ENHANCEMENT OF THE STABILITY AT THE SITE OF AN ANCIENT LANDSLIDE IN A ROAD CUTTING WITH DRAINAGE AND REINFORCEMENT – CASE HISTORY AT GINIGATHHENA

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Master of Engineering in Foundation Engineering and Earth Retaining Systems

Department of Civil Engineering
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Sri Lanka

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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or Institute of higher learning to the best of our 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.

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The above candidate has carried out research for the Master Dissertation under my supervision.

Signature of the supervisor:…….. Date:……...

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ABSTRACT

Engineers involved in infrastructure development projects in the hilly terrain of Sri Lanka encounter ancient landslides which could be triggered by rainfall or construction activities. One such landslide was encountered during the widening of a bridge in the main connecting road between central hill country and capital; Avissavella – Hatton – Nuwaraeliya road at bridge no. 48/2 near Ginigathhena. Extensive mitigation measures had to be designed with detailed attention to construction sequence in order to prevent reactivation of the slide.

A valley area had been formed by the previous landslide. Morphology of the area is a sloping land with undulating topography towards upper slope. This has led to the formation of a waterlogged marshy area on a flat land at immediate upper slope and a stream flowing through valley. Water table of the area is quite high. The landslide got activated due to a minor excavation at the toe region for the bridge widening. There had been no rain when the slide was activated. Subsequent rain cause further activation of the landslide. Further widening is necessary according to the new highway design.

Ground water regime management and geometry modification are the two primary approaches used in enhancing the safety margins of the site. Surface and subsurface drainage improvement by various methods such as; cutoff drains, berm drains, trench drains and horizontal drains were introduced for lowering the ground water table. The stability of the steep cuts necessary to accommodate the increased road width was enhanced further by the use of soil nailing. Top down approach was adopted to ensure the safety of the slope during construction. Drainage measures were very effective in economizing the soil nailing design. The analysis and design of stabilizing measures were done using GeoStudio Seep/W and Slope/W software.

Design outcomes were confirmed by monitoring of ground water table and surface movements of the slope.

Key Words – Landslide, Stabilization, Drainage Improvement, Reinforcement, Monitoring

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