# DESIGN OF PEDESTAL @ GRIDS-A1

## [A] DESIGN INPUT:

### (a) Loads:

(i) Unfactored Support Reactions:

Comp. (C) = 300.0 kN; Tension (T) = 200.0 kN

Shear (V) = 50.0 kN; BM (M1) = 75.0 kN.m

(ii) Blockwall on Plinth Beam/ RCC Wall:

Length (Wl) = 8.00 m; Height (Wh) = 1.50 m

Thk. (Wt) = 0.20 m; Density (Wd) = 7.5 kN/cu.m

(iii) Plinth Beam/ RCC Wall on Pedestal:

Length (Wl) = 8.00 m

Width (Tb) = 0.20 m; Depth (TD) = 2.15 m

### (b) Concrete & Steel:

fck = 20 Mpa; fy = 500 MPa

Main bar dia. (d) = 25 mm

Dia. of lateral ties (ds) = 8 mm

Concrete cover (cc) = 40 mm



PEDESTAL DESIGN

SECTION 1-1 N.T.S

KEY PLAN N.T.S

SECTION 2-2 N.T.S

BAR ARRANGEMENTS N.T.S

2-SIDES   4-SIDES

### (c) Pedestal Dimensions:

Unsupported length (L) = 4.00 m; k,min = 0.5; k,maj = 2

Assume width (b) = 0.30 m

Assume depth, i.e. dimension || to shear (D) = 0.60 m

## [B] DESIGN LOADS:

Weight of Blockwall (Ww) = 18.0 kN

Weight of Tie-Beam/ RCC Wall (Wb) = 86.0 kN

Weight of Pedestal (Wp) = 18.0 kN

## [C] SLENDERNESS & ECCENTRICITY:

### (a) Slenderness:

Lambda,min = k,min. L/b = 6.7

Lambda,maj = k,maj. L/D = 13.3
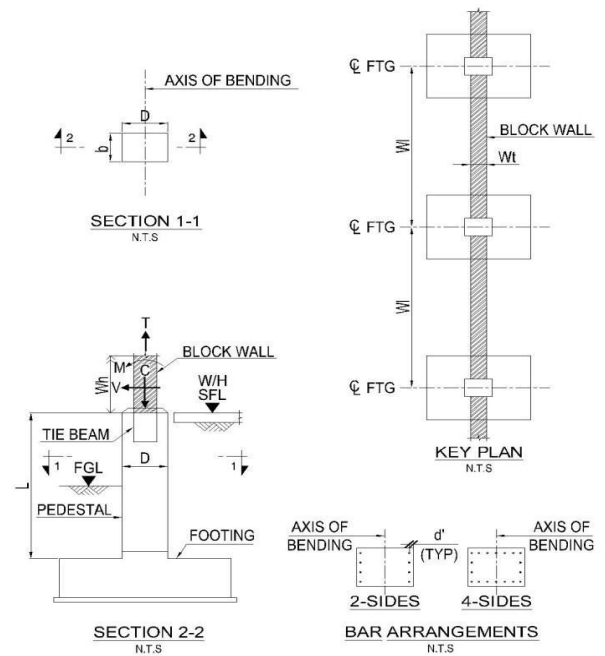
Hence, Lambda,crit = 13.3 > 12 (Long Column)

### (b) Minimum Ecccentricity:

emin @ Minor Axis (emin,min) = Larger of {20, (L/500+b/30)} = Larger of (20, 18) = 20 mm

emin @ Major Axis (emin,maj) = Larger of {20, (L/500+D/30)} = Larger of (20, 28) = 28 mm

Hence, emin = Larger of (20, 28) = 28 mm

| | | | | | | |
|---|---|---|---|---|---|---|
| | | **Client: M/s** | | | | Element: Pedestal |
| | Project: 1002 | Doc. No.: 1002-CAL-1-2-023 | | | | Location/ Grids: A2 |
| | Rev. | Ppd. by | Date | Chd. by | Date | Designation: P3 |
| Project: W/H at AAA | 2 | | | | | |
| Structure: Warehouse-B | 1 | | | | | |
| Type: Sub-structure | 0 | S.K. | 03.01.2018 | S.H.H. | 04.01.2018 | Sht. 1 of 2 |

**[D] COMPRESSION+BENDING:**

Max. Compression (Pc) = C + Ww + Wb + Wp = 300.0 + 18.0 + 86.0 + 18.0 = 422 kN

Pu = 1.5 × Pc = 1.5 × 422 = 633.0 kN

=> Pu/fck.b.D = 0.18

Moment due to support reactions (Mo) = M1 + V × L = 75.0 + 50.0 × 4.00 = 275 kNm

Since member is classified as 'slender column',

Addnl. moment due to slenderness (Msle) = Pc × {(k,maj.L)^2/(2000D)}

=> Msle = 422 × 53.3/1000 = 22.5

BM, M = Mo + Msle = 275 + 22.5 = 297.5 kNm

Mu = 1.5 × M = 1.5 × 297.5 = 446.3 kNm

=> Mu/fck.b.D^2 = 0.207

d'= 53.0 mm

d'/D ~ 0.10; fy = 500 Mpa…… (Ref. Chart48 of SP:16)

=> p/fck = 0.136 => p = 0.136 × 20 = 2.71%

Hence, p = Max(p, pmin) = 2.71%


**[E] TENSION+BENDING:**

Max. Tension (Pt) = -T + Ww + Wb + Wp = -200.0 + 18.0 + 86.0 + 18.0 = -78 kN < 0 (Net tension)

Hence, Pu = 1.5 × Pt = -117.0 kN

=> Pu/fck.b.D = 0.03

Slenderness Moment (Ms) = 0 (Not applicable for Tension+Bending)

Bending Moment (M) = Mo = 275 kNm => Mu = 1.5 × M = 412.5 kNm

=> Mu/fck.b.D^2 = 0.191

d'= 53.0 mm

d'/D ~ 0.10; fy = 500 Mpa…… (Ref. Chart83 of SP:16)

=> p/fck = 0.133 => p = 0.133 × 20 = 2.65%

Hence, p = Max(p, pmin) = 2.65%


**[F] REINFORCEMENT:**

p = Max(2.71, 2.65) = 2.71%

As = p × b × D/100 = 4878 sq.mm

Pedestal size: 300mm x 600mm

(3+3) T25 bars parallel to width faces

(2+2) T25 bars on remaining faces

T8 links @ 300 c/c