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THE RETROFIT IN BRIDGES SYSTEM OF RING ROAD OF THE BELÉM METROPOLITAN REGION - PARÁ, BRAZIL

Leila Adriane N. M. Pamplona

leilanmartins@yahoo.com

br / Civil engineer / C.O. of The Secretary of transportation for the state of Pará, Brazil

Adler Almeida da Silveira

adleralmeidadasilveira@gmail.com

/ Secretary of Transportation for the state of Pará, Brazil

Pedro Afonso de O. Almeida

palmeida@usp.br

/ Prof. Dr. Polytechnic School of USP, SP, Brazil

ABSTRACT

This paper approaches the retrofit in the bridges system of the “Alca Viaria,” or ring road, built in the early 2000s in the Metropolitan region of Belem, in the Brazilian state of Para. The ring’s route is 87 kilometers (km) long. It connects the Southwest and South of the state region to the metropolitan region. It also crosses the three rivers of Amazon’s delta in the state of Para: Guama River, with 1,975 m in crossing extension; Acara River and Moju, both with 860 m in crossing extensions. The retrofit of structural systems takes place from the high incidence of impact between barges and bridges, occurring over the last twenty years of the structure’s service life. This results in significant damage to the supports and leads to the partial collapse of the bridge. In the last five years, these kinds of accidents required the retrofit of structural systems with a stayed-cable and the exchange of all strands in the Guamá stayed-cable bridge. Besides this, it also required the construction of floating protections on the lateral bent of the canal, the Moju, and Acará bridges. Therefore, the Department of State and Transportation of Pará has been developing efforts to ensure the operation of the system.

Keywords: stayed-cable bridge, floating protections, fender, retrofit of bridge.

1 INTRODUCTION

The retrofit of three bridges in ring road that are constructed using different structural systems. The bridge over the Guamá River is the largest, with the main span built with a 720 m long stayed-cable bridge. It consists of a 320 main span, with two H-shaped masts and two bridge of access built-in precast straight beams of prestressed concrete.

The bridges over the Acará River and the Moju River are originally with composed cross section of steel-concrete, with navigation spans of 88 meters. These bridges are now 20 years old and undergo profound adjustments both in the main structural system and in the systems for the protection of the main supports of navigation spans. The retrofit of structural systems considers of a high incidence of impact with barges that has often occurred over the last twenty years of service life, causing great damage to the structures that required the state government in the last 10 years a profound readjustment of structural systems with exchange of stayed-cable of the largest bridge