CE 386

CONCRETE STRUCTURE DESIGN SESSIONAL I

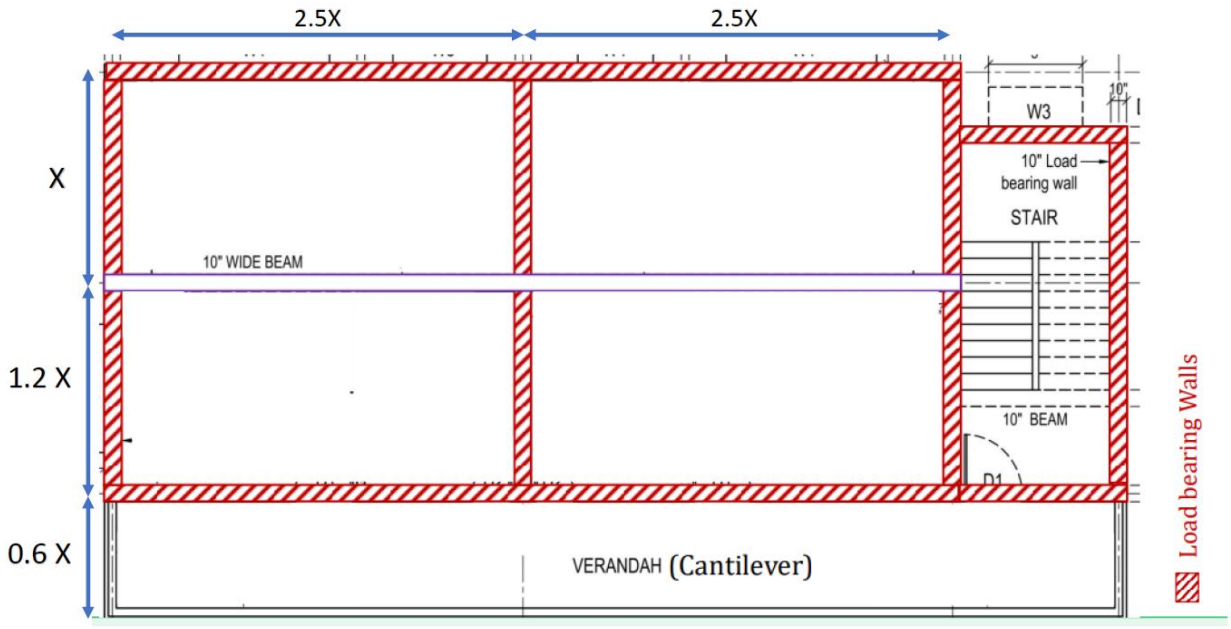
DESIGN OF WALL FOUNDATION

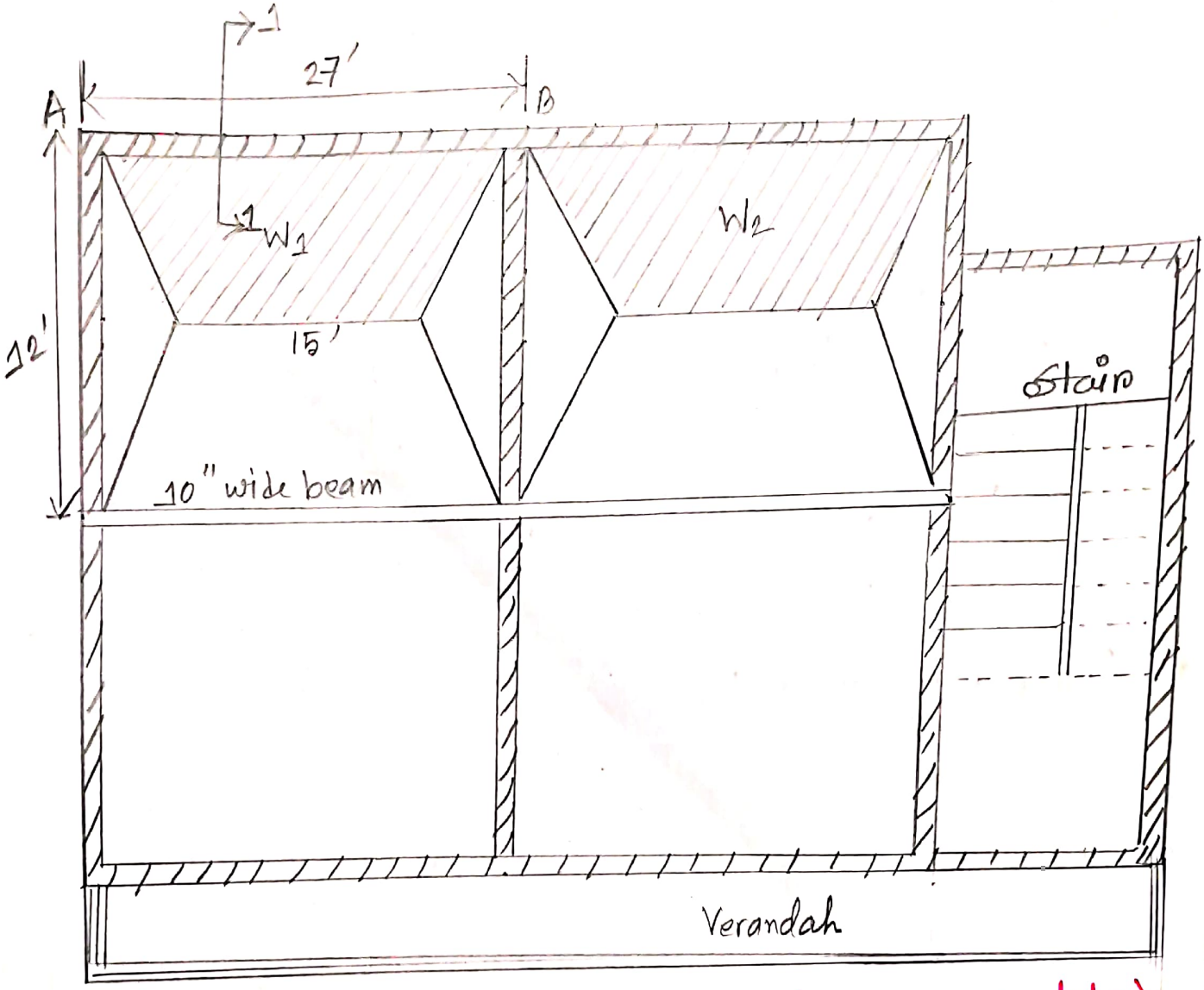
Umme Nusaiba Islam

Lecturer

Department of Environmental, Water Resources, and Coastal Engineering

Plan:


2.5X
2.5X
X
1.2 X
0.6 X
W3
10"
10" Load bearing wall
STAIR
10" WIDE BEAM
10" BEAM
D1
VERANDAH (Cantilever)
Load bearing Walls



(Use your own data)

• Load calculation:

1. Load on brick wall from floor slab:

Let, FF = 25 psf

Slab thickness = 6"

No. of storey = 2

LL = 40 psf

DL = Self wt. of slab = $\frac{6}{12} \times 150 = 75$ psf

Total DL on typical floor = No. of storey (DL + FF)

$= 2(75 + 25)$

$= 200$ psf

Total LL on typical floor = 2×40

$= 80$ psf

Roof:

LL = 50% of typical floor LL

$= 50\% \times 40 = 20$ psf

DL = 25 + 75 = 100 psf

Total DL from floor & roof = 200 + 100 = 300 psf

Total LL from floor & roof = 80 + 20 = 100 psf

Total Load = total DL + total LL

(from slab) $= (300 + 100)$ psf

$\therefore$ TL = 400 psf

Tributary area, $W_1 = \frac{1}{2}(27' + 15') \times 6'$

$= 126$ sft

Load from slab on foundation $= W_1 \times TL$

$= 126 \times 400$

$= 50400$ lb

Total wall length $= 27'$

Now,

Load on wall from slab per unit length of the wall is $= \frac{50400}{27}$ lb/ft

$= 1866.7$ lb/ft

2. Load from Sunshade:

$DL = 8' \times 2' \times \frac{3.5''}{12} \times 150 = 700$ lb

$LL = 10\ lb/ft^2 \times 8' \times 2' = 160$ lb

let, thickness = 3.5"

$TL = DL + LL = (700 + 160)$ lb

$= 860$ lb

$\therefore$ Load on wall AB $= \frac{860}{27'} \times 2$ → 2-storied building

$= 63.70$ lb/ft of the wall

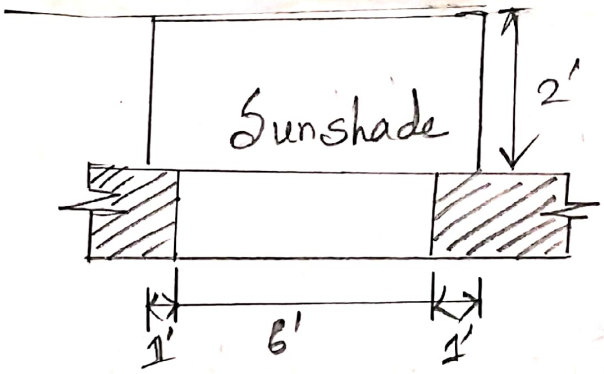
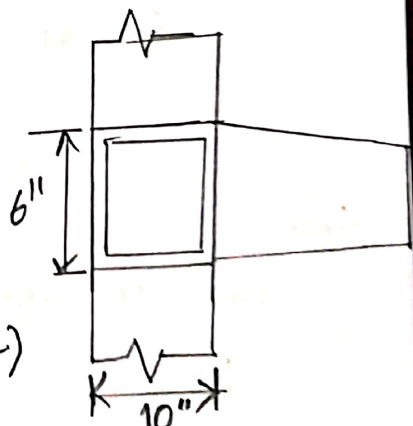


fig: plan view of sunshade

3. Load from Lintel:

Lintel weight $= \left[\frac{6''}{12} \times \frac{10''}{12} \times 8'\right] \times 150$

$= 500$ lb



$\therefore$ Load on wall AB $= \frac{500\ lb}{27\ ft} \times 2$ (storey)

$= 37.03$ lb/ft of the wall

4. Load from wall self wt:

Self wt. of wall of one floor = (Thickness of wall x height of wall x unit wt.) per ft of wall length

$$= \frac{10''}{12} \times 10' \times 120' \times 1'$$

$$= 1000 \text{ lb/ft of wall length}$$

for 2 storey building,

Self wt. of floor = $(1000 \times 2) = 2000$ lb/ft

5. ~~Floor~~ Load from Brick work of GL to PL:

$$= \frac{10''}{12} \times 1.5' \times 1' \times 120$$

$$= 150 \text{ lb/ft of wall length}$$

Now,

Sum at GL, $P = (1866.7 + 63.7 + 2000 + 150 + 37.04)$

$= 4117.44$ lb/ft of the wall length

Here,

Load on the soil = Load at GL (P) + Foundation Weight (W)

Let,

Allowable bearing capacity of soil = $q_{allowable} = 2300$ psf

foundation geometry & width unknown. So, taking foundation weight, W = 10% of P

$= 10\% \times 4117.44 = 411.74$ lb/ft

Required width of the wall foundation $= \frac{(P+W)\ lb/ft}{2300\ lb/ft^2}$

So,

Required width, $B_{required} = \frac{(4117.44 + 411.74)}{2300}$

$= 1.96'$

$= 23.63'' \simeq 25''$

Now,

foundation self wt., $W' = \left[\left(\frac{10''}{12} \times 1.5'\right) + \left(\frac{15''}{12} \times \frac{6''}{12}\right) + \left(\frac{20''}{12} \times \frac{6''}{12}\right) + \left(\frac{25''}{12} \times \frac{6''}{12}\right)\right] \times 1' \times 120 +$

$\left[\frac{25''}{12} \times \frac{3''}{12}\right] \times 1' \times 120 + \left[\frac{25''}{12} \times \frac{3''}{12}\right] \times 1' \times 145$

$= 588.02\ lb/ft$

So, Required width of the wall foundation is $= \frac{(4117.44 + 588.02)}{2300}$

$= 2.04'$

$= 24.55'' < 25''$

[ok]

So, the final foundation width is $B = 25''$

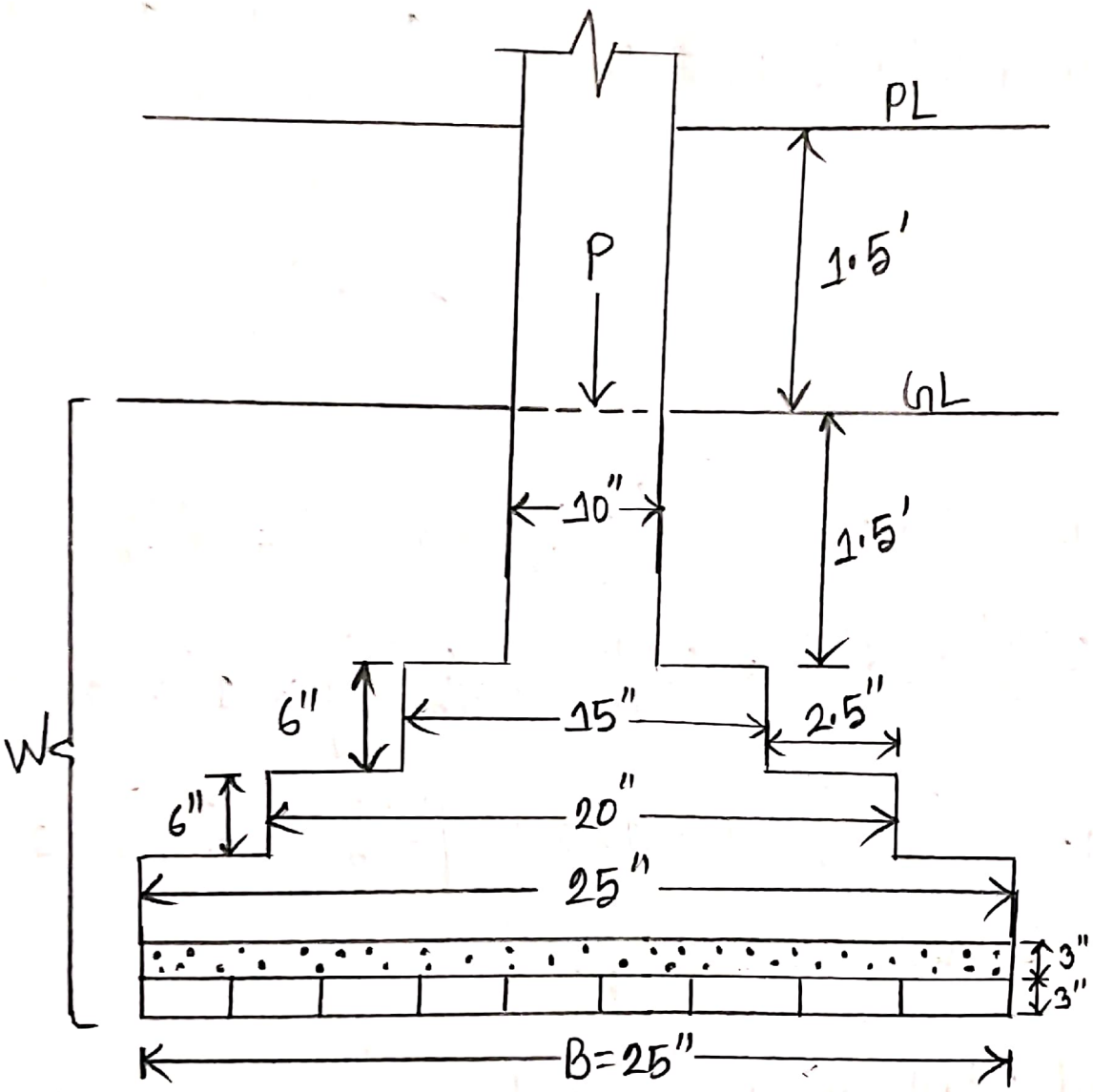


fig: Foundation for section 1-1
(Sectional view)