

Structural Design of the Busan-Geoje Immersed Tunnel

Michael TONNESEN

Chief Specialist
COWI A/S
Lyngby, Denmark
mit@cowi.com

Michael Tonnesen, is Chief Specialist in COWI's Department of Tunnels and Underground Structures and was responsible for the structural design of the Busan-Geoje Immersed Tunnel

Peter JACKSON

Project Director
COWI A/S
Lyngby, Denmark
pgr@cowi.com

Peter Jackson, is a Project Director in COWI's bridge tunnel and marine works division and was Project Manager for the design of the Busan-Geoje immersed.

Summary

The immersed tunnel part of the Busan-Geoje Fixed Link is the deepest and 2nd longest segmental concrete immersed tunnel at the time of opening the link for traffic in December 2010. With more than 140 articulation joints along the immersed tunnel, design of the joints is a key element of the structural design.

This paper describes some of the main challenges for the structural design of the immersed tunnel especially the watertightness design of the joints and design of the shear keys and some of the Soil Structure Interaction (SSI) analysis required to determine shear forces and movements of the joints.

Keywords: Segmental Immersed Tunnel; offshore conditions, articulation joints, deep tunnel, high water pressure.

1. Introduction

The Busan immersed tunnel consist of 18 number of 180 m long tunnel elements corresponding to a total length of 3,24 km. At the two land falls the immersed tunnel is linked to short cut & cover sections as shown in Figure 1. With a maximum depth of around 47 m to mean sea level it is the deepest immersed concrete tunnel for vehicular traffic at the time of opening the tunnel for traffic.

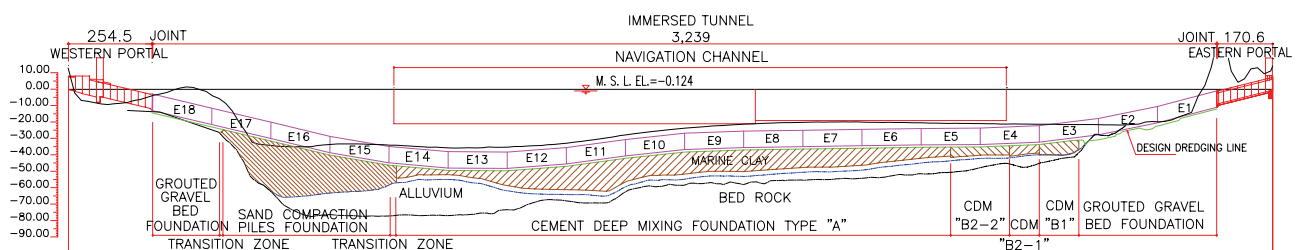


Fig.1: Long Section of the Immersed Tunnel Alignment

In general the tunnel including the tunnel protection is located just below the seabed, except for the western landfall where tunnel is founded on a subsea embankment due to constraints to the road alignment.