

ENGINEERING GEOLOGY INVESTIGATIONS FOR DEVELOPMENT OF AN INDUSTRIAL ESTATE IN TRINIDAD AND TOBAGO

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La Brea in south Trinidad was selected for the development of an industrial estate by the Government of Trinidad and Tobago. Over TT \$100M was spent on site and earthworks preparation. However, the area has unstable foundation conditions. The site occupies an area of about 12km², is seismically active, having experienced many shallow earthquakes (less than 35km) of Richter magnitudes up to 6.5. Ground deformation has been documented for over 150 years, including ground heaving, sagging, tilting and warping of buildings, roads, bridge abutments, retaining walls, piles, port and jetty support structures. Investigations show surface deformation are the response of the area to diapiric outflows of asphalt, rock and saturated sediments from deep sub-surface horizons, via thrust and oblique fault systems. Sediments in this area were subject to high compressive stresses and thrust deformation, tectonic dewatering and diapiric outflows from the Miocene to Pliocene. These stresses resulted in natural hydraulic fracturing of water and hydrocarbon reservoirs, causing tectonic shearing along thrust faults. Present day abnormal formation pressure and subsurface movements cause migration of rock, sediments and formation fluids (oil, gas and water) upwards to the surface via fault apertures. Consequently, there is considerable instability of shallow horizons. Since much of these movements are variable through space and time, there is uncertainty in predicting ground deformation. Therefore, building an industrial estate in this area is not without risk and geotechnical uncertainty, while the sound performance of structures founded in this terrain cannot be guaranteed.