資料－Ⅶ　西オムラニア地区及び
西ムニラ地区地質調査データ

Technical Report on the Soil and Foundations Tests for the Sanitary Drainage Project at Omrania West and Mounira West, in Giza Governorate

Contents

Appendix

2. BOREHOLES

Six (6) boreholes were done in Omrania West, and four (4) in Mounira West in locations as shown in Figures A & B.

Manual equipment and caisson of diameter 150 mm were used, and excavation depth was up to 6 meters in all the boreholes.

Disturbed samples were taken from each of the cohesive clayey soil and cohesionless sandy soil at every 1 meter or at the change in layers.

Initial and final groundwater levels were observed for each borehole and a sample of groundwater was taken from each borehole for chemical analysis.

3. SOIL NATURE

Field and laboratory analysis were done for soil samples taken out from the boring, and accordingly the soil was classified into layers, as shown in figures 1 to 10. Sections shown in these figures show that the soil characteristics are generally as follows:

First: Omrania West

3.1 Borehole (1): Salam street.

A. Natural ground level to a depth of 1.5m;
Fill composed of lime chips, sand, and pieces of red bricks.

B. 1.5m to 6.0m (end of borehole);
Brown silty clay.

3.2 Borehole (2): Hakim Morgan street

A. Natural ground level to a depth of 2.5m;
Fill composed of (silt, lime chips, red bricks, and sand).

B. 2.5m to 3.5m;
Brown sandy silt and traces of silt.

C. 3.5m to 6.0m (end of borehole);
Brown silty clay.

3.3 Borehole (3): Madaress street

A. Natural ground level to a depth of 1.5m;
Fill composed of (silt, lime chips, and red bricks).

B. 1.5m to 4.5m;
Brown silty clay and traces of lime chips.

C. 4.5m to 6.0m (end of borehole);
Brown clayey silt and traces of fine sand.

3.4 Borehole (4): Moasskar st. and Madaress st. intersection

A. Natural ground level to a depth of 1.5m;
Brown clayey silt and traces of lime chips.

B. 1.5m to 2.5m;
Brown sandy silt and traces of clay
C. 2.5m to 4.5m;
Brown silty clay and traces of lime chips.
D. 4.5m to 6.0m (end of borehole);
Brown sandy silt and traces of clay.

3.5 Borehole (5): Eshterakia street

A. Natural ground level to a depth of 1.5m;
Brown clayey silt and traces of (lime chips, red bricks, and sand).
B. 1.5m to 2.5m;
Brown sandy silt and traces of clay.
C. 2.5m to 6.0m (end of borehole);
Brown silty clay.

3.6 Borehole (6): Al Ahed street

A. Natural ground level to a depth of 1.5m;
Brown clayey silt and traces of (fine sand, lime chips, sand, and red bricks).
B. 1.5m to 4.5m;
Fine brown sandy silt.
C. 4.5m to 6.0m (end of borehole);
Brown silty clay.

Second: Mounira West

3.7 Borehole (1): Noaman Abou Zahra street

A. Natural ground level to a dapth of 3.5m;
Brown clayey silt and traces of (fine sand and lime chips).
B. 3.5m to 5.5m;
Brown silty clay and traces of lime chips.
C. 5.5m to 6.0m (end of borehole);
Brown clayey silt and fine silicious sand.

3.8 Borehole (2): along Sawameaa Railway

A. Natural ground level to depth of 1.5m;
Graded silicious sand and traces of (silt and lime chips) and some gray sand chips.
B. 1.5m to 6.0m (end of borehole);
Clayey silt to brown silty clay and traces of (fine sand and lime chips).

3.9 Borehole (3): along Sawameaa Railway

A. Natural ground level to depth of 1.5m;
Fill composed of (silt, sand, thin gravel, vegetation roots, and lime chips).
B. 1.5m to 2.4m;
Brown silty clay.
C. 2.4m to 3.5m;
Brown clayey silt and some red bricks chips.
D. 3.5m to 5.5m;
Brown silty clay.

E. 5.5m to 6.0m (end of borehole);
Brown silt and some fine sand.

3.10 Borehole (4): Mohamed Aly Osman street

A. Natural ground level to depth of 1.5m;
Fill composed of (sand, red bricks pieces, lime stone, pieces of pottery and plastic).
B. 1.5m to 2.5m;
Brown silty clay.
C. 2.5m to 3.5m;
Fine silicious sand and some brown silt.
D. 3.5m to 6.0m (end of borehole);
Brown silty clay.

Third: Groundwater level at Omrania West

The following table shows initial and final groundwater levels for Omrania West from the present natural ground level:

Table (1)

Borehole No.	Initial Level (m)	Final Level (m)
1	4.50	2.80
2	2.00	1.10
3	5.00	2.00
4	4.00	1.80
5	2.50	0.80
6	2.50	1.10

Fourth: Groundwater level at Mounira West

Table (2)

Borehole No.	Initial Level (m)	Final Level (m)
1	4.50	2.90
2	4.00	2.40
3	4.20	1.90
4	4.25	1.80

4. LABORATORY TESTS

A. Grain Size Distribution

The grain size distribution curve was prepared using the standard sieves for a number of samples that represent the sandy soil. The results are shown in figures 11 to 14.

The above mentioned results were used to determine the accuracy of the layers previously made by visual inspection of the samples.

B. Atterberg Limits of Soil

The tests to determine the Atterberg limits and the natural moisture content were done on samples representing the clayey soil. The results are shown in the figures (15) to (19).

The above mentioned results were used in classification of the clayey soil by the Casagrande method, as shown in figures 20 and

21. A summary is given in the following table:

Table (3)

First: Omrania West Borehole No.	Sample Depth (m)	Classification by ASTM
1	3.00	CH
2	5.00	CH
4	4.00	CH
Second: Mounira West		
1	3.00	CH
3	5.00	CH

C. Permeability Factor

It is suggested to use Hazen equation to calculate permeability factor for sandy soil;

$$k = C\, d_{10}^{2} \quad \text{mm/sec}$$

where d_{10} : effective dimeter of particles in mm, and value taken directly from grain size distribution curves.

C : constant of value between 8 - 12 for poor graded sand, and 6 - 8 for well graded sand.

For clayey soil permeability factor ranges between 10^{-6} to 10^{-8} mm/sec.

The above mentioned values are approximate, and it is noted that in case of making a detailed soil study for the project it is necessary to practically identify the actual value.

D. Results of Groundwater Chemical Analysis

The following table shows the chemical analysis for a sample of groundwater from each of Omrania West and Mounira West respectively.

Table (4) Chemical Analysis for Groundwater from Omrania West

First: Sample Data
1. Location : Omrania project
2. Borehole No.: 5

Second: Physical Analysis
1. Sample color after filtration: transparent with no color
2. Color of suspended soil: light brown
3. Sample odor: ordinary with no organic or perfumed odor

Third: Chemical Analysis

Serial	Chemical composition	Term	ppm
1	Total mineral salts dissolved by sample evaporation after filtration at temp. of 105 C	Various salts	2050
2	Total alkalinity as sodium carbonates by orange methane indicator	Na2 CO3	1314
3	Sodium chloride using Mohr method (silver (silver nitrates)	Na Cl	419
4	Sulphates in form of sulphate trioxide by settling in barium sulphate	SO3	210
5	Hydrogen number for water (inverted logarithm of positive hydrogen ions) by electrochemical method	log 1/(H+)	7.14

Table (5) Chemical Analysis for Groundwater from Mounira West

First: Sample Data
1. Location : Project at Mohamed Aly Osman street
2. Borehole No.: 2

Second: Physical Analysis
1. Sample color after filtration: transparent with no color
2. Color of suspended soil: light brown
3. Sample odor: ordinary, with no organic or perfumed odor

Third: Chemical Analysis

Serial	Chemical composition	Term	ppm
1	Total mineral salts dissolved by sample evaporation after filtration at temp. of 105 C	Various salts	870
2	Total alkalinity as sodium carbonates by orange methane indicator	Na2 CO3	540
3	Sodium chloride using Mohr method (silver (silver nitrates)	Na Cl	140
4	Sulphates in form of sulphate trioxide by settling in barium sulphate	SO3	90
5	Hydrogen number for water (inverted logarithm of positive hydrogen ions) by electrochemical method	log 1/(H+)	7.12

5. SUMMARY

Boreholes numbering 6 and 4 have been drilled for each of Omrania West and Mounira West, up to 6m per borehole for the purpose of obtaining preliminary information concerning soil layers, and groundwater initial and final levels. Some laboratory tests were done and results showing various soil layers properties were

obtained.

In general, in total this study is a preliminary one for guidance, and it is noted that it is necessary to undertake a detailed study at the stage of detailed design (working drawings) for excavation shoring and water extraction, especially in the case of deep excavations, due to the large area of both sites.

Prepared on 23 April 1988
Dr. Eng. Mohsen Mashour

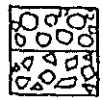
Appendix

المرفقات

DEFINITION OF IDENTIFICATION TERMS AND SYMBOLS

(I) Symbols Used in Soil Sections

rounded



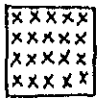
angular

Gravel

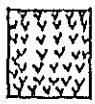
Sand Stone

Sand

Lime Stone

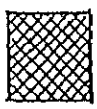


Silt



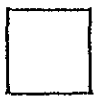
Peat or Organic matter

Clay



Fill

Loam



(II) Definitions of Terms Identifying the Composition of Granular Soils

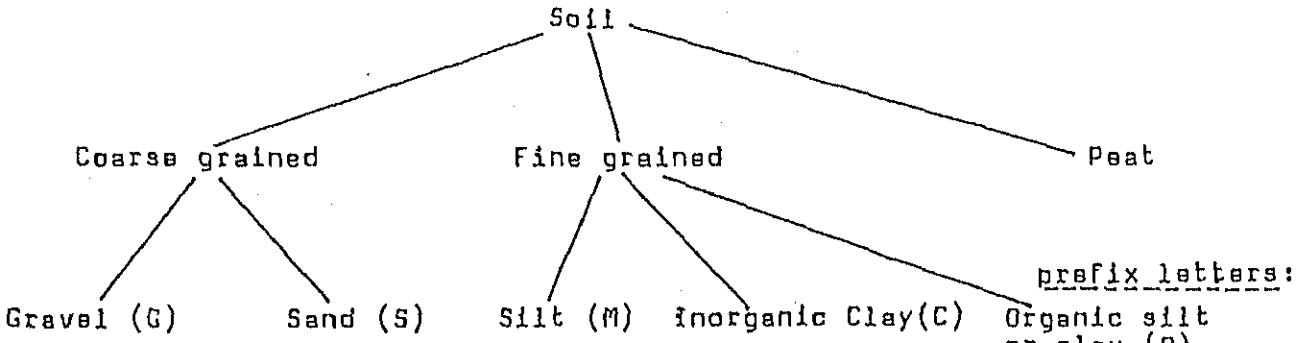
Proportion Terms	Defining Range of Percentages by Weight
trace	1 to 10
Some	10 to 20
Adjective	20 to 35
And	35 to 50

(III) Particle Size Classifcation

Description		Nominal diameter (mm)
COBBLES		more than 60.0
GRAVEL	Coarse	60.0 to 20.0
	Medium	20.0 to 6.0
	Fine	6.0 to 2.0
SAND	Coarse	2.0 to 0.6
	Medium	0.6 to 0.2
	Fine	0.2 to 0.06
SILT	Coarse	0.06 to 0.02
	Medium	0.02 to 0.006
	Fine	0.006 to 0.002
CLAY		less than 0.002

(IV) Unified Classification System

In this system, each soil is allotted two letters; a prefix depending on the predominant particle size, and a suffix related to the engineering properties.



prefix letters:

W=well graded(c_u > 4 for G or>6 for S; 1<c_z<3)
P=poorly graded(not meeting all requirements for W)
C=W or P with some clay(fines>12% & PI above A-Line)
M=W or P with some silt(fines>12% & PI below A-Line)
F=W or P with excess fines

suffix letters:

L=low plasticity (LL<35%)
I=intermediate plasticity (35%<LL<50%)
H=high plasticity (LL>50%)

(V) State of Compation of Cohesionless Soils in Terms of SPT Results

N-value(no. of blows for 1 ft penetration)	State of compaction	Relative density R_d	Equivalent value of ϕ (approx.)
1 - 4	Very loose	$0.00 < R_d \leq 0.15$	$< 30^o$
4 - 10	Loose	$0.15 < R_d \leq 0.33$	
10 - 30	Medium dense	$0.33 < R_d \leq 0.67$	$30 - 35^o$
30 - 50	Dense	$0.67 < R_d \leq 0.85$	$35 - 40^o$
> 50	Very dense	$0.85 < R_d \leq 1.0$	$40 - 45^o$

(VI) Consistency of Cohesive Soils in Terms of SPT Results

N-value(no. of blows for 1 ft penetration)	State of compaction	Consistency	Unconfined compressive strength, q_u (Kg / cm2)
< 2	Very soft	$I_c < 0.5$	< 0.25
2 - 4	Soft		0.25-0.50
4 - 8	Medium	$0.5 \leq I_c < 0.75$	0.50-0.84
8 - 15	Stiff	$0.75 \leq I_c < 1.0$	1.00-2.00
15 - 30	Very stiff	$I_c > 1.0$	2.00-4.00
> 30	Hard		> 4.00

(VII) 1- Description made for borehole logs is based on the examination of soil samples obtained by boring contractor.

2- No warranty is given that the information shown represents conditions between boreholes.

OMRANIA WEST AREA

MOUNIRA WEST AREA

Borehole 1

Salem st., Omrania

رقم الجسة:	١
المشروع:	الصرف الصحي محافظة الجيزة
الموقع:	شارع السلام بالعمرانية
منسوب سطح الجسة:	
Initial groundwater level / منسوب الماء الجوفي الابتدائي:	- 1.50 m (١,٥٠ متر)
Final groundwater level / منسوب الماء الجوفي النهائي:	- 2.40 m (١,٨٠ متر)

Soil Classification / تصنيف التربة	Unconfined pressure (Kg/cm²) / الضغط غير المحصور كجم/سم²	Number of blows for standard penetration / عدد الدقات للاختراق القياسي	Section / القطاع	Depth (m) / العمق بالمتر
ردم يتكون من (حصى جيري ورمل وطوب أحمر) Fill (lime chips, sand, red bricks)				صفر – ١
طين طمي بني Brown Silty Clay				٢ – ٣ – ٤ – ٥ – ٦
				٧ – ٨ – ٩ – ١٠ – ١١ – ١٢ – ١٣ – ١٤ – ١٥ – ١٦ – ١٧ – ١٨ – ١٩ – ٢٠

Fig No. (1)

شكل رقم (١)

Borehole 2

Hakim Morgan st., Omrania

رقم الجسة:	٢
المشروع:	الصرف الصحي محافظة الجيزة
الموقع:	شارع حكيم مرجان العمرانية
منسوب سطح الجسة:	
Initial groundwater level / منسوب الماء الجوفي الابتدائي:	- 2.00 m (١,٠٠ متر)
Final groundwater level / منسوب الماء الجوفي النهائي:	- 1.1 m (١,١٠ متر)

Soil Classification / تصنيف التربة	Unconfined pressure (Kg/cm²) / الضغط غير المحصور كجم/سم²	Number of blows for standard penetration / عدد الدقات للاختراق القياسي	Section / القطاع	Depth (m) / العمق بالمتر
ردم يتكون من (طمي وحصى جيري وطوب أحمر ورمل) Fill (Silt, lime chips, red brick, and sand)				صفر – ١ – ٢
طمي بني رملي وآثار طمي. Brown sandy silt and traces of silt.				٣
طين طمي بني (آثار رمل ناعم) Brown silty clay (traces of fine sand)				٤ – ٥ – ٦
				٧ – ٨ – ٩ – ١٠ – ١١ – ١٢ – ١٣ – ١٤ – ١٥ – ١٦ – ١٧ – ١٨ – ١٩ – ٢٠

Fig. (2)

شكل رقم (٢)

مكتب التصميمات والاستشارات الهندسية

شارع ٢٦ يوليو ميدان لبنان - المهندسين

Borehole 3

Madares street, Omrania

رقم الجسة:	٣
المشروع:	الصرف الصحي محافظة الجيزة
الموقع:	شارع المدارس - العمرانية
منسوب سطح الجسة:	
Initial groundwater level / منسوب الماء الجوفي الابتدائي:	- 5.0 m (٠,٠٠ متر)
Final groundwater level / منسوب الماء الجوفي النهائي:	- 2.0 m (٢,٠٠ متر)

Soil classification / تصنيف التربة	Unconfined pressure (Kg/cm²) / الضغط غير المحصور كجم/سم²	Number of blows for standard penetration / عدد الدقات للاختراق القياسي	Section / القطاع	Depth (m) / العمق بالمتر
ردم يتكون من (طمي وحصى جيري وطوب أحمر) Fill (silt, lime chips, red bricks)				صفر – ١
طين طمي بني وآثار حصى جيري Brown silty clay and traces of lime chips				٢ – ٣ – ٤
طمي طيني بني وآثار رمل ناعم (آثار حصى جيري) Brown clayey silt and traces of fine sand and lime chips				٥ – ٦
				٧ – ٨ – ٩ – ١٠ – ١١ – ١٢ – ١٣ – ١٤ – ١٥ – ١٦ – ١٧ – ١٨ – ١٩ – ٢٠

Fig (3)

شكل رقم (٣)

مكتب التصميمات والاستشارات الهندسية

شارع ٢٦ يوليو ميدان لبنان - المهندسين

Borehole 4

Intersection of Moaskar street with Madares street, Omrania

رقم الجسة:	٤
المشروع:	الصرف الصحي محافظة الجيزة
الموقع:	شارع المعسكر مع المدارس بالعمرانية
منسوب سطح الجسة:	
Initial groundwater level / منسوب الماء الجوفي الابتدائي:	- 4.0 m (٠,٠٠ متر)
Final groundwater level / منسوب الماء الجوفي النهائي:	- 1.8 m (١,٨٠ متر)

Soil classification / تصنيف التربة	Unconfined pressure (Kg/cm²) / الضغط غير المحصور كجم/سم²	Number of blows for standard penetration / عدد الدقات للاختراق القياسي	Section / القطاع	Depth (m) / العمق بالمتر
طمي طيني بني وآثار حصى جيري Brown clayey silt and traces of lime chips				صفر – ١
طمي بني رملي وآثار طمي Brown sandy silt and traces of silt				٢
طين طمي بني وآثار حصى جيري Brown silty clay and traces of lime chips				٣ – ٤
طمي بني رملي وآثار طمي Brown sandy silt and traces of silt				٥ – ٦
				٧ – ٨ – ٩ – ١٠ – ١١ – ١٢ – ١٣ – ١٤ – ١٥ – ١٦ – ١٧ – ١٨ – ١٩ – ٢٠

Fig. (4)

شكل رقم (٤)

شارع ٢٦ يوليو ميدان لبنان - المهندسين

Borehole 5 — Eshtrakia st., Omrania

المشروع: الصرف الصحي محافظة الجيزة
الموقع: شارع الاشتراكية بالعمرانية
منسوب سطح الجسة:

رقم الجسة: ٥
Initial groundwater level: -2.5 m
منسوب المياه الجوفية الابتدائي: -٢,٥ متر
Final groundwater level: -6.2 m
منسوب المياه الجوفية النهائي: -٨,٠ متر

Soil Classification / تصنيف التربة	Unconfined pressure (kg/cm²) / الضغط غير المحصور كجم/سم²	Number of blows for standard penetration / عدد الدقات للاختراق القياسي	Section / القطاع	Depth (m) / العمق بالمتر
Brown clayey silt and traces of (lime chips, red brick and sand) / طمى طينى بنى وآثار (حصى جيرى وطوب أحمر ورمل)				0–1
Brown sandy silt and traces of silt / طمى بنى رملى وآثار طين				1–2
(+ silt) (+ طمى) (Traces of fine sand) (آثار رمل ناعم) Brown silty clay / طين طمى بنى				3–6

Fig. (5)
شكل رقم (٥)

شارع ٢٦ يوليو ميدان لبنان - المهندسين

Borehole 6 — El Ahad el Gedid st., Omrania

المشروع: الصرف الصحي محافظة الجيزة
الموقع: شارع المعهد الجديد بالعمرانية
منسوب سطح الجسة:

رقم الجسة: ٦
Initial groundwater level: -2.5 m
منسوب المياه الجوفية الابتدائي
Final groundwater level
منسوب المياه الجوفية النهائي

Soil Classification / تصنيف التربة	Unconfined pressure (kg/cm²) / الضغط غير المحصور كجم/سم²	Number of blows for standard penetration / عدد الدقات للاختراق القياسي	Section / القطاع	Depth (m) / العمق بالمتر
Brown clayey silt and traces of (fine sand, lime chips and red brick) / طمى طينى بنى وآثار (رمل ناعم وحصى جيرى ورمل وطوب أحمر)				0–1
Brown sandy silt (+ silt) / طمى بنى رملى ناعم (+ طين)				1–4
Brown silty clay / طين طمى بنى				4–6

Fig. (6)
شكل رقم (٦)

مكتب التصميمات والاستشارات الهندسية
شارع ٢٦ يوليو ميدان لبنان - المهندسين

Borehole 1 — Noaman Abu Zahra st., Hounin

المشروع: الصرف الصحي بمحافظة الجيزة
الموقع: شارع نعمان ابو زهرة بالجيزة
منسوب سطح الجسة:

رقم الجسة: ١
Initial groundwater level: -4.5 m
منسوب المياه الجوفية الابتدائي: -٤,٥ متر
Final groundwater level: -2.9 m
منسوب المياه الجوفية النهائي: -٢,٩ متر

Soil Classification / تصنيف التربة	Unconfined pressure (kg/cm²) / الضغط غير المحصور كجم/سم²	Number of blows for standard penetration / عدد الدقات للاختراق القياسي	Section / القطاع	Depth (m) / العمق بالمتر
Brown clayey silt and traces of (fine sand, and lime chips) / طمى طينى بنى وآثار (رمل ناعم وحصى جيرى)				0–3
Brown silty clay and traces of lime chips / طين طمى بنى وآثار حصى جيرى				3–5
Brown clayey silt and fine siliceous sand / طمى طينى بنى ورمل سليسى ناعم				5–6

Fig. (7)
شكل رقم (٧)

مكتب التصميمات والاستشارات الهندسية
شارع ٢٦ يوليو ميدان لبنان - المهندسين

Borehole 2 — [illegible] Railway, Hounin

المشروع: الصرف الصحي بمحافظة الجيزة
الموقع: سكة حديد المواج بالجيزة
منسوب سطح الجسة:

رقم الجسة: ٢
Initial groundwater level: -4.0 m
منسوب المياه الجوفية الابتدائي: -٤,٠ متر
Final groundwater level: -2.4 m
منسوب المياه الجوفية النهائي: -٢,٤ متر

Soil Classification / تصنيف التربة	Unconfined pressure (kg/cm²) / الضغط غير المحصور كجم/سم²	Number of blows for standard penetration / عدد الدقات للاختراق القياسي	Section / القطاع	Depth (m) / العمق بالمتر
Graded siliceous sand and traces of (silt and lime chips) and some gray sand stone / رمل سليسى متدرج وآثار (طمى وحصى جيرى) وبعض الحصى الرملى بلون رمادى				0–2
Clayey silt to brown silty clay and traces of (fine sand and lime chips) / طمى طينى الى طين طمى بنى وآثار (رمل ناعم وحصى جيرى)				2–6

Fig. (8)
شكل رقم (٨)

Borehole 3

شارع ١٦ يوليو ميدان لبنان - المهندسين

Sawami railway, Mounira

المشروع: العرق الصحى بمحافظة الجيزة

الموقع: سكة حديد العوامى بالشيرة

منسوب سطح الجسة:

رقم الجسة: ٣

منسوب الماء الجوفية الابتدائي: -4.2 m : Initial groundwater level ٢,٠ متر

منسوب الماء الجوفية النهائي: -1.9 m : Final groundwater level ١,١٠ متر

Soil Classification / تصنيف التربة	الضغط المحصور كجم/سم²	عدد الدقات الاختراق القياسي	القطاع Section	العمق Depth (m) بالمتر
Fill composed of (silt, sand, chin gravel, vegetation roots, and lime chips) ردم يتكون من (طمى ورمل وزلط رفيع وجذور نباتيه وحصى جيرى)	Unconfined pressure (kg/cm²)	Number of blows for Standard penetration		٠ – 1
Brown silty clay طين طمى بنى				١ – 2
Brown clayey silt and some red bricks chips طمى طينى بنى وبعض حصى الطوب الاحمر				٣ – 3
Brown silty clay. طين طمى بنى				٤ – 4
Brown silt and some fine sand طمى بنى وبعض الرمل الناعم				٥ – 5, ٦ – 6

Depth scale: ٧ ، ٨ ، ٩ ، ١٠ ، ١١ ، ١٢ ، ١٣ ، ١٤ ، ١٥ ، ١٦ ، ١٧ ، ١٨ ، ١٩ ، ٢٠

Fig (9)

شكل رقم (٩)

Borehole 4

شارع ١٦ يوليو ميدان لبنان - المهندسين

Mohamed Aly Osman st., Mounira

المشروع: العرق الصحى بمحافظة الجيزة

الموقع: شارع محمد على عثمان بالشيرة

منسوب سطح الجسة:

رقم الجسة: ٤

منسوب الماء الجوفية الابتدائي: -4.25 m : Initial groundwater level ٢,٠ متر

منسوب الماء الجوفية النهائي: -1.8 m : Final groundwater level ١,٨٠ متر

Soil Classification / تصنيف التربة	الضغط المحصور كجم/سم²	عدد الدقات الاختراق القياسي	القطاع Section	العمق Depth (m) بالمتر
Fill (sand, red bricks pieces, lime stone, pieces of pottery and plastic) ردم يتكون من (رمل وكسر طوب احمر وحجر جيرى وقطع فخارية وبلاستيك)	Unconfined pressure kg/cm²	Number of blows for standard penetration		٠ – 1
Brown Silty Clay طين طمى بنى				١ – 2
Fine siliceous sand and some brown silt رمل سليسى ناعم وبعض الطمى البنى				٣ – 3
Brown silty clay. طين طمى بنى				٤ – 4, ٥ – 5, ٦ – 6

Depth scale: ٧ ، ٨ ، ٩ ، ١٠ ، ١١ ، ١٢ ، ١٣ ، ١٤ ، ١٥ ، ١٦ ، ١٧ ، ١٨ ، ١٩ ، ٢٠

Fig. (10)

شكل رقم (١٠)

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ENGINEERING DESIGN CONSULTANTS

Soil Mechanics Laboratory

Omrania West

GRAIN SIZE DISTRIBUTION

العمرانية الغربية - العرق الصحى

Project: Location: Date:

Borehole number: 6 Depth in m: 4.0

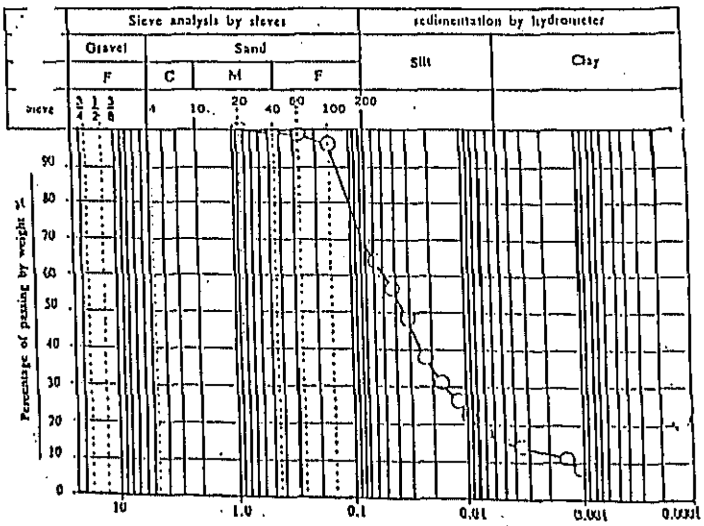

Fig (11)

Diameter of soil grain in mm

Visual and manual Identification	Grain size parameters of soil sample
Colour: Brown	ASTM Classification: ML
Structure: Cohesive	Uniformity Coefficient Cu: -
Name: Siliceous Fine Sandy Silt, Some Clay.	Effective diameter D 10 % in mm: -
	Uniformity curvature Cc: -

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ENGINEERING DESIGN CONSULTANTS

Soil Mechanics Laboratory

Mounira west

GRAIN SIZE DISTRIBUTION

الشيرة الغربية - العرق الصحى

Project: Location: Date:

Borehole number: 1 Depth in m: 6.0

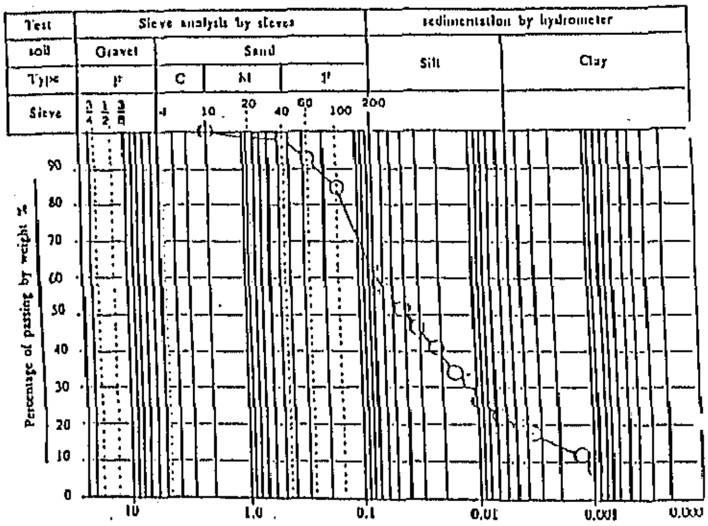

Fig (12)

Diameter of soil grain in mm

Visual and manual Identification	Grain size parameters of soil sample
Colour: Brown	ASTM Classification: ML
Structure: Cohesionless	Uniformity Coefficient Cu: -
Name: Clayey Silt & Siliceous Fine Sand.	Effective diameter D 10 % in mm: -
	Uniformity curvature Cc: -

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ENGINEERING DESIGN CONSULTANTS

Soil Mechanics Laboratory

Mounira Wed

GRAIN SIZE DISTRIBUTION

الخبر الغربية – الغرق السحى

Project :
Location :
Date :
Borehole number: 2
Depth in m : 5.0

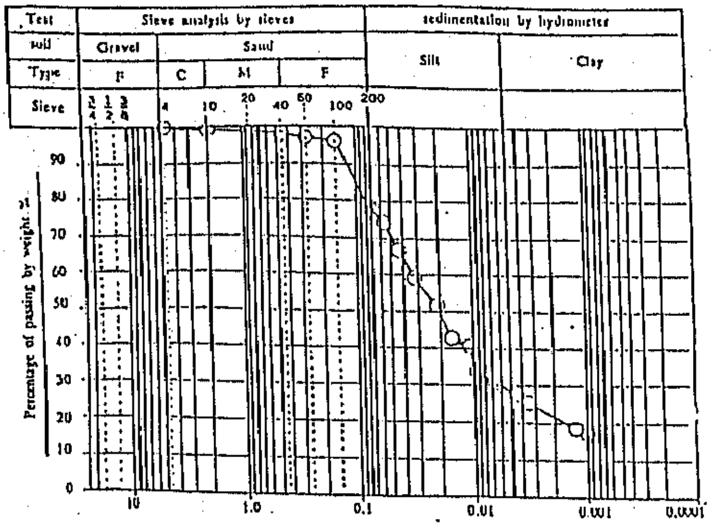

Fig (13)
Diameter of soil grain in mm

Visual and manual identification	Grain size parameters of soil sample
Colour : Brown	A S T M Classification : ML
Structure : Cohesionless	Uniformity Coefficient C_u : -
Name : Clayey Silt , Some Of Fine Sand .	Effective diameter D 10 % in mm : -
	Uniformity curvature C_c : -

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Mounira Wed

GRAIN SIZE DISTRIBUTION

الخبر الغربية – الغرق السحى

Project :
Location :
Date :
Borehole number: 4
Depth in m : 3.0

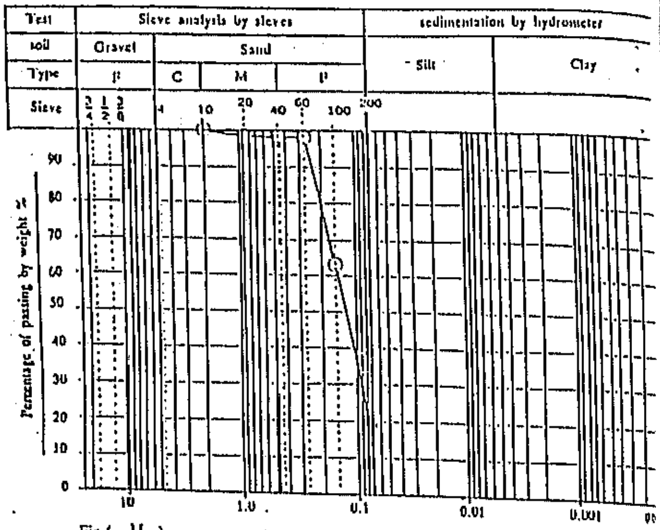

Fig (14)
Diameter of soil grain in mm

Visual and manual identification	Grain size parameters of soil sample
Colour : Brown	A S T M Classification : SM
Structure : Cohesionless	Uniformity Coefficient C_u : -
Name : Siliceous Fine Sand , Some Of Silt .	Effective diameter D 10 % in mm : -
	Uniformity curvature C_c : -

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ENGINEERING DESIGN CONSULTANTS

ATTERBERG LIMITS OF SOIL

Soil Mechanics Laboratory

Project : Omrania Wed مشروع العمرانية
Location :
Date : April 11,
Borehole number: 1
Depth in m : 3.00

Serial number	Description	Result	Serial number	Description	Result
1	Water content %	N A	4	Plasticity index %	36.6
2	Liquid limit %	62.8	5	Shrinkage limit %	N A
3	Plastic limit %	26.2	6	Relative consistency (C_r)	N A

FLOW CURVE OF SOIL

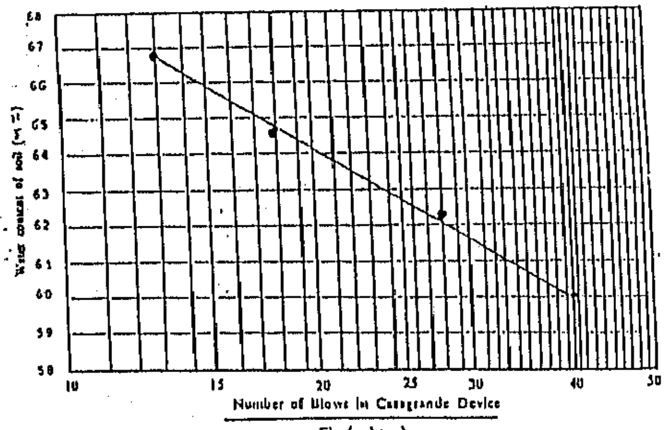

Fig (15)

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ATTERBERG LIMITS OF SOIL

Soil Mechanics Laboratory

Project : Omrania Wed مشروع العمرانية
Location :
Date : April 11,
Borehole number: 2
Depth in m : 5.00

Serial number	Description	Result	Serial number	Description	Result
1	Water content %	N A	4	Plasticity index %	33.8
2	Liquid limit %	59.9	5	Shrinkage limit %	N A
3	Plastic limit %	26.1	6	Relative consistency (C_r)	N A

FLOW CURVE OF SOIL

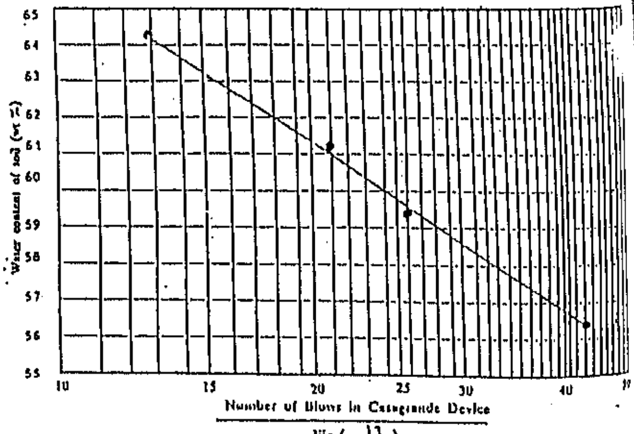

Fig (16)

ENGINEERING DESIGN CONSULTANTS

ATTERBERG LIMITS OF SOIL

Soil Mechanics Laboratory

Project : مشروع المعرانية Ouranie Wet   Location :   Date : April 11, 1988

Borehole number: 4   Depth in m : 4.00

Serial number	Description	Result	Serial number	Description	Result
1	Water content %	N A	4	Plasticity index %	34.7
2	Liquid limit %	55.6	5	Shrinkage limit %	N A
3	Plastic limit %	20.9	6	Relative consistency (C_r)	N A

FLOW CURVE OF SOIL

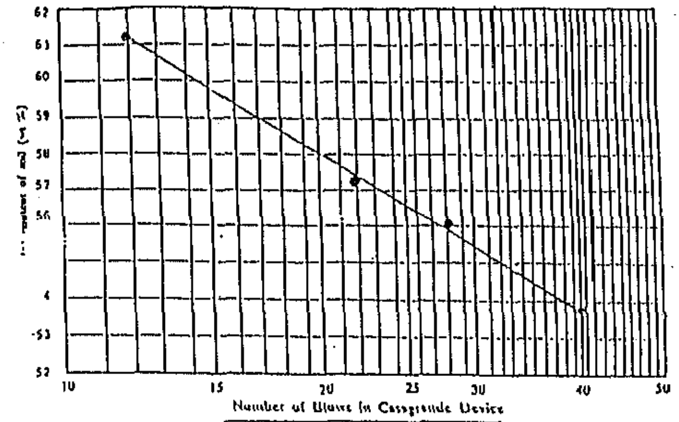

Fig (١٧)
17

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ATTERBERG LIMITS OF SOIL

Soil Mechanics Laboratory :

Project : مشروع النيرة الغربية Mounira Wet   Location :   Date : April 11, 1988

Borehole number: 1   Depth in m : 3.00

Serial number	Description	Result	Serial number	Description	Result
1	Water content %	N A	4	Plasticity index %	30.7
2	Liquid limit %	56.6	5	Shrinkage limit %	N A
3	Plastic limit %	25.9	6	Relative consistency (C_r)	N A

FLOW CURVE OF SOIL

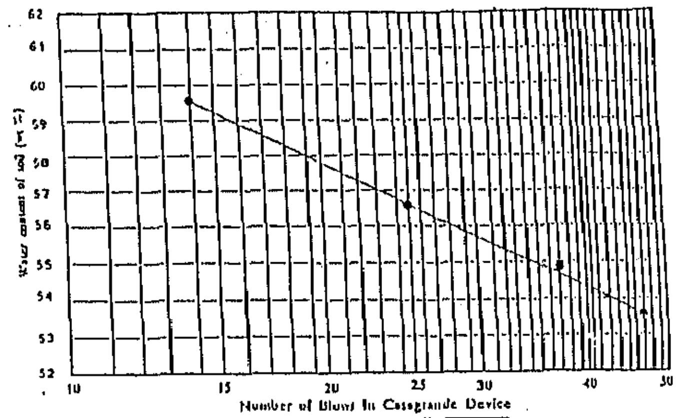

Fig (١٨)
18

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ATTERBERG LIMITS OF SOIL

Soil Mechanics Laboratory

Project : مشروع النيرة الغربية Mounira Wet   Location :   Date : April 11, 1988

Borehole number: 3   Depth in m : 5.00

Serial number	Description	Result	Serial number	Description	Result
1	Water content %	N A	4	Plasticity index %	29.1
2	Liquid limit %	53.6	5	Shrinkage limit %	N A
3	Plastic limit %	24.5	6	Relative consistency (C_r)	N A

FLOW CURVE OF SOIL

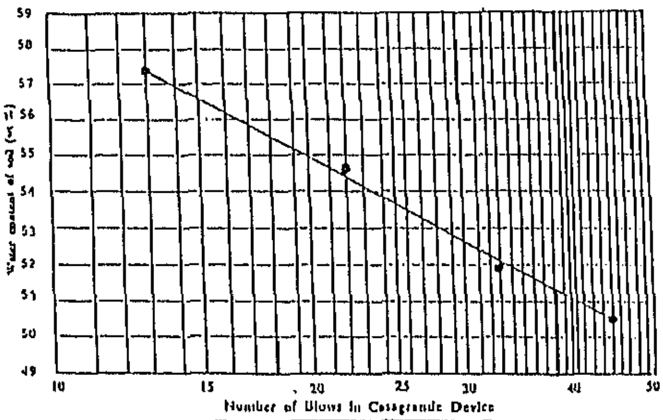

Fig (١٩)
19

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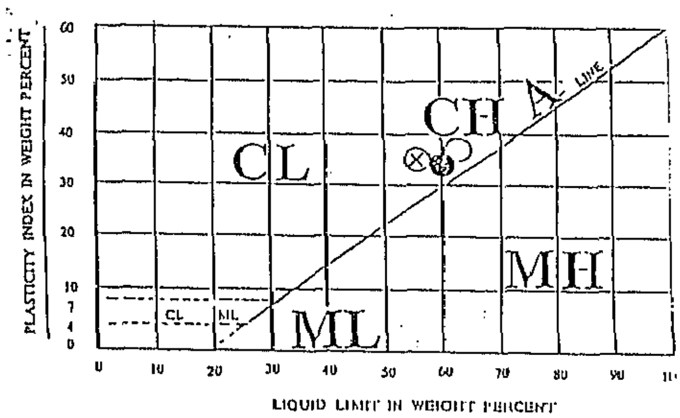
Soil Mechanics Laboratory

PLASTICITY CHART OF SOIL SA
(CASAGRANDE DEVICE)

Project : Ouranie Wet   مشروع المعرانية   Location :   Date : April 11,



Legend

Fig (٢٠)
20

Symbol	BH	Depth Of Sample In m =
○	BH 1	3.00
⊛	BH 2	5.00
⊗	BH 4	4.00

FDECON

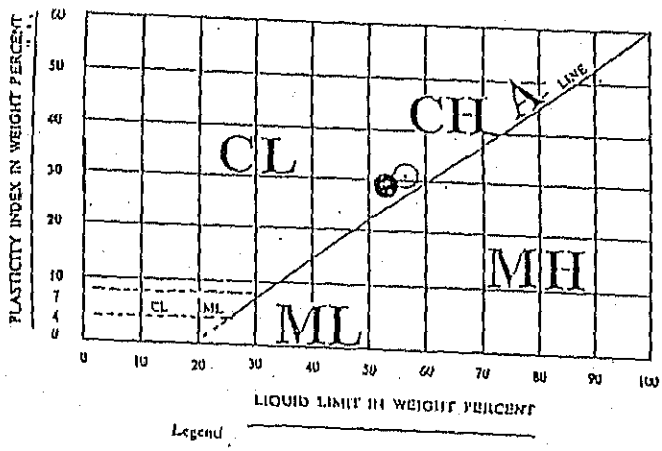
ENGINEERING DESIGN CONSULTANTS

Soil Mechanics Laboratory

PLASTICITY CHART OF SOIL SAMPLES
(CASAGRANDE DEVICE)

Project : Mountain Wall مشروع الشيخ الغريب Location :

Date : April 11, 1980



Legend

Fig (11)
21

⊙ BH 1 Depth Of Sample in m = 3.00

⊗ BH 3 Depth Of Sample in m = 5.00

資料－Ⅷ　現地調査時の上水道施設及び下水道施設の検討（ＦＩＥＬＤ　ＲＥＰＯＲＴ）

Ref. No. : YEC-CAI-L 30
Date : 11 June, 1988

Mr. Fouad Khalil
Mayor of Giza City
Giza Governorate

Ref : The Project for Omrania West and Mounira West
Water Supply and Sewer Upgrading, Giza City

Sub : Submission and Request of Approval on the Field Report

Dear Sirs :

The JICA basic design study team on the project for water supply and sewer upgrading in Omrania West and Mounira West, Giza City has executed site survey, collection data and information, and consultations with the authorities concerned about the study area, the contents of the study, the basic design conditions, and the conceptual plan and figures of water supply and sewer upgrading from 12th May to 16th June, 1988 while receiving your deepest cooperation, advice and support.

We made this field report based on the site survey and consultations with the authorities concerned and so forth.

We would like to submit this report in order to receive your understanding and approval about JICA proposed water supply and sewer upgrading plan.

The draft final reports of the project shall be prepared based on the field report, your comments and recommendations on the report, the detailed study of data and information and consultation with the Japanese authorities concerned.

The draft final reports are to be submitted at the beginning of August, 1988, and explained and discussed by JICA study team in order to receive your understanding and approval. Therefore, we would like to request your approval about this report and the comments if you have any by 16th June, 1988.

Your kind cooperation would be highly appreciated.

Yours sincerely,

Ryousuke Teranishi
Chief of Consulting Team
for Basic Design Study
JICA

THE BASIC DESIGN STUDY
ON
THE PROJECT FOR OMRANIA WEST AND MOUNIRA WEST WATER SUPPLY AND SEWER UPGRADING, GIZA CITY
IN
THE ARAB REPUBLIC OF EGYPT

FIELD REPORT

JUNE, 1988

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

CONTENTS OF FIELD REPORT

1. Summary of Scope for Basic Design Study

1-1 Omrania West

Scope of the basic design study for Omrania West is summarized as follows;

(1) To perform the basic design for water supply and sewer main lines, the proposed routes of which are shown on Fig. G-1.

(2) To study the improvement of Amina Mohamed Pump Station.

(3) To study the supply of necessary pipe cleaning facilities for sewer lines.

(4) To study the possibility of piping materials supply for water and sewer network branch lines, provided that the plan and the budget are available for the installation of pipes by the Egyptian side.

1-2 Mounira West

For Mounira West, technical recommendations will be made based on the collected data and information from the authorities and consultants concerned, and site reconnaissance.

Such recommendations shall be included in our final report and used to support the Egyptian side request for grant aid to be extended to Mounira West as the next project in the future.

2. Items to be Confirmed by Giza City

We would like to confirm the following basic conditions for the estimation of construction cost, the recommendation of this grant aid project to JICA and the Japanese authorities concerned and so forth.

(1) Provision of the following temporary land for a construction liason office (hereinafter referred to as "the office"), warehouse, stock yard, etc. in Omrania West during the construction period.

Approx. ~~100 m × 100 m~~ 2,000 – 10,000 m²

(2) Provision of access roads from the office to the main road, if necessary.

(3) Provision of the dumping yard for the disposal of surplus soil from excavation work.

The transportation distance from the project site to the dumping yard is;

Approx. 15 km

(4) Provision of the disposal place for the removal of groundwater from excavation work.

The transportation distance from the project site to the disposal place is;

Approx. km (EL ZOMOR CANAL 予定)

(5) Proper maintenance and effective use of facilities constructed and equipments (including the trash removing equipment and grit removing machine) to be supplied under the Grant.

(6) In case that the Japanese Government will supply the piping materials for water and sewer network branch lines in Omrania West, the budget for installation of the pipes shall be secured by the Eygptian side.

(7) We are planning to use, for the most part, the construction materials and equipments available in the Greater Cairo region.

However, some construction materials and equipments are not available for the following reasons;

- They are not in Greater Cairo.
- It is very difficult to get them in Greater Cairo.
- It is doubtful to maintain the desired safety and quality of facilities to be constructed, and/or the construction schedule.

Therefore, we will bring the following materials and equipment from Japan. Necessary measures shall be taken by Giza City for the Contractor to bring them in Egypt without any trouble and/or delay.

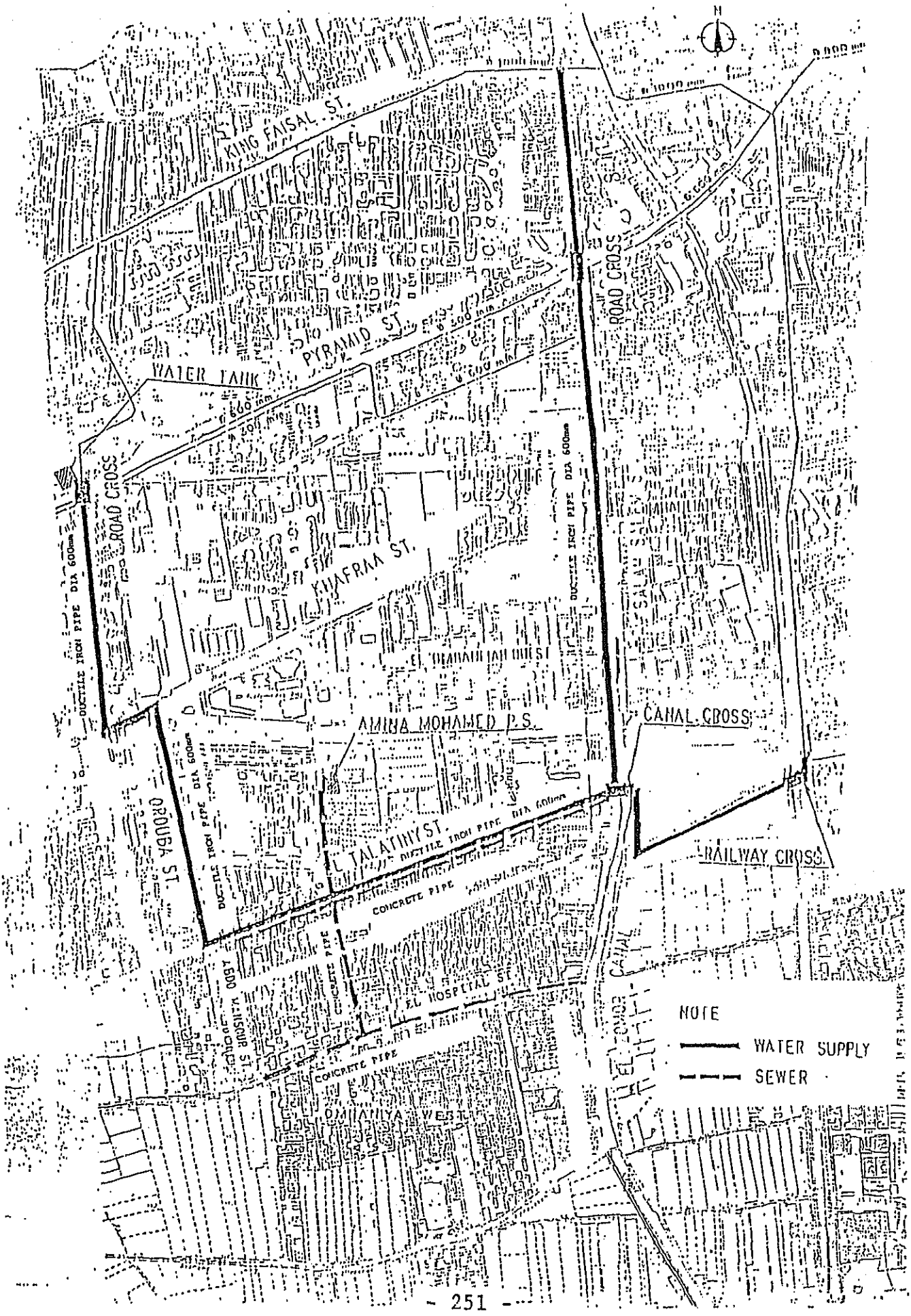
- Jacking machine and ancillary equipments
- Vibro hammer of low vibration
- Centrifugal reinforced concrete pipes for intermediate jacking
- Ancillary materials of centrifugal reinforced concrete pipes e.g., connection materials, rubber materials
- Strength test machine of external surface for centrifugal reinforced concrete pipes
- All fittings of ductile cast iron pipes e.g., bends and valves

- All fittings of ductile cast iron pipes e.g., bends and valves
- All fittings of cast iron pipes e.g., bends and valve
- Sheet pile
- Grouting materials for soil stabilization, and so on

(8) Submission of detailed construction schedule for the Contract 20A, by sections, in Mounira West executed by Ambric.

(9) In order to keep the construction schedule which is very tough, the jacking work shall be executed for about 16 hours per day by two shift system, if necessary.

Fig. G -1 PROPOSED WATER SUPPLY AND SEWER MAIN LINE



THE BASIC DESIGN STUDY
ON
THE PROJECT FOR OMRANIA WEST AND MOUNIRA WEST
WATER SUPPLY AND SEWER UPGRADING, GIZA CITY
IN
THE ARAB REPUBLIC OF EGYPT

CONCEPTUAL PLAN OF WATER SUPPLY MAIN LINE FOR OMRANIA WEST, GIZA CITY

JUNE, 1988

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

⚠ 13, JUNE BUTTERFLY VALVES SHALL BE INSTALLED ON PIPE OF DIAMETER 400mm OR MORE.

MAIN BASIC DESIGN CONDITIONS OF WATER SUPPLY MAIN PIPES

1. Main basic design conditions of water supply main pipes are as follows:

(1) The routes, diameter and connection points of JICA proposed water supply main lines are decided based on the layout in World Bank Report prepared by Sabbour on September, 1987, for Omrania West Water Supply and Sewer Upgrading Project.
Therefore, water supply main lines proposed by JICA are the same as above except:
1) The route in Orouba street between Khafra street and El Talatiny street; and
2) Route around the tabacco factory between El Zomor Canal and state's railway.

(2) The routes of the water supply main pipes are as shown on the attached Fig. LD-1.

(3) Pipe diameter will be of 600mm.

(4) Pipe materials will be ductile cast iron pipes made in Egypt except all fittings, valves and accessories.
All fittings, valves and accessories will be made in Japan.

(5) T-shaped joints (push-on joints) will be used.

(6) Standard earth covering shall be of 1.2m.

(7) Ancillary equipment such as air valves will be installed in principle in the following spacing.

1) Valves

⚠1 Butterfly valves shall be installed on pipe of diameter 400mm or more, and sluice valves shall be insta led on those of lesser diameter as shown on Fig ST-1 and 2.

2) Washout valves (Washing valves)

Washout valves shall be installed at lowest points such as valve chambers constructed in jacking and receiving pits as shown on Fig. ST-3.

3) Air valves

Air valves shall be installed at certain points in mains such as aqueduct.
In case of pipe diameter over 400mm, double opening air valves shall be used as shown on Fig. ST-4.

4) Fire Hydrants

Fire hydrants shall be installed at intervals of 100 - 150 meters as shown Fig. LD-2 and 3.
A fire hydrants shall have two (2) out-puts of 10 - 15 liter/sec as shown on Fig. ST-5.

5) Safety valves

Safety valves shall be installed to safeguard against unexpected increase of pressure.

2. Conceptual plans

Please refer to Fig. LD-1 - 3 and ST-1 - 7.

3. Study on the Necessity of the Booster Pump Station

3-1 Request from GCWS

Regarding the water pressure at the connection points of the existing and new water supply main lines, GCWS requested to confirm the following:

(1) Coordination between the master plan of West Germany (prepared by GKW consultant) and World Bank report (prepared by Sabbour);

(2) Confirmation whether the existing water pressure in the study area is sufficient, conducting water pressure test.

3-2 Study by JICA

(1) The study of the coordination shows that there is no discrepancy between both plans.

(2) Although GCWS tried to prepare the water pressure test, the test could not be done due to the lack of the test equipment.

(3) In order to confirm the water pressure, we carried out the study of water level of the existing Pyramid elevated water reservoir

No.2, based on the data and information of the master plan of West Germany mentioned above.

The result are as follows:
1) During the day time, the reservoir often becomes empty.
2) During the night, it usually comes to be full.

Taking into account the above facts, it is considered that the actual pressure does not meet the design pressure of the Sabbour report.

Moreover, in case that booster pump station is installed and water is transfer to the Study Area, the water supply to the reservoir decreases as shown on Fig. WG-1.
This may cause the decrease of water supply volume to the area served by the reservoir.

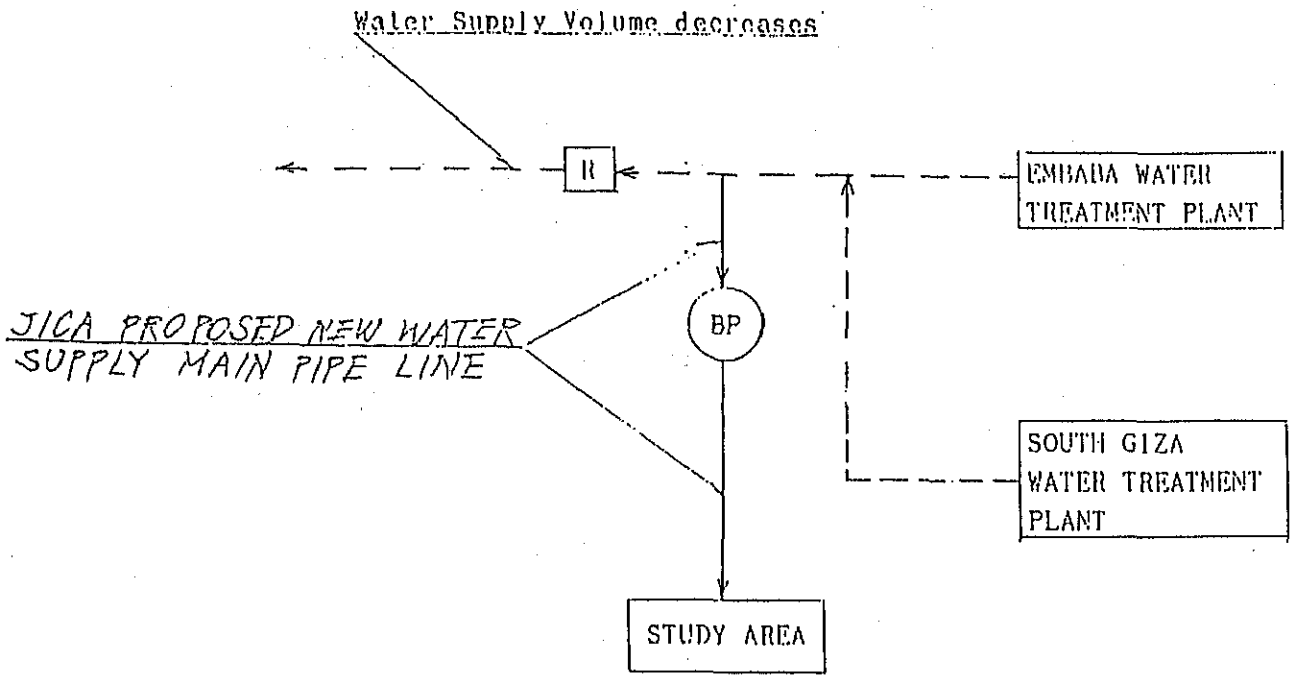
3-3 Conclusion

Through the above study, we came to conclusion that the booster pump station is not required for the following reasons:

(1) Installation of booster pump station may cause negative effect on the water supply in the outside of the Study Area, especially the area served from the reservoir.

(2) Water supply system will be upgraded by the improvement of Embaba Water Treatment Plant by West Germany to be completed in 1992.

FIG. WG-1 WATER FLOW IN CASE OF THE INSTALLTION OF BOOSTER PUMP STATION



NOTES:

R : Existing Pyramid Elevated Water Reservoir No.2
BP : Booster Pump Station required by GCWS

Fig LD-1 OUTLINE OF WATER SUPPLY MAIN LINE

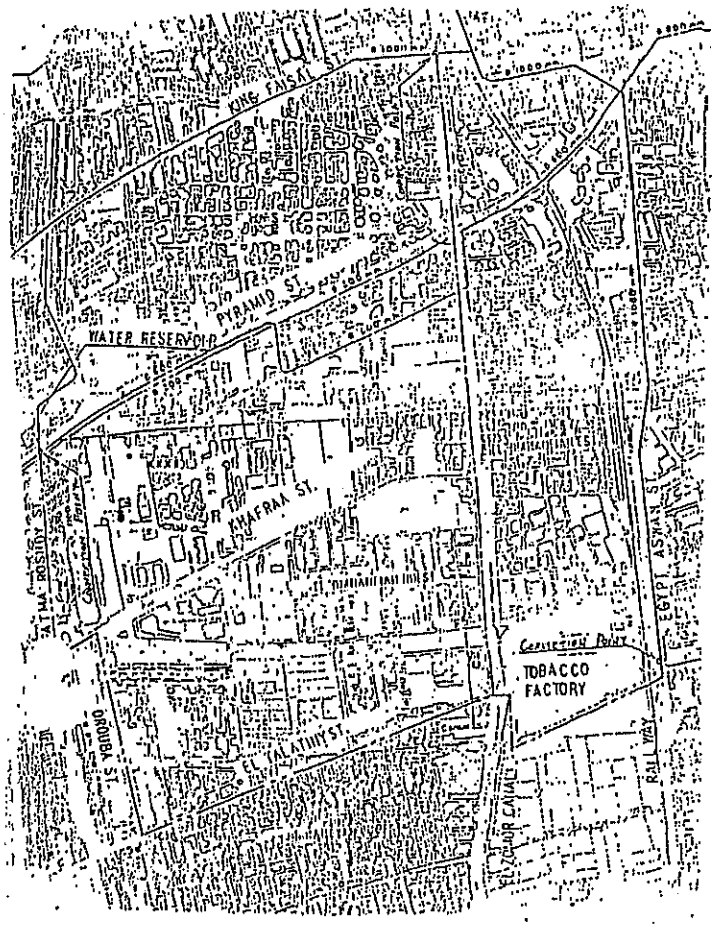


Fig LD-2 LAYOUT DRAWING OF WATER SUPPLY NETWORK (1)

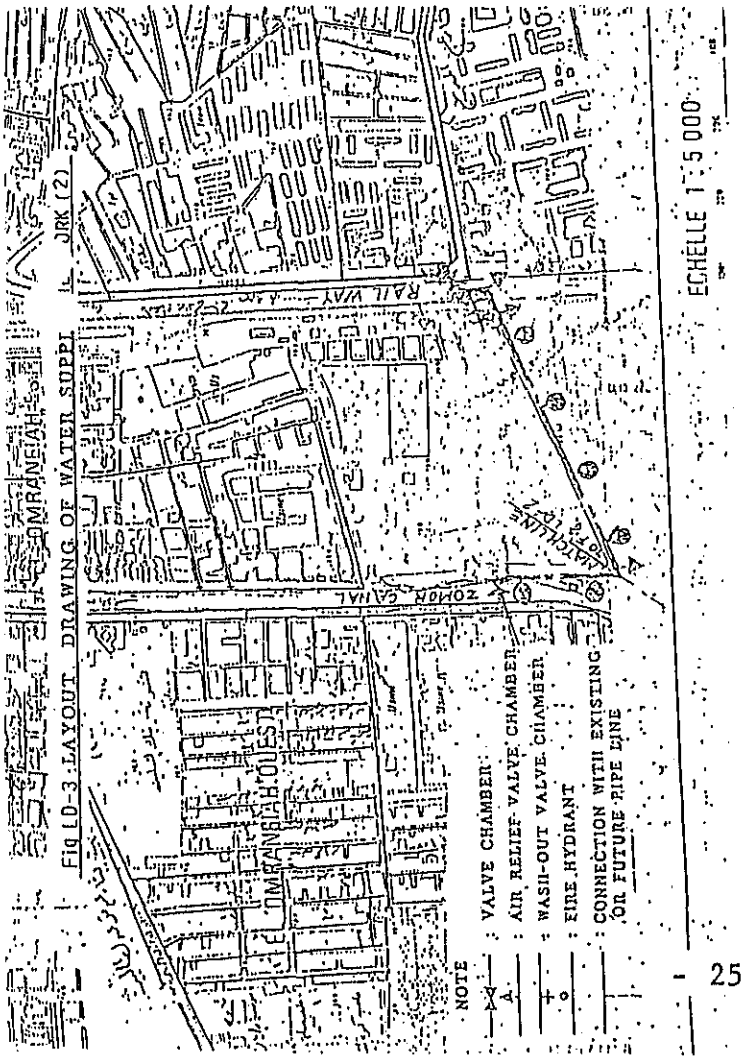
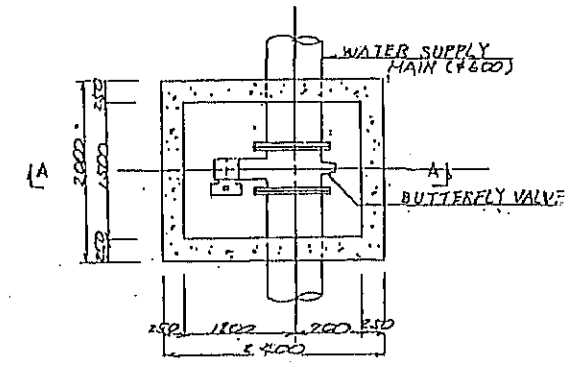


Fig LD-3 LAYOUT DRAWING OF WATER SUPPI

PAGE 8

Fig-ST-1 VALVE CHAMBER (HORZONTAL TYPE)



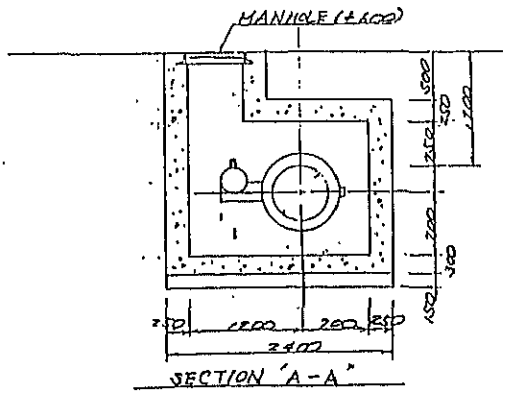


Fig. ST-4 AIR RELIEF VALVE CHAMBER

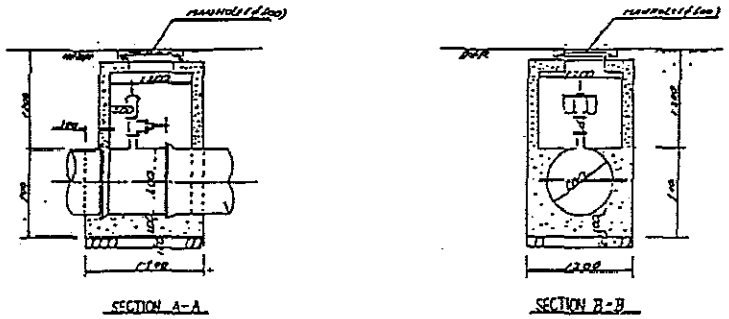


Fig-ST-2 VALVE CHAMBER (VERTICAL TYPE)

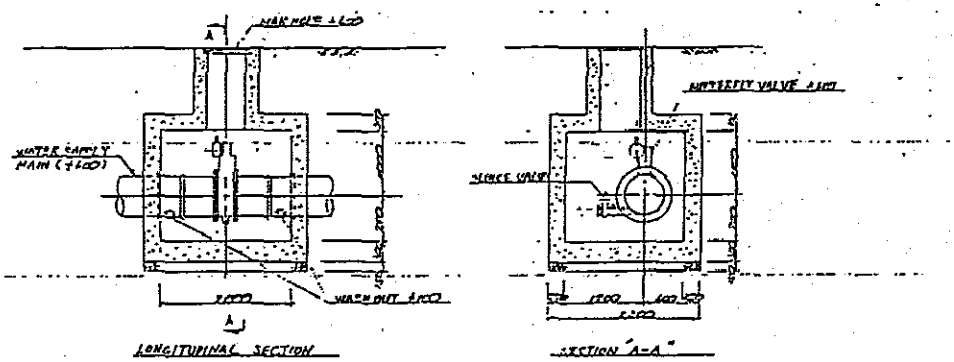


Fig ST-5 FIRE HYDRANT

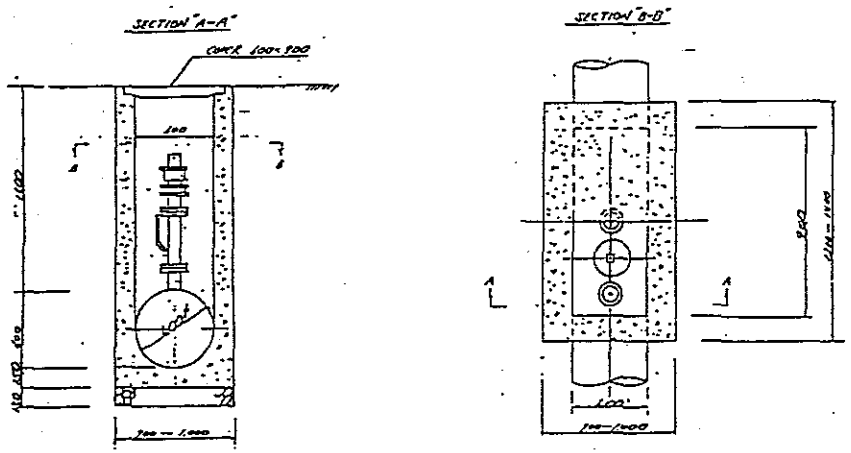
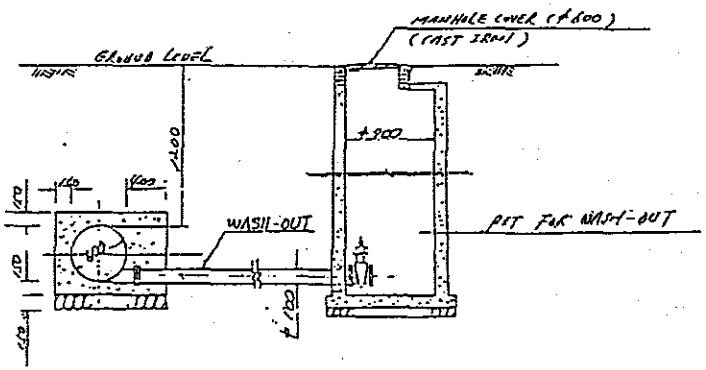


Fig ST-3 TYPICAL SECTION OF WASH-OUT

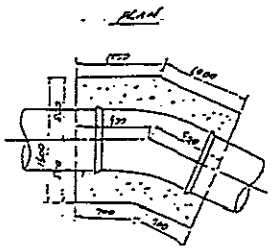


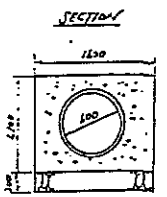
REMARKS :

. WATER DISCHARGED IN PIT FOR WASH-OUT WILL BE DEWATERED BY POTABLE PUMP EQUIPMENTS

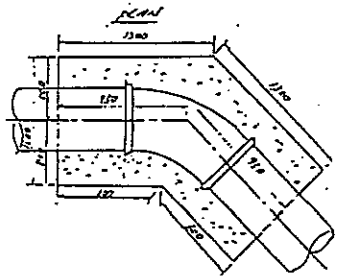
Fig . ANCHOR BLOCK STANDARDS FOR WATER SUPPLY MAIN LINE

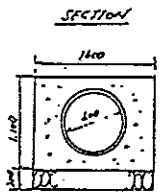
a) IN CASE OF 22½° BEND



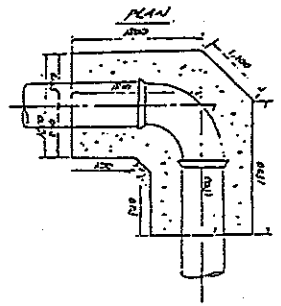


b) IN CASE OF 45° BEND





c) IN CASE OF 90° BEND



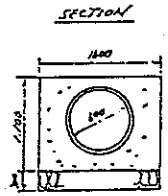
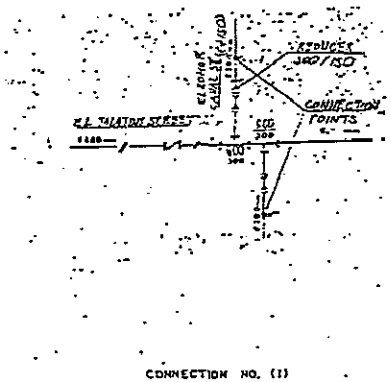


Fig. ST-7 DETAIL OF CONNECTION



NOTES:

1. FOR THE POSITION, REFER TO THE SABROURS DRAWING NO. W-1 ~ W-4 AND W-1' ~ W-4'

THE BASIC DESIGN STUDY
ON
THE PROJECT FOR OMRANIA WEST AND MOUNIRA WEST
WATER SUPPLY AND SEWER UPGRADING, GIZA CITY
IN
THE ARAB REPUBLIC OF EGYPT

CONCEPTUAL PLAN OF AQUEDUCT OVER EL ZOMOR CANAL FOR WATER SUPPLY MAIN LINE

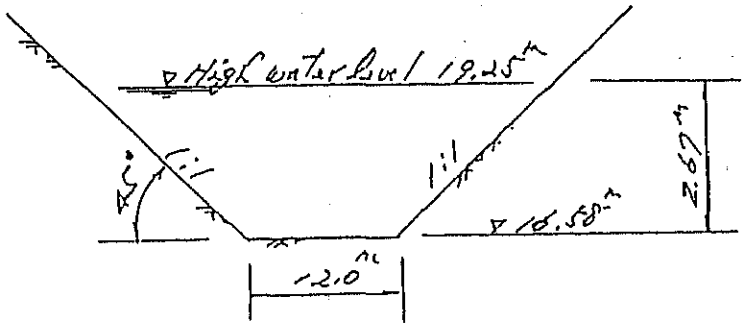
JUNE, 1988

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

MAIN BASIC DESIGN CONDITIONS OF AQUEDUCT

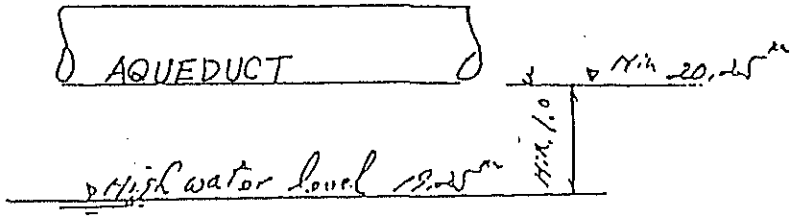
1. Main basic design conditions of aqueduct are as follows:

(1) Typical section of canal



- Width of the bed : 12m
- High water level : 19.25m above mean sea water level
- Level of the bed : 16.58m above mean sea water level
- Depth of water : 2.67m
- Side slope of the canal : 1:1 (=45°)
- Distance from standard point : approx. 3.05km

(2) Minimum clearance between the bottom level of the aqueduct and high water level : 1.0m



(3) Rehabilitation and/or explanation of canal : nil

(4) Conditions and/or construction period of aqueduct : nil

(5) Pipe materials of aqueduct : Ductile cast iron
Other materials of aqueduct : Structural steel

2. Conceptional drawings and/or figures of aqueduct are as shown on Figure No. AQ-1 - AQ-3.

Fig AQ.-1 PLAN

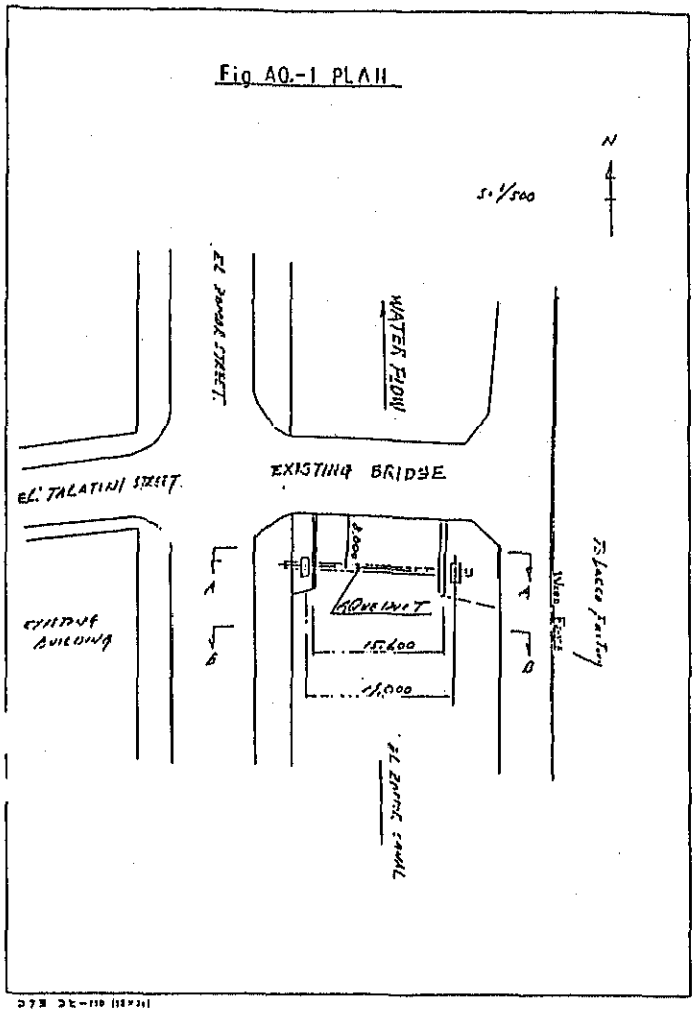
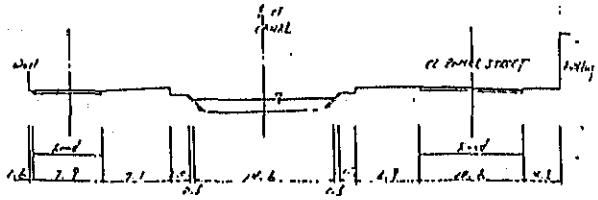
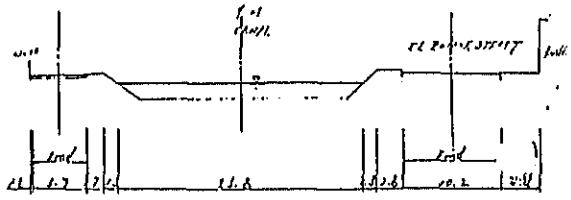


Fig AQ.-2 SECTION OF CANAL

S:1/100

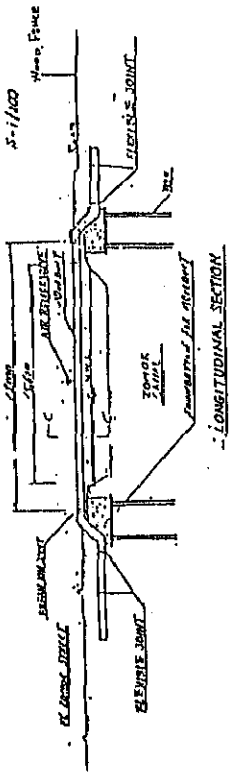


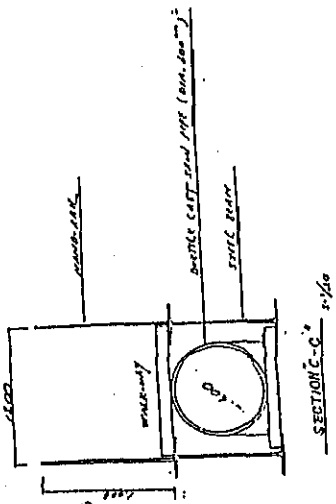
SECTION A-A



SECTION B-B

Fig AQ.-3 TYPICAL SECTION OF AQUEDUCT OVER THE [illegible]





THE BASIC DESIGN STUDY
ON
THE PROJECT FOR OMRANIA WEST AND MOUNIRA WEST
WATER SUPPLY AND SEWER UPGRADING, GIZA CITY
IN
THE ARAB REPUBLIC OF EGYPT

CONCEPTUAL PLAN OF JACKING METHOD AT PYRAMID STREET CROSSING FOR WATER SUPPLY MAIN LINE

JUNE, 1988

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

CONCEPTUAL PLAN OF JACKING METHOD AT PYRAMID STREET CROSSING
FOR WATER SUPPLY MAIN LINE

1. Basic design conditions

The basic design conditions of water supply main pipe lines at the crossing of the Pyramid street are as follows:

(1) The routes of water supply main lines are as shown on Fig. RD-1 - 4.

(2) Pipe diameter shall be of 600 mm.

(3) Pipe materials shall be ductile cast iron.

(4) Considering the following conditions, jacking method shall be applied:

1) The Pyramid street is a principal trunk road where traffic is very heavy.

2) It is difficult to presume the positions and diameters of the existing underground services exactly.

3) The depth of excavation will be about 3 meters in consideration of the location of the existing water supply pipes, sewer pipes and electrical cables.

4) When open cut excavation method is used, the existing facilities shall be protected and/or removed for the construction, if necessary.

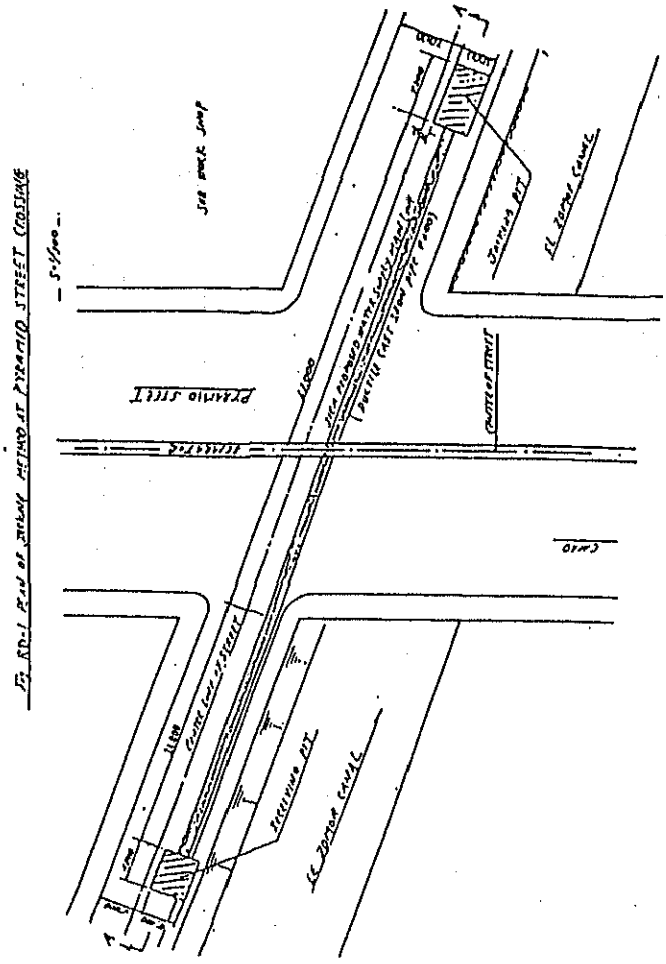
(5) Auxiliary equipment at the chamber constructed in jacking and receiving pits are as follows:

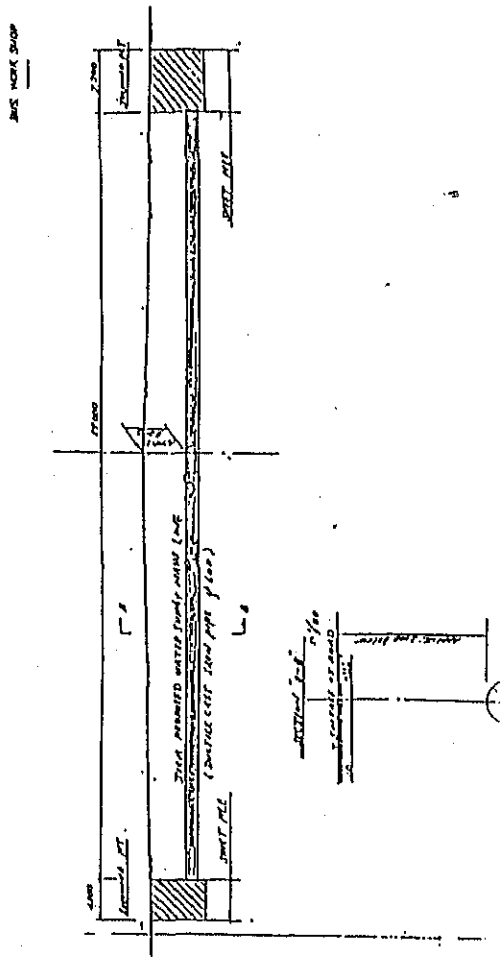
1) Air valves shall be installed near the bent-up pipes.

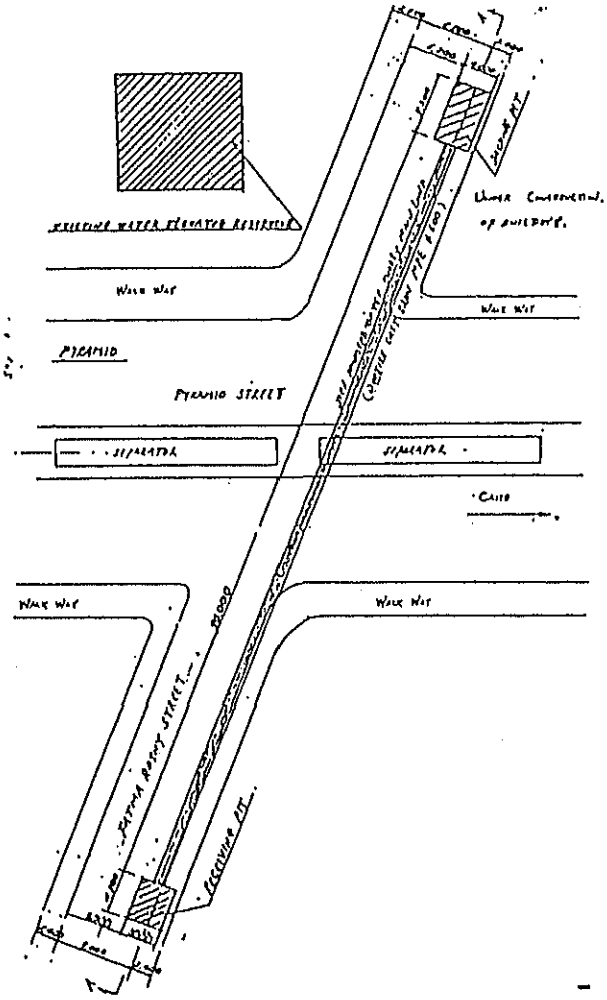
2) Sluice valves and wash-out valves shall be installed near the pipes bent downward.

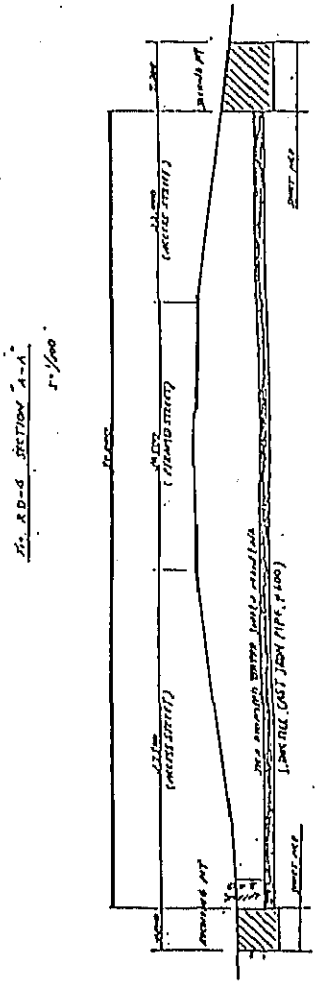
2. Conceptual plans

Please refer to Fig. RD-1 - 4.


PYRAMID STREET
EXISTING PIT
EXISTING CANAL
CENTRE LINE OF STREET
EXISTING PIT
EXISTING CANAL


SECTION "A-A"
EXISTING PIT
EXISTING PIT


EXISTING WATER RESERVOIR RESIDENCE
WALK WAY
PYRAMID
PYRAMID STREET
WALK WAY
WALK WAY
WALK WAY
EXISTING PIT


SECTION "A-A"
EXISTING PIT
EXISTING PIT

PAGE

Fig RD-5 PLAN OF CONNECTION WITH EXISTING PIPE LINE

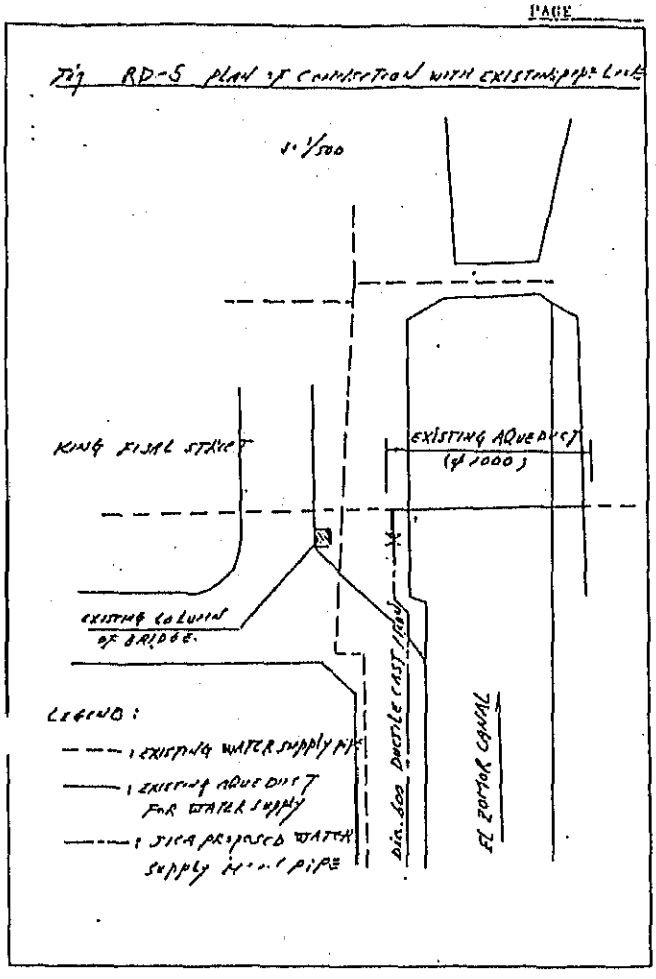
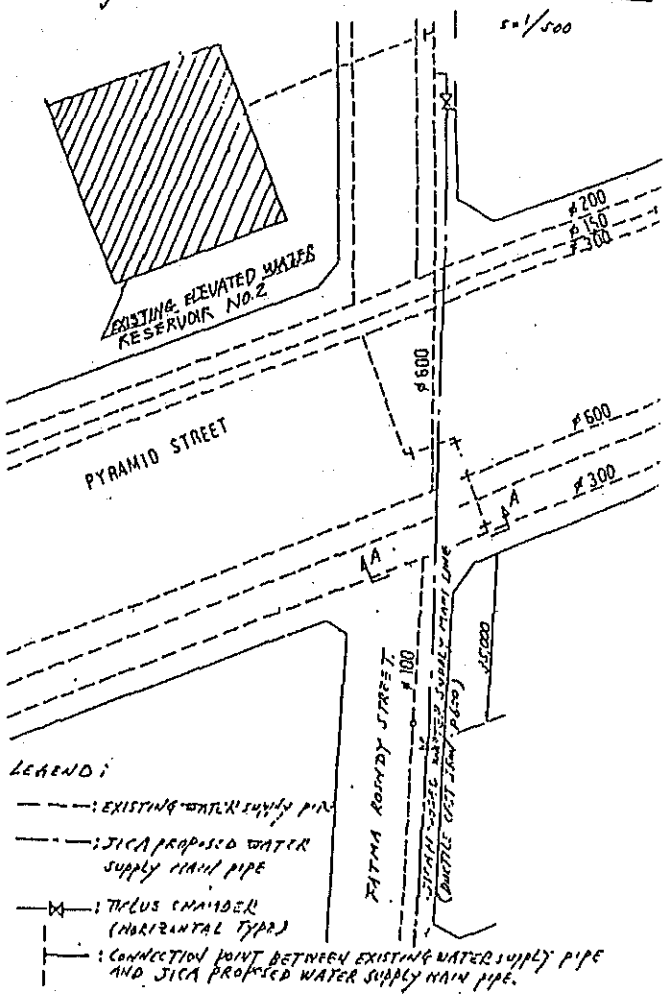


Fig RD-6 PLAN OF CONNECTION WITH EXISTING PIPE LINE



6.

THE BASIC DESIGN STUDY
ON
THE PROJECT FOR OMRANIA WEST AND MOUNIRA WEST
WATER SUPPLY AND SEWER UPGRADING, GIZA CITY
IN
THE ARAB REPUBLIC OF EGYPT

CONCEPTUAL PLAN OF JACKING METHOD AT THE STATE'S RAILWAY CROSSING FOR WATER SUPPLY MAIN LINE

JUNE, 1988

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

CONCEPTUAL PLAN OF JACKING METHOD AT THE STATE'S RAILWAY CROSSING FOR WATER SUPPLY MAIN LINE

1. Basic Design Conditions

The basic design conditions of water supply main pipes at the crossing of the railway are as follows:

(1) The routes of water supply main pipes are crossing right angle as shown on Fig. RW-1 - 3.

(2) Diameter of pipe are as follows:

1) Water supply main pipe : 600mm
2) Sleeve pipe : 1200mm (two times of water supply pipe)

(3) Materials of pipe are as follows:

1) Water supply main pipe : Ductile cast iron
2) Sleeve pipe : Centrifugal reinforced concrete

(4) The construction method shall be jacking method to keep the safety of railways.

(5) The jacking pit near the tobacco factory shall be applied the sheet pile.

(6) Receiving pit near the Egypt Aswan Street shall be applied the liner plate to prevent the damage of the existing electric cables above the receiving pit during the construction of the pit.

(7) The soil improvement made by cement milk will be applied to keep the safety of sheathing and prevent the leakage of underground water into the receiving pit.

(8) Auxiliary equipment at the chamber installed in the jacking and receiving pits, and connection point of the existing pipes are as follows:

1) The air valves shall be installed near the bent-up pipes.

2) Sluice valves and wash-out valves shall be installed near the pipes bent downward.

3) Sluice valves shall be installed near the connection point of the existing pipe line (Dia 1000mm)

2. Conceptual Plan

Please refer to Fig. RD-1 -5.

Fig. RW-1 LAYOUT DRAWING AT RAIL WAY CROSSING S = 1/500

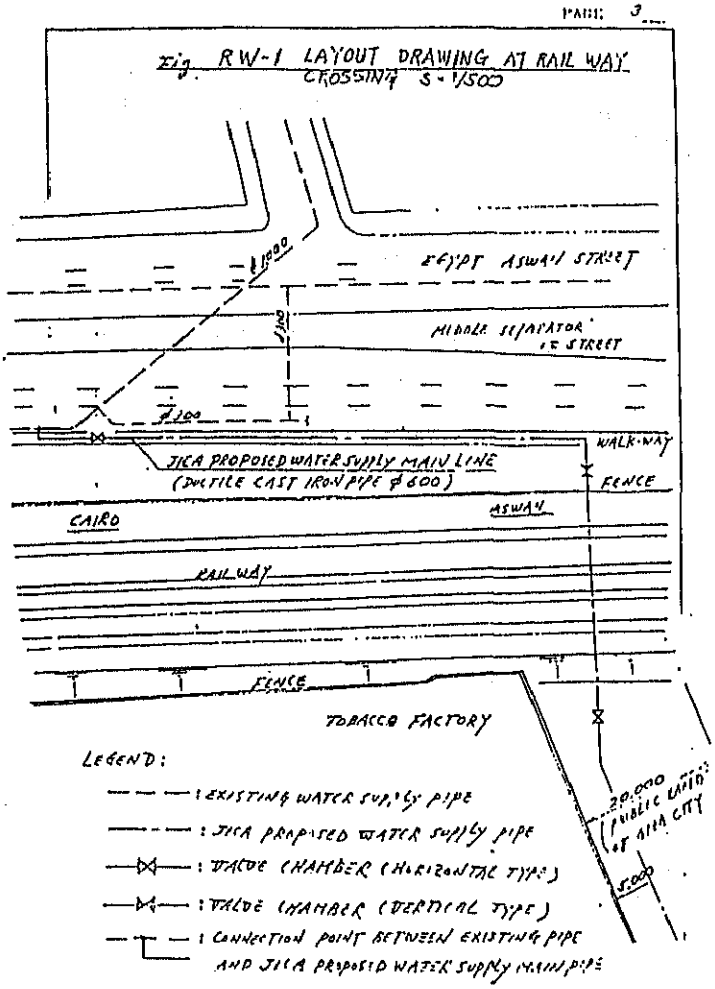


Fig. RW-2 PLAN OF JACKING METHOD AT RAILWAY CROSSING S = 1/500

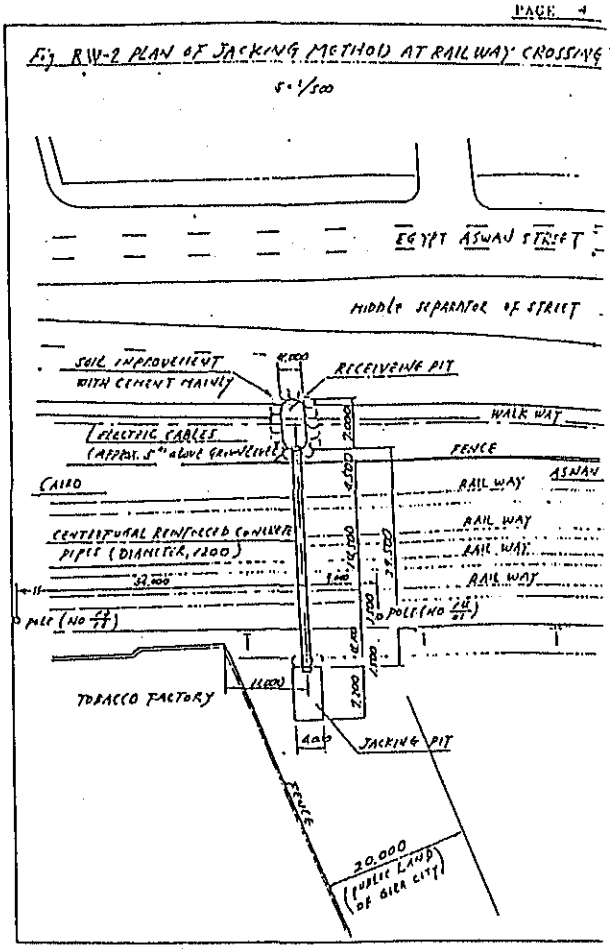
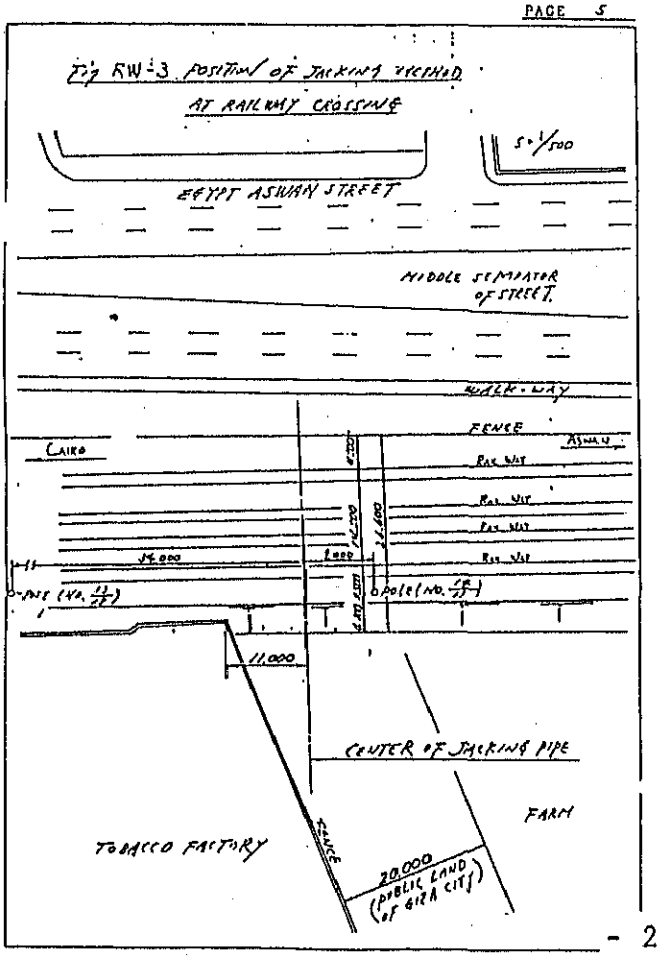
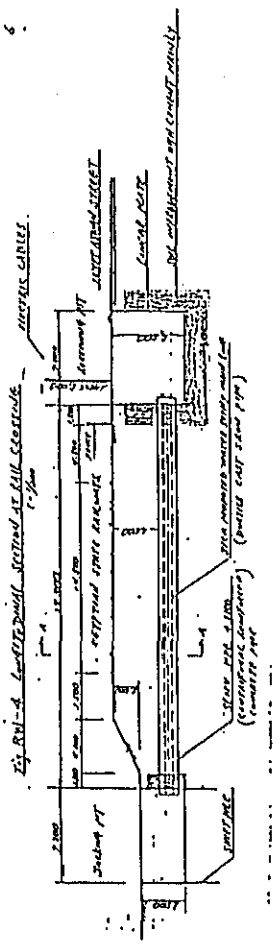
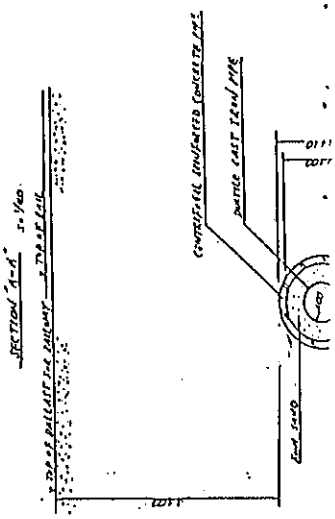


Fig. RW-3 POSITION OF JACKING METHOD AT RAILWAY CROSSING







REMARKS:-
1. IN THE SHOULDER OF RECEIVING PIT WILL BE ACCOMPLISHED WITH THE SHEET PILE IN ORDER TO PREVENT THE DAMAGE OF EXISTING ELECTRIC CABLES DURING THE CONSTRUCTION OF SHEATHING.
2. BY OUTSIDE AND WITHIN OF THE RECEIVING PIT WILL BE PERFORMED BY THE SOIL IMPROVEMENT METHOD WITH CEMENT IN ORDER TO KEEP THE SAFETY OF SHEATHING AND PREVENT THE LEAKAGE OF UNDERGROUND WATER INTO EXCAVATION PIT.

THE BASIC DESIGN STUDY
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CONCEPTUAL PLAN OF JACKING METHOD AT THE STATE'S RAILWAY CROSSING FOR WATER SUPPLY MAIN LINE

JUNE, 1988

JAPAN INTERNATIONAL COOPERATION AGENCY
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3) Sluice valves shall be installed near the connection point of the existing pipe line (Dia 1000mm)

2. Conceptual Plan

Please refer to Fig. RD-1 -5.

Fig RW-1 LAYOUT DRAWING AT RAIL WAY CROSSING S = 1/500

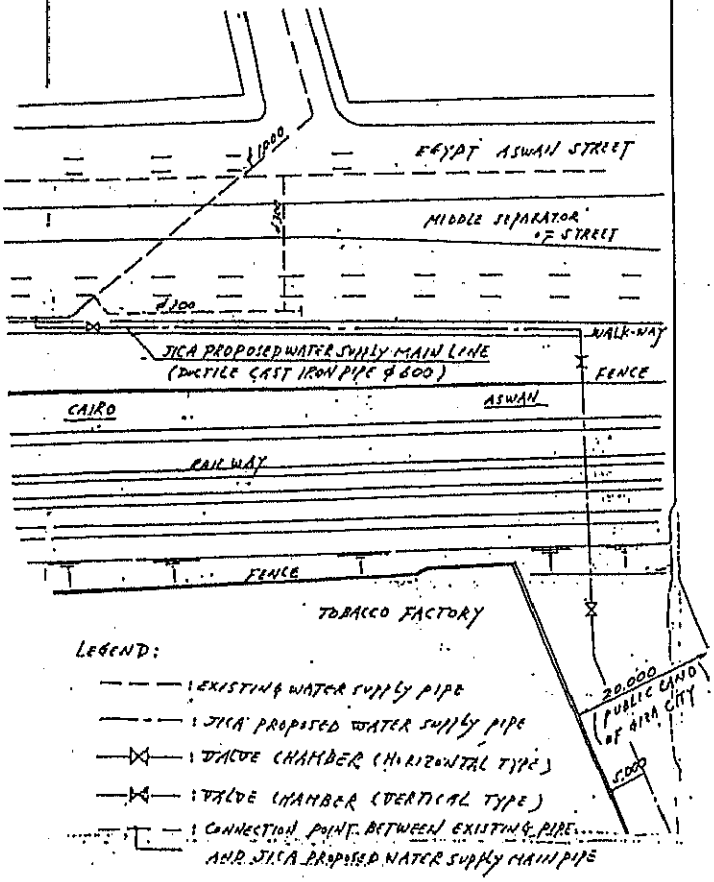


Fig RW-2 PLAN OF JACKING METHOD AT RAILWAY CROSSING

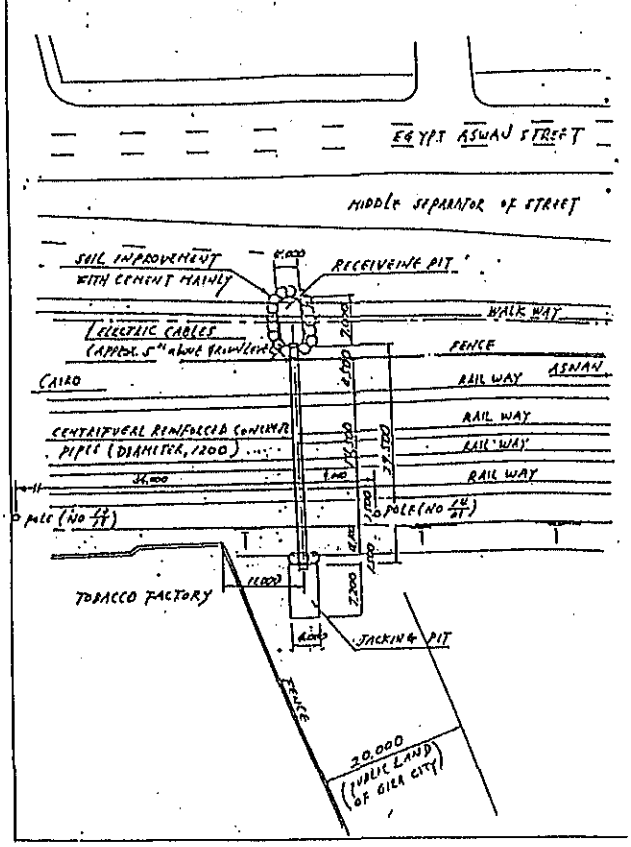
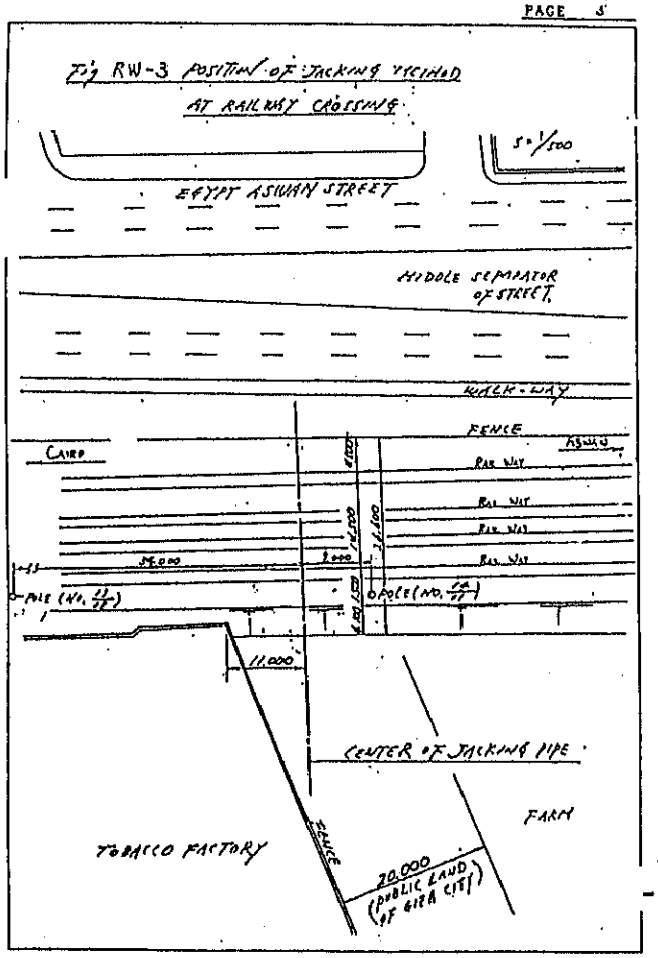
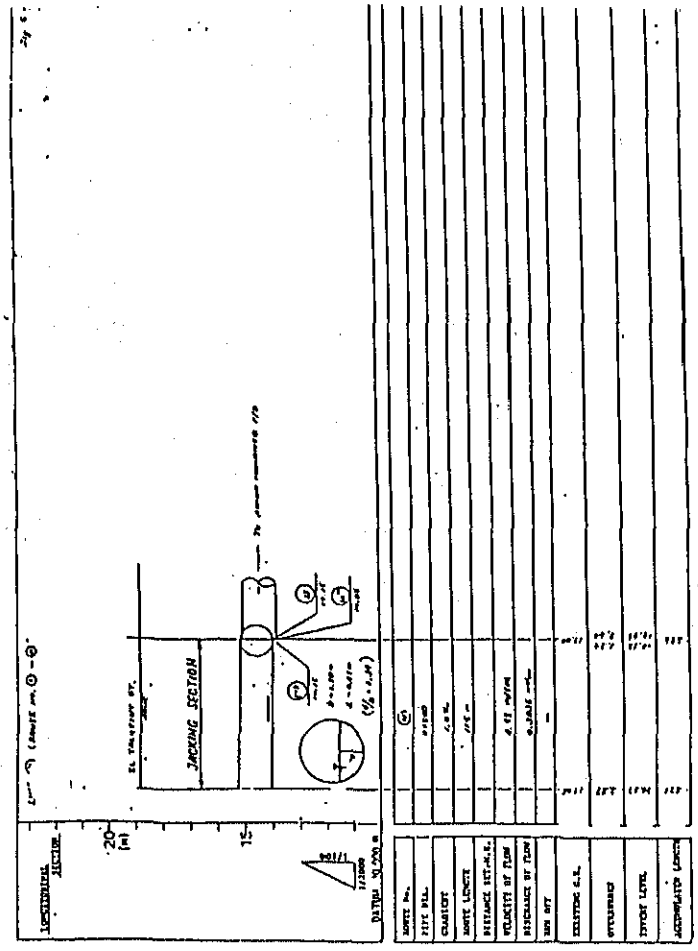
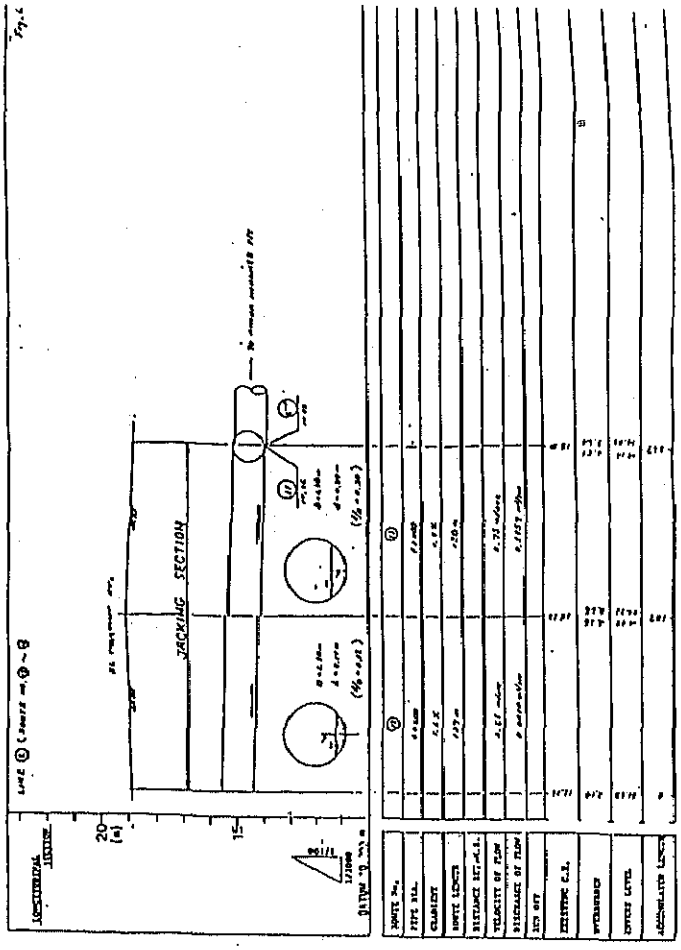


Fig RW-3 POSITION OF JACKING MACHINE AT RAILWAY CROSSING







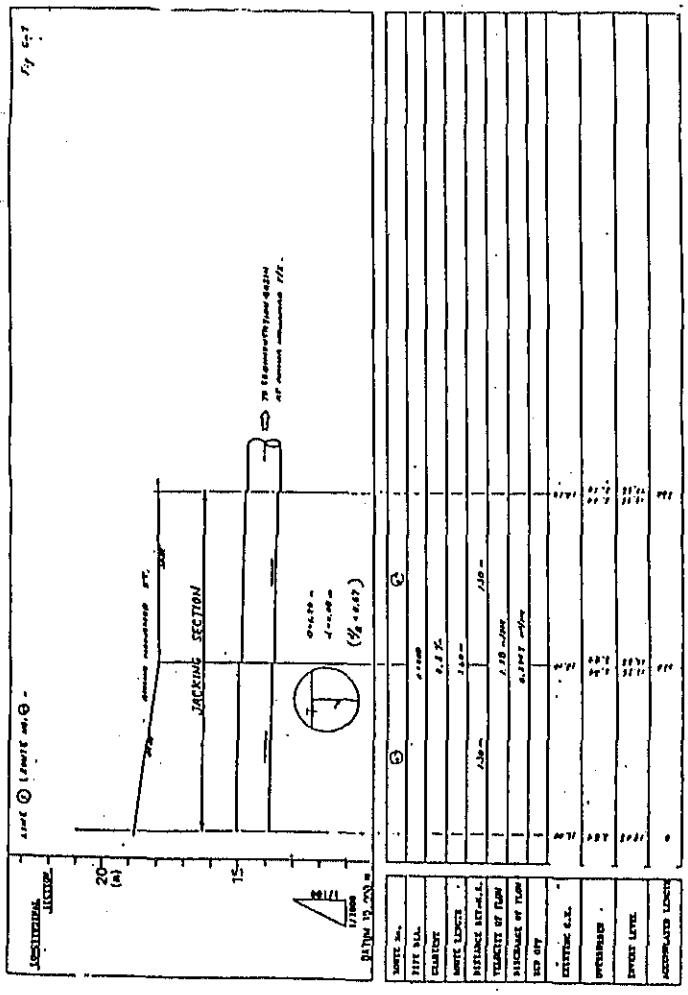
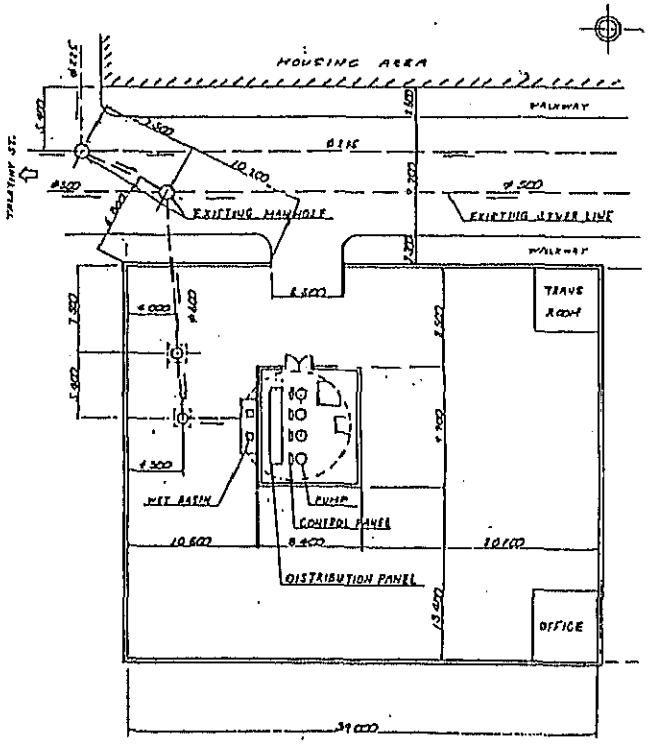


Fig. 7 TYPICAL MONOWELL PUMP STATION - PLAN



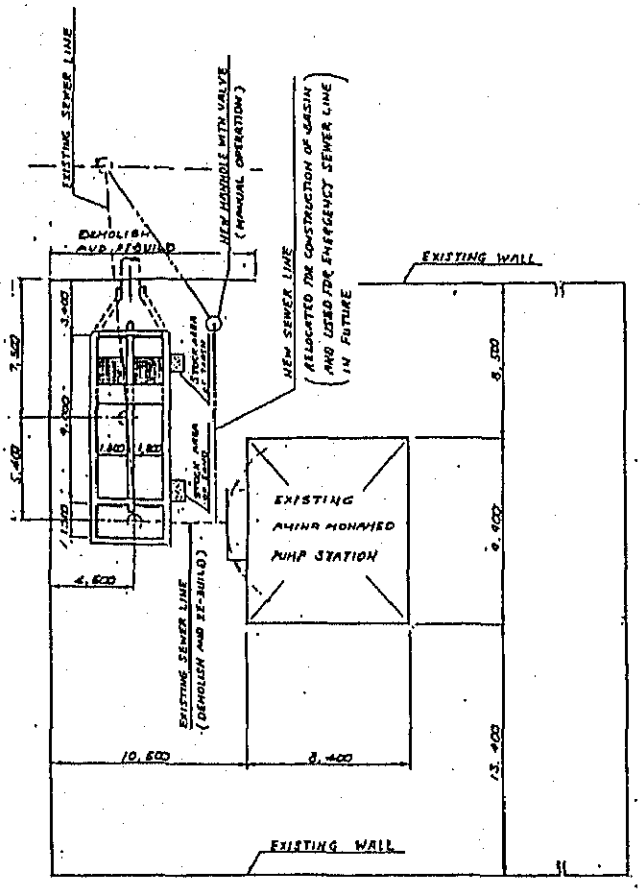


Fig. 8 CONCEPTUAL LAYOUT OF SEDIMENTATION BASIN

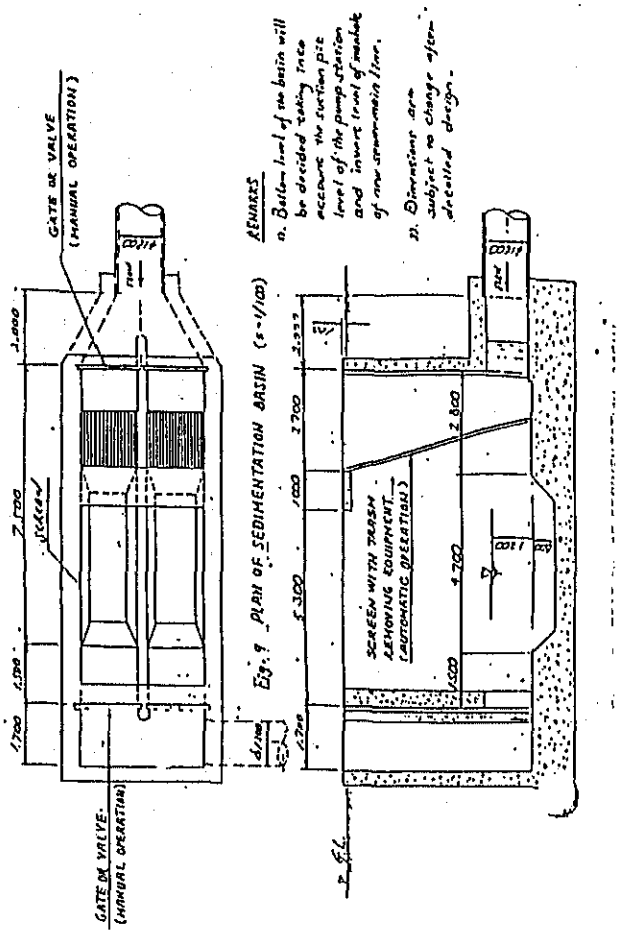


Fig. 9 PLAN OF SEDIMENTATION BASIN (s=1/100)

THE BASIC DESIGN STUDY
ON
THE PROJECT FOR OMRANIA WEST AND MOUNIRA WEST
WATER SUPPLY AND SEWER UPGRADING, GIZA CITY
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CONCEPTUAL PLAN OF SEWER MAIN LINE AND IMPROVEMENT OF AMINA MOHAMED PUMP STATION FOR OMURANIA WEST, GIZA CITY

JUNE, 1988

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

1. SEWER MAIN LINE

1-1 Design Conditions

(1) Design parameters

Following design parameters are determined mainly based on Sabbour's reports

- Max. water consumption : 200 lit/cap./day
- Area : 58.82 ha(=140 feddans)
- Population at 2010 : 175460
- Max. discharge : 6.9 lit/sec/ha
- Design flow : 6.9 x 2 =13.8 lit/sec/ha
- Coefficient in Manning formula : 0.013
- Velocity of flow : 0.6 - 1.1 m/sec

(2) Materials

1) Pipes for jacking method

- Standard pipe
  Egyptian made centrifugal reinforced concrete pipe for jacking method shall be used.

- Pipe for intermediate jacking
  Since this pipe has special features and it is not available in Egypt, it shall be brought from Japan.

2) Pipes for connecting to existing sewer line

Vitrified clay pipes shall be used.

1-2 Condition of Existing Sewer System

As shown on Fig.1, existing main lines are running along El Hospital St., Taameer St. and El Talatiny St. The diameter of the existing main lines(Dia.225mm - Dia.375mm) are too small to serve the sewage in the Study Area.

Rough check for the present population shows that the sewer line running along El Talatiny St. and Amina Mohamed St. are considered overloaded.

For the future population(at 2010), all the main lines will be overloaded unless the existing sewer system is upgraded.

1-3 Proposed Sewer System

(1) Route plan

In order to upgrade the sewer system so that the existing and expected overloading can be eliminated, the new main lines shall be provided as shown on Fig. 2.

Longitudinal sections of the proposed main line are shown on Fig .6-1～6-7. LINE Ⓐ and LINE Ⓑ cover the area to the south of El Hospital St. LINE Ⓒ is a transfer line of collected sewer in LINE Ⓐ and LINE Ⓑ, and covers the area along Taameer St. LINE Ⓓ and LINE Ⓔ cover the area between El Hospital St. and El Talatiny St. LINE F is served as a transfer line for LINE Ⓐ to LINE Ⓕ and lead to Amina Mohamed Pump Station.

(2) Construction method

Pipe jacking method shall be applied to all the new main lines for the following reasons;

- Many existing underground services are expected.
- Open-air markets almost occupy the streets.
- Traffic(cars and pedestrians) is heavy.

(3) Pipe diameter

The required diameter of pipes calculated using the design parameters ranges 400mm to 1200mm. However, the diameter 1200mm shall be adopted for the new sewer main lines. The reasons are;

- Unexpected flow by self-help and from the outside area of the Study Area can be covered.

- Manual pipe cleaning can be achieved.

- In case several diameters are used, different types of jacking machines are required. This will cause the delay of the work and the increase of the construction cost.

1-4 Connection to Existing Sewer

Method for connecting the proposed sewer line to the existing sewer line is shown on Fig.3 (the location of connection are shown on the attached drawing "OMRANIA WEST - PROPOSED MAIN LINE").

Backdrop connection shall be provided when dropping depth is over 1.2m. The detail of backdrop connection is shown on Fig.4.

The diameter of new connection pipe shall be one pipe size greater than existing sewer.

1-5 Manholes

Manholes to be used shall be blue brick lined reinforced concrete as shown on Fig.5. For future pavement and other services, precast concrete reducer(H = 1.0m) shall be used.

2. IMPROVEMENT FOR AMINA MOHAMED PUMP STATION

2-1 Present Condition

As mentioned in the previous section, all the sewer in the Study Area flow into Amina Mohamed Pump Station.

The existing layout of the pump station is shown on Fig.7. At present, there is no equipment for removing grit, trash such as plastic articles, etc. included in the sewer. The removing work is done manually 2 - 3 times in a month, shutting the sewer to dry the wet basin.

The removed matters are piled near the wet basin, having an insanitary effect on the surrounding residents.

2-2 Proposed Equipment for Improvement

(1) Equipment

In order to improve the condition mentioned above, following equipment shall be provided. The layout, plan and section are shown on Fig.8, 9 and 10.

- Sedimentation basin : 2 channels
- Screen with trash removing equipment : 2 units
  (automatic operation)
- Grit removing machine : 1 unit
  (travelling pump type)

(2) Design conditions are as follows;

1) Inflow volume
   - At the year 1988 : 0.48 m^3/sec
   - At the year 2010 : 0.89 m^3/sec

2) Water depth of sedimentation basin
   - 1.2m (approx.)

3) Horizontal velocity in sedimentation basin
   - 0.2 ~ 0.3 m/sec

4) Width of sedimentation basin
   - 3.6m (1.8m x 2 channel)

5) Size of grit to be removed
- 0.2mm

6) Screen opening;
- 65mm

(3) Check of hydraulic conditions in the basin

Hydraulic conditions in the basin are checked as follows;

1) Horizontal velocity

$$V = Q/A = 0.89/(3.6 \times 1.2) = 0.21 \text{ m/sec}$$

2) Detention period

$$t = L/V = 4.7/0.21 = 22 \text{ sec}$$

(4) Power supply for the new equipment

New cable from the new equipment shall be connected with the existing power distribution panel located in the pump house as shown on Fig.7. New breaker therefor shall be installed in the existing power distribution panel.

Fig.1 FLOW OF EXISTING SEWER SYSTEM

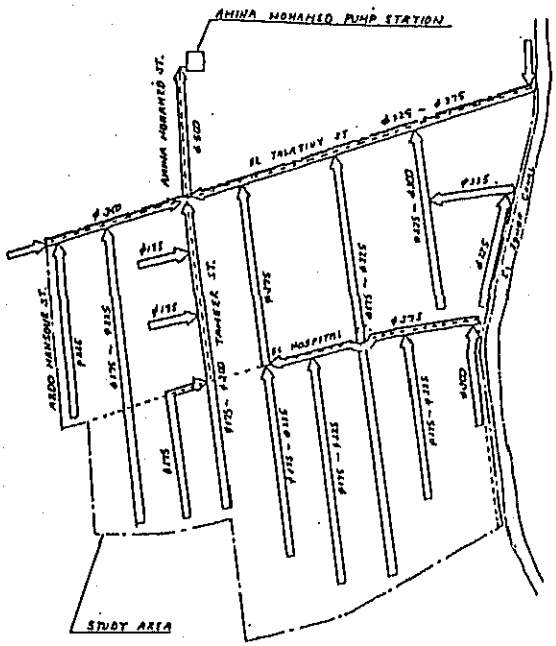


Fig.2 FLOW OF PROPOSED SEWER SYSTEM

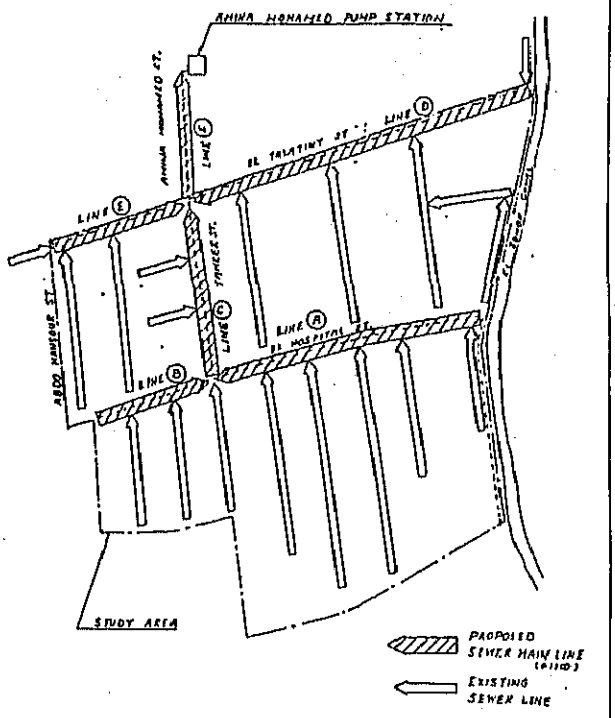


Fig.3 CONNECTION TO EXISTING MANHOLE

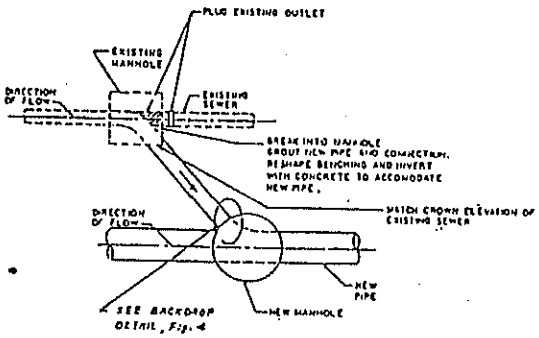


Fig.4 BACKDROP CONNECTION

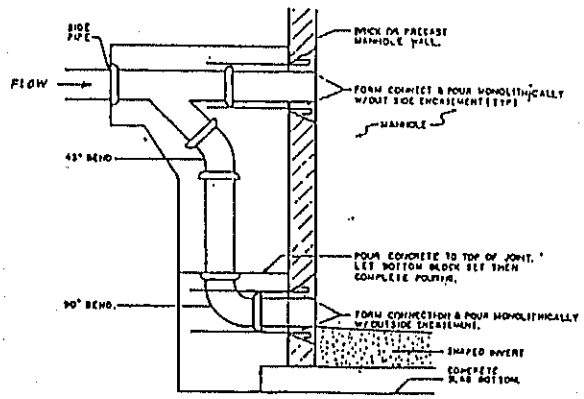
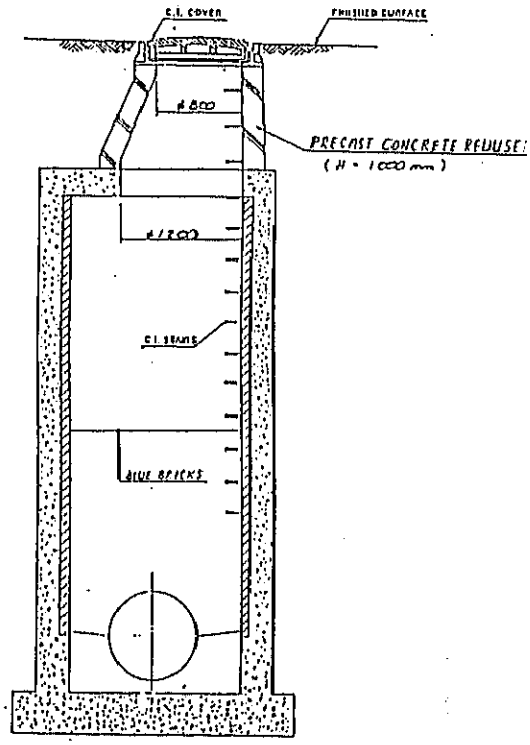
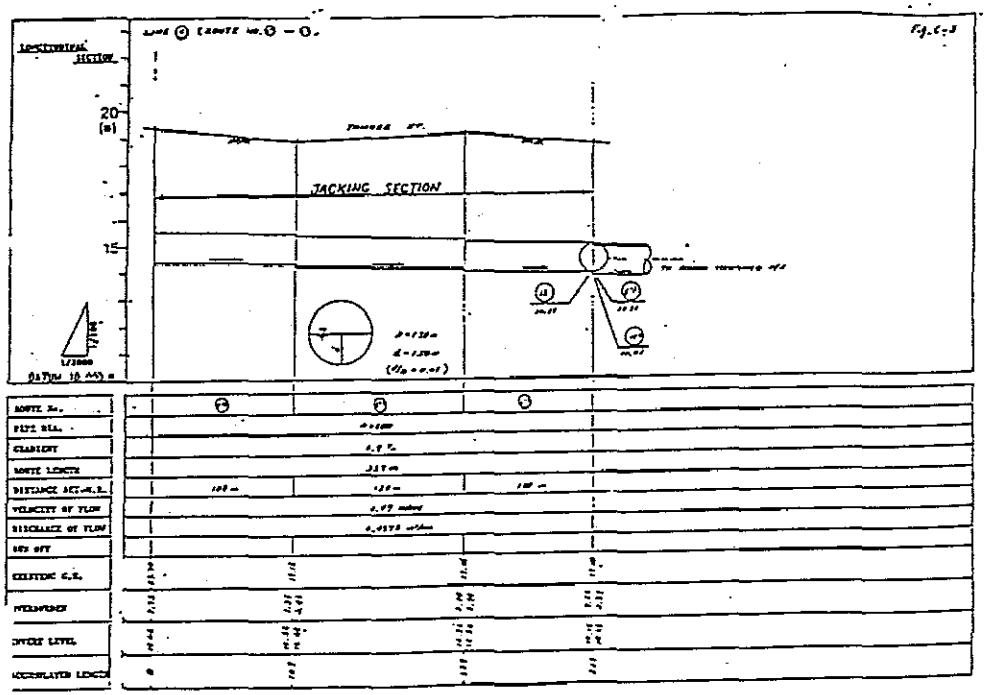
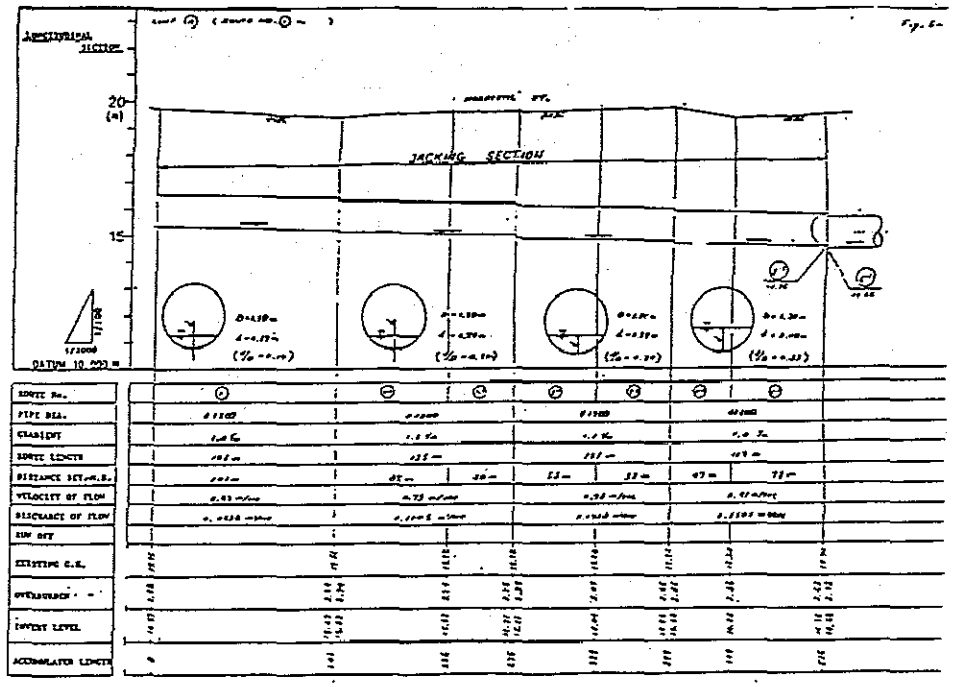


Fig.5 BLUE BRICK LINED REINFORCED CONCRETE MANHOLE

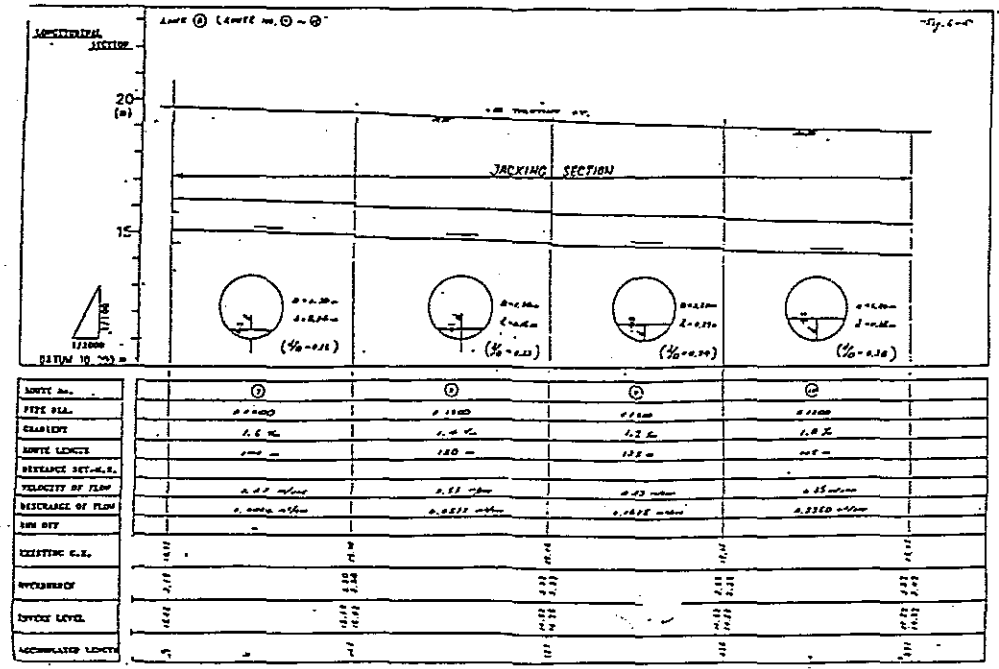




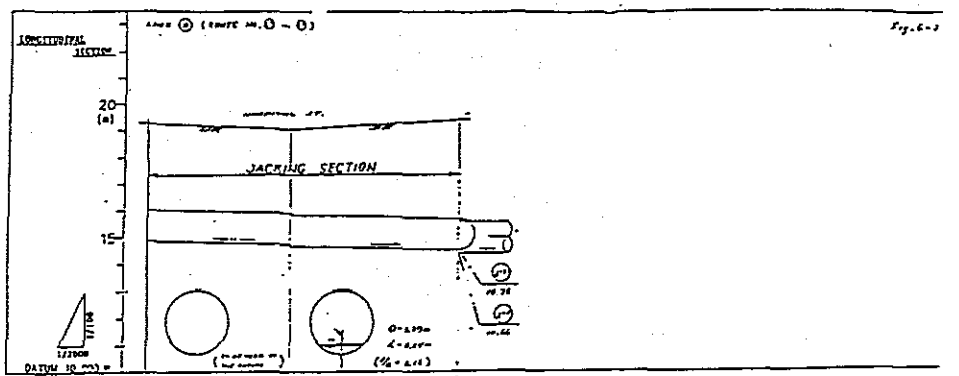
ROUTE No.	⊖	⊖	⊖				
PIPE DIA.							
GRADIENT							
ROUTE LENGTH							
DISTANCE SECT.-M.H.	100 m	120 m	100 m				
VELOCITY OF FLOW							
DISCHARGE OF FLOW							
SUB OUT							
EXISTING G.L.							
OVERBURDEN							
INVERT LEVEL							
ACCUMULATED LENGTH							



ROUTE No.	⊖	⊖	⊖	⊖	⊖	⊖	⊖
PIPE DIA.							
GRADIENT							
ROUTE LENGTH							
DISTANCE SECT.-M.H.							
VELOCITY OF FLOW							
DISCHARGE OF FLOW							
SUB OUT							
EXISTING G.L.							
OVERBURDEN							
INVERT LEVEL							
ACCUMULATED LENGTH							



ROUTE No.	⊖	⊖	⊖	⊖
PIPE DIA.				
GRADIENT				
ROUTE LENGTH				
DISTANCE SECT.-M.H.				
VELOCITY OF FLOW				
DISCHARGE OF FLOW				
SUB OUT				
EXISTING G.L.				
OVERBURDEN				
INVERT LEVEL				
ACCUMULATED LENGTH				



ROUTE No.	⊖	⊖
PIPE DIA.		
GRADIENT		
ROUTE LENGTH		
DISTANCE SECT.-M.H.		
VELOCITY OF FLOW		
DISCHARGE OF FLOW		
SUB OUT		
EXISTING G.L.		
OVERBURDEN		
INVERT LEVEL		

資料－Ⅸ　現地調達可能建設資機材

資料Ⅸ. 現地調達可能建設資機材

1. 建 設 機 械

- トラック　クレーン	20 t
- トラック　クレーン	35 t
- トレーラ	20 t
- ダンプ　トラック	10 t
- ピックアップ	2000 cc
- 自動車	1000 cc
- ディーゼル杭打ち機	2.5 t
- パワーショベル	1.5 ㎥
- クラムシェル	30 t
- バック　ホー	0.7 ㎥
- ブルドザー	D-6
- グレーダー	3.7 t
- バイブレーションローラー	8-10 t
- タイヤ　ローラ	8-20 t
- ランマー	60-100 kg
- タンパー	60-100 kg
- コンクリート　ミキサー	0.3 ㎥
- 水タンク車	6 ㎥
- バイブレター	45 mm -5 ps
- 発電機	150 KVA
- 溶接機	120A - 6.8 ps
- エアーコンプレッサー	7 ㎥/hr
- 水中サンドポンプ	Dia 3 "

2. 建設資材

- 砂	
- 粗骨材	
- 耐硫酸性セメント	
- 鉄筋（普通強度）	
- 木材（角材）	
- 合板型枠	幅 4' × 長さ 8' × 厚さ 1/2'
- 推進工法用鉄筋コンクリート管	1 種、管径 1200mm
- ダクタイル鋳鉄管	管径 600mm × 長さ 6mm
- ダクタイル鋳鉄管	管径 400mm
- 硬質塩化ビニル管	管径 300mm
- 硬質塩化ビニル管	管径 200mm
- 硬質塩化ビニル管	管径 150mm
- 硬質塩化ビニル管	管径 100mm
- 陶管	管径 450mm
- 陶管	管径 400mm
- 陶管	管径 375mm
- 陶管	管径 350mm
- 陶管	管径 300mm
- 陶管	管径 250mm
- 陶管	管径 225mm
- 陶管	管径 200mm
- 陶管	管径 175mm
- コンクリートブロック	長さ 400mm×幅 200mm×厚 120mm
- ブルー・ブリック	長さ 230mm×幅 115mm×厚 65mm
- ガソリン	
- 軽油	
- 潤滑油	
- グリース	

資料－X　収集リスト

No.	資　　料　　名	備　考
1.	FINAL REPORT VOLUME 2 STUDY OF WATER SUPPLY FOR CITY OF GIZA	報告書
2.	FINAL REPORT VOLUME 3 STUDY OF WATER SUPPLY FOR CITY OF GIZA	図　面
3.	FINAL REPORT ON REVIEW OF MASTER PLAN GREATER CAIRO WATER SUPPLY IMPROVEMENT EXECUTIVE SUMARY	報告書
4.	FINAL REPORT ON REVIEW OF MASTER PLAN GREATER CAIRO WATER SUPPLY IMPROVEMENT MAIN REPORT	〃
5.	FINAL REPORT ON REVIEW OF MASTER PLAN GREATER CAIRO WATER SUPPLY IMPROVEMENT APPENDICES	〃
6.	WATERWORKS IN CAIRO	案内書
7.	西オムラニア、西ムニラ地区　地形図　1/5000	地　図
8.	グレーターカイロ都市計画図	計画図
9.	西オムラニア、西ムニラ地区　上水道既設管平面　1/5000	平面図
10.	グレーターカイロ　下水道計画図	計画図
11.	GREATER CAIRO REGION,LONG RANGE URVAN DEVELOPMENT SCHEME,STRATEGY PLAN	報告書
12.	MAIN REPORT ON INTERIM DEVELOPMENT PLAN REHABILITATION AND EXPANSION OF THE CAIRO WASTEWATER SYSTEM	〃
13.	DESIGN INCEPTION REPORT	〃
14.	JUSTFICATION REPORT,ORGANIZATION FOR EXECUTION OF THE GREATER CAIRO WASTEWATER PROJECT	〃
15.	30% DESIGN SUBMITTAL WEST BANK PROJECT	〃
16.	アブラウォッシュ下水処理場地質調査報告書	〃
17.	EGYPT'S SECOND FIVE-YEAR PLAN FOR SOCIO ECONOMIC DEVELOPMENT (1987/88-1991/92)	〃
18.	ANSWER FROM AMBRIC (調査団の質問に対する回答)	回答書
19.	GREATER CAIRO WASTEWATER PROJECT	案内書
20.	OMRANIYA WEST UPGRADING PROJECT	
	- ENTERIM REPORT (P.B.SABBOUR APRIL 1987)	報告書
	- DRAFT CONTRACT DOCUMENT (P.B.SABBOUR APRIL 1987)	〃
	- PHYSICAL IMPROVEMENT PLAN COST ESTIMATES (P.B.SABBOUR APRIL 1987)	〃
21.	MOUNERA WEST UPGRADING PROJECT	
	- ENTERIM REPORT (P.B.SABBOUR APRIL 1987)	報告書
	- DRAFT CONTRACT DOCUMENT (P.B.SABBOUR APRIL 1987)	〃

No.	資　料　名　備　考	
	- PHYSICAL IMPROVEMENT PLAN COST ESTIMATES (P.B.SABBOUR APRIL 1987)	報告書
22.	MOUNIRA WEST　インフラ現況図	図　面
23.	OMRANIA WEST　インフラ現況図	〃
24.	Existing Sewer Line	〃
25.	Design Criteria for Sanitary and Drainage	報告書
26.	RAWS AND REGULATIONS	
	- Decision of the President of the Rep.1636/1968 Instituting the General Potable Water Organism	〃
	- Presidential Decree 93/1962 Concerning Drainage of Liquid Wastes	〃
	- MD 133/1984 Fixing Selling Prices of Local & Import Cement and Regulating its Circulation	〃
	- Labour Law	〃
	- Egyptian Standard 583/1970, Sulphate Resisting Portland Cement	〃
	- Decree No.43/1988 Condition of Work Permits for Foreigners	〃
	- Decree No.24/1985 Average Selling Prices of Local and Imported Iron	〃
27.	P.B.Sabbur　ボーリングデータ	〃
28.	Monthly Bulletin of Consumer Price Index (March 1988)	〃
29.	Sewer Cleaning Method	〃
30.	ギザ市組織図　ギザ市	〃
31.	ギザ市既設上水道平面図 (1/5000)	図　面
32.	ギザ市道路計画図	〃

JICA