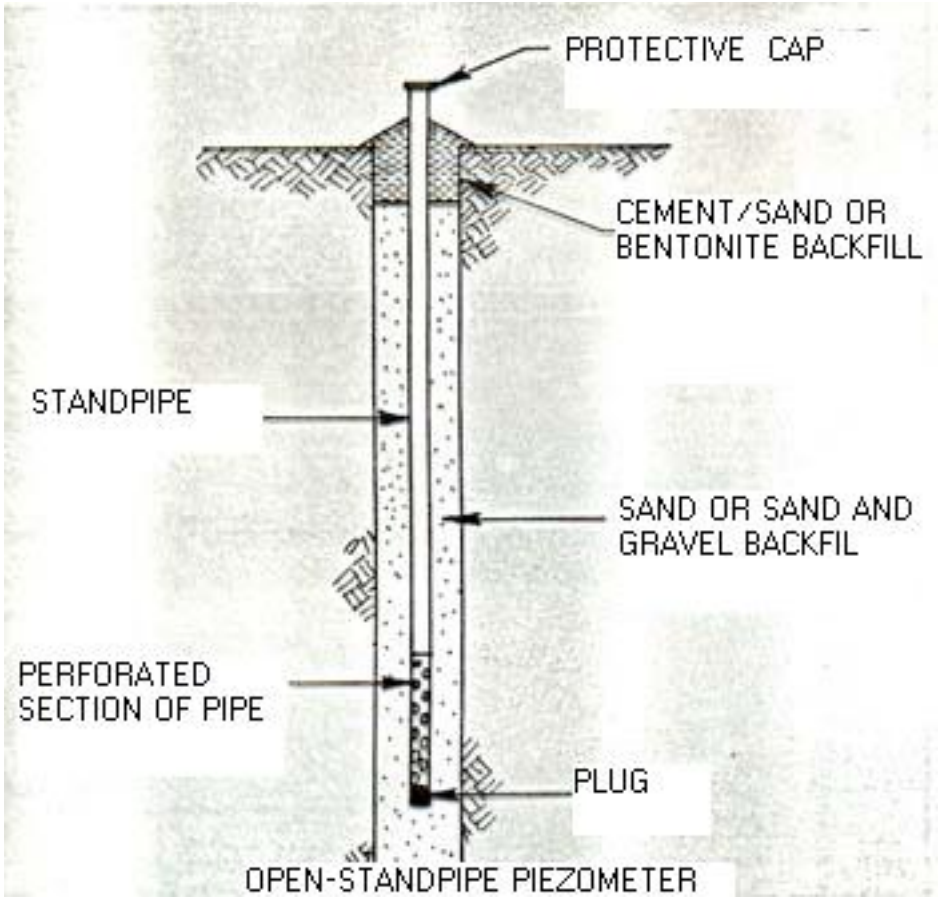
- ***Stand pipe / Piezometer system***
    - Monitor pore water pressure for calculation of embankment stability and landfill dike.
    - Monitor ground improvement techniques such as vertical drains, sand drain and dynamic compaction .
    - Monitor dewatering schemes for excavations and under ground openings.
    - Monitor seepage and ground water movement in embankment , landfill dike and dam.
    - Monitor water drawn down during pumping test.

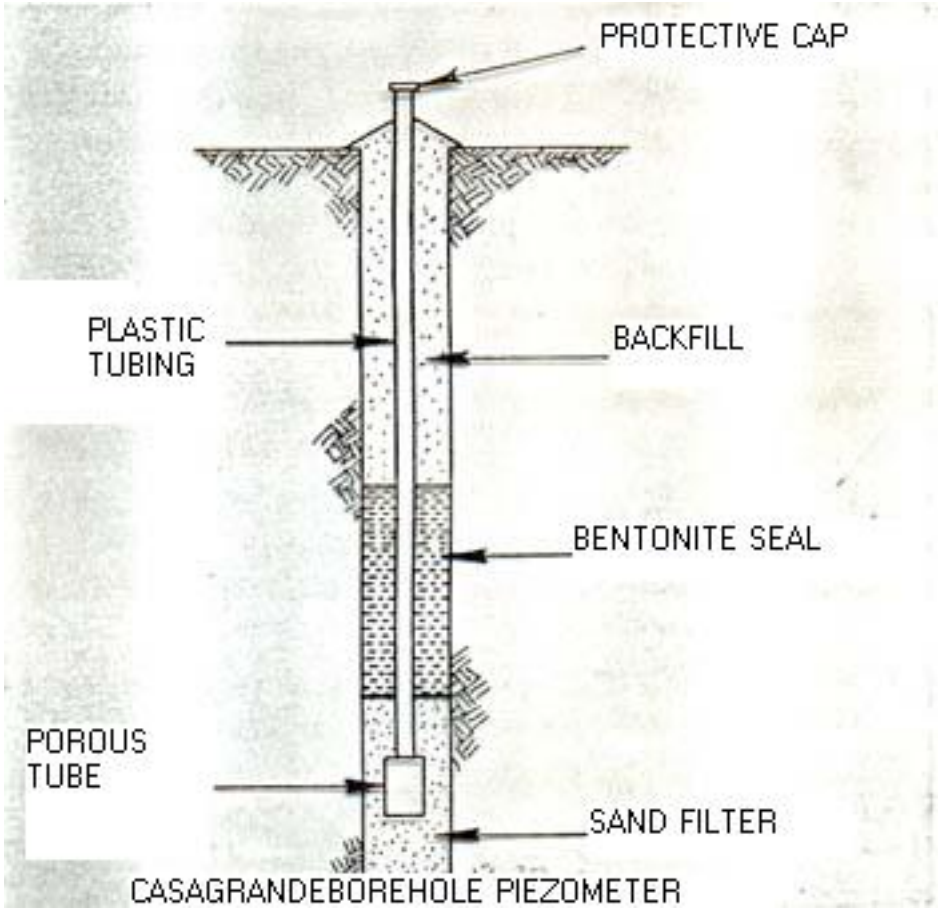
- ***Stand pipe piezometers.***

Porous & Sreened Filters for observation wells and standpipe piezometer. Casagrande type piezometer tips-(60 micron) 1 1/2 -inch diameter, porous staone or porous plastic in 6, 12, 18 or 24 inch lengths. slotted PVC pile -screen size from 0.010 inch and larger, various lengths, 1 1/2 inch pipe .

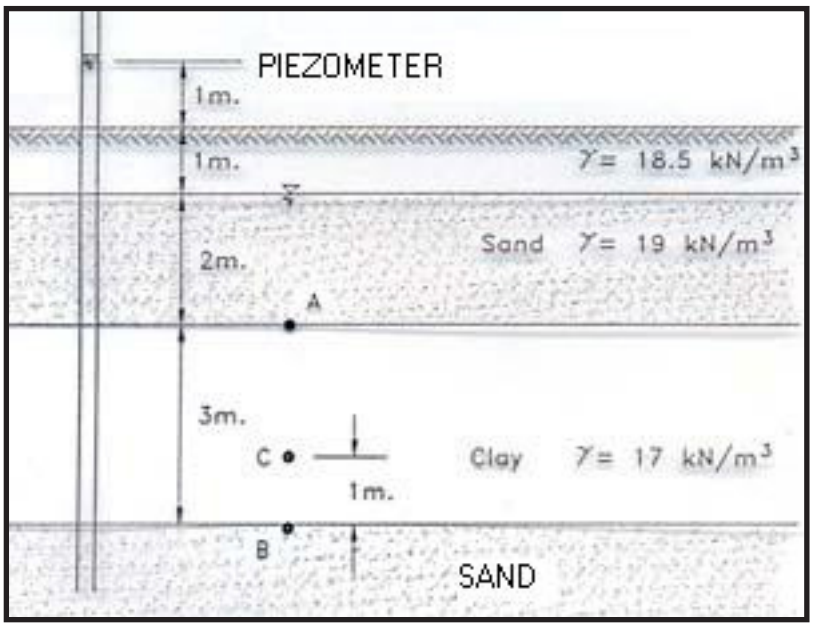
Drivable well points 1 1/4 inch & 2 inch diameter. Geonor M-206 push-in type, porous tipm, sintered bronze filter (replaceable) -adapted for E-rod threads. Riser pipe -PVC or steel, standard or flush-coupled, 1/2 inch or larger Bentonite Pellets : (1/4", 3/8" or 1/2" sizes) seal pneumatic, electric, standpipe and well-point piezometers in boreholes.

Water Level Indicator . Filter tip & Bentonite Pelletes


PROTECTIVE CAP
CEMENT/SAND OR
BENTONITE BACKFILL
STANDPIPE
SAND OR SAND AND
GRAVEL BACKFIL
PERFORATED
SECTION OF PIPE
PLUG
OPEN-STANDPIPE PIEZOMETER


PROTECTIVE CAP
PLASTIC
TUBING
BACKFILL
BENTONITE SEAL
POROUS
TUBE
SAND FILTER
CASAGRANDEBOREHOLE PIEZOMETER

- ***Example Propblem.***



An artesian presure exists in the lower sand layer of the profile shown above, with a piezometer surface 1 m. above ground surface.Determine the total stress, pore presure and effective stress at point A,B and C

Point A

$$\sigma = \gamma H_1 + \gamma_{sat} H_2$$

$$\sigma = 18.5(1) + 19.0(2) = 56.5 \text{ kPa}$$

$$u = \gamma_w H_2$$

$$u = 9.81(2) = 19.6 \text{ kPa}$$

$$\sigma' = \sigma - u$$

$$\sigma' = 56.5 - 19.6 = 36.9 \text{ kPa}$$

Point B

$$\sigma = 18.5(1) + 19.0(2) + 17.0(3)$$

$$\sigma = 107.5 \text{ kPa}$$

$$u = 9.81(7) = 68.7 \text{ kPa}$$

$$\sigma' = 107.5 - 68.7 = 38.8 \text{ kPa}$$

The pore pressure in the lower sand layer is determined by the height of water in the piezometer.

Point C

$$\sigma = 18.5(1) + 19.0(2) + 17.0(2)$$

$$\sigma = 90.5 \text{ kPa}$$

$$u = \gamma_w h_{pC}$$

$$h_{pC} = h_{TC} - h_{eC}$$

$$h_{TC} = h_{TB} - i\,(y)$$

$$i = \frac{h_L}{L} = \frac{2}{3} = 0.667$$

$$h_{TC} = 7 - 0.667(1)$$

$$h_{TC} = 6.33 \text{ m.}$$

$$h_{pC} = 6.33 - 1.0 = 5.33 \text{ m.}$$

$$u = 9.81(5.33) = 52.3 \text{ kPa}$$

$$\sigma' = 90.5 - 52.3 = 38.2 \text{ kPa}$$

A staedy - state seepage condition exists in the clay layer with water flowing upward. The pore presure must, therefore, be evaluated by first calculating the pressure head at point C. Establish a datum at the bottom of the clay layer.