

**Testimony to the Joint State Legislative Audit Committee**

**Best Project Management Practices for  
the Bay Bridge Project**

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## **Best Project Management Practices for the Bay Bridge Project**

**Dr. William Ibbs<sup>1</sup>**

### **Introduction**

Thank you, Madame Chairwoman. I appreciate the opportunity to provide my views on the Project Management aspects of the Bay Bridge East Span project. This is a very important project and I congratulate the committee on its dedicated efforts to make this project successful.

Before I begin, allow me to introduce myself so that you understand my background and the context of my remarks. I am a professor of Construction Management at the University of California at Berkeley, where I've been teaching and researching cost and schedule problems of major construction problems. My research has been sponsored by The National Science Foundation, The US Army and even Caltrans itself.

Prior to my academic career, I worked in private practice as a design engineer and as a construction project manager. I've been a consultant on Boston's Central Artery/Tunnel Project (called the "Big Dig"); the Los Angeles MTA subway program; and many other large projects in the US and abroad.

My expertise is in Project Management. I have been active in the leading professional organization dedicated to Project Management, namely the Project Management Institute, where I've served as PMI's Research Director.

### **Some Context for my Testimony**

I was asked to speak today about Best Practices for Project Management Control Systems on the Bay Bridge project and will do so. Accordingly, the goal of my testimony is to offer some guidance for the future, not to criticize the past.

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There are a number of contextual issues that I believe this Committee should first reflect upon so that it can wisely guide Caltrans.

First, Construction is an enormously complex industry and process. It is complex and, as we are all aware today, it is expensive. Substantial amounts of expensive, precisely manufactured materials – such as steel, electrical systems, and concrete – are needed. To install these vast volumes of materials, the Bay Bridge will mobilize an army of thousands of workers – laborers, engineers, managers, contract administrators, and so on. The physical weights and forces involved could not have been accommodated as recently as 15 years ago.

This particular project will also have a lengthy schedule. Under the best of circumstances it will likely take 8 years to complete construction. Who among us can predict what the world will look like in 8 years? In terms of communications technology, labor rates and material prices, weather, traffic conditions, and so forth?

This project is also complicated and risky because it involves physical conditions under the earth we can't accurately foresee. And as you well know, this project is being built in a very visible manner, with 200,000 commuters driving by everyday, many of whom want to serve as construction superintendent. It's also disruptive to our social and environmental fabrics.

Because of these and other circumstances, the Bay Bridge is a very, very risky project. Without good control systems and management practices, the problems we've seen to-date seem like small potatoes before the work is finished.

### **Recommended Best Practices for Managing this Project**

In preparing to speak with you today I gave a lot of thought to what I consider the **KEY BEST PRACTICES**. There are many, many "best practices" developed by other agencies, by the private sector, and by proven research that

Caltrans should take advantage of, but the following 5 recommendations are what I consider most important.

*1. Use an "all in" system that comprehensively reports all project costs.*

Speaking from experience on many other big projects, I know that systems tend to be isolated and not communicate with other. When I teach my students about projects, I use a balloon metaphor. A project has many dimensions – a cost dimension, a schedule dimension, a scope dimension, and so on. When you squeeze a balloon, one side of that balloon will compress but another side will expand. Likewise, we may squeeze the cost side of this project but surely something else is going to change. Perhaps the schedule, perhaps the scope.

What is imperative is that the project management team be able to look at the integration of Cost-Schedule-Scope in a unified way, so that they then can make informed choices.

Moreover, the project manager should use an "all in" system that gives a total, comprehensive picture of all the project costs. Not just the historical costs incurred to-date, but also the costs forecasted to come. To do this requires a solid forecasting procedure, and modern Project Management practice emphasizes a technique called an Earned Value system. Caltrans and its contractors should use this Earned Value system.

*2. Use Modern Risk Management Techniques*

Another imperative for this project is that the Project Management team use modern risk management techniques. The Auditor's report has emphasized this and Caltrans seems amenable, so I won't say anything more except that I endorse the idea.

### *3. Use Modern Change Management Techniques*

Thirdly, I can assure you that even under the best of circumstances this project will have changes. It is inevitable for reasons I've mentioned earlier. Given that, Caltrans should implement a modern Change Management system. Most Change Management systems report the changes that have arisen – that is, they're like looking in the rear view mirror of your car. What is instead needed on this project is a proactive Change Management system. That ties in with the forecasting issue I discussed earlier when I mentioned the Earned Value concept.

### *4. Establish a Project Management Oversight Committee.*

As the Auditor has already established, effective Project Management will be a key to the success of this project. Because it will be a Key Success Factor on this project and because the profession of project management is rapidly changing, I strongly recommend that Caltrans establish a panel of experts that will help Caltrans do 2 things: 1) keep its eye on the most important issues associated with this project, and 2) take advantage of the Best Project Management Practices that are continually emerging from the private sector and the research community.

### *5. Get People who are not afraid to bring bad news forth*

My last recommendation is founded on a simple, yet often-overlooked management concept: People matter as much as computers. As we found repeatedly on the Big Dig project in Boston, the political climate of the project was very difficult and that difficulty often leads people to operate on an overly-optimistic basis. The US General Accounting Office expressed it very well when it said in its report on the Central Artery/Tunnel:

*“The systems used by the CA/T Project staff to predict cost increases are appropriate but not being used properly by Project Management...The current*

*practice of constraining cost indicators to equal a predetermined budget amount must end.”*

That means that the project management team should convey regular updates to you and to Caltrans’s senior management in a prompt and fearless manner. No one likes surprises, but delaying bad news only makes such surprises worse.

### **Summary**

In conclusion, this is one of the most challenging projects that Bay Area residents will ever see constructed in their lifetimes. That means the Project Management Leaders and Project Management Systems must be ready for a world class challenge and consequently use world class tools and techniques. The 5 measures I have outlined here today – a cost control system that provides a comprehensive picture of the project’s status, a proactive Change Management System, modern Risk Management procedures, a Project Management Oversight Board and Leaders who commit to quick and clear status reports all the way up the chain – will help bring this Bridge in on time and on budget.

Again, I appreciate the opportunity to speak with you here today, and would now welcome your questions.