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Comparative Study On Permeability Characteristics Of Kathmandu Valley Soils

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Sudip Karki

(069/MSG/820)

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The undersigned certify that they have read, recommended to the Institute Of Engineering for acceptance, a thesis entitled, "**Comparative Study On Permeability Characteristics Of Kathmandu Valley Soils**" submitted by Sudip Karki (069/MSG/820) in partial fulfillment of requirement for the degree of Master of Science in Geotechnical Engineering.

Supervisor, _____
Dr. Indra Prasad Acharya
Lecturer
M. Sc. Program in Geotechnical Engineering
Pulchowk Campus, Pulchowk, Lalitpur, Nepal.

External Examiner, _____
Prof. Dr. Akkal Bahadur Singh
M. Sc. Program in Geotechnical Engineering
Pulchowk Campus, Pulchowk, Lalitpur, Nepal.

Program Coordinator/Supervisor,_____
Dr. Indra Prasad Acharya
Lecturer
M. Sc. Program in Geotechnical Engineering
Department of Civil Engineering
Pulchowk Campus, Pulchowk, Lalitpur, Nepal.

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Sudip Karki
2069/MSG/820

ABSTRACT

This study investigates the permeability characteristics of the different nine soils from the Kathmandu i.e. from Kalanki, Champi, Matatirtha, Thimi, Kamerotar, Luvu, sand of Bagmati, sand of Manohara and sand from Bungmati. Visual inspections, Grain size distributions, Atterberg limits, Specific gravity, Permeability test of soils are carried out. The digitization of the test result from the literature of Lambe and Whitman is done with the aid of Plot digitizer software.

From the result of classification of soil as per USCS Sand from Manohara, Bagmati and from Bungmati are classified as SP. Kalanki and Luvu soil as CL, Matatirtha soil as CL-ML, Thimi soil as ML and OL, Kamerotar and Champi soil as ML.

Result of study on the permeability characteristics of the Kathmandu soil, it is found that as the void ratio of soil increases the coefficient of the permeability increases and vice versa. The relation between the void ratio and the coefficient of permeability is found to be almost straight for all soil. The coefficients of permeability of Kathmandu valley soil are found within range of 10^{-2}cm/sec to 10^{-7}cm/sec. As per Terzaghi and Peck (1967) classification soils from Kathmandu are classified as soil having very low permeability to medium permeability.

Further, comparison between test result of my investigation and literature test result it shows that permeability of soils from Thimi, Champi, Matatirtha, Kalanki, Kamerotar and Luvu lies between the permeability characteristics of silt of Boston to Sand from Dike. The Champi soil permeability characteristic is similar to that of Silt- North Carolina. This research works deals with simple observation of K values of soils at different location of Kathmandu, the difference between K values for these soils are mainly due to particle size and somehow affected by composition, structure and shape of particles.

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ABBREVIATION

A	Area of soil specimen in permeater
a	Area of stand pipe
ASTM	American Society for Testing and Materials
C	Shape factor
C_c	Coefficient of curvature
CH	Highly Plastic Clay
CL	Clay of low Plasticity
C_u	Coefficient of uniformity
D_{10}	Effective particle size
D_{30}	30% finer particles
D_{60}	60% finer particles
D_s	Some effective particle diameter
e	Void ratio
G	Specific gravity of solid
h	Hydraulic head
H	Highly Plastic
k	Coefficient of permeability
k_{20}	Coefficient of permeability at 20º C
k_T	Coefficient of permeability at Tº C
$k_{0.85}$	Coefficient of permeability at Void ratio of 0.85
L	Length of soil specimen in permeater
LL	Liquid Limit
ML	Silt of Low plasticity
OH	Organic Soil of Medium to High Plasticity
OL	Organic Soil of low plasticity
PI	Plasticity Index
PL	Plastic Limit
SP	Poorly Graded sand
USCS	Unified Soil Classification System
w	Water content
γ	Unit weight of permeant
η_{T^oC}	Viscosity of Permeant at T º C
η_{20^oC}	Viscosity of permeant at 20º C