

## เอกสารอ้างอิง



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โยธาบัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย, 2531



ภาคผนวก ก.

รายละเอียดผลการทดสอบเสาเข็ม และข้อมูลหลุมเจาะดินที่ใช้วิจัย

Project : THE THAI MILITARY BANK LTD. -----

Pileload test No. PT 1, Boring log No.: BH-1 -----

Working load (ton): 3.00 -----

Settlement at working load (mm) 3.00 -----

pile section dimension: 1.20,  $\phi$ (m) 1.20 -----

pile cross section area (cm<sup>2</sup>) 11310 -----

pile length (m) 49.00 -----

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration: 4 - $\phi$  1.20\*49.00 mm

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0	812.5	3.98		
162.5	0.25	975	5.58		
325	0.84	1137.5	7.27		
487.5	1.72	1300	9.63		
650	3.00	1462.5	11.70		
325	2.89	1625	13.51		
0	-0.24	125	2.50		
		0	2.20		
0	-0.33				
162.5	-0.38				
325	1.16				
487.5	0.02				
650	3.00				

Soil Boring Log No.

Project: THAI MILITARY BANK HEAD OFFICE

Location : Phaholyotin Road, BKK.		Soil Investigator: S.T.S										
Borehole no.: BH1		Boring Started: 25/09/89		Finished: 28/09/89								
Soil Description	$t_c$ $t/m^3$	Att. Limits, %					Su from UC		SPT			
		PL	Wn	LL	Test		Blows/ft		N			
		— 0 —					$t/m^2$		Blows/ft			
		20	40	60	80	100	2.5	5.0	20	40	60	80
concrete slab & sand fill												
silty clay, grey brown, stiff (CH)									•12			
									•20			
clay trace fine sand and shell fragment dark grey, soft (CH)									•15			
									•21			
									•24			
									•25			
silt clay trace fine sand li-grey li-brown, stiff to very stiff (CH)									•30			
Fine sandy clay, yellowish brown, stiff									•15			
									•17			
silty clay trace to some fine sand, li-greyish brown, very stiff to hard (CL)									•15			
									•16			
clayey fine sand to fine sandy clay, li-greyish brown, dense (SC - CL)									•20			
									•38			
									•24			
									•19			
									•36			



Project : IMPERIAL TARA IIPileload test No. EDE/PLT/90/01, Boring log No.: BH-3Working load (ton): 1060Settlement at working load (mm) 5.19pile section dimension: 1.50,  $\phi$ (m) 1.50pile cross section area (cm<sup>2</sup>) 17671pile length (m) 56.00pile             $\Delta$  friction pile                                     $\blacktriangle$  End bearing pileloading support    $\blacktriangle$  Anchore pile                             $\Delta$  counter weight

Anchore configuration                    4 Anchore

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00	795	2.65		
265	1.16	1060	4.62		
530	1.74	1325	8.12		
795	2.87	1855	10.46		
1060	5.19	2100	48.36		
795	4.60	1590	46.89		
530	3.26	1060	39.32		
265	1.56	0	34.54		
0	-0.84				
0	-0.84				
265	0.16				
530	1.34				





Project : OCEAN TOWER II

Pileload test No. EDE/PLT/90/06, Boring log No.: B\_1

Working load (ton): 700

Settlement at working load (mm) 3.37

pile section dimension: 1.20,  $\phi$ (m) 1.20

pile cross section area (cm<sup>2</sup>) 11310

pile length (m) 53.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration    4 - $\phi$ 1.20\*53.0 m

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0	700	3.43		
175	0.29	875	3.80		
350	1.27	1050	5.97		
525	2.31	1225	7.49		
700	3.37	1400	11.15		
350	3.22	1050	11.10		
175	2.08	700	9.32		
0	0.51	350	5.63		
		0	2.04		
0	0.51				
175	0.76				
350	1.44				
525	2.44				







Project : SAICHON MANSION

Pileload test No. EDE/PLT/90/12, Boring log No.: B 1

Working load (ton): 500

Settlement at working load (mm) 3.30

pile section dimension: 1.20,  $\phi$ (m) 1.20

pile cross section area (cm<sup>2</sup>) 11310

pile length (m) 46.21

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support    $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration: 4 - $\phi$ 1.20\*46.0 m

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0	375	4.87		
125	0.84	250	3.78		
250	1.63	125	2.78		
375	2.51	0	1.22		
500	3.30				
625	4.26				
750	5.22				
875	6.29				
1000	8.50				
875	8.12				
750	7.29				
625	6.56				
500	5.72				

Soil Boring Log No.

Project: SAICHON MANSION

Location : Charoennakhon RD. BKK. Soil Investigator: W.A.C		Borehole no.: B1		Boring Started: 24/7/90		Finished: 27/7/90							
Soil Description	γ <sub>t</sub> t/m <sup>3</sup>	Att.Limits,%					Su from UC		SPT				
		PL	Wn	LL	Test		N						
		— 0 —					t/m <sup>2</sup>		Blows/ft				
		20	40	60	80	100	2.5	5.0	20	40	60	80	
Filled material													
medium dark clay grey silty clay							2.5						
Very soft dark grey silt clay occasional							2.0						
very fine sand							2.0						
ML-Cl. & OL							2.0						
Very loose dark grey silty very fine sand										4			
occasional mica										4			
Very soft dark grey silty clay trace of										4			
very fine sand										5			
Medium dark grey silty very fine sand										7			
SM										21			
Medium dark grey silty very fine sand										11			
trace of calcareous										8			
Very stiff to stiff light grey and yellowish										22			
brown silty clay occasional very fine sand										21			
Medium to dense light grey and brown very										18			
fine sand										41			
Hard brown silty clay										57			
Dense to very dense light grey and brown										77			
very fine sand										63			
SM													
Very dense yellow and fine sand										62			

Soil Boring Log No.

Project: SAICHON MANSION

Location : Charoennakhon RD. BKK.		Soil Investigator: W.A.C											
Borehole no.: B1		Boring Started: 24/7/90		Finished: 27/7/90									
Soil Description	γ <sub>t</sub> t/m <sup>3</sup>	Att. Limits, %					Su from UC Test t/m <sup>2</sup>		SPT N Blows/ft				
		PL	Wn	LL	— 0 —		2.5	5.0	20	40	60	80	
Very dense to dense light grey very fine sand SM & SM - SP									•36				80
									•56				
									•56				167
									•71				
dense light grey and brown fine to ? sand, trace of gravels GM - GP									•45				
									•48				
Very dense to dense grey and brown very fine sand, occasional pea gravels SM, SP, SM - SP & SW									•32				
									•64				
													141
									•68				
									•89				
								•76					
								•44					
													111
													102
													112
									•63				

Project :    SUKHUMVIT   CENTER   -----

Pileload test No.   EDE/PLT/89/05  , Boring log No. :   B\_1  -----

Working load (ton) :    500   -----

Settlement at working load (mm)    2.04   -----

pile section dimension :    1.20   ,  $\phi$ (m)    1.20   -----

pile cross section area (cm<sup>2</sup>)   11310  -----

pile length (m)   56.00  -----

pile            $\Delta$  friction pile                            $\blacktriangle$  End bearing pile

loading support    $\blacktriangle$  Anchore pile                    $\Delta$  counter weight

Anchore configuration:    4   $-\phi 1.20 \times 56.00$  m

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0	0	- 0.04	1000	7.29
125	0.15	241	0.86	750	5.93
250	0.63	337	1.48	500	4.32
375	1.29	434	2.08	250	2.02
500	2.04	530	2.68	0	0.02
625	2.73	626	3.31		
750	3.64	723	3.94		
875	4.44	807	4.59		
1000	6.16	940	5.18		
750	5.35	1024	5.74		
500	3.88	1108	6.43		
250	2.25	1181	6.90		
0	-0.04	1250	8.12		



Soil Boring Log No.

Project: SUKHUMVIT CENTER

Location : Sukhumvit Soi 17, BKK.		Soil Investigator: W.A.C												
Borehole no.: B1		Boring Started: 24/4/31		Finished: 2/5/31										
Soil Description	γ <sub>t</sub> t/m <sup>3</sup>	Att. Limits, %					Su from UC Test t/m <sup>2</sup>		SPT N Blows/ft					
		PL	W <sub>n</sub>	LL	— 0 —		2.5	5.0	20	40	60	80		
-25														
Hard light grey, reddish and yellowish brown clay CL, CH & ML - DL													•36	
													•26	
													•28	
													•41	
													•49	
-40	Hard grey and brown clay CL & ML - OL												•45	
													•44	
													•43	
													•38	
-45	Dense to very dense brown silty very fine sand SM												•31	
													•49	
													•39	
-50	Hard grey and brown clay CL & ML - OL												•47	
													•51	
													•55	
-55	Very dense grey and brownish grey very fine sand occasional gravels SM												•80	
													•136	
													•125	
-60													•161	



Project :  P.S. TOWER -----

Pileload test No.  EDE/PLT/89/15, Boring log No. :  B\_1 -----

Working load (ton) :  600 -----

Settlement at working load (mm)  4.36 -----

pile section dimension :  1.20 ,  $\phi$ (m)  1.20 -----

pile cross section area (cm<sup>2</sup>)  11310 -----

pile length (m)  53.00 -----

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration:    4 -  $\phi$ 1.20\*53.00 m

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0	600	4.31		
150	0.72	750	5.46		
300	1.24	900	6.88		
450	2.53	1050	9.10		
600	4.36	1200	12.25		
300	3.06	900	10.19		
150	2.24	600	7.68		
0	0.95	300	6.85		
		150	4.91		
		0	1.35		
0	0.95				
150	1.52				
300	2.56				
450	3.32				



Soil Boring Log No.

Project: P.S TOWER

Location: Sukhumvit Soi 21, BKK.		Soil Investigator: W.A.C											
Borehole no.: B1		Boring Started: 2/9/89		Finished: 7/9/89									
Soil Description	$\gamma_t$ t/m <sup>3</sup>	Att. Limits, %					Su from UC		SPT				
		PL	Wn	LL	— 0 —		Test		N				
		20	40	60	80	100	2.5	5.0	Blows/ft				
									20	40	60	80	
Very stiff to hard light grey, red and brown silty clay, occasional very fine sand and pea gravels CL													35 50 54
Stiff to very stiff dark grey silty clay trace to very fine sand and decayed wood CL - ML													17 19 41
Very stiff grey and brown silty clay, occasional very fine sand CL													42 59
Dense to very dense greyish brown and brown very fine sand SM													82
Hard to very stiff grey and reddish brown silty clay MH - OH & ML - OL													40 37 42
Dense to very dense dark grey very fine sand SM													76 74
Dense to very dense grey and greyish brown very fine sand, occasional coarse and gravels SM - SP & SM													33 110 99 106

Project : AYOTHAYATHANI HOTEL

Pileload test No. EDE/PLT/90/08, Boring log No. : BH-2

Working load (ton) : 450

Settlement at working load (mm) 2.52

pile section dimension : 1.20,  $\phi$ (m) 1.20

pile cross section area (cm<sup>2</sup>) 11310

pile length (m) 42.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration:    4 - $\phi$ 1.20\*42.00

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0	562.5	2.92		
112.5	0.65	675	3.74		
225	1.42	787	4.61		
337.5	2.30	900	6.04		
450	2.52	675	5.95		
225	2.30	450	4.87		
0	0.13	225	3.02		
		0	0.35		
0	0.13				
112.5	0.70				
225	1.17				
337.5	1.68				
450	2.30				





Project : CTI TOWER

Pileload test No. EDE/PLT/89/09, Boring log No.: BH-1

Working load (ton): 500

Settlement at working load (mm) 4.57

pile section dimension: 1.00,  $\phi$ (m) 1.00

pile cross section area (cm<sup>2</sup>) 7854

pile length (m) 53.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration:    4 - $\phi$ 1.00\*53.00 m

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00	375	2.56		
125	0.49	500	3.57		
250	0.96	625	5.25		
375	2.06	750	8.47		
500	4.57	875	18.19		
375	3.91				
250	3.71				
125	1.87.				
0	0.04				
0	0.04				
125	0.78				
250	1.33				







Project : FOUR-WING MANSION

Pileload test No. EDE/PLT/89/04, Boring log No. : BH-1

Working load (ton) : 450

Settlement at working load (mm) 2.33

pile section dimension : 1.00,  $\phi$ (m) 1.00

pile cross section area (cm<sup>2</sup>) 7854

pile length (m) 49.00

pile             $\Delta$  friction pile                                     $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                             $\Delta$  counter weight

Anchore configuration:    4 Anchore

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	337.5	1.44		
112.5	0.51	450	2.02		
225	1.00	562.5	2.62		
337.5	1.46	675	3.39		
450	2.33	787.5	4.10		
337.5	2.32	900	6.33		
225	2.60	675	6.31		
112.5	2.21	450	6.20		
0	0.00	225	4.45		
		0	1.80		
0	0.00				
112.5	0.40				
225	0.85				

Project : OCEAN TOWER

Pileload test No. EDE/PLT/89/09, Boring log No. : B-2

Working load (ton) : 600

Settlement at working load (mm) 2.91

pile section dimension : 1.20,  $\phi$ (m) 1.20

pile cross section area (cm<sup>2</sup>) 11310

pile length (m) 55

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration: 4  $-\phi 1.20 \times 55.00$  m

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0	450	1.84		
150	0.44	600	2.61		
300	1.02	750	3.46		
450	1.77	900	4.46		
600	2.91	1050	5.72		
450	2.80	1200	7.30		
300	2.27	900	6.88		
150	1.33	600	5.23		
0	-0.28	300	3.42		
		0	-0.06		
0	-0.28				
150	-0.29				
300	1.07				





Project : MAKASAN TOWER

Pileload test No. EDE/PLT/90/09, Boring log No.:

Working load (ton): 900

Settlement at working load (mm) 3.13

pile section dimension: 1.50,  $\phi$ (m) 1.50

pile cross section area (cm<sup>2</sup>) 17671

pile length (m) 57.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration:    4 Anchore

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0 (0)	0.00	675	2.54		
225 (25%)	0.51	900	3.57		
450 (50%)	1.28	1125	4.81		
675 (75%)	2.15	1350	6.12		
900 (100%)	3.13	1575	7.70		
675 (75%)	3.12	1800	9.32		
450 (50%)	2.64	2025	11.52		
225 (25%)	1.54	2250	14.86		
0 (0)	0.00	1800	14.85		
		1350	14.25		
0	0.00	900	11.48		
225	0.67	450	8.26		
450	1.56	0	3.24		

Project : \_\_KIAN GWAN OFFICE BUILDING\_\_

Pileload test No. \_\_PT 1\_\_, Boring log No. : \_\_BH-2\_\_

Working load (ton) : \_\_650\_\_

Settlement at working load (mm) \_\_3.52\_\_

pile section dimension : \_\_1.20\_\_,  $\phi$ (m) \_\_1.20\_\_

pile cross section area (cm<sup>2</sup>) \_\_11310\_\_

pile length (m) \_\_48.60\_\_

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configeration:    4     $-\phi 1.20 \times 48.00$  m

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	487.5	2.19	0	1.10
162.5	0.46	650	3.01		
325	1.17	731.25	3.46		
487.5	1.98	812.5	3.94		
650	3.52	893.75	4.65		
487.5	3.41	975	5.02		
325	2.71	1056.25	5.74		
162.5	1.74	1137.5	6.47		
0	0.17	1218.75	7.13		
		1300	8.32		
0	0.17	975	8.17		
162.5	0.74	650	6.34		
325	1.31	325	4.16		

Soil Boring Log No.

Project: KIAN GWAN OFFICE BUILDING

Location: Wireless Road, BKK.		Soil Investigator: S.T.S										
Borehole no.: BH2		Boring Started: 14/8/87		Finished: 16/8/87								
Soil Description	$E_c$ t/m <sup>2</sup>	Att. Limits, %					Su from UC		SPT			
		PL	Wn	LL			Test		N			
		— 0 —					t/m <sup>2</sup>		Blows/ft			
		20	40	60	80	100	2.5	5.0	20	40	60	80
Asphaltic concrete + fill												
silty clay with pisolitic granule, brownish li-grey, medium stiff (CH)									•20			
									•26			
clay with shell fragment, dark grey, soft (CH)									•20			
									•18			
									•25			
clay with shell fragment, dark grey, medium stiff (CH)									•28			
									•30			
									•30			
silty clay trace of fine sand, li-brownish li-grey, stiff to very stiff (CH)									•18	•5		
									•17	•14		
										•11		
										•8		
fine sandy clay, li-greyish, li-brown, medium stiff (CL)										•7		
										•23		
										•35		
silty fine sand trace of mica, brown, medium to dense										•21		
										•27		
silty clay trace of fine sand, having lime concretions @ ss-21, 22, li-greyish li-brown, very stiff										•22		





Project : PROMPONG

Pileload test No. EDE/PLT/89/ , Boring log No. : BH\_1

Working load (ton) : 250

Settlement at working load (mm) 2.18

pile section dimension: 0.80 ,  $\phi$ (m) 0.80

pile cross section area (cm<sup>2</sup>) 5027

pile length (m) 32.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration: 4 - $\phi$ 0.80\*32.00 m

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	250	2.08		
90	0.56	310	2.80		
125	0.85	375	3.64		
180	1.43	430	4.34		
250	2.18	500	5.55		
125	1.98	375	5.58		
60	1.15	250	4.46		
0	0.03	125	3.00		
		0	0.15		
0	0.03				
90	0.58				
125	0.87				
180	1.39				

Soil Boring Log No. 1

Project: PROMPONG

Location : Sukhumvit Soi 39 , BKK.      Soil Investigator: W.A.C												
Borehole no.: BH1			Boring Started: 15/10/88			Finished: 2/11/88						
Soil Description	$f_c$ t/m <sup>3</sup>	Att.Limits,%					Su from UC		SPT			
		Pl	Wn	LL			Test	N	Blows/ft			
		— 0 —					t/m <sup>2</sup>					
		20	40	60	80	100	2.5	5.0	20	40	60	80
Top soil												
Very soft to medium dark grey silty clay, occasional very fine sand, shell bits							• 10					
							• 20					
							• 25					
							• 25	• 30				
Very stiff light grey and green silty clay, occasional, very fine sand (CL)							• 50					
							• 60			• 27	• 23	
Medium brownish, yellow very fine sand (SM)										• 29		
very stiff light grey and brownish yellow silty very fine sand										• 28		
Medium light grey and brownish yellow silty very fine sand										• 21		
										• 16		
stiff yellowish light brown silty clay trace to very fine sand										• 20		
										• 15		



Project :  C.T.I PLAZA

Pileload test No.  EDE/PLT/89/18 , Boring log No. :  BH -A

Working load (ton) :  500

Settlement at working load (mm)  2.96

pile section dimension :  1.20 ,  $\phi$ (m)  1.20

pile cross section area (cm<sup>2</sup>)  11310

pile length (m)  32.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration: 4 - .20\*32.00 m

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	625	4.73		
125	0.71	750	5.56		
250	1.17	875	6.17		
375	2.09	1000	8.74		
500	2.96	750	8.20		
250	2.14	500	6.56		
0	0.00	250	4.83		
		0	1.21		
0	0.00				
125	1.16				
250	2.39				
375	3.35				
500	4.09				

Soil Boring Log No.

Project: C.T.I PLAZA

Location : Sukhumvit Soi 59 , BKK.      Soil Investigator: S.T.S.												
Borehole no.: BH - A                      Boring Started: 1/11/89                      Finished: 3/11/89												
Soil Description	$\gamma_t$ $t/m^3$	Att.Limits,%					Su from UC		SPT			
		PL	Wn	LL	— 0 —		Test		N			
		20	40	60	80	100	2.5	5.0	Blows/ft			
									20	40	60	80
Fill material												
clay trace organic material and shell, dark grey, soft (CH)									•17			
									•24			
									•14			
									•23			
clay trace fine sand, grey, medium stiff (CH)									•15			
									•13			
									•28			
silty clay trace fine sand, brownish li-grey, stiff (CH)									•73			
									•51			
									•13			
sandy clay or clayey sand, brown, medium dense (SC - CL)									•12			
									•17			
silty clay trace fine sand, greyish brown, stiff (CL)									•23			
									•5			
silty fine to medium sand, brown, dense (SM)									•33			
									•34			
									•48			
									•48			



Project : ASOKE TOWERS

Pileload test No. E, Boring log No. : BH - 3

Working load (ton) : 300

Settlement at working load (mm) 4.87

pile section dimension : 0.80,  $\phi$ (m) 0.80

pile cross section area (cm<sup>2</sup>) 5027

pile length (m) 51.42

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configerung :    4 Anchore

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00	300	4.69		
75	1.00	375	6.05		
150	1.99	450	7.67		
225	3.02	525	9.60		
300	4.87	600	11.99		
150	3.46	675	20.29		
75	2.41	750	33.46		
0	0.94	600	33.17		
		450	32.48		
0	0.94	300	30.59		
75	1.88	150	27.94		
150	2.82	0	23.47		
225	3.75				







Project : KARUMEE TOWER

Pileload test No. \_\_\_\_\_, Boring log No.: \_\_\_\_\_

Working load (ton): 120

Settlement at working load (mm) 4.19

pile section dimension: 0.525\*0.525,  $\phi$ (m) 59.24

pile cross section area (cm<sup>2</sup>) 2756

pile length (m) 28.30

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configeration:    4 Anchore

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	150	4.61		
30	1.29	180	5.62		
60	2.05	210	6.59		
90	2.81	240	7.76		
120	4.16	180	7.17		
60	3.21	120	5.63		
0	0.42	60	3.97		
		0	0.40		
0	0.42				
30	1.60				
60	2.69				
90	3.06				
120	3.87				





Project : HABITAT SUKHUMVIT 35

Pileload test No. \_\_\_\_\_, Boring log No.: \_\_\_\_\_

Working load (ton): 450

Settlement at working load (mm) 2.95

pile section dimension: 1.00,  $\phi$ (m) 1.00

pile cross section area (cm<sup>2</sup>) 7854

pile length (m) 53.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration:    4 Anchore

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00	0	1.27		
112.5	0.69				
225	1.41				
337.5	2.08				
450	2.95				
562.5	3.76				
675	4.64				
787.5	5.62				
900	8.46				
675	7.63				
450	6.08				
225	4.07				
112.5	2.84				







Project : SIAM INN HOTEL

Pileload test No. PT\_1, Boring log No. : B\_1

Working load (ton) : 200

Settlement at working load (mm) 4.02

pile section dimension : 0.80,  $\phi$ (m) 0.80

pile cross section area (cm<sup>2</sup>) 5027

pile length (m) 35.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\Delta$  Anchore pile                     $\blacktriangle$  counter weight

Anchore configuration: 4 Anchore

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	250	4.93		
50	0.66	300	5.93		
100	1.52	350	6.91		
150	2.46	400	8.84		
200	4.02	300	8.03		
100	2.59	200	6.15		
0	0.46	100	3.87		
		0	1.06		
0	0.46				
50	1.11				
100	1.87				
150	2.77				
200	3.76				





Project :  D.S. TOWER

Pileload test No.  PT 2 , Boring log No. :  BH-A

Working load (ton) :  250

Settlement at working load (mm)  2.14

pile section dimension :  0.80 ,  $\phi$ (m)  0.80

pile cross section area (cm<sup>2</sup>)  5027

pile length (m)  30.00

pile             $\Delta$  friction pile     $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile     $\Delta$  counter weight

Anchore configuration:    8 Anchore  $\phi$ 0.60\*21.00 m

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00				
62.5	0.44				
125	0.95				
187.5	1.47				
250	2.14				
312.5	2.96				
375	4.31				
437.5	5.59				
500	9.17				
375	8.78				
250	7.39				
125	5.96				
0	2.88				





Project :  D.S. TOWER  
 Pileload test No.  PT\_1 , Boring log No. :  BH-B  
 Working load (ton) :  250  
 Settlement at working load (mm)  2.00  
 pile section dimension :  0.80 ,  $\phi$  (m)  0.80  
 pile cross section area (cm<sup>2</sup>)  5027  
 pile length (m)  30.00  
 pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile  
 loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight  
 Anchore configuration : 8 Anchore  $\phi$ 0.60\*21.00 m

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00				
62.5	0.06				
125	0.56				
187.5	1.31				
250	2.00				
312.5	3.23				
375	4.44				
437.5	6.43				
500	7.15				
437.5	28.28				
0	21.82				

Soil Boring Log No.

Project: D.S. TOWER

Location: Sukhumvit Soi 33, BKK.		Soil Investigator: S T S										
Borehole no.: BH - B		Boring Started: 29/1/89		Finished: 31/1/89								
Soil Description	γ <sub>s</sub> t/m <sup>3</sup>	Att. Limits, %					Su from UC Test t/m <sup>2</sup>		SPT N Blows/ft			
		PL	Wn	LL			2.5	5.0	20	40	60	80
		— 0 —										
silty clay, trace to some fine sand & roots, dark greyish dark brown (Top soil)												
silty clay, trace fine sand, li-greyish, li-brown, stiff (CH)												
clay, trace fine sand, dark grey, soft (CH)												
silty clay, trace fine sand (T) dark greyish block/(B) li-brownish li-grey to li-brown, stiff (CH)												
clayey fine sand, brown, medium dense (SC)												
silty clay, trace fine sand, li-brownish li-grey, very stiff												
clayey fine sand, brown and brownish li-grey, medium dense (SC)												
silty clay, some fine sand (T) li-brownish li-grey li-brown, stiff (CL/CH)												
clay, some fine sand pocket, dark grey, stiff (CH)												





Project : RAJATHEVE TOWER

Pileload test No. PLT 1, Boring log No. : BH1

Working load (ton) : 285

Settlement at working load (mm) 3.50

pile section dimension : 0.80,  $\phi$ (m) 0.80

pile cross section area (cm<sup>2</sup>) 5027

pile length (m) 34.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configeration: 4 Anchore

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	356.25	4.02		
71.25	0.56	427.50	5.11		
142.50	1.27	498.75	6.58		
213.75	1.96	570.00	9.10		
285.00	3.50	427.25	8.55		
142.50	2.23	285.00	6.67		
0	0.37	142.50	4.71		
		0	2.11		
0	0.37				
71.25	0.97				
142.50	1.67				
213.75	2.43				
285.00	3.27				

Soil Boring Log No.

Project: RATCHATAEWEE TOWER

Location : Ratchataewee, BKK.		Soil Investigator: INTER CONSULT CO.,LTD.											
Borehole no.: BH - 1		Boring Started: 13/11/82					Finished: 16/11/82						
Soil Description	t <sub>c</sub> t/m <sup>2</sup>	Att.Limits,%					Su from UC		SPT				
		PL	Wn	LL			Test		N				
		— 0 —					t/m <sup>2</sup>		Blows/ft				
		20	40	60	80	100	2.5	5.0	20	40	60	80	
brown,medium clay trace coarse sand (CH)													
							•0.72						
							•2.79						
Dark grey,very soft to medium silty clay (CH)							•2.98						
							•2.29						
							•2.79						
							•3.19						
							•6.17						
grey and brown,stiff to very stiff silty clay (CL - CH)							•16						
							•19						
							•22						
							•34						
							•22						
brown,very stiff fine sandy silty clay (CL)							•41						
							•36						
brown,very stiff fine sandy clay (CL)							•31						
							•58						
brown and grey,dense to very dense fine sand (SP)							•36						
							•42						

Soil Boring Log No.

Project: RATCHATAEWEE TOWER

Location : Rachataewee , BKK.		Soil Investigator: INTER CONSULT CO.,LTD.										
Borehole no.: BH-1		Boring Started: 13/11/82					Finished: 16/11/82					
Soil Description	γ <sub>t</sub> t/m <sup>3</sup>	Att.Limits,%					Su from UC		SPT			
		PL	Wn	LL			Test		N			
		— 0 —					t/m <sup>2</sup>		Blows/ft			
		20	40	60	80	100	2.5	5.0	20	40	60	80
brown and grey,dense to very dense fine sand (SP)												
greyish brown,hard clay (CL - CH)												
greyish brown,hard fine sandy silty clay (CL)												
brown,very dense fine to medium sand (SP)												

Project : THAI FARMER BANK

Pileload test No. DE - 8/9, Boring log No. : B - 2

Working load (ton) : 300

Settlement at working load (mm) 3.35

pile section dimension : 1.20,  $\phi$ (m) 1.20

pile cross section area (cm<sup>2</sup>) 11310

pile length (m) 24.5

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration: 4 Anchore

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
75	0.67	525	7.56		
150	1.15	550	12.44		
225	1.72	450	11.92		
300	3.35	300	10.93		
150	2.65	150	9.76		
0	1.00	0	7.14		
75	2.31				
150	3.04				
225	3.64				
300	4.16				
375	4.72				
450	5.80				





Project : THAI FARMER BANK

Pileload test No. EF - 5/6, Boring log No. : B - 4

Working load (ton) : 300

Settlement at working load (mm) 1.60

pile section dimension : 1.20,  $\phi$  (m) 1.20

pile cross section area (cm<sup>2</sup>) 11310

pile length (m) 25.50

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration: 4 Anchore

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.02	375	3.35		
75	0.47	450	4.42		
150	0.79	525	8.20		
225	1.24	550	14.82		
300	1.60	450	14.62		
150	0.96	300	14.11		
0	-0.24	150	13.10		
		0	11.06		
0	0.68				
75	1.14				
150	1.64				
225	2.11				
300	2.69				







Project : ROYAL ORCHID HOTEL  
 Pileload test No. TP\_1, Boring log No. : B\_1  
 Working load (ton) : 250  
 Settlement at working load (mm) 2.30  
 pile section dimension : 1.00,  $\phi$ (m) 1.00  
 pile cross section area (cm<sup>2</sup>) 7854  
 pile length (m) 33.00  
 pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile  
 loading support    $\blacktriangle$  Anchore pile                     $\Delta$  counter weight  
 Anchore configuration: 6 Anchore

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	312.5	3.26		
62.5	0.61	375	3.95		
125	1.12	437.5	4.98		
187.5	1.67	500	6.96		
250	2.30	375	6.05		
125	1.66	250	4.91		
0	0.16	125	3.27		
		0	1.66		
0	0.16				
62.5	0.83				
125	1.36				
187.5	1.93				
250	2.50				

Soil Boring Log No.

Project: ROYAL ORCHID HOTEL

Location : Sipaya Road, BKK.		Soil Investigator: INTER CONSULT. CO., LTD.										
Borehole no.: B 1		Boring Started: 17/11/79		Finished: 20/11/79								
Soil Description	γ <sub>t</sub> t/m <sup>3</sup>	Att. Limits, %				Su from UC		SPT				
		PL	W <sub>n</sub>	LL		Test		N				
		— 0 —				t/m <sup>2</sup>		Blows/ft				
		20	40	60	80	100	2.5	5.0	20	40	60	80
concrete pavement							•0.4					
lateritic soil, fill												
silty clay, trace of organic matter grey												
medium. Top soil							•0.3					
clay some very fine sand, shell & mica, grey, very soft to soft (CH)							•0.25					
							•0.28					
clay trace to some very fine sand, yellowish brown & li-grey, very stiff (CH)							•0.3					
							•1.4					
							•1.2			•28		
very fine sandy - stiff clay, yellow & li-grey, very stiff (CL)							•1.7			•27		
										•27		
clay trace of very fine sand, brown & li-grey, hard (CH)										•8		
										•38		
							•45			•42		
clay trace of very fine sand, brown & li-grey, hard (CH)							•3.7			•40		
										•40		
										•38		
										•28		



Project : ROYAL ORCHID HOTEL

Pileload test No. TP 2, Boring log No. : B 2

Working load (ton) : 130

Settlement at working load (mm) 2.24

pile section dimension : 0.80,  $\phi$ (m) 0.80

pile cross section area (cm<sup>2</sup>) 5027

pile length (m) 34.50

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration: 6 Anchore

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00	187.5	2.96		
37.5	0.93	225	3.67		
75	1.30	262.5	4.32		
112.5	1.67	300	5.12		
150	2.24	225	4.56		
75	1.63	150	3.66		
0	0.39	75	2.52		
		0	0.77		
0	0.39				
37.5	1.15				
75	1.58				
112.5	1.94				
150	2.48				

Soil Boring Log No.

Project: ROYAL ORCHID HOTEL

Location : Sipaya Road, BKK.		Soil Investigator: INTER CONSULT CO., LTD.										
Borehole no.: B 2		Boring Started: 2/11/79		Finished: 6/11/79								
Soil Description	γ <sub>s</sub> t/m <sup>3</sup>	Att. Limits, %					Su from UC		SPT			
		PL	Wn	LL	Test		N		Blows/ft			
		— 0 —					t/m <sup>2</sup>		Blows/ft			
		20	40	60	80	100	2.5	5.0	20	40	60	80
concrete pavement												
sand fill							.03					
silty clay, trace of organic matter, brownish grey, medium. Top soil							.03					
silty clay, some very fine sand, trace of shell, mica & peat, grey, soft. (CH)							.05					
							.03					
							.04					
							.02					
clay brown & li-grey, stiff to very stiff (CH)							.07					
							.15			.17		
										.21		
clay trace of fine sand & gravel, yellow & li-grey, very stiff. (CH)										.23		
										.28		
fine sandy-silty clay, yellowish brown, very stiff. (CL)							.47			.35		
							.63			.47		
clay trace of fine & sand gravel, brown & li-grey, very stiff to hard. (CH)							.53			.75		.52
										.58		
silty clay, red, li-grey & yellow hard. (CH)										.37		





Project : สำนักงานกระทรวงการคลัง

Pileload test No. T\_2, Boring log No. : BH\_5

Working load (ton) : 50

Settlement at working load (mm) 2.31

pile section dimension : I 0.35\*780\*24.00,  $\phi$ (m) 39.49

pile cross section area (cm<sup>2</sup>) 780

pile length (m) 24.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration : 4 Anchore (s = 1.99)

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	37.5	1.57	50	3.76
12.5	0.51	50	2.18	37.5	3.23
25	0.94	62.5	2.77	25	2.47
37.5	1.65	75	3.41	12.5	1.49
50	2.31	87.5	4.31	0	0.04
37.5	1.81	100	5.11		
25	1.46	112.5	6.22		
12.5	1.07	125	7.59		
0	0.05	112.5	7.58		
		100	6.27		
0	0.05	87.5	5.90		
12.5	0.33	75	5.14		
25	0.90	62.5	4.63		

Soil Boring Log No.

Project : สำนักงานคณะกรรมการคลัง

Location : ถนนพระรามที่ 6, บางเขน		Soil Investigator: ENTER CONSULT CO.,LTD.										
Borehole no.: BH - 5		Boring Started: 25/12/22		Finished:								
Soil Description	t <sub>c</sub> t/m <sup>2</sup>	Att.Limits,%					Su from UC		SPT			
		PL	Wp	LL			Test		N			
		— 0 —					t/m <sup>2</sup>		Blows/ft			
		20	40	60	80	100	3	6	20	40	60	80
fill top soil												
Very soft to soft dark grey silty clay, trace of mica, shell bits & decayed wood. (CL, ML - OL)							•26					
							•25					
							•24					
silty dark grey silty clay trace of mica							•25					
							•27					
Very stiff grey silty clay & brown clayey silt, trace of fine sand & mica (CL, ML - OL)									•175			
									•21			
									•24			
									•21			
Hard & very stiff grey & brown silty clay, trace of silty very fine sand.									•35			
									•22			
									•45			
Dense to very dense grey & brown clayey silt & silty very fine sand, trace of coarse sand & pea gravel.											•57	
											•120	
									•37			



Project : สำนักงานกระทรวงการคลัง

Pileload test No. T 5, Boring log No. : BH - 2

Working load (ton) : 50

Settlement at working load (mm) 2.46

pile section dimension : I 0.35\*780\*24.00,  $\phi$ (m) 39.49

pile cross section area (cm<sup>2</sup>) 780

pile length (m) 24.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configerung: 4 Anchore (s = 1.99)

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	37.5	2.11	37.5	5.48
12.5	0.54	50	2.76	25	4.74
25	1.17	62.5	3.60	12.5	3.76
37.5	1.76	75	4.57	0	1.88
50	2.46	87.5	5.57		
37.5	1.97	100	6.62		
25	1.51	112.5	7.51		
12.5	0.64	125	10.69		
0	0.08	112.5	10.00		
		100	9.34		
0	0.08	75	8.19		
12.5	0.56	62.5	7.63		
25	1.26	50	6.59		

Soil Boring Log No.

Project : ลำปางงานกวดตรวจการคลัง

Location : ถนนพหลโยธินที่ 6, กรุงเทพมหานคร		Soil Investigator: INTER CONSULT CO., LTD.										
Borehole no.: BH - 2		Boring Started: 25/12/22		Finished:								
Soil Description	$\gamma_s$ t/m <sup>3</sup>	Att. Limits, %					Su from UC		SPT			
		PL	Wn	LL			Test		N			
		— 0 —					t/m <sup>2</sup>		Blows/ft			
		20	40	60	80	100	3	6	20	40	60	80
TOP SOIL												
Very soft to soft dark grey silty clay. (CL)												
								16				
								10				
stiff to very stiff olive green & yellowish brown silty clay, trace of calcareous & mica (CL)										14		
										21		
										29		
										27		
Very stiff brown silty very fine sand. (SM)										32		
										41		
Dense brown & reddish brown silty very fine to fine sand. (SM)										39		
										35		



Project : WINDSOR HOTEL

Pileload test No. E.D.E/PTT/90/19, Boring log No. : -

Working load (ton) : 600

Settlement at working load (mm) 4.67

pile section dimension : 1.20 ,  $\phi$ (m) 1.20

pile cross section area (cm<sup>2</sup>) 11310

pile length (m) 55.23

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration: 4 Anchore

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00	600	4.53		
150	0.96	750	5.85		
300	1.82	900	8.08		
450	2.87	1050	13.11		
600	4.67	1200	51.74		
300	3.08	900	47.71		
150	1.80	600	44.65		
0	0.21	300	43.02		
		0	39.64		
0	0.21				
150	1.37				
300	2.30				
450	3.365				

Project : GYPSUM MAHANAKORN OFFICE BUILDING

Pileload test No. E.D.E/PLT/90/22, Boring log No. : -

Working load (ton) : 5.50

Settlement at working load (mm) 2.23

pile section dimension : 1.20 ,  $\phi$  (m) 1.20

pile cross section area (cm<sup>2</sup>) 11310

pile length (m) 52.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configeration: 4 Anchore

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	412.5	1.91		
137.5	0.06	550	2.61		
275	0.59	687.5	3.40		
412.5	1.20	825	4.31		
550	2.23	962.5	5.49		
412.5	2.22	1100	7.06		
275	2.20	825	7.00		
137.5	1.53	550	5.63		
0	0.57	275	3.79		
		0	0.65		
0	0.57				
137.5	0.78				
275	1.19				



Project : UM. OFFICE

Pileload test No. EDE/PLT/90/24, Boring log No. : BH - 3

Working load (ton) : 500

Settlement at working load (mm) 4.65

pile section dimension : 1.00,  $\phi$ (m) 1.00

pile cross section area (cm<sup>2</sup>) 7854

pile length (m) 53.42

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration: 4 Anchore

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00	625	5.86		
125	0.90	750	7.24		
250	1.87	875	8.76		
375	2.93	1000	10.55		
500	4.65	1125	13.75		
250	3.46	1250	18.54		
0	0.12	1000	18.24		
		750	15.88		
0	0.12	500	12.08		
125	1.12	250	8.74		
250	2.27	0	2.68		
375	3.32				
500	4.60				





Project : BANGKOK INTERNATIONAL AIRPORT EXPANSION

Pileload test No. T2, Boring log No. : BH - 8

Working load (ton) : 60

Settlement at working load (mm) 2.17

pile section dimension : 0.40\*0.40\*24.00,  $\phi$ (m) 0.451

pile cross section area (cm<sup>2</sup>) 1360

pile length (m) 24.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\Delta$  Anchore pile                             $\blacktriangle$  counter weight

Anchore configuration: -

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00	150	8.12		
15	0.83	120	7.34		
30	1.24	90	6.03		
45	1.68	60	4.42		
60	2.17	30	3.08		
75	2.77	0	0.76		
90	3.34				
105	3.95				
120	4.56				
135	5.14				
150	5.76				
165	6.55				
180	8.22				

Soil Boring Log No.

Project: BANGKOK INTERNATIONAL AIRPORT EXPRESSION

Location : DON MUANG BKK.		Soil Investigator: INTER CONSULT CO.,LTD.										
Borehole no.: BH - 8		Boring Started: 16/8/84		Finished: 18/8/84								
Soil Description	$\gamma_t$ t/m <sup>3</sup>	Att.Limits,%				Su from UC		SPT				
		PL	Wn	LL		Test		N				
		— 0 —				t/m <sup>2</sup>		Blows/ft				
		20	40	60	80	100	2.5	5.0	20	40	60	80
Top soil												
Very soft clay;brownish grey silty some organic saturated. (CH)												
soft to medium clay;dark grey > silty saturated.							•2.5					
stiff clay;yellowish brown trace grey,silty some decomposed moist.							•1.25					
							•3.75					
							•3.75		•10			
							•10.12		•11			
							•20		•18			
							•13.75		•18			
									•11			
dense sand ; fine to coarse brownish red some black saturated										•59		
											•70	
										•31		
										•35		
stiff clay ; reddish brown,silty trace fine sand some mica coarse moist.							•18.75		•20			
							•12.50		•22			



Project : BANGKOK INTERANTIONAL AIRPORT EXPANSION

Pileload test No. T3, Boring log No. : BH-6

Working load (ton) : 60

Settlement at working load (mm) 2.21

pile section dimension : 0.40\*0.40\*24.00,  $\phi$ (m) 0.451

pile cross section area (cm<sup>2</sup>) 1360

pile length (m) 24.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support    $\Delta$  Anchore pile                     $\blacktriangle$  counter weight

Anchore configeration: -

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	150	7.63		
15	0.79	120	6.73		
30	1.21	90	5.58		
45	1.62	60	4.40		
60	2.21	30	2.57		
75	2.79	0	0.70		
90	3.32				
105	3.99				
120	4.70				
135	5.29				
150	6.00				
165	6.72				
180	8.15				

Soil Boring Log No.

Project: BANGKOK INTERNATIONAL AIRPORT EXPANSION

Location : DON MUANG ,BKK.		Soil Investigator: INTER CONSULT CO.,LTD.										
Borehole no.: BH - 6		Boring Started: 20/8/84		Finished: 22/8/84								
Soil Description	t <sub>s</sub> t/m <sup>3</sup>	Att.Limits,%					Su from UC		SPT			
		PL	Wn	LL			Test		N			
		— 0 —					t/m <sup>2</sup>		Blows/ft			
		20	40	60	80	100	2.5	5.0	20	40	60	80
TOP SOIL												
very soft clay ; silty dark grey some organic saturated. (CH)												
soft clay ; silty dark grey some organic saturated. (CH)												
medium clay ; silty trace fine sand saturated.												
stiff clay ; silty greenish grey some decom posed moist.												
medium yellow grey silty fine sand trace clay wet.												
dense sand ; dark brown trace yellow fine sand saturated.												
very stiff clay ; yellowish brown clay, silty trace fine sand moist.												





Project : BANGKOK INTERNATIONAL AIRPORT EXPANSION

Pileload test No. T5, Boring log No. : BH - 6

Working load (ton) : 80

Settlement at working load (mm) 3.45

pile section dimension: 0.525\*0.525\*22.00,  $\phi$ (m) 0.592

pile cross section area (cm<sup>2</sup>) 2049

pile length (m) 22.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\Delta$  Anchore pile                     $\blacktriangle$  counter weight

Anchore configeration:

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	0	—		
20	1.42				
40	2.20				
60	2.84				
80	3.45				
100	4.02				
120	4.84				
140	5.63				
160	6.88				
180	8.26				
200	10.47				
220	61.44				
184	61.98				





Project : BANGKOK INTERNATIONAL AIRPORT EXPANSION

Pileload test No. T7, Boring log No. : BH - 6

Working load (ton) : 60

Settlement at working load (mm) 5.56

pile section dimension : 0.40\*0.40\*22.00,  $\phi$ (m) 0.451

pile cross section area (cm<sup>2</sup>) 1360

pile length (m) 22.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support    $\Delta$  Anchore pile                     $\blacktriangle$  counter weight

Anchore configuration:

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	150	20.51		
15	3.71	120	19.96		
30	4.40	90	18.88		
45	4.83	60	17.31		
60	5.56	30	16.03		
75	5.75	0	8.31		
90	6.46				
105	7.23				
120	8.65				
135	11.04				
150	12.39				
165	13.33				
180	21.13				

Soil Boring Log No.

Project: BANGKOK INTERNATIONAL AIRPORT EXPANSION

Location : DON MUANG , BKK.		Soil Investigator: INTER CONSULT CO.,LTD.										
Borehole no.: BH - 6		Boring Started: 20/8/84		Finished: 22/8/84								
Soil Description	t <sub>c</sub> t/m <sup>3</sup>	Att.Limits,%				Su from UC		SPT				
		Pl.	Wn	LL		Test		N				
		— 0 —				t/m <sup>2</sup>		Blows/ft				
		20	40	60	80	100	2.5	5.0	20	40	60	80
TOP SOIL												
very soft clay ; silty dark grey some organic saturated. (CH)												
soft clay ; silty dark grey some organic saturated. (CH)							• 1.25					
							• 2.50					
medium clay ; silty trace fine sand saturated.							• 2.50					
							• 5.00					
stiff clay ; silty greenish grey some decomposed moist.							• 10		• 10			
									• 13			
medium yellow grey silty fine sand trace clay wet.									• 12			
									• 13			
dense sand, dark brown trace yellow fine sand saturated.												• 74
												• 52
												• 24
												• 22
very stiff clay ; yellowish brown clay ; silty trace fine sand moist.												• 35
												• 27



Project : BANGKOK INTERNATIONAL AIRPORT EXPANSION

Pileload test No. T8, Boring log No. : BH - 6

Working load (ton) : 50

Settlement at working load (mm) 2.11

pile section dimension : 0.35\*0.35\*22.00,  $\phi$ (m) 0.395

pile cross section area (cm<sup>2</sup>) 1225

pile length (m) 22.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support    $\Delta$  Anchore pile                     $\blacktriangle$  counter weight

Anchore configuration:

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	125	3.64		
12.5	0.98	100	7.61		
25	1.23	75	6.53		
37.5	1.62	50	5.30		
50	2.11	25	3.97		
62.5	2.73	0	0.89		
75	3.25				
87.5	3.90				
100	4.71				
112.5	5.45				
125	6.14				
137.5	7.00				
150	9.07				



Soil Boring Log No.

Project: BANGKOK INTERNATIONAL AIRPORT EXPANSION

Location: DON MUANG, BKK.		Soil Investigator: INTER CONSULT CO., LTD.										
Borehole no.: BH - 6		Boring Started: 20/8/84		Finished: 22/8/84								
Soil Description	$\gamma_t$ t/m <sup>3</sup>	Att. Limits, %				Su from UC		SPT				
		PL	W <sub>n</sub>	LL		Test		N				
		— 0 —				t/m <sup>2</sup>		Blows/ft				
		20	40	60	80	100	2.5	5.0	20	40	60	80
TOP SOIL												
very soft clay; silty dark grey some organic saturated. (CH)												
							• 125					
soft clay; silty dark grey some organic saturated (CH)							• 250					
							• 250					
medium clay; silty trace fine sand saturated.							• 250					
							• 500					
stiff clay; silty greenish grey some decomposed moist.							• 10			• 10		
										• 13		
medium yellow grey, silty fine sand trace clay wet										• 12		
										• 15		
dense sand; dark brown trace yellow fine sand saturated.											• 72	
											• 52	
										• 24		
										• 22		
very stiff clay; yellowish brown clay, silty										• 35		
trace fine sand moist.										• 27		



Project : BANGKOK INTERNATIONAL AIRPORT EXPANSION

Pileload test No. T9, Boring log No. : BH - 8

Working load (ton) : 80

Settlement at working load (mm) 2.18

pile section dimension: 0.525\*0.525\*24.00,  $\phi$ (m) 0.592

pile cross section area (cm<sup>2</sup>) 2049

pile length (m) 24.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\Delta$  Anchore pile                     $\blacktriangle$  counter weight

Anchore configuration:

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
0	0.00	200	9.62		
20	1.13	160	8.09		
40	1.45	120	7.43		
60	1.80	80	7.25		
80	2.18	40	4.93		
100	2.68	0	2.49		
120	3.42				
140	4.25				
160	5.09				
180	5.78				
200	6.88				
220	8.20				
240	10.70				

Soil Boring Log No.

Project: BANGKOK INTERNATIONAL AIRPORT EXPANSION

Location : DON MUANG , BKK.		Soil Investigator: INTER CONSULT CO.,LTD.										
Borehole no.: BH - 8		Boring Started: 16/8/84		Finished: 18/8/84								
Soil Description	t <sub>s</sub> t/m <sup>3</sup>	Att.Limits,%					Su from UC		SPT			
		PL	Wn	LL	Test		N					
		— 0 —					t/m <sup>3</sup>		Blows/ft			
		20	40	60	80	100	10	20	20	40	60	80
TOP SOIL												
very soft clay;brownish grey silty some organic saturated. (CH)												
soft to medium clay;dark grey,silty saturated.												
							•25					
							•125					
stiff clay;yellowish brown trace grey - silty some decom posed moist.							•8.75					
							•8.75		•10			
							•10.12		•11			
							•2000		•18			
							•13.75		•18			
									•11			
dense sand;fine to coarse brownish red black saturated.										•59		
											•70	
										•31		
										•35		
stiff clay;reddish brown,silty trace fine sand some micaceous moist.							•18.75		•20			
							•12.50		•22			



Project : \_\_EXPRESSWAY\_CHAO\_PHYA\_RIVER\_CROSSING\_AT\_WAT\_SAI\_\_

Pileload test No. \_\_BK\_1\_\_, Boring log No. : \_\_BD\_1\_\_

Working load (ton) : \_\_100\_\_

Settlement at working load (mm) \_\_2.21\_\_

pile section dimension: 0.525\*0.525\*27.00,  $\phi$ (m) 0.592

pile cross section area (cm<sup>2</sup>) \_\_2049\_\_

pile length (m) \_\_27.00\_\_

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support    $\Delta$  Anchore pile                     $\blacktriangle$  counter weight

Anchore configuration: 4 Anchore

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
10	0.00	62.5	2.19	200	7.97
20	0.21	10	0.92	150	6.68
30	0.44			100	5.30
40	0.65	10	0.92	50	3.73
50	0.88	36.25	1.57	10	2.59
60	1.18	112.50	3.03	0	1.87
70	1.43	125	3.43		
80	1.68	145	4.01		
90	1.96	165	4.55		
100	2.21	190	5.33		
110	2.48	210	6.09		
120	2.86	230	6.80		
125	3.66	250	8.95		







Project : EXPRESSWAY\_CHO\_PHYA\_RIVER\_CROSSING\_AT\_WAT\_SAI

Pileload test No. BK\_5, Boring log No. : BE\_1

Working load (ton) : 100

Settlement at working load (mm) 2.34

pile section dimension: 0.525\*0.525\*27.00,  $\phi$ (m) 0.592

pile cross section area (cm<sup>2</sup>) 2049

pile length (m) 27.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\Delta$  Anchore pile                             $\blacktriangle$  counter weight

Anchore configeration: -

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
10	0.00	62.5	1.71	280	8.61
20	0.29	10	0.33	300	10.01
30	0.50			320	22.44
40	0.75	10	0.33	300	22.28
50	1.02	56.25	1.44	200	20.08
60	1.26	112.50	2.90	100	16.90
70	1.51	125	3.23	50	15.14
80	1.83	145	3.69	0	13.37
90	2.09	165	4.27		
100	2.34	185	4.88		
110	2.60	210	5.57		
120	2.95	230	6.26		
125	3.16	250	7.16		





Project : EXPRESSWAY\_CHAO\_PHYA\_RIVER\_CROSSING\_AT\_WAT\_SAI

Pileload test No. TH\_1, Boring log No. : BD\_6

Working load (ton) : 100

Settlement at working load (mm) 2.17

pile section dimension: 0.525\*0.525\*27.00,  $\phi$ (m) 0.592

pile cross section area (cm<sup>2</sup>) 2049

pile length (m) 27.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\Delta$  Anchore pile                     $\blacktriangle$  counter weight

Anchore configuration:

P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)	P (ton)	$\rho$ (mm)
10	0.00	59	1.93	200	8.82
20	0.10	32	1.00	150	7.46
30	0.32			100	5.91
40	0.55	32	1.00	50	4.49
50	0.79	56.25	1.61	10	3.03
60	1.12	112.50	3.12		
70	1.37	125	3.57		
80	1.61	145	4.11		
90	1.88	165	4.75		
100	2.17	190	5.83		
110	2.45	210	6.83		
120	2.87	230	7.78		
125	3.37	250	9.88		





Project : SATHORN\_UNIQUE\_TOWER

Pileload test No. EDE/PLT/90/18, Boring log No. : BH 1

Working load (ton) : 750

Settlement at working load (mm) 5.11

pile section dimension : 1.20,  $\phi$ (m) 1.20

pile cross section area (cm<sup>2</sup>) 11310

pile length (m) 67.85

pile            ▲ friction pile                            ▲ End bearing pile

loading support    ▲ Anchore pile                            ▲ counter weight

Anchore configuration: 4 Anchore

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00	562.5	3.47		
117.5	0.87	750	4.67		
375	1.79	937.5	5.88		
562.5	3.05	1125	7.42		
750	5.11	1312.5	9.35		
562.5	4.73	1500	11.72		
375	3.54	1687.5	14.39		
187.5	2.10	1875	19.69		
0	0.24	1500	18.55		
		1125	16.96		
0	0.24	750	14.17		
187.5	1.30	375	11.00		
375	2.39	0	4.75		





Soil Boring Log No.  
Project: SARTHORN UNIQUE TOWER

Location : Charoen keung 51 , BKK. Soil Investigator: S.T.S		Boring Started: 1/12/89		Finished: 8/12/89								
Borehole no.: BH - 1												
Soil Description	γ <sub>s</sub> / m <sup>3</sup>	Att. Limits, %					Su from UC		SPT			
		PL	Wn	LL			Test		N			
		— 0 —					t/m <sup>2</sup>		Blows/ft			
		20	40	60	80	100	10	20	20	40	60	80
										21		
										33		
36 m.								41				
silty fine sand but medium grain brown , medium to dense. (SM)										35		
										23		
										32		
										57		
silty clay trace fine sand , li-brown and grey , hard. (CL)												90
clayey fine sand , greenish grey , very dense. (SC)											44	
												80
fine sand clay , greenish grey , hard. (CL)												75
										45		
silty fine sand some medium sand but fine to medium grain 49.5 m. li greyish li brown, dense to very dense. (SM)												60
										46		
										52		
										40		
silty clay trace fine sand , greyish brown , very stiff to hard. (CL)												59
										42		
										37		
										44		
										25		

Project : 41\_TOWER

Pileload test No. EDE/PLT/90/13, Boring log No.: BH\_1

Working load (ton): 700

Settlement at working load (mm) 7.57

pile section dimension: 1.00,  $\phi$ (m) 1.00

pile cross section area (cm<sup>2</sup>) 7854

pile length (m) 52.00

pile             $\Delta$  friction pile                             $\blacktriangle$  End bearing pile

loading support     $\blacktriangle$  Anchore pile                     $\Delta$  counter weight

Anchore configuration:    4 Anchore

P (ton)	$s$ (mm)	P (ton)	$s$ (mm)	P (ton)	$s$ (mm)
0	0.00				
87.5	0.48				
175	0.95				
262.5	1.59				
350	2.24				
437.5	3.11				
525	3.91				
612.5	4.84				
700	7.57				
525	7.55				
350	6.61				
175	4.61				
0	0.968				



Soil Boring Log No.

Project: 41 TOWER

Location: Sakhuvit soi 41, RPK.		Soil Investigator: W.A.C.											
Borehole no.: PH 1		Boring Started: 8/3/89											
		Finished: 28/3/89											
Soil Description	t <sub>c</sub> t/m <sup>3</sup>	Att. Limits, %				Su from UC		SPT					
		PL	Wn	LL	SL	Test		N					
		20	40	50	80	100	10	20	20	40	60	80	
medium to dense light grey and yellow silty very fine sand. (SM)													36 33
stiff dark grey silty clay trace of very fine sand. (CL & ML -OL)													7 6 10
Very dense grey very fine sand. (SM)													75 53
Hard grey and yellowish brown silty clay, trace of very fine sand.													89 61
Hard dark grey and yellow silty clay, trace of very fine sand. (CL)													59 40 55
Very dense grey and yellowish brown clayey very fine sand.													104 116
very dense grey and yellowish brown very fine sand, occasional gravels. (SM, SW & SM SP)													62 58 69 82 75







ภาคผนวก ข.

สมการเส้นถดถอยแบบเส้นตรง และสูตร Estimate ค่า Parameter ต่าง ๆ



ภาคผนวก ข. สมการเส้นดัดถอยแบบเส้นตรง (Linear Regression Analysis)

ข. 1 สมการเส้นดัดถอยแบบเส้นตรง โดยไม่ผ่านจุดศูนย์

โมเดล  $y = a + bx$

การ Estimated ค่าพารามิเตอร์ สรุปไว้ในตารางที่ ข.1

ตารางที่ ข.1

Parameter	Variance	คุณภาพของ Regression
$a = \bar{y} - b\bar{x}$	$S^2 = \frac{1}{n-2} \sum_{i=1}^n [y_i - (a+bx_i)]^2$	$\gamma_{x,y}^2 = \frac{S_{x,y}^2}{S_x^2 S_y^2}$
$b = \frac{\sum_{i=1}^n x_i y_i - n\bar{x}\bar{y}}{\sum_{i=1}^n x_i^2 - n(\bar{x})^2}$	or $S^2 = \frac{n}{n-2} [1 - \gamma_{x,y}^2] S_y^2$	
$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$	$S_{x,y} = \frac{1}{n} [\sum_{i=1}^n x_i y_i - n\bar{x}\bar{y}]$	
$\bar{y} = \frac{\sum_{i=1}^n y_i}{n}$	$S_x^2 = \frac{1}{n} [\sum_{i=1}^n x_i^2 - n(\bar{x})^2]$	
	$S_y^2 = \frac{1}{n} [\sum_{i=1}^n y_i^2 - n(\bar{y})^2]$	

x = Independent Variable

y = Random Variable Dependent on x

S = The assumed constant standard deviation of y given x

$S_{x,y}$  = Sample Covariance

$S_x$  &  $S_y$  = Sample Standard deviation

$\gamma_{x,y}$  = Sample Correlation Coefficient

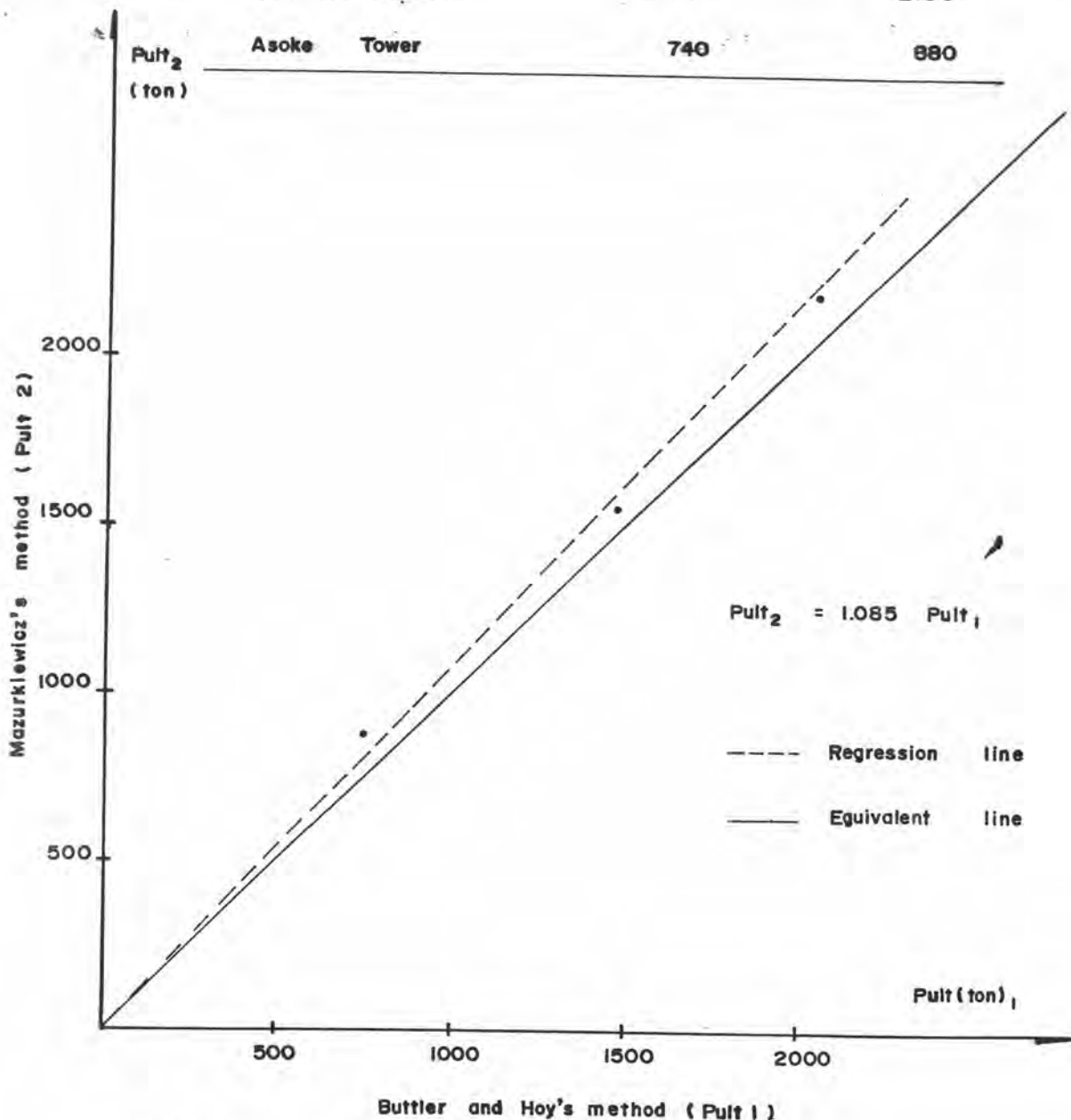
n = Number of Sample

ภาคผนวก ค.

ผลการวิเคราะห์ค่า Ultimate Load โดยวิธี Mazurkiewicz

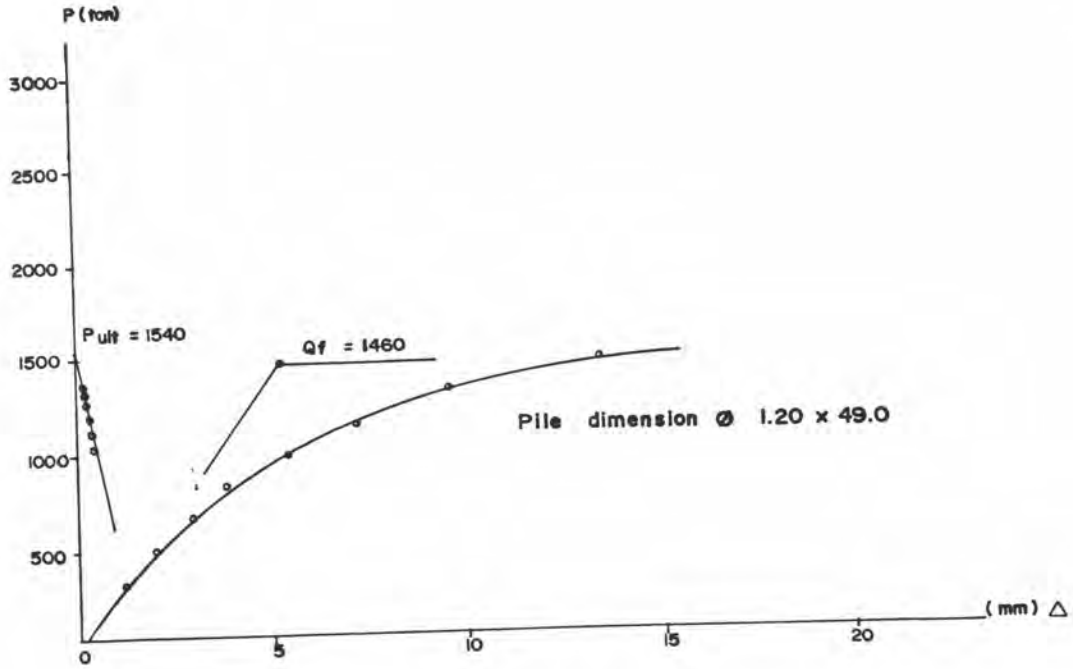
ตารางที่ ค.1 แสดงผลการเปรียบเทียบค่า Pult ที่คาดว่าจะเกิดขึ้น ตามวิธีการคาดคะเนซึ่งถูกเสนอโดย BUTLER & HOY (1977)-MAZURKIEWICZ (1972)

โครงการ	Butler & Hoy	Mazurkiewicz
Thai military Bank	1460	1540
Imperial tara II	2040	2180
Asoke Tower	740	880

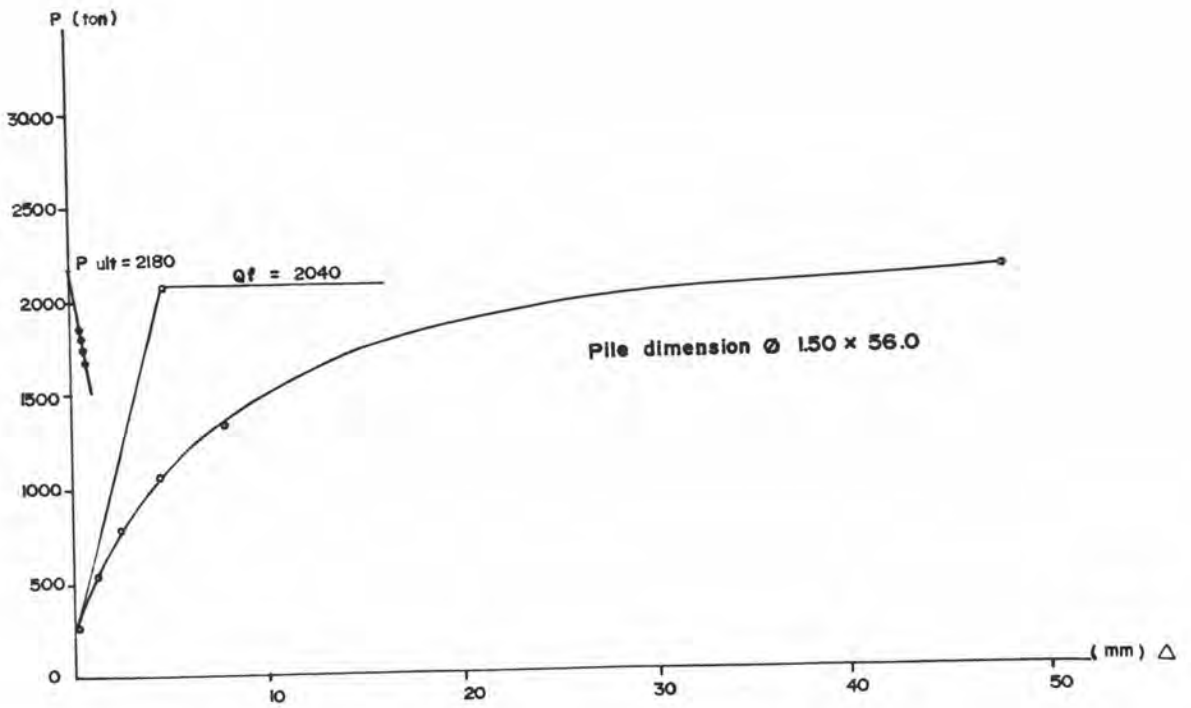


รูปที่ ค.1. แสดงการเปรียบเทียบค่า Pult ตามวิธีซึ่งเสนอโดย

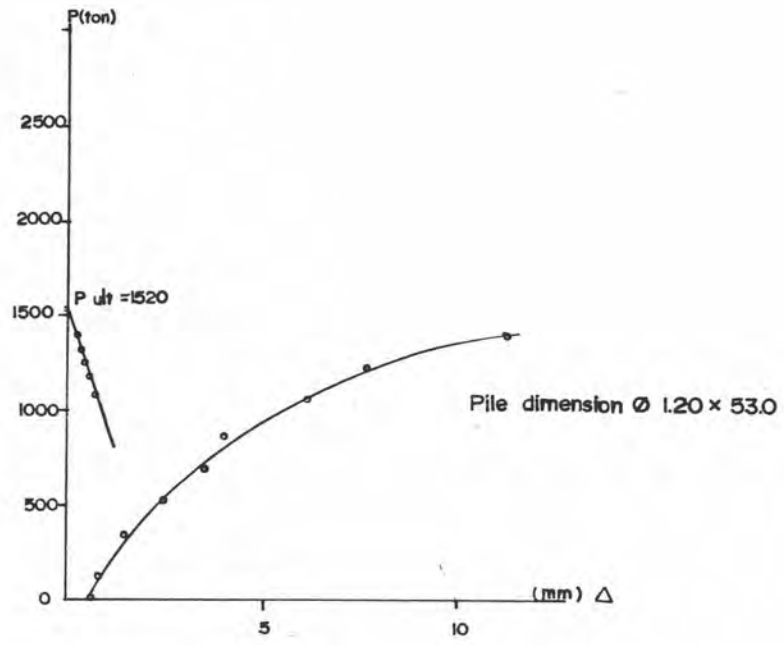
Mazurkiewicz ( 1972 ) กับ Butler & Hoy ( 1977 )



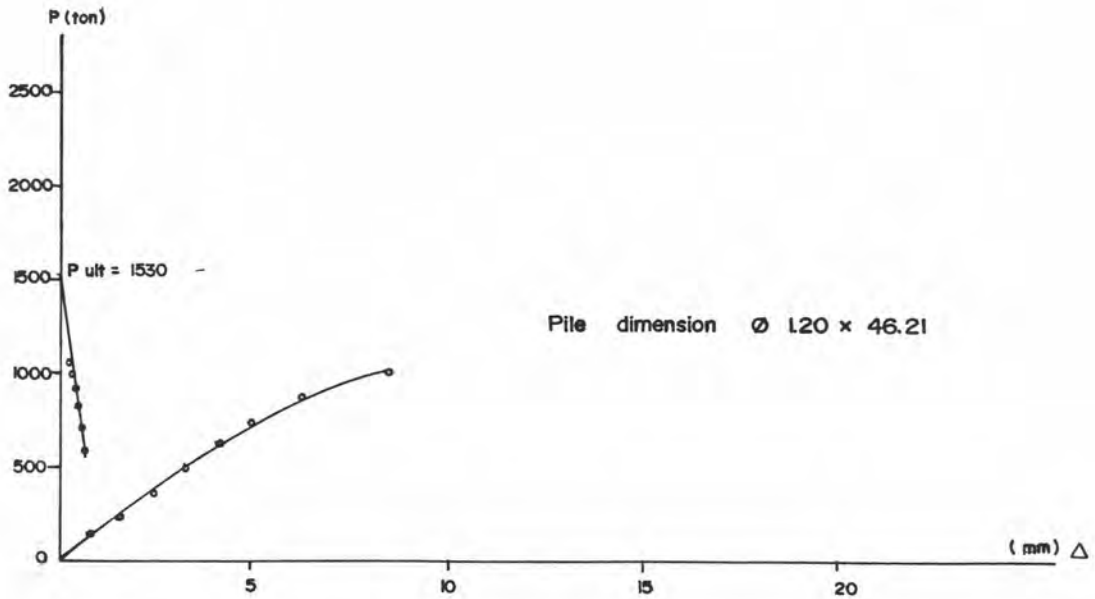
THAIMITARY BANK



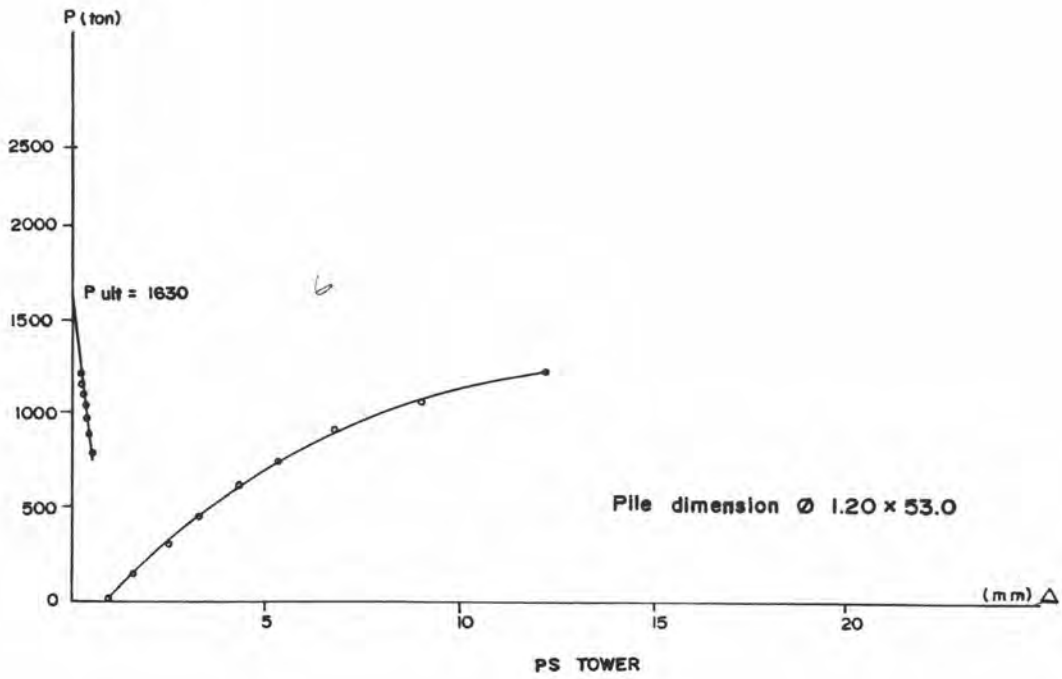
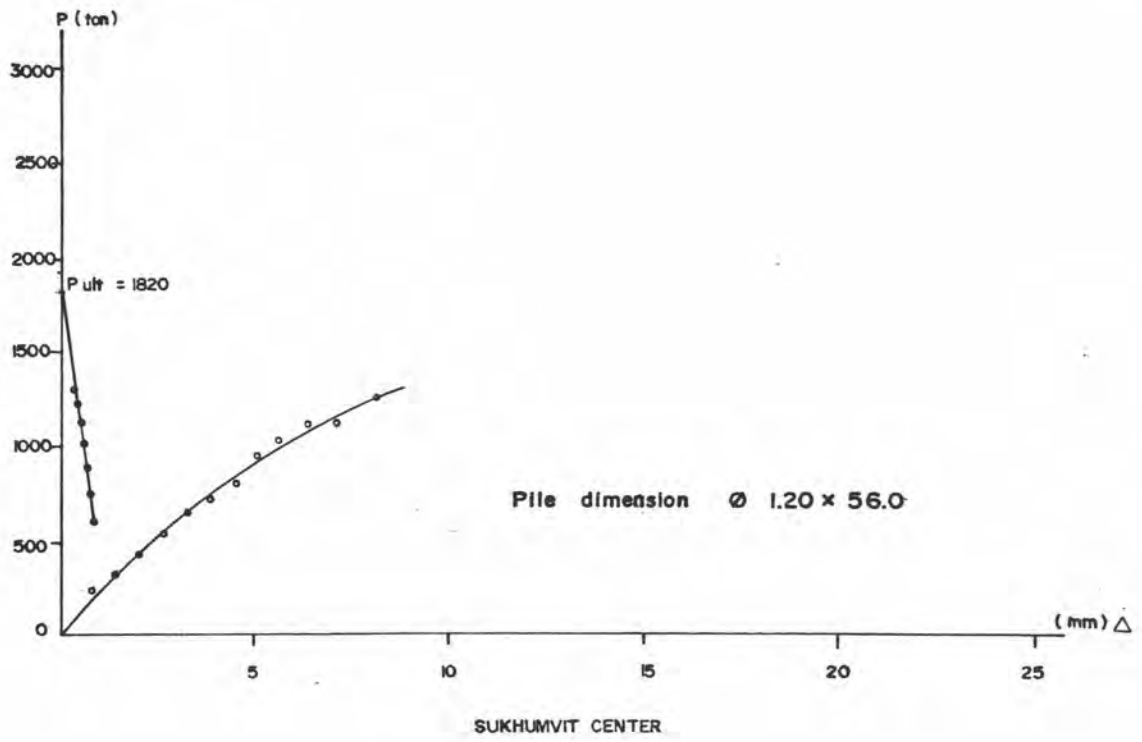
IMPERIAL TARA II

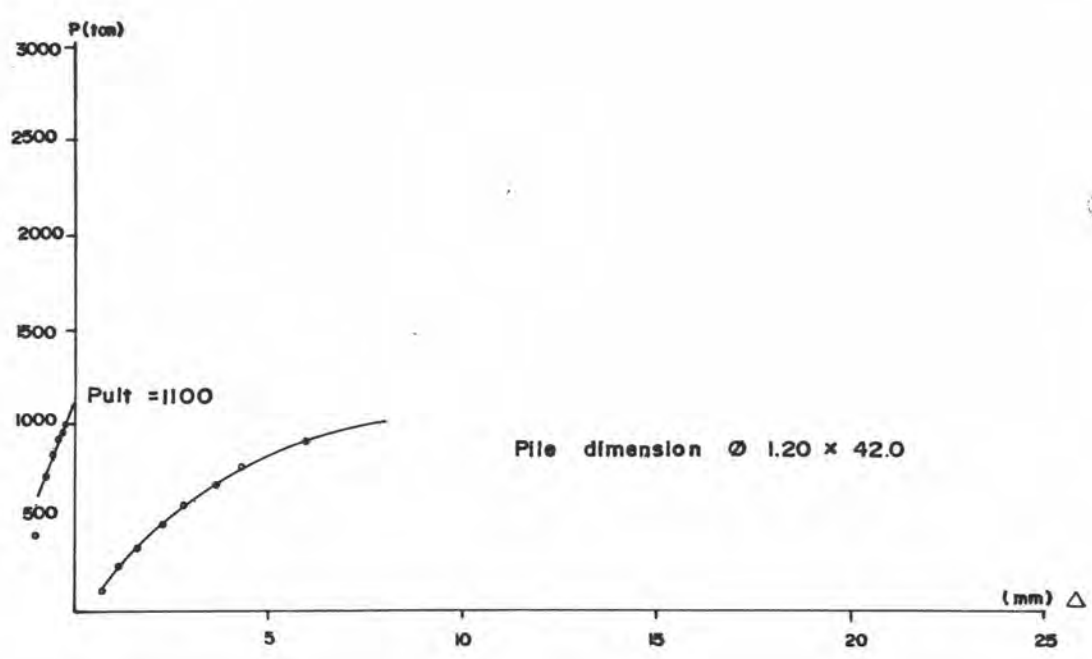


OCEAN TOWER II

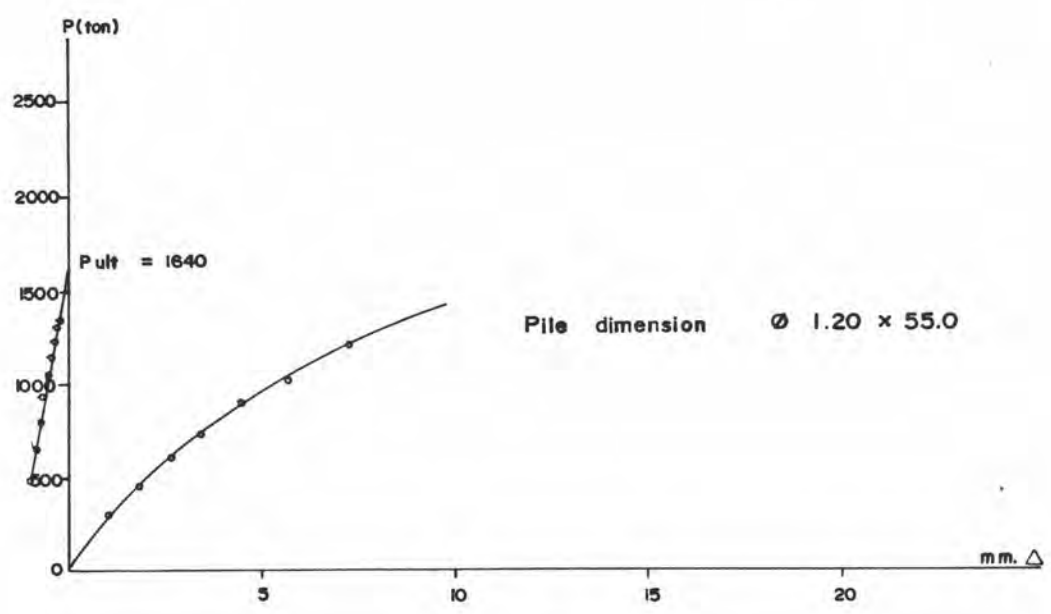


SAICHON MANSION





AYOTHAYA THANI



OCEAN TOWER I

ข.2 เส้นถดถอยแบบเส้นตรงผ่านจุดศูนย์

$$\text{Model } y = cx$$

การ Estimated ค่าพารามิเตอร์ สรุปไว้ในตารางที่ ข.2

Parameter	Variance	คุณภาพของ Regression
$c = \frac{\sum_{i=1}^n x_i y_i}{\sum_{i=1}^n x_i^2}$	$\sigma^2 = \frac{1}{n-1} \sum_{i=1}^n (y_i - cx_i)^2$ $\sigma_c^2 = \frac{\sigma^2}{\sum_{i=1}^n x_i^2}$	$R^2 = \frac{[\sum_{i=1}^n (x_i y_i)]^2}{\sum_{i=1}^n x_i^2 \sum_{i=1}^n y_i^2}$

$S^2$  or  $\sigma^2$  = Standard deviation of y given on x

$\sigma_c^2$  = Standard deviation of constant C

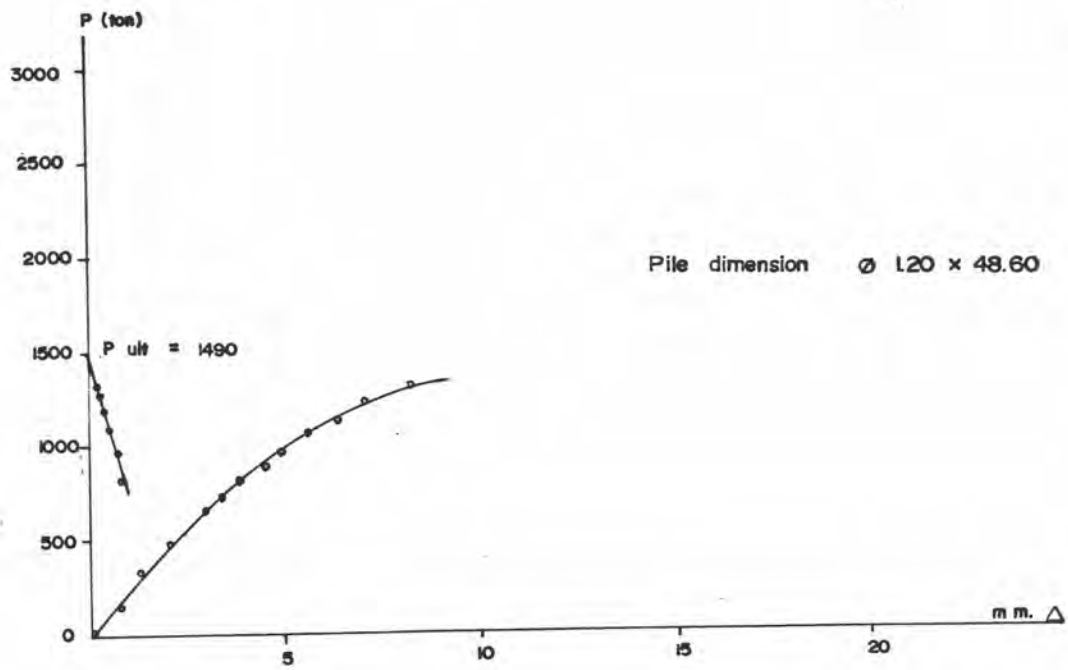
$R^2$  = Coefficient of Determination

90 % Confidence interval of C =  $C \pm t_{0.05, (n-2)} \sigma_c$

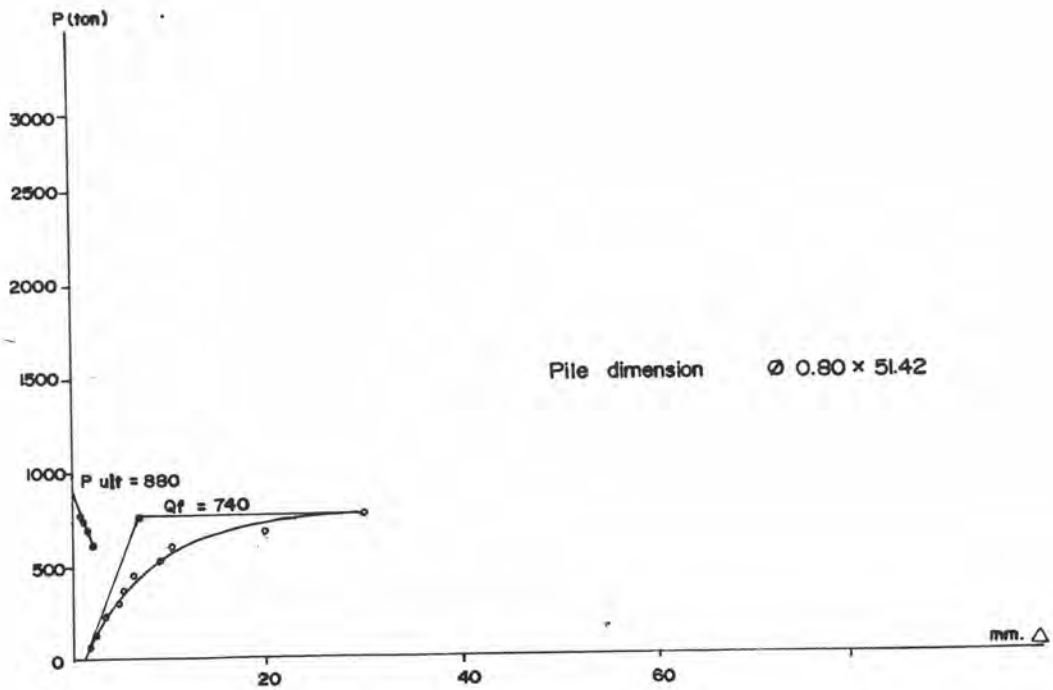
ตาราง Analysis of Variance (Model  $y = cx$ )

Source of variation	Sum of Square	Degree of freedom	Variance	F Value
Due to regression	$\frac{(\sum_{i=1}^n x_i y_i)^2}{\sum_{i=1}^n x_i^2}$	1	$S_Y^2 = \frac{(\sum_{i=1}^n x_i y_i)^2}{\sum_{i=1}^n x_i^2}$	$\frac{S_Y^2}{S^2}$
On the regression	$\sum_{i=1}^n (y_i - Y_i)^2$	n-1	$S^2 = \frac{\sum_{i=1}^n (y_i - Y_i)^2}{n-1}$	
Total	$\sum_{i=1}^n y_i^2$	n		

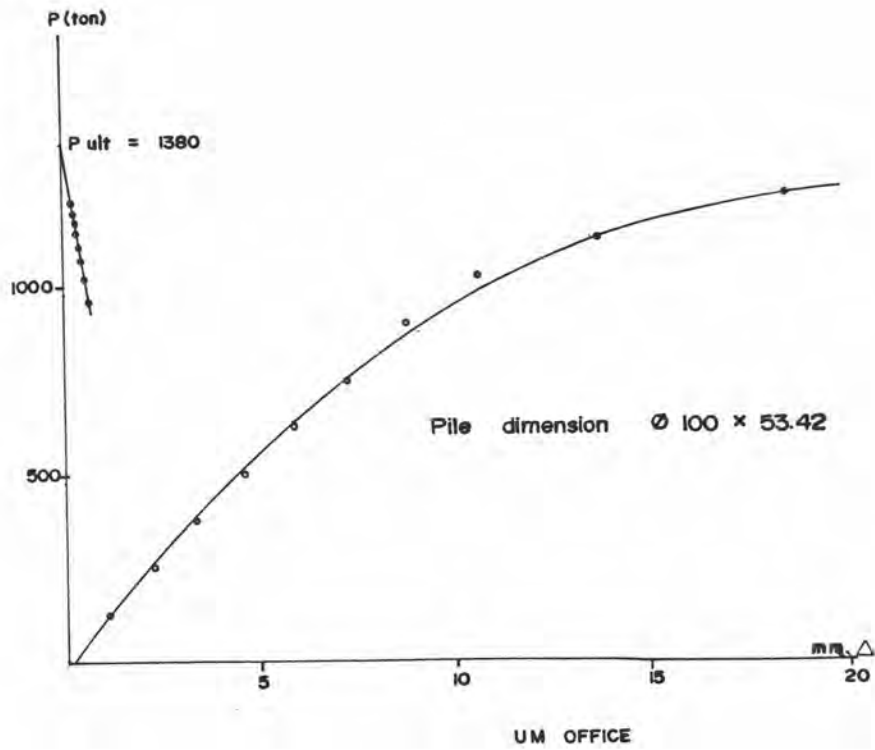
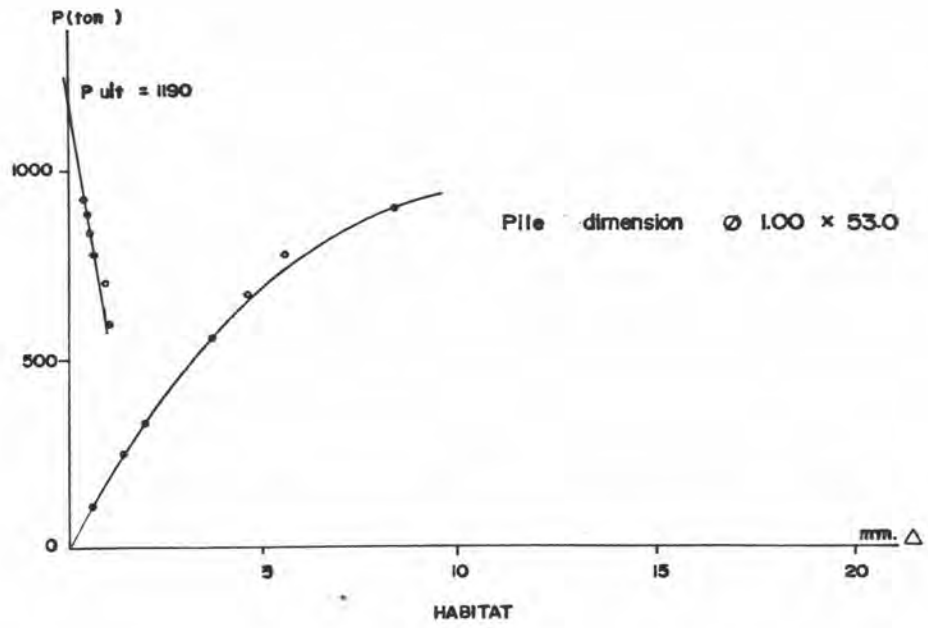


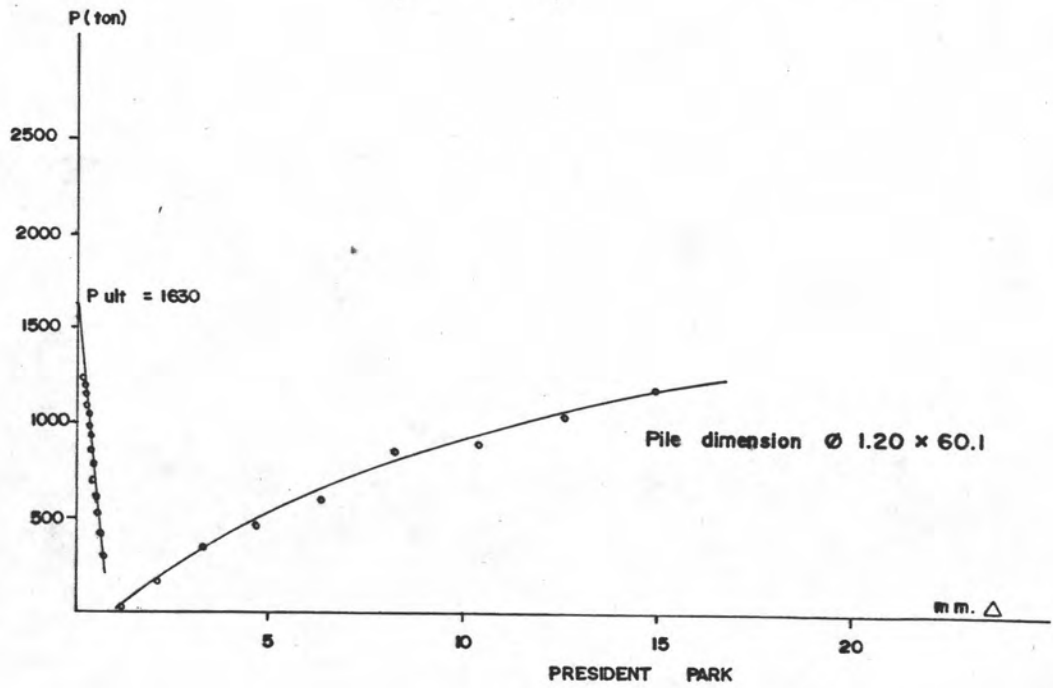
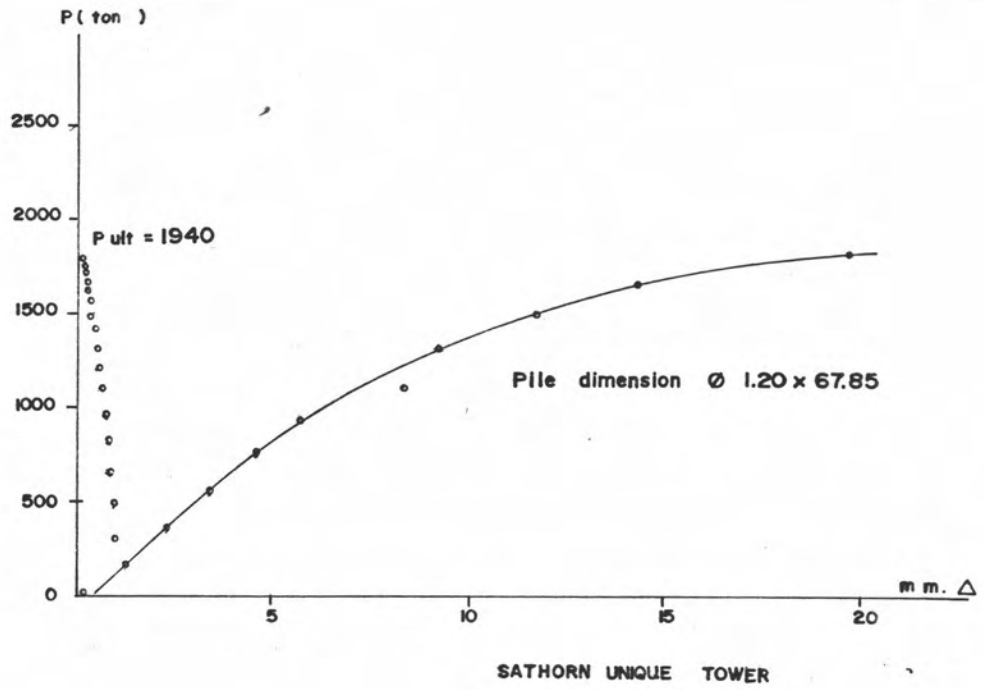


KIAN-GWAN OFFICE



ASOKE TOWER





ภาคผนวก ง.

ตัวอย่างการคำนวณค่า  $N_q$ ,  $E_s$ ,  $P$  และ  $\mu$

ภาคผนวก (i) ตัวอย่างการคำนวณค่า  $N_q$  สำหรับเสาเข็มเจาะในชั้นทรายชั้นที่ 2

โครงการ OCEAN TOWER II (Pile load test No.3)

ผลการทดสอบเสาเข็มชั้นดินที่ B1

วันที่ก่อสร้างเสาเข็ม : 28 กุมภาพันธ์ 2533  
 วันที่ทดสอบเสาเข็ม : 13-16 พฤษภาคม 2533  
 ขนาดเสาเข็ม : BP  $\phi 1.20 \times 53.00$  ม.  
 เส้นรอบรูป 3.77 ม.; พื้นที่หน้าตัด  $1.131 \text{ ม}^2$

ก) ผลการเจาะสำรวจชั้นดิน

ชั้นดิน	ระดับ (ม)	ค่า $S_u$ หรือ $N$ เฉลี่ย
1. ดินเปลือก	+0.00 ถึง -2.60	ค่า $S_u$ เฉลี่ย = $2.0 \text{ t/m}^2$
2. ดินเหนียวอ่อนถึงปานกลาง	-2.60 ถึง -19.00	ค่า $S_u$ เฉลี่ย = $2.84 \text{ t/m}^2$
3. ดินเหนียวแข็งชั้นแรก	-19.00 ถึง -21.00	ค่า $S_u$ เฉลี่ย = $10 \text{ t/m}^2$
4. ชั้นทรายชั้นแรก	-21.00 ถึง -21.70	ค่า $N$ เฉลี่ย = 38 Blow/ft
5. ชั้นดินเหนียวแข็งชั้นที่ 2	-21.70 ถึง 49.45	ค่า $N$ เฉลี่ย = 38.8 Blow/ft
6. ชั้นทรายชั้นที่ 2	-49.45 ถึง 68.95	ค่า $N_s$ เฉลี่ย = 90.7 Blow/ft $N_b$ เฉลี่ย = 70.5 Blow/ft

หมายเหตุ :  $N_s$  เป็นค่าเฉลี่ยของผลการทดสอบ SPT ตั้งแต่ระดับ -49.45 ถึง -53.00  
 $N_b$  เป็นค่าเฉลี่ยของผลการทดสอบ SPT ตั้งแต่ระดับ 53.00 -  $\phi$  ถึง 53.00 +  $2\phi$

ข) ผลการทดสอบน้ำหนักบรรทุกเสาเข็ม

P(ton)	$\Delta$ (mm)	หมายเหตุ
0	0.51	
175	0.76	ค่านน.บรรทุกที่จุดวิกฤติ (Pult)
350	1.44	หาจากวิธีซึ่งเสนอโดย
525	2.44	Mazurkiewicz ดังแสดงใน
700	3.43	รูป ง.1
875	3.80	
1050	5.97	
1225	7.49	
1400	11.15	

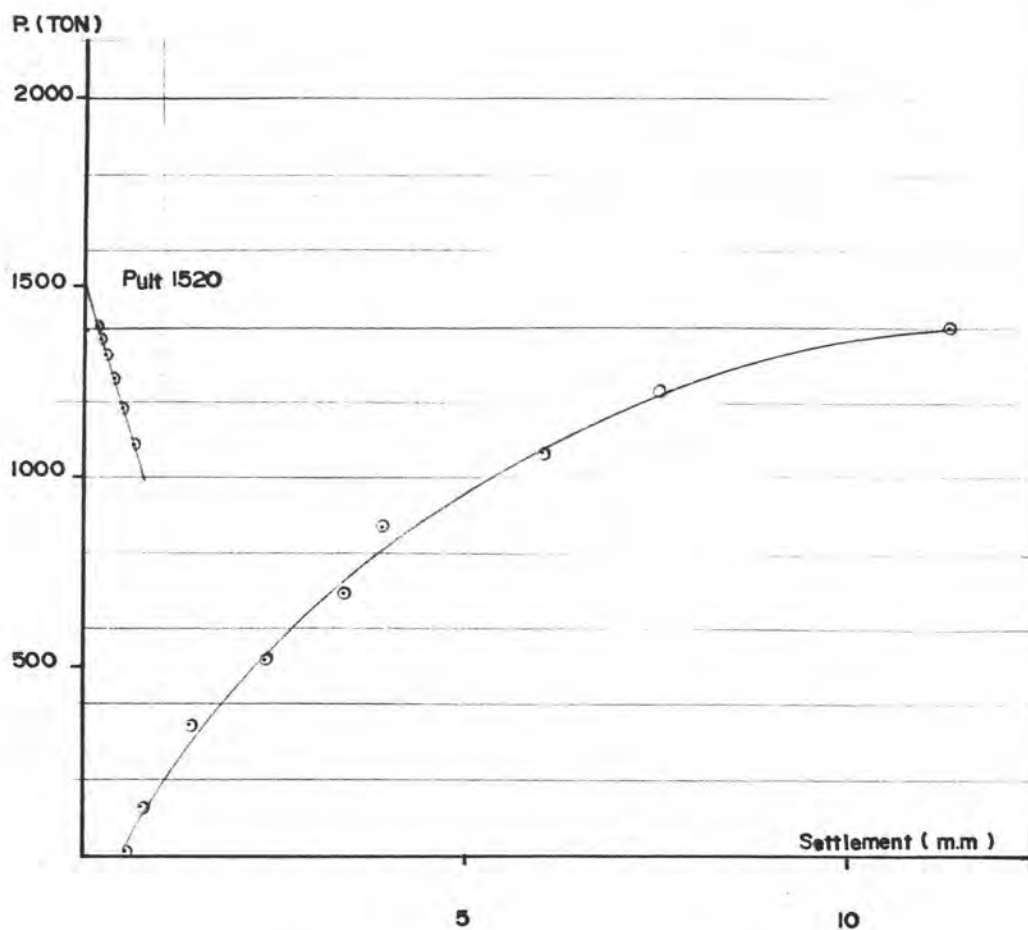
การคำนวณค่าแรงฝัดด้านข้าง Ps

1) ฝิวดิน (TOP SOIL)

$$S_u = 2.0 \text{ ตัน/ตร.ม.} , \alpha = 0.80 \text{ (สูตรม 2531)}$$

$$A_s = CL = 3.77 * 2.6 = 9.8 \text{ ตร.ม.}$$

$$P_{s1} = \alpha S_u A_s = 15.7 \text{ ตัน}$$



รูปที่ ง.1 แสดงวิธีการหาค่า ultimate load ตามวิธีที่เสนอโดย Mazurkiewicz

2) ดินเหนียวอ่อนถึงปานกลาง (soft to medium clay)

$$S_u = 2.84 \quad \text{ตัน/ตร.ม.} \quad , \quad \alpha = 0.716 \quad (\text{สูตร 2531})$$

$$A_s = CL = 3.77 * 16.4 = 61.8 \quad \text{ตร.ม.}$$

$$Ps2 = \alpha Su As = 125.7 \quad \text{ตัน}$$

3) ดินเหนียวแข็งชั้นแรก (First stiff clay)

$$Su = 10 \quad \text{ตัน/ตร.ม.} , \alpha = 0.45 \quad (\text{สูตรกรม 2531})$$

$$As = CL = 3.77 * 2 = 7.54 \quad \text{ตร.ม.}$$

$$Ps3 = \alpha Su As = 33.9 \quad \text{ตัน}$$

4) ทรายชั้นแรก (First sand)

$$N = 38 \quad \text{Blow/ft} ; 6'_{v0} = 33.7 \quad \text{ตัน/ตร.ม.}$$

$$N_{cor} = 38 * 0.615 = 23 \quad \text{Blow/ft}$$

$$\phi' = 34.3 \quad \text{องศา} ; Ks \tan \phi a = 0.196$$

$$As = CL = 3.77 * 0.7 = 2.64 \quad \text{ตร.ม.}$$

$$Ps4 = Ks \tan \phi a 6'_{v0} As = 17.4 \quad \text{ตัน}$$

5) ดินเหนียวแข็งชั้นที่ 2 (second stiff clay)

$$N = 38.8 \quad \text{Blow/ft}$$

$$Su(CL) = 0.5175 N = 20.1 \quad \text{ตัน/ตร.ม. (วิธีนั้นที่ 2526)}$$



$$\alpha = 0.319 ; A_s = CL = 3.77 * 27.75 = 104.6 \text{ ตัน}$$

$$P_{s5} = \alpha S_u A_s = 670.7 \text{ ตัน}$$

6) ชั้นทรายชั้นที่ 2 (second sand)

$$N = 90.0 \text{ Blow/ft} ; 6'_{\text{vo}} = 64.6 \text{ ตัน/ตร.ม.}$$

$$N_{\text{cor}} = 90 * 0.41 = 37.4 \text{ Blow/ft}$$

$$\phi = 38.1 \text{ องศา} ; K_s \tan \phi_a = 0.245$$

$$A_s = CL = 3.77 * 3.55 = 13.38 \text{ ตร.ม.}$$

$$P_{s6} = K_s \tan \phi_a 6'_{\text{vo}} A_s = 211.7 \text{ ตัน}$$

$$\begin{aligned} \text{ผลรวมของ } P_s &= 15.7 + 61.8 + 33.9 + 17.4 + 670.9 + 211.7 \\ &= 1075 \text{ ตัน} \end{aligned}$$

การคำนวณค่าน้ำหนักเสาเข็มและค่าแรงดันน้ำใต้ดิน

$$W_p = \gamma_c A_{pl} = 2.4 * 1.131 * 53.00 = 144 \text{ ตัน}$$

$$U = u A_p = 0.747 (53 - 15) * 1.131 = 32 \text{ ตัน (NG, 1983)}$$

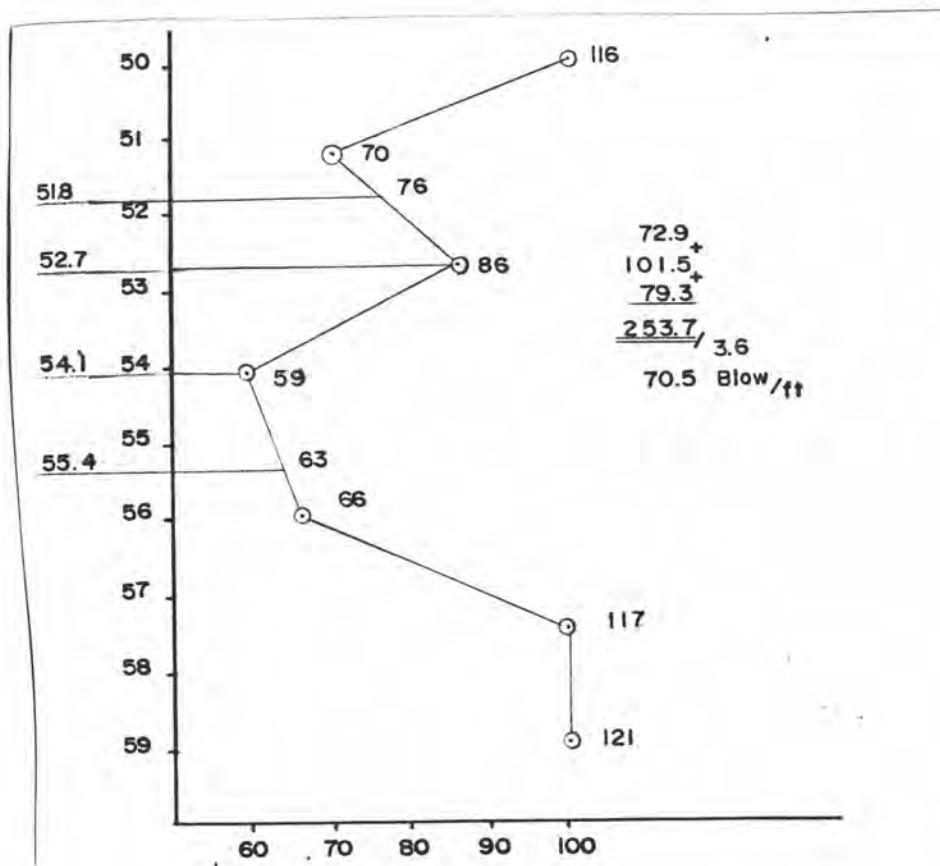
การคำนวณค่า  $N_q$

$$P_b = P_{ult} - P_s + W_p - U = 1520 - 1075 + 144 - 32 = 557$$

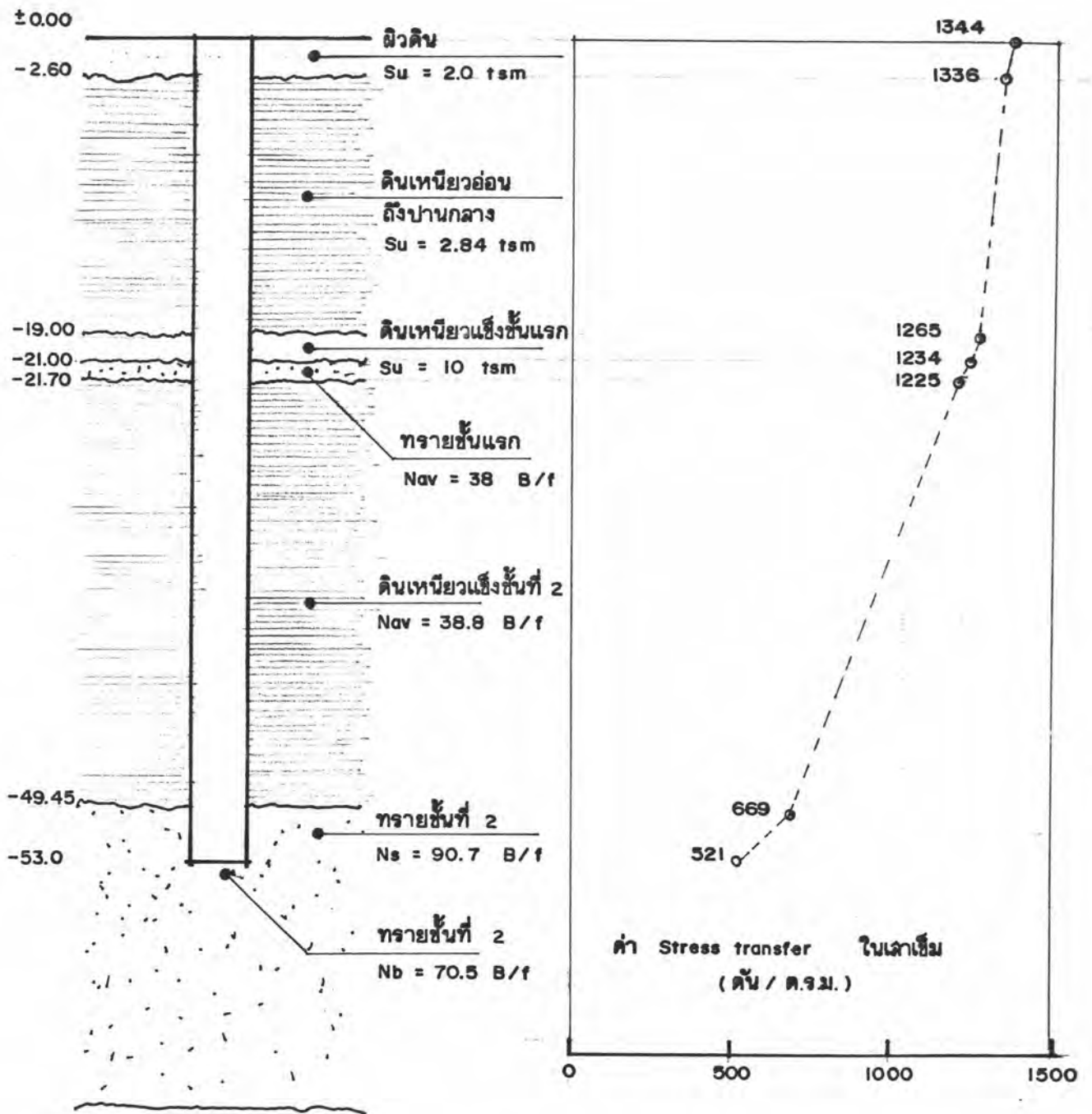
$$s'_{vb} = 66.2 \text{ ตัน} , Ap = 1.131 \text{ ตัน}$$

$$Nq = Pb / (s'_{vb} * Ap) = 557 / (66.2 * 1.131) = 7.4$$

การคำนวณค่า Nb แสดงในรูป ง.2 สำหรับเสาเข็มที่มีระดับปลายเสาเข็มที่ระดับ -53.00 ม. มีเส้นผ่าศูนย์กลางเท่ากับ 1.20 ม. โดยค่าเฉลี่ยคิดจากระดับ -53.00+1.20 = 51.80 ม. ถึงระดับ -53.00-2.40 = 55.40 ม.



รูปที่ ง.2 แสดงการคำนวณค่า Nb



รูปที่ ง.3 แสดง STRESS TRANSFER ในเสาเข็มตามระดับความลึก สำหรับเสาเข็มทดสอบ EDE/PLT/90/06

ภาคผนวก(ii) ตัวอย่างการคำนวณค่าหา Es

โครงการ : รอยัล ออร์คิด ไฮเต็ล  
 บริษัทผู้ติดตั้งเสาเข็ม : บริษัท Fondisa Far East จำกัด  
 บริษัทผู้ทดสอบเสาเข็ม : บริษัท Inter Consult จำกัด  
 บริษัทผู้เจาะสำรวจชั้นดิน : บริษัท Inter Consult จำกัด  
 ผลการทดสอบเสาเข็มที่ TP 1  
 ผลการเจาะสำรวจชั้นดินที่ B 1  
 วันที่ทดสอบเสาเข็ม 2 - 6 พฤศจิกายน 2522  
 ขนาดเสาเข็ม  $\phi 1.00 \times 33.00$  เสาเข็มเจาะ  
 เส้นรอบรูป 3.14 ม. , พื้นที่หน้าตัด 0.785

## ผลการเจาะชั้นดิน

ชั้นดิน	ระดับความลึก (ม.)
1) ผิวดิน	$\pm 0.00$ ถึง $- 2.00$
2) ดินเหนียวอ่อนถึงปานกลาง	$- 2.00$ ถึง $-13.70$
3) ดินเหนียวแข็งชั้นแรก	$-13.70$ ถึง $-28.50$
4) ทราบชั้นแรก	$-28.50$ ถึง ก้นหลุมเจาะ

น้ำหนักบรรทุกใช้งาน = 250 ตัน

ค่าการทรุดตัวที่นน.บรรทุกใช้งาน = 0.230 ซม.

$$= 0.0023 \text{ ม.}$$

$$L/d = 33.00/1.00 = 33.00, I_o = 0.060 \quad \text{จากรูป 2.28}$$

$$R_A = 1.00 \quad \text{สำหรับเสาเข็มเจาะ}, E_b/E_s = 4.00$$

$$s = 3.00 \text{ ม.}$$

- ขั้นตอนการ trial & error

$$\text{สมมติให้ } E_s = 6000 \text{ TSM}$$

$$K = R_A E_p/E_s = 500$$

$$\text{จากรูป 2.30 } R_k = 1.25 \quad \text{เมื่อ } L/d = 25$$

$$R_k = 1.60 \quad \text{เมื่อ } L/d = 50$$

$$\text{ดังนั้น } R_k = 1.36 \quad \text{เมื่อ } L/d = 33$$

$$\text{จากรูป 2.33 } R_b = 0.86 \quad \text{เมื่อ } L/d = 25$$

$$R_b = 0.93 \quad \text{เมื่อ } L/d = 50$$

$$\text{ดังนั้น } R_b = 0.88 \quad \text{เมื่อ } L/d = 33$$

$$\text{จากรูป 2.35 } \alpha_F = 0.46 \quad \text{เมื่อ } L/d = 25$$

$$\text{จากรูป 2.36 } \alpha_F = 0.44 \quad \text{เมื่อ } L/d = 50$$

$$\text{ดังนั้น } \alpha_F = 0.45 \quad \text{เมื่อ } L/d = 33$$

$$\text{จากรูป 2.40 } \alpha_E = 0.082 \quad \text{เมื่อ } L/d = 25$$

$$\alpha_E = 0.225 \quad \text{เมื่อ } L/d = 50$$

$$\text{ดังนั้น } \alpha_E = 0.128 \quad \text{เมื่อ } L/d = 33$$

$$\text{จากรูป 2.41 } F_E = 0.341 \quad \text{เมื่อ } L/d = 25$$

$$F_E = 0.317 \quad \text{เมื่อ } L/d = 50$$

$$\text{ดังนั้น } F_E = 0.333 \quad \text{เมื่อ } L/d = 33$$

$$\alpha = \alpha_F - F_E (\alpha_F - \alpha_E)$$

$$= 0.35$$

$$\rho = \frac{\pi \sigma_r k R b (1 - \alpha)}{E s d}$$

$$= \frac{250 * 0.060 * 1.36 * 0.88 (1 - 0.35)}{(6000 - 1.0)}$$

$$= 0.00194 \text{ m} = 0.194 \text{ cm}$$

จากขั้นตอนการ trail ค่า  $E_s$  ต่างๆจะได้ค่า  $f_m$  ดังนี้

$E_s$	$R_k$	$R_b$	$\alpha$	$f_m$
10000	1.50	0.90	0.34	0.134
6000	1.36	0.88	0.35	0.194
4290	1.28	0.86	0.36	0.246
3000	1.19	0.84	0.37	0.315
1500	1.10	0.82	0.39	0.550
1000	1.06	0.80	0.39	0.776
600	1.03	0.78	0.40	1.205

หมายเหตุ : ค่าการทรุดตัว  $f_m$  ที่วัดได้เท่ากับ 0.23 cm. ดังนั้นค่า  $E_s$  ที่ถูกต้องคือ 4817 TSM

ภาคผนวก ง(iii) วิธีการดำเนินการหาค่ากำลังรับน้ำหนักของเสาเข็ม

จากรายละเอียดการคำนวณค่าหน่วยแรงเสียดทานด้านข้างของเสาเข็มของการทดสอบ EDE/PLT/90/06 ของโครงการ OCEAN TOWER ดังแสดงในภาคผนวก ง.(i) พบว่าค่าแรงต่างๆมีค่าดังนี้

- แรงเสียดทานตลอดความยาวของเสาเข็ม  $P_s = 1075$  ตัน
- น้ำหนักของเสาเข็ม  $W_p = 144$  ตัน
- แรงดันน้ำใต้ดิน  $U = 32$  ตัน

ค่า  $N(SPT)$  ที่ยังไม่ปรับแก้เฉลี่ยที่ปลายเสาเข็มเท่ากับ 70.5 ครั้ง/ฟุต

$N'(SPT)$  ปรับแก้โดยค่า  $C_n$  ตามรูป 2.10 เท่ากับ 27.8 ครั้ง/ฟุต

$$(a) N_q = 5.14 \exp(0.00563N) = 7.64$$

$$(b) N_q = 5.23 \exp(0.013N') = 7.53$$

ค่าหน่วยแรงประสิทธิผลในแนวตั้งที่ปลายเสาเข็ม  $q'_v = 66.2$  ตัน/ตร.ม.

พื้นที่หน้าตัดของเสาเข็ม  $A_p = 1.131$  ตร.ม.

$$P_b = N_q q'_v A_p = 7.64 * 66.2 * 1.131 = 572 \text{ ตัน} \dots (a)$$

$$= 7.53 * 66.2 * 1.131 = 564 \text{ ตัน} \dots (b)$$

$$P_{\text{predicted}} = P_s + P_b - W_p + U$$

$$= 1075 + 572 - 144 + 32 = 1535 \text{ ตัน} \dots (a)$$

$$= 1075 + 564 - 144 + 32 = 1527 \text{ ตัน} \dots (b)$$

ภาคผนวก ง (iv) วิธีการดำเนินการหาค่าการทรุดตัวของเสาเข็ม

จากความสัมพันธ์ 4.3, 4.4 และ 4.5 คือ

$$E_s = 1157 \exp(0.0147P) \text{ สำหรับเสาเข็มตอกในชั้นทรายชั้นที่ 1}$$



$E_s = 2753 \exp(0.00223P)$  สำหรับเสาเข็มเจาะในชั้นทรายชั้นที่ 1

$E_s = 3124 \exp(0.00112P)$  สำหรับเสาเข็มเจาะในชั้นทรายชั้นที่ 2

$E_s$  มีหน่วยเป็นตันต่อตารางเมตร

$P$  มีหน่วยเป็นตัน

โครงการรอยัลลอร์ดคิดโฮเต็ล  $\phi 1.00 \times 33.00$  ม. (เสาเข็มเจาะในชั้น  
ทรายชั้นที่ 1)

น้ำหนักบรรทุกทุกใช้งาน = 250 ตัน

ดังนั้น  $E_s = 2753 \exp(0.00223 \times 250) = 4808$  ตัน/ตร.ม.

$$R_A = 1.00, K = 3,000,000 / 4808 = 624$$

$$E_b/E_s = 4.00, s/d = 3.00, l/d = 33.0$$

$$\text{จากรูป 2.28 ได้ } I_o = 0.060$$

$$\text{จากรูป 2.30 ได้ } R_k = 1.368$$

$$\text{จากรูป 2.33 ได้ } R_b = 0.806$$

$$\text{จากรูป 2.35, 2.36, 2.40 และ 2.41 ได้ } \alpha = 0.349$$

$$P_{\text{predicted}} = P I_o R_k R_b (1-\alpha) / E_s d$$

$$= 250 * 0.06 * 1.368 * 0.806 (1 - 0.349) / 4808 * 1.0$$

$$= 0.00224 \text{ m}$$

$$= 0.224 \text{ cm}$$

### ประวัติ

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