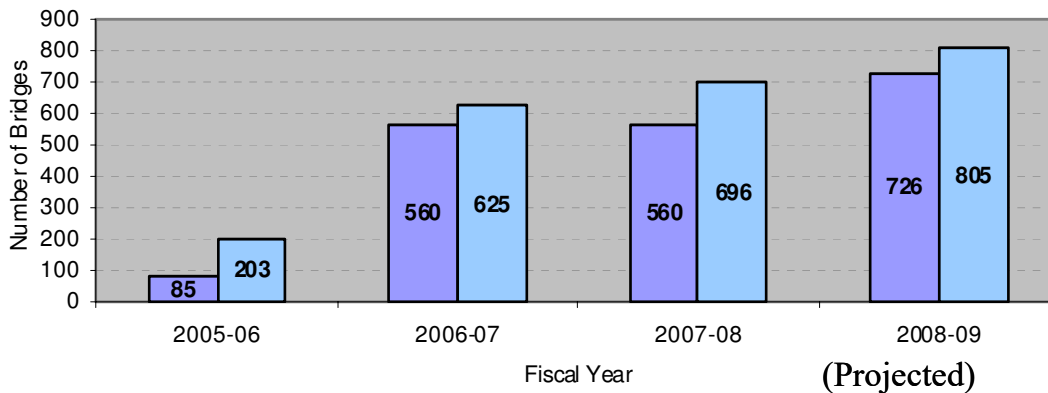


Figure 8: Accomplishments through Bridge Preventive Maintenance

Drainage

The State highway system includes an estimated 205,000 culverts. These culverts drain the State's highways, serving as conduits for streams, drainage channels, and other waterways to flow under the highways. Culvert damage or failure can seriously damage the roadway, create the need for extensive repairs, and threaten the mobility and safety of the traveling public.

The 2007 Plan provided for continuation of a proactive inspection program to identify damaged or failed culverts. Of approximately 39,000 culverts that have been assessed to date, about 36 percent require some form of maintenance. Of these, 23 percent are in need of corrective maintenance, 11 percent need either rehabilitation or replacement, and 2 percent are considered critical enough to require immediate emergency work. The category "Needs Corrective Maintenance" is the fastest growing segment of the culvert inventory. This category has grown 71 percent from the 2007/08 fiscal year. The categories "Rehabilitation/Replacement" and "Catastrophic" have grown by 58 percent. The category "No Deficiencies" increased by 42 percent.

Using 23 percent as a baseline (for corrective maintenance) and assuming the Department will be able to perform 14,000 assessments per year, an additional 3,220 culverts may be identified as needing corrective maintenance work each year. The Department would have to address this additional workload each year to prevent backlog growth. The estimated cost for dealing with an additional 3,220 culverts per year requires an increased investment of \$180 million annually. This increase will be difficult to fund and, if redirected from the SHOPP, could drastically decrease funds for other needed pavement and bridge rehabilitation projects. Until the inventory is more complete and a large percentage of the needed rehabilitation work funded, no additional funding for preventive drainage work will be requested.

The Culvert Inspection Program will continue to improve the understanding of the circumstances leading to culvert failure, and that knowledge will potentially lead to changes in design specifications, construction methods, and/or materials for improved culvert performance. Management procedures have been developed to measure the health of drainage systems, prioritize potential culvert projects based on condition, cost, and traveler delay (measured both by traffic volume and detour length), and track accomplishments and delivery schedules of maintenance work. In addition, the use of Geographic Information Systems (GIS) will assist in reevaluating watersheds to ensure that culverts are meeting current design standards and will improve workforce expertise and the ability for quick response to emergency situations involving culverts.

Preventive maintenance for culverts is performed by a combination of State forces and contract work. The 2007 Plan identified repair of 230 culverts and estimated an inspection rate of 14,000 culverts annually. Although only 11,689 culverts were inspected during FY 2006/07, the inspection rate is expected to increase to meet the goal this year. Refer to Figure 9 for a graphical representation of the culvert inspection and

preventive maintenance project accomplishments over the past three fiscal years and those planned for FY 2008/09.

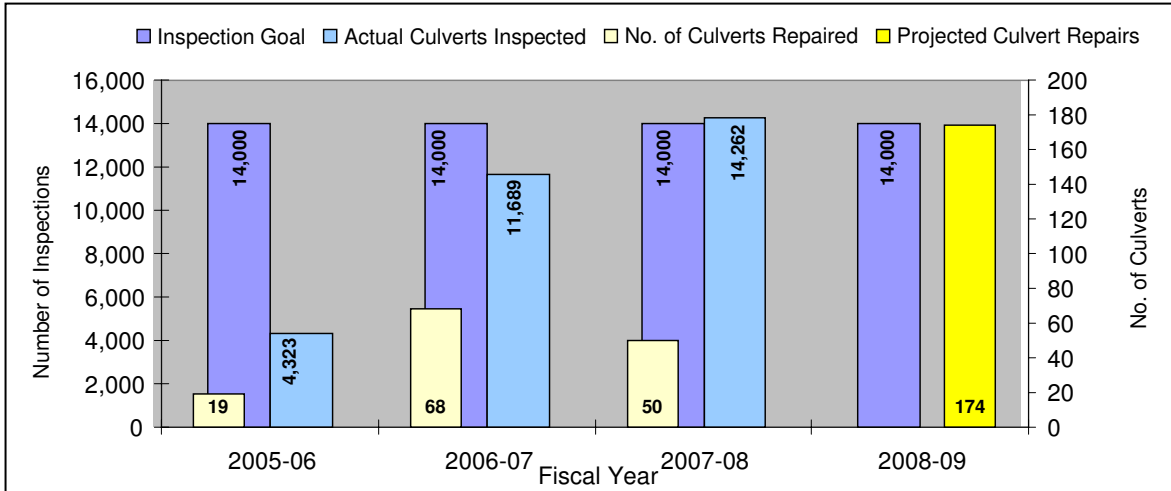


Figure 9: Drainage Preservation and Culvert Inspection Accomplishments

MAINTENANCE PROGRAM BUDGET MODEL

The Maintenance Program budget model uses a combination of expenditures, highway system inventory, and performance measurement data to project future maintenance resource needs and performance expectations for each of the Department's 12 districts.

Historically the Maintenance Program established a multidistrict perspective by grouping the Department's 12 districts into sets of "comparable" characteristics (generalized information on geographic, population, and traffic volume characteristics). This allows the Department to compare the results of similar districts to highlight activities where a district may be under-performing relative to other districts.

The Maintenance level of service (LOS) evaluation system is the performance measurement tool for roadside, drainage, traffic guidance, and electrical maintenance activities. Each activity receives a target LOS based on its percentage of Safety, Preservation, and Service priorities and the emphasis given to each of those priorities by the Maintenance program. Using a linear formula, the current budget model assumes that an increase or decrease in resources will produce a corresponding increase or decrease in LOS.

The Department is working to update the existing budget model from a district-level tool, to a more precise county/route-level, performance-based budgeting tool.

Development updates include:

- , Awarding a contract to develop the budget model to be completed by March 2009 focused on performance-based budgeting.
- , Replacing the current district comparisons with comparisons of county routes with similar characteristics, for example routes with low traffic volumes in the desert, the Department has developed 30 such combinations or "zones" and has identified GIS mapping of all county routes for all 12 districts.
- , Developing a working group to provide the contractor with data and subject matter experts to develop this next generation budget model.
- , Developing a six-member steering committee consisting of five District Deputy Directors for Maintenance and chaired by the Chief, Division of Maintenance to provide guidance and direction on the development and implementation of the budget model.
- , Analyzing the updated budget model data that will identify resource needs of the newly-zoned county routes.
- , Determining performance and funding relationships between each activity.

Implementation updates include:

- , Determining the optimum level of funding in relation to performance and the points and rate of diminishing returns of each activity and function.
- , Demonstrating the gain or loss in performance relative to a proposed change in resources and establishing workload standards relative to performance.
- , Expanding sampling of LOS data to capture representation in all 30 zones.
- , Assisting decision makers in determining the best course of action relative to budgetary and performance issues. This will allow the Department to determine impacts due to new mandates and activities with greatest resource needs and to predict funding and capital needs in future years based on current year actions and decisions for budget change proposals (BCP).
- , Using the updated budget model to produce a performance-based budget annual allocation and the data to support such BCPs.

The Department uses a Pavement Condition Reporting System and a programmatic pavement treatment analysis tool to identify pavement conditions and forecast the impacts that various funding levels would have on the overall condition of pavement statewide.

Over the next two years, the Department is transforming the pavement budget model from a reactive worst-first model to one where projects are selected based on pavement degradation curves, identifying locations where less expensive corrective work will prevent the pavement from becoming distressed, thus avoiding or delaying more costly solutions. These revisions are the result of 2008/09 Finance Letter No.10, which funded an engineering analysis, a pavement structure inventory, and an initial automated pavement condition survey. All of these are needed to develop degradation curves.

Additionally, the Department plans to pursue development of a robust pavement management system in FYs 2009/10 and 2010/11. This system would better forecast overall system performance, assess individual project impacts, and perform overall highway pavement network analysis. The budget model used to forecast for the 2009 Plan is a programmatic estimating tool, which tracks historical data and approximates future pavement conditions, given various funding scenarios.

The Department's annual State of the Pavement Report includes an overall metric for communicating how the Department's pavement program is performing. The specific quantifiable goals for pavement maintenance address the number of lane miles of highway that can benefit from maintenance treatments, how many treatments are needed annually, how many miles have been treated, and the pavement condition outcome of the

actual work. Currently, pavement condition is rated in three categories: Good, Fair, and Poor (green, yellow, and red), as discussed on page 7 and shown in Figure 4. With the advent of improved pavement condition surveys and implementation of a pavement management system, pavement condition ratings can be more detailed. Starting with the 2013 Plan, there are expected to be five categories of pavement, ranging from Very Good to Very Poor. The Department will then be able to identify pavement sections that currently transition from Good to Fair unavoidably, and the project type and funding level to sustain Good pavement sections regardless of their age.

All maintenance activities in pavement, structures, and drainage provide pro-active measures that reduce the rehabilitation needs in the SHOPP. As required by Section 164.6b of the Streets and Highways Codes, these maintenance activities help reduce the backlog of maintenance with recommended strategies for funding.

ANALYSIS OF ALTERNATIVE LEVELS OF INVESTMENT

Eliminate Backlog in Ten Years

Pavement

In FY 2006/07, pavement maintenance capital funding was \$149 million. The 2007 Plan added \$85 million in FY 2007/08 pavement investment for a total of \$234 million (\$206 million capital plus \$28 million in support) to address the preservation needs of 2,700 lane miles of Good pavement. The most cost-effective plan for keeping Good pavement at that rating is to apply a preservation treatment once every five to seven years, which translates to a need for such treatment of at least 7,000 lane miles per year. It is similar to painting a bridge: once one reaches the end, it’s time to start at the beginning again. It has been seven years since the first 1/7th of the pavement in the system was treated.

Based on current estimates and forecasts using the stated pavement maintenance assumptions, the level of funding for 2,700 lane miles is not adequate to prevent an increase in the backlog of pavement maintenance needs. The current level of investment does not arrest the backlog increase and cannot maintain the percentage of Good pavement, whether it’s over a five-year or ten-year period. As the amount of SHOPP funding decreases, fewer lane miles of substandard pavement gain a Good rating to offset an increasing amount that has a Fair rating. Considering only the pavement that unavoidably transitions from a rating of Good to Fair, approximately \$390 million in CapM project needs will be added to the equation. Table 2 summarizes the 2009 Plan’s allocation, goals, backlog, and SHOPP avoidance details of the FY 2008/09 pavement baseline.

Table 2: Pavement Cost Estimate – Annual FY 2008/09 Baseline

Personnel Years	Allocation (In Millions)	Accomplishment Goals	Change in Backlog	Future SHOPP Cost Avoidance (In Millions)
266	\$ 234	2,700 Lane Miles	2,389 Lane Miles Increase	(\$ 1,054)

The investment analysis for pavement in the 2009 Plan assumes:

1. SHOPP funding for pavement is \$200 million over a five- or ten-year period.
2. Most of SHOPP funding for pavement rehabilitation is focused on repairing Fair pavements using CapM strategies.
3. The 2009 Plan for pavement includes construction costs escalated at 3.5 percent in FYs 2008/09 and 2009/10, and 6 percent per annum thereafter. (Previous Plans did not include the impacts of forecasted construction cost increases.)

4. The backlog is based on a seven-year preservation cycle for keeping Good pavements in that category.

The 2009 Plan recognizes a forecasted increase in the overall percentage of distressed pavement, which is partly due to the reduced level of annual funding for the pavement portion of the 2008/09 SHOPP. Any increase in maintenance funding would most likely be transferred from the SHOPP allocation instead of coming from new funding, and, if it all came from the pavement element of the SHOPP, the outcome and overall condition rating of the highway system would be similar. Table 3 shows the expected funding associated with pavement maintenance, SHOPP and other resources over the next five years.

Table 3: Five-Year Overall Pavement Funding Plan

Source	FY				
	08-09	09-10	10-11	11-12	12-13
	(In Millions)				
Maintenance (HM1 Preservation)	\$206	\$206	\$206	\$206	\$206
Proposition 1B SHOPP	\$66				
GARVEE	\$310		\$335	\$148	
2008 SHOPP	\$200	\$200			
2010 SHOPP			\$200	\$200	\$200
SHOPP Total	\$576	\$200	\$535	\$348	\$200
Grand Total	\$782	\$406	\$741	\$554	\$406

Bridge and Drainage

The 2007 Plan annual funding for bridge and drainage was \$137 million, and the backlog consisted of 2,544 bridges and 2,296 culverts. With a planned annual funding level increase of \$62.1 million beginning in FY 2008/09, and adjusting for actual budget actions, the current total amount for the two components has increased to \$178.1 million. With this level of investment:

- The backlog of maintenance needs for bridges is expected to be reduced.
- The rate of increase in the backlog of maintenance needs for drainage facilities is expected to be reduced.

In FY 2008/09, \$41.1 million was funded from SHOPP for bridges to reduce the backlog by 172 bridges. Table 4 summarizes the costs, goals, backlog, and SHOPP avoidance details of the bridge and drainage of this alternative.

Table 4: Eliminate Backlog in Ten Years – Annual Cost, Backlog, and SHOPP Avoidance Details

Component	Personnel Years	Allocation (in Millions)	Accomplishment Goals	Change in Backlog	Future SHOPP Cost Avoidance (In Millions)
Bridge ¹	361	\$ 155	732 Bridges	172 Decrease	\$ 1,861
Drainage	188	\$ 23	585 Culverts 14,000 Inspections	1,655 Increase	\$ 115
Totals	549	\$ 178			\$ 1,976

(1) Structural increases of \$41.1 million include \$31.2 million in bridge preventive contracts funded in the SHOPP, and 97 PYs and \$9.9 million for contract delivery. Includes State repair crews, materials, equipment rental, contract dollars, and support.

Eliminate Backlog in Five Years

Pavement

In FY 2006/07, pavement maintenance capital funding was \$149 million. The 2007 Plan added \$85 million in FY 2007/08 pavement investment for a total of \$234 million (\$206 million capital plus \$28 million in support) to address the preservation needs of 2,700 lane miles of Good pavement. The most cost-effective plan for keeping Good pavement at that rating is to apply a preservation treatment once every five to seven years, which translates to a need for such treatment of at least 7,000 lane miles per year. It is similar to painting a bridge: once one reaches the end, it's time to start at the beginning again. It has been seven years since the first 1/7th of the pavement in the system was treated.

Based on current estimates and forecasts using the stated pavement maintenance assumptions, the level of funding for 2,700 lane miles is not adequate to prevent an increase in the backlog of pavement maintenance needs. The current level of investment does not arrest the backlog increase and cannot maintain the percentage of Good pavement, whether it's over a five-year or ten-year period. As the amount of SHOPP funding decreases, fewer lane miles of substandard pavement gain a Good rating to offset an increasing amount that has a Fair rating. Considering only the pavement that unavoidably transitions from a rating of Good to Fair, approximately \$390 million in CapM project needs will be added to the equation. Table 2 summarizes the 2009 Plan's allocation, goals, backlog, and SHOPP avoidance details of the FY 2008/09 pavement baseline.

The investment analysis for pavement in the 2009 Plan assumes:

1. SHOPP funding for pavement is \$200 million over a five- or ten-year period.

2. Most of SHOPP funding for pavement rehabilitation is focused on repairing Fair pavements using CapM strategies.
3. The 2009 Plan for pavement includes construction costs escalated at 3.5 percent in FYs 2008/09 and 2009/10, and 6 percent per annum thereafter. (Previous Plans did not include the impacts of forecasted construction cost increases.)
4. The backlog is based on a seven-year preservation cycle for keeping Good pavements in that category.

The 2009 Plan recognizes a forecasted increase in the overall percentage of distressed pavement, which is partly due to the reduced level of annual funding for the pavement portion of the 2008/09 SHOPP. Any increase in maintenance funding would most likely be transferred from the SHOPP allocation instead of coming from new funding, and, if it all came from the pavement element of the SHOPP, the outcome and overall condition rating of the highway system would be similar. Table 3 shows the expected funding associated with pavement maintenance, SHOPP and other resources over the next five years.

Bridge and Drainage

With increased annual Maintenance funding of more than \$504 million, all existing backlog of bridge and drainage maintenance work would be eliminated over a five-year period. Future SHOPP needs would be significantly less than under the “Eliminate Backlog in Ten Years scenario.” If funds were available beginning in FY 2008/09, the backlog of bridge and culvert projects could be reduced to zero in five years. At that point, annual maintenance funding could be decreased for those categories. Table 5 summarizes the costs, goals, backlog and SHOPP avoidance details of this alternative.

Table 5: Eliminate Backlog in Five Years – Annual Allocation, Backlog, and SHOPP Avoidance Details

Component	Personnel Years	Allocation (In Millions)	Accomplishment Goals	Decrease in Backlog	Future SHOPP Cost Avoidance (In Millions)
Bridge ¹	585	\$ 259	1,144 Bridges	584	\$ 3,108
Drainage ²	1,042	\$ 306	4,043 Culverts 39,600 Inspections	1,803	\$ 1,530
Totals	1,627	\$ 565			\$ 4,638

(1) Includes State repair crews, materials, equipment rental, contract dollars, and support.

(2) Includes State repair crews, materials, equipment rental, contract dollars, and support. In addition, the drainage strategy is to implement a fully funded statewide inspection program.

CONCLUSION/RECOMMENDATION

By approving the 2007 Plan, the Governor and the Legislature underscored the importance of completing critically needed maintenance work to California's infrastructure as a way to protect the State's unique quality of life and enable its economic competitiveness in the global marketplace.

The best use of transportation resources is the optimum combination of funding for preventive maintenance work and SHOPP projects. This recommendation supports, and is consistent with, the principles of "Go California" by supporting the wise investment of existing funding with a vision of maintaining safety and mobility.

Because of the current state of the economy and difficulty in obtaining additional funding for transportation, the 2009 Plan recommends no funding changes for pavement, bridge, or drainage maintenance programs.

Appendix 1 - Streets and Highways Code, Section 164.6

Senate Bill 1098, Chapter 212, Statutes of 2004, amended Section 164.6 of the Streets and Highways Code to read:

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 2 - SHOPP Elements

Element	Category	Acct Code
Bridge	Bridge Rehabilitation	201.110
	Bridge Scour Mitigation	201.111
	Bridge Rail Replacement/Upgrade	201.112
	Bridge Seismic Restoration	201.113
	Bridge Widening	201.114
	Preventative Maintenance	201.119
	Trans Permit Requirements for Bridges	201.322
Roadway (Pavement)	Pavement Preservation (CAPM)	201.121
	Pavement Rehabilitation (2R)	201.122
	Roadway Rehabilitation (3R)	201.120
	Long-Life Pavement Corridors (4R)	201.125
Roadway (Other)	Roadway Protective Betterment	201.150
	Drainage System Restoration	201.151
	Signs and Lighting Rehabilitation	201.170
Roadside	Highway Planting Restoration	201.210
	Freeway Maintenance Access	201.230
	Roadside Safety Improvements	201.235
	Roadside Enhancement	201.240
	Roadside Modernization	201.245
	Safety Roadside Rest Area Restoration	201.250
	New Safety Roadside Rest Areas	201.260
Facilities Improvements	Equipment Facilities	201.351
	Maintenance Facilities	201.352
	Office Buildings	201.353
	Materials Lab	201.354
District Projects	Minor A	
	Minor B	
Emergency	Emergency Damage Repair	201.130
	Permanent Restoration	201.131
	Roadway Protective Betterment	201.150
Collision Reduction	Safety Improvements	201.010
	Collision Severity Reduction	201.015
	Median Barrier Upgrade	201.020
Mandates	Relinquishments	201.160
	Noise Attenuation for Schools	201.270
	Railroad	201.325
	Hazardous Waste Mitigation	201.330
	Storm Water	201.335
	Americans With Disabilities Act Curb Ramp	201.361
	Pedestrian Infrastructure	NEW
Mobility Improvements	Operational Improvements	201.310
	Transportation Management Systems	201.315
	Weigh Stations and Weigh In Motion Facilities	201.321