Geological and Geophysical Investigations of the Coyote Pass Escarpment for Design Considerations of the Eastside Light Rail Transit Project in Los Angeles, California

PROJECT DESCRIPTION

Between Interstate 5 and Soto Street, the proposed Eastside Light Rail Transit Project (ELRTP) runs beneath First Street in East Los Angeles. It is here that a section of the proposed tunnel extends along the Coyote Pass escarpment. The escarpment is a west-trending fold that is expressed at the surface as an abrupt rise in the topography. The fold, which is forming in response to episodic movement on buried thrust faults beneath the surface, changes character from a well-constrained, tight and steep monocline on the east to a broad, shallow monocline on the west. This change in character could be the result of a north-trending tear fault that may have the potential to rupture the tunnel during a large earthquake. ***Earth Consultants International*** was retained to conduct both geological and geophysical investigations along this segment of the proposed Eastside Light Rail Transit Project.

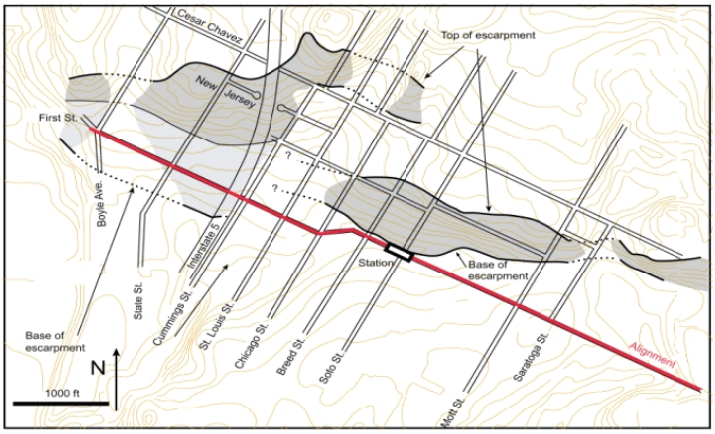
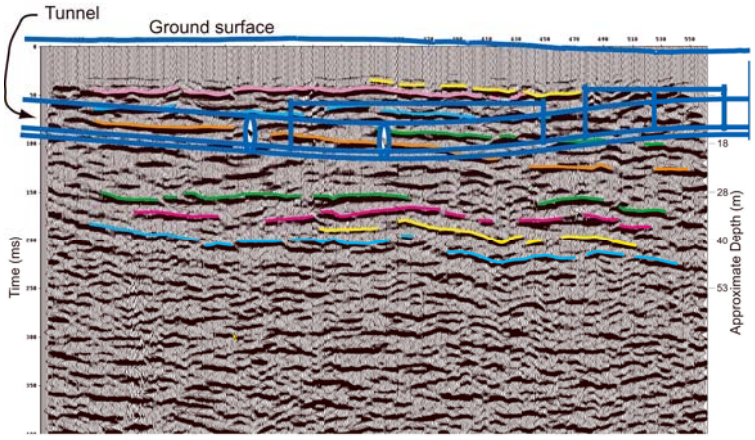


Figure showing the two segments of the Coyote Pass escarpment in gray. Our geophysical study was designed to investigate the section of the tunnel alignment between the two fold segments, to evaluate the potential for future deformation due to faulting.

SOLUTION

In 2001, ***Earth Consultants International*** drilled a series of continuously cored borings and determined that the Eastside Light Rail route comes very close to the base of the Coyote Pass escarpment. The station proposed at the intersection of First and Soto Streets is located a few meters south of the hinge of the fold. This proximity suggested that, during a future large earthquake, deformation might occur at the underground station. We addressed this issue by calculating the design tilts anticipated to occur during an earthquake on the buried thrust faults, and concluded that in the event of an earthquake the proposed station would not suffer strains greater than 0.3%. The tunnel engineers designed this section of the tunnel to accommodate these strains.



Tunnel outline superimposed on interpretation of reflection data.

In 2002, seismic reflection profiles were conducted along both First and Second Streets to evaluate the presence of the inferred tear fault. From the seismic reflection data, we concluded that two small faults occur beneath Second Street, but that these do not extend northward to the area of the tunnel under First Street. Strain appears to be transferred to the north as a broad zone of folding distributed over at least 130 m. However, due to limitations in the geophysical data we could not preclude the possibility that vertical offsets of about 7 cm per earthquake could occur in the area of the tunnel. The tunnel engineers concluded that this amount of deformation will not pose an impact to the tunnel as designed.

Earth Consultants International

1642 E. Fourth Street • Santa Ana • California • 92701
714.544.5321 • www.earthconsultants.com