

## COMPARISON OF HIGH SPEED RAILWAY BRIDGE FOUNDATION DESIGN

Hussein YOUSIF AZIZ\*

*Doctor, College of Engineering, Muthanna University, Sammawa, Muthanna, Iraq  
husseinyousif\_9@yahoo.com*

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### ABSTRACT

This paper discusses the design and analysis of bridge foundation subjected to load of train with three codes, namely AASHTO code, British Standard BS Code 8004 (1986), and Chinese code (TB10002.5-2005). The study focused on the design and analysis of bridge's foundation manually with the three codes and found which code is better for design and controls the problem of high settlement due to the applied loads. The results showed the Chinese codes are costly that the number of reinforcement bars in the pile cap and piles is more than those with AASHTO code and BS code with the same dimensions. Settlement of the bridge was calculated depending on the data collected from the project site. The vertical ultimate bearing capacity of single pile for three codes was also studied. By using the two-dimensional Plaxis program and other programs like SAP2000 14 and PROKON many other parameters were also calculated. The maximum values of the vertical displacement were close to the calculated ones. The results indicate that the AASHTO code was economic and safer in the bearing capacity of single pile.

The other purpose of this project is to study the pier on the basis of the design of the pile foundation. There is a 32m simply supported beam of box section on top of the structure. The pier of bridge is round-type. The main component of the design is to calculate pile foundation and the settlement. According to the related data, we choose 1.0m in diameter bored pile of 48m. The pile is laid in the rectangular pile cap. The dimension of the cap is 12m×9m. Because of the interaction factors of pile groups, we must check the load-bearing capacity of simple pile, the punching resistance of pile cap, the shear strength of pile cap, and the part in bending of pile cap, all of them are very important to the structure stability. Also, checking soft sub-bearing capacity is necessary under the pile foundation. This project provides a deeper analysis and comparison about pile foundation design schemes. First, here are brief instructions of the construction situation about the bridge. With the actual construction geological features and the upper load on the bridge, this project analyzes the bearing capacity and settlement of single pile. In the paper, the Equivalent Pier Method is used to calculate and analyze settlements of the piles.

### 1. INTRODUCTION

In Iraq, the earthquake situation has not been considered in design of bridge from many years ago. Currently in our code of practice BS 5400, there is no rule on earthquake design consideration for bridge structure. Even though our country does not have earthquake very frequently, we must be aware that our neighboring countries such as Iran is located in an active earthquake prone region. Therefore, we must take into consideration the potential impacts of earthquakes in our neighboring countries in design of our structures, especially bridges. Even though our bridge structure might just get small vibration due to earthquake from our near region country, it may also contribute to some side effect in long term period if it happened for many times. This situation might cause cracking and collapse of our bridge. So, in solving this problem we need a code of practice that considered earthquake loading in design process.

\* Corresponding Author: Tel.: 009647819731727; e-mail: [husseinyousif\\_9@yahoo.com](mailto:husseinyousif_9@yahoo.com), [husseinyousifaziz@gmail.com](mailto:husseinyousifaziz@gmail.com)