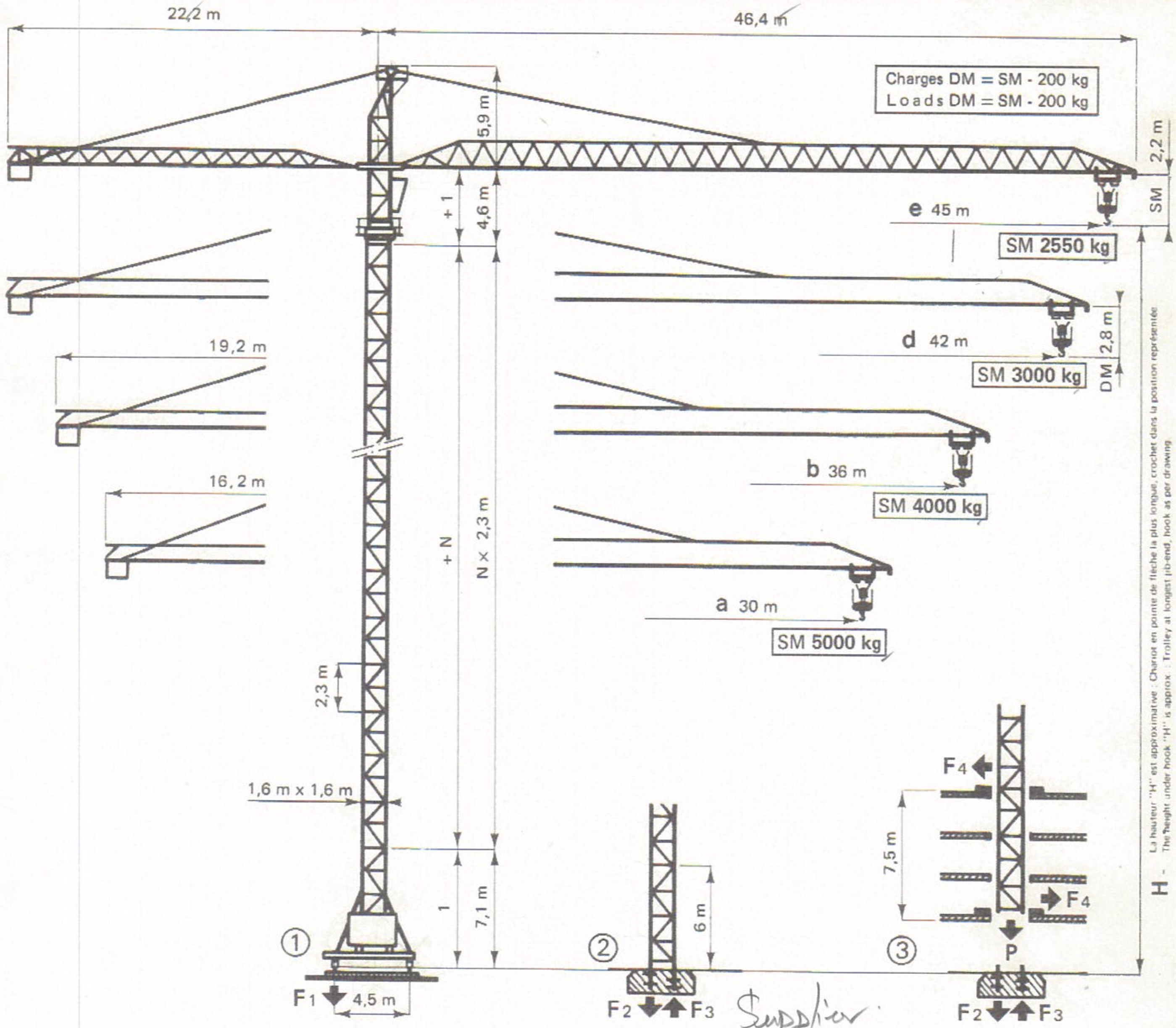
Potain 744 CS



① H 1 + 15 + 1

F1 ●	58 t
F1 ■	65 t

② H 1 + 14 + 1

F2 ■	97,6 t
F3 ■	76,9 t

③ H 1 + 6 + 1

F2 ●	62 t	F 4 ●	14 t
F3 ●	40 t	P ●	45 t

● En service - In service
■ Hors service - Out of service

LEVAGE - HOISTING					
Treuil / Hoist Winch / RCS 2A / 45 - 45 ch/hp				m/mn	kg
	SM	Low speed	1	0 → 30	5000
			2	0 → 40	4000
		High speed	1	0 → 60	2500
			2	0 → 80	2000
	DM	Low speed	1	0 → 15	10000
			2	0 → 20	8000
		High speed	1	0 → 30	5000
			2	0 → 40	4000

1 - Tambour - Drum 2 - Coquilles - Laggings
Grande vitesse - High speed
Petite vitesse - Low speed

H/DM = H/SM − 0,6 m

Pylône Mast	H/SM 1 (m)	H/SM 2 (m)	H/SM 3 (m)
1 + 0 + 1	9,5	8,4	8,4
1 + 2 + 1	14,1	13	13
1 + 4 + 1	18,7	17,6	17,6
1 + 6 + 1	23,3	22,2	22,2
1 + 8 + 1	27,9	26,8	26,8
1 + 10 + 1	32,5	31,4	31,4
1 + 12 + 1	37,1	36	36
1 + 14 + 1	41,7	40,6	
1 + 15 + 1	44	42,9	
1 + 16 + 1	46,3	45,2	

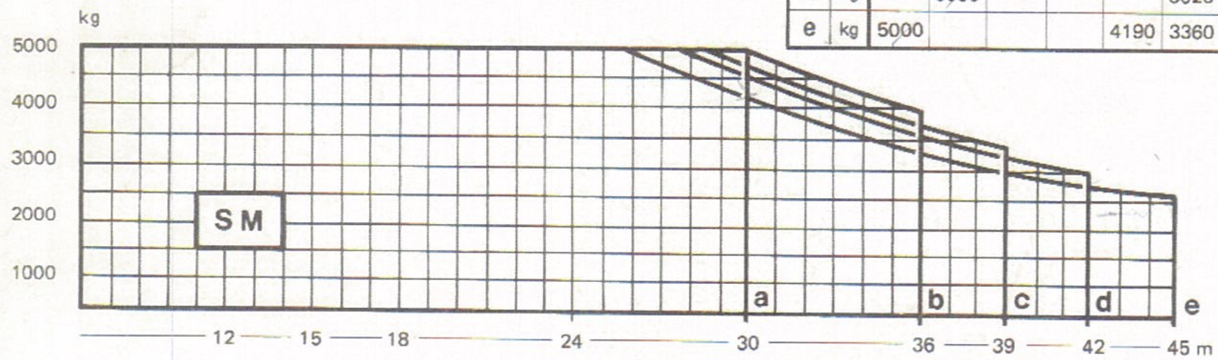
Ancrage / Anchorage (hatched cells)

744 CS

grue à tour
tower crane

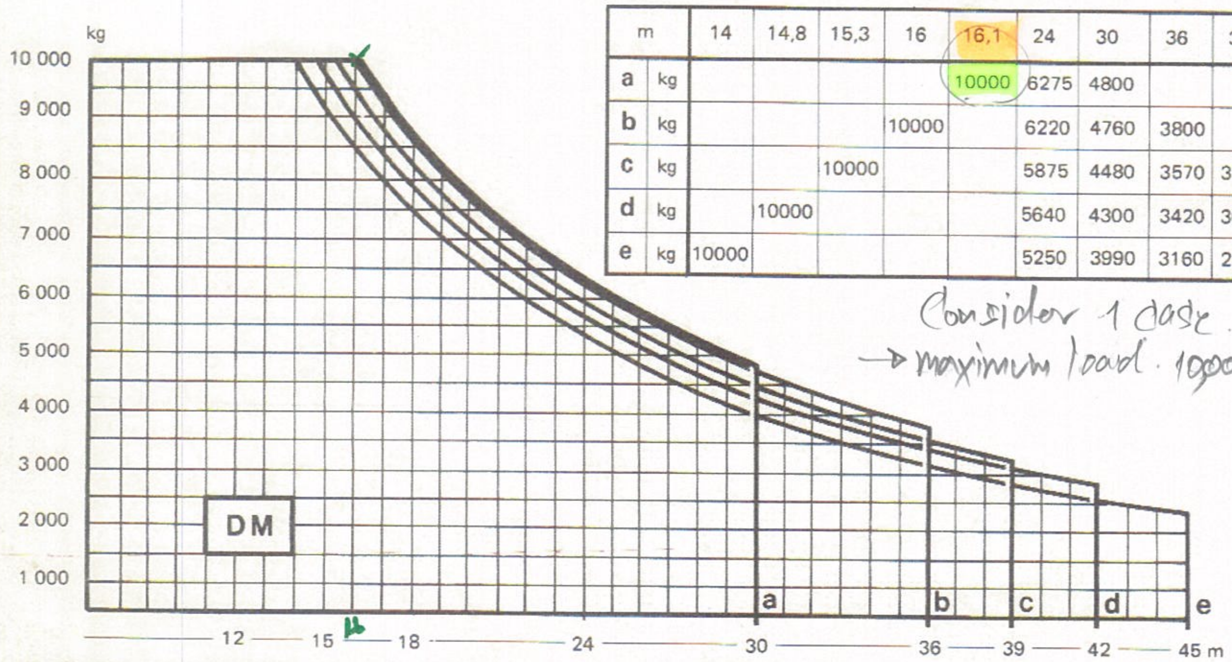
Consider 2 case.
→ maximum load 5000kg L= 30m
→ maximum Length = 45m Load = 2550 kg

m		25,8	27,4	28,2	29,8	30	36	39	42	45
a	kg					5000				
b	kg				5000		4000			
c	kg			5000			3770	3425		
d	kg		5000				3620	3285	3000	
e	kg	5000				4190	3360	3050	2780	2550



m		14	14,8	15,3	16	16,1	24	30	36	39	42	45
a	kg					10000	6275	4800				
b	kg				10000		6220	4760	3800			
c	kg			10000			5875	4480	3570	3225		
d	kg		10000				5640	4300	3420	3085	2800	
e	kg	10000					5250	3990	3160	2850	2580	2350

Consider 1 case.
→ maximum load. 10000 kg L= 16.1m.



Orientation Slewing	RCO	0 → 0,8 t/m n	2 x 6,5 ch hp	Puissance électrique nécessaire : 60 kVA Necessary electric power : 60 kVA
Chariot Jib-Trolley	- RCC2	0 → 60 m/m n	7 ch hp	Courant triphasé 380 V - 50 périodes Mains supply 380 V - 3 phases - 50 cycles
Translation Travelling	- RT	25 m/m n	2 x 5 ch hp	Poids de la grue sans lest : 48 t Weight of crane without ballast : 48 t

Le poids de la grue indiqué correspond au cas ① avec flèche et hauteur maxi
The weight of the crane is indicated for ① with longest jib and maxi height under hook.

Modifications réservées
Subject to modification

Potain

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Printed in France - Réf. 537 DZF 1

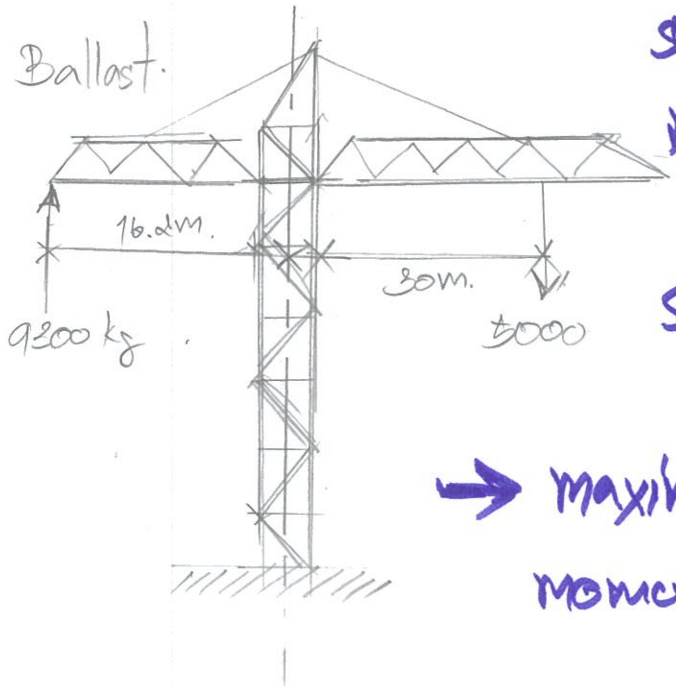
Remark: Selfweight 42 Ton

Potain. 744 CS.

SM (winche) 2 case.

→ maximum Load 5000 kg Length = 30 m.

Moment = 5000(30) = 150,000 kg-m.



SO: Ballast (weight)

$M = P(L)$

$P = \frac{M}{L} = \frac{150,000}{16.2} = 9300$ kg

Summary: USE Liveload = 5000 kg
Ballast = 9300 kg

→ maximum Length 45 m Load = 2550 kg

Moment = (2550)(45 m)
= 114,750 kg-m

SO: Ballast (weight)

$M = P(L)$

$P = \frac{M}{L} = \frac{114,750}{22.5\text{m.}} = 5100$ kg

Summary:

USE Liveload 2550 kg
Ballast = 5100 kg

DM (winche) 1 case.

→ maximum load 10000 kg Length = 16.1 m.

Moment = (10000)(16.1) = 161,000 kg-m.

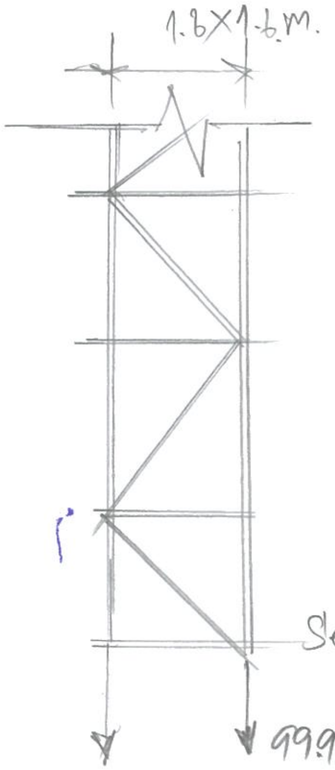
SO: Ballast (weight)

$P = \frac{M}{L} = \frac{161000}{8.5} = 18900$ kg

Summary:

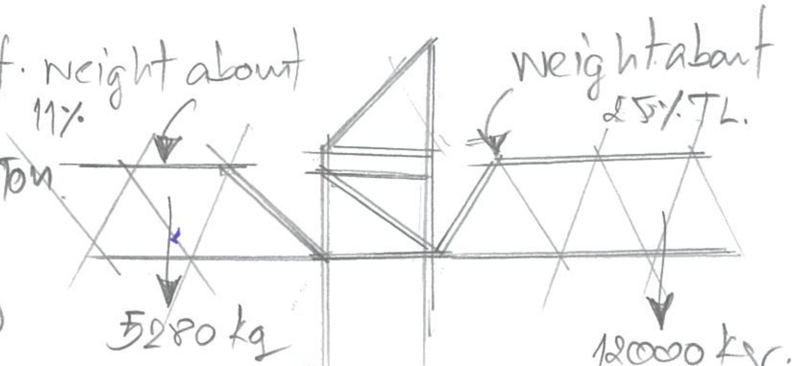
USE Liveload = 10000 kg
Ballast = 18900 kg

} Control.



weight ⇒ 10,000 + 18900. + 48000

⇒ 76,900 kg (76.9 Ton)



Out of service Moment (ใช้ตุ้มถ่วงหน้าไม่ได้ใช้งาน)

$M_{p\,Ballast} = -18900(8.5) = -160,650$ kg-m

$M_{p\,self} = -5280\left(\frac{8.5}{2}\right) = -22440$ kg-m.

$M_{p\,self} = 12000(8.05) = 96,600$ kg-m.

$\} -86,490$ kg-m

In Service Moment

$M = PL = 10,000(16.1) = 161000$ kg-m — $M = 161000 - 86490$

$= 74$ T-m.

Add Impact load 30% $= 1.3 \times 76.9$ Ton.

$= 99.97$ Ton (about)

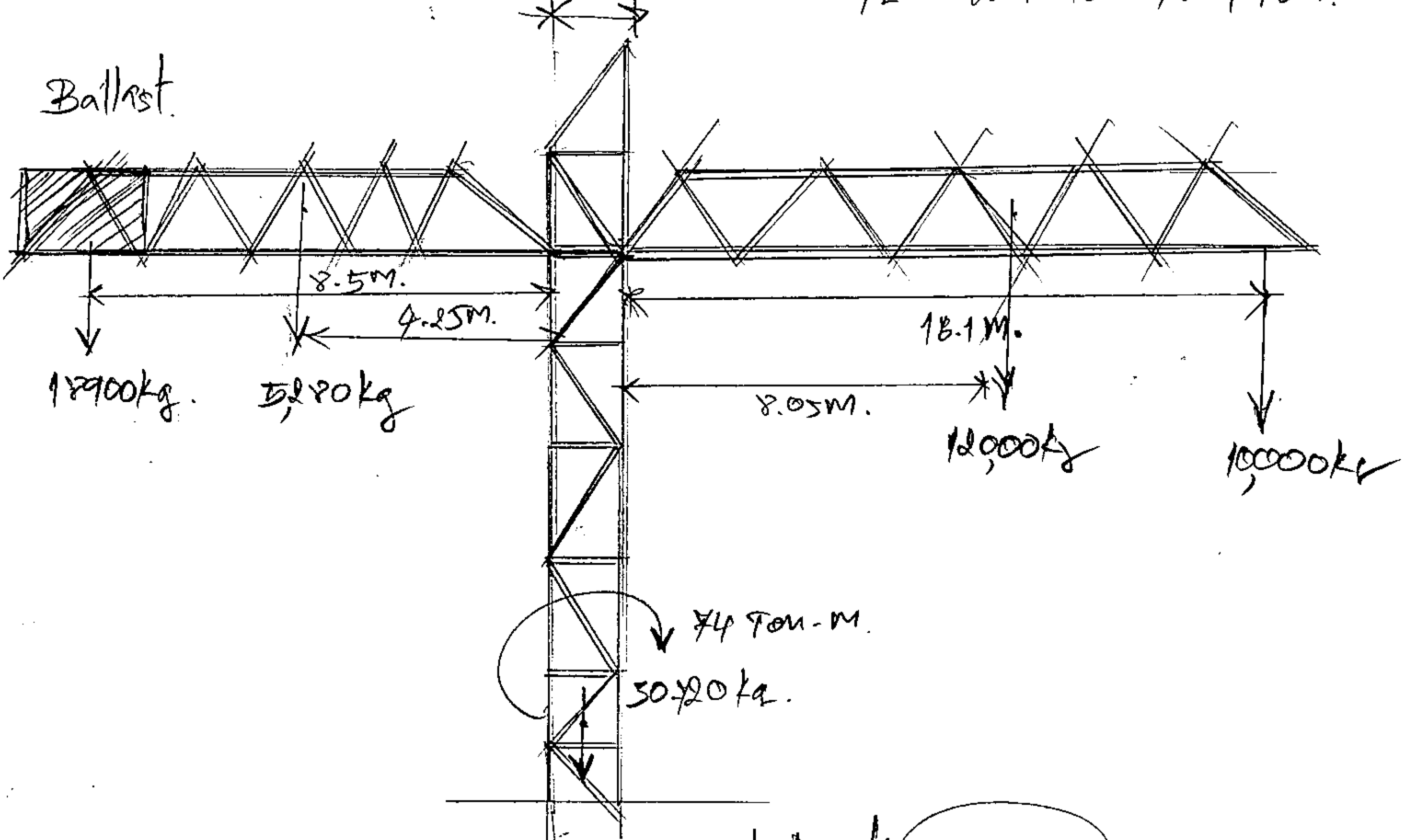
Potain. 744OS.

DM(winche) case 1.

DL = 48 Ton (selfweight)
= 18.9 Ton (Ballast)
= 66.9 Ton.

LL = 10 Ton x Impact load 30%
= 13 Ton.

TL = 66.9 + 10 = 76.9 Ton.



Reaction. 76.9 Ton.
(10000 + 18900 + 48000).

Reaction (Impact load 30%)
1.3 x 76.9 = 99.97 Ton.

Moment = 161000 - 86490
= 74 Ton-M.

<u>Summary</u>:
USE Reaction (Impact) 99.9 Ton.
Moment 74 Ton-M.

#

ANALYSIS AND DESIGN OF PILE FOOTING (SDM)

Project :		***Footing No. :***	***F Square***
Building :	***TOWER CRANE***	***Location :***	***TOWER CRANE***
By :	***Mr. KITTIKUN P.***	***Date :***	

					Rounded		Deformed		
A.	**Material Properties**				Rounded		Deformed		
Step 1	Ultimate Compressive Strength (fc')			:			240	ksc	
	Steel Grade (SD-xx or SR-xx)			:	SR-24		SD-40	ksc	
	Yield Strength ,fy			:	2,400		4,000	ksc	
	β_1			:			0.85		
	ρ_b	:	$\beta_1\left(\frac{0.85(fc'}{f_y}\cdot\frac{6120}{6120+f_y}\right)$	:			0.0262		
	ρ_{max}	:	$0.75\rho_b$	:			0.0197		
	ρ_{min}			:			0.00350		
B.	**Estimate Size of Footing**	MD -86490 ML	161000 kg.m		M 74510	Mu	136514	kg.m	
Step 2	Column Load	DL 86970 LL	13000 kg	:		DL+LL	99970	kg	
	Total Load (include assume footing & Soil.) 10-30 %		P	:	30 %	P	129961	kg	
	Use Pile Type - Capacity	:	SPUN PILE 0.3 x 0.3 x 19.00 m.	:	112000 kg/pile	Safe Load	56000	kg/pile	
	No. of Pile Requied - No. of Pile Used			:	Req'd 3.0	Used	4	pile	
	Pile Size	Width : 0.30 m.	Length	:			0.30	m.	
	Column Size	Width (a) : 1.50 m.	Length(b)	:			1.50	m.	
	Footing Size	Width : 4.00 m.	Length	:			4.00	m.	
	Ultimate Load		Pu = 1.4DL+1.6LL	:		Pu	142558	kg	
	Actual Pile Load			:		Qu	58392	kg	OK
Step 3	Number of pile Line 1 or A			:			2	Nos	
	Resistance from Pile (Shear)			:		V4 , V5	116784	kg	
	Moment of Footing			:		M4 ,M5	8758775	kg.cm	
	Maximun Thickness Footing (ρmin Control)		Ru = ρ.fy (1-0.59ρ.fy/fc')	:			13.52	ksc.	
	Effective Depth			:		$d=\sqrt{\frac{M_{4or5}}{\phi.Ru.B}}$	42	cm.	
	Minimun Thickness Footing (ρmax Control)		Ru = ρ.fy (1-0.59ρ.fy/fc')	:			63.44	ksc.	
	Effective Depth			:		$d=\sqrt{\frac{M_{4or5}}{\phi.Ru.B}}$	20	cm.	
	Thinkness Footing			:	T = **20**	to	**42**	cm.	
	Use Thinkness (Recommended lass thane 40 cm. for Pile footing)			:		Used	130	cm.	
Step 4	Punching Shear @ Distance d/2 around Edge of Column								
	Effective Depth Section			:		d	121.5	cm.	
	Line Critical of Punching Shear			:		d/2	60.75	cm.	
	Dp(Pile Size)		30 cm.	:	- Dp/2 -15	Dp/2	15.0	cm.	
	Pile 2B	No. 0 :	Center line Pile to Line Critical (X)	:		X	-75.75	cm.	
	Load Resistanc	:		:		q_1	0.0	kg	
	Pile 1A , 1C , 3A , 3C	No. 4	Center line Pile to Line Critical (X)	:		X	20.15	cm.	
	Load Resistanc	:		:		q_1	233567	kg	
	Pile 1B , 2A , 2C , 3B	No. 0	Center line Pile to Line Critical (X)	:		X	14.25	cm.	
	Load Resistanc	:		:		q_1	0	kg	
	V_p Punching Shear	:	$V_P=\sum_{q1}$	:		v_P	233567	kg	
	b_o	:	2(a+d)+2(b+d)	:			1086.0	cm.	
	B_c	:	B_c = b/a	:		B_c	1.0		
	α	:	Case 3	:		α	40.0		
	Allowable Shear force ;Vc	:	Case 3	:		Vc	2166794	kg	
				:	Minimun Control ; Vc		2166794	kg	
	ΦVc	:		:		ΦVc	1841775	kg	OK
Step 5	Beam Shear @ Distance d from Edge of Column								
	Effective Depth Section			:		d	121.5	cm.	
	Line Critical of Punching Shear			:		d	121.5	cm.	
	Dp(Pile Size)		30 cm.	:	- Dp/2 -1500	Dp/2	15.0	cm.	
	Pile 2A , 2B , 2C	No. 0 :	0 Center line Pile to Line Critical (X)	:		X	-196.5	cm.	
	Load Resistanc	:		:		q_1	0.0	kg	
	Pile 1A , 1B , 1C	No. 2 :	0 Center line Pile to Line Critical (X)	:		X	-46.5	cm.	
	Load Resistanc	:	V =	:		q_1	-122623	kg	

ANALYSIS AND DESIGN OF PILE FOOTING (SDM)

Project :		***Footing No. :***	***F Square***
Building :	***TOWER CRANE***	***Location :***	***TOWER CRANE***
By :	***Mr. KITTIKUN P.***	***Date :***	

	V_b Beam Shear	:	$v_b = \sum_{q1}$	:	V_b	-122623	kg	
	Allowable Shear force ;Vc	:	$Vc = 0.53\sqrt{fc'}.B.d$	:	Vc	399041	kg	
	ΦVc	:		:	ΦVc	339185	kg	OK
Step 6	Check Capacity of Pile							
	P (DL+LL)		$q = \frac{P+W_f+W_p+W_s}{N_p}$	:	P	99970.0	kg	
	$W_{footing}$	:		:	$W_{footing}$	49920.0	kg	
	$W_{pedestal}$	:	H 0.8 m.	:	$W_{pedestal}$	4320.0	kg	
	Wsoil	:	ϒ 1690 kg/m3	:	Wsoil	18590.0	kg	
	Load Resistanc of pile	:	$q = \frac{P+W_f+W_p+W_s}{N_p} + \frac{Md_x}{\sum d_x^2} \le q_a$	:	q	**55618.3**	kg	OK
D.	**Determine Reinforcement**							
Step 7	Ru	:	$Ru = \frac{M_u}{\phi b d^2}$	:	Ru	1.65	ksc	
	ρ	:	$\rho = \frac{0.85fc'}{f_y}\left[1-\sqrt{1-\frac{2R_u}{0.85fc'}}\right]$	:	ρ	**0.00041**		
	Main Steel (Long Side), A_{SL}	:	As = 1.33ρbd	:	A_{SL}	26.74	sq.cm.	
	Temp Steel (Short Side), A_{SS}	:	(0.0020 or 0.0018)bt	:		93.60	sq.cm.	

Steel Rebar	As,req cm^2	DB12		DB16		DB20		DB25		DB28		DB32	
		No.	As	No.	As	No.	As	No.	As	No.	As	No.	As
Main Steel, A_{SL}	26.74	24	27.12	14	28.14	9	28.26	6	29.46	5	30.75	4	32.2
Temp Steel, A_{SS}	93.60	83	93.79	47	94.47	30	94.2	20	98.2	16	98.4	12	96.5
l_{db} (Theory)	$l_{db} = 0.06A_b\frac{f_y}{\sqrt{fc'}}$	14		31		49		76		95		125	
ldb (Actually)	$l_{db} = \frac{L}{2}-\frac{a}{2}-0.075$	118		117.5		118		118		118		118	
Status		OK		OK		OK		OK		OK		Reduce.Rebar	

Dowel bar			at	Case	2	A_1	900	sq.cm.					
$As_{,req}$ = 0.005A_1	=	4.5	sq.cm.	Used Db	25	As/pcs	6.16	sq.cm.					
				no.	8	$A_{s,use}$	49.28	sq.cm.	OK				
				l_{db} =	20.00	cm.	l_{brace} =	70	cm.	l_c =	30	cm.	L_{total} = 120.00 cm.