

# Project Experience

## SCADA/Telemetry System Study

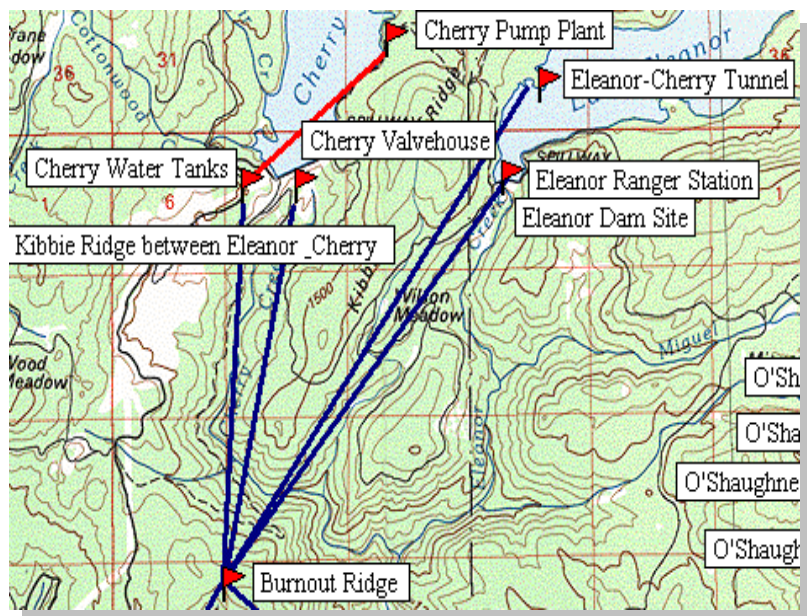
### Hetch Hetchy Water & Power

#### Public Utilities Commission

#### City & County of San Francisco, Moccasin, CA

As a subconsultant to Olivia Chen Consultants of San Francisco, Timberline performed a study in support of SCADA system expansion and telecommunication upgrade programs for Hetch Hetchy Water & Power (HHWP). Timberline was responsible for the SCADA and telemetry with supporting site civil engineering performed by the prime consultant.

Raw water is collected and stored in reservoirs in and around Yosemite National Park and delivered via tunnels and aqueduct pipelines to treatment facilities and water purveyors in the Bay Area. The study investigated telemetry options for 11 water resource sites, including Cherry Lake, Lake Eleanor, Hetch Hetchy Reservoir and O'Shaughnessy Dam, and associated water conveyance tunnels. In addition, five electrical substations in Newark, Treasure Island, Millbrae (SFO airport), and Oakland (two) required RTUs and telemetry links to the existing SCADA system in Moccasin. Telemetry options included a



A PORTION OF THE PROPOSED SYSTEM DESIGN

combination of licensed and unlicensed 900 MHz multiple address system (MAS) radio, licensed and unlicensed point-to-point microwave radio, fiber optic cable, leased satellite services (VSATs), and leased telephone circuits. Some sites of the Hetch Hetchy Water System have existing RTUs that will be either upgraded or replaced. HHWP already utilizes a westward-looking 900 MHz MAS radio on nearby Moccasin Peak that is also a microwave repeater site.

In addition, this study analyzed the replacement of existing multimode fiber optic terminal equipment at the Holm and Kirkwood powerhouses and the Early Intake Switchyard. The planning for the telemetry system and location of the radio equipment considered HHWP's existing fiber optic and terrestrial analog microwave networks that support SCADA functions, transfer trip and internal telephone connections between switchyards and hydroelectric power plants. This microwave backbone may be replaced and expanded as a new single-mode fiber optic cable transmission network in a subsequent phase of this project.

Timberline's study responsibilities included requirements determination via meetings and workshops, site visits, conceptual system architecture development, map studies and radio path analyses, technical report preparation and review meetings. This project involved unique technical challenges due to the wide geographic dispersion of remote sites in and around Yosemite National Park and across the San Joaquin Valley, 150 miles away in the San Francisco Bay Area. All must communicate with the SCADA system master station at the Moccasin Powerhouse. Timberline used a quantitative decision analysis technique to make the best decisions in an environment of uncertainty with respect to regulatory and funding issues.



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