

Lifting and Rehabilitation of 5 Highway Overpasses in Brazil

Caio Nogaroli Boecker, Marcelo Melo, João Luís Casagrande, Leonardo Patrício Chaves

Casagrande Engenharia (CAGEN), Rio de Janeiro, RJ, Brazil

Contact: cnboecker@cagen.com.br, mlfilho@cagen.com.br, ilcasagrande@cagen.com.br, lpchaves@cagen.com.br

Abstract

This paper presents the structural solution for the lifting and rehabilitation of 5 overpasses crossing a Federal Highway, located in the south part of Brazil. All structures were built in the 1960s, a period in which the design practice required a minimum height of 5,0 m to allow the flow of vehicles under the deck. Due to the recent expansion of taller vehicles and increment of traffic in the region, the highway administrator, in order to meet the space requirements of 5,5 m, financed both project and construction works. The main requirement was to carry out the entire construction without causing the interruption of traffic under the overpasses. The proposed solution included: preliminary static load tests, construction of corbels to support hydraulic jacks, localized strengthening of structural components, replacement of the originally designed fixed bearings by new elastomeric bearings and the heightening of the piers using steel plates as reinforcement.

Keywords: overpass; lifting; rehabilitation; strengthening; load test.

1 Introduction

The Brazilian Federal Highway BR-290, where the 5 overpasses are located, connects major states of Brazil and other South American countries to the Ports of Rio Grande and Porto Alegre. It has been experiencing recently an increasing in the traffic of larger and taller vehicles (see Figure 1), responsible mainly for the transportation of agricultural production, such as soy and wheat grains for exportation. From 2020 to 2021, export volumes in the region surpassed 47 million tons, which represents an increase of 19,37% in one year. China market alone was responsible for the consumption of 56,32% of the goods exported in the same period, according to the Regional Communication Advisory.

Within this context, our office was hired by the currently highway administrator to develop the structural project for the lifting of all overpasses and, therefore, achieve the safety requirement of

5,5 m established by the federal regulations. Due to economic importance of the highway under the structures, the entire construction process had to be carried without causing the interruption of traffic.

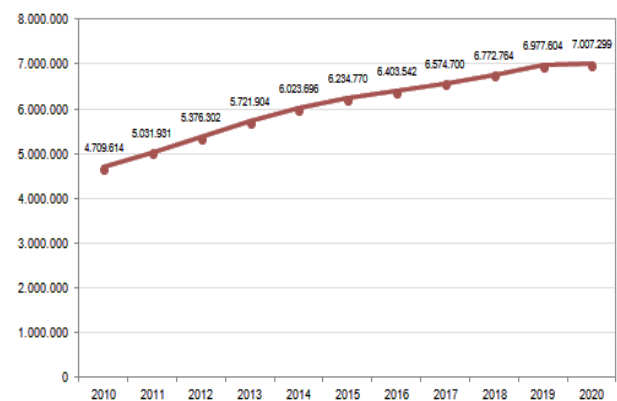


Figure 1. Evolution of motorized vehicles fleet in Rio Grande do Sul from 2010 to 2020 (DETRAN-RS)