

Development and Control of Deep Seated Gravitational Slope Deformation: The Case of Colzate-Vertova Landslide, Bergamo, Northern Italy

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Abstract : This paper presents the Colzate-Vertova landslide, a Deep Seated Gravitational Slope Deformation (DSGSD) located in the Seriana Valley, Northern Italy. The paper aims at describing the development as well as evaluating the factors that influence the evolution of the landslide. After defining the conceptual model of the landslide, numerical simulations were developed using a finite element numerical model, first with a two-dimensional domain, and later with a three-dimensional one. The results of the 2-D model showed a displacement field typical of a sackung, as a consequence of the erosion along the Seriana Valley. The analysis also showed that the groundwater flow could locally affect the slope stability, bringing about a reduction in the safety factor, but without reaching failure conditions. The sensitivity analysis carried out on the strength parameters pointed out that slope failures could be reached only for relevant reduction of the geotechnical characteristics. Such a result does not fit the real conditions observed on site, where a number of small failures often develop all along the hillslope. The 3-D model gave a more comprehensive analysis of the evolution of the DSGSD, also considering the border effects. The results showed that the convex profile of the slope favors the development of displacements along the lateral valley, with a relevant reduction in the safety factor, justifying the existing landslides.

Keywords : deep seated gravitational slope deformation, Italy, landslide, numerical modeling

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