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A Characterization of Residual Soil in the Illegal Waste Landfill

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ABSTRACT

As population becomes increasing under confined land, reuse of abandoned or derelict land including landfills has been considered extensively. The reclamation of terminated landfills is a new approach, which is to expand landfill capacity of municipal solid waste and to avoid the high cost for acquiring additional land. The landfill reclamation is conducted in a number of ways based on project goals and site-specific characteristics. In general, the reclamation of terminated landfills follows three steps: Excavation-Soil Separation (Sorting)-Transferring Treatment. Depending on local conditions, either soils or wastes may be reclaimed. In the case of excavated wastes, they are followed another process using a material recovery facility in order to separate valuable components (e.g., steel and aluminum) or burned in a municipal waste combustor to produce energy. The separated soils can be used as a filling-material or as daily cover soil in a sanitary landfill.

In this study, the residual soil used was obtained from 5 spots, which are representative of landfill in J city. The fresh soil was sampled from the vicinity of the landfill area, which was not affected by wastes.

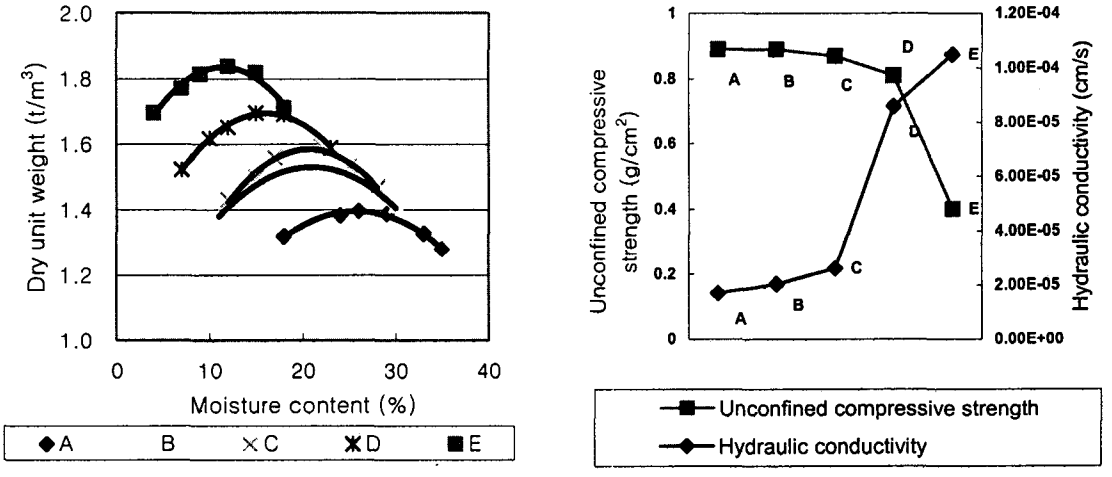
This study was performed to examine the geotechnical properties and to estimate the environmental hazardousness of the residual soil in landfill. The specific goal was to investigate the possibility of reuse of residual soil.

Table 1. The physical properties of residual soil and fresh soil.

Compound	Impurities (%)	Water Content (%)	Gs	LL (%)	PL (%)	PI	Cu	No.4 Passing (%)	No.200 Passing (%)	Cg	USCS	AASHTO
Residual soil	0.80	36.47	2.54	48.8	41.1	7.7	18.3	91.67	9.49	3	SW-SC	A-2-5
Fresh soil	-	23.4	2.7	NP	NP	NP	18.3	98.88	6.68	1.15	SW-SC	A-3

According to the results of analysis of environmental hazardousness, the residual soil was suitable for reuse (Table 1). Since the result of geotechnical properties analysis was classified "Well-graded sand with clay (SW-SC)", the residual soil was included in the general grade of cover soil. By mixing it with the fresh soil, the residual soil was improved in the compaction property; the change of unconfined compressive strength and permeability property were limited.

As the results, the residual soil from the landfill in J city can be reused as landfill cover soil, reclamation of garden erosion layer, and construction material after mixing with the fresh soil (Fig. 1).



A: Residual soil 100%
B: Residual soil 75% + Fresh soil 25%
C: Residual soil 50% + Fresh soil 50%
D: Residual soil 25% + Fresh soil 75%
E: Fresh soil 100%

Fig. 1 Standard proctor compaction test, uniaxial compression and permeability test results.

Key words: residual soil, reuse, landfill, reclamation, fresh soil