

Lessons learned from three failures on a high steep geogrid-reinforced slope

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Abstract

An excavated slope that connects the school campus and Tai-21 Road is located on the approaching road to Chi-Nan University in Nantou, Taiwan. The toe portion of this high and steep slope is reinforced by a PET geogrid, with the height of the reinforced zone ranging between 10 meters (m) and 40 m at different sections. A slope failure occurred during construction of the reinforced slope in 1994. A massive failure of the reinforced slope then happened at the 40 m high section when the Chi-Chi (Taiwan) earthquake struck on September 21, 1999. The failure portion was rehabilitated, but another failure of the reinforced slope took place at another 20 m high section after a heavy rainstorm on July 2, 2004. The research herein presents the information and the history of these PET geogrid-reinforced slope failures. We perform extensive field observations and numerical analyses to examine the failure mechanism and causes contributing to these failures. Lessons learned from these case histories, with regard to carrying out a detailed site investigation, selecting permeable materials as backfill, installing drainage systems appropriately and combining the design of a reinforced slope with other types of retaining structures to improve the system global stability, are also discussed.

Keywords: Reinforced slope, Case history, Failure, Earthquake, Pore pressure

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