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Oroville Dam repairs will be long, complicated. Here's a look at who might do the work.

By Dale Kasler
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The repair job at the battered Oroville Dam spillway lacks a price tag and a finalized design. But it has drawn the interest of four leading construction contractors, all with experience in big dam projects.

The four contenders for the project are Kiewit Corp. of Omaha, Neb.; Granite Construction of Watsonville; Barnard Construction Co. of Bozeman, Mont.; and ASI Constructors Inc. of Pueblo West, Colo., according to the Department of Water Resources.

DWR released its repair plan Thursday, acknowledging the work won't be finished until 2018 and will leave the fractured spillway partially undone when the next rainy season begins this fall. Nonetheless, Acting DWR Director Bill Croyle said the 3,000-foot-long concrete chute, whose problems led to a near catastrophe in February, will be functional by the time the rains arrive in November.

Kiewit's resume includes work on the $900 million auxiliary spillway at Folsom Dam, which is expected to increase dam safety when it opens this fall. Barnard's website said the Montana contractor has worked on more than 70 dam and reservoir projects over the past four decades, while ASI has experience with dams from Australia to Maine. Granite, a $2.5 billion-a-year publicly held corporation, was awarded a big dam contract in Texas two years ago.

The state's Oroville repair plan was released nearly two months to the day after a giant crater erupted in the dam's main spillway, eventually triggering a crisis that forced the temporary evacuation of 188,000 residents.

Croyle acknowledged the plan is a work in progress.

"We have a little less than a 60 percent design," he told reporters. Still, DWR expects to execute a contract by April 17 and start work soon after.

"We're moving as fast as we can. We need this (contract) in a matter of hours or days, not weeks or months," Croyle said.

Croyle said he was unable to provide a cost estimate beyond his original projection nearly two months ago that it would take up to $200 million to repair the structure. President Donald Trump made a disaster declaration over the weekend that's expected to free up approximately $274 million in federal funds for Oroville repairs, although much of that money is being spent on debris removal and other functions not directly tied to repairing the spillway.

Gov. Jerry Brown moved to expedite the project Thursday, signing an executive order that waives state environmental laws and other red tape. Nonetheless, Croyle said DWR will be as sensitive as it can to environmental issues as work progresses.

The crater that erupted Feb. 7 essentially split the concrete spillway in two. Water gushing down the spillway, misdirected by the giant chasm, carved an enormous ravine in a nearby hillside.

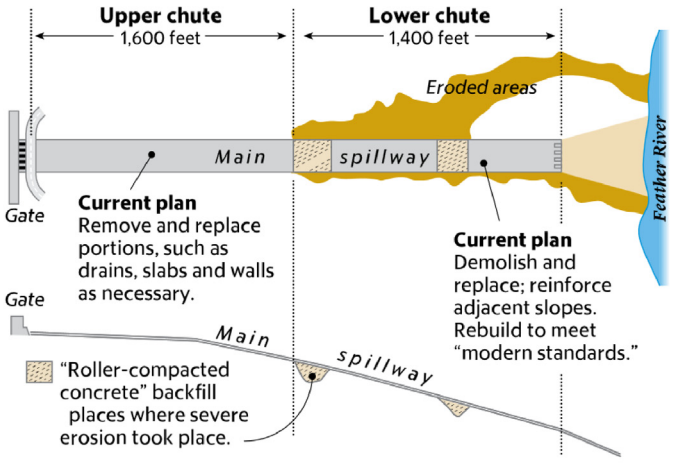
Croyle said DWR plans to leave the ravine in place this year. It could serve as a kind of auxiliary outlet in case the reservoir is rising too high and the concrete structure, despite its repairs, can't handle excessive water flows.

The lower spillway itself will be "demolished and replaced" over the summer, said DWR chief engineer Jeanne Kuttel. "It will be stronger than it was before," she said. The state plans to use quick drying "roller compacted concrete" on the lower portion of the structure, she said.

Croyle and Kuttel said the upper portion of the spillway, although undamaged, might be partially or completely replaced this summer as well. However, recent geotechnical studies have shown much of the upper spillway is thicker than previously believed, and might not have to be replaced, Croyle said.

OROVILLE MAIN SPILLWAY REPAIR PLAN

Multiple designs remain under consideration because of uncertainty about how spring weather will affect the construction timeline.



Source: Calif. Dept. of Water Resources

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Croyle acknowledged that plenty of work will be left over to 2018. That includes building higher retaining walls alongside the concrete chute to handle extremely high flows.

Meanwhile, he said DWR plans to partially line the adjacent emergency spillway with concrete this summer – a first for the structure.

The emergency spillway turned out to be the weak link in the February near disaster.

After the main spillway fractured, it was shut down temporarily for inspection. Inflows from a heavy rainstorm spiked water levels at Lake Oroville to unprecedented levels, and water poured over the emergency spillway – a concrete apron [sic] perched atop a hillside – for the first time since the reservoir opened in 1968.

A day later, engineers discovered that the hilllside was eroding so badly that the concrete apron [sic] might crumble, unleashing a "wall of water" into the Feather River below. That sparked the evacuation of 188,000 downstream residents Feb. 12 until lake levels receded and the situation stabilized.

Butte County Sheriff Kory Honea, who ordered the evacuation, said he was encouraged with the progress on the repairs. "We're moving from an emergency crisis management mode to a recovery mode," he said. "We are in a much, much better position today than we were on Feb. 12th."

Croyle said DWR, in consultation with the sheriff, won't make bid documents public because they're considered "critical energy infrastructure information," and could be used to create "harm and havoc." DWR cited the same explanation for sealing several investigatory documents with the Federal Energy Regulatory Commission last month. FERC licenses the dam and is overseeing the repair effort.

Department of Water Resources workers check on the flow of the Oroville Dam's main spillway on March 17 after water resumed flowing down the fractured main spillway after a three-week shutdown. Hector Amezcua hamezcua@sacbee.com

An earlier document, from a team of consultants hired by DWR to advise on the repairs, said fixing the spillway in one year would be nearly impossible because of design flaws and the severity of the damage. The report was the first sign that repairs would continue beyond 2017.

Croyle said that first report "shouldn't have been made public" and DWR will make sure future reports by the consultants stay sealed.

Paul Tullis, an engineering consultant from Utah who has studied spillway designs, said DWR's approach to the repairs seems reasonable, given the impossibility of completely fixing the structure in time for the next rainy season.

"There's only so much they can repair in a half a year or so," Tullis said. "They can only do what they can do."

Tullis said it will be critically important to monitor the hillside next to the main spillway next winter if DWR has to let more water flow through the recently-carved ravine. If too much of the hillside gets washed away, it could potentially harm the earthen wall of the dam itself, he said.

The spillway has been shut off since March 27 for temporary repairs. As raindrops fell outside the giant tent where he briefed reporters, Croyle said he believes the upcoming storm won't raise lake levels to uncomfortable levels, even with the spillway not releasing any water.

He added that the spillway will probably be used once or twice more this spring, depending on how heavy the runoff gets as the Sierra snowpack melts. Before long DWR plans to shut it down for good to begin the major repairs.

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http://www.sacbee.com/news/state/california/water-and-drought/article143200489.html

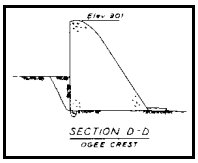

Figure 5 Ogee Crest Section. See figure 8 for section D-D location. ACE 1970

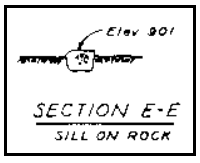

Figure 6 Ogee Crest Section See figure 8 for section E-E location. ACE 1970

FOR annotation: The emergency/auxiliary spillway is probably most easily described as 1,700 ft. long weir with no spillway below it. One might also describe it as the spillway lip. Oroville auxiliary spillway design cross sections to the left from ACE Reservoir Regulation Manual. A spillway "apron" is a comparatively short section of spillway below a spillway outlet control structure (weirs or gates).