

Influences of Slope Inclination on the Storage Capacity and Stability of Municipal Solid Waste Landfills

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Abstract : The world's most prevalent waste management strategy is landfills. However, it grew more difficult due to a lack of acceptable waste sites. In order to develop larger landfills and extend their lifespan, the purpose of this article is to expand the capacity of the construction by varying the slope's inclination and to examine its effect on the safety factor. The capacity change with tilt is mathematically determined. Using a new probabilistic calculation method that takes into account the heterogeneity of waste layers, the safety factor for various slope angles is examined. To assess the effect of slope variation on the overall safety of landfills, over a hundred computations were performed for each angle. It has been shown that capacity increases significantly with increasing inclination. Passing from 1:3 to 2:3 slope angles and from 1:3 to 1:2 slope angles, the volume of garbage that can be deposited increases by 40 percent and 25 percent, respectively, of the initial volume. The results of the safety factor indicate that slopes of 1:3 and 1:2 are safe when the standard method (homogenous waste) is used for computation. Using the new approaches, a slope with an inclination of 2:3 can be deemed safe, despite the fact that the calculation does not account for the safety-enhancing effect of daily cover layers. Based on the study reported in this paper, the malty layered nonhomogeneous calculating technique better characterizes the safety factor. As it more closely resembles the actual state of landfills, the employed technique allows for more flexibility in design parameters. This work represents a substantial advance in limiting both safe and economical landfills.

Keywords : landfill, municipal solid waste, slope inclination, capacity, safety factor

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