D. INTERMEDIATE WASTEWATER PUMPING STATION

Based on the results obtained from the above tests, the following characteristics were calculated :

- Dry density	γ_d	(g/cm^3)
- Void ratio	e	
- Porosity	n	
- Degree of saturation	G	(%)
- Plasticity index	PI	(%)
- Water plasticity index	B	
- Compression index	Cc	(cm^2/kg)
- Coefficient of consolidation	Cv	(cm^2/kg)
- Coefficient of Volume compressibility	mv	(cm^2/g)
- Coefficient of permeability	k_{20}	(cm/s)

Methods of the exploration:

- Thin wall tube sampling of soil	: D 1587
- Preserving and transporting soil samples	: D 4220
- Standard penetration test	: D 1586
- Grain size analysis	: D 422
- Moisture content	: D 2216, D4959
- Specific gravity	: D 854
- Atterberg limits	: D 4318
- Unconfined compression	: D 2166
- Consolidation Test	: D 2435
- Classification of soil	: D 2487
- Description and identification of soil	: D 2488

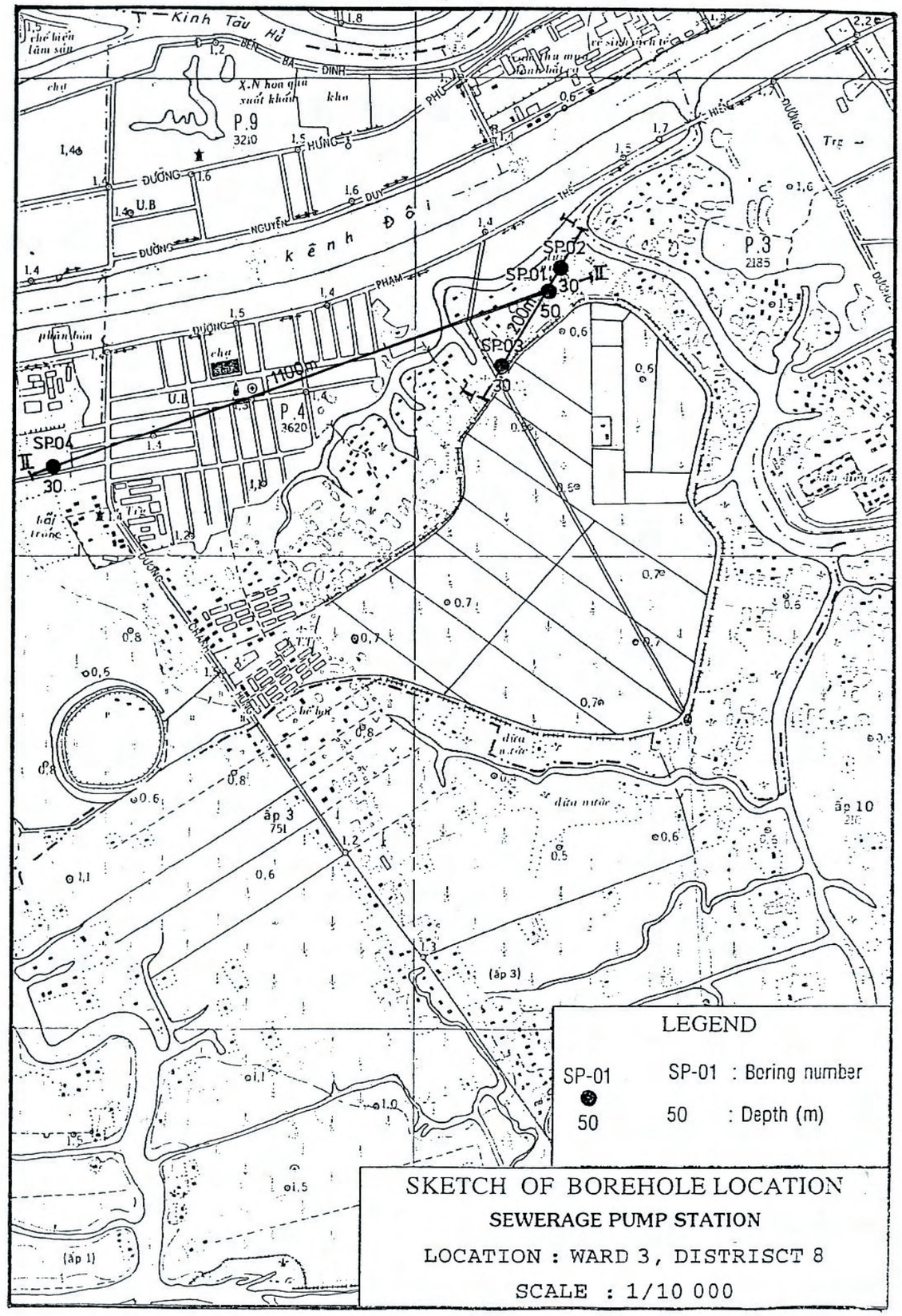
3 . INVESTIGATION LOCATION:

The investigation site is located in District 8, Ho Chi Minh City on the accumulative plain relief. There are rice fields, gardens, ponds, channel and canals in the survering area. The water level in channels, canals and ponds are affected by semidiurnal tide (see sketch of borehole location).

4 . PROGRESS OF INVESTIGATION.

Drilling, sampling and field test : Carried out from Aug 1st to Aug 3th , 1999.

Laboratory test : Carried out from Aug 8th , 1999 to Aug 30th , 1999.



II ÁNLYSIS OF THE INVESTIGATION RESULT

1 . STRUCTURE OF THE BASE SOIL.

Based on in-situ survey, drilling documents and the results obtained from the soil tests, we have noticed that basic soil on the surveying site (up to 50.0m deep) was composed by Holocene, Pleistocene and Pliocene deposits and on the surface there is made ground on the surface with the thickness 0.5m. From the surface downwards there are the following layers:

1.1 . Layer 1: Made ground - Brownish grey clayey sand.

This layer lies right on the surface found at boreholes from SP-02 to SP-04, with the thickness is from 0.5m (SP-02 and SP-04) to 0.9m (SP-03).

1.2 . Layer 2: Very soft, high plasticity blackish grey ORGANIC CLAY (OH).

It lies right on the surface or is covered by layer 1 with thickness from 2.1m (SP-03) to 4.5m (SP-01 and SP-04) and the bottom is from 3.0m (SP-03) to 5.0m (SP-04) deep. Standard penetration resistance N from 0 to 1. In total, 10 samples were taken from this layer, the obtained physico-mechanical properties of the samples have shown that, natural moisture is from 74.31% to 111.87%, wet density from 1.367 to 1.489g/cm^3, liquid limit from 76.4 to 115.2%, plasticity index from 32.4 to 63.7%, high compressibility (see average value of the physico-mechanical properties - table 1). The main characteristics of the layer are as follows :

Wet density	γ_w	=	1,410 g/cm^3
Unconfined compressive strength	q_u	=	0.106 Kg/cm^2
Compression index	Cc	=	1.199
Coefficient of consolidation	Cv	=	1.94 x 10^{-4}
Coefficient of volume compressibility	mv	=	1.58 x 10^{-4}

1.3 . Layer 3: Stiff, low plasticity, brown greenish grey CLAY (CL).

Was found only at borehole SP-04. Thickness is 1.5m and the layer bottom is 6.5m deep. Standard penetration resistance N = 3. With 1 samples was taken from this layer, the obtained physico-mechanical properties of the samples have shown that, natural moisture is 22.48%, wet density 1.947g/cm^3 , liquid limit 36.3%, plasticity index 15.8% (see average value of the physico-mechanical properties - table 2). The main characteristics of the layer are as follows :

Wet density	γw	=	1,947 g/cm^3
Unconfined compressive UVrength	q_u	=	0.313 Kg/cm^2

1.4 . Layer 3a: Very loose, blackish grey CLAYEY SAND (SC).

Was found only at borehole SP-03. Thickness is 1.8m and the layer bottom is 8.0m deep. Standard penetration resistance N from 0 to 3. With 1 samples was taken from this layer, the obtained physico-mechanical properties of the samples have shown that, natural moisture is 47.34%, wet density 1.618g/cm^3 , liquid limit 47.1%, plasticity index 20.0% (see average value of the physico-mechanical properties - table 3).

1.5 . Layer 4: Medium dense, yellowish grey CLAYEY SAND (SC)

Was found at the boreholes from SP-01 to SP-03. The thickness is from 2.8 (SP-02) to 4.0m (SP-01) and the depth of the layer bottom is from 7.5m (SP-02) to 8.5m (SP-01). Standard penetration resistance from 11 to 20. In total, 7 samples were taken from this layer, the obtained physico-mechanical properties of the samples have shown that, natural moisture is from 14.00% to 20.24%, wet density from 1.837 to 2.116g/cm^3, (see average value of the physico-mechanical properties - table 4). The main characteristics of the layer are as follows :

Wet density	γ_w	=	1,956 g/cm^3
Unconfined compressive strength	q_u	=	1.075 Kg/cm^2
Compression index	Cc	=	0.121
Coefficient of consolidation	Cv	=	1.08 x 10^{-3}
Coefficient of volume compressibility	mv	=	2.96 x 10^{-4}

1.6 . Layer 4a: Medium dense, reddish brown, yellowish brown SILTY, CLAYEY SAND (SMSC)

Was found at all the boreholes. The thickness is from 5.5 (SP-04) to 21.0m (SP-01) and the depth of the layer bottom is from 12.0m (SP-04) to 32.0m (SP-01). Standard penetration resistance from 12 to 24. In total, 29 samples were taken from this layer, the obtained physico-mechanical properties of the samples have shown that, natural moisture is from 14.43% to 21.23%, wet density from 1.913 to 2.040g/cm^3, liquid limit from 17.4 to 20.5%, plasticity index from 4.1 to 6.9% (see average value of the physico-mechanical properties - table 5). The main characteristics of the layer are as follows :

Wet density	γ_w	=	1,969 g/cm^3
Unconfined compressive strength	q_u	=	0.901 Kg/cm^2
Compression index	Cc	=	0.1214
Coefficient of consolidation	Cv	=	9.94 x 10^{-4}
Coefficient of volume compressibility	mv	=	2.60 x 10^{-5}