รายการอ้างอิง

ภาษาไทย

วิโรจน์ ชนะนันทศักดิ์,สมรรถนะของดินหนองงูเห่าเมื่อปรับปรุงด้วยเข็มปูนขาวโดยวิธีแทนที่ภายใต้คันดินทดสอบ , *วิทยานิพนธ์ปริญญามหาบัณฑิต ภาควิชาวิศวกรรมโยธา คณะวิศวกรรมศาสตร์ บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย* ,2541

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ภาคผนวก ก

ผลการทดสอบ Triaxial Compression(UU)Test

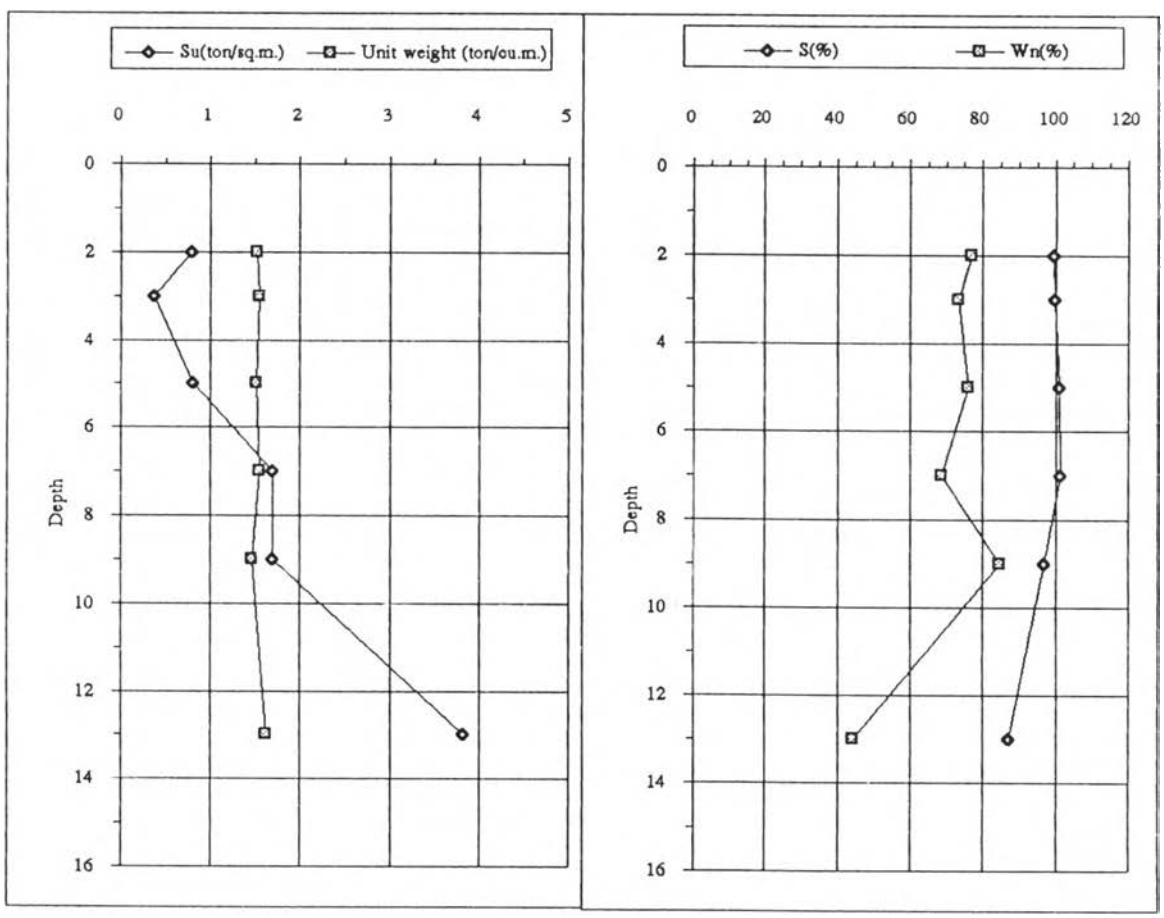
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH1/07 Location: TS1(1/3)

Description : Intermediat Soil Between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^3)	Wn %
ST2	2.00	0.08	0.00	3.06	0.80	99.63	1.53	76.91
ST3	3.00	0.02	0.04	4.64	0.37	99.77	1.55	73.36
ST5	5.00	0.07	0.01	7.56	0.80	101.13	1.51	76.15
ST7	7.00	0.15	0.02	10.84	1.70	101.41	1.55	68.48
ST9	9.00	0.16	0.01	13.24	1.70	96.77	1.47	84.72
ST13	13.00	0.38	0.00	21.10	3.82	87.07	1.62	44.28



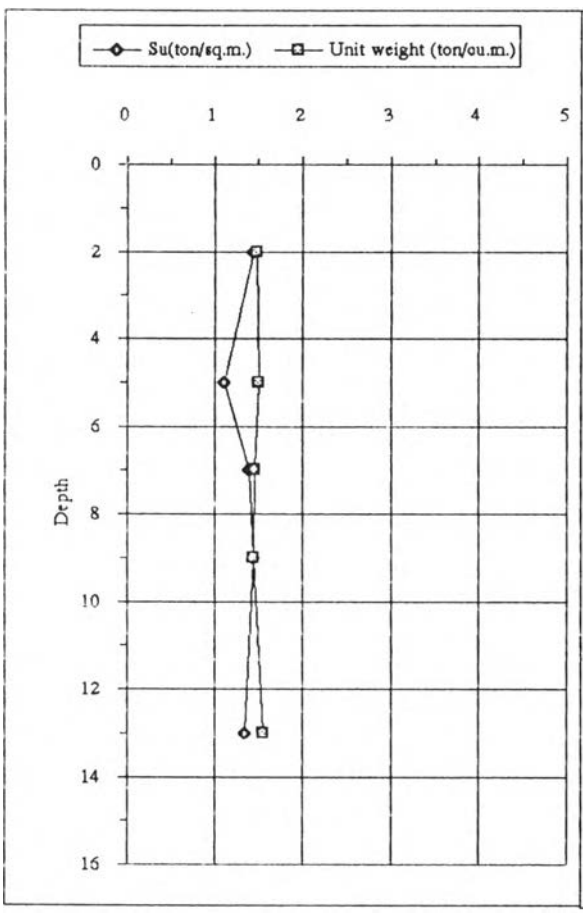
SOIL MECHANICS LABORATORY

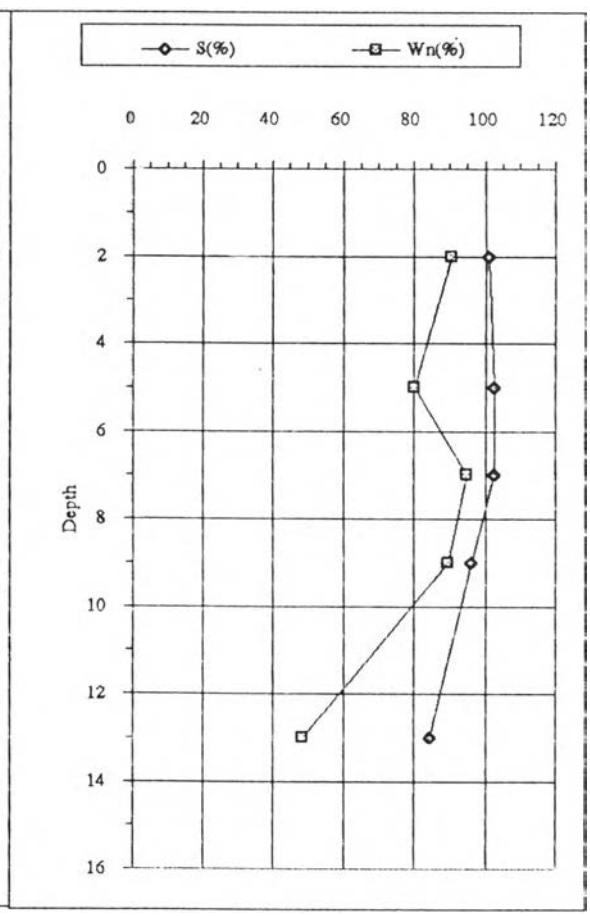
TRIAXIAL(U.U. TEST)

Boring No. : BH2/07 Location: TS1(1/2)

Description : Intermediat Soil Between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^2)	Wn %
ST2	2.00	0.14	0.01	4.47	1.45	101.15	1.49	90.67
ST5	5.00	0.10	0.02	7.54	1.11	102.71	1.51	80.44
ST7	7.00	0.10	0.04	10.21	1.40	102.45	1.46	94.87
ST9	9.00	0.13	0.01	13.01	1.45	96.28	1.45	89.88
ST13	13.00	0.12	0.01	20.22	1.35	84.47	1.56	48.53





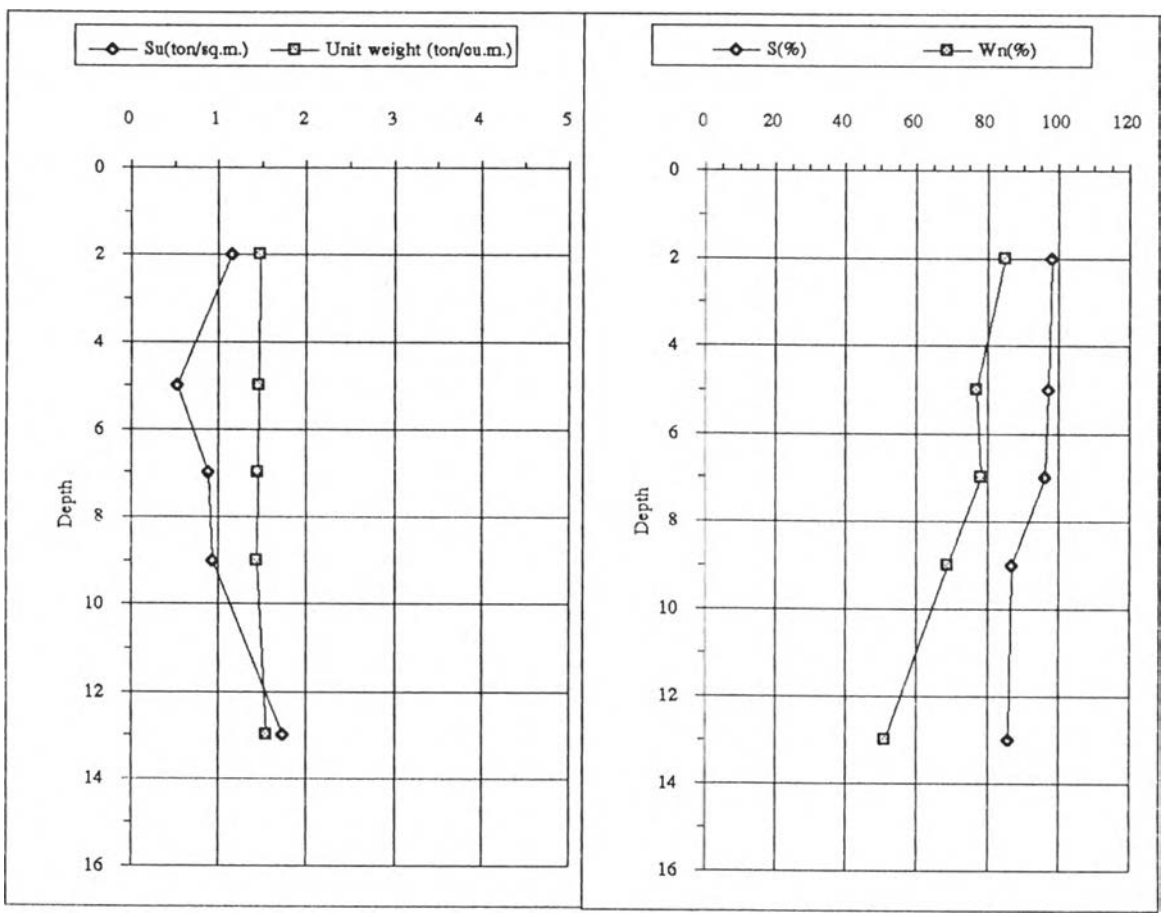
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH3/15 Location: TS1(1/2)

Description : Intermediat Soil Between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^3)	Wn %
ST2	2.00	0.11	0.00	2.96	1.15	98.18	1.48	84.89
ST5	5.00	0.05	0.00	7.34	0.53	97.22	1.47	77.15
ST7	7.00	0.09	0.00	10.21	0.88	96.33	1.46	78.14
ST9	9.00	0.09	0.00	12.95	0.93	86.87	1.44	68.95
ST13	13.00	0.14	0.02	20.14	1.74	85.88	1.55	51.15



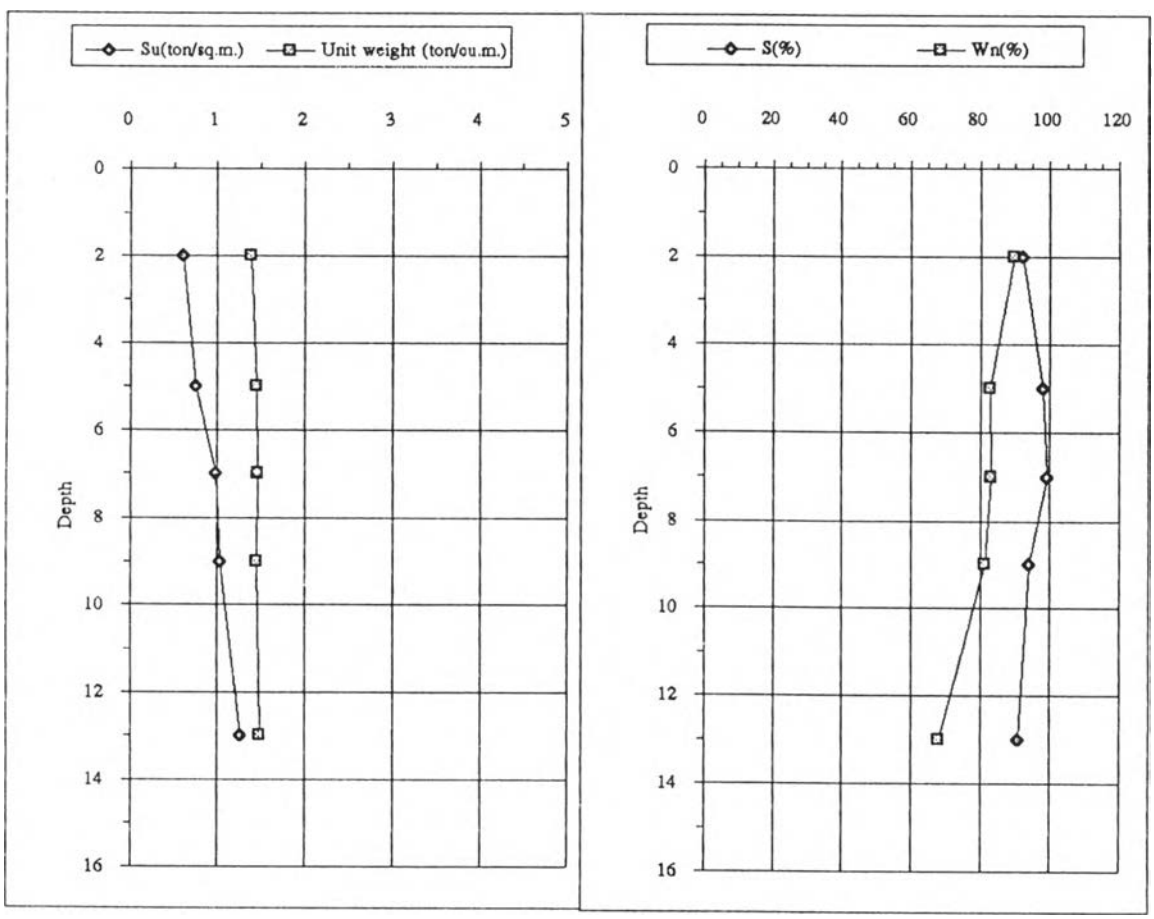
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH4/15 Location: TS1(1/3)

Description : Intermediat Soil Between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^3)	Wn %
ST2	2.00	0.06	0.01	2.79	0.60	92.02	1.40	89.57
ST5	5.00	0.07	0.00	7.26	0.75	97.92	1.45	82.91
ST7	7.00	0.09	0.01	10.27	0.98	99.26	1.47	83.20
ST9	9.00	0.10	0.00	13.12	1.03	94.14	1.46	81.28
ST13	13.00	0.09	0.02	19.37	1.27	90.93	1.49	67.94



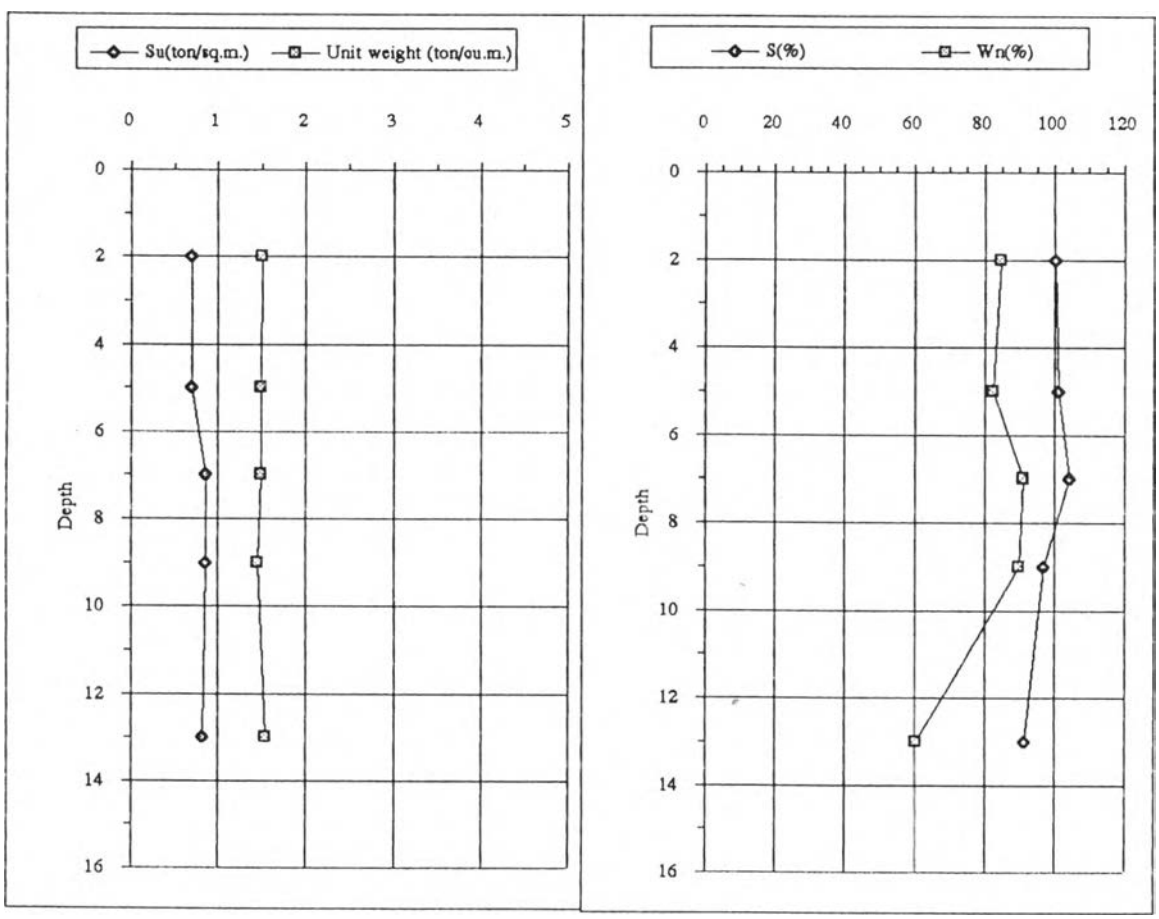
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH9/30 Location: TS1(1/3)

Description : Intermediat Soil Between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^3)	Wn %
ST2	2.00	0.07	0.01	3.01	0.70	100.26	1.50	84.82
ST5	5.00	0.07	0.00	7.43	0.70	101.21	1.49	82.52
ST7	7.00	0.07	0.01	10.42	0.86	104.34	1.49	91.16
ST9	9.00	0.08	0.00	13.07	0.86	97.01	1.45	89.91
ST13	13.00	0.03	0.03	20.03	0.83	91.41	1.54	60.44



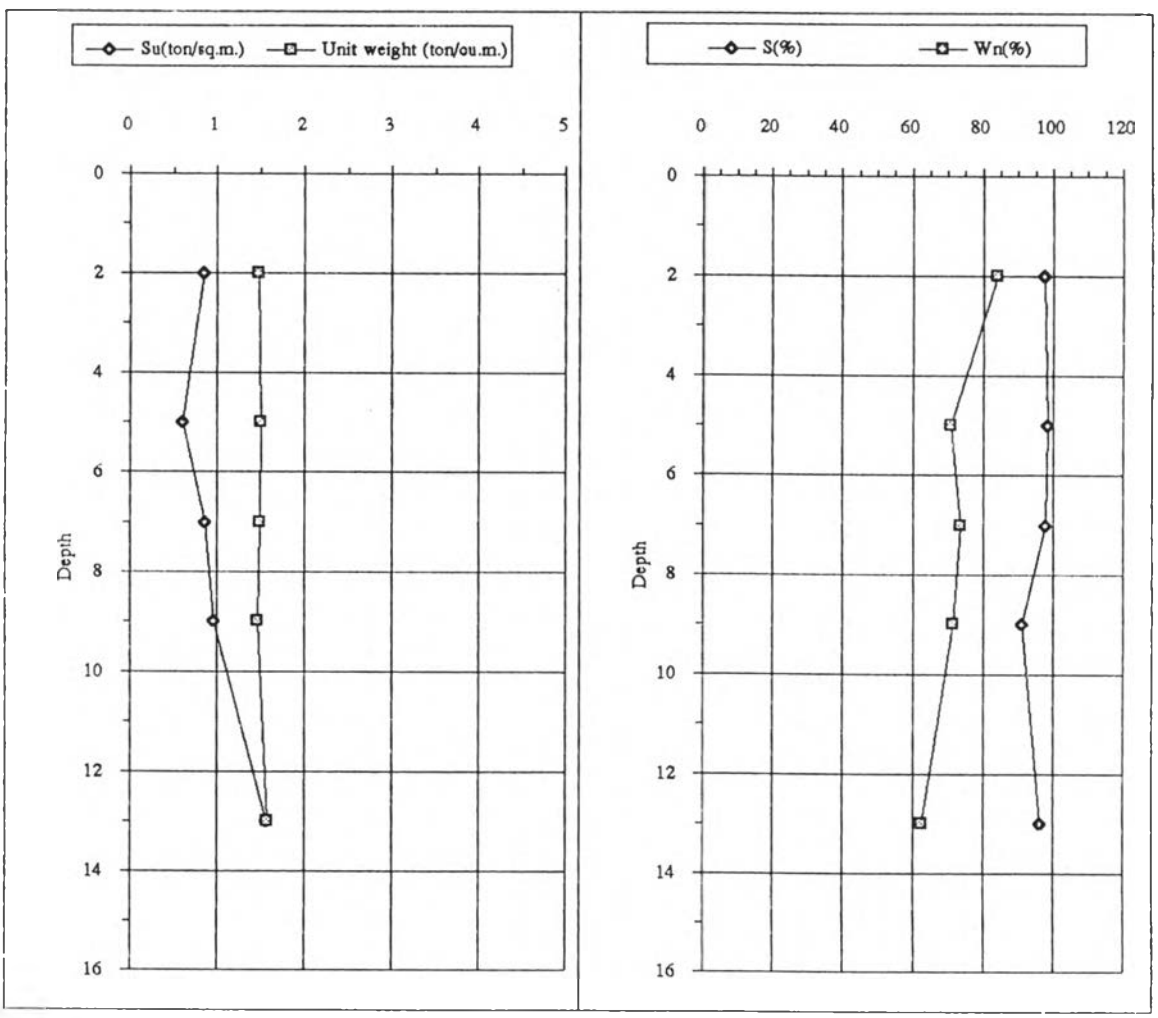
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH10/30 Location: TS1(1/2)

Description : Intermediat Soil Between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^3)	Wn %
ST2	2.00	0.09	0.00	2.96	0.85	97.70	1.48	84.01
ST5	5.00	0.06	0.01	7.54	0.60	98.37	1.51	70.82
ST7	7.00	0.08	0.01	10.45	0.87	97.76	1.49	73.80
ST9	9.00	0.09	0.00	13.25	0.96	91.13	1.47	71.51
ST13	13.00	0.12	0.02	20.55	1.57	96.50	1.58	62.63



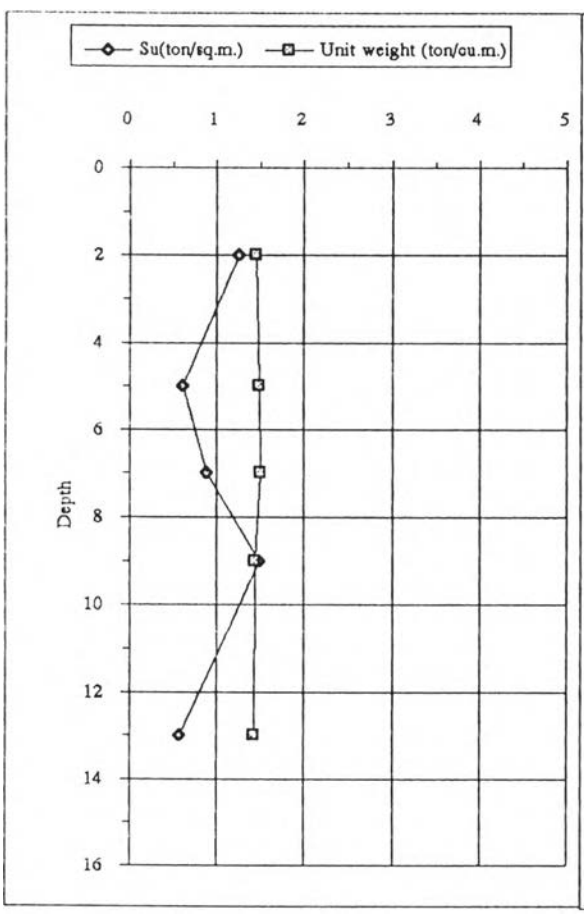
SOIL MECHANICS LABORATORY

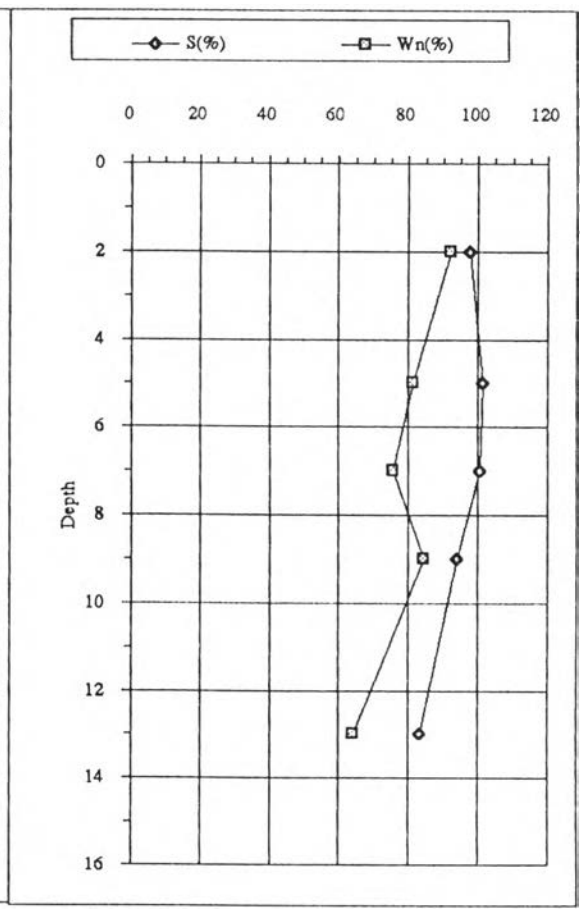
TRIAXIAL(U.U. TEST)

Boring No. : BH13/60 Location: TS1(1/2)

Description : Intermediat Soil Between Lime Piles Date: 14/09/96

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^3)	Wn %
ST2	2.00	0.12	0.02	2.90	1.26	97.94	1.45	92.22
ST5	5.00	0.06	0.00	7.46	0.61	101.41	1.49	81.59
ST7	7.00	0.09	0.00	10.55	0.89	100.59	1.51	75.61
ST9	9.00	0.15	0.00	13.00	1.49	94.18	1.44	84.62
ST13	13.00	0.03	0.01	18.53	0.57	83.38	1.43	64.19





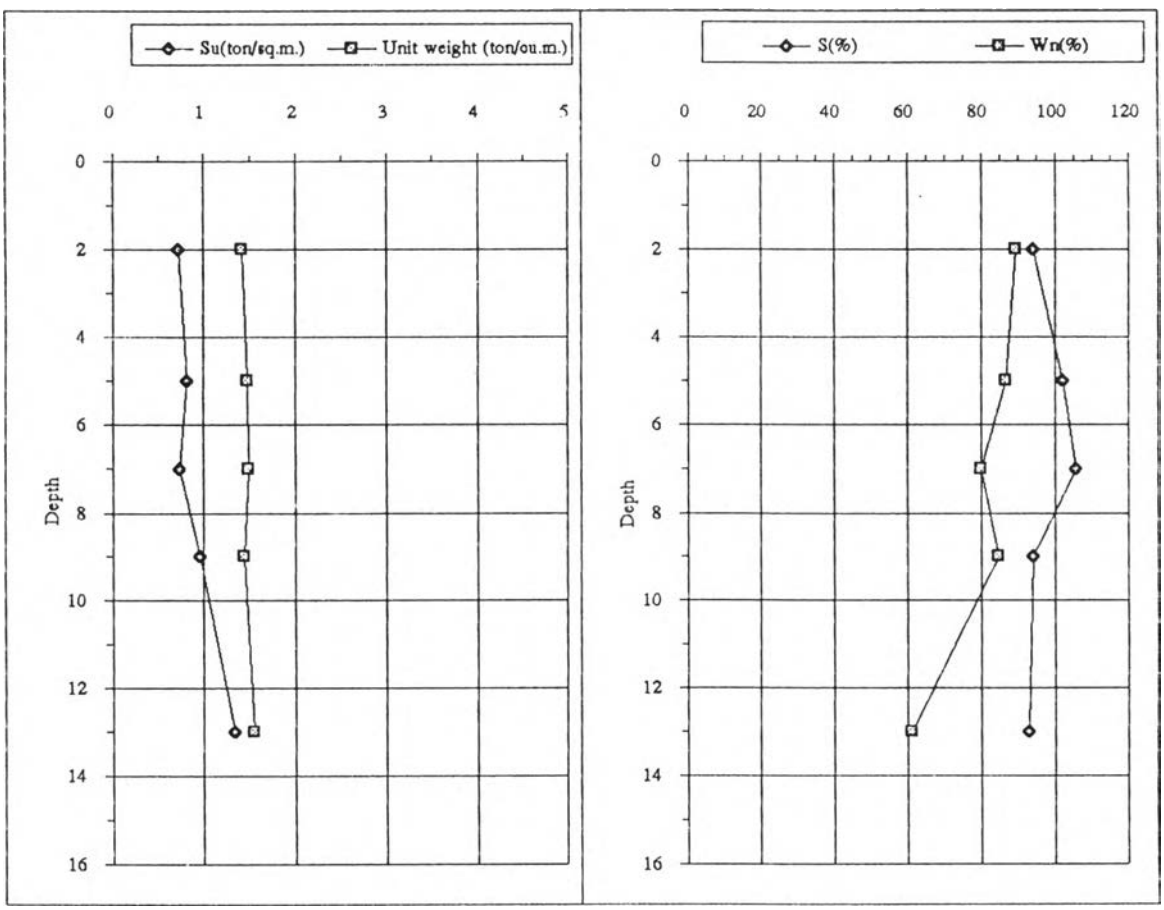
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH14/60 Location: TS1(1/3)

Description : Intermediat Soil Between Lime Piles Date: 12/09/96

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^3)	Wn %
ST2	2.00	0.07	0.01	2.84	0.72	94.03	1.42	89.53
ST5	5.00	0.07	0.01	7.39	0.82	102.03	1.48	86.77
ST7	7.00	0.07	0.00	10.45	0.74	105.61	1.49	79.90
ST9	9.00	0.09	0.00	13.00	0.96	94.18	1.44	84.62
ST13	13.00	0.11	0.01	20.18	1.34	92.98	1.55	61.26



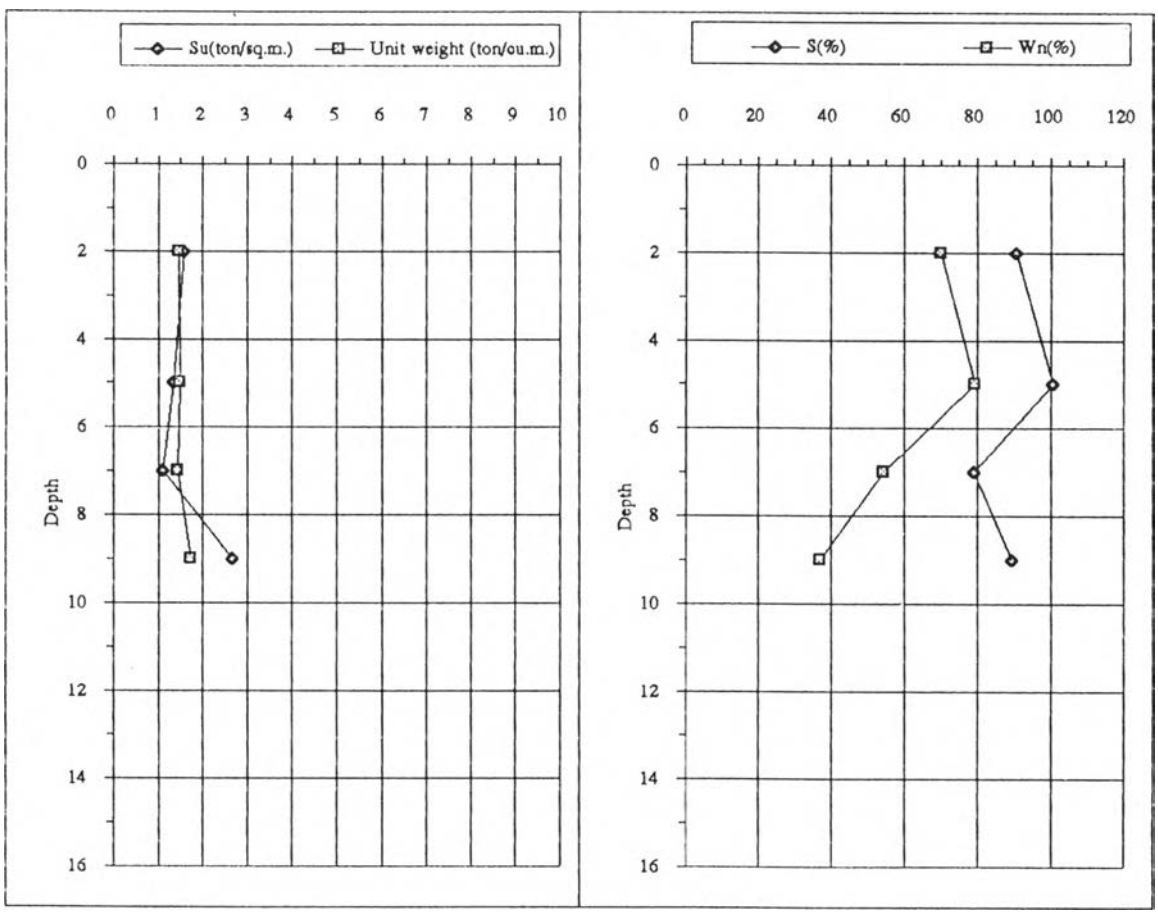
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH17/90 Location: TS1(1/2)

Description : Intermediat Soil Between Lime Piles Date: 12/09/96

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^3)	Wn %
ST2	2.00	0.15	0.01	5.90	1.60	90.71	1.47	69.88
ST5	5.00	0.11	0.02	10.44	1.34	100.61	1.49	79.56
ST7	7.00	0.11	0.00	13.00	1.10	79.12	1.44	54.55
ST9	9.00	0.27	0.00	15.52	2.66	89.40	1.72	37.06



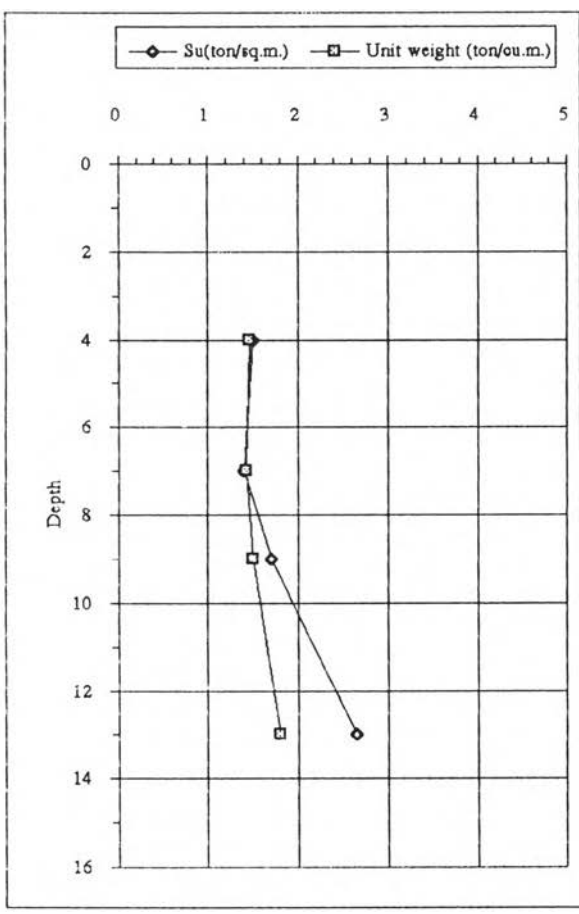
SOIL MECHANICS LABORATORY

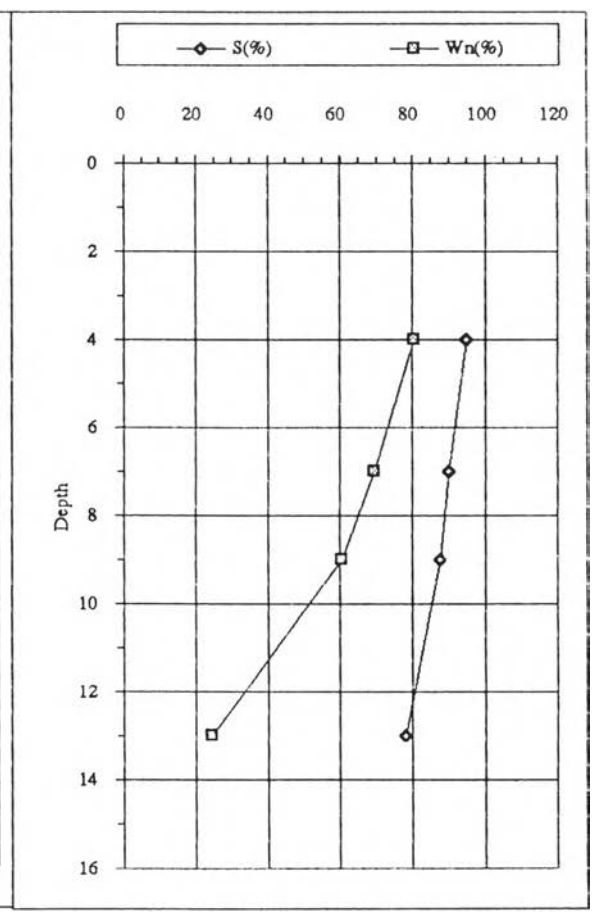
TRIAXIAL(U.U. TEST)

Boring No. : BH18/90 Location: TS1(1/3)

Description : Intermediat Soil Between Lime Piles Date: 12/09/96

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^2)	Wn %
ST2	2.00	0.09	0.01	2.84	0.90	94.03	1.42	89.53
ST5	4.00	0.15	0.01	5.86	1.50	94.95	1.46	80.62
ST7	7.00	0.11	0.03	10.00	1.40	89.94	1.43	69.39
ST9	9.00	0.14	0.02	13.50	1.70	87.63	1.50	60.41
ST13	13.00	0.26	0.00	23.35	2.64	78.22	1.80	24.46





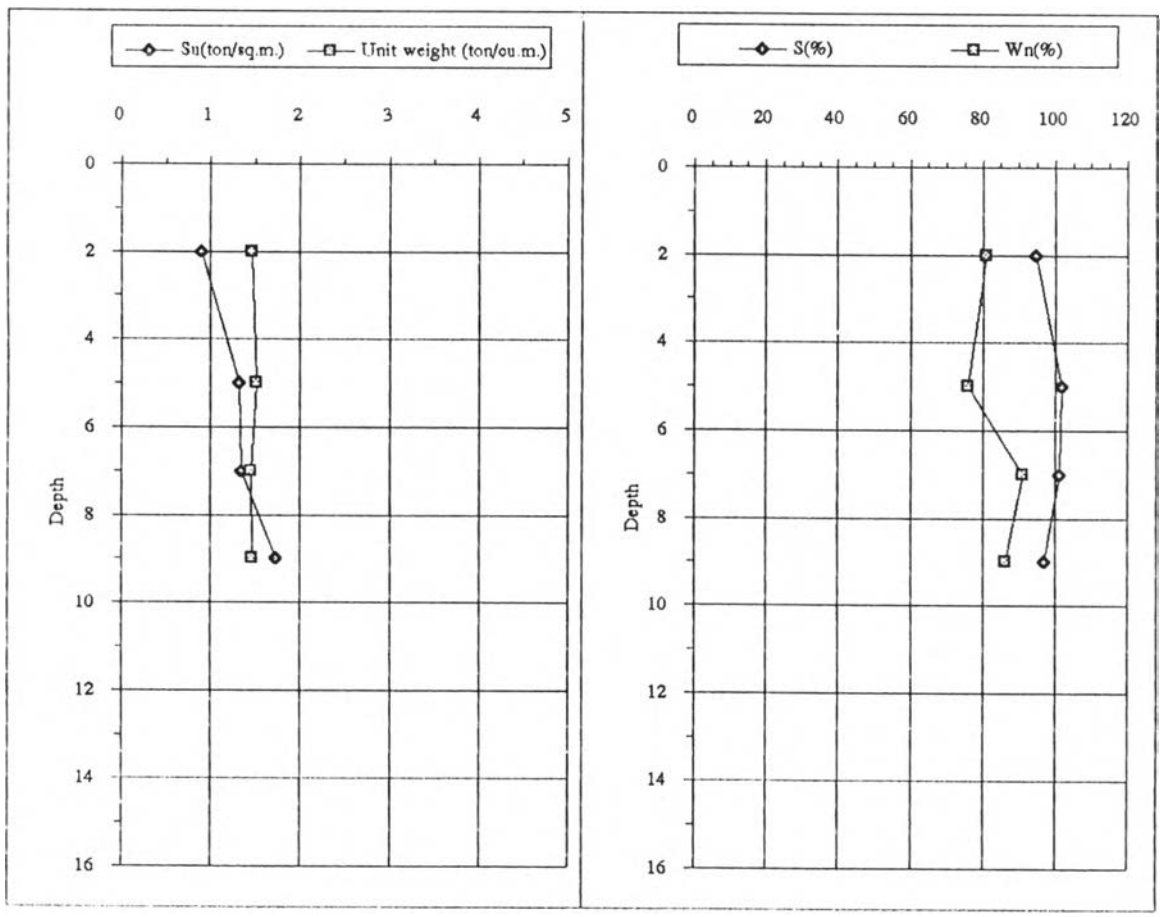
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH21/160 Location: TS1(1/3)

Description : Intermediat Soil Between Lime Piles Date: 7/12/96

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m²)	τ (t/m²)	Sr %	γ (t/m²)	Wn %
ST2	2.00	0.09	0.00	2.92	0.90	94.83	1.46	81.01
ST5	5.00	0.12	0.02	7.60	1.32	101.98	1.52	75.99
ST7	7.00	0.12	0.02	10.19	1.35	101.25	1.46	91.18
ST9	9.00	0.17	0.00	13.21	1.73	97.07	1.47	86.24



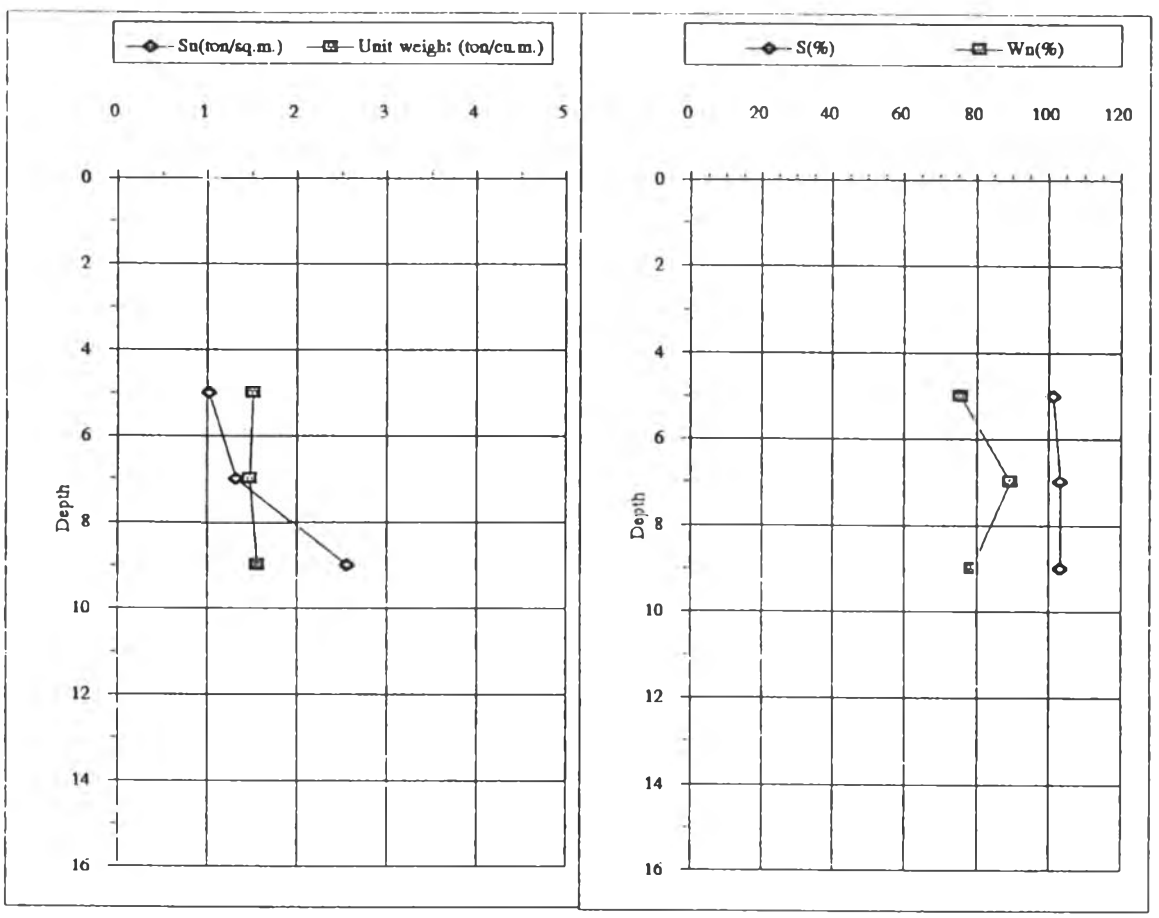
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH22/160 Location: TS1(1/2)

Description : Intermediat Soil Between Lime Piles Date: 8/01/97

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	Sr %	γ (t/m^2)	Wn %
ST5	5.00	0.10	0.01	7.58	1.02	101.42	1.52	75.51
ST7	7.00	0.11	0.02	10.36	1.33	103.24	1.48	89.41
ST9	9.00	0.21	0.03	14.08	2.56	103.24	1.56	78.74



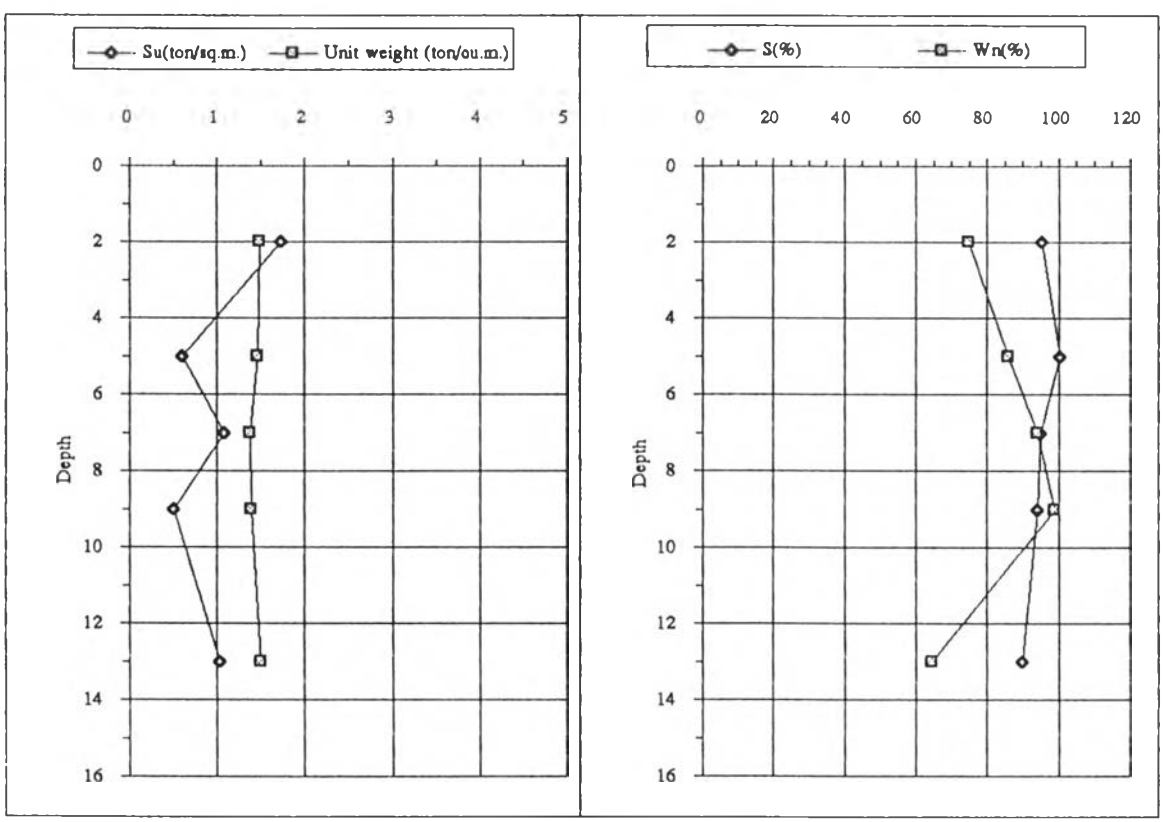
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH5/07 Location: TS2(1/2)

Description : Intermediat Soil between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST2	2.00	0.17	0.00	2.99	1.74	95.29	1.49	74.90
ST5	5.00	0.06	0.01	7.33	0.61	100.34	1.47	85.84
ST7	7.00	0.11	0.00	9.70	1.09	94.93	1.39	94.07
ST9	9.00	0.05	0.00	12.50	0.50	94.05	1.39	98.87
ST13	13.00	0.07	0.02	19.48	1.03	89.85	1.50	64.47



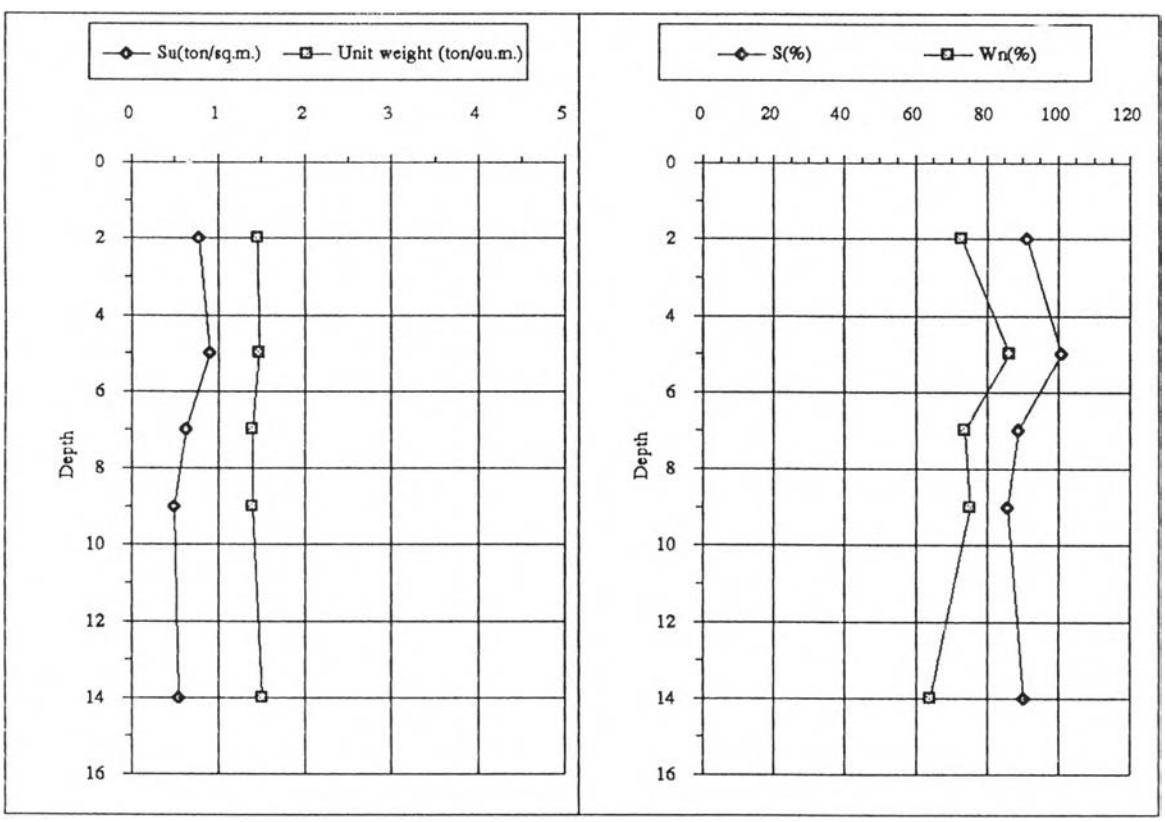
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH6/07 Location: TS2(1/3)

Description : Intermediat Soil between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST2	2.00	0.08	0.00	2.93	0.78	91.38	1.46	72.98
ST5	5.00	0.09	0.00	7.35	0.91	101.02	1.47	86.30
ST7	7.00	0.06	0.00	9.81	0.63	88.89	1.40	73.88
ST9	9.00	0.05	0.00	12.56	0.50	85.98	1.40	75.25
ST14	14.00	0.05	0.00	21.06	0.55	90.26	1.50	64.18



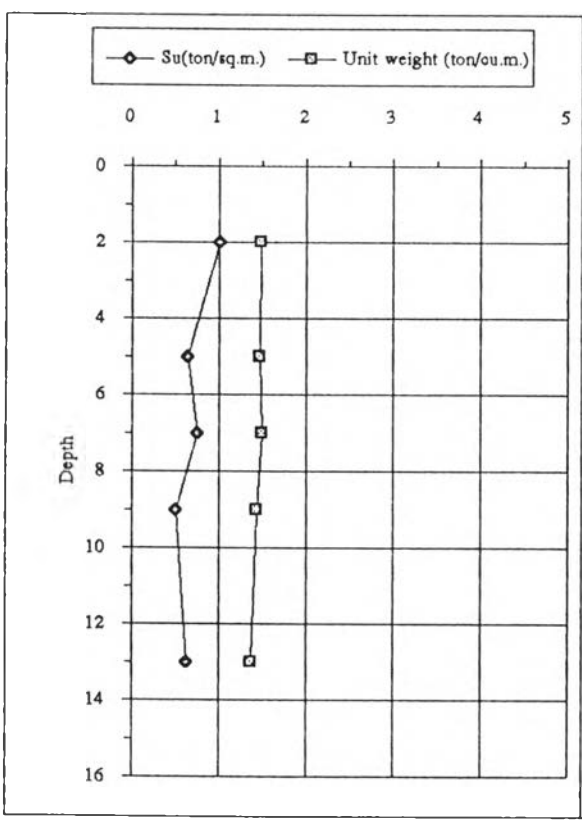
SOIL MECHANICS LABORATORY

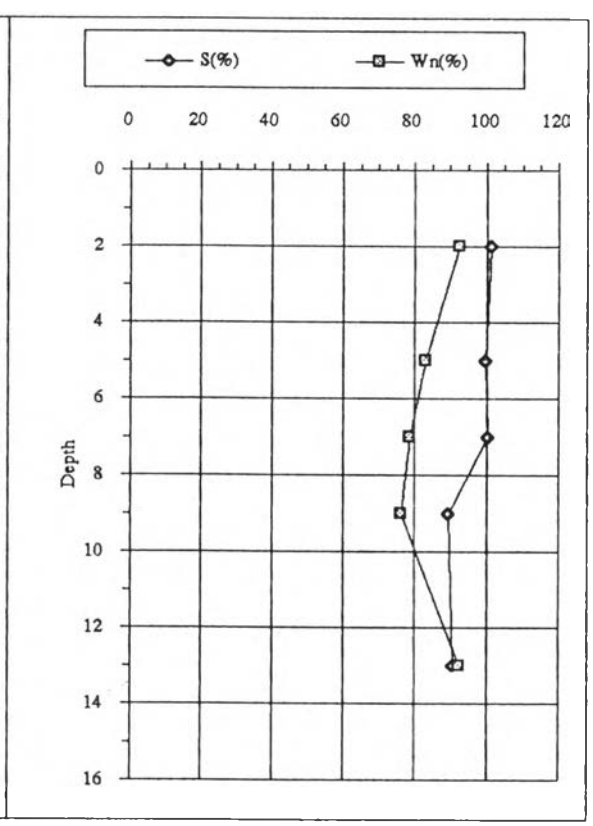
TRIAXIAL(U.U. TEST)

Boring No. : BH7/15 Location: TS2(1/2)

Description : Intermediat Soil between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST2	2.00	0.10	0.01	2.98	1.02	101.41	1.49	92.48
ST5	5.00	0.06	0.00	7.34	0.65	99.65	1.47	83.20
ST7	7.00	0.07	0.01	10.47	0.76	100.48	1.50	78.84
ST9	9.00	0.05	0.00	12.87	0.50	89.50	1.43	76.38
ST13	13.00	0.05	0.01	17.89	0.63	90.83	1.38	92.61





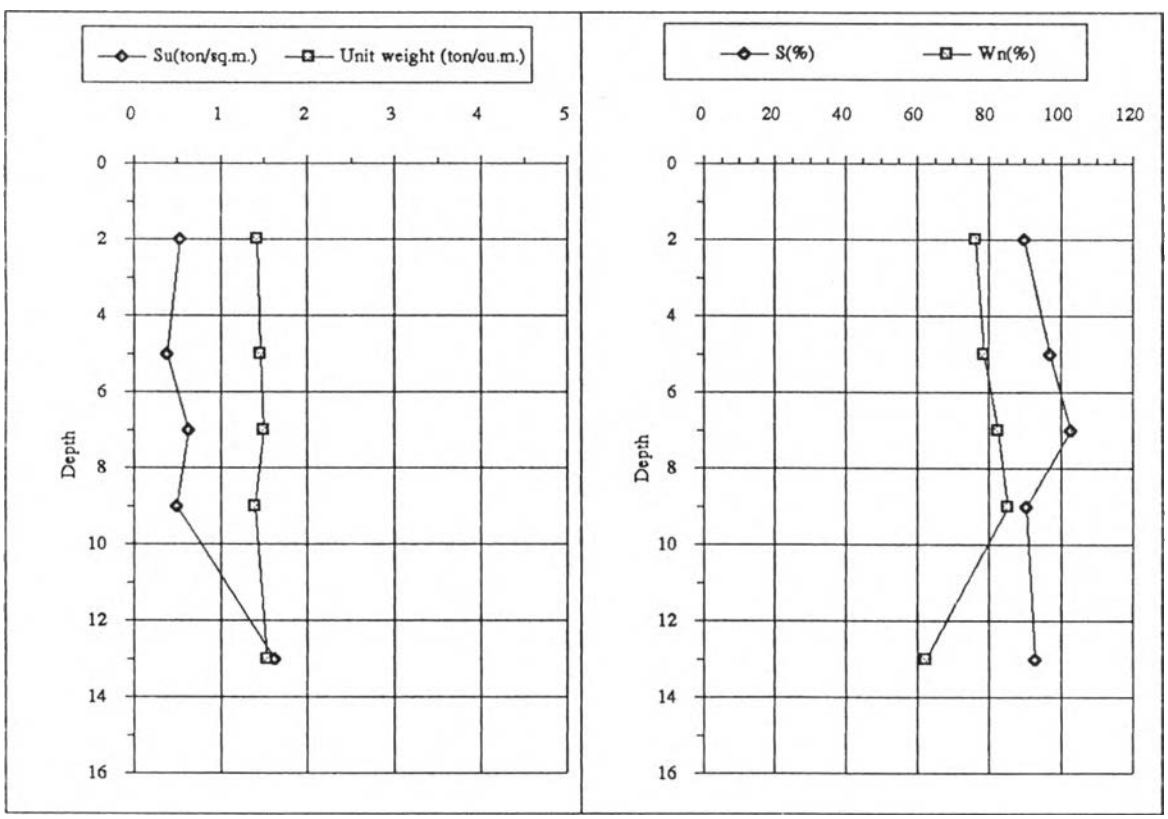
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH8/15 Location: TS2(1/3)

Description : Intermediat Soil between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST2	2.00	0.05	0.01	2.86	0.53	89.98	1.43	76.41
ST5	5.00	0.04	0.00	7.32	0.38	97.01	1.46	78.78
ST7	7.00	0.06	0.01	10.54	0.64	102.85	1.51	82.64
ST9	9.00	0.05	0.00	12.61	0.49	90.54	1.40	85.41
ST13	13.00	0.12	0.02	20.07	1.63	92.73	1.54	62.33



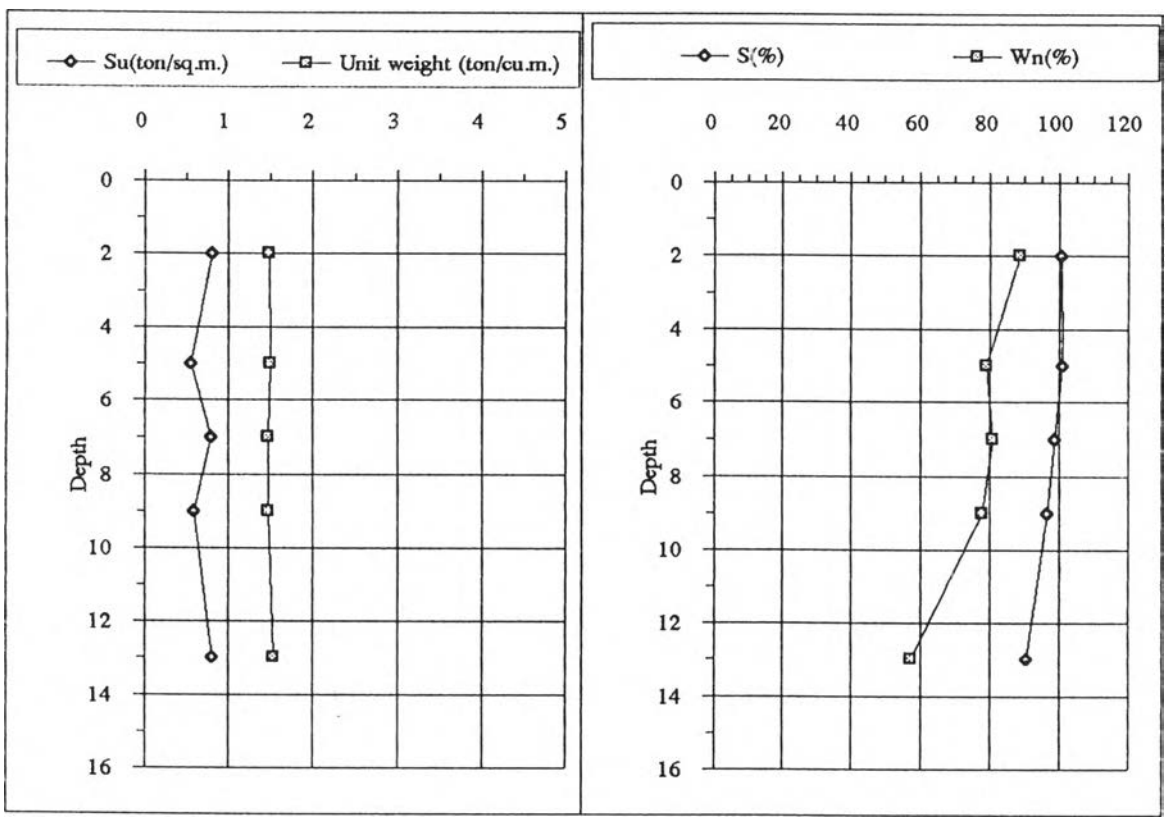
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH11-30 Location: TS2(1/3)

Description : Intermediat Soil between Lime Piles Date: 13/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST2	2.00	0.08	0.00	2.98	0.80	100.62	1.49	88.88
ST5	5.00	0.06	0.00	7.49	0.55	101.09	1.50	79.06
ST7	7.00	0.08	0.00	10.29	0.79	98.68	1.47	81.16
ST9	9.00	0.05	0.01	13.27	0.59	96.61	1.47	78.03
ST13	13.00	0.06	0.01	19.95	0.81	90.70	1.53	57.29



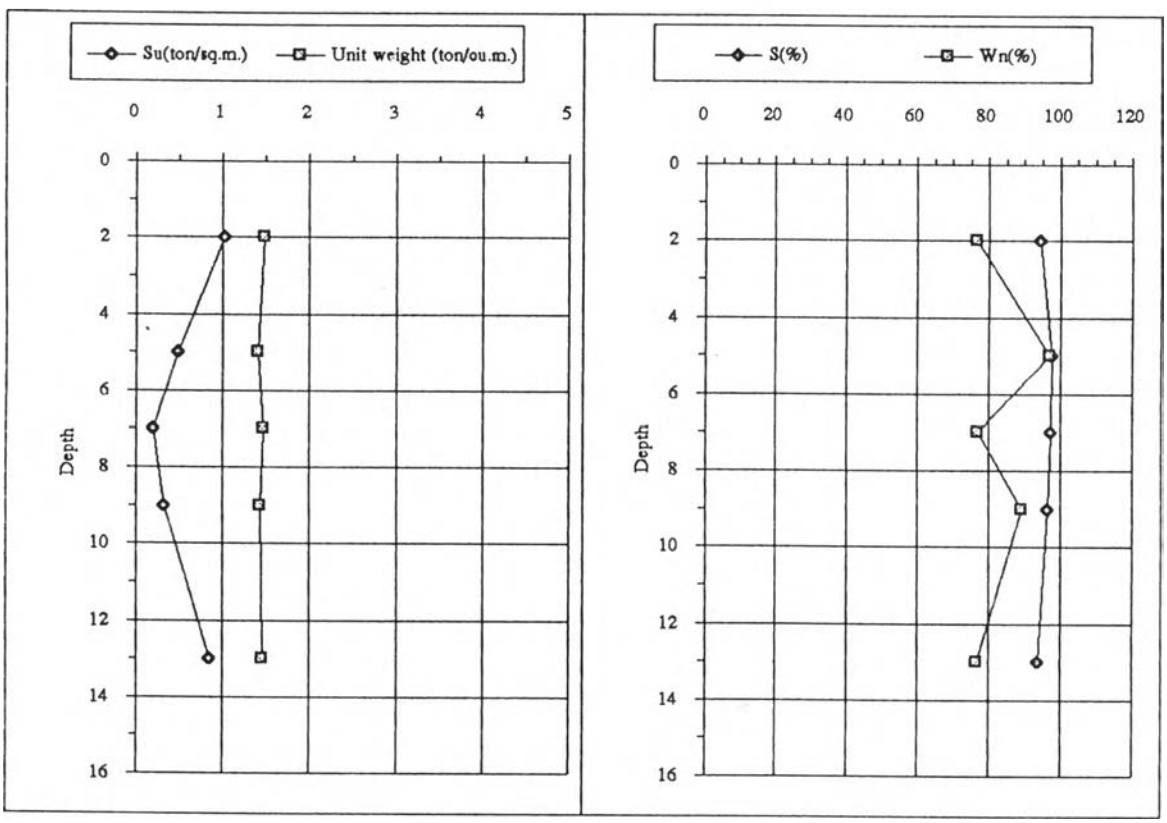
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH12-30 Location: TS2(1/2)

Description : Intermediat Soil between Lime Piles Date: 16/08/39

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST2	2.00	0.10	0.00	2.96	1.02	94.42	1.48	76.57
ST5	5.00	0.05	0.00	7.02	0.49	97.70	1.40	97.18
ST7	7.00	0.02	0.00	10.32	0.20	97.44	1.47	76.93
ST9	9.00	0.03	0.00	12.93	0.33	96.54	1.44	89.15
ST13	13.00	0.07	0.01	19.02	0.85	93.80	1.46	76.49



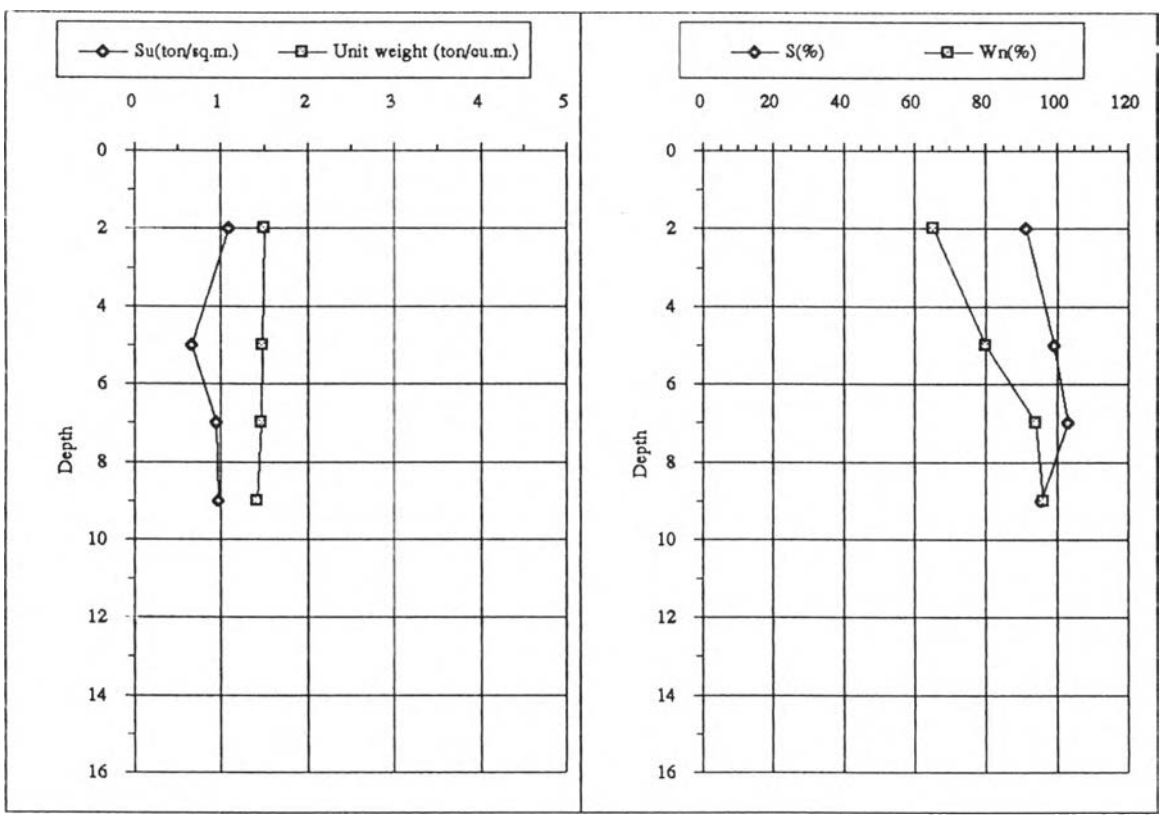
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH15/60 Location: TS2(1/3)

Description : Intermediat Soil between Lime Piles Date: 12/09/96

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST2	2.00	0.11	0.01	3.01	1.10	91.38	1.50	65.47
ST5	5.00	0.07	0.00	7.38	0.65	99.21	1.48	80.03
ST7	7.00	0.10	0.00	10.25	0.95	103.14	1.46	93.95
ST9	9.00	0.10	0.00	12.73	0.96	95.54	1.41	96.23



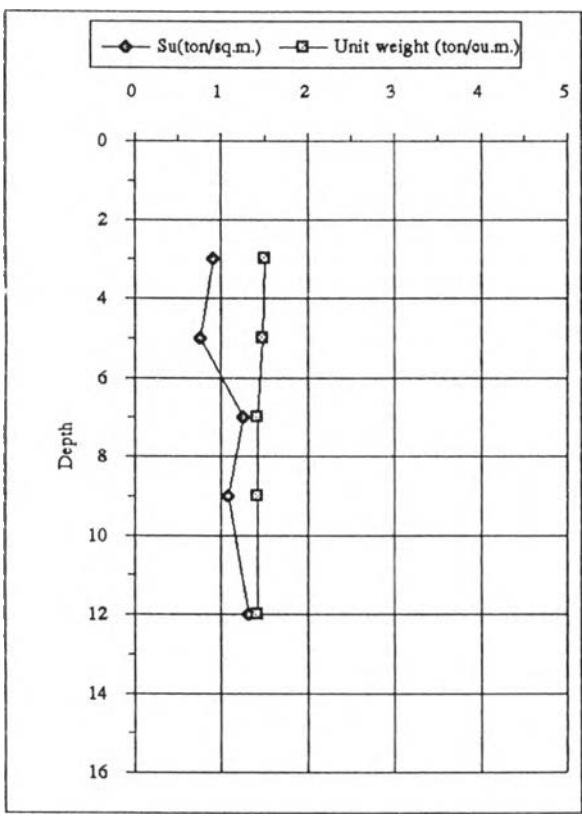
SOIL MECHANICS LABORATORY

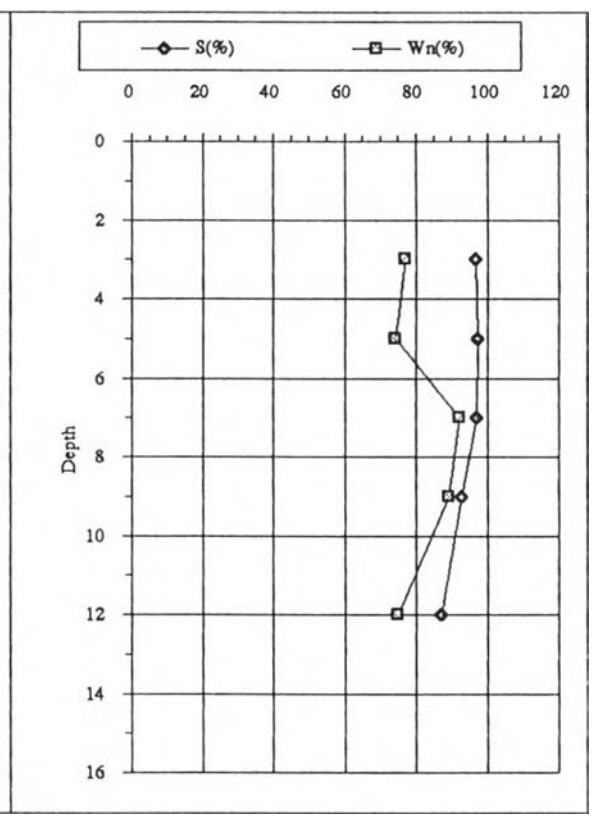
TRIAXIAL(U.U. TEST)

Boring No. : BH16/60 Location: TS2(1/2)

Description : Intermediat Soil between Lime Piles Date: 12/09/96

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST3	3.00	0.09	0.01	4.50	0.91	96.85	1.50	77.08
ST5	5.00	0.07	0.01	7.42	0.76	97.55	1.48	74.34
ST7	7.00	0.12	0.01	9.91	1.26	97.08	1.42	92.45
ST9	9.00	0.10	0.01	12.71	1.08	92.95	1.41	89.27
ST12	12.00	0.10	0.02	16.97	1.32	87.30	1.41	74.98





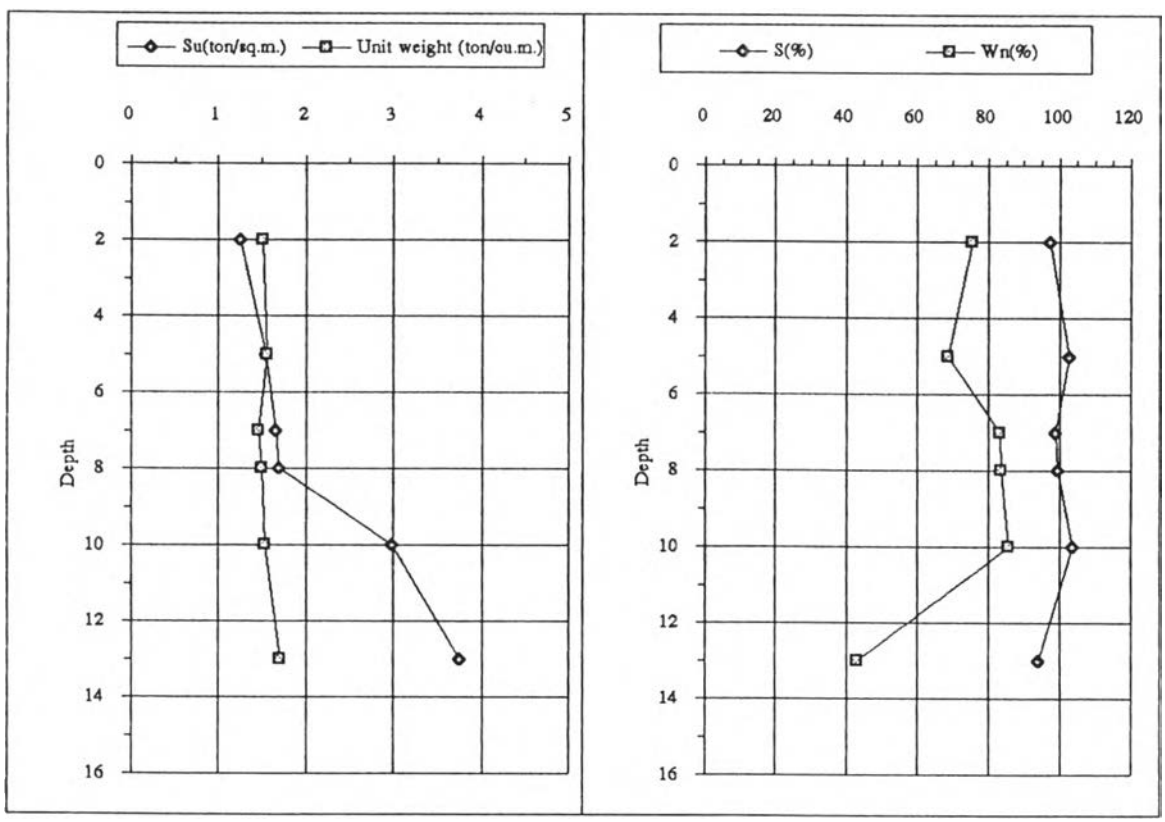
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH19/90 Location: TS2(1/2)

Description : Intermediat Soil between Lime Piles Date: 7/02/97

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST2	2.00	0.12	0.01	3.03	1.26	97.27	1.51	75.35
ST5	5.00	0.14	0.02	7.81	1.55	102.80	1.56	68.86
ST7	7.00	0.17	0.00	10.21	1.66	98.82	1.46	83.30
ST8	8.00	0.12	0.04	12.03	1.70	99.47	1.50	83.61
ST10	10.00	0.17	0.08	15.40	2.98	103.73	1.54	85.48
ST13	13.00	0.21	0.07	22.19	3.75	94.00	1.71	43.05



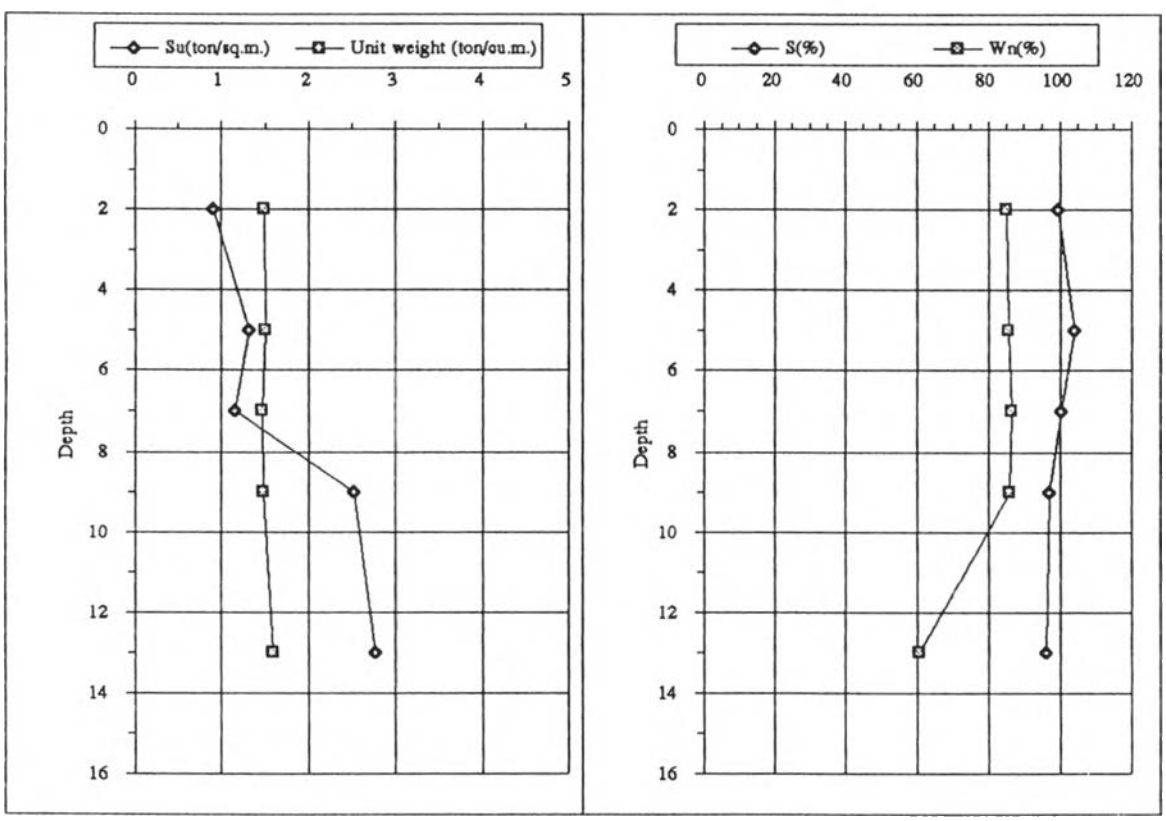
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH20/90 Location: TS2(1/3)

Description : Intermediat Soil between Lime Piles Date: 25/02/97

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m²)	τ (t/m²)	S %	γ (t/m³)	Wn %
ST2	2.00	0.09	0.00	2.98	0.91	99.44	1.49	85.07
ST5	5.00	0.13	0.00	7.51	1.32	104.10	1.50	85.60
ST7	7.00	0.10	0.01	10.23	1.16	100.34	1.46	86.63
ST9	9.00	0.17	0.06	13.27	2.52	97.27	1.47	86.07
ST13	13.00	0.16	0.06	20.68	2.77	96.34	1.59	60.67



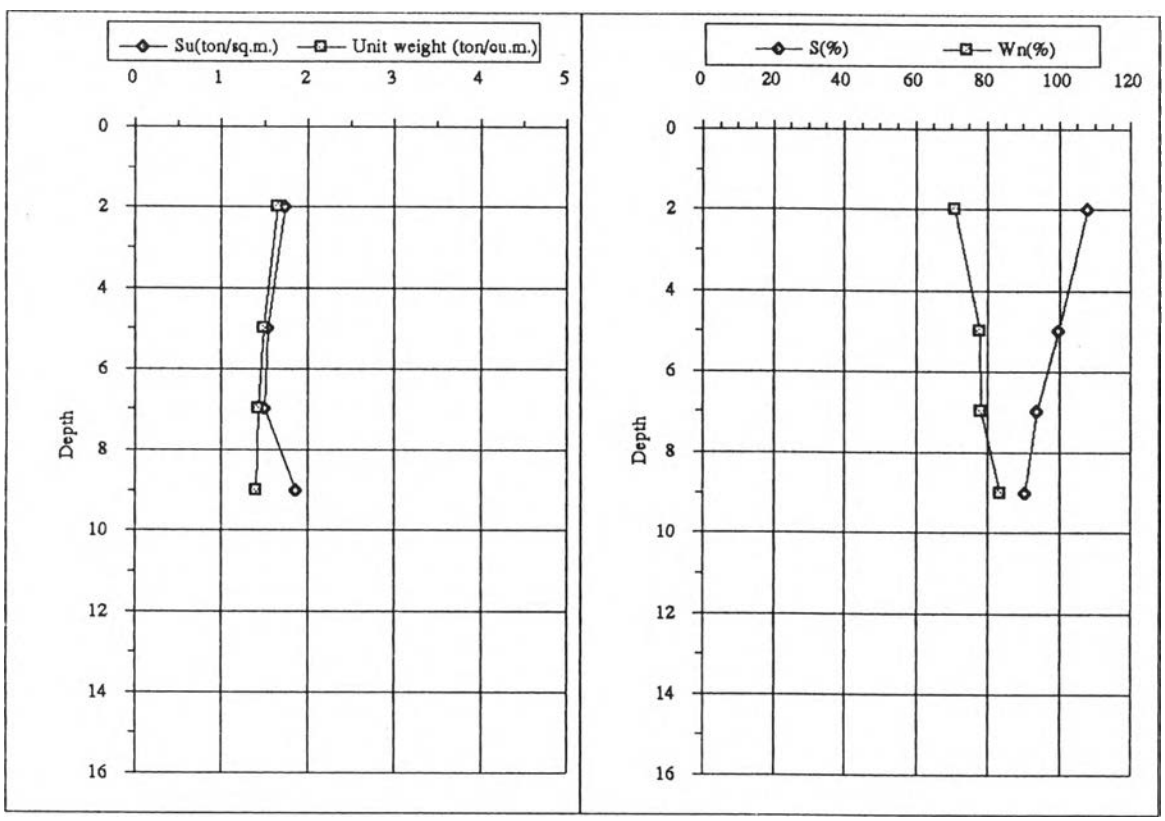
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH23/160 Location: TS2(1/2)

Description : Intermediat Soil between Lime Piles Date: 3/03/97

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST2	2.00	0.17	0.00	3.32	1.74	107.85	1.66	70.97
ST5	5.00	0.15	0.00	7.45	1.54	99.70	1.49	77.90
ST7	7.00	0.14	0.01	10.02	1.50	93.91	1.43	78.17
ST9	9.00	0.18	0.01	12.68	1.86	90.50	1.41	83.52



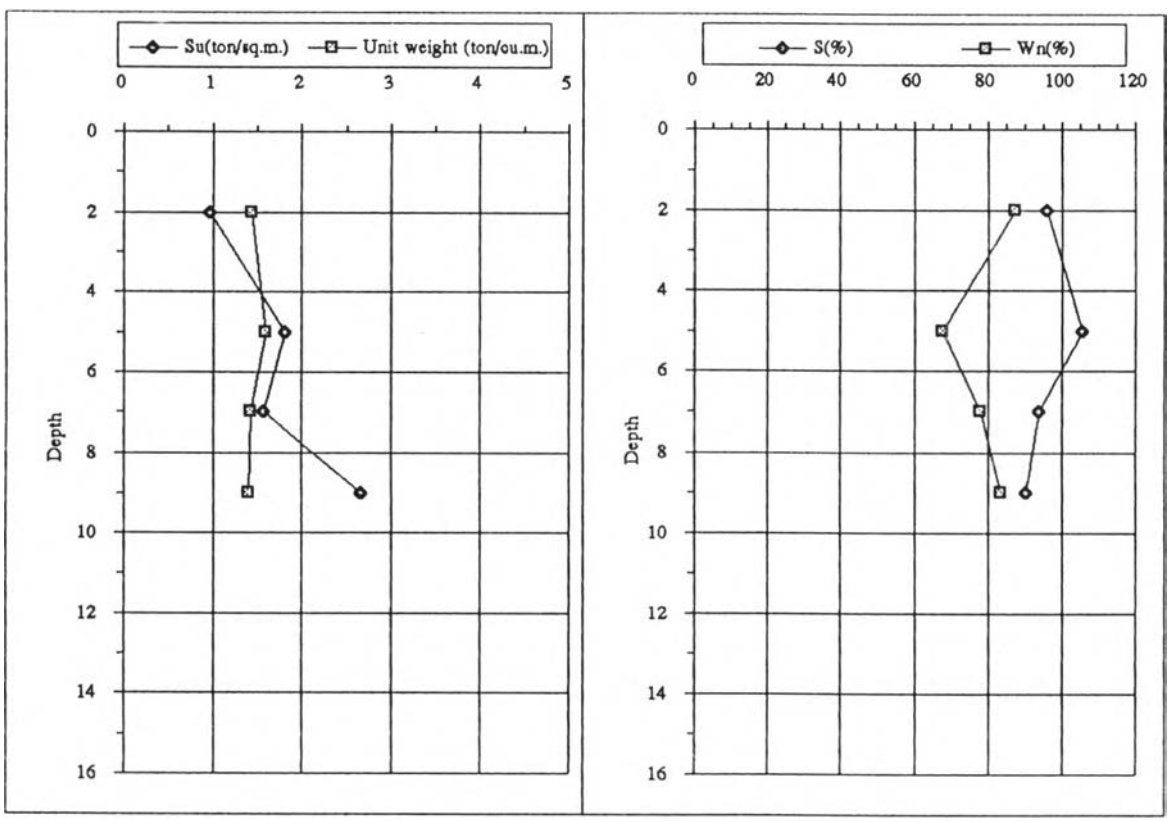
SOIL MECHANICS LABORATORY

TRIAXIAL(U.U. TEST)

Boring No. : BH24/160 Location: TS2(1/3)

Description : Intermediat Soil between Lime Piles Date: 11/03/97

Sample No.	Depth (m)	c (ksc.)	ϕ (rad)	σ (t/m^2)	τ (t/m^2)	S %	γ (t/m^3)	Wn %
ST2	2.00	0.09	0.02	2.89	0.97	95.94	1.45	87.55
ST5	5.00	0.18	0.00	7.97	1.81	105.65	1.59	67.77
ST7	7.00	0.16	0.00	10.02	1.58	93.91	1.43	78.17
ST9	9.00	0.26	0.01	12.68	2.66	90.50	1.41	83.52



ภาคผนวก ข

ผลการทดสอบ Consolidation Test

- ตัวอย่างดินเดิม .....
- ตัวอย่างดินจากแปงทดสอบ TS1 .....
- ตัวอย่างดินจากแปงทดสอบ TS2 .....

SOIL MECHANICS LABORATORY

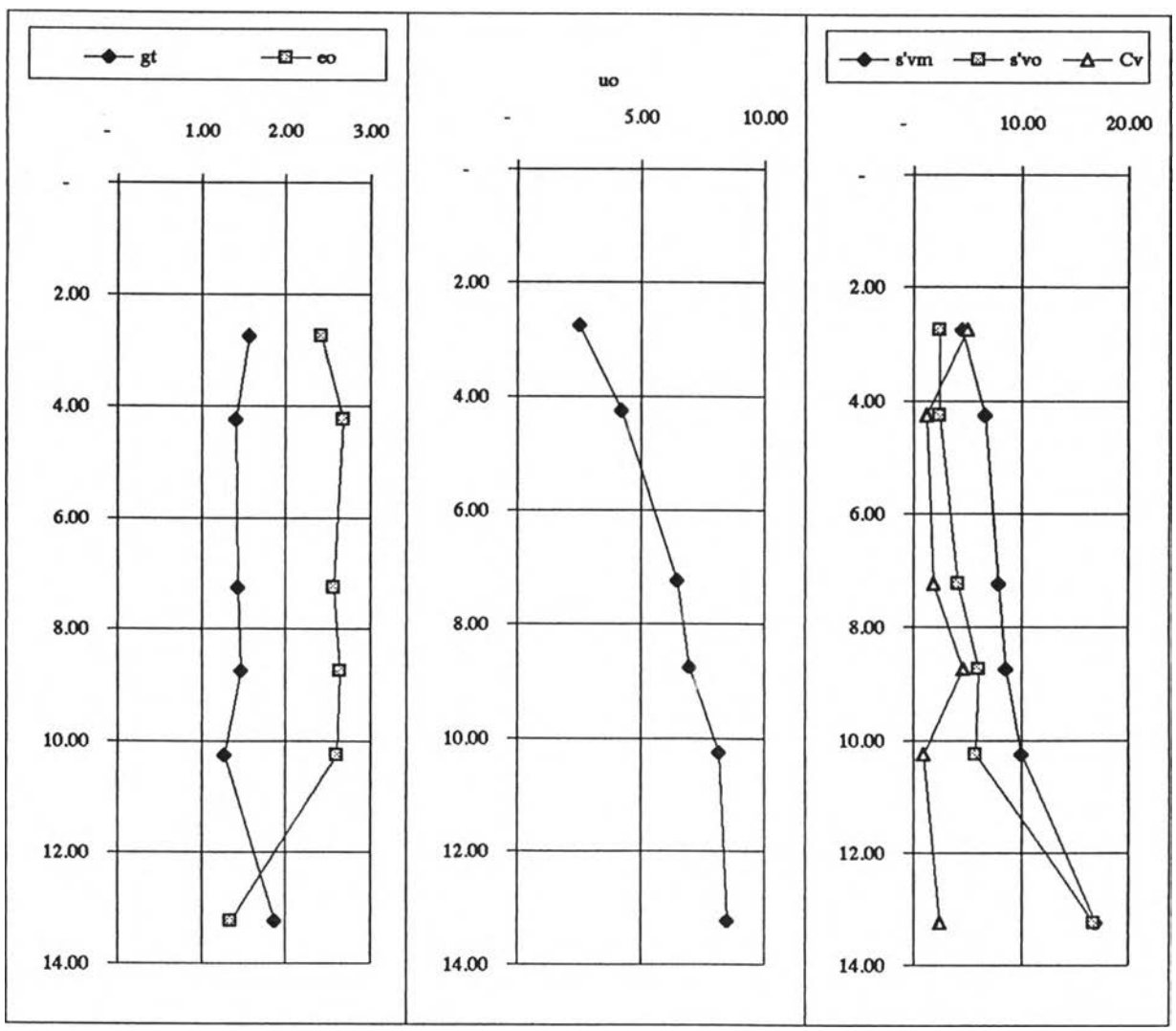
CONSOLIDATION TEST

Borehole No. BH-1 (Initial)

Location : TS-1

Description of Sample : NNH Clay

Sample depth		γ_T	G_s	u_o	e_0	C_C	C_r	CR	RR	OCR	σ'_{v0}	σ'_{vm}	C_v
From	To	t/m^3		t/m^2							t/m^2	t/m^2	$x10^{-4}\ m^2/yr$
2.50	3.00	1.57	2.61	2.50	2.43	1.43	0.25	0.42	0.07	1.83	2.52	4.60	5.05
4.00	4.50	1.41	2.59	4.20	2.68	2.06	0.19	0.56	0.05	2.69	2.49	6.70	1.26
7.00	7.50	1.44	2.57	6.50	2.58	2.08	0.20	0.58	0.06	1.86	4.24	7.90	1.89
8.50	9.00	1.47	2.58	7.00	2.64	1.66	0.23	0.46	0.06	1.40	6.16	8.60	4.73
10.00	10.50	1.28	2.60	8.20	2.61	1.42	0.18	0.39	0.05	1.72	5.82	10.00	0.95
13.00	13.50	1.87	2.64	8.50	1.35	0.92	0.25	0.39	0.11	1.01	16.88	17.00	2.52



SOIL MECHANICS LABORATORY

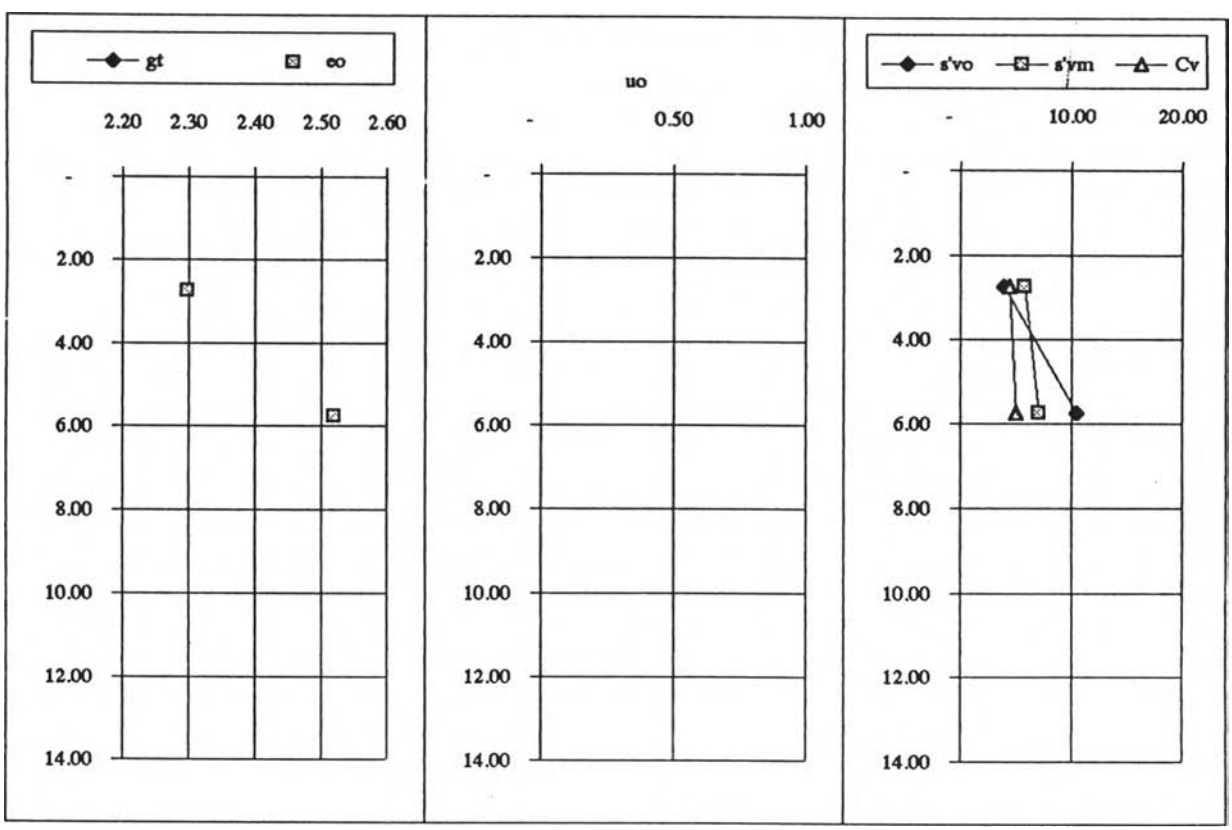
CONSOLIDATION TEST

Borehole No. BH-2 (Initial)

Location : Dummy Area

Description of Sample : NNH Clay

Sample depth		γ_T	G_s	u_o	e_0	C_C	C_r	CR	RR	OCR	σ'_{v0}	σ'_{vm}	C_v
From	To	t/m^3		t/m^2							t/m^2	t/m^2	x10^{-4} m^2/yr
2.50	3.00		2.63		2.30	1.53	0.29	0.46	0.09	1.45	3.99	5.80	4.42
5.50	6.00		2.62		2.52	1.80	0.23	0.51	0.07	0.68	10.51	7.10	5.05



SOIL MECHANICS LABORATORY

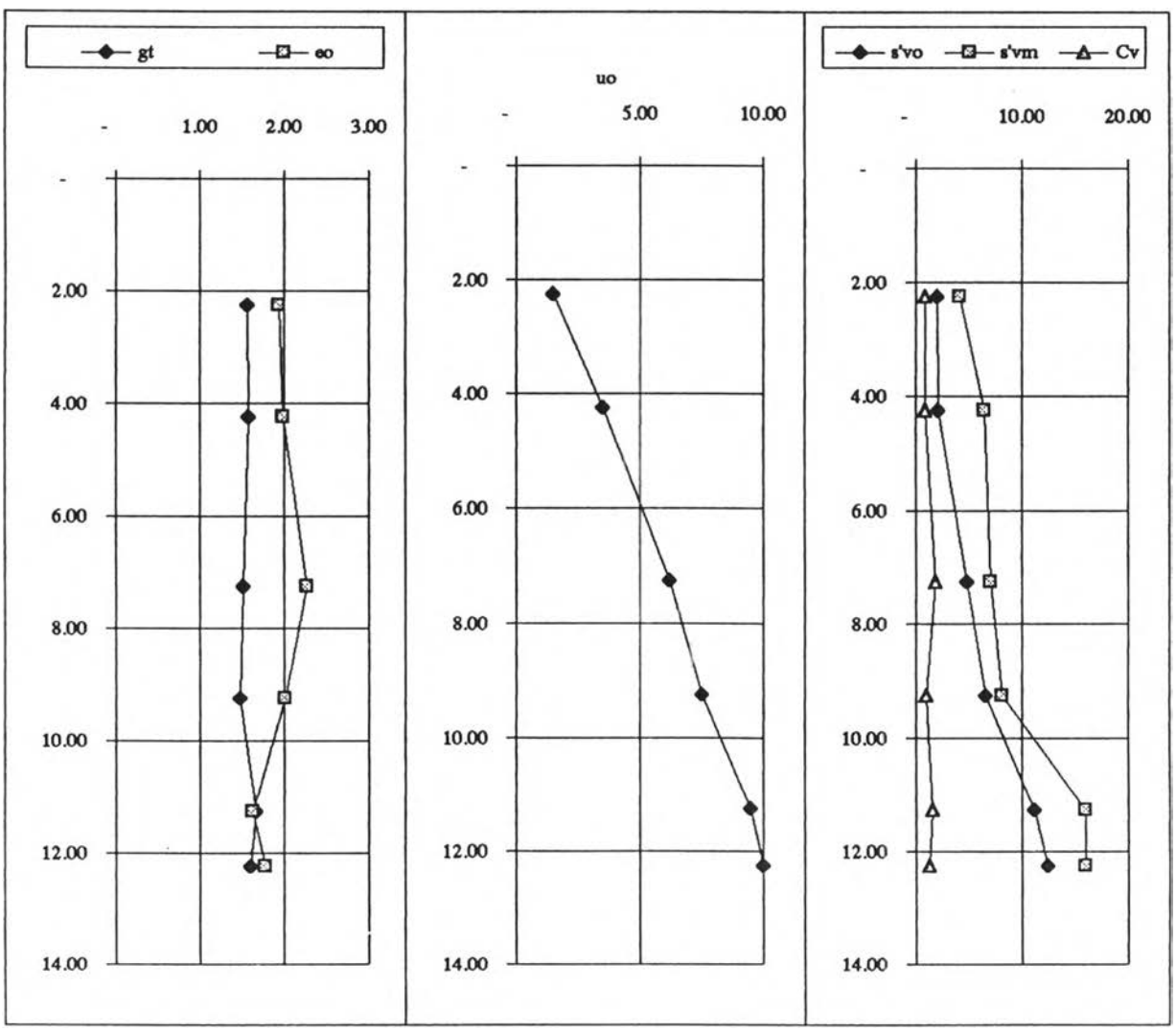
CONSOLIDATION TEST

Borehole No. BH-18/90

Location : TS-1

Description of Sample : NNH Clay

Sample depth		γ_T	G_s	u_o	e_0	C_C	C_r	CR	RR	OCR	σ'_{v0}	σ'_{vm}	C_V
From	To	t/m^3		t/m^2							t/m^2	t/m^2	$x10^{-4}\ m^2/yr$
2.00	2.50	1.56	2.62	1.50	1.93	0.84	0.21	0.29	0.07	2.09	2.01	4.20	0.88
4.00	4.50	1.58	2.64	3.50	1.98	0.83	0.15	0.28	0.05	3.02	2.15	6.50	0.88
7.00	7.50	1.52	2.64	6.20	2.27	0.90	0.10	0.28	0.03	1.47	4.82	7.10	1.89
9.00	9.50	1.48	2.62	7.50	2.01	0.88	0.12	0.29	0.04	1.24	6.59	8.20	0.95
11.00	11.50	1.66	2.65	9.50	1.63	0.88	0.13	0.33	0.05	1.43	11.18	16.00	1.58
12.00	12.50	1.61	2.65	10.00	1.78	0.90	0.14	0.32	0.05	1.29	12.42	16.00	1.26



SOIL MECHANICS LABORATORY

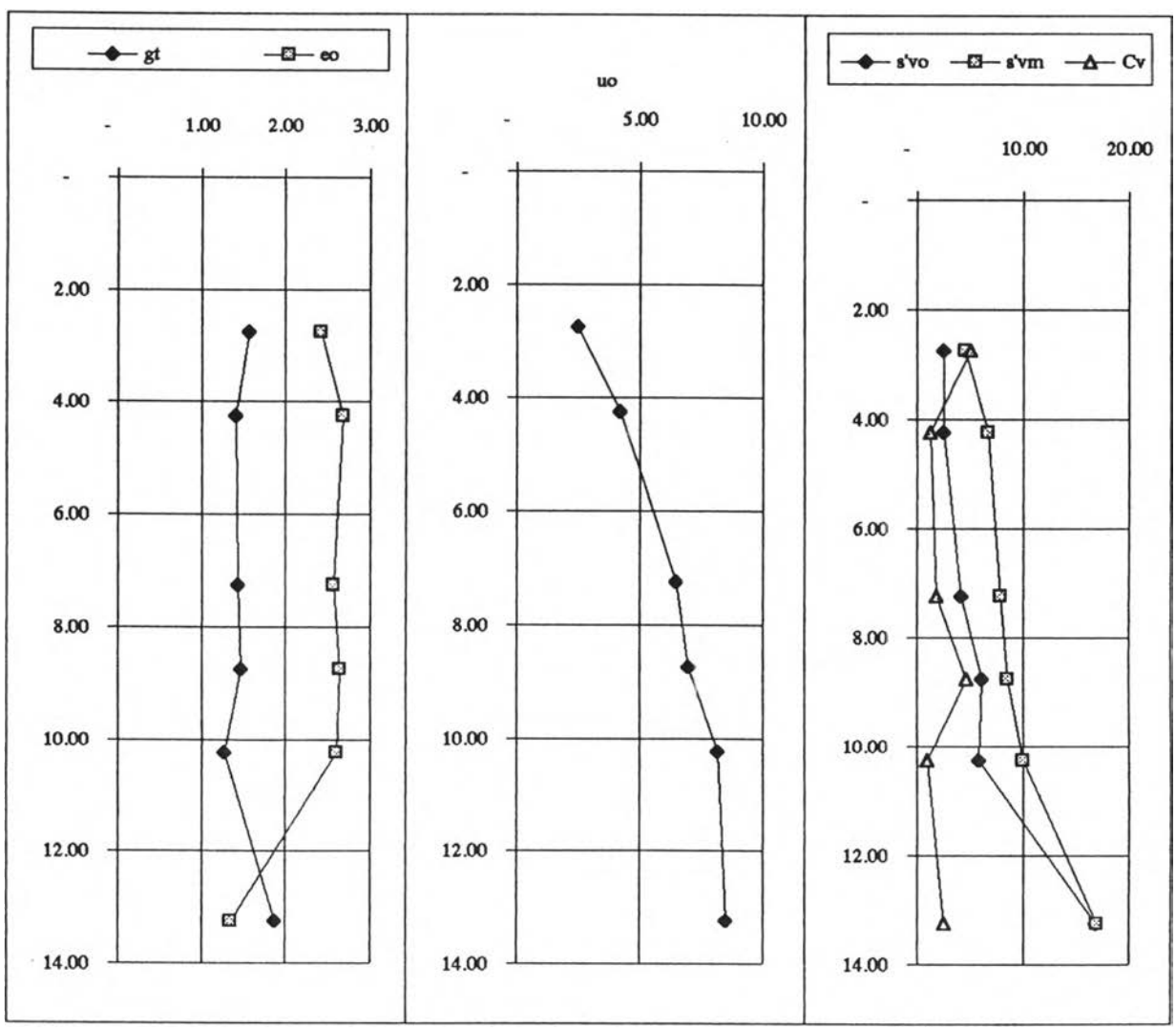
CONSOLIDATION TEST

Borehole No. BH-21/160

Location : TS-1

Description of Sample : NNH Clay

Sample depth		γ_T	G_s	u_o	e_0	C_C	C_r	CR	RR	OCR	σ'_{v0}	σ'_{vm}	C_v
From	To	t/m^3		t/m^2							t/m^2	t/m^2	$x10^{-4} m^2/yr$
2.50	3.00	1.57	2.61	2.50	2.43	1.43	0.25	0.42	0.07	1.83	2.52	4.60	5.05
4.00	4.50	1.41	2.59	4.20	2.68	2.06	0.19	0.56	0.05	2.69	2.49	6.70	1.26
7.00	7.50	1.44	2.57	6.50	2.58	2.08	0.20	0.58	0.06	1.86	4.24	7.90	1.89
8.50	9.00	1.47	2.58	7.00	2.64	1.66	0.23	0.46	0.06	1.40	6.16	8.60	4.73
10.00	10.50	1.28	2.60	8.20	2.61	1.42	0.18	0.39	0.05	1.72	5.82	10.00	0.95
13.00	13.50	1.87	2.64	8.50	1.35	0.92	0.25	0.39	0.11	1.01	16.88	17.00	2.52



SOIL MECHANICS LABORATORY

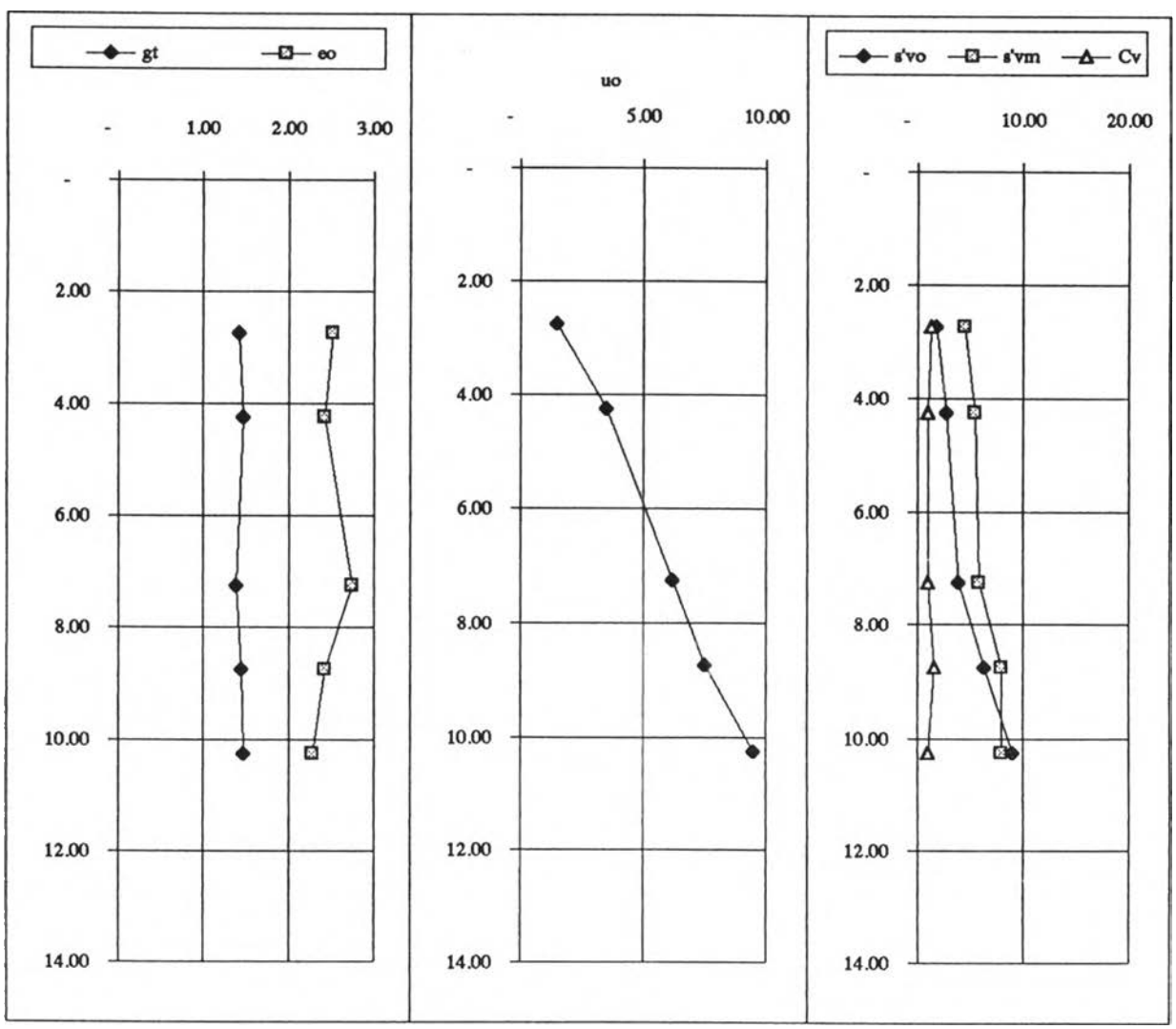
CONSOLIDATION TEST

Borehole No. BH-20/90

Location : TS-2

Description of Sample : NNH Clay

Sample depth		γ_T	G_s	u_o	e_0	C_C	C_r	CR	RR	OCR	σ'_{v0}	σ'_{vm}	C_v
From	To	t/m^3		t/m^2							t/m^2	t/m^2	$x10^{-4}\ m^2/yr$
2.50	3.00	1.43	2.70	1.50	2.52	0.83	0.26	0.24	0.07	2.62	1.72	4.50	1.26
4.00	4.50	1.47	2.64	3.50	2.42	1.33	0.14	0.39	0.04	1.96	2.75	5.40	0.95
7.00	7.50	1.39	2.64	6.20	2.75	1.16	0.26	0.31	0.07	1.49	3.88	5.80	0.95
8.50	9.00	1.45	2.70	7.50	2.42	1.19	0.10	0.35	0.03	1.27	6.31	8.00	1.58
10.00	10.50	1.47	2.70	9.50	2.28	0.93	0.13	0.28	0.04	0.88	9.04	8.00	0.95



SOIL MECHANICS LABORATORY

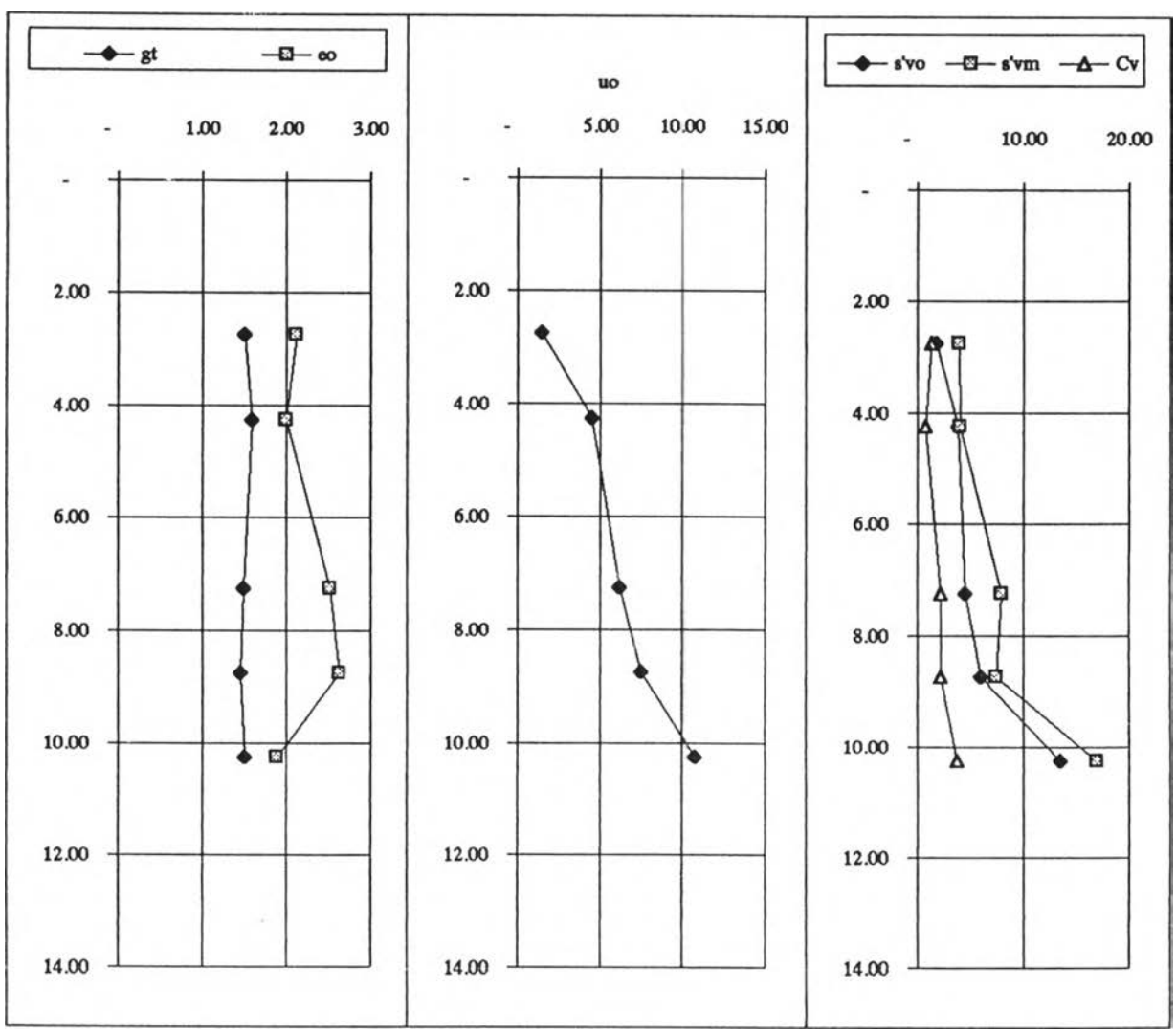
CONSOLIDATION TEST

Borehole No. BH-23/160

Location : TS-2

Description of Sample : NNH Clay

Sample depth		γ_T	G_s	u_o	e_0	C_C	C_r	CR	RR	OCR	σ'_{v0}	σ'_{vm}	C_V
From	To	t/m^3		t/m^2							t/m^2	t/m^2	$x10^{-4}\ m^2/yr$
2.50	3.00	1.50	2.67	1.50	2.12	0.78	0.23	0.25	0.07	2.13	1.88	4.00	1.32
4.00	4.50	1.60	2.64	4.50	1.99	0.83	0.20	0.28	0.07	1.05	3.90	4.10	0.76
7.00	7.50	1.49	2.70	6.20	2.52	1.57	0.03	0.45	0.01	1.74	4.60	8.00	2.21
8.50	9.00	1.46	2.70	7.50	2.64	1.44	0.03	0.40	0.01	1.25	6.01	7.50	2.21
10.00	10.50	1.51	2.75	10.80	1.89	0.94	0.10	0.33	0.03	1.26	13.51	17.00	3.78



ภาคผนวก ค

ผลการทดสอบ Unconfine Compression Test ของตัวอย่างเข็มปูนขาว

Unconfine compression test

Sample lime pile

Constant Proving Ring 35.21 lb/div

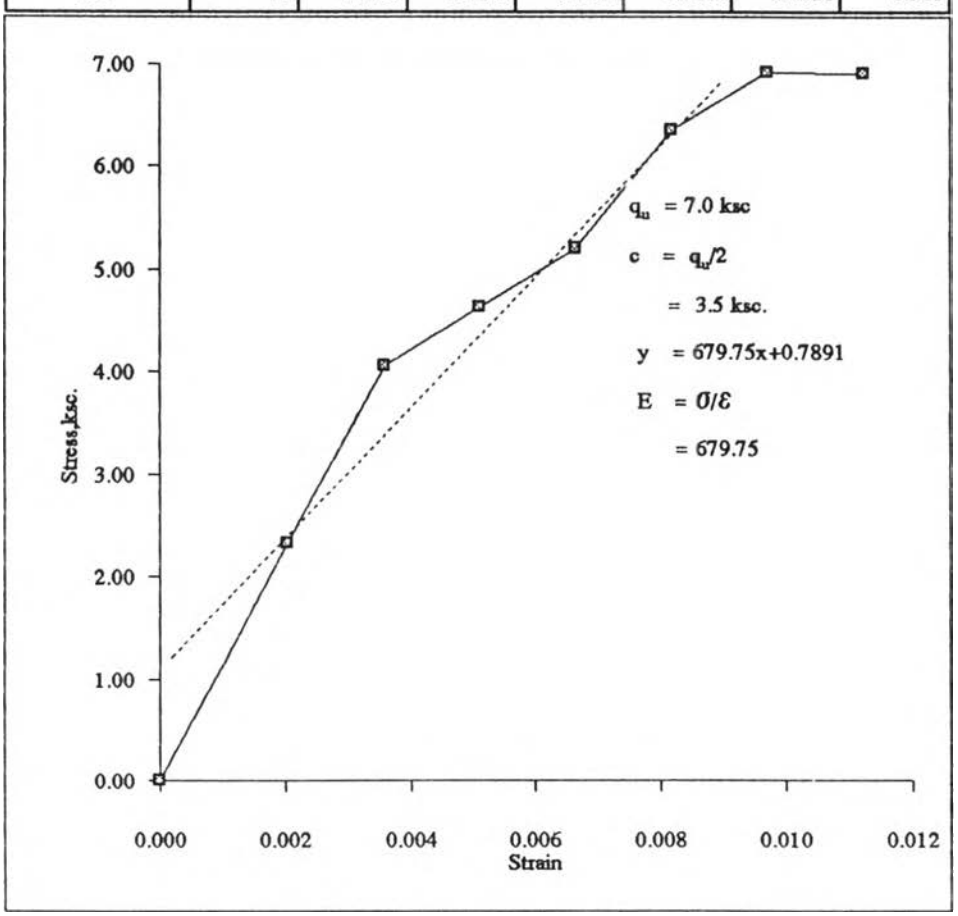
Dia. of sample 5.92 cm.

Height of sample 7.83 cm.

Initial area,Ao 27.51 $cm.^2$

Volume of sample 215.48 $cm.^3$

Vertical reading	Load			Strain,ε	1-ε	Corrected	Stress,σ
0.001 in	div	lb	kg.			area	ksc
0	0	0.00	0.00	0.0000	1.0000	27.508	0.000
40	4	140.84	64.02	0.0020	0.9980	27.565	2.322
70	7	246.47	112.03	0.0036	0.9964	27.607	4.058
100	8	281.68	128.04	0.0051	0.9949	27.650	4.631
130	9	316.89	144.04	0.0066	0.9934	27.692	5.201
160	11	387.31	176.05	0.0082	0.9918	27.735	6.348
190	12	422.52	192.05	0.0097	0.9903	27.778	6.914
220	12	422.52	192.05	0.0112	0.9888	27.821	6.903



Unconfine compression test

Sample lime pile

Constant Proving Ring 35.21 lb/div

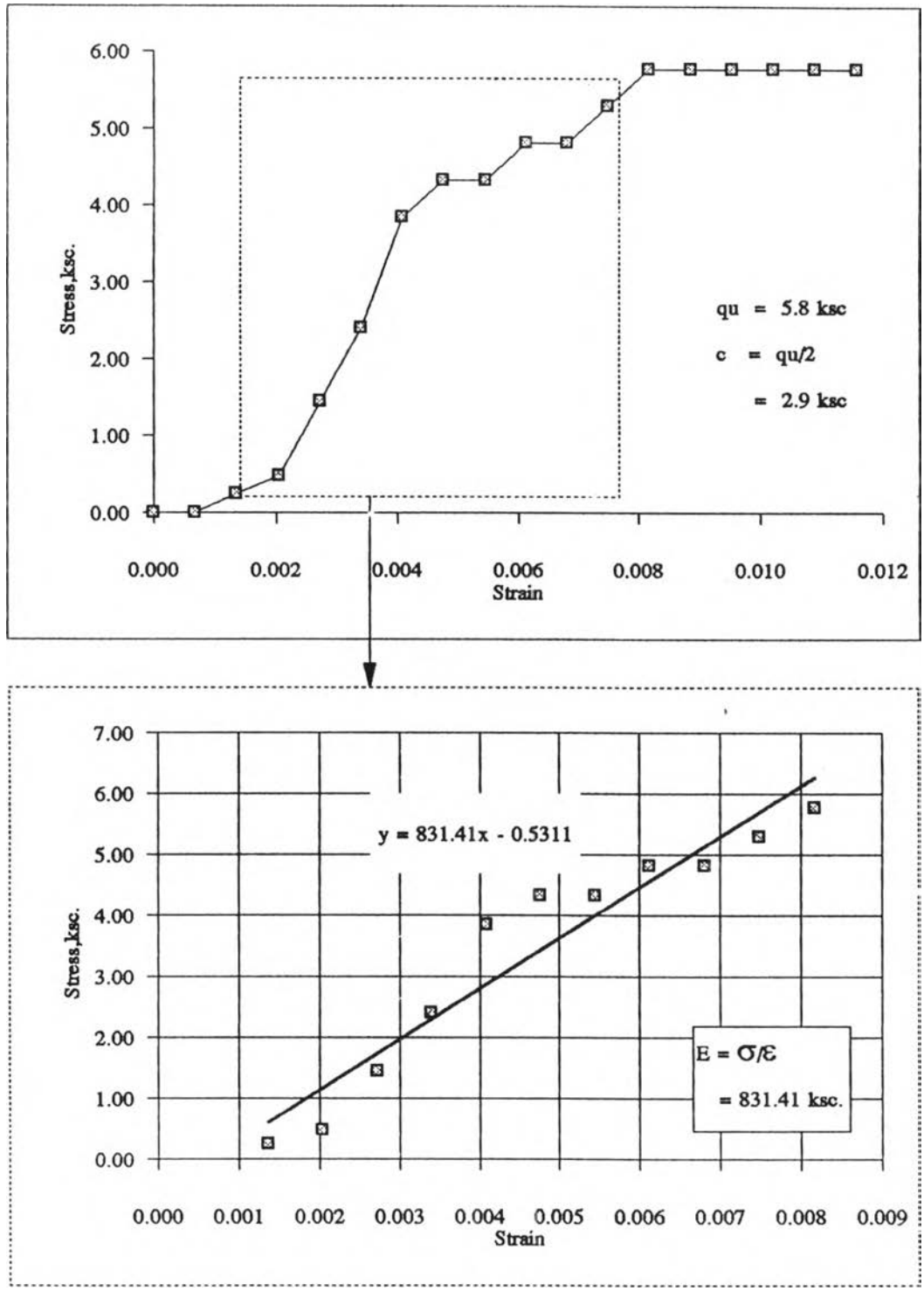
Dia. of sample 6.51 cm.

Height of sample 11.75 cm.

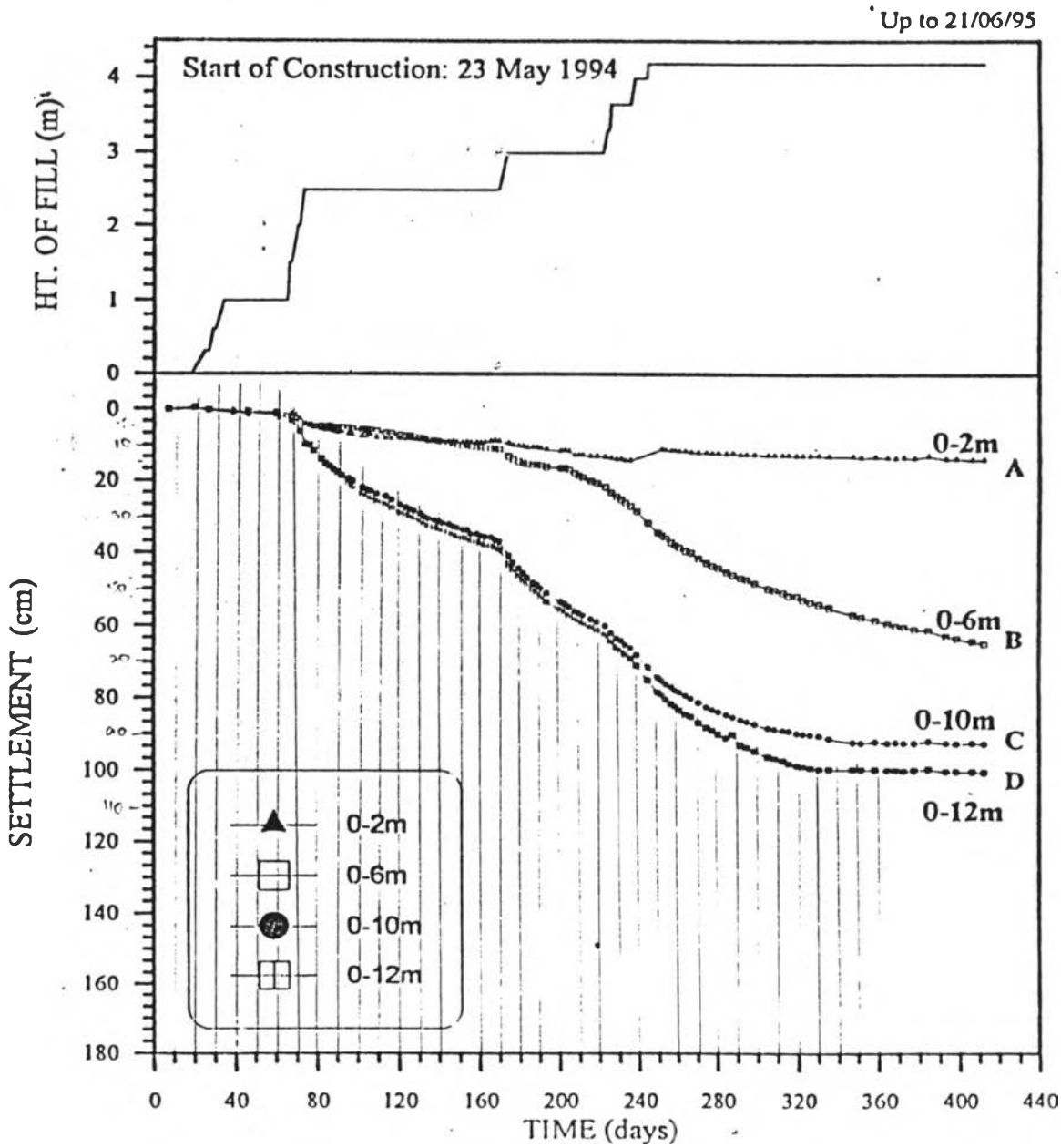
Initial area,Ao 33.29 $cm.^2$

Volume of sample 391.10 $cm.^3$

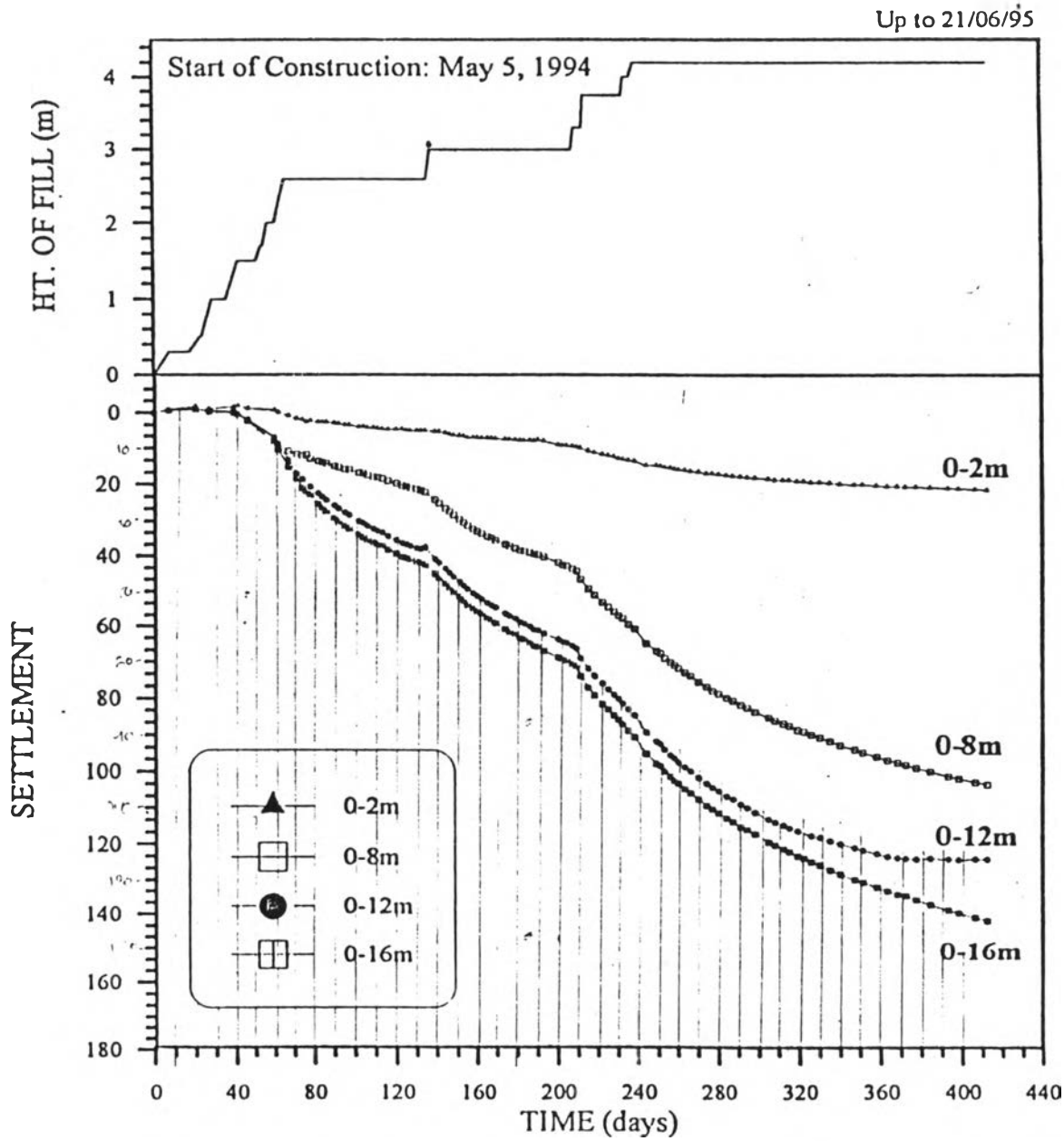
Vertical reading	Load			Strain,ε	1-ε	Corrected	Stress,σ
(0.001 in)	div	lb	kg.			area	ksc
0	0.00	0.00	0.00	0.0000	1.0000	33.285	0.000
20	0.00	0.00	0.00	0.0007	0.9993	33.308	0.000
40	0.50	17.60	8.00	0.0014	0.9986	33.331	0.240
60	1.00	35.21	16.00	0.0020	0.9980	33.353	0.481
80	3.00	105.63	48.01	0.0027	0.9973	33.376	1.442
100	5.00	176.05	80.02	0.0034	0.9966	33.399	2.404
120	8.00	281.68	128.04	0.0041	0.9959	33.422	3.847
140	9.00	316.89	144.04	0.0048	0.9952	33.445	4.327
160	9.00	316.89	144.04	0.0054	0.9946	33.468	4.327
180	10.00	352.10	160.05	0.0061	0.9939	33.490	4.808
200	10.00	352.10	160.05	0.0068	0.9932	33.513	4.808
220	11.00	387.31	176.05	0.0075	0.9925	33.536	5.289
240	12.00	422.52	192.05	0.0082	0.9918	33.559	5.770
260	12.00	422.52	192.05	0.0089	0.9911	33.582	5.770
280	12.00	422.52	192.05	0.0095	0.9905	33.606	5.770
300	12.00	422.52	192.05	0.0102	0.9898	33.629	5.770
320	12.00	422.52	192.05	0.0109	0.9891	33.652	5.770
340	12.00	422.52	192.05	0.0116	0.9884	33.675	5.770
360	11.00	387.31	176.05	0.0123	0.9877	33.698	5.289
380	11.00	387.31	176.05	0.0129	0.9871	33.721	5.289
400	10.00	352.10	160.05	0.0136	0.9864	33.745	4.808
420	8.00	281.68	128.04	0.0143	0.9857	33.768	3.847


6.00
5.00
4.00
3.00
2.00
1.00
0.00
Stress,ksc.
0.000
0.002
0.004
0.006
0.008
0.010
0.012
Strain
qu = 5.8 ksc
c = qu/2
= 2.9 ksc
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Stress,ksc.
y = 831.41x - 0.5311
E = σ/ε
= 831.41 ksc.
0.000
0.001
0.002
0.003
0.004
0.005
0.006
0.007
0.008
0.009
Strain

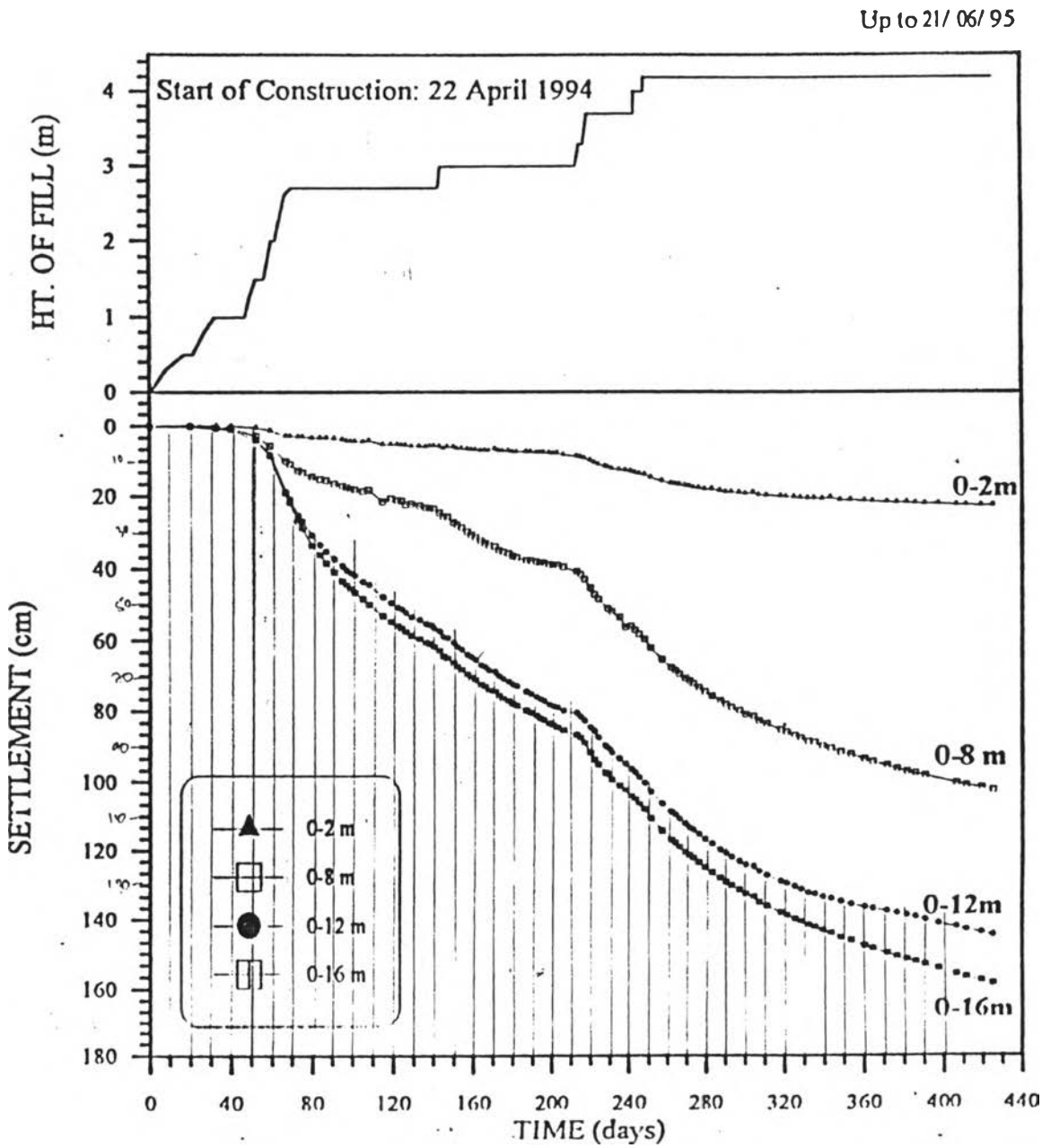
ภาคผนวก ง
ข้อมูลจากการวัดค่าการทรุดตัว,การเคลื่อนตัวด้านข้าง และแรงดันน้ำ ของแปลงทดสอบ PVD จากการศึกษาของ AIT



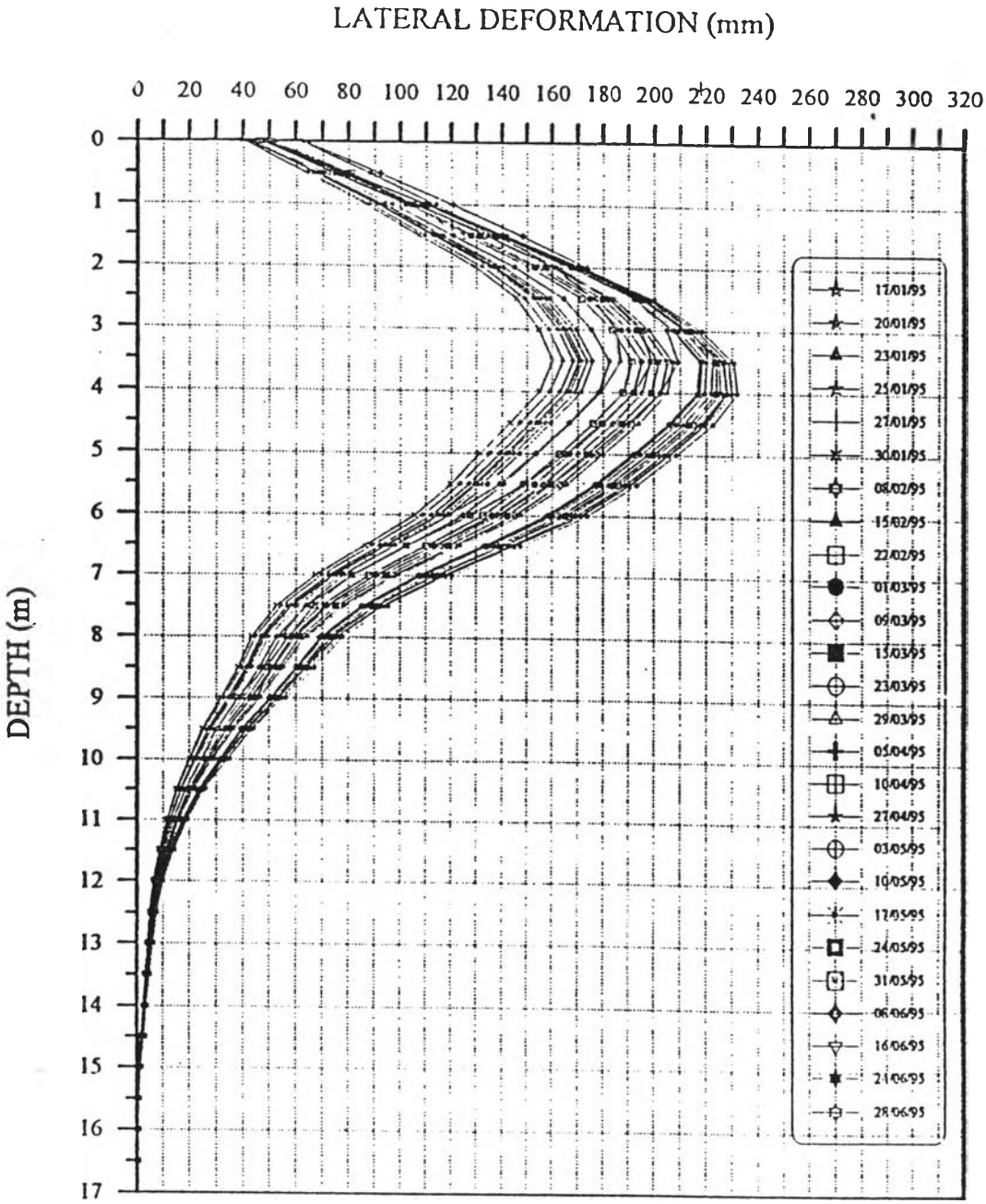
Settlements of Layers of Increasing Thickness from the Ground Surface (TS1)



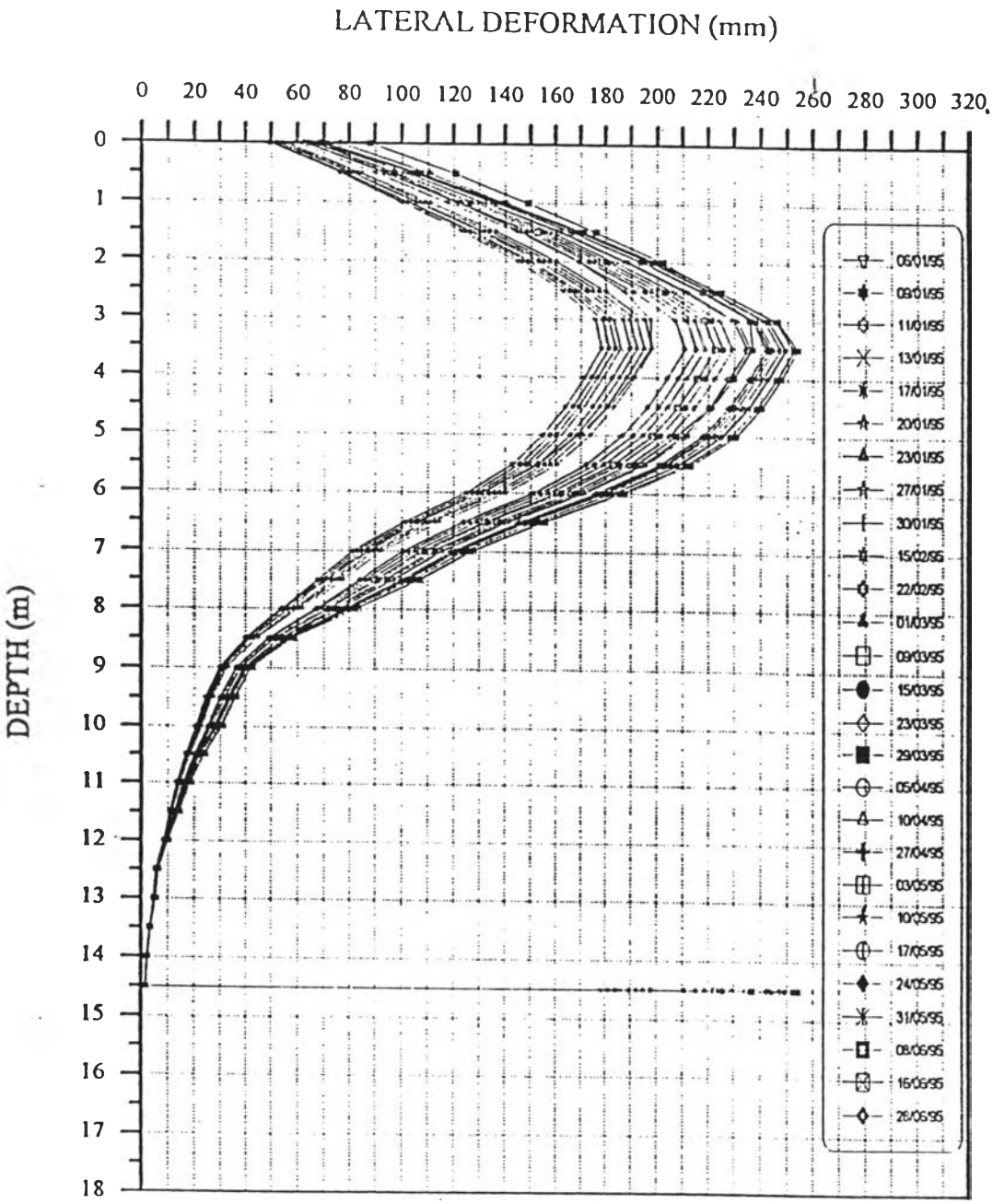
Settlement of Layers of Increasing Thickness from the Ground Surface (TS2)



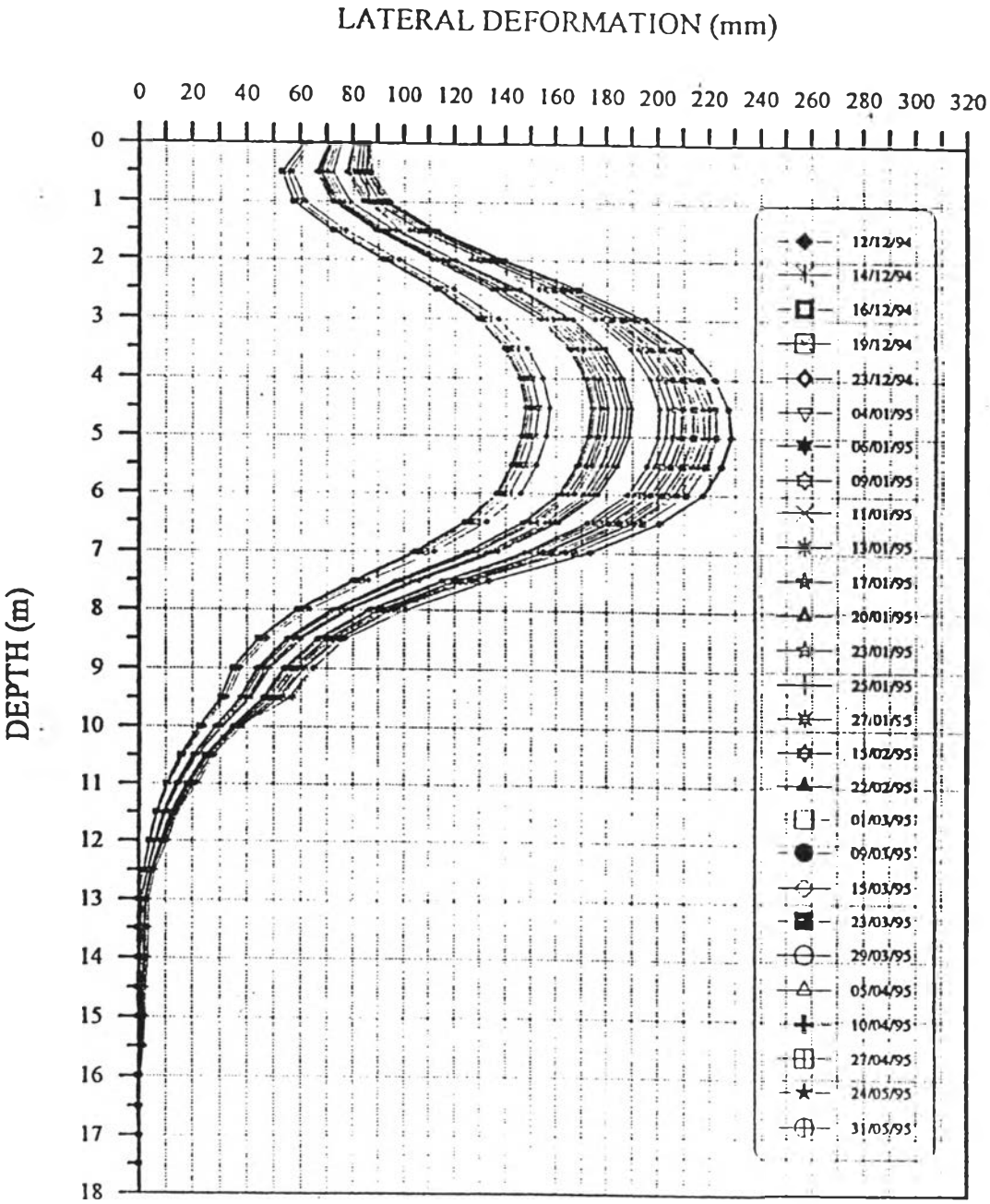
Settlement of Layers of Increasing Thickness from the Ground Surface (TS3)



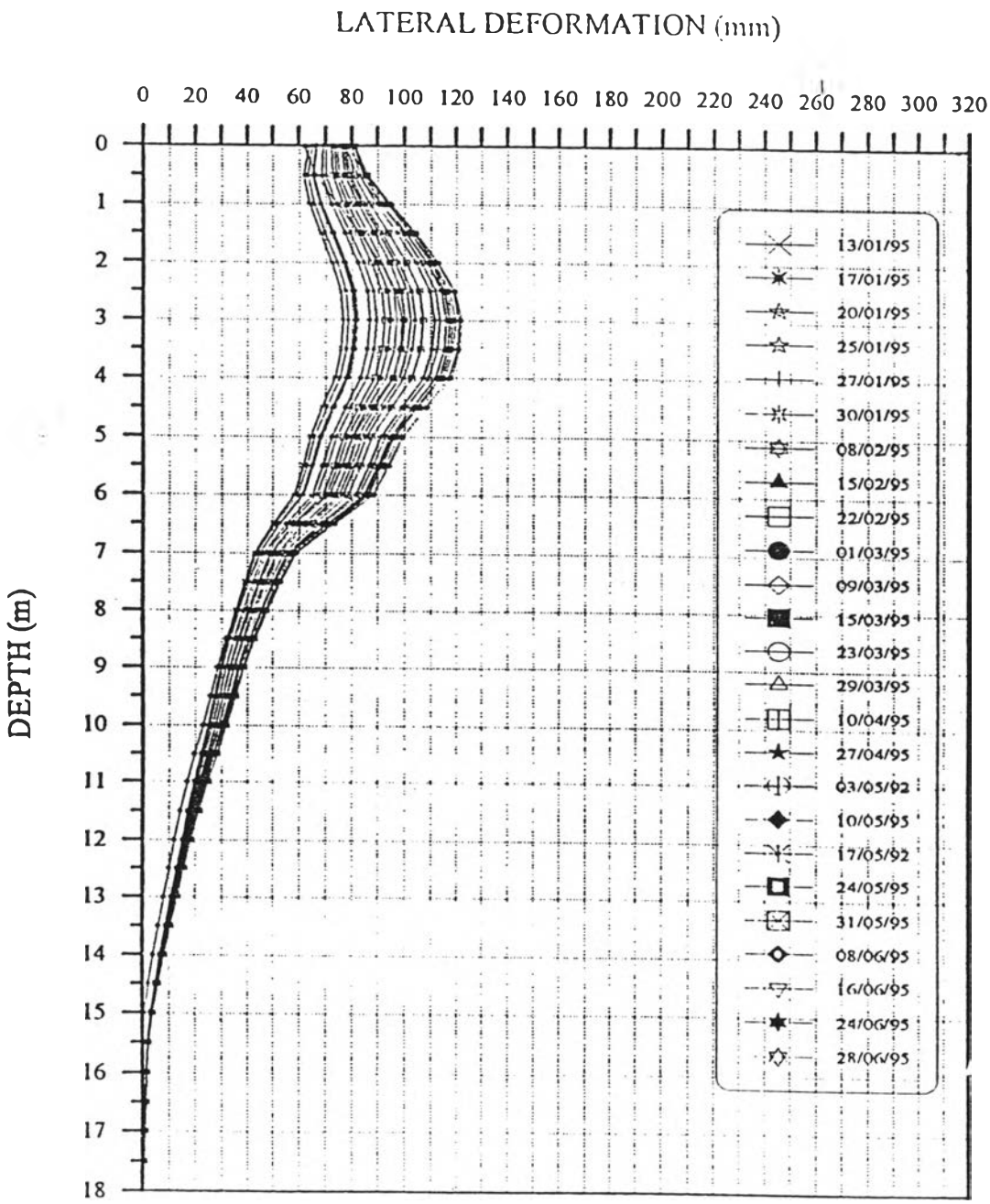
Lateral Deformations with Depth(TS1-I2)



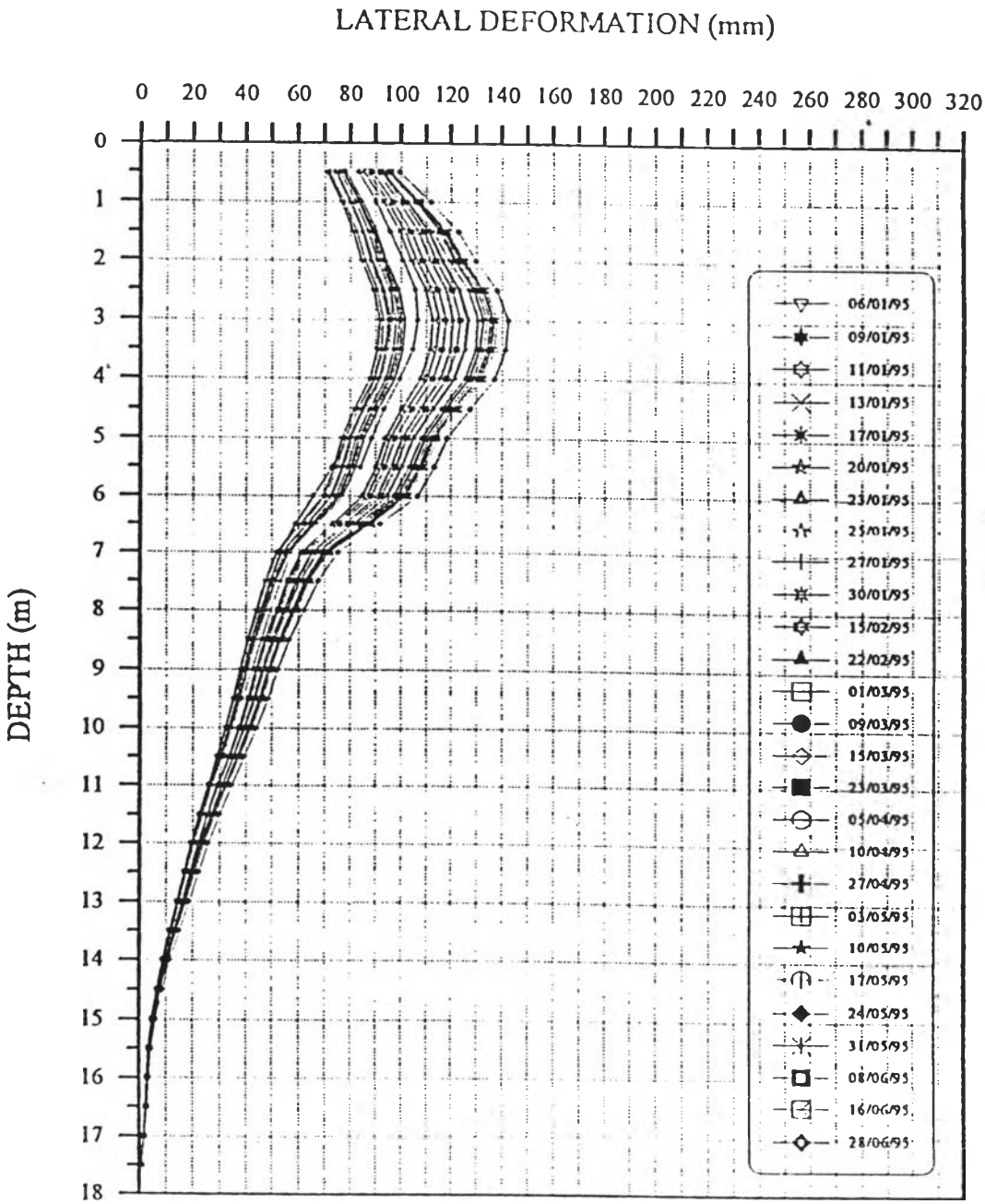
Lateral Deformations with Depth(TS2-I2)



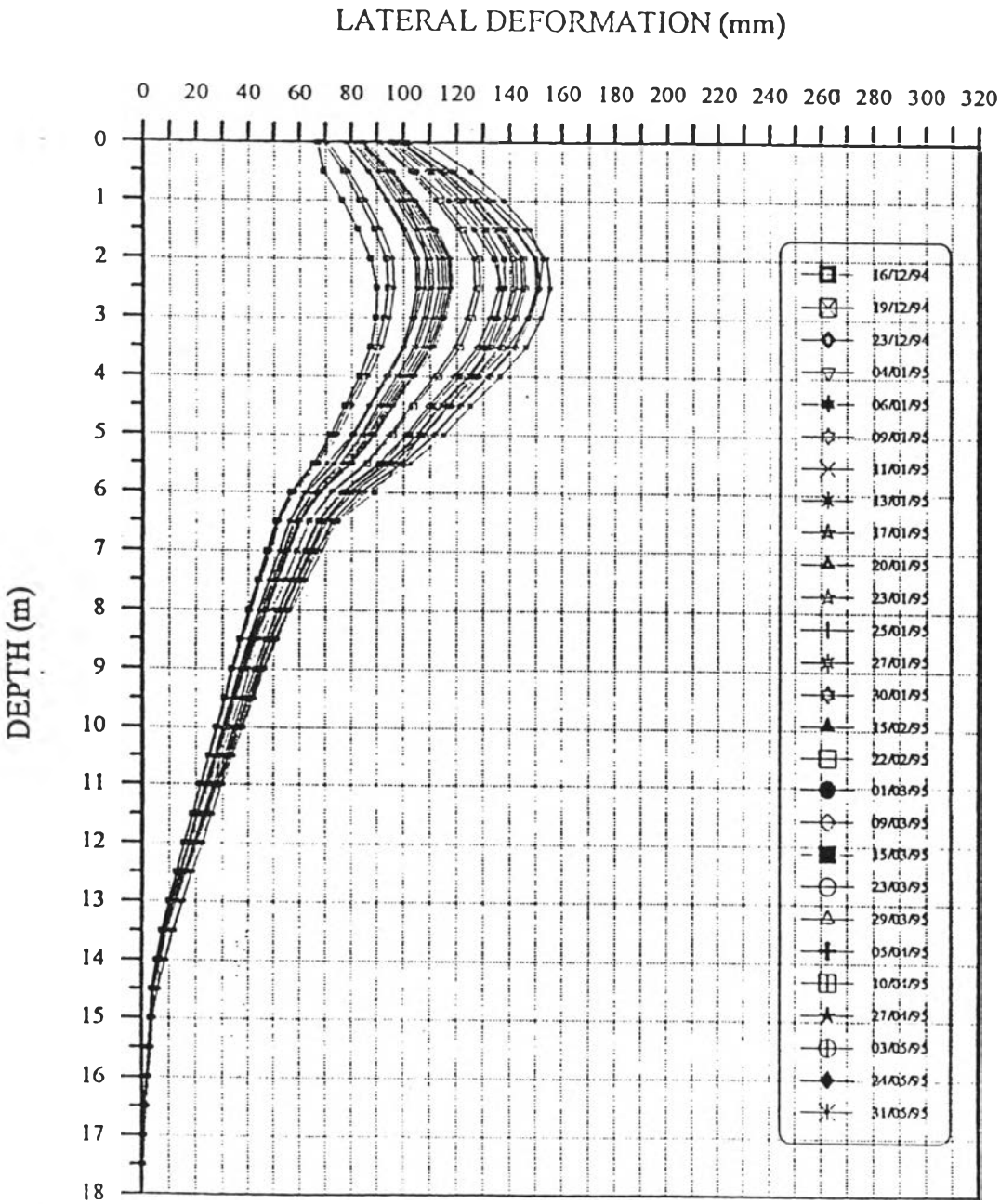
Lateral Deformations with Depth(TS3-I2)



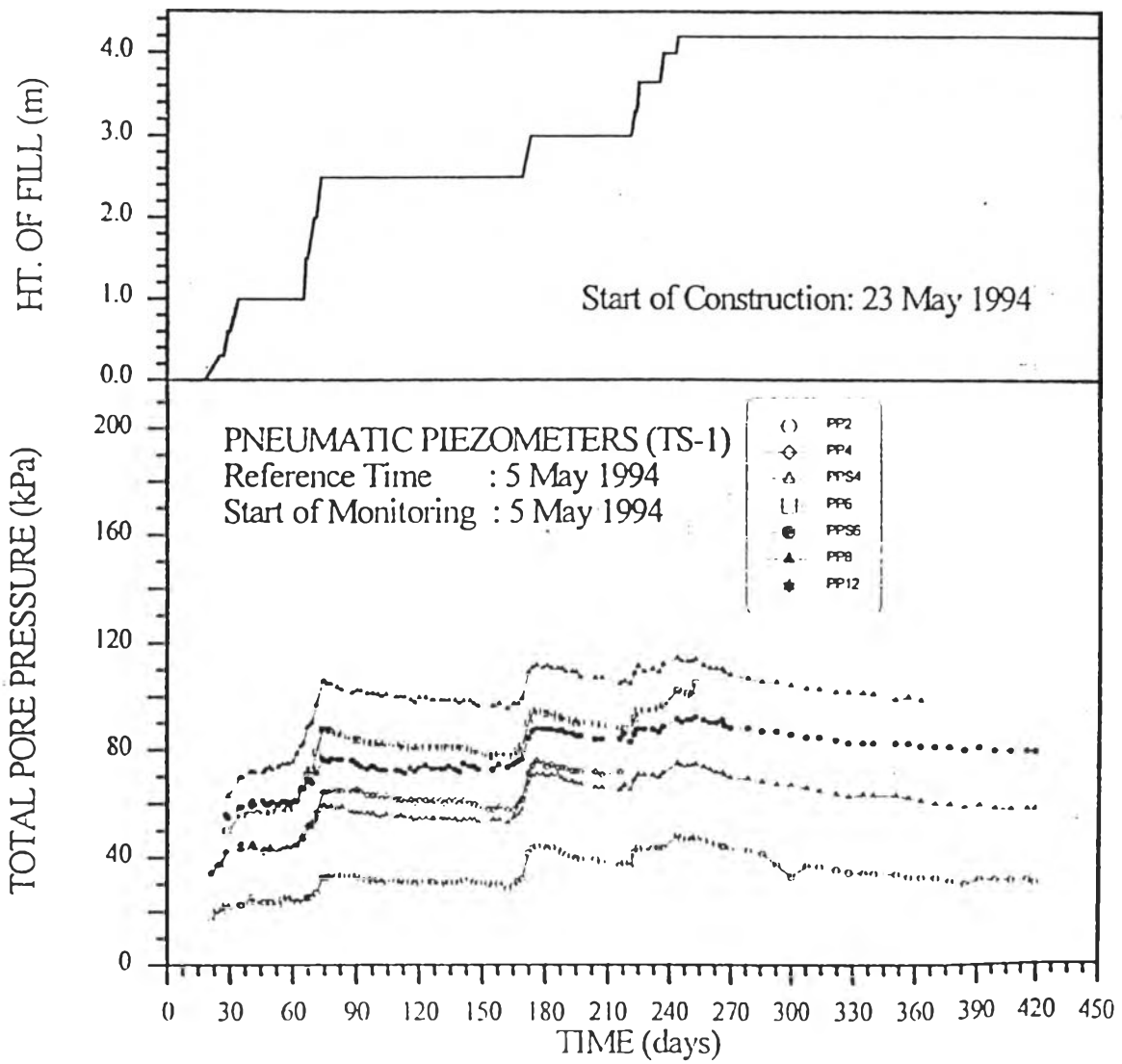
Lateral Deformations with Depth(TS1-I1)



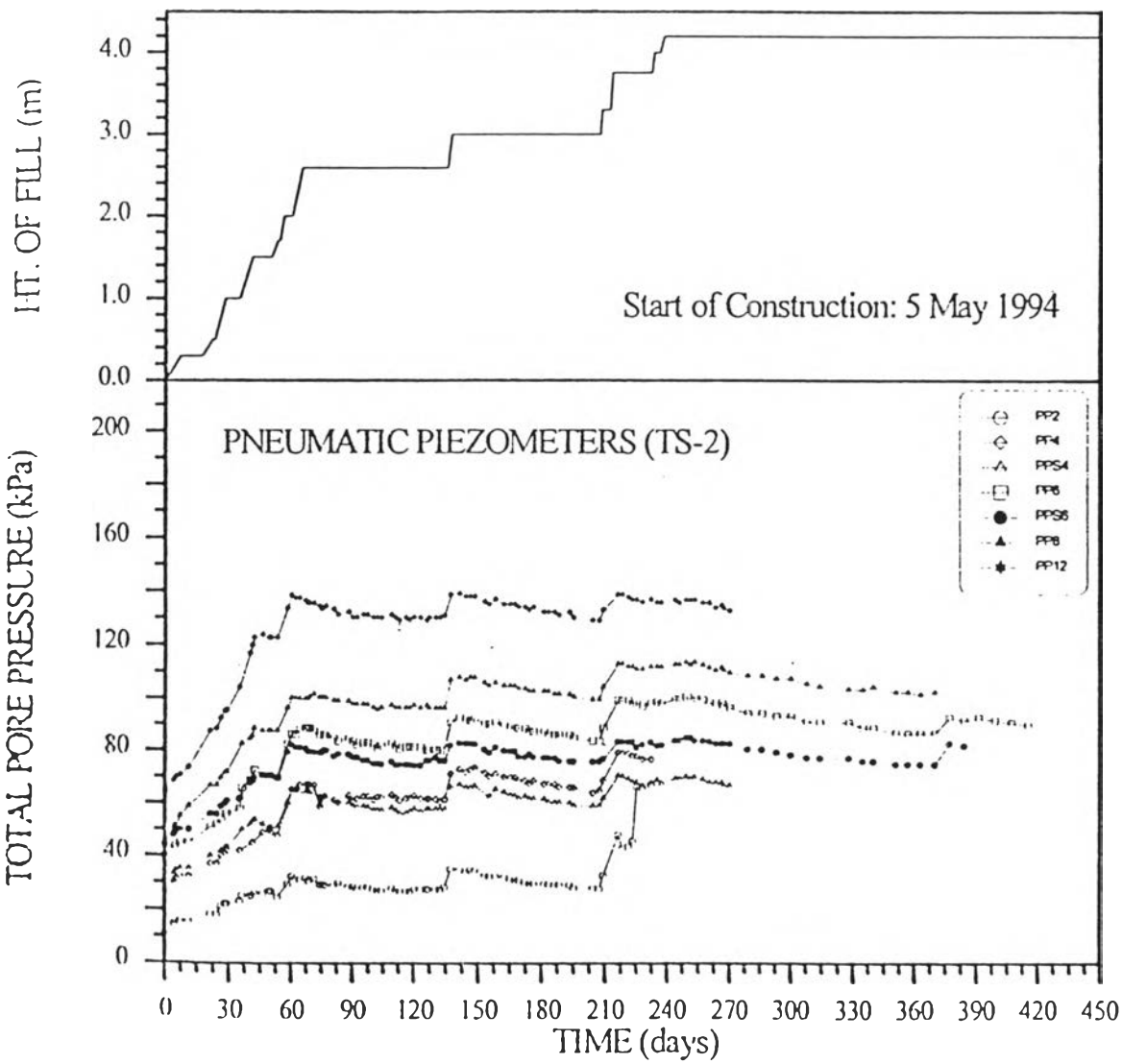
Lateral Deformations with Depth(TS2-I1)



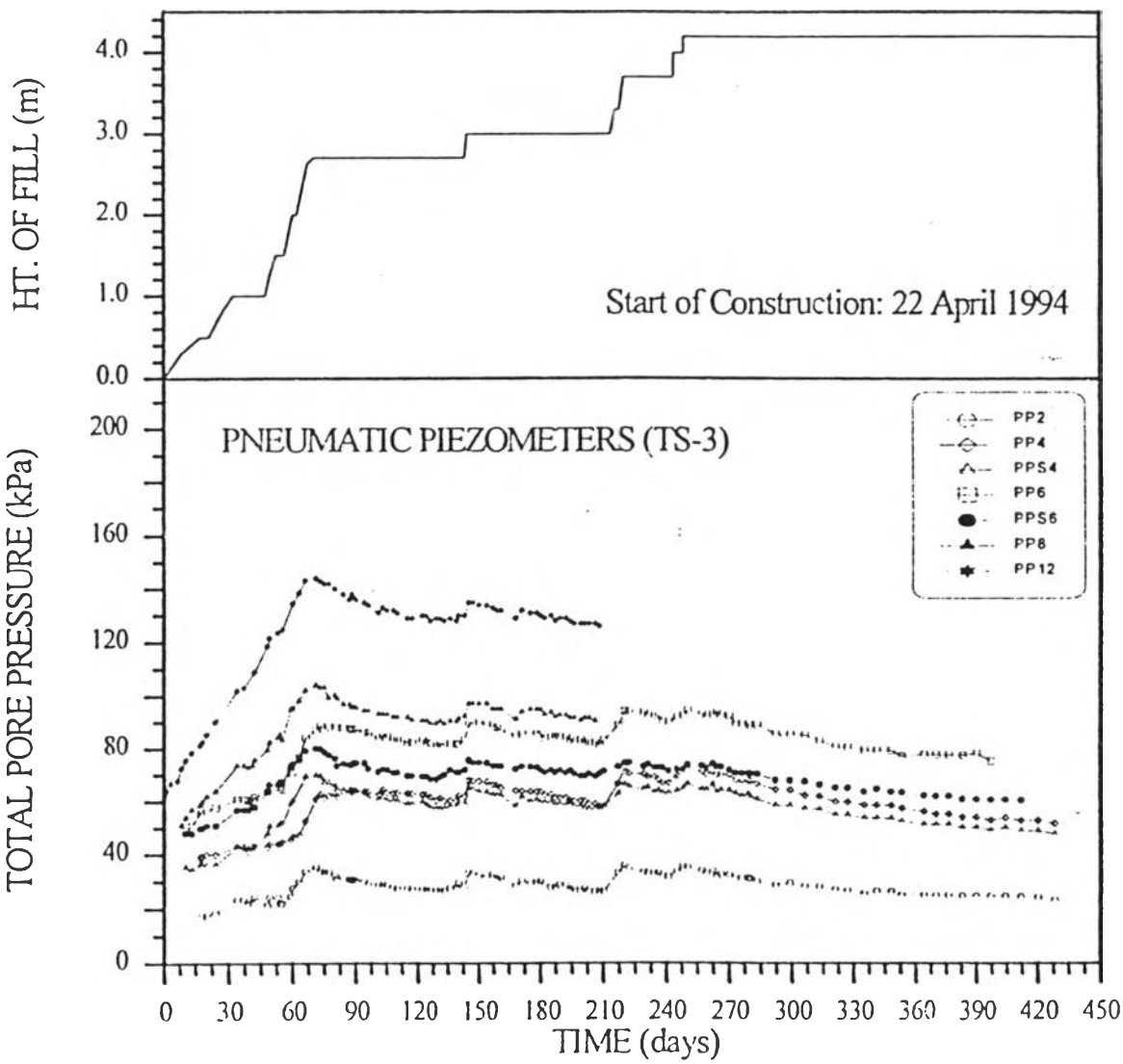
Lateral Deformations with Depth(TS3-I1)



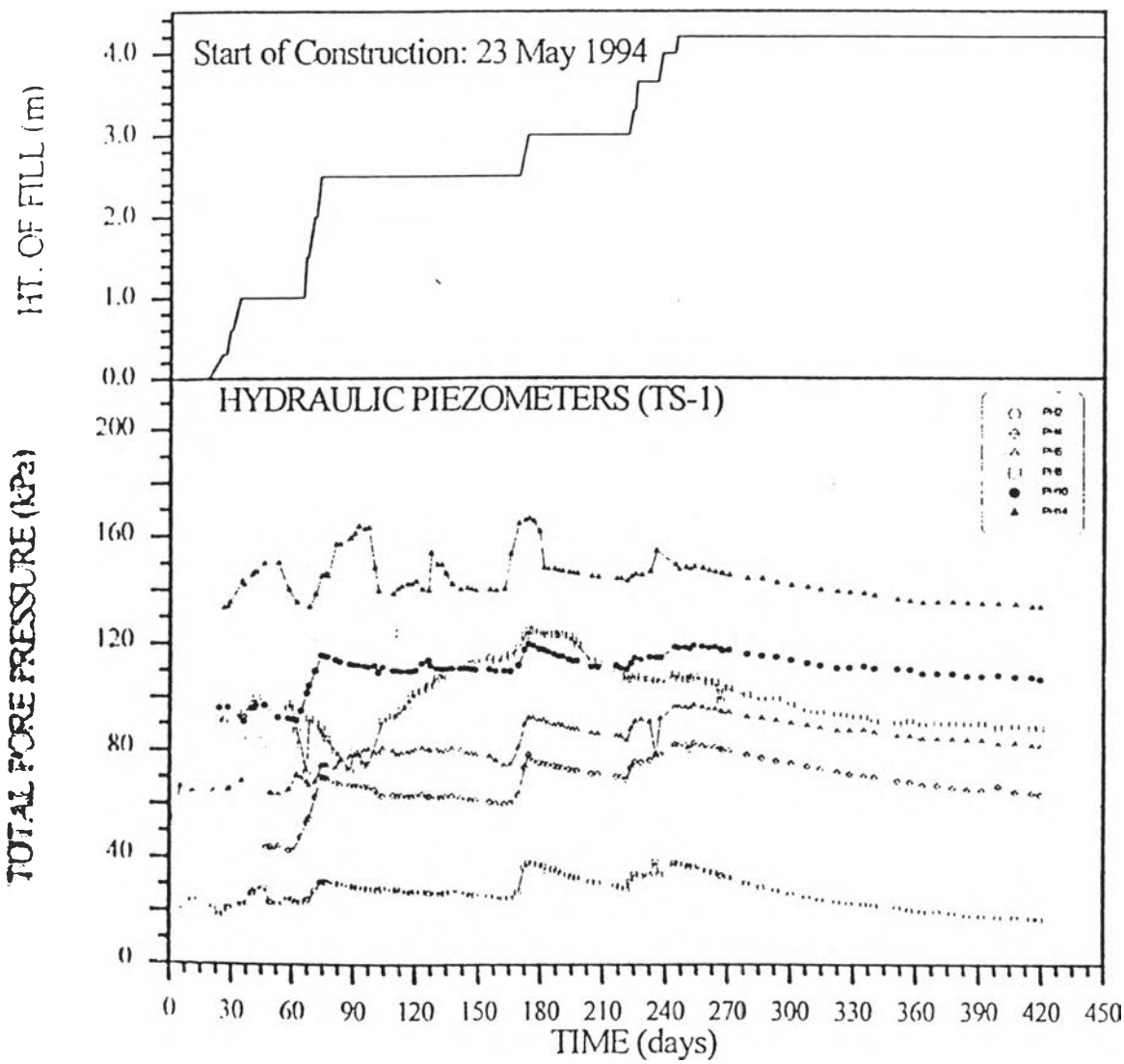
Pore Pressure from Stanpipe Piezometer Corrected for Settlements(TS1)



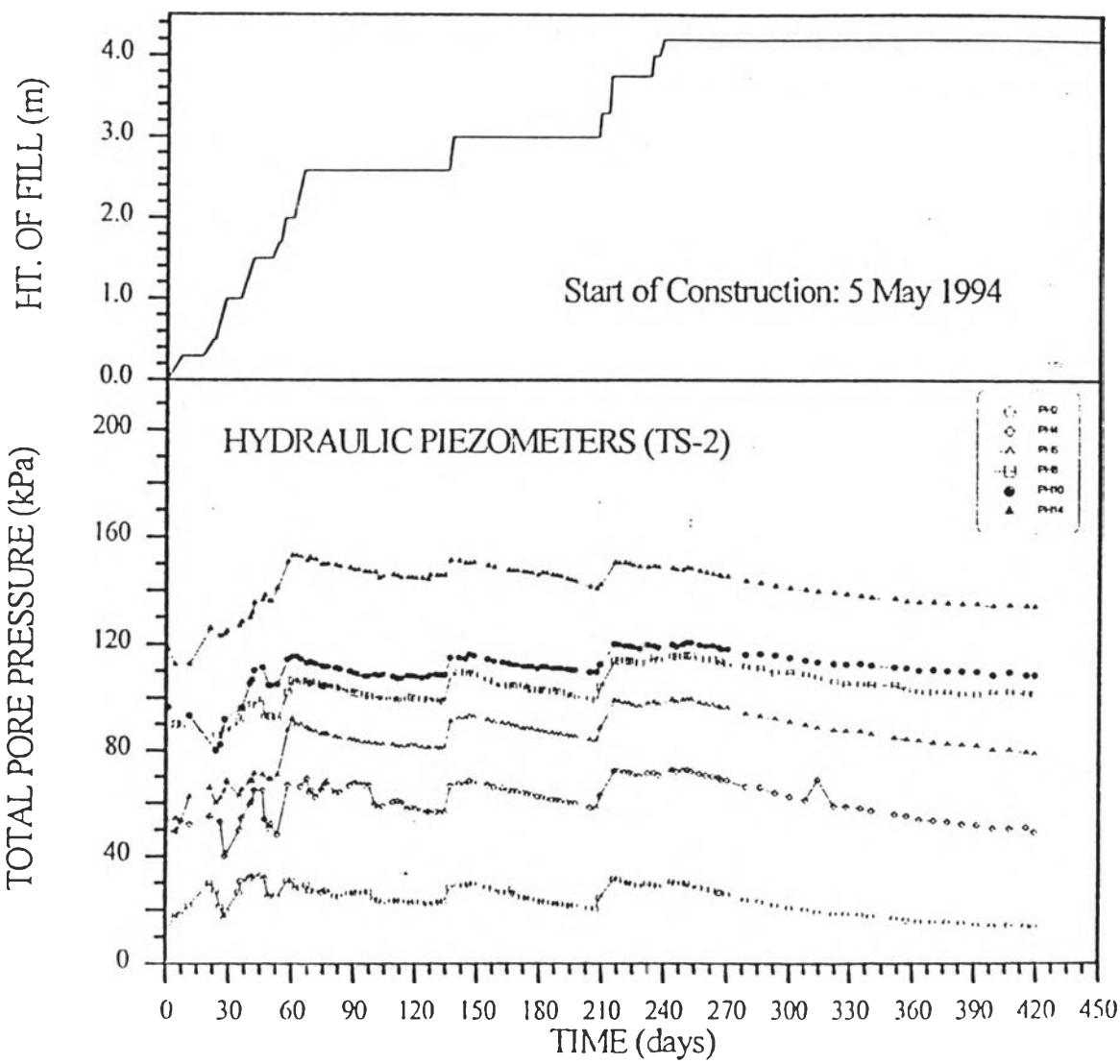
Pore Pressure from Stanpipe Piezometer Corrected for Settlements(TS2)



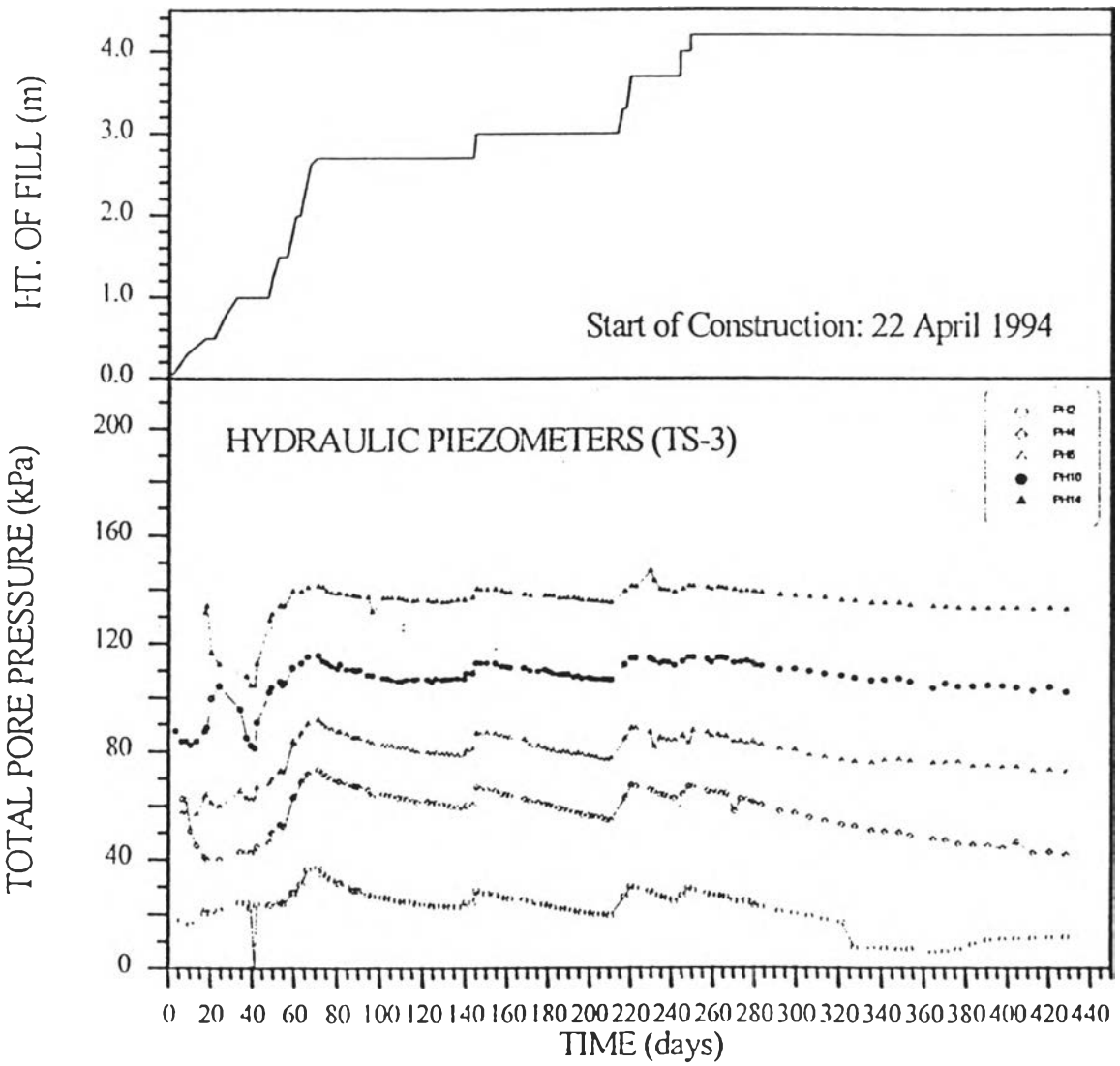
Pore Pressure from Stanpipe Piezometer Corrected for Settlements(TS3)



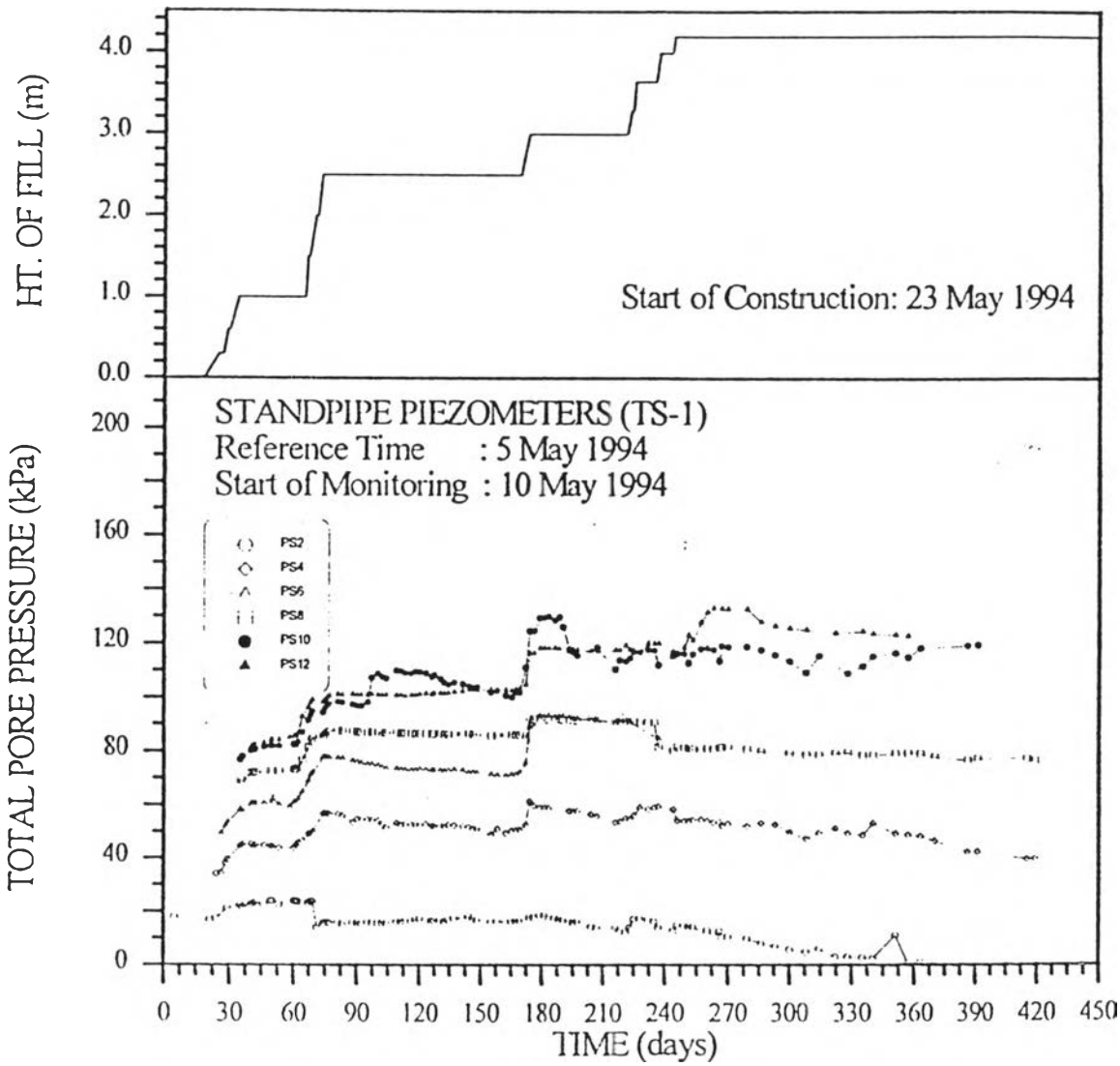
Pore Pressure from Pneumatic Piezometer Corrected for Settlements(TS1)



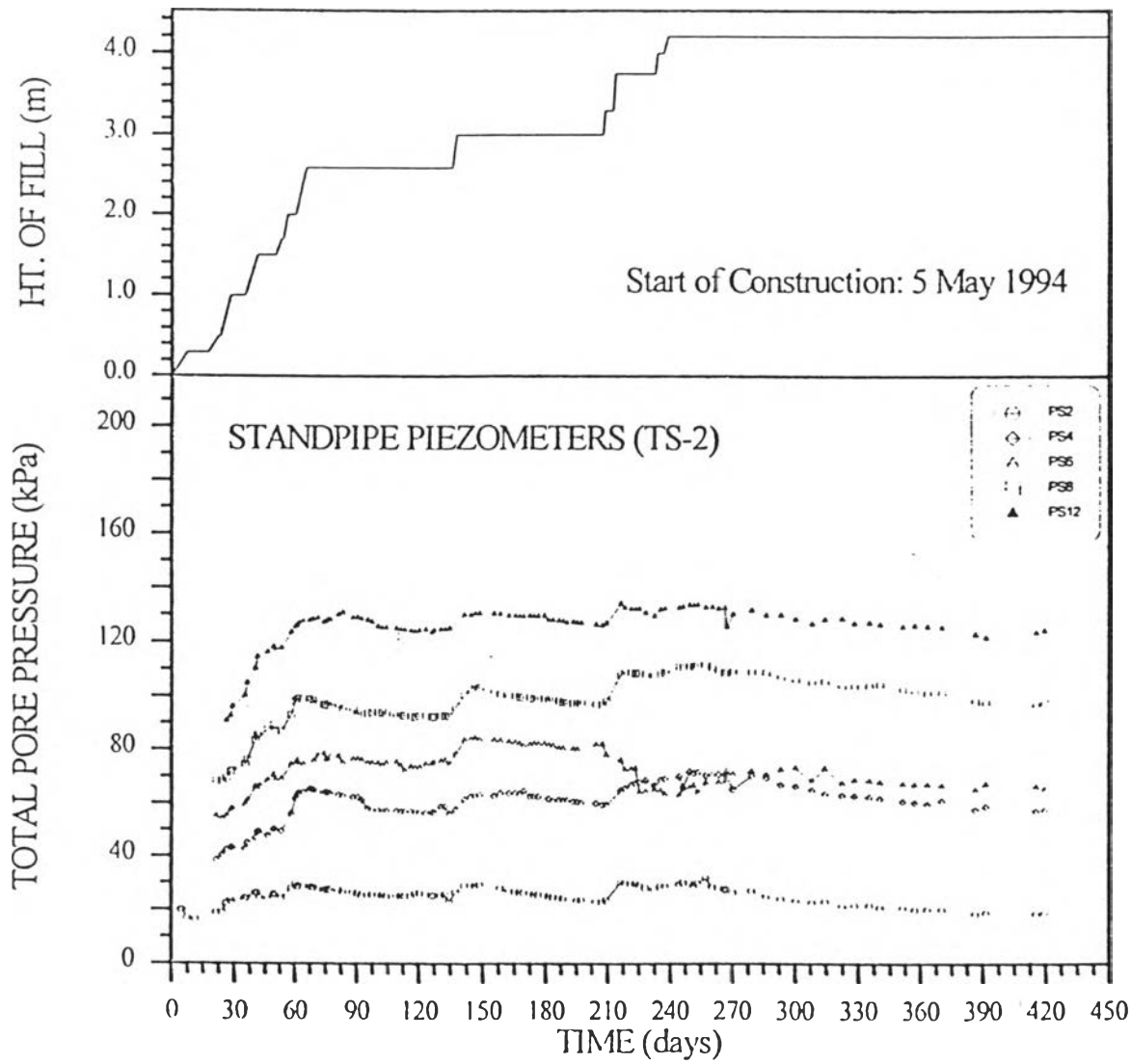
Pore Pressure from Pneumatic Piezometer Corrected for Settlements(TS2)



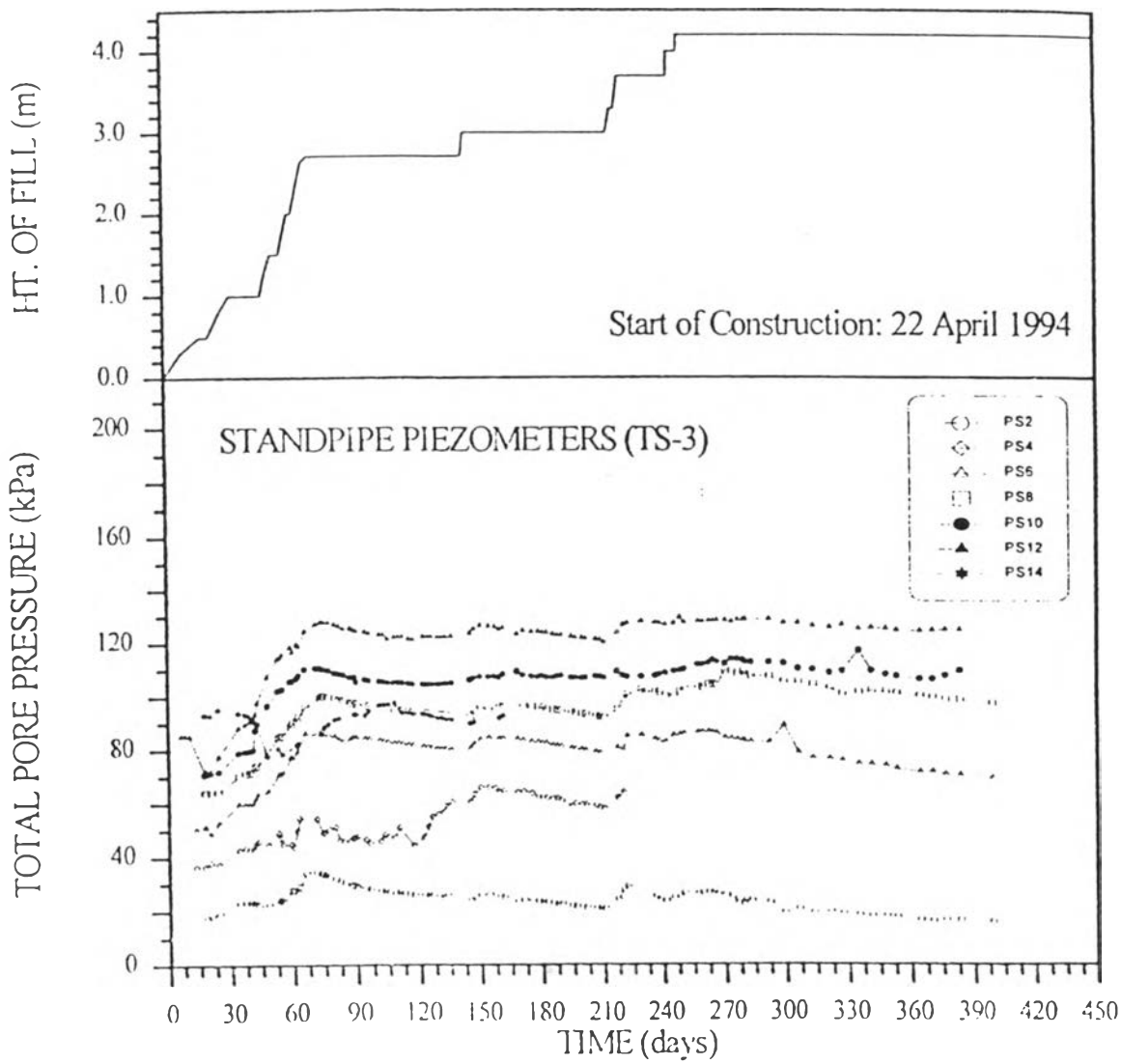
Pore Pressure from Pneumatic Piezometer Corrected for Settlements(TS3)



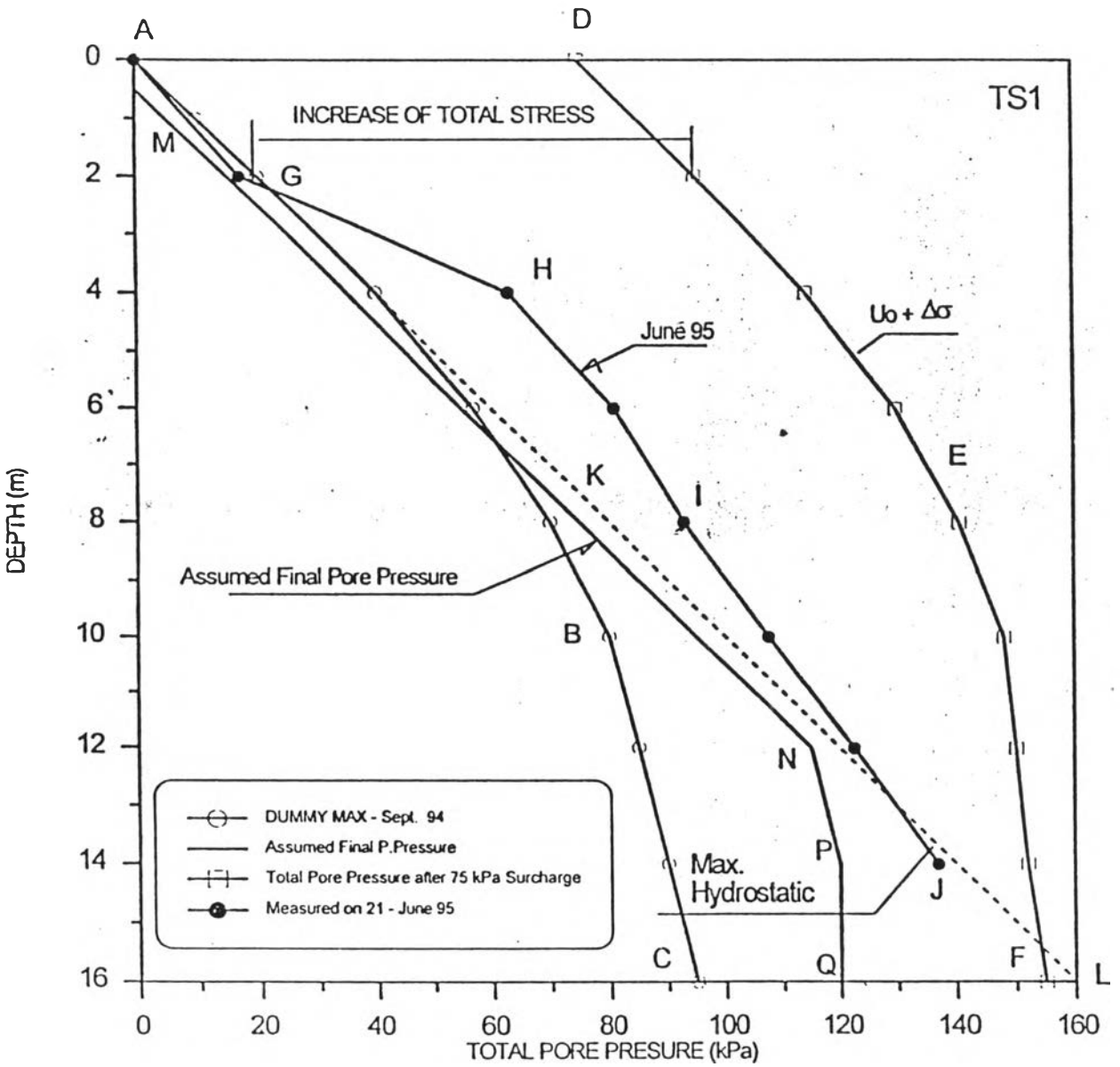
Pore Pressure Hydraulic Piezometer Corrected for Settlements(TS1)



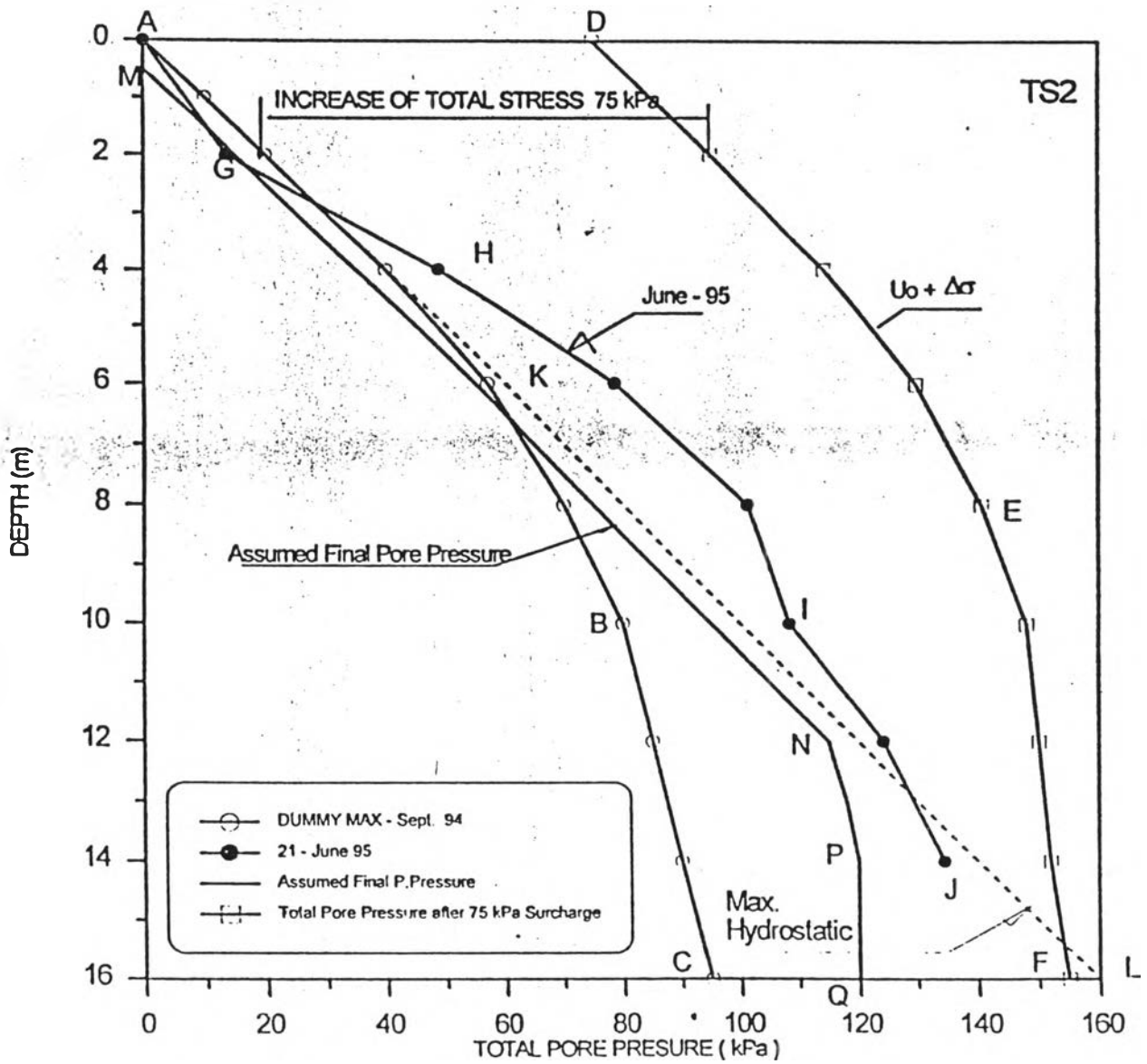
Pore Pressure Hydraulic Piezometer Corrected for Settlements(TS2)



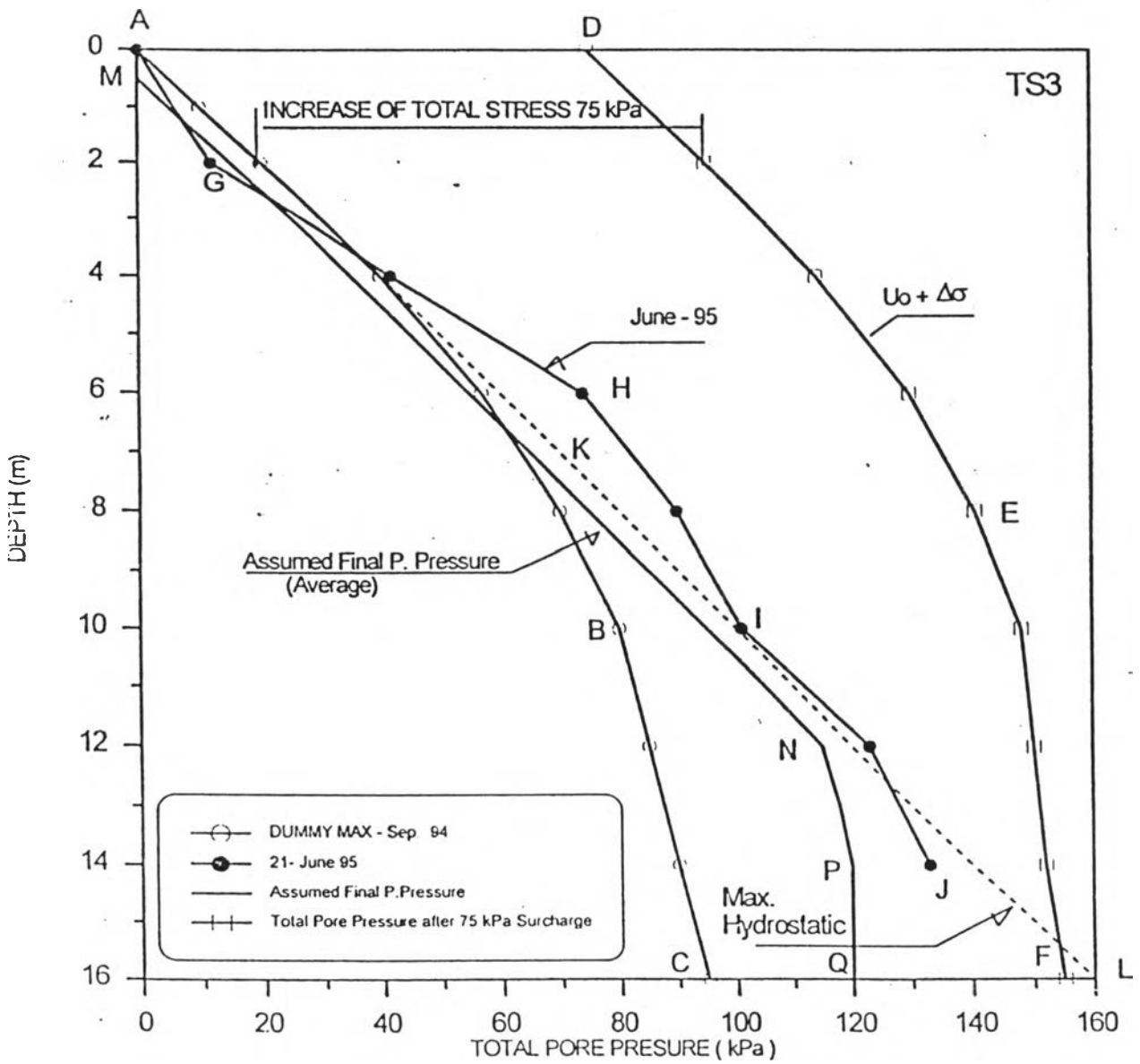
รูปที่ 2.48 Pore Pressure Hydraulic Piezometer Corrected for Settlements(TS3)



Pore Pressure Profiles for Settlement Computations (TS1)

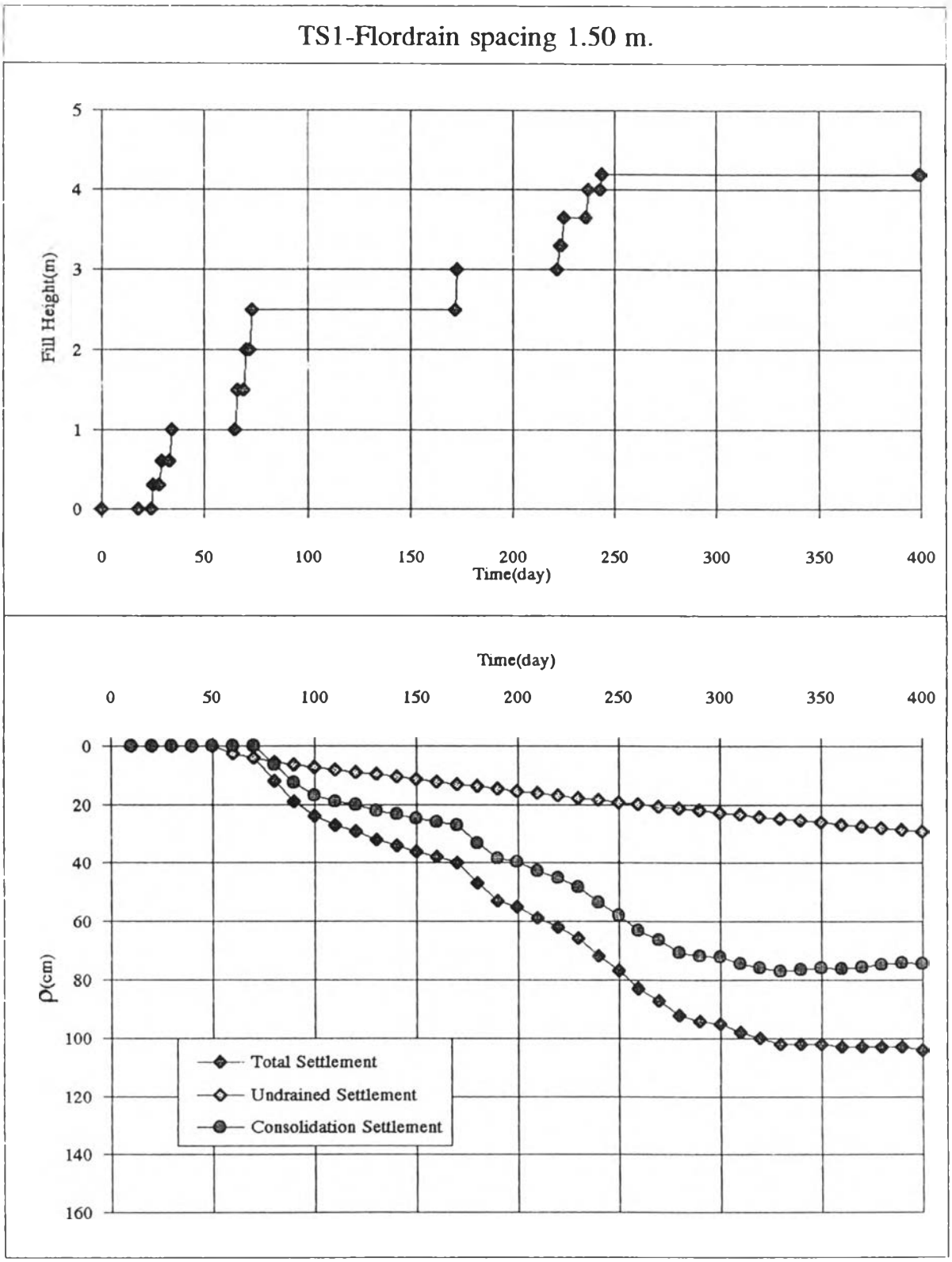


Pore Pressure Profiles for Settlement Computations (TS2)



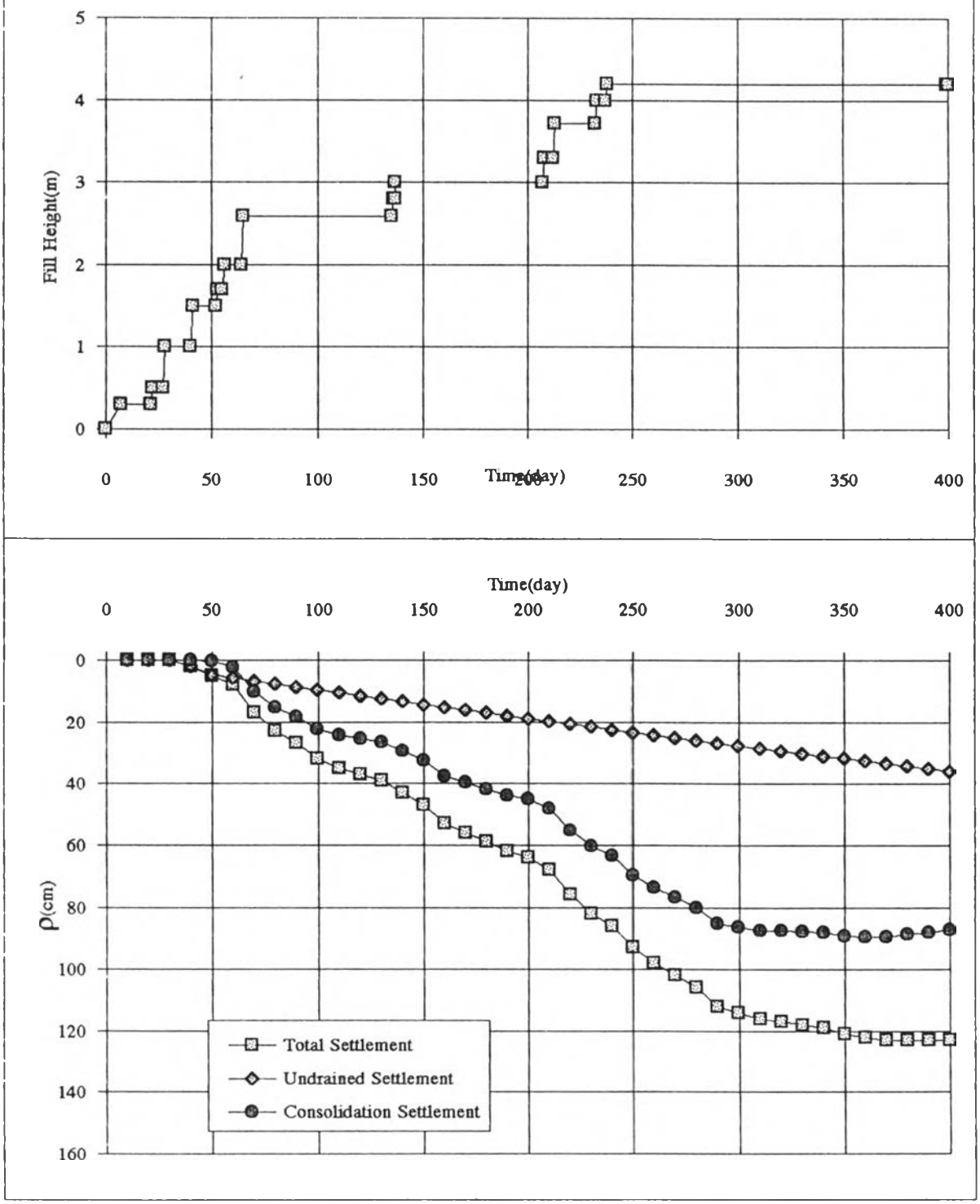
Pore Pressure Profiles for settlement Computations (TS3)

ภาคผนวก จ
รายละเอียดการวิเคราะห์ค่าการทรุดตัวของแปลงทดสอบ PVD ของ AIT

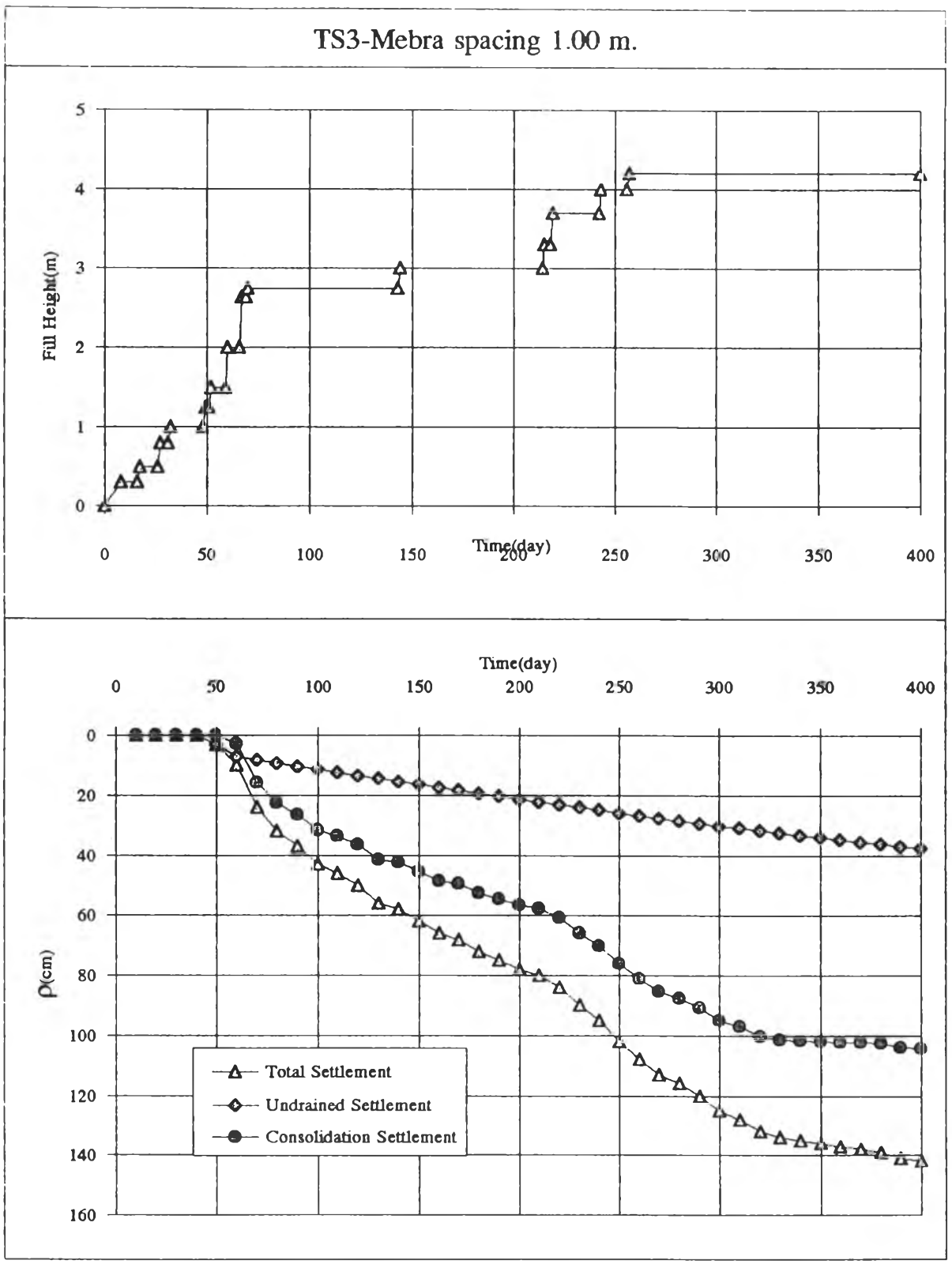


Time-Settlement of PVD Test Section 1

TS2-Castle Board spacing 1.20 m.



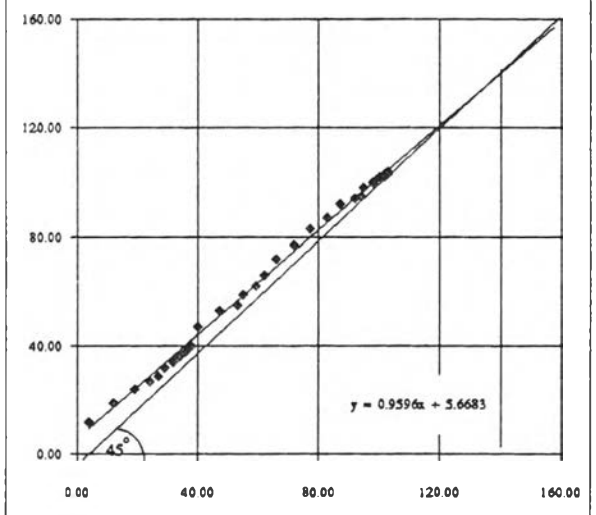
Time-Settlement of PVD Test Section 2



Time-Settlement of PVD Test Section 3

Calculation total primary settlement by Asaoka's method

TS1-Flordrain spacing 1.50 m.



$\beta 0$ = 5.6683 $\beta 1$ = 0.9596

S_f = $\beta o/(1-\beta 1)$ = 5.6683/(1-0.9596) = 140.30 cm.

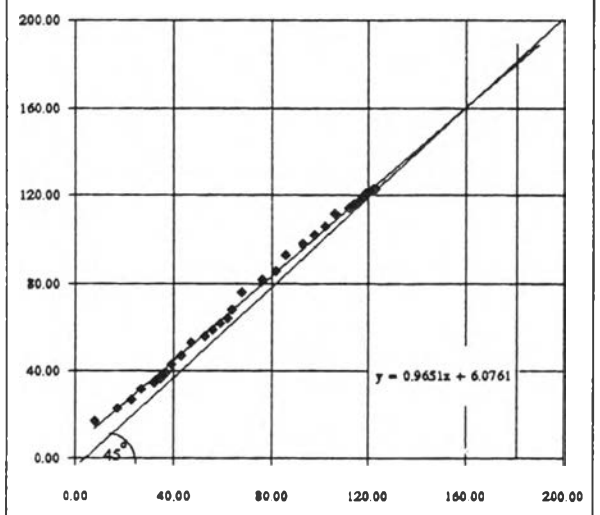
heigth of fill after final primary settlement

H = 4.20 - 1.403 = 2.797 m

uniform load from fill with H and γ 1.80 ton/m^3

q = 1.80 x 2.797 = 5.03 ton/m^2

TS2-Castle Board spacing 1.20 m.



$\beta 0$ = 6.0761 $\beta 1$ = 0.9651

S_f = $\beta o/(1-\beta 1)$ = 6.0761/(1-0.9651) = 174.10 cm.

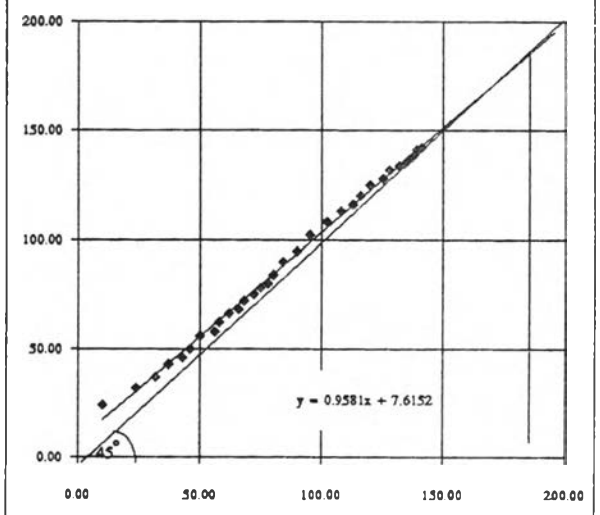
heigth of fill after final primary settlement

H = 4.20 - 1.741 = 2.459 m

uniform load from fill with H and γ 1.80 ton/m^3

q = 1.80 x 2.459 = 4.43 ton/m^2

TS3-Mebra spacing 1.00 m.



$\beta 0$ = 7.6152 $\beta 1$ = 0.9581

S_f = $\beta o/(1-\beta 1)$ = 7.6152/(1-0.9581) = 181.75 cm.

heigth of fill after final primary settlement

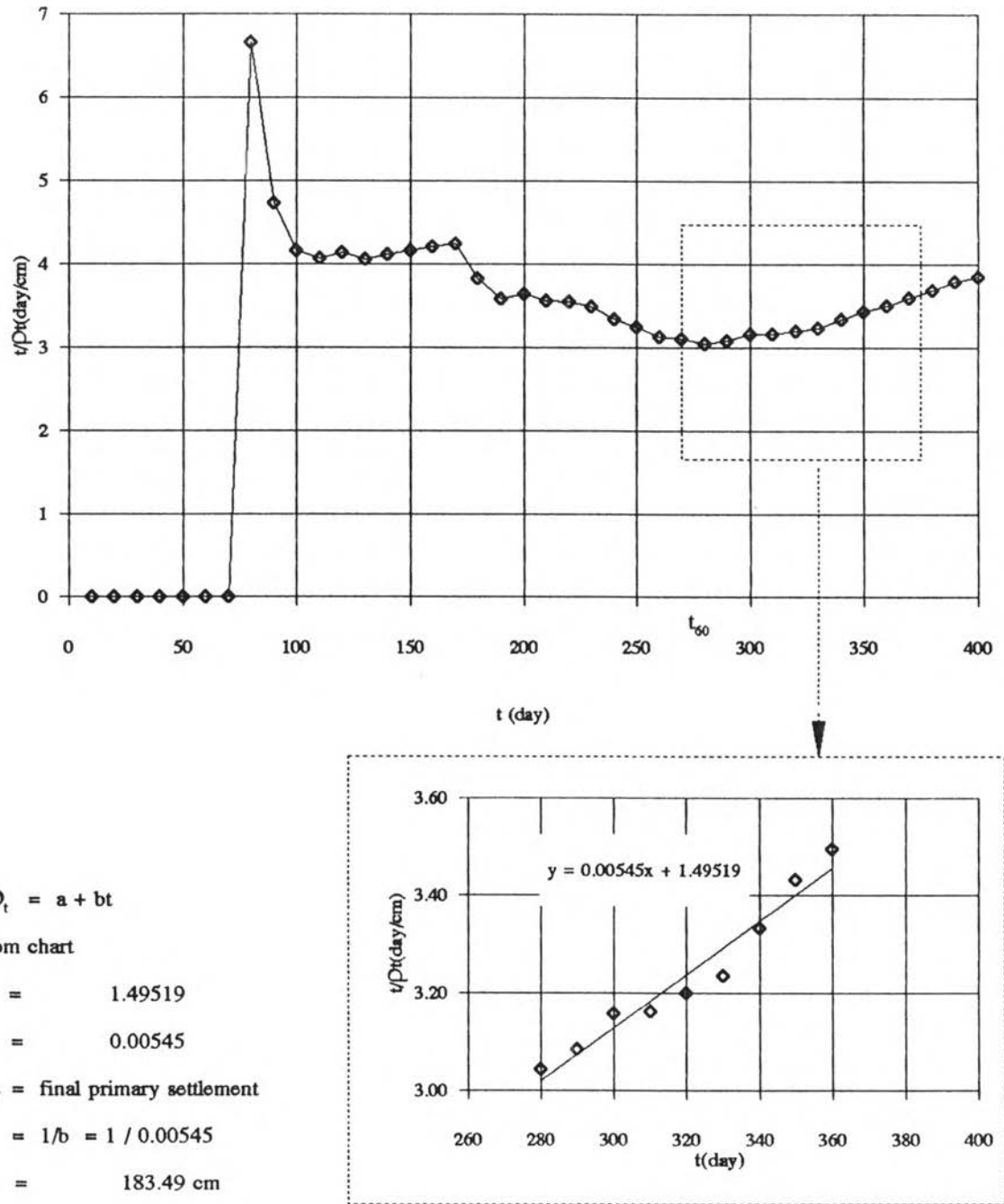
H = 4.20 - 1.817 = 2.383 m

uniform load from fill with H and γ 1.80 ton/m^3

q = 1.80 x 2.383 = 4.29 ton/m^2

Calculation Final Primary Settlement by Hyperbolic Method

o TS1-Flordrain spacing 1.50 m. with embankment height 4.20 m.



$t/\rho_t = a + bt$

from chart

a = 1.49519

b = 0.00545

ρ_f = final primary settlement

= 1/b = 1 / 0.00545

= 183.49 cm

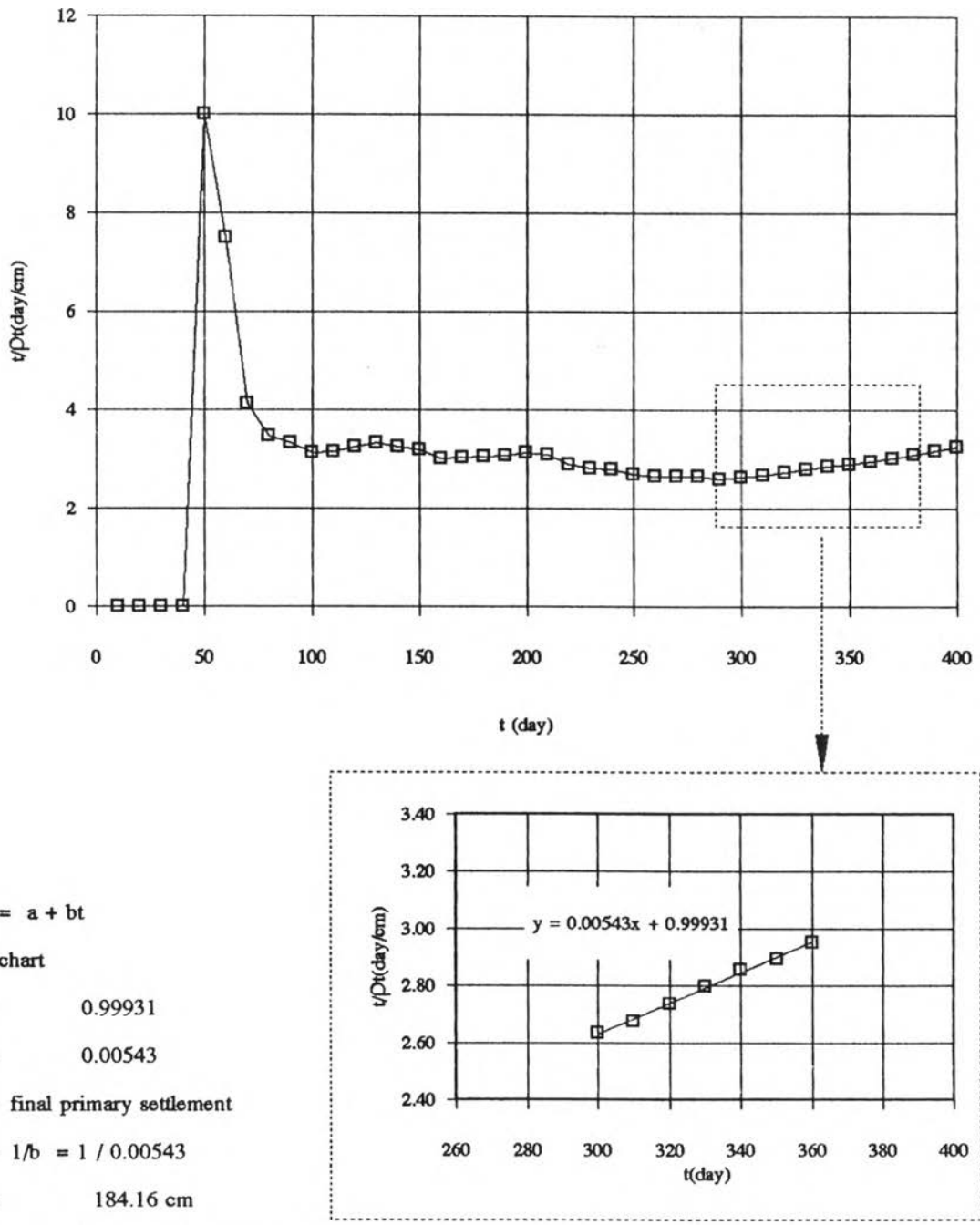
heigth of fill after final primary settlement

H = 4.20 - 1.835 = 2.365 m

uniform load from fill with H

q = 1.80 x 2.365 = 4.26 ton/m^2 (density of embankment is 1.80 ton/m^3)

o TS2-Castle Board spacing 1.20 m. with embankment height 4.20 m.



$t/\rho_t = a + bt$

from chart

a = 0.99931

b = 0.00543

ρ_f = final primary settlement

= 1/b = 1 / 0.00543

= 184.16 cm

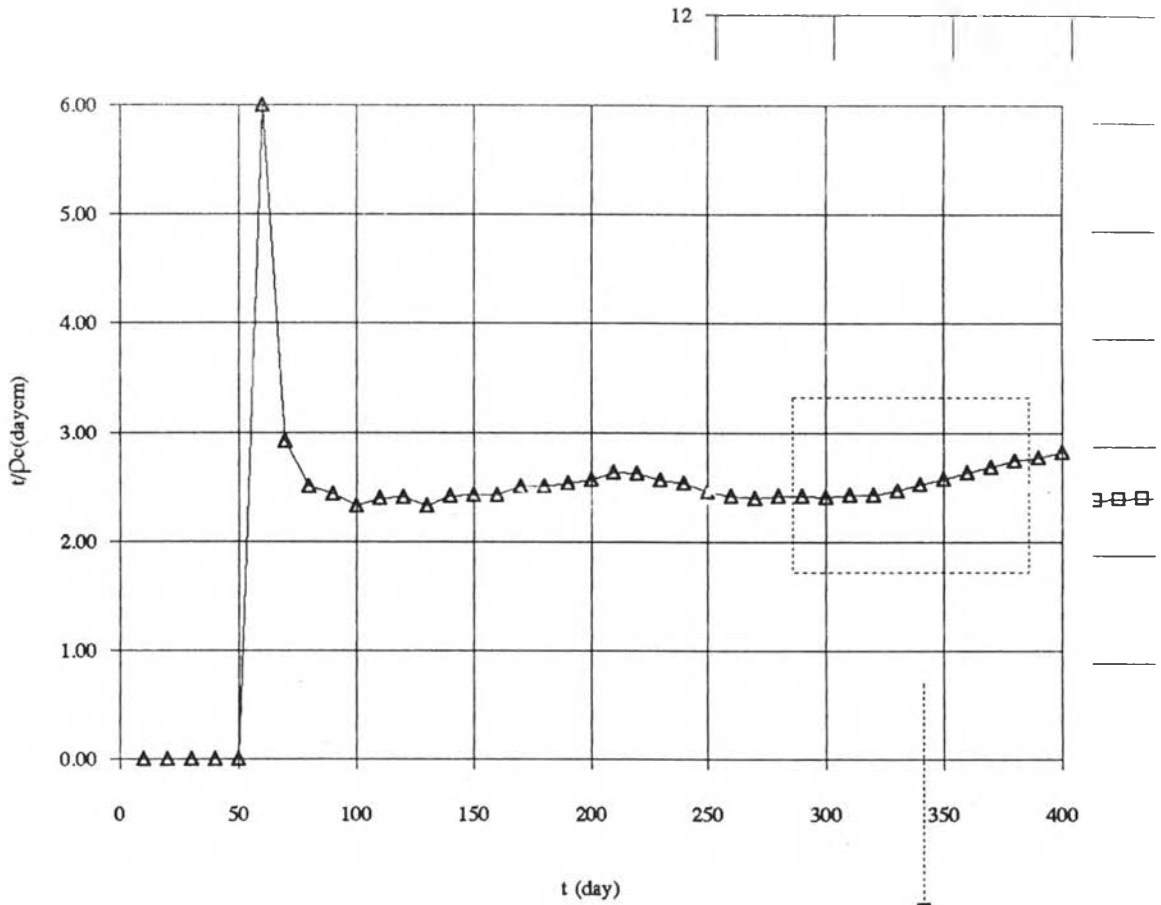
heigth of fill after final primary settlement

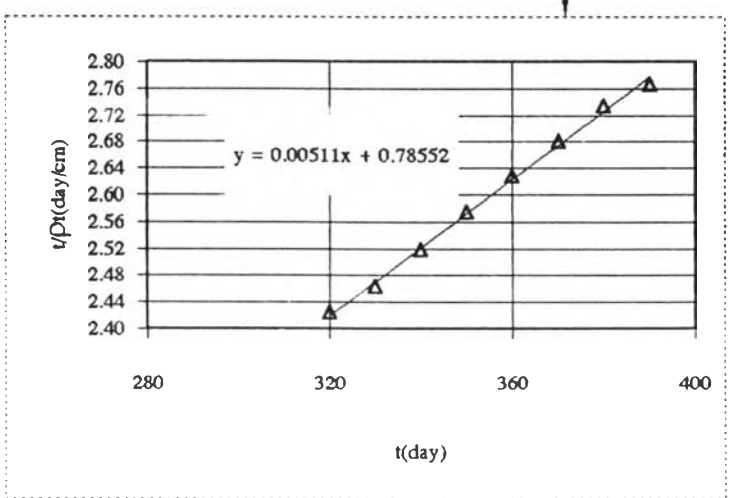
H = 4.20 - 1.842 = 2.358 m

uniform load from fill with H

q = 1.80 x 2.358 = 4.25 ton/m^2 (density of embankment is 1.80 ton/m^3)

o TS3-Mebra spacing 1.00 m. with embankm





$t/\rho_t = a + bt$

from chart

a = 0.78552

b = 0.00511

ρ_f = final primary settlement

= 1/b = 1 / 0.00511

= 195.69 cm

heigth of fill after final primary settlement

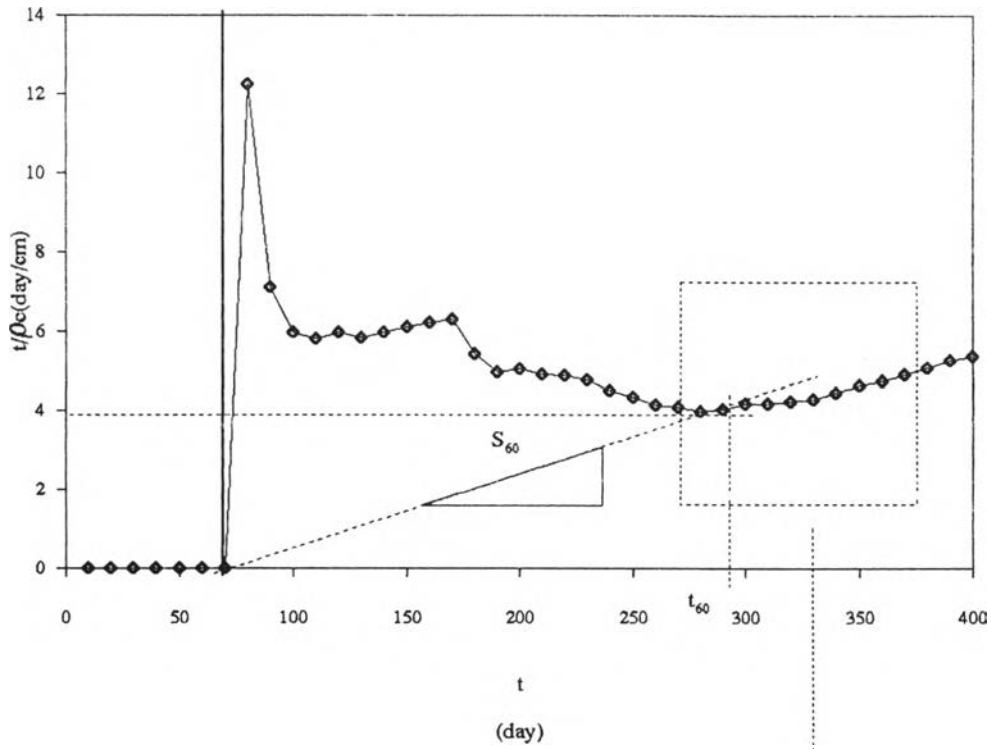
H = 4.20 - 1.957 = 2.243 m

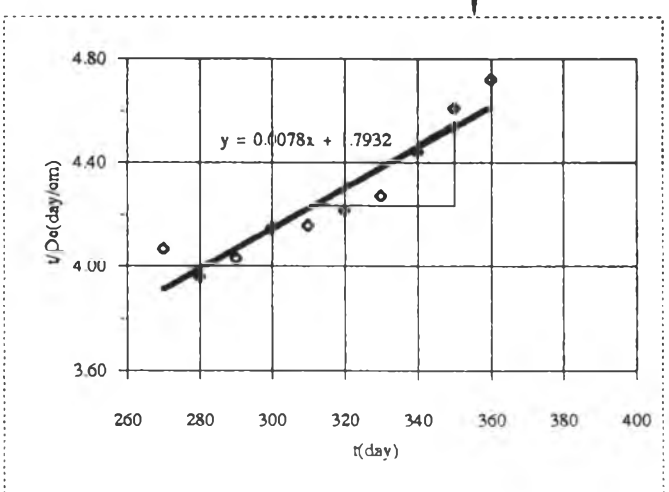
uniform load from fill with H

q = 1.80 x 2.243 = 4.04 ton/m^2 (density of embankment is 1.80 ton/m^3)

Calculation total consolidation settlement by Barron's theary

o TS1-Flordrain spacing 1.50 m. with embankment height 4.20 m.





พิจารณาจากค่า ρ_{60} และ t_{60}

t_{60} = 230 day

t_{60}/ρ_{60} = 3.90 day/cm

ρ_{60} = 58.97 cm

ρ_c = ρ_{60} / 0.60

= 98.29 cm

พิจารณาจากค่า αi และ Si

αi = 0.80

Si = 0.0078 cm^{-1}

ρ_c = $\alpha i/Si$

= 102.56 cm

$\therefore \rho_c$ = 1.026 m

จากสมการ

ρ_c = $\alpha i/Si$ = $\rho_{60}/0.60$ = $\rho_{90}/0.90$

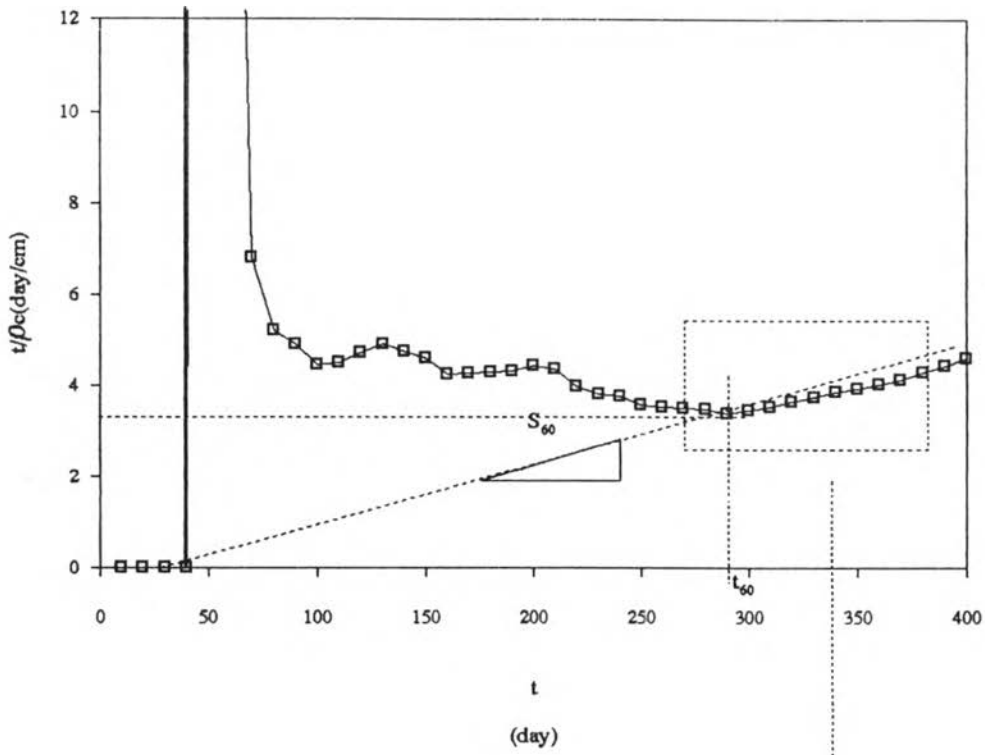
$\therefore \rho_{90}$ = 0.90x87.91 = 92.308 cm.

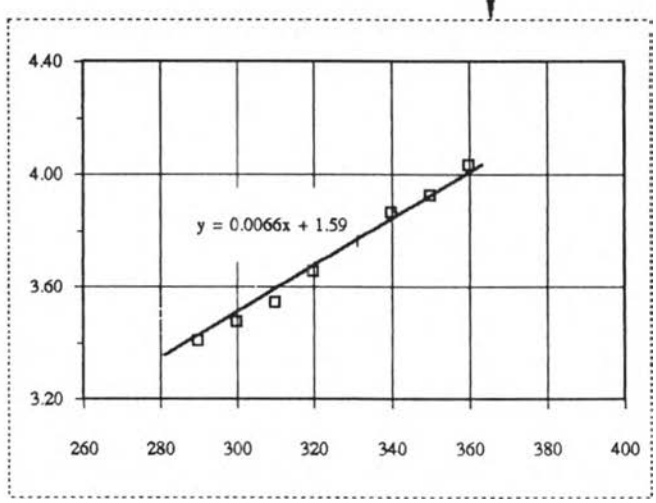
จากกราฟจะได้ t/ρ = 0.0091t+1.3592

$\therefore t_{90}$ = 1.3592x79.121/(1-0.0091x79.121) = 384.08 days = 12.80 months

$\therefore t_{100}$ = 1.3592x87.91/(1-0.0091x87.91) = 597.38 days = 19.91 months

o TS2-Castle Board spacing 1.20 m. with embankment height 4.20 m.





พิจารณาจากค่า ρ_{60} และ t_{60}

t_{60} = 240 day

t_{60}/ρ_{60} = 3.40 day/cm

ρ_{60} = 70.59 cm

ρ_c = ρ_{60} / 0.60

= 117.65 cm

พิจารณาจากค่า αi และ Si

αi = 0.77

Si = 0.0066 cm^{-1}

ρ_c = $\alpha i/Si$

= 116.67 cm

$\therefore \rho_c$ = 1.17 m

จากสมการ

ρ_c = $\alpha i/Si$ = $\rho_{60}/0.60$ = $\rho_{90}/0.90$

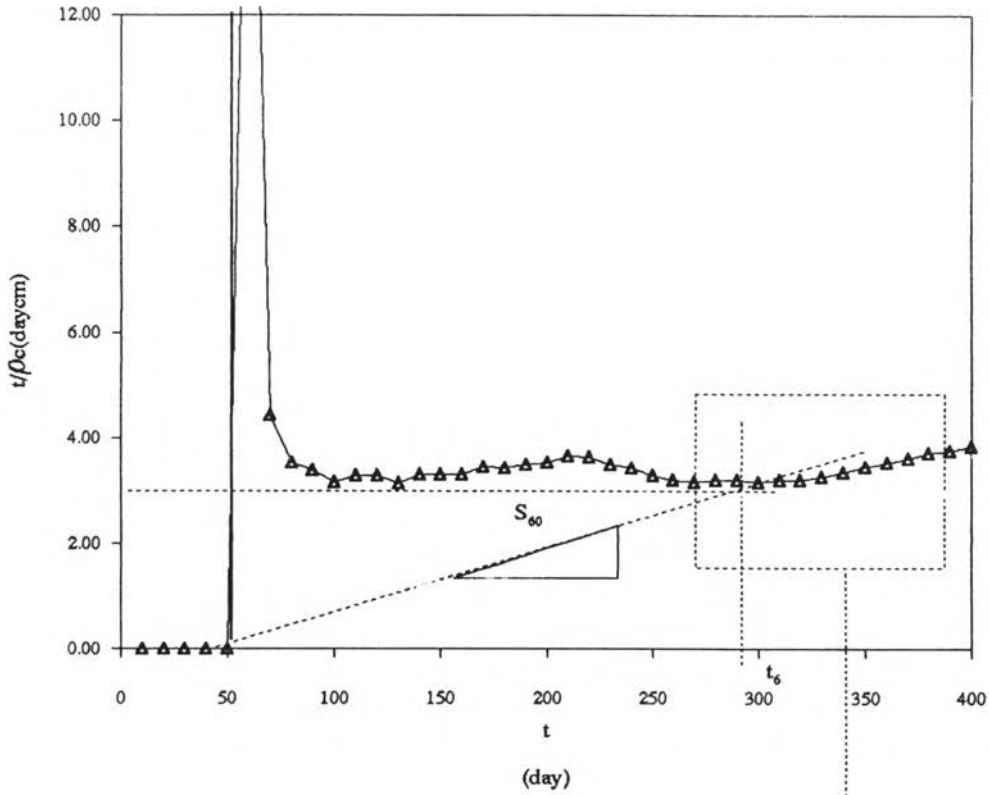
$\therefore \rho_{90}$ = 0.90x116.67 = 105.000 cm.

จากกราฟจะได้ t/ρ = 0.0066t+1.59

$\therefore t_{90}$ = 1.59x105.0/(1-0.0066x105.0) = 543.81 days = 18.13 months

$\therefore t_{100}$ = 1.59x116.67/(1-0.0066x116.67) = 806.62 days = 26.89 months

o TS3-Mebra spacing 1.00 m. with embankment height 4.20 m.



พิจารณาจากค่า ρ_{60} และ t_{60}

t_{60} = 230 day

t_{60}/ρ_{60} = 3.10 day/cm

ρ_{60} = 74.19 cm

ρ_c = ρ_{60} / 0.60

= 123.66 cm

พิจารณาจากค่า αi และ Si

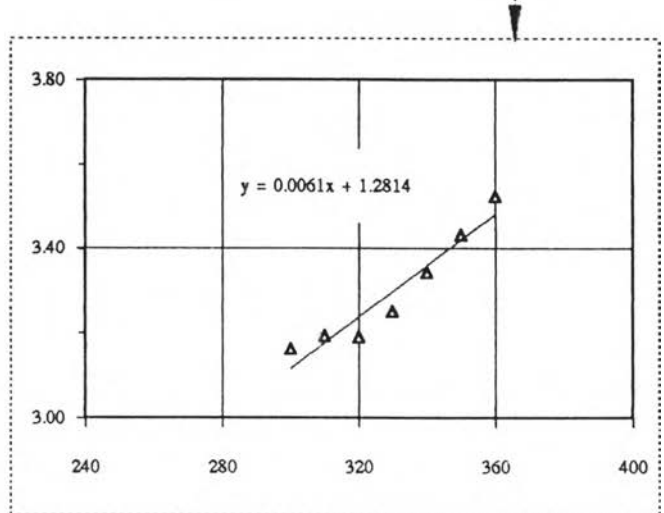
αi = 0.75

Si = 0.0061 cm^{-1}

ρ_c = $\alpha i/Si$

= 122.95 cm

$\therefore \rho_c$ = 1.23 m



จากสมการ

ρ_c = $\alpha i/Si$ = $\rho_{60}/0.60$ = $\rho_{90}/0.90$

$\therefore \rho_{90}$ = 0.90x122.95 = 110.656 cm.

จากกราฟจะได้ t/ρ = 0.0061t+1.2814

$\therefore t_{90}$ = 1.2814x110.656/(1-0.0061x110.656) = 436.29 days = 14.54 months

$\therefore t_{100}$ = 1.2814x122.95/(1-0.0061x122.95) = 630.18 days = 21.01 months

ตารางสรุปปริมาณการทรุดตัวและ Degree of Consolidation ของแปลงทดสอบ PVD จากคำนวณและวัดค่าจากเครื่องมือที่ติดตั้งในสนาม

PVD Test Section		Calculation				Measured at 400 days (m)			Degree of Consolidation U (%)		
		Hyperbolic method			Asaoka's method,						
Test Section (Type of PVD)	Spacing (m)	ρ_t (m)	ρ_c (m)	ρ_u (m)	ρ(m)	total settlement	undrained settlement	consolidation settlement	from measured total settlement	from measured consolidation settlement	from measured pore pressure (By AIT)
TS1 (Flordrain)	1.50	1.835	1.026	0.809	1.403	1.040	0.292	0.748	57%	73%	75%
TS2 (Castle Board)	1.20	1.842	1.170	0.672	1.741	1.230	0.358	0.872	67%	75%	76%
TS3 (Mebra)	1.00	1.957	1.230	0.727	1.817	1.420	0.377	1.043	73%	85%	84%

Remark : Final embakment height 4.20 m.

ρ_t - total primary settlment

ρ_c - total consolidation settlement calculated by hyperbolic method(Barron Theory)

$\rho_u = \rho_t - \rho_c$

Consolidation settlement(measured) = total settlement(measured) - undrained settlement(measured)

Undrained settlement(measured) calculated from lateral movement monitoring data

ตารางการคำนวณปริมาณการทรุดตัวจากการทำคันดินทดสอบสูง 2.4 ม.ของแปลงทดสอบ PVD

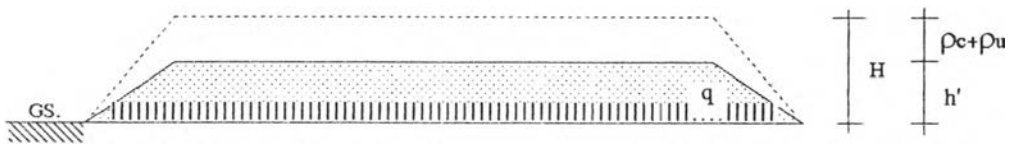
โดยวิธี 1-D (Terzaghi's Theory)

Depth,Z (m)	CR	RR	σ'_{v0} kPa	σ'_{vm} kPa	m	$\Delta\sigma_v$ kPa	σ'_{vf} kPa	RRxHxlog($\sigma'_{vm}/\sigma'_{v0}$) m	CRxHxlog($\sigma'_{vf}/\sigma'_{vm}$) m	ρ_{cf} m
0.5	0.19	0.04	9.10	62.00	80.00	42.57	51.67	0.015	0.000	0.015
1.5	0.17	0.03	15.00	75.00	26.67	42.57	57.57	0.024	0.000	0.024
2.5	0.42	0.02	19.60	52.00	16.00	42.56	62.16	0.007	0.033	0.040
3.5	0.36	0.05	25.00	40.00	11.43	42.55	67.55	0.011	0.082	0.093
4.5	0.26	0.04	29.60	42.00	8.89	42.53	72.13	0.006	0.060	0.066
5.5	0.40	0.06	37.30	52.00	7.27	42.49	79.79	0.009	0.074	0.083
6.5	0.37	0.06	44.60	56.00	6.15	42.44	87.04	0.006	0.072	0.078
7.5	0.48	0.04	51.70	65.00	5.33	42.37	94.07	0.004	0.077	0.082
8.5	0.55	0.07	60.20	70.00	4.71	42.28	102.48	0.005	0.091	0.095
9.5	0.29	0.02	68.80	85.00	4.21	42.17	110.97	0.001	0.034	0.035
10.5	0.49	0.03	80.10	84.00	3.81	42.04	122.14	0.001	0.079	0.080
11.5	0.36	0.07	93.90	97.00	3.48	41.89	135.79	0.001	0.052	0.053
12.5	0.34	0.05	106.90	115.00	3.20	41.71	148.61	0.002	0.038	0.040
16.0	0.19	0.04	121.40	140.00	2.50	40.88	162.28	0.008	0.043	0.051
								0.100	0.736	0.835

Load ,q 4.26 t/sq.m.

Width,B 40 m

Calculated height of embankment at the end of consolidation settlement



h' = Height of Embankment at end of Consolidation Settlement

= H - (ρc + ρu)

H = Height of Embankment,m

ρc = Total Consolidation Settlment,m

ρu = Total Undrained Settlment,m

q = uniform load from sand fill with h' and γ

= h' x γ

γ = unit weight of sand fill

o *TS1-Flordrain spacing 1.50 m.*

H = 4.200 m. ρc = 1.026 m.

γ = 1.800 ton/m^3 ρu = 0.809 m.

∴ h' = 2.365 m.

q = 4.257 ton/m^2

o *TS2-Castle Board spacing 1.20 m.*

H = 4.200 m. ρc = 1.170 m.

γ = 1.800 ton/m^3 ρu = 0.672 m.

∴ h' = 2.358 m.

q = 4.245 ton/m^2

o *TS3-Mebra spacing 1.00 m.*

H = 4.200 m. ρc = 1.230 m.

γ = 1.800 ton/m^3 ρu = 0.727 m.

∴ h' = 2.243 m.

q = 4.037 ton/m^2

ภาคผนวก ฉ

รายละเอียดการวิเคราะห์ Bearing Capacity ,Slope Stability , และค่าการทรุดตัวของแปลงทดสอบเสาเข็มปูนขาว

Calculation bearing capacity of lime pile(TS1)

o Single pile

P_{utl} = $(P_e + P_f)Ge - N_f - W_p$

Q_e = $Nc.Cu + \sigma_{vo}$

= $9x11 + 1.65x1.5 + 1.45x(11 - 1.5) + 1.50x(15.5 - 11) + 1.65x(16 - 15.5)$

= 128.68 ton/m^2

P_e = $Q_e.A_p$

= 25.27 ton/pile

Q_fi = $\Sigma\alpha i.Cui$

αi = 0.85 in soft clay (Su < 2 t/m2)

= 0.80 in medium clay (2 < Su < 10 t/m2)

= 0.75 in stiff clay (Su > 10 t/m2)

P_f = $\Sigma Q_fi.A_fi$

= $(0.8x5x4.5 + 0.75x11.65x0.5)x\pi x0.5$

= 35.14 ton/pile

N_f = $\beta.\sigma'_{vo}.As$ (Nutral point at -13.0 m)

= $0.23x\{[1.65x(1.5-0.5)^2-0.75]/2 + [1.45x(11-1.5)^2-7.50]/2 + [1.5x(13-11)^2-7.75]/2\}x\pi x0.5$

= 22.13 ton/pile

W_p = $\gamma_p.V_p$

= $1.2x\pi x0.5^2x(16 - 1.5)/4$

= 3.42 ton/pile

$\therefore$ P_{utl} = 16.73 ton/pile (Ge for compression pile , S = 3B ->0.7)

o Pile Group

P_e = ($Q_e$single pile)xaxb

= $128.68x14x14$

= 25,220.30 ton

P_f = $\Sigma Q_fi.A_fi$

= $(14x4)x(0.8x5x4.5 + 0.75x11.65x0.5)$

= 1,252.65 ton

N_f = $0.23x\{[1.65x(1.5-0.5)^2-0.75]/2 + [1.45x(11-1.5)^2-7.50]/2 + [1.5x(13-11)^2-7.75]/2\}x14x4$

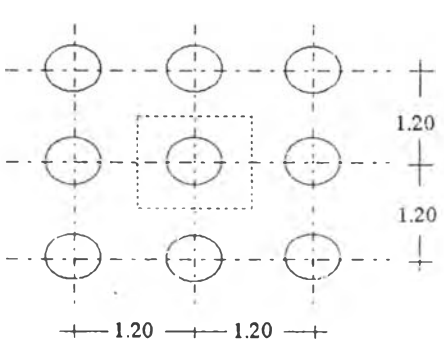
= 788.98 ton

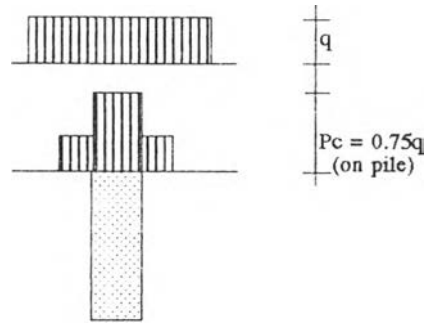
W_p = $\{1.65x1.5 + 1.45x(11 - 1.5) + 1.50x(15.5 - 11) + 1.65x(16 - 15.5)\}x14x14$

= 4,669.70 ton

$\therefore$ P_{utl} = $(P_e + P_f)Ge - N_f - W_p$

= 21,014.27 ton (Ge = 1.0)





surcharge from sand fill with height(H) of fill of PVD site at the end of primary settlement

TS-1, Flordrain 1.50 m.spacing

h' = 2.37 m. q = 4.26 ton/m^2

distributed load on single pile,P_C = (4.48+1.5x0.7)x1.2x1.2x0.75 = 5.73 ton/pile

FS = P_{ult}/P_C = 2.92

distributed load on pile group,P_C = (4.48+1.5x0.7)x(16.5x16.5) = 1,444.90 ton

FS = P_{ult}/P_C = 14.54

TS-2,Castle Board 1.20 m.spacing

h' = 2.36 m. q = 4.25 ton/m^2

distributed load on single pile,P_C = (4.17+1.5x0.7)x1.2x1.2x0.75 = 5.72 ton/pile

FS = P_{ult}/P_C = 2.93

distributed load on pile group,P_C = (4.17+1.5x0.7)x(16.5x16.5) = 1,441.59 ton

FS = P_{ult}/P_C = 14.58

TS-3,Mebra 1.00 m.spacing

h' = 2.24 m. q = 4.04 ton/m^2

distributed load on single pile,P_C = (3.85+1.5x0.7)x1.2x1.2x0.75 = 5.49 ton/pile

FS = P_{ult}/P_C = 3.05

distributed load on pile group,P_C = (3.85+1.5x0.7)x(16.5x16.5) = 1,385.07 ton

FS = P_{ult}/P_C = 15.17

ตารางสรุปผลรายการคำนวณค่า F.S. สำหรับแปลงทดสอบเสาเข็มปูนขาว TS1

PVD Test Section	h'	q	Pc		Pult		F.S. = Pult/Pc	
	m	ton/sq.m.	Single	Group	Single	Group	Single	Group
TS-1	2.37	4.26	5.73	1,444.90	16.73	21,014.27	2.92	14.54
TS-2	2.36	4.25	5.72	1,441.59	16.73	21,014.27	2.93	14.58
TS-3	2.24	4.04	5.49	1,385.07	16.73	21,014.27	3.05	15.17

H = height of fill after final primary settlement of PVD site finished($\rho c+\rho u$)

q = uniform load from fill with H and lime mixing platform

Calculation bearing capacity of lime pile(TS2)

o Single pile

P_{utl} = $(P_e + P_f)Ge - N_f - W_p$

Q_e = $Nc.Cu + \sigma_{vo}$

= $9x11 + 1.65x1.5 + 1.45x(11 - 1.5) + 1.50x(15.5 - 11) + 1.65x(16 - 15.5)$

= 128.68 ton/m^2

P_e = $Q_e.A_p$

= 25.27 ton/pile

Q_f = $\Sigma\alpha i.Cui$

αi = 0.85 in soft clay (Su < 2 t/m2)

= 0.8 in medium clay (2 < Su < 10 t/m2)

= 0.75 in stiff clay (Su > 10 t/m2)

P_f = $\Sigma Q_f i.A_f i$

= $(0.8x5x4.5 + 0.75x11.65x0.5)x\pi x0.5$

= 35.14 ton/pile

N_f = $\beta.\sigma'_{vo}.As$ (Nutral point at -13.0 m)

= $0.23x\{[1.65x(1.5-0.5)^2-0.75]/2 + [1.45x(11-1.5)^2-7.50]/2 + [1.5x(13-11)^2-7.75]/2\}x\pi x0.5$

= 22.13 ton/pile

W_p = $\gamma_p.V_p$

= $1.2x\pi x0.5^2x(16 - 1.5)/4$

= 3.42 ton/pile

$\therefore$ P_{utl} = 16.73 ton/pile (Ge for compression pile , S = 3B ->0.7)

o Pile Group

P_e = $(Q_e$single pile$)xaxb$

= $128.68x11x10$

= 14,154.25 ton

P_f = $\Sigma Q_f i.A_f i$

= $(14+15.5)x2x(0.8x5x4.5 + 0.75x11.65x0.5)$

= 1,319.76 ton

N_f = $0.23x\{[1.65x(1.5-0.5)^2-0.75]/2 + [1.45x(11-1.5)^2-7.50]/2 + [1.5x(13-11)^2-7.75]/2\}x(14+15.5)x2$

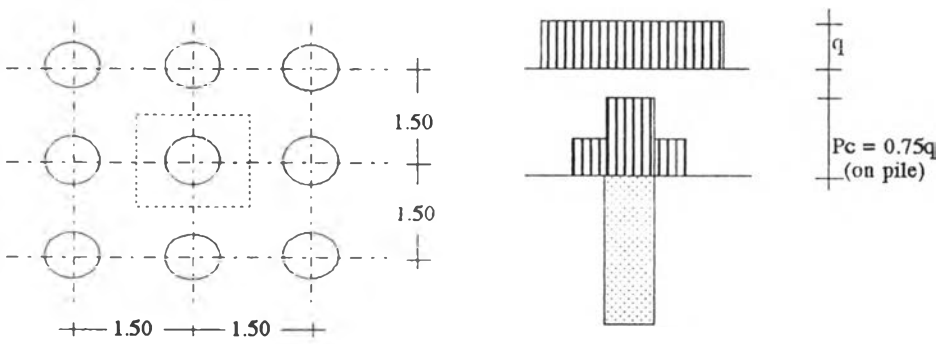
= 831.25 ton

W_p = $\{1.65x1.5 + 1.45x(11 - 1.5) + 1.50x(15.5 - 11) + 1.65x(16 - 15.5)\}x14x15.5$

= 5,170.03 ton

$\therefore$ P_{utl} = $(P_e + P_f)Ge - N_f - W_p$

= 9,472.73 ton (Ge = 1.0)



surcharge from sand fill with height(H) of fill of PVD site at the end of primary settlement

TS-1, Flordrain 1.50 m.spacing

H = 2.37 m. q = 4.26 ton/m^2

distributed load on single pile,P_C = (4.48+1.5x0.7)x1.5x1.5x0.75 = 8.96 ton/pile

FS = P_{ult}/P_c = 1.87

distributed load on pile group,P_C = (4.48+1.5x0.7)x(16.5x18.0) = 1,576.25 ton

FS = P_{ult}/P_C = 6.01

TS-2,Castle Board 1.20 m.spacing

H = 2.36 m. q = 4.25 ton/m^2

distributed load on single pile,P_C = (4.17+1.5x0.7)x1.5x1.5x0.75 = 8.94 ton/pile

FS = P_{ult}/P_C = 1.87

distributed load on pile group,P_C = (4.17+1.5x0.7)x(16.5x18.0) = 1,572.64 ton

FS = P_{ult}/P_C = 6.02

TS-3,Mebra 1.00 m.spacing

H = 2.24 m. q = 4.04 ton/m^2

distributed load on single pile,P_C = (3.85+1.5x0.7)x1.5x1.5x0.75 = 8.59 ton/pile

FS = P_{ult}/P_C = 1.95

distributed load on pile group,P_C = (3.85+1.5x0.7)x(16.5x18.0) = 1,510.99 ton

FS = P_{ult}/P_C = 6.27

ตารางสรุปผลรายการคำนวณค่า F.S. สำหรับแปลงทดสอบเสาเข็มปูนขาว TS2

PVD Test Section	H	q	Pc		Pult		F.S. = Pult/Pc	
	m	ton/sq.m.	Single	Group	Single	Group	Single	Group
TS-1	2.37	4.26	8.96	1,576.25	16.73	9,472.73	1.87	6.01
TS-2	2.36	4.25	8.94	1,572.64	16.73	9,472.73	1.87	6.02
TS-3	2.24	4.04	8.59	1,510.99	16.73	9,472.73	1.95	6.27

H = height of fill after final primary settlement of PVD site finished

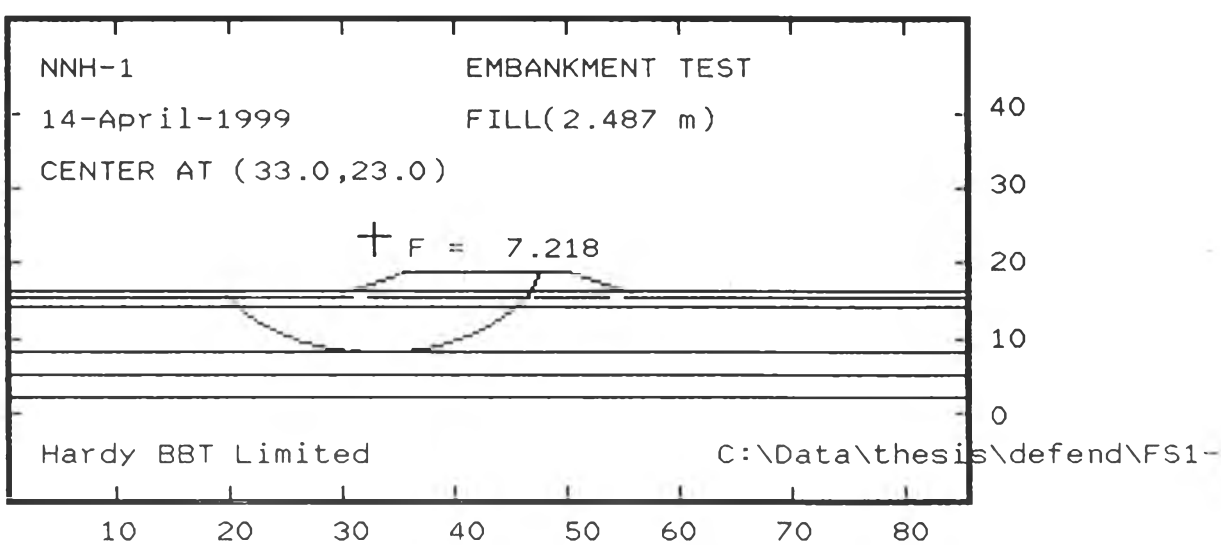
q = uniform load from fill with H and lime mixing platform

Results are for Bishop's Modified Method unless otherwise noted

File C:\Data\thesis\defend\FS1-1.GSL

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surface
# 1 -SAND FILL	18	0	35	0
# 2 -WEATHERED CRUST	14.3	52.2	0	1
# 3 -CHEMICOLIZER	14	200	0	1
# 4 -WEATHERED CRUST	14.3	52.2	0	1
# 5 -SOFT	14.5	56.5	0	1
# 6 -MEDIUM	14.5	82.8	0	1
# 7 -MEDIUM TO STIFF	14.7	105.8	0	1
# 8 -STIFF	16.6	143.5	0	1

X-centre	Y-centre	Radius	Factor of Safety	Iterations	Slices
33.00	23.50	15.50	7.2184	3	35



There are no explicit external forces in the data set.

รายการคำนวณ Slope Stability Analysis จากการทำคันดินสูง 2.487 ม.

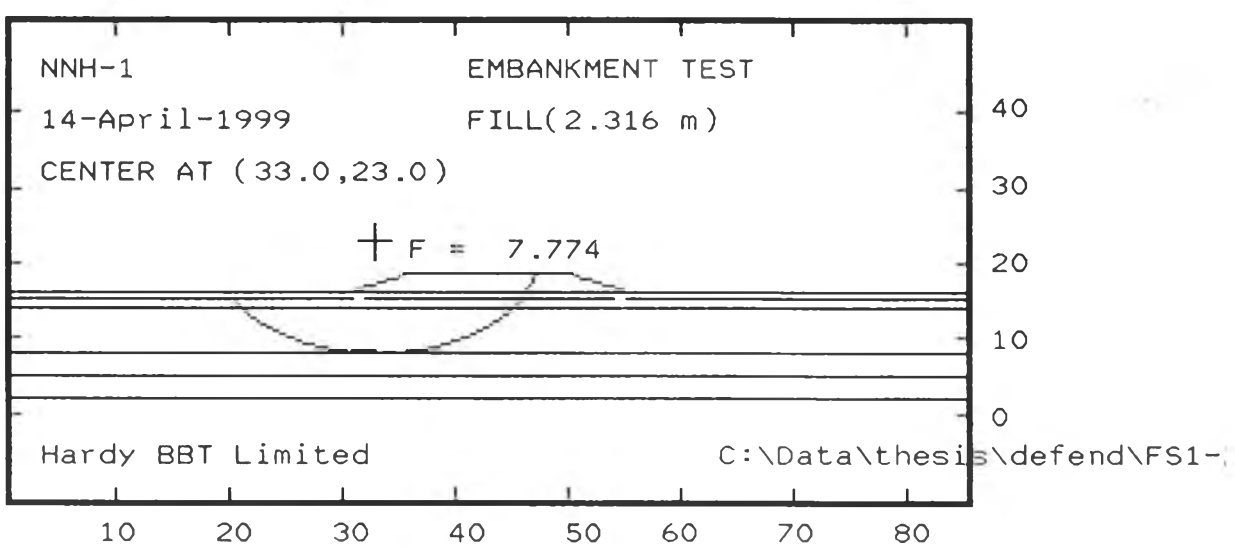
บนแปลงทดสอบ TS1(Lime pile spacing 1.20 m.)

Results are for Bishop's Modified Method unless otherwise noted

File C:\Data\thesis\defend\FS1-2.GSL

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surface
# 1 -SAND FILL	18	0	35	0
# 2 -WEATHERED CRUST	14.3	52.2	0	1
# 3 -CHEMICOLIZER	14	200	0	1
# 4 -WEATHERED CRUST	14.3	52.2	0	1
# 5 -SOFT	14.5	56.5	0	1
# 6 -MEDIUM	14.5	82.8	0	1
# 7 -MEDIUM TO STIFF	14.7	105.8	0	1
# 8 -STIFF	16.6	143.5	0	1

X-centre	Y-centre	Radius	Factor of Safety	Iterations	Slices
33.00	23.00	15.00	7.7736	3	33



There are no explicit external forces in the data set.

รายการคำนวณ Slope Stability Analysis จากการทำคันดินสูง 2.316 ม.

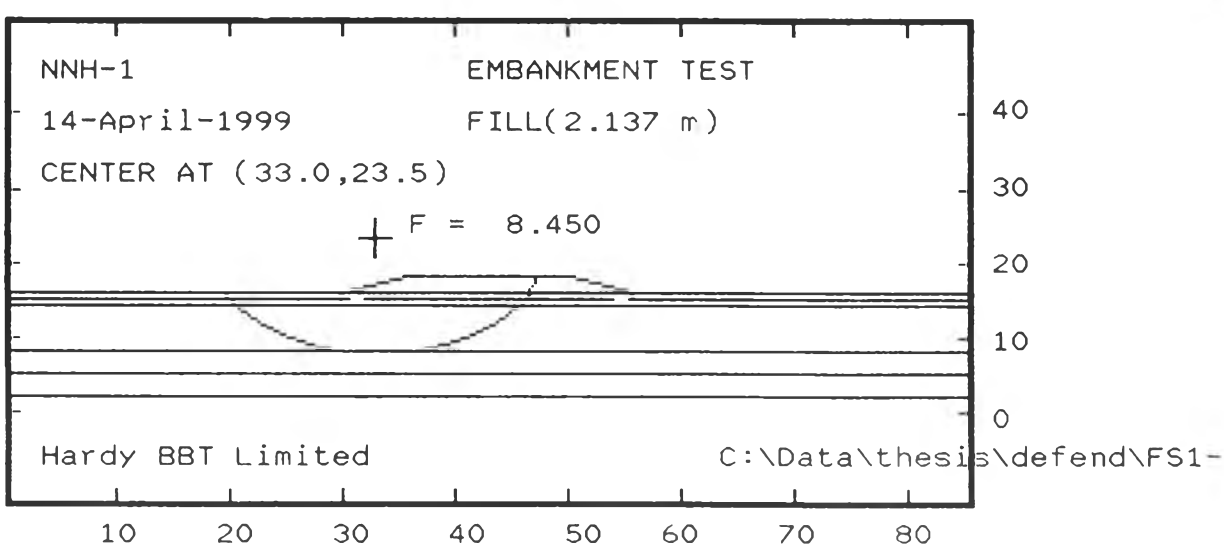
บนแปลงทดสอบ TS1(Lime pile spacing 1.20 m.)

Results are for Bishop's Modified Method unless otherwise noted

File C:\Data\thesis\defend\FS1-3.GSL

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surface
# 1 -SAND FILL	18	0	35	0
# 2 -WEATHERED CRUST	14.3	52.2	0	1
# 3 -CHEMICOLIZER	14	200	0	1
# 4 -WEATHERED CRUST	14.3	52.2	0	1
# 5 -SOFT	14.5	56.5	0	1
# 6 -MEDIUM	14.5	82.8	0	1
# 7 -MEDIUM TO STIFF	14.7	105.8	0	1
# 8 -STIFF	16.6	143.5	0	1

X-centre	Y-centre	Radius	Factor of Safety	Iterations	Slices
33.00	23.50	15.50	8.4504	3	34



There are no explicit external forces in the data set.

รายการคำนวณ Slope Stability Analysis จากการทำคันดินสูง 2.137 ม.

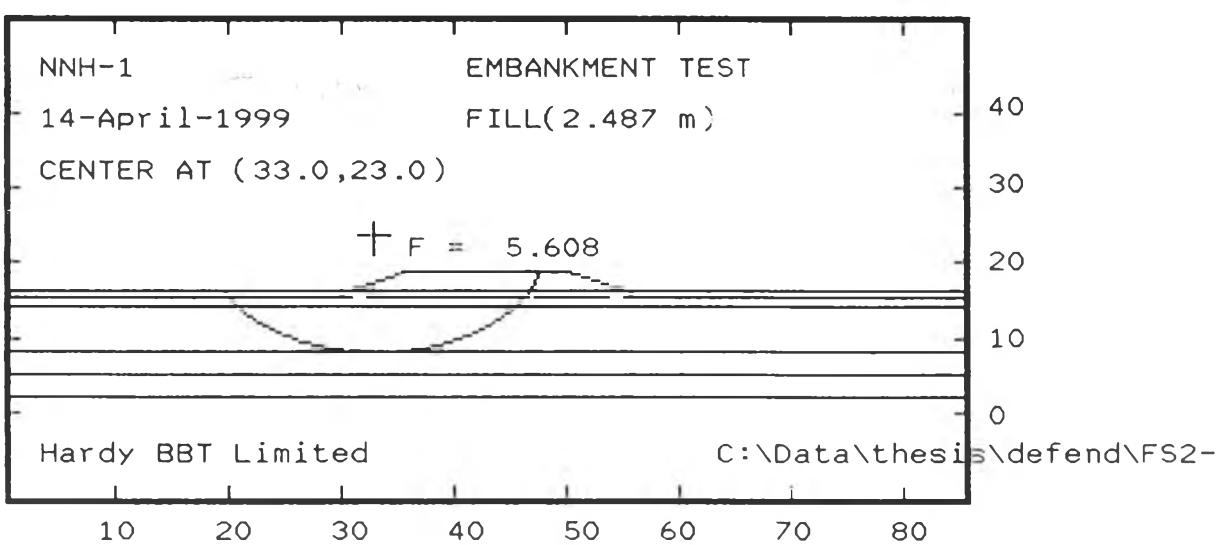
บนแปลงทดสอบ TS1(Lime pile spacing 1.20 m.)

Results are for Bishop's Modified Method unless otherwise noted

File C:\Data\thesis\defend\FS2-1.GSL

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surface
# 1 -SAND FILL	18	0	35	0
# 2 -WEATHERED CRUST	14.4	43	0	1
# 3 -CHEMICOLIZER	14	200	0	1
# 4 -WEATHERED CRUST	14.4	43	0	1
# 5 -SOFT	14.5	41.4	0	1
# 6 -MEDIUM	14.5	74.6	0	1
# 7 -MEDIUM TO STIFF	14.8	96.8	0	1
# 8 -STIFF	16.7	124.1	0	1

X-centre	Y-centre	Radius	Factor of Safety	Iterations	Slices
33.00	23.50	15.50	5.6080	3	35



There are no explicit external forces in the data set.

รายการคำนวณ Slope Stability Analysis จากการทำคันดินสูง 2.487 ม.

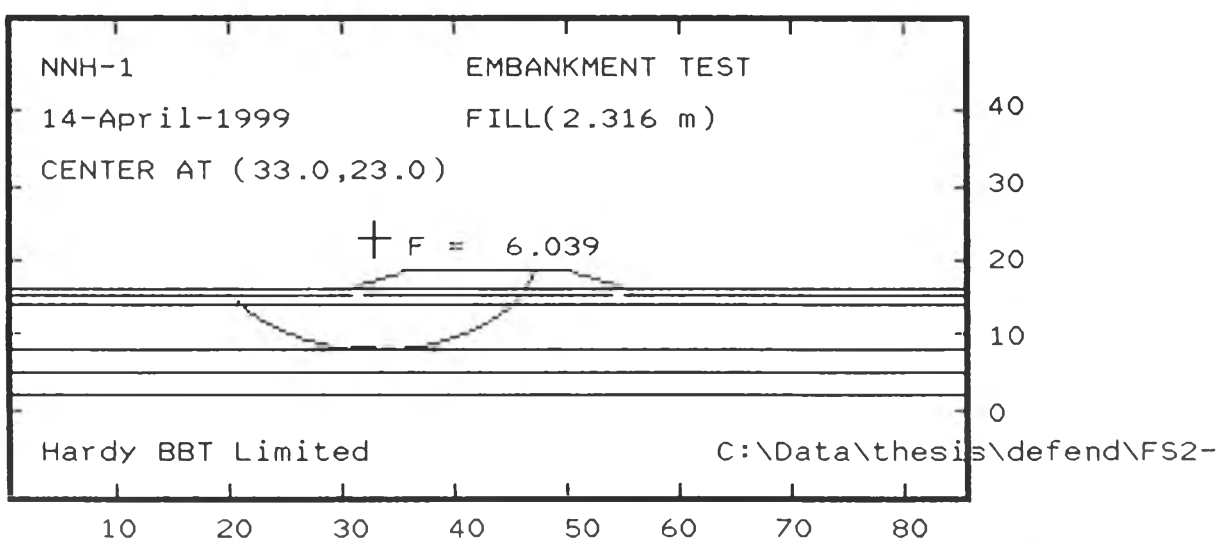
บนแปลงทดสอบ TS2(Lime pile spacing 1.50 m)

Results are for Bishop's Modified Method unless otherwise noted

File C:\Data\thesis\defend\FS2-2.GSL

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surface
# 1 -SAND FILL	18	0	35	0
# 2 -WEATHERED CRUST	14.4	43	0	1
# 3 -CHEMICOLIZER	14	200	0	1
# 4 -WEATHERED CRUST	14.4	43	0	1
# 5 -SOFT	14.5	41.4	0	1
# 6 -MEDIUM	14.5	74.6	0	1
# 7 -MEDIUM TO STIFF	14.8	96.8	0	1
# 8 -STIFF	16.7	124.1	0	1

X-centre	Y-centre	Radius	Factor of Safety	Iterations	Slices
33.00	23.00	15.00	6.0395	3	33



There are no explicit external forces in the data set.

รายการคำนวณ Slope Stability Analysis จากการทำคันดินสูง 2.316 ม.

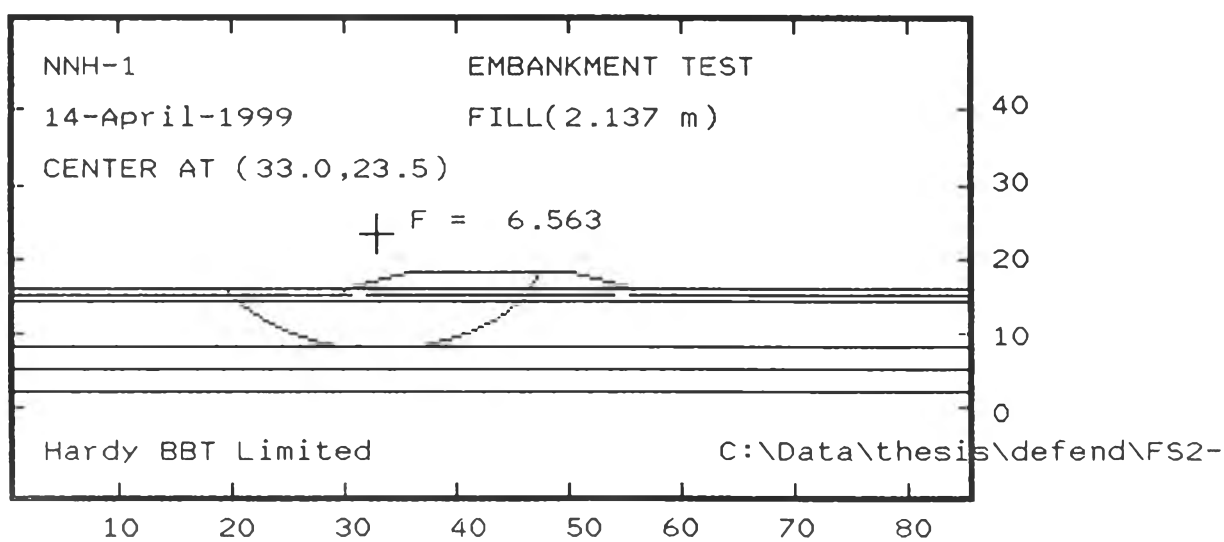
บนแปลงทดสอบ TS2(Lime pile spacing 1.50 m)

Results are for Bishop's Modified Method unless otherwise noted

File C:\Data\thesis\defend\FS2-3.GSL

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surface
# 1 -SAND FILL	18	0	35	0
# 2 -WEATHERED CRUST	14.4	43	0	1
# 3 -CHEMICOLIZER	14	200	0	1
# 4 -WEATHERED CRUST	14.4	43	0	1
# 5 -SOFT	14.5	41.4	0	1
# 6 -MEDIUM	14.5	74.6	0	1
# 7 -MEDIUM TO STIFF	14.8	96.8	0	1
# 8 -STIFF	16.7	124.1	0	1

X-centre	Y-centre	Radius	Factor of Safety	Iterations	Slices
33.00	23.50	15.50	6.5626	3	34



There are no explicit external forces in the data set.

รายการคำนวณ Slope Stability Analysis จากการทำคันดินสูง 2.137 ม.

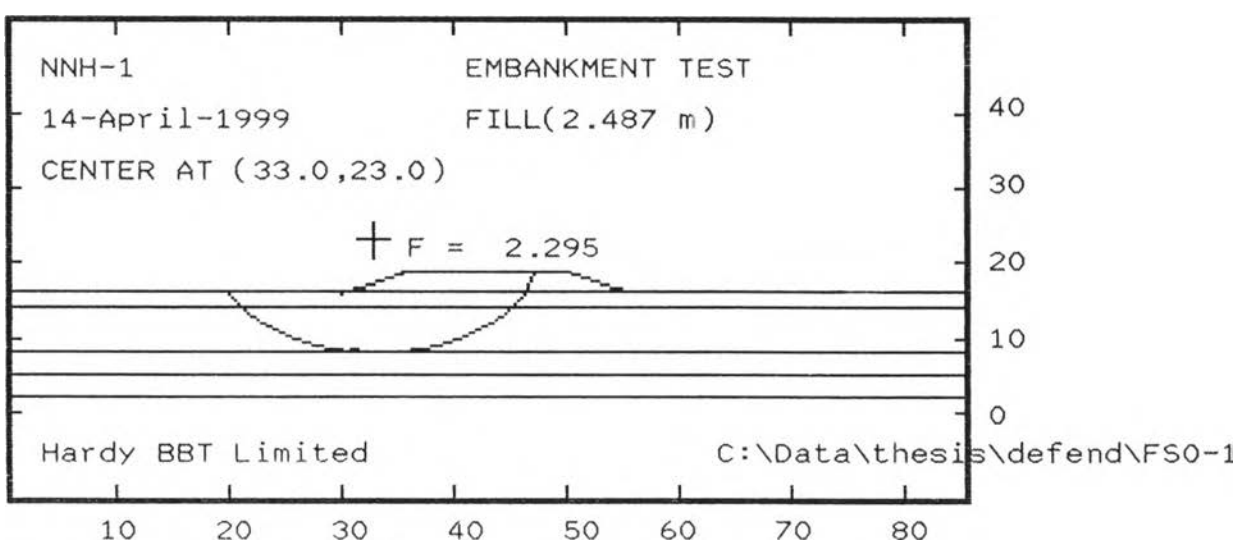
บนแปลงทดสอบ TS2(Lime pile spacing 1.50 m)

Results are for Bishop's Modified Method unless otherwise noted.

File C:\Data\thesis\defend\FS0-1.GSL

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surface
# 1 -SAND FILL	18	0	35	0
# 2 -WEATHERED CRUST	14.5	26.6	0	1
# 3 -SOFT	14.7	17.8	0	1
# 4 -MEDIUM	14.7	56.4	0	1
# 5 -MEDIUM TO STIFF	15	75.5	0	1
# 6 -STIFF	17	112.5	0	1

X-centre	Y-centre	Radius	Factor of Safety	Iterations	Slices
33.00	23.00	15.00	2.2947	3	34



There are no explicit external forces in the data set.

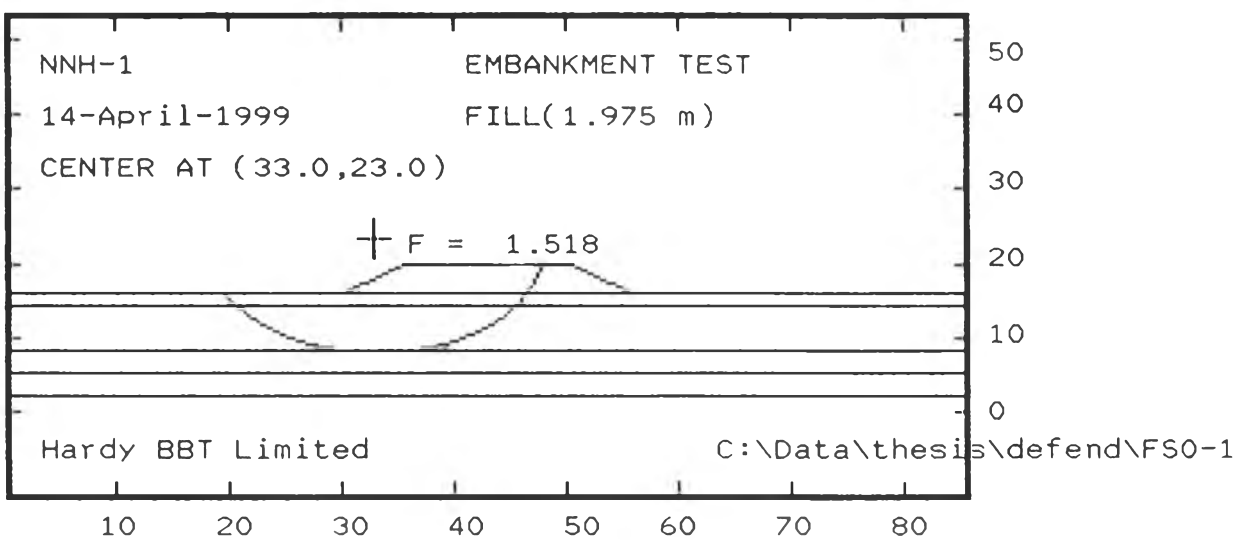
รายการคำนวณ Slope Stability Analysis จากการทำคันดินสูง 2.487 ม.
บนดินหนองงูเห่าเมื่อไม่มีการปรับปรุงใดๆ

Results are for Bishop's Modified Method unless otherwise noted.

File C:\Data\thesis\defend\FS0-1.GSL

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surface
# 1 -SAND FILL (h=1.975 m.)	18	0	35	0
# 2 -WEATHERED CRUST	14.5	26.6	0	1
# 3 -SOFT	14.7	17.8	0	1
# 4 -MEDIUM	14.7	56.4	0	1
# 5 -MEDIUM TO STIFF	15	75.5	0	1
# 6 -STIFF	17	112.5	0	1

X-centre	Y-centre	Radius	Factor of Safety	Iterations	Slices
33.00	23.50	15.50	1.5184	3	34



There are no explicit external forces in the data set.

รายการคำนวณ Slope Stabilty Analysis เพื่อหาความสูงของคันดินที่มากที่สุดบนดินหนองงูเห่าเมื่อไม่มีการปรับปรุงใดๆ

Calculation settlement by Poulos's method with negative skin friction(TS1)

Surcharge from sand fill with height(H) of fill of PVD site at the end of primary settlement on Lime Pile Test Section 1(1.20 m.pile pitch)

TS-1, Flordrain 1.50 m.spacing

H = 2.37 m. q = 4.26 ton/m^2

Settlement of single pile

ρ_i = P.I/(Esd)

I = $I_o.R_k.R_h.R_v$

= 0.065x2.2x0.68

= 0.097

Pc = 27.86 ton/pile with negative skin friction

Es = 205 ton/m^2

Ep = 800 ton/m^2

ρ_i = 23.23x0.097/(205x0.5)

= 0.026 m.

Settlement of pile group (4x4 no./group)

ρ_g = $R_g.\rho_i.\xi_{sb}.\xi_{sb}.\xi_v$

= 6.234x0.027x0.55x0.98x1.0

= 0.089 m.

$\rho_{undrain}/\rho_{drain}$ = 0.75

$\therefore \rho_{undrain}$ = 0.118 m.

Equivalent peir for pile group

ρ_{RP} = $R_g.\rho_i.\xi_{sb}.\xi_{sb}.\xi_v$

= 3.8x0.119x0.6x0.98x1

= 0.265 m.

$\rho_{undrain}/\rho_{drain}$ = 0.79

$\therefore \rho_{undrain}$ = 0.335 m.

ρ_{avg} = ((0.575+0.30)x0.338+0.338)/3

0.209 m.

TS-2,Castle Board 1.20 m.spacing

H = 2.36 m. q = 4.25 ton/m^2

Settlement of single pile

ρ_i = P.I/(Esd)

I = $I_o.R_k.R_h.R_v$

= 0.065x2.2x0.68

= 0.097

Pc = 27.85 ton/pile with negative skin friction

Es = 205 ton/m^2

Ep = 800 ton/m^2

ρ_i = 23.23x0.097/(205x0.5)

= 0.026 m.

Settlement of pile group (4x4 no./group)

ρ_g = $R_s.\rho_i.\xi_h.\xi_b.\xi_v$

= 6.234x0.024x0.55x0.98x1.0

= 0.089 m.

$\rho_{undrain}/\rho_{drain}$ = 0.75

$\therefore \rho_{undrain}$ = 0.118 m.

Equivalent peir for pile group

ρ_{EP} = $R_s.\rho_i.\xi_h.\xi_b.\xi_v$

= 3.8x0.106x0.6x0.98x1

= 0.264 m.

$\rho_{undrain}/\rho_{dram}$ = 0.79

$\therefore \rho_{undrain}$ = 0.335 m.

ρ_{avg} = ((0.575+0.30)x0.299+0.299)/3

0.209 m.

TS-3,Mebra 1.00 m.spcacing

H = 2.24 m. q = 4.04 ton/m^2

Settlement of single pile

ρ_i = P.I/(Esd)

I = $I_o.R_k.R_h.R_v$

= 0.065x2.2x0.68

= 0.097

Pc = 27.63 ton/pile with negative skin friction

Es = 205 ton/m^2

Ep = 800 ton/m^2

ρ_i = 23.23x0.097/(205x0.5)

= 0.026 m.

Settlement of pile group (4x4 no./group)

ρ_g = $R_s.\rho_i.\xi_h.\xi_b.\xi_v$

= 6.234x0.024x0.55x0.98x1.0

= 0.088 m.

$\rho_{undram}/\rho_{dram}$ = 0.75

$\therefore \rho_{undram}$ = 0.117 m.

Equivalent peir for pile group

ρ_{EP} = $R_s.\rho_i.\xi_h.\xi_b.\xi_v$

= 3.8x0.106x0.6x0.98x1

= 0.262 m.

$\rho_{undram}/\rho_{dram}$ = 0.79

$\therefore \rho_{undram}$ = 0.332 m.

ρ_{avg} = ((0.575+0.30)x0.299+0.299)/3

0.208 m.

ตารางสรุปผลรายการคำนวณการทรุดตัวของแปลงทดสอบเสาเข็มปูนขาว(TS1)

PVD Test Section	H m	q ton/sq.m.	ρ_{avg} m
TS-1	2.37	4.26	0.209
TS-2	2.24	4.25	0.209
TS-3	2.24	4.04	0.208

H = height of fill at the end of final primary settlement of PVD site finished

q = uniform load from fill with H and lime mixing platform

Calculation settlement by Poulos's method with negative skin friction(TS2)

Surcharge from sand fill with height(H) of fill of PVD site at the end of primary settlement on Lime Pile Test Section 2(1.50 m.pile pitch)

TS-1, Flordrain 1.50 m.spacing

H = 2.37 m. q = 4.26 ton/m^2

Settlement of single pile

ρ = P.I/(Esd)

I = $I_o.R_k.R_h.R_v$

= 0.065x2.1x0.68

= 0.093

Pc = 31.09 ton/pile with negative skin friction

Es = 114 ton/m^2

Ep = 800 ton/m^2

ρ_i = 23.31x0.093/(114x0.5)

= 0.051 m.

Settlement of pile group (5x5 no./group)

ρ_g = $R_s.\rho_i.\xi_{sh}.\xi_{sb}.\xi_v$

= 6.59x0.041x0.55x0.97x1.0

= 0.178 m.

$\rho_{undrain}/\rho_{dram}$ = 0.72

$\therefore$ ρ_{undram} = 0.247 m.

Equivalent peir for pile group

ρ_{gp} = $R_s.\rho_i.\xi_{sh}.\xi_{sb}.\xi_v$

= 2.28x0.198x0.72x0.97x1

= 0.394 m.

$\rho_{undrain}/\rho_{dram}$ = 0.82

$\therefore$ ρ_{undram} = 0.480 m.

ρ_{avg} = ((0.595+0.335)x0.385+0.385)/3

0.309 m.

TS-2,Castle Board 1.20 m.spacing

H = 2.36 m. q = 4.25 ton/m^2

Settlement of single pile

ρ = P.I/(Esd)

I = $I_o.R_k.R_h.R_v$

= 0.065x2.1x0.68

= 0.093

Pc = 31.07 ton/pile with negative skin friction

Es = 114 ton/m^2

Ep = 800 ton/m^2

ρ_i = 23.31x0.093/(114x0.5)

= 0.051 m.

Settlement of pile group (5x5 no./group)

ρ_g = $R_s.\rho_i.\xi_h.\xi_b.\xi_v$

= 6.59x0.041x0.55x0.97x1.0

= 0.178 m.

$\rho_{undrain}/\rho_{drain}$ = 0.72

$\therefore \rho_{undrain}$ = 0.247 m.

Equivalent peir for pile group

ρ_{EP} = $R_s.\rho_i.\xi_h.\xi_b.\xi_v$

= 2.28x0.198x0.72x0.97x1

= 0.393 m.

$\rho_{undrain}/\rho_{drain}$ = 0.82

$\therefore \rho_{undrain}$ = 0.480 m.

ρ_{avg} = ((0.595+0.335)x0.385+0.385)/3

0.309 m.

TS-3,Mebra 1.00 m.spacing

H = 2.24 m. q = 4.04 ton/m^2

Settlement of single pile

ρ = P.I/(Esd)

I = $I_o.R_k.R_h.R_v$

= 0.065x2.1x0.68

= 0.093

Pc = 30.72 ton/pile with negative skin friction

Es = 114 ton/m^2

Ep = 800 ton/m^2

ρ_i = 23.31x0.093/(114x0.5)

= 0.050 m.

Settlement of pile group (5x5 no./group)

ρ_g = $R_s.\rho_i.\xi_h.\xi_b.\xi_v$

= 6.59x0.041x0.55x0.97x1.0

= 0.176 m.

$\rho_{undram}/\rho_{dram}$ = 0.72

$\therefore \rho_{undram}$ = 0.244 m.

Equivalent peir for pile group

ρ_{EP} = $R_s.\rho_i.\xi_h.\xi_b.\xi_v$

= 2.28x0.198x0.72x0.97x1

= 0.389 m.

$\rho_{undram}/\rho_{dram}$ = 0.82

$\therefore \rho_{undram}$ = 0.474 m

ρ_{avg} = ((0.595+0.335)x0.385+0.385)/3

0.305 m.

ตารางสรุปผลรายการคำนวณการทรุดตัวของแปลงทดสอบเสาเข็มปูนขาว(TS2)

PVD Test Section	H m	q ton/sq.m.	ρ_{avg} m
TS-1	2.37	4.26	0.309
TS-2	2.24	4.25	0.309
TS-3	2.24	4.04	0.305

H = height of fill at the end of primary settlement of PVD site

q = uniform load from fill with H and lime mixing [illegible]

ตารางสรุปปริมาณการทรุดตัวและ Degree of Consolidation ของแปลงทดสอบ PVD จากคำนวณและวัดค่าจากเครื่องมือที่ติดตั้งในสนาม

PVD Test Section		Calculation				Measured at 400 days (m)			Degree of Consolidation U (%)		
		Hyperbolic method			Asaoka's method,						
Test Section (Type of PVD)	Spacing (m)	ρ_t (m)	ρ_c (m)	ρ_u (m)	ρ(m)	total settlement	undrained settlement	consolidation settlement	from measured total settlement	from measured consolidation settlement	from measured pore pressure (By AIT)
TS1 (Flordrain)	1.50	1.835	1.026	0.809	1.403	1.040	0.292	0.748	57%	73%	75%
TS2 (Castle Board)	1.20	1.842	1.170	0.672	1.741	1.230	0.358	0.872	67%	75%	76%
TS3 (Mebra)	1.00	1.957	1.230	0.727	1.817	1.420	0.377	1.043	73%	85%	84%

Remark : Final embakment height 4.20 m.

ρ_t - total primary settlment by hyperbolic method used time-settlement data of PVD test section(AIT)

ρ_c - total consolidation settlement calculated by hyperbolic method(Barron Theory) used time dependent consolidation settlement {total settlement - undrained settlement (from lateral movement data)}

$\rho_u = \rho_t - \rho_c$

Consolidation settlement(measured) = total settlement(measured) - undrained settlement(measured)

Undrained settlement(measured) calculated from lateral movement monitoring data

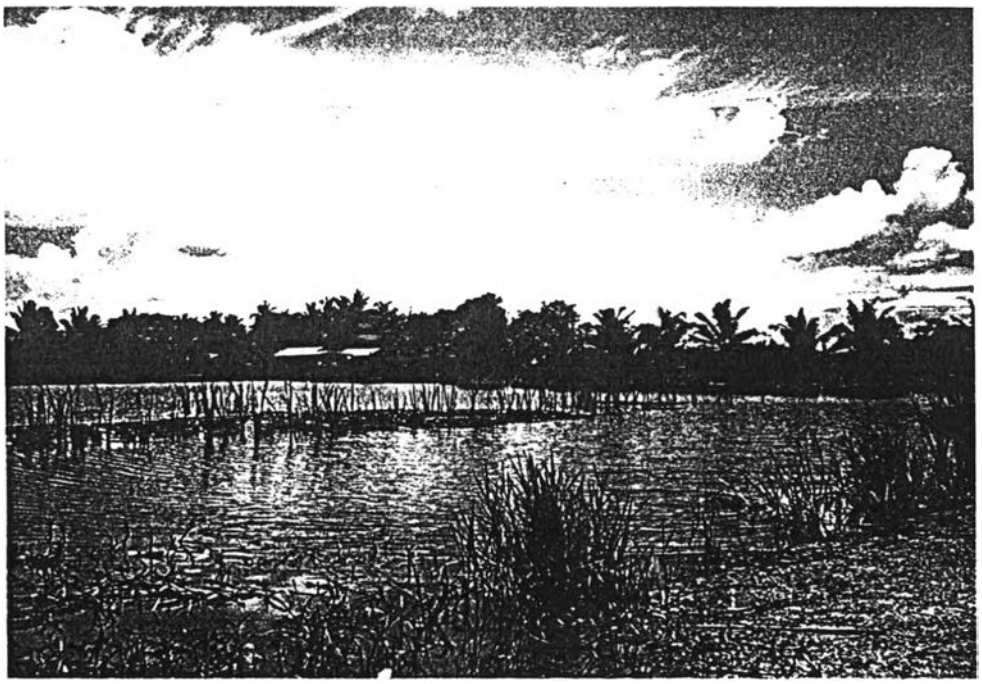
ตารางการคำนวณค่าการทรุดตัวเริ่มแรกทั้งหมดของชั้นดินบริเวณแปลงทดสอบก่อนการติดตั้งเข็มปูนขาว(1-D Consolidation Settlement)

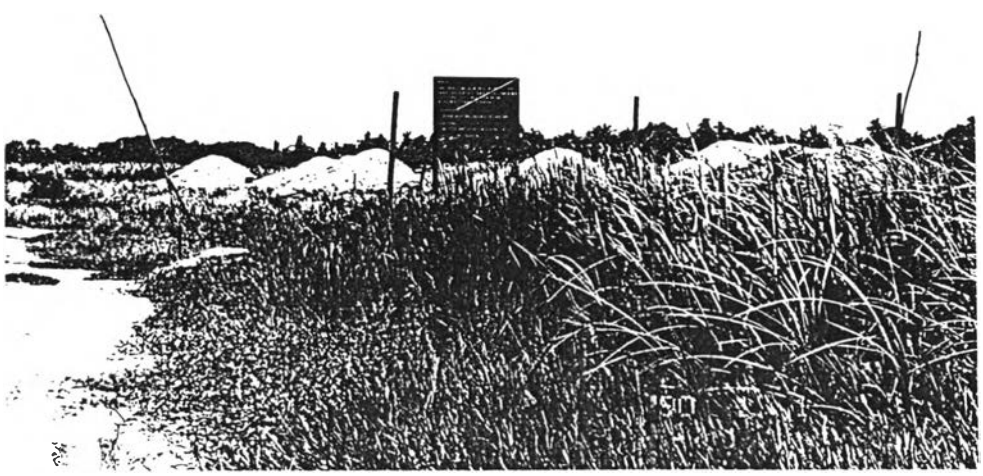
Depth,Z (m)	γ_t ($t/m.^3$)	CR	RR	σ_{v0} ($t/m.^2$)	u_0 ($t/m.^2$)	σ'_{v0} ($t/m.^2$)	σ'_{vm} ($t/m.^2$)	m	$\Delta\sigma_v$ ($t/m.^2$)	σ'_{vf} ($t/m.^2$)	$RRxHx\log(\sigma'_{vm}/\sigma'_{v0})$ m	$CRxHx\log(\sigma'_{vf}/\sigma'_{vm})$ m	ρ_{cf} m
3.0	1.43	0.42	0.09	4.29	3.00	1.29	4.60	6.67	4.25	5.54	0.149	0.101	0.250
4.5	1.48	0.46	0.16	6.66	4.20	2.46	6.70	4.44	4.22	6.68	0.104	-	0.104
6.0	1.46	0.58	0.07	8.76	5.70	3.06	7.90	3.33	4.18	7.24	0.043	-	0.043
7.5	1.47	0.40	0.06	11.03	6.80	4.23	8.10	2.67	4.12	8.34	0.025	0.008	0.033
10.5	1.45	0.46	0.12	15.23	8.20	7.03	8.60	1.90	3.92	10.95	0.032	0.145	0.176
12.0	1.57	0.39	0.07	18.84	8.60	10.24	10.20	1.67	3.80	14.04	-	0.081	0.081
16.0	1.54	0.39	0.07	24.64	8.90	15.74	17.00	1.25	3.40	19.14	0.009	0.080	0.090
											0.363	0.415	0.778

Load ,q 4.26 t/sq.m.

Width,B 20 m

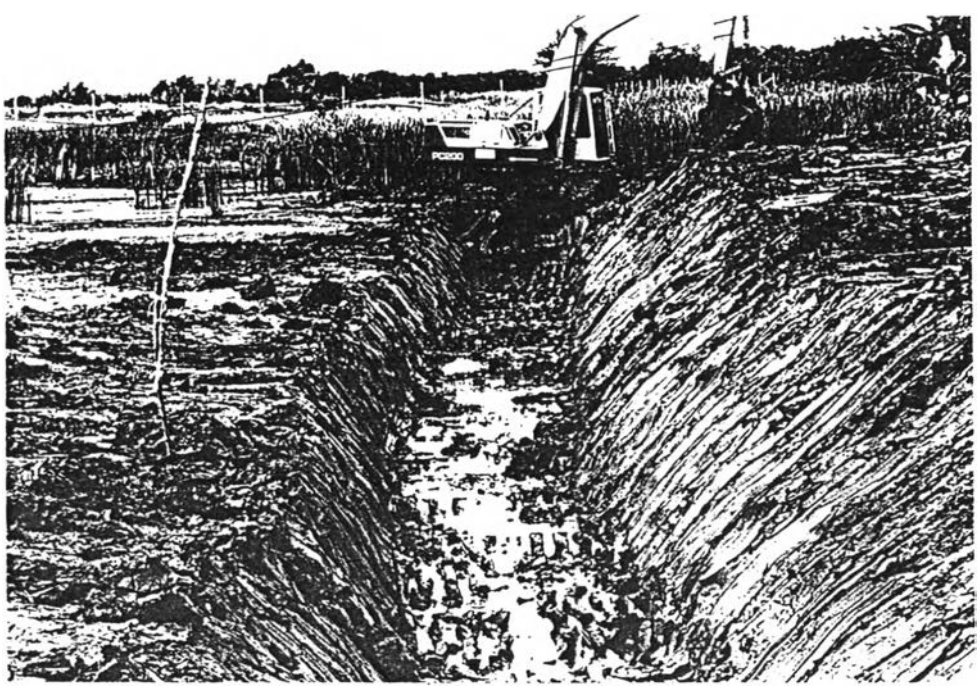
ภาคผนวก ฉ
ภาพถ่ายระหว่างการศึกษาวิจัย



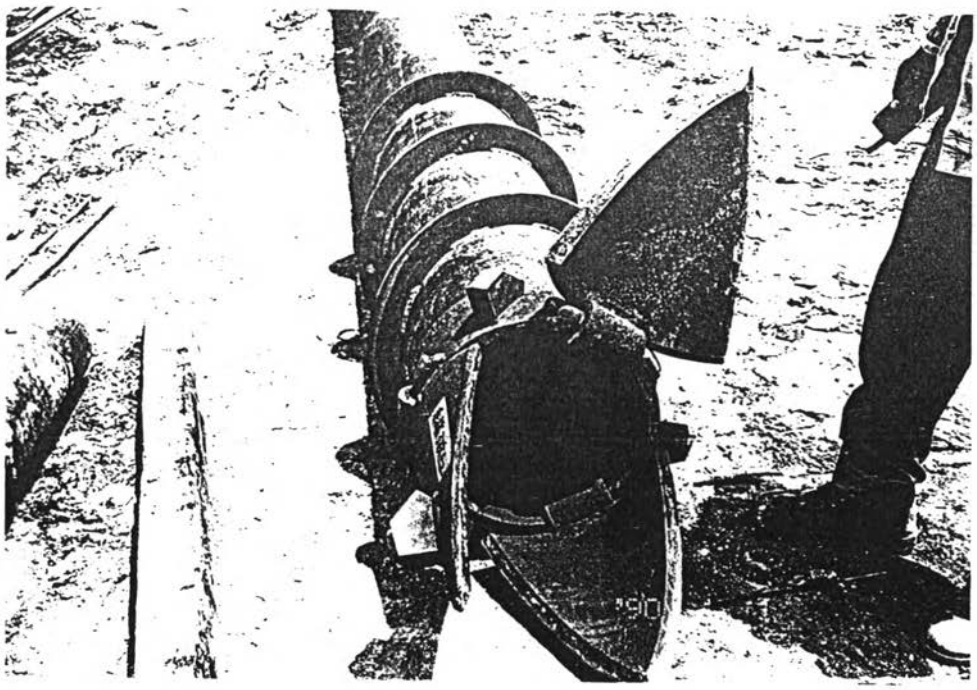


สภาพพื้นที่บริเวณแปลงทดสอบก่อนการปรับพื้นที่และสูบน้ำ

การปรับพื้นที่บริเวณแปลงทดสอบโดยการสูบน้ำและขุดลอกหน้าดิน

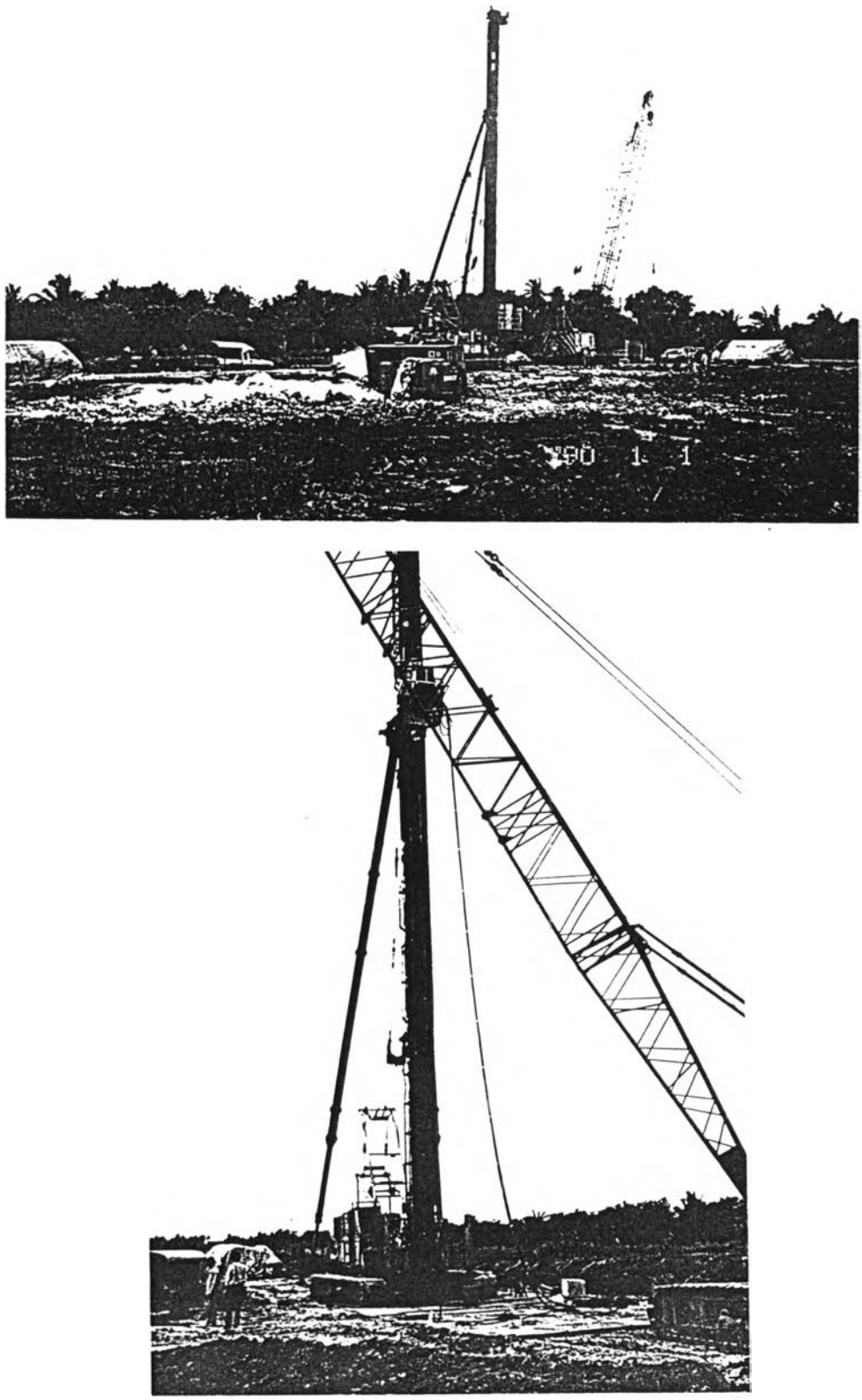


การก่อสร้างคูระบายน้ำโดยรอบบริเวณที่จะก่อสร้างแปลงทดสอบ

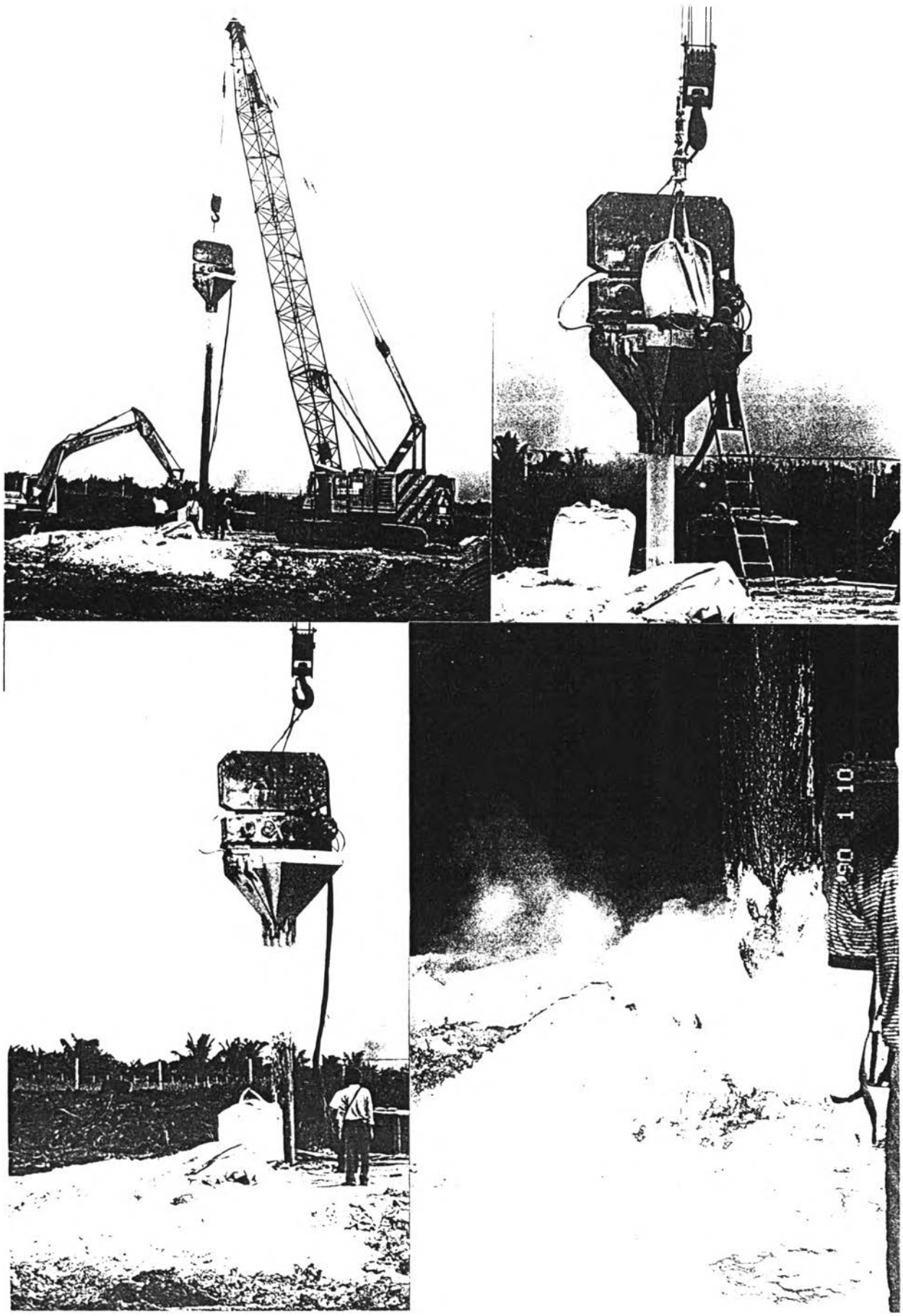


ลักษณะของ Casing ที่ใช้ในการติดตั้งเข็มปูนขาว

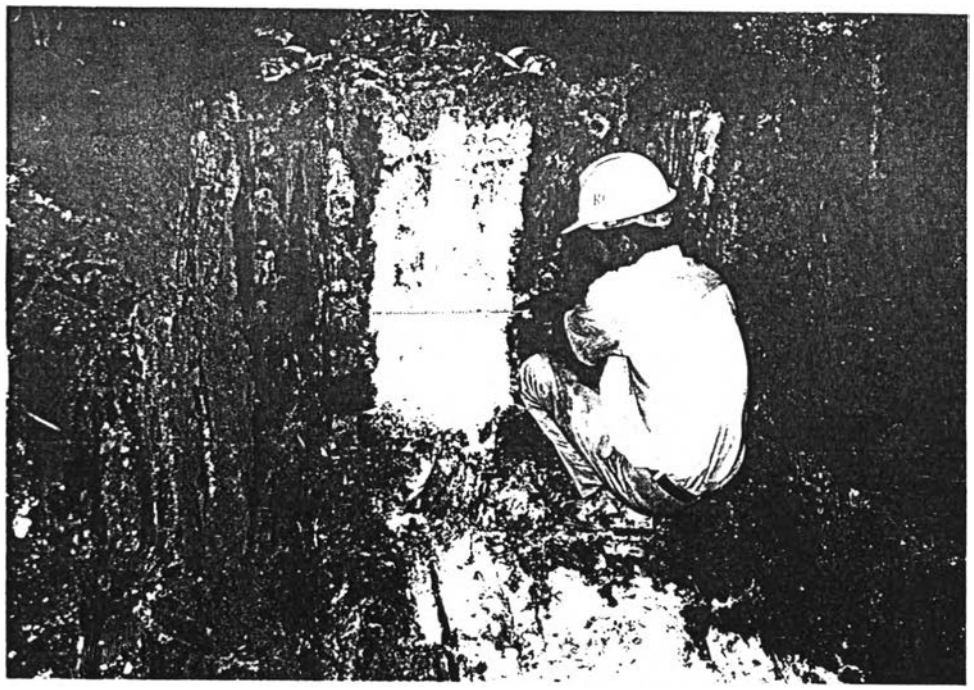
การกองเก็บปูนขาวบริเวณใกล้เคียงกับแปลงทดสอบ



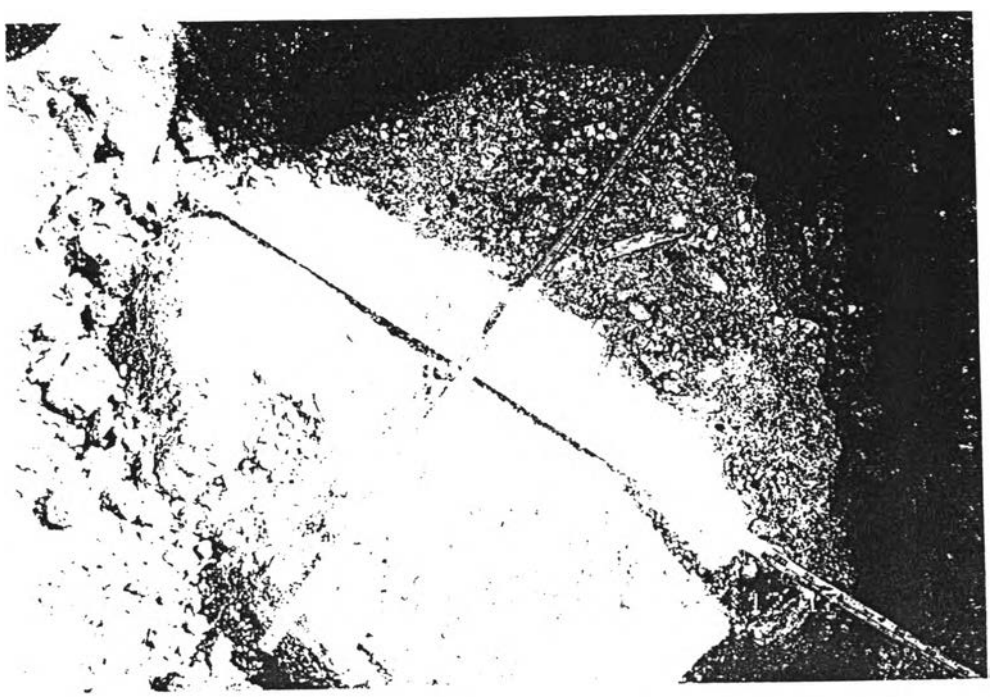
การติดตั้งเข็มปูนขาวด้วย Rotary Machine ในแปลงทดสอบ TS1



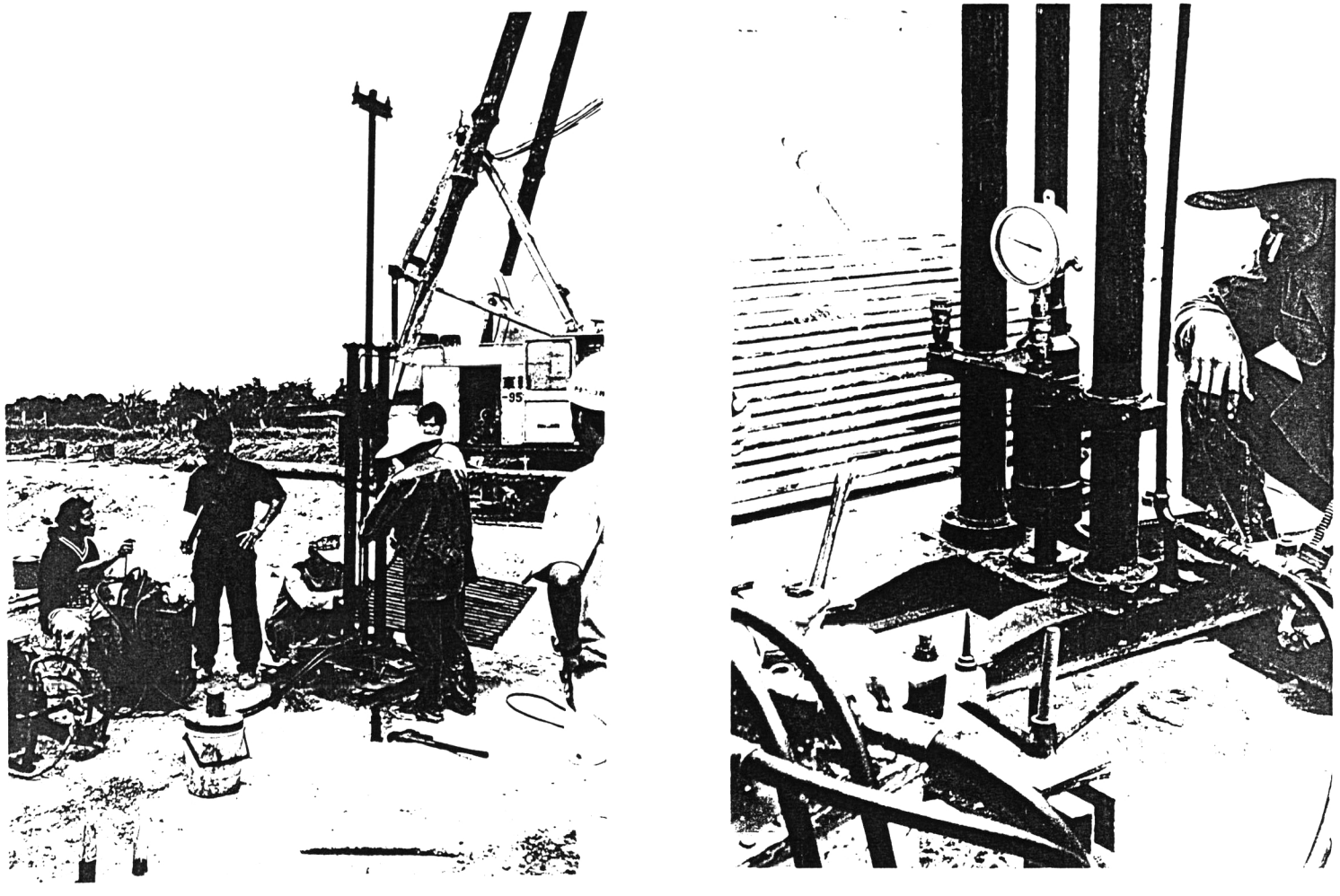
การติดตั้งเข็มปูนขาวด้วย Vibratary Machine ในแปลงทดสอบ TS2



ลักษณะและขนาดของเข็มปูนขาวหลังการติดตั้ง 1 วัน



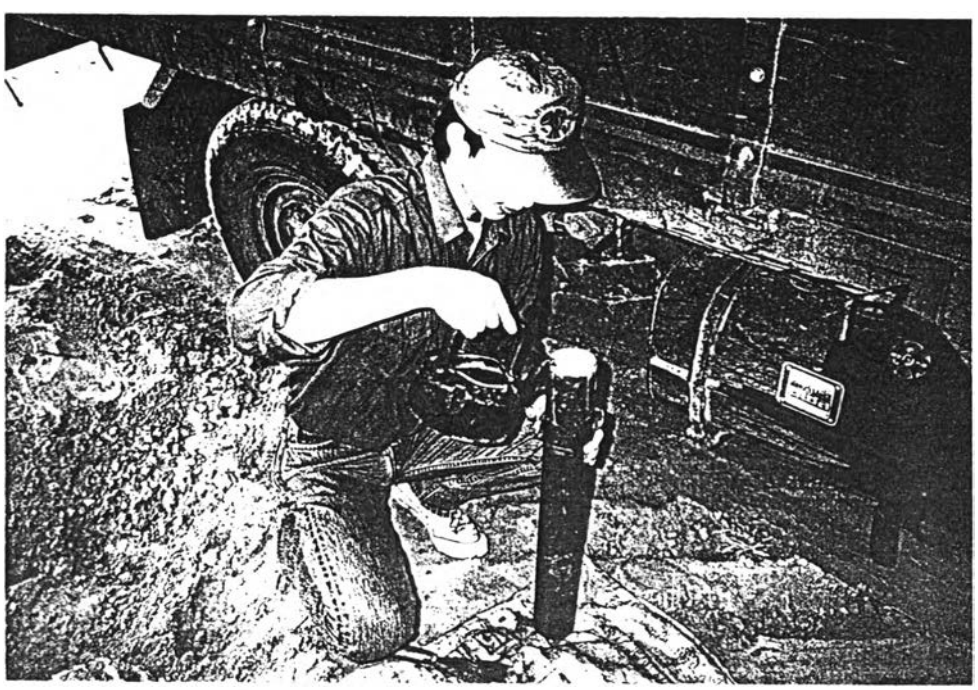
ลักษณะและขนาดของเข็มปูนขาวหลังการติดตั้ง 160 วัน



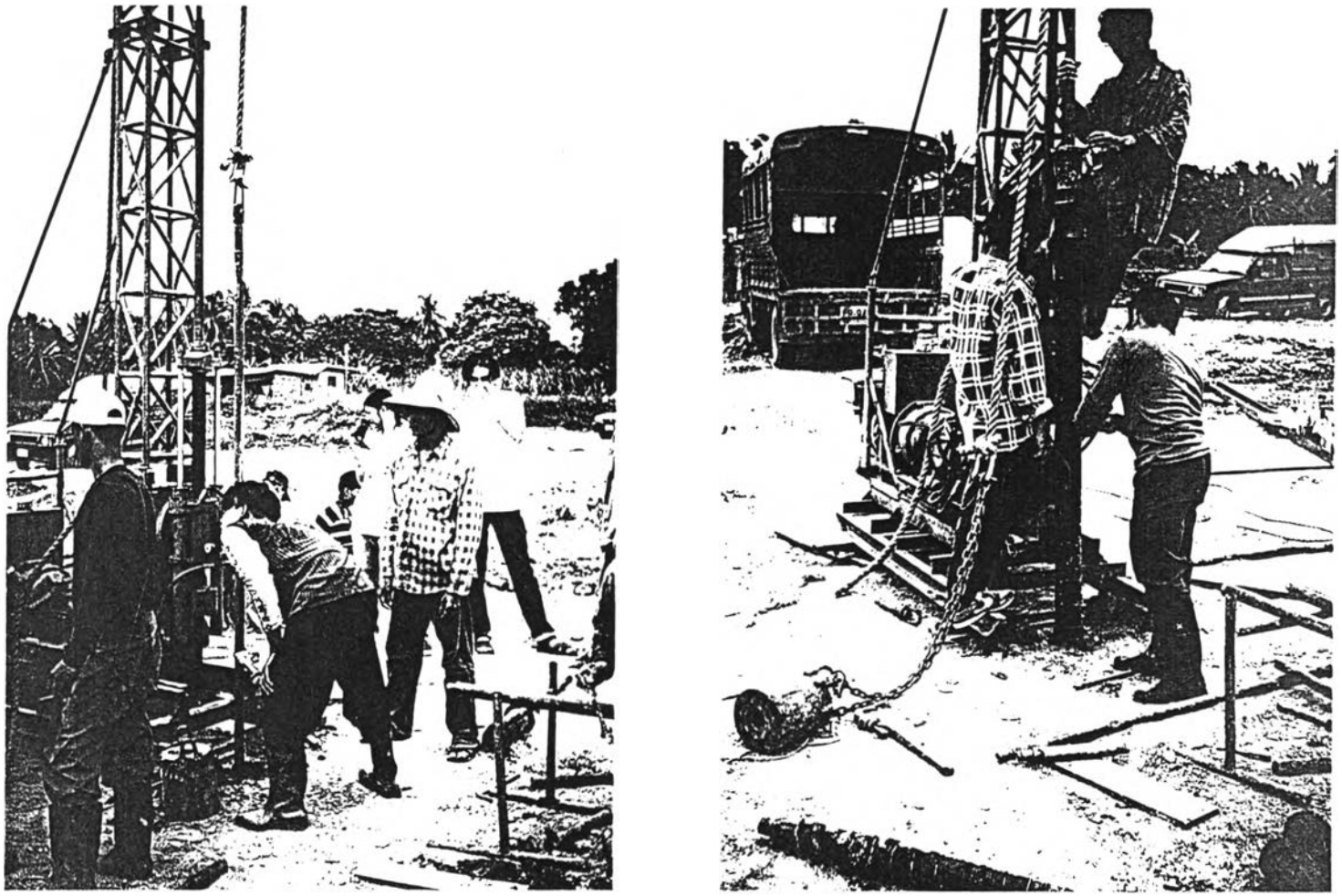
การทดสอบ Dutch Cone Penetration Test

การทดสอบ Pocket Penetration Test

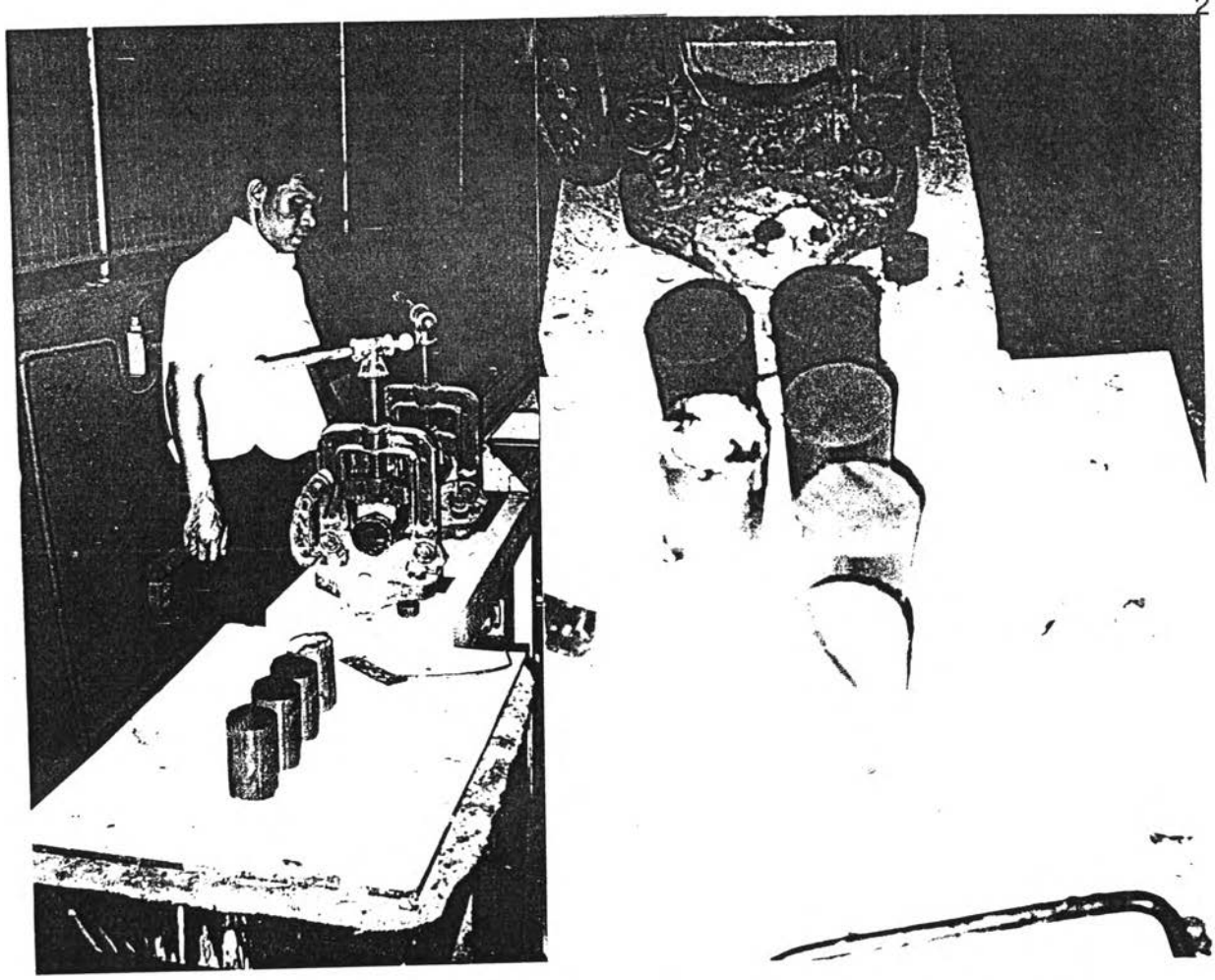
การเก็บตัวอย่างด้วยวิธี Washout Boring



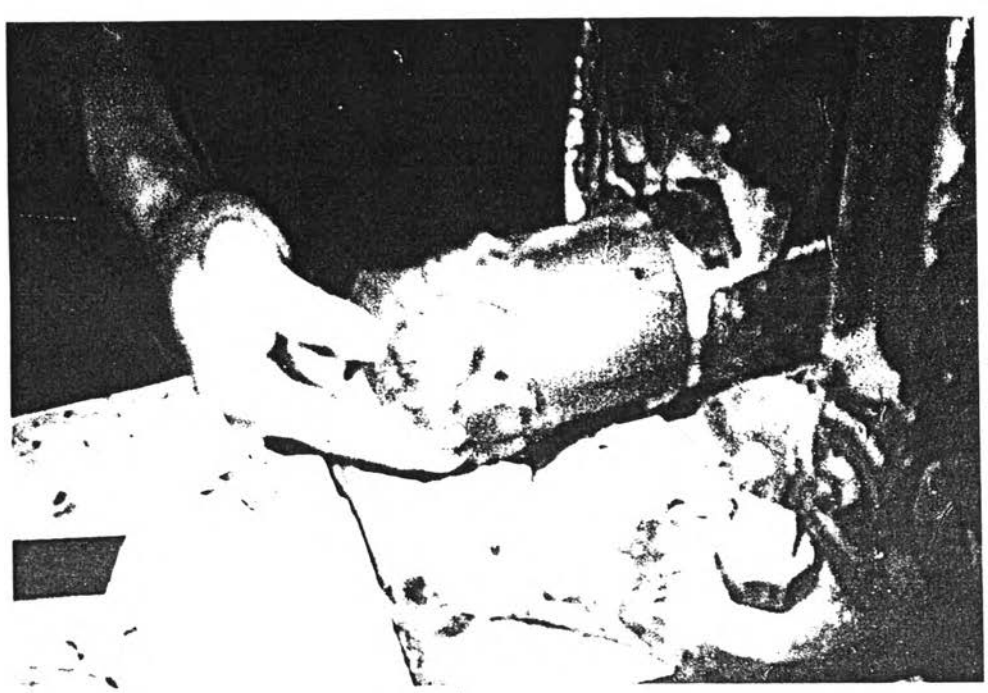
การเคลือบกระบอกเก็บตัวอย่างด้วยขี้ผึ้งเหลวก่อนขนส่งเข้าห้องปฏิบัติการ



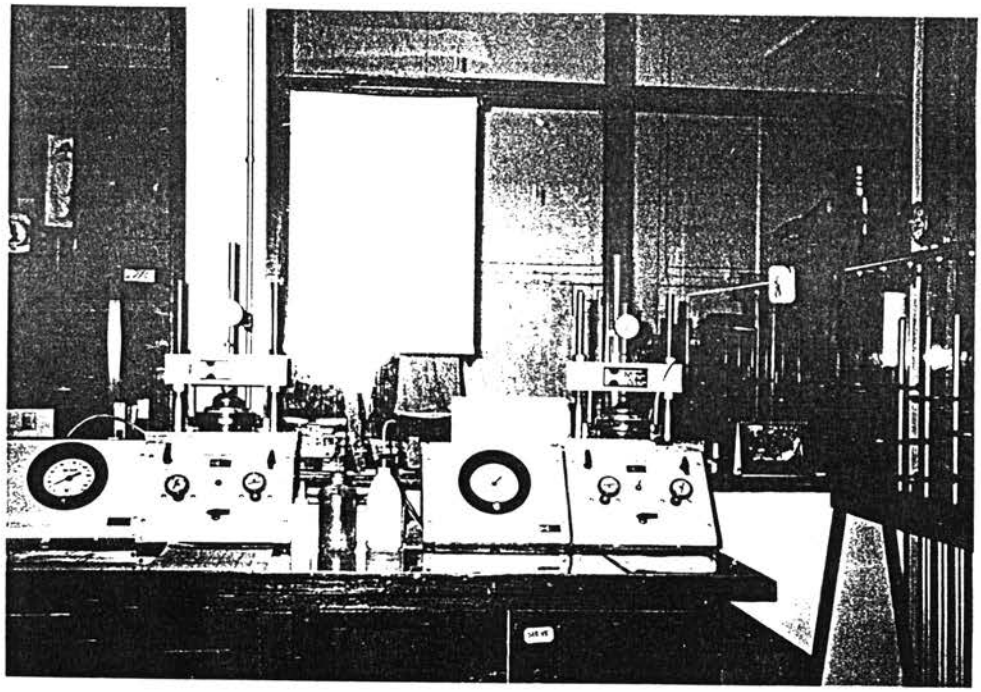
การเก็บตัวอย่างด้วยวิธี Rotary Drilling



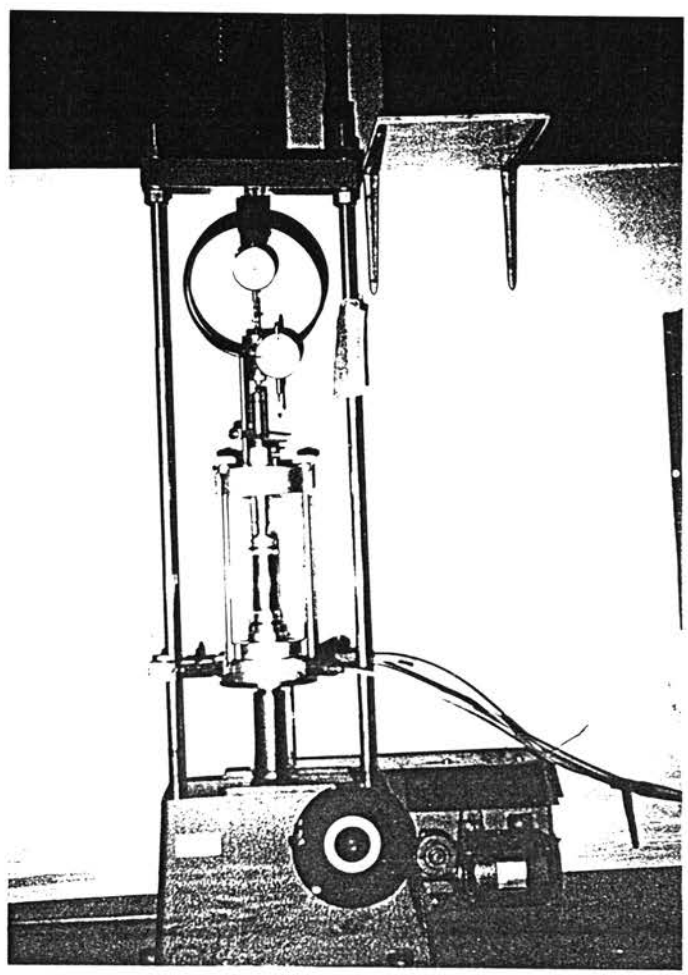
การดันตัวอย่างออกจากกระบอกและ Labelling



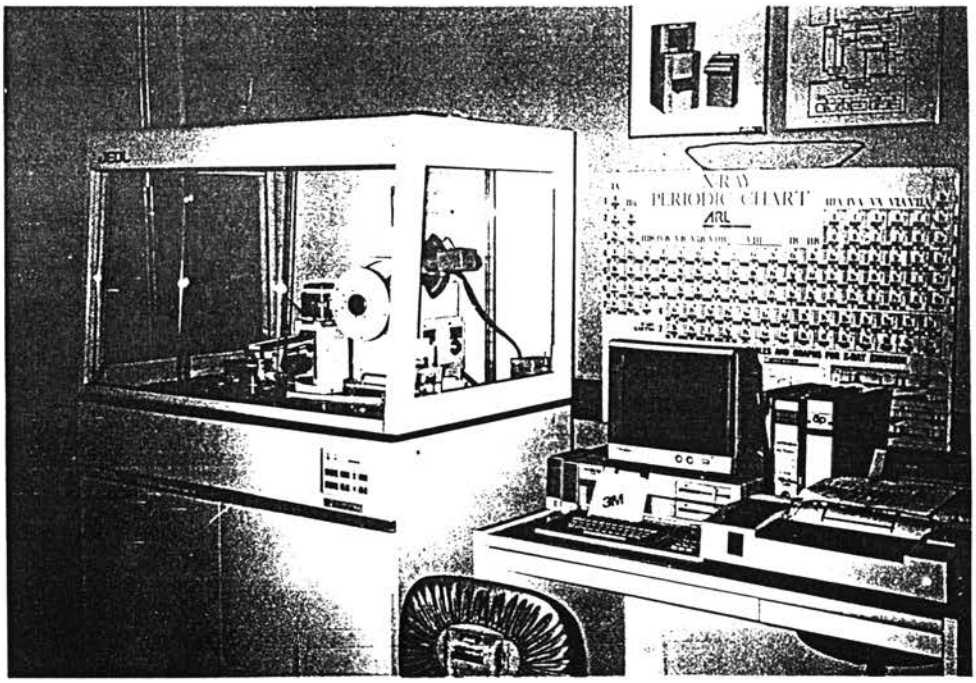
ลักษณะตัวอย่างซึ่งถูกรบกวนจากการติดตั้งและอุณหภูมิจากปฏิกิริยาของปูนขาว

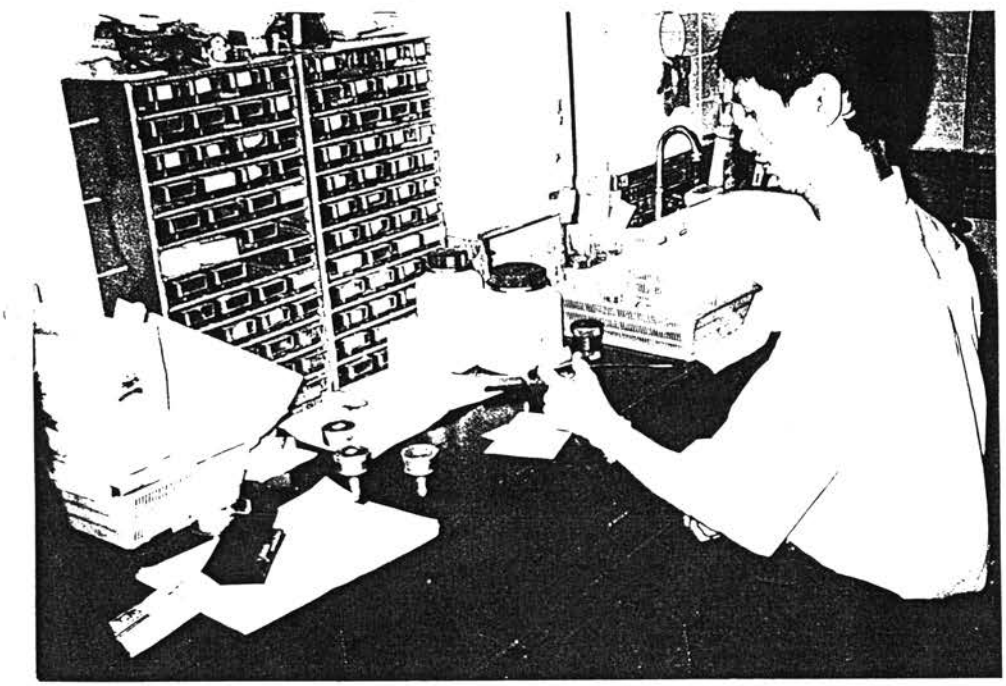


เครื่องมือและการทดสอบ Consolidation Test



เครื่องมือและการทดสอบ Triaxial Compression Test





เครื่องมือและการเตรียมตัวอย่างเพื่อทดสอบ X-ray diffraction

ประวัติผู้เขียน

นาย ศิริชัย ห่วงจริง เกิดวันที่ 20 กันยายน พ.ศ.2513 ที่จังหวัดนครราชสีมา สำเร็จการศึกษาระดับปริญญาตรี วิศวกรรมศาสตรบัณฑิต สาขาวิศวกรรมโยธา จากมหาวิทยาลัยขอนแก่น เมื่อปีพ.ศ.2537 เข้าศึกษาต่อในภาควิชาวิศวกรรมโยธา บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย ปีการศึกษา 2538