F. Topographic and Geological Survey at Nam Son

BOREHOLE LOG

SHEET 1 OF 2

NAM SON WASTE LANDFILL PROJECT			
Location	HONG KY VILLAGE		Borehole No. B-1
Coordinates	X:	Y:	Date: 7 to 10 November 1998
Ground elevation-m: 9.37			
Drilled by: VIWASE			Drilling method: rotary

samples and tests				SPT N (blows/30cm)	Legend	Depth and Thickness	Description
Depth (m)	Type and No	Value	Test and sample	0 50 100 150 200			
0							
1 0.80-1.25	S1	28/29/31		60			Layer 1: Hard reddisd brown sandy CLAY of low/ Intermediate plasticity with some angula gravel, alternated with purplish brown medium grained SANDSTONE, moderaterly weak to weak.
2 1.40-2.00	U1			48			
2.00	P1	$8.54x10^{-5}$					
2.20-2.65	S2	22/23/25		120			
3 2.95-3.40	S3	20/59/61		132			
4 3.70-4.15	S4	22/60/72		80			
5 4.45-4.90	S5	15/42/48		125		8.30	
5.20-5.65	S6	30/68/57		135			
6 5.95-6.40	S7	28/66/69		100			
7 6.70-7.15	S8	23/50/50		140			
7.45-7.90	S9	40/68/72		160			
8 8.00	P2	$5.07x10^{-6}$					
8.20-8.65	S10	52/75/85				8.30	
9 9.00-9.40	U2						Layer 2 Purplish brown, medium grained SANDSTONE, morderaterly weak to moderaterly strong. (Core very fracture, moderaterly weathered)
10							
11							
12							
13							
14							
15						15.00	

REMARKS

Permeability Test — P
Undistubed sample — U
Standard penetration test(SPT) — S

Ground water Stabilized at depth: 4.80m

VIWASE

BOREHOLE LOG

SHEET 2/2

NAM SON WASTE LANDFILL PROJECT		
Location	HONG KY VILLAGE	Borehole No. B-1
Coordinates	X: Y:	Date: 7 to 10 November 1998
Ground elevation-m: 3.37		
Drilled by: VIWASE		Drilling method: rotary

samples and tests				SPT N (blows/30cm)	Legend	Depth and Thickness	Description
Depth (m)	Type and No	Value	Test and sample	50 100 150 200			
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	28.00	P3	3.73×10^{-6}			13.20 21.50 8.50 30.00	*Layer 3* greyish- blue fine grained CLAYSTONE, morderaterly weak to moderaterly strong. (Core very fracture, moderaterly weathered)

REMARKS

Permeability Test — P
Undistubed sample — U
Standard penetration test(SPT) — S

Ground water Stabilized at depth: 4.80m

VIWASE

BOREHOLE LOG

SHEET 1 OF 2

NAM SON WASTE LANDFILL PROJECT		
Location	BAC SON VILLAGE	Borehole No. B-2
Coordinates	X: Y:	Date: 13 to 16 November 1998
Ground elevation-m: 9.40		
Drilled by: VIWASE		Drilling method: rotary

samples and tests				SPT N (blows/30cm)					Depth and Thickness	Description
Depth (m)	Type and No	Value	Test and sample	0	50	100	150	200		
1.05-1.50	S1	50/52/60				112			0.40	Cultivated ground
1.60-2.00	U1									
2.00	P1	6.8×10^{-5}				95			2.60	Hard yellowish brown sandy SILT of intermediate plasticity with some gravel, alternated with yellowish brown medium grained SANDSTONE, morderaterly weak to weak.
2.20-2.65	S2	30/46/49								
2.95-3.40	S3	34/50/52				102			3.00	
3.70-4.15	S4	39/60/63				123				
4.45-4.90	S5	30/31/35				76				
5.00	P2	1.5×10^{-6}							4.20	yellowish grey SILTSTONE morderately weak, occasional bands of sandy SILT.(highly weathered)
6.00-6.45	S6	30/68/57				125				
									7.20	
										Light-grey fresh CLAYSTONE, morderately strong to strong (slightly weathered)
									22.80	
14.0-14.4	U2									
									15.00	

REMARKS

Permeability Test — P
Undistubed sample — U
Standard penetration test(SPT) — S

Ground water Stabilized at depth:

VIWASE

BOREHOLE LOG

NAM SON WASTE LANDFILL PROJECT		
Location	BAC SON VILLAGE	Borehole No. B-2
Coordinates	X: Y:	Date: 13 to 16 November 1998
Ground elevation-m: 9.40		
Drilled by: VIWASE		Drilling method: rotary

samples and tests				SPT N (blows/30cm)					
Depth (m)	Type and No	Value	Test and sample	0	50	100	150	200	Legend	Depth and Thickness	Description
16											
17											
18											
19											
20											
21											
22	22.00	P3	4.9×10^{-6}								Light-grey fresh CLAYSTONE, morderately strong to strong (slighlly weathered)
23											
24											
25											
26											
27											
28											
29											
30										30.00	

REMARKS

Permeability Test — P
Undistubed sample — U
Standard penetration test(SPT) — S

Ground water Stabilized at depth:

VIWASE

NAM SON WASTE LANDFILL PROJECT

IN-SITU PERMEAB: TY TEST

BOREHOLE : B-1

r - radius of casing(cm):6.35cm
H- Water head from bottom of the ..ole up to the constant water level: 366cm
Q- Rate of water supply (cm3/min):

Date	Time	Q (cm3/min)
8 November 1998	15h15	112.0
	15h16	110.0
	15h17	107.0
	15h18	100.0
	15h19	95.0
	15h20	92.0
	15h21	90.0
	15h22	85.0
	15h23	80.0
	15h24	72.0
	15h25	67.0
	15h26	67.0
	15h27	67.0
	15h28	67.0
	15h29	67.0
	15h30	67.0
	15h31	67.0
	15h32	67.0
	15h33	67.0
	15h34	66.5
	15h35	66.5
	15h36	66.5
	15h37	66.0
	15h38	66.0
	15h39	66.0
	15h40	66.0
	15h41	66.0
	15h42	65.5
	15h43	65.5
	15h44	65.5
	15h45	65.5
	15h46	65.5
	15h47	65.5
	15h48	65.5

Formula for borehole permeabbility tests:

$$k = \frac{Q}{5.5\, r\, H \times 60}$$

Where

k is Coefficient of permeability (cm/s)

$$k = \frac{65.5}{5.5 \times 6.35 \times 366 \times 60} = 0.0000854 \text{cm/s}$$

NAM SON WASTE LANDFILL PROJECT

IN-SITU PERMEABILITY TEST

BOREHOLE : B-1

Depth of the borehole: 8.00m
Depth of the ground water level:4.80m
r - radius of casing(cm):6.35cm
H- Water head from the ground water level up to the constant water level: 640cm
Q- Rate of water supply (cm3/min):

Date	Time	Q (cm3/min)
9 November 1998	8h10	8.0
	8h11	8.0
	8h12	8.0
	8h13	8.0
	8h14	8.0
	8h15	7.7
	8h16	7.7
	8h17	7.5
	8h18	7.5
	8h19	7.5
	8h20	7.5
	8h21	7.3
	8h22	7.3
	8h23	7.3
	8h24	7.3
	8h24	7.0
	8h26	7.0
	8h27	7.0
	8h28	7.0
	8h29	7.0
	8h30	7.0
	8h31	7.0
	8h32	6.8
	8h33	6.8
	8h34	6.8
	8h35	6.8
	8h36	6.8
	8h37	6.8
	8h38	6.8
	8h39	6.8
	8h40	6.8
	8h41	6.8
	8h42	6.8
	8h43	6.8

Formula for borehole permeabbility tests:

$$k = \frac{Q}{5.5\, r\, H \times 60}$$

Where
k is Coefficient of permeabllity (cm/s)

$$k = \frac{6.8}{5.5 \times 6.35 \times 640 \times 60} = 0.00000507 \text{cm/s}$$

NAM SON WASTE LANDFILL PROJECT

IN-SITU PERMEABILITY TEST

BOREHOLE : B-1

Depth of the borehole:28.00m
Depth of the ground water level:4.80m
r - radius of casing(cm):6.35cm
H- Water head from the ground water level up to the constant water level: 640cm
Q- Rate of water supply (cm3/min):

Date	Time	Q (cm3/min)
11 November 1998	10h30	5.5
	10h31	5.5
	10h32	5.5
	10h33	5.2
	10h34	5.2
	10h35	5.0
	10h36	5.0
	10h37	5.0
	10h38	5.0
	10h39	5.0
	10h40	5.0
	10h41	5.0
	10h42	5.0
	10h43	5.0
	10h44	5.0
	10h45	5.0
	10h46	5.0
	10h47	5.0
	10h48	5.0
	10h49	5.0
	10h50	5.0
	10h51	5.0
	10h52	5.0
	10h53	5.0
	10h54	5.0
	10h55	5.0
	10h56	5.0
	10h57	5.0
	10h58	5.0
	10h59	5.0
	11h00	5.0
	11h01	5.0
	11h02	5.0
	11h03	5.0

Formula for borehole permeabbility tests:

$$k = \frac{Q}{5.5\, r\, H \times 60}$$

Where
k is Coefficient of permeability (cm/s)

$$k = \frac{5.0}{5.5 \times 6.35 \times 640 \times 60} = 0.00000373 \text{cm/s}$$

NAM SON WASTE LANDFILL PROJECT

IN-SITU PERMEABILITY TEST

BOREHOLE : B-2

Depth of the borehole: 2.00m
Depth of the ground water level:
r - radius of casing(cm):6.35cm
H- Water head from the ground water level up to the constant water level:393cm
Q- Rate of water supply (cm3/min):

Date	Time	Q (cm3/min)
13 November 1998	13h00	75.0
	13h01	72.0
	13h02	67.5
	13h03	66.0
	13h04	64.0
	13h05	62.0
	13h06	57.5
	13h07	57.0
	13h08	56.5
	13h09	56.0
	13h10	56.0
	13h11	56.0
	13h12	56.0
	13h13	56.0
	13h14	56.0
	13h15	56.0
	13h16	56.0
	13h17	56.0
	13h18	56.0
	13h19	56.0
	13h20	56.0
	13h21	56.0
	13h22	56.0
	13h23	56.0
	13h24	56.0
	13h25	56.0
	13h26	56.0
	13h27	56.0
	13h28	56.0
	13h29	56.0
	13h30	56.0
	13h31	56.0
	13h32	56.0
	13h33	56.0

Formula for borehole permeabbility tests:

$$k = \frac{Q}{5.5\, r\, H \times 60}$$

Where
k is Coefficient of permeability (cm/s)

$$k = \frac{56}{5.5 \times 6.35 \times 393 \times 60} = 0.000068 \text{cm/s}$$

NAM SON WASTE LANDFILL PROJECT

IN-SITU PERMEABILITY TEST

BOREHOLE : B-2

Depth of the borehole: 5.00m
Depth of the ground water level:4.70m
r - radius of casing(cm):6.35cm
H- Water head from the ground water level up to the constant water level: 631cm
Q- Rate of water supply (cm3/min):

Date	Time	Q (cm3/min)
14 November 1998	8h10	2.4
	8h11	2.4
	8h12	2.2
	8h13	2.2
	8h14	2.2
	8h15	2.0
	8h16	2.0
	8h17	2.0
	8h18	2.0
	8h19	2.0
	8h20	2.0
	8h21	2.0
	8h22	2.0
	8h23	2.0
	8h24	2.0
	8h24	2.0
	8h26	2.0
	8h27	2.0
	8h28	2.0
	8h29	2.0
	8h30	2.0
	8h31	2.0
	8h32	2.0
	8h33	2.0
	8h34	2.0
	8h35	2.0
	8h36	2.0
	8h37	2.0
	8h38	2.0
	8h39	2.0
	8h40	2.0
	8h41	2.0
	8h42	2.0
	8h43	2.0

Formula for borehole permeabbility tests:

$$k = \frac{Q}{5.5\, r\, H \times 60}$$

Where
k is Coefficient of permeability (cm/s)

$$k = \frac{2.0}{5.5 \times 6.35 \times 631 \times 60} = 0.0000015 \text{cm/s}$$

NAM SON WASTE LANDFILL PROJECT

IN-SITU PERMEABILITY TEST

BOREHOLE : B-2

Depth of the borehole: 22.0m
Depth of the ground water level: 5.20m
r - radius of casing(cm):6.35cm
H- Water head from the ground water level up to the constant water level: 730cm
Q- Rate of water supply (cm3/min):

Date	Time	Q (cm3/min)
16 November 1998	16h10	31.0
	16h11	31.0
	16h12	31.0
	16h13	31.0
	16h14	20.5
	16h15	20.5
	16h16	20.5
	16h17	20.0
	16h18	20.0
	16h19	20.0
	16h20	15.0
	16h21	15.0
	16h22	15.0
	16h23	12.0
	16h24	12.0
	16h25	12.0
	16h26	12.0
	16h27	11.5
	16h28	12.0
	16h29	10.0
	16h30	10.0
	16h31	10.0
	16h32	10.0
	16h33	9.0
	16h34	9.0
	16h35	9.0
	16h36	8.0
	16h37	8.0
	16h38	8.0
	16h39	8.0
	16h40	8.0
	16h41	8.0
	16h42	7.5
	16h43	7.5
	16h44	7.5
	16h45	7.5
	16h46	7.5
	16h47	7.5

Date	Time	Q (cm3/min)
19 November 1998	16h48	7.5
	16h49	8.0
	16h50	7.5
	16h51	7.5
	16h52	7.5
	16h53	7.5
	16h54	7.5
	16h55	7.5
	16h56	7.5
	16h57	7.5
	16h58	7.5
	16h59	7.5
	16h60	7.5
	16h61	7.5

Formula for borehole permeabbility tests:

$$k = \frac{Q}{5.5\, r\, H \times 60}$$

Where
k is Coefficient of permeability (cm/s)

$$k = \frac{7.5}{5.5 \times 6.35 \times 730 \times 60} = 0.0000049 \text{cm/s}$$

NAM SON WASTE LANDFILL PROJECT

INVENTORY OF WELL

WELL NO.	OWNER OF WELLS	DATE OF INSPECTION	GROUND ELEVATION (M)	GROUND WATER DEPTH (M)	GROUND WATER ELEVATION (M)	USAGE OF WATER	PH	WATER TEMPERATURE (°C)	ELECTRIC CONDUCTIVITY (µS/CM)
1	NGỌC TÂN	12H30 17.11.98	16.64	6.10	10.54	DRINKING	7.37	30	45
2	THƠM	13H 17.11.98	13.70	5.70	8.00	DRINKING	6.79	30	128
3	LÂM HOA	13H30 17.11.98	9.50	4.45	5.05	DRINKING	6.52	26	57
4	THƯỞNG	15H20 17.11.98	12.05	3.10	8.95	DRINKING	6.26	27	143
5	THANH	16H10 17.11.98	15.85	8.20	7.65	DRINKING	5.33	27	49
6	HƯƠNG	17H00 17.11.98	13.66	4.10	9.56	DRINKING	5.90	26	195
7	VÂN	17H30 17.11.98	14.50	5.10	9.40	DRINKINK	6.05	27	306
8	TẤN	9H30 18.11.98	13.50	3.80	9.70	DRINKING	6.14	26	214
9	VỆ	12H 18.11.98	15.50	6.15	9.35	DRINKING	6.20	26	208
10	TƯỞNG	12H30 18.11.98	16.50	6.90	9.60	DRINKING	6.22	26	76

VIWASE

SUMMARY OF TEST RESULTS

Project: Nam Son Waste Landfill
Borehole N_O: B. 1
Description: Hard purpdish brown sandy CLAY of Intermediate plasticity (Weathered soil from Sanstones)

ORDER N_0	NORM	SYMBOL	UNIT	VALUES OF NORM			
				SAMPLE 1	SMPLE 2	SAMPLE 3	SAMPLE 4
1	Depth of sample (m)			1.40-2.00			
2	Gradation-Particle size: 20.000mm	P	%	100			
	6.000			95			
	2.000			88			
	0.600 -		%	80			
	0.200 -		%	70			
	0.060 -		%	42			
	0.020 -		%	26			
	0.006 -		%	18			
	0.002 -		%	14			
3	Moisture content	W	%	18			
4	Unit weight -Wet	γ_w	G/Cm3	2.01			
5	-Dry	γ_c	G/Cm^3	1.70			
6	Specific gravity	Gs	G/Cm^3	2.68			
7	Void ratio	e_o		0.573			
8	Porosity	n	%	36			
9	Degree of saturation	S	%	84			
10	Atterberg limits: -Liquit	Wl	%	35			
11	-Plastic	Wp	%	19			
12	Index of plasticity	Ip	%	16			
13	Index of consitency	Is		-0.06			
14	Triaxial tests(U-U):	Cu	KG/Cm^2	0.81			
15		ϕ u °	Degree	$12^0 2($			
16	Triaxial tests(C-U):	Ccu		).55			
17		ϕ cu °		$19^0 32'$			
18		C'		0.72			
19		ϕ ' °		$24^0 26'$			
20	Permeablility coefficient	K	Cm/s	8.75×10^{-6}			
21	Coefficient of Consolidation: (x 10^{-3})	Cv	Cm^2/KG				
	Pressures:0-0.5 KG/Cm2	$Cv_{0-0.5}$	Cm^2/KG				
	0.5-1 -	$Cv_{0.5-1.0}$	Cm^2/KG	1.08×10^{-3}			
	1-2 -	$Cv_{1.0-2.0}$	Cm^2/KG	8.89×10^{-4}			
	2-4 -	Cv2.0-4.0	Cm^2/KG	7.84×10^{-4}			
22	Permeability coefficient	Kv	Cm/s				
	Pressures:0-0.5 KG/Cm2	Kv0.0-0.5	Cm/s				
	0.5-1 -	Kv0.5-1.0	Cm/s	1.79×10^{-6}			
	1-2 -	Kv1-2	Cm/s	7.42×10^{-9}			
	2-	Kv2-4	Cm/s	3.05×10^{-9}			
23	Uni-axial compressive strengtn	Qu	KG/Cm^2	1.88			
		E	KG/Cm^2	150			
24	Cation exchange capacity	me/100g soil		4.5			
25	Hydrated compound ratio		%	0.08			
26	Ignition loss		%	5			
27	Total organic matters		%	0			
28	Classification: BS			CIS			

VIWASE

SUMMARY OF TEST RESULTS

Project: Nam Son Waste Landfill

Borehole N_0: B-2

Description: Hard yellowish grey sandy SILT of intermediate plasticity (Weathered soil from Aleurolite and claystone)

ORDER N_0	NORM	SYMBOL	UNIT	VALUES OF NORM			
				SAMPLE 1	SMPLE 2	SAMPLE 3	SAMPLE 4
1	Depth of sample (m)			1.20-1.40			
2	Gradation-Particle size: 20.000mm	P	%				
	6.000			100			
	2.000			90			
	0.600 -		%	80			
	0.200 -		%	68			
	0.060 -		%	50			
	0.020 -		%	30			
	0.006 -		%	15			
	0.002 -		%	10			
3	Moisture content	W	%	25			
4	Unit weight -Wet	γ_w	G/Cm3	1.89			
5	-Dry	γ_c	G/Cm^3	1.51			
6	Specific gravity	Gs	G/Cm^3	2.70			
7	Void ratio	e_o		0.786			
8	Porosity	n	%	44			
9	Degree of saturation	S	%	86			
10	Atterberg limits: -Liquit	Wl	%	45			
11	-Plastic	Wp	%	28			
12	Index of plasticity	Ip	%	17			
13	Index of consitency	Is		-0.18			
14	Triaxial tests(U-U):	Cu	KG/Cm^2	0.79			
15		ϕ u ^{o}	Degree	$10^042'$			
16	Triaxial tests(C-U):	Ccu		0.55			
17		ϕ cu ^{o}		$18^039'$			
18		C'		0.77			
19		ϕ'^o		$23^018'$			
20	Permeability coefficient	K	Cm/s	3.84×10^{-8}			
21	Coefficient of Consolidation: (x 10^{-3})	Cv	Cm^2/KG				
	Pressures:0-0.5 KG/Cm2	$Cv_{0-0.5}$	Cm^2/KG				
	0.5-1 -	$Cv_{0.5-1.0}$	Cm^2/KG	1.47×10^{-3}			
	1-2 -	$Cv_{1.0-2.0}$	Cm^2/KG	7.95×10^{-4}			
	2-4 -	Cv2.0-4.0	Cm^2/KG	8.20×10^{-4}			
22	Permeability coefficient	Kv	Cm/s				
	Pressures:0-0.5 KG/Cm2	Kv0.0-0.5	Cm/s				
	0.5-1 -	Kv0.5-1.0	Cm/s	3.04×10^{-5}			
	1-2 -	Kv1-2	Cm/s	8.29×10^{-9}			
	2-4 -	Kv2-4	Cm/s	3.20×10^{-9}			
23	Uni-axial compressive strength	Qu	KG/Cm^2	1.65			
		E	KG/Cm^2	130			
24	Cation exchange capacity	me/100g soil		6			
25	Hydrated compound ratio		%	0.12			
26	Ignition loss		%	7			
27	Total organic matters		%	0			
28	Classification: BS			MIS			

SUMMARY OF ROCK TEST RESULTS

Project: Nam Son Waste Landfill
Borehole N_0: B1
Description: Weathered sandstone

ORDER N_0	NORM	SYMBOL	UNIT	VALUES OF NORM			
				SAMPLE 1	SMPLE 2	SAMPLE 3	SAMPLE 4
1	Depth of sample (m)				9.0-9.4		
2	Moisture content	W	%		13		
3	Unit weight -Wet	γ_w	G/Cm3		2.16		
4	-Dry	γ_c	G/Cm^3		1.91		
5	Specific gravity	Gs	G/Cm^3		2.71		
6	Porosity	n	%		29.5		
7	Uni axial Compressive strength	σn	KG/Cm2		11.8		
8	Drawn strength	σk	KG/Cm2		0.8		
9	Cohesion	C	KG/Cm^2		4.3		
10	Internal friction angle	ϕ °	Degree		35^{0}00'		

Project: Nam Son Waste Landfill
Borehole N_0: B2
Description: Weathered aleurolite and claystone

ORDER N_0	NORM	SYMBOL	UNIT	VALUES OF NORM			
				SAMPLE 1	SMPLE 2	SAMPLE 3	SAMPLE 4
1	Depth of sample (m)				14.0-14.4		
2	Moisture content	W	%		12		
3	Unit weight -Wet	γ_w	G/Cm3		2.41		
4	-Dry	γ_c	G/Cm^3		2.32		
5	Specific gravity	Gs	G/Cm^3		2.79		
6	Porosity	n	%		16.8		
7	Uni axial Compressive strength	σn	KG/Cm2		49.6		
8	Drawn strength	σk	KG/Cm2		10		
9	Cohesion	C	KG/Cm^2		15.6		
10	Internal friction angle	ϕ °	Degree		24^{0}30'		

VIWASE

UNCONFINED COMPRESSION TEST

Project: Nam Son Waste Landfill
Location: Soc Son Hanoi
Description:
Tested by: Eng.Nguyen Viet Tinh
Checked by : Dr.Do Minh Toan

Boring No: B1
Sample No: 1
Depth: 1.40-2.00 m
Date of test 19/11/98

SPECIMEN DATA

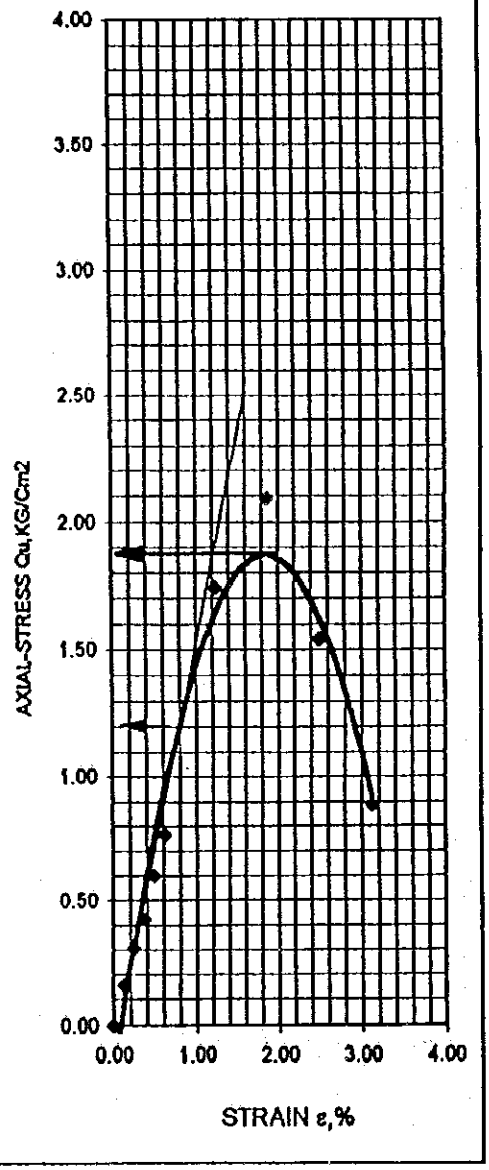
Moisture content determination			Density determination	
Contener No:			Wt Specimen Wet	
Wt Contener wet soil			Wt Specimen dry	
Wt Contener dry soil			Wet Density G/Cm3	2.01
Wt water			Dry density	1.70
Wt Contener			Proving ring No	
Wt dry soil			Diameter,Cm	3.90
Moisture content average ,%	18		Hight,Cm	8.00

Total strain	Strain e	Average Corr.Area	Dial reading	Equiv. load	Axial Stress
x 10^{-2}	%	A',Cm^2	div	P,Kg	Qu,Kg/Cm2
0	0.00	11.94	0.726	0.0	0.00
10	0.13	11.95		2.6	0.16
20	0.25	11.97		5.0	0.30
30	0.38	11.98		7.0	0.42
40	0.50	12.00		9.9	0.60
50	0.63	12.02		12.6	0.76
100	1.25	12.09		29.0	1.74
150	1.88	12.17		35.0	2.09
200	2.50	12.25		26.0	1.54
250	3.13	12.33		15.0	0.88
300	3.75	12.41			
350	4.38	12.49			
400	5.00	12.57			
450	5.63	12.65			
500	6.25	12.74			
550	6.88	12.82			
600	7.50	12.91			
650	8.13	13.00			
700	8.75	13.08			
750	9.38	13.18			
800	10.00	13.27			
850	10.63	13.36			
900	11.25	13.45			
950	11.88	13.55			
1000	12.50	13.65			
1050	13.13	13.74			
1100	13.75	13.84			
1150	14.38	13.94			
1200	15.00	14.05			
1250	15.63	14.15			
1300	16.25	14.26			
1350	16.88	14.36			
1400	17.50	14.47			
1450	18.13	14.58			
1500	18.75	14.70			

STRESS-STRAIN DIAGRAM

Qu = 1.88 KG/Cm^2

E = 150 KG/Cm^2



VIWASE

UNCONFINED COMPRESSION TEST

Project: Nam Son Waste Landfill
Location: Soc Son Hanoi
Description:
Tested by: Eng.Nguyen Viet Tinh
Checked by : Dr.Do Minh Toan

Boring No: B2
Sample No: 2
Depth: 1.60-2.00 m
Date of test 19/11/98

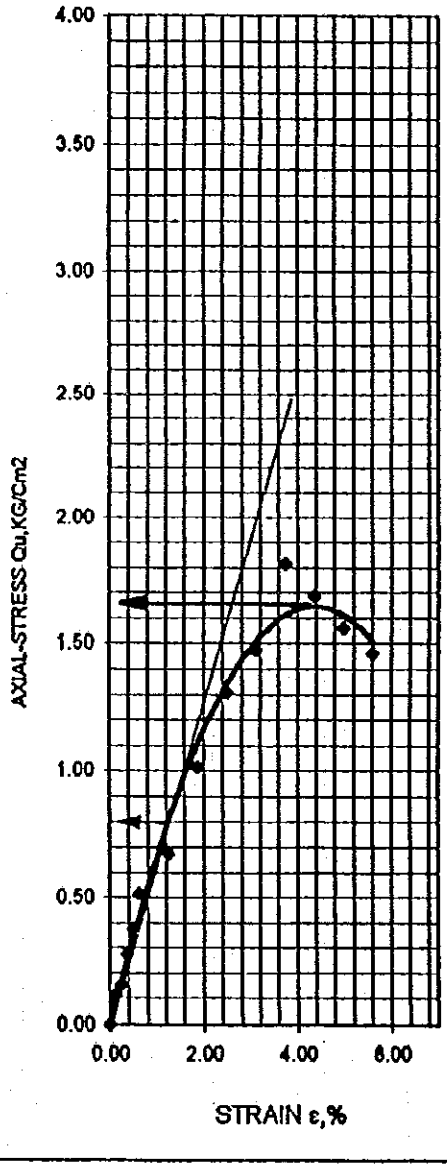
SPECIMEN DATA

Moisture content determination			Density determination	
Contener No:			Wt Specimen Wet	
Wt Contener wet soil			Wt Specimen dry	
Wt Contener dry soil			Wet Density G/Cm3	1.89
Wt water			Dry density	1.51
Wt Contener			Proving ring No	
Wt dry soil			Diameter,Cm	3.90
Moisture content average ,%	25		Hight,Cm	8.00

Total strain x 10^{-2}	Strain e %	Average Corr.Area A',Cm^2	Dial reading div	Equiv. load $P_{,KG}$	Axial Stress $Qu_{,KG/Cm2}$
0	0.00	11.94	0.724	0.0	0.00
10	0.13	11.95		1.8	0.11
20	0.25	11.97		2.5	0.15
30	0.38	11.98		4.5	0.27
40	0.50	12.00		6.2	0.38
50	0.63	12.02		8.5	0.51
100	1.25	12.09		11.2	0.67
150	1.88	12.17		17.0	1.01
200	2.50	12.25		22.0	1.30
250	3.13	12.33		25.0	1.47
300	3.75	12.41		31.0	1.81
350	4.38	12.49		29.0	1.69
400	5.00	12.57		27.0	1.56
450	5.63	12.65		25.5	1.46
500	6.25	12.74			
550	6.88	12.82			
600	7.50	12.91			
650	8.13	13.00			
700	8.75	13.08			
750	9.38	13.18			
800	10.00	13.27			
850	10.63	13.36			
900	11.25	13.45			
950	11.88	13.55			
1000	12.50	13.65			
1050	13.13	13.74			
1100	13.75	13.84			
1150	14.38	13.94			
1200	15.00	14.05			
1250	15.63	14.15			
1300	16.25	14.26			
1350	16.88	14.36			
1400	17.50	14.47			
1450	18.13	14.58			
1500	18.75	14.70			

STRESS-STRAIN DIAGRAM

Qu = 1.65 KG/Cm^2
E = 130 KG/Cm^2



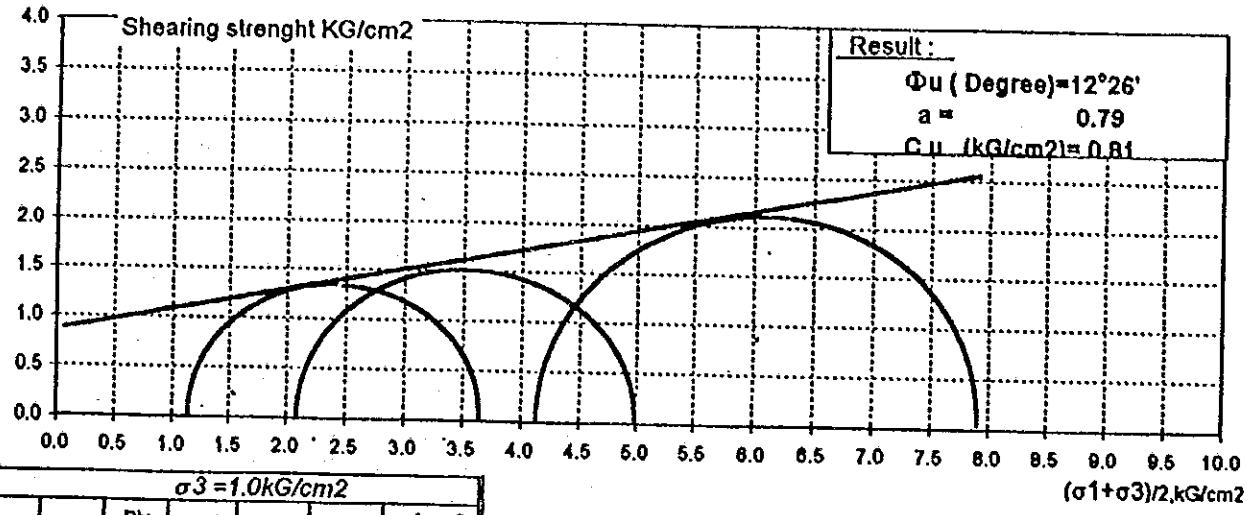
VIWASE

TRIAXIAL COMPRESSION TEST

Test type : UU

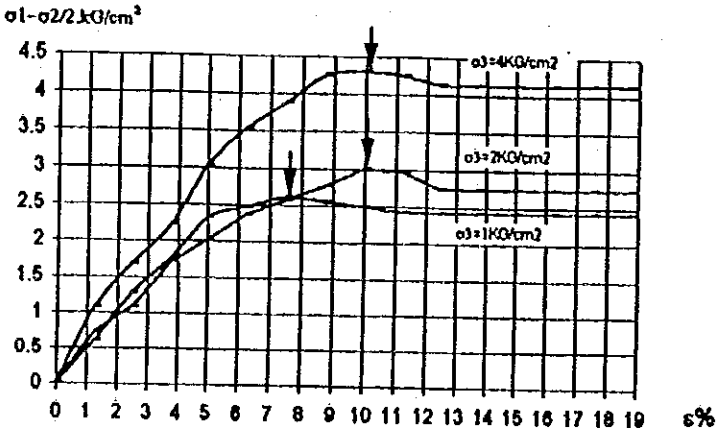
Project : Nam Son Waste Landfill
Borehole : B1
Sample number : 1
Number of Lab : 1
Load ring contant kG/div : 0.724

Location : Soc Son Hanoi
Depth(m): 1.40-2.00
Date : 18/11/98
Tested by : Eng . Nguyen Viet Tinh
Checked by: Dr . Do Minh Toan



σ3 =1.0kG/cm2

ΔH	ε,%	Div 0.01mm	P	ΔC	σ1−σ3	(σ1−σ3)/2
0.1	1.25	10.0	7.24	12.09	0.60	
0.2	2.50	21.6	15.64	12.25	1.28	
0.3	3.75	30.2	21.86	12.41	1.76	
0.4	5.00	40.1	29.03	12.57	2.31	
0.5	6.25	43.5	31.49	12.74	2.47	
0.6	7.50	46.3	33.52	12.91	2.60	1.30
0.7	8.75	46.0	33.30	13.08	2.55	
0.8	10.00	45.4	32.87	13.27	2.48	
0.9	11.25	45.0	32.58	13.45	2.42	
1.0	12.50					
1.1	13.75					
1.2	15.00					
1.3	16.25					
1.4	17.50					
1.5	18.75					



σ3 = 2.0 kG/cm2

ΔH	ε,%	DIV 1.01mm	P	ΔC	σ1−σ3	(σ1−σ3)/2
0.1	1.25	12.1	8.76	12.09	0.72	
0.2	2.50	18.2	13.18	12.25	1.08	
0.3	3.75	29.3	21.21	12.41	1.71	
0.4	5.00	35.1	25.41	12.57	2.02	
0.5	6.25	41.6	30.12	12.74	2.36	
0.6	7.50	45.9	33.23	12.91	2.57	
0.7	8.75	50.0	36.20	13.08	2.77	
0.8	10.00	55.0	39.82	13.27	3.00	1.50
0.9	11.25	55.0	39.82	13.45	2.96	
1.0	12.50	54.6	39.53	14.45	2.74	
1.1	13.75					
1.2	15.00					
1.3	16.25					
1.4	17.50					
1.5	18.75					

σ3 =4.0 kG/cm2

ΔH	ε,%	DIV 0.01mm	P	ΔC	σ1−σ3	(σ1−σ3)/2
0.1	1.25	18.0	13.03	12.09	1.08	
0.2	2.50	28.5	20.6	12.25	1.68	
0.3	3.75	38.1	27.6	12.41	2.22	
0.4	5.00	46.2	38.0	12.57	3.02	
0.5	6.25	53.8	45.0	12.74	3.53	
0.6	7.50	60.1	50.1	12.91	3.88	
0.7	8.75	65.3	55.8	13.08	4.27	
0.8	10.00	76.0	67.0	13.27	4.30	2.15
0.9	11.25	67.8	57.0	13.45	4.24	
1.0	12.50	67.0	56.5	13.65	4.14	
	13.75					
	15.00					
	16.25					
	17.50					
	18.75					

FAILURE MODE

Wo=	18%	19	18
γ_w=	2.01g/cm³	2.02	2.02
γ_d=	1.70g/cm³	1.70	1.71

Diameter ,cm: 3.9
Hight,cm: 8.00
Area,cm²: 11.94
Volume,cm³: 95.52

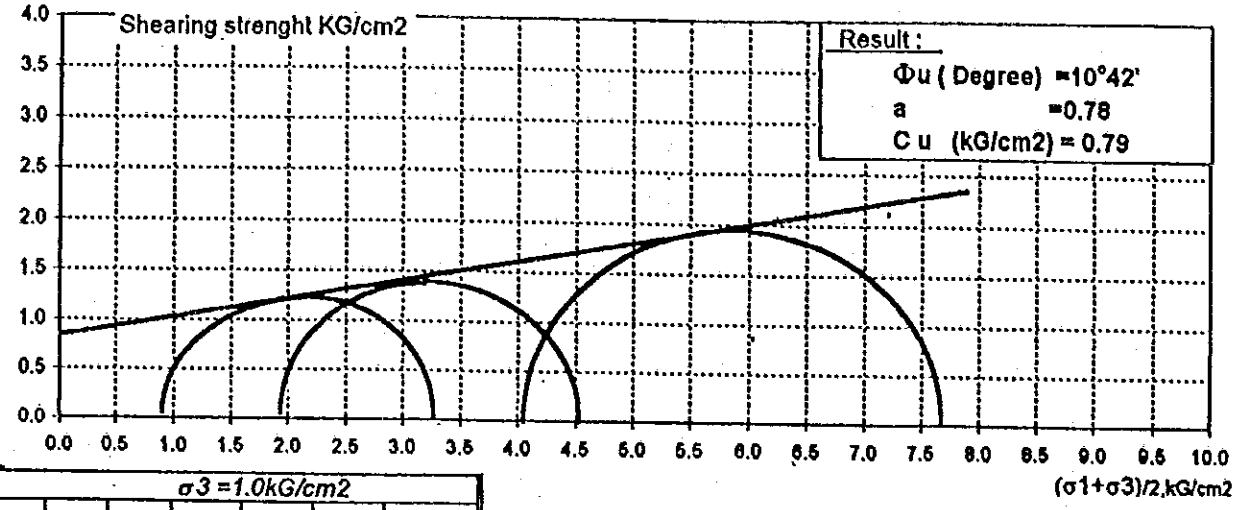
VIWASE

TRIAXIAL COMPRESSION TEST

Test type : UU

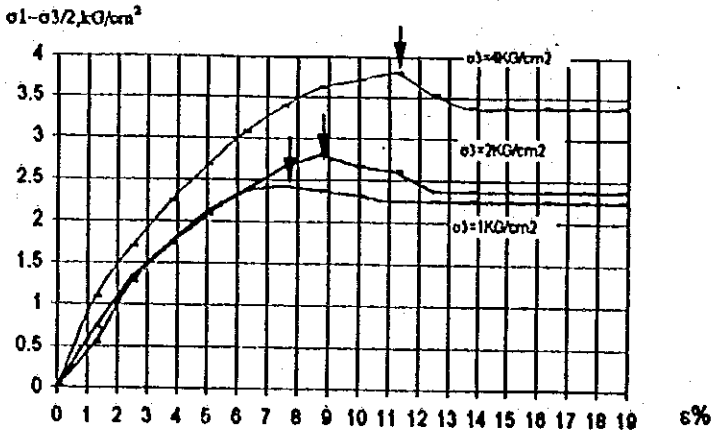
Project : Nam Son Waste Landfill
Borehole : B2
Sample number : 1
Number of Lab : 2
Load ring contant kG/div : 0.726

Location : Soc Son Hanoi
Depth(m): 1.40-2.00
Date : 18/11/98
Tested by : Eng . Nguyen Viet Tinh
Checked by: Dr . Do Minh Toan



σ3 =1.0kG/cm2

ΔH	ε,%	Div 0.01m m	P	ΔC	σ1−σ3	(σ1−σ3)/2
0.1	1.25	8.9	6.46	12.09	0.53	
0.2	2.50	21.3	15.46	12.25	1.26	
0.3	3.75	29.4	21.34	12.41	1.72	
0.4	5.00	35.6	25.85	12.57	2.06	
0.5	6.25	41.0	29.77	12.74	2.34	
0.6	7.50	42.7	31.00	12.91	2.40	1.20
0.7	8.75	42.5	30.86	13.08	2.36	
0.8	10.00	42.0	30.49	13.27	2.30	
0.9	11.25	41.5	30.13	13.45	2.24	
1.0	12.50					
1.1	13.75					
1.2	15.00					
1.3	16.25					
1.4	17.50					
1.5	18.75					



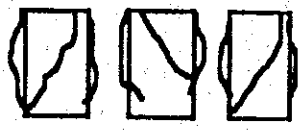
σ3 = 2.0 kG/cm2

ΔH	ε,%	DIV 1.01m m	P	ΔC	σ1−σ3	(σ1−σ3)/2
0.1	1.25	11.8	8.57	12.09	0.71	
0.2	2.50	22.3	16.19	12.25	1.32	
0.3	3.75	29.8	21.63	12.41	1.74	
0.4	5.00	36.5	26.50	12.57	2.11	
0.5	6.25	41.2	29.91	12.74	2.35	
0.6	7.50	47.0	34.12	12.91	2.64	
0.7	8.75	48.7	35.36	13.08	2.70	1.35
0.8	10.00	48.4	35.14	13.27	2.65	
0.9	11.25	48.0	34.85	13.45	2.59	
1.0	12.50	47.0	34.12	14.45	2.36	
1.1	13.75					
1.2	15.00					
1.3	16.25					
1.4	17.50					
1.5	18.75					

σ3 =4.0 kG/cm2

ΔH	ε,%	DIV 0.01m m	P	ΔC	σ1−σ3	(σ1−σ3)/2
0.1	1.25	16.0	13.07	12.09	1.08	
0.2	2.50	28.5	20.69	12.25	1.69	
0.3	3.75	38.1	27.66	12.41	2.23	
0.4	5.00	46.2	33.54	12.57	2.67	
0.5	6.25	53.8	39.06	12.74	3.07	
0.6	7.50	60.1	43.63	12.91	3.38	
0.7	8.75	65.3	47.41	13.08	3.62	
0.8	10.00	68.0	49.37	13.27	3.72	
0.9	11.25	70.4	51.11	13.45	3.80	1.90
1.0	12.50	70.0	50.82	13.65	3.72	
	13.75	68.0	49.37	14.65	3.37	
	15.00					
	16.25					
	17.50					
	18.75					

FAILURE MODE



Wo=	25%	25	24
γ_w=	1.89g/cm³	1.89	1.89
γ_d=	1.51g/cm³	1.51	1.52

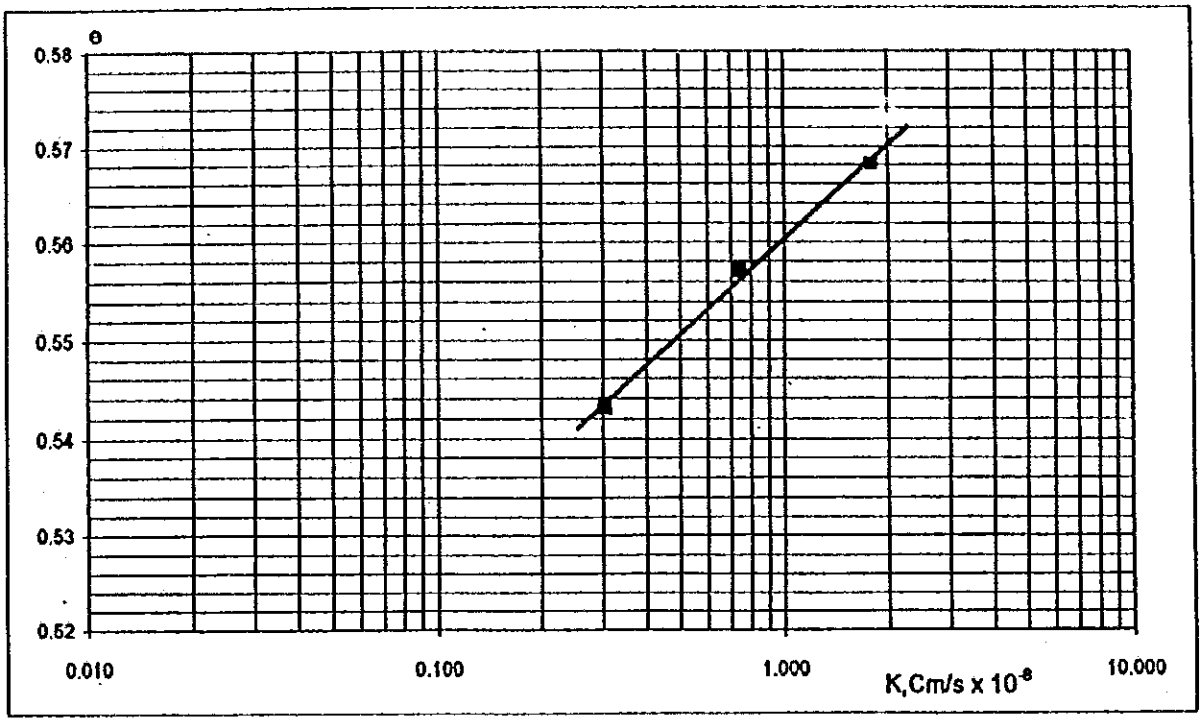
Diameter ,cm: 3.9
Hight,cm: 8.00
Area,cm²: 11.94
Volume,cm³: 95.52

VIWASE

CONSOLIDATION TEST

Project : Nam Son Waste Landfill
Location: Soc Son - Hanoi
Tested by : Bui Thi Bich
Reported by: Eng.Nguyen Viet Tinh

Numner of test : 1 Borehole: B1
Depth (m): 1.40-2.00m
Date: 18/11/98
Checked by: Dr.Do Minh Toan



COEFFICIENT OF PERMEABILITY

$$K = \frac{a_v \times C_v \times \gamma water}{1 + e_{av}}$$

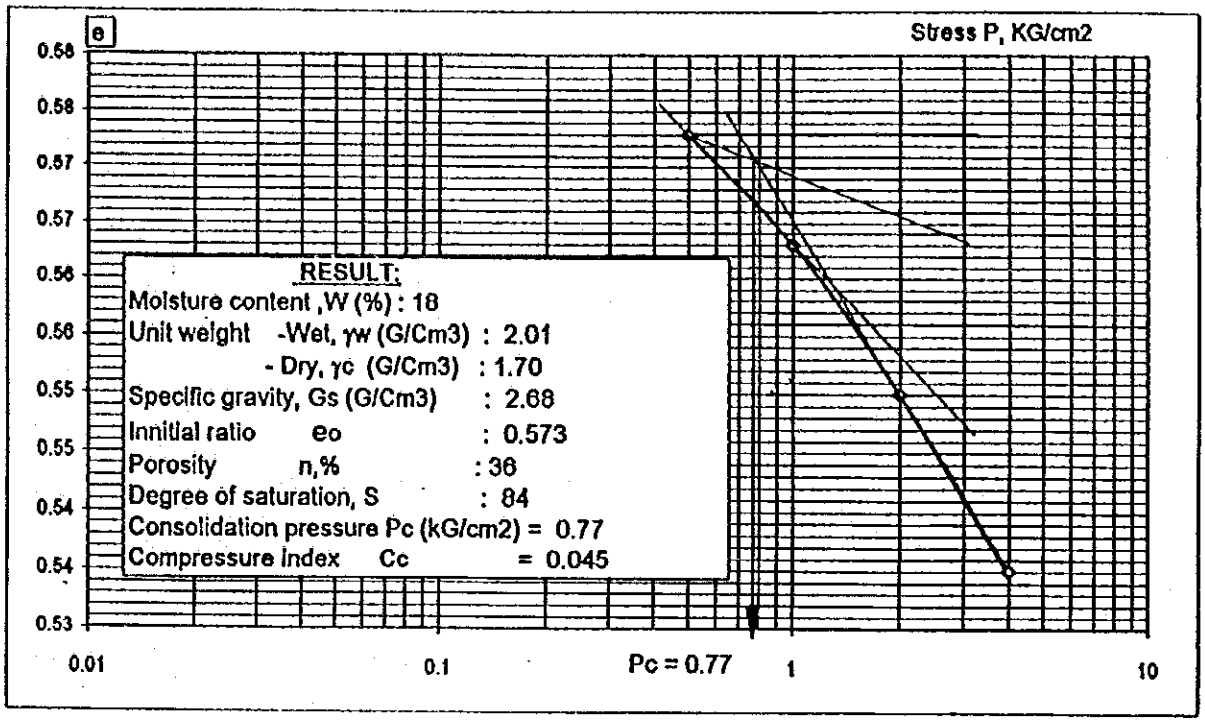
P = KG/Cm^2	1 + e_{av}	a_v = Cm^2/KG	Cv = Cm^2/S	K = Cm/S
0.0-0.5				
0.5-1.0	0.568	0.026	1.08×10^{-3}	1.79×10^{-8}
1.0-2.0	0.557	0.013	8.89×10^{-4}	7.42×10^{-9}
2.0-4.0	0.543	0.006	7.84×10^{-4}	3.05×10^{-9}

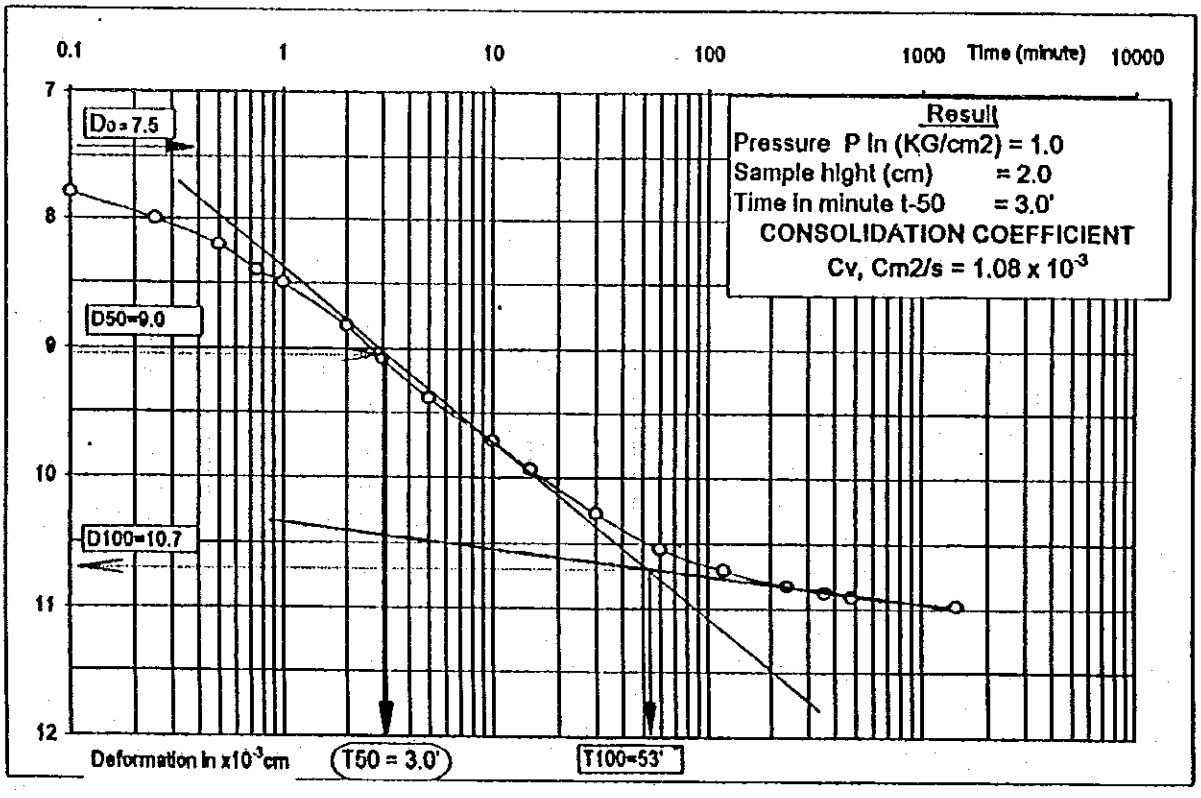
Note : Deformations of soil are very small at P=0.25 and P=0.5 KG/Cm^2

VIWASE

CONSOLIDATION TEST

Project : **Nam Son Waste Landfill** Numner of test : 1 Borehole: B1
Location: Soc Son - Hanoi Depth (m): 1.40-2.00m
Tested by : Bui Thi Bich Date: 18/11/98
Reported by: Eng.Nguyen Viet Tinh Checked by: Dr.Do Minh Toan



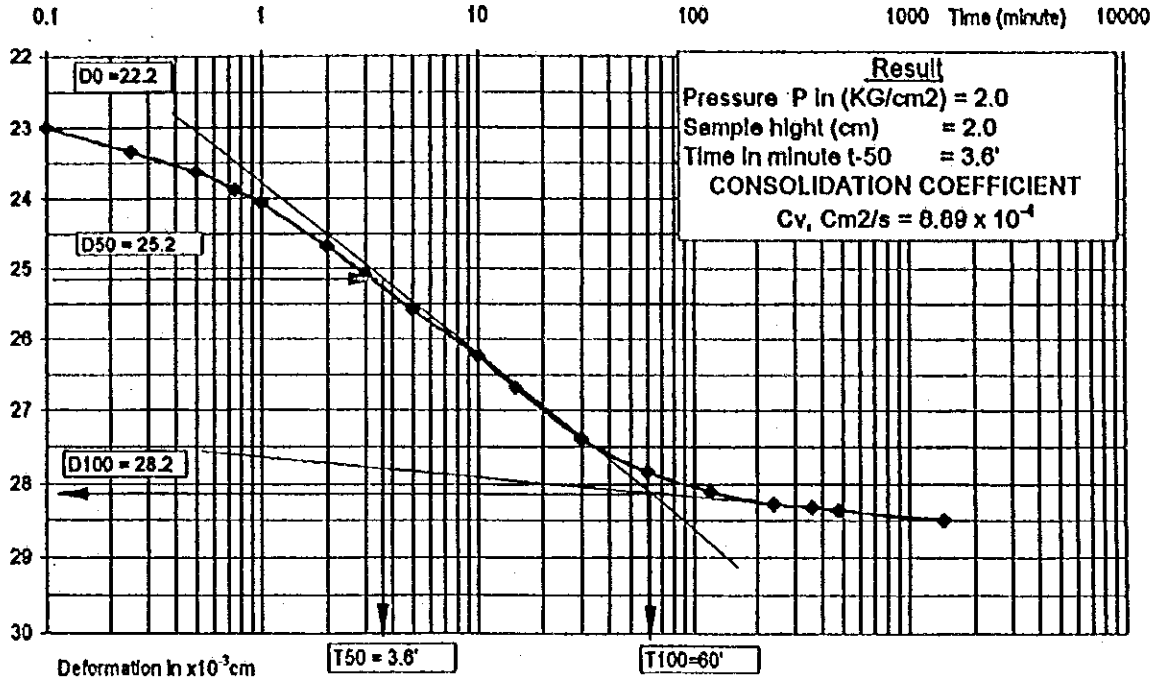


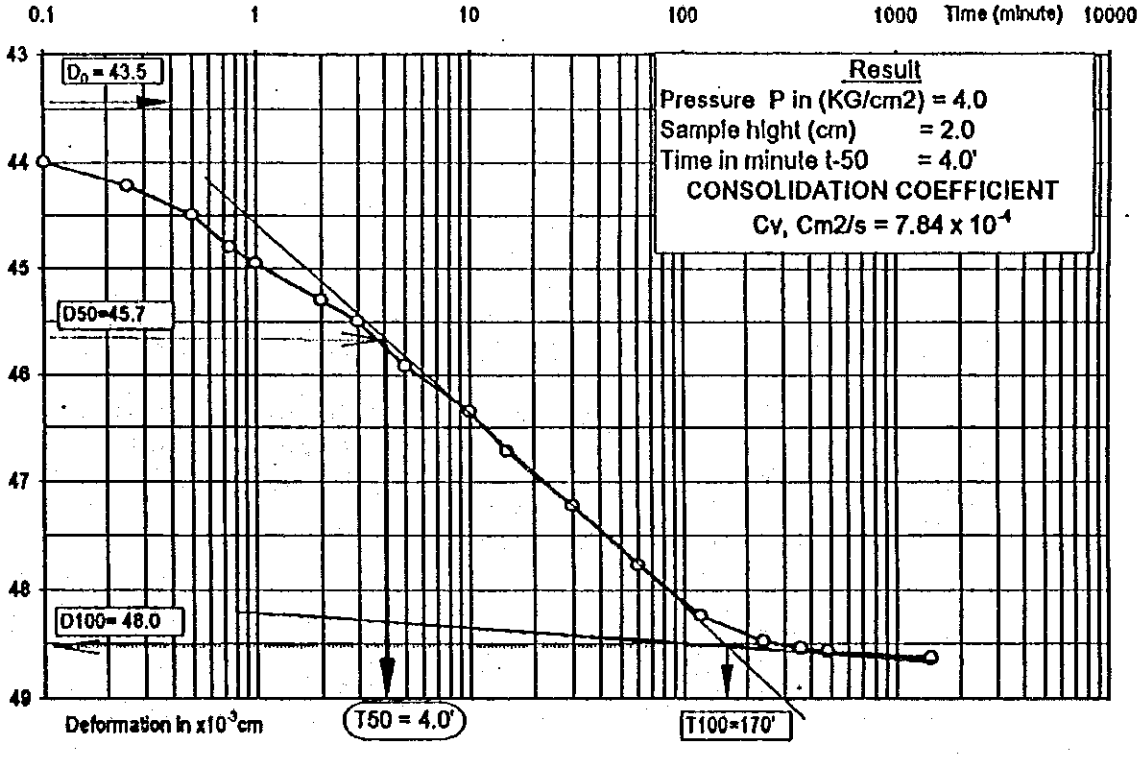
VIWASE

CONSOLIDATION TEST

Project : Nam Son Waste Landfill
Location: Soc Son - Hanoi
Tested by : Bui Thi Bich
Reported by: Eng.Nguyen Viet Tinh

Numner of test : 1 Borehole: B1
Depth (m): 1.40-2.00m
Date: 18/11/98
Checked by: Dr.Do Minh Toan

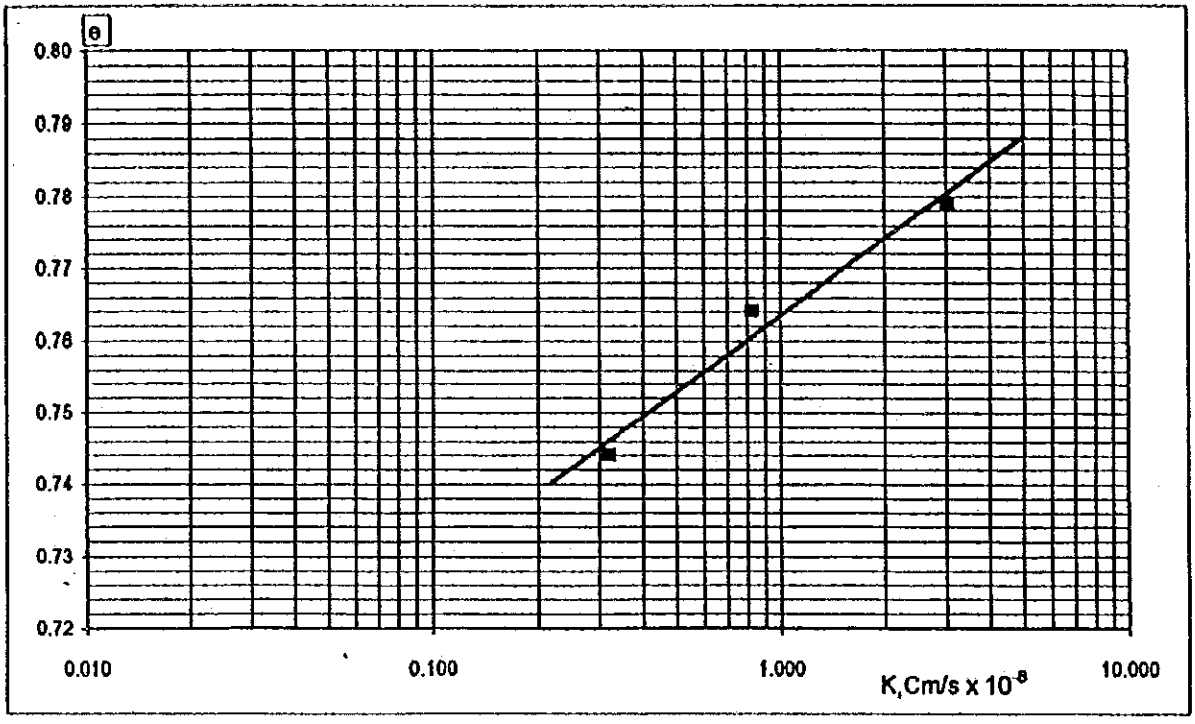




VIWASE

CONSOLIDATION TEST

Project : **Nam Son Waste Landfill** Numner of test : 2 Borehole: B2
Location: Soc Son - Hanoi Depth (m): 1.60-2.00m
Tested by : Bui Thi Bich Date: 18/11/98
Reported by: Eng.Nguyen Viet Tinh Checked by: Dr.Do Minh Toan



COEFFICIENT OF PERMEABILITY

$$K = \frac{a_v \times C_v \times \gamma water}{1 + e_{av}}$$

P = KG/Cm^2	$1 + e_{av}$	a_v = Cm^2/KG	Cv = Cm^2/S	K = Cm/S
0.0-0.5				
0.5-1.0	0.779	0.037	1.47×10^{-3}	3.04×10^{-8}
1.0-2.0	0.764	0.018	7.95×10^{-4}	8.29×10^{-9}
2.0-4.0	0.744	0.009	6.20×10^{-4}	3.20×10^{-9}

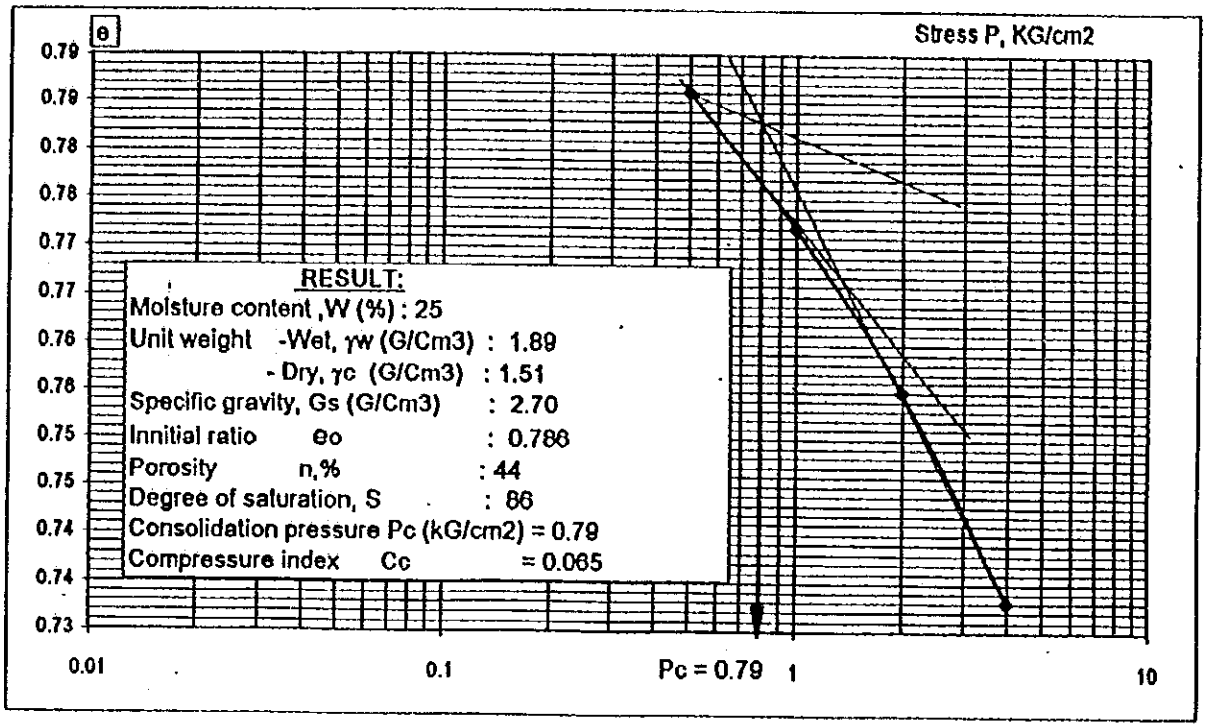
Note : Deformations of soil are very small at P=0.25 and P=0.5 KG/Cm^2

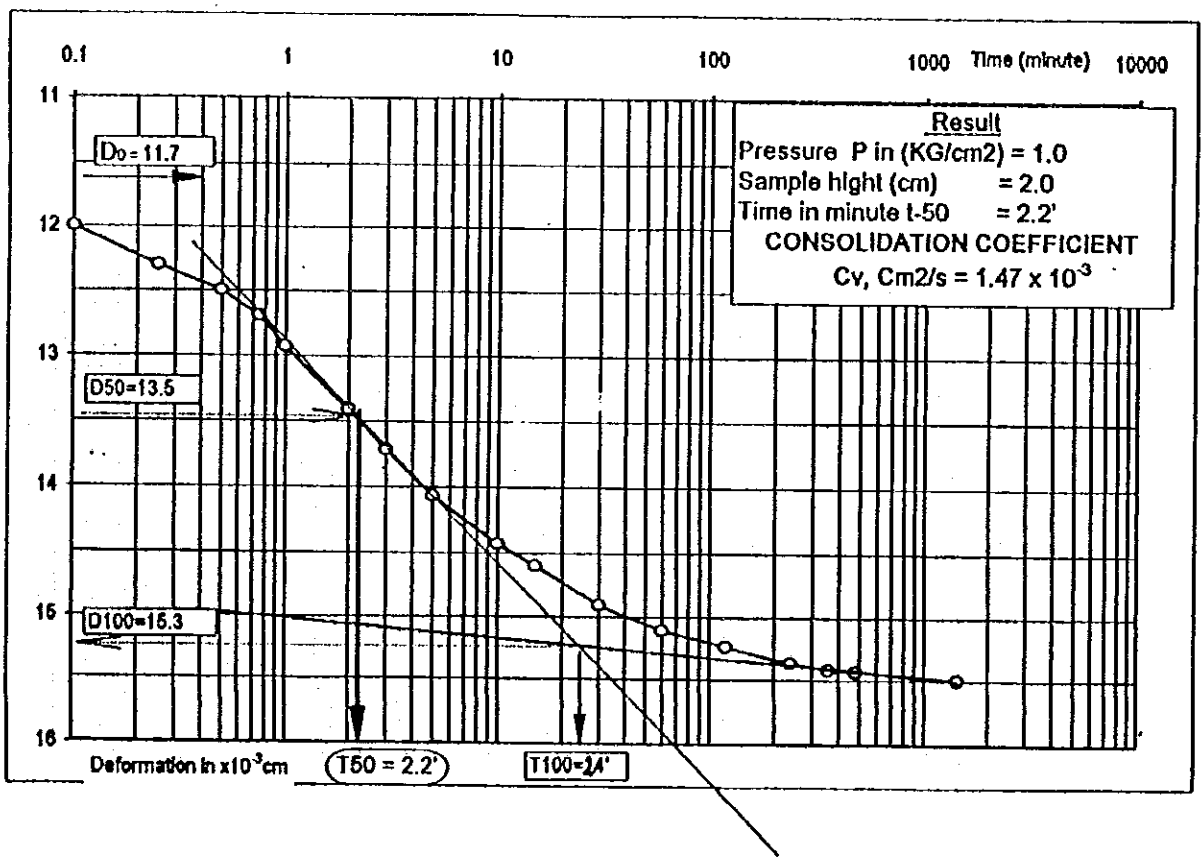
VIWASE

CONSOLIDATION TEST

Project : Nam Son Waste Landfill
Locati :n: Soc Son - Hanoi
Teste : Bui Thi Bich
Reported by: Eng.Nguyen Viet Tinh

Numner of test : 2 Borehole: B2
Depth (m): 1.60-2.00m
Date: 18/11/98
Checked by: Dr.Do Minh Toan



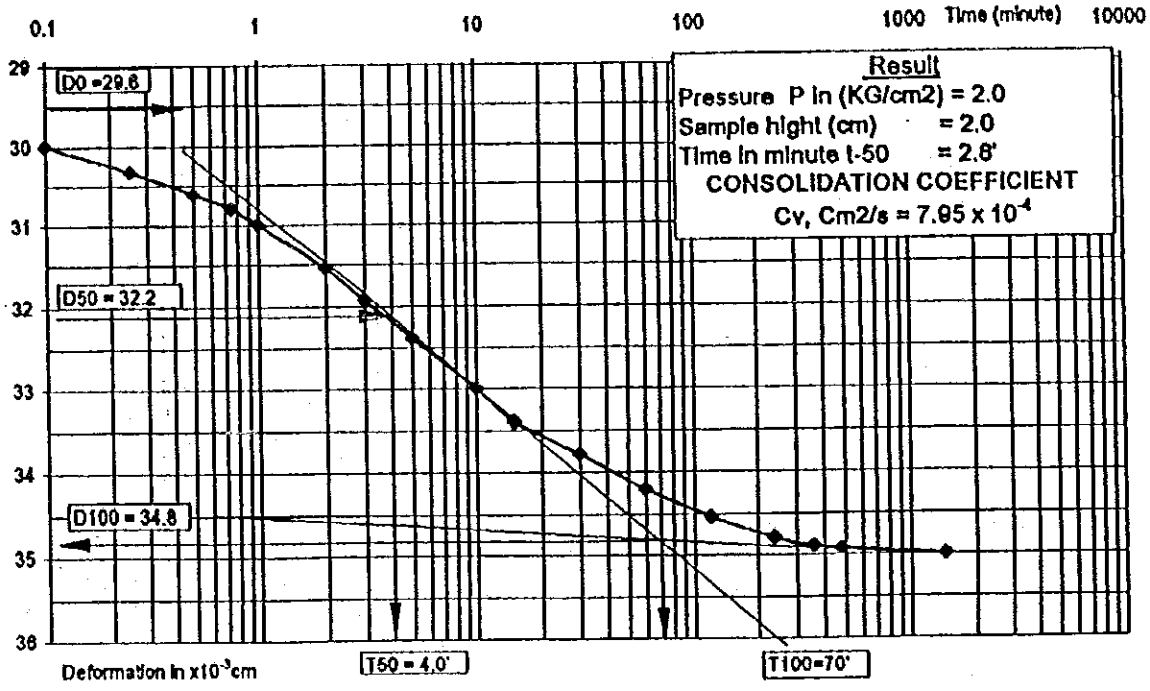


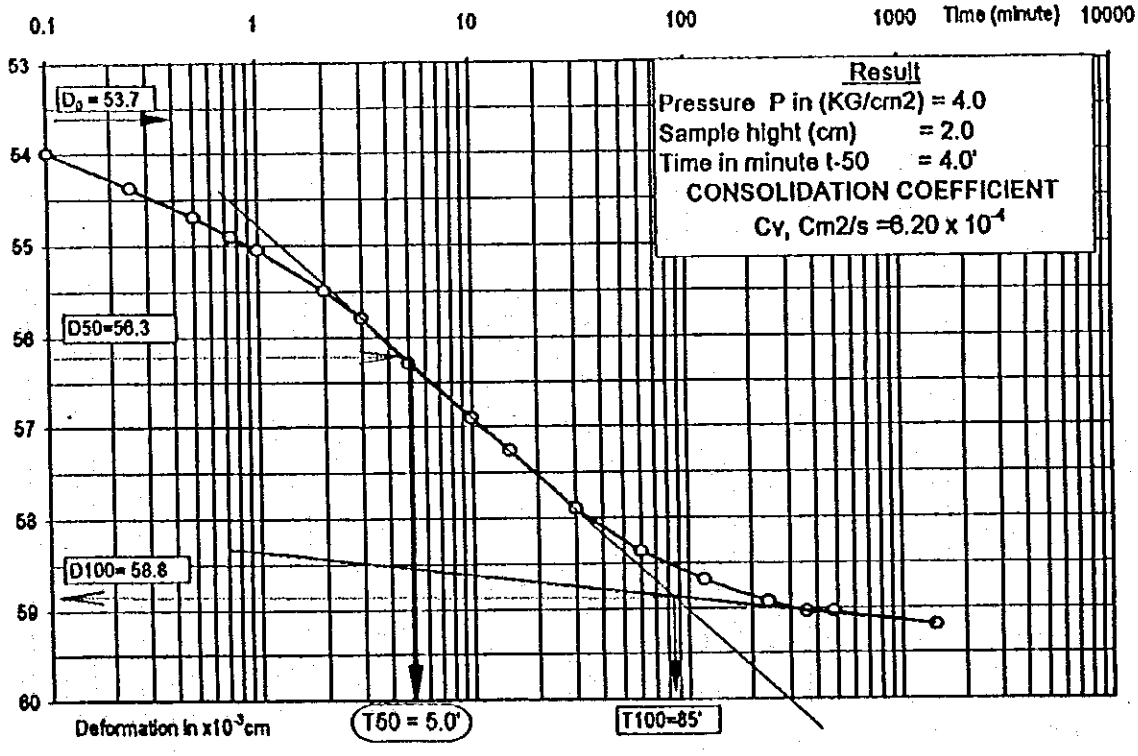
VIWASE

CONSOLIDATION TEST

Project : **Nam Son Waste Landfill**
Location: Soc Son - Hanoi
Tested by : Bui Thi Bich
Reported by: Eng.Nguyen Viet Tinh

Numner of test : 2 Borehole: B2
Depth (m): 1.60-2.00m
Date: 18/11/98
Checked by: Dr.Do Minh Toan



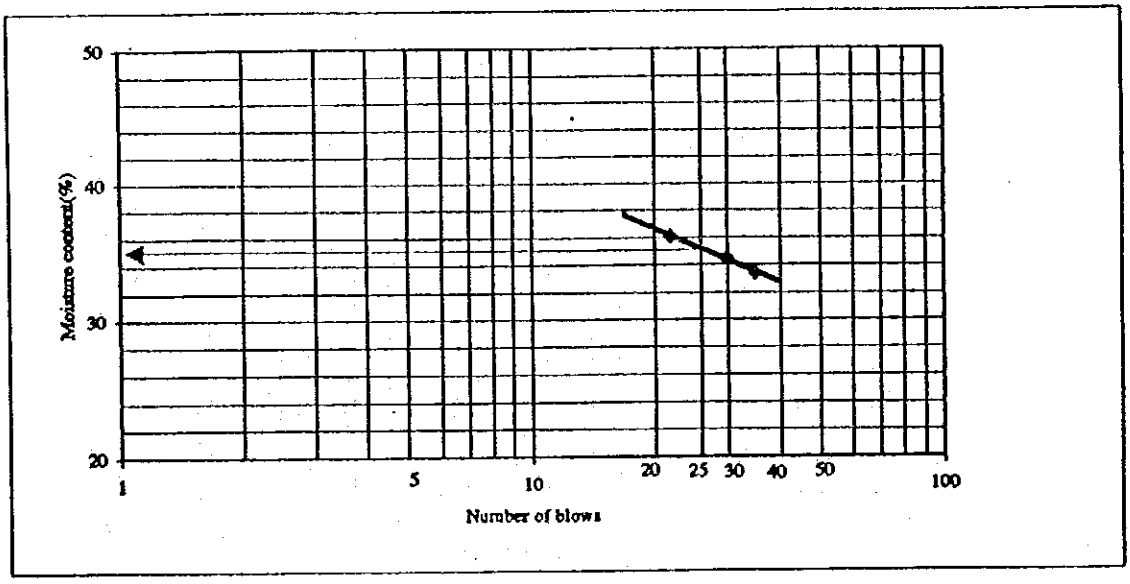


MOISTURE CONTENT AND ATTERBERG LIMITS

Project: Nam Son waste landfill
Location:
Borehole number: BH1
Sample number:
Sample depth: 1.40-2.00M

Date: 18/11/98
Test number: 1
Tested by: Bui Thi Bich
Checked by: Nguyen Viet Tinh
Sample sand by:

Moisture content Determination	Moisture content W,%		Liquid limit Wl,%				Plastic Limit Wp,%	
Container number	18	49-1	10	21	58		1	37
Number of blows			35	30	22			
Weight of wet soil container(g)	42.00	49.50	31.80	34.80	34.60		19.20	43.40
Weight of dry soil container(g)	36.80	43.10	25.80	27.90	27.50		17.40	37.70
Weight of container (g)	7.910	7.873	7.815	7.875	7.832		8.080	7.590
Weight of water (g)	5.20	6.40	6.00	6.90	7.10		1.80	5.70
Weight of dry soil (g	28.89	35.23	17.99	20.03	19.67		9.32	30.11
Moisture content %	18	18	33	34	36		19	19
Average moisture content %	W= 18		WL= 35				Wp= 19	



RESULTS

Plasticity Index %
Ip=WL-WP= 16

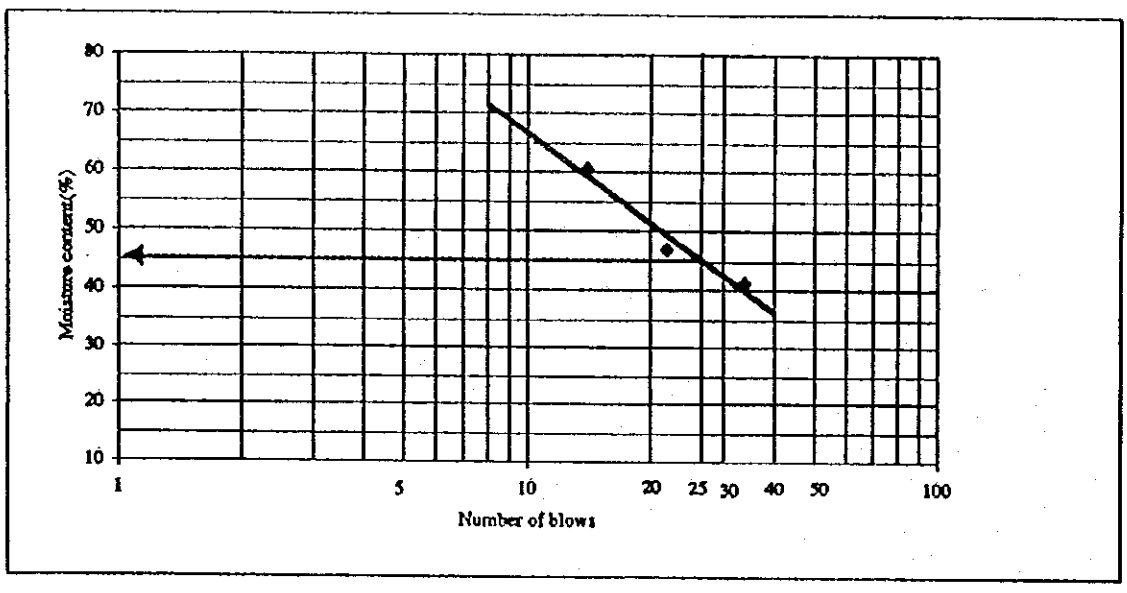
Liquidity Index
Is=W-Wp/Ip = -0.06

MOISTURE CONTENT AND ATTERBERG LIMITS

Project: Nam Son waste landfill
Location:
Borehole number: BH2
Sample number:
Sample depth: 1.60-2.00M

Date: 18/11/1998
Test number: 2
Tested by: Bui Thi Bich
Checked by: Nguyen Viet Tinh
Sample sand by:

Moisture content Determination	Moisture content W,%		Liquid limit Wl,%				Plastic Limit Wp,%	
Container number	17-1	13-1	57	14	16		5	2
Number of blows			34	22	14			
Weight of wet soil container(g)	45.00	42.40	30.80	32.50	34.90		18.50	16.6
Weight of dry soil container(g)	37.30	35.50	24.10	24.50	24.60		16.10	14.8
Weight of container (g)	7.700	7.725	7.800	7.460	7.567		7.771	8.290
Weight of water (g)	7.70	6.90	6.70	8.00	10.30		2.40	1.80
Weight of dry soil (g	29.60	27.78	16.30	17.04	17.03		8.33	6.51
Moisture content %	26	25	41	47	60		29	28
Average moisture content %	W= 25		WL= 45				Wp= 28	



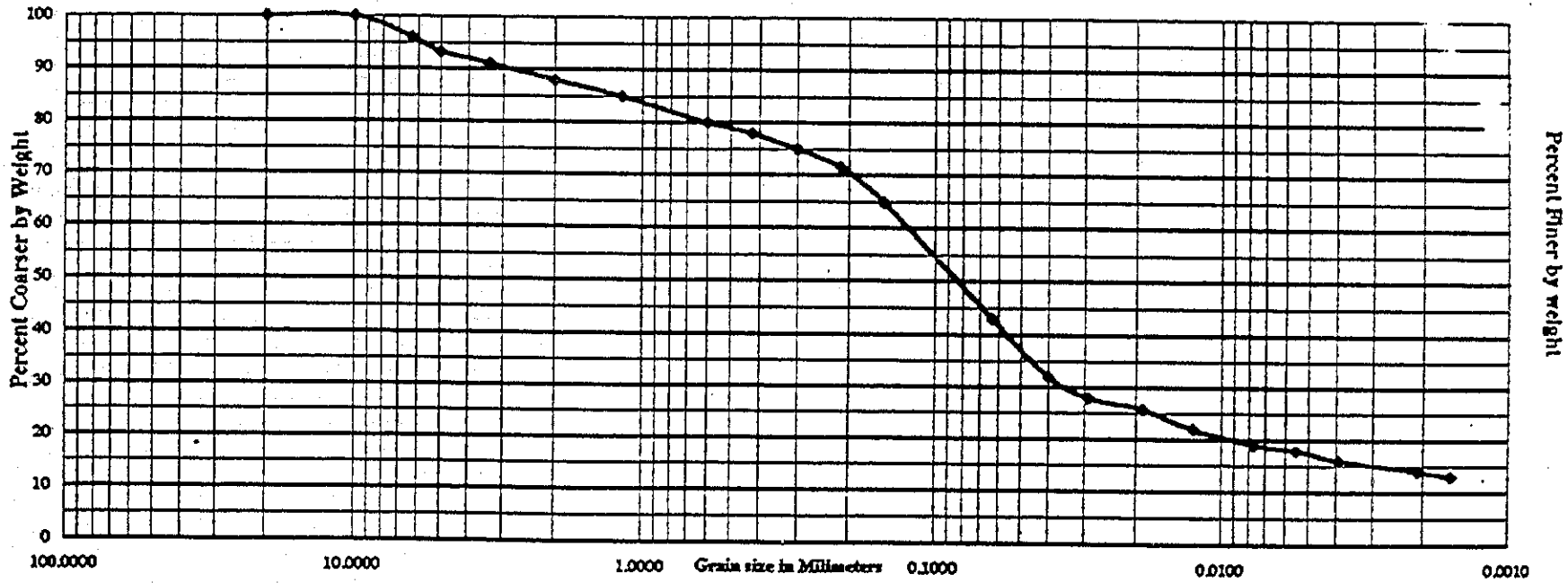
RESULTS

Plasticity Index %
Ip=WL-WP= 17

Liquidity Index
Is=W-Wp/Ip = -0.18

GRADATION CURVES

PROJECT: NAM SON WASTE LANDFILL

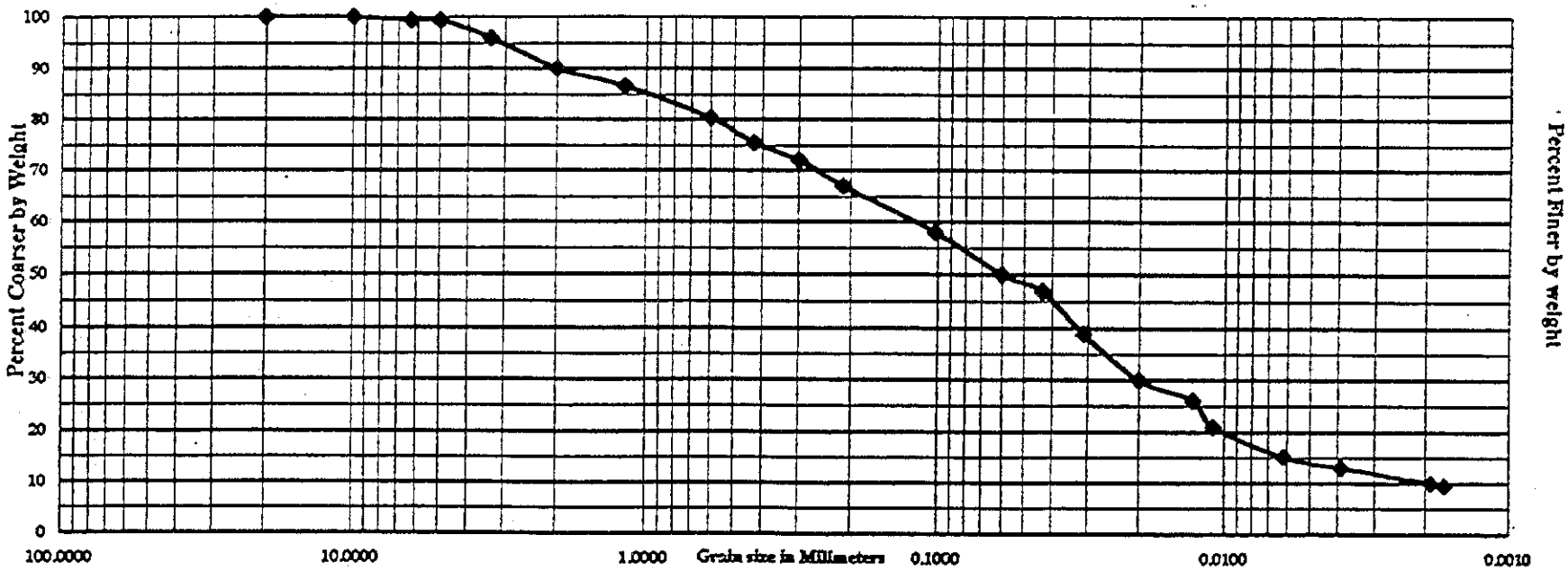


SAMPLE No.	HOLE No.	DEPTH OF SAMPLE m	SPECIFIC GRAVITY Gs,g/cm3	SIEVE AND HYDROMETER ANALYSIS, %								
				mm								
				20	6	2	0.60	0.20	0.06	0.020	0.006	0.002
1	BH1	1.4 - 2.0	2.68	100	95	88	80	70	42	26	18	14

Tested by:Eng. Nguyen Viet Tinh
Checked by : Dr. Do Minh Toan

GRADATION CURVES

PROJECT: NAM SON WASTE LANDFILL



SAMPLE No.	HOLE No.	DEPTH OF SAMPLE m	SPECIFIC GRAVITY Gs,g/cm3	SIEVE AND HYDROMETER ANALYSIS, %								
				mm								
				20	6	2	0.60	0.20	0.06	0.020	0.006	0.002
2	BH2	1.6 -2.0	2.70		100	90	80	66	50	30	15	10

Tested by:Eng. Nguyen Viet Tinh
Checked by : Dr. Do Minh Toan

VIWASE

TRIAXIAL COMPRESSION TEST

(SUMMARY AND REPORT DATA SHEET)

Test No: 1

Test type: Cu

Soil description :Hard,purpdish brown sandy CLAY of intermediate plasticity

Project: Nam Son Waste Landfill

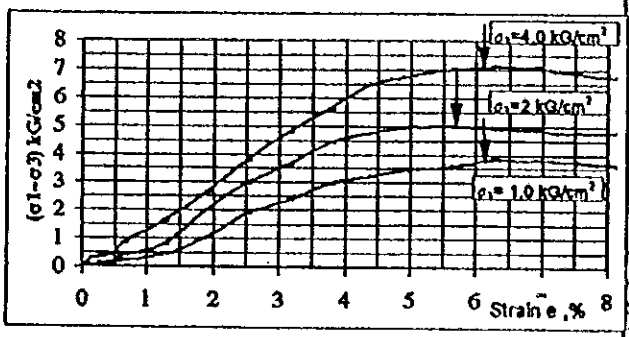
Type of sample : Undisturbed

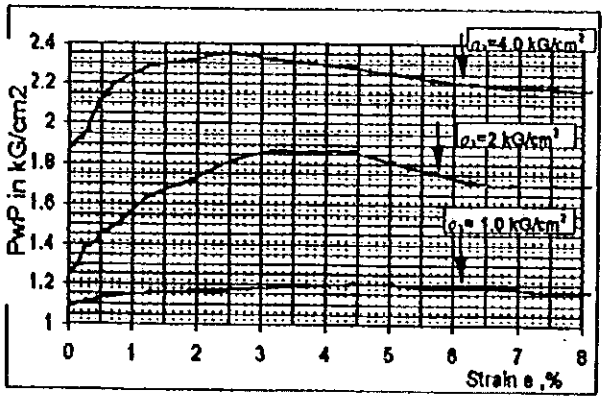
Borehole No: B1

Depth of sample: 1.4-2.0 m

Shearing rate :

Date : 30/11/98



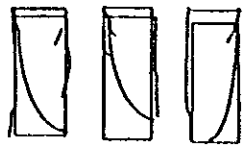


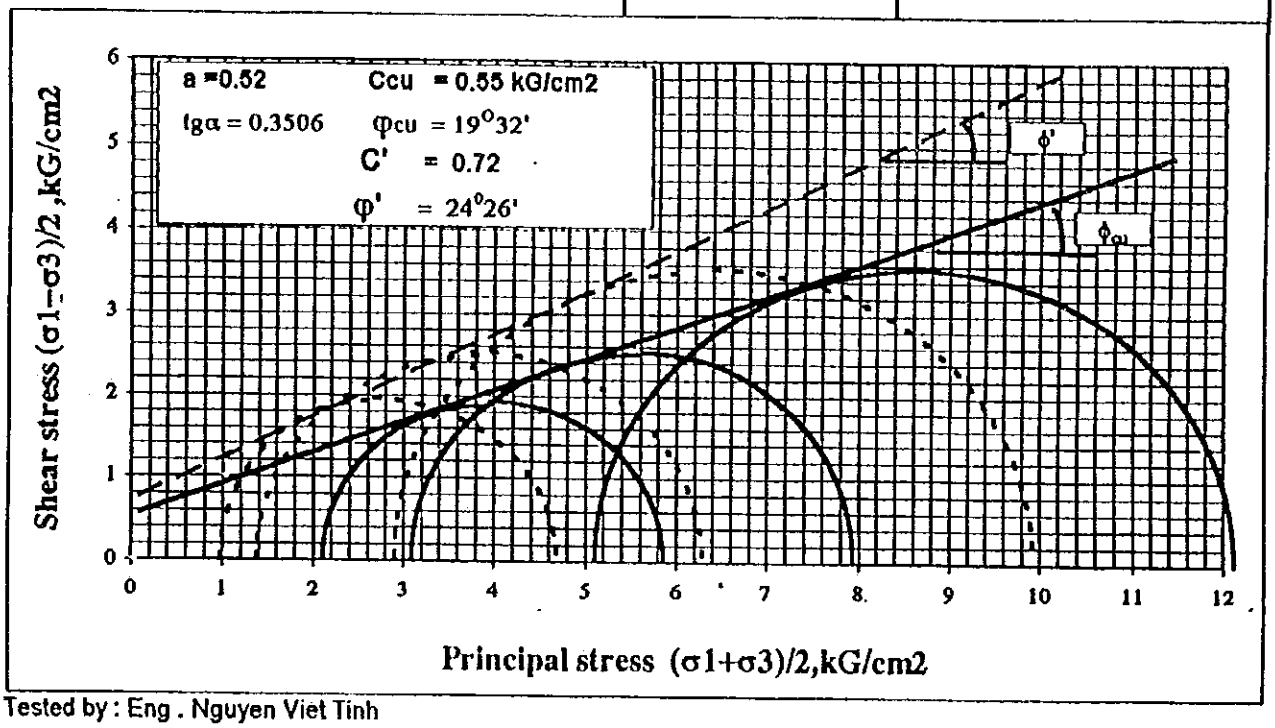
Specimen properties and shearing stage(at failure)

W_i : % ; I_p : ; I_L : H_0: mm; D_0: mm

	Specimens	Unit	A	B	C
INITIAL	Wet density γ_w	g/cm3	2.01	2.01	2.02
	Moisture W	%	18	17	18
	Drydensity γ_d	g/cm3	1.70	1.72	1.71
FINAL	Wet density γ_w	g/cm3	2.03	2.08	2.16
	Moisture W	%	24	21	17
	Drydensity γ_d	g/cm3	1.63	1.71	1.84
Lateral stress σ_3		kG/cm²	1	2	4
Strain ε			6.25	5.63	6.25
Deviator stress $\sigma_1-\sigma_3$		kG/cm²	3.80	4.98	7.09
Shear stress $(\sigma_1-\sigma_3)/2$		kG/cm²	1.90	2.49	3.55
Ceter morh circle($\sigma_1+\sigma_3/2$		kG/cm²	3.90	5.49	8.55
PWP . UF		kG/cm²	1.18	1.76	2.20
Effective morh $(\sigma'_1+\sigma'3)/2$		kG/cm²	2.72	3.73	6.35
Max total stress σ_1		kG/cm²	5.80	7.98	12.09

ILUSTATIVE DESCRIPTION OF SPECIMEN AT FAILURE





Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr. Do Minh Toan

VIWASE

TRIAXIAL COMPRESSION TEST

Project :	Nam Son Waste Landfill	**Test type:**	CU-PWP
Borehole :	B1	**Test No :**	1
Depth :	1.4-2.0 m	**Date started :**	20/11/1998

Soil description : Hard purpnish brown sandy CLAY of intermediate plasticity

Specimen preparation

INITIAL CONDITIONS			
Height of specimen	Hi =	80	mm
Diameter of specimen	di =	39	mm
Area of specimen	Ai =	1194	mm^2
Volume of specimen	Vi =	95520	mm^3
STAGE PRIOR TO CONSOLIDATION or SHEARING			
Change in height	ΔHu =		mm
change in volume	ΔVu =		mm^3
Height at end of stage	Hps =		mm
Volume at end of stage	Vps =		mm^3
Area at end of stage	Aps =		mm^2
CONSOLIDATION STAGE			
Change in height	ΔHc =		mm
change in volume	ΔVc =		mm^3
Height at end of stage	Hps =	75.65	mm
Volume at end of stage	Vps =	80492	mm^3
Area at end of stage	Aps =	1064	mm^2
AFTER TESTING			
Change in volume	ΔV =		mm^3
Volume at end of stage	Vi		mm^3
Height of specimen	Hi		mm
Diameter of specimen	di		mm

PHISIAL PROPERTIES	SPECIMEN	
	Intial	After test
Specific gravity	2.68	2.68
Wet mass of specimen (g)		
Dry mass of specimen (g)		
Mass of Water (g)		
Moisture content (%)	18	24
Wet density (g/cm^3)	2.01	2.03
Dry density (g/cm^3)	1.70	1.63
Void ratio	0.573	0.641
Degree of saturation (%)	84	100

DATA OF TEST

Test type : Cu

With / ~~Without~~	Pore pressure measurements		
~~With~~ / Without	Side drains		
With / ~~Without~~	Saturation		
~~With~~ / Without	Back pressure		
Cell pressure		σ_3= 2.00	kG/cm^2
Vetical stress		σ_1=	kG/cm^2
Back pressure		Ub= 1.00	kG/cm^2
Intial effec.cell pressure		σ_3'= 1.00	kG/cm^2
Intial effec.Vertical pressure		σ_1'=	kG/cm^2

MODE OF FAILURE

Tested by : Eng . Nguyen Viet Tinh

Checked : Dr . Do Minh Toan

sheet 13

TRIAXIAL COMPRESSION TEST

Test type : cu-pwp

Project :

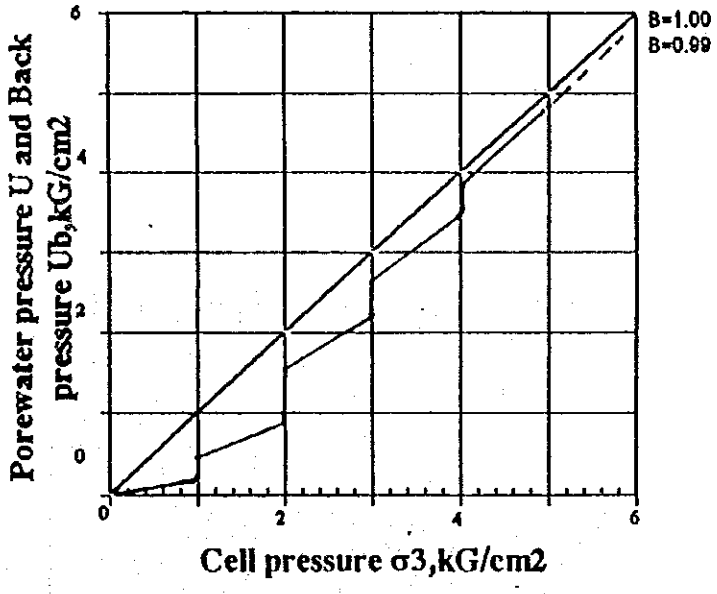
Test N_o : 1

Hole N_o B1 Depth: 1.4-2.0 m Load rinh N_o : 0.724kG/Div Date started : 20/11/1998

SATURATION PROCEDURE :

Test type : Cu-pwp	~~With~~ / Without Side drains	load ring constant	Piston area
Cell pressure : 1.0 ,2.0 ,3.0, 4.0,5.0 kG/cm²		Back pressure increments : 0.9 ; 1.9 ; 2.9 ;3.9. kG/cm²	
Final cell pressure : 5.00 kG/cm²		Final back pressure : 3.9 kG/cm²	
PWP after saturation : 4.89 kG/cm²		Value of B achieved : 0.99	
Effect pressure after saturation : kG/cm²		Degree of saturation reached : 99 %	

Date	Pressure (kG/cm²)				B	Strain	Back pressure(volume change mm³)			Cell volume change (mm³)				
time	Cell	Back	PWP	ΔPWP	Value	div 0.01mm	Before	After	Diff	Before	After	Diff	Console +	- exp
20/11/98	0	0	0	0	0		58.8							
	1.00		0.20		0.20									
	1.00	0.90	0.42											
21/11	2.00		0.90		0.48									
	2.00	1.90	1.60											
22/11	3.00		2.25		0.65									
	3.00	2.90	2.65											
23/11	4.00		3.52		0.87									
	4.00	3.90	3.90											
	5.00		4.89		0.99			75.8						



Porepressure respose to cell pressure increment

Slope=

Pore pressure change due to increase back pressure

$$B = \frac{PWP - PWPo}{\Delta\sigma} = 0.99$$

Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr . Do Minh Toan

TRIAXIAL COMPRESSION TEST

Test type : Cu-pwp

Project:

Test N_o : 1

Hole N_o B1 Depth,m: 1.4-2.0 Load ring N_o : 0.724 kG/div Date started : 24/11/1998

Test type: ~~with~~ / without side drains

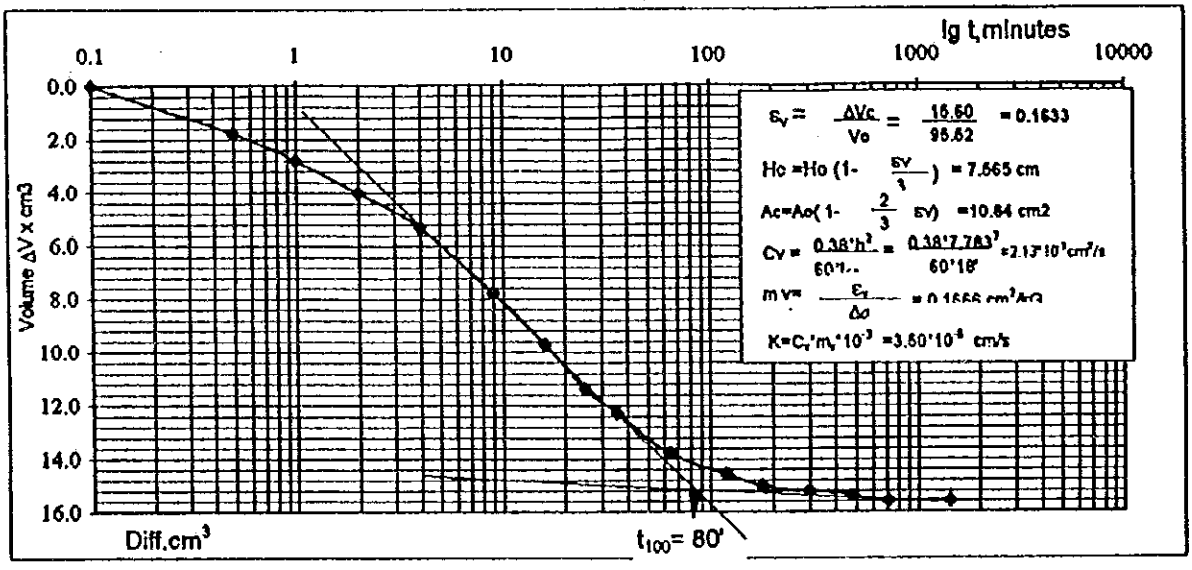
Cell pressure	2.00	kG/cm²
Vertical stress		
Back stress	1.00	
PwP After build up	1.99	
Difference	1.00	
Effective pressure	1.00	
t_{100} =	80 min	
$t_f = a * t_{100} = 0.51 * 80 =$	40.8	

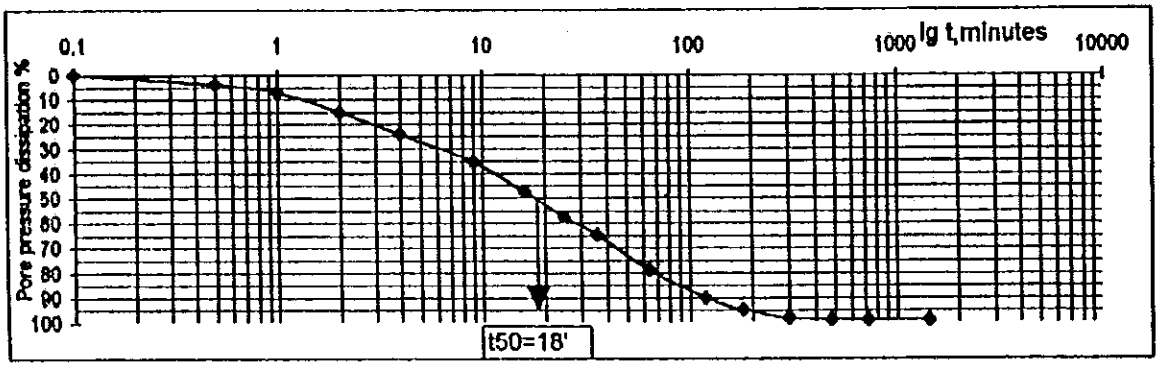
RATE OF DISPLACEMENT

$\frac{\varepsilon_f H_{fi}}{100 t_f} = \frac{0.05 * 75.65}{40.8} = 0.0927$

Selcsted v = mm/min

DATE	Clock time	Time t, minutes	Lgt	Volume change: gauge,o m³	Volume change: Diff, cm³	Pore pressure: Reading kG/cm²	Pore pressure: Diff kG/cm²	Diss,%
24/11/98	7h35	0		75.8	0.0	1.99		0
		30"		74.0	1.8	1.95		4
		1'		73.0	2.8	1.92		7
		2'		71.8	4.0	1.84		15
		4'		70.5	5.3	1.75		24
		8'		68.0	7.8	1.64		35
		16'		66.1	9.7	1.52		47
		25'		64.4	11.4	1.42		58
	8h11	36'		63.5	12.3	1.35		65
	8h39	64'		62.0	13.8	1.21		79
	10h35	120'		61.2	14.6	1.10		90
	11h35	180'		60.8	15.0	1.05		95
	13h35	300'		60.6	15.2	1.02		98
	16h35	480'		60.4	15.4	1.01		99
	20h00'	720'		60.2	15.6	1.01		99
25/11	8h35	1440'		60.2	15.6	1.01		99
		2880'						
		4320'						





Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr . Do Minh Toan

Sheet 4

VIWASE

TRIXIAL COMPRESSION TEST

TEST TYPE Cu-PwP

Project : Nam Son Waste Landfill — Test N_o 1

Cell N_o — Load ring N_o 0.724 — Date started : 25/11/98

Test type CU	Load ring constant	With / Without Side drains	Cell pressure σ_3= 2.00 kG/cm²
Rate :	CR = 0.724 kG/Div	Membranes	Vertical stress σ_1 = kG/cm²
Specimen prior to shearing			Back pressure Po = 1.0 kG/cm²
Height H= mm 75.65	Area A = 1064 mm²	Volume V= 80492 mm³	Eff.cell pressure σ3'= 1.0 kG/cm²

Stain		Load		U	A	Deviatorsress kG/cm²		Stresses kG/cm²						Volume	
Div 0.01 mm	ε,%	Div 0.01 mm	kG	kG/cm²	cm²	Stress	mem bcorr	$\sigma_1-\sigma_3$	σ_1'	σ_3'	$\frac{\sigma_1-\sigma_3}{2}$	$\frac{\sigma_1+\sigma_3}{2}$	$\frac{\sigma_1'+\sigma_3}{2}$	σ_1/σ_3	V	ΔV
0	0.00	0.0	0.000	1.09	10.64	0.00	0	0.00	0.91	0.91	0.00	2.00	0.91	1.00		
10	0.13	0.6	0.434	1.10	10.65	0.04		0.04	0.94	0.90	0.02	2.02	0.92	1.05		
20	0.25	1.0	0.724	1.11	10.67	0.07		0.07	0.96	0.89	0.03	2.03	0.92	1.08		
30	0.38	1.4	1.014	1.12	10.68	0.09		0.09	0.97	0.88	0.05	2.05	0.93	1.11		
40	0.50	1.8	1.303	1.13	10.69	0.12		0.12	0.99	0.87	0.06	2.06	0.93	1.14		
50	0.63	3.0	2.172	1.14	10.71	0.20		0.20	1.06	0.86	0.10	2.10	0.96	1.24		
100	1.25	6.1	4.416	1.15	10.77	0.41		0.41	1.26	0.85	0.20	2.20	1.05	1.48		
150	1.88	15.0	10.860	1.16	10.84	1.00		1.00	1.84	0.84	0.50	2.50	1.34	2.19		
200	2.50	28.0	20.272	1.17	10.91	1.86		1.86	2.69	0.83	0.93	2.93	1.76	3.24		
250	3.13	32.0	23.168	1.18	10.98	2.11		2.11	2.93	0.82	1.05	3.05	1.87	3.57		
300	3.75	45.0	32.580	1.19	11.05	2.95		2.95	3.76	0.81	1.47	3.47	2.28	4.64		
350	4.38	49.2	35.621	1.20	11.13	3.20		3.20	4.00	0.80	1.60	3.60	2.40	5.00		
400	5.00	53.4	38.662	1.20	11.20	3.45		3.45	4.25	0.80	1.73	3.73	2.53	5.31		
450	5.63	55.3	40.037	1.18	11.27	3.55		3.55	4.37	0.82	1.78	3.78	2.60	5.33		
500	6.25	59.6	43.150	1.18	11.35	3.80		3.88	4.62	0.82	1.96	3.90	2.72	5.64		
550	6.88	59.6	43.150	1.18	11.43	3.78		3.78	4.60	0.82	1.89	3.89	2.71	5.61		
600	7.50	59.5	43.078	1.18	11.50	3.75		3.75	4.59	0.84	1.87	3.87	2.71	5.46		
650	8.13	58.0	41.992	1.18	11.58	3.63		3.63	4.47	0.84	1.81	3.81	2.65	5.32		
700	8.75	56.0	40.544	1.18	11.66	3.48		3.48	4.32	0.84	1.74	3.74	2.58	5.14		
750	9.38	55.0	39.820	1.15	11.74	3.39		3.39	4.24	0.85	1.70	3.70	2.55	4.99		
800	10.00	54.5	39.458	1.15	11.82	3.34		3.34	4.19	0.85	1.67	3.67	2.52	4.93		
850	10.63				11.90											
900	11.25				11.99											
950	11.88				12.07											
1000	12.50				12.16											
1050	13.13				12.25											
1100	13.75				12.34											
1150	14.38				12.43											
1200	15.00				12.52											
1250	15.63				12.61											
1300	16.25				12.70											
1350	16.88				12.80											
1400	17.50				12.90											

Tested by :

Checked by

Sheet 11

VIWASE

TRIAXIAL COMPRESSION TEST

Project :	Nam Son Waste Landfill	**Test type:**	CU-PWP
Borehole :	B1	**Test No :**	1
Depth :	1.4-2.0 m	**Date started :**	26/11/98

Soil description : Hard purpnish brown sandy CLAY of intermediate plasticity

Specimen preparation

INITIAL CONDITIONS			
Height of specimen	Hi =	80	mm
Diameter of specimen	di =	39	mm
Area of specimen	Ai =	1194	mm^2
Volume of specimen	Vi =	95520	mm^3
STAGE PRIOR TO CONSOLIDATION or SHEARING			
Change in height	ΔHu =		mm
change in volume	ΔVu =		mm^3
Height at end of stage	Hps =		mm
Volume at end of stage	Vps =		mm^3
Area at end of stage	Aps =		mm^2
CONSOLIDATION STAGE			
Change in height	ΔHc =		mm
change in volume	ΔVc =		mm^3
Height at end of stage	Hps =	73.91	mm
Volume at end of stage	Vps =	74797	mm^3
Area at end of stage	Aps =	1012	mm^2
AFTER TESTING			
Change in volume	ΔV =		mm^3
Volume at end of stage	Vi		mm^3
Height of specimen	Hi		mm
Diameter of specimen	di		mm

PHISIAL PROPERTIES	SPECIMEN Intial	SPECIMEN After test
Specific gravity	2.68	2.68
Wet mass of specimen (g)		
Dry mass of specimen (g)		
Mass of Water (g)		
Moisture content (%)	18	21
Wet density (g/cm^3)	2.01	2.08
Dry density (g/cm^3)	1.70	1.71
Void ratio	0.573	0.563
Degree of saturation (%)	84	100

DATA OF TEST

Test type : Cu

With / ~~Without~~ Pore pressure measurements

~~With~~ / Without Side drains

With / ~~Without~~ Saturation

~~With~~ / Without Back pressure

Cell pressure	σ_3=	3.00	kG/cm^2
Vetical stress	σ_1=		kG/cm^2
Back pressure	Ub=	1.00	kG/cm^2
Intial effec.cell pressure	σ_3'=	2.00	kG/cm^2
Intial effec.Vertical pressure	σ_1'=		kG/cm^2

MODE OF FAILURE

Tested by : Eng . Nguyen Viet Tinh

Checked : Dr . Do Minh Toan

VIWASE # TRIAXIAL COMPRESSION TEST

Test type : Cu-pwp

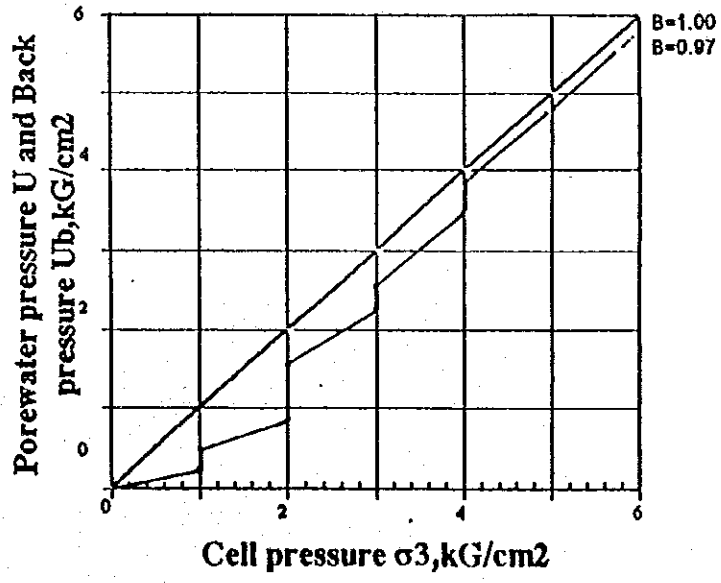
Project : Test N_o : 1

Hole N_o B1 Depth: 1.4-2.0 m Load rinh N_o : 0.724kG/Div Date started : 26/11/98

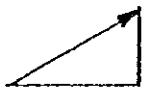
SATURATION PROCEDURE :

Test type : Cu-pwp	With / ~~Without~~ Side drains	load ring constant	Piston area
Cell pressure : 1.0 ,2.0 ,3.0, 4.0,5.0 kG/cm²		Back pressure increments : 0.9 ; 1.9 ; 2.9 ;3.9. kG/cm²	
Final cell pressure : 5.00 kG/cm²		Final back pressure : 3.90 kG/cm²	
PWP after saturation : 4.87 kG/cm²		Value of B achieved : 0.97	
Effect pressure after saturation : kG/cm²		Degree of saturation reached : 97 %	

Date	Pressure (kG/cm²)				B	Strain dlv	Back pressure(volume change mm³)			Cell volume change (mm³)				
time	Cell	Back	PWP	ΔPWP	Value	0.01mm	Before	After	Diff	Before	After	Diff	Console	exp
26/11/98	0	0	0	0	0		50.8							
	1.00		0.22		0.22									
	1.00	0.90	0.43											
	2.00		0.87		0.44									
27/11	2.00	1.90	1.64											
	3.00		2.33		0.69									
	3.00	2.90	2.68											
28/11	4.00		3.55		0.87									
	4.00	3.90	3.90											
	5.00		4.87		0.97			77.0						



Porepressure respose to cell pressure increment



Slope=

Pore pressure change due to increase back pressure

$$B = \frac{PWP - PWPo}{\Delta\sigma} \qquad B = 0.97$$

Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr . Do Minh Toan

VIWASE # TRIAXIAL COMPRESSION TEST

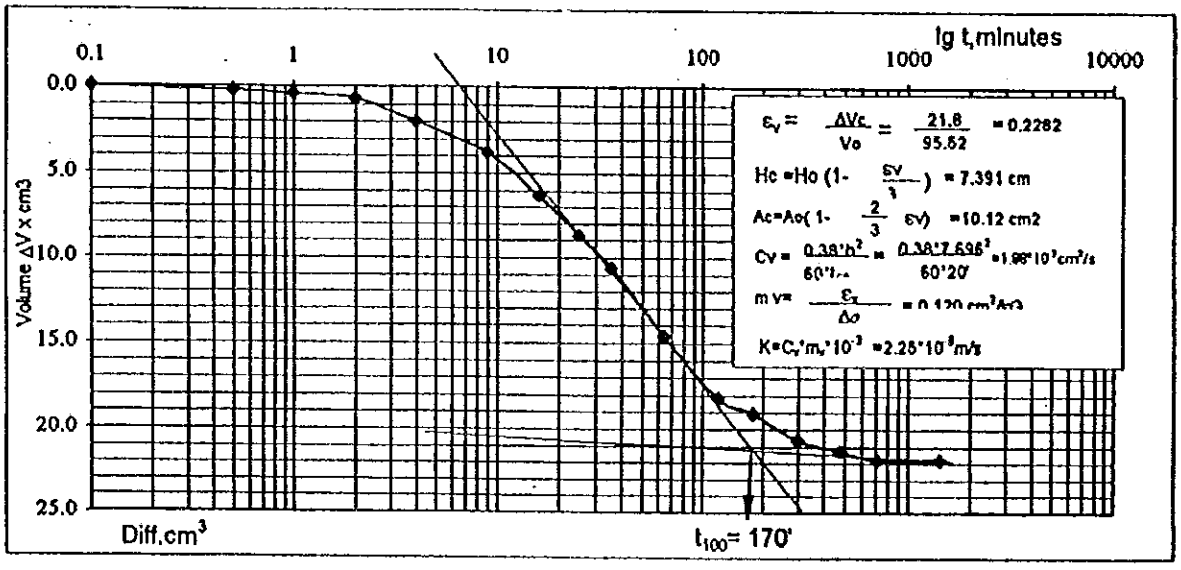
Test type : Cu-pwp

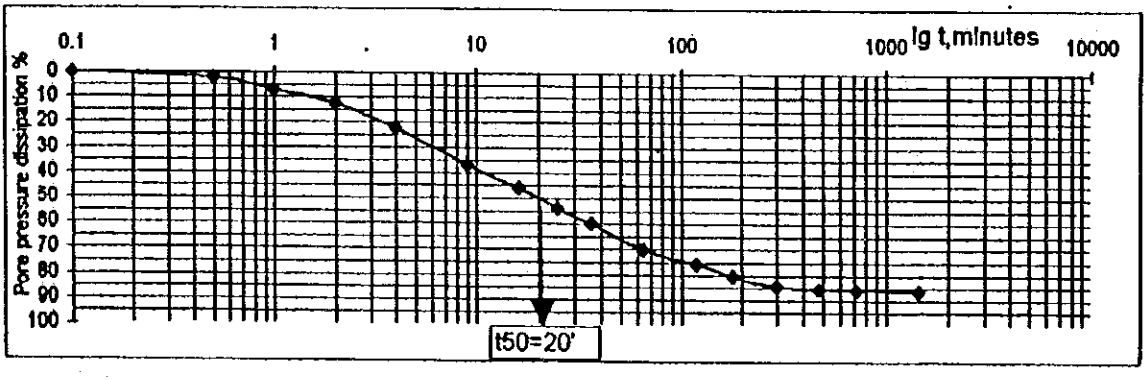
Project: Nam Son waste landfill

Test N$_o$: 1

Hole N$_o$ B1 Depth,m: 1.4-2.0 Load ring N$_o$: 0.724 kG/div Date started : 29/11/199

Test type	~~with~~ / without side drains		DATE	Clock time	Time t, minutes	Lgt	Volume change		Pore pressure		
							gauge,c m^3	Diff, cm^3	Reading kG/cm^2	Diff kG/cm^2	Diss,%
Cell pressure	3.00	kG/cm^2	29/11/98	7h35	0		77.0	0.0	2.95		0
Vertical stress					30"		76.8	0.2	2.90		3
Back stress	1.00				1'		76.6	0.4	2.81		7
PwP After build up	2.95				2'		76.3	0.7	2.70		13
Difference	2.00				4'		75.0	2.0	2.52		22
Effective pressure	2.00				9'		73.2	3.8	2.23		37
t_{100} =	170	min			16'		70.7	6.3	2.05		46
$t_v = a * t_{100} = 0.51 * 80 =$		86.7			25'		68.3	8.7	1.90		54
RATE OF DISPLACEMENT				8h11	36'		66.4	10.6	1.78		60
				8h39	64'		62.4	14.6	1.58		70
				10h35	120'		58.8	18.2	1.47		76
				11h35	180'		57.9	19.1	1.38		81
$\frac{c_v H_{tb}}{100.t_v.8} = \frac{0.05 * 73.91}{86.7'} = 0.0416$				13h35	300'		56.4	20.6	1.30		85
				16h35	480'		55.7	21.3	1.28		86
				20h00'	720'		55.2	21.8	1.27		86
Selcsted v =0.036 mm/min			30/11	7h35	1440'		55.2	21.8	1.26		87
					2880'						
					4320'						





Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr . Do Minh Toan

VIWASE

TRIXIAL COMPRESSION TEST

TEST TYPE Cu-PwP

Project : Nam Son Waste Landfill

Test N_o 1

Cell N_o

Load ring N_o 0.724

Date started : 30/11/98

Test type CU	Load ring constant	With / Without Side drains	Cell pressure σ_3= 3.00 kG/cm²
Rate :	CR = 0.724 kG/Div	Membranes	Vertical stress σ_1 = kG/cm²
Specimen prior to shearing			Back pressure Po = 1.0 kG/cm²
Height H= mm 73.91	Area A = 1012 mm²	Volume V= 74797 mm³	Eff.cell pressure σ3'= 2.0 kG/cm²

Strain		Load		U	A	Deviator stress kG/cm²			Stresses kG/cm²						Volume	
Div 0.01 mm	ε,%	Div 0.01 mm	kG	kG/cm²	cm²	Stress	mem bcorr	$\sigma_1-\sigma_3$	σ_1'	σ_3'	$\frac{\sigma_1-\sigma_3}{2}$	$\frac{\sigma_1+\sigma_3}{2}$	$\frac{\sigma_1'+\sigma_3}{2}$	σ_1/σ_3	V	ΔV
0	0.00	0.0	0.000	1.26	10.12	0.00	0	0.00	1.74	1.74	0.00	3.00	1.74	1.00		
10	0.13	0.7	0.507	1.29	10.13	0.05		0.05	1.76	1.71	0.03	3.03	1.74	1.03		
20	0.25	1.5	1.086	1.38	10.15	0.11		0.11	1.73	1.62	0.05	3.05	1.67	1.07		
30	0.38	2.0	1.448	1.41	10.16	0.14		0.14	1.73	1.59	0.07	3.07	1.66	1.09		
40	0.50	2.9	2.100	1.46	10.17	0.21		0.21	1.75	1.54	0.10	3.10	1.64	1.13		
50	0.63	4.0	2.896	1.49	10.18	0.28		0.28	1.79	1.51	0.14	3.14	1.65	1.19		
100	1.25	11.0	7.964	1.56	10.25	0.78		0.78	2.22	1.44	0.39	3.39	1.83	1.54		
150	1.88	28.0	20.272	1.71	10.31	1.97		1.97	3.26	1.29	0.98	3.98	2.27	2.52		
200	2.50	42.5	30.770	1.81	10.38	2.96		2.96	4.15	1.19	1.48	4.48	2.67	3.48		
250	3.13	52.0	37.648	1.86	10.45	3.60		3.60	4.74	1.14	1.80	4.80	2.94	4.16		
300	3.75	65.0	47.060	1.86	10.51	4.48		4.48	5.62	1.14	2.24	5.24	3.38	4.93		
350	4.38	72.0	52.128	1.86	10.58	4.93		4.93	6.07	1.14	2.46	5.46	3.60	5.32		
400	5.00	73.0	52.852	1.81	10.65	4.96		4.96	6.15	1.19	2.48	5.48	3.67	5.17		
450	5.63	73.8	53.431	1.76	10.72	4.98		4.98	6.22	1.24	2.49	5.49	3.73	5.02		
500	6.25	73.5	53.214	1.71	10.79	4.93		4.93	6.22	1.29	2.46	5.46	3.75	4.82		
550	6.88	73.0	52.852	1.70	10.87	4.86		4.86	6.16	1.30	2.43	5.43	3.73	4.74		
600	7.50	72.0	52.128	1.70	10.94	4.76		4.76	6.06	1.30	2.38	5.38	3.68	4.67		
650	8.13				11.01											
700	8.75				11.09											
750	9.38				11.17											
800	10.00				11.24											
850	10.63				11.32											
900	11.25				11.40											
950	11.88				11.48											
1000	12.50				11.57											
1050	13.13				11.65											
1100	13.75				11.73											
1150	14.38				11.82											
1200	15.00				11.91											
1250	15.63				11.99											
1300	16.25				12.08											
1350	16.88				12.17											
1400	17.50				12.27											

Tested by :

Checked by

VIWASE

TRIAXIAL COMPRESSION TEST

Project :	Nam Son Waste Landfill	**Test type:**	CU-PWP
Borehole :	B1	**Test No :**	1
Depth :	1.4-2.0 m	**Date started :**	1/12/98

Soil description : Hard purpnish brown sandy CLAY of intermediate plasticity

Specimen preparation

INITIAL CONDITIONS			
Height of specimen	Hi =	80	mm
Diameter of specimen	di =	39	mm
Area of specimen	Ai =	1194	mm^2
Volume of specimen	Vi =	95520	mm^3
STAGE PRIOR TO CONSOLIDATION or SHEARING			
Change in height	ΔHu =		mm
change in volume	ΔVu =		mm^3
Height at end of stage	Hps =		mm
Volume at end of stage	Vps =		mm^3
Area at end of stage	Aps =		mm^2
CONSOLIDATION STAGE			
Change in height	ΔHc =		mm
change in volume	ΔVc =		mm^3
Height at end of stage	Hps =	72.69	mm
Volume at end of stage	Vps =	70945	mm^3
Area at end of stage	Aps =	976	mm^2
AFTER TESTING			
Change in volume	ΔV =		mm^3
Volume at end of stage	Vi		mm^3
Height of specimen	Hi		mm
Diameter of specimen	di		mm

PHISIAL PROPERTIES	SPECIMEN Intial	SPECIMEN After test
Specific gravity	2.68	2.68
Wet mass of specimen (g)		
Dry mass of specimen (g)		
Mass of Water (g)		
Moisture content (%)	18	17
Wet density (g/cm^3)	2.01	2.16
Dry density (g/cm^3)	1.70	1.84
Void ratio	0.573	0.455
Degree of saturation (%)	84	100

DATA OF TEST

Test type : Cu

With / ~~Without~~ Pore pressure measurements

~~With~~ / Without Side drains

With / ~~Without~~ Saturation

~~With~~ / Without Back pressure

Cell pressure	σ_3= 5.00	kG/cm^2
Vetical stress	σ_1=	kG/cm^2
Back pressure	Ub= 1.00	kG/cm^2
Intial effec.cell pressure	σ_3'= 4.00	kG/cm^2
Intial effec.Vertical pressure	σ_1'=	kG/cm^2

MODE OF FAILURE

Tested by : Eng . Nguyen Viet Tinh

Checked : Dr . Do Minh Toan

VIWASE

TRIAXIAL COMPRESSION TEST

Test type : cu-pwp

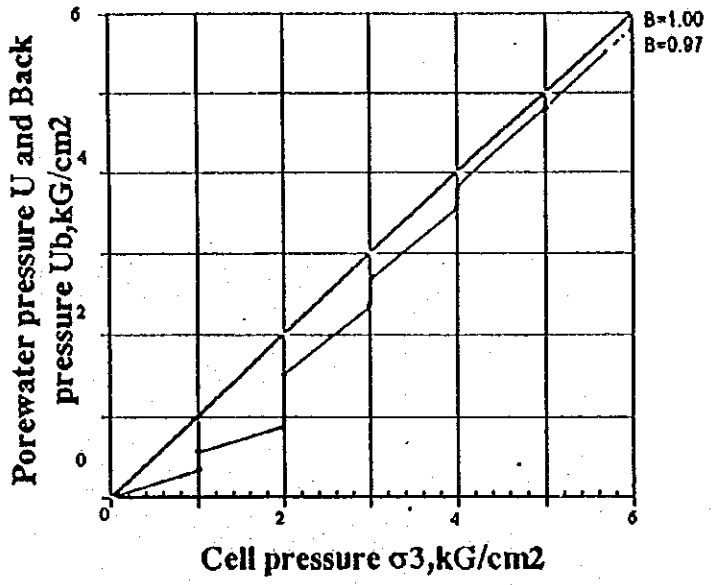
Project : Nam Son Waste Landfill — Test N_o : 1

Hole N_o B1 — Depth: 1.4-2.0 m — Load rinh N_o : 0.724kG/Div — Date started : 1/12/98

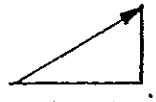
SATURATION PROCEDURE :

Test type : Cu-pwp	~~With~~ / Without Side drains	load ring constant	Piston area
Cell pressure : 1.0 ,2.0 ,3.0, 4.0,5.0 kG/cm²		Back pressure increments : 0.9 ; 1.9 ; 2.9 ;3.9. kG/cm²	
Final cell pressure : 5.00 kG/cm²		Final back pressure : 3.90 kG/cm²	
PWP after saturation : 4.87 kG/cm²		Value of B achieved : 0.99	
Effect pressure after saturation : kG/cm²		Degree of saturation reached : 97 %	

Date time	Pressure (kG/cm²) Cell	Back	PWP	ΔPWP	B Value	Strain div 0.01mm	Back pressure(volume change mm³) Before	After	Diff	Cell volume change (mm³) Before	After	Diff	Console	exp
1/12/98	0	0	0	0	0		28.0							
	1.00		0.31		0.31									
	1.00	0.90	0.45											
2/12/98	2.00		0.89		0.44									
	2.00	1.90	1.83											
3/12/98	3.00		2.35		0.72									
	3.00	2.90	2.69											
4/12/98	4.00		3.68		0.89									
	4.00	3.90	3.88											
	5.00		4.87		0.99			60.0						



Porepressure respose to cell pressure increment



Slope=

Pore pressure change due to increase back pressure

$$B = \frac{PWP - PWPo}{\Delta\sigma} = 0.99$$

Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr . Do Minh Toan

VIWASE

TRIAXIAL COMPRESSION TEST

Test type : Cu-pwp

Project: Nam Son waste landfill — Test N_o: 1

Hole N_o: B1 — Depth,m: 1.4-2.0 — Load ring N_o: 0.724 kG/div — Date started : 5/12/98

Test type: ~~with~~ / without side drains

Cell pressure	5.00	kG/cm²
Vertical stress		
Back stress	1.00	
PwP After build up	4.95	
Difference	4.00	
Effective pressure	4.00	

t_{100} = 280 min

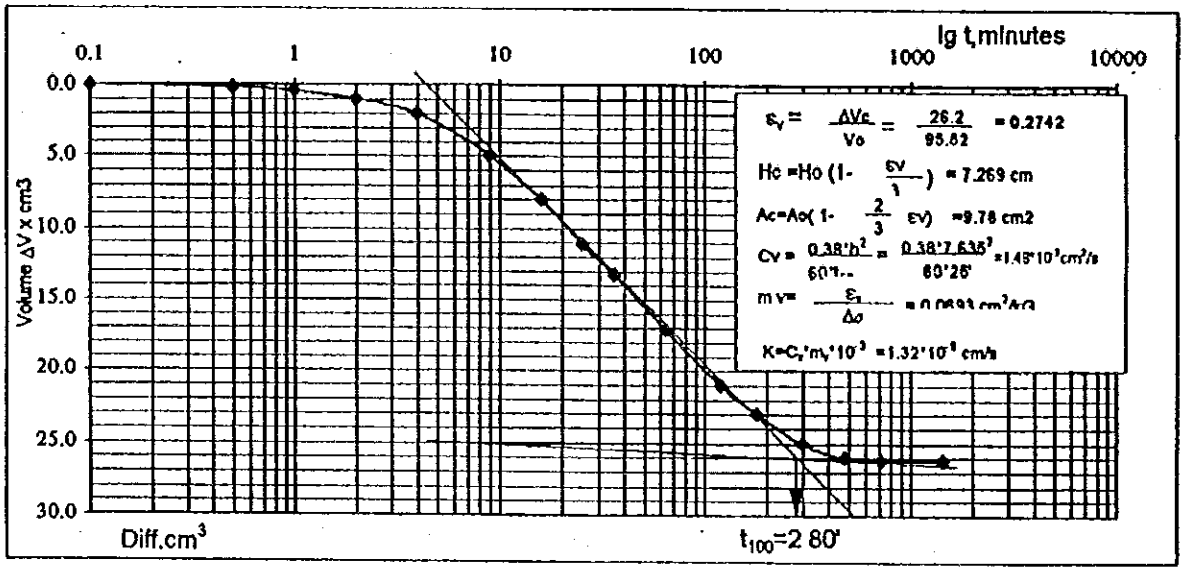
$t_v = a * t_{100} = 0.51 * 80 =$ 142

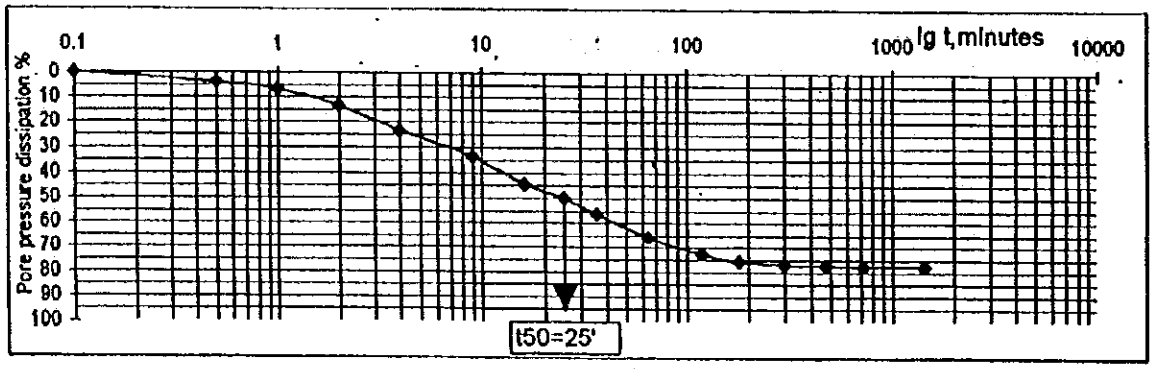
RATE OF DISPLACEMENT

$$\frac{\varepsilon_v H_{tb}}{100 t_v 8} = \frac{0.05 * 72.56}{142} = 0.0256$$

Selected v = 0.036 mm/min

DATE	Clock time	Time t, minutes	Lgt	Volume change: gauge,o m³	Volume change: Diff, cm³	Pore pressure: Reading kG/cm²	Pore pressure: Diff kG/cm²	Diss,%
5/12/98	7h35	0		60.0	0.0	4.95		0
		30"		59.8	0.2	4.80		4
		1'		59.6	0.4	4.69		7
		2'		59.0	1.0	4.41		14
		4'		58.0	2.0	4.02		24
		8'		55.0	5.0	3.62		34
		16'		52.0	8.0	3.19		45
		25'		48.9	11.1	2.98		50
	8h11	36'		46.8	13.2	2.72		56
	8h39	64'		42.9	17.1	2.35		66
	10h35	120'		39.0	21.0	2.08		73
	11h35	180'		37.0	23.0	1.96		76
	13h35	300'		35.0	25.0	1.91		77
	16h35	480'		34.0	26.0	1.90		77
	20h00'	720'		33.8	26.2	1.88		78
6/12	7h35	1440'		33.8	26.2	1.89		78
		2880'						
		4320'						





Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr . Do Minh Toan

VIWASE

TRIXIAL COMPRESSION TEST

TEST TYPE Cu-PwP

Project : Nam Son Waste Landfill — Test N$_o$ 1

Cell N$_o$ — Load ring N$_o$ 0.724 — Date started : 6/12/98

Test type CU	Load ring constant	With / Without Side drains	Cell pressure σ_3= 5.00 kG/cm^2
Rate :	CR = 0.724 kG/Div	Membranes	Vertical stress σ_1 = kG/cm^2
Specimen prior to shearing			Back pressure Po = 1.0 kG/cm^2
Height H= mm 72.69	Area A = 976 mm^2	Volume V= 70945 mm^3	Eff.cell pressure σ3'= 4.0 kG/cm^2

Strain		Load		U	A	Deviatorsress kG/cm^2			Stresses kG/cm^2						Volume	
Div 0.01 mm	ε,%	Div 0.01 mm	kG	kG/cm^2	cm^2	Stress	mem bcorr	$\sigma_1-\sigma_3$	σ_1'	σ_3'	$\frac{\sigma_1-\sigma_3}{2}$	$\frac{\sigma_1+\sigma_3}{2}$	$\frac{\sigma_1'+\sigma_3}{2}$	σ_1/σ_3	V	ΔV
0	0.00	0.0	0.000	1.88	9.76	0.00	0	0.00	3.12	3.12	0.00	5.00	3.12	1.00		
10	0.13	3.5	2.534	1.90	9.77	0.26		0.26	3.36	3.10	0.13	5.13	3.23	1.08		
20	0.25	4.2	3.041	1.95	9.78	0.31		0.31	3.36	3.05	0.16	5.16	3.21	1.10		
30	0.38	5.0	3.620	2.08	9.80	0.37		0.37	3.29	2.92	0.18	5.18	3.10	1.13		
40	0.50	6.0	4.344	2.15	9.81	0.44		0.44	3.29	2.85	0.22	5.22	3.07	1.16		
50	0.63	6.8	6.371	2.20	9.82	0.65		0.65	3.45	2.80	0.32	5.32	3.12	1.23		
100	1.25	20.0	14.480	2.24	9.88	1.47		1.47	4.23	2.76	0.73	5.73	3.49	1.53		
150	1.88	36.0	26.064	2.30	9.95	2.62		2.62	5.32	2.70	1.31	6.31	4.01	1.97		
200	2.50	47.0	34.028	2.35	10.01	3.40		3.40	6.05	2.65	1.70	6.70	4.35	2.28		
250	3.13	55.2	39.965	2.32	10.07	3.97		3.97	6.65	2.68	1.98	6.98	4.66	2.48		
300	3.75	72.5	52.490	2.30	10.14	5.18		5.18	7.88	2.70	2.59	7.59	5.20	2.92		
350	4.38	85.0	66.780	2.28	10.21	6.74		6.74	9.46	2.72	3.37	8.37	6.09	3.48		
400	5.00	100.0	72.400	2.25	10.27	7.05		7.05	9.80	2.75	3.52	8.52	6.27	3.56		
450	5.63	100.0	72.400	2.22	10.34	7.00		7.00	9.78	2.78	3.50	8.50	6.28	3.52		
500	6.25	102.0	73.848	2.20	10.41	7.09		7.08	9.89	2.80	3.55	8.55	6.35	3.53		
550	6.88	102.0	73.848	2.18	10.48	7.05		7.05	9.87	2.82	3.52	8.52	6.34	3.50		
600	7.50	100.0	72.400	2.18	10.55	6.86		6.86	9.68	2.82	3.43	8.43	6.25	3.43		
650	8.13	98.0	70.952	2.17	10.62	6.68		6.68	9.51	2.83	3.34	8.34	6.17	3.36		
700	8.75				10.70											
750	9.38				10.77											
800	10.00				10.84											
850	10.63				10.92											
900	11.25				11.00											
950	11.88				11.08											
1000	12.50				11.15											
1050	13.13				11.23											
1100	13.75				11.32											
1150	14.38				11.40											
1200	15.00				11.48											
1250	15.63				11.57											
1300	16.25				11.65											
1350	16.88				11.74											
1400	17.50				11.83											

Tested by :

Checked by

VIWASE

TRIAXIAL COMPRESSION TEST

(SUMMARY AND REPORT DATA SHEET)

Test No: 2

Test type: Cu

Soil description :Hard,yellowish grey sandy SILT of intermediate plasticity

Project: Nam Son Waste Landfill

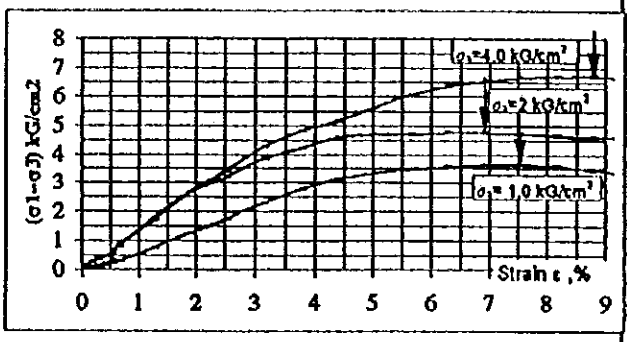
Type of sample : Undisturbed

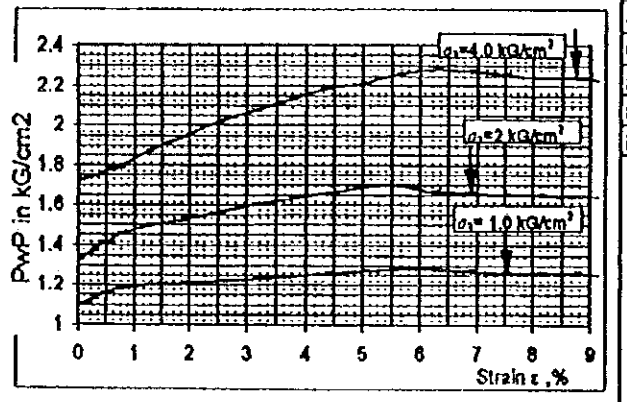
Borehole No: B2

Depth of sample: 1.6-2.0 m

Shearing rate :

Date : 13/12/98



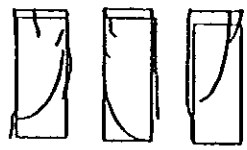


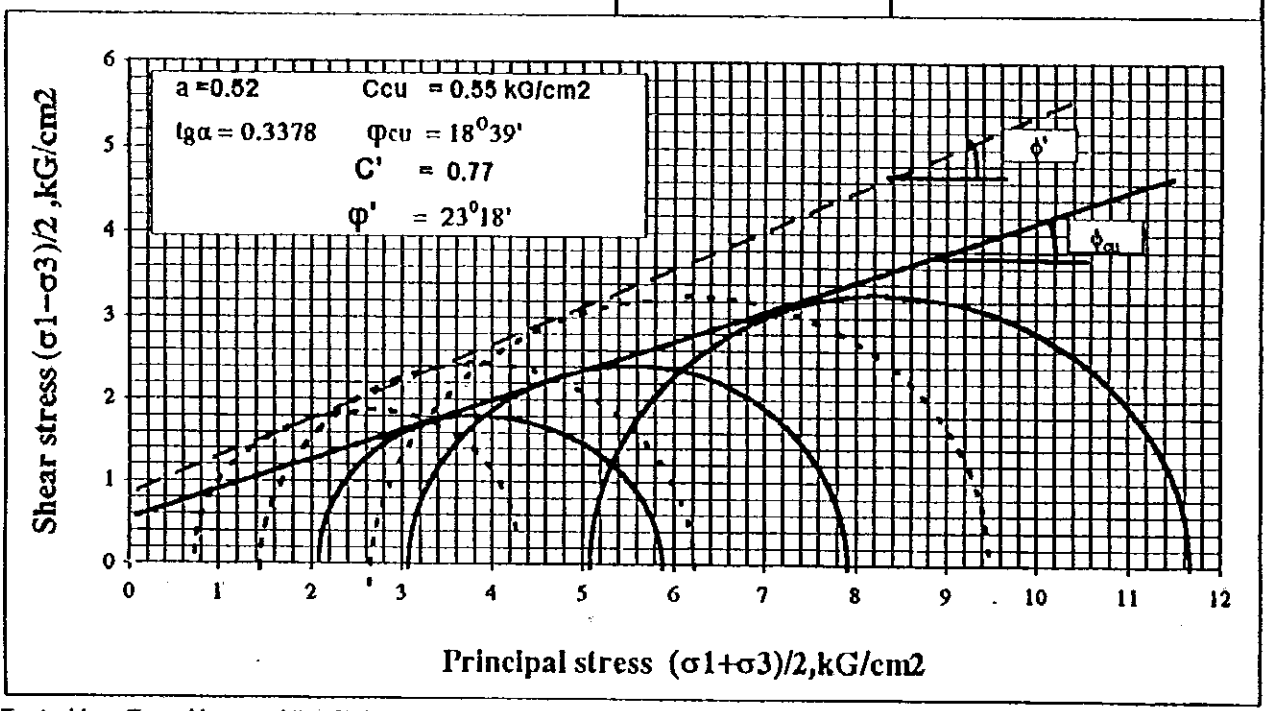
Specimen properties and shearing stage(at failure)

W_i : % ; I_b : ; I_t : H_0: mm; D_0: mm

	Specimens	Unit	A	B	C
INITIAL	Wet density γ_w	g/cm3	1.89	1.88	1.90
	Moisture W	%	25	25	24
	Drydensity γ_d	g/cm3	1.51	1.50	1.53
FINAL	Wet density γ_w	g/cm3	2.00	2.05	2.15
	Moisture W	%	26	23	18
	Drydensity γ_d	g/cm3	1.59	1.67	1.82
Lateral stress σ_3		kG/cm²	1	2	4
Strain ε		%	7.50	6.88	8.75
Deviator stress $\sigma_1-\sigma_3$		kG/cm²	3.63	4.86	6.68
Shear stress $(\sigma_1-\sigma_3)/2$		kG/cm²	1.81	2.43	3.34
Celer morh circle($\sigma_1+\sigma_3/2$		kG/cm²	3.81	5.43	8.34
PWP	UF	kG/cm²	1.26	1.66	2.24
Effective morh $(\sigma'_1+\sigma'3)/2$		kG/cm²	2.55	3.77	6.1
Max total stress σ_1		kG/cm²	5.63	7.86	11.68

ILUSTATIVE DESCRIPTION OF SPECIMEN AT FAILURE





Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr. Do Minh Toan

VIWASE

TRIAXIAL COMPRESSION TEST

Project :	Nam Son Waste Landfill	**Test type:**	CU-PWP
Borehole :	B2	**Test No :**	2
Depth :	1.6-2.0 m	**Date started :**	26/11/199

Soil description : Hard yellowish grey sandy SILT of intermediate plasticity

Specimen preparation

INITIAL CONDITIONS			
Height of specimen	Hi =	80	mm
Diameter of specimen	di =	39	mm
Area of specimen	Ai =	1194	mm^2
Volume of specimen	Vi =	95520	mm^3
STAGE PRIOR TO CONSOLIDATION or SHEARING			
Change in height	ΔHu =		mm
change in volume	ΔVu =		mm^3
Height at end of stage	Hps =		mm
Volume at end of stage	Vps =		mm^3
Area at end of stage	Aps =		mm^2
CONSOLIDATION STAGE			
Change in height	ΔHc =		mm
change in volume	ΔVc =		mm^3
Height at end of stage	Hps =	76.09	mm
Volume at end of stage	Vps =	81949	mm^3
Area at end of stage	Aps =	1077	mm^2
AFTER TESTING			
Change in volume	ΔV =		mm^3
Volume at end of stage	Vi		mm^3
Height of specimen	Hi		mm
Diameter of specimen	di		mm

PHISIAL PROPERTIES	SPECIMEN Intial	SPECIMEN After test
Specific gravity	2.70	2.70
Wet mass of specimen (g)		
Dry mass of specimen (g)		
Mass of Water (g)		
Moisture content (%)	25	26
Wet density (g/cm^3)	1.89	2.00
Dry density (g/cm^3)	1.51	1.59
Void ratio	0.786	0.701
Degree of saturation (%)	84	100

DATA OF TEST

Test type : Cu

With / ~~Without~~ Pore pressure measurements

~~With~~ / Without Side drains

With / ~~Without~~ Saturation

~~With~~ / Without Back pressure

Cell pressure	σ_3= 2.00	kG/cm^2
Vetical stress	σ_1=	kG/cm^2
Back pressure	Ub= 1.00	kG/cm^2
Intial effec.cell pressure	σ_3'= 1.00	kG/cm^2
Intial effec.Vertical pressure	σ_1'=	kG/cm^2

MODE OF FAILURE

Tested by : Eng . Nguyen Viet Tinh

Checked : Dr . Do Minh Toan

TRIAXIAL COMPRESSION TEST

Test type : cu-pwp

Project :

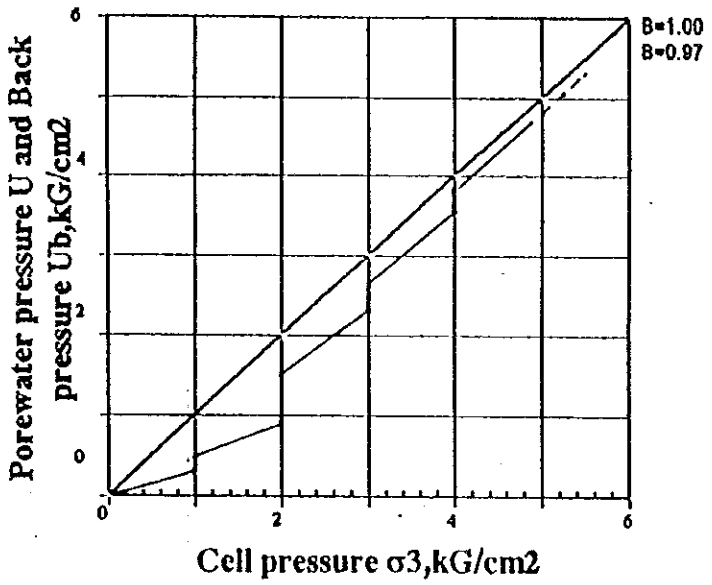
Test N_o : 2

Hole N_o B2 Depth: 1.6-2.0 m Load rinh N_o : 0.72kG/Div Date started : 26/11/1998

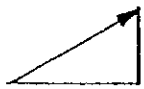
SATURATION PROCEDURE :

Test type : Cu-pwp	~~With~~ / Without Side drains	load ring constant	Piston area
Cell pressure : 1.0 ,2.0 ,3.0, 4.0,5.0 kG/cm²		Back pressure increments : 0.9 ; 1.9 ; 2.9 ;3.9. kG/cm²	
Final cell pressure : 5.00 kG/cm²		Final back pressure : 3.9 kG/cm²	
PWP after saturation : 4.85 kG/cm²		Value of B achieved : 0.97	
Effect pressure after saturation : kG/cm²		Degree of saturation reached : 97 %	

Date	Pressure (kG/cm²)				B	Strain	Back pressure(volume change mm³)			Cell volume change (mm³)				
time	Cell	Back	PWP	ΔPWP	Value	div 0.01mm	Before	After	Diff	Before	After	Diff	Console	exp
26/11/98	0	0	0	0	0		54.0							
	1.00		0.25		0.25									
	1.00	0.90	0.40											
27/11	2.00		0.90		0.50									
	2.00	1.90	1.63											
28/11	3.00		2.30		0.67									
	3.00	2.90	2.70											
29/11	4.00		3.62		0.92									
	4.00	3.90	3.88											
	5.00		4.85		0.99			70.0						



Porepressure respose to cell pressure Increment



Slope=

Pore pressure change due to increase back pressure

$$B = \frac{PWP - PWPo}{\Delta\sigma} = 0.97$$

Tested by : Eng . Nguyen Viet Tinh

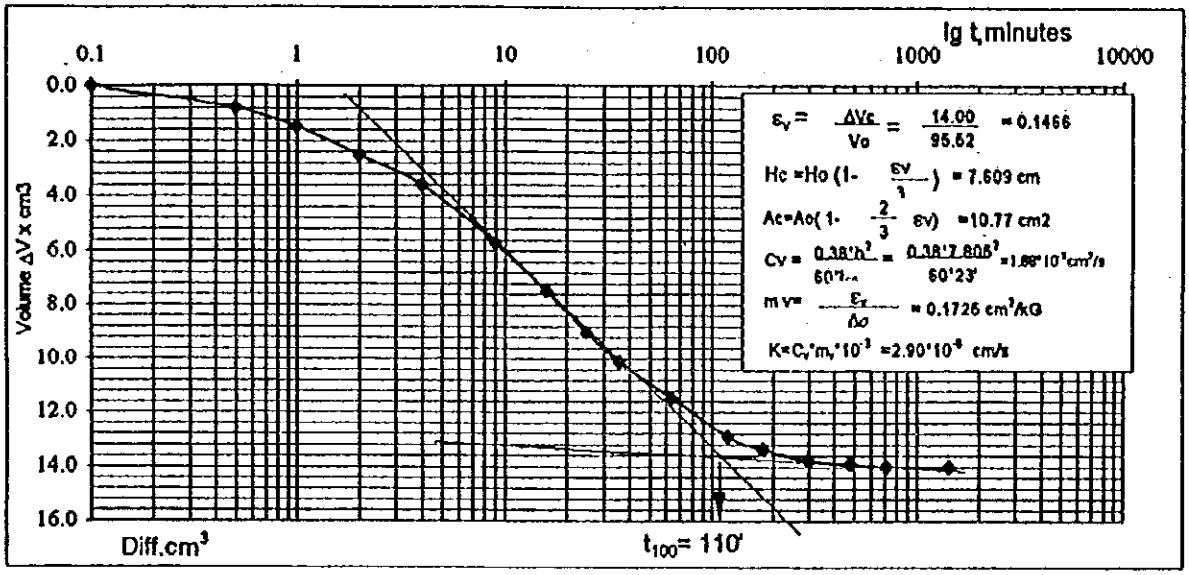
Checked by : Dr . Do Minh Toan

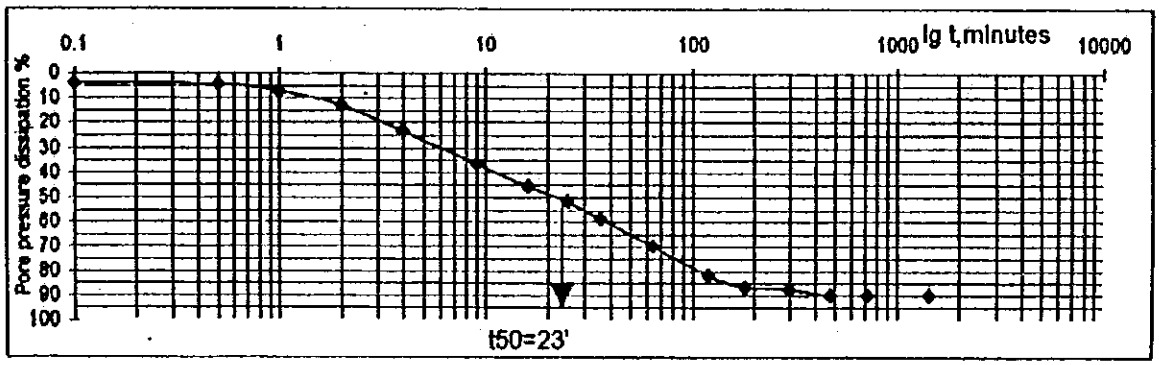
VIWASE **TRIAXIAL COMPRESSION TEST** Test type : Cu-pwp

Project: Nam Son Waste Lanfill Test N_o : 2

Hole N_o B2 Depth: 1.6-2.0 m Load ring N_o : 0.726 kG/div Date started : 30/11/1998

Test type	~~with~~ / without side drains		DATE	Clock time	Time t, minutes	Lgt	Volume change		Pore pressure		
							gauge,o m^3	Diff, cm^3	Reading kG/cm^2	Diff kG/cm^2	Dis,%
Cell pressure	2.00	kG/cm²	30/11/98	8h35	0		70.0	0.0	1.95		4
Vertical stress					30"		69.2	0.8	1.95		5
Back stress	1.00				1'		68.5	1.5	1.92		7
PwP After build up	1.99				2'		67.5	2.5	1.88		13
Difference	1.00				4'		66.4	3.6	1.76		23
Effective pressure	1.00				9'		64.3	5.7	1.63		36
t_{100} =	110 min				16'		62.5	7.5	1.54		45
$t_f = a * t_{100} = 0.51 * 110 =$	56.1				25'		61.0	9.0	1.48		52
RATE OF DISPLACEMENT				8h11	36'		59.9	10.1	1.41		59
				8h38	64'		58.5	11.5	1.30		70
				10h35	120'		57.1	12.9	1.18		82
				11h35	180'		56.6	13.4	1.13		87
$\frac{\varepsilon_f.H_{po}}{100.t_f.8} = \frac{0.05 * 76.09}{56.1} = 0.0678$				13h35	300'		56.2	13.8	1.12		88
				16h35	480'		56.1	13.9	1.10		90
				20h35'	720'		56.0	14.0	1.10		90
Selected v = 0.038 mm/min			1/12	8h35	1440'		56.0	14.0	1.10		90
					2880'						
					4320'						





Tested by : Eng . Nguyen Viet Tinh Checked by : Dr . Do Minh Toan

VIWASE

TRIXIAL COMPRESSION TEST

TEST TYPE Cu-PwP

Project : Nam Son Waste Landfill

Test N_o 2

Cell N_o

Load ring N_o 0.728

Date started : 1/12/98

Test type CU	Load ring constant	~~With~~ / Without Side drains	Cell pressure σ_3= 2.00 kG/cm²
Rate :	CR = 0.728 kG/Div	Membranes	Vertical stress σ_1 = kG/cm²
Specimen prior to shearing			Back pressure Po = 1.0 kG/cm²
Height H= mm 76.09	Area A = 1077 mm²	Volume V= 81949 mm³	Eff.cell pressure σ3'= 1.0 kG/cm²

Strain		Load		U	A	Deviator stress kG/cm²		Stresses kG/cm²							Volume	
Div 0.01 mm	ε,%	Div 0.01 mm	kG	kG/cm²	cm²	Stress	mem bcorr	$\sigma_1-\sigma_3$	σ_1'	σ_3'	$\frac{\sigma_1-\sigma_3}{2}$	$\frac{\sigma_1+\sigma_3}{2}$	$\frac{\sigma_1'+\sigma_3}{2}$	σ_1/σ_3	V	ΔV
0	0.00	0.0	0.000	1.10	10.77	0.00	0	0.00	0.90	0.90	0.00	2.00	0.90	1.00		
10	0.13	1.0	0.726	1.11	10.78	0.07		0.07	0.96	0.89	0.03	2.03	0.92	1.08		
20	0.25	1.3	0.944	1.13	10.80	0.09		0.09	0.96	0.87	0.04	2.04	0.91	1.10		
30	0.38	1.8	1.307	1.15	10.81	0.12		0.12	0.97	0.85	0.06	2.06	0.91	1.14		
40	0.50	2.8	2.033	1.16	10.82	0.19		0.19	1.03	0.84	0.09	2.09	0.93	1.22		
50	0.63	4.2	3.049	1.18	10.84	0.28		0.28	1.10	0.82	0.14	2.14	0.96	1.34		
100	1.25	8.1	5.881	1.20	10.91	0.54		0.54	1.34	0.80	0.27	2.27	1.07	1.67		
150	1.88	14.6	10.527	1.21	10.98	0.96		0.96	1.75	0.79	0.48	2.48	1.27	2.21		
200	2.50	20.0	18.876	1.22	11.05	1.71		1.71	2.49	0.78	0.85	2.85	1.63	3.19		
250	3.13	35.0	25.410	1.23	11.12	2.29		2.29	3.06	0.77	1.14	3.14	1.91	3.97		
300	3.75	42.1	30.565	1.24	11.19	2.73		2.73	3.49	0.76	1.37	3.37	2.13	4.59		
350	4.38	48.2	34.993	1.26	11.26	3.11		3.11	3.85	0.74	1.55	3.55	2.29	5.20		
400	5.00	51.5	37.389	1.27	11.34	3.30		3.30	4.03	0.73	1.65	3.65	2.38	5.52		
450	5.63	54.3	39.422	1.28	11.41	3.45		3.45	4.17	0.72	1.73	3.73	2.45	5.80		
500	6.25	56.0	40.656	1.28	11.49	3.54		3.54	4.26	0.72	1.77	3.77	2.49	5.92		
550	6.88	57.5	41.745	1.27	11.57	3.61		3.61	4.34	0.73	1.80	3.80	2.53	5.94		
600	7.50	58.2	42.259	1.26	11.64	3.63		3.63	4.37	0.74	1.81	3.81	2.55	5.90		
650	8.13	58.0	42.108	1.26	11.72	3.59		3.59	4.33	0.74	1.80	3.80	2.54	5.85		
700	8.75	56.0	40.656	1.26	11.80	3.44		3.44	4.18	0.74	1.72	3.72	2.48	5.65		
750	9.38	55.0	39.930	1.25	11.88	3.36		3.36	4.11	0.75	1.68	3.68	2.43	5.48		
800	10.00	54.5	39.567	1.24	11.97	3.31		3.31	4.07	0.76	1.65	3.65	2.41	5.35		
850	10.63				12.05											
900	11.25				12.14											
950	11.88				12.22											
1000	12.50				12.31											
1050	13.13				12.40											
1100	13.75				12.49											
1150	14.38				12.58											
1200	15.00				12.67											
1250	15.63				12.76											
1300	16.25				12.86											
1350	16.88				12.96											
1400	17.50				13.05											

Tested by :

Checked by

VIWASE

TRIAXIAL COMPRESSION TEST

Project :	Nam Son Waste Landfill	**Test type:**	CU-PWP
Borehole :	B2	**Test No :**	2
Depth :	1.6-2.0 m	**Date started :**	2/12/98

Soil description : Hard yellowish grey sandy SILT of intermediate plasticity

Specimen preparation

INITIAL CONDITIONS			
Height of specimen	Hi =	80	mm
Diameter of specimen	di =	39	mm
Area of specimen	Ai =	1194	mm^2
Volume of specimen	Vi =	95520	mm^3
STAGE PRIOR TO CONSOLIDATION or SHEARING			
Change in height	ΔHu =		mm
change in volume	ΔVu =		mm^3
Height at end of stage	Hps =		mm
Volume at end of stage	Vps =		mm^3
Area at end of stage	Aps =		mm^2
CONSOLIDATION STAGE			
Change in height	ΔHc =		mm
change in volume	ΔVc =		mm^3
Height at end of stage	Hps =	74.43	mm
Volume at end of stage	Vps =	76440	mm^3
Area at end of stage	Aps =	1027	mm^2
AFTER TESTING			
Change in volume	ΔV =		mm^3
Volume at end of stage	Vi		mm^3
Height of specimen	Hi		mm
Diameter of specimen	di		mm

PHISIAL PROPERTIES	SPECIMEN	
	Intial	After test
Specific gravity	2.70	2.70
Wet mass of specimen (g)		
Dry mass of specimen (g)		
Mass of Water (g)		
Moisture content (%)	25	23
Wet density (g/cm^3)	1.88	2.05
Dry density (g/cm^3)	1.50	1.67
Void ratio	0.573	0.620
Degree of saturation (%)	84	100

DATA OF TEST

Test type : Cu

With / ~~Without~~ Pore pressure measurements

~~With~~ / Without Side drains

With / ~~Without~~ Saturation

~~With~~ / Without Back pressure

Cell pressure	σ_3= 3.00	kG/cm^2
Vetical stress	σ_1=	kG/cm^2
Back pressure	Ub= 1.00	kG/cm^2
Intial effec.cell pressure	σ_3'= 2.00	kG/cm^2
Intial effec.Vertical pressure	σ_1'=	kG/cm^2

MODE OF FAILURE

Tested by : Eng . Nguyen Viet Tinh

Checked : Dr . Do Minh Toan

VIWASE

TRIAXIAL COMPRESSION TEST

Test type : cu-pwp

Project : Nam Son Waste Landfill — Test N_o : 2

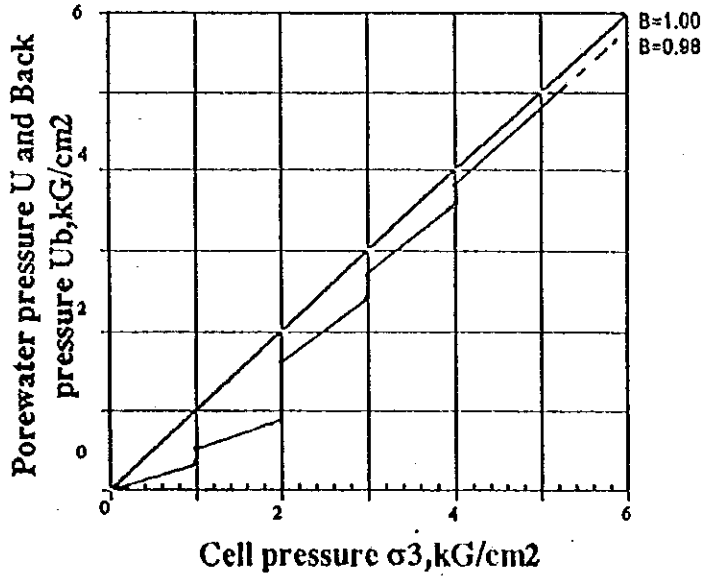
Hole N_o B2 — Depth: 1.6-2.0 m — Load rinh N_o : 0.726kG/Div — Date started : 2/12/98

SATURATION PROCEDURE :

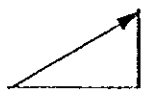
Test type : Cu-pwp	~~With~~ / Without Side drains	load ring constant	Piston area

Cell pressure : 1.0 ,2.0 ,3.0, 4.0,5.0 kG/cm²		Back pressure increments : 0.9 ; 1.9 ; 2.9 ;3.9. kG/cm²	
Final cell pressure : 5.00 kG/cm²		Final back pressure : 3.90 kG/cm²	
PWP after saturation : 4.84 kG/cm²		Value of B achieved : 0.98	
Effect pressure after saturation : kG/cm²		Degree of saturation reached : 98 %	

Date	Pressure (kG/cm²)				B	Strain dlv	Back pressure(volume change mm³)			Cell volume change (mm³)				
time	Cell	Back	PWP	ΔPWP	Value	0.01mm	Before	After	Diff	Before	After	Diff	Console +	- exp
2/12/98	0	0	0	0	0		42.0							
	1.00		0.27		0.27									
	1.00	0.90	0.44											
3/12	2.00		0.89		0.45									
	2.00	1.90	1.88											
4/12	3.00		2.41		0.73									
	3.00	2.90	2.87											
5/12/98	4.00		3.58		0.91									
	4.00	3.90	3.86											
	5.00		4.84		0.98			65.0						



Porepressure respose to cell pressure increment



Slope=

Pore pressure change due to increase back pressure

$$B = \frac{PWP - PWPo}{\Delta\sigma} = 0.98$$

Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr . Do Minh Toan

VIWASE # TRIAXIAL COMPRESSION TEST

Test type : Cu-pwp

Project: Nam Son waste landfill — Test N_o: 2

Hole N_o B2 — Depth: 1.6-2.0 m — Load ring N_o: 0.726 kG/div — Date started : 6/12/98

Test type: ~~with~~ / without side drains

Cell pressure	3.00	kG/cm²
Vertical stress		
Back stress	1.00	
PwP After build up	2.92	
Difference	2.00	
Effective pressure	2.00	

t_{100} = 190 min

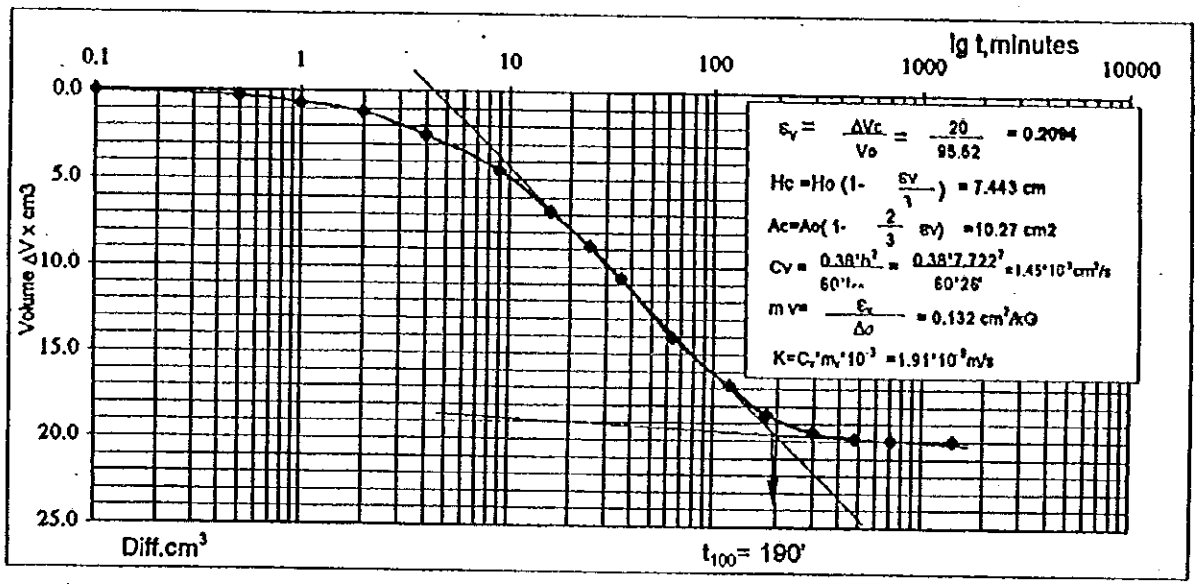
$t_v = a * t_{100} = 0.51 * 190 =$ 96.9

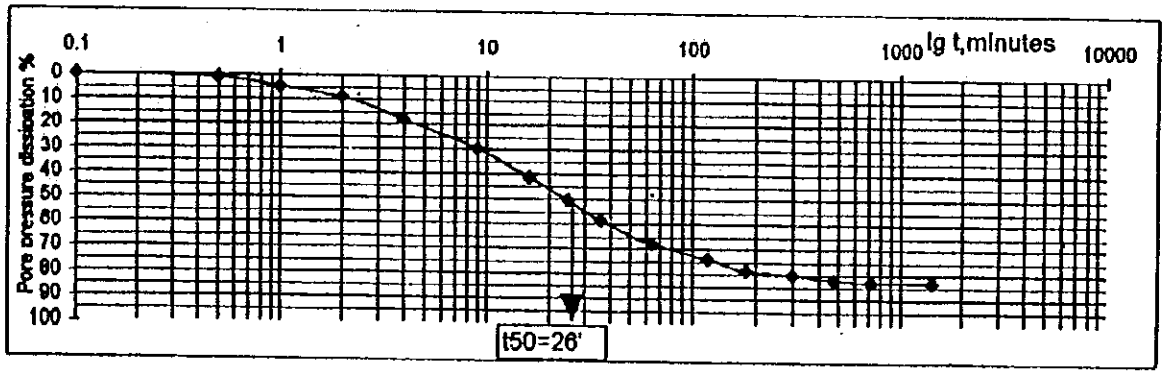
RATE OF DISPLACEMENT

$\frac{\varepsilon_f \cdot H_{pd}}{100 \cdot t_f \cdot 8} = \frac{0.05 * 74.43}{96.9'} = 0.0385$

Selected v =0.036 mm/min

DATE	Clock time	Time t, minutes	Lgt	Volume change gauge,c m³	Volume change Diff, cm³	Pore pressure Reading kG/cm²	Pore pressure Diff kG/cm²	Diss,%
6/12/98	7h35	0		65.0	0.0	2.92		0
		30"		64.7	0.3	2.90		1
		1'		64.3	0.7	2.83		5
		2'		63.8	1.2	2.75		9
		4'		62.5	2.5	2.58		18
		9'		60.5	4.5	2.35		30
		16'		58.2	6.8	2.13		41
		25'		56.2	8.8	1.95		51
	8h11	36'		54.3	10.7	1.80		58
	8h39	64'		50.9	14.1	1.62		68
	10h35	120'		48.2	16.8	1.50		74
	11h35	180'		46.5	18.5	1.41		79
	13h35	300'		45.5	19.5	1.38		80
	16h35	480'		45.1	19.9	1.34		82
	20h00'	720'		45.0	20.0	1.33		83
7/12/98	7h35	1440'		45.0	20.0	1.33		83
		2880'						
		4320'						





Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr . Do Minh Toan

VIWASE

TRIXIAL COMPRESSION TEST

TEST TYPE Cu-PwP

Project : Nam Son Waste Landfill

Test N_o 2

Cell N_o

Load ring N_o 0.726

Date started : 7/12/98

Test type CU	Load ring constant	With / Without Side drains	Cell pressure σ_3= 3.00 kG/cm²
Rate :	CR = 0.726 kG/Div	Membranes	Vertical stress σ_1 = kG/cm²
Specimen prior to shearing			Back pressure Po = 1.0 kG/cm²
Height H= mm 74.43	Area A = 1027 mm²	Volume V= 76440 mm³	Eff.cell pressure σ3'= 2.0 kG/cm²

Strain		Load		U	A	Deviator stress kG/cm²		Stresses kG/cm²							Volume	
Div 0.01 mm	ε,%	Div 0.01 mm	kG	kG/cm²	cm²	Stress	mem bcorr	$\sigma_1-\sigma_3$	σ_1'	σ_3'	$\frac{\sigma_1-\sigma_3}{2}$	$\frac{\sigma_1+\sigma_3}{2}$	$\frac{\sigma_1'+\sigma_3}{2}$	σ_1/σ_3	V	ΔV
0	0.00	0.0	0.000	1.33	10.27	0.00	0	0.00	1.67	1.67	0.00	3.00	1.67	1.00		
10	0.13	0.7	0.508	1.35	10.28	0.05		0.05	1.70	1.65	0.02	3.02	1.67	1.03		
20	0.25	1.5	1.089	1.37	10.30	0.11		0.11	1.74	1.63	0.05	3.05	1.68	1.06		
30	0.38	3.0	2.178	1.41	10.31	0.21		0.21	1.80	1.59	0.11	3.11	1.70	1.13		
40	0.50	4.1	2.977	1.45	10.32	0.29		0.29	1.84	1.55	0.14	3.14	1.69	1.19		
50	0.63	11.0	7.986	1.47	10.33	0.77		0.77	2.30	1.53	0.39	3.39	1.92	1.51		
100	1.25	25.3	18.368	1.49	10.40	1.77		1.77	3.28	1.51	0.88	3.88	2.39	2.17		
150	1.88	38.1	27.661	1.52	10.47	2.64		2.64	4.12	1.48	1.32	4.32	2.80	2.79		
200	2.50	45.6	33.106	1.56	10.53	3.14		3.14	4.58	1.44	1.57	4.57	3.01	3.18		
250	3.13	58.5	42.471	1.60	10.60	4.01		4.01	5.41	1.40	2.00	5.00	3.40	3.86		
300	3.75	63.2	45.883	1.63	10.67	4.30		4.30	5.67	1.37	2.15	5.15	3.52	4.14		
350	4.38	67.3	48.860	1.66	10.74	4.55		4.55	5.89	1.34	2.27	5.27	3.61	4.40		
400	5.00	70.5	51.183	1.69	10.81	4.73		4.73	6.04	1.31	2.37	5.37	3.68	4.61		
450	5.63	72.0	52.272	1.70	10.88	4.80		4.80	6.10	1.30	2.40	5.40	3.70	4.69		
500	6.25	73.0	52.998	1.67	10.95	4.84		4.84	6.17	1.33	2.42	5.42	3.75	4.64		
550	6.88	73.8	53.579	1.66	11.03	4.86		4.86	6.20	1.34	2.43	5.43	3.77	4.63		
600	7.50	72.0	52.272	1.65	11.10	4.71		4.71	6.06	1.35	2.35	5.35	3.70	4.49		
650	8.13	71.5	51.909	1.65	11.18	4.64		4.64	5.99	1.35	2.32	5.32	3.67	4.44		
700	8.75	71.0	51.546	1.64	11.25	4.58		4.58	5.94	1.36	2.29	5.29	3.65	4.37		
750	9.38				11.33											
800	10.00				11.41											
850	10.63				11.49											
900	11.25				11.57											
950	11.88				11.65											
1000	12.50				11.74											
1050	13.13				11.82											
1100	13.75				11.91											
1150	14.38				11.99											
1200	15.00				12.08											
1250	15.63				12.17											
1300	16.25				12.26											
1350	16.88				12.35											
1400	17.50				12.45											

Tested by :

Checked by

VIWASE

TRIAXIAL COMPRESSION TEST

Project :	Nam Son Waste Landfill	**Test type:**	CU-PWP
Borehole :	B2	**Test No :**	2
Depth :	1.6-2.0 m	**Date started :**	8/12/98

Soil description : Hard yellowish grey sandy SILT of intermediate plasticity

Specimen preparation

INITIAL CONDITIONS			
Height of specimen	Hi =	80	mm
Diameter of specimen	di =	39	mm
Area of specimen	Ai =	1194	mm^2
Volume of specimen	Vi =	95520	mm^3
STAGE PRIOR TO CONSOLIDATION or SHEARING			
Change in height	ΔHu =		mm
change in volume	ΔVu =		mm^3
Height at end of stage	Hps =		mm
Volume at end of stage	Vps =		mm^3
Area at end of stage	Aps =		mm^2
CONSOLIDATION STAGE			
Change in height	ΔHc =		mm
change in volume	ΔVc =		mm^3
Height at end of stage	Hps =	72.38	mm
Volume at end of stage	Vps =	69991	mm^3
Area at end of stage	Aps =	967	mm^2
AFTER TESTING			
Change in volume	ΔV =		mm^3
Volume at end of stage	Vi		mm^3
Height of specimen	Hi		mm
Diameter of specimen	di		mm

PHISIAL PROPERTIES	SPECIMEN Intial	SPECIMEN After test
Specific gravity	2.70	2.70
Wet mass of specimen (g)		
Dry mass of specimen (g)		
Mass of Water (g)		
Moisture content (%)	25	18
Wet density (g/cm^3)	1.89	2.15
Dry density (g/cm^3)	1.51	1.82
Void rataio	0.573	0.485
Degree of saturation (%)	84	100

DATA OF TEST

Test type : Cu

With / ~~With~~ Without — Pore pressure measurements

~~With~~ / Without — Side drains

With / ~~With~~ Without — Saturation

~~With~~ / Without — Back pressure

Cell pressure	σ_3= 5.00	kG/cm^2
Vetical stress	σ_1=	kG/cm^2
Back pressure	Ub= 1.00	kG/cm^2
Intial effec.cell pressure	σ_3'= 4.00	kG/cm^2
Intial effec.Vertical pressure	σ_1'=	kG/cm^2

MODE OF FAILURE

Tested by : Eng . Nguyen Viet Tinh

Checked : Dr . Do Minh Toan

VIWASE # TRIAXIAL COMPRESSION TEST

Test type : Cu-pwp

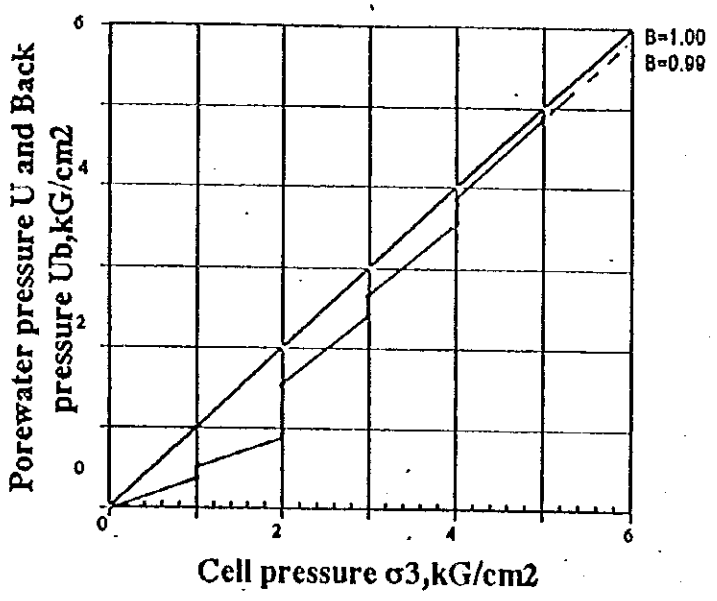
Project : Nam Son Waste Landfill — Test N_o : 2

Hole N_o: B2 Depth: 1.6-2.0 m — Load rinh N_o : 0.726kG/Div — Date started : 8/12/98

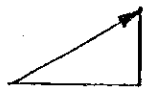
SATURATION PROCEDURE :

Test type : Cu-pwp	With / Without Side drains	load ring constant	Piston area
Cell pressure : 1.0 ,2.0 ,3.0, 4.0,5.0 kG/cm²		Back pressure increments : 0.9 ; 1.9 ; 2.9 ;3.9. kG/cm²	
Final cell pressure : 5.00 kG/cm²		Final back pressure : 3.90 kG/cm²	
PWP after saturation : 4.92 kG/cm²		Value of B achieved : 0.99	
Effect pressure after saturation : kG/cm²		Degree of saturation reached : 99 %	

Date	Pressure (kG/cm²)				B	Strain	Back pressure(volume change mm³)			Cell volume change (mm³)				
time	Cell	Back	PWP	ΔPWP	Value	div 0.01mm	Before	After	Diff	Before	After	Diff	Console +	- exp
8/12/98	0	0	0	0	0		43.0							
	1.00		0.26		0.26									
	1.00	0.90	0.43											
9/12/98	2.00		0.89		0.46									
	2.00	1.90	1.69											
10/12/98	3.00		2.45		0.76									
	3.00	2.90	2.70											
11/12/98	4.00		3.59		0.89									
	4.00	3.90	3.93											
	5.00		4.92		0.99			71.0						



Porepressure respose to cell pressure increment



Slope=

Pore pressure change due to increase back pressure

$$B = \frac{PWP - PWPo}{\Delta\sigma} = 0.99$$

Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr . Do Minh Toan

VIWASE

TRIAXIAL COMPRESSION TEST

Test type : Cu-pwp

Project: Nam Son waste landfill — Test N_o: 2

Hole N_o: B2 — Depth: 1.4-2.0 m — Load ring N_o: 0.726 kG/div — Date started : 12/12/98

Test type: ~~with~~ / without side drains

Cell pressure	5.00	kG/cm²
Vertical stress		
Back stress	1.00	
PwP After build up	4.89	
Difference	4.00	
Effective pressure	4.00	

t_{100} = 410 min

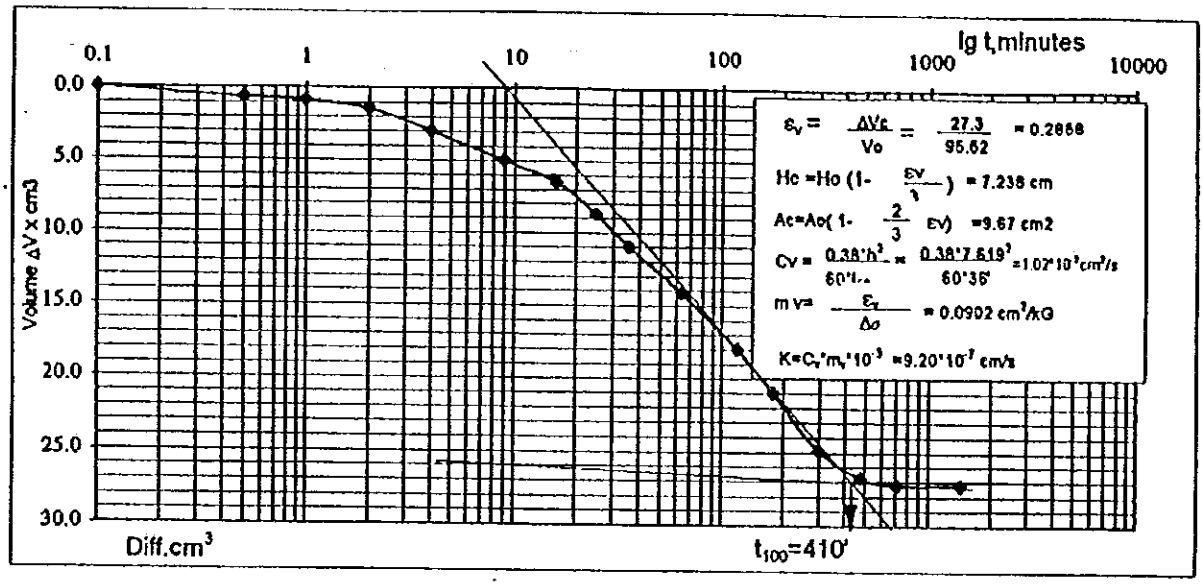
$t_f = a * t_{100} = 0.51 * 410 =$ 209

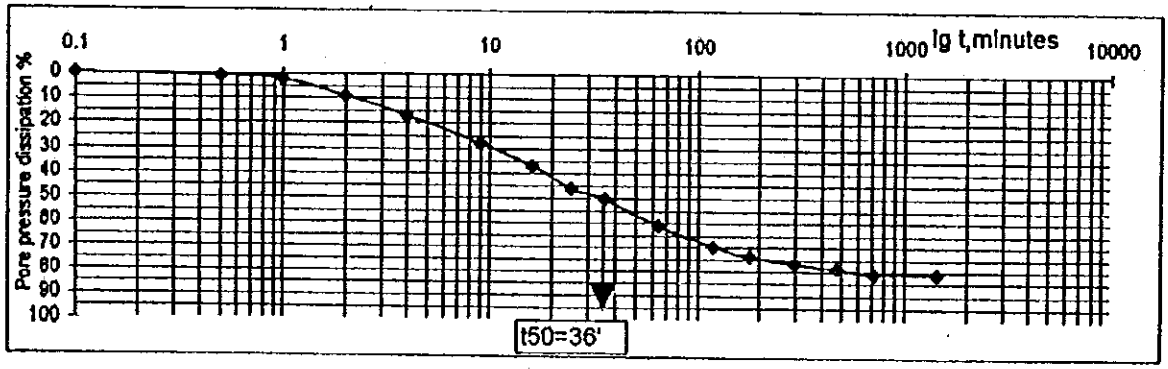
RATE OF DISPLACEMENT

$\frac{\varepsilon_f . H_o}{100 . t_f . 8} = \frac{0.05 * 72.38}{209} = 0.0173$

Selected v = 0.036 mm/mn

DATE	Clock time	Time t, minutes	Lgt	Volume change: gauge, cm³	Volume change: Diff, cm³	Pore pressure: Reading kG/cm²	Pore pressure: Diff kG/cm²	Diss,%
12/12/98	7h35	0		71.0	0.0	4.89		0
		30"		70.4	0.6	4.85		1
		1'		70.1	0.9	4.79		3
		2'		69.6	1.4	4.53		9
		4'		69.0	3.0	4.22		17
		9'		66.0	5.0	3.81		28
		16'		64.5	6.5	3.45		37
		25'		62.3	8.7	3.10		46
	8h11	36'		60.0	11.0	2.93		50
	8h39	64'		56.8	14.2	2.52		61
	10h35	120'		53.0	18.0	2.18		70
	11h35	180'		50.0	21.0	2.02		74
	13h35	300'		46.1	24.9	1.80		77
	16h35	480'		44.3	26.7	1.82		79
	20h00'	720'		43.7	27.3	1.73		81
13/12	7h35	1440'		43.7	27.3	1.72		81
		2880'						
		4320'						





Tested by : Eng . Nguyen Viet Tinh

Checked by : Dr . Do Minh Toan

VIWASE

TRIXIAL COMPRESSION TEST

TEST TYPE Cu-PwP

Project : Nam Son Waste Landfill — Test N° 2

Cell N° — Load ring N° 0.728 — Date started : 13/12/98

Test type CU	Load ring constant	With / Without Side drains	Cell pressure σ_3= 5.00 kG/cm²
Rate :	CR = 0.728 kG/Div	Membranes	Vertical stress σ_1 = kG/cm²
Specimen prior to shearing			Back pressure Po = 1.0 kG/cm²
Height H= mm 72.38	Area A = 967 mm²	Volume V= 69991 mm³	Eff.cell pressure σ3'= 4.0 kG/cm²

Strain		Load		U	A	Deviator stress kG/cm²			Stresses kG/cm²						Volume	
Div 0.01 mm	ε,%	Div 0.01 mm	kG	kG/cm²	cm²	Stress	mem bcorr	$\sigma_1-\sigma_3$	σ_1'	σ_3'	$\frac{\sigma_1-\sigma_3}{2}$	$\frac{\sigma_1+\sigma_3}{2}$	$\frac{\sigma_1'+\sigma_3}{2}$	σ_1/σ_3	V	ΔV
0	0.00	0.0	0.000	1.72	9.67	0.00	0	0.00	3.28	3.28	0.00	5.00	3.28	1.00		
10	0.13	3.0	2.178	1.73	9.68	0.22		0.22	3.49	3.27	0.11	5.11	3.38	1.07		
20	0.25	4.5	3.267	1.74	9.69	0.34		0.34	3.60	3.26	0.17	5.17	3.43	1.10		
30	0.38	6.0	4.356	1.75	9.71	0.45		0.45	3.70	3.25	0.22	5.22	3.47	1.14		
40	0.50	7.0	5.082	1.76	9.72	0.52		0.52	3.76	3.24	0.26	5.26	3.50	1.16		
50	0.63	11.3	8.204	1.77	9.73	0.84		0.84	4.07	3.23	0.42	5.42	3.65	1.26		
100	1.25	19.5	14.157	1.79	9.79	1.45		1.45	4.66	3.21	0.72	5.72	3.93	1.45		
150	1.88	36.1	26.209	1.82	9.85	2.66		2.66	5.84	3.18	1.33	6.33	4.51	1.84		
200	2.50	45.0	32.670	1.95	9.92	3.29		3.29	6.34	3.05	1.65	6.65	4.70	2.08		
250	3.13	58.2	42.253	2.00	9.98	4.23		4.23	7.23	3.00	2.12	7.12	5.12	2.41		
300	3.75	66.1	47.989	2.08	10.05	4.78		4.78	7.70	2.92	2.39	7.39	5.31	2.64		
350	4.38	71.5	51.909	2.15	10.11	5.13		5.13	7.98	2.85	2.57	7.57	5.42	2.80		
400	5.00	78.2	56.773	2.21	10.18	5.58		5.58	8.37	2.79	2.79	7.79	5.58	3.00		
450	5.63	85.0	61.710	2.28	10.25	6.02		6.02	8.76	2.74	3.01	8.01	5.75	3.20		
500	6.25	90.0	65.340	2.29	10.31	6.33		6.33	9.05	2.72	3.17	8.17	5.89	3.33		
550	6.88	94.2	68.389	2.28	10.38	6.59		6.59	9.31	2.72	3.29	8.29	6.01	3.42		
600	7.50	95.3	69.188	2.27	10.45	6.62		6.62	9.35	2.73	3.31	8.31	6.04	3.42		
650	8.13	96.4	69.986	2.26	10.53	6.65		6.65	9.39	2.74	3.32	8.32	6.06	3.43		
700	8.75	97.5	70.785	2.24	10.60	6.68		6.68	9.44	2.76	3.34	8.34	6.10	3.42		
750	9.38	97.0	70.422	2.24	10.67	6.60		6.60	9.36	2.76	3.30	8.30	6.06	3.39		
800	10.00	97.0	70.422	2.23	10.74	6.55		6.55	9.32	2.77	3.28	8.28	6.05	3.37		
850	10.63				10.82											
900	11.25				10.90											
950	11.88				10.97											
1000	12.50				11.05											
1050	13.13				11.13											
1100	13.75				11.21											
1150	14.38				11.29											
1200	15.00				11.38											
1250	15.63				11.46											
1300	16.25				11.55											
1350	16.88				11.63											
1400	17.50				11.72											

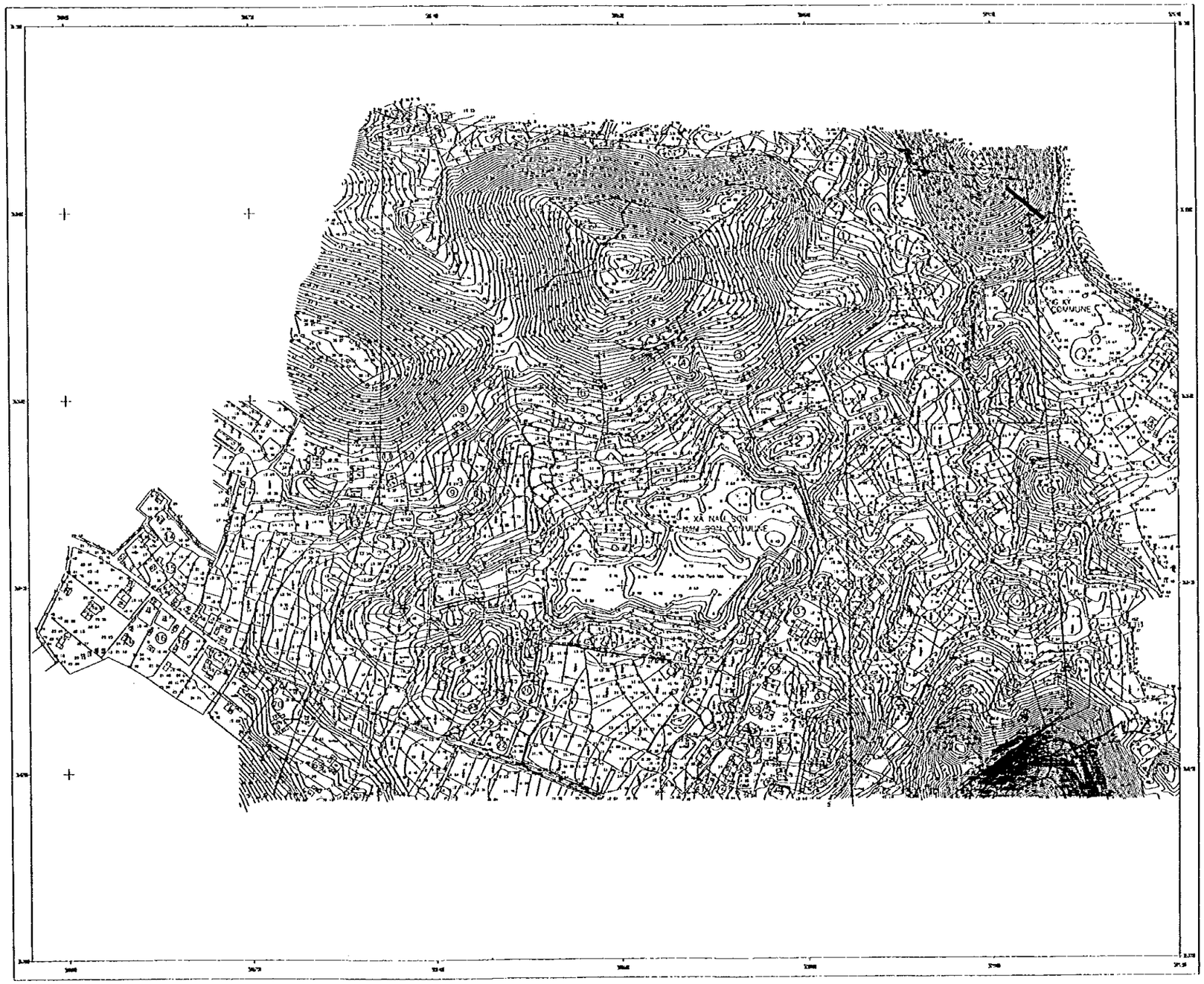
Tested by : Eng.Nguyen Viet Tinh

Checked by Dr. Do Minh Toan

BẢN ĐỒ KHU LIÊN HỢP XỬ LÝ CHẤT THẢI RẮN XÃ NAM SƠN – NAM SON SOLID WASTE TREATMENT COMPLEX AREA

BÃI CHÔN LẤP – SANITARY LANDFILL

MẢNH 1 – No 1



CHÚ THÍCH – LEGEND:

Đường – Road
Biển báo – Precautionary Sign
Hố ga/ống thoát nước – Sewer
Cột điện – Electric Wire Pole
Mốc – Accurate Level
Cây – Tree
Lúa – Rice
Đồi
Đồng – Hill

TỶ LỆ : 1 : 2000

1 cm trên bản đồ bằng 20m ngoài thực địa.
1 cm on the map equal to 20m reality

Đo vẽ tại Công Ty Tư vấn Cấp Thoát Nước và Môi Trường Việt Nam

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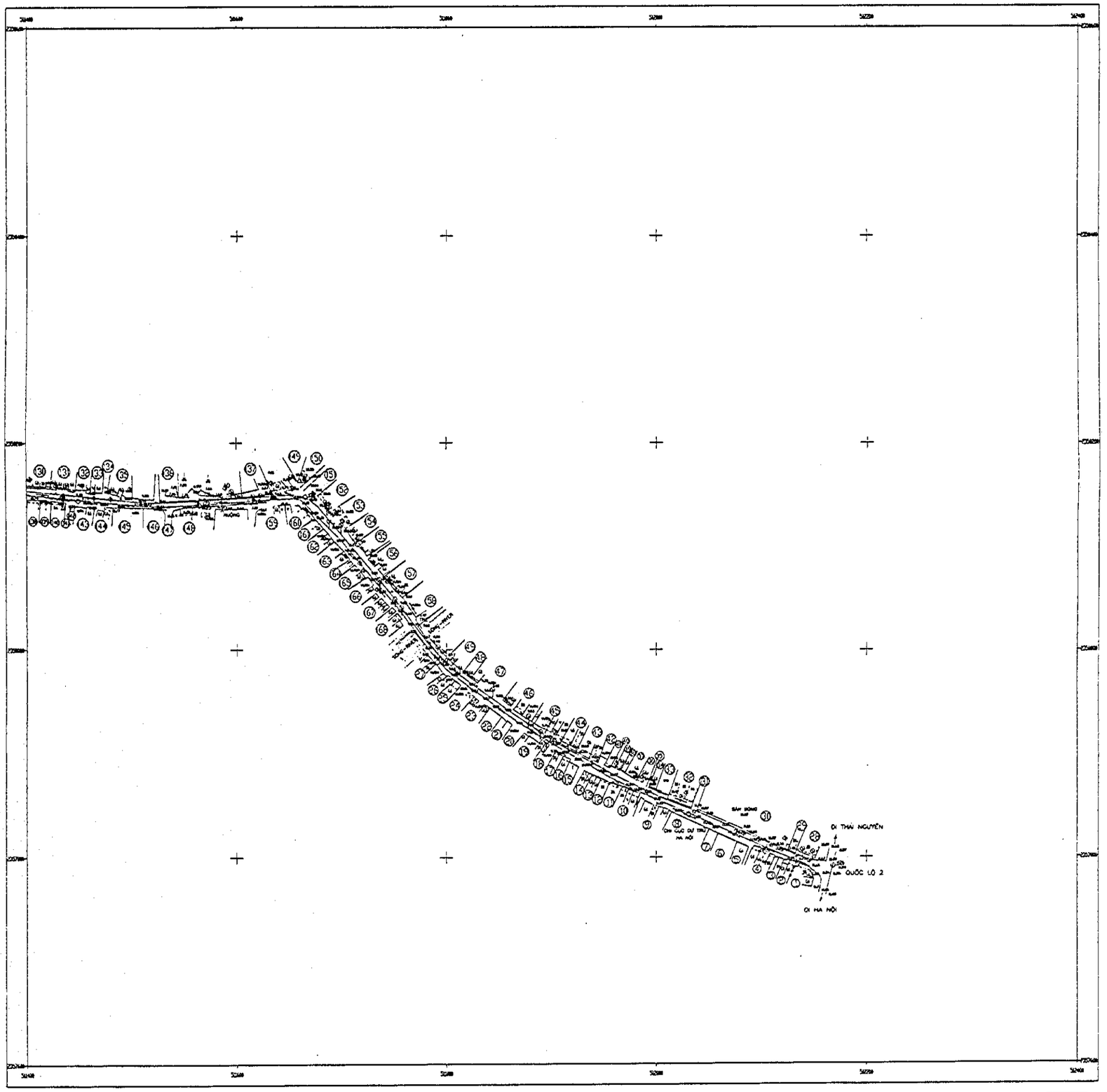
BẢN ĐỒ KHU LIÊN HỢP XỬ LÝ CHẤT THẢI RẮN NAM SƠN – SÓC SƠN HÀ NỘI
ĐƯỜNG VÀO BÃI
NAM SƠN – SOLID WASTE TREATMENT COMPLEX AREA
ACCESS ROAD

MẢNH 6 – No 6



CHÚ THÍCH – LEGEND:
- Đường – Road.
- Biển báo – Precationary Sign
- Hố ga,cống thoát nước – Sewer
- Cột điện – Electric Wire Pole
- Thổ cư - Ancestral Land
- Cây – tree.
- Lúa – rice
- Dừa
- Giếng – Well

TỶ LỆ : 1 : 2000

1 cm trên bản đồ bằng 20m ngoài thực địa.
1 cm on the map equal to 20m reality

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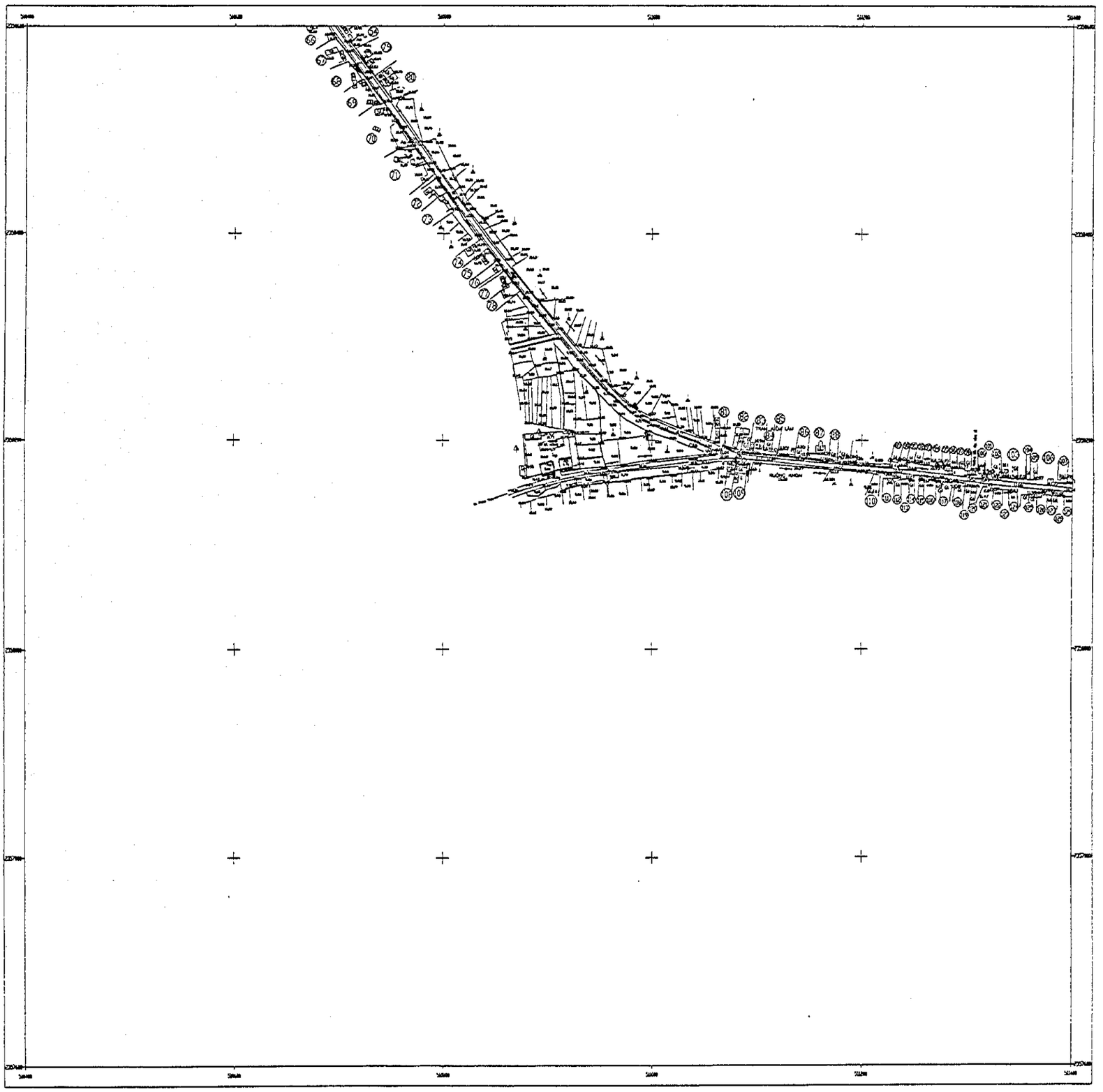
BẢN ĐỒ KHU LIÊN HỢP XỬ LÝ CHẤT THẢI RẮN NAM SƠN – SÓC SƠN HÀ NỘI
ĐƯỜNG VÀO BÃI
NAM SƠN – SOLID WASTE TREATMENT COMPLEX AREA
ACCESS ROAD
MẢNH 5 – No 5



CHÚ THÍCH – LEGEND:
- Đường – Road.
- Biển báo – Precautionary Sign
- Hố ga,cống thoát nước – Sewer
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- Dừa
- Giếng – Well

TỶ LỆ : 1 : 2000

1 cm trên bản đồ bằng 20m ngoài thực địa.
1 cm on the map equal to 20m reality

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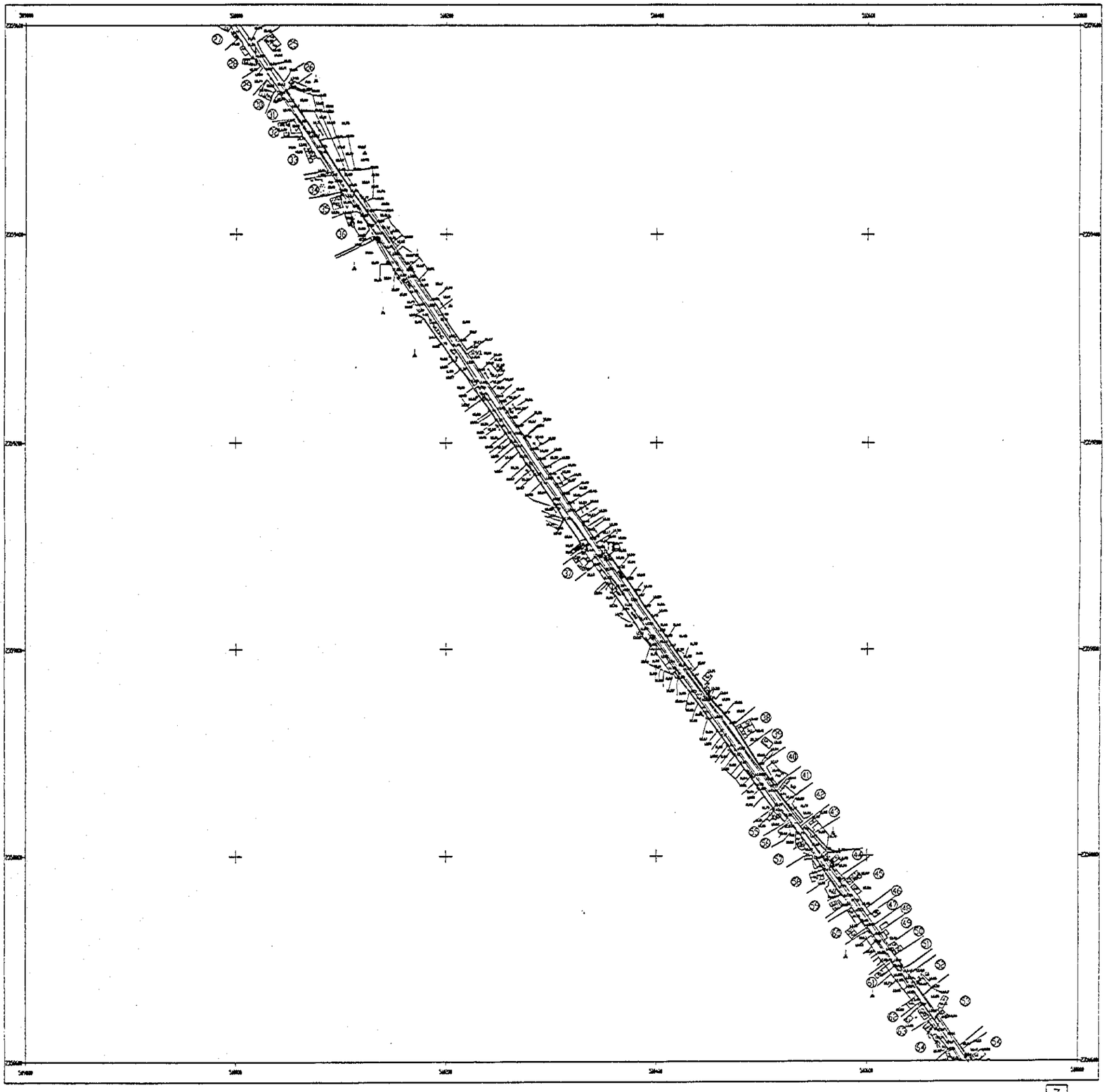
BẢN ĐỒ KHU LIÊN HỢP XỬ LÝ CHẤT THẢI RẮN NAM SƠN – SÓC SƠN HÀ NỘI
ĐƯỜNG VÀO BÃI
NAM SƠN – SOLID WASTE TREATMENT COMPLEX AREA
ACCESS ROAD

MẢNH 4 – No 4



CHÚ THÍCH – LEGEND:

- Đường = Road.
- Biển báo – Precautionary Sign
- Hố ga,cống thoát nước – Sewer
- Cột điện – Electric Wire Pole
- Thổ cư - Ancestral Land
- Cây – Tree.
- Lúa – rice
- Dừa
- Giếng – Well

TỶ LỆ : 1 : 2000

1 cm trên bản đồ bằng 20m ngoài thực địa.
1 cm on the map equal to 20m reality

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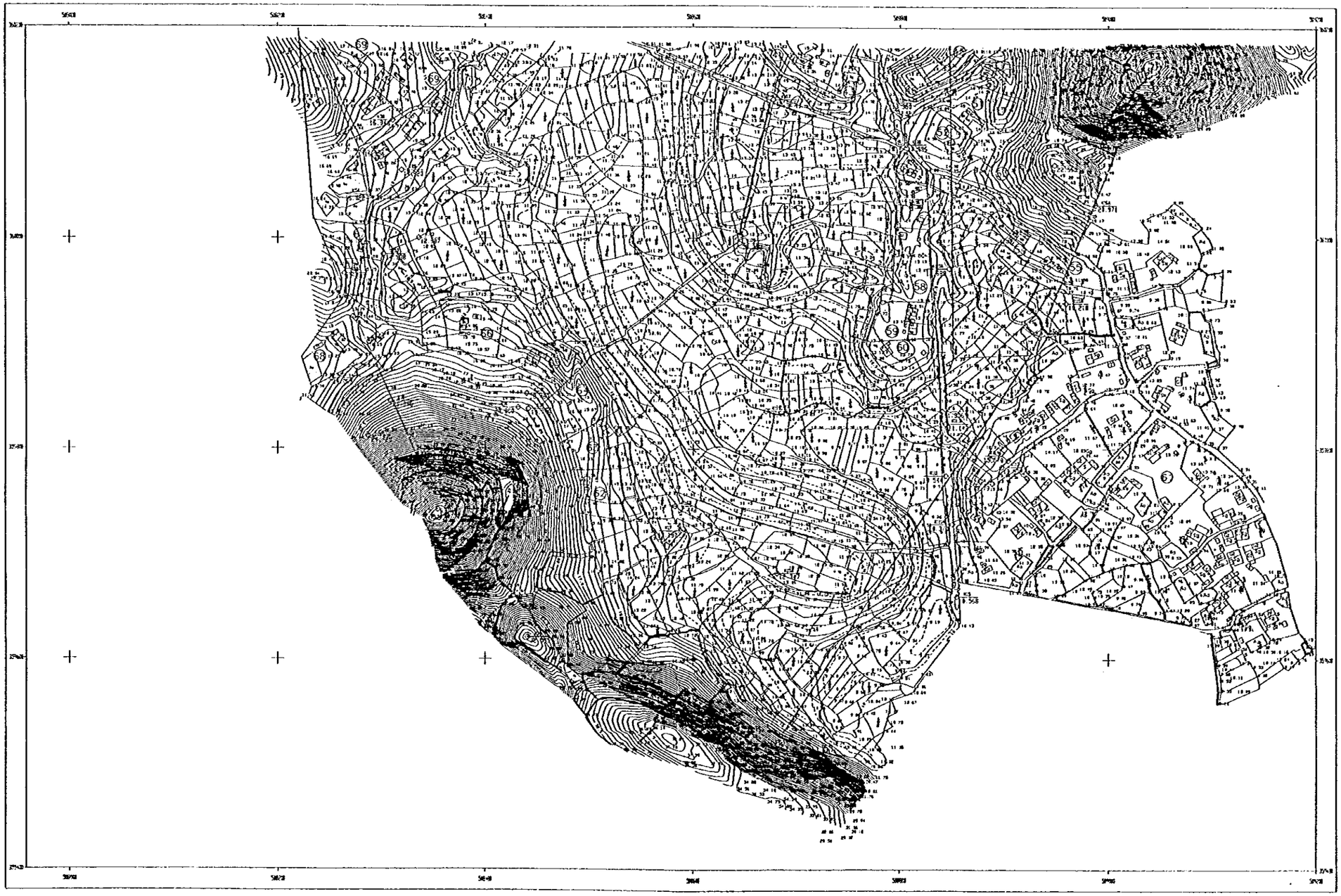
BẢN ĐỒ KHU LIÊN HỢP XỬ LÝ CHẤT THẢI RẮN XÃ NAM SƠN – NAM SON SOLID WASTE TREATMENT COMPLEX AREA

BÃI CHÔN LẤP – SANITARY LANDFILL

MẢNH 2 – No2



CHÚ THÍCH – LEGEND:

- Đường – Road
- Biển báo – Precationary Sign
- Hố ga,cống thoát nước – Sewer
- Cột điện – Electric Wire Pole
- Thổ cư-Ancestral Land
- Cây – tree
- Lúa – rice
- Đồi
- Giếng – Well

TỶ LỆ : 1 : 2000

1 cm trên bản đồ bằng 20m ngoài thực địa.
1 cm on the map equal to 20m reality

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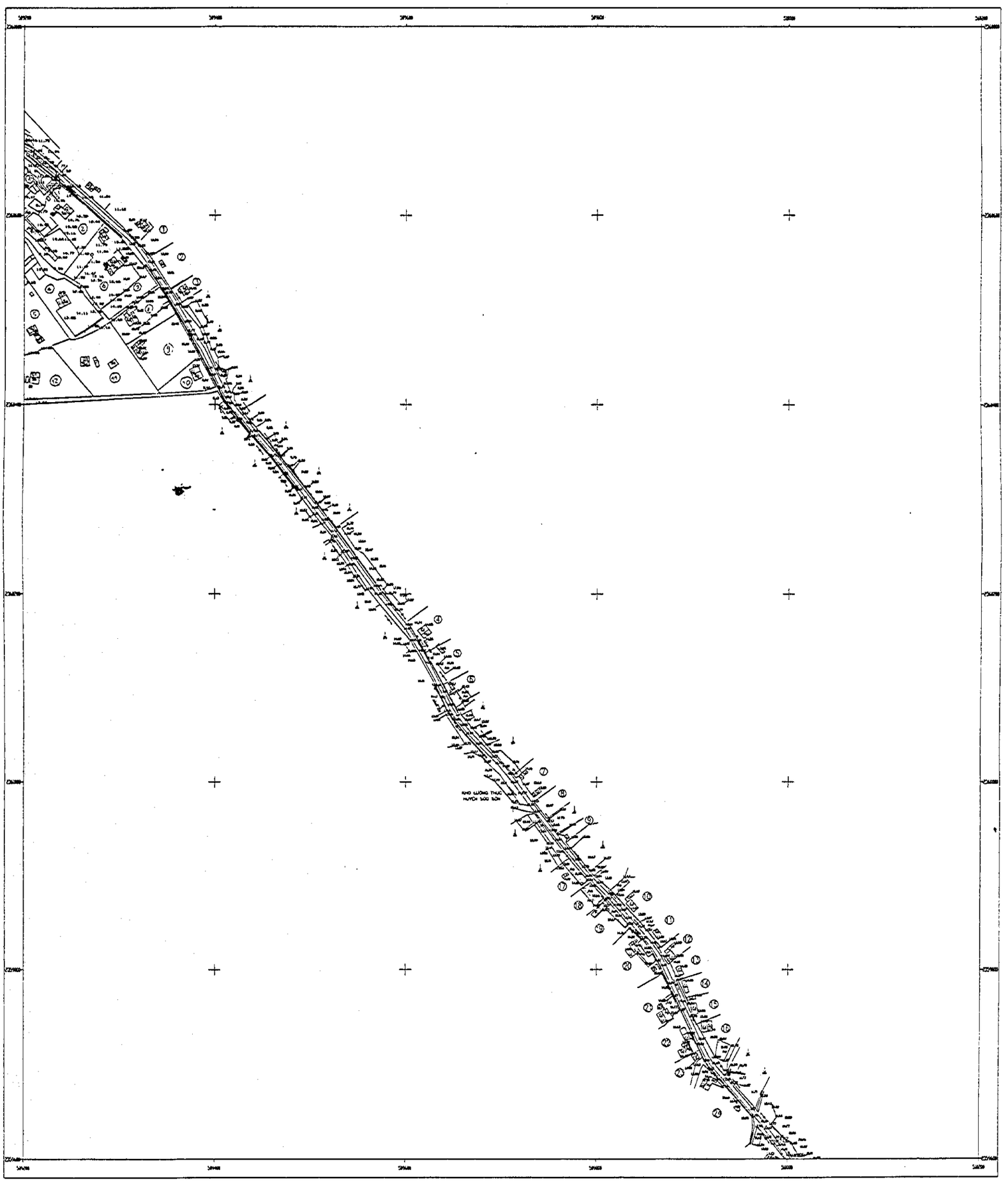
BẢN ĐỒ KHU LIÊN HỢP XỬ LÝ CHẤT THẢI RẮN NAM SƠN – SÓC SƠN HÀ NỘI
ĐƯỜNG VÀO BÃI
NAM SƠN – SOLID WASTE TREATMENT COMPLEX AREA
ACCESS ROAD

MẢNH 3 – No 3



CHÚ THÍCH – LEGEND:

- Đường – Road.
- Biển báo – Precationary Sign
- Hố ga,cống thoát nước – Sewer
- Cột điện – Electric Wire Pole
- ② Thổ cư - Anoestatal Land
- Cây – tree.
- Lúa – rice
- Dừa
- Giếng – Well

TỶ LỆ : 1 : 2000

1 cm trên bản đồ bằng 20m ngoài thực địa.
1 cm on the map equal to 20m reality

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