



BarChip 54 was chosen as the primary lining support for the complicated ground conditions.

The Devil's Slide project is located on route 1 in San Metro Country. The project calls for construction of two tunnels beneath San Pedro Mountain, each 30 feet wide and 4,200 feet long.

Tunnel boring will progress from south to north using the New Austrian Tunnelling Method (NATM). Excavation consists of a road header and drill and blast for harder rock conditions. Each tunnel has a vertical clearance of 4.75 m and provides a single 3.6 m wide travelled way, two shoulder areas (2.4 m and 0.6 m wide), and two 1.2 m wide sidewalks, for a total width of 9.0 m. The ventilation jet fans are placed in the crown of the tunnel and cross passages are provided every 120 m.

Depending on ground conditions along the alignment, the initial support system may include shotcrete, rock dowels, lattice girders, spiles, and grouted steel pipes in various combinations. The final lining is a cast-in-place reinforced concrete lining, with a waterproofing membrane and drainage system placed between the initial and final linings.

BarChip fibre reinforcement was chosen as the preferred primary lining reinforcement. The project was originally reinforced using BarChip Shogun, changing to BarChip 54 during constructions. The lower dose rate of BarChip 54 easily met the 7 day toughness specification of 320 Joules (RDP). The long term durability of BarChip reinforcement was a key factor when compared against corrosive steel alternatives.

Quick Facts

- Twin tunnels approximately 1,250 m long
- Approximately 9.0 m wide, 4.75 m vertical clearance, with cross passages every 120 m
- 7 day toughness specification of 320 Joules (RDP)
- Reinforcement changed from BarChip Shogun to BarChip 54 as a result of superior performance from BarChip 54.
- Approximately 300t of BarChip used over the entire project
- Using New Austrian Tunnelling Method (NATM)
- Excavation using road header and drill and blast
- Estimated cost of USD \$ 180 to \$ 200 million.
- Complicated geological conditions include 3 faults
- First tunnels built by Caltrans in 40 years
- Reinforced with BarChip structural synthetic fibre

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Synthetic Reinforcing Fibre