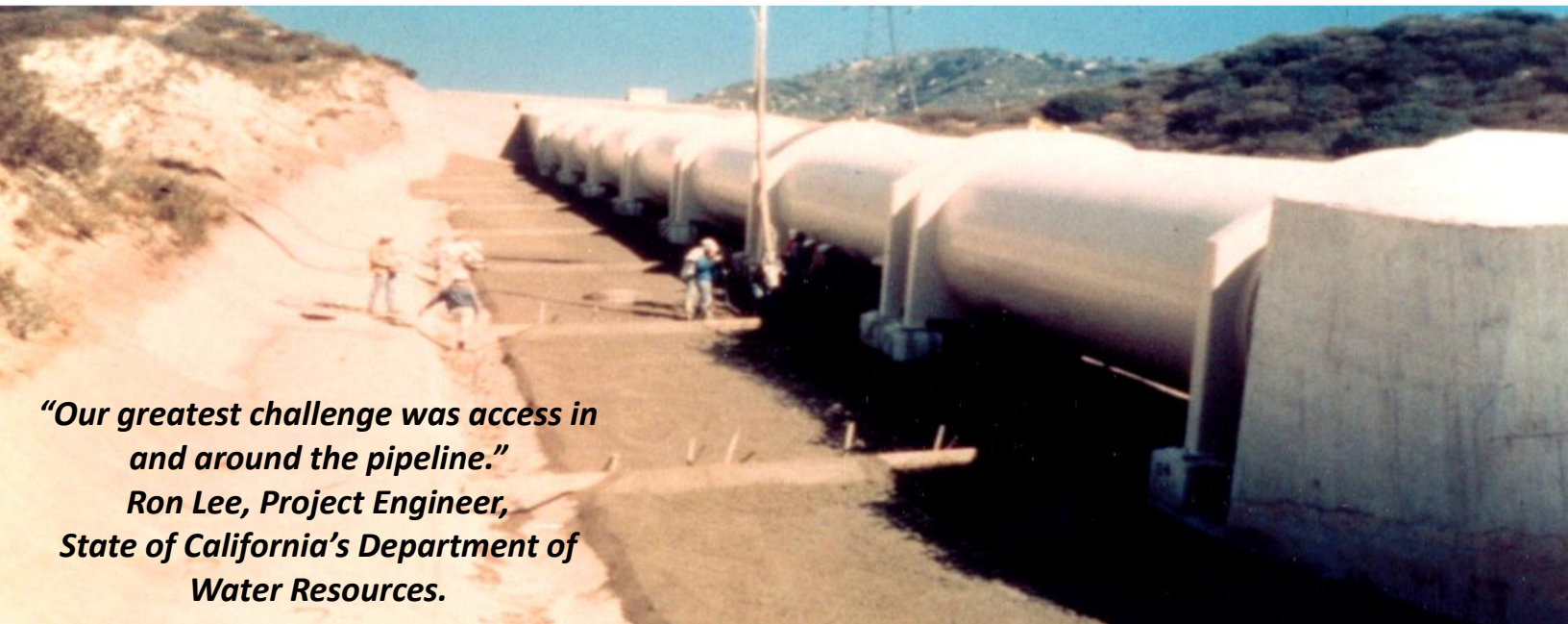


GEOWEB®

HARD-ARMOR PIPELINE EROSION PROTECTION Devil Canyon Power Plant



“Our greatest challenge was access in and around the pipeline.”
Ron Lee, Project Engineer,
State of California’s Department of
Water Resources.

GEOWEB® SYSTEM PROTECTS A PIPELINE’S SUPPORT STRUCTURES

PROJECT BACKGROUND

Constant demands for water and electricity in heavily populated areas in California prompted the Devil Canyon Power Plant project. Constructed from 1969 to 1974, the power plant is located at the San Bernardino Mountains near the mouth of Devil Canyon. Two pipelines, carrying water from Silverwood Lake and through an elevation drop of 1500 ft (460 m) and four Pelton wheel turbines, generate enough power to accommodate both the communities of San Bernardino and Riverside.

PROJECT CHALLENGES

Severe erosion. Difficult site access. Time constraints.

In 1994, the pipelines were in trouble. Erosion of the structures built to support the pipelines due to decades of water runoff was noticed. Winter was just around the corner and engineers looked for a solution before further erosion threatened the pipelines.

“Our greatest challenge was access in and around the pipeline,” explained Ron Lee, Project Engineer for the State of California’s Department of Water Resources. He continued, “As the pipeline travels down the mountain, it covers some very steep sections. The grade goes from flat to nearly 45%. Several sections are easily accessible with vehicles, while others on the steepest portions are only reachable on foot.”

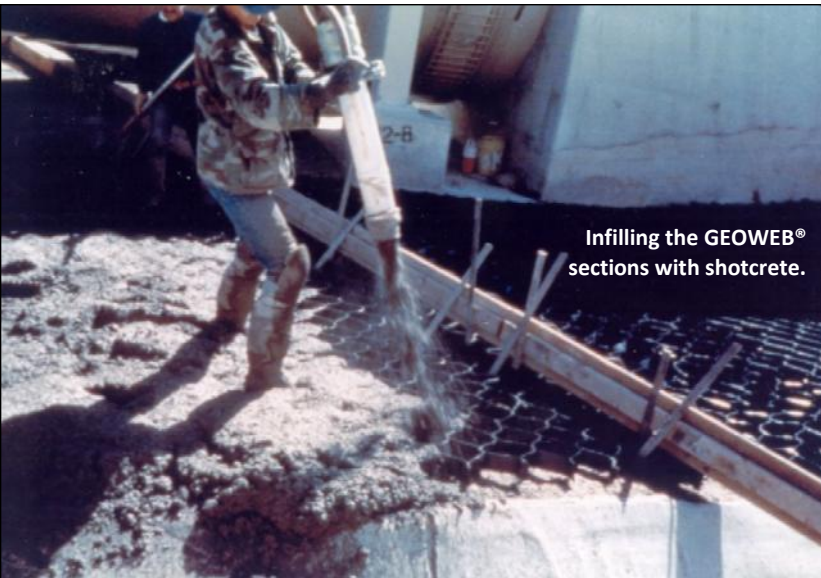
The project needed to be completed within 30 to 40 days, before harsh winter rains set in. Return trips would make the project costly and time consuming so finding a long-term solution was even more critical.



Prior to placing the concrete infill, the GEOWEB® system is installed along the base of the pipelines.

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Infilling the GEOWEB® sections with shotcrete.

FLEXIBLE FORMWORK | HARD-ARMOR PROTECTION Conforms to grade contours. Controls concrete thickness.

The GEOWEB System eliminated the need to build forms and the cellular structure provided a permanent flexible form acting as a series of expansion joints adjusting to the shape and grade of the soil. The concrete thickness could be controlled due to the system's uniform depth. The surface finish and thickness of the concrete were selected to meet the specific design needs.

Over 1800 ft² (170 m²) of the confinement system were installed. Folded like an accordion, the sections were brought up by trucks and placed in designated areas at the steepest parts of the mountains. In some cases, when an area was inaccessible, workers carried the sections and placed them where needed. The GEOWEB sections were expanded, staked in place and pumped with shotcrete for an installed strength of 3000 psi (21 MPa). The sections were then struck off and left to set up with no extra finish work needed. To help divert runoff, special check dams made of shotcrete were placed on the filled concrete surfaces. The dams diverted the runoff before water could accumulate and do any damage.

PROJECT RESULTS

Installation was completed in less than 40 days. Since its completion, the pipeline has survived various bouts of the El Niño weather pattern.

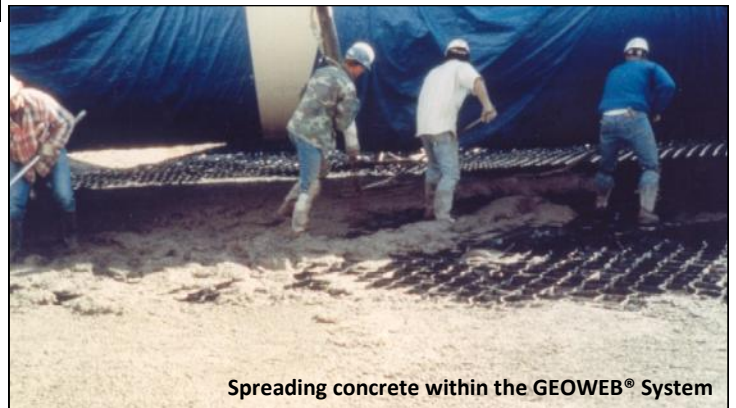
GEOWEB® EROSION PROTECTION SOLUTION

Easy to transport. Fast to deploy.

A list of workable solutions and materials was put together once the challenges were identified. Short on options, Presto's GEOWEB cellular confinement system infilled with concrete was chosen for the job.

The GEOWEB system is a proven component of slope stabilization and erosion control. The three-dimensional structure can be collapsed and easily transported to remote areas. When filled with concrete, it is a flexible hard-armor mat that provides erosion protection from the destructive effects of runoff.

Added benefits were that no training or special tools were required and installation could be performed with local construction crews.



Spreading concrete within the GEOWEB® System



GEOWEB® slope protection system near completion.

PRESTO



Call 800-548-3424 for more information.
www.prestogeo.com

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