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Toll Bridge Seismic Retrofit Program

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This presentation document is only intended to outline selected portions of the report. For a more complete explanation of the points outlined in this document, please refer to the report.

Report 2004-140 ***Department of Transportation: Various Factors Increased Its Cost Estimates for Toll Bridge Retrofits, and Its Program Management Needs Improving*** **(December 2004)**

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AUDIT SCOPE

BACKGROUND INFORMATION

Compared cost estimates prepared under AB 1171 (Chapter 907, Statutes of 2001) and those supporting Department of Transportations' (Caltrans) August 2004 report and reviewed the methodology for estimating capital and support costs.

Focused on the East Span of the San Francisco-Oakland Bay Bridge and the Richmond-San Rafael Bridge because these projects accounted for 99 percent of the cost increases for specific bridges.

- Analyzed cost changes on these projects to determine where significant variances occurred and whether these cost factors were unforeseen at the time of AB 1171.

Interviewed Caltrans staff and program managers and evaluated documentation to ascertain the reasons for the increases.

Examined supporting documentation for Bechtel Infrastructure Corporation's (Bechtel) August 2004 cost review of the program.

Compared program cost increases and their causes with those that occurred in similarly large projects managed by Caltrans for Bay Area Toll Authority's (BATA) measure 1 program.

Compared Caltrans management of the program to project management best practices as described in the Project Management Body of Knowledge, Federal Highway Administration (FHWA) guidance for major projects, and Caltrans' internal project management handbooks.

Focused on management of risk, cost, and communications with external stakeholders.

- **Risk management:** Evaluated Caltrans' risk management planning and its processes for risk identification, quantification, mitigation, and tracking for the East Span.

- **Cost management:** Ascertained whether Caltrans regularly prepared program-wide estimates of costs and contingency reserves and kept them updated.

- **External communications:** Ascertained whether Caltrans regularly supplied updated and reasonably accurate reports, incorporating estimates of project costs and contingency reserves, of the status of the overall program, to critical stakeholders—the Legislature, FHWA, and the Metropolitan Transportation Commission (commission).

AUDIT HIGHLIGHTS

Cost estimates have increased $3.2 billion since April 2001, including a $900 million program contingency reserve.

- ☑ Caltrans' 2001 cost estimate amounted to $5.1 billion, including a $448 million program contingency reserve to cover unforeseen costs. At that time, Caltrans projected that the program would be completed in 2009.

- ☑ In August 2004, Caltrans informed the Legislature that the program could cost $8.3 billion—$7.4 billion for specific projects and a $900 million contingency reserve for possible cost increases on those projects—and would be completed no sooner than 2013.

Approximately $930 million of the $3.2 billion increase relates to the May 2004 bid for the superstructure of the signature span of the San Francisco-Oakland Bay Bridge's east span; the remainder is attributable to other cost categories.

Various factors have driven cost increases including volatile markets for steel and contractor services, a lengthening of the East Span's timeline, and Caltrans' past experience with the program, which is reflected in contingency reserves.

Caltrans neglected several important aspects of generally accepted standards for project management. Specifically:

- ☑ Caltrans did not create a comprehensive risk management plan for the East Span, and lacked processes to identify, track, and quantify risks throughout this project's life.

- ☑ Caltrans did not regularly update its cost estimates for some components of the East Span or the entire program. Caltrans' cost update for the August 2004 report to the Legislature was its first program-wide update of cost estimates since April 2001.

- ☑ Caltrans failed to disclose information to the Legislature according to the law's regular reporting schedule and disclosed huge cost overruns long after it should have been aware of them.

- ☑ In November 2003, Caltrans' financial plan update to the FHWA did not reveal the probable extent of estimated program costs. At that time, based on internal reports, Caltrans should have known that the program was over budget.

Various Factors Have Dramatically Increased Estimated Costs

RISING COSTS AND DELAYS PLAGUE COMPLETION OF THE STATE'S LARGEST PUBLIC SAFETY PROJECT

Caltrans' 2001 estimates formed the basis for the program budget the Legislature adopted in AB 1171. In August 2004, Caltrans reported to the Legislature cost estimates that were $3.2 billion, or about 63 percent higher, than the estimates it prepared in April 2001.

Caltrans reevaluation of program costs was triggered in May 2004 by receiving the sole bid for the signature span's superstructure, which exceed Caltrans' 2001 estimate by $930 million.

After this event, the commission hired Bechtel to review Caltrans' estimate of costs to complete the program. Bechtel agreed on a program cost estimate of $8.3 billion, including a $900 million program contingency reserve.

As Table 3 on the following page shows, the revised cost estimate for individual toll bridges was about $2.8 billion more than the cost estimates used for AB 1171, while the program contingency rose by $452 million.

Of these increases, Caltrans estimates that about $2.5 billion relates to higher costs for the East Span.

The small variances for the remaining five bridges in the table were not surprising because these bridges were substantially complete when Caltrans recalibrated the program budget in 2001.

Most of the Program's Significant Increase in Cost Estimates and Program Delays Relate to the East Span

- More than 90 percent, or $2.5 billion, of the cost increase for specific bridges relates to the East Span replacement project, which has a number of components, including the signature span, the skyway, and the demolition of the existing bridge.

- The cost estimate for the signature span rose by more than $1.3 billion, or 162 percent.

- The cost for the skyway component that remained in the East Span design rose by $564 million, or 61 percent.

- The remainder of the East Span composed of 12 components rose by $618 million, or 73 percent.

In total, it appears that the East Span costs, including amounts related to the program contingency, total about $5.9 billion.

TABLE 3

The Toll Bridge Seismic Retrofit Program Has Experienced Significant Increases in Projected Costs (Dollars In Millions)

Toll Bridges	AB 1171 Estimate	Caltrans' August 2004 Estimate	Projected Cost Increase/(Decrease)	Percentage Increase/(Decrease)
San Francisco-Oakland Bay Bridge				
Skyway	$ 926	$1,490	$ 564	61%
Signature span	830	2,178	1,348*	162
Other East Span projects†	844	1,462	618	73
Subtotals, East Span Replacement‡	**2,600**	**5,130**	**2,530**	**97**
West Span Retrofit and Approach Replacement§	700	737	37	5
San Francisco-Oakland Bay Bridge Totals	**3,300**	**5,867**	**2,567**	**78**
Richmond-San Rafael Bridge‖	665	914	249	37
San Mateo-Hayward Bridge#	190	165	(25)	(13)
Benicia-Martinez Bridge#	190	180	(10)	(5)
Carquinez Bridge#	125	115	(10)	(8)
San Diego-Coronado Bridge#	105	105	0	0
Vincent Thomas Bridge#	62	59	(3)	(5)
Subtotals, Project Specific	**4,637**	**7,405**	**2,768**	**60**
Program Contingency	448	900	452	101
Grand Totals	**$5,085**	**$8,305**	**$3,220**	**63%**

Sources: Chapter 907, Statutes of 2001 (AB 1171), and the Caltrans August 2004 report.

* The signature span projected cost increase is comprised of $930 million related to the sole bid for the superstructure, $146 million related to support costs, $122 million related to increased reserves, $100 million related to other contracts, and $50 million related to miscellaneous items.

† Other projects needed to complete the East Span, including the South/South Detour, Yerba Buena Island structures, Oakland Touchdown, and the demolition of the existing bridge.

‡ The East Span construction is 25 percent complete as of the Caltrans August 2004 report.

§ The West Span retrofit is 100 percent complete and the West Approach construction is 25 percent complete as of the Caltrans August 2004 report.

‖ Bridge retrofit is 85 percent complete as of the Caltrans August 2004 report.

Bridge retrofit is 100 percent complete as of the Caltrans August 2004 report.

In August 2004, Caltrans expected the program to be completed by 2013, four years later than it estimated in 2001. This delay can be attributed almost entirely to the signature span.

Caltrans postponed the bid opening five times during the advertisement period to allow bidders more time to prepare their bids, which delayed the project by almost one year.

Caltrans also agreed to give contractors three more years than it originally envisioned to complete their work to attract as many bidders as possible and to address potential bidders concerns about the time needed to construct the signature span superstructure.

VARIOUS FACTORS CONTRIBUTED TO THE HIGHER COST ESTIMATES AND DELAYS

The multiplicity of factors, along with the limited access Caltrans has to the proprietary data that supports contractors' bids, makes it difficult to attribute dollar effects to specific causes.

According to standard provisions in Caltrans' contracts for the program, a contractor must submit all documentary information used in preparation of its bid.

> Caltrans has only 48 hours after receipt to examine the bid documentation to make sure it is authentic, legible, and includes the necessary documentation to support the bid before sealing it and depositing it in an agreed upon commercial bank for storage.
>
> After this point, Caltrans and the contractor may retrieve and jointly review the bid documentation in order to assist in the negotiation of price adjustments and change orders or to assist in the resolution or settlement of claims or disputes.

Caltrans could not provide detailed support for the increased costs it attributed to particular factors in its communications with the Legislature in August 2004. Caltrans stated that the amounts were based on professional judgment and that there was no documentary support that identified the methodology or calculations attributed to each factor.

Nevertheless, when we compared Caltrans' two cost estimates, from 2001 and 2004, we found that much of the program's cost increases occurred in several areas such as structural steel, contractor overhead, and support costs.

Categories with the most significant cost increases include:

- Contractor overhead.
- Structural steel.
- Contingency reserves for the East Span's skyway and signature span.
- Support costs for the East Span.
- Program contingency reserves.

We reviewed cost categories for the skyway, signature span, and the Richmond-San Rafael Bridge projects and our analysis points to the following market and project developments that led to higher estimates for these cost categories:

- Higher steel prices.
- Lengthened schedules that increase the need for contractor overhead and Caltrans support.
- Escalation that Caltrans did not apply to the entire life of the projects at the time of AB 1171.
- Difficulties with underwater work.
- Recognition of significant continuing risk that led to increased contingency reserves.

Table 4 on the following page shows that a few types of costs account for most of these projects' cost increases.

TABLE 4

Amounts of Increases in Various Cost Categories (In Thousands)

	San Francisco-Oakland Bay Bridge			
	Skyway	Signature Span	Skyway and Signature Span	Richmond-San Rafael Bridge
Cast-in-place concrete	$ 27,026	$ 52,453	$ 79,479	$ 321
Core concrete/drill and bond/ prestressing	8,683	4,476	13,159	1,878
Environmental preservation	2,286	279	2,565	210
Excavation and cleanup	8,125	136	8,261	21,855
Marine access	NA*	43,000	43,000	NA
Micropiles	NA	NA	NA	14,211
Other materials and services	(72)	10,458	10,386	1,750
Contractor overhead	178,187	406,769	584,956	11,455
Pilings	23,007	5,010	28,017	11,577
Precast concrete	51,647	NA	51,647	1,931
Removal and demolition	NA	1,200	1,200	271
Roadway	(390)	4,284	3,894	NA
Seismic safety	8,757	10,337	19,094	641
Structural steel and miscellaneous metal	99,605	498,332	597,937	35,830
Temporary items	2,186	NA	2,186	253
Traffic control and safety	286	(1,498)	(1,212)	3,082
Utility work and services	2,122	20	2,142	928
Water pollution control measures	(225)	NA	(225)	173
Reserves	85,872	121,623	207,495	107,657
Other items†	761	45,199	45,960	(4,023)
Subtotals, Capital outlay increases	**$497,863**	**$1,202,078**	**1,699,941**	**210,000**
Capital outlay increases other East Span projects			334,000	
Support cost increases for East Span			496,000	
Support cost increases for Richmond-San Rafael Bridge				39,000
Totals, Project Cost Differences			**$2,529,941**	**$249,000**

Sources: Caltrans' April 2001 and August 2004 cost estimates.

NA = Not applicable.

* Marine access was a separate category in the skyway estimate used for AB 1171, but the item was included under the contractor overhead category in the project bid.

† Other items include supplemental work, state-furnished materials, and minor differences.

Volatile Market Conditions Contributed to Cost Increases for Materials

Structural steel items greatly increased from the AB 1171 estimate made in 2001 to the May 2004 contractor's bid.

Caltrans saw a $498 million, or 137 percent, increase in the cost of structural steel items for the signature span.

Part of this increase is attributable to a significant increase in the price of structural steel in the first half of 2004.

According to an industry index that Caltrans engineers use to monitor steel price fluctuations, the industry experienced a 26 percent increase in structural steel prices in the first half of 2004.

We applied this percentage to the AB 1171 estimate of $365 million in structural steel costs for the signature span to get a rough idea of its impact on materials costs, and the computation yields $95 million in extra structural steel costs.

Although steel prices played a part in rising costs, increases in some bid items are well over what can be explained by a general increase in steel prices.

- At the time of AB 1171, when the bridge design was about 65 percent complete, Caltrans estimated that temporary towers would cost $10 million. The 26 percent increase in structural steel prices in the first half of 2004 would increase this estimate to $12.6 million.

- However, in April 2004, after the sharp increase in steel prices, Caltrans' internal estimates indicated that the probable bid amount for the temporary towers would be nearly $70 million.

- In the single bid Caltrans received in May 2004, the temporary towers were estimated at $215 million, far beyond the amount by which higher steel prices would have increased the cost.

We asked Caltrans to explain the significant increase, specifically questioning whether a portion of it could be explained by a difference in quantity.

According to the director, the consulting firm used to estimate the cost and materials for the temporary towers verified that its quantity estimates are still valid.

Caltrans indicated that the higher than expected bid amount is due to a number of factors including:

- The bidder may have included in that amount the costs for the heavy equipment used to lift the deck into place instead of putting those costs in other line items.

- The bidder may have incorporated an amount to reflect risk related to how long the temporary towers would have to support the permanent work.

- Cash flow may have played a role. The bidder may have moved amounts from another line item into the temporary tower line item in order to receive contract payments earlier.

Caltrans Underestimated the Contractor's Overhead as a Share of Construction Costs

In estimating costs for the East Span's skyway and signature span, Caltrans underestimated the contractor's overhead as a proportion of total project capital costs.

The signature span and the skyway bids included separate lump-sum amounts for time-related overhead and mobilization.

> Caltrans defines time-related overhead as the daily cost for the contractor's field and home office managerial and administrative staff as it relates to the number of days needed to complete the contract.
>
> Caltrans defines mobilization as the cost of moving laborers, tools, construction equipment, construction materials, and incidentals to the project site; establishing offices, buildings, and other facilities necessary for work on the project.

The contractors' bids for time-related overhead for the skyway and signature span of the East Span were much higher than Caltrans anticipated.

- **Skyway:** $208 million, or 235 percent higher

- **Signature span:** $243 million, or 501 percent higher

Caltrans calculates overhead costs as a percentage of capital costs and applied a rate of 10 percent to East Span projects. However, rates for time-related overhead for the two projects in the August 2004 estimates are much higher—20 percent for the skyway and 15 percent for the signature span.

The director states that Caltrans believes that market conditions after September 11, 2001, have led to higher insurance and bonding costs, and greater scrutiny of risk on large projects, which has contributed to higher time-related overhead bid amounts.

Longer Project Timelines and Delays Also Played a Role in Higher Costs

Caltrans' meetings with potential bidders resulted in 26 addenda to the proposed contract to address issues that contractors raised, such as the level of liquidated damages imposed in the contract, the three-year contract period, and various cash flow issues.

Five addenda added more than three years to the time allowed for contract completion.

Considering that the addenda doubled the length of time for construction, a large increase in time-related overhead could be expected.

Additionally, mobilization was a major factor in increased overhead costs for the signature span.

- **Skyway:** $99 million, or 45 percent higher
- **Signature span:** $233 million, or nearly 411 percent higher

The East Span project manager attributed higher mobilization costs for the signature span to the fact that Caltrans increased contractual mobilization payments to relieve cash flow constraints on contractors and to mitigate the costs of financing.

Increases in Estimates for Caltrans' Support Costs Contributed Significantly to Overall Program Costs

Support costs for Caltrans' administration of the program increased significantly, accounting for $556 million, or 20 percent, of overall cost increases before program contingencies.

> Support costs include staff salaries, consultant fees, and other operating costs of administering construction activities involved in retrofitting the toll bridges.

Time delays and extensions also offer an explanation for why support costs would be expected to increase.

Support cost estimates under AB 1171 in 2001 extended through 2007; however, the August 2004 estimate accounts for support costs through 2012.

> Caltrans' expenditures for support costs averaged about $8 million per month for the 12-month period ending October 2003. Using this same monthly rate over the additional five years included in the August 2004 estimate could account for roughly $480 million of the $556 million increase in the program's support costs.

Caltrans Underestimated Price Escalation

For large construction projects that extend over a period of time, estimates need to build in escalation rates for inflation over a project's life.

Caltrans applied an annual escalation of 5 percent into its AB 1171 estimates up to the time that it expected to receive contract bids, but not for the construction phase.

To reflect inflation that would occur during construction, Caltrans should have extended its escalation calculations to cover the expected time to complete these components.

For the skyway and signature span, escalating costs through the mid-point of the expected construction period would have yielded an AB 1171 estimate that may have been approximately $69 million and $70 million higher, respectively, than the Caltrans' figure.

Similarly, inflating capital cost estimates under AB 1171 for the four-year extension could account for up to $110 million of the signature span cost increase.

Underwater Work Increased Costs for the Richmond-San Rafael Bridge

Underwater debris discovered after construction began, deeper than expected bedrock at several locations, and lack of clearance for driving micropiles have challenged the contractor working on the project.

Caltrans accumulated $47.6 million in additional costs related to underwater work on the Richmond-San Rafael Bridge, including $22 million to remove underwater debris.

Conditions related to the piling work have resulted in a number of project change orders totaling $11.6 million.

Change orders related to micropile work have cost Caltrans more than $14 million over contracted amounts.

The Program's Contingency Reserves for Potential Cost Increases Remain High

Caltrans looks to its contingency reserves to cover unforeseen costs and potential claims related to identified problems, generally establishing a contingency reserve for each project and sometimes a program-wide contingency reserve.

The contingency reserve amounts that Caltrans built into its August 2004 cost estimates for the skyway, signature span, and the Richmond-San Rafael Bridge remain substantial, sometimes even above AB 1171 cost estimates in terms of the percentage of capital costs they represent.

The $900 million contingency reserve represents the level Bechtel concluded was necessary to provide an 80 percent assurance that costs would not exceed Caltrans' August 2004 cost estimate.

With Continuing Uncertainties, the Program's Costs May Rise Further

The August 2004 estimates assumed that Caltrans would accept the bid for the signature span superstructure and thus keep the program on schedule.

In August 2004, Bechtel indicates it reviewed Caltrans' analysis of bid options for the superstructure, which indicated that project costs would increase if the superstructure was readvertised and rebid, or redesigned.

> Bechtel was careful to say that its review was not a detailed estimate of program costs and that it did not perform a value engineering analysis. It used information provided by Caltrans and the Bay Area Toll Authority but did not independently verify that information.

In September 2004, Caltrans, with a preliminary review by Bechtel, developed a cost estimate for rebidding a skyway design to replace the signature span.

> Before considering other factors such as schedule delays and the cancellation and modification of existing contracts, this estimate indicates that a skyway design would cost $665 million less than the signature span.
>
> However, Caltrans estimated that costs associated with the other factors would largely offset this gain, yielding either savings of $255 million or additional costs of $140 million.

On December 10, 2004, Caltrans published a study that recommended either completing the signature span as originally designed or extending the skyway across the East Span.

We requested supporting schedules supporting Caltrans' cost figures, as well as its reconciliation of costs to its August 2004 report to the Legislature. Because we did not receive the schedules from Caltrans with sufficient time to review them prior to publishing this report, we were unable to analyze the cost figures in this study.

Caltrans' Project Management Practices Need Improvement

- ☑ Caltrans neglected several important aspects of project management that could have helped it maintain realistic and up-to-date estimates of program costs and risks, and communicate those estimates in a timely manner.

- ☑ Caltrans had numerous early indications that the program would exceed the AB1171 budget.

- ☑ Caltrans did not develop a comprehensive risk management plan for this project.

- ☑ Although Caltrans identified certain risks through various analyses, it has not performed some of the major processes—planning, tracking, and quantifying—necessary to maximize the chances of positive rather than adverse events in the East Span project.

- ☑ Caltrans did not regularly update its costs estimates for the East Span project or the entire program, including updating estimates for capital costs, support costs, and contingency reserves, which should cover the cost of known potential risks and unknown risks.

- ☑ Caltrans has not paid enough attention to communications management, failing to inform its major stakeholders such as the Legislature and the commission of potential cost overruns.

Although Caltrans Has Some Risk Management Activities in Place, It Lacks a Comprehensive Risk Management Plan

Contrary to generally accepted practices and its risk management handbook, Caltrans did not create a risk management plan for the East Span.

> Such a plan defines various risk management processes and how often they will be used throughout the project, so that results of risk analyses can be developed early enough to affect decisions.

In a February 2003 report, a consulting firm Caltrans hired to perform a quality assurance check and risk assessment of the estimated construction schedule for the East Span, warned that the East Span project's complexity and uniqueness warranted an increased risk management effort.

The consultant stressed that an essential part of risk mitigation for the project would be to form a risk management team fully dedicated to this project that not only manages risks associated with the signature span, but also coordinates and manages risks for the overall project.

Moreover, the consultant warned that if a risk management team and other mitigation strategies for technical issues were not implemented, it was highly unlikely that Caltrans could complete the East Span by the then-expected completion date of 2008.

In response to the consultant's recommendations, Caltrans indicates that the risk assessment group is responsible for risk management for the project and that a group of managers meets quarterly to identify and discuss mitigation strategies for construction risks related to the East Span.

Having these groups is a good first step in addressing risk management issues for the project; however, neither group undertook planning for all the processes that best practices dictate are needed to manage risks.

> For example, the risk assessment group does not plan how risk management activities will systematically address risk identification, quantification, or tracking over the project's life.

Caltrans used a status report to track risk activities, but stopped it in January 2003, even though one of the action items in the report was to develop and maintain this program-wide status report to update issues and action items.

Caltrans Took Steps to Identify, Prioritize, and Mitigate Project Risks

Despite its lack of a comprehensive risk management plan, Caltrans took several steps to systematically identify, rank, and respond to the East Span project's risks.

In March 2002, a Caltrans consultant performed a constructibility review study to identify errors, omissions, and inconsistencies in its construction documents and specifications, as well as to develop ways to improve contractors' ability to construct the project.

Caltrans also initiated a quality assurance review by the Caltrans Central Region, issued in December 2002, that primarily analyzed the cost estimate for the signature span and secondarily focused on the remaining East Span contracts not under construction.

- Among other things, the Central Region recommended that Caltrans increase the cost estimate for the signature span to $800 million to better reflect unknowns.

- It also recommended that Caltrans pursue a waiver of the federal regulations requiring the use of domestic steel, which it claimed would have a substantial effect on the costs for the steel tower and other components.

In October 2003, Caltrans formed an independent review committee of consultants to review the contract requirements for two major East Span contracts—the signature span and its foundations—before advertisement.

Caltrans Did Not Adequately Quantify Risks Associated With the Project

Although Caltrans acted to identify, qualitatively analyze, and mitigate risks that could affect the East Span, it did not have a coordinated risk management plan in place to ensure that it quantified risks in terms of increased costs to the project.

Three of five analyses Caltrans initiated quantified risk in terms of potential cost; however, Caltrans did not use these quantified risks to update its cost estimates.

> According to the summary of risk management activities Caltrans prepared for us, Bechtel's August 2004 cost review was the only program-wide quantitative risk analysis performed for the program since AB 1171 was passed.

The December 2002 quality assurance review recommended contingency reserves of at least 20 percent; however, Caltrans' internal estimates for the signature span contracts included only a 5 percent project contingency reserve.

CALTRANS DOES NOT REGULARLY UPDATE PROGRAM COST ESTIMATES TO MONITOR THE PROGRAM'S BUDGET APPROPRIATELY

We reviewed Caltrans' performance on two key elements of project cost management—cost estimating and cost control.

Under AB 1171, the Legislature gave Caltrans a budget of approximately $5.1 billion, including a $448 million program contingency reserve. However, Caltrans has not updated the projected program costs regularly to assess whether it is staying within the budget that AB 1171 established.

> In particular, Caltrans has not regularly updated its estimates of support costs needed for the life of the program and has not reassessed its program contingency reserve.

Caltrans Does Not Regularly Update Cost Estimates for the Whole Program

Although it prepares monthly estimates of costs on projects under construction, Caltrans lacks a regularly updated overview that includes actual costs, anticipated costs, and contingency reserves from a program-wide perspective.

Caltrans' project management handbook notes that effective cost management requires project managers to regularly compare actual expenditures to planned expenditures at the level used in budget development.

Further, the FHWA strongly recommends development of a monthly cost, schedule, and status report, including a current cost forecast compared with the latest budget, with an explanation for budget deviations.

Caltrans' cost update for the August 2004 report to the Legislature was its first program-wide update of cost estimates since Caltrans prepared the cost estimates for AB 1171 in April 2001.

Caltrans Did Not Regularly Reevaluate the Program's Support Costs

Proper tracking of support costs is important because they represent 17 percent of the program's budget that AB 1171 established in 2001.

Until recently, Caltrans did not regularly track whether its support costs, set at $796 million in AB 1171, were projected to stay within budget.

As of October 2003, Caltrans' accounting records showed that it had spent $612 million in support costs since the program began. In November 2003, Caltrans reported to the FHWA that it was reducing its support cost budget to $766 million, leaving only $154 million to pay support costs through 2011.

At its 2003 usage rate of $8 million per month, Caltrans would have spent its remaining support costs budget of $154 million by June 2005.

According to the project control manager, the project control unit for Caltrans' District 4 Office prepared a detailed estimate of total support costs needed for the remainder of the program in March 2004, but he was not aware of Caltrans completing such estimates for fiscal years 2002–03 and 2003–04.

Caltrans Had Not Regularly Reevaluated the Program's Contingency Reserve Nor Accounted for Potential Cost Increases

Caltrans' August 2004 report includes the first reevaluation of the program's contingency reserve since AB 1171 became law in October 2001. Yet, during this three-year gap, Caltrans had several signs that its program contingency reserve was insufficient to cover cost overruns.

In addition, the Caltrans' cost estimates initially drawn up for the August 2004 report significantly underestimated the program's cost.

A joint effort by Caltrans, Bechtel, and the commission increased Caltrans' May 2004 cost estimate of $6.8 billion to $8.3 billion, including a $900 million contingency reserve.

According to supporting documentation for Bechtel's August 2004 cost review, Caltrans did not account for $452 million in potential future capital costs associated with adjustments to reflect increased prices for steel and concrete, contractor's time-related overhead and mobilization, and escalation costs for several projects.

Caltrans Generally Follows Its Internal Contract Change Order Policies

Caltrans issues change orders to make changes to original contracts, paying for changes with contingency reserves.

Caltrans complied with its internal policies and procedures when we reviewed a sample of 20 change orders with a value greater than $1 million for the Richmond-San Rafael Bridge and skyway projects and greater than $300,000 for the West Approach project.

Caltrans also performed an appropriate assessment of each change order's impact on the overall project.

CALTRANS DID NOT EMPLOY GOOD COMMUNICATIONS MANAGEMENT, RESULTING IN THE FAILURE TO REPORT COST OVERRUNS TO STAKEHOLDERS IN A TIMELY FASHION

Caltrans failed to keep its stakeholders informed of relevant changes in its estimates of program costs and cost overruns on a reasonable and timely basis.

Although state law requires regular reporting to the Legislature, Caltrans did not provide a status report on the program for 2003 or the first half of 2004 until August 2004.

- ☑ Caltrans had strong indications that the program's costs would exceed the AB 1171 cost estimates as early as November 2003 when it provided its annual financial plan to the FHWA.

- ☑ Caltrans' financial plan contained information that did not reflect its internal cost estimates, and thus understated the extent of the cost overruns.

- ☑ Caltrans provided no information on potential program funding shortfalls before May 2004 to the commission, a critical stakeholder that represents the commuters who pay to use the toll bridges.

Caltrans Failed to Report the Program's Status and Cost Overruns to the Legislature, as State Law Requires

Although state law requires Caltrans to periodically report the program's status and notify the Legislature of program cost overruns, Caltrans did not report cost overruns it should have known of until they were staggering.

With the sole bid for the signature span's superstructure expiring on September 30, 2004, Caltrans gave the Legislature about six weeks to develop a funding solution to the $3.2 billion cost overrun.

Through 2003, the Streets and Highways Code required Caltrans to provide program status reports annually; beginning in 2004 the law was changed to require quarterly reports. These quarterly reports are supposed to include the following items:

- The status, including details, of each toll bridge project.
- The baseline budget at the time of AB 1171.
- An updated budget and expenditures to date for support and capital outlay costs.
- A comparison between the baseline and the updated budget.
- A summary of milestones achieved, issues identified, and actions taken to address those issues.

The code also requires that if Caltrans "determines that the actual costs exceed the [budget provided in AB 1171 Caltrans] shall report to the Legislature within 90 days from the date of that determination as to the difference and the reason for the increase in costs."

> However, Caltrans submitted no status report for 2003 or the first half of 2004 until it reported in August 2004 that the program's costs could greatly exceed its funds.

Caltrans intended to include the status information for 2003 in its first quarterly report for 2004; however, it also made a conscious decision that given the imminent bid opening of the contract for the signature's span's superstructure due on May 26, 2004, and the dynamics of the bidding environment and market prices for steel and concrete, submittal of a quarterly report in May 2004 would lack meaningful detail to report.

Caltrans Should Have Known Significant Cost Overruns Were Likely When It Reported the Program's Status to the Federal Government in November 2003

Under federal law entities receiving federal funds for a project with an estimated cost of $1 billion or more must submit a financial plan by November 15 of each year to FHWA.

Caltrans' financial plan that it submitted to the FHWA in November 2003 showed that the program's projects were exceeding AB 1171 cost estimates and that there was less than a 3 percent program contingency reserve remaining to fund any further cost overruns for a program that was eight years from completion.

Caltrans' financial plan caused FHWA to question several issues regarding the program's funding. In addition, the FHWA financial manager told us that she emphasized to Caltrans executives during project meetings and communications the importance of disclosing knowledge of potential cost overruns to the federal government and other stakeholders.

In January 2004, FHWA sent a letter to Caltrans with its concerns. In February 2004, Caltrans supplied FHWA a breakdown of program costs, indicating the program had total cost overruns of $563 million.

Caltrans told FHWA that it would use $237 million in projected savings and $326 million from the $448 million in program contingency reserves to pay for these cost overruns. However, these savings had almost evaporated by the time Caltrans reassessed the program's viability for its August 2004 report.

Six months after Caltrans' February 2004 letter to FHWA asserted that the program contingency reserve of $122 million was sufficient, it reported to the Legislature that the program was over budget by $3.2 billion.

Caltrans' Estimate for Support Costs for the Remaining Eight Years of the Program Was Understated Significantly

In its November 2003 report to FHWA, Caltrans indicated that its program support costs would total $766 million, a $30 million reduction. However, as of October 2003, Caltrans accounting records showed that it had spent $612 million in support costs since the program began, leaving only $154 million to pay support costs through 2011.

At its usage rate of $8 million per month in 2003, the $154 million would have lasted little more than one-and-a-half years; therefore, no resources would then be available for the remaining six-and-a-half year period of June 2005 through December 2011.

If Caltrans had assumed a usage rate for the six-and-a-half year period, it would have computed that it needed an additional $624 million for a total of roughly $1.4 billion. When it finally performed an analysis of future support costs for its August 2004 report, the revised estimate totaled $1.352 billion.

Caltrans' Internal Estimates for the Signature Span's Superstructure Showed the Potential for Increased Costs Well Before the May 2004 Bid Was Received

Caltrans' internal estimates for the cost of the signature span's superstructure also were increasing and should have led Caltrans to alert the Legislature that program costs would be higher than the AB 1171 estimates.

Internal analyses show that Caltrans had indications that its "call-out number" (used to give bidders a general idea of the contract's scope) of $733 million was understated significantly.

Table 7 on the following page shows that based on a consultant's mock bid, there were indications as early as August 2002 that the superstructure bid could be as high as $934 million.

In December 2003, the assigned Caltrans bridge cost estimating specialist computed an estimated cost of $1.036 billion.

Further, in April 2004 shortly before the bid opening, an internal estimate of the bid amount was nearly $1.3 billion, which is slightly less than the actual bid amount of $1.4 billion.

TABLE 7

Timeline of Estimates for the Signature Span's Superstructure

Basis for Estimate	Date	Amount
AB 1171 estimate	April 2001	$469 million
Consultant's mock bid*	August 2002	$934 million
Engineer of record's estimate†	December 2002	$637 million
Caltrans' call-out number‡	February 2003	$733 million
Caltrans' mathematical update to the engineer of record's estimate§	June 2003	$703 million
Caltrans' mathematical update to the engineer of record's estimate§	October 2003	$726 million
Caltrans bridge cost estimating specialist‖	December 2003	$1.036 billion
Caltrans bridge cost estimating specialist‖	April 2004	$1.286 billion
Bid received by sole bidder#	May 2004	$1.399 billion (foreign steel) $1.804 billion (domestic steel)

Note: Estimates exclude supplemental work, state furnished items, and project contingency.

* Estimate was produced by Caltrans' value analysis consultant.

† Estimate represents the Caltrans consultant engineer of record's estimate.

‡ Estimate was based on final bid items for the advertised contract.

§ Estimate was based on Caltrans' mathematical update to individual contract line items based on addenda to plans and specifications. These addenda add payment provisions, correct errors, and add or eliminate bid items.

‖ The Caltrans director says the estimates of Caltrans' bridge cost estimating specialist were speculative and do not reflect the engineer of record's estimate at the time.

The single bid included domestic steel and foreign steel bids.

The Program Contingency Reserve Was Almost Completely Committed in November 2003

The program reserve that Caltrans reported to the FHWA was $122 million of the original $448 million budgeted in AB 1171.

This amount was grossly insufficient for several reasons:

- The bid for the signature span's superstructure was not yet received.
- Caltrans' internal estimates indicated that the superstructure would cost significantly more than expected.
- The skyway section of the East Span was only 31 percent constructed.

The Estimated Cost for the Richmond-San Rafael Bridge Was Higher Than Caltrans Reported to FHWA

Caltrans underreported to FHWA the estimated costs for the retrofit work to the Richmond-San Rafael Bridge.

In response to FHWA's questions, Caltrans asserted that the cost for the Richmond-San Rafael Bridge would be $570 million, but internal reports showed a total potential cost of $613 million to $648 million.

In its August 2004 report, Caltrans reported that the Richmond-San Rafael Bridge would incur additional costs overruns, which would raise the total estimated capital outlay cost for the project to $780 million.

The Skyway Was Less Than Half Constructed and Was Likely to Require Additional Funding to Cover Unforeseen Cost Increases

As of November 2003, the skyway was only 31 percent constructed, yet its projected cost was $302 million to $321 million over the AB 1171 estimate, and Caltrans reported having only a $20 million contingency reserve balance for the project.

In its August 2004 report, Caltrans stated that the skyway's estimated cost had increased $186 million beyond the amount it reported to FHWA in November 2003, with the total estimated capital cost for the skyway rising to $1.293 billion.

Caltrans Did Not Keep the Commission Informed of the Program's Cost Overruns

Caltrans has not updated the commission regularly on the program's cost overruns for ongoing projects and on changing cost estimates for the signature span.

The first time Caltrans officially disclosed to the commission that cost estimates for the seismic program would exceed the AB 1171 estimates, was a meeting between Caltrans and the commission on June 2, 2004, or seven days after Caltrans opened the bid for the signature span's superstructure.

In contrast, the commission contracts with Bechtel to monitor Caltrans' project management over Regional Measure 1 projects. Bechtel provides the commission a monthly progress report within 23 working days after each month. These monthly reports provide a mechanism to alert the commission promptly to potential cost and schedule problems.

RECOMMENDATIONS

To ensure that it properly manages the risks associated with large construction projects, Caltrans should continue to revise its risk management practices, but ensure that its efforts include:

- Establishing a comprehensive risk management plan that clearly defines roles and responsibilities for risk management, and addresses how it will identify and quantify project risks, implement and track risk response activities, and monitor and control risks throughout the life of the project.
- Quantifying the effect of identified risks in financial terms.
- Developing and maintaining documents to track identified risks and related mitigation steps.

To ensure that it follows generally accepted practices for cost management, Caltrans should:

- Regularly update its estimates of capital and support costs.
- Regularly reassess its reserves for potential claims and unknown risks, incorporating information related to risks identified and quantified through its risk assessment processes.
- Regularly integrate estimates for capital, support costs, and contingency reserves into a program-wide report.

To ensure that it keeps its stakeholders informed on the status of projects, Caltrans should:

- Submit quarterly status reports to the Legislature as the law requires.
- Ensure that reports to FHWA and other stakeholders reflect current data and provide accurate representation of the program's status.
- When key events occur, such as a bid opening for a major project, quickly inform stakeholders how these key events affect the program's overall budget and schedule.

The Legislature should consider revising state law to require that Caltrans submit its quarterly reports within a certain period after each quarter, such as 45 days.

The Legislature should also consider changing state law to require that the quarterly reports provide a program-wide summary of the programs' budget status for both capital outlay and support costs.

In reviewing the options that Caltrans presents for completing the East Span, the Legislature should consider requesting that Caltrans provide sufficient detail to understand the financial implications of each option.

This detail should include for each option a breakdown of the costs for capital outlay, support, and contingencies at the project and program level. Further, Caltrans should provide a reconciliation of each option to the figures it presented in its August 2004 report to the Legislature.