



Crack Control Technology in Construction of V-Shaped Piers of the Main Bridge of China-Maldives Friendship Bridge

Liang Xiang , Fangwen Weng , Hehui Zheng

China Communications Construction Company (CCCC) Second Harbor Engineering Co., Ltd., Wuhan, Hubei, China

Contact: 393313210@qq.com

Abstract

The piers no.19~21 of the main bridge of China-Maldives Friendship Bridge are V-shaped piers, which are constructed by the method of "cast-in-place slant legs with cable-stayed connection and hanging section + cast-in-place block no.0 with inner supports". Based on the analysis of the whole construction stage of the bridge by the finite element method, the factors of concrete cracking during the construction of V-shaped piers are grasped. In view of the risk of structural cracks, the scheme of setting prestressed steel beam in the slant legs and accurately controlling the removal time of the cable hanging bracket is adopted to effectively prevent the concrete cracking during the construction of V-shaped piers.

Keywords: continuous rigid frame bridge; v-shaped piers; crack control; construction technology; prestress; stress control.

1 Project overview

The main bridge of China-Maldives Friendship Bridge is a six-span rigid frame bridge with concrete and steel box composite girders and V-shaped piers. With a total length of 760m, asymmetric spans of (100 + 2×180 + 140 + 100 + 60)m are adopted. The triangular area of piers no.19~21 is a concrete V-shaped pier structure.

Pier no.20: the angle between the middle axis of slant legs and the center line of the pier is 64°; the bottom of block no.0 on triangular pier top is a cambered surface with a radius of 50m and the circular chamfer with a radius of 3.1m is applied for transition between V legs. Overall 1910.5m³C55 marine concrete with a total weight of 5063t is used in the V-shaped pier in the triangular area.

Pier no.19 and no.21: the radius of bottom of block 0 of box girder on triangular pier top is 50m and the circular chamfer with a radius of 1.5m is applied for transition between V legs. Angles between the middle axis of slant legs and the center line of the pier are 70° and 66° respectively. Overall 1764.1m³ C55 marine concrete with a total weight of 4675t is used in V-shaped piers in the triangular area.

V legs are single box double chamber concrete sections with top width of 9.9m, bottom width of 8.8m and cross section of 3.4~4.6m. The structure of block no.0 box girder is the single box double chamber with top width of 21m and bottom width of 12.1m. The beam height varies gradually and the minimum beam height is 2.7m. The closure of V legs and block no.0 forms the main girder structure.