Research on the bearing capability of the middle tower caisson foundation of Taizhou bridge

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Summary

An caisson was adopted for the middle tower foundation of Taizhou Bridge. The shallow foundation calculation formula commonly used by chinese designer is not applicable for the middle tower foundation located above the 200-meter overlying deposit in the water. Model test and 3D numerical simulation analysis are simultaneously conducted for Taizhou Bridge, to obtain the foundation soil bearing capacity of the open caisson foundation of the middle tower and ensure the structural safety and stability.

Keywords: bearing capability of caisson;model test; Numerical Simulation; the overlying deposit.

1. Introduction

Taizhou Bridge is a three-tower two-span suspension bridge with main spans of 1080m each, the middle tower is situated in the middle of the river, with river bed relatively stable at an elevation of ∇-15.0m. The overlying deposit on river bed, due to long-term quick sand alleviation, is extremely thick, with the bed rock embedded 200m below. At the middle tower foundation, it is composed primarily of fine silt sand from the riverbed down to ∇-55m, medium coarse sand from ∇-55m to ∇-68m, fine sand from ∇-68m to ∇-79m, and medium gravel below ∇-79m. The three-tower two-span suspension bridge structure demands sufficient deformation rigidity and ship collision force (or seismic force) resistance capacity of the middle tower. After selection among various foundation schemes such as open caisson foundation and high pile cap foundation with drilled hole, the open caisson foundation (Fig. 1) with large self-rigidity, low requirements for foundation bearing capacity and good resistance to horizontal load was finally adopted. According to the structural and load carrying requirements of the tower column bottom, the 58×44m fillet rectangle open caisson was adopted with a total height of 76m. For the convenience of smooth construction in deep water, the lower part of the caisson is of steel-shelled concrete structure, and the upper part of caisson is of reinforced concrete structure.

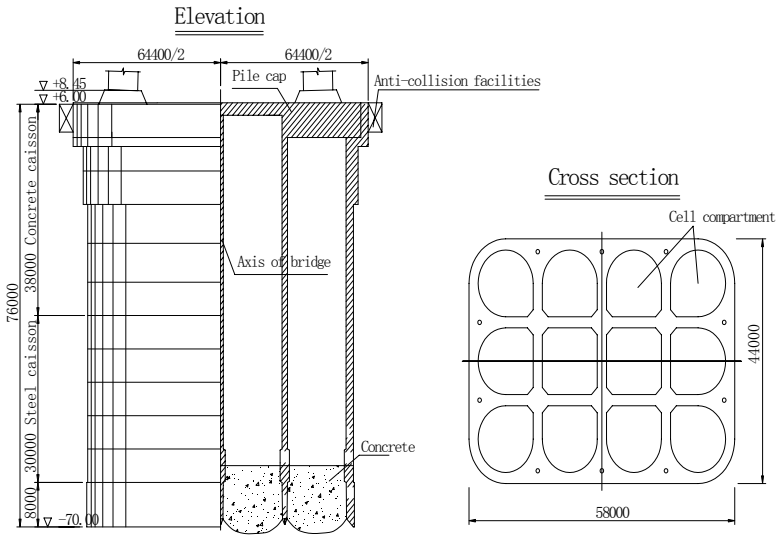

Fig. 1:Caisson Structure (unit: mm)

The middle tower of Taizhou Bridge is 135MN in weight, the

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