RITE GEOSYSTEMS

ENCARDIO RITE METASENSING FOR MEGA STRUCTURES

Project dossier

PROJECT DOSSIER

New Chirajara Bridge Project, Colombia

PROJECT OVERVIEW

In January 2018, the Chirajara Bridge was being built as part of a new expansion of the National Route 40 between Bogotá and Villavicencio. The bridge collapsed during construction.

The New Chirajara Bridge is now being built in the same place. It will have 3 spans of 114.6, 192 and 114.6 m each, making a total length of 421.20 m and 2 lanes in each direction. This Route to Los Llanos (the Colombia Great Plains) will ease the communication between Bogotá and Villavicencio.

Project	Construction of the New Chirajara Bridge Project
Location	Guayabetal, Colombia
Contractor	Coviandes
Our client	Geoandina i SAS
Duration	June 2021, ongoing completion expected by end of 2023

Brief history

The old cable-stayed Chirajara bridge collapsed on January 15, 2018, while under construction. With only 164 ft of the floor system remaining to be constructed between the towers, the western tower suddenly collapsed, destroying that part of the bridge. The other tower remained standing, approximately in the same construction stage as the collapsed tower. As per the investigation reports, cause of the collapse was determined to be a deficiency in the strength of the tower. This happened due to a design error, with an incorrect assumption made about the strength provided by a transverse tie beams and diaphragm at the diamond shaped pier.

The report also found that the foundations structural and geotechnical capacities were adequate for this type of bridge and could be retained for the reconstruction. Hence the new bridge is being constructed on this.

WHY MONITORING?

Instrumentation data play a key role during every phase of a bridges' life-cycle for not only risk assessment, but also to validate design assumptions regarding the static and dynamic behavior of the bridge structure. The data from sensors detect, locate and quantify damage happening to the bridge structure. It helps in early damage detection and ensure the longevity of the structure.

The instrumentation monitoring plan adopted for Chirajara Bridge is to control on the one hand the bridge structure in construction, and on the other hand the effect that potential landslide events could provoke.

MONITORING SOLUTION

Encardio-rite was the selected supplier of the monitoring instruments deployed in the project. The installation & commissioning was done by our partners in the region - *Geoandina i SAS*.

INSTRUMENTS USED

- Load Cells

  Load cells were installed at the anchor heads of rock bolts, they are used to determine the load these bolts bear to contain and prevent landslides in the pile foundation areas

- Tiltmeters

  Tilt meters were installed to monitor variations in the tilt of piles and other structures in the project.

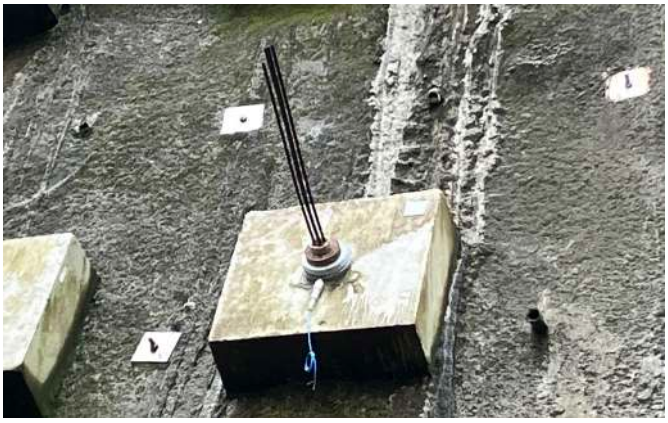
- Piezometer

  VW Piezometer: installed to monitor the variations in groundwater level and its effect on the infrastructure and the natural slopes.

- RF nodes / gateway

  RF dataloggers (nodes) witn gateway was deployed to automate and remotely transmit data from the project area to the data management system.

The data was available in near real time over the web based data management software, with instant alerts via SMS and emails.



Load cells being used for slope stability

RESULTS

Online data management successfully provided the contractor with the data needed to perform construction activities while monitoring structural movements within required threshold tolerances.

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