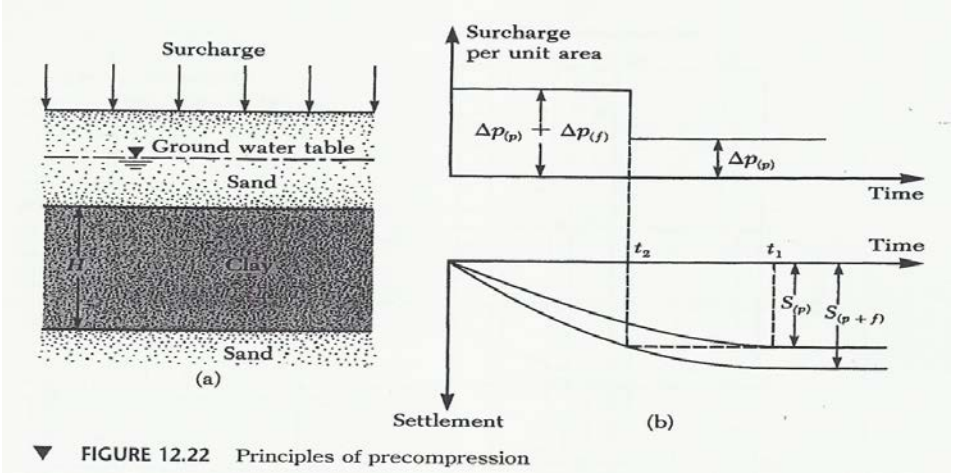
**CE 468 GEOTECHNICAL DESIGN**

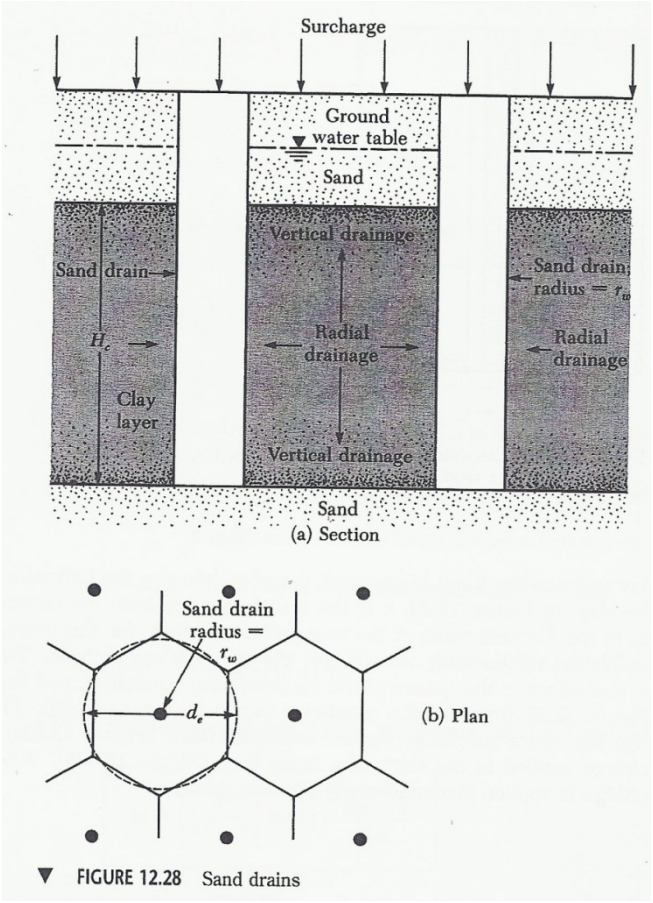
***DESIGN PROBLEM: PRELOADING WITH VERTICAL DRAINS***

Refer to Fig. 1 and Fig. 2 given below where the terminology and symbols regarding the preloading and vertical drains are described.




▼ FIGURE 12.22 Principles of precompression

FIG.1




▼ FIGURE 12.28 Sand drains

FIG. 2

During the construction of a highway bridge, the average permanent load on the clay layer is expected to increase by about 115 kN/$m^2$. The average effectice overburden pressure at the middle of the clay layer is 210 kN/$m^2$ .
Here , $H_c$ = 6 m, $C_c$ = 0.28, $C_v$ = 0.36 $m^2$/mo. The clay is normally consolidated.

Determine :

a. The total primary consolidation settlement of the bridge without preloading
b. The surcharge, $\Delta p(f)$ needed primary consolidation to eliminate the entire settlement in 9 mo.

Solve the problem, given above ,with the addition of some sand drains. Assume that:

$r_w$ = 0.1 m
$d_w$ = 3.0 m
$C_v = C_{vr}$ = 0.36 $m^2$/mo

Note:Do not consider smear effects.