

UNDER GROUND CATEGORY WINNER

POE TUNNEL

Dees Hennessey, Inc. - Shotcrete Contractor

POE TUNNEL - PARKHILL, CA

The Poe Tunnel is a 15-mile tunnel constructed in the 1950s in the foothills of the Sierra Nevada Mountains. A rugged landscape filled with many steep canyons. The tunnel is almost 20 ft in diameter and transports water from a forebay on the North Fork of the American River to the Poe Powerhouse where hydroelectric power is generated.

The initial scope of the project consisted of a new shotcrete lining for 90 ft of the tunnel. Once the project was underway it was evident 180 ft of tunnel needed repair. The design thickness for the new shotcrete lining was 10 in. not including overbreak and other repair work. The final shotcrete volume installed was over 500 cubic yards.

A primary challenge on the project was access to the site. The location of shotcrete work was 2300 ft from the nearest portal into the tunnel. Also, at the nearest portal there was no ready access to that location by vehicles or even by foot. And then to add to the challenge the nearest ready-mix concrete plant was two hours away.

To meet the access and concrete material challenge a plan was developed to transport the shotcrete pumps and all the shotcrete material by helicopter across the canyon. Once the shotcrete material was delivered to the portal the concrete would be pumped 2300 ft to the work location. All the crew had to take a 5-mile buggy ride into the job site every morning through the remote area.

One of the limiting factors in planning for the project was the weight that a helicopter could carry. The load limit for concrete carried by the helicopter only allowed about ½ cubic yard per trip. The time involved from batching to pumping required a highly retarded shotcrete mixture. The retarder had to allow the batching and delivery time, the transportation time from the truck to the site by helicopter, and the pumping of the shotcrete mix to the placement location. The wet-mix concrete mixture also needed a high slump so the concrete could be pumped 2300 ft to the nozzle. A shotcrete accelerator was injected at the nozzle to negate the high slump to allow proper placement and to rapidly get the shotcrete to setup.

The advantages that shotcrete provided to the project was in the removal of all formwork on the project, adaptability in the work sequence to meet the design requirements, and flexibility in the scope of the work. Through all of these changes and difficulties, the job completed on the originally scheduled date even though the scope of work doubled in size.

