



University at Buffalo
The State University of New York

Department of Civil, Structural and Environmental Engineering

Engineering Seminar

CONCRETE FOR THE DEEPEST IMMERSED TUBE TUNNEL

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Abstract

With an immersion depth reaching up to 60 m, Marmaray Bosphorus Crossing Project in Istanbul is the deepest immersed tube tunnel in the world. The immersed tube tunnel is composed of 11 reinforced concrete elements that are 15.3 m wide, 8.6 m high and a maximum of 135 m long. Other than the immersed tube tunnel (1.38 km) linking Europe and Asia, the project includes twin-bore TBM tunnels (18.72 km) and NATM tunnels (250 m) on both continents. Approximately 1,3 million m³ of concrete is used in the project.

In order to satisfy the Employer's Requirements on concrete, a project-dedicated laboratory is established at Istanbul Technical University, Civil Engineering Department. During the pretesting stage, several parameters related to durability were evaluated in the laboratory to satisfy the min. 100 years of service life criteria of the structure. These parameters included properties of constituent materials, additives and admixtures, mixture proportions, alkali silica reactivity, early age cracking risk, freeze-thaw resistance and chloride permeability. During the full scale trials mixing, transporting, placement and curing of concrete and methodology for repairs were also tested. In order to assess the quality of the in-situ concrete, paste homogeneity, internal stability and air void system of the cores were examined by microscopy.



After receiving his PhD from Northwestern University in 2000, Prof. Akkaya worked at the Center for Advanced Cement Based Materials, Evanston, IL as a Research Associate. He has been working as an Associate Professor at Istanbul Technical University (ITU) since 2004. He is the director of the Marmaray Project Laboratory at ITU. His research interests include high performance concrete, early age properties of concrete and nondestructive testing of structures.

DATE: Tuesday, October 25, 2011
TIME: 12:30 p.m.
LOCATION: 140 Ketter Hall