PROPOSED DESIGN OF A REINFORCED CONCRETE ARCH BRIDGE CONNECTING BANCOD AND MATAAS NA LUPA ACROSS JORDAN RIVER IN INDANG, CAVITE

Design Project

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ABSTRACT

BACLAGAN, JESSICA MAE D. and TERRIBLE, JOZEL BRYAN M. Proposed Design of a Reinforced Concrete Arch Bridge Connecting Bancod and Mataas na Lupa Across Jordan River in Indang, Cavite. Undergraduate Design Project. Bachelor of Science in Civil Engineering. Cavite State University. Indang, Cavite. May 2017. Adviser: Engr. Larry E. Rocela.

The study entitled "Proposed Design of a Reinforced Concrete Arch Bridge Connecting Bancod and Mataas na Lupa Across Jordan River in Indang, Cavite" was conducted from September 2016 to April 2017 at Cavite State University.

The main objective of the study was to design a reinforced concrete arch bridge across Jordan River that may provide better transportation in the near barangays of Bancod and Mataas na Lupa in Indang, Cavite. Specifically, it aimed to conduct design a reinforced concrete arch bridge, provide architectural and structural plans and detailed specifications, provide a detailed cost estimate of the project, and provide a tarpaulin.

Based on the conducted analysis and design, the reinforced arch bridge had a span of 200 meters with 160 meters clear span of the arch. The width of the pavement was 14.6 meters.

The architectural and structural design of bridge elements were determined. Computed dimensions for pedestrian and traffic rail were 0.15 by 0.30 meters while the post for both were 0.25 by 0.25 by 1.00 meters and 0.25 by 0.25 by 1.20 meters respectively. The thickness of the sidewalk was determined to be 0.20 meters while the slab is 0.35 meters. The exterior and interior girder was determined to have a dimension of 1.00 m by 1.50 m. the diaphragm had a dimension of 0.3 m by 0.6 m. Pier coping had a dimension equal to 2.0 m by 2.0 m. The pier column had 2.0 m by 2.0 m dimension while

the spandrel column's dimension was 2.0 m by 3.0 m. the arch rib had a dimension equal to 3.0 m by 5.0 m. The pier footings computed dimension were 10.50 m by 10.50 m with 1.25 m thickness.

The Engineering Software STAAD (Structural Aided Analysis and Design) was used in the analysis of the arch. The guidelines set by the National Structural Code of the Philippines (NSCP) and American Concrete Institute (ACI) were followed in the design computation. The maximum moment, shear and axial loads were the basis for the design.

All needed specifications were followed in the design process. Detailed analysis of the design was proven safe and economical after the manual computation of the design. The reinforced arch bridge was designed by applying the author's knowledge and skills.

The estimated total project cost of the suspension bridge was P185,424,076.59.

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INTRODUCTION

Humanity has been building bridges for all of history, but it has only been building arches since around sixth century BC. The arch first appeared in building construction, brought to the Greeks from Mesopotamia around fourth century BC. Arch bridges, necessarily, came afterward, first appearing in Rhodes, Greece as a footbridge. It was not until the Romans that the arch became a common form for bridge construction. The Roman road system tied the empire together, and those roads required many bridges. Some of these bridges are still standing today, a tribute to the excellence of the engineers who built those centuries ago (Beyer, 2012).

The history and beauty hidden in every arches fascinated the authors and inspired them to conduct the study. Barangay Bancod and Barangay Mataas na Lupa in Indang, Cavite was considered as their location for their proposed design. Indang is one of the 19 municipalities of Cavite that found in the south central part of the province that consists 36