

PEDESTAL DESIGN (LSM-IS 456:2000)

DESIGN INPUT:

Note: When referring to an axis, prefixes 'G'/'L' denote global structure & local ped. axes, resp'tly.

(a) Governing LCs (All loads are factored):

Node	L/C	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kN.m)	My (kN.m)	Mz (kN.m)	Stress Inc. (Y/N)	Governing Criteria
1	1	41	818	1	0	0	0	N	Compression + Bending
-	-	-	-	-	-	-	-	-	Tension + Bending
1	1	41	818	1	0	0	0	N	Shear @ GX dirn.
1	1	41	818	1	0	0	0	N	Shear @ GZ dirn.

' Loads are in structure global axes (as obtained from structure analysis)

(b) Tie-beams & blockwalls:

(i) Tie beams:

@ LX dirn.: Length, Tlx = 0 m; Width, Tbx = 0 m; Depth, TDx = 0 m

@ LZ dirn.: Length, Tlz = 3 m; Width, Tbz = 0.5 m; Depth, TDz = 0.6 m

(ii) Blockwalls:

@ LX dirn.: Length, Wlx = 0 m; Height, Whx = 0 m; Thk., Wtx = 0 m

@ LZ dirn.: Length, Wlz = 0 m; Height, Whz = 0 m; Thk., Wtz = 0 m

Wall density, Wd = 0 kN/m³

(c) Materials:

fck = 25 MPa; fy (main steel) = 500 MPa; fy (lateral ties) = 500 MPa

Concrete cover, cc = 40 mm (main steel)

(d) Levels (ref. section 1-1):

Unsupported length, Lo = 2.1 m

Eff. length factor for bending @ LX, kx = 0.8

Eff. length factor for bending @ LZ, kz = 2

(e) Pedestal details (assumed):

Dim. || to LX, Px = 500 mm

Dim. || to LZ, Pz = 500 mm

Steel: 12-T16 (main bars) & T8 @ 250 mm c/c (lateral ties)

DESIGN LOADS:

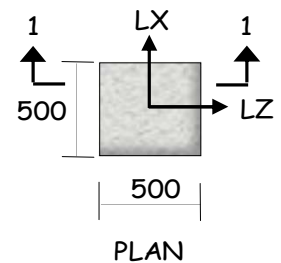
(a) Wt. of tie beam (Wb):

(i) Tie beam in local-X dirn, Wbx:

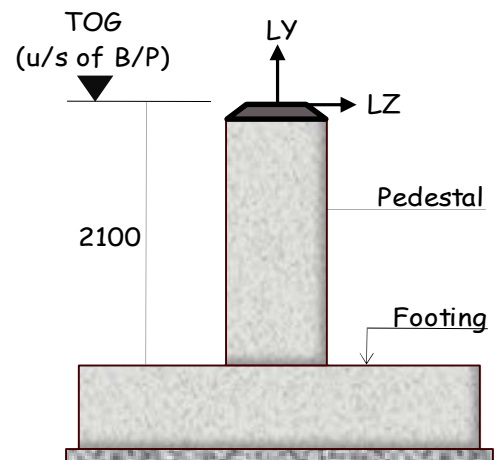
$$Wbx = 25 \cdot Tlx \cdot Tbx \cdot TDx = 25 \times 0 \times 0 \times 0 = 0 \text{ kN}$$

(ii) Tie beam in local-Z dirn, Wbz:


$$Wbz = 25 \cdot Tlz \cdot Tbz \cdot TDz = 25 \times 3 \times 0.5 \times 0.6 = 22.5 \text{ kN}$$



(All dims. are in mm)



(All dims. are in mm)

	Client : EPICENTER CONSULTING ENGINEERS					Element:
	Project:	1001	Doc. No.:	1001-CV-001		Location/ Designation: PO
	Rev.	Ppd. by	Date	Chd. by	Date	
Project:	WAREHOUSE	2				Sht. 1 of 7
Structure:	A-BUILDING	1				
Type:	PEB	0	-	20-12-2025	-	

=> $W_b = W_{bx} + W_{bz} = 0 + 22.5 = 22.5 \text{ kN}$

(b) Wt. of blockwall (Ww):

(i) Blockwall in local-X dirn (Wwx):

$W_{wx} = W_d \cdot W_l \cdot W_t \cdot W_h = 0 \times 0 \times 0 \times 0 = 0 \text{ kN}$

(ii) Blockwall in local-Z dirn (Wwz):

$W_{wz} = W_d \cdot W_l \cdot W_t \cdot W_h = 0 \times 0 \times 0 \times 0 = 0 \text{ kN}$

=> $W_w = W_{wx} + W_{wz} = 0 + 0 = 0 \text{ kN}$

(c) Self wt. of pedestal (Wp):

$W_p = 25 \cdot P_x \cdot P_z \cdot L_o = 25 \times 0.5 \times 0.5 \times 2.1 = 13.13 \text{ kN}$

SLENDERNESS & ECCENTRICITY:

(a) Slenderness:

For bending @ LX, $\lambda_x = k_x \cdot L_o / P_z = 0.8 \times 2100 / 500 = 3.4$

For bending @ LZ, $\lambda_z = k_z \cdot L_o / P_x = 2 \times 2100 / 500 = 8.4$

Hence, $\lambda_{crit} = \text{Max}(3.4, 8.4) = 8.4$ ($3 < 8.4 < 12$... short column)

(b) Minimum eccentricity:

In LX dirn. (Mz moment), $e_{min,z} = \text{Max}\{(L_o / 500 + L_X / 30), 20\}$

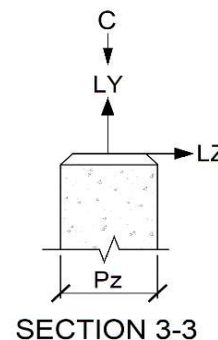
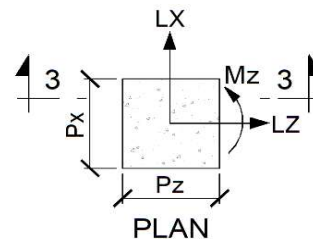
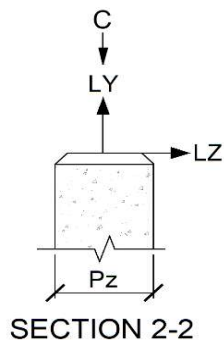
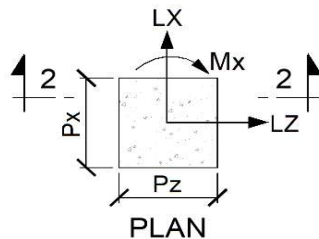
=> $e_{min,z} = \text{Max}\{(2100 / 500 + 500 / 30), 20\} = \text{Max}(20.9, 20) = 20.9 \text{ mm}$


In LZ dirn. (Mx moment), $e_{min,x} = \text{Max}\{(L_o / 500 + L_Z / 30), 20\}$

=> $e_{min,x} = \text{Max}\{(2100 / 500 + 500 / 30), 20\} = \text{Max}(20.9, 20) = 20.9 \text{ mm}$

Hence, $e_{min} = \text{Max}(e_{min,z}; e_{min,x}) = \text{Max}(20.9, 20.9) = 20.9 \text{ mm}$

COMP+BEN (Gov. Node/LC: 1/1; Stress increase = 0%):



	Client : EPICENTER CONSULTING ENGINEERS					Element:
	Project:	1001	Doc. No.:	1001-CV-001		Location/
	Rev.	Ppd. by	Date	Chd. by	Date	
	Project:	WAREHOUSE	2			Designation: PO
	Structure:	A-BUILDING	1			
Type:	PEB	0	-	20-12-2025	-	20-12-2025

(a) Design loads adjusted for perm. stress increase & ped. end restraint (Load redn. factor = 1):

$F_x = 41/1 = 41 \text{ kN}$; $F_y = 818/1 = 818 \text{ kN}$; $F_z = 0/1 = 0 \text{ kN}$
 $M_x = 0/1 = 0 \text{ kN}$; $M_y = 0/1 = 0 \text{ kN}$; $M_z = 0/1 = 0 \text{ kN}$

(b) Steel ratio:

With assumed steel viz. 12-T16 bars,

$$A_{sc} = 12 \times (\pi \times 16^2 / 4) = 2412.7 \text{ mm}^2$$

$$\Rightarrow p_c = 100 A_{sc} / (P_x \cdot P_z) = 100 \times 2412.7 / (500 \times 500) = 0.97\%$$

$$\Rightarrow p_c / f_{ck} = 0.97 / 25 = 0.039$$

(c) Mx bending:

(i) Axial load:

$$P_{c,x} = F_y + W_w + W_b + W_p = 818 + 0 + 22.5 + 13.13 = 853.6 \text{ kN (C)}$$

$$P_{uc,x} = P_{c,x} = 853.6 \text{ kN}$$

$$\Rightarrow P_{uc,x} / (f_{ck} \cdot P_x \cdot P_z) = 1000 \times 853.6 / (25 \times 500 \times 500) = 0.14$$

(ii) Bending moment:

Since $3 < \lambda_x < 12$ ($3 < 3.4 < 12$), the member is a 'short column' in Mx bending

$$\Rightarrow \text{Min. eccentricity in Mx bending, } e_{min,x} = 20.9 \text{ mm}$$

$$\text{Min. (unf.) moment, } M_{min,x} = P_{c,x} \cdot e_{min,x} = 853.6 \times 20.9 / 1000 = 17.84 \text{ kNm}$$

$$\text{Base moment, } M_{xb} = M_x + F_z \cdot L_o = 0 + 0 \times 2.1 = 0 \text{ kNm}$$

$$M_{c,x} = \text{Max}(M_{xb}, M_{min,x}) = \text{Max}(0, 17.84) = 17.84 \text{ kNm}$$

$$M_{uc,x} = M_{c,x} = 17.84 \text{ kNm}$$

$$d' = \text{clear cover} + \text{dia} / 2 = 40 + 16 / 2 = 48 \text{ mm}$$

$$d' / P_z = 48 / 500 \sim 0.1; f_y = 500 \text{ Mpa..... (Ref. Chart49 of SP:16)}$$

From Chart49 of SP:16 we have, for given p / f_{ck} & $P_u / f_{ck} \cdot b \cdot D$ ratios,

$$M_{uc,x1} / (f_{ck} \cdot P_x \cdot P_z^2) = 0.087 \Rightarrow M_{uc,x1} = 0.087 f_{ck} \cdot P_x \cdot P_z^2$$

$$\Rightarrow M_{uc,x1} = 0.087 \times 25 \times 500 \times 500^2 / 1000,000 = 270.42 \text{ kNm}$$

(d) Mz bending:

(i) Axial load:

$$P_{c,z} = F_y + W_w + W_b + W_p = 818 + 0 + 22.5 + 13.13 = 853.6 \text{ kN (C)}$$

$$P_{uc,z} = P_{c,z} = 853.6 \text{ kN}$$

$$\Rightarrow P_{uc,z} / (f_{ck} \cdot P_z \cdot P_x) = 1000 \times 853.6 / (25 \times 500 \times 500) = 0.137$$

(ii) Bending moment:

Since $3 < \lambda_z < 12$ ($3 < 8.4 < 12$),

\Rightarrow The member is a 'short column' in Mz bending

$$\Rightarrow \text{Min. eccentricity in Mz bending, } e_{min,z} = 20.9 \text{ mm}$$


$$\text{Min. (unf.) moment, } M_{min,z} = P_{c,z} \cdot e_{min,z} = 853.6 \times 20.9 / 1000 = 17.84 \text{ kNm}$$

$$\text{Base moment, } M_{zb} = M_z + F_x \cdot L_o = 0 + 41 \times 2.1 = 86.1 \text{ kNm}$$

$$M_{c,z} = \text{Max}(M_{zb}, M_{min,z}) = \text{Max}(86.1, 17.84) = 86.1 \text{ kNm}$$

$$M_{uc,z} = M_{c,z} = 86.1 \text{ kNm}$$

$$d' = \text{clear cover} + \text{dia} / 2 = 40 + 16 / 2 = 48 \text{ mm}$$

	Client : EPICENTER CONSULTING ENGINEERS					Element:	
	Project:	1001	Doc. No.:	1001-CV-001		Location/	
	Rev.	Ppd. by	Date	Chd. by	Date		
	Project:	WAREHOUSE	2			Designation:	
Structure:	A-BUILDING	1			PO		
Type:	PEB	0	-	20-12-2025	-	20-12-2025	Sht. 3 of 7

$d' / P_x = 48 / 500 \sim 0.1$; $f_y = 500 \text{ Mpa} \dots$ (Ref. Chart49 of SP:16)
 From Chart49 of SP:16 we have, for given p / f_{ck} & $P_u / f_{ck} \cdot b \cdot D$ ratios,
 $M_{uc,z1} / (f_{ck} \cdot P_z \cdot P_x^2) = 0.087 \Rightarrow M_{uc,z1} = 0.087 f_{ck} \cdot P_z \cdot P_x^2$
 $\Rightarrow M_{uc,z1} = 0.087 \times 25 \times 500 \times 500^2 / 1000,000 = 270.42 \text{ kNm}$

(e) Interaction check:

$A_{sc} = 12 \times (\pi \times 16^2 / 4) = 2412.7 \text{ mm}^2$

$A_{cg} = 500 \times 500 = 250000 \text{ mm}^2$

$A_c = A_{cg} - A_{sc} = 250000 - 2412.7 = 247587 \text{ mm}^2$

Axial capacity, $P_u = 0.45 f_{ck} \cdot A_c + 0.75 F_y \cdot A_{sc}$

$= (0.45 \times 25 \times 247587 + 0.75 \times 500 \times 2412.7) / 1000 = 3690.14 \text{ kN}$

$F_{uy} = P_c = 853.6 \text{ kN}$

Hence, $F_{uy} / P_u = 853.6 / 3690.14 = 0.23 \Rightarrow \alpha_{en} = 1.05$


$M_{uc,x} / M_{uc,x1} = 17.84 / 270.42 = 0.066$

$M_{uc,z} / M_{uc,z1} = 86.1 / 270.42 = 0.32$

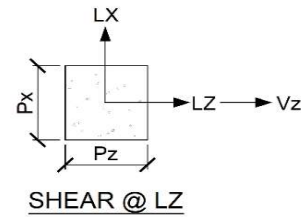
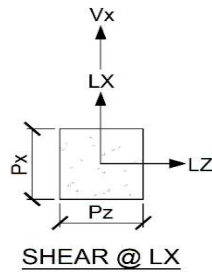
$\Rightarrow (M_{uc,x} / M_{uc,x1})^{\alpha_{en}} + (M_{uc,z} / M_{uc,z1})^{\alpha_{en}} = 0.066^{1.05} + 0.32^{1.05} = 0.357 < 1, \text{ OK}$

TEN+BEN:

[No pedestal is subjected to 'net' tension at its base; Hence this check is not applicable]

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	Rev.	Ppd. by	Date	Chd. by	Date	
Project:	WAREHOUSE	2				Sht. 4 of 7 FORM: ECE-B0002
Structure:	A-BUILDING	1				
Type:	PEB	0	-	20-12-2025	-	

SHEAR:



(a) Shear @ LX dirn. (Gov. Node/LC: 1/1; Stress increase = 0%):

(i) Loads: $F_x = 41 / 1 = 41 \text{ kN}$; $F_y = 818 / 1 = 818 \text{ kN}$; $F_z = 0 / 1 = 0 \text{ kN}$ [Ped. restrained]

Assume T8 links @ 250 mm c/c with 4 legs || LX

$V_u = 41 \text{ kN}$; Eff. depth @ LX dirn, $d_x = 500 - 40 - 16 / 2 = 452 \text{ mm}$

$\Rightarrow v_u = V_u / bd = 1000 \times 41 / (500 \times 452) = 0.18 \text{ MPa} \ll \tau_{c, \max} (= 3.1 \text{ MPa})$

(ii) Design shear strength of conc. (Eff. tension steel: 4-T16 bars):

$100 A_s / b.d = 100 \times (4 \times 201.1) / (500 \times 452) = 0.36\% \Rightarrow \tau_{c, c} = 0.42 \text{ MPa}$ (Table 19, IS 456)

(iii) Enhanced shear strength of conc., $\tau_{c, ce}$ (Cl 40.2.2, IS 456):

$P_u = 818 \text{ kN}$; $A_g = 500 \times 500 = 250000 \text{ mm}^2$; $f_{ck} = 25 \text{ MPa}$

$1 + 3 P_u / A_g.f_{ck} = 1 + 3 \times (818 \times 1000) / (250000 \times 25) = 1.39$

$\Delta = \text{Min}(1 + 3 P_u / A_g.f_{ck}, 1.5) = \text{Min}(1.39, 1.5) = 1.39 \Rightarrow \tau_{c, ce} = \Delta \times \tau_{c, c} = 1.39 \times 0.42 = 0.58 \text{ MPa}$

Since $\tau_{c, ce} (= 0.58 \text{ MPa}) > v_u (= 0.18 \text{ MPa})$, provide nominal links

$A_{sv} = 4 \times 50.3 = 201.2 \text{ mm}^2$; $b = 500 \text{ mm}$

Reqd. spg of 4 legs of T8 links, $s_v = 2.5 A_{sv} \cdot 0.87 f_y / b$, where $b = \text{member width}$

$\Rightarrow s_v = 2.5 \times 201.2 \times 0.87 \times 500 / 500 = 437.6 \text{ mm} > s_{v, \text{prov}} (= 250 \text{ mm})$, OK

(b) Shear @ LZ dirn. (Gov. Node/LC: 1/1; Stress increase = 0%):

(i) Loads: $F_x = 41 / 1 = 41 \text{ kN}$; $F_y = 818 / 1 = 818 \text{ kN}$; $F_z = 0 / 1 = 0 \text{ kN}$ [Ped. restrained]

Assume T8 links @ 250 mm c/c with 4 legs || LZ

$V_u = 0 \text{ kN}$; Eff. depth @ LZ dirn, $d_x = 500 - 40 - 16 / 2 = 452 \text{ mm}$

$\Rightarrow v_u = V_u / bd = 1000 \times 0 / (500 \times 452) = 0 \text{ MPa} \ll \tau_{c, \max} (= 3.1 \text{ MPa})$

(ii) Design shear strength of conc. (Eff. tension steel: 4-T16 bars):

$100 A_s / b.d = 100 \times (4 \times 201.1) / (500 \times 452) = 0.36\% \Rightarrow \tau_{c, c} = 0.42 \text{ MPa}$ (Table 19, IS 456)

(iii) Enhanced shear strength of conc., $\tau_{c, ce}$ (Cl 40.2.2, IS 456):

$P_u = 818 \text{ kN}$; $A_g = 500 \times 500 = 250000 \text{ mm}^2$; $f_{ck} = 25 \text{ MPa}$

$1 + 3 P_u / A_g.f_{ck} = 1 + 3 \times (818 \times 1000) / (250000 \times 25) = 1.39$

$\Delta = \text{Min}(1 + 3 P_u / A_g.f_{ck}, 1.5) = \text{Min}(1.39, 1.5) = 1.39 \Rightarrow \tau_{c, ce} = \Delta \times \tau_{c, c} = 1.39 \times 0.42 = 0.58 \text{ MPa}$


Since $\tau_{c, ce} (= 0.58 \text{ MPa}) > v_u (= 0 \text{ MPa})$, provide nominal links

$A_{sv} = 4 \times 50.3 = 201.2 \text{ mm}^2$; $b = 500 \text{ mm}$

Reqd. spg of 4 legs of T8 links, $s_v = 2.5 A_{sv} \cdot 0.87 f_y / b$, where $b = \text{member width}$

$\Rightarrow s_v = 2.5 \times 201.2 \times 0.87 \times 500 / 500 = 437.6 \text{ mm} > s_{v, \text{prov}} (= 250 \text{ mm})$, OK

Provide sets of T8 @ 250mm c/c (4 legs || LX; 4 legs || LZ)

	Client : EPICENTER CONSULTING ENGINEERS					Element:
	Project:	1001	Doc. No.:	1001-CV-001		Location/ Designation: PO
	Rev.	Ppd. by	Date	Chd. by	Date	
Project:	WAREHOUSE	2				Sht. 5 of 7 FORM: ECE-B0002
Structure:	A-BUILDING	1				
Type:	PEB	0	-	20-12-2025	-	

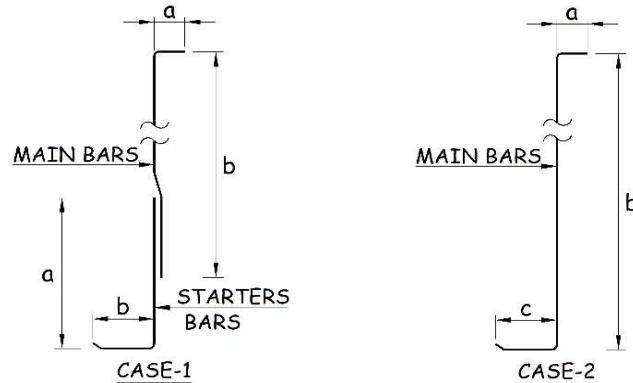
BILL OF QUANTITIES: [Ref. CAD dwg for accurate rebar quantities]

Table-Q1:

Material	Ped. nos.	Pedestal dimensions			Quantity		Remarks
		B (mm)	D (mm)	L (mm)	Vol./ ped. (cu.m)	Total vol. (cu.m)	
Concrete	1	500	500	2,100	0.52	0.5	

Table-Q2a (Steel - Main bars):

[Case-1: With pedestal starters]



Ped. nos.	Dia. (mm)	Bars/ ped (mm)	Starter bars (A)				Main bars (B)				
			Dims. (mm)		1 ped. (kg)	Tot. qty. (kg)	Dims. (mm)			1 ped. (kg)	Tot. qty. (kg)
			a	b			a	b	c		
1	16	12	1,276	450	32.7	33	300	1,950	-	42.6	43
Total (A+B) ---->										75	76

Table-Q2b (Steel - Lateral ties):

Ped. nos.	Dia. (mm)	L/ set (m)	Wt./ set (kg)	In ftg. No. of sets	Middle portion			End portion(s)			Tot. wt. (kg)	
					Dist (mm)	Spg. (mm)	No. of sets	Dist. (mm)	Spg. (mm)	No. of sets	1 ped.	All peds.
1	8	4.80	1.89	3	2,100	250	9	-	-	-	22.7	22.7

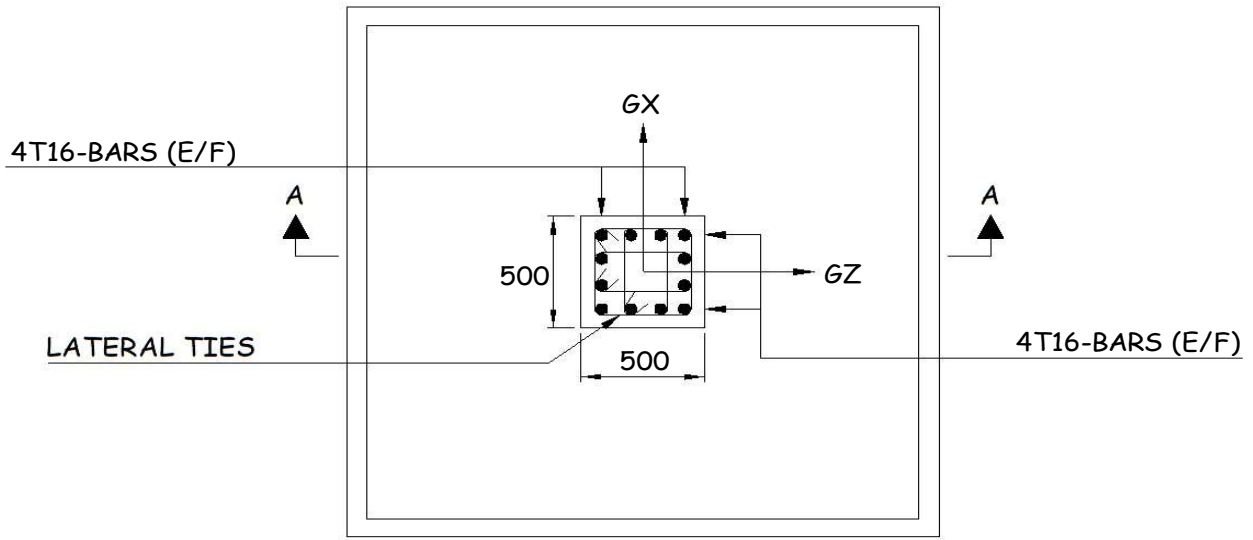
Table-Q3:

Material	Ped. nos.	Pedestal dimensions			Quantity		Remarks
		B (mm)	D (mm)	L (mm)	Area/ ped. (sq.m)	Total area (sq.m)	
Formwork	1	500	500	2,100	4.2	4.2	

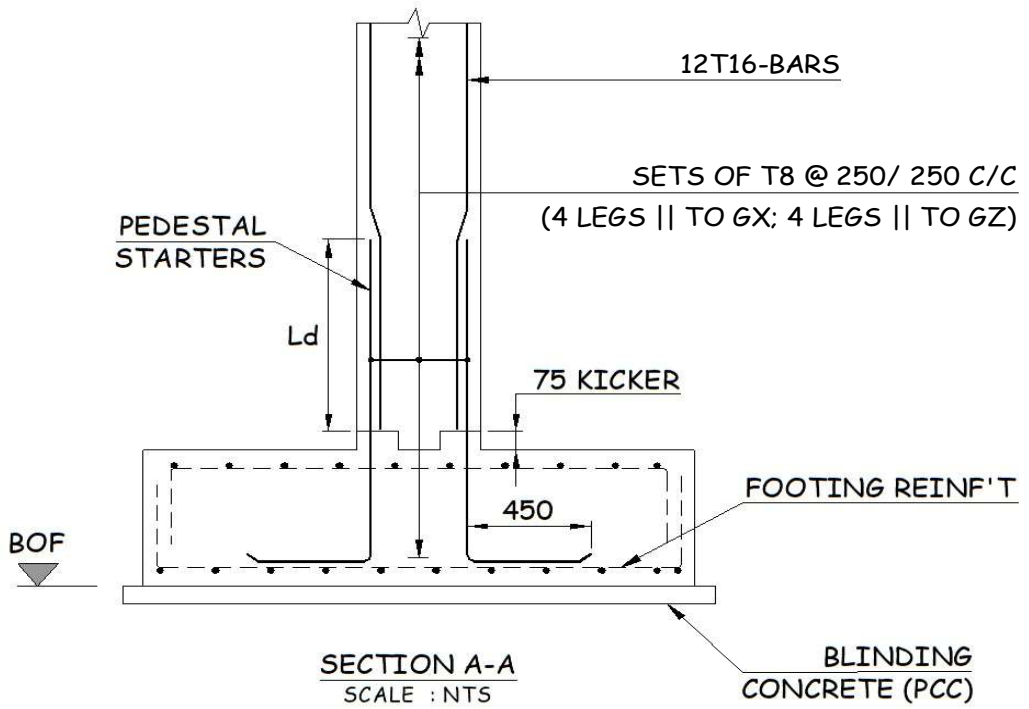
Table-Q4 (Cost):

Element	Unit rate		Ped. nos.	Quantity			Cost (USD)		
	Rate (USD)	UOM		1 ped.	All peds.	UOM	1 ped.	All peds.	Ratio (%)
Concrete	65	cu.m	1	0.52	0.5	cu.m	34	34	21.7
Reinforcing steel	1	kg	1	98	99	kg	98	98	62.3
Formwork	6	sq.m	1	4.2	4.2	sq.m	25	25	16.0
Total ---->							157	157	100

	Client : EPICENTER CONSULTING ENGINEERS					Element:
	Project:	1001	Doc. No.:	1001-CV-001		Location/
	Rev.	Ppd. by	Date	Chd. by	Date	
	Project: WAREHOUSE	2				Designation:
Structure: A-BUILDING	1				PO	
Type: PEB	0	-	20-12-2025	-	20-12-2025	Sht. 6 of 7




PEDESTAL C/S
SCALE : NTS



SECTION A-A
SCALE : NTS

NOTES & LEGEND:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. PEDESTAL AXES INDICATED CORRESPOND TO STRUCTURE GLOBAL AXES.
3. THE BARS DEPICTED IN THE C/S DIAGRAM OF PEDESTAL SERVE AS A GUIDE. FOR CORRECT NUMBER OF BARS/TIES, KINDLY FOLLOW WRITTEN INSTRUCTIONS.
4. THE 1st & 2nd NOS FOR TIE SPG ARE RESP'LY FOR THAT IN THE MIDDLE AND END PORTIONS.

	Client : EPICENTER CONSULTING ENGINEERS					Element:	
	Project:	1001	Doc. No.:	1001-CV-001		Location/	
	Rev.	Ppd. by	Date	Chd. by	Date		
Project:	WAREHOUSE	2				Designation: PO	
Structure:	A-BUILDING	1					
Type:	PEB	0	-	20-12-2025	-	20-12-2025	Sht. 7 of 7



Client:	EPICENTER CONSULTING ENGINEERS PVT. LTD.	Rev.:	0	Date:
		Prep. by:		Chd. By:
Project:	WAREHOUSE	Rev.:	0	Date:
Structure:	A-BUILDING	Prep. by:		Chd. By:
Area/Unit:		Rev.:	0	Date:
Member:	PEDESTAL	Prep. by:	-	Chd. By:

Member	Bar mark	Type	Dia. (mm)	No of mbrs	Bars in each	Shape code	Bar dimensions (mm)					Total bars	Bar length (mm)	Tot. bar length (m)	Total weight (kg)
							A	B	C	D	E				
P0	01s	T	16	1	12	11	454	1268	-	-	-	12	1694	20.33	32.08
	01	T	16	1	12	34	800	128	1049	16	362	12	2307	27.68	43.69
	02	T	8	1	12	51	436	436	-	-	-	12	1869	22.43	8.85
	03	T	8	1	12	51	436	166.7	-	-	-	12	1330	15.97	6.30
	04	T	8	1	12	51	166.7	436	-	-	-	12	1330	15.97	6.30

OPTION NO.	DIMENSIONS (MM)		REINFORCEMENT								BOQ					COST					COSTLIER THAN MOST COST-EFFECTIVE SIZE		
			MAIN BARS			LATERAL TIES					CONC. (CU.M)	REINFORCING STEEL (KG)			F/W+LABOUR (SQ.M)	(%)			(USD)				
	TO GX	TO GZ	DIA. (MM)	NOS.	Pt (%)	DIA. (MM)	SPG. (MM)		LEGS TO GX	LEGS TO GZ		MAIN BARS	TIES	TOTAL		CONC.	STEEL	FORM	CONC. (A)	STEEL (B)		FORM (C)	TOTAL (A+B+C)
							MID	END															
1	500	500	16	12	0.97	8	250	250	4	4	0.52	75.3	22.7	98	4.2	21.69%	62.30%	16.01%	34.1	98	25.2	157	0.00%
2	500	550	16	12	0.88	8	250	250	4	4	0.58	75.3	23.9	99.2	4.41	23.01%	60.78%	16.22%	37.5	99.2	26.5	163	3.69%
3	500	600	12	22	0.83	8	175	175	7	6	0.63	73.7	57.2	130.9	4.62	20.52%	65.58%	13.89%	41	130.9	27.7	200	26.80%
4	500	650	16	14	0.87	8	250	250	4	5	0.68	87.8	29.8	117.6	4.83	23.23%	61.60%	15.17%	44.4	117.6	29	191	21.37%
5	500	700	16	14	0.8	8	250	250	5	4	0.74	87.8	30.1	117.9	5.04	24.38%	60.18%	15.43%	47.8	117.9	30.2	196	24.52%
6	500	750	16	16	0.86	8	250	250	5	5	0.79	100.4	35.5	135.9	5.25	23.42%	62.17%	14.41%	51.2	135.9	31.5	219	38.92%
7	500	800	16	16	0.8	8	250	250	5	5	0.84	100.4	36.9	137.3	5.46	24.30%	61.12%	14.58%	54.6	137.3	32.8	225	42.80%
8	500	850	16	18	0.85	8	250	250	6	5	0.89	112.9	41.2	154.1	5.67	23.57%	62.61%	13.82%	58	154.1	34	246	56.42%
9	500	900	16	18	0.8	8	250	250	6	5	0.94	112.9	42.6	155.5	5.88	24.35%	61.66%	13.99%	61.4	155.5	35.3	252	60.29%
10	550	500	12	22	0.9	8	175	175	6	7	0.58	73.7	54.7	128.4	4.41	19.51%	66.74%	13.75%	37.5	128.4	26.5	192	22.29%
11	550	550	12	22	0.82	8	175	175	6	7	0.64	73.7	57.6	131.3	4.62	20.62%	65.54%	13.84%	41.3	131.3	27.7	200	27.27%
12	550	600	12	24	0.82	8	175	175	7	7	0.69	80.4	64.8	145.2	4.83	20.55%	66.23%	13.22%	45	145.2	29	219	39.32%
13	550	650	16	16	0.9	8	250	250	5	5	0.75	100.4	34.1	134.5	5.04	22.85%	62.98%	14.16%	48.8	134.5	30.2	214	35.70%
14	550	700	16	16	0.84	8	250	250	5	5	0.81	100.4	35.5	135.9	5.25	23.89%	61.79%	14.32%	52.6	135.9	31.5	220	39.79%
15	550	750	16	18	0.88	8	250	250	6	5	0.87	112.9	40.1	153	5.46	23.26%	63.20%	13.54%	56.3	153	32.8	242	53.81%
16	550	800	16	18	0.82	8	250	250	6	5	0.92	112.9	41.5	154.4	5.67	24.17%	62.13%	13.69%	60.1	154.4	34	248	57.90%
17	550	850	16	20	0.86	8	250	250	7	5	0.98	125.5	46	171.5	5.88	23.58%	63.38%	13.04%	63.8	171.5	35.3	271	71.98%
18	550	900	16	20	0.81	8	250	250	7	5	1.04	125.5	47.4	172.9	6.09	24.39%	62.42%	13.19%	67.6	172.9	36.5	277	76.07%
19	600	500	12	22	0.83	8	175	175	6	7	0.63	73.7	57.2	130.9	4.62	20.52%	65.58%	13.89%	41	130.9	27.7	200	26.80%
20	600	550	16	14	0.85	8	250	250	4	5	0.69	87.8	29.3	117.1	4.83	23.57%	61.26%	15.17%	45	117.1	29	191	21.44%
21	600	600	16	16	0.89	8	250	250	5	5	0.76	100.4	34.1	134.5	5.04	22.98%	62.88%	14.14%	49.1	134.5	30.2	214	35.92%
22	600	650	16	16	0.82	8	250	250	5	5	0.82	100.4	35.5	135.9	5.25	24.13%	61.60%	14.28%	53.2	135.9	31.5	221	40.22%
23	600	700	16	18	0.86	8	250	250	5	6	0.88	112.9	40.9	153.8	5.46	23.51%	63.06%	13.43%	57.3	153.8	32.8	244	55.00%
24	600	750	16	18	0.8	8	250	250	6	5	0.94	112.9	41.8	154.7	5.67	24.56%	61.84%	13.60%	61.4	154.7	34	250	58.95%
25	600	800	16	20	0.84	8	250	250	6	6	1.01	125.5	47.7	173.2	5.88	23.91%	63.22%	12.87%	65.5	173.2	35.3	274	74.15%
26	600	850	16	22	0.87	8	250	250	7	6	1.07	138	52.8	190.8	6.09	23.44%	64.26%	12.30%	69.6	190.8	36.5	297	88.75%
27	600	900	16	22	0.82	8	250	250	7	6	1.13	138	54.5	192.5	6.3	24.24%	63.33%	12.43%	73.7	192.5	37.8	304	93.23%
28	650	500	12	24	0.84	8	175	175	6	8	0.68	80.4	63.6	144	4.83	20.41%	66.25%	13.33%	44.4	144	29	217	38.12%
29	650	550	16	16	0.9	8	250	250	4	6	0.75	100.4	33.5	133.9	5.04	22.91%	62.89%	14.20%	48.8	133.9	30.2	213	35.34%
30	650	600	16	16	0.82	8	250	250	4	6	0.82	100.4	35.2	135.6	5.25	24.16%	61.55%	14.29%	53.2	135.6	31.5	220	40.04%
31	650	650	16	18	0.86	8	250	250	5	6	0.89	112.9	40.6	153.5	5.46	23.64%	62.93%	13.43%	57.7	153.5	32.8	244	55.04%
32	650	700	16	22	0.97	8	250	250	6	7	0.96	138	50	188	5.67	21.86%	66.17%	11.97%	62.1	188	34	284	80.57%
33	650	750	16	22	0.91	8	250	250	6	7	1.02	138	52	190	5.88	22.80%	65.11%	12.09%	66.5	190	35.3	292	85.45%
34	650	800	16	22	0.85	8	250	250	7	6	1.09	138	53.1	191.1	6.09	23.77%	64.00%	12.24%	71	191.1	36.5	299	89.79%
35	650	850	16	22	0.8	8	250	250	7	6	1.16	138	54.8	192.8	6.3	24.64%	63.01%	12.35%	75.4	192.8	37.8	306	94.50%
36	650	900	16	24	0.82	8	250	250	7	7	1.23	150.6	61.6	212.2	6.51	24.11%	64.09%	11.79%	79.9	212.2	39.1	331	110.46%
37	700	500	16	16	0.92	8	250	250	4	6	0.74	100.4	33	133.4	5.04	22.60%	63.09%	14.31%	47.8	133.4	30.2	211	34.33%
38	700	550	12	28	0.82	8	175	175	7	9	0.81	93.8	79.3	173.1	5.25	20.44%	67.31%	12.25%	52.6	173.1	31.5	257	63.42%
39	700	600	16	18	0.86	8	250	250	5	6	0.88	112.9	40.3	153.2	5.46	23.56%	62.98%	13.46%	57.3	153.2	32.8	243	54.64%
40	700	650	16	20	0.88	8	250	250	5	7	0.96	125.5	45.7	171.2	5.67	23.23%	64.05%	12.72%	62.1	171.2	34	267	69.92%
41	700	700	16	20	0.82	8	250	250	6	6	1.03	125.5	47.7	173.2	5.88	24.29%	62.90%	12.81%	66.9	173.2	35.3	275	75.02%
42	700	750	16	22	0.84	8	250	250	6	7	1.1	138	53.7	191.7	6.09	23.90%	63.92%	12.18%	71.7	191.7	36.5	300	90.59%
43	700	800	16	24	0.86	8	250	250	7	7	1.18	150.6	59.7	210.3	6.3	23.56%	64.80%	11.65%	76.4	210.3	37.8	325	106.22%
44	700	850	16	24	0.81	8	250	250	7	7	1.25	150.6	61.6	212.2	6.51	24.42%	63.83%	11.75%	81.2	212.2	39.1	333	111.33%
45	700	900	16	30	0.96	8	250	250	9	8	1.32	188.2	76.7	264.9	6.72	21.98%	67.71%	10.31%	86	264.9	40.3	391	148.63%
46	750	500	16	16	0.86	8	250	250	4	6	0.79	100.4	34.1	134.5	5.25	23.57%	61.93%	14.50%	51.2	134.5	31.5	217	38.02%
47	750	550	16	18	0.88	8	250	250	4	7	0.87	112.9	38.9	151.8	5.46	23.37%	63.03%	13.60%	56.3	151.8	32.8	241	53.09%
48	750	600	16	18	0.8	8	250	250	5	6	0.94	112.9	41.8	154.7	5.67	24.56%	61.84%	13.60%	61.4	154.7	34	250	58.95%
49	750	650	16	22	0.91	8	250	250	6	7	1.02	138	51.4	189.4	5.88	22.85%	65.04%	12.11%	66.5	189.4	35.3	291	85.09%
50	750	700	16	22	0.84	8	250	250	6	7	1.1	138	53.4	191.4	6.09	23.92%	63.89%	12.20%	71.7	191.4	36.5	300	90.41%
51	750	750	16	24	0.86	8	250	250	7	7	1.18	150.6	59.7	210.3	6.3	23.64%	64.73%	11.64%	76.8	210.3	37.8	325	106.44%
52	750	800	16	24	0.8	8	250	250	7	7	1.26	150.6	61.6	212.2	6.51	24.58%	63.70%	11.72%	81.9	212.2	39.1	333	111.76%
53	750	850	16	28	0.88	8	250	250	8	8	1.34	175.7	72.7	248.4	6.72	23.16%	66.11%	10.73%	87	248.4	40.3	376	138.81%
54	750	900	16	28	0.83	8	250	250	8	8	1.42	175.7	75	250.7	6.93	23.97%	65.22%	10.82%	92.1	250.7	41.6	384	144.30%
55	800	500	16	16	0.8	8	250	250	4	6	0.84	100.4	35.2	135.6	5.46	24.49%	60.82%	14.69%	54.6	135.6	32.8	223	41.71%
56	800	550	16	18	0.82	8	250	250	4	7	0.92	112.9	40.1	153	5.67	24.31%	61.92%	13.77%	60.1	153	34	247	57.00%
57	800	600	16	20	0.84	8	250	250	5	7	1.01	125.5	46.6	172.1	5.88	24.01%	63.06%	12.93%	65.5	172.1	35.3	273	73.43%
58	800	650	16	22	0.85	8	250	250	5	8	1.09	138	52.3	190.3	6.								

74	900	550	16	22	0.89	8	250	250	5	8	1.04	138	50.6	188.6	6.09	23.09%	64.43%	12.48%	67.6	188.6	36.5	293	86.00%
75	900	600	16	22	0.82	8	250	250	5	8	1.13	138	52.8	190.8	6.3	24.38%	63.12%	12.50%	73.7	190.8	37.8	302	92.15%
76	900	650	16	24	0.82	8	250	250	6	8	1.23	150.6	60.2	210.8	6.51	24.22%	63.94%	11.85%	79.9	210.8	39.1	330	109.56%
77	900	700	16	28	0.89	8	250	250	7	9	1.32	175.7	71.6	247.3	6.72	23.02%	66.19%	10.79%	86	247.3	40.3	374	137.43%
78	900	750	16	28	0.83	8	250	250	7	9	1.42	175.7	74.2	249.9	6.93	24.02%	65.14%	10.84%	92.1	249.9	41.6	384	143.76%
79	900	800	16	30	0.84	8	250	250	8	9	1.51	188.2	81.8	270	7.14	23.90%	65.68%	10.42%	98.3	270	42.8	411	161.29%
80	900	850	16	32	0.84	8	250	250	8	10	1.61	200.8	89.2	290	7.35	23.81%	66.13%	10.06%	104.4	290	44.1	439	178.69%
81	900	900	16	34	0.84	8	250	250	9	10	1.7	213.3	97.2	310.5	7.56	23.71%	66.57%	9.73%	110.6	310.5	45.4	466	196.40%