



Beneficial Use Case Study

ACAA Oroville Dam Spillway Recovery

Coal Combustion Product Type

Class F Fly Ash

Project Location

Oroville, Butte County, Calif.

Project Participants

Kiewit Infrastructure West Co., California Department of Water Resources, Salt River Materials Group, Mathews Readymix

Project Completion Date

Phase 1: 2018

Project Summary

Oroville Dam is an earth-filled embankment dam on the Feather River near Oroville, California, in the foothills of the Sierra Nevada Mountains east of the Sacramento Valley. The dam forms Lake Oroville, California's second-largest man-made reservoir, with a capacity of over 3.5 million acre feet. Built in the 1960s for flood control, water supply, and hydroelectricity generation, the dam, amid heavy rainfalls in February 2017, sustained damage to its main spillway that, upon inspection, revealed a large area of concrete and foundation erosion.

Dam engineers continued to operate the damaged spillway, attempting to lower the rising reservoir levels sufficiently and avoid use of a second, earthen emergency spillway. On February 11, 2017, after discharge was reduced to the main spillway, the emergency spillway carried water for the first time in its history. Before reservoir levels had been brought under control, debris from the crater in the main spillway had been carried downstream, and the emergency spillway had sustained erosion.

Project Description

While it was clear that the main spillway would have to be rebuilt, the immediate need was to stabilize the hillside and minimize any erosion that could threaten the spillways and cities below. Chad Christie, Plant Manager at Mathews Readymix, was called on to supply more than 20,000 yards of concrete to the unlined hillside below the emergency spillway. After emergency action was taken, the California Department of Water Resources and its contractors began a two-year project to rebuild the main and emergency spillways and splash pad.

Ultimately, over 100,000 tons of Class F fly ash would be consumed during Phase 1 of the project, primarily for the one million cubic yards of roller-compacted concrete (RCC) batched at the larger of two on-site plants. Structural and leveling (slabs) required an additional 75,000 cubic yards of fly



Credit: Salt River Materials Group.



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ash concrete, which was delivered in conventional mixer trucks and placed with concrete pumps.

This phase of the project—completed in 2018—was similar to many RCC projects but with higher volumes of fly ash. The target for the RCC mix was over 50% fly ash by weight of cementitious material. This ensured less thermal cracking and lower heat of hydration during the placement. Dump trucks were utilized to deliver the RCC, which was distributed with bulldozers and compacted with vibratory rollers and plates.