



Archimedes Bridge Underwater of BaiYangDian Lake

Teng Zhi-Bo

ShangHai TongHao Civil Engineering Consulting Co., Ltd., Shanghai, 200092

Abstract

Based on the concept to build a floating bridge being the mixture of bridges and tunnels on anchored submarines, this paper tells a conceptual design of 3x50 Archimedes bridge underwater of BaiYangDian Lake, and also of prospectives on the same type of Archimedes bridge for TaiWan Strait.

Keywords: BaiYangDian Lake; Archimedes; Underwater Bridge; BIM; Anti-overload Vajra; Anchored Submarine; TaiWan Strait

1 Introduction

The author of the book "Aesthetics of Bridge Design" [1], when introducing the Li River Bridge in Guilin and the Taihu Lake Bridge, which he designed, quoted a famous architecture professor from Tongji University: Guilin is so beautiful that bridges cannot compare with it in any way. The bridge could only be built there "quietly".

In order to realize this concept "quietly" to the fullest extent possible, the author proposed to the author of the book the idea of building an underwater bridge in BaiYangDian Lake. This bridge was named BaiYangDian-Archimedes Bridge by him. According to the Chinese People's Volunteer Army team during the war against the United States [2], the so-called underwater bridge is this bridge to the surface of the water forty or fifty centimetres. It enables the river not to flood the exhaust pipe of the car, but also hides the bridge well. Of course, in the current era of peace, the bridge in the water does not need to be so deep.

The following is the conceptual design of a 3x50m Archimedes (underwater) bridge for a site in BaiYangDian Lake.

2 The bridge position and its hydrological situation profile

According to the website Baidu, the situation of BaiYangDian Lake[3] is as follows. According to the measurement in 2009, BaiYangDian Lake has a water area of 108.8 square kilometres (water level 7.09 meters). The total area is 336 square kilometres (when the Dagū elevation is 10.6 meters), with 102.4 million cubic meters of water storage, and the ground landscape is dominated by water. More than 3700 horizontal and vertical ravines divide the entire lake into 143 small lakes of different sizes. It is also reported that in recent years, the annual diversion of water from the Yellow River 105~200 million m³ of water is injected into BaiYangDian Lake. Its usual water level is maintained at 6.6~7.0m; and 105~200 million m³/108.8km²m.

The form of the bridge deck cross-section, or the corresponding roadway grade, depends on the roadway to be connected at both ends of the bridge. If the existing ground beneath the bridge does not meet the space requirements for the bridge box, the