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RESEARCH HIGHLIGHTS

AN ALTERNATIVE GEOREHABILITATION SOLUTION USING LIGHTWEIGHT POLYURETHANE FOAM: A CREATIVE AND INNOVATIVE APPROACH TO RESOLVE POST CONSTRUCTION SETTLEMENT

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In recent years, settlement of the ground, post construction has always been a prolong issue since most roads are constructed on soft ground, typically, either marine or alluvial in nature. The most critical condition occurs when settlement was experienced by the road users between the transition section of the earth fill embankment towards the piled embankment or bridge and culvert approaches. These conditions lead to driving hazards and discomfort, thus become a nationwide problem when it comes to post construction of approach sections. In order to provide an alternative georehabilitation solution to post construction settlements, a dedicated team of geotechnical specialist from Geotechnical Forensic Specialized Initiative Group (GeoForenSIG), School of Civil Engineering, College of Engineering, Universiti Teknologi MARA has taken up the challenge to conduct investigations of this complex geotechnical behaviour, thus provide an alternative solution to the civil engineering industry that is robust, cost effective and less intrusion.

These specialists have conducted various investigations such as Electrical Resistivity Imaging (ERI), subsurface exploration, dynamic probing as well as deformation survey to capture the ambiguity and uncertainties causing the post construction settlement. These investigations provide a comprehensive layout and information of the ground as well as the surrounding area that can influence significantly the settlement of existing structures and road embankments. From their detail findings and observations, alternative solutions using lightweight polyurethane foam systems were proposed to mitigate this issue, hence it has become an attractive and alluring to the industry since the systems do not engage in any excavation and demolishing/rebuilding of existing structures.

RESEARCH HIGHLIGHTS

There are two (2) polyurethane foam systems introduced and was extensively explored by the UiTM research team which include polyurethane foam injection system and polyurethane flatbed. In collaboration with Geocon (M) Sdn Bhd, together with Jabatan Kerja Raya Malaysia, the team of researchers developed enhanced systems that could resolve the current post construction settlement issues, which in turn provide an economical value to the industry, not to mention, reduce the work and construction hazards significantly.

polyurethane foam injection system

polyurethane flatbed

The extensive research conducted by dedicated researchers and research students from UiTM has evolved these systems to be ventured by the industry and gain confidence to resolve post construction settlement issues. These systems have assisted various post construction settlements such as settlement of approach bridges at South Klang Valley Expressway, approach culverts at route 5, Jalan Hutan Melintang, approach bridge at Kuala Selangor, undulation and settlement at PLUS expressway, MTD expressway and new road construction at Kampung Paya Redan, Malacca.

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