XXV Congresso de Iniciação Científica da Unicamp

October 18 to 20 Campinas | Brazil

2017

COVER GEOTECHNICAL CHARACTERIZATION OF LISIMETERS FILLED WITH MUNICIPAL SOLID WASTE.

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Abstract

Two soil samples were studied aiming the application in cover of sanitary landfill. Results indicated micro aggregation of the particles, moderate plasticity and high coefficients of saturated permeability.

Key words: Sanitary Landfill, Cover, Geotechnical Characterization.

Introduction

The generation of municipal solid waste (MSW) has been increasing in the world, due to the population growth and changes in consumption patterns. There are several destination alternatives, such as reuse, recycling, recovery, composting and even energy use. However, the disposal on sanitary landfill persists as the technique of great use in Brazil. Therefore, the study of the structural elements of the sanitary landfill becomes extremely important for its stability and safety. Cover is a structural element, which has the function of controlling the flow of water into and out the sanitary landfill and consequently the process of biodegrading of MSW. Depending on its kind, the cover can allow of gas liberation generated within the mass of waste.

This research aimed to characterize the soil used for the cover of six lysimeters filled with MSW in order to simulate a sanitary landfill. The data were analyzed for their geotechnical behavior.

Results and Discussion

Six lysimeters were built with rectangular cross-section (2m²) and filled with 3 tons of compacted MSW. All of them have liner system, leachate drainage system, gas drainage system and cover. The soil used as cover was collected of a deposit of Delta A, sanitary landfill of Campinas city, southeast Brazil. The sample soils were called as Soil 1 and Soil 2.

Sample soils were submitted to characterization tests to determinate moisture content, particle density, grain-size distribution and consistency limits. Moreover, variable head permeability tests were performed to obtain the coefficients of saturated permeability, using the compacted soils with density of 1.55g/cm³ (Soil 1) and 1.44g/cm³ (Soil 2).

Results of geotechnical tests were shown in Chart 1. Grain-size distribution curves, obtained with (WD) and without (ND) the use of the deflocculant, were illustrated in Figure 1.

Both soils were classified as CL (low plasticity clay) by Unified Soil Classification System (USCS). Grain-size distribution curves indicated micro aggregation for both soils, a consequence, in general, of intense action of chemical weathering at tropical regions. Soils 1 and 2 were texturally classified as clayey-sandy silts using the deflocculant (WD) and as sandy-clayey silts, without the use of the deflocculant (ND) (Fig. 1). Their plasticity was considered moderate. The coefficients of saturated permeability of both were considered high, typical of fine sands, due to the micro aggregation already mentioned.

Chart 1. Results of geotechnical tests

Parameter	Soil 1	Soil 2
Moisture content (%)	6.7	9.8
Particle density (g/cm ³)	2.667	2.718
Liquid limit (%)	37.2	40.2
Plastic limit (%)	21.5	25.7
Plasticity index (%)	15.7	14.5
Coefficient of saturated permeability (cm/s)	2.83 E-4	1.29 E-4

Figure1. Grain-size distribution curves

Conclusions

Both of the soils studied presented geotechnical characteristics not indicated for application as cover of sanitary landfill, mainly in relation to high permeability to water.

Acknowledgement

The authors would like to thank to FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo) for research supporting (process number 2013/19778-1), to Consórcio Renova Ambiental, to Municipality of Campinas for the support on the performance of the experiment and to CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico) for the Scholarship for scientific initiation.