# Rail-connection structure in Colombia

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## Summary

This paper presents a singular structure that provides rail and pedestrian access to oilfield and supports the main pipeline which will transport oil to the refinery facilities. Because of the ecological relevance of the area and a sustainable structure is designed with high environmental concerns. Two key areas of the steel bridge design must be highlighted: seismic analysis and track-bridge interaction.

**Keywords:** steel bridge; railway; bridge-track interaction; seismic analysis; pilling; swamp; pipeline.

## 1. Introduction

Bridge design could be defined as the art of identifying bridge requirements, analysing environmental boundary conditions and connecting both of them with the best structural solution. Based on this point of view, a singular structure is presented in this paper. Located in Colombia a 3 km long steel railway bridge has been designed to provide access to drilling facilities over a swamp. The singular constraints of the project derived from provided access as well as environmental location characteristics.

Presented structure was designed by Ardanuy Ingeniería during 2011 and 2012. Assitance to construction works was also provided during 2013.

### 1.1 Bridge objective and requirements

Designed structure provides access to an artificial island built on the middle of the lake (swamp) for about 3 km length. An artificial island is created to install the drilling facilities foreseen by the owner (oil company). For this new complex rail access was required as well as a pipeline for oil transport from the new drilling point to the preliminary treatment facilities.

Because of the potential environmental risks of the pipeline itself and because of the environmental value of the location of the structure, huge importance was given to structure safety not only during service stage but also during construction one.

### 1.2 Swamp Environment

Located in Colombia, the swamp where the structure is localized has an ecosystem that works as a shock absorber for water rising and sediment retention. Hydrological behaviour of the swamp determines variable depths of the water and the vegetation that covers the whole area; which means that there is not a sharp water surface during the year.

Swamp surface is covered with several flora species that cover the entire water layer; in certain areas and on swamp borders, denser flora exists. The main richness of the area is located in the swamp border, where different species find their shelter and food.

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