



Key technologies for design and construction of deep-buried capping cofferdam in the confined water layer area of the Yellow River Basin

He Jiangping , Wang Qi , Mu Yaoqing

CCCC Second Harbor Engineering Co.Ltd., Wuhan, China

Contact: 903398426@qq.com

Abstract

The Anluo Yellow River Expressway Bridge is a (110+135+520+135+110) m double-tower double-cable plane composite beam cable-stayed bridge, The main pier cap adopts the separated octagonal cap, The outer outline size of a single bearing platform is 35.6m×32.1m, the thickness is 6.0m, and it is buried 12.2m underground. The cofferdam adopts PLC combined pile^[1] structure, the outer contour size is 38.6m×35.1m, and three support systems are set up. About a series of problems for platform, such as: a long period of platform construction, high risk of sudden surge in foundation pits, high safety risk of cofferdam process conversion, high risk of temperature control in the construction of mass concret. Moreover, this deeply buried platform located in the Yellow River Basin pressurized water layer., through the calculation and design of Visual modflow software, a single cofferdam is set with 12 dewatering wells and 1 observation well for continuous dewatering to improve the anti-surge stability of the foundation pit; use MIDAS software to simulate the working conditions of each process of cofferdam construction to reduce the safety risk of process conversion, and it is calculated that the strength, stiffness and embedded stability of each component of the cofferdam can meet the design requirements.

Keywords: Composite beam cable-stayed bridge, pier cap, PLC combined pile, sudden surge in foundation pits.

1 Introduction

The main bridge of Anluo Yellow River Expressway Bridge is (110+135+520+135+110) m double-tower double-cable plane composite beam cable-stayed bridge follows: Figure 1, the semi-floating structure system is adopted, the main beam is a full bilateral steel box girder section, the cable tower adopts a steel shell concrete bottle tower, and 23 pairs of steel strand stay cables are arranged on each side.

The foundation of the main pier of the bridge adopts a separate cap, and 36 D2.7m~D2.2m bored cast-in-place piles are arranged under a

single cap, arranged in a plum blossom shape, and the pile length is 95m. The design elevation of the top surface of the pile cap is +74.8m, and the size of the cap is 35.6m×32.1m×6m follows: Figure 2, the tower base with a height of 2.0m is set on the top surface of the bearing platform. The size of the upper plane of the tower base is 14m×14m,

and the size of the lower plane is 18m×18m. The main pier of the North Tower adopts the combined cofferdam of steel pipe piles and steel sheet piles for foundation pit support for the bearing platform range[3], the design adopts the 1985 National Elevation System Datum.