Annex-IV

Contents of Technical Assistance (Soft Component)

The contents of activities in the Soft Component are as follows.

1. Guidance in water treatment process management technology
   The contents of guidance are as follows. Lectures with practical training will be given to the trainees since lectures alone may not raise the trainees' motivation.

   a. Preparation of training texts in Japan
   b. Accurate grasp of the current technical level and problems in water treatment process
   c. Lecture on theory and control techniques of water treatment process
   d. Practical training in water quality control and water treatment process operation
   e. Preparation of standard form for inputting water quality data

2. Guidance in data-based maintenance technology
   The contents of guidance are as follows;

   a. Outline explanation of the monitoring system
   b. Guidance in data processing methods
   c. Technical guidance concerning information utilization

Annex- V

Works undertaken by NOPWASD About Monitoring System

1. The Egyptian side shall supply and install the following measuring equipments with required cables and a terminal box for detecting flow rate and residual chlorine concentration of the treated water from the existing water treatment plant.

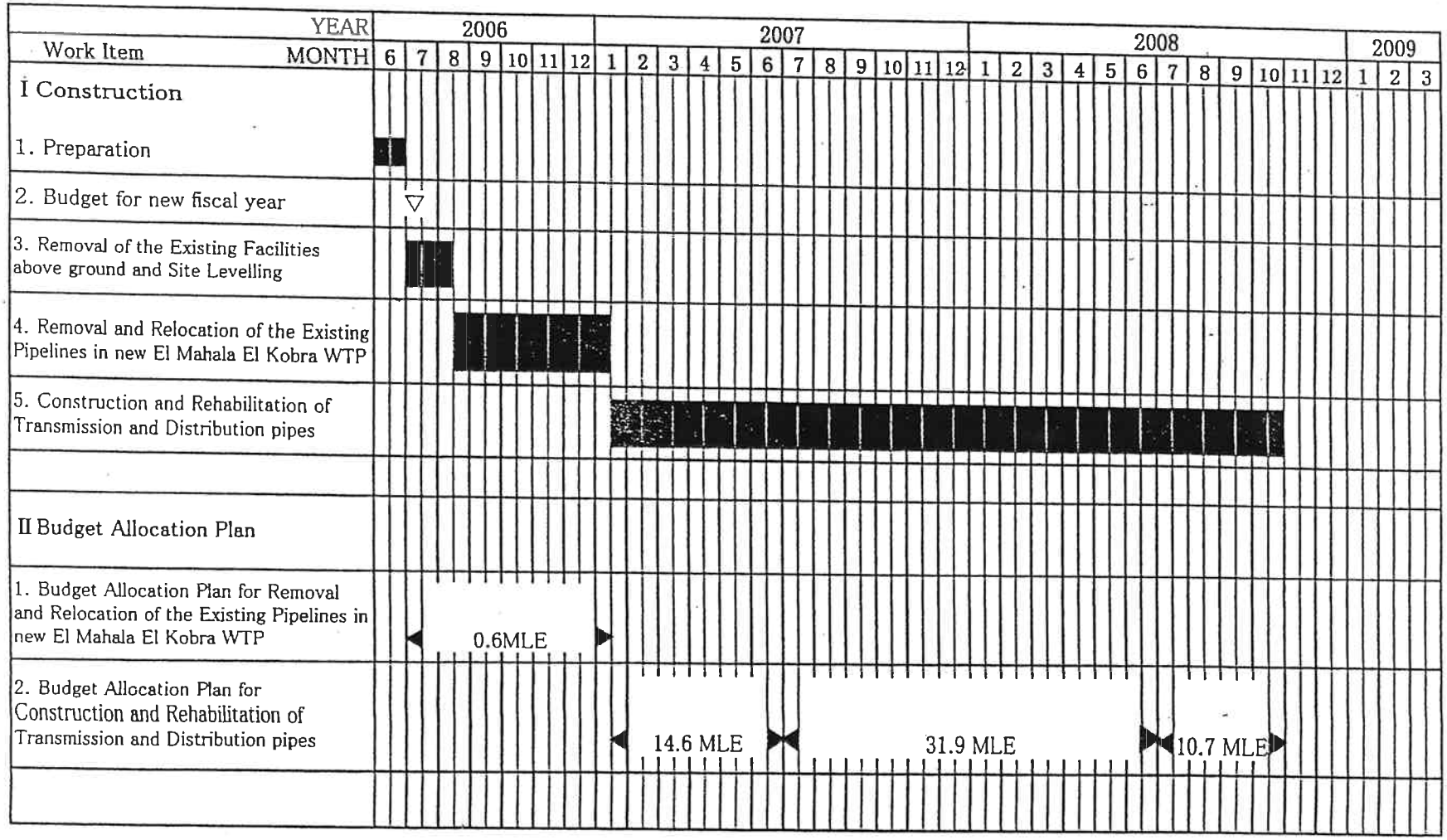
   - Flow meter (detector)
   - Residual chlorine concentration meter (detector)

   The Japanese side shall connect the terminal box, which shall be installed near by the above equipments, to the monitoring panel in the proposed electrical room.

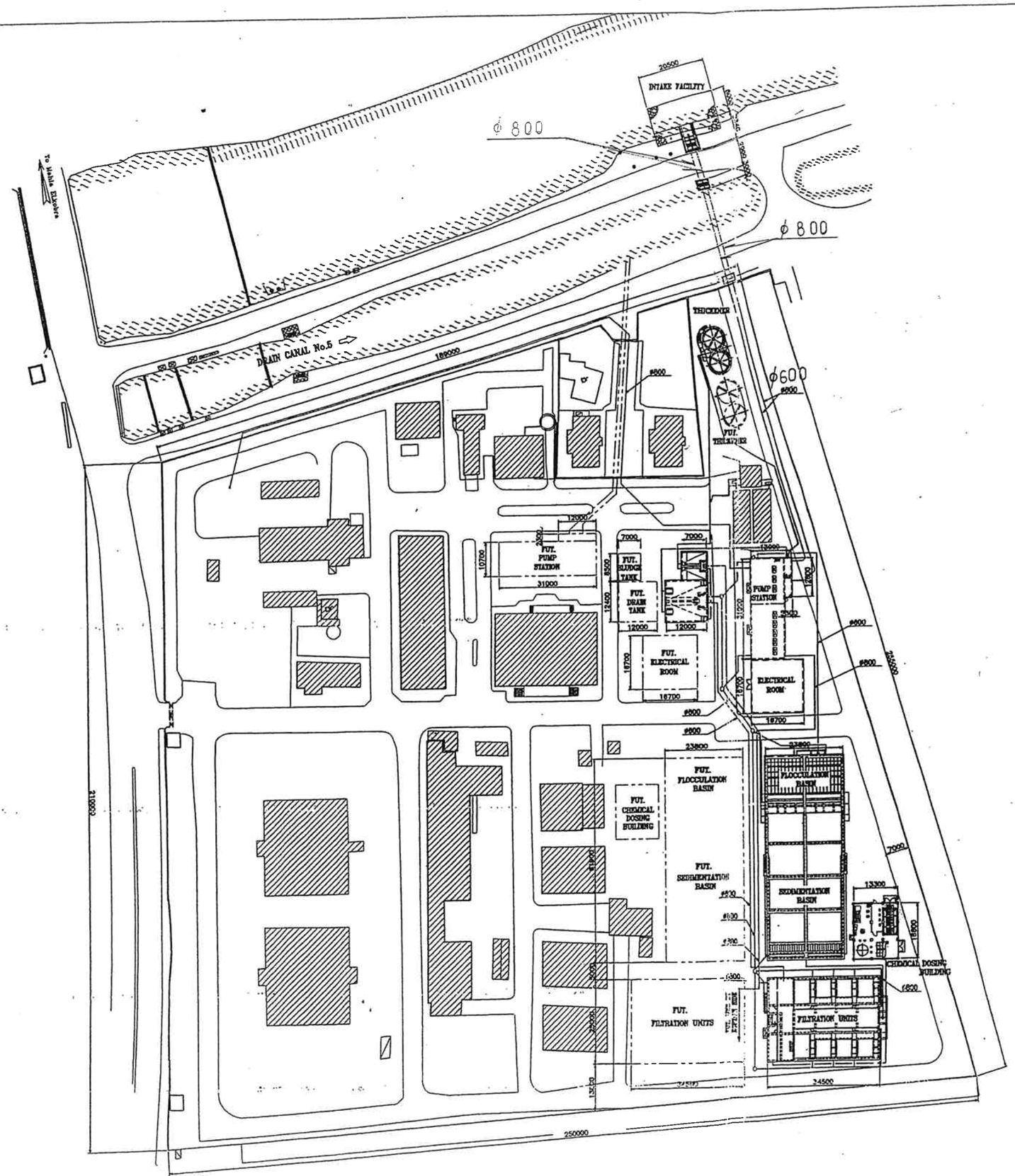
2. The Egyptian side shall provide a personal computer with incidental accessories such as a printer and UPS. The personal computer shall be pre-installed type with necessary software such as Windows. The personal computer will be used for processing of the measured data and displaying and printing the processed data for operating and maintenance use of the water treatment plant. The items supplied by the Egyptian side shall be as follows.
   - Personal computer
   - Printer
   - UPS (Uninterruptible Power Supply) Unit
   - OS (Operating system) of Windows XP of compatible English and Arabic
   - Standard application software of Office

Annex-VI Tentative Schedule of Implementation and Budget Allocation for Main Undertakens by the Egyptian Side
The Project for Upgrading of El Mahala El Kobra Water Treatment Plant in the Arab Republic of Egypt

Currency Unit:Million LE

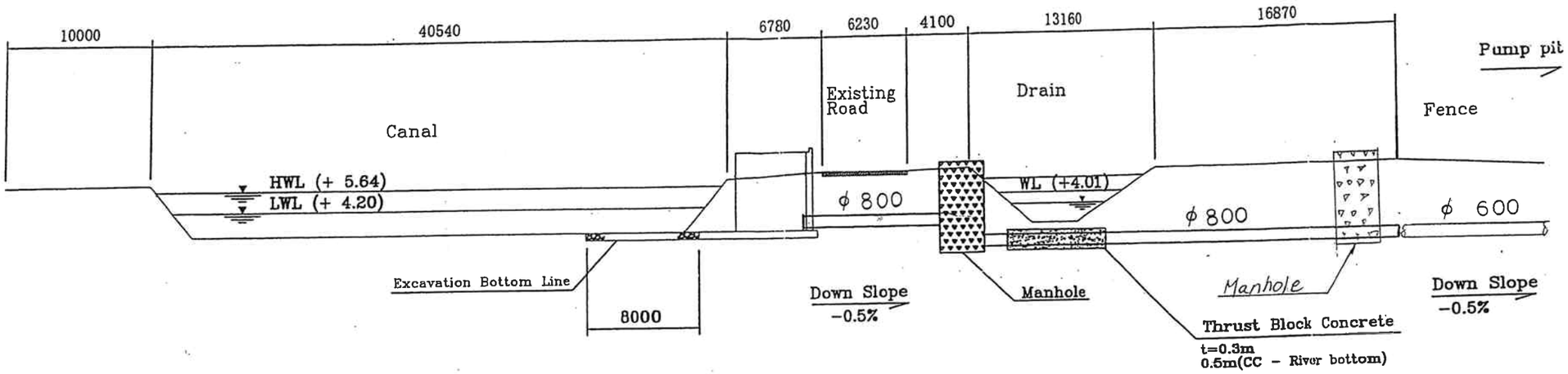


MLE: Million Egyptian Pound

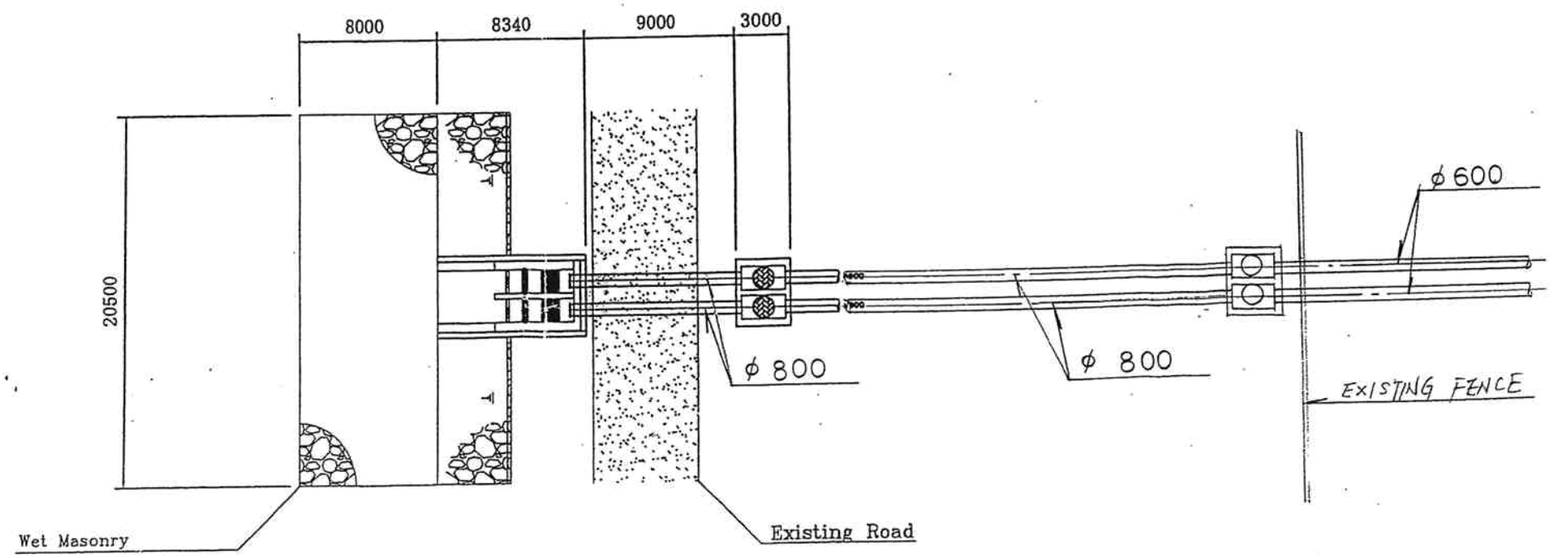


MKWP-01 General Layout

SECTION OF EL MALLAH CANAL AT WATER INTAKE FACILITY



PLAN OF WATER INTAKE FACILITY



MKWP-11 Water Intake Facility(1/2)

Appendix-5 Soil Survey

Bahr Engineering Consultant Office,

BECO

Prof. Mohamed Awad Bahr

TECHNICAL SOIL REPORT
for
Upgrading El Mahala Water Treatment Plant
El Mahala El Kobra - Gharbeya

Yachiyo Engineering CO., LTD - Engineering Consultants

C/O: Scientific Office for Engineering
Design & Surveying, ***CADEC - A***
Prof. Ayman Soliman Aguib

September 2005

5 Ahmed Nour El Din from Kabool, Makrem Ebied, Nasr City 11371, Cairo-Egypt Tefax: +202-2756533

BECO

Contents:

Tables:

Figures:

1. Introduction

This report is presented at the request of Yachiyo Engineering Co., LTD. The soil investigation was carried out at the site of El Mahala El Kobra Water Treatment Plant. The soil investigation was carried out by drilling Five boreholes 30m deep. Soil boring was carried out by mechanical means using rotary drilling by a professional soil drilling contractor under our supervision.

Visual inspection of soil samples recovered from different boreholes together with required laboratory tests were performed. Based on the outcome of the geotechnical investigation, our recommendations with respect to the soil formation at the site and other geotechnical construction considerations are presented.

2. The Site

The site under investigation is the existing El Mahala El Kobra Water Treatment Plant at El Mahala El Kobra, Gharbya, Egypt . The study under investigation concerns the areas selected for the intake facilities and the new water treatment plant.

3. Boreholes Drilling and Soil Sampling

Five Boreholes were carried out 30 m deep. Two boreholes were carried out at the location of the new intake facilities, and three boreholes were carried out at the location of the new water treatment plant. The location of boreholes are shown on the general layout of the plant, refer to fig. (1). The boreholes locations were decided by Yachiyo Engineering Co., LTD. Undisturbed samples were obtained wherever the cohesive clay is existed, and disturbed samples were obtained wherever the silty and sandy soils are existed.

4. Testing

4.1 In - Situ Testing

The standard Penetration Test (SPT) was performed during soil boring according to the Egyptian geotechnical code of practice regulations. The results of the tests are shown on soil logs, refer to figures (2–1 to 2-5).

4.2. Laboratory Testing

An extensive laboratory testing program was developed to determine the physical and mechanical properties of different soil layers encountered at the site. Gradation tests and Atterberg limits were performed to identify soil constituents. Unconfined compression tests were performed for evaluation of the strength characteristics of surface clayey soil encountered at the site.

4.2.1 Soil Classification Tests

Gradation tests were performed to the different soil layers encountered at the site. The grain-size distribution curves are shown in figures (3-1 to 3-5). Bulk density, specific gravity, natural water content, and Atterberg limits were determined for cohesive soil. The results are shown on soil logs of figures (2-1 to 2-5). The tests were performed during soil boring according to the Egyptian geotechnical code of practice regulations.

4.2.2 Soil Strength tests

Unconfined compression tests were performed on five samples taken from the shallow layer of dark brown silty clay. The results of the tests are shown in figures (2-1 to 2-5). The results of the tests show that the clay at shallow depths is stiff to very stiff and the unconfined compression strength is in the range of 157 - 240 kN/m^2. The test was performed according to the Egyptian geotechnical code of practice regulations.

4.3. Chemical Analysis Tests

pH tests as well as elusion tests were performed on three soil and water samples taken at about 1-2m depth from the ground surface. One sample was taken from the area of new intake facilities (B.H. 2) and two samples were taken from the area of new water treatment plant (B.H. 3 and B.H.4). The elusion was determined in terms of chloride ions CL^- and sulphate ions SO_4^{2-}. The tests were performed at the Micro Analytical Center. The results of the chemical analysis are given in table (1). The high sulphate contents enhances the using of sulphate resistant Portland cement for all foundations construction.

Table (1) Chemical Analysis Results

Sample No.	B.H. No.	pH	Chlorides CL^-	Sulphates SO_4^{2-}
1	2	8.71	Nill	1750
2	3	8.16	Nill	1400
3	4	8.26	Nill	1340

5. Geological Background and Subsurface Soil Conditions

The subsurface soil profile has been interpreted from the borings and the detailed boring logs are shown in figures (2–1 to 2-5). The soil formation at the site is the typical Nile deposit of the Nile Delta. The top soil is agricultural soil of silt, sand and stones. It extends to about 1.0m to 3.5m below the existing ground surface. The top soil followed by brown medium to very stiff silty clay. It extends 6.0m to 11.5 m. below the top soil. The results of consistency limits and gradation tests show that the clay is active. The results of the unconfined compression tests carried out on undisturbed samples extracted at a depth below the ground water table show that the unconfined compressive strength for this clay ranges between 157 to 240 KN/m^2. A layer of organic grayish brown silt and fine sand with trace of clay underlies the top layer of silty clay. The layer extends 1.5m. to 5.5m. below

existing silty clay layer. The top clayey and silty soil layers are succeeded by successive layers of medium sand at the top layers and becoming medium to coarse graded sand at the bottom layers. The top layers of sand are medium dense to dense and the following layers become dense to very dense. The layers of sand extend to end of boring.

6. Groundwater

Groundwater was encountered at 2.8m, 0.4m, 0.7m, 1.1m and 1.1m. below ground surface at the location of boreholes 1, 2, 3, 4 and 5 respectively. These differences in ground water table levels can be referred to the differences of ground surface.

7. Recommendations

The recommendations presented in this report are based on the analysis of field data and laboratory test results revealed at the boreholes locations. The recommendations presented do not reflect any horizontal or vertical stratigraphic variations which may occur between the borings of this investigation. During the course of construction, if any variations then appear evident it will be necessary for the re-evaluation of the recommendations presented in this report in light of the characteristics of these variations. From the study the following recommendations are drawn:

1) For light weight structures shallow foundations using isolated footings can be used. The foundation level shall be at least 1.5 m. below the lowest existing ground surface after avoiding the fill layer. The footings are to be connected together by tie beams.

2) The maximum allowable net bearing capacity of the soil is 150 kN/m^2.

3) Settlement analysis should be considered in the design according to the type and condition of loading to be existed with respect to the selected footing type.

4) For heavy weight and / or large size footings, if existed, pile foundations are used. The minimum pile length is 17.0 m. below existing ground surface inside the layer of

medium sand with minimum penetration depth equals to 2.0 in this layer. Friction - end bearing piles are to be considered in the evaluation of allowable pile capacity.

7 General Precautions

1) In case the required foundation level lies below the groundwater table, lowering of groundwater level is carried out using surface dewatering techniques.

2) Sulphate resistant Portland cement is used for foundations. The cement content shall not be less than 350 kg per cubic meter for reinforced concrete, and not less than 250 kg per cubic meter for plain concrete.

3) The exposed faces of footings, tie beams, and pedestals are to be coated with three coats of oxidized bituminous material.

4) Concrete cover for footings is 5 cm.

Consultant Engineer

Prof. Mohamed Awad Bahr

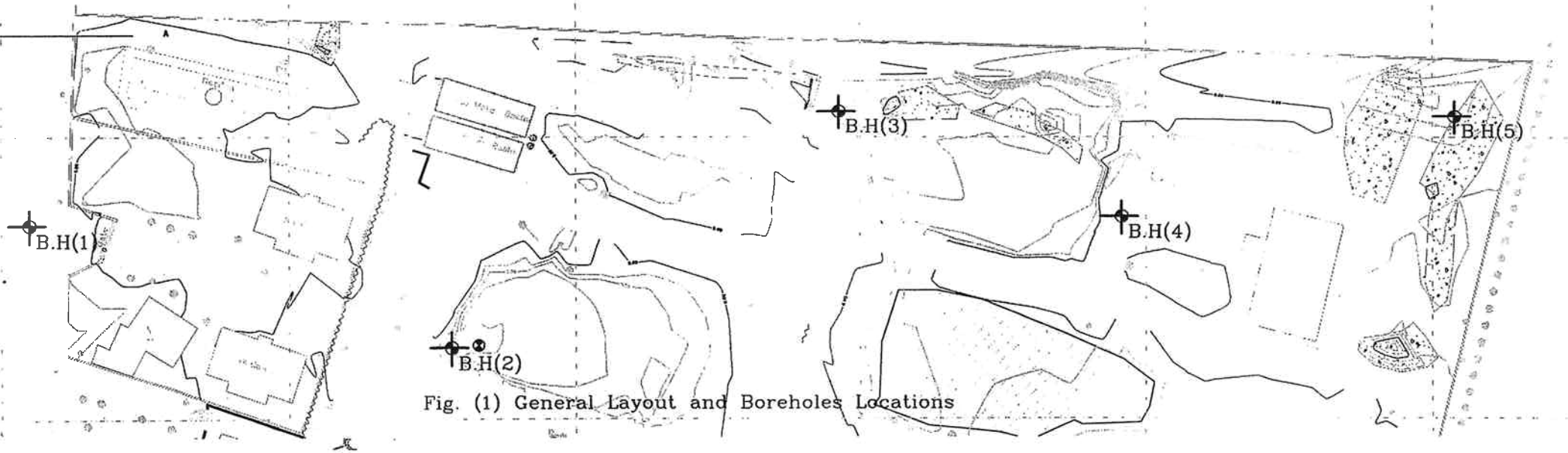


Fig. (1) General Layout and Boreholes Locations

El Mahala El Kobra Water Treatment Plant.
Intake Facilities - Upgrading Project.
Gharbeya - Egypt

Bahr Engineering Consultant Office
BECO
Prof. Dr. Mohamed Awad Bahr

Boring No. (1)

Initial Ground Water Table, IGWT =

Final Ground Water Table, FGWT = -2.80

Ground Surface, GS

Test Results

N	$\frac{\gamma d}{qu}$ kN/m3 / kN/m2	wc %	wl %	wp %	Gs / <2u
	1.25 / 220	43	102	37	2.75 / 75
23					
22					
19					
37					
40					
51/10cm					
51/7cm					

2.50 Fill Soil: Broken stones, silt, roots,...etc.

Very stiff grayish brown silty clay, fine stones, crumbling.

11.00

Grayish brown clayey silt, traces fine sand, organic matter.

14.50

15.30

Fine to Medium brown sand, mica.

19.00

Medium to fine brown sand, mica.

26.00

Graded brown sand, mica.

30.00 End of Boring

Fig. (2-1)

El Mahala El Kobra Water Treatment Plant.
Intake Facilities - Upgrading Project.
Gharbeya - Egypt

Bahr Engineering Consultant Office
BECO
Prof. Dr. Mohamed Awad Bahr

Boring No. (2)

Initial Ground Water Table, IGWT =

Final Ground Water Table, FGWT = -0.75m from G.S

Ground Surface, GS

		Test Results					
		N	γ_d / qu	wc	wl	wp	Gs / <2u
			kN/m3 / kN/m2	%	%	%	
FGWT 1.00	Top Soil: Brown clayey silt, roots, fine stones, crumbling						
	Medium to stiff brown silty clay, traces of fine sand.	18					
			1.45 / 157	33	55	21	2.7 / 42
4.00							
	Stiff dark brown silty clay, traces of fine sand, crumbling.	22					
8.00							
	Very stiff grayish brown silty clay, fine stones, crumbling.	28					
12.50							
14.00	Grayish brown clayey silt, traces fine sand, organic matter.	34					
		37					
		44					
	Medium to fine brown sand, mica.	51/14cm					
25.00		51/8cm					
	Graded brown sand, mica.						
30.00	End of Boring						

Fig. (2-2)

El Mahala El Kobra Water Treatment Plant.
New Water Treatment Plant- Upgrading Project.
Gharbeya - Egypt

Bahr Engineering Consultant Office
BECO
Prof. Dr. Mohamed Awad Bahr

Boring No. (3)

Initial Ground Water Table, IGWT =

Final Ground Water Table, FGWT = -0.4m from G.S.

Ground Surface, GS

FGWT

1.00	Top Soil: Brown silty clay, roots, fine stones, crumbling
4.00	Medium to stiff brown silty clay, traces of fine sand
8.50	Stiff dark brown silty clay, traces of fine sand, crumbling.
12.00	Very stiff grayish brown silty clay, fine stones, crumbling.
14.50	Grayish brown clayey silt, traces fine sand, organic matter.
24.00	Medium to coarse brown sand, mica.
30.00	Graded brown sand, mica.
	End of Boring

Test Results

N	$\frac{\gamma d}{qu}$ kN/m3 / kN/m2	wc %	wl %	wp %	Gs/<2u
19					
	1.50 / 180	32	45	21	2.68 / 35
22					
28					
44					
44					
47					
51/18cm					
51/8cm					

Fig. (2-3)

El Mahala El Kobra Water Treatment Plant.
New Water Treatment Plant- Upgrading Project.
Gharbeya - Egypt

Bahr Engineering Consultant Office
BECO
Prof. Dr. Mohamed Awad Bahr

Boring No. (4)

Initial Ground Water Table, IGWT =

Final Ground Water Table, FGWT = - 1.10 m from G.S.

Ground Surface, GS

FGWT

3.50

6.00

9.50

15.00

24.00

30.00

Top Soil: Brown clayey silt, fine sand, roots, crumbling

Stiff dark brown silty clay, traces of fine sand, crumbling.

Very stiff grayish brown silty clay, fine stones, crumbling.

Grayish brown clayey silt, traces fine sand, organic matter.

Medium brown sand, mica.

Graded brown sand, mica.

End of Boring

Test Results

N	$\frac{\gamma d}{qu}$ kN/m3 kN/m2	wc %	wl %	wp %	Gs/ <2u
19					
21	1.50 / 180	32	61	22	2.68 / 46
27					
32					
46					
47					
51/19cm					
51/10cm					

Fig. (2-4)

El Mahala El Kobra Water Treatment Plant.
New Water Treatment Plant- Upgrading Project.
Gharbeya - Egypt

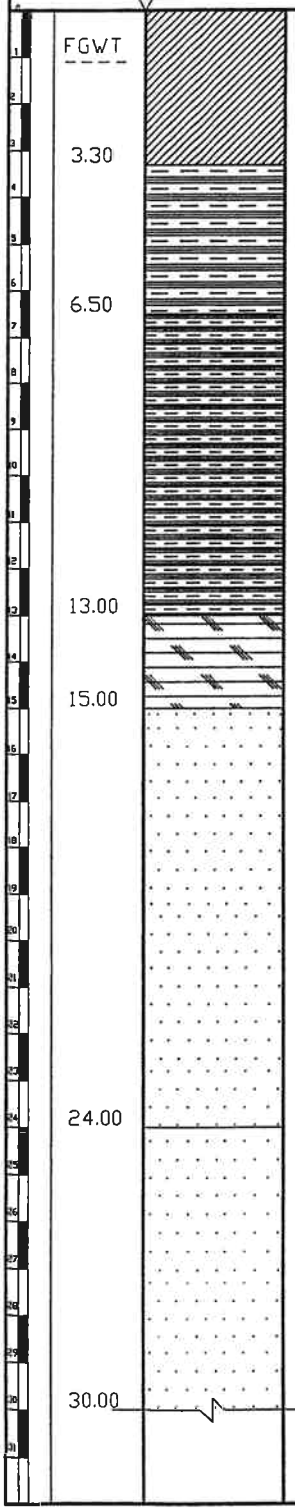
Bahr Engineering Consultant Office
BECO
Prof. Dr. Mohamed Awad Bahr

Boring No. (5)

Initial Ground Water Table, IGWT = miss measure

Final Ground Water Table, FGWT = 1.1m

Ground Surface, GS



Top Soil: Brown clayey silt, fine sand, roots, crumbling

Stiff dark brown silty clay, traces of fine sand, crumbling.

Very stiff grayish brown silty clay, fine stones, crumbling.

Grayish brown clayey silt, traces fine sand, organic matter.

Medium brown sand, mica.

Graded brown sand, mica.

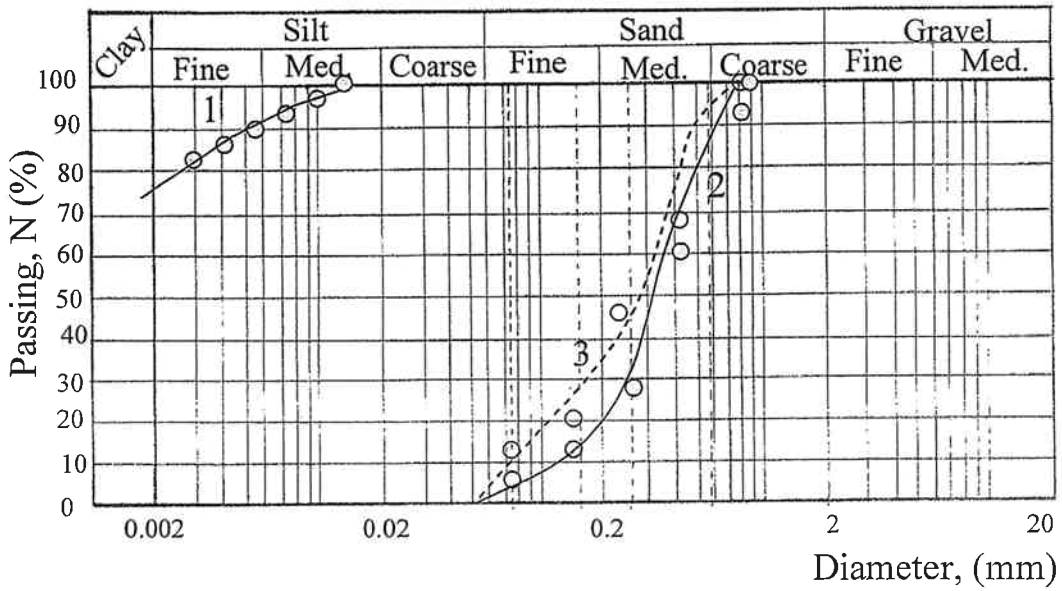
End of Boring

Test Results

N	γd / qu (kN/m3 / kN/m2)	wc %	wl %	wp %	Gs / <2u
19					
22	1.58 / 240	31	68	21	2.68 / 46
28					
33					
32					
47					
51/18cm					
51/8cm					

Fig. (2-5)

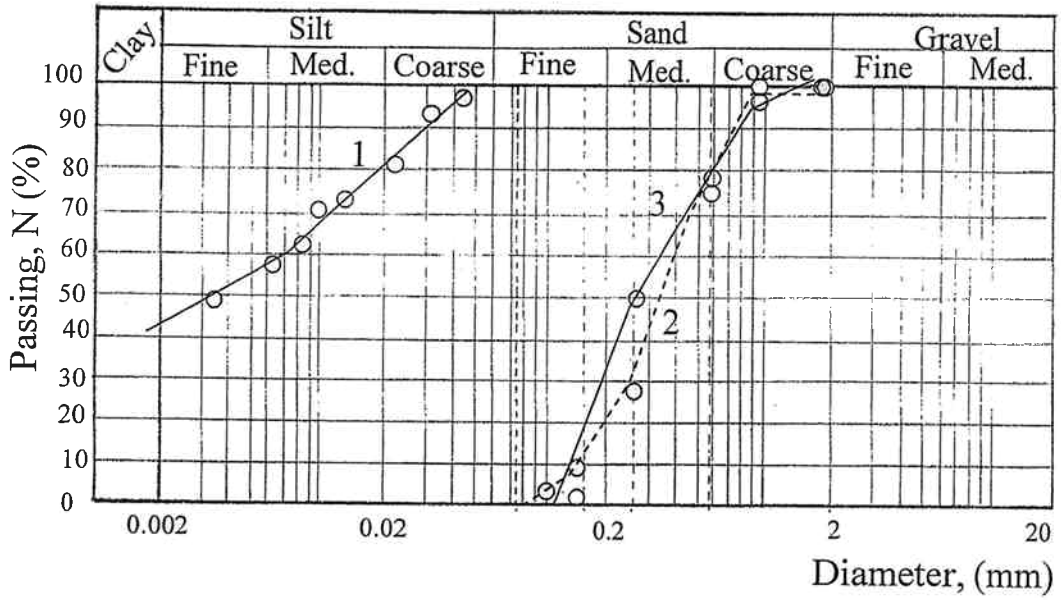
Boring No. (1)



Curve No.	1	2	3			
Depth, m	-4	-16	-22			

Fig. (3-1) Grading Curves.

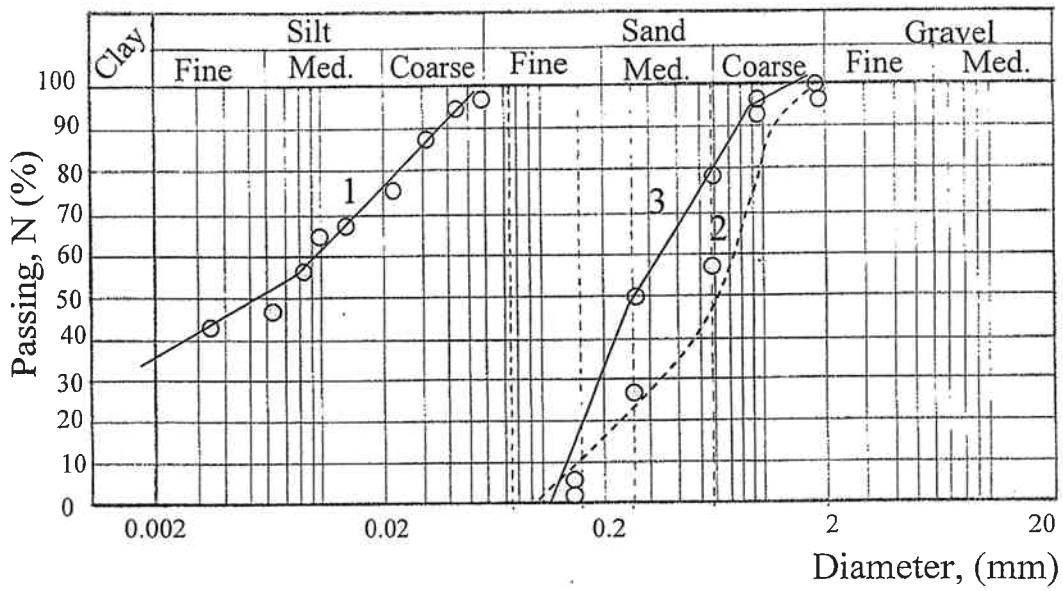
Boring No. (2)



Curve No.	1	2	3			
Depth, m	-4	-15	-26			

Fig. (3-2) Grading Curves.

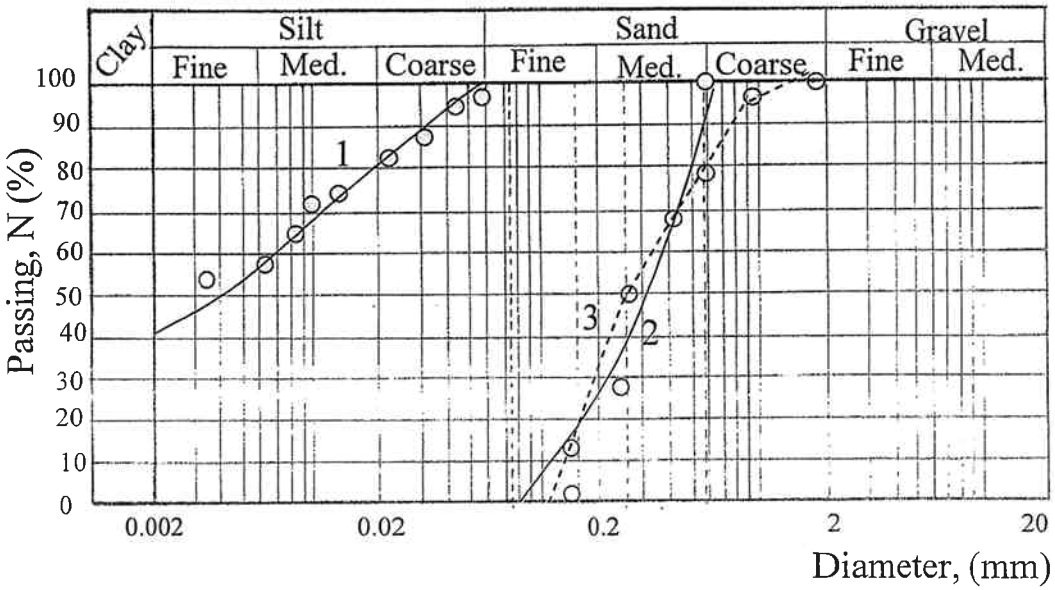
Boring No. (3)



Curve No.	1	2	3			
Depth, m	-4	-17	-26			

Fig. (3-3) Grading Curves.

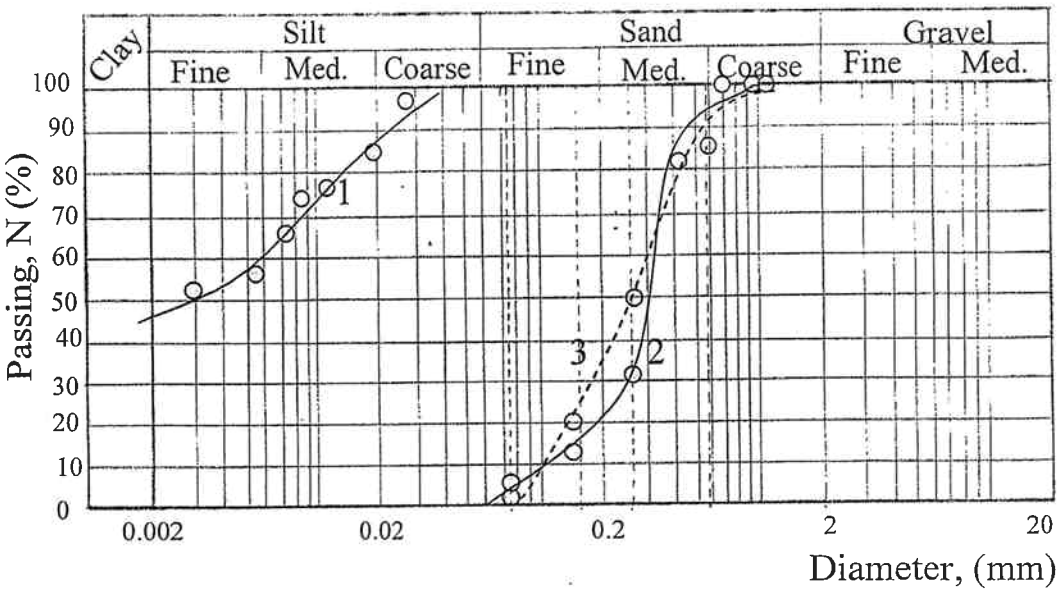
Boring No. (4)



Curve No.	1	2	3			
Depth, m	-5	-16	-26			

Fig. (3-4) Grading Curves.

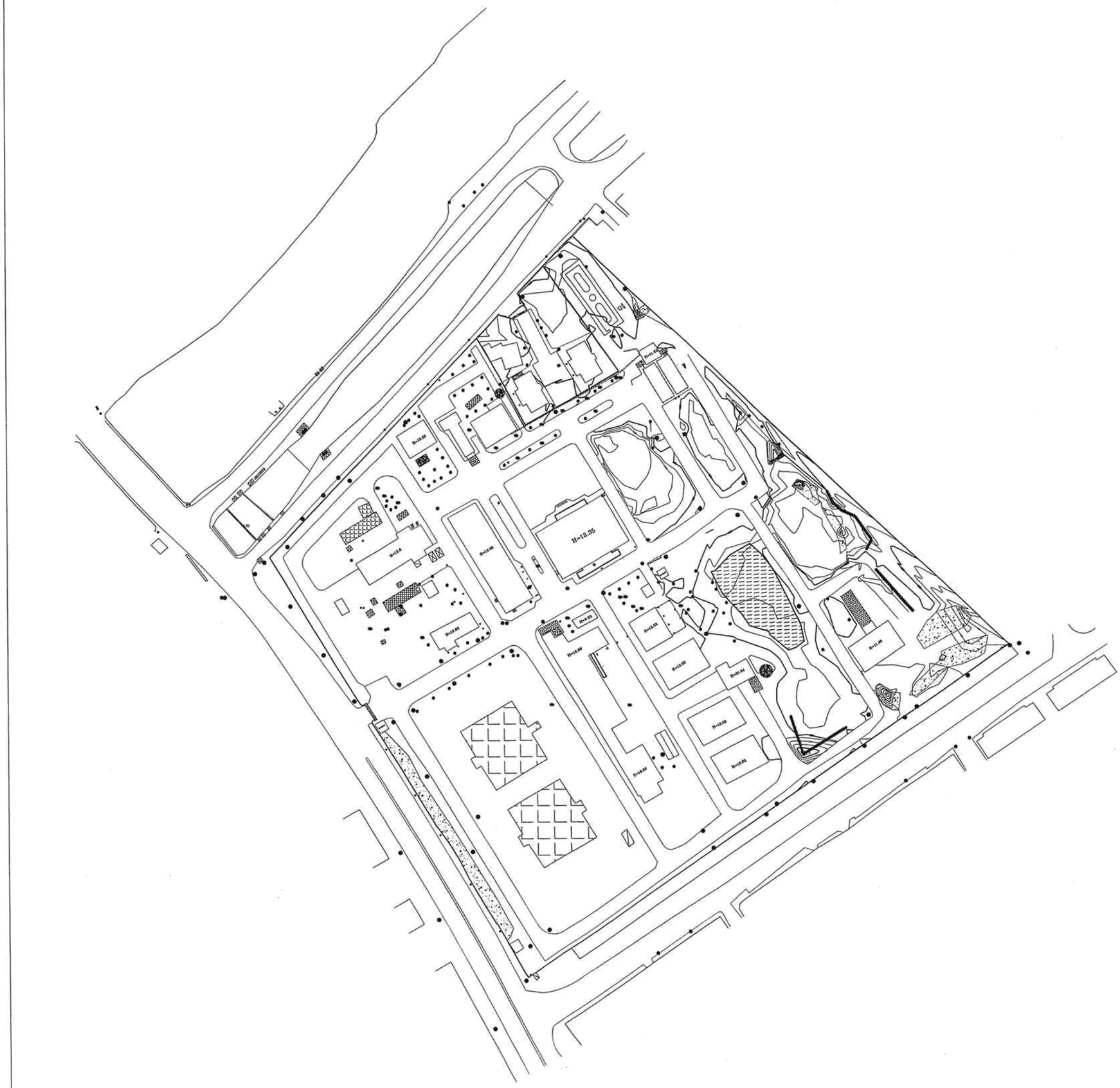
Boring No. (5)



Curve No.	1	2	3			
Depth, m	-5	-16	-26			

Fig. (3-5) Grading Curves.

Appendix-6 Topographic Survey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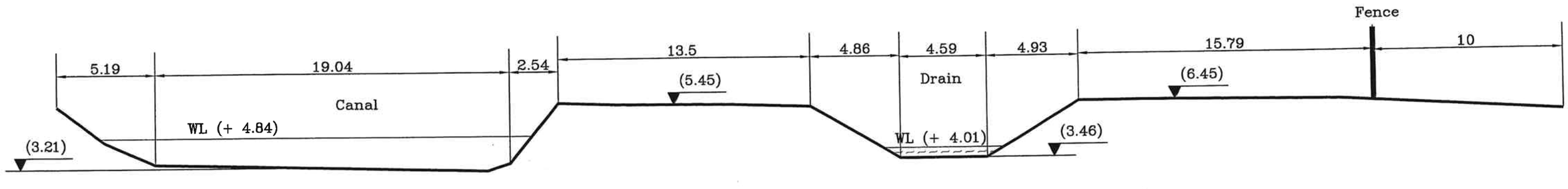
Fence
5.19
19.04
2.54
13.5
4.86
4.59
4.93
15.79
10
Canal
Drain
(5.45)
(6.45)
WL (+ 4.84)
WL (+ 4.01)
(3.21)
(3.46)

X-Section A-A