

Ruta del Sol Road Project Agencia Nacional Infraestructura (ANI)

Location: Villeta to Guaduas, Cundinamarca Department, Colombia

Date: 2013

Structure: Two-lane highway with long tunnels, viaducts, bridges, embankments, and high cuts

Length: Sector 1, Tramo 1: 21.6 kilometers (13.4 miles); El Trigo Tunnel: 2,248 meters (7,375 feet); La Cumbre Tunnel: 978 meters (3,208 feet)

Cross-Section: El Trigo and La Cumbre tunnels: 108 square meters (1,163 square feet)

Geology: Marine and terrestrial sedimentary rocks (shales, siltstones, mudstones, sandstones, conglomerates); seismically-active area with several active thrust and strike-slip faults

Client: Agencia Nacional Infraestructura (ANI), Helios Road Consortium (HELIOS)

Owner: Agencia Nacional Infraestructura (ANI)

produces wetter-than-average conditions. Flooding and landslides were common throughout the Project area, and these impacts led to a dispute over the constructability and sustainability of the alignment of Sector 1, Tramo 1. Figure 2 displays the Geologic Units of the Project Area and the alignment of Sector 1, Tramo 1 in green.

Gall Zeidler Consultants (GZ) was retained by the owner and contractor as an independent, objective arbitrator to review the design of the alignment of Tramo 1 in relation to the geomorphological conditions before and after the 2010-2011 La Niña event in order to determine the consequences, if any, on the constructability and long-term performance of Sector 1, Tramo 1. GZ evaluated the geological conditions along the alignment and developed an in-depth risk-based analysis of normal and La Niña conditions to the structures of the project.

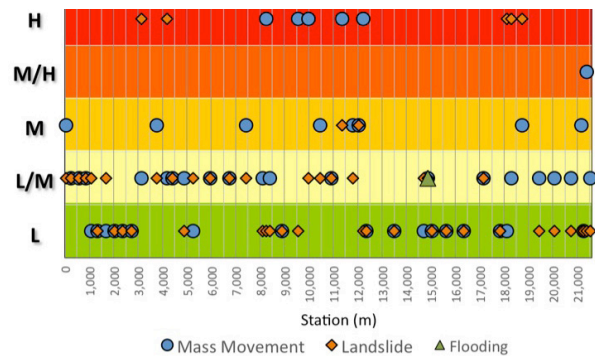


Figure 1. Risk probability for the threat of mass movements along the alignment of Sector 1, Tramo 1.

Engineering Consulting and Arbitration Services:

The Ruta del Sol Road Project is a two-lane highway over 1,000-kilometers (620-mile) long that connects Colombia's capital city of Bogotá to the Caribbean Coast, providing a safer and more reliable road artery for both commuters and the transportation of goods and services. The alignment of the road is divided into three Sectors, which are further sub-divided into sectors called "Tramos." Sector 1, Tramo 1, is approximately 21.6 kilometers (13.4 miles) long and connects the municipalities of Villeta and Guaduas in Cundinamarca Department, northwest of Bogotá. The alignment traverses the mountains of the Eastern Cordillera, a seismically active branch of the Andes mountain range with several active north-south trending faults. The geologic formations of Sector 1, Tramo 1, include predominantly fine-grained sedimentary rocks of marine origin, including shales, siltstones, mudstones, and lesser amounts of terrestrial coarse-grained sandstones and conglomerates. The alignment is highly susceptible to weathering, erosion, and slope failures due to the properties of the rocks, active faulting throughout the region and the wet tropical climate of the project area.

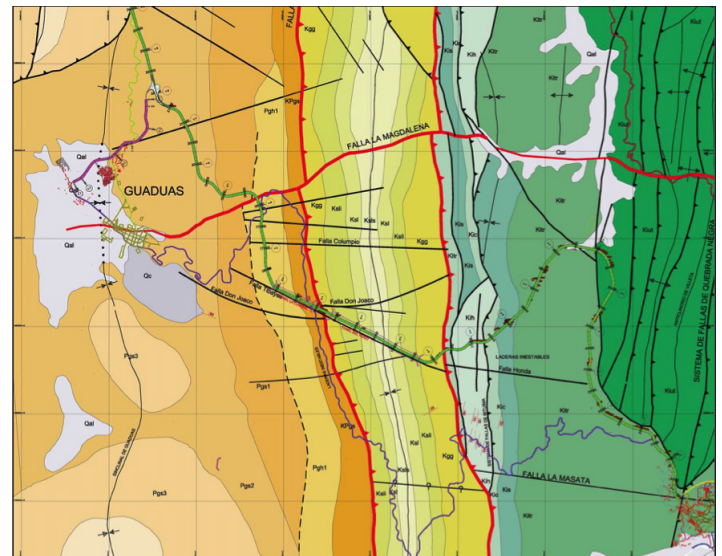


Figure 2. The Geologic Units of the Project Area and the alignment of Sector 1, Tramo 1 in green.

Between 2010 and 2011, the country of Colombia experienced the effects of the La Niña weather phenomenon, which generally