

## Senior Canyon Tunnel Improvements Study

**Owner & Client:**

Senior Canyon Mutual Water  
Company (SCMWC)  
Ojai, CA

**Role:**

Tunnel Condition Inspection  
Geological Mapping  
Rehabilitation Design  
Cost Estimating

**Key Characteristics:**

- 2,400-feet of accessible 8-foot by 8-foot horseshoe shaped rock drill and blast tunnel.
- Tunnel intermittently supported by short concrete segments and timber sets.
- A water resource and conveyance tunnel currently collecting and discharging at a minimum rate of 60-gpm.

**Professional Services:**

From: January 2017

To: May 2017

JCK Underground was contracted by SCMWC to perform inspection and rehabilitation design of the existing Senior Canyon Tunnel. The tunnel is in the Santa Ynez Mountain, north of the Ojai Valley, and serves as a water resource.



*Senior Canyon Tunnel Prior to Rehabilitation*

In 1929, the tunnel was drilled and blasted 1,555-feet into the sedimentary layers of the bedrock that form the mountains. Sometime after 1929, the tunnel was further advanced to a total length of 3,000- to 3,500-feet. The 8-foot by 8-foot horseshoe shaped tunnel is mostly unlined, with short stretches of fractured rock requiring cast-in-place concrete and timber sets for support. A partial collapse of the tunnel was encountered at 2,400-feet making it impassible and limiting the inspection to this distance.

Water movement into the tunnel is through a complex series of geologic discontinuities in the rock consisting of bedding joints, steep angled fractures, and faults. The original water inflow into the tunnel has been impeded by near surface healing of the discontinuities. The tunnel currently collects water from the surrounding rock and discharges it at a minimum flow rate of 60-gpm.

JCK Underground performed a general condition assessment inspection of the tunnel while concurrently performing geological mapping of bedrock, and documenting discontinuities and water inflows. Using the data collected, JCK Underground prepared a report summarizing the inspection method, the inspection results and corresponding condition assessment. The report also recommended solutions for tunnel rehabilitation including improved ground support and overall water resource capacity improvements. Other data collected, included as-built geometries, a bottom-up construction cost estimate for the tunnel rehabilitation, and recommended enhancements to increase water flow capacity.