EFFECT OF CONSTRUCTION SEQUENCE ON LANDSLIDE RECTIFICATION ACTIVITIES: A CASE STUDY AT KADUGANNAWA LANDSLIDE

C. T. MAMPITIYAARACHCHI

198345H

MSc/PG Diploma in Geotechnical Engineering

Department of Civil Engineering

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree

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DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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Signature: Date: 17.04.2024

C. T. Mampitiyaarachchi

The above candidate has carried out research for the Masters thesis under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Prof S A S Kulathilaka

Signature of the Supervisor: Date: 17-4-2024

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ABSTRACT

Rain-induced landslides in tropical countries like Sri Lanka have increased due to changing climatic conditions, urbanization, and human intervention in vulnerable areas. In particular, modification of hill slopes for road construction have created unstable slopes, where instabilities can occur during heavy rainfall, due to excessive rainwater infiltration leading to loss of matric suction, development of perched water tables and rising groundwater table. In order to address such rain-induced landslides slope rectification measures are necessitated, especially if the landslide is located at a major transportation route. When designing slope rectification measures, it is important to address the root causes for the destabilization. Therefore, the primary focus should be to manage the surface and subsurface water regime. Some cases require additional interventions to ensure a satisfactory safety margin is achieved. Further, other case-specific requirements like road widening or space restrictions can also necessitate some additional rectification measures. However, it is of prime importance to consider the construction sequence of these different measures to come up with an optimal design that is technically and financially feasible.

A case study at Lower Kadugannawa landslide was used to examine the effect of the sequence of construction of different combinations of slope rectification measurers that can provide an optimal design solution to achieve the desired safety margin during and after construction. The most economical approach to carry out the different rectification measures could be proposed through seepage and slope stability analyses using GeoStudio SEEP/W and SLOPE/W modules. The importance of carrying out the construction using the top-down approach was established.. A critical rainfall event developed based on the actual rainfall monitoring data during the landslide initiation in 2021 was used for the analyses.

Keywords: Rain-induced Landslides, Construction Sequence, Drainage Management

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