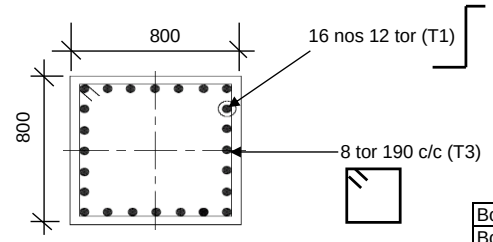
BEFORE CASTING THE FOUNDATION VERIFY THE DIMENSIONS OF THE FOUNDATION BOLT (DIA.& QTY.) AND ANCHOR PLATE (PCD) WITH RESPECT TO THE DIMENSIONS MENTIONED IN THIS DRG.

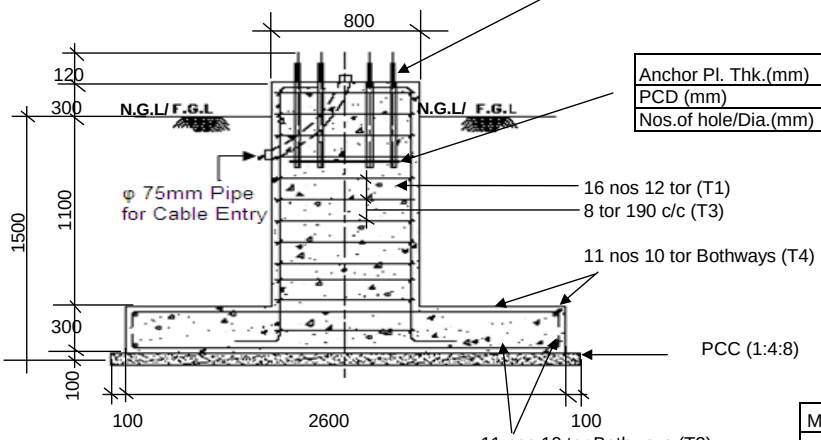
FOUNDATION LOADINGS		
WIND SPEED	(M/SEC)	50.0
BENDING MOMENT	(T-M)	5.87
HORIZONTAL SHEAR	(T)	0.78
VERTICAL LOAD	(T)	0.66
MAX GR BEARING PRESSURE	(T/M^2)	5.23
SAFETY FACTOR AGAINST OVERTURNING		2.25
CONCRETE MIX VIBRATED		M-20
MIN COVER	(MM)	50
STEEL		Fe-500
SOIL BEARING CAPACITY	(T/M^2)	40.79
GROUND WATER TABLE		1.5m



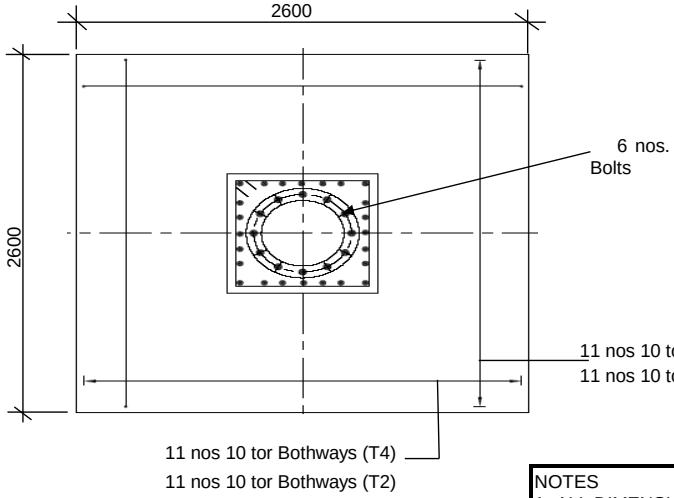
DETAIL OF PEDESTAL

Bolt Nos.	=	6
Bolt Dia.	=	24 mm
Length	=	850 mm

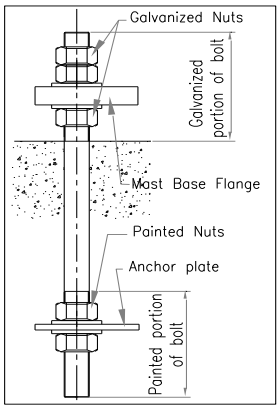
Anchor Pl. Thk.(mm)	=	6 mm
PCD (mm)	=	445 mm
Nos.of hole/Dia.(mm)	=	6 / 30



SECTIONAL ELEVATION



SECTIONAL PLAN



BAR BENDING SCHEDULE

MK	QTY	SIZE	LENGTH	SHAPE
T1	16	⌀ 12	1995	1575, 100, 320
T2	22	⌀ 10	2700	100, 2500
T3	9	⌀ 8	2992	700, 700
T4	22	⌀ 10	2700	100, 2500

QUANTITIES

RCC (M^3)	PCC (M^3)	STEEL (kg)
2.92	0.78	117.96

NOTES
1- ALL DIMENSIONS ARE IN MM. DO NOT SCALE THE DRAWING
2- MIN. LAP LENGTH OF BARS SHALL BE 50xD. UNLESS OTHERWISE STATED.
3- WE RECOMMANDED THAT MAST FLANGE REMAIN UNGROUTED
4- IF GROUTING IS CARRIED OUT IT IS ESSENTIAL TO LEAVE A MINIMUM OF 4 NOS 25MM DIA DUCTS EQUALLY SPACED AROUND THE FLANGE TO ALLOW DRAINGE AND VENTILATION
5- BARS DRAWN IN THE DRAWING ARE FOR ILLUSTRATION ONLY. REFER TO THE NUMBERS SHOWN FOR ACTUAL REINFORCEMENT QUANTITY.

REV	DESCRIPTION	DATE

DATE	12/1/24	**TITLE: General Arrangement Foundation Drawing for 16m High Mast**		**Sheet No.**	**Rev.**
DRN BY	AUTO			01 of 01	0
DSGD BY		**M/S- PLATEFORMES INDUSTRIELLES DU CONGO POINTE-NOIRE SAU**	**DRAWING NUMBER: -**		
CHKD BY			EX000621-16M_HM(250W_12F)_PLATEFORMES INDUSTRIELLES_R0_SK		
APPRD BY					
SCALE	NTS				

FOUNDATION DESIGN CALCULATIONS OF 16 M HIGH MAST
M/S- PLATEFORMES INDUSTRIELLES DU CONGO POINTE-NOIRE SAU
Republic of the Congo - Soil investigation Part 02 (20221223 - 20230201)

A. DESIGN PARAMETERS

1)	Soil Bearing Capacity	:	40.79 as per SBC report	T/m^2
2)	Ground Water Table	:	1.5m	
3)	Grade of concrete	:	M- 20	

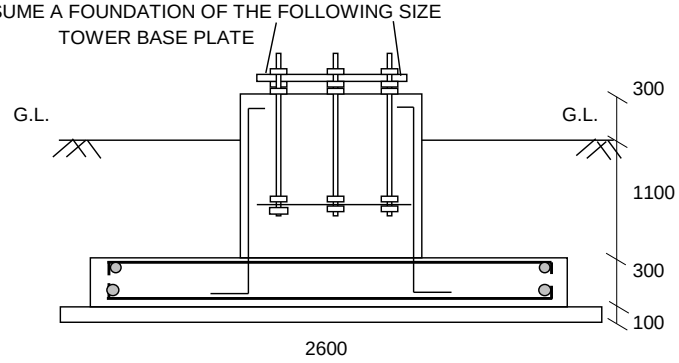
B LOADS AT BOTTOM OF MAST AS PER ULTIMATE LIMIT STATE

1)	Max.wind pressure (Wp) Wp = 0.06 x Vd x Vd	:	1349.76	N/m^2
2)	Total wind force on luminaire (Wfl) Wfl = Awt x Wp	:	1188.47	N
3)	Unit wind pressure at the top of the mast (Wt) = Sf x d x Wp	:	149.62	N/m.
4)	Unit wind pressure at the bottom of the mast (WB) = Sf x D x Wp	:	359.09	N/m.
5)	Net wind pressure on complete mast (Wnet) = ((Wt + Wb)/2) x Ht	:	4069.70	N
6)	Total horizontal force on complete mast	:	7.64	kN
7)	Over turning moment at base of the mast	:	73.04	kN-m

Thus various forces acting on the foundation are as follows

1)	Downward/ Vertical load of the mast system (Fv)	:	656.00 0.66	kg T
2)	Total horizontal force	:	778.56	kg
3)	Moment at the base of the foundation (73.04 + 7.64 * (1.4 + 0.3)) / 1.24 * 100	:	7045.25	kg-m

ASSUME A FOUNDATION OF THE FOLLOWING SIZE



Size of Pedestal (L1,B1)	=	0.80	m
Height of pedestal (H1)	=	1.40	m
Height of pedestal above ground level(h1)	=	0.30	m
Size of raft (L2,B2)	=	2.60	m
Thickness of raft (H2)	=	0.30	m
depth of foundation above PCC & below FGL	=	1.40	m

Check for Soil pressure

Density of Concrete	=	2.50	T/m^3
Weight of foundation (Wf)			
= Weight of pedestal + Weight of raft	=	7.31	T
Density of soil	=	1.65	T/m^3
		as per SBC report	
Weight of soil acting on raft (Ws)	=	11.11	T

Thus total vertical load acting on the soil below foundation is
F' v = Weight of system + weight of foundation + weight of soil

= Fv + Wf + Ws	=	19.07	T

The Design verification for safe bearing pressure as follows.

Section modulus Z	=	L2 x B2^2/6	
Z	=	2.93	m^3
Soil pressure	=	[(P / L 2X B2) +/- (M/Z)]	
Pmax	=	5.23	T/m^2
Pmin	=	0.42	T/m^2
e (M/P)	=	0.37	m
B 3(B2/2-e)	=	2.79	m
% of Foundation in contact with ground (Under submerged condtion)	=	95.20	%
	=	5.23	T/m^2
	<	40.79	**SAFE**

Check against overturning

Factor of safety = Restoring moment(due to D.L) / Over turningmoment

Restoring moment for 50 % of soil weight	=	F2 v x L2 /2 *0.9	
	=	15.82	T-m
Factor of safety	=	2.25	
	>	1.50	**SAFE**

Check against sliding

Sliding force	=	0.7786	T	
Coefficient of friction (tan 25)	=	0.466		
Frictional capacity	=	8.89	T	
Factor of safety	=	11.42		
		> 1.50		**SAFE**

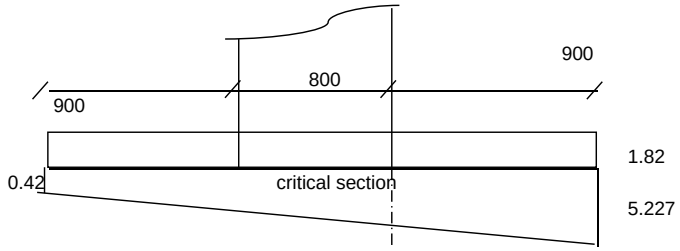
DESIGN OF PEDESTAL

Pedestal size	=	800X800	mm	
Check for L/D	=	1.88		
Design as Pedestal				
Load on pedestal -P	=	2.90	T	
Moment @ bottom of pedestal -M	=	8.536	T-m	
Assume Cover	=	50	mm	
Pu / fck bd	=	0.0036		
Mu / fck bd^2	=	0.0145		
d' /D Refer design aids of concrete, Chart 44	=	0.06		
p / fck	=	negligible		
pt (Provide a min of 0.15% steel.)	=	negligible	%	
Consider diameter of bar	=	12	mm	
Assume Pt	=	0.27	%	
Nos of Bar Required	=	16		
pt_{ACt}	=	0.3	%	
8 Tor Rings at c/c of	=	190	c/c	

Provide 16 tor 12 mm steel as longitudinal reinforcement & tor 8 mm ties @ 190 c/c.

Z of pedestal = 1/6 * B^3	=	8.5E+07	m^3	
Direct Stress Due to P (P/A) $s_{cc,cal}$	=	0.07	N/m^2	
s_{cc}		< 5		**SAFE**
Bending Stress due to M (M/Z) $s_{cbc,cal}$	=	1.500	N/m^2	
s_{cbc}		< 7		**SAFE**
Combined Stress ($s_{cc,cal}$ / s_{cc} + $s_{cbc,cal}$ / s_{cbc})	=	0.23	N/m^2	
		< 1		**SAFE**

DESIGN OF RAFT



SOIL PRESSURE DIAGRAM

Effective cantilever span	=	0.9	m
Soil Pressure @ critical section	=	3.56	T/m^2
Net Max. Cantilever moment @ bottom 3.56*0.9^2/2+0.5*(5.23-3.562)*0.9*0.9*2/3-1.82*0.9^2/2	=	1.16	T-m/m
Mu	=	17.35	kN-m/m
Assume Cover	=	50	mm
d 300-50-10/2	=	245	mm
Mu / bd^2	=	0.289	
Pt	=	0.087	%
Pt act	=	0.141	%
Ast/m (Provide Ptmin=0.12%)	=	294	mm^2
Consider diameter of bar	=	10	mm
Spacing of bars	=	250	mm

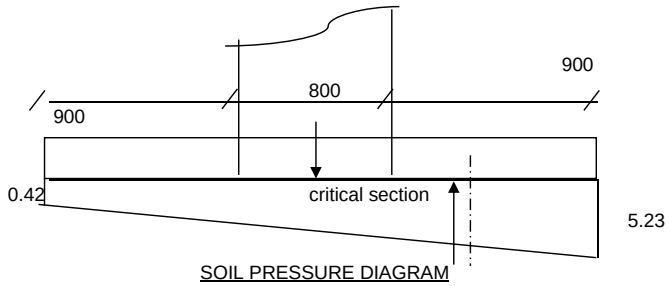
11 tor 10 bothways @ bottom

Soil Pressure from top	=	1.82	T/m^2
Max. Cantilever moment on top	=	0.37	T-m/m
Mu at top	=	5.51	kN-m/m
Mu / bd^2	=	0.092	
Pt	=	0.028	%
Pt act	=	0.141	%
Ast/m (Provide Ptmin=0.12%)	=	360	mm^2
Consider diameter of bar	=	10	mm
Spacing of bars	=	250	mm

11 tor 10 bothways @ top

CHECK FOR ONE WAY SHEAR

Critical section is at 'd ' from face of column.



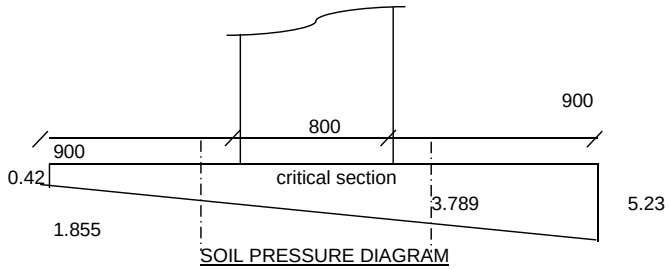
SOIL PRESSURE DIAGRAM

Distance of critical section for one way shear from edge	=	0.655	m
Soil Pressure at the critical section	=	4.01	T/m^2
Max. shear force	=	3.03	T/m
Factored shear force	=	45.40	kN/m
Shear stress	=	0.185	N/mm^2
b	=	16.464	
Permissible shear stress	=	0.280	N/mm^2

SAFE

CHECK FOR TWO WAY SHEAR

Critical section is at 'd/2 ' from face of column.



SOIL PRESSURE DIAGRAM

Distance of critical section for two way shear from edge	=	0.7775	m
Soil Pressure at the critical section	=	3.79	T/m^2
Max. shear force	=	15.99	T
Factored shear force	=	239.88	kN
B0	=	1045.00	mm
Shear stress	=	0.23	N/mm^2
Permissible shear stress	=	k s $\sqrt{Tc}$	
	=	0.25 x 20^0.5	
	=	1.12	N/mm^2

SAFE