



Devil's Slide Tunnels California Department of Transportation District 4

Location: San Pedro Mountain on US Highway 1,
Between Half Moon Bay and Pacifica,
California

Date: 2006 – 2010

Structure: Highway Tunnels

Length: 8,000 feet (2,240 meters) Total Length
(Two Bores)

Cross-Section: 37.4 feet (11.4 meters) at Springline

Geology: Highly Tectonized and Chemically Altered
Granite, Granodiorite and Sandstone
with Multiple Faults with Gauges;
Groundwater Table Above Tunnel

Cost: Approximately \$268 Million

Client: Kiewit Construction Company

Owner: California Department of
Transportation (CALTRANS) District 4



Figure 1. South portal during construction.

Integrated On-Site Team (IOST) Support Services for NATM Engineering & Construction:

Twin highway tunnels were constructed through San Pedro Mountain, bypassing a stretch of US Highway 1 that is notorious for landslides. The project also included eleven cross-passages linking the tunnels for fire life safety, and three underground equipment rooms.

The tunnels were constructed using New Austrian Tunneling Method (NATM) with five different support categories for the main tunnels. Support categories were selected in the field in accordance with ground support requirements. The tunnels feature shotcrete linings and rock reinforcement for initial tunnel support, aided by a set of pre-support elements that include spilling and pipe arch canopies. An open (drained) PVC membrane based system was installed for waterproofing. Final tunnel support was accomplished by a reinforced cast-in-place concrete lining. Jet fans provided longitudinal ventilation.

Gall Zeidler Consultants (GZ) provided IOST support services including preparation of shop drawings, ground structure interaction analyses, evaluation of ground conditions in the field and selection of ground support categories, as well as the evaluation of NATM instrumentation and results monitoring and the provision of senior advisory field staff.



Figure 2. Southbound tunnel initial support.