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THE COOPER UNION

Albert Nerken School of Engineering

Soil Mechanics Laboratory

Experiment No. 6 - Constant Head Permeability Test

Date: 4/4/1224/4/122

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Members:

Location:

Depth:

Horizon:

Boring:

Elevation:

Agronomic Name:

Geological Region:

Sample:

Description:

Formulae:

1)  $k_T = q_l/hAt$

2)  $k_{20} = k_T(\sigma_T/\sigma_{20})(\gamma_{20}/\gamma_t)$

3)  $D_r = ((1/\gamma_{d\ min} - 1/\gamma_{d\ nat})/(1/\gamma_{d\ min} - 1/\gamma_{d\ max}))*100\%$

$k_T$  = coefficient of permeability, cm/s, as observed temperature

$m_T$  = absolute viscosity of liquid at T °C, in g-s/cm<sup>2</sup>

$q$  = quantity of water collected, in cc

$h$  = head loss, in cm

$A$  = cross-sectional area of sample, in cm<sup>2</sup>

$\gamma_{d\ max}$  = maximum dry unit weight, in pcf

$\gamma_{d\ nat}$  = natural, or compacted dry unit weight, in pcf

$\gamma_t$  = unit weight of liquid at T:C, in g/cm<sup>3</sup>

$k_{20}$  = coefficient of permeability corrected to 20°C

$m_{20}$  = absolute viscosity of liquid at 20°C, in g-s/cm<sup>2</sup>

$L$  = distance the head loss  $h$  occurs in, or distance between piezometer outlets, in cm

$D_r$  = relative density, in %

$\gamma_{d\ min}$  = minimum dry unit weight, in pcf

$\gamma_{20}$  = unit weight of liquid at 20°C, in g/cm<sup>3</sup>

$t$  = time to collect the water,  $q$ , in sec

Table 1 [Data Sheet (A)]: Sample Preparation Data

Determination Number:	1	2	3
Area of Sample, A (cm <sup>2</sup> ):	62.02		
Length of Sample, L' (cm):	37.15		
Distance Between Piezometers, L (cm):	17.70		
Total Volume of Sample, V <sub>t</sub> (cc):	2304		
Weight of Container & Soil Before (g):	9201		
Weight of Container & Soil After (g):	5930		
Weight of Dry Soil Sample (g):	3271		
Specific Gravity, G <sub>s</sub> :	2.66		
Dry Unit Weight of Sample (pcf):	89		
Max. Dry Unit Weight of Soil (pcf):	99.60		
Min. Dry Unit Weight of Soil (pcf):	88.40		
Relative Density, D <sub>r</sub> (%):	6		
Void Ratio of Sample, e:	0.864988764044		
Porosity of Sample, n (%):	46.38037401195		

Table 2 [Data Sheet (B)]: Run Data

Determination Number:	1								
Run Number	Piezometer Readings		Loss in Head, h (cm)	Hydraulic Gradient, i = h/L	Time, t (sec)	Quantity, q (cm <sup>3</sup> )	Temperature, T (:C)	V=q/At @ T, :C (cm/sec)	V=q/At @ 20 :C (cm/sec)
	h <sub>1</sub> (cm)	h <sub>2</sub> (cm)							
1	107.6	103.4	4.199999999	0.237288135	180	25	23.7	0.0022394209	0.0020459623
2	104.5	93.0	11.5	0.649717514	180	72	23.7	0.0064495324	0.0058923716
3	103.2	89.0	14.20000000	0.802259887	180	93.5	23.7	0.0083754344	0.0076518992
4	101.5	83.0	18.5	1.045197740	180	119	23.0	0.0106596438	0.0099030079
5	98.4	73.9	24.5	1.384180790	180	157	21.9	0.0140635637	0.0134211038
6	95.5	63.1	32.4	1.830508474	180	206	21.2	0.0184528288	0.0179069395
7			NaN	NaN				NaN	NaN
8			NaN	NaN				NaN	NaN
9			NaN	NaN				NaN	NaN
10			NaN	NaN				NaN	NaN
11			NaN	NaN				NaN	NaN
12			NaN	NaN				NaN	NaN
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