# 2.1 Asin Pumping Station2.1.5 Structural Calculation of Pumping Station

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2.	Desig	n Criteria				
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2.2	Loads			en e		
2.3	Cases	of Analysis				
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3.	Stabil	ity Analysis		n an tha		
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.2	Weigh	nt of Machine and Othe	er Structures			
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3.7	Earth	Pressure				
5.8	Seism	ic Force			· · ·	
3.9	Total I	Forces				
3.10	Pile F	oundation Analysis				
3.11	Safety	Against Buoyancy		$\frac{1}{4t} = \frac{1}{2t^2} = \frac{1}{$	n in the State of th	
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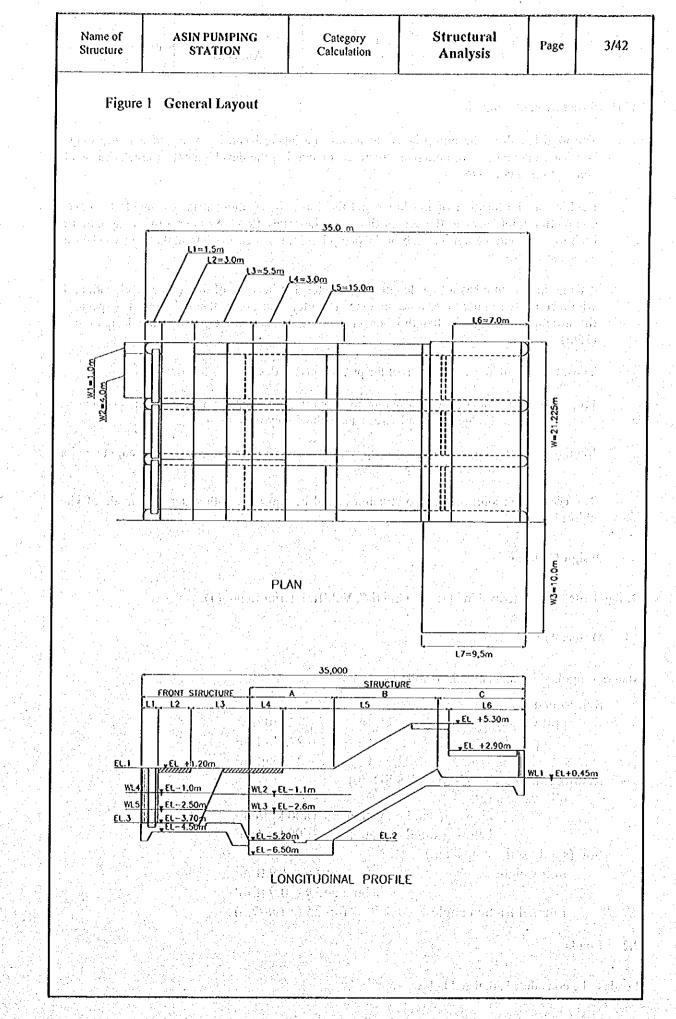
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	Genera	l Layout			e"	
he d g.1.	limensio	n of pump house is deter	mined by layout of	machine. The genera	l layout	is shown in
(I)	Up/do	wn stream direction			, Den solo	- 1.
		ace for stop log			d de l	
	L2: spa	ace for inspection road fo	r stop log			
		ace for screen belt convey				
- 14 - 14	1.1.1.1.1.1.1					
		ace for inspection road for	r screw and gates		در در در در در در	
	L5: spa	ace for screw				
	L6: spa	ace for gear and engine				
	L7: spa	ace for pump control build	ding			
2)		water level				
	11 - E.,	design high water level Se	emarang River Side			
		design high water level be		a gata serena da Santa		
i endi Tele		lesign low water level bel			a de la composición d	
	WL4: c	lesign high water in the p	ump pond			
	WL5: d	lesign low water level in t	the pump pond			
3)	Design	structure elevation				
	EL1: pi	umping station ground lev	/el			
	EL2: pi	amp pond bottom elevatio	n	에 있는 것 같이 있다. - 기억에 가장 같은 것은 것		
	4 1 2 E S	creen bottom elevation		가난 이 전체 등의. 기간 1월 16일 1일		
n.					era Bec	
I)		eft bank direction ace for inspection road				
	W2: spa	ace for screw/engine syste	em			

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#### (5) Structure configuration

The total length of the pump house including the intake basin is 35 m and it is too long to construct in one piece of concrete structure, considering the development of cracks caused by contraction of concrete.

Looking at the location of machines and the force distribution, it is reasonable to make a contraction joint between the screen floor and the screw floor. As the screw is supported by both top slab and the bottom slab of the pump house, it is necessary to make the two slabs act as one structure.

This main structure has a total length of 25 meter, but because of difference of elevation, the whole concrete can not be cast at one time. Therefore, no excess thermal stress is expected in the structure, although the length is longer than the standard value stated in the design criteria (15m).

Thus, the structural configuration of the pump house is designed as follows;

Front Structure: independent structure to support the weight of intake basin, maintenance bridge No.2 and screen and belt conveyor (in future).

Main Structure: single structure to support the weight of screw, gear system engine and all the building load.

The contraction joint of the two structures shall be equipped with water stop made of vinyl chloride

#### 2. Design Criteria

Design Criteria is described in "Design Criteria", Vol.III, Interim Report(4).

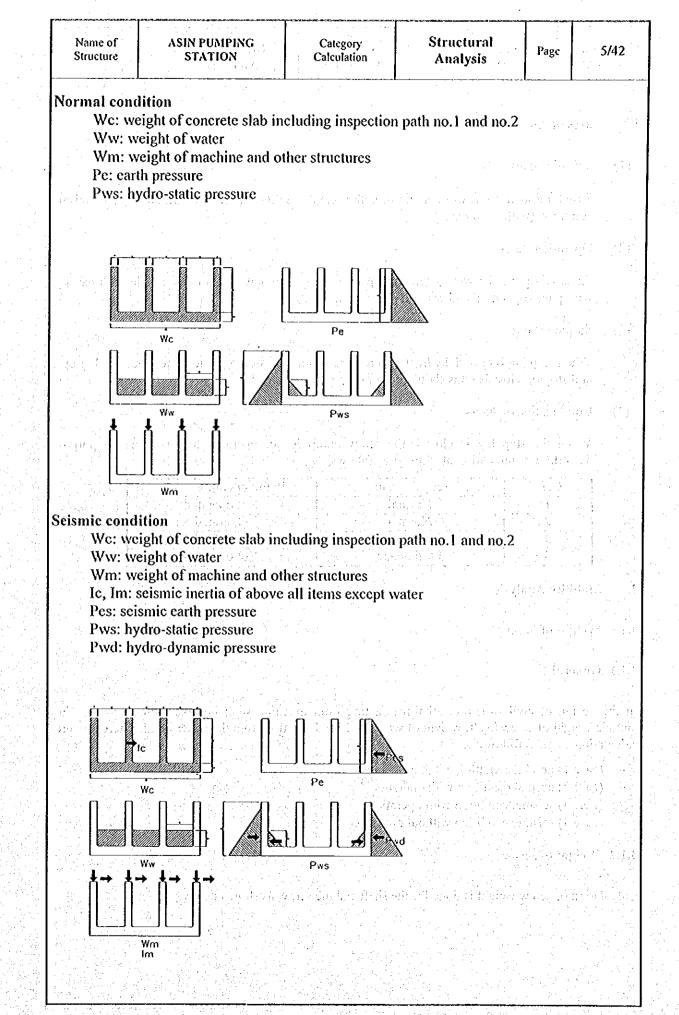
#### 2.1 Materials

Materials applied in calculation is as follows;

	Reinforced Concrete
	unit weight 2.50 m <sup>2</sup> /t
÷ .	compressive strength $C_1 = \sigma_{28} = 225 \text{ kgf/m}^2$
	$C_2 = \sigma_{28} = 225 \text{ kgf/m}^2$
- I	Reinforcing Bar (SII U-30 or JIS SD-30) allowable stress
÷ 1	above ground elevation : 1800 kgf/cm <sup>2</sup>
	below ground elevation : 1600 kgf/cm <sup>2</sup>
- 5	Soil (sandy soil, compacted)
1. T	unit weight wet $\gamma = 1.9$ tf/m <sup>3</sup>
•	submerged $\gamma = 0.9$ tf/m <sup>3</sup>
	internal friction angle $\phi = 25.6^{\circ}$ (N=7.5)

2.2 Loads

Loads to be considered are listed below.



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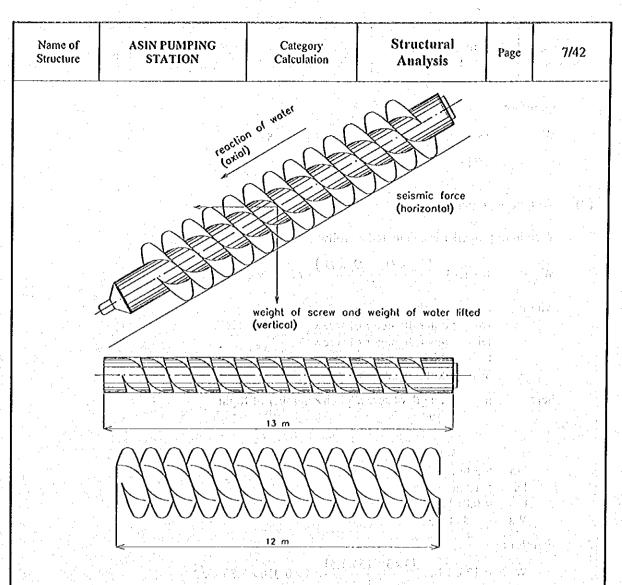
Stri	me of ucture		PUMPING FATION	Category Calculation	Catculation       Analysis       Page       6/42         in both normal condition (without earthquake) and seismic       in both normal condition (without earthquake) and seismic       in both normal condition (without earthquake) and seismic         is dynamic force, the analysis is to be made in both cases of pump operation.       in both stoplog. Therefore, both stoplog-open e considered.         ic pressure acts on the stoplog. Therefore, both stoplog-open e considered.       in both stoplog. Therefore, both stoplog-open e considered.         ie screw pump is not operated for maintenance purpose. as follows;       in Operated in Operated in Operated in the stoplog operated is the operated i		
2.3	Cases o	f Analysis	i Line I.e., 194				Later ( of general) <sup>a</sup>
(1)	Seism	ic status			日本日本 一本会員長・「日本時 14月1日		
	Structu condit	ural analy: ion (with e	sis is to be mac earthquake).	te in both normal co	ondition (without eart	hquake)	and seismi
(2)	Орега	tion status					· · ·
	Since with p	an operate ump opera	d screw genera ition and withou	tes dynamic force, t it pump operation.	he analysis is to be m	nade in l	both cases o
(3)	Stoplo	g status		an an taon ann an Aonaichtean an A Ann an Aonaichtean an An Aonaichtean an Aonai			
	When and sto	stop log is oplog-clos	closed, hydros ed status should	tatic pressure acts on be considered.	the stoplog. Therefor	e, both :	stoplog-ope
(4)	Combi	ination of	status				
	When	the stop	log is closed,	the screw pump is	not operated for m	aintenar	ice purpose
1.1.1.1	Incici	ore, como	manon of status	is as ionows,			
		lase	Seismic	<u>a de la constante de la constante</u>	Pump operation statu	IS	
		lase	Seismic Non	status mal		IS	
		Case	Seismic Noп Non	status mal mal	Not operated Operated		
	C	Case 1 2 3	Seismic Non Non Earthc	status mal mal juake	Not operated Operated Operated	tan () Maradi Maradi	
	C	Case 1 2 3	Seismic Noп Non	status mal mal juake	Not operated Operated Operated	tan () Maradi Maradi	
<b>3.</b>		Case 1 2 3	Seismic Norr Norr Earthc Earthc	status mal mal juake	Not operated Operated Operated Not operated		
	Stability	Case 1 2 3 4	Seismic Norr Norr Earthc Earthc	status mal mal juake	Not operated Operated Operated Not operated		
3.1	Stability	Case 1 2 3 4 y Analysis of Screw	Seismic Norr Norr Earthc Earthc	status mal mal juake	Not operated Operated Operated Not operated		
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3.1 3.1.1 In the includ calcula –	Stability Stability Weight General design e weight ation cass (case 1) 1 (case 2) 1	ase 1 2 3 4 y Analysis of Screw of Screw i of screw i es as follo normal con normal con	Seismic Non Non Eartho Eartho Eartho ructure, all for tself, weight of	e status mal mal juake juake juake ces acting from ma water lifted and reac operation eration	Not operated Operated Not operated	into ac	count. The

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# 3.1.2 Weight of screw

Calculation of screw weight is done for the shaft and the screw as shown below.

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(1) Weight of the shaft

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Weight of the shaft is calculated as follows;

$$W = 1 \times 3.14 \times \frac{(D_o + D_i)}{2} \times t \times W_s$$

where 1

 $d_{i}^{ii}$   $b_{i}$   $b_{i}^{ii}$   $d_{ij}$ 

Do ; outer diameter

Di ; inner diameter

t ; thickness of plate

ws ; unit weight of steel

; length of shaft

here for Asin Pumping station

1 = 13 m Do = 1.500 m Di = 1.490 m t = 0.012 m  $Ws = 7.85 t/m^{3}$ 

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Name of ASIN PUMPING Structural Category 8/42 Page Structure STATION Calculation Analysis therefore  $1 \times 3.14 \times \frac{(1.500 + 1.488)}{2} \times 0.0012 \times 7.85$ W = 5.74 t = (2) Weight of propeller Weight of propeller is calculated as follws;  $n \times 3.14 \times \frac{(D_o \times D_o - D_i \times D_i)}{4} \times t \times W_S \times \sqrt{2}$ W where : number of screw n Do : outer diameter of screw Di : inner diameter of screw : thickness of plate t ₩s : unit weight of steel here = length of screw/pitch×number of flight n  $=\frac{12}{3}\times3$ = 12Do = 3.0m Di = 1.5m t = 0.010m Ws = 7.85 t/m3 therefore  $= 12 \times 3.14 \times \frac{(3 \times 3 - 15 \times 1.5)}{4} \times 4 \times 0.010 \times 7.85 \times \sqrt{2}$ W  $= 4.99 \times \sqrt{2}$ = 7.06 (3) Total weight of screw Total weight of screw = weight of shaft + weight of propeller = 5.74+7.06 = 12.80By adding 10% for other parts total weight of screw system =  $12.80 \times 1.1 = 14.1$  t The direction of the force is vertical and it is divided into axial and radial components. Axial component Ξ 14.1 × SIN 30° =\_\_\_` 7.05 t Radial component = 14.1 × COS 30° 12.21 t 3.1.3 Weight of water lifted The weight of water lifted is calculated as follows;  $= 12 \times 3.14 \times \frac{(3 \times 3 - 15 \times 1.5)}{4} \times 4 \times 0.010 \times 7.85 \times \sqrt{2}$ = 4.99 \times \sqrt{2} Ŵ = 7.06

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Name of	ASIN PUMPING	Category	Structural	Page	9/42
Structure	STATION	Calculation	Analysis	I ago	742
where		na sense da la companya da la compa Na companya da la comp			
	W : weight of wate	er lifted (t)		la, to, e e	in an
2	l : length of shaft	(m)	14 12		n Anna anna
	Dp : diameter of pro	opeller (m)			
· · ·	Ds : diameter of sha	aft (m)	$\sum_{i=1}^{n} \left( \left  p_{i}^{i} \right _{i=1}^{n} + \frac{1}{2} \left  \frac{1}{2} \right _{i=1}^{n} \left  p_{i}^{i} \right _{i=1}^{n} \right)$		· · · · · · · · · · · · · · · · · · ·
	Ww : unit weight of	water (t/m³)		al travel St	eratoria Altaria
	$W = 12 \times 3.14 \times \frac{1}{2}$	$\times \frac{(1.5 \times 1.5 - 0.75 \times 0.000)}{4}$	75) ×W.,	ng shagar S	
	= 7.948 t	4		+ 1, 1 to;	
n an	divided into axial compor	A south of the second sec			
· · · ·	· · · · · · · · · · · · · · · · · · ·	and the growth of the		1>	
a di seren dese			ipported by the propel		
Radial	component = 7.948	$\times \text{COS30}^{\circ} = 6.$	88t (supported by the	concrete	bed)
3.1.4 Reactio	n of water lifted				·
Ang Sarang			1977 – Battine Grand Jenne Stationer († 1978)		
The reaction o	f water lifter is calculated	as follows;		a An Artana	
	$Fr = Q \times v \times W_w$				
		1.0.140		- 1911 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 111 - 11	le an seo-
where	Fr : reaction of wate Q : discharge	r lifted (t) (m <sup>3</sup> /s)			
	v : velocity of wate	r (m/s)	na Na sa kata taba sa		
	W <sub>w</sub> : unit mass of wal	er (t/m <sup>3</sup> )	n se an a la fil de la sette se La	548-87 1	
here Q=3 i	n <sup>3</sup> /s				and a
	v = Q/A	re o jazzli gara dite. Na		. :	
	A = section area of	the second se			
	$= 1/2 \times 3.14 \times (1.5)$ = 2.649 m <sup>2</sup>	'-0.75')			
	= 2.049  m = 3/2.649=1.13m/	/s			
	$Ww = 1.0 t/m^3$			i Seto to s	n de la composition d La composition de la c
herefore					· · · ·
	$Fr = 3 \times 1.13 \times 1$				1.
	= 3.39 t			·	
The direction (	of the force is axial.	and a subscription of the second s Restaura second			an tai
3.1.5 Combin	nation of force			н н. Н	
an gun an					
	al condition without opera		an a		
weight o			= 7.05 ~ 8 t		
	radial comp	JOHENT	= 12.21 ~ 13 t	e de la ve La recurs	
(case-2) norma	al condition with operation	1			
weight o	of screw : axial comp	onent	= 7.05 t		
	radial comp		= 12.21 t		
waight	of water lifted	axial component	= 3.97t		

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Name of Structure	ASIN PUMPING STATION	Category Calculation	Structural Analysis	Page	10/42
		radial component	= 6.88t	- -	
reaction f	from water lifted	axial component	= 0	12	
		radial component	= 3.39 t		
combined	1 force	axial component	= 7.05+3.97+0= 11.0	$2 \sim 12t$	
· ·		radial component	= 12.21+6.88+3.39=	22.48 ~	23t
se-3) seismic	condition with operati	on .			•
weight of	screw	axial component	= 7.05 t		
		radial component	= 12.21 t		•
weight of	water lifted	axial component	= 3.97t	· ·	· ·
		radial component	= 6.88t	in table The second	
seismic fo	orce acting on the screw			a seguri de la	
	seismic force	(horizontal)= 14.08	weight)×0.11(seismic	coeffici	ent) =1.55 t
		axial component	$= 1.55 \times COS30^{\circ} = 1.$	34 t 🚎	n sin alfa
• • •		radial component	= 1.55 × SIN30°=0.7	8 t	
seismie fe	orce acting on water		alis da Alexandra da Alexandra. Maren alexandra da Alexandra da Alexandra	e Higg	
	seismic force	(horizontal) = 7.948	(weight)×0.11(seismic	coeffic	ient)=0.87t
		axial component	$= 0.87 \times \text{COS30}^\circ = 0$	).75 t 👘	
		radial component	$= 0.87 \times SIN30^{\circ} = 0.$	44 t 👘	По на С. на
reaction f	rom water lifted	axial component	= 0	i strani fiz Tiva en	an a
combined	1 <b>6</b> -	radial component	. <b>= 3.39 t</b> 1 and a state		
combined	Iorce	axial component	= 7.05+3.97+1.34+0.1		
		radial component	=12.21+6.88+0.78+0.	44+3.39	)=23.17~24t
e-4) seismic	condition without oper	ation			
weight of	screw	axial component	= 7.05 t		
		radial component	= 12.21 t		
seismic fo	orce acting on the screw		= 1.34 t		
		radial component	= 0.78 t		
combined	torce	axial component	= 7.05 + 1.34 = 8.39 t		
	and the second	radial component	= 12.21 + 0.78 = 12.9	0. 12.2	

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Name of Structure	ASIN PUMPING STATION	Category Calculation	Structural Analysis	Page	11/42
The con	clusion is		· _ ·		
110 000					
case(1)	normal without operatio	n axial force	= 8 t	e Al thursday	
1.		radial force	= 13 t		· · · ·
case(2) ı	normal with operation	axial force	= 12 t		
		radial force	= 23 t	· · · ·	
case(3) s	seismic with operation	axial force	= 14 t	1111	
		radial force	= 24 t		
case(4) s	eismic without operatio	maxial force	= 9 t		
		radial force	= 13 t	· · ·	

All cases and acting points are shown in Table - 1.

9)

In structural analysis of concrete slab, the axial forces shall be applied on both ends of the screw shaft as the full force, considering the uncertainty of force distribution. However, the radial forces shall be applied on both ends of the screw as the half of the force as it is certainly distributed evenly.

3.2 Weight of Machine and Other Structures

The location of machine and other structure is shown in Fig. 2.

The weight of machine and other structures are shown in Table - 2.

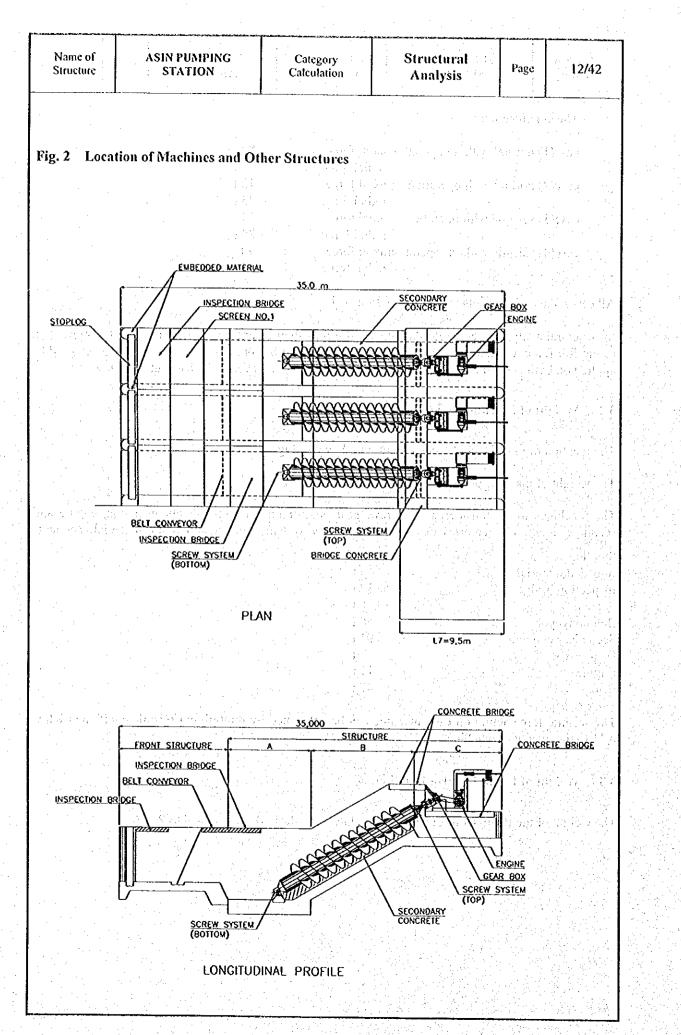
The machines to be considered are screw, gear box, engine and screen. For gear box, engine and screen, estimation by factories are adopted. For screen system, future installation is taken into account.

Stop log	3	t
Imbeded material	3	t
Inspection bridge	12	t
Screen	8	t
Belt conveyor	50	t
Secondary concrete	91 · · · · · · · · · · · · · · · · · · ·	t
Gear box	2	t
Engine	17	ŧ
Bridge	47	t

The seismic force acting on each machine can be calculated by multiplying seismic coefficient Kh = 0.11 to the weight of machine.

#### 3.3 Weight of Pump Control Building

The weight of the Pump Control Building (architectural design) is adssumed as 2.5 t/m<sup>2</sup>.



•	Nan Struc	ne of	Λ	SIN PUMI STATIO		Catego		<b></b>	Structu		Page	13/	/42
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			.136.199 ] .136.199 ] .136.199 ] .136.199 ]	274.800 274.800 274.800 824.399	216.002 216.002 216.002	435.814 435.814 435.814 435.814 1307,442	242.528 242.528	-242.52 -727.58	489.333 489.333 489.333 489.333 1468.000	x 147.79	147.790 147.790 443.370	298.186 298.186 298.186 894.558	
			113.38 113.38 113.38 113.38 113.38 113.38 113.38 113.38		ព ព ព ព ន ន ន ន ន ន ន	88888	13.38	· ·	522.88 522.88 522.88			8888	
			0000	0000	0000		00		0000			1.114075 1.114075 1.114075 3.342226	
, W				និននេង	2000 2000	6666	ន្តន្ត	39	33939	13 1.11	38 3.34		
m Screw		đ	N .	18 -9.63 18 -9.63 18 -9.63 53 -28.88	14 .15.96 14 .15.96 14 .15.96 14 .15.96	14 -15.96 14 -15.96 14 -15.96 42 -47.87	12 -17.39 12 -17.39	12 -17. 37 -52.	12 .17.39 12 .17.39 12 .17.39 37 .52.17	· 🚽	04 -10.13 04 -10.13 13 -30.38	04 10.13 04 10.13 04 10.13 13 30.38	
le from	0, 4,74	ition) F	7779	6.5 .10.18 6.5 .10.18 6.5 .10.18 30.53	1) 101 15 -16.14 15 -16.14 15 -16.14	11.5 -16.14 11.5 -16.14 11.5 -16.14 11.5 -16.14	condition) radio  12 -18.12 12 -18.12	12 ·18. 54.	12 -18.12 12 -18.12 12 -18.12 -54.37	condition) (a) Fx (5 11.0	.5 11.04 .5 11.04 .33.13	6.5 11.04 6.5 11.04 6.5 11.04 33.13	
Actin	۳ وي	operation condition)	0000 0000		axial radial 12 11.5 12 11.5 12 11.5	ដ្ឋស្ន		14	444	58		o o o o o o o	
Force	, , ,	operatic		1999 999	operation o av e-A no-1 e-A no-2 e-A no-3	100 100 100 100 100	00-1 00-1 00-1	og i i		ž	9.9	100	
-		without	1 structure-A no-1 1 structure-A no-2 1 structure-A no-3	ucture-C ucture-C ucture-C		n structure-C no-1 n structure-C no-2 n structure-C no-3	thquake with structure A r structure A r	ucture-A	structure-C no-1 structure-C no-2 structure-C no-3	e.A	i structure-A r i structure-A r	icture-C icture-C	
Table		(normal v	main stru main stru main stru total	main structure C no.1 main structure C no.2 main structure C no.2 total	(normal with main structu main structu main structu	main stru main stru main stru total	(earthquake with main structure A main structure.A	main stru total	main stru main stru main stru toto	(carthquake main structu	main stru main stru total	main structure-c no-z main structure-C no-2 main structure-C no-3 total	
Ľ		. <u></u>					с сс 11.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	<b>نبه بی</b> د ۲۰۰۰					at the

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Name of Structure	ASIN PU STAT			Category Calculation		Structura Analysis		Page	14/42
			<b>-</b>	······································	l		l	1	
Table - 2 Wei	2ht of Mac	hine and C	)ther St	ructures					
	n an			14010103					
name	tana Y₀:					· · ·			
nome		weight	X	Mx	actii Y	ng point			
front structure		·		111.4	y	Му	Ž	Mz	
stop log no.1		-3.00	1.15	-3.45	4.20	-12.60	3.00		9
stop log nó.2 stop log no.3		3.00	1.15	-3.45	4.20	-12.60	8.00	-2	
imbeded material r	in 1	-3.00 -3.00	1.15	-3.45	4.20	-12.60	13.00	-3	
imbeded material r		-3.00	1.15	·3.45 ·3.45	4.20 4.20	-12.60	3.00		9
imbeded material r	10.3	-3.00	1.15	-3.45	4.20	-12.60 -12.60	8.00 13.00	-2	
inspection bridge 1	0.1.1	-12.00	3.00	36.00	7.50	-90.00	3.00	-3	
inspection bridge (		-12.00	3.00	-36.00	7.50	-90.00	8.00	-9	
inspection bridge N	10.1-3	-12.00	3.00	-36.00	7.50	-90.00	13.00	-15	
screen no.1		8.00	6.50	-52.00	2.80	-22.40	3.00	-2	4
screen no.3		8.00	6.50	-52.00	2.80	-22.40	8.00	•6	
beltconbeyor		8.00 •56.00	6.50 9.25	-52.00 -518.00	2.80	-22.40	13.00	10	
total	n e ser en de la serie de La serie de la s	134.00	5.99	-802.70	7.70 6.30	-431.20 -844.00	8.00 8.00	44	
				002.70	0.50	-044.00	0.00	-107	4
main structure A			A State						n a j
inspection bridge N	10.2-1	-12.00	11.50	-138.00	7.50	-90.00	3.00	-3(	5 5 5 5 5
inspection bridge N	10.2.2	-12.00	11.50	-138.00	7.50	-90.00	8.00	-9(	
nspection bridge A screw system no. 1	10.2·3	-12.00	11.50	-138.00	7.50	-90.00	13.00	-150	
screw system no.2	(bottom)	-7.05 -7.05	13.38 13.38	-94.34	1.80	-12.69	3.00	21.1	
screw system no.3	(bottom)	7.05	13.38	·94.34 ·94.34	1.80 1.80	-12.69	8.00	-56.4	
lotal		-57.15	12.20	697.03	5.39	-12.69 -308.07	13.00	-91.6	
						000.07	0.00	-157.6	-
main structure B			i de la co		1.64				
secondary concret		-90.95	16.81	·1,528.48	6.21	-564.86	3.00	-272.8369	
secondary concrete secondary concrete	e 110.2 a no 3	·90.95 ·90.95	16.81	-1,528.48	6.21	-564.86	8.00	·727.5651	
pridge Cno.1	011010	6.50	16.81 25.35	-1,528.48 -164.79	6.21 11.55	-564.86	13.00	-1182.293	
bridge Cno.2		-6.50	25.35	-164.79	11.55	75.08	3.00 8.00	•19.5	
bridge-Cno.3		6.50	25.35	.164.79	11.55	-75.08	13.00	·52 ·84.5	
otal		-292.34	17.38	-5079.79	6.57	-1919.82	8.00	-2338.70	
nain structure C									
crew system no1.	(ton)	-7.05	27.00	100.25	0.00		• • •		· · ·
crew system no.2		-7.05	27.00	-190.35 -190.35	9.66 9.66	68.12	3.00	21.15	
crew system no3.		7.05	27.00	-190.35	9.66	68.12 68.12	8.00 13.00	·56.4	
gear box no.1		2	29.10	-58.20	10.44	20.87	3.00	-91.65 -6	
gear box no.2		2	29.10	-58.20	10.44		: 8.00	-16	
ear box no.3		-2	29.10	-58.20	10.44	-20.87	13.00	-26	
engine no.1		•13	31.00	403.00	10.44	-135.68	j <b>3.00</b> .	-39	e e est
angine no.2		·13 ·13	31.00	-403.00	10.44	-135.68	8.00	•104	
ridge-Cno,1-1		-10.00	31.00 27.50	-403.00 -275.00	10.44	-135.68	13.00	•169	
ridge Cno.2.1		10.00	27.50	-275.00	11.55 11.55		3.00	-30	
ridge Cno.3-1		10.00	27.50	-275.00	11.55	-115.50 -115.50	8.00 13.00	-80 -130	
ridge-Cno.2-2		31.63	31.50	.996.19	9.15	-289.37	3.00	-94.875	
oridge Cno.2-2		-31.63	31.50	·996.19	9.15	-289.37	8.00	-34.875	
oridge Cno.3.2		-31.63	31.50	·996.19	9.15	-289.37	13.00	411.125	
otal	化合成 化合金	-191.03	30.20	-5768.21	9.89	-1888.64	8.00	1528.20	

Novae II

3.1 Weight of Civil Structure         Weight of civil structure is calculated by dividing it into small parts as show in the figure below.         Table 3 shows the forces acting from civil structure.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Table 3 shows the forces acting from civil structure.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure below.         Image: structure is calculated by dividing it into small parts as show in the figure by dividit parts as show in the figure by d		Name of Structure	ASIN PUMPIN STATION		ategory leulation	Strue Anal		Page	15 15 15
Weight of civil structure is calculated by dividing it into small parts as show in the figure below. Table 3 shows the forces acting from civil structure.	3.4	Weight	of Civil Structure						en de La contraction
Table 3 shows the forces acting from civil structure.         Image: structure intervention interventintervention interventintervention intervention intervention interve	We	ight of civi	l structure is calcula	ated by dividir	- <u>-</u>				
	Tal	ole 3 shows	the forces acting fi	rom civil struc	ture.			• •	
Bottom Sob Wall No.2 Wall No.2 Wall No.2 Wall No.3 Wall No.4 PLAN Rouse Sob						at juta e			
Bottom Sob Wall No.2 Wall No.2 Wall No.2 Wall No.3 Wall No.4 PLAN Rouse Sob									
Bottom Sob Wall No.2 Wall No.2 Wall No.2 Wall No.3 Wall No.4 PLAN Rouse Sob					n nga san an 17 Geografia (1944)				
Bottom Sob Wall No.2 Wall No.2 Wall No.2 Wall No.3 Wall No.4 PLAN Rouse Sob			FRONT STRUCTURE		MAIN STRI	ICTURE		 . /	· ·
FROMI_STRUCTURE       MOM_STRUCTURE         FROMI_STRUCTURE       MOM_STRUCTURE         Image: structure in the structure in t		Bollo	Contraction of the second				с		· · · ·
FROMI STRUCTURE         Moll No.2         Woll No.4         Woll No.4         PLAN         House Stob								-	
PLAN $House Stob$ $PLAN$ $House Stob$		는 지원과 사망권 관		1.			1992 - 1995 		
			$\left  \right\rangle$			╧╬╌			
$\frac{1}{1}$									
PLAN PLAN House Sub House Sub House Sub $K^{(n)}$ $K^{(n)}$				1					e in fri
Image: PLAN       Image: PLAN				Woll No.3					
PLAN PLAN House Stob FRONT STRUCTURE MAIN St							D		
PLAN PLAN FRONT STRUCTURE WAI STRUCTURE WAI STRUCTURE WAI STRUCTURE WAI STRUCTURE WAI WILL $WAI WILL WAI WILL WILL WAI WILL WAI WILL WILL WAI WILL WAI WILL WILL WAI WILL WILL WAI WILL WILL WAI WILL WILL WILL WAI WILL W$				Woll No.4					
FRONT STRUCTURE     MAIN STRUCTURE $Main Structure$ $w=1$ $w=1$ $w=1$ $w=1$ $b=1$				1					
FRONT STRUCTURE     MAIN STRUCTURE $Main Structure$ $w=1$ $w=1$ $w=1$ $w=1$ $b=1$									
FROMI STRUCTURE       MAIN STRUCTURE $Main Structure$ $Main Structure$ $w=1$ $w=1$ $w=1$ $w=1$ $w=1$ $w=1$ $b=3$ $b=3$ $b=3$									
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$				PLAN	가는 김 전값 - 김 동 환자	Ho	use Slob		
w=2 $w=1$ $w=2$ $w=2$ $b=1$ $b=4$ $b=3$ $b=3$ $b=4$ $b=2$ $b=4$ $b=3$ $b=4$ $b=3$ $b=4$ $b=4$ $b=3$ $b=4$			- 倉倉県 (小説) - 1. たけ後にないたかか						
w=2 $w=1$ $w=2$ $w=2$ $b=1$ $b=4$ $b=3$ $b=3$ $b=4$ $b=2$ $b=4$ $b=3$ $b=4$ $b=3$ $b=4$ $b=4$ $b=3$ $b=4$				ange talen. Stalensere	an a				
w=2 $w=1$ $w=2$ $w=2$ $b=1$ $b=4$ $b=3$ $b=3$ $b=4$ $b=2$ $b=4$ $b=3$ $b=4$ $b=3$ $b=4$ $b=4$ $b=3$ $b=4$									*
w=1 $w=1$ $w=1$ $b=1$ $b=1$ $b=1$ $b=2$ $b=1$ $b=1$			FRONT STRUCTURE		MAIN STRU	CTURE			
w=1 $w=1$ $b=1$ $b=1$ $b=1$ $b=2$ $b=1$ $b=2$ $b=1$			「「新月」」(2月19日)   1月36日   1月19日   1月19日   1月19日   1月19日   1月19日	A de la	- Marcola	-2.1	1		an traite. Anglis
w=1 $w=1$ $w=1$ $b=1$ $b=4$ $b=1$ $b=4$ $b=1$ $b=2$ $b=3$ $b=1$ $b=1$ $b=2$ $b=1$									
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$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		5 5					I		
				<b>w-2</b>	X	<u>b-4</u>	<b>\<u>b-</u>1</b>		
			6-1 XX						
이 이 것을 수밖에 다른 것이 많다. 바늘에서 가지 않는 것은 것을 하는 것이 많다. 말을 가지 않는 것을 가지 않는 것을 하는 것을 수 있다. 것을 하는 것을 하는 것을 수 있는 것을 하는 것을 하는 것을 하는 것을 수 있는 것을 수 있는 것을 수 있는 것을 수 있는 것을 하는 것을 수 있는 것을 수 있다. 것을 수 있는 것을 것을 수 있는 것을 것을 수 있는 것을 수 있는 것을 것을 수 있는 것을 것을 수 있다. 것을 것을 것을 것을 것을 것 같이 않는 것을 것 같이 않는 것을 것 같이 않는 것을 것 않는 것을 것 같이 않는 것 않는 것 않는 것 같이 않는 것 같이 않는 것 않는 것 않는 것 같이 않는 것 않는 것 않는 것 않는 것 같이 않는 것 않는			6-2 6-3	L/	<u>} -2</u>				
LONGITUDINAL PROFILE			6-3/						
				LONGITUE	dinal profi	LL			
,我们就是你们的你们,我们就是你们的你,我们就是你们的你,你们就是你们的你们,你们们就是你们的你们,你们们的你们,你们们不是你们的你们,你们们不是你们们,你们们									

Name of Structure	ASIN PUM STATIO			ategory Iculatio			ictural alysis	Pa	ige	16/4	2
Table - 3	Force Actin	g from C	ivil Str	ucture		· · ·			· · · · · · · · · · · · · · · · · · ·		1
		-									
weight of conci	rele	et da sub E	1.1.1.1.1	Ш. н.) (П. н.)	ja koja da je					. :•	
Y <sub>0</sub> =	-6.50										E
slab name	name	weight	inertia		t por el la com	acti	ng point			direc	
						÷.,				tion	
front structure	wall no.1-1	122.50	-13.48	X	Mx	у	My	Z	Mz		
	wall no.1-2	0.76	-15.46	5.00 9.63	-67.38 -0.80	5.25	•70.74	0.50			- ·
	wall no.2-1	-122.50	-13.48	5.00	-67.38	2.43 5.25	-0.20 -70.74	0.50			
	wall no.2-2	0.76	-0.08	9.63	-0.80	2.43	-0.20	5.50 5.50	-74.11 0.46		
	wall no.3-1	-122.50	-13.48	5.00	-67.38		70.74	10.50	141.49		
	wall no.3-2	0.76	-0.08	9.63	-0.80	2.43	-0.20	10.50	0.87		1
	wall no.4-1	-122.50	-13.48	5.00	-67.38	5.25	-70.74	15.50			
· .	wall no.4-2	-0.76	-0.08	9.63	-0.80	2.43	-0.20	15.50			<b>.</b>
	bottom slab 1	-296.00	-32.56	4.63	-150.59	2.40	-78.14	8.00	260.48		
	bottom slab 2	6.40	-0.70	9.38	6.61	2.27	-1.60	8.00			
	bottom slab 3	-49.00	-5.39	8.95	-48.24	1.65	8.89	8.00			
	bottom slab 4 bottom slab 5	-2.50 -30.00	-0.28 -3.30	8.42	2.31	1.13	-0.31	8.00	2.20		
	total	-876.93	-3.30 -96.46	9.25 5.30	30.53 -510.98	1.05 3.90	-3.47	8.00			
main structure A		-121.58	-30.40		-184.56	- 4.50	-376.19 60.18	8.00	.771.69		
	wall no.2-1	-121.58	-13.37		-184.56	4.50	-60.18	5.50	-6.69 -73.56		
	wall no.3-1	-121.58	13.37		-184.56	4.50	60.18		140.43		
	wall no.4-1	-121.58	-13.37		-184.56	4.50	60.18	15.50	-207.30		
	bottom slab-1	-395.15	43.47		-599.81	0.65	28.25	8.00	-347.73		
	bottom slab-2		2.70		46.00	1.62	-4.38		-21.60		
	total	906.03	-99.66		-1384.04	2.74	-273.37	8.00	-797.30		
main structure -B		-114.03	-12.54		-273.45	6.95	-87.17	0.50	-6.27	٠z	:
	wall no.1-2 wall no2-1	1.22 -114.03		25.57	3.43	12.05	1.62	0.50	0.07	·Z	
	wall no2.2	1.22	-12.54	21.80	-273.45	6.95	-87.17	5.50	68.99		×.,
	wall no3-1	-114.03	12.54		3.43 273.45	12.05 6.95	1.62	5.50	0.74		
	wall no3-2	1.22		25.57	3.43	12.05	87.17 1.62	10.50 10.50	-131.70		
	wall no4-1	114.03	-12.54		273.45	6.95	-87.17	15.50	-194.42	Z Z	•
	wall no4-2	1.22		25.57	3.43	12.05	1.62	15.50	2.08		
	top slab-1	-19.52	2.15	25.35	-54.42	11.55	-24.79		17.17	-2	
	bottom slab-1	-310.45	-34.15		-744.47	4.24	-144.66	8.00	-273.19		ŀ .
main at-	total	-781.19	-85.93		-1878.94	5.95	-511.67	8.00	-687.45		
main structure-C	wall no.1-1	-34.30		27.00	-101.88	9.00	33.96	0.39	-1.46	-7	-
	wall no1-2 wall no.2-1	-68.58		31.50	237.63	7.80	-58.84	0.39	-2.92	, ·Z	
	waii no.2-2	-28.00 -55.98		27.00	-83.17	9.00	27.72	5.50	-16.94	Z	
	wall no.3-1	-28.00	5 US	31.50 27.00	·193.98 -83.17	7.80 9.00	-48.03	5.50	-33.87	٠Z	
	wall no.2-2	-55.98		31.50	-193.98	7.80	-27.72 -48.03	10.50 10.50	-32.34	-Z	
	wall no4-1	-28.00		27.00	-133.38	9.00	-46.03	15.50	-64.66 47.74	- Z - Z	
	wall no4-2	-55.98		31.50	-193.98	7.80	48.03	15.50	-95.45	2	
$(1,2) \in \{1,2,\dots,n^{k}\}$	bottom-1	215.95	-23.75	30.50	724.54	6.60	-156.78		187.37	z	
	bottom 2	-4.24	-0.47	26.14	-12.19	7.23	-3.37	8.00	-3.73	-z	
	bottom 3	8.62	0.95	26.67	-25.29	7.32	6.94	8.00	-7.59	z	
	bottom 4	-3.71		26.50	-10.82	7.06	-2.88	8.00	-3.27	·z	
nouse structure	total bottom	·587.36 ·112.48	·64.61 ·12.37		-1943.81 -377.37	7.58 9.15	-490.04 -1029.15		-497.34 -259.82	∙z ∙z	
	Total Weight	-3263.98									
	total volume	1305.59									1. 
	total volume	1202.28	10 A. A. A.		- S.A		and the second	1		1.1.1	

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3.5       Weight of Water         Water weight is calculated as shown in Table – 4.         Table -1       Weight of Water         water level =       2.60 m         Yo= 6.1       front structure         water loody name       name         water loody name       name         water loody name       name         water loody name       name         water nol 1       44.00         5.00       220.00         water nol 2       2.25         9.75       2.194         water nol 2       2.25         9.79       2.202         water nol 2       2.25         9.79       2.202         9.79       2.202         9.79       2.202         9.79       2.202         9.79       2.202         9.79       2.202         9.79       2.202         9.79       2.202         9.79       2.202         9.79       2.202         9.79       2.202         9.79       2.202         9.79       2.202         9.72.70       2.202         9.72.71.70.70         9.72.71.70.71	Name of Structure		PUMPINC ATION	3	Catego Calcula			Struct Analy		Page	17/42
$ \begin{array}{rcl} \label{eq:Water weight is calculated as shown in Table - 4. \\ \hline Table - 1 & Weight of Water \\ \hline \begin{tabular}{lllllllllllllllllllllllllllllllllll$	3.5 Weight (	of Water									- 1
Table -1 Weight of Water         water level = -2.60 m         Yp= 6.1       adding point       direct ion         water body name       name       weight       scling point       ion         font structure       water no.1.1       44.00       5.00       -220.00       2.95       -123.80       3.00       -132.00       y         water no.1       2.25       9.75       221.94       1.90       4.28       3.00       -6.75       y         water no.21       2.40       5.00       -220.00       2.95       1.92.80       8.00       3.82.00       y         water no.32       2.25       9.79       22.02       1.90       4.28       3.00       -572.00       y         water no.32       2.25       9.79       22.02       1.90       4.28       3.00       -232.09       y         main structure A       water no.1       -79.03       13.80       1090.57       2.25       177.82       3.00       232.79       y         water no.22       3.27       17.04       55.76       1.22       4.01       3.00       282.49       y         water no.31       .79.03       13.80       1090.57       2.52       1		· - · · · · · · · · ·									. <u>.</u>
Table - 1       Weight of Water         water level       =       -2.60 m         Yop = 6.1       x       Mx       y       My       2       Mz         front structure       water nol-1       44.00       5.00       -220.00       2.95       -129.80       3.00       -132.00       y         water nol-2       -2.25       9.75       -21.94       1.90       4.28       3.00       -6.75       y         water no-21       -4.40       5.00       -220.00       2.95       -129.80       1.300       -572.00       y         water no-32       -2.25       9.79       -22.02       1.90       -4.28       3.00       -572.00       y         water no-32       -2.25       9.79       -22.02       1.90       -4.28       3.00       -232.09       y         main structure-A       water no-1-1       -79.03       13.80       -1090.57       2.25       -177.82       3.00       -632.24       y         water no-22       3.27       17.04       55.76       1.22       4.01       3.00       -632.24       y         water no-23       3.27       17.04       55.76       1.22       4.01       3.00									* * *		
Table -1 Weight of Water water level = 2.60 m $Y_0 = 6.1$ water body name name weight acting point ion front structure water no1-1 44.00 5.00 -220.00 2.95 129.80 3.00 -132.00 y water no2-2 -2.25 9.75 -21.94 1.90 4.28 3.00 6.75 y water no2-2 -2.25 9.79 2.20.2 1.90 4.28 3.00 1.80.0 y water no3-1 44.00 5.00 -220.00 2.95 -129.80 1.300 5.72.00 y water no3-2 2.25 9.79 22.02 1.90 4.28 1.300 2.925 y total -138.75 5.23 -725.99 2.90 4.022 3.800 -1110.00 y water no2-2 3.27 17.04 55.76 1.22 4.01 3.00 9.82 y water no2-1 -79.03 13.80 -1090.57 2.25 -177.82 3.00 -237.09 y water no2-2 3.27 17.04 55.76 1.22 4.01 3.00 9.82 y water no2-1 -79.03 13.80 -1090.57 2.25 -177.82 3.00 -237.89 y water no2-2 3.27 17.04 55.76 1.22 4.01 13.00 4.254 y water no3-2 3.27 17.04 55.76 1.22 4.01 13.00 4.254 y water no3-2 3.27 17.04 55.76 1.22 4.01 13.00 4.254 y total -227.27 13.66 -3104.44 2.29 521.43 8.00 -1818.17 main shucture-C wall no.1 2.24.0 30.50 683.22 6.45 -144.48 3.00 67.20 y wall no.2 2.24.0 30.50 683.22 6.45 -144.48 3.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 3.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 3.00 537.60 y total -67.20 3.050 -2049.67 6.45 433.44 8.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y wall no.3 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y wall no.2 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y wall no.2 22.40 30.50 683.22 6.45 -144.48 8.00 537.60 y	Water weight is	s calculate	d as show	vn in Ta	able – 4.						
		고리 한 바람이	4.1.2.1	ay en la	t Stevenski.	$\{i_{i}\}_{i \in \mathbb{N}}$	1.00 4.00	, · )	, strada gita a	·	
	Table - 4 Weight	of Water						.'		e en la	
$V_{9} = 6.1$ water body name name weight acting point ion front structure water no1-1 44.00 5.00 -220.00 2.95 129.80 3.00 -132.00 y water no2-1 44.00 5.00 -220.00 2.95 129.80 8.00 -352.00 y water no2-1 44.00 5.00 -220.00 2.95 129.80 13.00 -572.00 y water no3-1 44.00 5.00 -220.00 2.95 129.80 13.00 -572.00 y water no3-1 44.00 5.00 -220.00 2.95 129.80 13.00 -572.00 y water no3-2 2.225 9.79 22.02 1.90 4.28 8.00 -1110.00 y main structure A water no1-1 79.03 13.80 -1090.57 2.25 177.82 3.00 -632.24 y water no2-2 3.27 17.04 55.76 1.22 4.01 3.00 9.82 y water no2-2 3.27 17.04 55.76 1.22 4.01 3.00 -632.24 y water no2-2 3.27 17.04 55.76 1.22 4.01 3.00 -632.24 y water no2-2 3.27 17.04 55.76 1.22 4.01 3.00 1027.38 y water no2-2 3.27 17.04 55.76 1.22 4.01 3.00 1027.38 y water no2-2 3.27 17.04 55.76 1.22 4.01 3.00 -1027.38 y water no3-1 -22.00 30.50 -683.22 6.45 144.48 8.00 -1791.20 y water no3-2 2.00 30.50 -2049.67 6.45 4.33.44 8.00 -537.60 y water no3-2 2.00 30.50 -2049.67 6.45 4.33.44 8.00 -537.60	Ť										
water body name name weight acting point ion ront structure water no1-1 44.00 5.00 -220.00 2.95 -129.80 3.00 -132.00 y water no1-2 2.25 9.75 2.1.94 1.90 4.28 3.00 -6.75 y water no2-1 44.00 5.00 -220.00 2.95 -129.80 3.00 -352.00 y water no3-1 44.00 5.00 -220.00 2.95 -129.80 3.00 -352.00 y water no3-1 44.00 5.00 -220.00 2.95 -129.80 3.00 -352.00 y water no3-2 2.55 9.79 -22.02 1.90 4.28 3.00 -237.09 y water no3-2 2.25 9.79 2.90 -402.23 3.00 -237.09 y water no1-2 3.27 17.04 55.76 1.22 4.01 3.00 9.82 y water no1-2 3.27 17.04 55.76 1.22 4.01 3.00 9.82 y water no3-2 3.27 17.04 55.76 1.22 4.01 3.00 -1027.38 y water no3-2 3.27 17.04 55.76 1.22 4.01 3.00 -1027.38 y water no3-2 3.27 17.04 55.76 1.22 4.01 3.00 42.54 y total 227.27 13.66 -3104.44 2.29 -521.43 8.00 -1818.17 main structure-C wall no.1 -22.40 30.50 -683.22 6.45 -144.48 3.00 -67.20 y water no3-2 3.22 17.04 55.76 1.22 4.01 13.00 -291.20 y total 227.27 13.66 -3104.44 2.29 -521.43 8.00 -1818.17 main structure-C wall no.1 -22.40 30.50 -683.22 6.45 -144.48 3.00 -179.20 y water no3-2 3.27 17.04 55.76 1.42 4.01 13.00 -291.20 y total 67.20 30.50 -683.22 6.45 -144.48 8.00 -179.20 y water no3-2 3.27 17.04 55.76 5.43 3.44 8.00 -179.20 y water no3-2 3.27 17.04 55.76 5.44 3.44 8.00 -179.20 y water no3-2 3.27 17.04 55.76 5.45 -433.44 8.00 -179.20 y water no3-2 3.27 17.04 55.76 5.45 -433.44 8.00 -537.60 y water no3-2 3.27 17.04 55.76 5.45 -433.44 8.00 -537.60 y water no3-2 3.27 17.04 55.76 5.45 -433.44 8.00 -537.60 y water no3-2 3.27 17.04 55.76 5.45 -433.44 8.00 -537.60 y water no3-2 3.27 17.04 55.76 1.22 4.01 13.00 -291.20 y water no3-2 3.27 17.04 55.76 1.45 4.33.44 8.00 -537.60 y water no3-2 3.27 17.04 55.76 1.45 4.33.44 8.00 -537.60 y water no3-2 3.27 17.04 55.76 1.45 4.33.44 8.00 -537.60 y water no3-2 3.27 17.04 55.76 1.45 4.33.44 8.00 -537.60 y water no3-2 3.27 17.04 55.76 1.45 4.33.44 8.00 -537.60 y water no3-2 3.27 17.04 55.76 1.45 4.33.44 8.00 -537.60 y water no3-2 3.27 17.04 55.76 1.45 4.33.44 8.00 -537.60 y water no3-2 3.27 17.04	water level =	-2.6	0 m 0						•	e tet	
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water body name       name       weight       acting point       ion         font structure       water no1-1       44.00       5.00       -220.00       2.95       -129.80       3.00       -5.75       -y         water no1-2       2.25       9.75       21.94       1.90       4.28       3.00       -6.75       -y         water no2-1       44.00       5.00       -220.00       2.95       -129.80       8.00       -18.00       -y         water no3-1       44.00       5.00       -220.01       2.95       -129.80       13.00       -572.00       -y         water no3-1       44.00       5.00       -220.01       2.95       -129.80       13.00       -572.00       -y         water no3-1       -140.05       5.00       -220.01       2.95       -129.80       13.00       -18.00       -y         water no3-1       -138.75       5.23       -725.99       2.90       -402.23       8.00       -110.00       -y         main structure-A       water no1-1       -79.03       13.80       -1090.57       2.25       -177.82       8.00       632.24       -y         water no3-1       -79.03       13.80       -1090.57       2.25	Y <sub>0</sub> ≓	-6.1	· ·	<b>*</b> ,							
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main structure -C walt no.1 - 22.40 30.50 - 683.22 6.45 - 144.48 13.00 - 572.00 - y water no3:2 - 2.25 - 9.79 - 22.02 1.90 - 4.28 13.00 - 29.25 - y total - 138.75 5.23 - 725.99 2.90 - 402.23 8.00 - 1110.00 - y water no1:2 - 3.27 17.04 55.76 1.22 - 4.01 - 3.00 - 2.82 - y water no2:2 - 3.27 17.04 - 55.76 1.22 - 4.01 - 3.00 - 6.83.24 - y water no3:2 - 3.27 17.04 - 55.76 1.22 - 4.01 - 13.00 - 6.28 - y water no3:2 - 3.27 17.04 - 55.76 1.22 - 4.01 - 13.00 - 1027.38 - y water no3:2 - 3.27 17.04 - 55.76 1.22 - 4.01 - 13.00 - 1027.38 - y water no3:2 - 3.27 17.04 - 55.76 1.22 - 4.01 - 13.00 - 1027.38 - y water no3:2 - 3.27 17.04 - 55.76 1.22 - 4.01 - 13.00 - 42.54 - y total - 227.27 - 13.66 - 3104.44 - 2.29 - 521.43 - 8.00 - 1818.17 - 1011 - 22.40 - 30.50 - 683.22 - 6.45 - 144.48 - 3.00 - 67.20 - y wall no.3 - 22.40 - 30.50 - 683.22 - 6.45 - 144.48 - 3.00 - 537.60 - y wall no.3 - 22.40 - 30.50 - 683.22 - 6.45 - 144.48 - 3.00 - 537.60 - y wall no.3 - 22.40 - 30.50 - 683.22 - 6.45 - 144.48 - 3.00 - 537.60 - y wall no.3 - 22.40 - 30.50 - 643.22 - 6.45 - 144.48 - 3.00 - 537.60 - y wall no.3 - 22.40 - 30.50 - 643.22 - 6.45 - 144.48 - 3.00 - 537.60 - y wall no.3 - 22.40 - 30.50 - 2049.67 - 6.45 - 433.44 - 8.00 - 537.60 - y wall no.3 - 22.40 - 30.50 - 2049.67 - 6.45 - 433.44 - 8.00 - 537.60 - y wall no.3 - 22.40 - 30.50 - 2049.67 - 6.45 - 433.44 - 8.00 - 537.60 - y - 1011 - 67.20 - 30.50 - 2049.67 - 6.45 - 433.44 - 8.00 - 537.60 - y - 1011 - 67.20 - 30.50 - 2049.67 - 6.45 - 433.44 - 8.00 - 537.60 - y - 1011 - 67.20 - 30.50 - 2049.67 - 6.45 - 433.44 - 8.00 - 537.60 - y - 1011 - 67.20 - 30.50 - 2049.67 - 6.45 - 433.44 - 8.00 - 537.60 - y - 1011 - 67.20 - 10				•						•	
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$\frac{\text{total}}{\text{main structure-A}} = \frac{138.75}{2.23} \cdot \frac{5.23}{17.52} \cdot \frac{725.99}{2.90} \cdot \frac{402.23}{4.02.23} \cdot \frac{8.00}{1110.00} \cdot \frac{9}{9} \cdot \frac{9}{9}$ $\frac{9}{\text{main structure-A}} = \frac{1000}{12} \cdot \frac{1000}{3.27} \cdot \frac{1000}{12.25} \cdot \frac{1000}{17.82} \cdot \frac{3.00}{3.00} \cdot \frac{237.09}{9.82} \cdot \frac{9}{9}$ $\frac{9}{\text{water no1-2}} \cdot \frac{3.27}{17.04} \cdot \frac{1000}{55.76} \cdot \frac{1.22}{2.25} \cdot \frac{100}{17.82} \cdot \frac{1000}{8.00} \cdot \frac{632.24}{6.45} \cdot \frac{9}{144.48} \cdot \frac{1000}{127.38} \cdot \frac{1027.38}{9} \cdot \frac{9}{9}$ $\frac{9}{\text{water no3-1}} \cdot \frac{1000}{127.38} \cdot \frac{1000}{1000.57} \cdot \frac{2.25}{2.25} \cdot \frac{1000}{17.82} \cdot \frac{1000}{127.38} \cdot \frac{1027.38}{9} \cdot \frac{9}{9}$ $\frac{9}{\text{water no3-2}} \cdot \frac{3.27}{17.04} \cdot \frac{1000.57}{55.76} \cdot \frac{2.25}{122} \cdot \frac{1000}{13.00} \cdot \frac{1027.38}{42.54} \cdot \frac{9}{9} \cdot \frac{1000}{42.54} \cdot \frac{1000.57}{122} \cdot \frac{2.5}{100} \cdot \frac{1027.38}{13.00} \cdot \frac{402.54}{42.54} \cdot \frac{9}{9} \cdot \frac{1000}{42.54} \cdot \frac{1000}{42.54}$	and the second		1 A A A A A A A A A A A A A A A A A A A				1 A A A A A A A A A A A A A A A A A A A	** 2.5 **		~	
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main structure-A water no1.1 79.03 13.80 1090.57 2.25 177.82 3.00 237.09 y water no1.2 3.27 17.04 55.76 1.22 4.01 3.00 9.82 y water no2.1 79.03 13.80 1090.57 2.25 177.82 8.00 632.24 y water no3.1 79.03 13.80 1090.57 2.25 177.82 13.00 1027.38 y water no3.2 3.27 17.04 55.76 1.22 4.01 13.00 42.54 y total 227.27 13.66 3104.4 2.29 521.43 8.00 1818.17 main structure-C wall no.1 22.40 30.50 683.22 6.45 144.48 3.00 179.20 y wall no.3 22.40 30.50 683.22 6.45 144.48 13.00 291.20 y total 67.20 30.50 683.22 6.45 144.48 13.00 291.20 y total 67.20 30.50 683.22 6.45 3.144.48 8.00 3537.60 y wall no.3 22.40 30.50 683.22 6.45 3.144.48 13.00 291.20 y total 67.20 30.50 683.22 6.45 3.144.48 13.00 291.20 y total 67.20 30.50 6.2049.67 6.45 433.44 8.00 537.60 y				J.23		2.90	.402.25	0.00	-1110.00		
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$\frac{1}{1000} = \frac{1}{1000} = 1$	and the second	~									1.5.2
$\frac{1}{1000} = \frac{1}{1000} = 1$		1				1.4		-			
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water no3-2 3.27 17.04 55.76 1.22 4.01 13.00 42.54 y total 227.27 13.66 3104.44 2.29 $-521.43 8.00 -1818.17$ main structure C wall no.1 22.40 30.50 $-683.22 - 6.45 -144.48 - 3.00 -67.20 - y$ wall no.2 22.40 30.50 $-683.22 - 6.45 -144.48 - 8.00 -179.20 - y$ wall no.3 22.40 30.50 $-683.22 - 6.45 -144.48 - 13.00 -291.20 - y$ total $-67.20 - 30.50 - 2049.67 - 6.45 - 433.44 - 8.00 -537.60 - y$		1					•	A. 1. A. 1.		У	
total $-227.27$ 13.66 $-3104.44$ $2.29$ $-521.43$ $8.00$ $-1818.17$ main structure-C       wall no.1 $-22.40$ $30.50$ $-683.22$ $6.45$ $-144.48$ $3.00$ $-67.20$ y         wall no.2 $-22.40$ $30.50$ $-683.22$ $6.45$ $-144.48$ $8.00$ $-179.20$ y         wall no.3 $-22.40$ $30.50$ $-683.22$ $6.45$ $-144.48$ $13.00$ $-291.20$ y         total $-67.20$ $30.50$ $-2049.67$ $6.45$ $-433.44$ $8.00$ $-537.60$ y         FRONT STRUCTURE         Water-1         Woter-1         Woter-1         Woter-1         Woter-2         Woter-2						4 C. C.			1. A. 1. A.	·У	
main structure C wall no.1 $22.40 \ 30.50 \ 683.22 \ 6.45 \ 144.48 \ 3.00 \ 67.20 \ y$ wall no.2 $22.40 \ 30.50 \ 683.22 \ 6.45 \ 144.48 \ 8.00 \ 179.20 \ y$ wall no.3 $22.40 \ 30.50 \ 683.22 \ 6.45 \ 144.48 \ 13.00 \ 291.20 \ y$ total $67.20 \ 30.50 \ 6.45 \ 433.44 \ 8.00 \ 537.60 \ y$	and the second	A CONTRACTOR OF A CONTRACTOR OF A CONTRACTOR AND A CONTRACT							4	У	
wall no.2 ·22.40 30.50 ·683.22 6.45 ·144.48 8.00 ·179.20 ·y wall no.3 ·22.40 30.50 ·683.22 6.45 ·144.48 13.00 ·291.20 ·y total ·67.20 30.50 ·2049.67 6.45 ·433.44 8.00 ·537.60 ·y		total	227.27	13.66	-3104.44	2.29	521.43	8.00	-1818.17		
wall no.2 ·22.40 30.50 ·683.22 6.45 ·144.48 8.00 ·179.20 ·y wall no.3 ·22.40 30.50 ·683.22 6.45 ·144.48 13.00 ·291.20 ·y total ·67.20 30.50 ·2049.67 6.45 ·433.44 8.00 ·537.60 ·y							i shi shi . Shi shi shi		an the the		n da la com
wall no.2 ·22.40 30.50 ·683.22 6.45 ·144.48 8.00 ·179.20 ·y wall no.3 ·22.40 30.50 ·683.22 6.45 ·144.48 13.00 ·291.20 ·y total ·67.20 30.50 ·2049.67 6.45 ·433.44 8.00 ·537.60 ·y											
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total -67.20 30.50 -2049.67 6.45 -433.44 8.00 -537.60 -y										-	· · · ·
FRONT STRUCTURE A B C Water-1 Water-2 Water-2 Water-2		and the second			· · · · · · · · · · · · · · · · · · ·						
FRONT STRUCTURE A B C Water-1 Water-1 Water-2 Woter-2 Woter-2	and the first of	total	-67.20	30.50	-2049.67	6.45	433.44	8.00	-537.60	• <b>y</b> ,	
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A B C Woler-1 Woler-1 Woler-2			i da ser esta de la composición de la c	t ti							
Water-1 Water-1 Woler-2		FRONT STR		r <b></b>				<u>a ta</u>		1	
Woler-2 Woler-2				·	A	8	<u> </u>		<u> </u>		· .
Woler-2 Woler-2						n fringeri Till and	A			.`	1. 1
Woler-2 Woler-2							<u> </u>				1. A.
Woler-2 Woler-2											
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Woler-2 Woler-2		W	oter-1							l	1
Woler-2/		<u> </u>		- <del>Ş</del>	Woter-1			and a second s	ang Ngang ang ang		
Woler-2/					/	//	<ul> <li></li></ul>				
Woler-2/			k		$\sim$	1.1		n i s ste			
Woler-2/			) X		-	Water			1 - E - E - E		
		Woter-	2/	<b>L</b>			s de la complete la complete	1997 - 1997 1	an An An A		
LONGITUDINAL PROFILE		19151					e de la composition Al composition				
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Structure	ASIN PUMPING STATION	Category Calculation	Structural Analysis	Page	18/42
6 Hydros	atic Pressure				
ydrostatic p lift is calcul	essure is lateral pressur ated in Table - 6.	e and uplift. Lateral		ed in Ta	
7 Earth I	ressure				
he earth pres	sure coefficient is calcul	ated in Table - 7.	en de la Carlos Secondo de la Carlos Secondo de la Carlos de la		
he earth pres .8 Seismic	sure is calculated in Tabl Forces	le 8.			
.8.1 Calcula	tion of Seismic Coeffici	ent			
ccording to t $\mathbf{G} = \mathbf{E} \mathbf{x}$	he Design Criteria of the	Project, earthquake l	oad is calculated as f	ollows:	
where G E N	: earthquake load : horizontal earth	hquake factor			
ne earthquake E = ad/ ad = n(a		g the following equat	ion;		
where ac		cceleration (cm/s²) celeration (cm/s²) n/s²			
Z			osition and equal 0.56	itaking	

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inally, we get E = 0.11 for the design.

Name of Structure	ASIN PUMPING STATION	Category Calculation	Structural Analysis	Page	19/42
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				4	
 · · · · · · · · · · · · · · · · · · ·					· · :
	tion t		direction y	אר אר גער אר	
	Mz 784.00		Mz 4,756.48 5,466.42 2,118.90	875.96	
	8 ×	48 84 0	0 4,75 0 5,46 0 2,11		
		0 4	z 200 200 200 200 200 200 200 200 200 200	7 8.00	
	oint My 457.33		My 1,158.38 0.00 887.29	635.07	
60	acting point y 4.67 457.	( <b>)</b> ( <b>)</b> ( <b>)</b>	그는 가는 승규가 많이	5.80	
op Lo	70 4 2 ~	water level(D/	y acting point y 1.95 0.00 3.35		eet pile
the St	112.7 12.7	water I			teel sh
n) to	× 1.15		x Mx 5.00 2,972.80 3.80 9,429.23 21.80 5,774.14	39.69	of the s
nditic log			0 0 0 0 0 2 1	e e o	inside
nal co è stop	<b>c</b> . 86 00	е С. 1975 г. – С. 1975 Г. 1976 г. – С. 1976		30.5	essure
Table - SWater Pressure (normal condition) to the Stop Logwater sressure(normal condition) to the stop log	water -1.00 $Y_0=$ -6.5 earth pressure name height width front slab wp $3.50$ 16.00	<b>-1.00 m</b>	uplift 594.56 5.00 683.30 13.80 264.86 21.80	109.49 30.50 3,339.69	uplift pre the water pressure inside of the steel sheet pile
essure ndition	00 aight 3.50		∧ <b>थ</b> <del>2</del> <del>2</del>		t t e
ter Pr mal co	water -1.00 -6.5 name heigh wp 3.5	6 Uplift water level(U/S) = Y <sub>0</sub> = -6.1	uplift uplift uplift	wall no.1	
Wat Ire(nor	wate Y <sub>o</sub> = -6.4 sure name wp	Table - 6 Uplift water level(U/ Y_n= -6.1	water body name name front slab uplift main slab-A uplift main slab-B uplift	8	<b>5</b>
e - 5 sressu	Y earth pressu front slab	»-6 wat	body n slab-A slab-A slab-B	main stab-C	
Tabl water	earth or front sia	Table	water body i front slab main slab-A main slab-B	main :	

Name of Structure		ASIN PU STAT				Categ Calcul	gory ation		Strue Ana	tural lysis	[	P	age	20/42
• • •	Kea 0.474 Kep 2.338							•	·					
	0.11 0.0174444	0.9437448 0.9940044 1 0.9940044	0.3306746	0.9437448 0.9940044	0.4318815 0.3306746				direction	ż	й	ż	Ņ	
	seismicity(kh) conversion(3.14/180)	cos(pahi-thetaO-theta) cos(thetaO) cos(theta)	costrictant remote the sin(pahi+delta) sin(pahi+delta) sin(phai-alpha-thetaO) cos(theta-alpha)	cos(phai-theta0+theta) cos(theta-theta0+delta)	sin(phai-delta) sin(phai+alpha-theta()	•			<b>dit</b>	z Mz 16.00 -1,239.25	244.48 16.00 1,524.02	71 16.00 -282.68	-46.69 16.00 ·111.49	
	25.6 0	800 57 9	19.32 6.28 25.6	19.32 0	19.32 -6.28	25.6 19.32			acting point		2.57	5.98 -105.71	6.70 -46	
	seismic condition phai delta	theta alpha thetaO	phai-thetaO-theta theta+thetaO+delta phai+delta	phai-alpha-thetaO theta-alpha	phai-thetaO+theta theta-thetaO+delta	phai-action phai-alpha-thetaO		1.00 t/m²		x Mx 5.00 .387.27	13.80 .1,314.42	21.80 385.16	30.50 .212.53	
6	· · · · ·							over burden =	Ka P	0.37 -77.45	0.37 .95.25	0.37 17.67	0.37 -6.97	
Calculation of Earth Pressure Coefficient ( $\phi=25.6^\circ$ ) tion 25.6 contractions 14.1900 0.017444 V-25.6°	conversion(s.14/180) 0.01/4444 Kas Kp cos(pahi-theta) 0.9019304	1 0.9889409 0.5608706 0.4318815	1 0.9019304 0.2933399	0.4318815			dition)	phai= 25.60 (natural soi!)	wight of soil	wet submerged 1.90 0.90	1.90 0.90	1.90 0.90	0:00	
rth Pressure	conversion(3.14/18U) cos(pahi-theta)	cos(theta) cos(theta+delta) sin(pahi+delta) sin(phai-alpha)	cos(theta-alpha) cos(phai+theta) sin(phai-delta)	sin(phai+alpha)			arth (normal cor	1.20 0.35 0.35	height width	5.90 10.00	7.70 7.599	3.950 8.403	1.50 8.998	
alculation of Ea	8.533 conve 8.533 cos(p;	0 cos(theta) cos(theta- 25.6 sin(pahi+c 8.533 sin(phai-ai		* 1 * * **	25.6		Force Acting from Earth (normal condition)	ground level= 1. g.water level= 0.		cp-1	ep-1	ep-1	ep.1	
le - 7 Ial condi	delta theta	alpha phai-theta theta+deita	phai+delta phai-alpha theta-alpha	phai+theta phai-delta	phai+alhpa		Table - 8 For		Y <sub>0</sub> = -6.5 earth pressure name	front slab	main slab-A	main slab-8	main slab-C	

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Structure		ATION		Calculatio				alysis	<u> </u>	
9 Total	Forces									
otal forces	which would	act on th	e structur	e are sho	wn i	n Table	;9~(	(1/4 ~ 4/4)		
and the second	lysis, critical o			1					an i	e of
			1	a dovoran	.5.0	1.010				
Table 9	9 (1/4) Tot 1) normal con	al Forces		onen (num	in on	herated				
(0030-1-			oint of action		ip op	direction	and the second second	Mom	ent footing	C.
	Total Force	X	y i	2	Х	Y	Z	Mx	My	М
front	-555.12	5.77	6.32	8.00 16.00	<u> </u>	*		0 133	0	·
main A	-77.45	13.38	3.72	8.00	*			155	0	
	-959.34	13.56	4.30	8.00		¥		0	0	
1. <u></u>	-104.09	13.76	2.50	15.32			·~	260	1,037	
main-C	-48.42	27.00	9.66	8.00	÷	1		0	0	
	1,727.29	29.41	8.82	7.90	;	*		173	0,	1
	-15.81	28.54	8.36	11.53	•		*	34	31	· · · · ·
house	337.43	30.50	10.18	16.00		*		0	0	
	) (2/4) Tot							a trata.	₹Z Z	· · · · ·
(case-1-2)	normal condition		g closed (pur pint of action	-		direction		ltar	ent footing (	· · ·
slah name	Total Force	<u>x</u>	y -1	1 Z	X	Orection Y		Mx i	My 1	M
front	98.00	1.15	4.67	8.00	*			0	0	
	416.37	5.95	7.46	8.00		*		0	0	1
1		5.00	3.72	16.00	. · ·		*.	133	0	19 - 19 19
main A	-30.53	13.38	1.80	8.00	*			0	0	7
e e statue e	•713.10	13.53	5.01	8.00		*.		0	0	
· · · · · · · · · · · · · · · · · · ·	104.09	13.76	2.50	15.32			*	260	1,037	· · · · ·
main C	-1,612.22	29.43	8.90	7.89 11.53	<u> </u>	¥		177	0 31	1
Table 9	) (3/4) Tota						<b>i</b>			
A	earthquake condi		and the second	ump operate	ed) -					1. A.
			pint of action	1		direction	1		ent footing C	
· · · · · · · · · · · · · · · · · · ·	Total Force		<u>y 1</u> 4.22	<u>z</u>	<u>X</u>	<u>  Y  </u>	2	Mx		<u> </u>
front	111.20	5.39	6.32	8.00 8.00		*		0	0	1.4 P
	-349.87	5.12	3.79	11.27			*	626	42	
main A	278.41	13.54	2.22	8.00	*		·	020	-12	
	-963.66	13.56	4.29	8.00		*		0	0	
	379.09	13.38	2.83	11.72	· ·		*	1,073	3,632	
main-C	-203.71	28.31	9.03	7.90	Ŧ			0	20;	
	1,679.42	29.48	8.80	7.89		*		185	0	1,
	-218.70	29.06	9.04	8.28			*	621	315	
house	37.12	30.50	10.18	16.00	¥		<b> </b>	0	0	
1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	337.43	30.50 30.50	10.18 10.18	16.00	· ·	*		0	0	
	· · · · ·			16.00		<u> </u>		91	<u> </u>	
	9 (4/4) Tota									
(case-2-2)	earthquake condi				_				-1 ( - 1 - 0	:
			oint of action			direction			nt footing C	
slab name front	Total Force 209.20	x   3.40	<u>y</u> 4.43	z 8.00	X *		Z	Mx I Ol	My 1	Mz 1,
	416,37	5.95	7.46	8.00		Ŧ		0	0	,
	-222.29	5.20	3.97	12.00		┼──┤	*	438	44	
main A	-254.57	13.55	2.26	8.00	*	<u> </u> ,-		0	0	
	.713.10	13.53	5.01	8.00	142	*		0	0	•
	-285.56	13.38	2.53	8.00			*	722	2,736	
main C	-285.31	28.58	9.19	8.00	*			0	0	
	+1,641.10	29.39	8.91	7.89		*		181	0	1,
	4					L-				
	218.70	29.06	9.04	8.28			*	621	315	

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Name of Structure	ASIN PUMPING STATION	Category Calculation	Structural Analysis	Page	22/42
·					

1999

		and the second se		
Table 10	Total Forces	(Summary)	÷.	1.12

Table 10 Total Forces (Summary)				
case no.	slab name	V reg	i ⇔H it	critical case
	Sido Harric	like <b>t</b> o eta	futient zuben	
<ul> <li>A statistical statisti Statistical statistical statisticae statisticae statisticae statisticae statis</li></ul>	- 20 <b>F</b> 12 A	555	77	
normal, stoplog open	Α	959	104	
	C	1,727	48	*
	Н	337	Ō	<b>*</b>
	- <b>F</b>	416	98	*
normal, stoplog closed	Α	713	104	*
	С	1,612	16	
	Н	337	0	
	1.13 F 1.53	555	350	*
earthquake, stoplog open	A State	964	379	* *
	С	1,679	219	
	Н	337	37	¥
	F	416	222	
earthquake, stoplog closed	A	713	285	
an an the second second second second	С	1,641	219	*
	H	337	37	

normal condition: no earthquake earthquake condition: earthquake

in stop log open condition, water weight is included in stop log closed condition, water pressure on stop log is included in earthquake condition, inertia on screw has vertical component in stop log open condition, driving force of screw is included

Name of Structure	ASIN PUMPING STATION	Category Calculation	Structural Analysis	Page	23/42
.10 Pile Fou	ndation Analysis				
.10.1Pile Stre	ss Analysis				
1) N-value fo	or design of pile foundation	o e constructo de la construction d Diversita de la construction de la c		er en av Alexander	
Geologica	l condition at the site is a	ssumed as shown in	Figure-11.	inikinin	
	pile tip (Nt): 50		El4.	0m <u>[ 1837]</u>	
	-value 3.75D above the ti			n an a' chuir a	N=5
3. N2	$75 D = 3.75 \times 0.5 = 1.87$ = (0.875 x 10 + 1.0	5 x 50)/1.875 =31.3	-→ 31 € <sub>1</sub> =1	1m	El.15 m
· · · ·	or pile design (N): $N = (5)$		28: Saliga do p 💶 1	0m	N=10
iv-vanio it	$\mathbf{A} \text{ price design} (\mathbf{A}). \mathbf{A} = (\mathbf{b})$	$0131/2 - 40.3 \rightarrow 40$	gen de la setera		El25 m
2) Estimation	of internal friction angle		€ <b>1</b> =1.0	n V V	N=50
6	$= 15 + \sqrt{(15 \times N)} = 15$	$+\sqrt{(15 \times 40)} = 39.5$	→ 40		
r					
3) Allowable	compressive bearing cap	acity (Ra)			
{qd >	$\langle A+u(li\times fi)\rangle$	an An an Anna Anna Anna An		an 177 Search Anna	
Ra = -	SF				
qd	: ultimate bearing capa	city per unit are at p	ile tip ( $tf/m^2$ )		
Å	: Area of pile tip ( $=\pi R$	$x^2/4 = 0.196 \text{ m}^2$			
li	: stratum depth ( $I_1 = I$ ) : circumferential lengt				
fi	: maximum skin firicti	on of stratum	<b>/</b>		
OF	$(f_1 = 2.5 \text{ tf/m}^2, f_2 = 3 \text{ tf/n}^2)$				
SF	: safety factor (normal:	: 3, earinquake:2)			
- ultimate	bearing capacity (qd)				
qa	$l = 1.3 \times c \times N + 0.3 \times R \times l$	$y_1 + N_2 \times Df \times Nq$			
C	: cohesion ( = 0 )				
and the second	, N <sub>r</sub> , Nq : bearing capac	•			
e de la companse de l	= 92, N <sub>y</sub> = 110, Nq = 85		y3		
Ϋ́1 Ϋ́2	: unit weight of soil be : unit weight of soil ab				
R	: diameter of pile ( $= 0$ .				
Df	: Pile length ( $= 22.0 \text{ m}$	i) National de la companya			
ad = 0.3 x	0.5 x 0.8 x 110 + 0.8 x 22	( 2.0 x 85 = 1509 2 tf/	, 497, 47 (2010), 49 (47). m <sup>2</sup> − 12 (2010), 49 (47).	attanti Alexandra	
<b>1</b>		1 bandedation	tter og skalende skalende som en skalende som e Samere som en skalende som en s		
1	9.2 x 0.196 + 1.571 x (11.0		3)} 390.8		

Normal condition: Ra = 130 tf
Earthquake condition: Ra = 195 tf

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1	ASIN PUMPING STATION	Category Calculation	Structural Analysis	Page	24/42	
(4) Allowable	pull-out capacity (Pa)	I <u> </u>		<u> </u>		
$Pa = \frac{Pu}{SF + t}$	<u> </u>		1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		na indriada. Alta	
	and the second	. · ·		2		
Pu: ultimat	te axial pull-out capacity	of pile determined l	by ground conditions (	lf)	· · ·	
	= $U\Sigma(\text{li x fi}) = 95$ : effective weight of p	ile ( = 1.6 tf/m x 22)	0 m <del>-</del> 25.2 +0			· ·
SF	: safety factor (normal: 6	6, earthquake:3)				
-N -Ei	ormal condition: Pa arthquake condition: Pa	a = 51.0  tf a = 69.9  ff	an an an an Anna. An Anna an Anna Anna Anna Anna Anna Ann	이 가공을 다. 이 다 가 가지	alanda Standar	
		a – 07.7 H				
5) Allowable	lateral bearing capacity	(Ha)				
Ha	= (k x D /β) x δa					
k:	coefficient of lateral read	ction of foundation <b>e</b>	round (kef/cm³)			
D:	pile diameter( = $0.5 \text{ m}$ )					
p:	charactaristic value of pi	le (cm ')				
and and a second se Second second second Second second	$\beta = \sqrt{\frac{k \cdot D}{4 \cdot E \cdot I}}$					
	¥4·E·I E: coefficient of elastic					
	I: momet of inertia of electric state	corss section of pile	body ( = 260.604.6 m <sup>4</sup>	)		
δа:	allowable displacement	of pile (normal: 1.0	cm, earthquake: 1.5 cr	n)		
5)-1 Estimation	n of coefficient of lateral	ronation of found-st	a the grant the second			
	· · · · · · · · · · · · · · · · · · ·	ICACUMENT DE TOTINICATI				
			ou Broatta (V)			
k =	= k <sub>0</sub> (B <sub>H</sub> /30) <sup>-3/4</sup>		a laga balan markara Maria			
k =	$= k_0 (B_{\rm H}/30)^{-3/4}$ $= \frac{1}{30} \times \alpha \times E_0.$					
k = k <sub>0</sub> :	$= k_0 (B_H/30)^{-3/4}$ = $\frac{1}{30} \times \alpha \times E_0$ E0 = 28N = 140, $\alpha$ =1 (					
k = k <sub>0</sub> :	$= k_0 (B_{\rm H}/30)^{-3/4}$ $= \frac{1}{30} \times \alpha \times E_0.$					
k = k <sub>0</sub> :	$= k_0 (B_H/30)^{-3/4}$ = $\frac{1}{30} \times \alpha \times E_0$ E0 = 28N = 140, $\alpha$ =1 (					
k = k <sub>0</sub> B <sub>H</sub> k =	$= k_0 (B_H/30)^{-3/4}$ $= \frac{1}{30} \times \alpha \times E_0$ $= 0 = 28N = 140, \alpha = 1 (\alpha = 1)^{-1}$ $= \sqrt{\frac{D}{\beta}}$ $D = 0.5 \text{ m}$ $= 1.70 \text{ (normal condition)}$	(normal), α=2 (earth	quake)			
k = k <sub>0</sub> B <sub>H</sub> k =	$= k_0 (B_H/30)^{-3/4}$ = $\frac{1}{30} \times \alpha \times E_0$ = $E0 = 28N = 140, \alpha = 1$ ( = $\sqrt{\frac{D}{\beta}}$ D = 0.5 m	(normal), α=2 (earth	quake)			
k = k <sub>0</sub> B <sub>H</sub> k = k =	$= k_0(B_H/30)^{-3/4}$ $= \frac{1}{30} \times \alpha \times E_0$ $= 0 = 28N = 140, \alpha = 1 (\alpha = 1)^{-1} = 10$ $= \sqrt{\frac{D}{\beta}}$ $D = 0.5 \text{ m}$ $= 1.70 \text{ (normal condition)}$ $= 3.40 \text{ (earthquake condition)}$	(normal), α=2 (earth ion)(details see table	quake)			
$k = k_0$ $B_{H}$ $k = k$ $5)-2 Allowable$	$= k_0(B_H/30)^{-3/4}$ $= \frac{1}{30} \times \alpha \times E_0$ $= 0 = 28N = 140, \alpha = 1 (\alpha = 1)^{-1}$ $= \sqrt{\frac{D}{\beta}}$ $D = 0.5 \text{ m}$ $= 1.70 \text{ (normal condition)}$ $= 3.40 \text{ (earthquake condit)}$ $= 1 = 1000 \text{ (earthquake condit)}$	(normal), α=2 (earth ion)(details see table	quake)			
$k = k_0$ $B_{H}$ $k = k$ $5)-2 Allowable$	$= k_0(B_H/30)^{-3/4}$ $= \frac{1}{30} \times \alpha \times E_0$ $= 0 = 28N = 140, \alpha = 1 (\alpha = 1)^{-1}$ $= \sqrt{\frac{D}{\beta}}$ $D = 0.5 \text{ m}$ $= 1.70 \text{ (normal condition)}$ $= 3.40 \text{ (earthquake condit)}$ $= 1 = 1000 \text{ (earthquake condit)}$	(normal), α=2 (earth ion)(details see table	quake)			
k = k <sub>0</sub> B <sub>H</sub> k = k =	$= k_0 (B_H/30)^{-3/4}$ $= \frac{1}{30} \times \alpha \times E_0$ $= 0 = 28N = 140, \alpha = 1 (\alpha = 1)^{-1} (\beta = 1)^{-1$	(normal), α=2 (earth ion)(details see table (Ha)	<b>quake)</b> ⊱5)			
$k = k_0$ $B_{H}$ $k = k$ $5)-2 Allowable$	$= k_0 (B_H/30)^{-3/4}$ $= \frac{1}{30} \times \alpha \times E_0$ $= 0 = 28N = 140, \alpha = 1 (\alpha = 1)^{-1} (\beta = 1)^{-1$	(normal), α=2 (earth ion)(details see table (Ha) al), 3.40 kgf/cm <sup>3</sup> (ea	<b>quake)</b> ⊱5)			
$k = k_0$ $B_{H}$ $k = k$ $5)-2 Allowable$	$= k_0 (B_H/30)^{-3/4}$ $= \frac{1}{30} \times \alpha \times E_0$ $= 0 = 28N = 140, \alpha = 1 (\alpha = 1)^{-1} (\beta = 1)^{-1$	(normal), α=2 (earth ion)(details see table (Ha) al), 3.40 kgf/cm <sup>3</sup> (ea cm)	<b>quake)</b> ⊱5)			
$k = k_0$ $B_{H}$ $k = k$ $5)-2 Allowable$	$= k_0 (B_H/30)^{-3/4}$ $= \frac{1}{30} \times \alpha \times E_0$ $= 0 = 28N = 140, \alpha = 1 (\alpha = 1)^{-1} (\beta = 1)^{-1$	(normal), α=2 (earth ion)(details see table (Ha) al), 3.40 kgf/cm <sup>3</sup> (ea cm) 64.5 cm	quake) 			
$k = k_0$ $B_{\rm H}$ $k = k = 5)-2 \text{ Allowable}$ $Ha = \left(K \times Ha = 22.5\right)$	= $k_0(B_H/30)^{-3/4}$ = $\frac{1}{30} \times \alpha \times E_0$ . E0 = 28N = 140, $\alpha$ =1 ( = $\sqrt{\frac{D}{\beta}}$ D = 0.5 m = 1.70 (normal condition) 3.40 (earthquake condit lateral bearing capacity $\frac{D}{\beta}$ ) $\times \delta \alpha$ K: 1.70 kgf/cm <sup>3</sup> (normal D: pile diameter(= 50 G $\beta$ : 0.0038 cm <sup>-1</sup> , $1/\beta$ = 2 $\delta a$ : allowable displacent t (normal),	(normal), α=2 (earth ion)(details see table (Ha) al), 3.40 kgf/cm <sup>3</sup> (ea cm) 64.5 cm	quake) 			
$k = k_0$ $B_{\rm H}$ $k = k = 5)-2 \text{ Allowable}$ $Ha = \left(K \times Ha = 22.5\right)$	= $k_0(B_H/30)^{-3/4}$ = $\frac{1}{30} \times \alpha \times E_0$ E0 = 28N = 140, $\alpha$ =1 ( = $\sqrt{\frac{D}{\beta}}$ D = 0.5 m 1.70 (normal condition) 3.40 (earthquake condit lateral bearing capacity $\frac{D}{\beta}$ $\times \delta \alpha$ K: 1.70 kgf/cm <sup>3</sup> (normation) D: pile diameter(= 50 G $\beta$ : 0.0038 cm <sup>-1</sup> , $1/\beta$ = 2 $\delta a$ : allowable displacent	(normal), α=2 (earth ion)(details see table (Ha) al), 3.40 kgf/cm <sup>3</sup> (ea cm) 64.5 cm	quake) 			
$k = k_0$ $B_{\rm H}$ $k = k = 5)-2 \text{ Allowable}$ $Ha = \left(K \times Ha = 22.5\right)$	= $k_0(B_H/30)^{-3/4}$ = $\frac{1}{30} \times \alpha \times E_0$ . E0 = 28N = 140, $\alpha$ =1 ( = $\sqrt{\frac{D}{\beta}}$ D = 0.5 m = 1.70 (normal condition) 3.40 (earthquake condit lateral bearing capacity $\frac{D}{\beta}$ ) $\times \delta \alpha$ K: 1.70 kgf/cm <sup>3</sup> (normal D: pile diameter(= 50 G $\beta$ : 0.0038 cm <sup>-1</sup> , $1/\beta$ = 2 $\delta a$ : allowable displacent t (normal),	(normal), α=2 (earth ion)(details see table (Ha) al), 3.40 kgf/cm <sup>3</sup> (ea cm) 64.5 cm	quake) 			

Name o Structur		``;		I PUMI FATIO					egory ulatio				ctura alysis		P	age	2	5/4
6) Load a	nd mo	mei	nt for	a pile	 				÷		•							
				•						•								
6)-1 Load	and n	non	ent a	it foot	ing c	ente	<b>r</b> 111	•		•	· · ·		 					
	1		1.2.2		1. To 5		1.2.35				2			1		•		
Load and	mome	ent a	it foo	ting c	enter	' is c	alcula	ted	as fol	llows:			· .					
		••••		- 1 - 1 - 1 - 1 - 1	į						1	1. F.	- * -					3
P	· · · ·			1			<u></u>					******	· .					
Name of	no	rmal(	x	no	rmal(Z	)	seis	smic(	ZX)	sei	ismic(/	!Z)	sei	smic()	20	sei	smic(X	Z)
Structure	V	Н	М	γ	Н	М	V	Н	М	V	Н	M	Y	Н	М	V ·	Н	٨
Front Structure	416	98	984	-416	77	133	555	0	427	-555	-350	626	555	111	1094	-555	.77	13
Main Structure	-713	.31	.137	-713	-104	260	-964	.48	-144	-964	.379	1073	964	278	387	.964	-104	26
Main Structure-				.1727		E.	-1641			-1641		л. 15-е.				1641		
	-1727	•40	•143	-1727	•10	34	337	<u> </u>	1022	1041	.219	ovz	-1041		003	-1641		21

# 6)-2 Layout of pile

()

Layout of piles is shown below

Name of Structure	E E E E E P	ile Arrangeme	nt of a let
	X	Ζ.	total
Front Structure	6	9	54
Main Structure-A	5	10	50
Main Structure B	3	6	18
Main Structure-C	4	7	28
House Slab	3 3 5	4	12

## 6)-3 Calculation of displacement

Displacement calculated is shown below

Displacement of Piles and Load on Piles (Asin Pumping Station)

# Front Structure

uspiacement	(a) (a) (b) (b) (b)		er en	and the states	a second a second	e na star e na	e de la seta e
		- 月1日日	delta H(cm)		alpha	H(10-5 ra	dian)
	delta y	delta x	delta z	delta H	alpha x	alpha z	alphs H
normal	0.031	0.082	0.064	0.10	1.55	0.4	1.60
earthquake: z	0.042	0.00005	0.17	0.17	0.05	-1.52	1.52
earthquake:x	0.042	0.056	-0.038	0.07	1.49	0.334	1.53

#### load on

	P۱	r(t)		1		1
	Pvmax :	Pvmin	Ph(t)	Mo(tm)	Mm(tm)	
normal	8.5	6.9	2.31	3.06	0.6	1
earthquake: z	12.9	7.9	6.48	7.28	1.5	
earthquake: x	11.7	12.2	2.50	2.81	0.6	

beta(normal)= 0.00378 beta(quake)= 0.004449

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Name of Structure		PUMPING ATION		Category alculation		ructural nalysis	Page	26/42
Main Structure displacement	÷A					tati kira		t in the cate of
		delta H(crr			alpha H(10	)-5 radian)	6 <u>.</u>	s in start.
	delta y	delta x	delta z	delta H	alpha x		hs H	
normal	0.057						0.93	
earthquake: z	-0.078						2.00	
earthquake:x	0.078	0.153	0.055	0.163	-5.27	-0.48	5.29	
load						· · · · · ·	·	
1000	<u> </u>	/(t)		T	<u> </u>			
			Ph(t)	Mo(tm)	Mm(tm)			
normal	15.6		2.17		-0.5968	hatalaa	rmail	0.00070
earthquake: z	23.0		7.61		-1.7618	beta(no beta(q	•	0.00378
earthquake: x	23.2	15.4	5.94		-1.3752	Dera(d	Jakej=	0.00449
		L			1.07.52			
Main Structure	• C		n in the second s					
displacement	2 - england			an da sa li dadi				
		delta H(cm	)		alpha H(10	-5 radian)		
		delta x	delta z	delta H			is H	
normal	0.249	0.078	.0.025	0.082	-1.65	0.15	1.66	
earthquake: z	0.237	0.001	-0.208	0.208	-0.46	1.74	1.80	
earthquake:x	0.237	-0.277	0.015	0.277	.7.81	-0.12	7.81	
а. 1. Бала <b>н</b> а стал	· ·						•••••	
load	<u>_</u>							
and a second second	Pv						an e Shina an a	
normal			Ph(t)		Mm(tm)			
earthquake: z	59.5 62.1		0.56	· · · ·	-0.154	beta(no		0.00378
earthquake: x	60.4	51.2 53.1	7.82	8.71	-1.8104	beta(qı	iake)=	0.00449
curanquane. x	00.4		10.16	11.34	2.3568			
House Slab		· · · ·			· · · ·			
								1. 1. 1. 1.
displacement								11.1 * 41 * 41
displacement	T	delta H(cm)	)	r	aloha	HILL 6 radian	<u> </u>	사람이 좋아 있었다.
		delta H(cm delta x		delta H		H(10-5 radian		antes de la serie de la serie La superiori de la serie La superiori de la serie
		delta x	delta z		alpha x 👘	alpha z 🛛 alph	is H	
	delta y	delta x 0.000	delta z 0.000	0.000	alpha x 0.00	alpha z alph 0.00	s H 0.00	
normal	delta y 0.11	delta x	delta z 0.000 -0.083	0.000 0.083	alpha x 0.00 0.00	alpha z alpł 0.00 -1.74	s H 0.00 1.74	
normal earthquake: z earthquake:x	delta y -0.11 -0.11	delta x 0.000 0.000	delta z 0.000	0.000	alpha x 0.00	alpha z alph 0.00	s H 0.00	
normal earthquake: z	delta y -0.11 -0.11 -0.11	delta x 0.000 0.000 -0.083	delta z 0.000 -0.083	0.000 0.083	alpha x 0.00 0.00	alpha z alpł 0.00 -1.74	s H 0.00 1.74	
normal earthquake: z earthquake:x oad	delta y -0.11 -0.11 -0.11 -0.11	delta x 0.000 0.000 -0.083	delta z 0.000 -0.083	0.000 0.083	alpha x 0.00 0.00	alpha z alpł 0.00 -1.74	s H 0.00 1.74	
normal earthquake: z earthquake:x oad	delta y -0.11 -0.11 -0.11 -0.11 Pvmax	delta x 0.000 0.000 -0.083	delta z 0.000 -0.083 0.000	0.000 0.083 0.083	alpha x 0.00 0.00 -1.66	alpha z alpł 0.00 -1.74	s H 0.00 1.74	
normal earthquake: z earthquake:x oad normal	delta y -0.11 -0.11 -0.11 -0.11 -0.11 Pvmax 27.2	delta x 0.000 0.000 -0.083	delta z 0.000 -0.083 0.000	0.000 0.083 0.083	alpha x 0.00 0.00	alpha z alph 0.00 •1.74 0.00	s H 0.00 1.74 1.66	0.00378
normal earthquake: z earthquake:x oad normal earthquake: z	delta y -0.11 -0.11 -0.11 -0.11 Pvmax 27.2 28.9	delta x 0.000 0.000 -0.083 (t) Pvmin	delta z 0.000 -0.083 0.000 Ph(t)	0.000 0.083 0.083 Mo(tm)	alpha x 0.00 0.00 -1.66 Mm(tm)	alpha z alph 0.00 1.74 0.00 beta(nor	s H 0.00 1.74 1.66 mal)=	0.00378 0.00449
normal earthquake: z earthquake:x oad normal	delta y -0.11 -0.11 -0.11 -0.11 -0.11 Pvmax 27.2	delta x 0.000 0.000 -0.083 (t) Pvmin 27.2	delta z 0.000 -0.083 0.000 Ph(t) 0	0.000 0.083 0.083 Mo(tm) 0.00	alpha x 0.00 0.00 -1.66 Mm(tm) 0	alpha z alph 0.00 •1.74 0.00	s H 0.00 1.74 1.66 mal)=	0.00378 0.00449
normal earthquake: z earthquake:x oad normal earthquake: z	delta y -0.11 -0.11 -0.11 -0.11 Pvmax 27.2 28.9	delta x 0.000 0.000 -0.083 (t) Pvmin 27.2 25.6	delta z 0.000 -0.083 0.000 Ph(t) 0 3.08	0.000 0.083 0.083 Mo(tm) 0.00 3.43	alpha x 0.00 0.00 -1.66 <u>Mm(tm)</u> 0 -0.7131	alpha z alph 0.00 ·1.74 0.00 beta(nor	s H 0.00 1.74 1.66 mal)=	
normal earthquake: z earthquake:x oad normal earthquake: z earthquake: x	delta y -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.12 -0.11 -0.12 -0.11 -0.11 -0.12 -0.12 -0.11 -0.1	delta x 0.000 0.000 -0.083 (t) Pvmin 27.2 25.6 25.8	delta z 0.000 -0.083 0.000 Ph(t) 0 3.08 3.08	0.000 0.083 0.083 Mo(tm) 0.00 3.43 3.43	alpha x 0.00 -1.66 Mm(tm) 0 -0.7131 -0.7131	alpha z alph 0.00 -1.74 0.00 beta(nor beta(qu	s H 0.00 1.74 1.66 mal)=	
normal earthquake: z earthquake:x oad normal earthquake: z	delta y -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.11 -0.12 -0.11 -0.12 -0.11 -0.11 -0.12 -0.12 -0.11 -0.1	delta x 0.000 0.000 -0.083 (t) Pvmin 27.2 25.6 25.8	delta z 0.000 -0.083 0.000 Ph(t) 0 3.08 3.08	0.000 0.083 0.083 Mo(tm) 0.00 3.43 3.43	alpha x 0.00 -1.66 Mm(tm) 0 -0.7131 -0.7131	alpha z alph 0.00 -1.74 0.00 beta(nor beta(qu	s H 0.00 1.74 1.66 mal)=	
normal earthquake: z earthquake:x oad normal earthquake: z earthquake: x	delta y -0.11 -0.11 -0.11 -0.11 -0.11 Pvmax 27.2 28.9 28.7 	delta x 0.000 0.000 -0.083 (t) Pvmin 27.2 25.6 25.8 ion;δy=δH	$\frac{\text{delta z}}{0.000}$ -0.083 0.000 Ph(t) 0 3.08 3.08 = 1.0 cm,	$\frac{0.000}{0.083}$ 0.083 $\frac{10000}{0.000}$ 0.00 0.00 0.00 0.00 0.00 0.00 0.	$\frac{alpha x}{0.00}$ $\frac{0.00}{-1.66}$ $\frac{Mm(tm)}{0}$ $\frac{0}{-0.7131}$ $\frac{0}{-0.7131}$ $\frac{0}{-0.7131}$	alpha z alph 0.00 -1.74 0.00 beta(nor beta(qu	s H 0.00 1.74 1.66 mal)= ake)=	
normal earthquake: z earthquake: x oad normal earthquake: z earthquake: x lowable: norm earth	delta y -0.11 -0.11 -0.11 -0.11 Pvmax 27.2 28.9 28.7 28.7 mal conditi hquake cor	delta x 0.000 0.000 -0.083 (t) Pvmin 27.2 25.6 25.8 ion;δy=δH	$\frac{\text{delta z}}{0.000}$ -0.083 0.000 Ph(t) 0 3.08 3.08 = 1.0 cm,	$\frac{0.000}{0.083}$ 0.083 $\frac{10000}{0.000}$ 0.00 0.00 0.00 0.00 0.00 0.00 0.	$\frac{alpha x}{0.00}$ $\frac{0.00}{-1.66}$ $\frac{Mm(tm)}{0}$ $\frac{0}{-0.7131}$ $\frac{0}{-0.7131}$ $\frac{0}{-0.7131}$	alpha z alph 0.00 -1.74 0.00 beta(nor beta(qu	s H 0.00 1.74 1.66 mal)= ake)=	
normal earthquake: z earthquake:x oad normal earthquake: z earthquake: x	delta y -0.11 -0.11 -0.11 -0.11 Pvmax 27.2 28.9 28.7 28.7 mal conditi hquake cor	delta x 0.000 0.000 -0.083 (t) Pvmin 27.2 25.6 25.8 ion;δy=δH	$\frac{\text{delta z}}{0.000}$ -0.083 0.000 Ph(t) 0 3.08 3.08 = 1.0 cm,	$\frac{0.000}{0.083}$ 0.083 $\frac{10000}{0.000}$ 0.00 0.00 0.00 0.00 0.00 0.00 0.	$\frac{alpha x}{0.00}$ $\frac{0.00}{-1.66}$ $\frac{Mm(tm)}{0}$ $\frac{0}{-0.7131}$ $\frac{0}{-0.7131}$ $\frac{0}{-0.7131}$	alpha z alph 0.00 -1.74 0.00 beta(nor beta(qu	s H 0.00 1.74 1.66 mal)= ake)=	
normal earthquake: z earthquake: x oad normal earthquake: z earthquake: x lowable: norm earth	delta y -0.11 -0.11 -0.11 -0.11 Pvmax 27.2 28.9 28.7 28.7 mal conditi hquake cor	delta x 0.000 0.000 -0.083 (t) Pvmin 27.2 25.6 25.8 ion;δy=δH	$\frac{\text{delta z}}{0.000}$ -0.083 0.000 Ph(t) 0 3.08 3.08 = 1.0 cm,	$\frac{0.000}{0.083}$ 0.083 $\frac{10000}{0.000}$ 0.00 0.00 0.00 0.00 0.00 0.00 0.	$\frac{alpha x}{0.00}$ $\frac{0.00}{-1.66}$ $\frac{Mm(tm)}{0}$ $\frac{0}{-0.7131}$ $\frac{0}{-0.7131}$ $\frac{0}{-0.7131}$	alpha z alph 0.00 -1.74 0.00 beta(nor beta(qu	s H 0.00 1.74 1.66 mal)= ake)=	

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Name of Structure		JMPING TION		Categ Calcula			Structu Analy:		Page	27/42
Pile stress(slab F	6*9)	· · · · · · · · · · · · · · · · · ·		- <b>t</b>		L				<b>I</b> /
ormal										· · ·
	+ 3.06 x	100000	1	10416.2	+ 12783	5 <b>]</b> x	1000 /	1182.4	=	77.6
- 41	- 3.06 x			10416.2			1000 /			18.8
8152.5	+ 321.3 x	100000	1	260604.6	· 42.	5 x	1000 /	1182.4	= 8,	239.8
		a ser a s Esta de la ser a			• •		an din an An an		· .	
earthquake Z	027720	100000	·		F7272 2015					
	+ 7.28 x		•	10416.2			1000 /			121.8
	7.28 x + 764.4 x		-	10416.2	日本にも ときょう	÷	1000 /			-18.0
8152.5	+ 7704.41X	100000	1	260604.6	<u>~04.</u>	<u>5</u> ]X	1000 /	1182.4	≕ ð,	391.3
		an de la c								
arthquake X										
	+ 52.81 x	100000	1	10416.2	+ 89111	7 X	1000 /	1182.4	=	77.9
41	- 2.81 x	100000	-				1000 /			23.9
	+ 295.1 x		-					1182.4	= 8,	
			· .						8 - 11 - 1	
			4. 1		it i gr	·	i galar		10.1	1
'ile stress(slab A	5×10)									
										a Alan Alaman di
ormał										
	- <b>2,87</b> x	100000	,	10/16.2	. NWISS	3 v	1000 /	1182.4 =		1.7
41	2.87 x	100000	/ /	10416.2 +	156	Ŷ	1000 /	1102.4 = 1182.4 =		5.6
and the second sec	- 301.35 x			260604.6			1000 /	1182.4 =		
	Eliona Sign				RZELICIE		tagan géra.		- 1	10
									n da. Sen an	
arthquake Z				10416.2	155555	x	1000 /	1182.4 =	1.4	1.8
41 +	18.47 x			10416.2 +		14 ·		1102.4	. 14	
41 -	8.47 x	100000	1 -	10416.2 +	23	x	1000 /	1182.4 =	-20	<b>).9</b>
41 -		100000	1 -		23	x				<b>).9</b>
41 4	8.47 x	100000	1 -	10416.2 +	23	x	1000 /	1182.4 =	-20	<b>).9</b>
41 + 41 8152.5 +	8.47 x	100000	1 -	10416.2 +	23	x	1000 /	1182.4 =	-20	<b>).9</b>
41 4 41	8,47 x 889,35 x	100000 100000	/ · / - :	10416.2 4 260604.6	115	X	1000 / 1000 /	1182.4 = 1182.4 =	-20 8,390	).9 5.5
41 4 41	8,47 x 889,35 x	100000 100000	/ · / - :	10416.2 4 260604.6	115	X	1000 / 1000 /	1182.4 = 1182.4 =	-20 8,390	).9 5.5
41 + 41 8152.5 + arthquake X 41 + 41	8.47 x	100000 100000 100000 100000		10416.2 + 260604.6 + 10416.2 + 10416.2 +	23 115 23.2 23.2	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	1000 / 1000 / 1000 / 1000 /	1182.4 = 1182.4 =	20 8,390 124	0.9 <sup>1.</sup>

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Name of Structure	ASIN PUN STATI		Categor Calculati			tructur Analysi:		Page	28/4	12
Pile stress(slab	C 4×7)									
normal										
c 41 +	0.74] ×	100000	/ 10416.2	+ 6	2.4 x	1000	1 1	182.4 =	100.9	
c' 41 ·		100000	/ 10416.2	+ 🛛 6	2.4 x		•	182.4 =		
p 8152.5 +	2777] x	100000 ,	/ 260604.6		312 x			182.4 =		
earthquake Z		• • •		n te National	•	•	2			
c 41 +	and the second	100000	/ 10416.2	+ 26	33 x	1000	/ 1	182.4 =	178.2	
c' 41 -	8.71 x	100000	/ 10416.2	+ 26	33 x		-	182.4 ==		
p 8152.5 +	914.55 x	100000	/ 260604.6	- 31	6.5 x	1000	/ 1	182.4 =	8,235.8	
	· • •		:							
earthquake X			· · · ·		· · ·					
c 41 +	1134 x			+ (26	18 x	1000	/ 1	182.4 =	202.1	
c' 41 ·	11:34 x	100000					-	182.4 =	-15.6	
p 8152.5 +	x 11907 x	100000	260604.6		309] x	1000	/ 1	182.4 =	8,348.1	
									Parts of	• .1
Pile stress(slab l	H 3×4)								· .	
									· -	••
normal			e înteîte ser Le service	с. С. 1919 г.	1	n ar s			 	·.
c 41 +	() x	100000		+ #2	72 x	1000	/ 1	182.4 =	64.0	
c' 41 -	0 x	100000	/ 10416.2	+	72 x	1000	/ 1	182.4 =	64.0	
p 8152.5 +	x(	100000	260604.6	·榆	136 x	1000	/ 1	182.4 =	8,037.5	• •.
earthquake Z	· · ·	19							-14	÷.
c 41 +	x 3:43 x	100000	10416.2	+ 2	8.9 x	1000	/ 1	182.4 =	98.4	:
c' 41 -	3:43 x 360.15 x	100000	10416.2	+ 💱	89 x	1000	/ 1	182.4 =	32.5	:
p 8152.5 +	360.15 x	100000 ,	260604.6	- 114	415 x	1000	/ 1	182.4 =	8,168.5	
									f star	•
earthquake X				- 5.5 	, i i	in a start a s	••			
c 41 +	3/43 x	100000	10416.2	+ 續2	871 x	1000	/ 1	182.4 =	98.2	
c' 41 ·	3?43 x	100000	/ 10416.2	+ 1/2	87 x	1000		182.4 =		÷.
p 8152.5 +	360,15 x	100000	260604.6	612	36 v				8,169.3	

# 3.10.2 Pile Cap Calculation

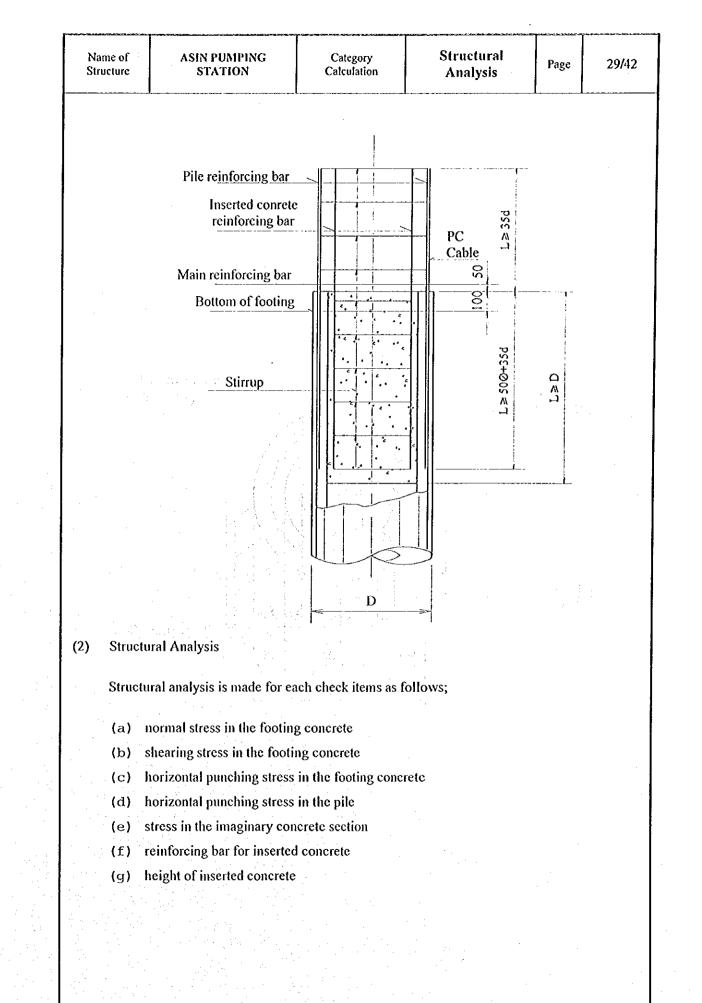
### (1) General

As the horizontal force acting on the piles are large in this structure, a rigid type connection method is applied in the pile cap treatment. The pile cap design criteria is described in "Design Criteria Report (1)". The concept of the pile cap treatment is shown in a figure below.

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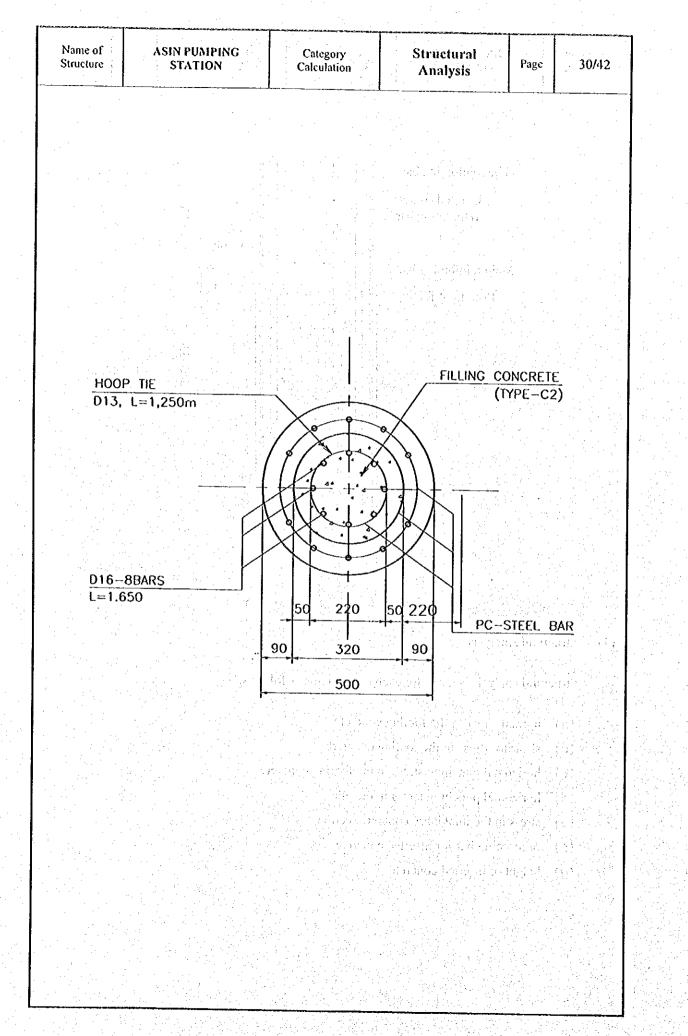


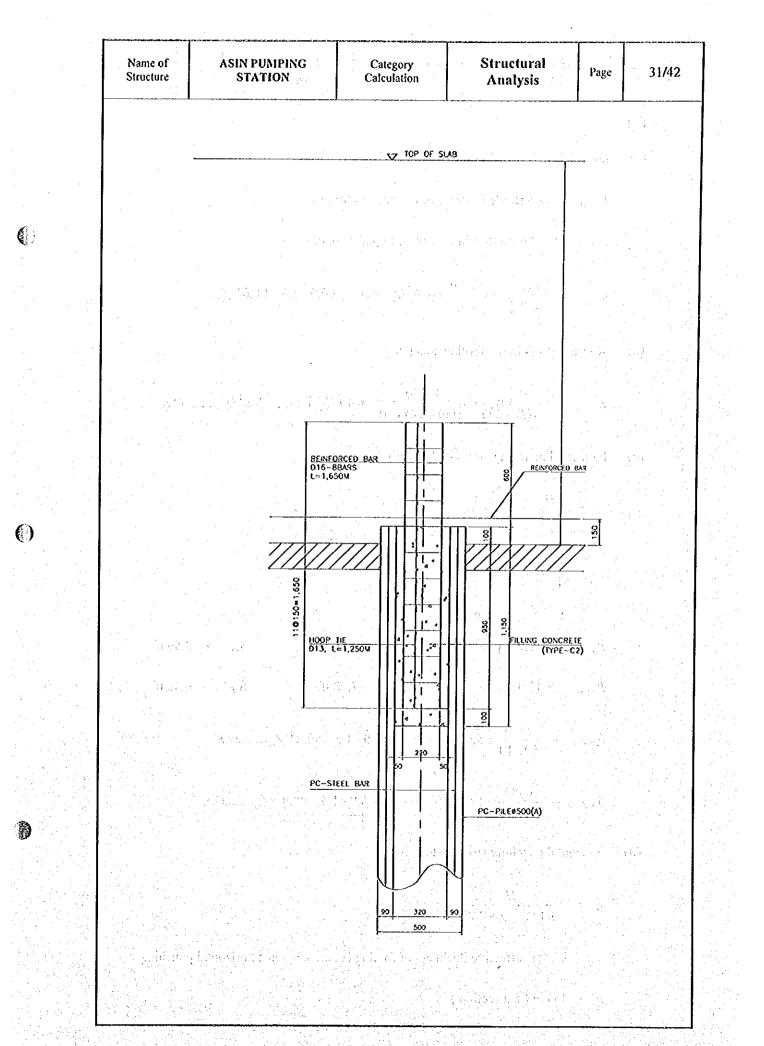
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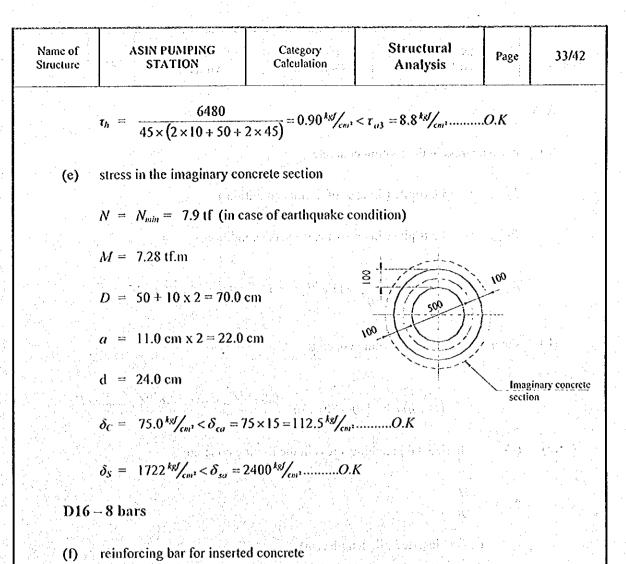
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Name of Structure	ASIN PUMPING Categor STATION Calculati		Page 32/42	
<u>F-F</u>	·······	I		-
(a)	normal stress in the footing concrete			
	$P_{Nnkat}$ = 8.5 tf/pile ( in case of norm	nal condition )		
	$P_{Nnax}$ = 12.6 tf/pile ( in case of eart	hquake condition )		
	$\delta_{cv} = \frac{P_{N \max}}{\pi D^2 / 4} = \frac{12900}{\frac{\pi}{4} \times 50^2} = 6.6^{\frac{k_B}{k_B}} / \frac{12900}{4}$	$m^{2} < \delta_{co} = 60.0 \times 1.5 = 90.0 \frac{kg}{cn}$	1	
<b>(b)</b>	shearing stress in the footing concrete	an an trainn an an An an Anna Anna Anna		
	$\tau_{V} = \frac{P_{N \max}}{\pi (D+h)h} = \frac{12900}{\pi (50+70) \times 7}$	$\frac{1}{10} = 0.49 \frac{\text{kgl}}{\text{cm}^3} < \tau_{ca} = 8.8 \frac{\text{kgl}}{\text{cm}^3}$	O.K.	
(c)	horizontal punching stress in the footi	ıg concrete		
	$\delta_{ch} = \frac{H}{D\ell}$			
	<pre>£ = inserted pile length (cm)</pre>			
	M = Moment (kgf.cm) H = Axial Force			
	$P_{Nmax} = 11.7 \text{ tf/pile} M_{-x}$	= 2.81 tf.m S.x	= 2.50 tf	
	$P_{Nmax} = 12.9 \text{ tf/pile} \text{M.z}$	= 7.28 tf.m S.z	= 6.48 tf	
	$\delta_{ch-X} = \frac{2500}{50 \times 10} = 5.0 \frac{kg}{cm^2} < \delta_{ca} = 6$	$50.0 \times 1.5 = 90.0 \frac{kg}{cm^3} \dots O.K$		
	$\hat{\delta}_{ch-Z} = \frac{6480}{50 \times 10} = 12.96 \frac{k_{sf}}{c_{m^2}} < \delta_{co} =$	$= 60.0 \times 1.5 = 90.0^{\frac{k_{gf}}{c_{rel}}} \dots 0.1$	K	
(d) I	norizontal punching stress in the pile			
	$h = \frac{H}{h'(2\ell + D + 2h')}$			
	h' = effective thickness of foc	oting concrete against horizont	al punching	
	t' = 45  cm (z  direction)			



**(f)** 

 $L_1 \ge L_0$  $L_0 = 350 \text{ (mm)}$ bond length in footing  $\emptyset$  = reinforcing bar diameter (mm)  $L_1 = 35 \times 16 = 560 \Rightarrow 600 \text{ mm}$ bond length in footing  $L_2 = 500 + L_0$ 0 = PC cable diameter (mm) 1.11  $L_2 = 50 \times 9.0 + 35 \times 16 = 1010 \text{ mm}$ ି ≑ 1050 mm  $r \ge p$ 

·出行性者:《是·出身·出行》注

(高生)(日本)(日本)

: D13 per 150 mm pitch Stirrup

height of inserted concrete (g)

 $L_2 \ge 1050 \text{ mm}$ 

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Name of Structure	ASIN PUMPING STATION	Category Calculation	Structural Analysis	Page	34/42	
<u>A-A</u>	an an Saistera					
(a)	normal stress in the footi					
			na state a state s			
	$P_{Nnux}$ = 15.6 tf/pile ( i	n case of normal co	ndition)			
<i>4</i> .						
	$P_{Nn/at} = 23.2 \text{ tf/pile (i}$	n case of earthquake	condition )			ľ
	$P_{N_{\text{max}}} \sim 232$	00				
• • •	$\delta_{cv} = \frac{P_{N\max}}{\pi D^{1}_{4}} = \frac{232}{\frac{\pi}{4} \times 3}$	$\frac{1}{50^2} = 11.8^{8}/_{cm^2} < \delta_c$	$\mu = 60.0 \times 1.5 = 90.0^{*g}$	cm²		
(b)	shearing stress in the foo	ting concrete	电带感染上的 计通过数字输出器 网络一个资源的 化 一个分子 计算法 化合金属合金			
	α	22200	가는 아파 가지가 다. 1993년 - 1993년 - 1993년 1993년 - 1993년 -			
	$\tau_V = \frac{P_{N\max}}{\pi(D+h)h} = -$	$\frac{23200}{\pi(50+70)\times70} = 0.8$	$88 \frac{\text{kgf}}{\text{cm}^2} < \tau ca = 8.8 \frac{\text{kgf}}{\text{cm}^2}$	,ı0	P.K.	
(c)	(c) horizontal punc	ching stress in the fo	oting concrete			:
nin in sin Nin						.
	$\delta_{ch} = \frac{H}{D\ell}$				1997年1月1日 注意到2月1日————————————————————————————————————	
	٤ = inserted pi	le length (cm)				
			44日前日日本 (11月1日) 1月1日(11月1日)(11月1日)	क्षेत्र हो। इ.स. हे		
	M = Moment (k	:gf.cm)				
• •	H = Axial Forc	e				
	$P_{Nmax} = 23.2 \text{ tf/pile}$	M. <sub>x</sub> = 6.	61 tf.m S. <sub>X</sub>	= 5.9	4 tf	
ana ang sang Ang	$P_{Nmax} = 23.0 \text{ tf/pile}$	M 9	A7 • 6 ····			•
		ivi.z 0.	47 tf.m S. <sub>z</sub>	- 7.6	I U • • • • • • • • • • • • • • • • • • •	
	$\delta_{ch-X} = \frac{5940}{50 \times 10} = 11.9$	181/ 28 -6004	1 S00 0 <sup>kg</sup> /	с - дана (* ) И		
	50×10	$\gamma_{cm} < 0_{ca} = 00.0 \times$	$1.3 = 90.0  G_{cm^{2}} \dots O_{cm^{2}}$	<b>`</b>		
	7610					
	$\delta_{ch-2} = \frac{7610}{50 \times 10} = 15.2$	$k_{cm}^{kgf}/_{cm} < \delta_{ca} = 60.0 \times$	$1.5 = 90.0 \frac{\text{kgf}}{\text{cm}^3} \dots O.1$	ĸ		
<i>.</i>						
(d)	horizontal punching stres	s in the pile				
	<b>H</b>					
	$\tau_h = \frac{H}{h'(2\ell + D + 2h')}$					

h' = 45 cm (z direction)

Name of  
StructuredASIN PUMPING  
STATIONCategory  
CatalationStructural  
Analysis
$$P_{0.90}$$
35/42 $\tau_0 = \frac{7610}{45 \times (2 \times 10 + 50 + 2 \times 45)} = 1.06^{4g}/_{ee} < \tau_{a1} = 8.8^{4g}/_{ee}$  $0.6$ (c)stress in the imaginary concrete section $N = N_{win} = 15.71 ff$  (in case of earthquake condition) $M = 8.471 ff.m$  $D = 50 + 10 \times 2 = 70.0 \text{ cm}$  $a = 11.0 \text{ cm} \times 2 = 22.0 \text{ cm}$  $d = 24.0 \text{ cm}$  $\delta_C = 19.2^{1/g}/_{ee} < \delta_{ee} = 75 \times 15 = 112.5^{1/g}/_{ee} \dots \dots O.K$  $\delta_S = 1534^{1/g}/_{ee} < \delta_{ee} = 2400^{1/g}/_{ee}, \dots \dots O.K$  $D16 - 8$  bars(f)reinforcing bar for inserted concrete $L_1 \ge L_0$ bond length in footing $L_0 = 350 (mm)$  $\Theta = reinforcing bar foot inserted concrete $L_1 = 2.5 \times 10^2 - 500 + 1.0^2$  $\Theta = reinforcing bar foot inserted concrete $L_1 = 3.5 \times 10^2 - 500 + 1.0^2$  $\Theta = reinforcing bar foot inserted concrete $L_1 = 3.5 \times 10^2 - 500 + 1.0^2$  $\Theta = PC$  cable diameter (mm) $L_2 = 500 + 1.0^2$  $\Theta = PC$  cable diameter (mm) $L_2 = 500 \times 9.0 \times 35 \times 10^2$  $H = 0.13 \text{ per 150 mm pitch}$ (g)height of inserted concrete $L_2 \ge 1050 \text{ min}$$$$ 

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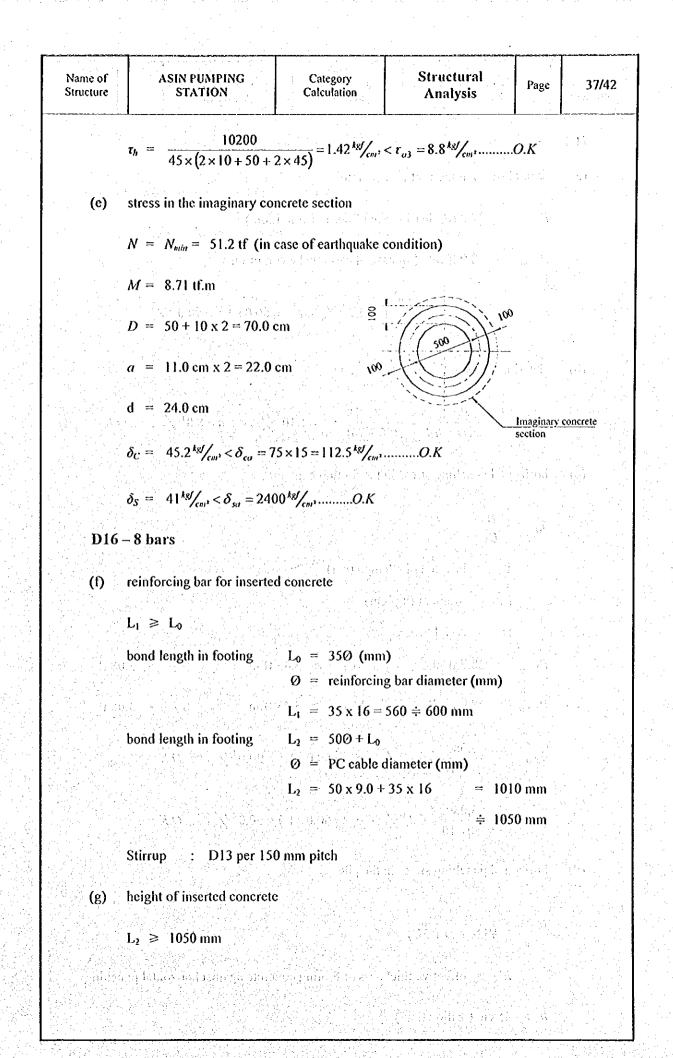
Name of Structure	ASIN PUMPING STATION	Category Calculation	Structural Analysis	Page	36/42
<u>C-C</u>				L]	
(a)	normal stress in the footin	in the second			
		1997 - 1997 -			
• .	$P_{Nmax} = 59.5 \text{ tf/pile ( in})$	case of normal cor	•		
	$P_{Nnux}$ = 62.1 tf/pile ( in	case of earthquake	era dijebe vir angela. • condition ) 🖌		
	$\delta_{cv} = \frac{P_{N\max}}{\pi D^{1}/4} = \frac{6210}{\frac{\pi}{4} \times 50}$	$\frac{0}{p^2} = 31.6^{\frac{kg}{cm^2}} < \delta_c$	$J = 60.0 \times 1.5 = 90.0^{k_{s}}$	cm² -	
(b)	shearing stress in the footing	ng concrete			
	$\tau_{\nu} = \frac{P_{N\max}}{\pi(D+h)h} = \frac{1}{\pi}$	<u>62100</u> (50 + 70)× 70 = 2.3	$5^{\text{kgf}}_{\text{cm}^2} < \tau ca = 8.8^{\text{kgf}}_{\text{cm}^2}$	,•0.	к. (
(c)	horizontal punching stress	in the footing conc	rete		
	$\delta_{ch} = \frac{H}{D\ell}$			4 ( 4 ) 4 ( 4 )	
	$\mathfrak{k}$ = inserted pile	length (cm)		- time	
	M = Moment (kg	f.cm)			
	H = Axial Force				
	$P_{Nmax} = 60.4 \text{ tf/pile}$	M <sub>-x</sub> = 11	.3 tf.m S.x	= 10.2	tf <
	$P_{Nmax}$ = 62.1 tf/pile <	M <sub>-z</sub> = 8.1	71 tf.m 🖌 S.z	= 7.82	tf -
	$\delta_{ch-X} = \frac{10200}{50 \times 10} = 20.4^{k}$	$s/c_{m}, < \delta_{ca} = 60.0 \times$	1.5 = 90.0 <sup>kg/</sup> cm <sup>3</sup> ,0.1	۲.	
	$\delta_{ch-z} = \frac{7820}{50 \times 10} = 15.6^{k_z}$	$\delta_{cm^1} < \delta_{ca} = 60.0 \times 10^{-1}$	$1.5 = 90.0^{kgf}/cm^20.k$	( (	
(d)	horizontal punching stress	in the pile			
	$\tau_h = \frac{H}{h'(2\ell+D+2k')}$				
		이 말한 것 같은 동물을 받았		a de la companya de l	· · · · · · · · · · · · · · · · · · ·

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Name of Structure	ASIN PUMPING STATION	Category Calculation	Struct Analy		Page	19 19 49 492 17 <b>38/42</b>
<u>H-H</u>			epiter The second second		<b>_</b>	
(a)	normal stress in the footing	concrete				
	$P_{Nmax}$ = 27.2 tf/pile ( in	case of normal co	ndition )			
. · ·	$P_{Nmax} = 28.9 \text{ tf/pile ( in example)}$	case of earthquake			т. 121. 1	
	$\delta_{cv} = \frac{P_{N \max}}{\pi p_{A}^{p}} = \frac{28900}{\frac{\pi}{4} \times 50}$	$\frac{1}{2} = 14.7 \frac{kg}{cm^2} < \delta_c$	" = 60.0 × 1.5	= 90.0 <sup>kg/</sup>	cm <sup>2</sup>	
(b)	shearing stress in the footin	ig concrete			5 5	
	$\tau_{V} = \frac{P_{N\max}}{\pi(D+h)h} = \frac{1}{\pi(D+h)h}$	<u>28900</u> 50 + 70) × 70 = 1.1	0 <sup>kgf</sup> /cm <sup>2</sup> < tCa	= 8.8 <sup>kg/</sup> (m	, <i>0</i> .	К.
(c)	horizontal punching stress	in the footing cond	rete			
	11					
	$\delta_{\epsilon h} = \frac{H}{D\ell}$				11月1日 11月1日日 11月1日日	
	$\mathbf{\hat{t}}$ = inserted pile	length (cm)				
	M = Moment (kg	f.cm)				
	H = Axial Force					
	$P_{N_{RHAX}} = 28.7 \text{ tf/pile}$	M. <sub>x</sub> = 3.	43 tf.m	S.x	= 3.08	Stf (
	$P_{Nmax} = 28.9 \text{ tf/pile}$	M. <sub>z</sub> = 3.	43 tf.m	S.z	= 3.08	Stf
	$\delta_{ch-X} = \frac{3,080}{50 \times 10} = 6.2^{\frac{1}{8}}$	$\zeta_{cm^1} < \delta_{ca} = 60.0 \times 1$	$.5 = 90.0^{ksl}/c$	"·		
	$\delta_{ch-Z} = \frac{3,080}{50 \times 10} = 6.2^{kg/2}$	$\zeta_{cn1} < \delta_{ca} = 60.0 \times 1$	.5=90.0 <sup>kg/</sup> c	"• <i>O.K</i>		
(d)	horizontal punching stress i	n the pile				
	$\tau_h = \frac{H}{h'(2\ell+D+2h')}$					
	h' = effective thicks the second se	kness of footing c				

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$$\tau_h = \frac{3,080}{45 \times (2 \times 10 + 50 + 2 \times 45)} = 0.43^{4d}/_{cal} < r_{a3} = 8.8^{4d}/_{cal}, \dots, O.K$$
(e)stress in the imaginary concrete section $N = N_{min} = 25.61f$  (in case of carthquake condition) $M = 3.43$  tf.m $D = 50 + 10 \times 2 = 70.0$  cm  
 $a = 11.0$  cm  $x = 22.0$  cm $d = 24.0$  cm $\sqrt{90}$  $\sqrt{90}$  $\delta_C = 17.3^{4d}/_{cal} < \delta_{ca} = 75 \times 15 = 112.5^{4d}/_{cal}, \dots, O.K$ D16 - 8 bars(f)reinforcing bar for inserted concrete $L_4 = L_4$ bond length in footing $L_6 = 350$  (mm) $O = reinforcing bar diameter (mm)$  $L_1 = 35 \times 16 = 560 \div 600$  mmbond length in footing $L_2 = 500 + L_6$  $O = PC$  cable diameter (mm) $L_2 = 50 \times 9.0 + 35 \times 16 = 1010$  mm $z = 1050$  mmStirrup: D13 per 150 mm pitch

(g) height of inserted concrete

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 $L_2 \ge 1050 \text{ mm}$ 

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