

**1.6. Layer 4b: Medium dense, light, white grey SILTY SAND (SM)**

Was found at boreholes DST(1)-01 and DST-03. Thickness is from 9.9m (DST(1)-01) to 18.0m (DST3) and the depth of the layer bottom is from 44.4m (DST(1)-01) to 47.0m (DST3). Standard penetration resistance N is from 25 to 30.

**1.7 . Layer 4c: Medium dense, white grey POORLY GRADED SAND with SILT (SP-PM)**

Was found at the borehole DST(1)-03 and DST-14. Its thickness was not determined yet because this borehole did not get through this layer. Standard penetration resistance N is from 25 to 28. Only 01 sample was taken from this layer. The obtained physico-mechanical properties of the samples have shown that natural moisture is 21.1%, wet density from 1.77g/cm<sup>3</sup>. (see average value of the physico-mechanical properties - table 4).

**1.8. Layer 4d: Dense, white POORLY GRADED SAND (SP)**

It was found at the boreholes ~~DST (1)-02, DST(1)-04, DST(1)-05 and DST-11~~ and DST-12. Thickness varies from 2.5m to 5.8m (DST-12) and the depth of the layer bottom is more than 34.0m as the mentioned boreholes did not get through the layer. Standard penetration resistance N is from 25 to 30. In total, 2 samples were taken from this layer. The obtained physical, mechanical properties of the samples have shown that natural moisture is from 15.00% to 16.71%, wet density from 1.559 to 1.647g/cm<sup>3</sup>, (see average value of the physico-mechanical properties - table 5).

**1.9. Layer 5: Hard, yellowish , light violet SANDY CLAY (CH)**

It was found at the boreholes DST(1)-01, DST(1)-02 and DST-3. Thickness is more than 11.5m because the deepest borehole of 550 deep did not get through yet this layer). Standard penetration resistance N is from 45 to 51.

***Hydrogeological conditions***

At the surveying area, the groundwater level is affected by the tide and changeable according to seasons. The groundwater level in the boreholes during the investigation time is from -1.0m to -1.3m. (The underground water level measured from ground surface) see follow table:

STT	Borehole ID	Groundwater level (m)	Measure date (dd/mm/yy)	Remark
1	DST(1)-01	-1.2	24/8/2000	From surface
2	DST(1)-02	-1.3	22/8/2000	From surface
3	DST(1)-03	-1.2	25/8/2000	From surface
4	DST(1)-04	-1.2	26/8/2000	From surface
5	DST(1)-05	-1.0	24/8/2000	From surface

AVERAGE VALUE OF PHYSICA - MECHANICAL PROPERTIES  
Layer 2 : Very soft, high plasticity, blackish grey ORGANIC CLAY (OH)

Table: 1

No	Properties	Sign	Average value.	Maximum value	Minimum value	Number of test
1	Sieve Analysis, % Passing					
	3/4" (19 mm)					
	1/2" (12.5 mm)					
	3/8" (9.5 mm)					
	#4 (4.75 mm)					
	#8 (2.36 mm)		100.0	100.0	100.0	3
	#16 (1.18 mm)		99.5	99.9	99.1	3
	#30 (0.6 mm)		95.8	99.8	88.8	3
	#50 (0.3 mm)		98.6	99.5	98.0	3
	#100 (0.15 mm)		99.7	100.0	99.1	20
	#200 (0.075 mm)		98.1	99.2	96.1	20
	< 0.005 mm		57.5	70.5	42.0	20
2	Natural moisture content (%)	w	89.73	109.30	70.92	20
3	Natural unit weight (g/cm <sup>3</sup> )	γ	1.423	1.528	1.268	20
4	Dry unit weight (g/cm <sup>3</sup> )	γ <sub>d</sub>	0.753	0.890	0.642	20
5	Specific gravity	G <sub>s</sub>	2.575	2.597	2.541	20
6	Porosity	n	0.710	0.750	0.660	20
7	Void ratio	e <sub>o</sub>	2.443	3.025	1.916	20
8	Degree saturation (%)	S	94.83	99.99	83.26	20
9	Liquid limit (%)	LL	91.64	106.60	73.10	20
10	Plastic limit (%)	LP	45.77	52.40	34.90	20
11	Plastic index (%)	PI	45.9	59.3	37.5	20
12	Water plasticity ratio (%)	B	0.96	1.25	0.74	20
13	Unconfined compression (Kg/cm <sup>2</sup> )	q <sub>u</sub>	0.170	0.400	0.080	20
14	Compression index (cm <sup>2</sup> /kg)	C <sub>c</sub>	1.1956	1.6224	0.8456	20
15	Coefficient of consolidation (cm <sup>2</sup> /s)	C <sub>v</sub>	2.50E-04	3.35E-04	1.72E-04	20
16	Preconsolidation pressure (kg/cm <sup>2</sup> )	P <sub>c</sub>	0.908	2.259	0.223	20
17	Coefficient of volum compressibility (cm <sup>2</sup> /g)	M <sub>v</sub>	1.26E-04	1.68E-04	1.03E-08	20
18	Permeability (cm/sec)	k <sub>20</sub>	3.37E-08	5.68E-08	1.50E-08	20
19	Anghe of internal friction (Degree)	φ	6°33'	6°54'	6°23'	3
20	Cohesion (Kg/cm <sup>2</sup> )	C	0.081	0.082	0.08	3

AVERAGE VALUE OF PHYSICA - MECHANICAL PROPERTIES  
Layer 3 : Soft, high plasticity, blackish grey ORGANIC CLAY (OH)

Table: 2

No	Properties	Sign	Average value.	Maximum value	Minimum value	Number of test
1	Sieve Analysis, % Passing					
	3/4" (19 mm)					
	1/2" (12.5 mm)					
	3/8" (9.5 mm)					
	#4 (4.75 mm)					
	#8 (2.36 mm)		100.0	100.0	100.0	6
	#16 (1.18 mm)		99.9	100.0	100.0	6
	#30 (0.6 mm)		99.6	99.9	99.1	6
	#50 (0.3 mm)		98.7	99.7	97.7	6
	#100 (0.15 mm)		97.5	100.0	92.2	10
	#200 (0.075 mm)		93.9	99.2	82.5	10
	< 0.005 mm		61.7	70.5	50.8	10
2	Natural moisture content (%)	w	75.94	87.96	56.61	10
3	Natural unit weight (g/cm <sup>3</sup> )	γ	1.478	1.530	1.416	10
4	Dry unit weight (g/cm <sup>3</sup> )	γ <sub>d</sub>	0.844	0.963	0.753	10
5	Specific gravity	G <sub>s</sub>	2.590	2.605	2.558	10
6	Porosity	n	0.670	0.710	0.630	10
7	Void ratio	e <sub>o</sub>	2.087	2.419	1.696	10
8	Degree saturation (%)	S	94.08	98.06	86.65	10
9	Liquid limit (%)	LL	83.37	94.40	73.70	10
10	Plastic limit (%)	LP	42.50	50.60	36.40	10
11	Plastic index (%)	PI	40.9	45.4	34.5	10
12	Water plasticity ratio (%)	B	0.81	0.98	0.52	10
13	Unconfined compression (Kg/cm <sup>2</sup> )	q <sub>u</sub>	0.243	0.455	0.114	10
14	Compression index (cm <sup>2</sup> /kg)	C <sub>c</sub>	1.1078	1.7020	0.8482	10
15	Coefficient of consolidation (cm <sup>2</sup> /s)	C <sub>v</sub>	2.78E-04	3.37E-04	1.99E-04	10
16	Preconsolidation pressure (kg/cm <sup>2</sup> )	P <sub>c</sub>	1.030	2.352	0.507	10
17	Coefficient of volum compressibility (cm <sup>2</sup> /g)	M <sub>v</sub>	8.72E-05	1.61E-04	9.10E-06	10
18	Permeability (cm/sec)	k <sub>20</sub>	2.72E-08	5.46E-08	1.83E-08	10