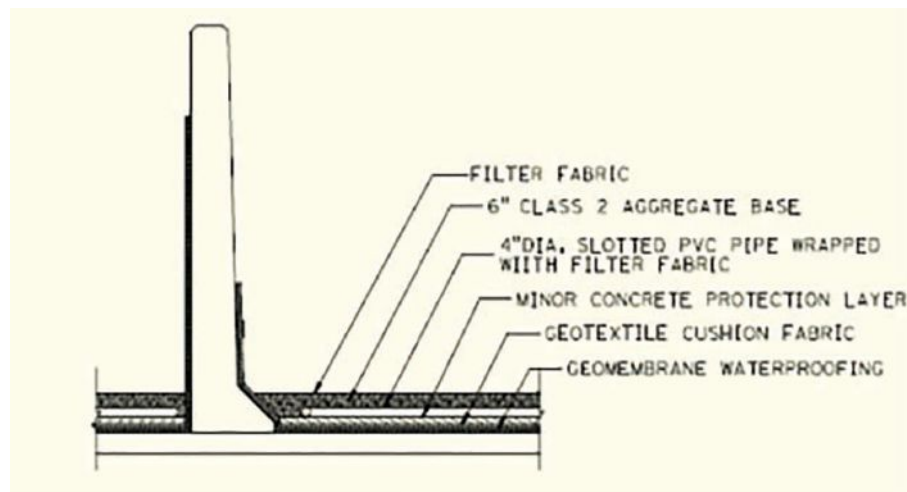


both ends of the bridge are designed to resist lateral forces and enhance the bridge's stability. Lateral forces include earth pressure from the soil behind the abutment and seismic lateral forces. These abutments are supported on spread footings, the construction of which was complicated by intense rainfall events early in the project.

Design Loads

The design of the superstructure, substructure, and foundation accounts for the dead load of the deck protection materials, vegetation, and soil. Whereas the designs of freeway bridge structures are typically governed by the live load associated with highway traffic, the controlling load in this case is the dead load of the vegetative layer on top of the structure. The unfactored dead load from the engineered soil included a maximum of 2 ft 11 in. of expanded shale at 97 lb/ft³, a maximum of 2 ft of horticultural saturated soil at 120 lb/ft³, and a maximum of 10 in. of Class 1 permeable material at 120 lb/ft³. The design live load uses an HL-93 truck load to account for incidental truck movement for maintenance and emergency activities after the bridge is completed. Seismic design for the structure uses a mean earthquake magnitude of 6.71 and a



The bridge deck and the roadway below are protected by multiple layers, which are also designed to permit drainage. Figure: California Department of Transportation.

design peak ground acceleration of 0.39g. No nonstandard features are required to resist the seismic loads because the design peak ground acceleration is not high.

Deck Layout and Landscape Buffers

The width of the bridge deck accommodates three distinct functional areas. The central deck area serves as the natural habitat for wildlife crossing over the freeway, and each side is bordered by an 11-ft-tall, exterior cast-

in-place concrete sound wall in addition to a robustly vegetated buffer landscape. The sound walls and vegetated buffer landscapes serve as a protective barrier for wildlife traversing the structure by reducing the impact of vehicle noise and artificial lights from the traffic below. The central deck area is overlaid with between 1 and 4 ft of engineered soil to create artificial topography, provide drainage, and support native vegetation. This area contributes to habitat restoration and features indigenous coastal sage scrub plants. The vegetated



AESTHETICS COMMENTARY

by Frederick Gottemoeller

When designing a wildlife crossing, designers typically must hide the artificiality of the crossing from its wildlife users. The Wallis Annenberg Wildlife Crossing posed this design challenge to an extreme degree since the wildlife corridor that crosses U.S. Route 101 and Agoura Road is an entire watershed with flowing and intermittent creeks. This crossing project specifically required complex and innovative design solutions to address two separate areas of concern: First, the water and drainage under the watershed topography that forms the wildlife corridor itself have to be controlled. Second, the crossing—which is carried over the highway and secondary road on two separate structures with a total 125 ft of vertical grade separation from end to end of the watershed—requires sound and visual barriers to separate the natural and highway environments.

The construction that controls water and drainage is all buried and is not a topic for aesthetic discussion. However, the barrier design is aesthetically important. From the wildlife side, the structural edges of the crossing structures themselves need to look just like the rest of the watershed topography. From the highway side, the edges need to look attractive to vehicle occupants and must evoke some recognition of the function of the whole project. This aspect of the crossing design affects road users' reaction to the project itself and will influence public support for future projects of this type.

First, let's consider what the wildlife sees. The central deck area serves as the natural habitat for animals crossing over the freeway, and each side is bordered by robustly vegetated buffer

landscape ending at a concrete sound wall. So, the wildlife should be happy.

Second, let's consider what highway users see. They see the other side of the concrete sound wall, which is fronted by 10 ft of sloped earth on which vegetation is grown to soften the appearance of the wall. Then they see the rounded edge of the first box girder, a concrete parapet wall, and fence support that hides a narrow maintenance walkway. Finally, they see that the soffit of the multicolumn median bent has a slight upward arch, further evoking the mountain landscape. In a quick glance, they take in all rounded surfaces and vegetation recalling the natural environment being carried overhead. That should impress the highway users, reassuring them that their highway dollars are being put to good use.

It seems to me that both the wildlife and the highway users are going to like what they see, and both animals and humans will feel that the Wallis Annenberg Wildlife Crossing is a natural component of their two very different environments.