



## Design methodology for Roads Bridges located on Chilean copper miner roads

**Matias A. Valenzuela**

*Pontificia Universidad Católica de Valparaíso, Valparaíso, Chile.*

**Francisco Hernandez**

*SACER, Santiago, Chile.*

**Contact:** matias.valenzuela@pucv.cl

### Abstract

The Manual de Carreteras is the code for the design, construction, and maintenance of road bridges in Chile. This code is applied on highways defining requirements to ensure strength, security, and comfort of the structures and users. Despite this, several roads are located in the zone with special design and operational requirements, for example, productive industries such as Ports, Airports, Forrest extraction, and mining. For that structure, a specific code review and application of particulars requirements have to be considered.

This paper reviews the design issues of a road bridge located on a Chilean copper mine, located in the central zone of the country, in a high elevation over mean seas level and high-temperature variation. First, the proposal design considers the Manual de Carreteras code and the specific loads and geometric design in order to match with the mine production requirements. Finally, a case of study is presented with a proposal design including special truckloads (overweight loads), safety requirement of barrier and solution of clearance, as a guideline for future designs of these structures in the country.

**Keywords:** Bridge Design; overweight loads; mining truck.

### 1 Introduction

Chile is one of the countries with one of the largest mining productions globally, specifically copper, with open-pit mines such as Chuquicamata in the north of the country or other underground ones. In all of them, a road network is necessary to allow access and carry out extraction activities [1].

Among the relevant aspects to consider in mining road networks are designs integrated into the production process, safe and resilient.

Generally, route designs are similar to the highway roads, and therefore in many cases, the Highway Manual code for roads and structures is applied.

However, many aspects differentiate it, and that in the case of bridges require a special study. These factors include the type of vehicle load, road safety, and performance level on the pavement (generally without a surface course).

Therefore, this work presents the methodology used and recommendations for the conceptual design of a typical bridge for crossing interferences (overpass), both of roads and pipes, in mining areas located in the north of Chile.

### 2 Standards

Mining routes do not consider a specific regulation or design guide that includes specific requirements