

## **Folsom Dam Modifications Project Presents Construction Challenges for Federal Engineers**

### **Cost Estimates for the Project Increase as Contractor Proposals Exceed Government Estimates**

**(Sacramento, CA) June 22, 2005** – On Monday, June 20, 2005, the U.S. Army Corps of Engineers met with the Sacramento Area Flood Control Agency (SAFCA), the State of California, and the Bureau of Reclamation to discuss increases in the potential cost of the Folsom Dam Modification Project at Folsom Dam. Based on the market information recently received by the Corps of Engineers, the project estimate has increased from \$214M to as high as \$650M.

The competitive proposals received from the private construction firms were significantly higher than the government's estimate. The price differential is attributable to many factors, some of which may include fluctuations in the cost of materials, such as structural steel and cement; uncertainties in the labor market for a project with a performance period of over 2,000 days; and the risk to the contractor under a firm fixed price contract to meet a construction schedule while maintaining extremely high levels of quality and safety, necessary for work on an operational dam.

Folsom Dam Modification is a part of the American River Watershed Project and will allow the dam to release more water through the structure and to do so earlier in a flood event. The work as previously planned would enlarge eight existing outlets by doubling their size and adding two new outlets 9 feet wide by 14 feet tall. Folsom Dam Modifications is one of the three key components to the American River Watershed Project. The other components are Folsom Dam Raise and levee work referred to as Common Features. The overall project seeks to reduce Sacramento's flood risk to less than 1 in 200 of being flooded in any single year.

Knowing that such significant structural changes had never before been made to a federal dam with water behind it, the Corps had the plans examined and reviewed by another Corps of Engineers District with expertise in cost estimating and a national consulting firm, specializing in project scope, schedules and cost. The Corps also shared the plans and estimates with the three other federal, state and local partner agencies participating in the Folsom Modifications Project. None identified the estimate as being unreasonably low.

Yet, when the work was advertised last December the competitive proposals from the private construction firms were significantly higher. (Precise numbers can not yet be released due to federal procurement law.) "Large engineering projects are complicated and full of unforeseen challenges and this one is no exception, but we are all surprised that the bids came in so high," said Mark Charlton, Deputy District Engineer for Project Management at the Corps Sacramento Office. "It's frustrating," he added.

Part the increase is attributable to increases in material costs. However it would seem that the majority of the cost increase reflects the risk involved with making significant internal structural changes to a 50 year-old dam, impounding approximately one million acre feet of water, 29 miles upstream of Sacramento, California, with its 40 billion dollars worth of damageable property, 400,000 people, 5,000 businesses and 1,300 public facilities within the dam's protected area. The dam modifications included in this project are the most significant, largest structural changes attempted on any dam in the United States.

“We will not award this contract until we and our partners agree the cost increases are justified and appropriate. We will be accountable and responsible to our partners and the taxpayers and will only award contracts for work we can build and for what price we say we can build it for. We remain committed to helping provide cost effective solutions to reduce flood risk in Sacramento and will work with the community to deliver projects that meet their budget and priorities,” Charlton added.

The Corps of Engineers will work collaboratively with the two local project sponsors, the State of California and SAFCA, to determine what strategy will be pursued. The partners will work together to discuss alternatives and options necessary to proceed with the project to meet the flood control objectives for the Sacramento area. Sacramento remains a city at risk. Located at the confluence of the Sacramento and American Rivers, parts of the city have a 26 percent of being flooded during the next 30 years. Other work to reduce Sacramento’s flood risk is on-going and within budgeted estimates.

- END-

### **Project Background**

**Title:** Folsom Dam Modification Project

**Authorized:** Section 101(a) (6) of the Water Resources Development Act of 1999.

**Original project cost:** \$214 Million

**Cost Sharing:** 65 percent federal and 35 percent non-federal.

**Planned Project Completion Date:** 2013

**Partners:** The U.S. Army Corps of Engineers, The US Bureau of Reclamation, The State of California Reclamation Board and the Sacramento Area Flood Control Agency.

The American River Watershed Feasibility Report was completed in December 1991 and the Supplemental Information Report was completed in March 1996. The Supplemental Information Report identified three candidate plans which would help reduce the flood risk facing Sacramento: modifying Folsom Dam and increasing the dedicated flood space; modifying Folsom Dam and the downstream system to allow increased objective releases; and constructing a detention dam upstream of Folsom Dam. In June 1996, the Chief of Engineers deferred a decision on a comprehensive flood control plan, but recommended that features common to all three plans be authorized as the first component of a comprehensive plan. These elements are being constructed within the American River Watershed (Common Features) Project.

The Sacramento Area Flood Control Agency (SAFCA) prepared the Folsom Dam Modification

Report New Outlets Plan dated March 1998 (SAFCA Outlet Report), which identified some proposed changes to the Folsom Modification Plan described in the 1996 Supplemental Information Report. The 1996 Supplemental Information Report as modified by SAFCA Outlet Report was the basis for the project authorized under the Water Resources Development Act of 1999. The Corps also studied the dam modifications in a 2003 Limited Reevaluation Report (LRR) and concluded that the project was feasible.

History: The existing Folsom Dam has an objective release of 115,000 cubic feet per second (cfs) during flood operations. However, the existing eight outlets limit releases to about 28,000 cfs until approximately one-half of the reservoir's flood control space is filled. At this level, the pool elevation is sufficient for the spillways to release the full 115,000 cfs. The project will modify the existing outlets to allow releases of roughly 115,000 cfs much earlier. The authorized project features consist of (1) constructing five new river outlets; (2) enlarging the eight existing river outlets; (3) constructing a stilling basin downstream from the emergency spillway; and (4) modifying the dikes and wing dam at Folsom Dam to allow for increased use of surcharge storage. Under further evaluation, it has been determined that the existing outlets can be enlarged sufficiently and two new outlets constructed to provide the 115,000 cfs release capability.

Site Location: Folsom Dam and Reservoir, located on the American River, is about 29 miles upstream of the City of Sacramento, California. The American River watershed drains about 2,100 square miles northeast of Sacramento and includes portions of Placer, El Dorado, and Sacramento Counties. Runoff from this basin flows through Folsom Reservoir and passes through Sacramento to the confluence with the Sacramento River.

<http://www.spk.usace.army.mil/projects/civil/americanriverwatershed/>

# **Dam project costs may triple**

## **Escalating tab for Folsom gates may reopen the fight for funding in Congress**

**Sacramento Bee – 6/22/05**

**By David Whitney, staff writer**

WASHINGTON - Key improvements to Folsom Dam to lower the risk of American River flooding in Sacramento will cost two or three times as much as initially estimated, blasting the total flood-control price tag toward \$1 billion and beyond, the Army Corps of Engineers said Tuesday.

"We're very frustrated," said Mark Charlton, the corps' deputy district engineer for project management in Sacramento. "We are all scratching our heads and rolling up our sleeves to figure this out."

So far, the escalating costs have not brought work on the multiphase project to a stop, but Charlton said the project may have to be reconfigured, and parts of it scaled back - if that can be done and still meet local flood-control goals.

That means the flood-control deal Sacramento officials thought they had finally resolved two years ago after more than a decade of bitter feuding will have to go back to a tight-fisted Congress for a new round of approvals.

It's uncertain whether the deal Rep. John Doolittle, R-Roseville, cut with former Rep. Robert Matsui, D-Sacramento, two years ago will withstand the new cost pressures.

Doolittle has been a longtime critic of corps cost overruns and a champion of a new dam at Auburn as the Sacramento area's best solution to American River flooding. He agreed to abandon his push for the Auburn dam in his deal with Matsui because of steep political opposition to it on Capitol Hill.

But that was when an Auburn dam was estimated to cost as much as \$2 billion and the combined fixes to Folsom Dam and the downstream levee system were a small fraction of that.

In a statement from Doolittle's office after word of the cost overruns became public Tuesday, a new dam was back in public discussion.

"Cost overruns have been the congressman's concerns all along," said Doolittle's press aide, Laura Blackann. "At some point you have to ask: Are we willing to spend a billion taxpayer dollars to fix up an old dam when there is another alternative available that would provide twice the protection at a similar cost?"

The reaction of others was surprise and concern.

Rep. Doris Matsui, elected in March to fill the Sacramento congressional seat after her husband's death Jan. 1, called the news "disappointing."

"This is a challenge," she said. "But I believe there are ways to get past this challenge. The options are yet to be determined. Auburn dam was twice turned down by Congress. This is a plan we believe we can get done."

The hard-fought American River flood-control work is congressionally authorized under several laws. There are three main components to it, and all are needed to reach the goal of providing Sacramento with 200-year flood protection - meaning that in any given year the risk of a damaging flood would be one in 200.

To reach such protection, new gates would be added to Folsom Dam so that the reservoir could be more quickly drained as a storm approaches. That requires stronger levees downstream at a cost of more than \$200 million. The final component would be a 7-foot addition to the top of the dam, estimated to cost \$250 million, to enlarge the lake's capacity.

At issue in this latest round of cost overruns are the new gates, which would be the biggest ever installed in a dam. The project would mark the first retrofitting of an existing dam with anything approaching the gates' size.

Initially estimated to cost \$215 million when Congress authorized the gates in 1999, the corps now says the work will cost at least \$450 million and perhaps as much as \$650 million. The Army Corps of Engineers said those numbers are based on preliminary information from construction companies proposing to do the work.

Charlton said that while the cost of materials is part of the problem, the numbers reflect the bigger difficulty of retrofitting a 50-year-old dam that must remain in use for flood control while the work proceeds for seven or eight years.

"It's a high dam, and it holds back nearly 1 million acre-feet of water," he said. "You're doing work inside the dam with water behind it. ... The risk of performance is on the contractor working at a firm, fixed price and timetable. It is complex and there is that level of uncertainty."

There are eight gates on the dam. The authorized work includes replacing all eight with bigger gates, plus adding two at the bottom. Even before the higher costs arrived on his desk, Charlton said the corps had divided the gates work into two phases - one involving the upper gates and the second involving the lower gates. Now, he said, the entire project will be re-evaluated.

But there's no assurance the cost of adding to the height of Folsom Dam, the final phase just beginning engineering study, won't also experience skyrocketing costs.

During final approval by the corps, for example, questions were raised about whether the pressure from additional water storage could cause the dam to shift from its footings.

The corps decided to spend an extra \$30 million on that work to drill additional anchors into the bedrock below. But other problems could arise as engineers and then construction companies begin to analyze the extent of the work more deeply.

Of course, big cost overruns could also happen with an Auburn dam, should that be authorized.

Charlton said he foresees no cost problems with raising the dam's height. "We are still comfortable with our estimates," he said.

But that has been the history of the corps' work on Sacramento flood-control work - estimates escalating into dramatically higher costs.

Work on the downstream levees was estimated to cost \$57 million in 1996 when it was first authorized by Congress but grew to \$205 million.

Caught in the middle is the Sacramento Area Flood Control Agency, whose leading advocate in Congress has shifted from a senior Democrat to the lowest-ranking Democrat in the House by virtue of Robert Matsui's death.

Stein Buer, the agency's new executive director, said the agency will sit down with the corps in the coming days and weeks to fully understand why a project that was estimated to cost \$214 million could end up at three times that amount.

"This is a big cost increase, and we are very concerned," Buer said. "At this point we are not exactly sure how to proceed. We appreciate the bipartisan support these projects have had and we are confident we will continue to work in a bipartisan way to solve these problems."

## **Talk of Auburn dam is revived**

### **Doolittle's long-sought plan may benefit from Folsom project overrun.**

**By David Whitney -- Bee Washington Bureau**

*Published in the Sacramento Bee, 2:15 am PDT Thursday, June 23, 2005*

WASHINGTON - Reacting to reports of a potential 200 percent cost increase in a key element of flood control work at Folsom Dam, Reps. Dan Lungren and John Doolittle said Wednesday that there should be a new effort to study the feasibility of a new multipurpose dam at Auburn.

But the two Sacramento-area Republicans stopped short of saying a 2-year-old deal that Doolittle struck with the late Rep. Robert Matsui, D-Sacramento, to make Folsom upgrades the key component of Sacramento flood protection should be scrapped.

"That deal was a good-faith deal," Doolittle, R-Roseville, said in an interview. "I do think, however, that this dramatic increase in costs constitutes a change of circumstances. I think there needs to be a re-examination of available alternatives."

Lungren said he agrees the cost overruns suggest that it's time for a new look at an Auburn dam.

"The kind of money we are talking about here seems extraordinarily high," he said. "It does at least suggest a question about whether we should take another look at the Auburn dam."

Despite their pledge to not pull the plug on the Doolittle-Matsui deal and to strive for a united delegation, Lungren and Doolittle were moving in the opposite direction from Rep. Doris Matsui, elected to fill the Sacramento congressional seat after the Jan. 1 death of her husband.

Doris Matsui said an Auburn dam is "not a politically viable option."

And while she said the U.S. Army Corps of Engineers' miscalculations on project costs are "upsetting" and "unacceptable," she believes that a flood control strategy centered on improvements to Folsom Dam remains the best option.

"I don't believe the corps' mistakes should obscure the fundamental benefits of this approach," she said. "In terms of lives saved and property protected, it is worth every penny invested."

The revival of arguments over an Auburn dam followed the corps' disclosure Tuesday that the cost of adding more and bigger outlets to the face of Folsom Dam would not be the \$214 million they had initially estimated, but more like \$450 million to \$650 million.

That size of increase plus ongoing levee work and the \$250 million cost of adding 7 feet to the height of the dam could push the cost of Sacramento flood protection to the \$1 billion level, with the risk of further overruns.

So far, according to the corps, there are no problems with the cost estimates on a new \$66 million bridge across the American River at the base of the dam. Engineering work on the bridge is proceeding and construction money could begin to flow next year.

The bridge, which would create a permanent route over the river and end the controversy over using a road on top of the dam, is part of the flood control package because of plans to add to the dam's height.

When Doolittle and Robert Matsui reached their agreement two years ago, it was hailed as a landmark achievement for the Sacramento area. It resulted in congressional authorization - without a hearing or vote - of the last components of flood control work while giving Doolittle authorization of about \$135 million in federal funding for water supply improvements in his district.

The Folsom Dam improvements, together with the levee work below the dam, are intended to give Sacramento 200-year flood protection, meaning that there would be only a one-in-200 chance of a damaging flood in any given year.

Matsui and the corps said they are committed to that goal.

But proponents of an Auburn dam said it would provide Sacramento with twice that protection. And while its cost is estimated today at \$3 billion, about two-thirds of that could be accounted for in new water supplies and an estimated 600 megawatts of new power production, whose sale would help pay for the costs. That would put the actual flood control component of an Auburn dam at roughly equivalent to what the corps now says it's likely to cost if all the planned work is done to Folsom Dam and the levees.

"I've always said that the only solution that works is an Auburn dam," Doolittle said. "It's the only solution that protects us from the largest foreseeable flood. ... The people of Sacramento are going to have to bear the burden of these increasing costs. Wouldn't they prefer to get something that gives them twice the protection and that pays for itself over time?"

Construction on an Auburn dam was halted after an earthquake in 1975 raised questions about its safety. Proponents contend that those questions have been fully resolved, but work on the dam never resumed.

Still, most of the area that would be inundated by the huge reservoir behind an Auburn dam already is government owned, and the footings of the dam are still in place. It is unclear how much of that work is still usable.

Critics of an Auburn dam said they don't see any fundamental change in the politics in Washington, where Congress twice before voted down reviving work to build the huge structure.

"We still don't have sponsors who will pay for an Auburn dam, it still carries all the baggage of earthquakes and environmental damage and it still is opposed by California's two senators," said Ronald Stork, a senior policy advocate for Friends of the River.

"My guess is that Representative Matsui, the Sacramento Area Flood Control Agency and the state will roll up their sleeves and work through these problems," Stork said. "We will figure it out."

**About the writer:**

The Bee's David Whitney can be reached at (202) 383-0004 or [dwhitney@mcclatchydc.com](mailto:dwhitney@mcclatchydc.com).



# Price could alter dam project

## High bids may change plan to enlarge Folsom outlets

By Matt Weiser -- Bee Staff Writer

*Published 2:15 am PDT Sunday, July 10, 2005, Sacramento Bee*

The high price to improve Folsom Dam for flood control could mean big changes in the project, including the possibility of raising the dam further and adding a second spillway on its eastern edge, near a proposed bridge over the river.

The U.S. Army Corps of Engineers announced in June that modifying the dam could cost up to three times more than the original estimate of \$200 million, based on information from companies bidding on the work. The project involves enlarging the eight river outlets in the dam's face and adding two new ones. The project is a key piece of a larger package, resulting from years of negotiations, to protect Sacramento from major flood events.

Officials involved in the project are scrambling to understand what is driving the bids so high. They're also working to redesign the project so it will stay within the budget authorized by Congress.

Michael Finnegan, area manager for the U.S. Bureau of Reclamation, said Friday that one option under consideration is to enlarge only the upper four river outlets in the dam, then add a spillway to the dam along its eastern flank. He said the dam also could be raised beyond the 7-foot increase now proposed.

Finnegan emphasized these are only concepts, and that much more work remains to determine how to move forward. The Corps of Engineers is in charge of the dam modifications, not the Bureau of Reclamation. But the bureau operates the dam, and Finnegan is intimately involved in the project.

"They are now seriously looking at an auxiliary spillway. We are, too," Finnegan said. "These are concepts being reviewed. These aren't decisions that have been made."

He said a new spillway would start where the dam's eastern edge joins the hillside, then follow the slope downhill to the American River.

This happens to be the approximate starting point for a new bridge across the river. The existing road over the dam was closed in 2003 for security reasons, inconveniencing about 18,000 commuters. The new bridge, still in the design phase, is intended to remedy this.

Finnegan suggested a new spillway probably would not conflict with the bridge. He said it might simply mean more earth-moving is needed to make room for both.

The goal of the dam modifications is to increase outflow from the dam's current 35,000 cubic feet per second to 115,000. This would allow water managers to more quickly make room for storm-induced runoff upstream. The trick is finding a balance of modifications to achieve that number without compromising dam safety.

Other local officials contacted this week said it is vital to Sacramento flood safety that the project remain on track, even in modified form.

"We are committed to moving forward with these programs, recognizing time is a very important factor as well," said Stein Buer, executive director of the Sacramento Area Flood Control Agency.

"We're working with the corps to understand the bids and the proposed construction limits, and how the construction limits could conceivably be altered."

Early information from companies bidding on the dam work showed the job could cost at least \$450 million, and maybe up to \$650 million.

Understanding these numbers is difficult, because all bidding information is confidential by law, to ensure that the bids are competitive and to protect proprietary information submitted by bidders. Even the names of the bidders are confidential.

The project to enlarge the eight outlets is just one piece of a package of improvements meant to ensure that Sacramento can withstand a wettest-in-200-years flood event. Another key component, with its own price tag of about \$250 million, is to raise the dam 7 feet.

The most likely path now, officials say, is to alter the dam modifications to bring the cost down while still achieving the same level of flood protection.

"We believe there are some options to have a mix of solutions to achieve a cost-effective answer," added Jason Fanselau, spokesman for the Army Corps.

The dam currently has two rows of four drains in its face, each sealed by metal gates measuring 5 feet wide by 9 feet high and fed by a tunnel running through the dam.

The gates are opened during major winter storms to release water before upstream runoff hits the lake. But sometimes they're too small to release water fast enough. In 1986 and 1997, runoff was so heavy that the dam was strained and some downstream levees failed.

The dam modifications, already authorized and partially funded by Congress, call for enlarging these tunnels and gates to 9 feet 4 inches wide and 14 feet high. Also, two new tunnels and gates of the same size would be added to the upper tier of existing gates, for a total of 10 gates.

The proposal has been altered several times in the last eight years. A 2001 version, for instance, did not include the two new gates, in part because they drove the cost up. Instead, that version proposed enlarging the eight existing gates even more - to 16 feet high - to handle the same water flows. This project's estimated cost was \$147 million.

But it turned out there wasn't enough room inside the dam to install gates that large. So in 2003, the present 10-gate project was unveiled, and the cost went up to \$200 million.

It is unclear whether this design change contributed to the bid overruns, and no one involved in the project would speculate.

Another potential concern is the risk associated with the job. The project is complex and involves a variety of unique construction skills.

"I don't think it's ever been done," Finnegan said. "There's really, worldwide, no experience in doing this."

Once the project is under way, crews must work underwater at depths of 220 feet on the inner face of the dam. They confront the challenge of cutting holes in an active dam while keeping 975,000 acre-feet of water in place above an unsuspecting population of nearly 1 million people downstream.

Because the work is to take six years, they also must ensure the dam's existing flood-control abilities remain unchanged throughout, in case a major storm hits during construction.

"We speculate the project was just so complex and risky, and the contractor bore all the risk, so you got all these crazy bids," said Ronald Stork, a senior policy advocate with Friends of the River.

Broader strains on the heavy-construction industry are another factor. The number of firms able to take on a job like this are limited, and many are engaged in major public works in China, Iraq and Afghanistan.

"There's a certain amount of large project construction resources in the world, and if you start stressing it all over the place, then the laws of economics say the price is going to go up to drive the demand down," said Joe Countryman, a partner with MBK Engineers, a Sacramento firm with decades of experience in major waterworks.

Finally, materials prices have soared over the past year, driving up costs for every buyer, from the federal government to backyard builders.

There have even been shortages recently in two key dam-building materials, steel and cement. The shortages have been so severe that the Portland Cement Association called on the Bush administration to lift tariffs so more cement can be imported from Mexico.

"For a large dam, obviously that eliminates some potential bidders, and narrows it to those that also might be busy on international work," said Ken Simonson, chief economist for the Associated General Contractors of America, based in Virginia.

Cost estimates by the Army Corps include an inflation factor of 6 percent. Simonson said the price of iron ore has increased 17 percent in the 12 months preceding May of this year, while cement increased 11 percent.

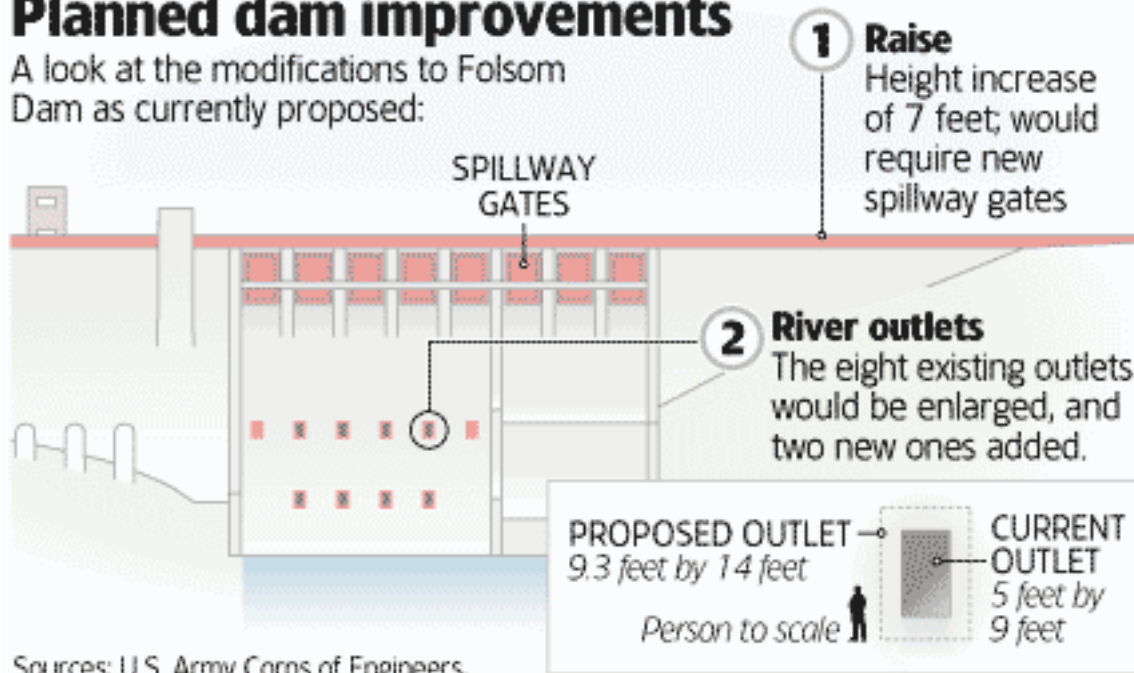
Diesel fuel, another construction staple, jumped 41 percent in the same 12 months, Simonson said, and 38 percent in the prior one-year period.

**About the writer:**

The Bee's Matt Weiser can be reached at (916) 321-1264 or mweiser@sacbee.com.

## Planned dam improvements

A look at the modifications to Folsom Dam as currently proposed:



Sources: U.S. Army Corps of Engineers, U.S. Bureau of Reclamation

Sacramento Bee/Nathaniel Levine