



## Temburong Bridge, Brunei Ground Engineering – Part 2: Geotechnical Design

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### Abstract

The new 30 km Cadangan Projek Jambatan Temburong (Temburong Bridge Project) in Brunei will provide a highway link between the two separated parts of Brunei, by spanning Brunei Bay. The complex geological setting brings particular challenges to the design and construction of the foundations required for the various forms of bridge structures. The varying depths of geological stratigraphy along the alignment and different loading conditions call for multiple deep foundation types, as well as different construction methodologies, to be adopted. Part 2 of this paper on the Ground Engineering aspects of the project focuses on the choices of foundation for different sections of the crossing, the geotechnical design approach and verification strategy, and the relevant computer analyses undertaken.

**Keywords:** Brunei, deep foundation, piles, Eurocode, soil-structure interaction, time-history analysis

### 1 Introduction

The new 30km Cadangan Projek Jambatan Temburong (Temburong Bridge Project) in Brunei will connect the relatively isolated district of Temburong to the more developed Brunei-Muara district. A detailed description of the scope of the project is provided in [1]. The primary components are 14km of marine viaducts across Brunei Bay in package CC2, 2 cable stayed bridges in package CC3, and 12km of low level viaduct crossing a swamp forest area in Temburong district in package CC4, as shown in Figure 1.

Part 1 of this Ground Engineering Paper [2] provides details of the ground conditions and associated challenges along the alignment. This Part 2 discusses the geotechnical design of the foundations for the proposed crossing in both the Brunei Bay and the Temburong district portions in order to overcome the challenges imposed by the complex ground conditions. It also gives an overview on the approach of the design and

verification of the foundations, as well as different levels of geotechnical computer analyses involved during the design stage.

### 2 Choices of Foundation

#### 2.1 Major Considerations

The presence of low strength superficial deposits along the alignment in Brunei Bay and Temburong inevitably requires the use of the deep piled foundations to provide the necessary support for the structures. However, there has been no prior deep pile construction experience in similar geology in this region, and the scale of the construction is unprecedented in Brunei. Therefore careful considerations were made to devise the most appropriate foundation schemes to achieve a risk-mitigated and cost-effective solution for the given construction programme timeframe. In particular the choices of the foundations had to address the following constraints and risks: