

iGrip webinar series on GEOSTRUCTURES

Development of Geosynthetics Reinforced-soil Structure for Japanese high-speed bullet train “Shinkansen”

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Prof. Kenji Watanabe
University of Tokyo

www.igrip.iitgn.ac.in

for more info email: igrip@iitgn.ac.in



Prof. Kenji Watanabe
University of Tokyo.

Dr. Kenji Watanabe graduated in Civil Engineering from the University of Tokyo in 1998. He obtained a Ph.D. at the University of Tokyo in 2007. From 2000, he worked for RTRI (Railway Technical Research Institute, Japan), specializing in design and construction of railway earth structures and Geosynthetic reinforced soil (GRS) structures. He was engaged in the development of a new GRS structures such as GRS bridge abutment and GRS integral bridge, those of which require higher performance compared to GRS retaining walls. He was in charge of railway design standard on earth structure and retaining structure which was revised according to performance-based design method in 2012. From 2014 to 2015 he worked at IFSTTAR (The French Institute of Science and Technology for Transport, Development and Networks) as a visiting researcher in Geotechnical engineering through the IFSTTAR-RTRI collaborative research on reinforced-soil structures. He has been Associate Professor of Civil Engineering at the University of Tokyo since 2018.

Abstract

Geosynthetic-Reinforced Soil Retaining Wall (GRS RW) with full-height rigid facing has been constructed for a total length more than 180 km at more than 1,100 sites mainly for railways in Japan. A very high cost-effectiveness with low life-cycle costs and a high stability against heavy rains and severe earthquakes have been validated for the last 30 years. The history of the application of GRS structures will be first briefly introduced and the three main elements of the structure (soil, rigid facing and geosynthetics) are overviewed in the presentation.

Based on several experiments and field observation, the design procedure of these GRS structures together with conventional RW and bridge abutment were established and published as “Design Standards for Railway Structures and Commentary (Earth Retaining Structure)” which follows the concept of performance-based design. Finally, the recent research activities applying geosynthetics for the railway structure will be introduced.

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