

## เอกสารอ้างอิง

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SPECIFIC GRAVITY TEST (ASTM D854 - 58 )

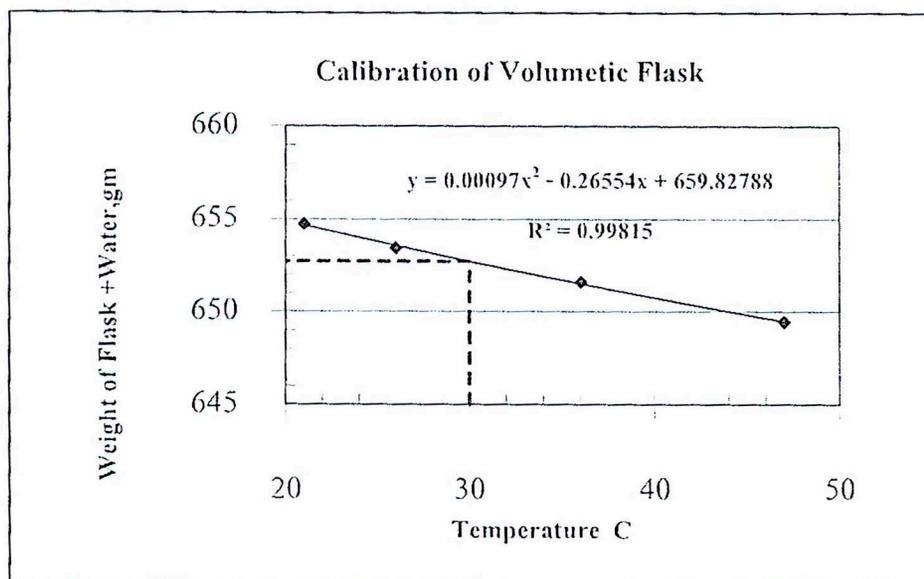
Project Master thesis Location  
 Borehole NO. Depth Sample No. Test No. 2  
 Soil Description ดินเหนียว ากม Tesed by พัทษา Date 5/9/2011

FLASK CALIBRATION

Determination No.	5	4	3	2	
Temperature	21	26	36	47	
Wt. Flask + Water	654.75	653.45	651.61	649.47	

SPECIFIC GRAVITY DETERMINATION

Determination No.					
Temperature	°C	30			
Flask + Water	g	652.73			
Flask + Water + Soil	g	681.55			
Container No.		3			
Dry Soil + Container	g	650.7			
Weight of Container	g	603.9			
Dry Soil	g	46.8			
Specific gravity of Water	GT	0.9957			
Specific gravity of Soil	Gs	2.59			
Average Specific gravity of Soil		2.59			



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SPECIFIC GRAVITY TEST (ASTM D854 - 58 )

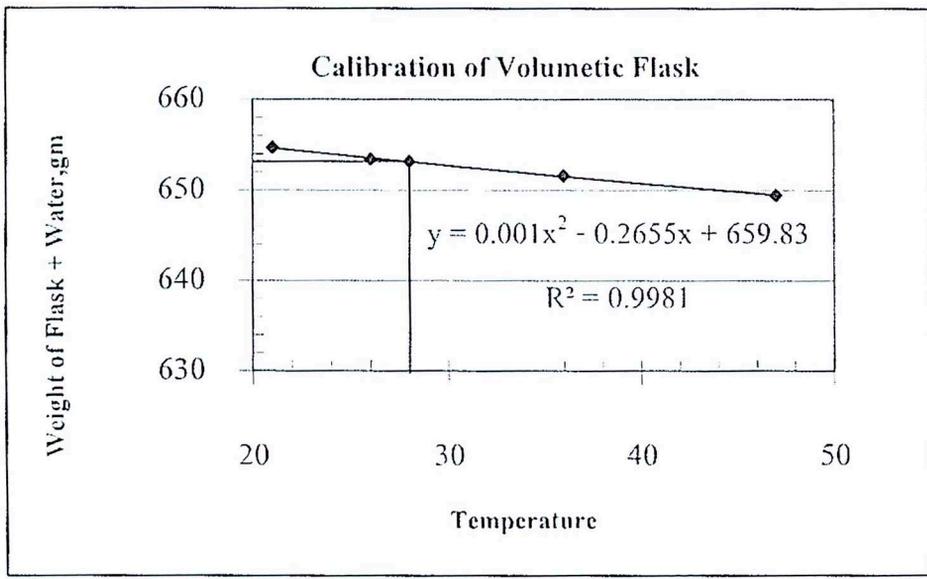
Project Master thesis Location  
 Borehole NO. Depth Sample No. Test No.  
 Soil Description clay BKK sand30% Tesed by พัทธยา Date

FLASK CALIBRATION

Determination No.	6	5	4	3	
Temperature	21	26	36	47	
Wt. Flask + Water	654.75	653.45	651.61	649.47	

SPECIFIC GRAVITY DETERMINATION

Determination No.					
Temperature °C	28				
Flask + Water g	653.18				
Flask + Water + Soil g	682.89				
Container No.	3				
Dry Soil + Container g	653.19				
Weight of Container g	603.5				
Dry Soil g	49.69				
Specific gravity of Water GT	0.9963				
Specific gravity of Soil Gs	2.48				
Average Specific gravity of Soil	2.48				



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SPECIFIC GRAVITY TEST (ASTM D854 - 58 )

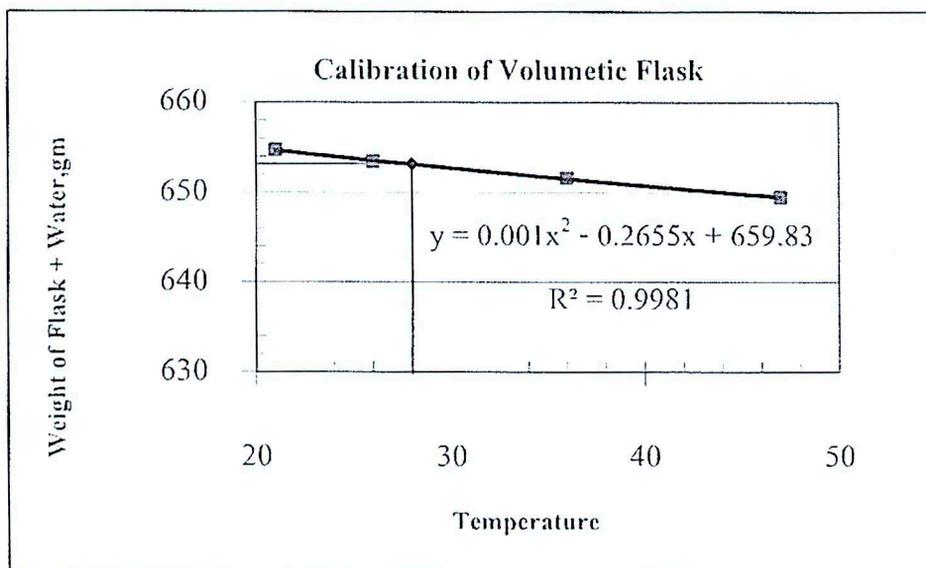
Project Master thesis Location  
 Borehole NO. Depth Sample No. Test No.  
 Soil Description clay BKK sand60% Tesed by พัทธภี Date

FLASK CALIBRATION

Determination No.	6	5	4	3
Temperature	21	26	36	47
Wt. Flask + Water	654.75	653.45	651.61	649.47

SPECIFIC GRAVITY DETERMINATION

Determination No.				
Temperature	°C	31.5		
Flask + Water	g	652.46		
Flask + Water + Soil	g	684.05		
Container No.		3		
Dry Soil + Container	g	653.58		
Weight of Container	g	603.48		
Dry Soil	g	50.1		
Specific gravity of Water	GT	0.9952		
Specific gravity of Soil	Gs	2.69		
Average Specific gravity of Soil		2.69		



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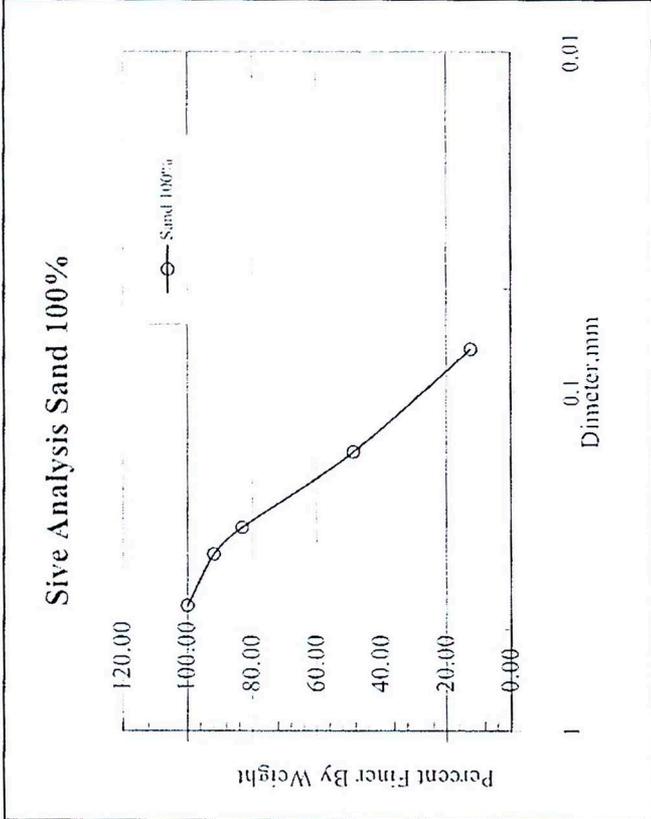
SIVE ANALYSIS (ASTM C136 ) FOR COARSE GRAIN SOIL

For :

SAMPLE WEIGHT  
 Container No. \_\_\_\_\_  
 Weight of Container + Dry Sampl g. \_\_\_\_\_  
 Weight of Container g. \_\_\_\_\_  
 Weight of Dry Sample g. \_\_\_\_\_

Project \_\_\_\_\_  
 Master Thesis \_\_\_\_\_  
 Description of Sample Sand 100% \_\_\_\_\_  
 Boring No. \_\_\_\_\_ Depth \_\_\_\_\_ m.  
 Tested By นันทยา \_\_\_\_\_

ตะแกรงร่อน	ขนาดตะแกรง	w.Sive	w.Sive+Soil	w.S	Col.R	Col.R%	%F
#40	0.425			0	0	0.00	100.00
#50	0.3	371.55	412.26	40.71	40.71	8.14	91.86
#60	0.25	333.5	377.26	43.76	84.47	16.89	83.11
#100	0.15	306.41	478.66	172.25	256.72	51.34	48.66
#200	0.075	299.92	481.12	181.2	437.92	87.58	12.42
Pan		282.43	299.44	17.01	454.93	90.99	9.01
				%N	90.986		



For :

Project

Master Thesis

Description of Sample

ClayBKK & Sand 30%

Boring No.

Depth \_\_\_\_\_ m.

Tested By

พัทธ

SAMPLE WEIGHT

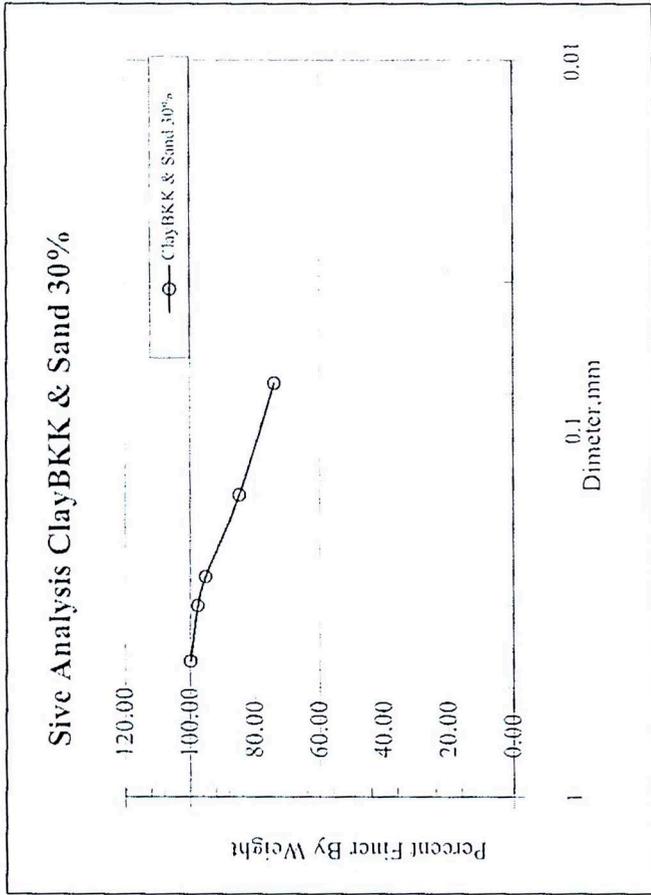
Container No. \_\_\_\_\_

Weight of Container + Dry Sampl \_\_\_\_\_ g.

Weight of Container \_\_\_\_\_ g.

Weight of Dry Sample \_\_\_\_\_ g.

ตะแกรงเบอร์	ขนาดของรู	w.Sive	w.Sive+Soil	w.S	Col.R	Col.R%	%F
#40	0.425			0	0	0.00	100.00
#50	0.3	371.55	383.08	11.53	11.53	2.31	97.69
#60	0.25	333.5	345.49	11.99	23.52	4.70	95.30
#100	0.15	306.41	358.4	51.99	75.51	15.10	84.90
#200	0.075	299.92	354.18	54.26	129.77	25.95	74.05
Pass		282.43	285.03	2.6	132.37	26.47	73.53
					26.474		



For : \_\_\_\_\_

Project : Master Thesis \_\_\_\_\_

Description of Sample : ClayBKK & Sand 60% \_\_\_\_\_

Boring No. : \_\_\_\_\_ Depth : \_\_\_\_\_ m.

Tested By : พัทธยา \_\_\_\_\_

SAMPLE WEIGHT

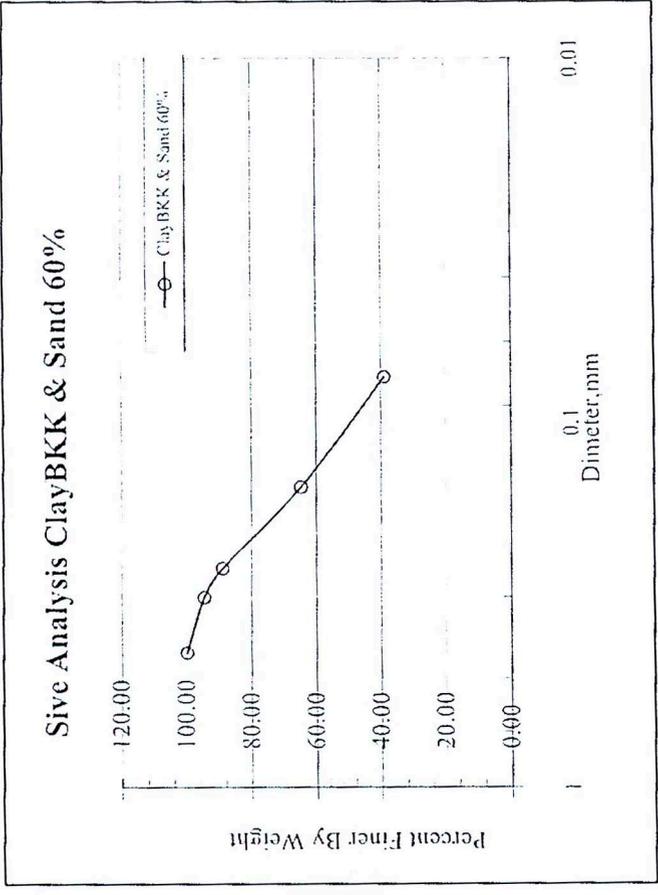
Container No. : \_\_\_\_\_

Weight of Container + Dry Sampl : \_\_\_\_\_ g.

Weight of Container : \_\_\_\_\_ g.

Weight of Dry Sample : \_\_\_\_\_ g.

ตะแกรงร่อน	ขนาดตะแกรง	w.Sieve	w.Sieve+Soil	w.S	Col.R	Col.R%	%F
#40	0.425			0	0	0.00	100.00
#50	0.3	371.55	398.1	26.55	26.55	5.31	94.69
#60	0.25	333.5	361.61	28.11	54.66	10.93	89.07
#100	0.15	306.41	427.7	121.29	175.95	35.19	64.81
#200	0.075	299.92	429.17	129.25	305.2	61.04	38.96
Pan		282.43	292.26	9.83	315.03	63.01	36.99
					63.006		



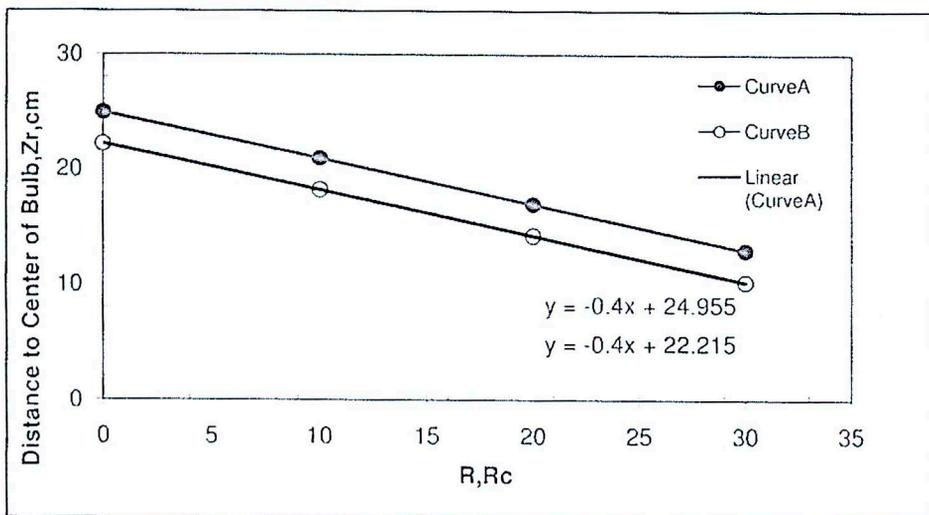
มหาวิทยาลัยเทคโนโลยีสุรนารี  
 ห้องทดลองปฐพีกลศาสตร์  
 การทดลองวิเคราะห์ไฮโดรมิเตอร์

Project Master Thesis Test No : \_\_\_\_\_  
 Location : \_\_\_\_\_ Boring No : \_\_\_\_\_ Depth \_\_\_\_\_ m  
 Description of Sample Clay BKK Test By : \_\_\_\_\_

Hydro meter reading, r	Length from to hydrometer Reding r, Li, cm	Hydrometer Bulb length L, cm	R=1000(r-1)	Distance to Center of Bulb Zr=Li-L/2	
				CurveA Zr, cm	CurveB Zr-VH/2A <sub>j</sub>
1.000	30.55	11.19	0	24.955	22.21
1.010	26.55		10	20.955	18.21
1.020	22.55		20	16.955	14.21
1.030	18.55		30	12.955	10.21

HYDROMETER JAR

Diameter, D 6.02 cm Cross Sectional Area, A<sub>j</sub> 28.46 cm<sup>2</sup>  
 Initial Reading of Graduate V1 900 cm<sup>3</sup>  
 Final Initial Reading of Graduate after Immersion Hydrometer, V2 978 cm<sup>3</sup>  
 Volume of hydrometer, VH=V2-V1 78 cm<sup>3</sup>



มหาวิทยาลัยเทคโนโลยีสุรนารี  
 ห้องทดลองปฐพีกลศาสตร์  
 การทดลองวิเคราะห์ไฮโดรมิเตอร์

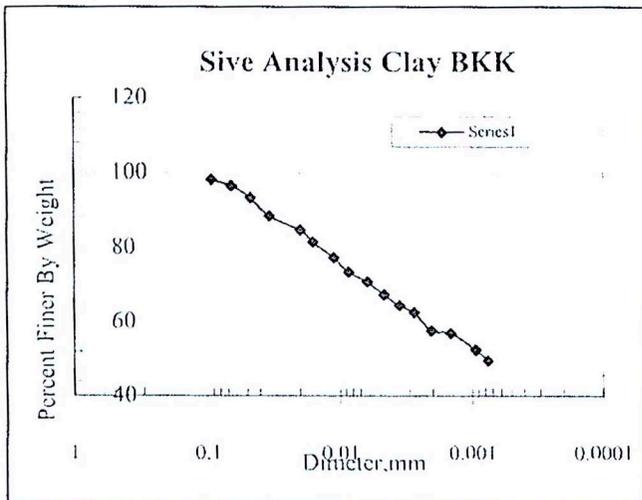
Project Master Thesis Test No : \_\_\_\_\_  
 Location : \_\_\_\_\_ Boring No : \_\_\_\_\_ Depth \_\_\_\_\_ m  
 Description of Sample Clay BKK Test By : \_\_\_\_\_

Gs= 2.59 SOIL SAMPLE WEIGHT  
 Tested Sample          Poured Off         

Hydrometer No. \_\_\_\_\_ Contrainer No : \_\_\_\_\_  
 Dispersing Agent \_\_\_\_\_ Weight of Contrainer+Dry Soil 651.5  
 \_\_\_\_\_ Weight of Contrainer 601.6  
 Amount \_\_\_\_\_ cm<sup>3</sup> Weight of Dry Soil 49.94  
 Meniscus Correction \*1000 = \_\_\_\_\_ Total Weight Dry Soil \_\_\_\_\_  
 Fraction Finer No.200 Sieve 0.987

Date	Time	Elapsed Time t,min	R=1000(r-1)	Rw= 1000(rw-1)	Temp. C	R-Rw	N= K1(R-Rw)	Re	Zr cm	sqrt(Zr/t)	D=K2* sqrt(Zr/t)	N' %
19/9/2554		0	27	-3.6	31.5	30.6	99.411097	27.5	13.96		0	98.1
		0.25	27	-3.6	31.5	30.6	99.411097	27.5	13.96	7.471	0.092569	98.1
		0.5	26.5	-3.6	31.5	30.1	97.786733	27	14.16	5.321	0.065924	96.5
		1	25.5	-3.6	31.5	29.1	94.538004	26	14.56	3.815	0.047269	93.3
		2	24	-3.6	31.5	27.6	89.664911	24.5	15.16	2.753	0.034106	88.5
		5	22.8	-3.6	31.5	26.4	85.766437	23.3	12.9	1.606	0.019897	84.7
		8	21.8	-3.6	31.5	25.4	82.517708	22.3	13.3	1.289	0.015972	81.5
		17	20.5	-3.6	31.5	24.1	78.294361	21	13.82	0.901	0.011169	77.3
		30	19.3	-3.6	31.5	22.9	74.395886	19.8	14.3	0.690	0.008553	73.4
		57	18.5	-3.6	31.5	22.1	71.796903	19	14.62	0.506	0.006274	70.9
		107	17.3	-3.7	31	21	68.223302	17.8	15.1	0.376	0.004654	67.3
		185	16.4	-3.7	31	20.1	65.299446	16.9	15.46	0.289	0.003581	64.5
		312	15.8	-3.7	31	19.5	63.350209	16.3	15.7	0.224	0.002779	62.5
		581	15.2	-2.8	28.5	18	58.477116	15.7	15.94	0.166	0.002052	57.7
20/9/2554		1170	14.3	-3.5	29	17.8	57.82737	14.8	16.3	0.118	0.001462	57.1
21/9/2554	15.38	2865	12.9	-3.5	29	16.4	53.27915	13.4	16.86	0.077	0.00095	52.6
22/9/2554	19.08	4515	12.5	-3	27	15.5	50.355294	13	17.02	0.061	0.000761	49.7

K1= 3.25  
 K2= 0.01239



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ATTERBERG'S LIMITS TEST (ASTM D4318)

Project Master thesis Location \_\_\_\_\_  
 Borehole NO. \_\_\_\_\_ Depth 10 ม. Sample No. \_\_\_\_\_ Test No. 2  
 Soil Description ดินเหนียวกรุงเทพ Tessed by พัทธา Date 5/9/2011

PLASTIC LIMIT

PL

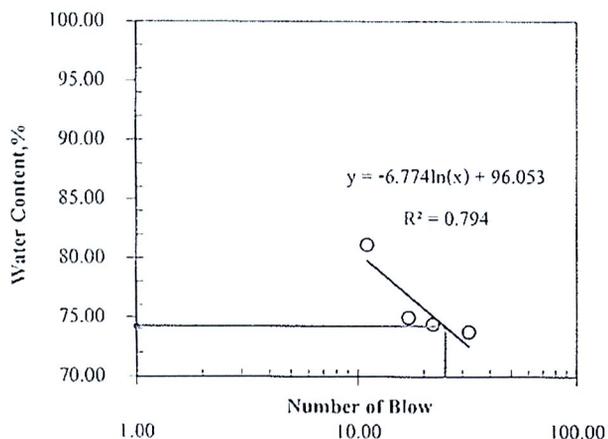
NC

Container No.		4	3		
Weight of Wet Soil + Container	g	33.65	37.47		
Weight of Dry Soil + Container	g	33.31	37.11		
Weight of Water	g	0.34	0.36		
Weight of Container	g	32.13	35.88		
Weight of Dry Soil	g	1.18	1.23		
Water Content ,w	%	28.81	29.27		
Average	%	29.04			

LIQUID LIMIT

Number of Blows		32.00	22.00	17.00	11.00	
Container No.		1.00	2.00	28.00	32.00	
Weight of Wet Soil + Container	g	36.45	35.95	36.71	38.92	
Weight of Dry Soil + Container	g	34.48	34.32	34.25	36.25	
Weight of Water	g	1.97	1.63	2.46	2.67	
Weight of Container	g	31.81	32.13	30.97	32.96	
Weight of Dry Soil	g	2.67	2.19	3.28	3.29	
Water Content ,w	%	73.78	74.43	75.00	81.16	
Average	%					

ATTERBERG'S LIMITS TEST



W<sub>n</sub>= \_\_\_\_\_ %  
 LL= 74.2 %  
 PL= 29.0 %  
 PI= 45.2 %  
 LI=  
 Activity, A=

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ATTERBERG'S LIMITS TEST (ASTM D4318)

Project Master thesis Location \_\_\_\_\_  
 Borehole NO. \_\_\_\_\_ Depth 10 ม. Sample No. \_\_\_\_\_ Test No. 3  
 Soil Description ดินเหนียวกรุงเทพ + ทรายละเอียด 30% Date 5/9/2011

PLASTIC LIMIT

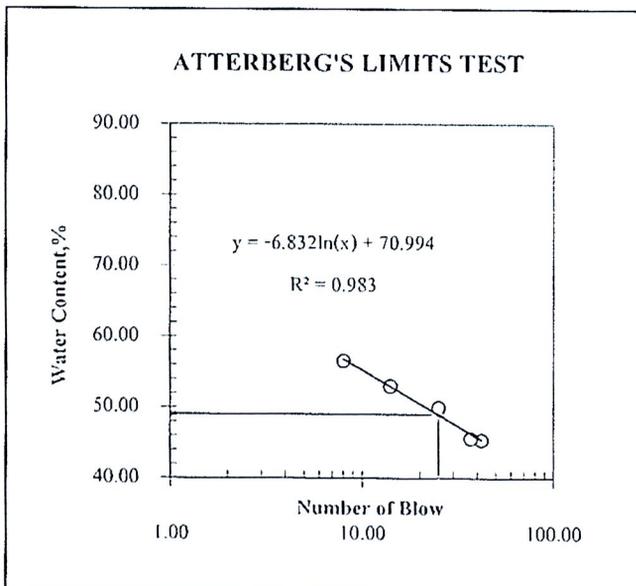
PL

NC

Container No.		86	B2		
Weight of Wet Soil + Container	g	33.96	38.39		
Weight of Dry Soil + Container	g	33.69	38.05		
Weight of Water	g	0.27	0.34		
Weight of Container	g	32.15	36.14		
Weight of Dry Soil	g	1.54	1.91		
Water Content ,w	%	17.53	17.80		
Average	%	17.67			

LIQUID LIMIT

Number of Blows		42.00	37.00	25.00	14.00	8.00
Container No.		1.00	2.00	28.00	32.00	35.00
Weight of Wet Soil + Container	g	36.71	38.50	38.71	41.45	40.10
Weight of Dry Soil + Container	g	35.18	36.51	36.13	38.51	37.76
Weight of Water	g	1.53	1.99	2.58	2.94	2.34
Weight of Container	g	31.81	32.15	30.97	32.96	33.62
Weight of Dry Soil	g	3.37	4.36	5.16	5.55	4.14
Water Content ,w	%	45.40	45.64	50.00	52.97	56.52
Average	%					



W<sub>n</sub>= \_\_\_\_\_ %

LL= 49.0 %

PL= 17.7 %

PI= 31.3 %

LI= \_\_\_\_\_

Activity, A= \_\_\_\_\_

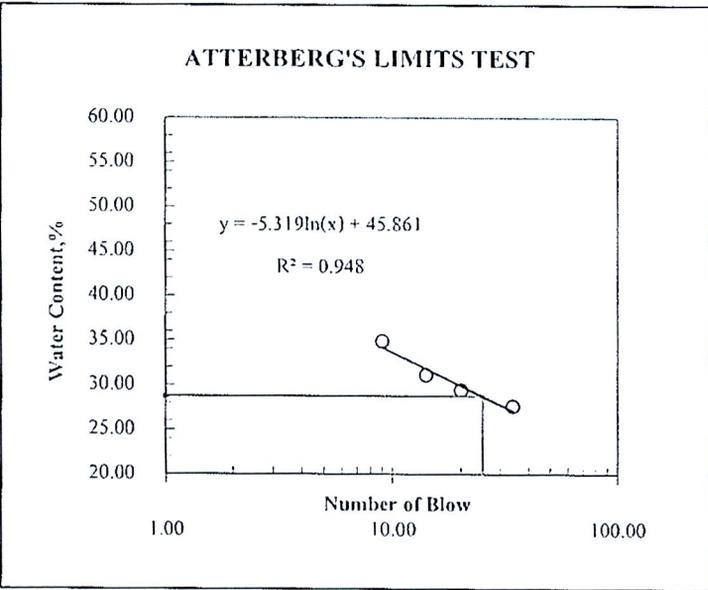
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ATTERBERG'S LIMITS TEST (ASTM D4318)

Project Master thesis Location \_\_\_\_\_  
 Borehole NO. \_\_\_\_\_ Depth 10 ม. Sample No. \_\_\_\_\_ Test No. 4  
 Soil Description ดินเหนียวกรุงเทพฯ + ทรายละเอียด 60% Date 5/9/2011

PLASTIC LIMIT		PL	NC
Container No.		12.00	14.00
Weight of Wet Soil + Container	g	33.89	37.88
Weight of Dry Soil + Container	g	33.69	37.67
Weight of Water	g	0.20	0.21
Weight of Container	g	32.14	36.13
Weight of Dry Soil	g	1.55	1.54
Water Content ,w	%	12.90	13.64
Average	%	13.27	

LIQUID LIMIT		34.00	20.00	14.00	9.00
Number of Blows		34.00	20.00	14.00	9.00
Container No.					
Weight of Wet Soil + Container	g	39.79	38.15	38.06	40.39
Weight of Dry Soil + Container	g	38.06	36.79	36.38	38.47
Weight of Water	g	1.73	1.36	1.68	1.92
Weight of Container	g	31.80	32.17	30.98	32.96
Weight of Dry Soil	g	6.26	4.62	5.40	5.51
Water Content ,w	%	27.64	29.44	31.11	34.85
Average	%				



W<sub>n</sub>= \_\_\_\_\_ %  
 LL= 28.7 %  
 PL= 13.3 %  
 PI= 15.4 %  
 LI=  
 Activity, A=

### Unconfined Compression Test

Project		Rate (mm/min)		1	
Sample NO.	1	$y=ax+b$	$a=$	0.06678	
			$b=$	0	
Sample Diameter (cm)	3.50	Weight of Sample		g	
Sample Area (cm <sup>2</sup> )	9.62	Water content	19.70	%	
Sample Height	7.10	Wet of Unit Weight		g/cm <sup>3</sup>	
Sample Volume	68.31	Dry of Unit Weight		g/cm <sup>3</sup>	

**Su= 37.99 kN/m<sup>2</sup>**

Dial min	Displacement mm	Dial Reading	Load kgf	$\epsilon$ %	Ac cm <sup>2</sup>	$\sigma$ t/m <sup>2</sup>	$\sigma$ kN/m <sup>2</sup>
0	0	0	0.00	0	9.62	0.00	0.00
10	0.254	18.5	1.24	0.36	9.65	1.28	12.55
20	0.508	31	2.07	0.72	9.69	2.14	20.96
30	0.762	42	2.80	1.07	9.72	2.88	28.29
40	1.016	52	3.47	1.43	9.76	3.56	34.90
50	1.27	62	4.14	1.79	9.80	4.23	41.47
60	1.524	70	4.67	2.15	9.83	4.75	46.65
70	1.778	77	5.14	2.50	9.87	5.21	51.12
80	2.032	84	5.61	2.86	9.90	5.66	55.57
90	2.286	89	5.94	3.22	9.94	5.98	58.66
100	2.54	94	6.28	3.58	9.98	6.29	61.72
120	3.048	102	6.81	4.29	10.05	6.78	66.48
140	3.556	107	7.15	5.01	10.13	7.06	69.22
160	4.064	110	7.35	5.72	10.20	7.20	70.62
180	4.572	115	7.68	6.44	10.28	7.47	73.27
200	5.08	117	7.81	7.15	10.36	7.54	73.98
220	5.588	120	8.01	7.87	10.44	7.67	75.29
240	6.096	121	8.08	8.59	10.52	7.68	75.32
260	6.604	123	8.21	9.30	10.61	7.74	75.97
280	7.112	124	8.28	10.02	10.69	7.75	75.98
300	7.62	125	8.35	10.73	10.78	7.75	75.99
320	8.128	126	8.41	11.45	10.86	7.75	75.98
340	8.636	126.5	8.45	12.16	10.95	7.71	75.67
360	9.144	126.5	8.45	12.88	11.04	7.65	75.05
380	9.652	127	8.48	13.59	11.13	7.62	74.73
400	10.16	127	8.48	14.31	11.23	7.55	74.11
420	10.668	127	8.48	15.03	11.32	7.49	73.49

### Unconfined Compression Test

Project		Rate (mm/min)		1	
Sample NO.	1	$y=ax+b$	a=	0.06678	
			b=	0	
Sample Diameter (cm)	3.50	Weight of Sample		g	
Sample Area (cm <sup>2</sup> )	9.62	Water content	19.70	%	
Sample Height	7.10	Wet of Unit Weight		g/cm <sup>3</sup>	
Sample Volume	68.31	Dry of Unit Weight		g/cm <sup>3</sup>	

Su= **18.74** kN/m<sup>2</sup>

Dial min	Displacement mm	Dial Reading	Load kgf	ε %	Ac cm <sup>2</sup>	σ t/m <sup>2</sup>	σ kN/m <sup>2</sup>
0	0	0	0.00	0	9.62	0.00	0.00
10	0.254	11	0.73	0.36	9.65	0.76	7.46
20	0.508	24	1.60	0.72	9.69	1.65	16.23
30	0.762	35	2.34	1.07	9.72	2.40	23.58
40	1.016	42	2.80	1.43	9.76	2.87	28.19
50	1.27	47	3.14	1.79	9.80	3.20	31.43
60	1.524	51	3.41	2.15	9.83	3.46	33.98
70	1.778	54	3.61	2.50	9.87	3.65	35.85
80	2.032	55.2	3.69	2.86	9.90	3.72	36.51
90	2.286	56	3.74	3.22	9.94	3.76	36.91
100	2.54	57	3.81	3.58	9.98	3.82	37.43
120	3.048	57.5	3.84	4.29	10.05	3.82	37.48
140	3.556	57.5	3.84	5.01	10.13	3.79	37.20
160	4.064	57.5	3.84	5.72	10.20	3.76	36.92
180	4.572	57.5	3.84	6.44	10.28	3.73	36.64
200	5.08	57.5	3.84	7.15	10.36		
220	5.588			7.87	10.44		
240	6.096			8.59	10.52		
260	6.604			9.30	10.61		
280	7.112			10.02	10.69		
300	7.62			10.73	10.78		
320	8.128			11.45	10.86		
340	8.636			12.16	10.95		
360	9.144			12.88	11.04		
380	9.652			13.59	11.13		
400	10.16			14.31	11.23		
420	10.668			15.03	11.32		

### Unconfined Compression Test

Project		Rate (mm/min)		1	
Sample NO.	1	$y=ax+b$	$a=$	0.06678	
			$b=$	0	
Sample Diameter (cm)	3.50	Weight of Sample	123.47	g	
Sample Area (cm <sup>2</sup> )	9.62	Water content	33.02	%	
Sample Height	7.10	Wet of Unit Weight		g/cm <sup>3</sup>	
Sample Volume	68.31	Dry of Unit Weight		g/cm <sup>3</sup>	

Su= **28.25** kN/m<sup>2</sup>

Dial min	Displacement mm	Dial Reading	Load kgf	ε %	Ac cm <sup>2</sup>	σ t/m <sup>2</sup>	σ kN/m <sup>2</sup>
0	0	0	0.00	0	9.62	0.00	0.00
10	0.254	35	2.34	0.36	9.65	2.42	23.75
20	0.508	54	3.61	0.72	9.69	3.72	36.51
30	0.762	63	4.21	1.07	9.72	4.33	42.44
40	1.016	70	4.67	1.43	9.76	4.79	46.99
50	1.27	74.5	4.98	1.79	9.80	5.08	49.83
60	1.524	76	5.08	2.15	9.83	5.16	50.64
70	1.778	80.2	5.36	2.50	9.87	5.43	53.25
80	2.032	82.5	5.51	2.86	9.90	5.56	54.57
90	2.286	84	5.61	3.22	9.94	5.64	55.36
100	2.54	85	5.68	3.58	9.98	5.69	55.81
120	3.048	86.5	5.78	4.29	10.05	5.75	56.38
140	3.556	87	5.81	5.01	10.13	5.74	56.28
160	4.064	88	5.88	5.72	10.20	5.76	56.50
180	4.572	88	5.88	6.44	10.28	5.72	56.07
200	5.08	88	5.88	7.15	10.36	5.67	55.64
220	5.588	88	5.88	7.87	10.44	5.63	55.21
240	6.096	88	5.88	8.59	10.52	5.58	54.78
260	6.604	88	5.88	9.30	10.61	5.54	54.35
280	7.112	88	5.88	10.02	10.69	5.50	53.92



