FIELD HYDRAULIC CONDUCTIVITY TEST
PIEZOMETER METHOD

FOR DRAINAGE INVESTIGATIONS

Piezometer Number _____

Estimated "HC" _____ Calculated "HC" _____

Location _____ Date _____ Technician _____

Stratum Thickness _____ Texture _____ Structure _____

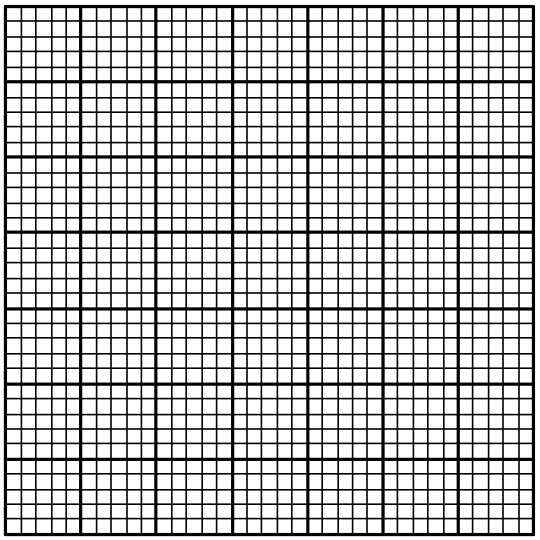
Depth Piez. _____ Auger Dia. _____ Piez. Dia. _____

Length Cavity _____ Sloughing _____ Times Cleaned _____

pH (Soil _____ Water _____) Salinity (Soil _____ Water _____)

TIME	ELAPSED TIME	Δt	DISTANCE TO WATER SURFACE FROM REFERENCE POINT			Δh	RESIDUAL DRAWDOWN
			BEFORE PUMPING	AFTER PUMPING	DURING RECHARGING		
			B	A	R	A–R	R–B
	Minutes	Minutes	Feet	Feet	Feet	Feet	Feet

COMMENTS



RESIDUAL DRAWDOWN (R–B) IN FEET

TIME IN MINUTES

FIELD HYDRAULIC CONDUCTIVITY TEST
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The piezometer method is used to obtain the hydraulic conductivity of a given strata or area in a soil profile. (Hyd. cond. is a permeability figure dependent on properties of the groundwater as well as the soil profile.) This is possible because the hole which is bored into the soil for the conductivity measurement is cased, except for a small cavity at its end. The rate of entry into this cavity is a measure of the hyd. cond. of the soil around the cavity.

EQUIPMENT: A 1-1/2 to 2 inch worm auger with a square bit end is used for the test. Electrical conduit 1-1/4 to 2 inch inside diameter, sharpened on one end is used as the piez. The auger is ground to about 1/16 inch smaller then the inside dia. of the piez. A driving head on the piez. top prevents damage during driving. An electrical device sounding bell or blow tube can be used to measure the water level. A soil tube jack or piez. removal equipment can be used to remove the piez.

METHOD: An auger hole is bored to a depth of 6 inches. The piez. is then driven into the hole about 5 inches with light blows from a maul. The hole is again augered to a depth of 6 inches below the piez. This procedure is continued until the piez. reaches the desired depth. A cavity 4 inches long is carefully augered below the end of the piez. A stop on the auger handle helps make this length precise. The auger should be removed very slowly to prevent sloughing of the cavity wall. A hollow auger or small tube to the auger bit may be required to permit air to break the suction and prevent sloughing of the cavity. The piez. is pumped or bailed out, with a pitcher pump or bail bucket, to permit the pores in the cavity wall to be flushed out. Flushing is repeated until the rate of rise in the piez. is the same as a previous pumping.

TEST: The water level is lowered in the piez. a distance dependent upon the sloughing tendency of the profile. The water levels and times of observations are recorded and used in the following Kirkham Piezometer formula to calculate the hyd. cond.

$$HC = 377 \times \frac{r^2}{c} \times \frac{\Delta h}{\Delta t} \times \frac{1}{A+R-2B}$$

HC – Hydraulic conductivity in inches per hour
r – Inside radius of piezometer in inches
c – Function from figure on this page
Δh – Raise of water level in feet Δt timed interval (A–R)
Δt – Time required to give Δh in minutes
A – Depth to water level at start of test
R – Depth to water level at end of test
B – Depth to static water level in feet

r = _____

c = _____

Δh = _____

Δt = _____

A = _____

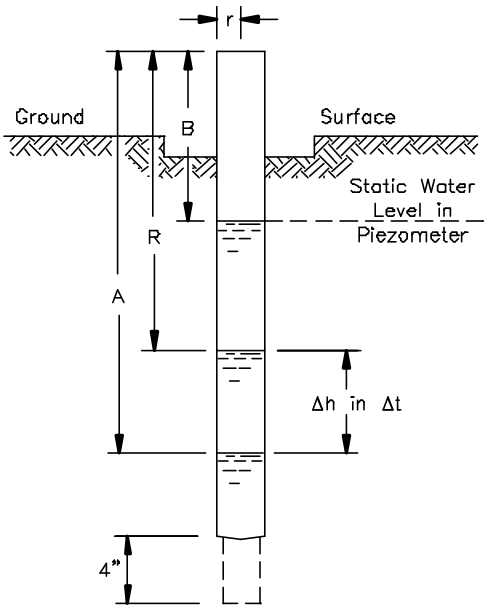
R = _____

B = _____

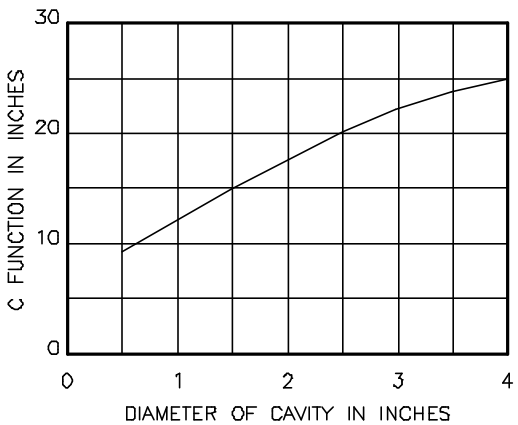
$HC = 377 \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} \times \frac{1}{\quad}$

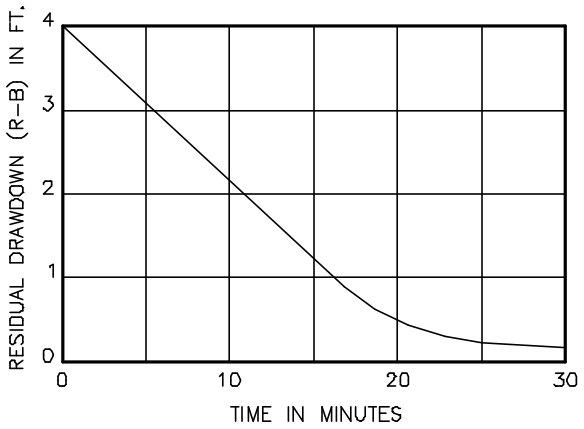
HC = _____

Piezometer Profile



C Function
for Cavity Four Inches Long





An estimate of hydraulic conductivity can be determined by plotting the residual drawdown at various recharge times. The shape of the curve can also be used in evaluating characteristics of the soil strata.