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OCCASION

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

CONTRACT N.89/169
PROJECT SI/ETH/89/901

FINAL REPORT

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1. BACKGROUND AND SUMMARY.

The following information is being furnished to you for your information and is not to be used for any other purpose.

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2. Description of effluent treatment plants and equipment

2.1 Foreward

The following information is being provided to you for your information. It is not intended to be a substitute for professional advice. The information is based on the information provided to us by the client and is subject to change without notice.

2.2 Description of the treatment cycle.

The treatment cycle consists of two phases. The first phase is the initial treatment phase, which is followed by the second phase, the maintenance phase.

The initial treatment phase is designed to reduce the severity of the symptoms and to stabilize the patient. It involves the use of a combination of medication and psychotherapy. The maintenance phase is designed to prevent the recurrence of symptoms and to maintain the patient's stability. It involves the use of medication and psychotherapy.

The treatment cycle is a continuous process. The patient's response to treatment is monitored and the treatment is adjusted as needed. The goal of the treatment cycle is to achieve long-term stability and to improve the patient's quality of life.

The treatment cycle is a complex process. It involves the use of a combination of medication and psychotherapy. The patient's response to treatment is monitored and the treatment is adjusted as needed. The goal of the treatment cycle is to achieve long-term stability and to improve the patient's quality of life.

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2.3 Technical schedule of the plants

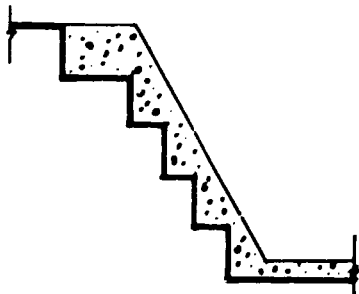
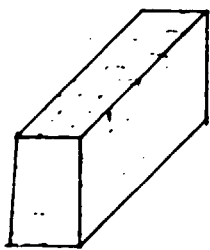
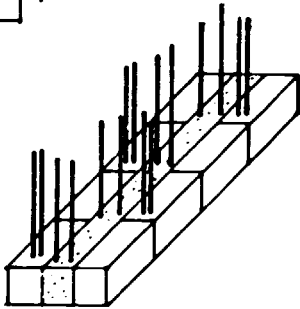
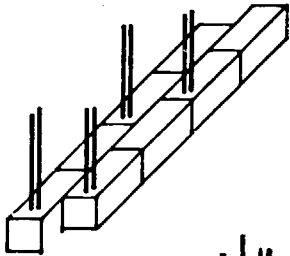
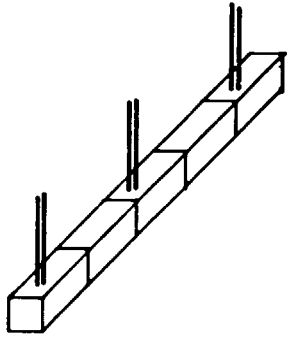
3. Guidelines for the civil works

3.1 General aspects

The civil works shall be executed in accordance with the specifications and standards of the project. The works shall be carried out in a safe and sound manner, taking into account the safety of the workers and the environment. The contractor shall be responsible for the design, construction, and maintenance of the civil works. The works shall be completed within the agreed time schedule and budget. The contractor shall provide regular progress reports to the project manager. The works shall be subject to inspection and approval by the project manager. The contractor shall be responsible for the removal of any debris or waste generated during the construction process. The works shall be carried out in accordance with the applicable laws and regulations. The contractor shall be responsible for the safety of the workers and the public. The works shall be completed in a timely and efficient manner. The contractor shall be responsible for the quality of the work and the materials used. The works shall be subject to the same standards and requirements as the structural works. The contractor shall be responsible for the coordination of the civil works with the structural works. The works shall be carried out in a professional and ethical manner. The contractor shall be responsible for the safety and health of the workers and the public. The works shall be completed in accordance with the project objectives and requirements. The contractor shall be responsible for the overall success of the project.

3.2 New structural elements

The new structural elements shall be designed and constructed in accordance with the specifications and standards of the project. The contractor shall be responsible for the design, construction, and maintenance of the new structural elements. The works shall be completed within the agreed time schedule and budget. The contractor shall provide regular progress reports to the project manager. The works shall be subject to inspection and approval by the project manager. The contractor shall be responsible for the removal of any debris or waste generated during the construction process. The works shall be carried out in accordance with the applicable laws and regulations. The contractor shall be responsible for the safety of the workers and the public. The works shall be completed in a timely and efficient manner. The contractor shall be responsible for the quality of the work and the materials used. The works shall be subject to the same standards and requirements as the civil works. The contractor shall be responsible for the coordination of the new structural elements with the civil works. The works shall be carried out in a professional and ethical manner. The contractor shall be responsible for the safety and health of the workers and the public. The works shall be completed in accordance with the project objectives and requirements. The contractor shall be responsible for the overall success of the project.



4. Combolcha: current situation, proposals and modifications.

4.1 Production and waste water volume

The factory has been operating since 1960. The water consumption is approximately 1000 m³ per day. The effluent is discharged into the Murel River. The factory is located in Combolcha, 10 km from Addis Ababa. The factory produces 1000 tons of product per day. The waste water volume is approximately 1000 m³ per day. The waste water contains various pollutants. The factory is planning to install a wastewater treatment plant. The plant will have a capacity of 1000 m³ per day. The plant will use the activated sludge process. The plant will be completed in 1985. The factory is also planning to install a water recycling system. The system will recycle 500 m³ of water per day. The system will be completed in 1985. The factory is also planning to install a solid waste management system. The system will manage 1000 tons of solid waste per day. The system will be completed in 1985.

10/1/72

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4.2 Proposed modifications in the plant process

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The following information was obtained from a review of the records of the [redacted] and is being furnished to you for your information. It is requested that you do not disseminate this information to any other person.

On [redacted] at [redacted] the [redacted] advised that [redacted] had been [redacted] by [redacted] on [redacted] at [redacted].

It is noted that [redacted] is a [redacted] of [redacted] and is currently [redacted] at [redacted].

The [redacted] advised that [redacted] had been [redacted] by [redacted] on [redacted] at [redacted].

It is noted that [redacted] is a [redacted] of [redacted] and is currently [redacted] at [redacted].

The [redacted] advised that [redacted] had been [redacted] by [redacted] on [redacted] at [redacted].

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It is noted that [redacted] is a [redacted] of [redacted] and is currently [redacted] at [redacted].

The following information was obtained from a review of the files of the [redacted] and [redacted] on [redacted] and [redacted]. The information is being provided to you for your information only and should not be disseminated outside your agency.

[redacted] was born on [redacted] at [redacted]. He is currently residing at [redacted]. [redacted] is a [redacted] and has been employed by [redacted] since [redacted].

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5. Combolcha tannery:
specifications, quantities and estimations for civil works.

5.1. Site works.

5.2. Screening chambers, open channels.

5.7. Collecting chamber and sulphide catalytic tank.

5.4. Homogenization tank.

5.5. Flocculation tank.

5.6. Primary sedimentation tank.

The primary sedimentation tank is a rectangular tank with a sloped bottom. It is used to remove suspended solids and floating materials from wastewater. The tank is divided into three zones: a floating zone at the top, a middle zone for sedimentation, and a bottom zone for sludge collection. The floating zone is where oils and greases rise to the surface. The middle zone is where suspended solids settle to the bottom. The bottom zone is where the settled sludge is collected and removed. The tank is equipped with a skimmer at the top to remove floating materials and a sludge collector at the bottom to collect and remove sludge. The tank is operated at a low flow rate to allow sufficient time for sedimentation. The effluent from the tank is sent to the secondary treatment stage.

5.7. Biological oxidation ditch.

5.8. Secondary sedimentation tank.

5.9. Chlorination tank.

5.10. Sludge drying beds.

5.11. Covered areas.

5.12. Raceways, pipe works, accessories.

5.13. Summary of estimations.

6. Modjo: current situation, proposals and modifications

6.1 Production and waste water volume

The following information was obtained from a review of the files of the [redacted] and is being furnished to you for your information. It is to be understood that this information is being furnished to you on a confidential basis and is not to be disseminated outside of your office.

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5.2 PROPOSED MODIFICATIONS IN THE TREATMENT PROCESS AT MODJO

The proposed modifications to the treatment process at MODJO are as follows:

1. The existing treatment process is to be maintained.
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7. Modjo tannery: specifications, bill of quantities
and estimations for the civil works.

5.1. Site works.

7.2. Screening and grit chambers, open channels.

7.7. Pumping station and sulphide catalytic tank.

7.4. Homogenization tank.

7.5. Coagulation and flocculation tank.

7.5. Primary sedimentation tank.

7.7. Biological oxidation ditch.

7.8. Secondary sedimentation tank and return pit.

7.9. Chlorination contact chamber.

7.10. Sludge drying beds.

7.11. Covered areas.

7.12. Raceways, pipe works, accessories.

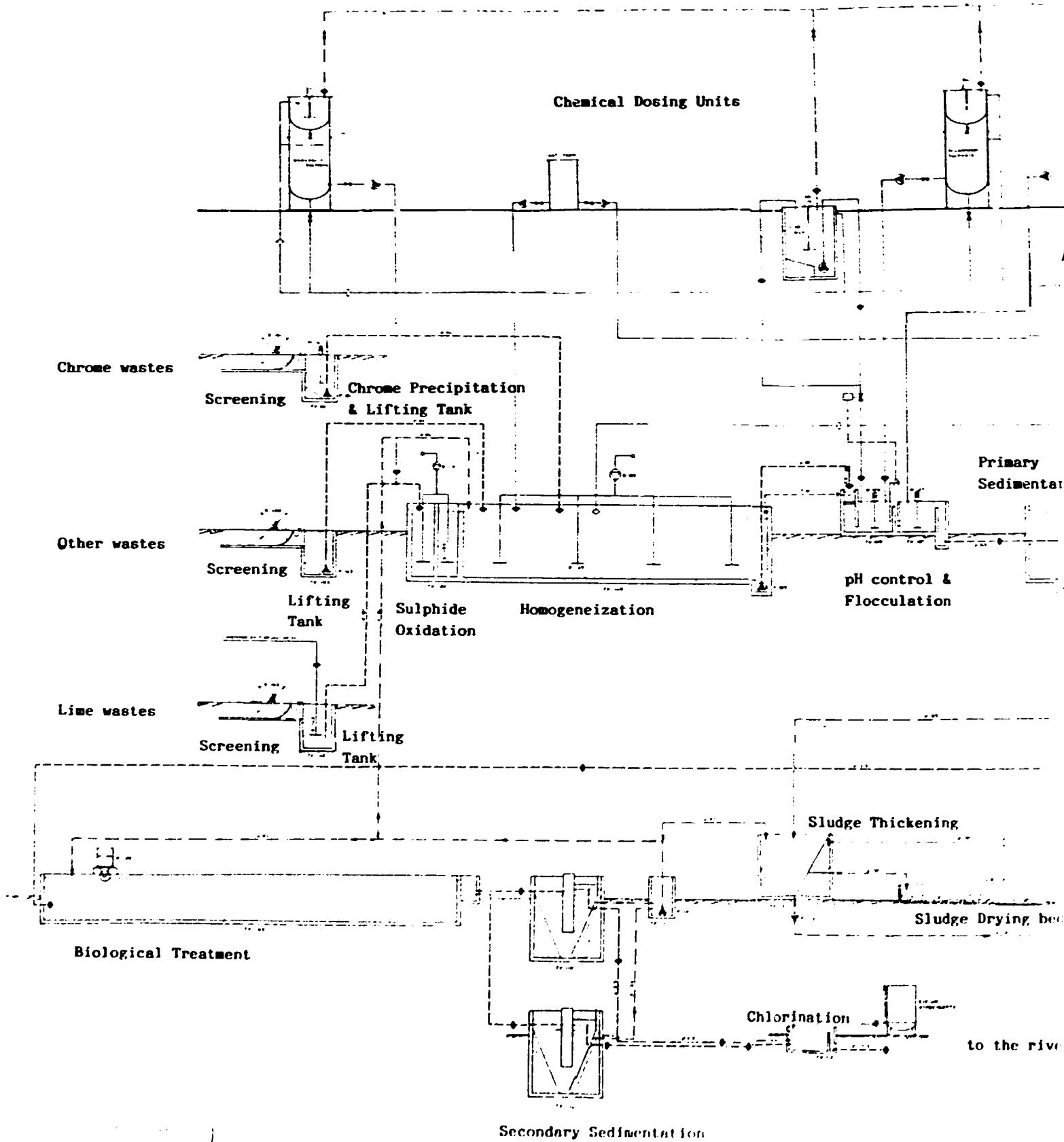
7.13. Summary of estimations.

8. Conclusion and final recommendations

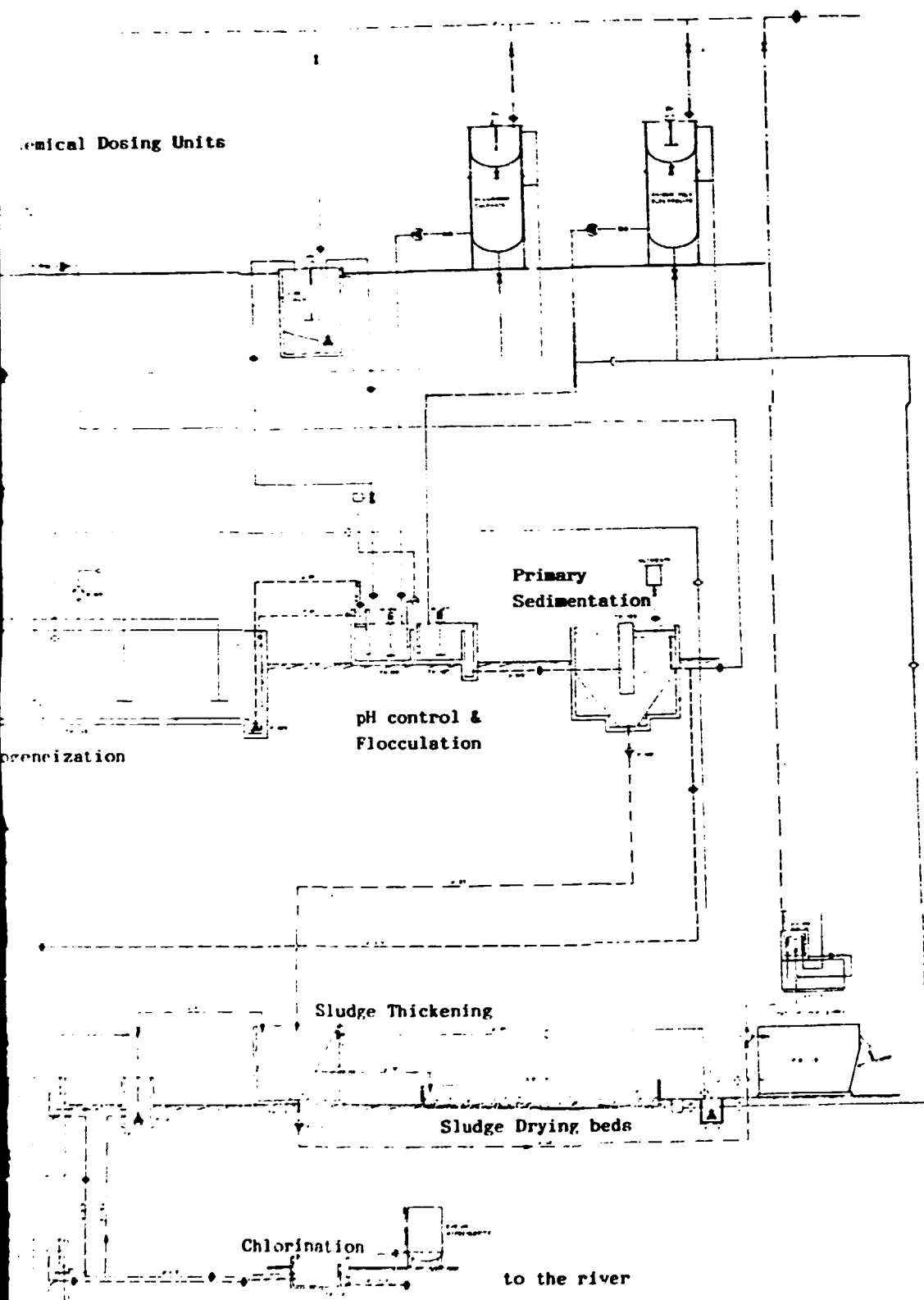
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ANNEX A



SYMBOLOLOGY

- Water effluent
- - - - Sludge line
- - - - - Suction line
- - - - - Pump
- - - - - Valve
- - - - - Chemical
- - - - - Service water

DITTA: NATIONAL LEATHER SHOE CORPORATION
 ADDS. 4800A - ETIMCHA MODUGO

DESCRIZIONE:
 Tannery waste water treatment plant
 Process flowsheet

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N° TAVOLA

2

N° PROGETTO
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ANNEX B

Extract from supply contract of Impianti Sacchiero

STANDARD TO BE MET

1) Raw

Soaking and Washing Waste	350 m ³ /day
Lime and Sulphide "	125 m ³ /day
Pickle and Chrome "	125 m ³ /day

Actual Effluent Load

BOD.....	2600 - 3000 mg/lit.
COD.....	5800 - 6500 "
S.S.....	2800 - 3400 "
P.H.....	7.9 - 9 "
SULPHIDE.....	250 - 310 "
AMMONIA.....	100 - 120 "
CHROMIUM.....	80 - 100 "
PHENOLS.....	1,5 - 2,5 "
SETTLABLE SOLID.....	50,000

Requirement

2) After Physical Chemical Treatment

P.H.....	8,5 mg/lit.
COD.....	1000 - 1500 mg/lit.
BOD.....	450 - 800 "
S.S.....	80 - 160 "
SULPHIDE.....	3 - 5 "
AMMONIA.....	80 - 100 "

CHROMIUM.....	1 - 1,5	mg/lit.
PHENOLS.....	0,9 - 1,5	"
SETTLEABLE SOLIDS.....	1500	"

3) After Biological Treatment

PH.....	7 - 7,5	mg/lit.
COD.....	120 - 180	"
BOD.....	20 - 35	"
N.S.....	30 - 40	"
SULPHIDE.....	-	"
AMMONIA.....	20	"
CHROMIUM.....	0,6 - 0	"
PHENOLS.....	0,1 - 0,15	"
SETTLEABLE SOLIDS.....	500	"

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ANNEX C

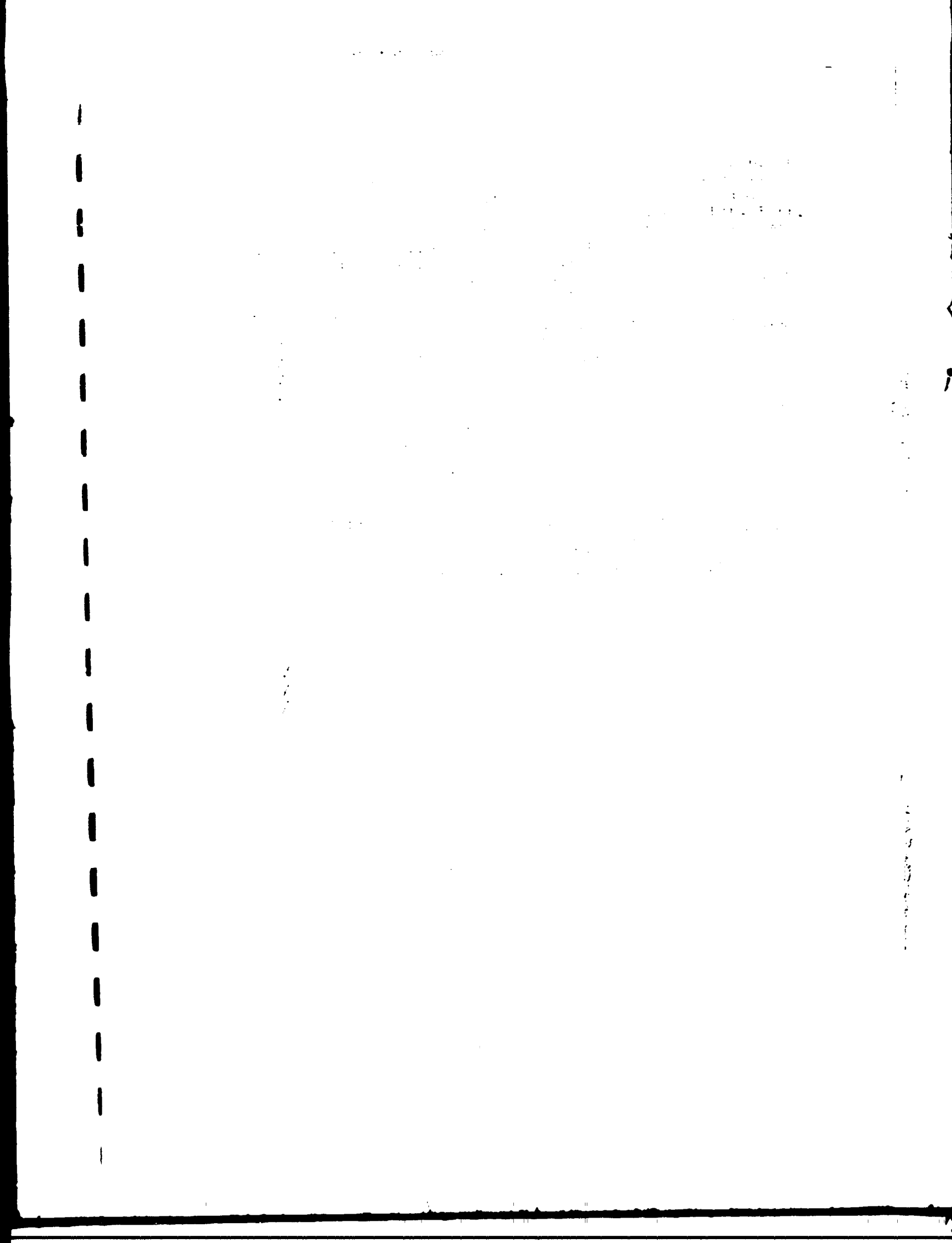
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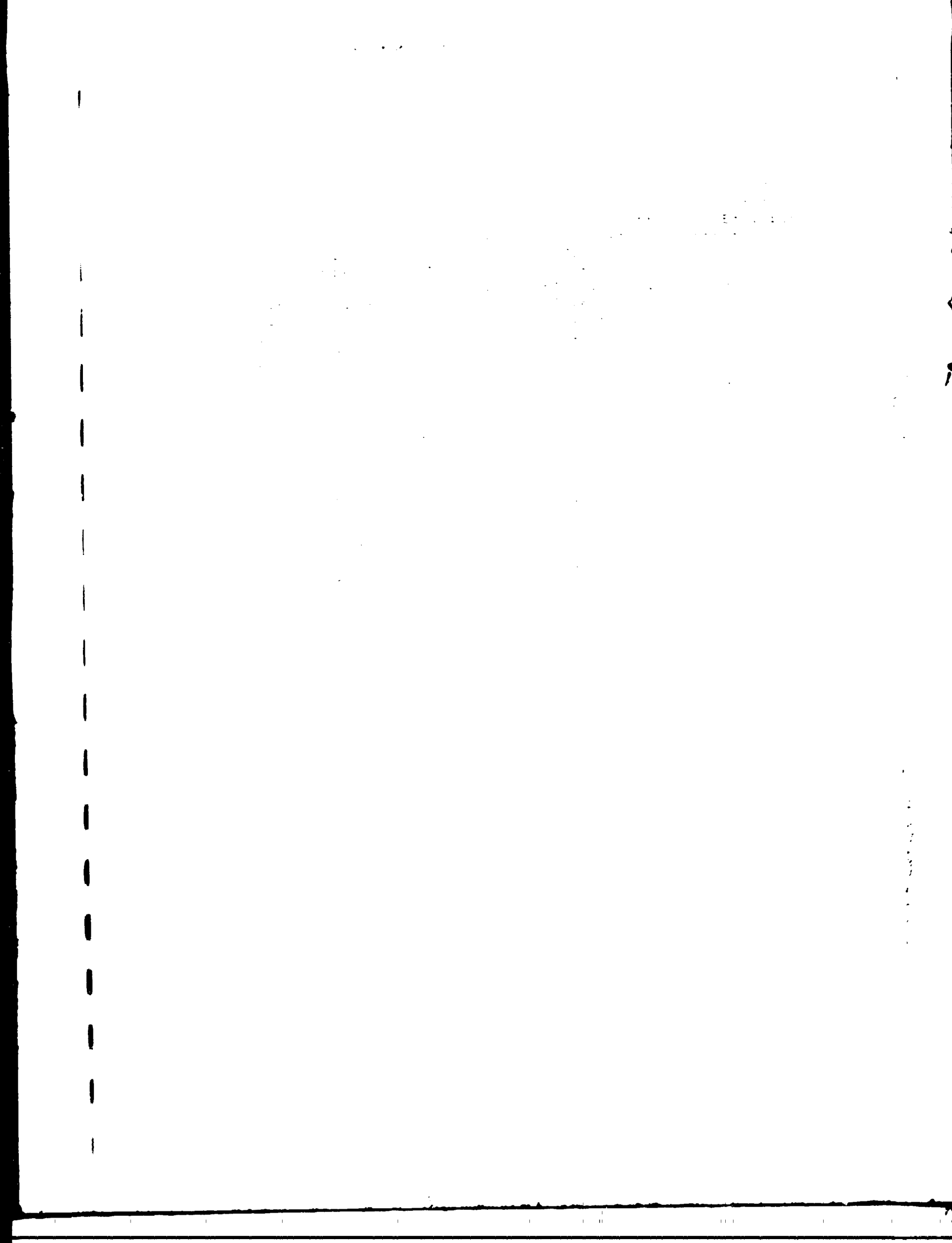
ANNEX D

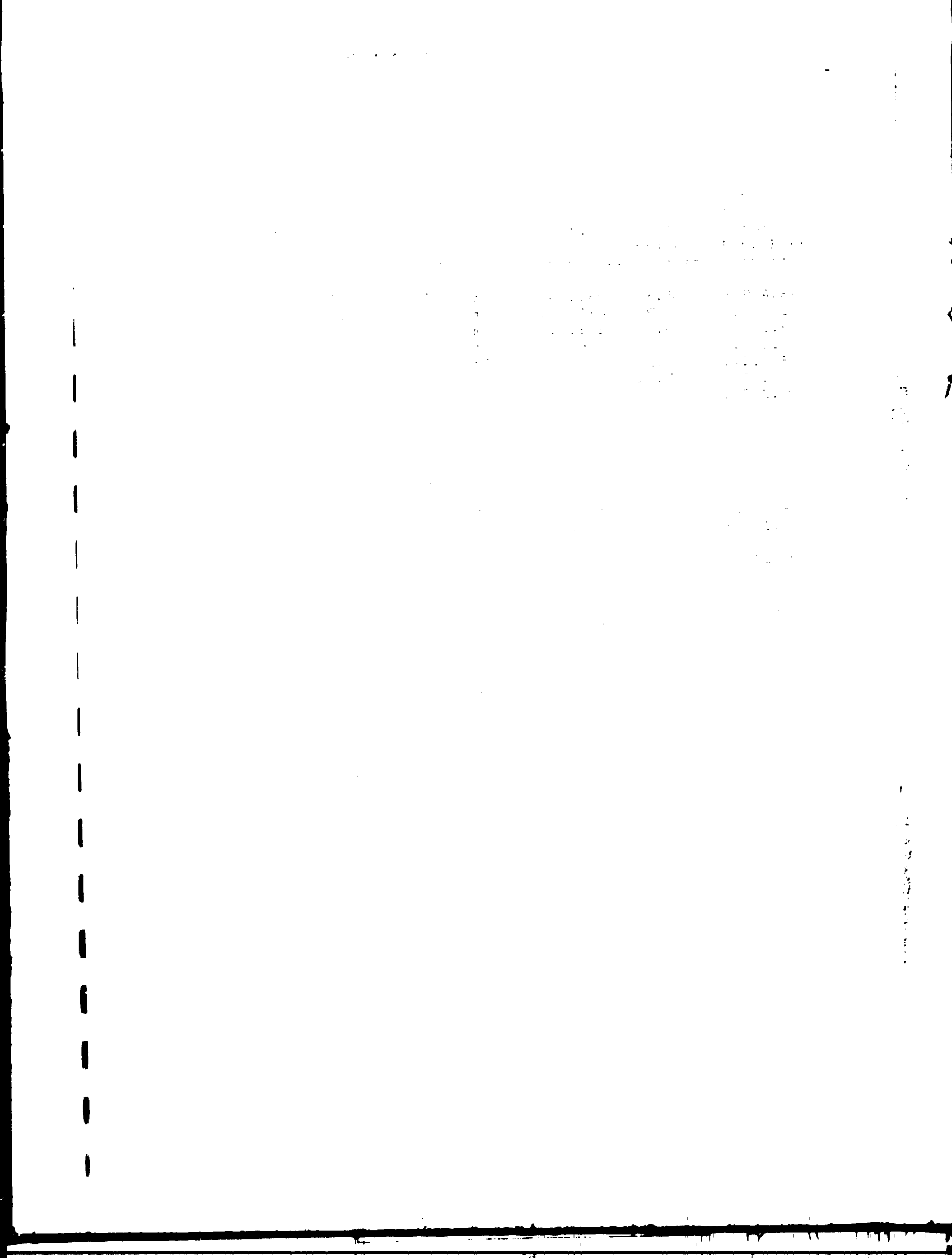
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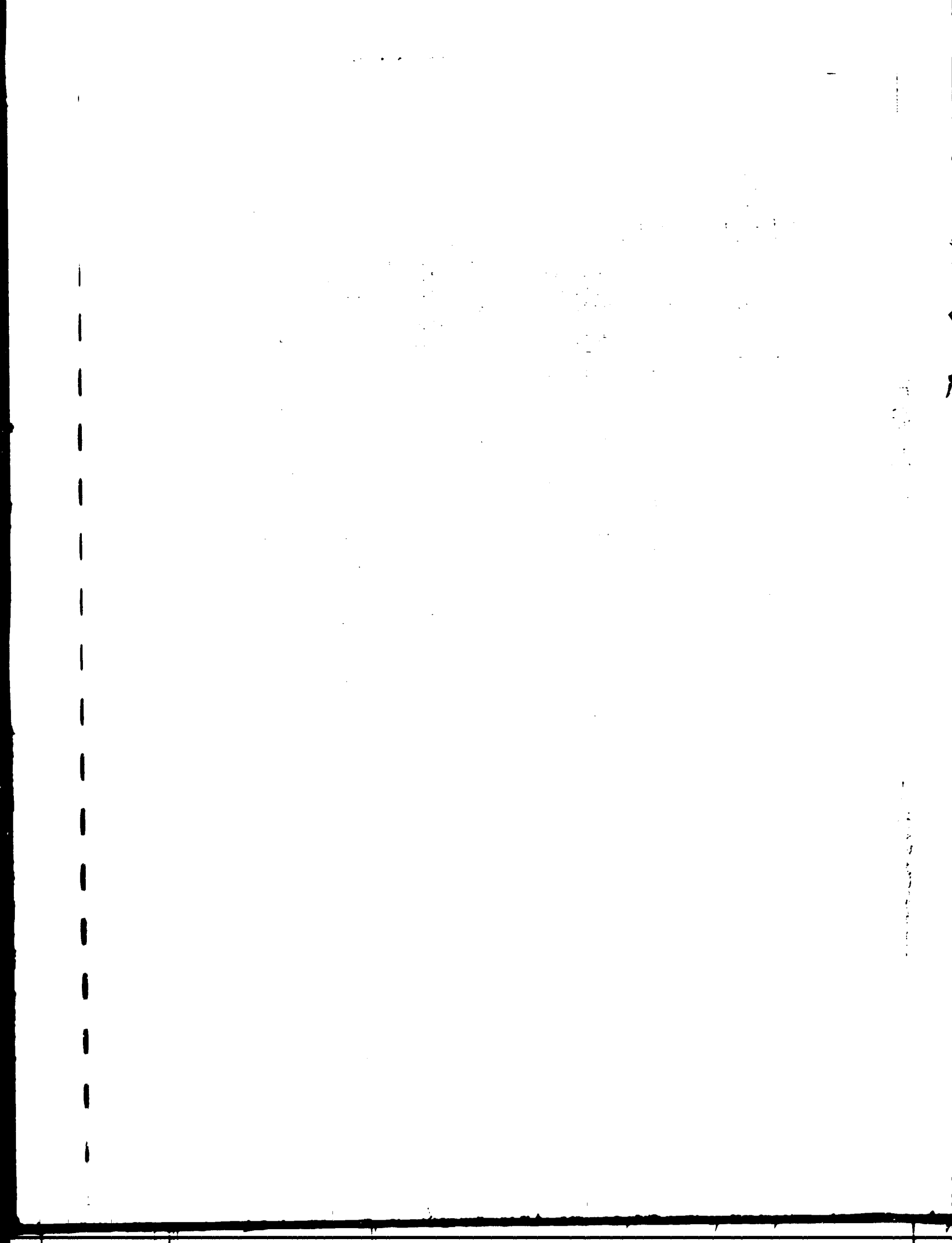
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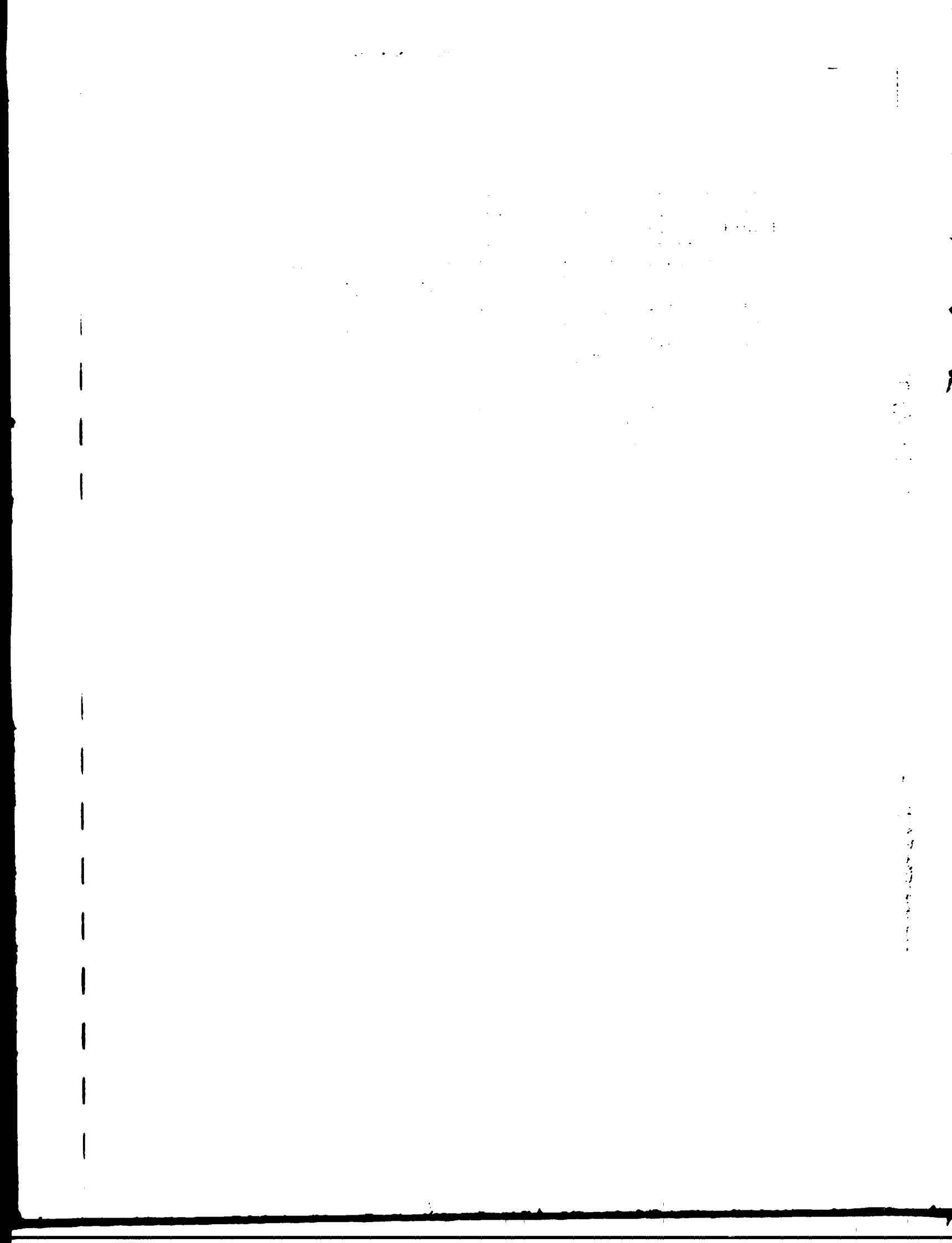
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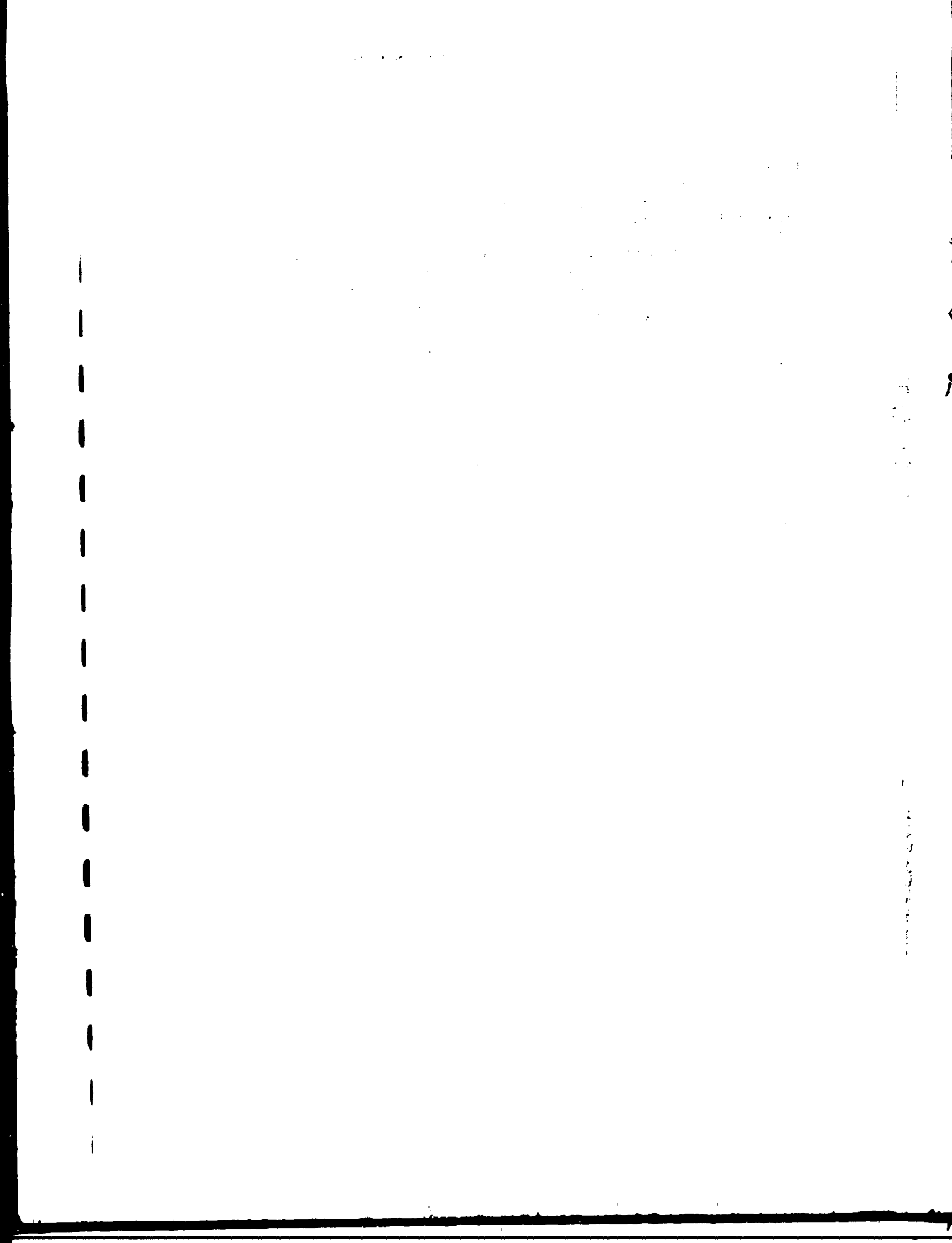
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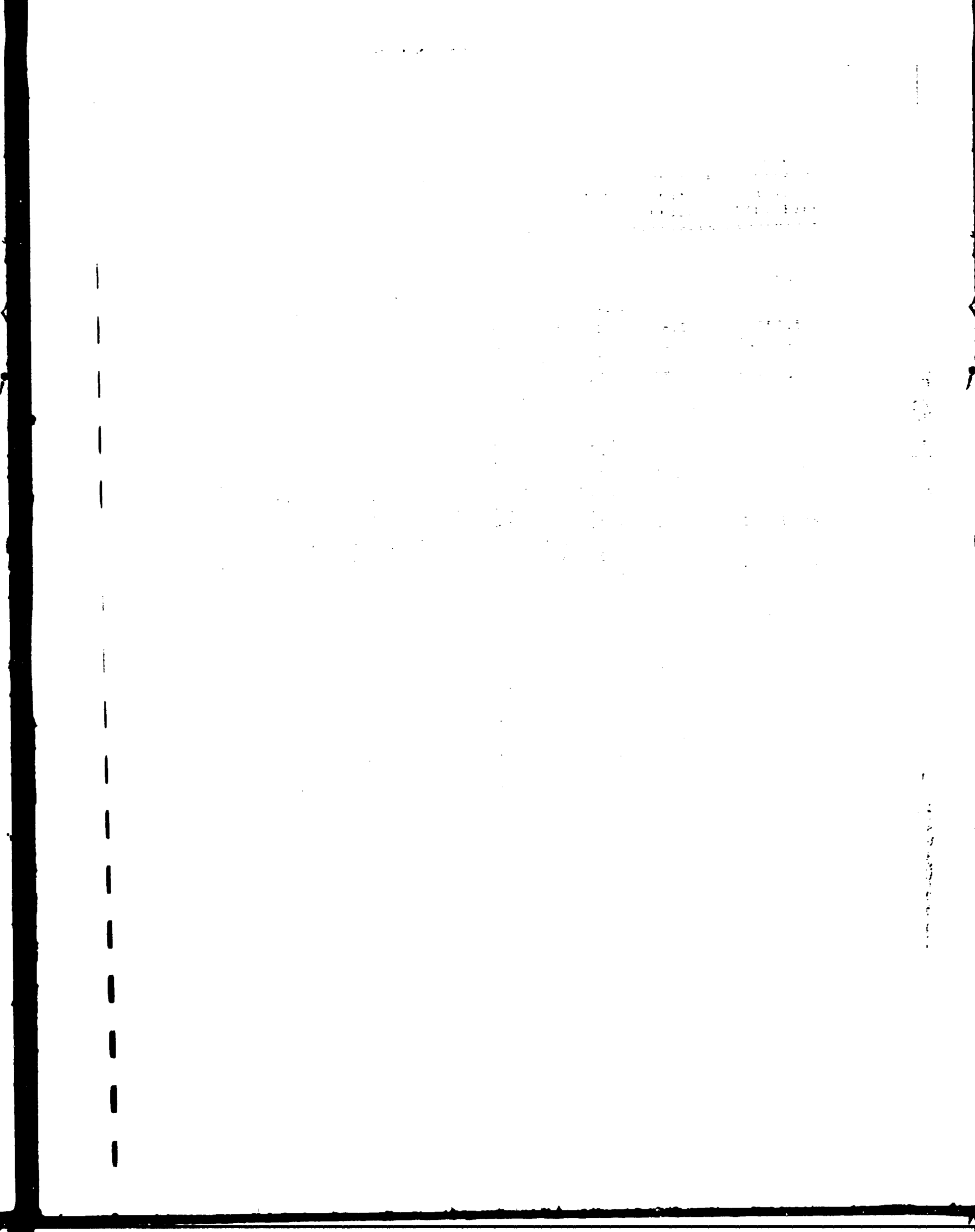
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The following information is for your information only. It is not intended to be used as a basis for any action.

Name	Address	City	State	Zip
John Doe	123 Main St	New York	NY	10001
Jane Smith	456 Elm St	Los Angeles	CA	90001
Robert Johnson	789 Oak St	Chicago	IL	60601
Mary White	101 Pine St	Houston	TX	77001
David Brown	202 Maple St	Phoenix	AZ	85001
Susan Green	303 Cedar St	Philadelphia	PA	19101
Michael Black	404 Birch St	San Antonio	TX	78101
Laura Lee	505 Walnut St	San Diego	CA	92101
James Hall	606 Spruce St	Portland	OR	97201
Patricia King	707 Ash St	Seattle	WA	98101

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The data presented in this report is preliminary and subject to change. It is intended to provide a general overview of the current situation and is not to be used as a basis for any decision-making.

For more information, please contact the appropriate department. We appreciate your interest and cooperation.

ANNEX E

LABORATORY FOR EFFLUENTS

In order to facilitate on field evaluations and controls of the performance and efficiency of the treatment plant or tests , to installe some simple apparatuses for waste waters analysis at Modjo Tannery ,where a chemical laboratory already exists, seems advisable.

The experts have reported here an indicative list of the minimal equipment and chemicals necessary :

i. Setteable Solids :

n.4 Imhoff cones and support.

ii. Jar tests :

n.2 magnetic stirrers and stirring bars (assortment);

n.5 500 ml beackers ;

n.4 5 and 10 ml graduated pipets (Mohr-wide tip);

n.4 500 ml graduated cylinders ;

n.2 100 ml " " ;

Chemicals (industrial grade products):

- Alum

- Ferrous Sulphate

- Ferric Chloride

- Lime

- Polyelectrolyte (various types).

iii. C.O.D. (Chemical Oxygen Demand):

n.1 hot-plates (4 places);

n.6 reflux apparatuses consisting of 250 ml Erlenmeyer flasks or flat-bottom balloons with ground-glass 24/40 neck and 300 mm jacket Liebig with 24/40 joint at bottom.

Chemicals :

- Potassium Dichromate (standard grade)
- Ferrous Ammonium Sulphate (analytical-grade crystals)
- Sulfuric Acid (conc. reagent)
- Silver Sulphate (reagent crystals)
- Ferroin indicator solution
- Mercuric Sulphate (analytical-grade crystals).

iv. B.O.D. (Biochemical Oxygen Demand) :

n.20 300 ml incubation bottles (for Winckler;i.e. standard method).

n.1 BOD Manometric Apparatus (HACH) 6 places ;

n.1 Temperature control (Incubol-Hach or similar).

Chemicals :

- Lithium Hydroxide Powder Pillows (HACH) 100 pieces x 3
- Nitrification Inhibitor (HACH) 35 grams x 2
- Ampule Standard for BOD (HACH) 10 pieces
- BOD Nutrient Buffer Pillows (HACH) 100 pieces x 2

v. Suspended Solids :

n.4 25 ml Gooch crucible funnels (sintered glass G4 type);

n.4 Buchner funnels,diam.10 cm

v. Sampling :

n.1 portable water sampler for composite "on field" sampling,
type AQUA SAMPLER PRT20,Struers, or similar.

Note : this facility can be utilized also at Combolcha or
other plants.

The listed equipment is completed by the normal facilities of a
chemical laboratory(balance,oven,desiccator,muffle,vacuum pump,etc.)
and chemicals.

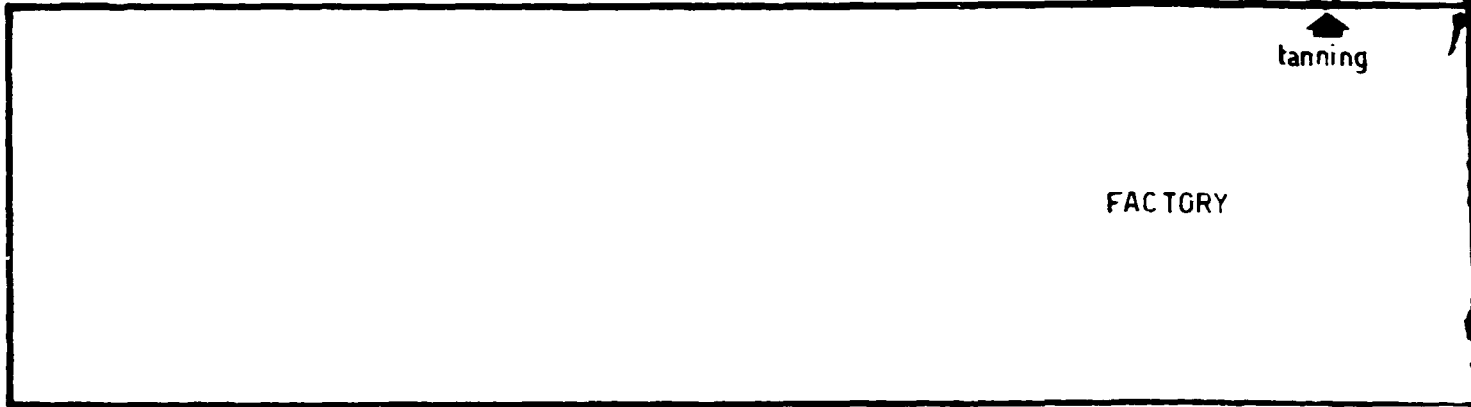
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ANNEX F

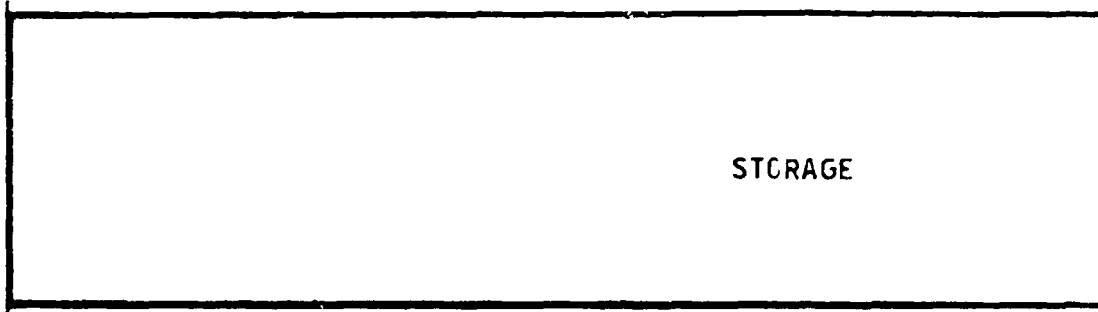
LIST OF UTILIZED SYMBOLS & ABBREVIATIONS

m	: meter
m ²	: square meter
m ³	: cubic meter
Nm ³	: standard cubic meter (air : 20°C, 1 atmosfere)
n. or n°	: number
BOD 5	: Biochemical Oxygen Demand (five days)
w.c.	: water column
HP	: horse power
kW	: kilo-watt
w	: watt
ca.	: circa (about)
h	: hour
H	: height
kg	: kilogramme
p.	: piece
d.w.	: dried weight
p.w.	: pelt weight
l	: liter
sec.	: second
mth	: month

.



FACTORY

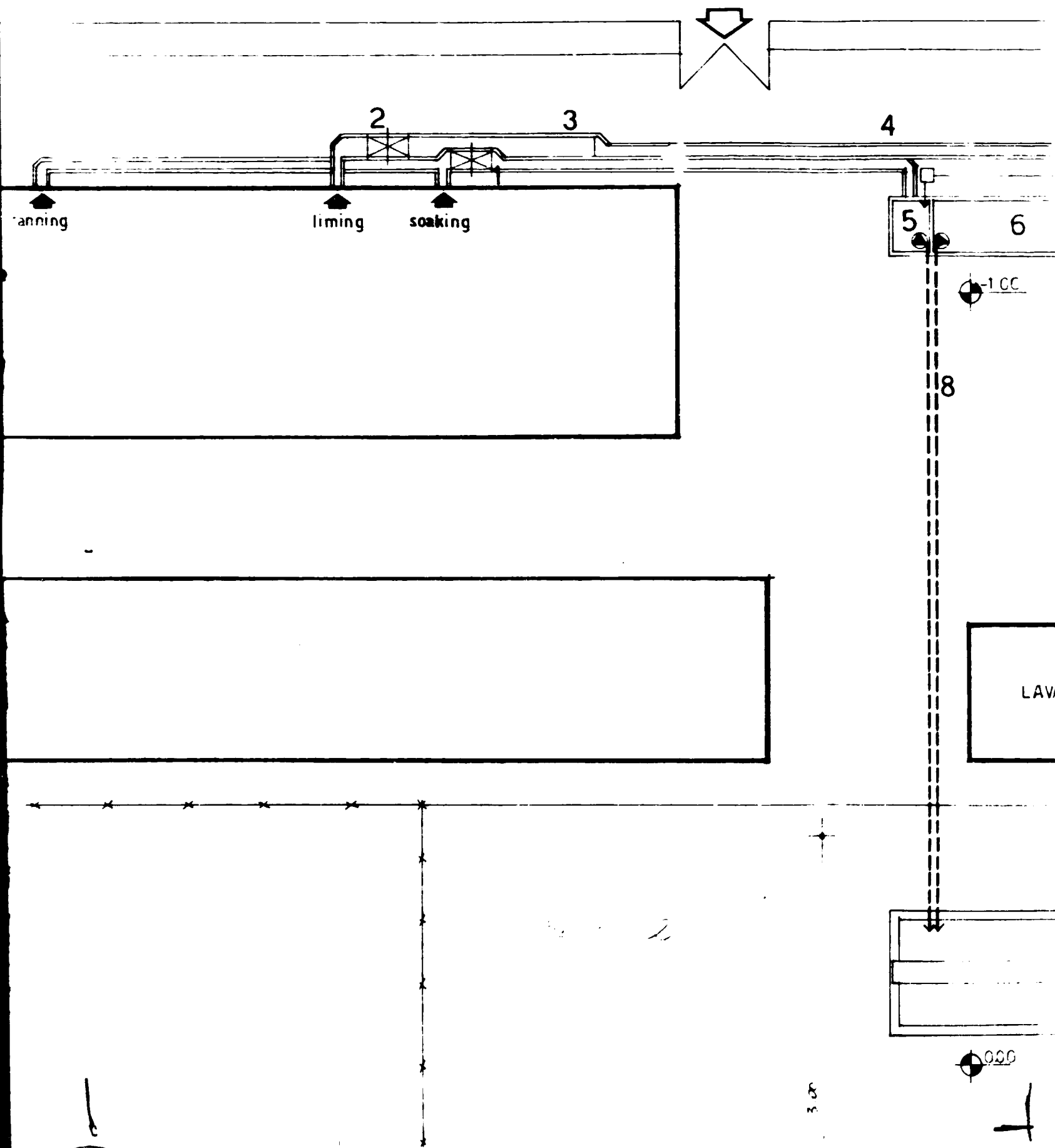


STORAGE

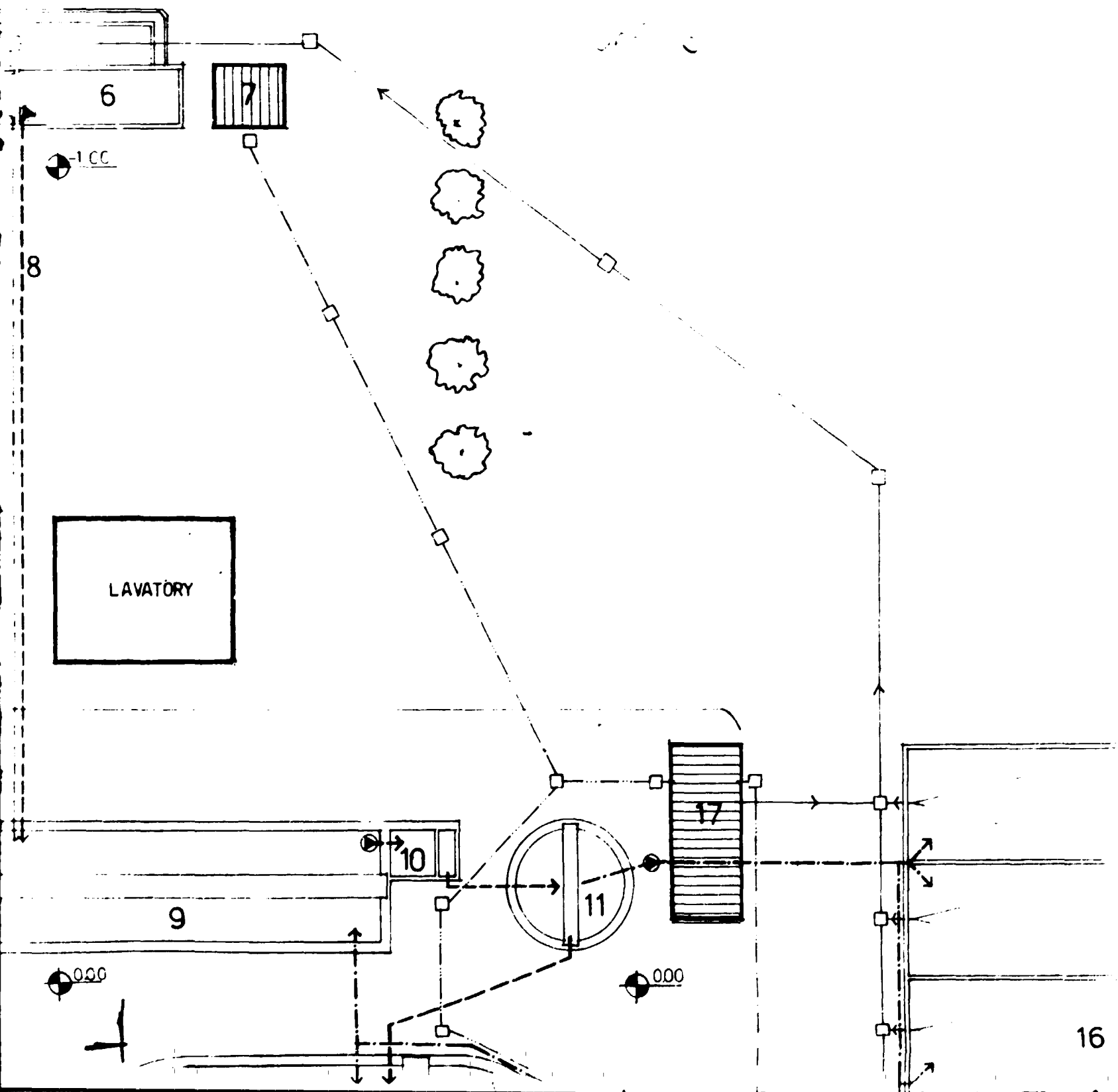


Section 1

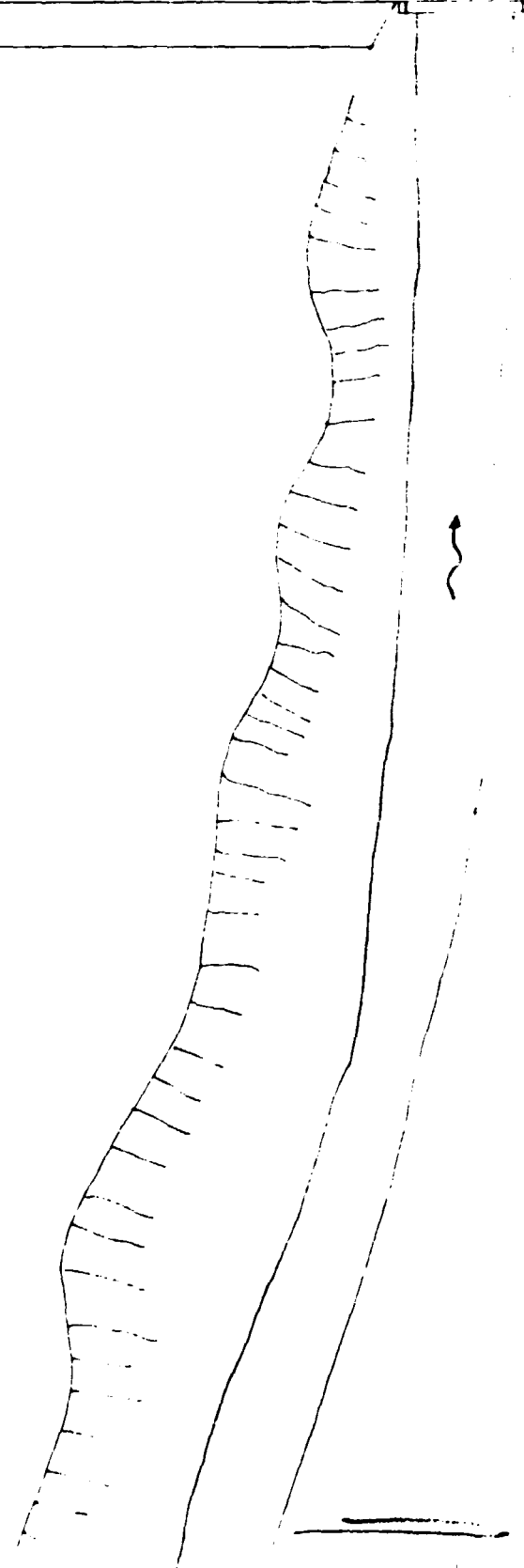
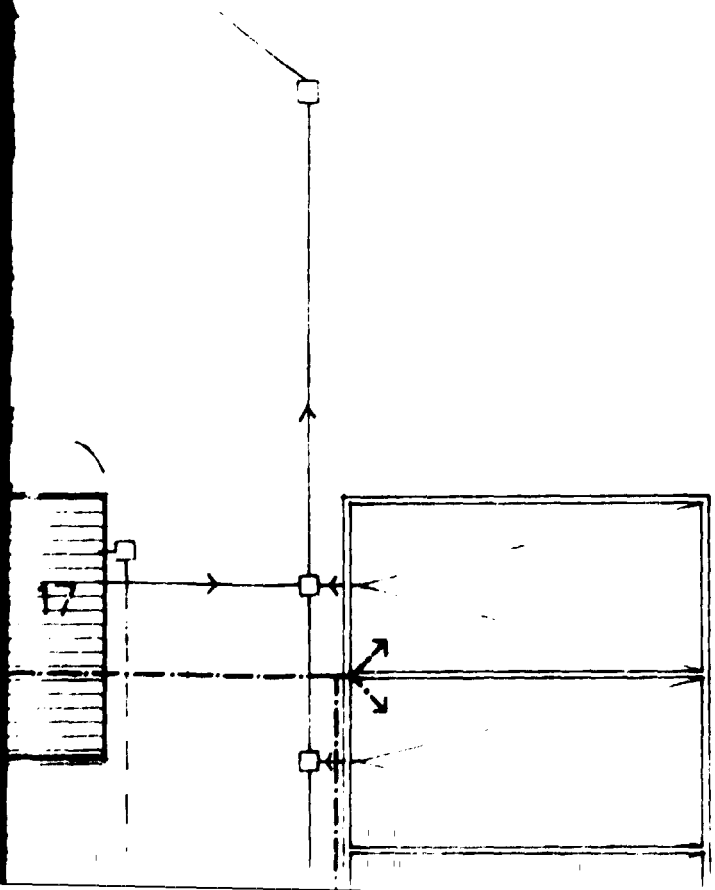
ROAD TO TEXTILE



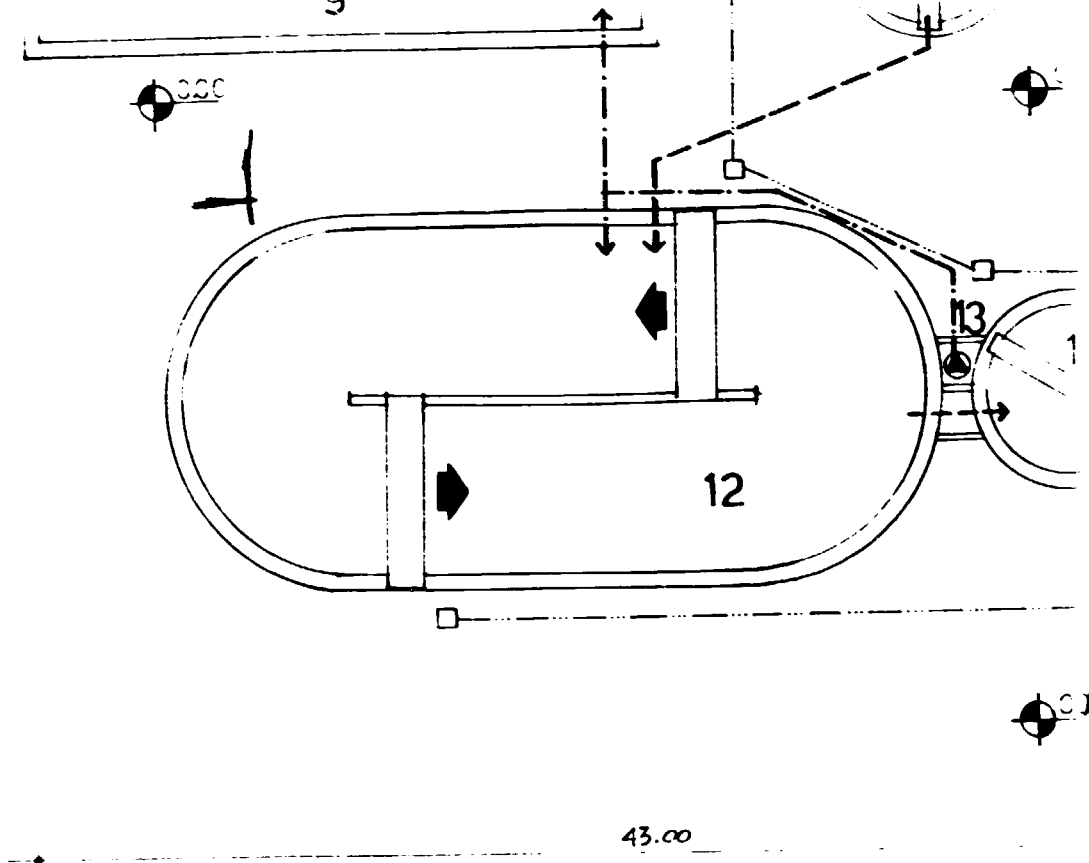
TO TEXTILE FACTORY



SECT 4



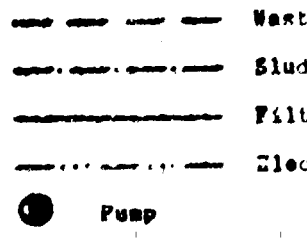
31.00

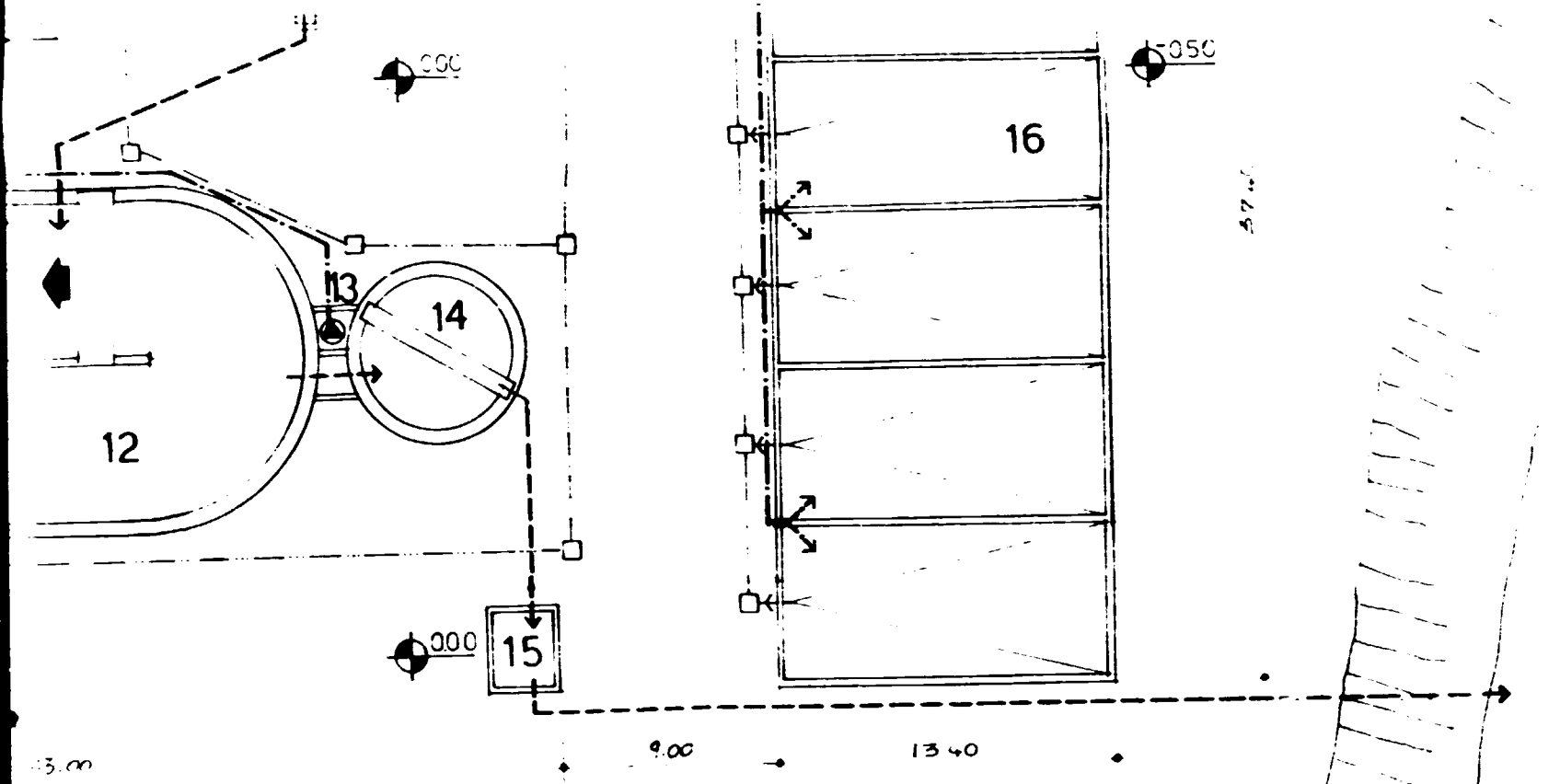


SECT E

Legend (Combolcha)

- 1 Screening chamber
- 2 Screening chamber
- 3 Grit chamber
- 4 Open channels
- 5 Pumping station
- 6 Sulphide catalyt
- 7 Covered area for
- 8 Channel for pipe
- 9 Homogenization
- 10 Flocculation tank
- 11 Primary sedimentation
- 12 Biological oxidation
- 13 Return sludge pump
- 14 Secondary sedimentation
- 15 Chlorination contact tank
- 16 Sludge drying bed
- 17 Covered area for





Legend (Combolcha)

- 1 Screening chamber (soaking and tanning waste)
- 2 Screening chamber (liming waste)
- 3 Grit chamber
- 4 Open channels
- 5 Pumping station
- 6 Sulphide catalytic oxidation tank
- 7 Covered area for equipment
- 8 Channel for pipe installation
- 9 Homogenization tank
- 10 Flocculation tank
- 11 Primary sedimentation tank
- 12 Biological oxidation ditch
- 13 Return sludge pit
- 14 Secondary sedimentation tank
- 15 Chlorination contact chamber
- 16 Sludge drying beds
- 17 Covered area for equipment

- Waste water line
- Sludge line
- Filtration water line
- Electrical cable line
- Pump

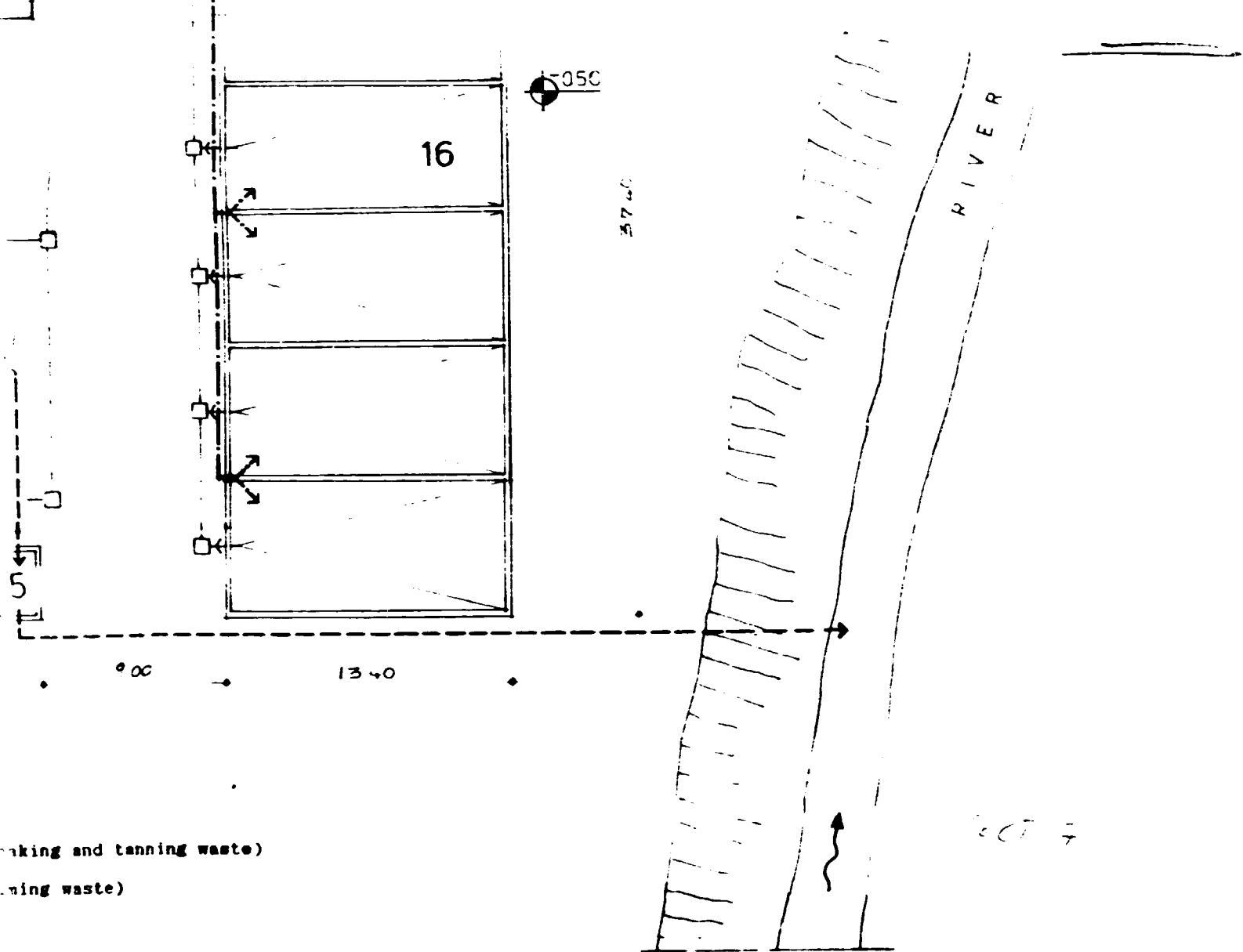
CONTRACT n. 89/169: UNIDO PROJECT

Combolcha tannery: waste water treatment

National Leather and Shoe
Addis Ababa - Ethiopia

"STUDIO TECNICO Dr. GIUSEPPE CLONFERO
Advisors
Mr. Giuseppe Clonfere
Mr. Mauro Carbonari

1 : 250
Plan layout



CONTRACT n. 60/159: UNIDO PROJECT SI/ETH/88/901

Combolcha tannery: waste water treatment plant

National Leather and Shoe Corporation
Addis Ababa - Ethiopia

"STUDIO TECNICO Dr. GIUSEPPE CLOFFERO" - FLORENCE ITALY

Advisors
Mr. Giuseppe Cloffero
Mr. Mauro Carbonari

March 1990

1 : 250
Plan layout

1

(drinking and tanning waste)
(washing waste)

sedimentation tank
aeration tank
clarification

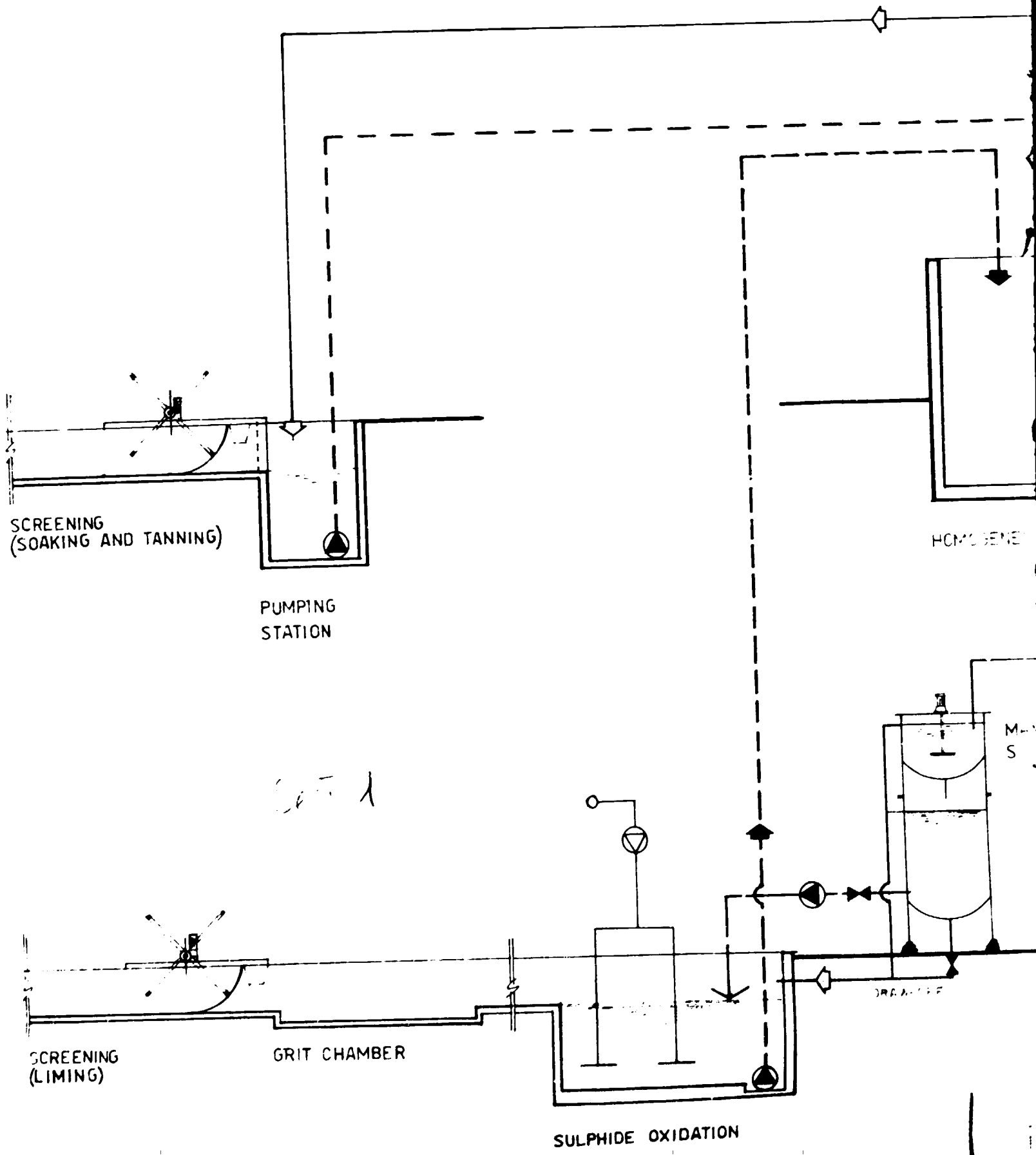
tank
ditch

in tank
chamber

segment

line

water line
cable line



Septic

M-S

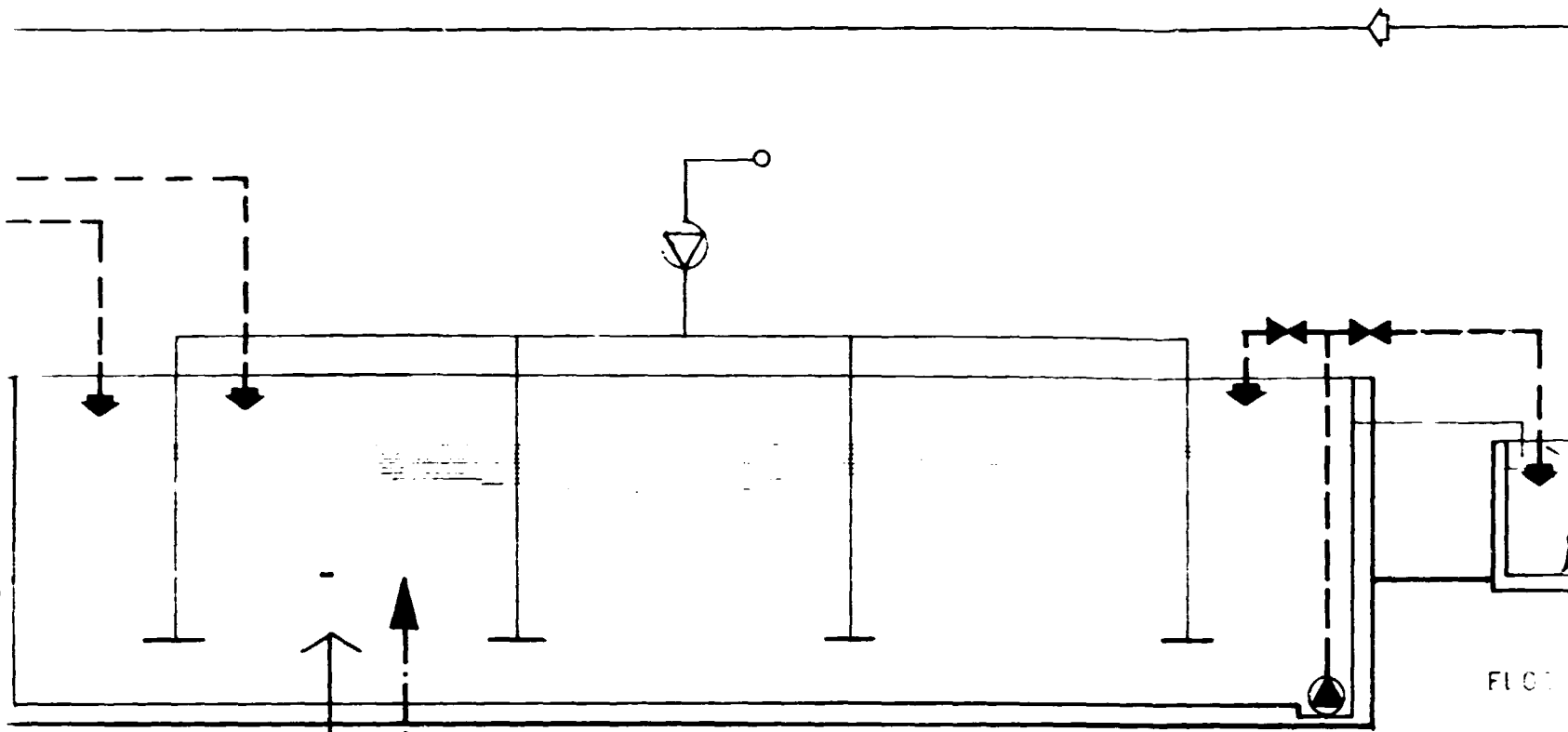
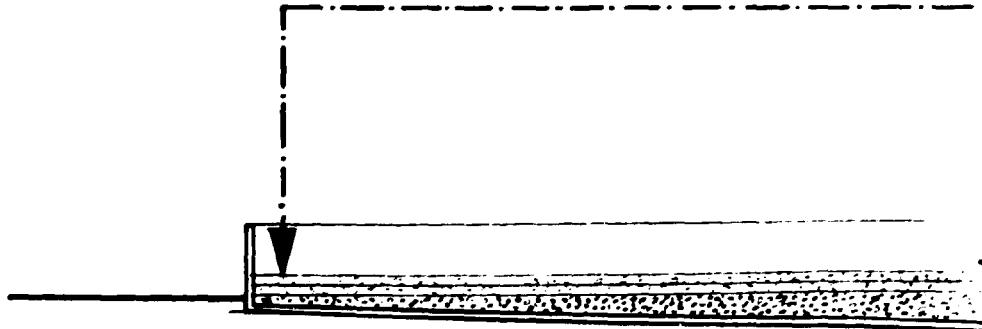
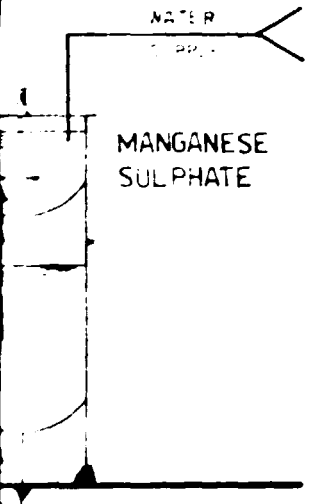
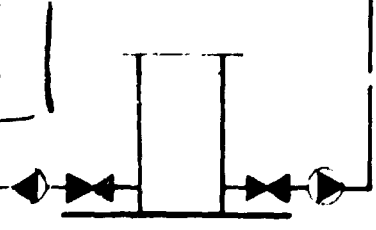


FIG. 1

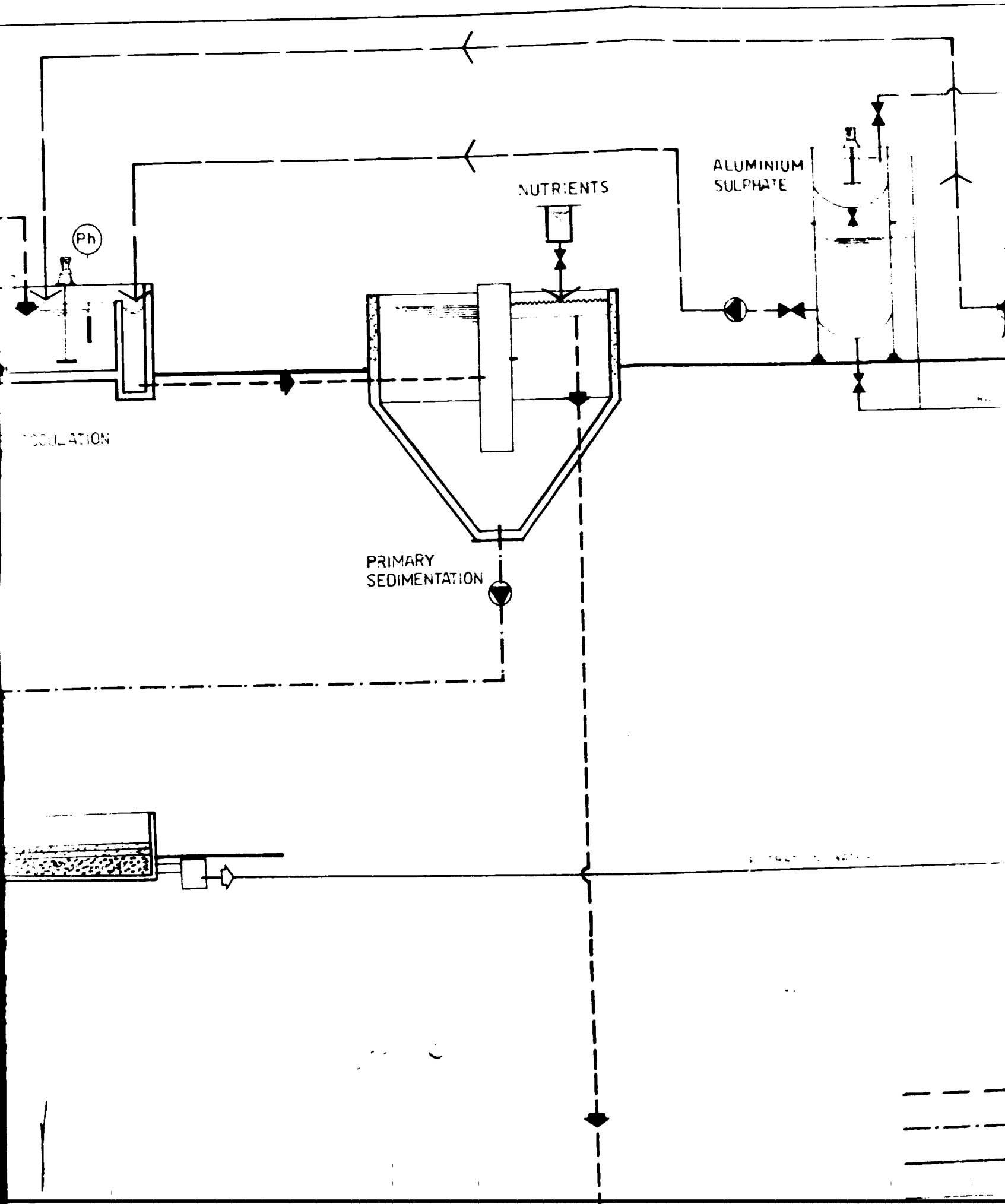
MIXING TANK

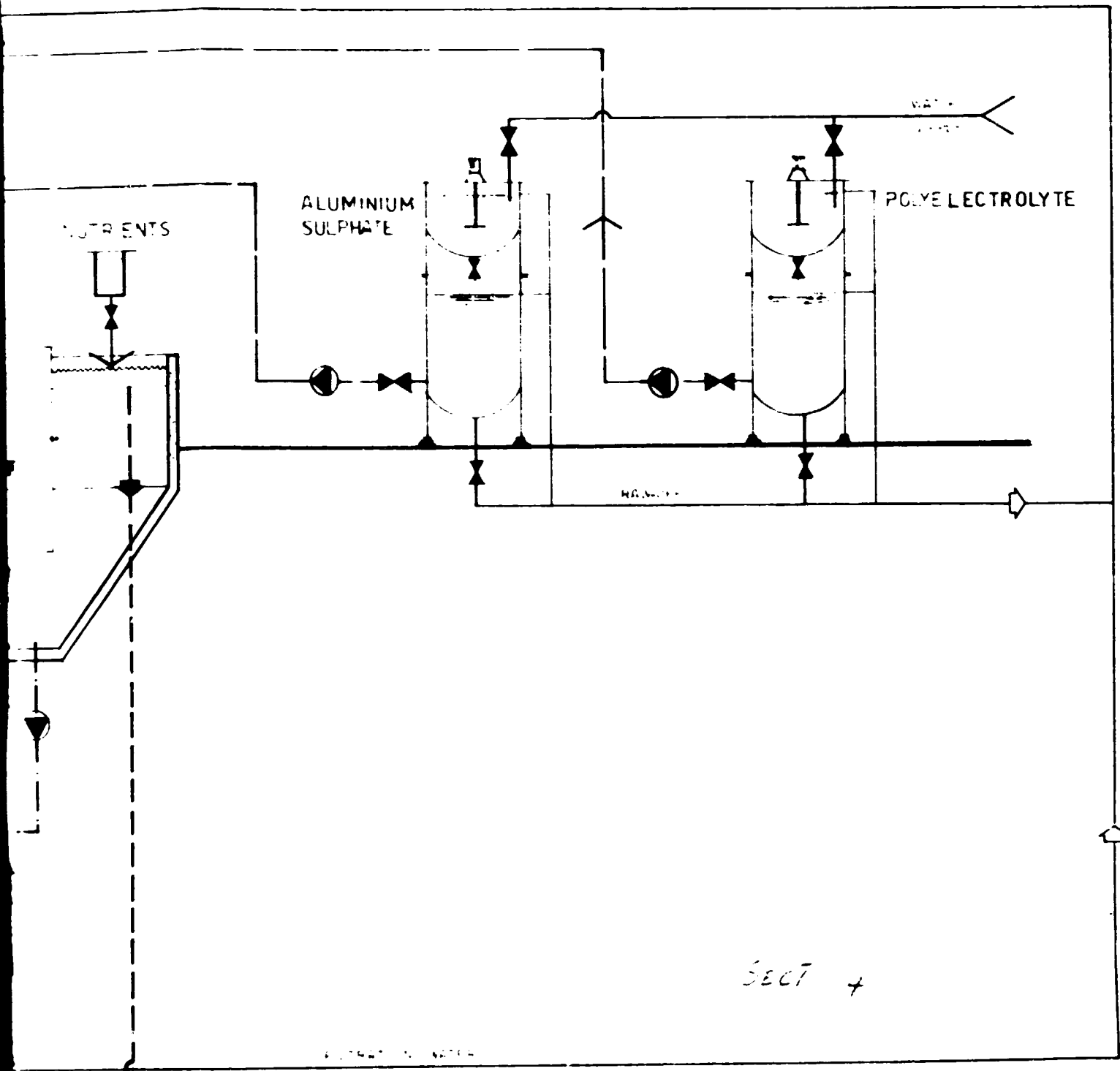


DRYING BEDS







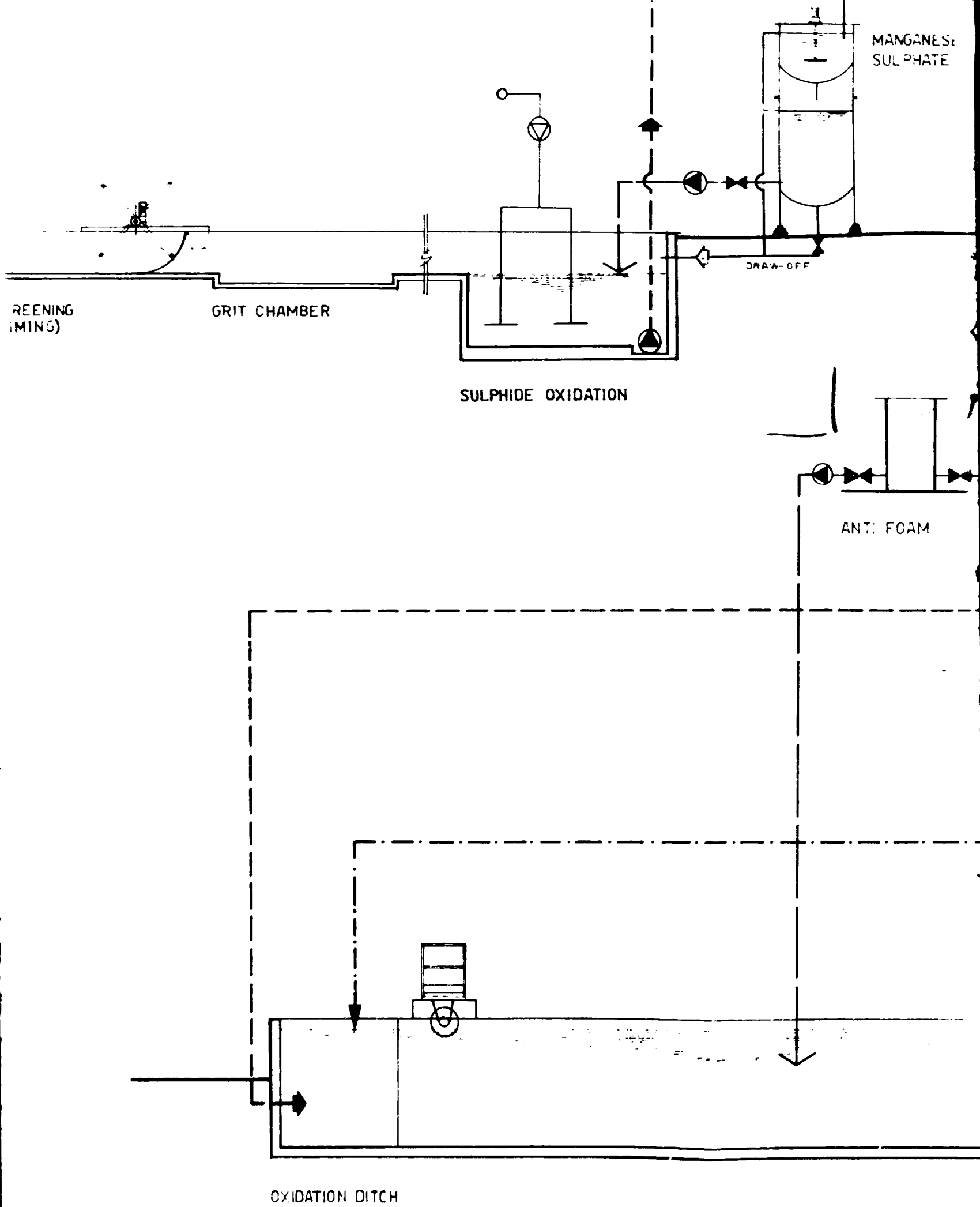
ANTI-FOAM

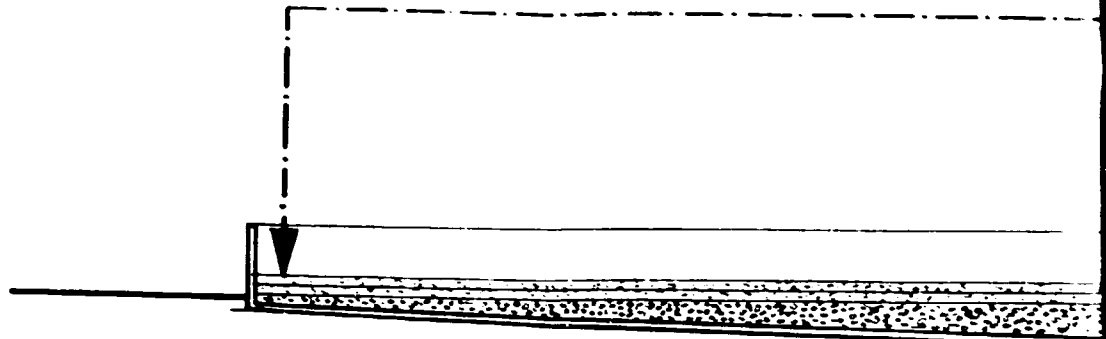




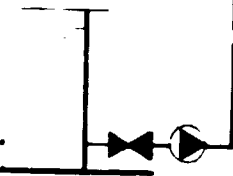
SYMBOLOLOGY

- 
waste-water line
- 
sludge line
- 
filtration water line
- 
service water

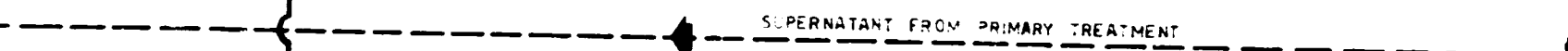




DRYING BEDS



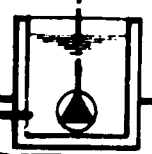
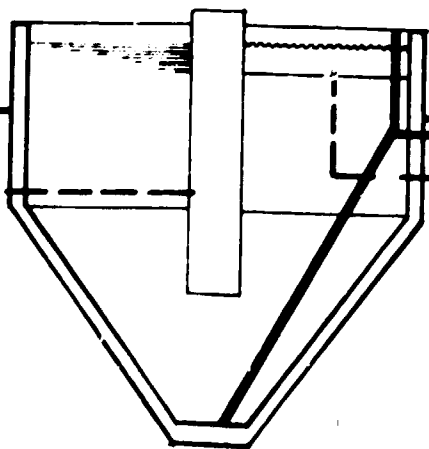
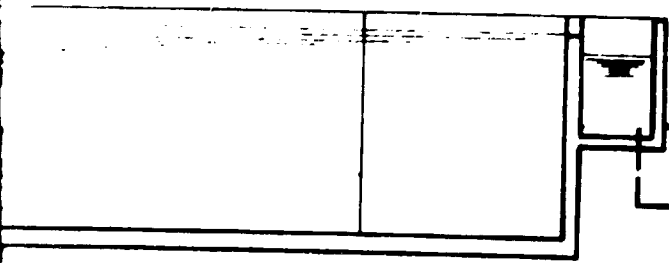
CAM



SUPERNATANT FROM PRIMARY TREATMENT



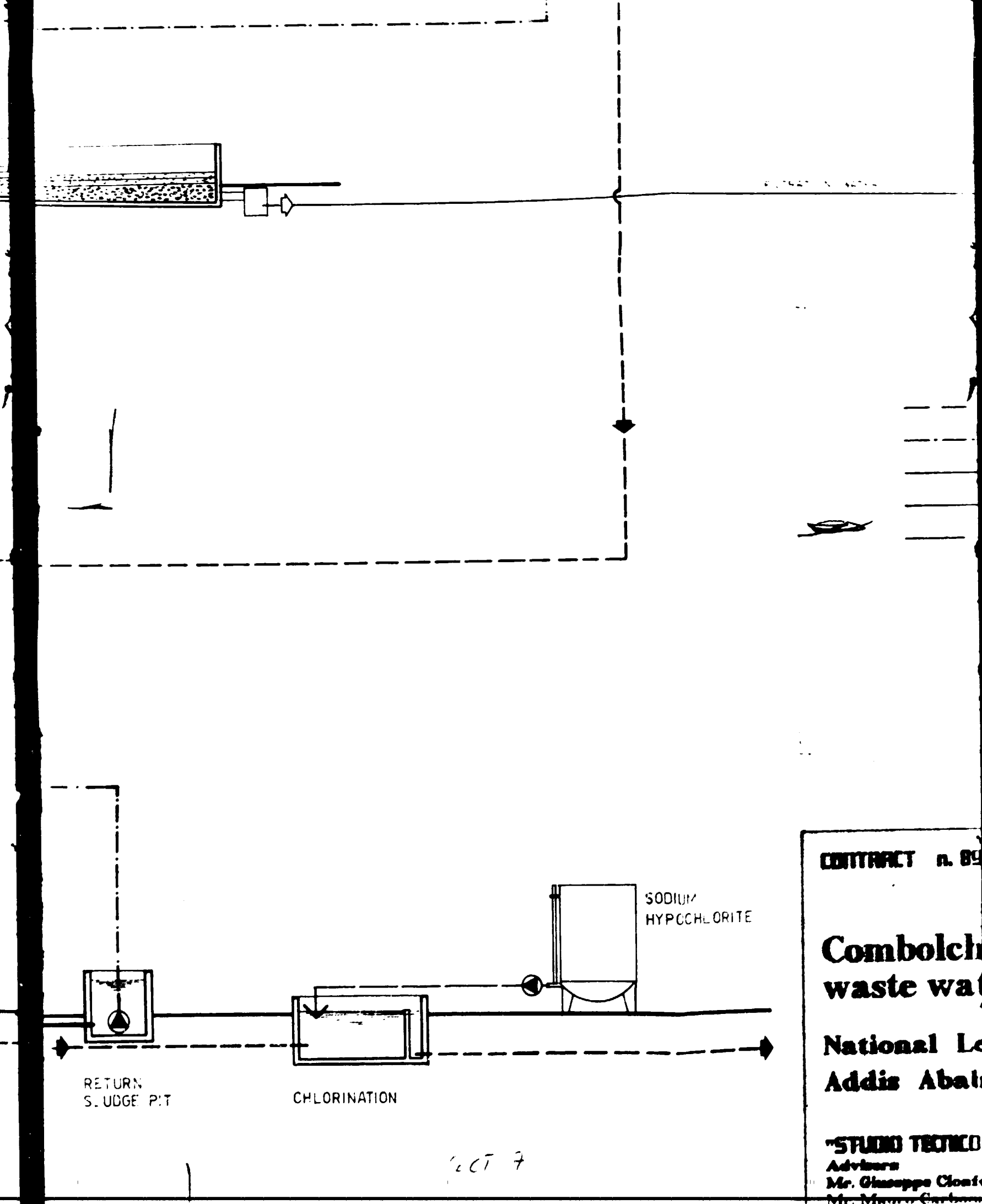
ACTIVATED SLUDGE RECYCLE



RETURN
SLUDGE PIT

sect 6





RETURN
S. UDDGE P:T

CHLORINATION

SODIUM
HYPOCHLORITE

CONTRACT n. 89

Combolch
waste wa

National Le
Addis Abat

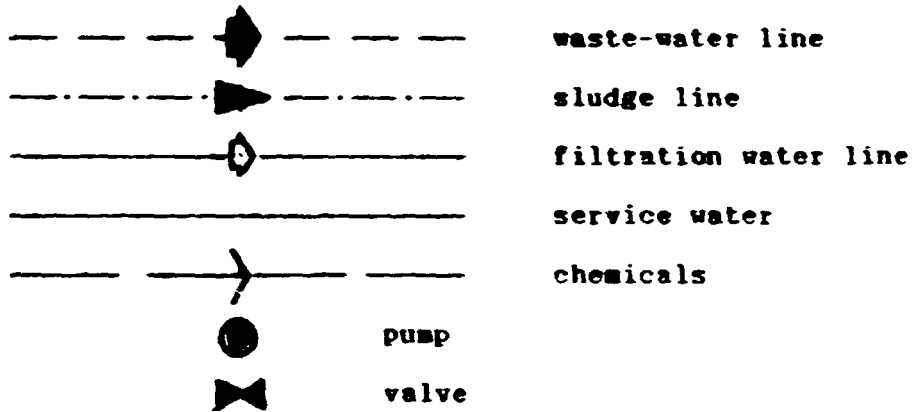
"STUDIO TECNICO"
Advisors

Mr. Giuseppe Clonf

Mr. Mauro Carlucci

SECT 7

SYMBOLOLOGY



CONTRACT n. 89/189: UNIDO PROJECT SI/ETH/88/901

Combolcha tannery: waste water treatment plant

National Leather and Shoe Corporation
Addis Ababa - Ethiopia

"STUDIO TECNICO Dr. GIUSEPPE CLOFFERO" - FLORENCE ITALY

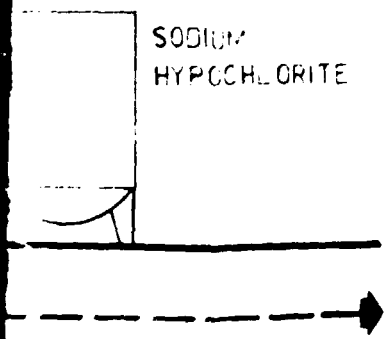
Advisors
Mr. Giuseppe Cloffero
Mr. Mauro Carbonari

March 1990

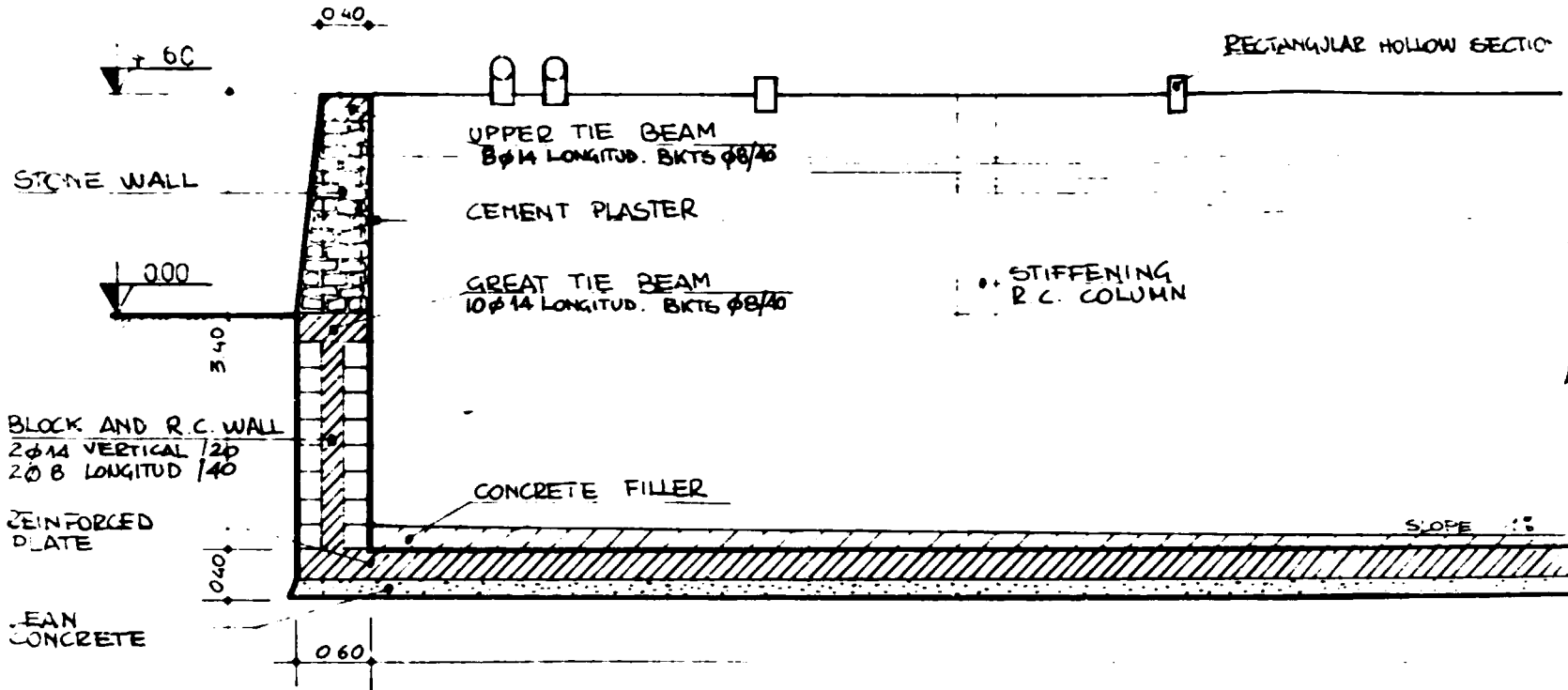
Process flowsheet

2

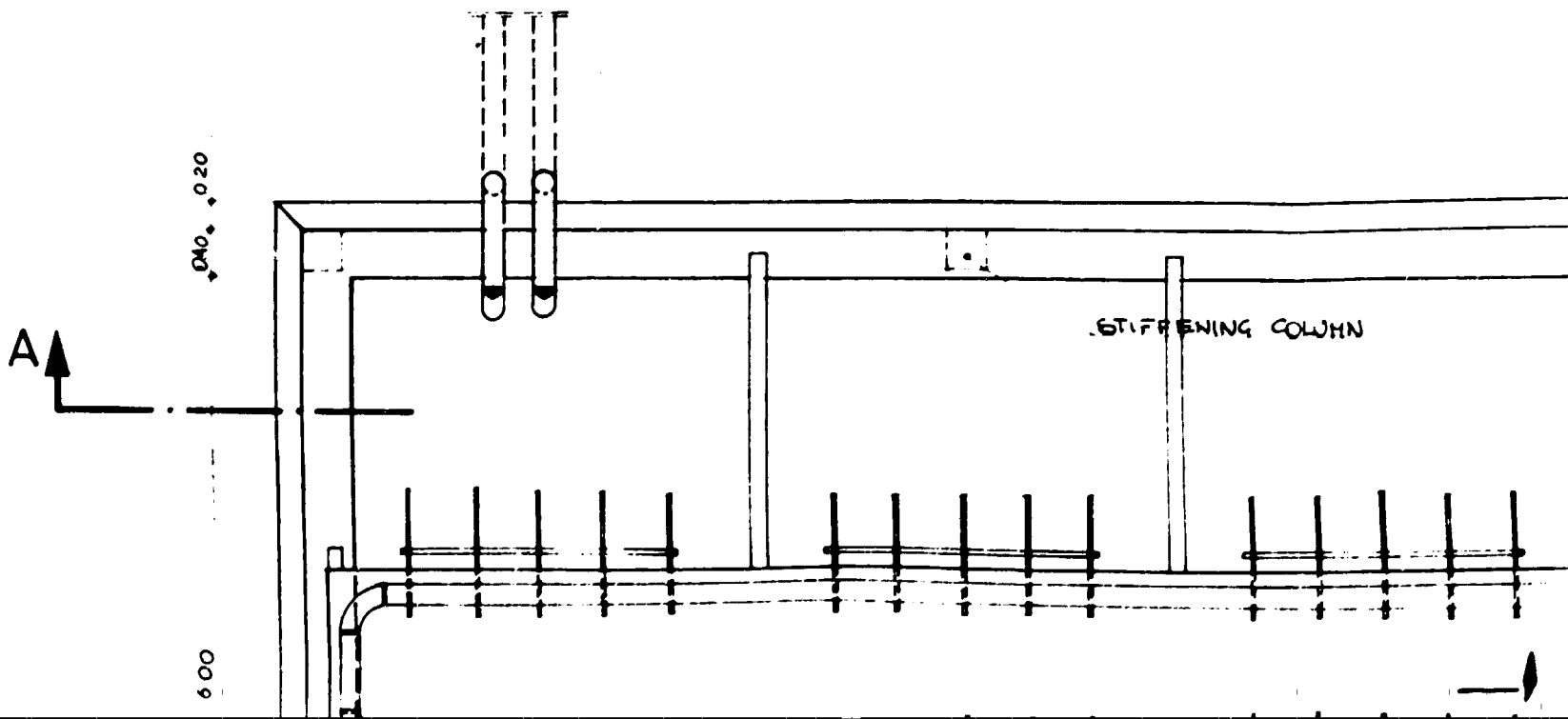
SODIUM
HYPOCHLORITE



SECTION A-A



Set 1



LOW SECTION 22.50

+1.60

VARIABLE

4φ16 VERTICAL
BARS φ8/25

-1.80

22.50

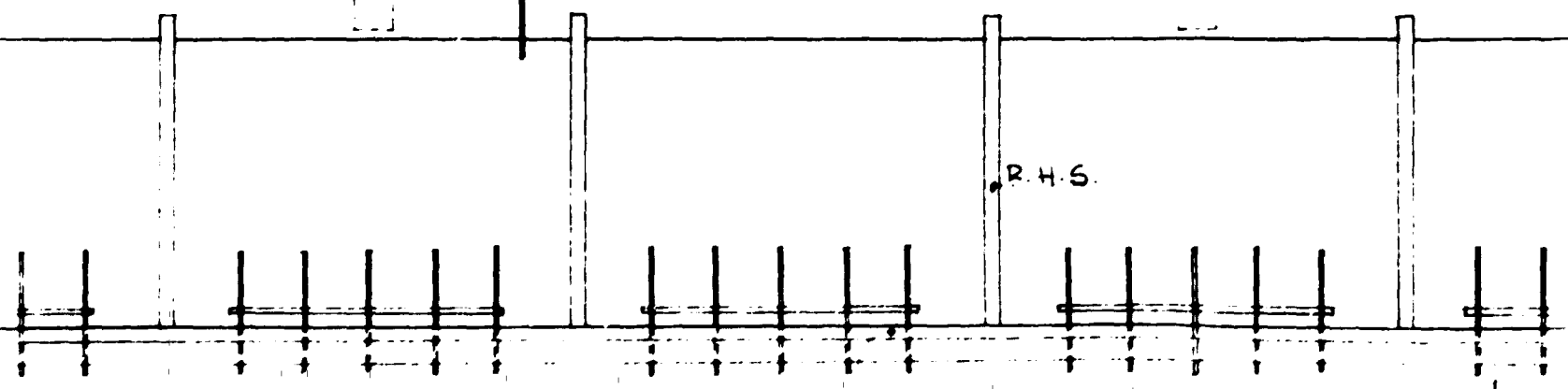
WIRE MESH
φ10/20 x 20

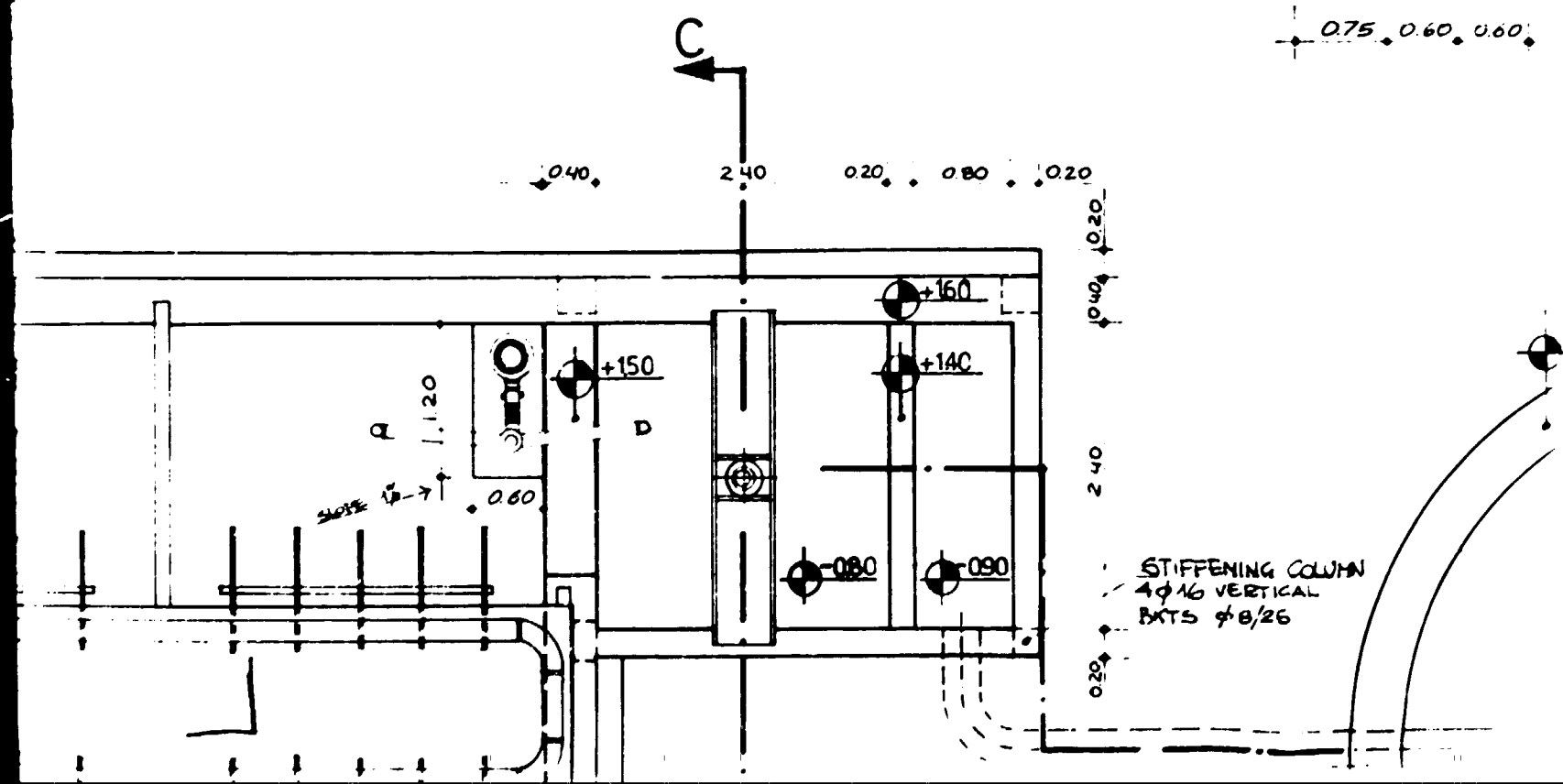
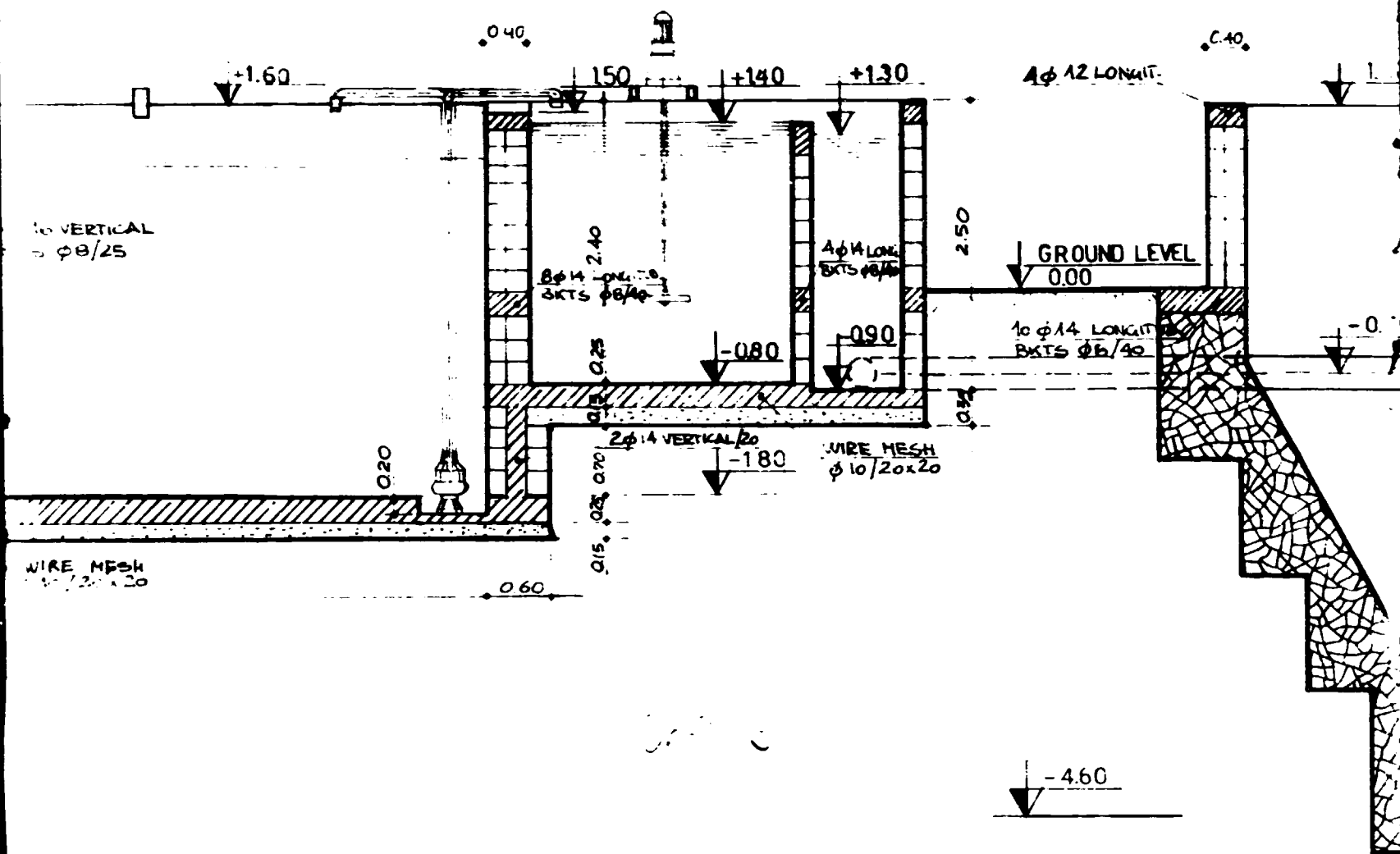
B

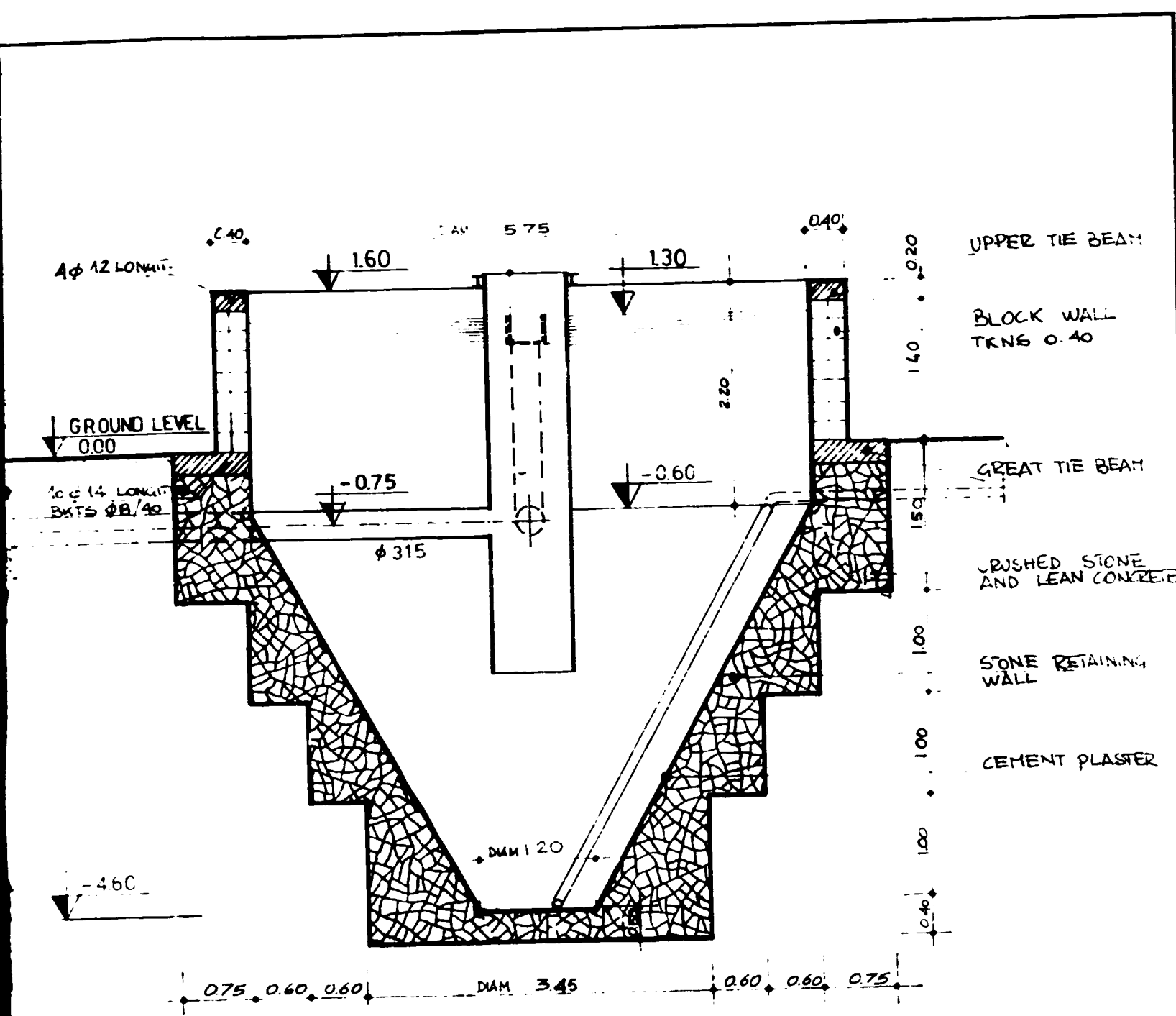


Section 2

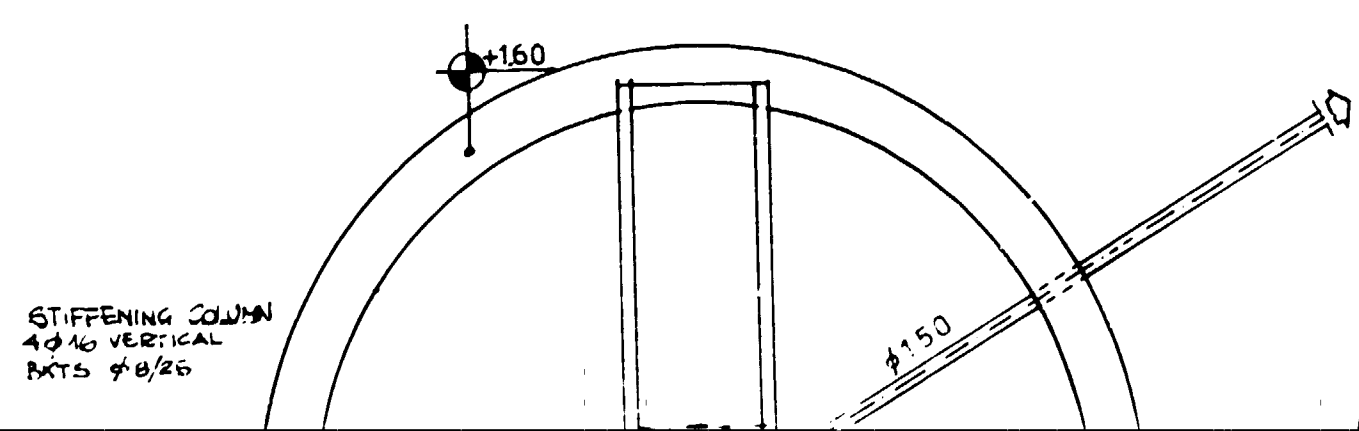
R.H.S.

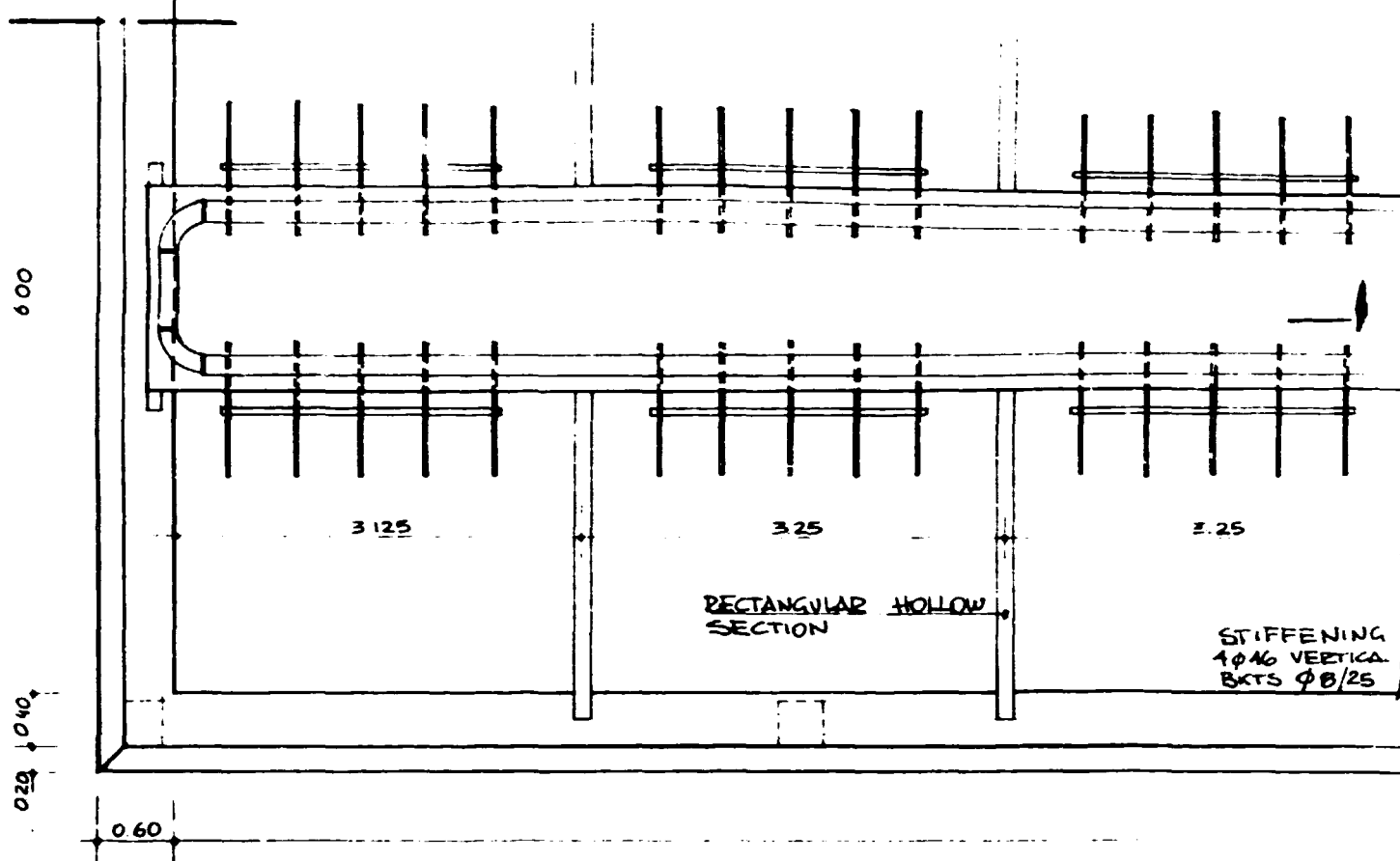






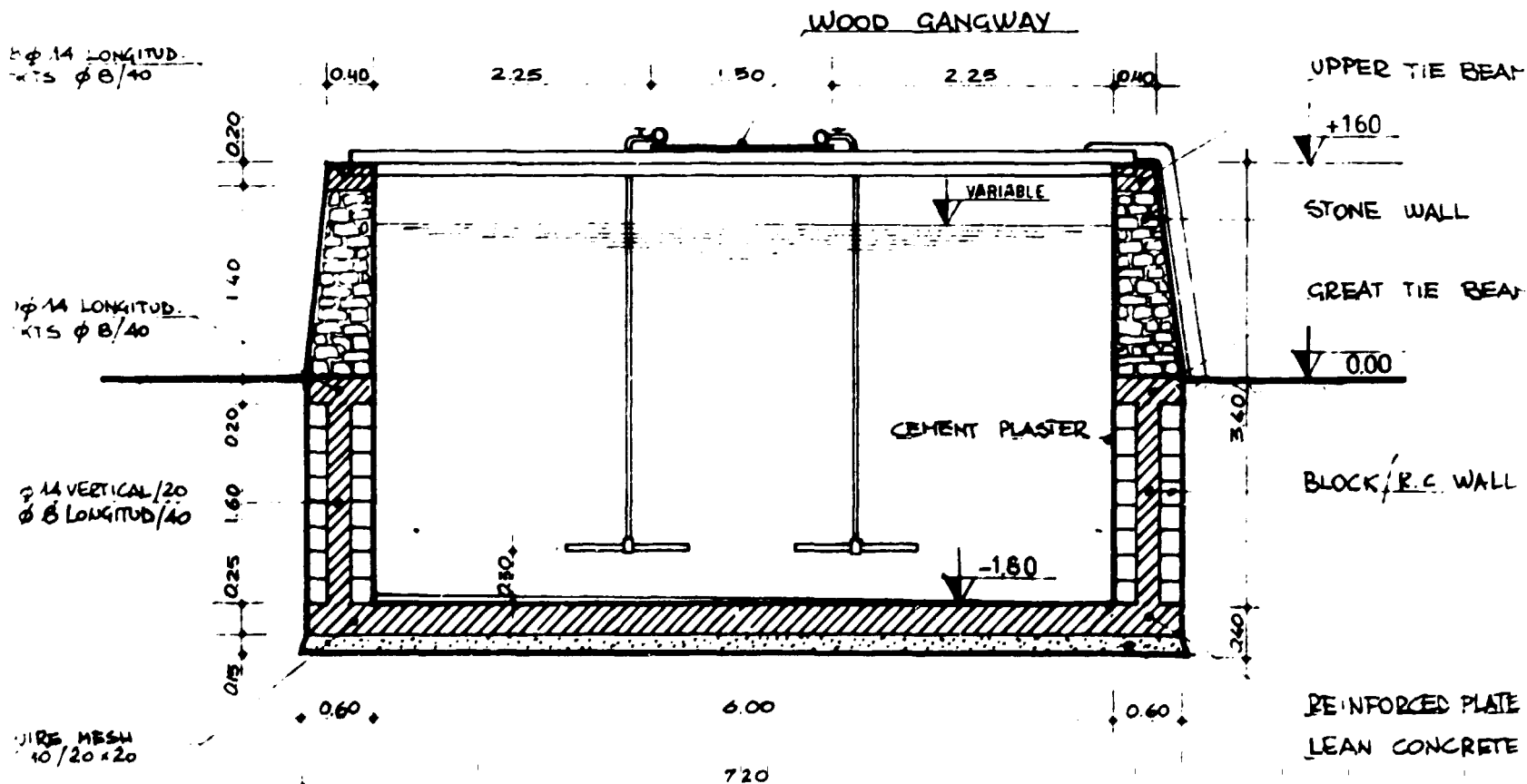
SECT +

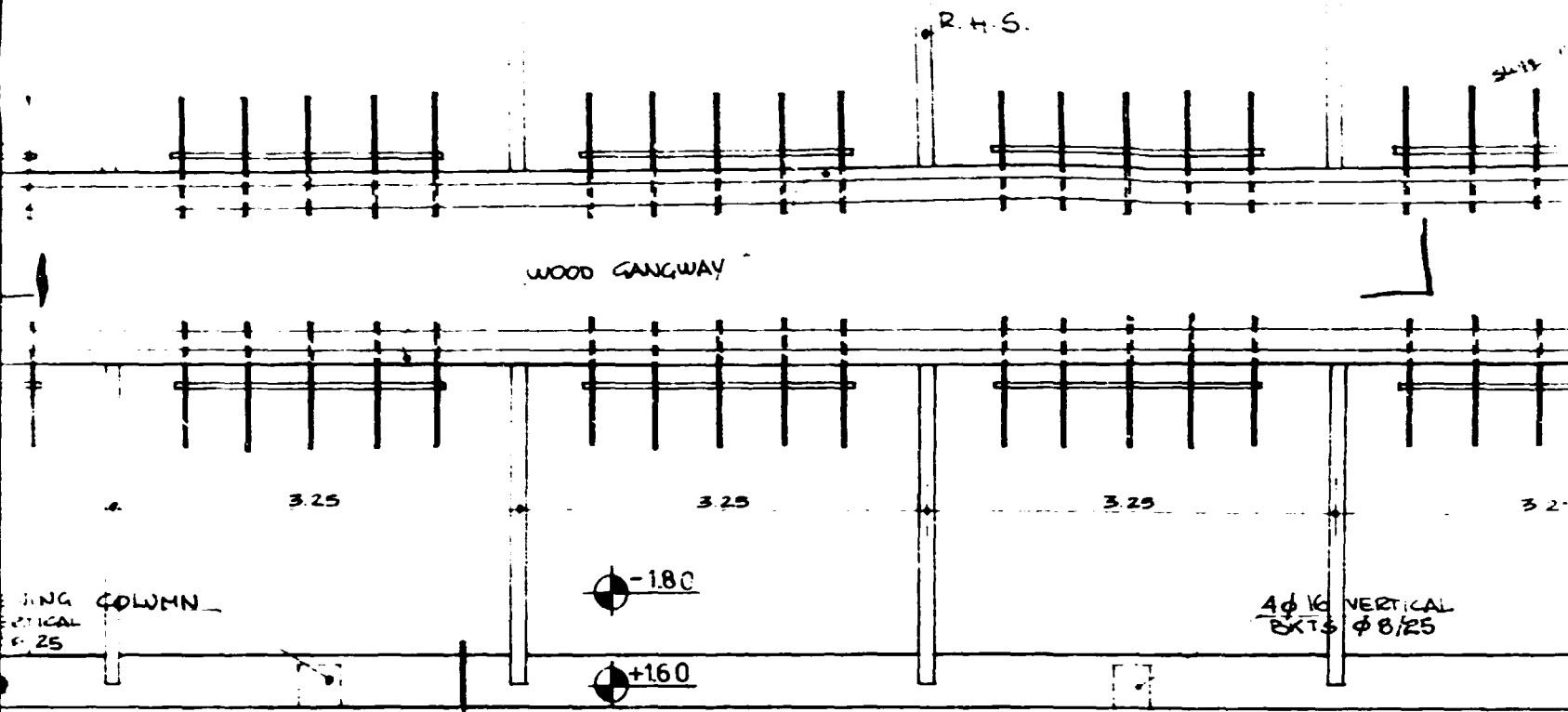




SECTION E

SECTION B-B





22.50



SECTION C-C

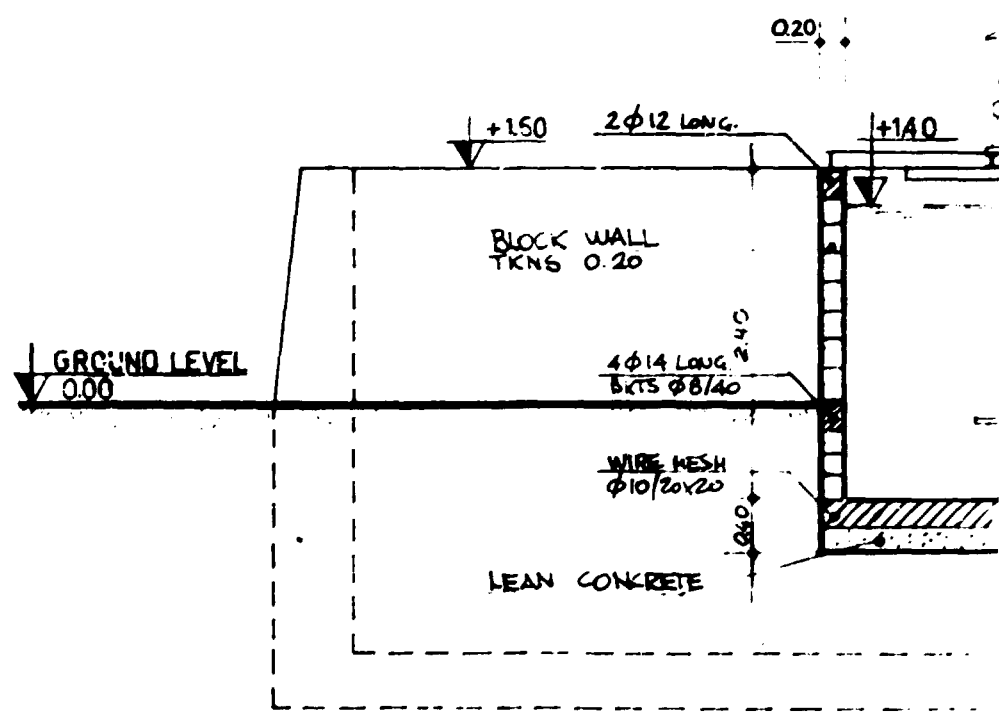
BEAM

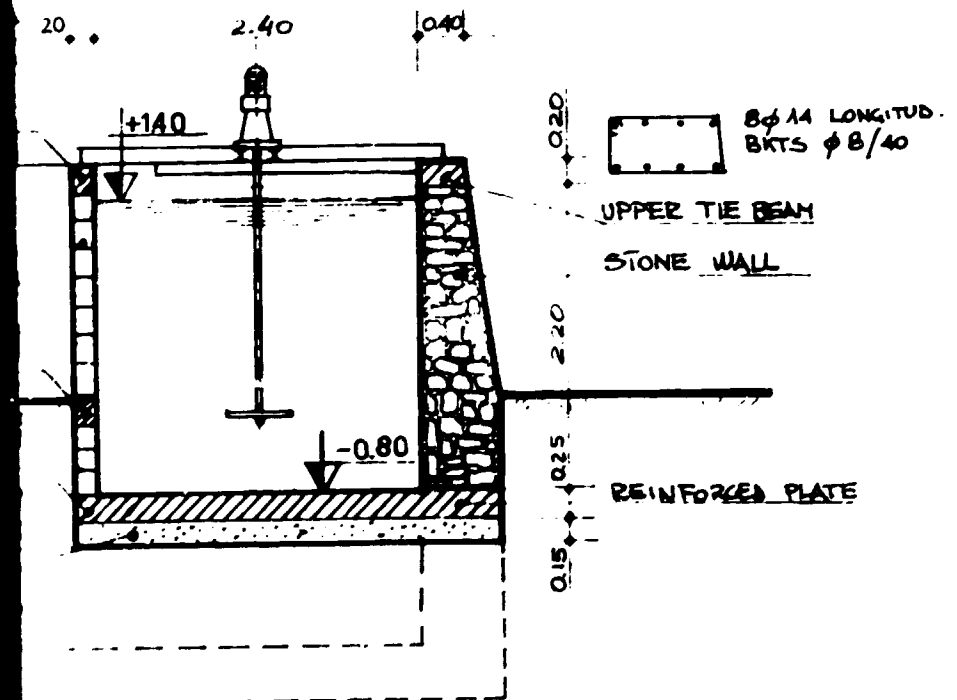
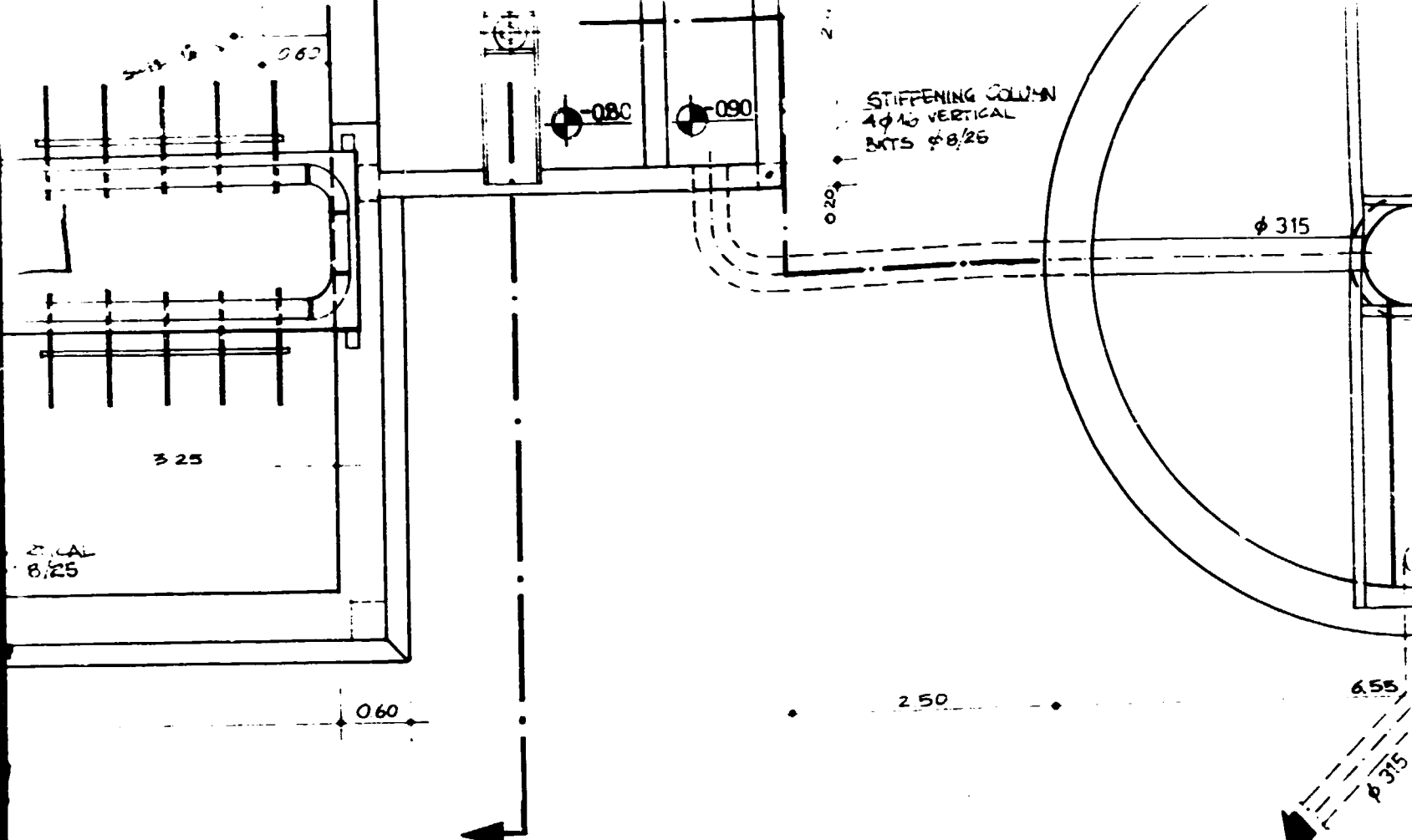
BEAM

WALL

SLAB

CONCRETE





207 7

CONTRACT n

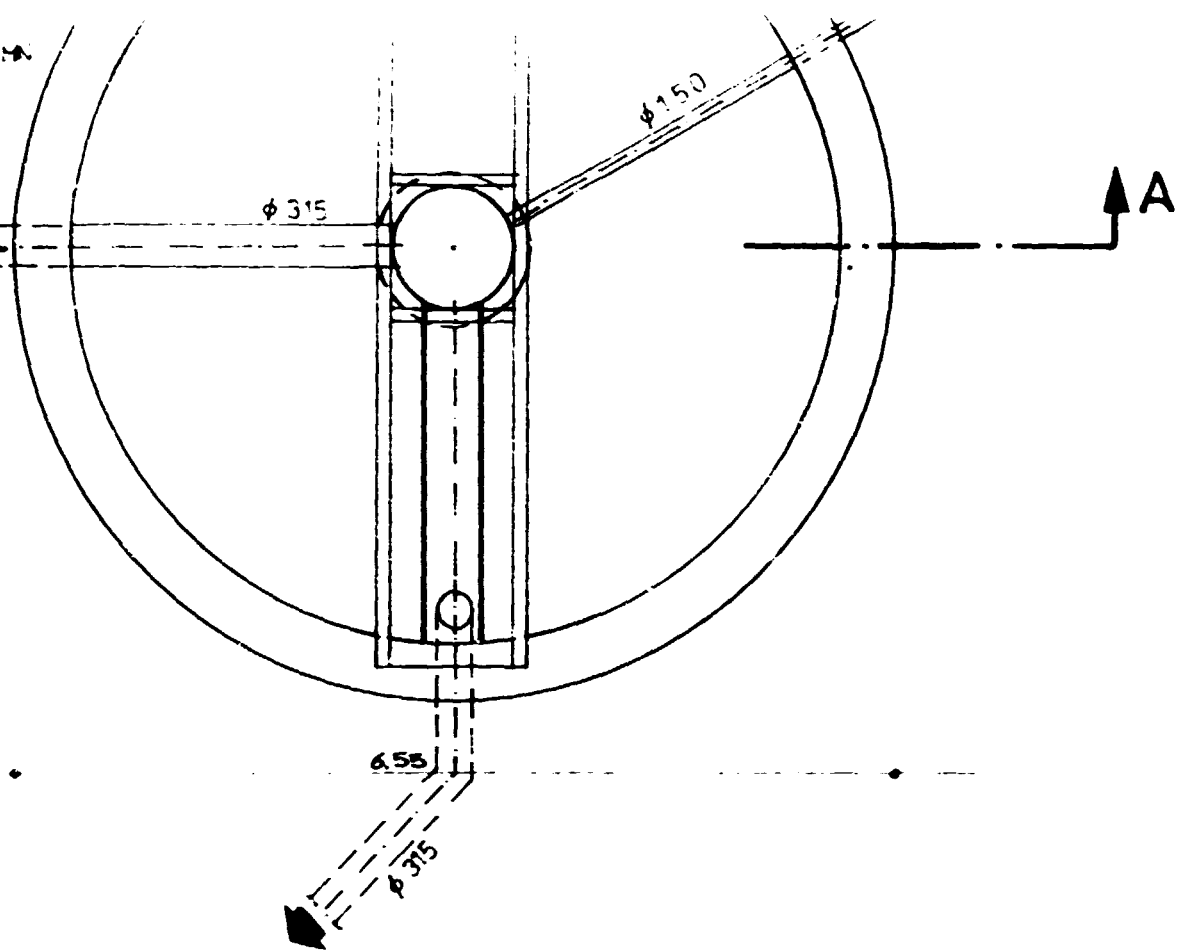
Combol
waste w

National
Addis Ab

"STUDIO TED
Advisors
Mr. Giuseppe C
Mr. Mauro C

1:50
Mechanical
Fluctuation

STIFFENING COLUMN
40% VERTICAL
20% 50 20



CONTRACT n. 89/188: UNIDO PROJECT SI/ETH/89/901

Combolcha tannery: waste water treatment plant

National Leather and Shoe Corporation
Addis Ababa - Ethiopia

"STUDIO TECNICO G. GIUSEPPE CLONFERO" - FLORENCE ITALY

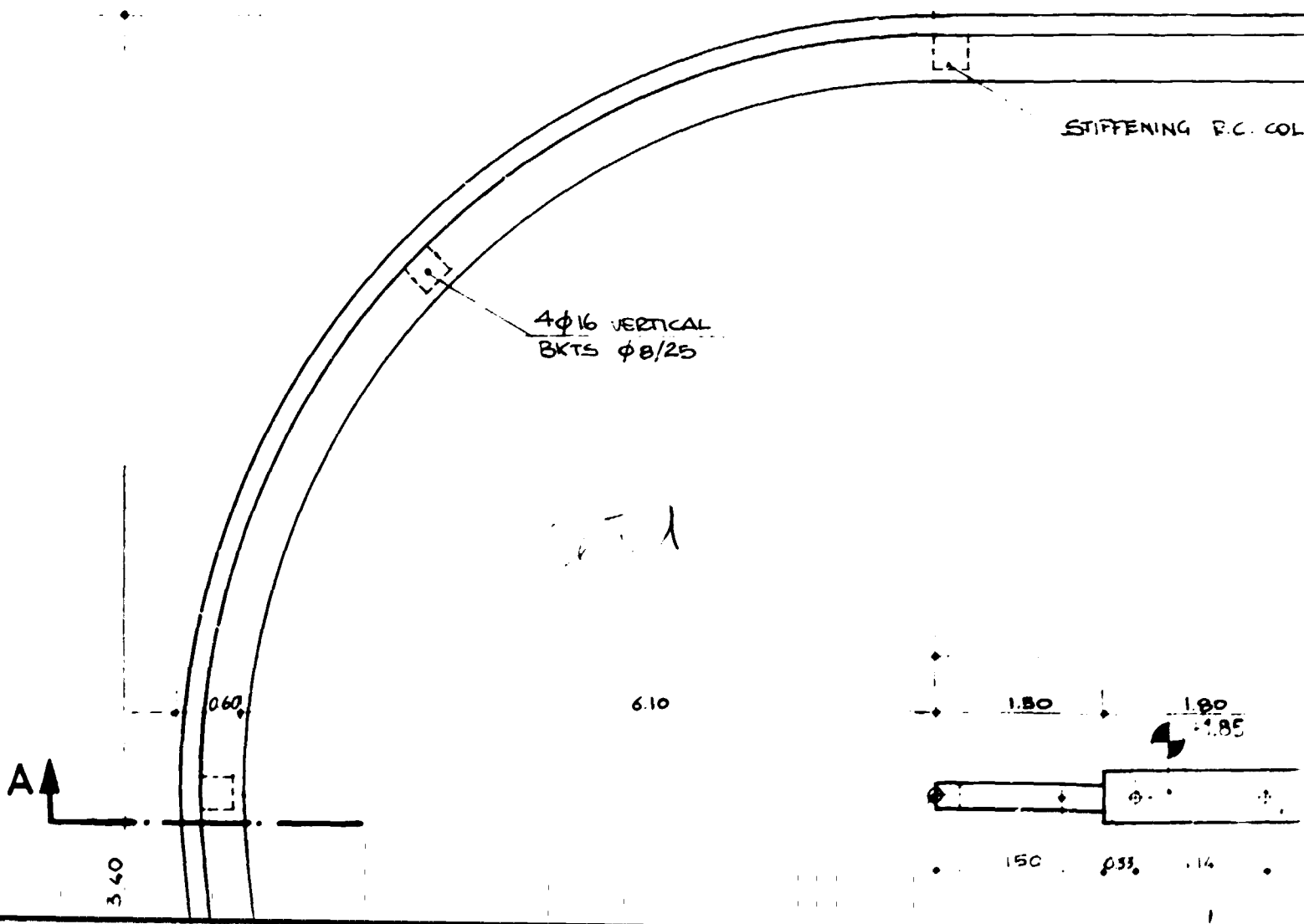
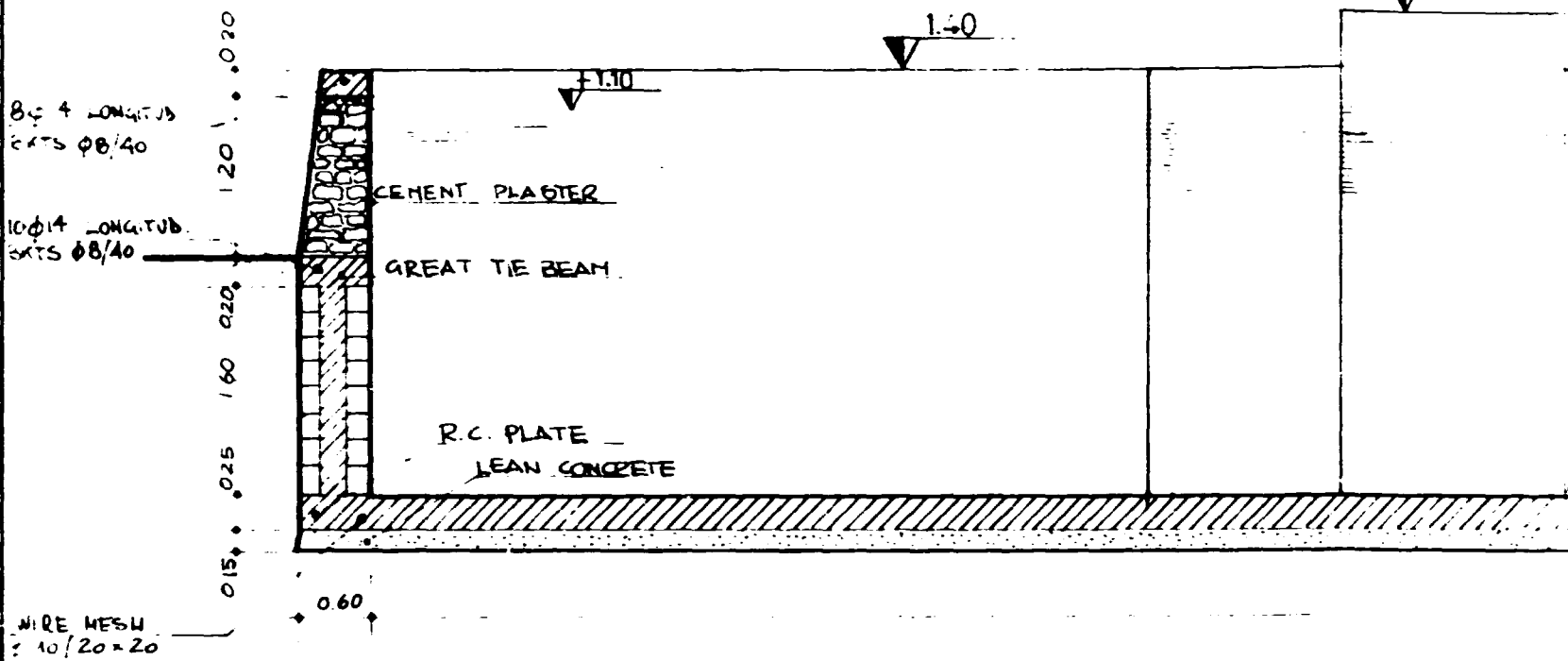
Advisors
Mr. Giuseppe Clonfero
Mr. Giuseppe Carbonari

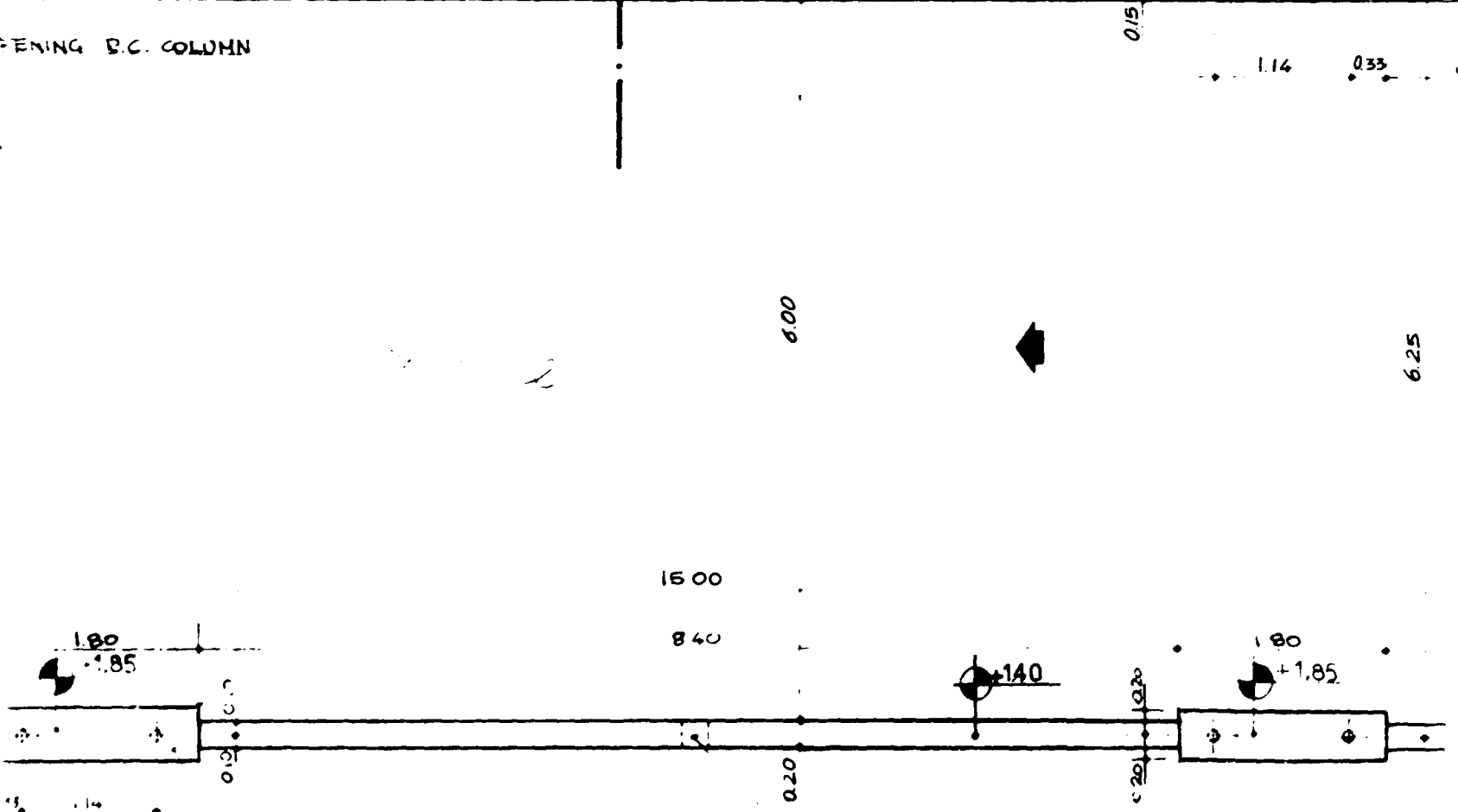
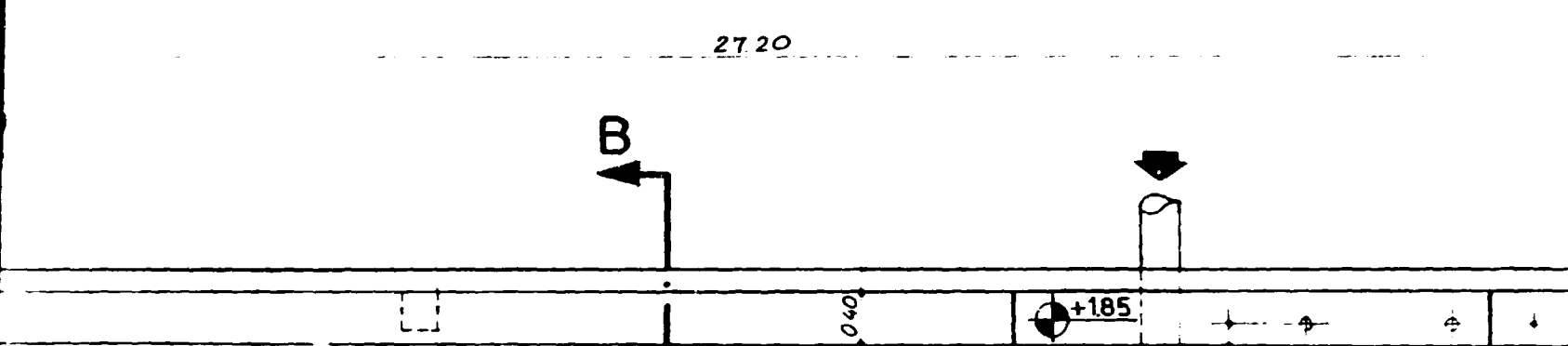
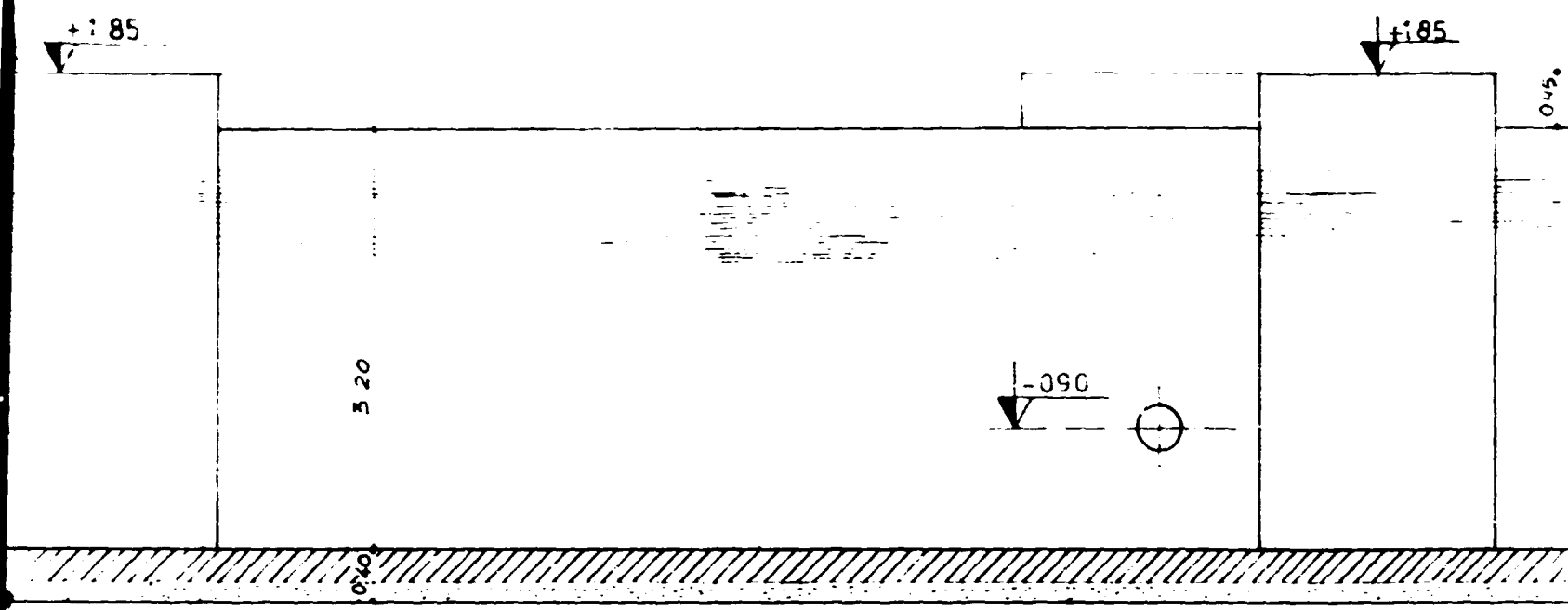
March 1990

1 : 50
Management task
Structural task
Quantity administration task

4

SECTION A-A

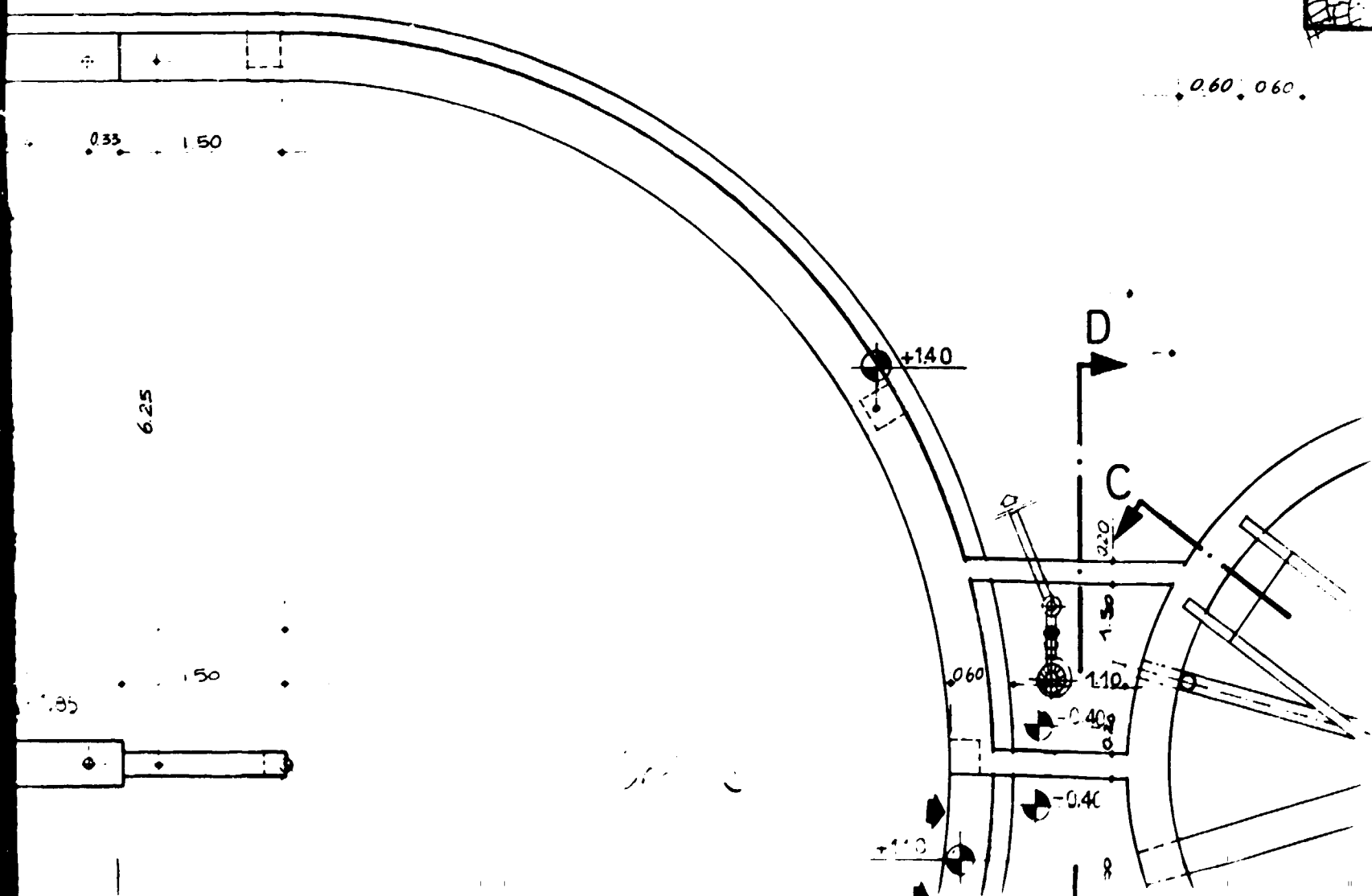
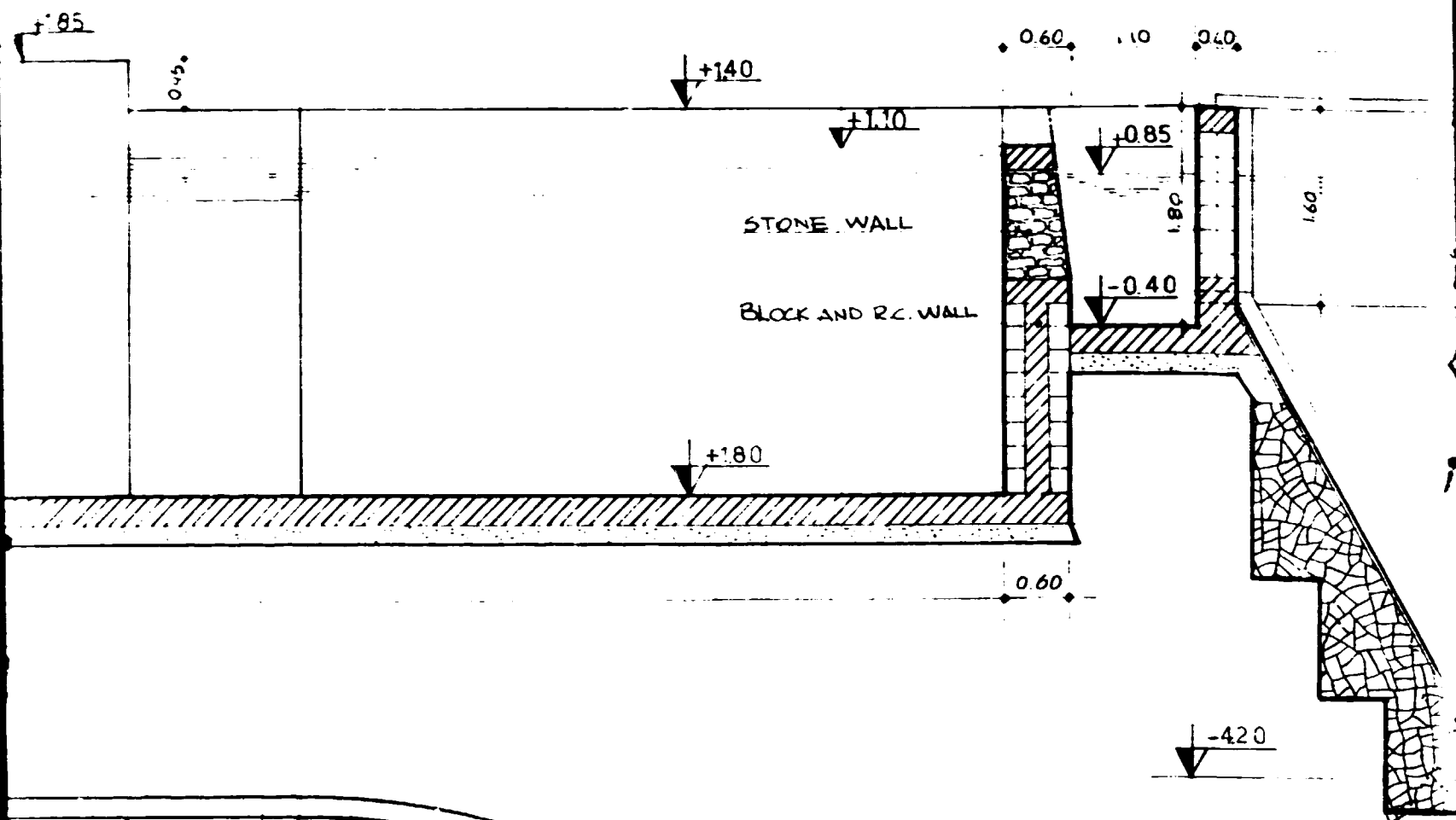


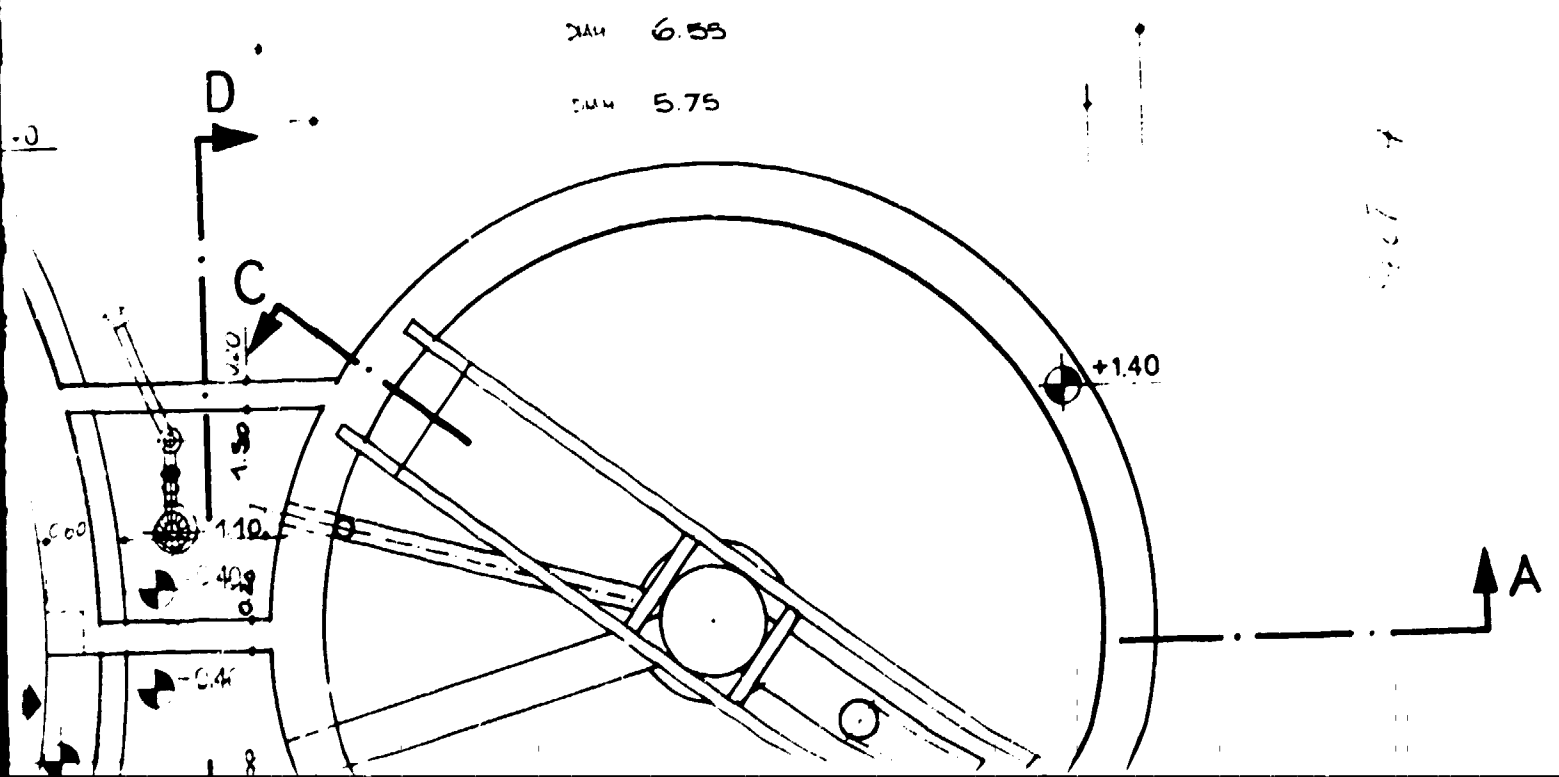
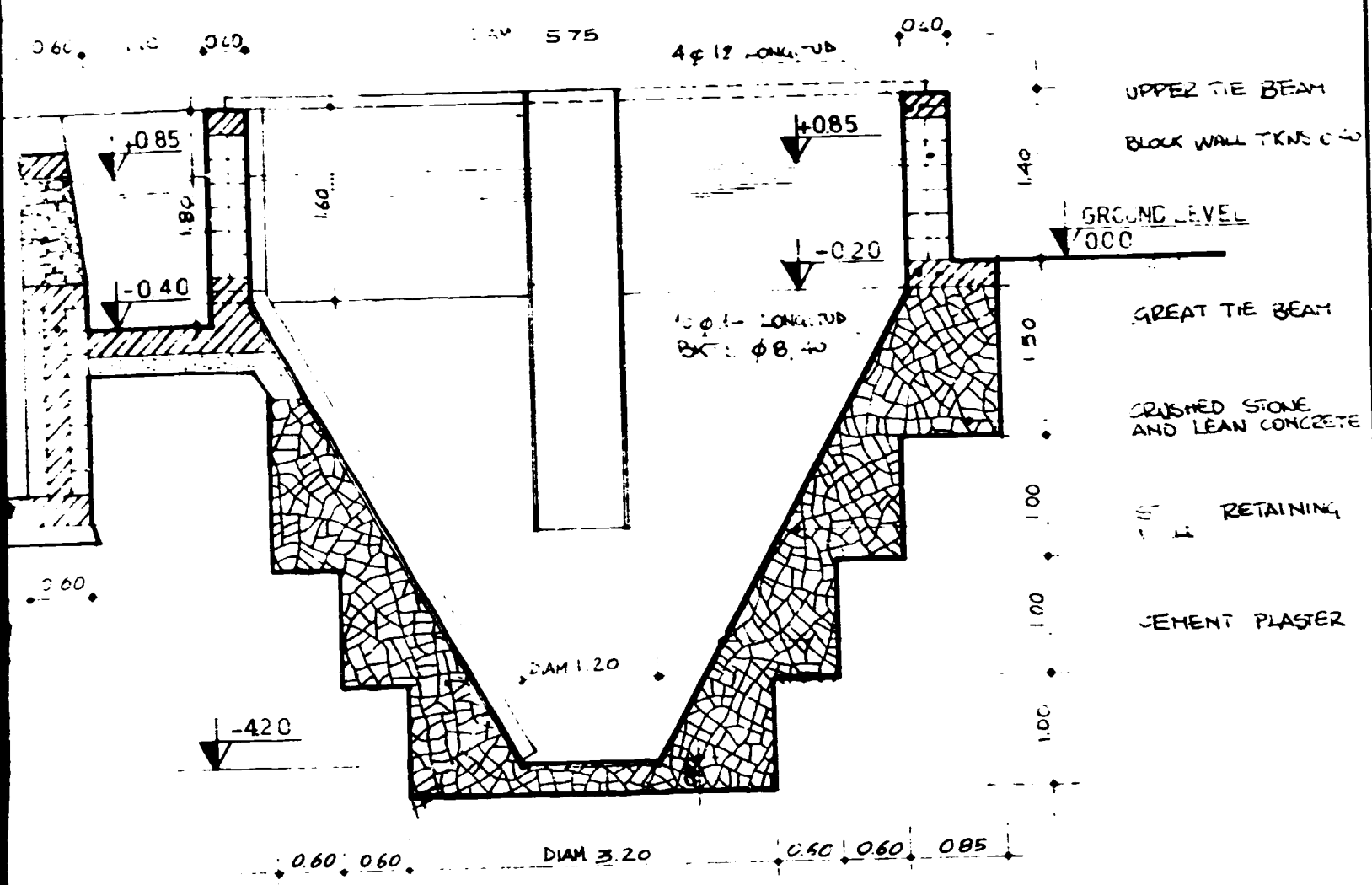


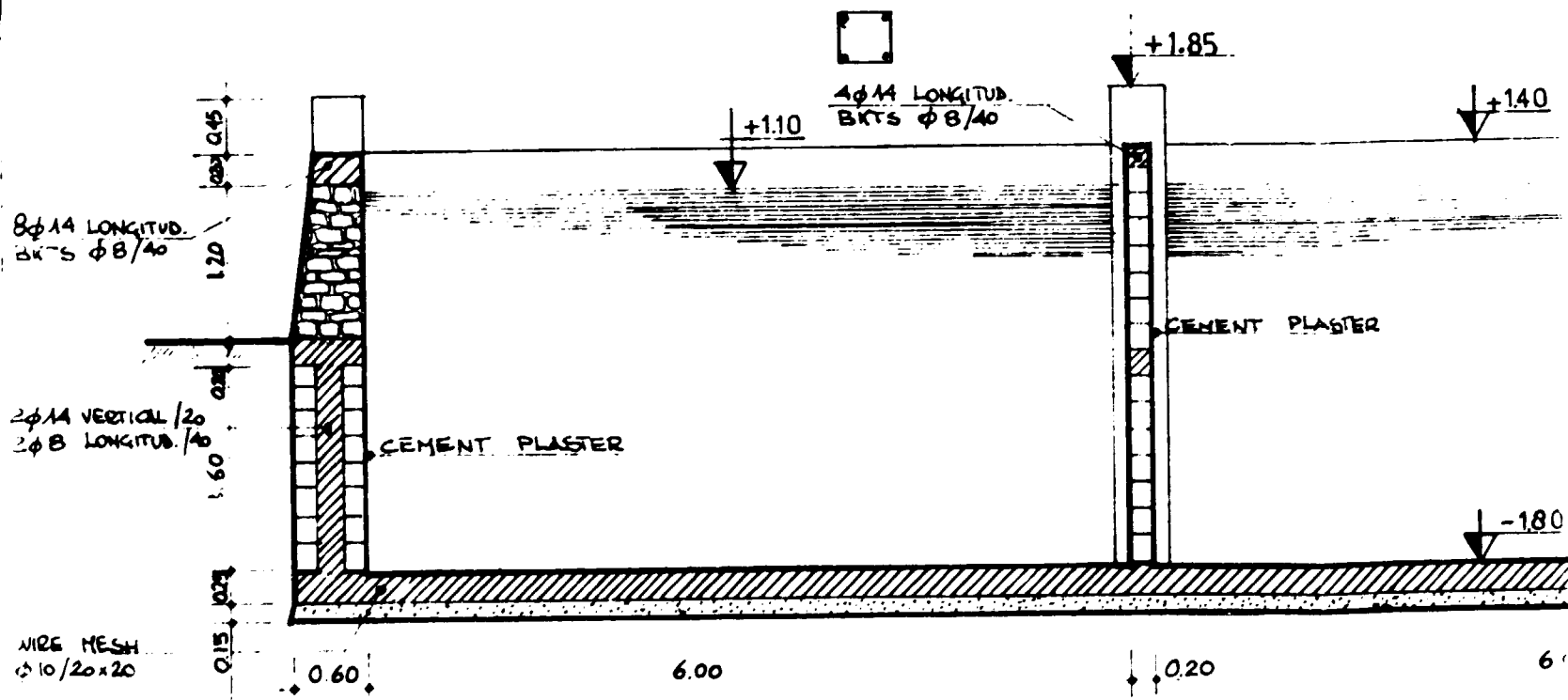
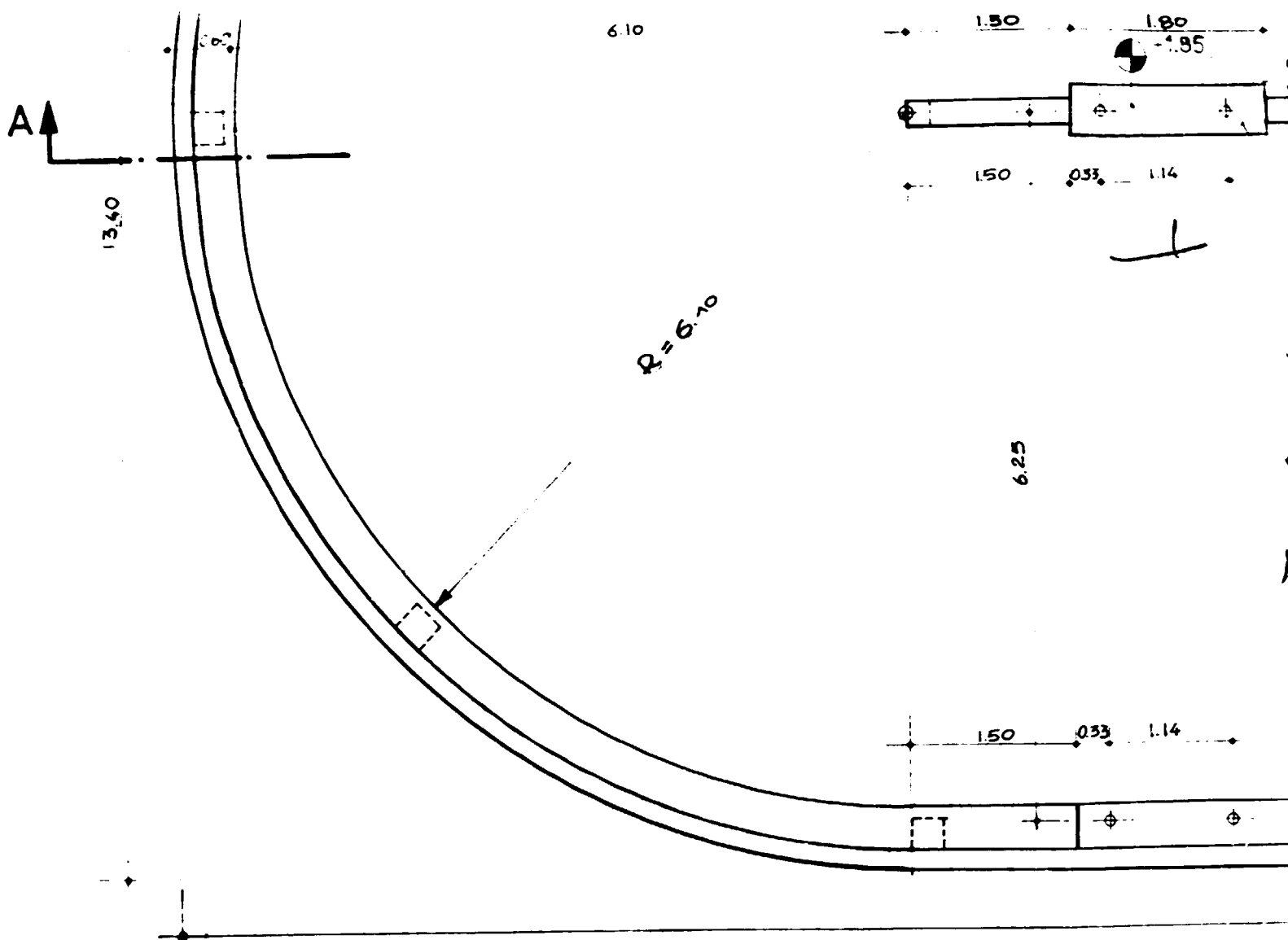
OPENING R.C. COLUMN

R.C. COLUMN

4 ϕ 16 VERTICAL
BARS ϕ R 25

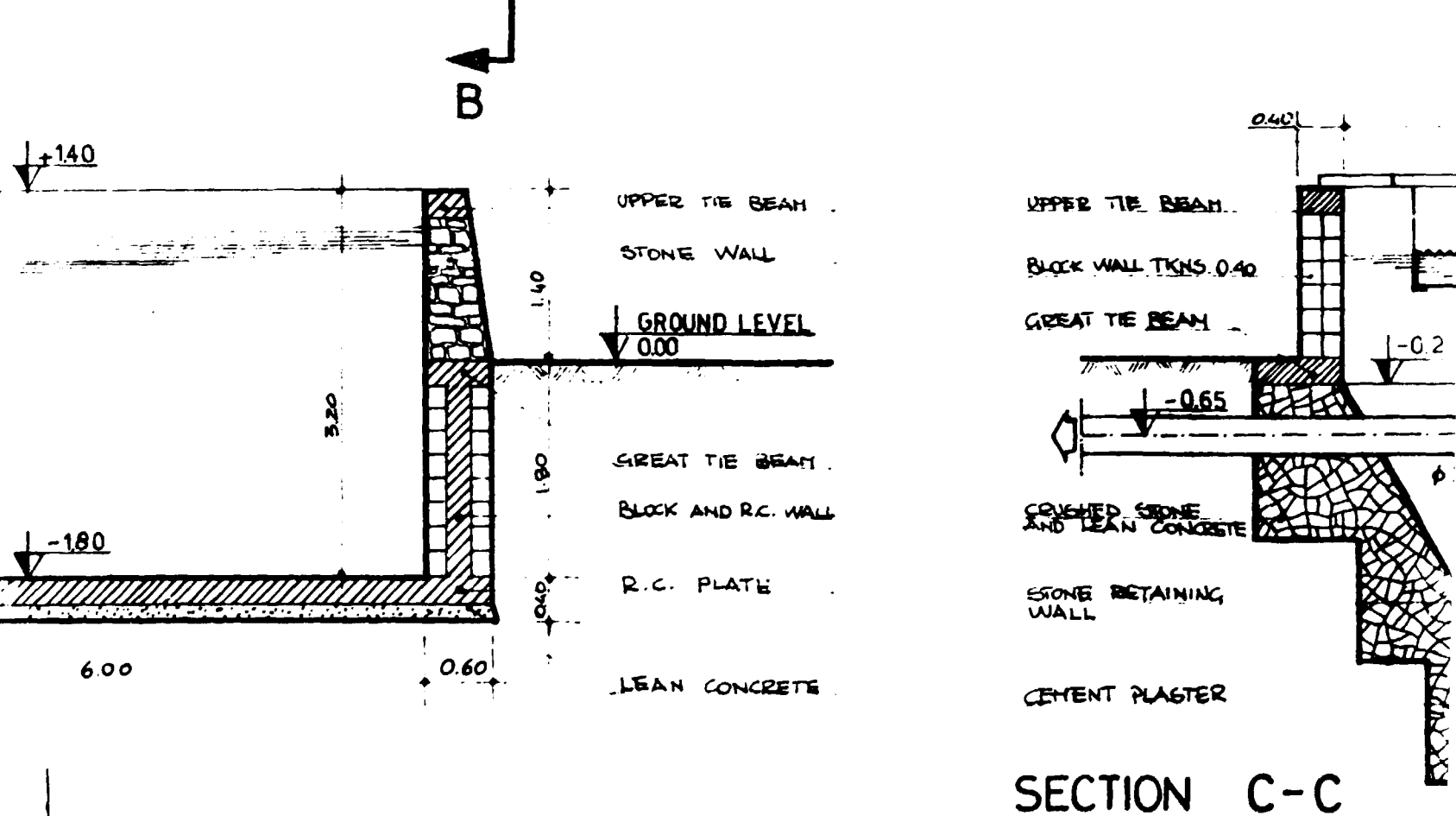
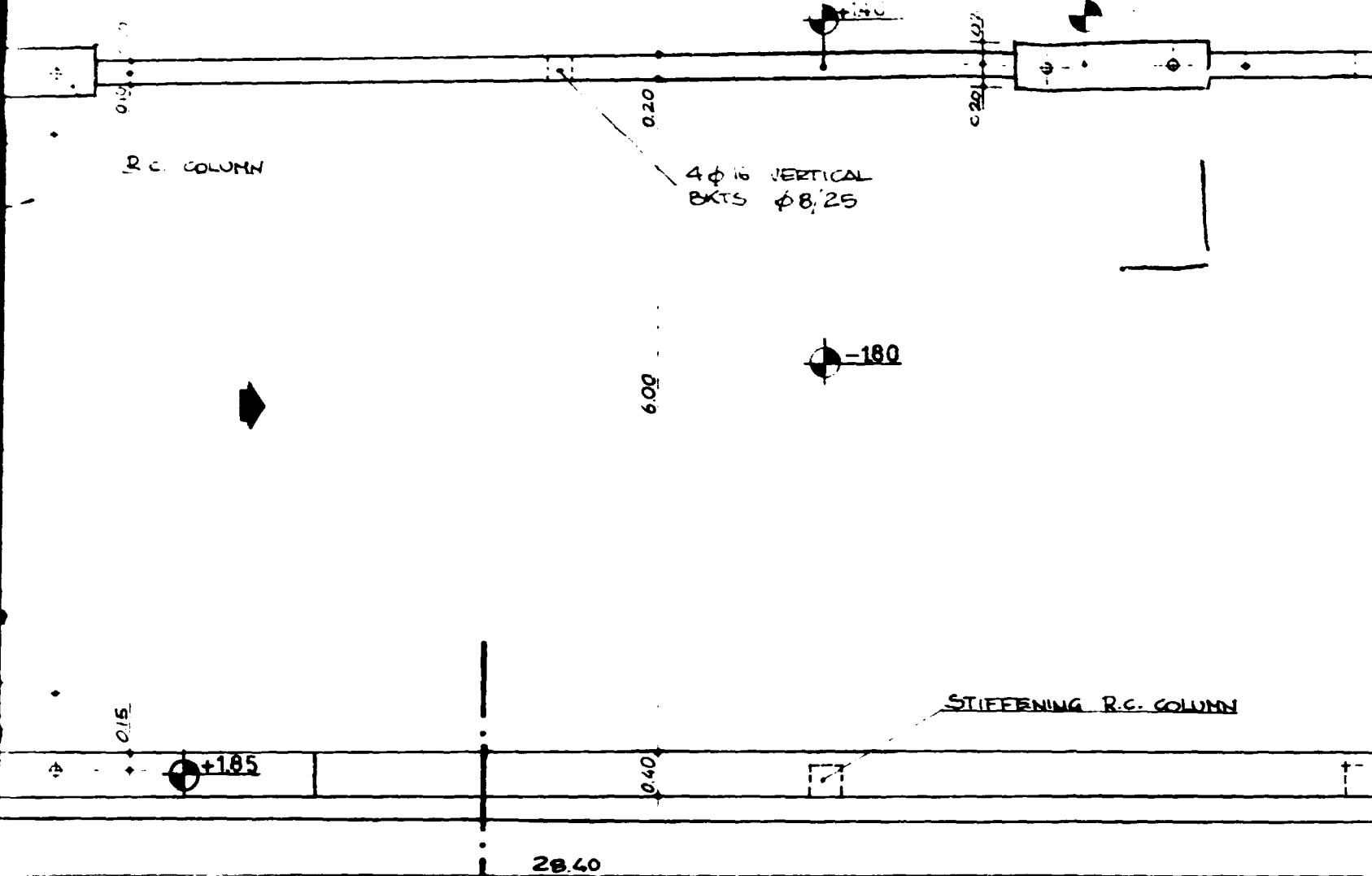




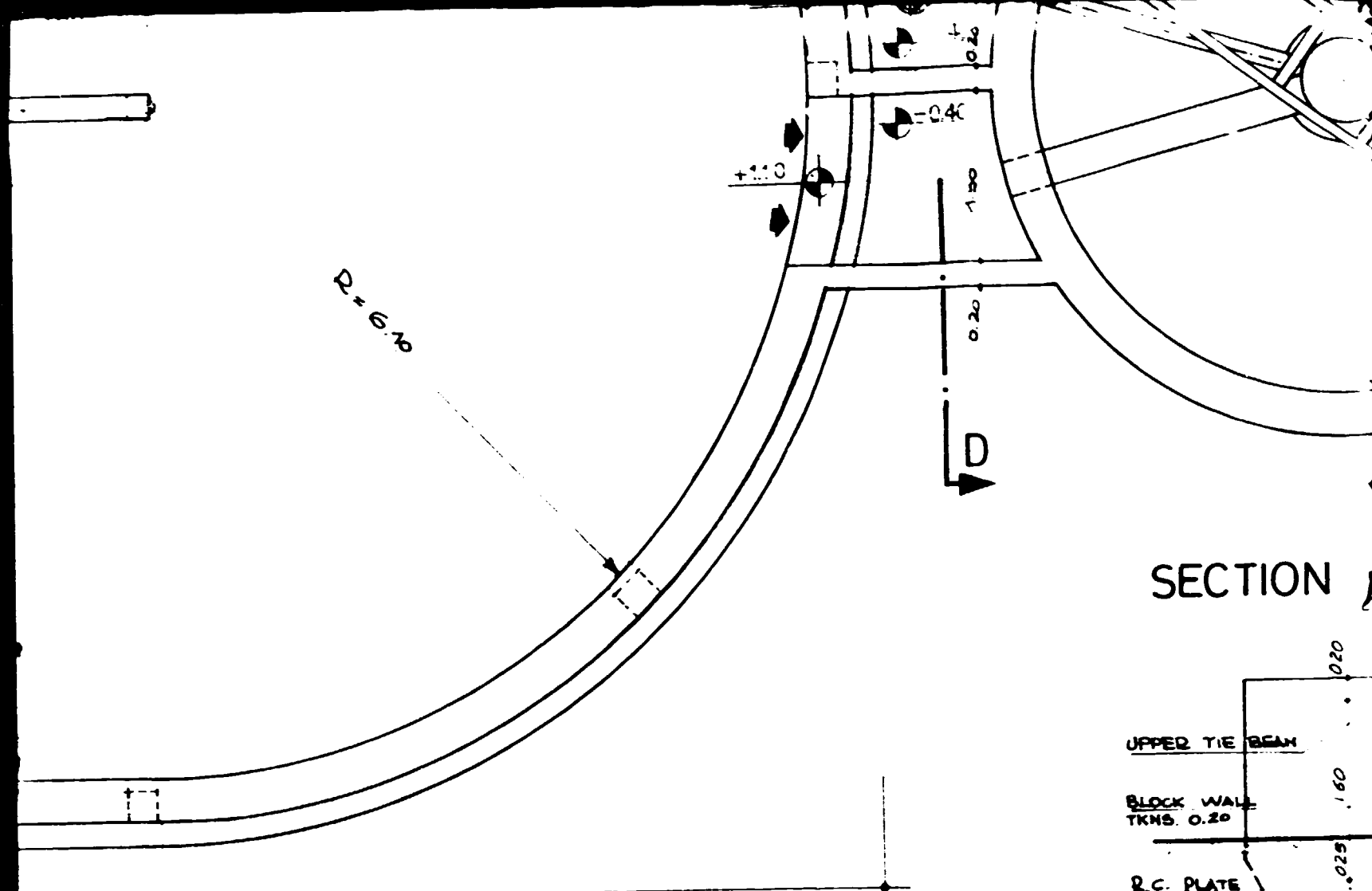


SECTION B-B

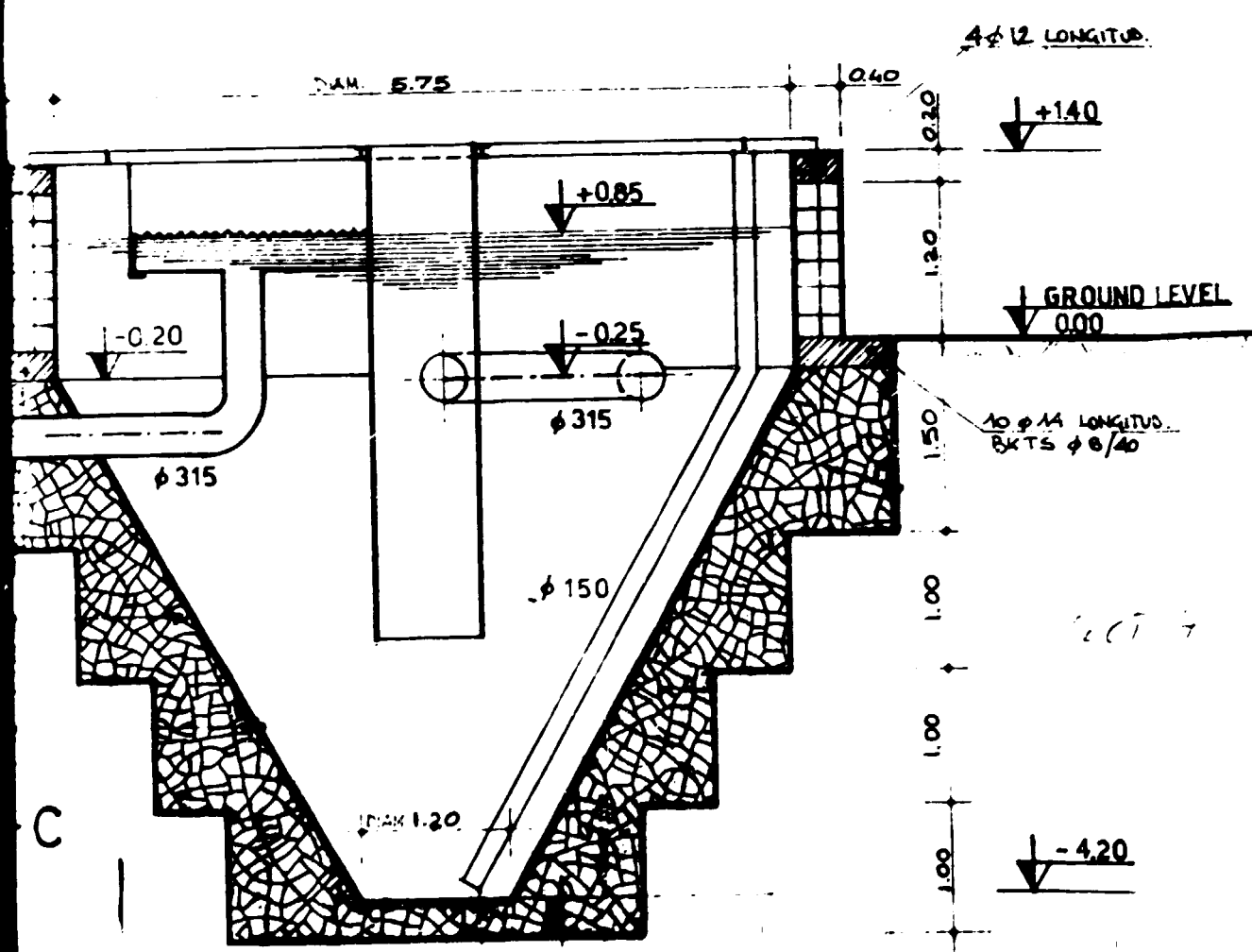
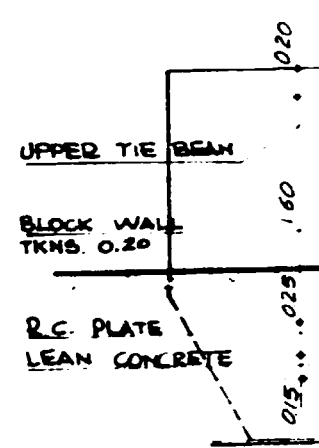
SECTION E



SECT 6



SECTION



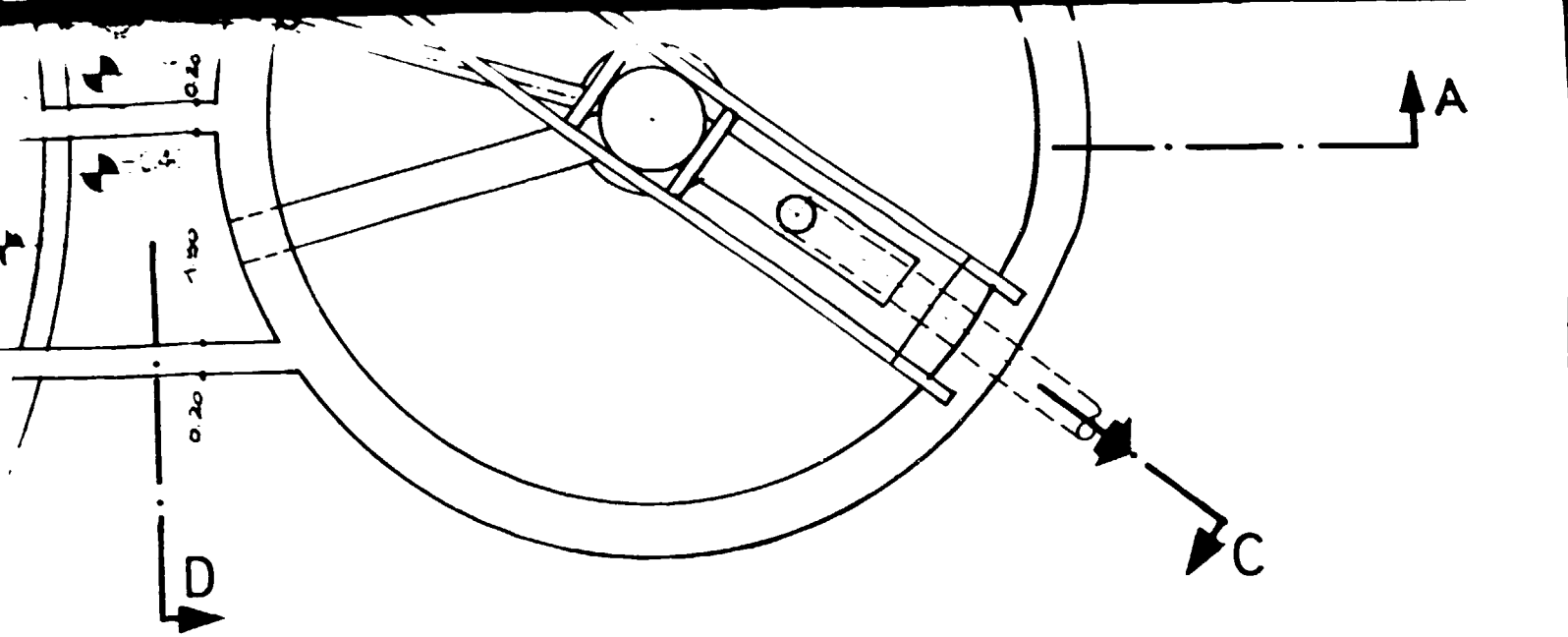
CONTRACT

Combol
waste w

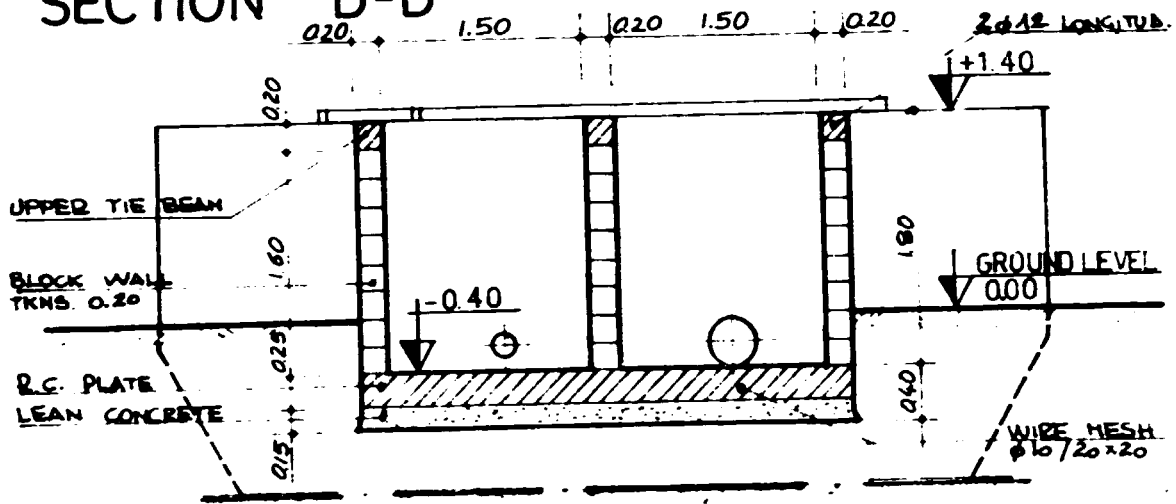
National
Addis Ab

STUDIO TECH
Advisors
Mr. Giuseppe C
Mr. Mauro C

1:20
Biological e
History, ab
Inventory



SECTION D-D



4φ12 LONGITUD.

↓ +1.40

↓ GROUND LEVEL
0.00

10 φ14 LONGITUD.
SPACINGS φ8/40

↓ -4.20

CONTRACT N. 88/188: UNED PROJECT S1/ETH/88/901

**Combolcha tannery:
waste water treatment plant**

**National Leather and Shoe Corporation
Addis Ababa - Ethiopia**

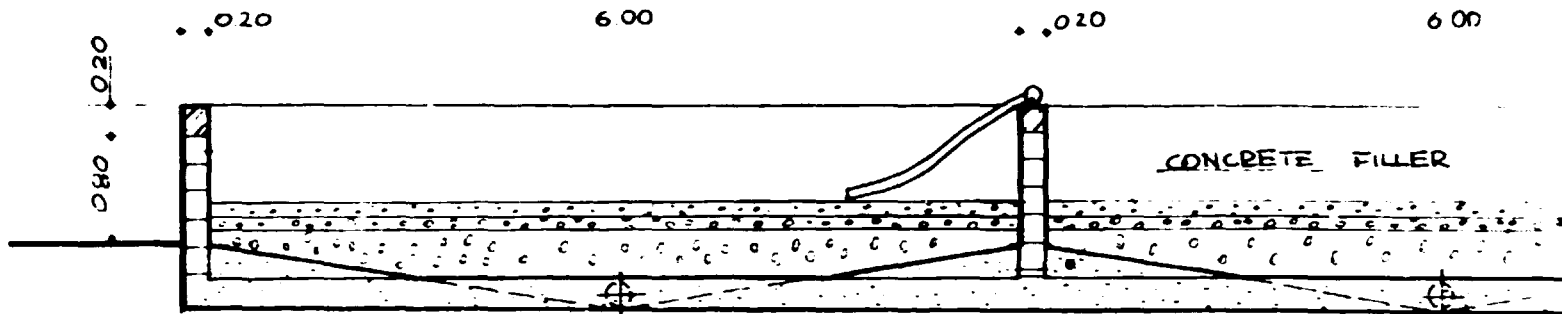
"STUDIO TECNICO G. GIUSEPPE CLOFFARD" - FIRENZE ITALY
 Advisors
 Mr. Giuseppe Cluffard
 Mr. Marco Carboni

March 1990

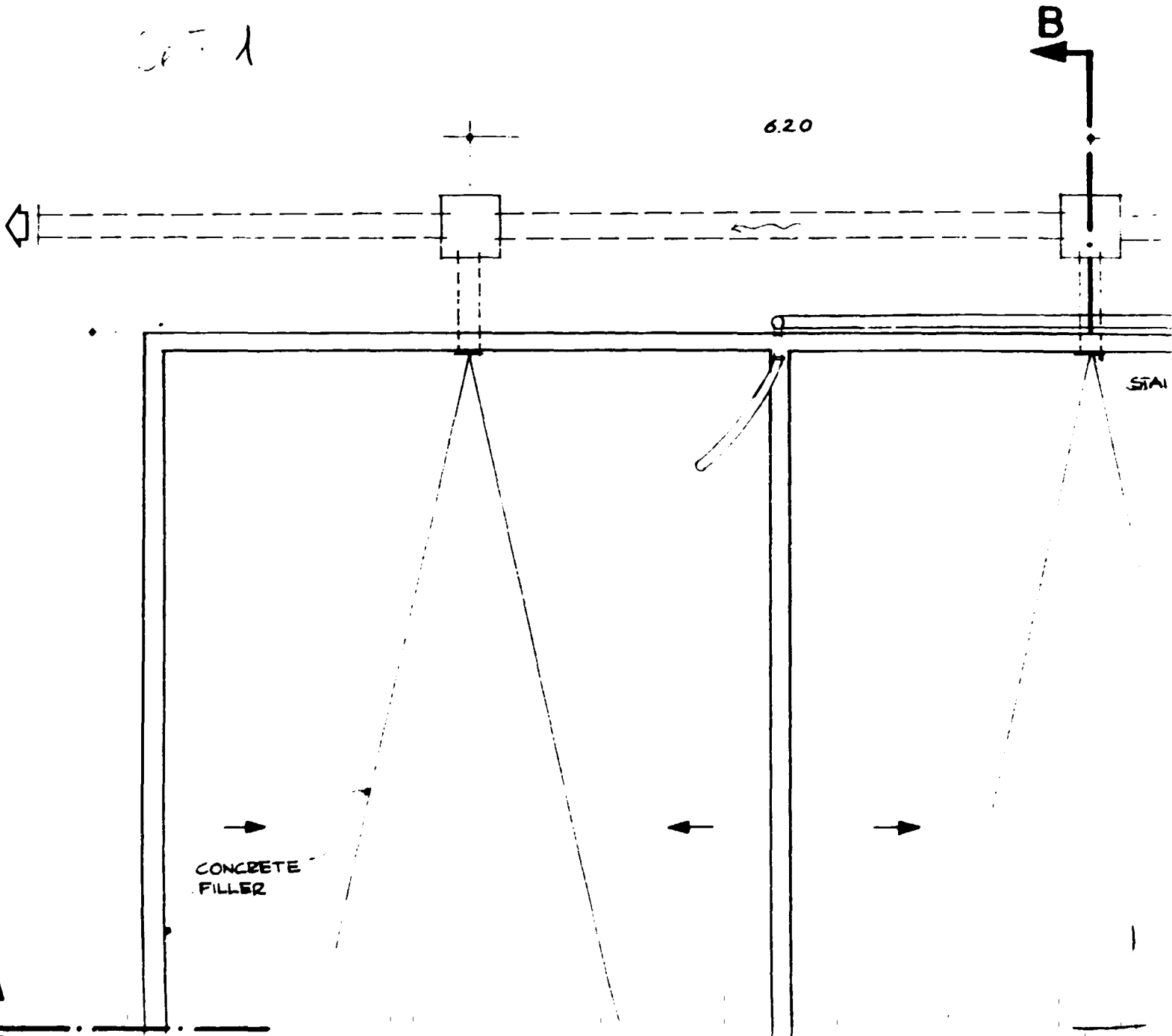
1:20
 Biological oxidation ditch
 Aeration chamber
 Secondary sedimentation tank

5

SECTION A-A



6.20



000

020

600

020

2 ϕ 12 LONGITUD.

ER

FILTERING SAND
(0.3-0.6 mm)

CRUSHED
(45-20 mm)

Section 2

6.20

6.20

ϕ 200

ϕ 150

ϕ 200

STAINLESS STEEL GRD

300



1300

600

0.020

600

0.020

CRUSHED STONE
(15-20 mm)

CRUSHED STONE
(40-80 mm)

FLEXIBLE PIPE

6.20

6.20

∅ 200

∅ 150

CONCRETE FILLER

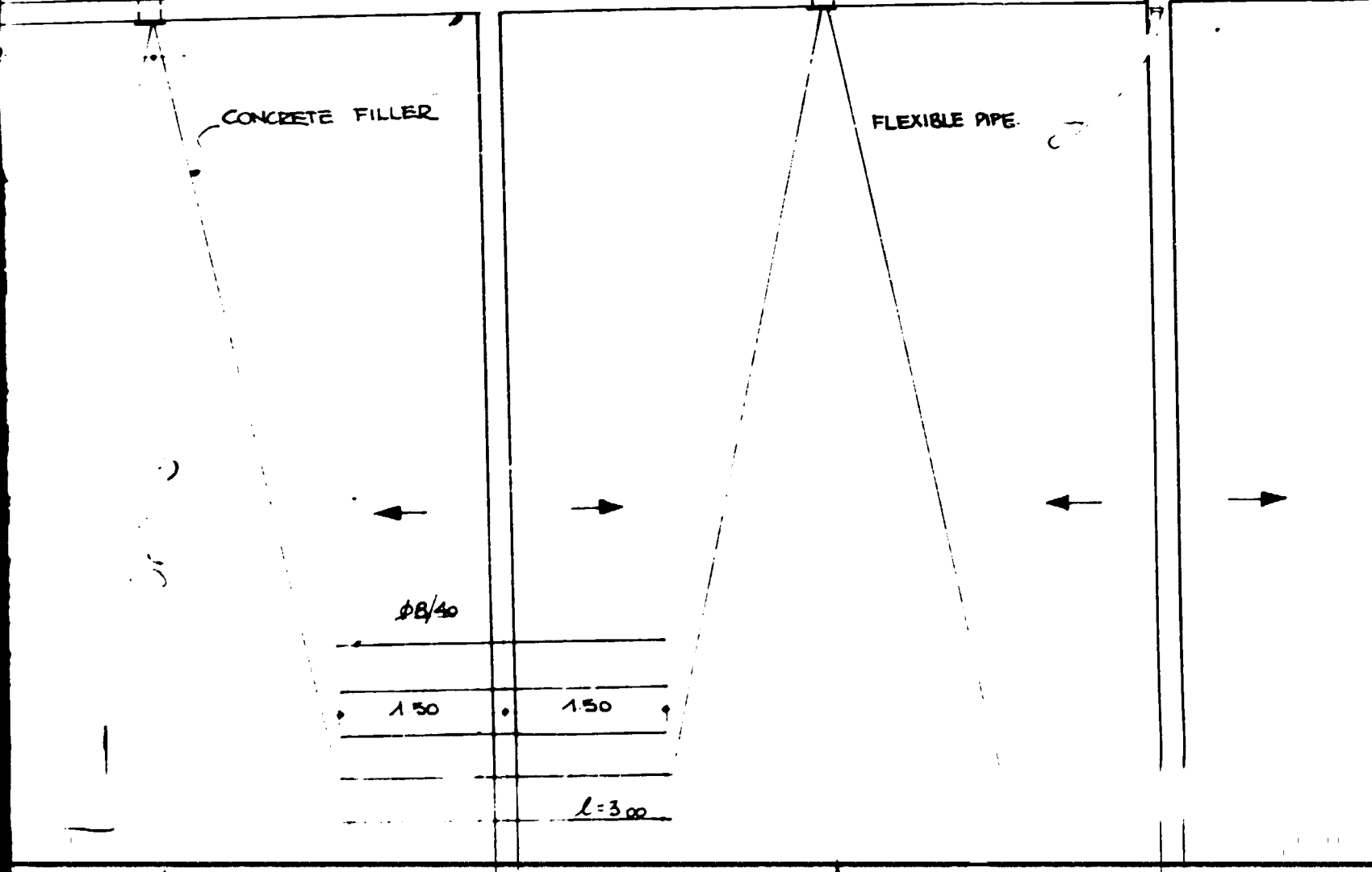
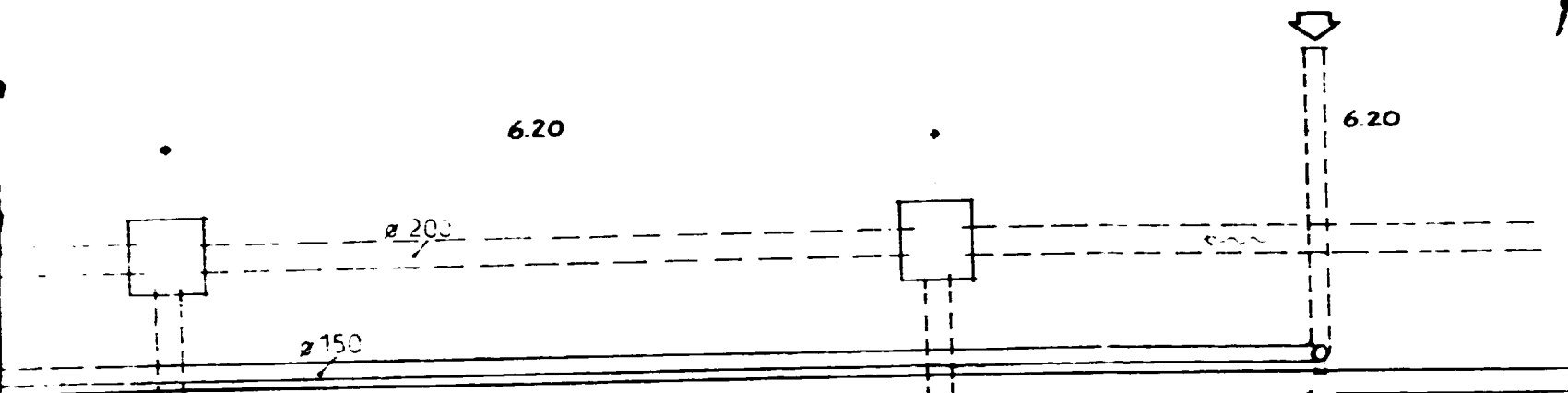
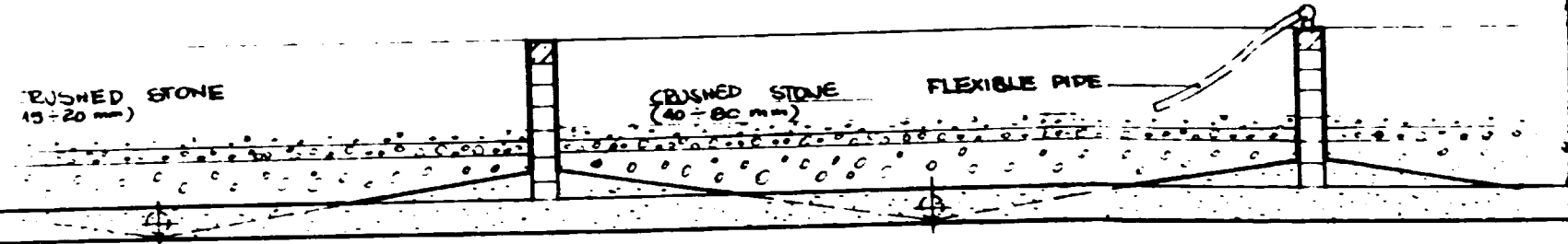
FLEXIBLE PIPE

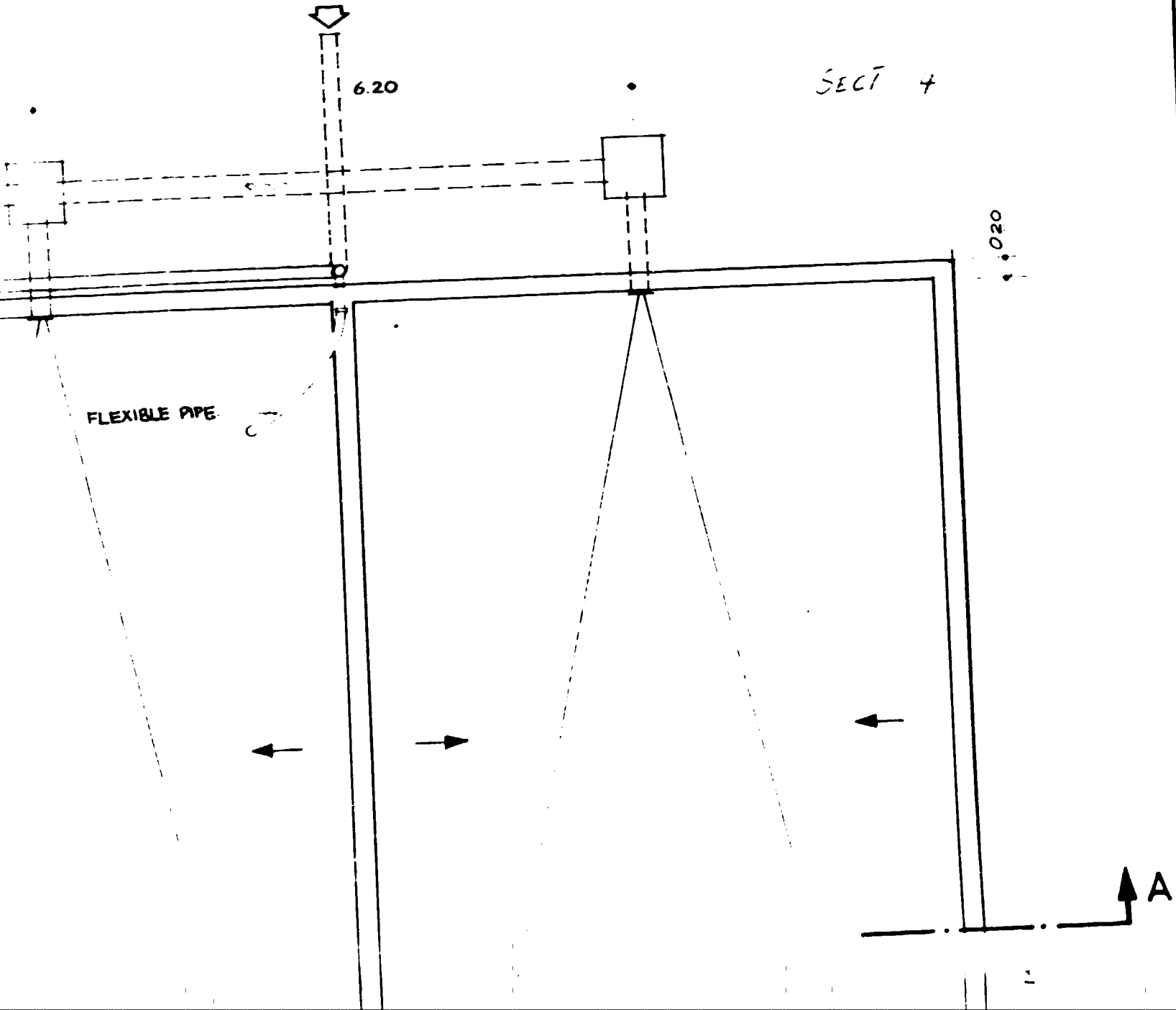
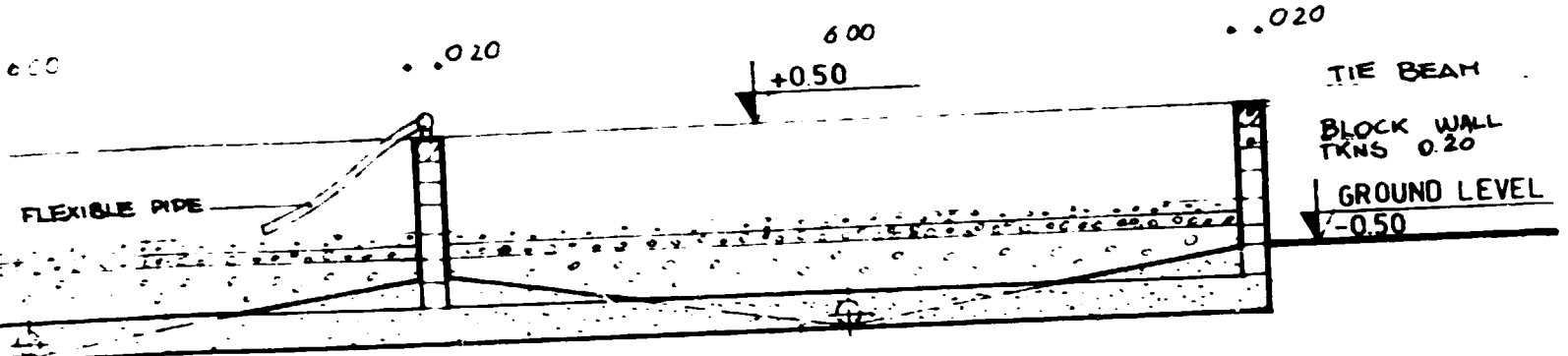
∅ 8/40

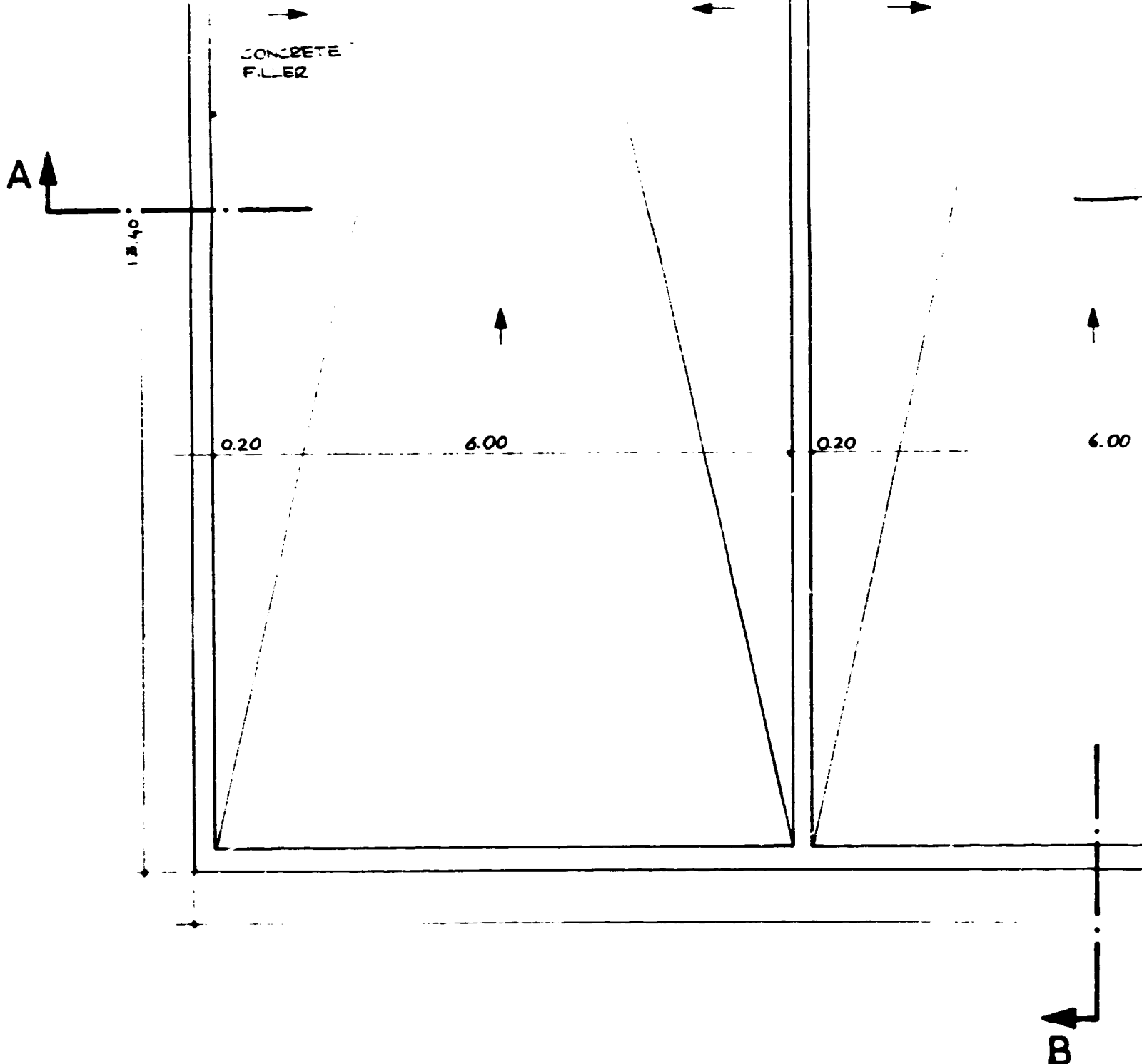
1.50

1.50

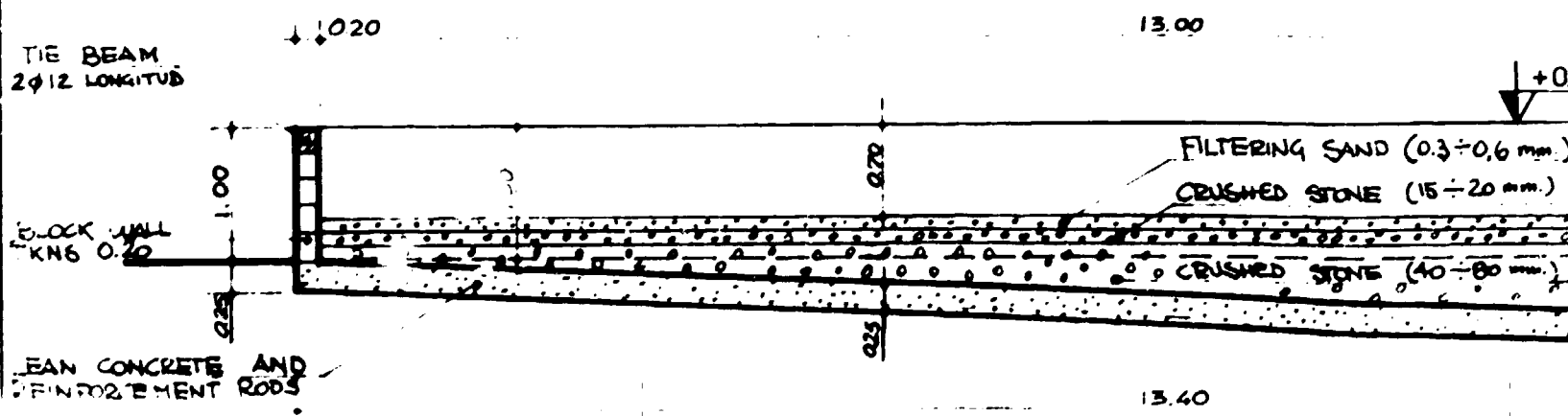
$l = 3.00$



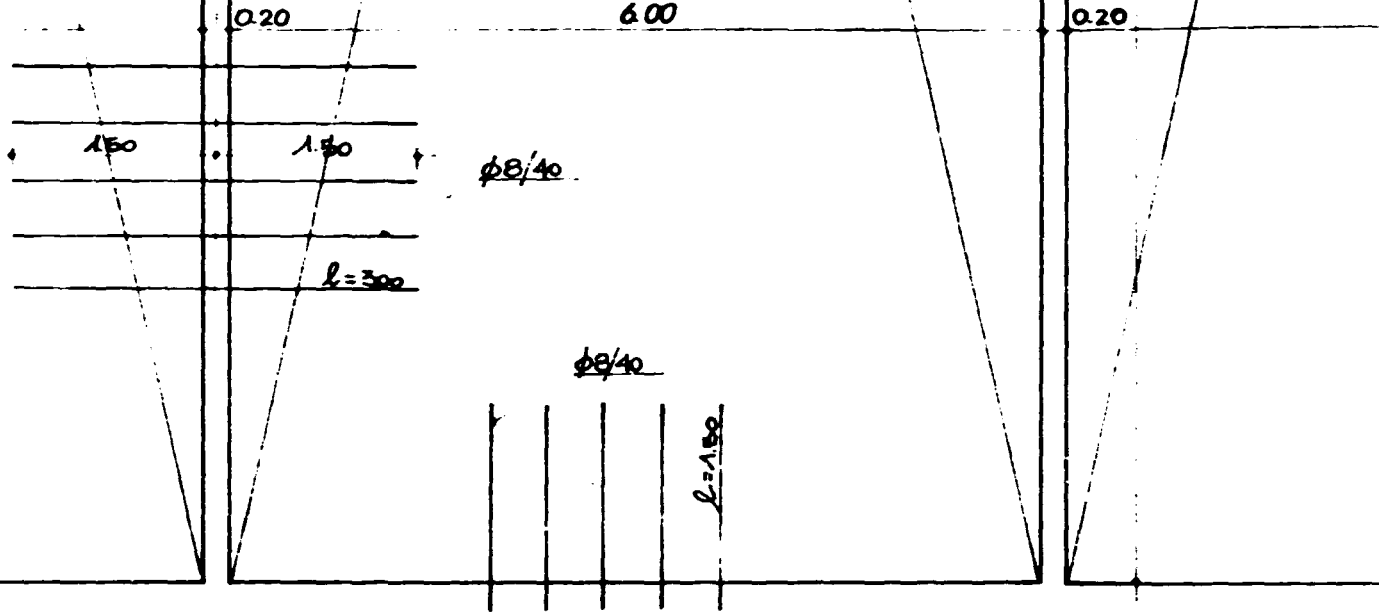




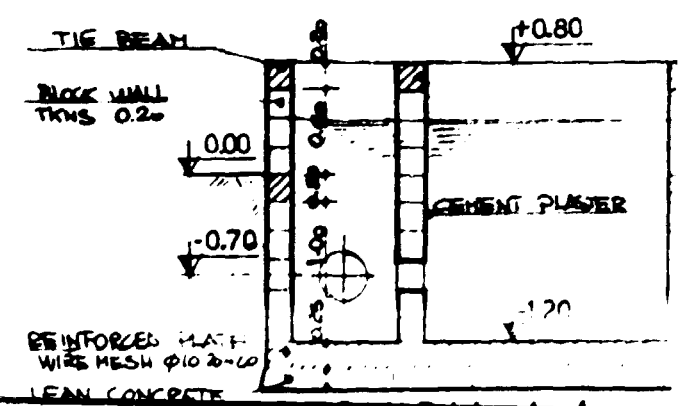
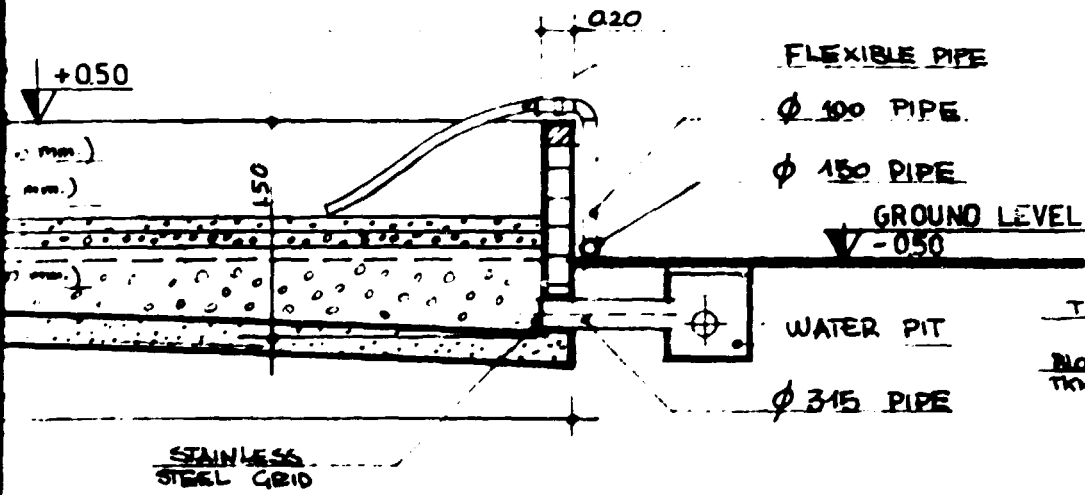
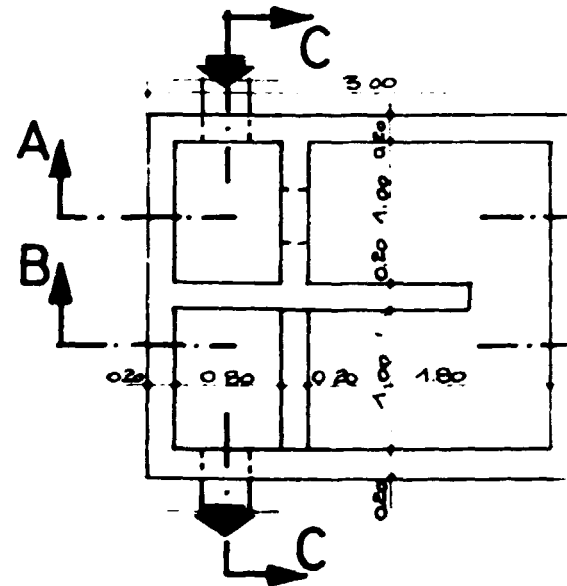
SECTION B-B



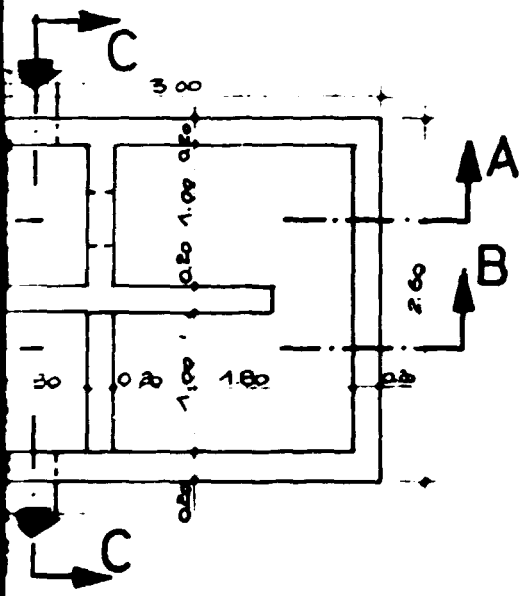
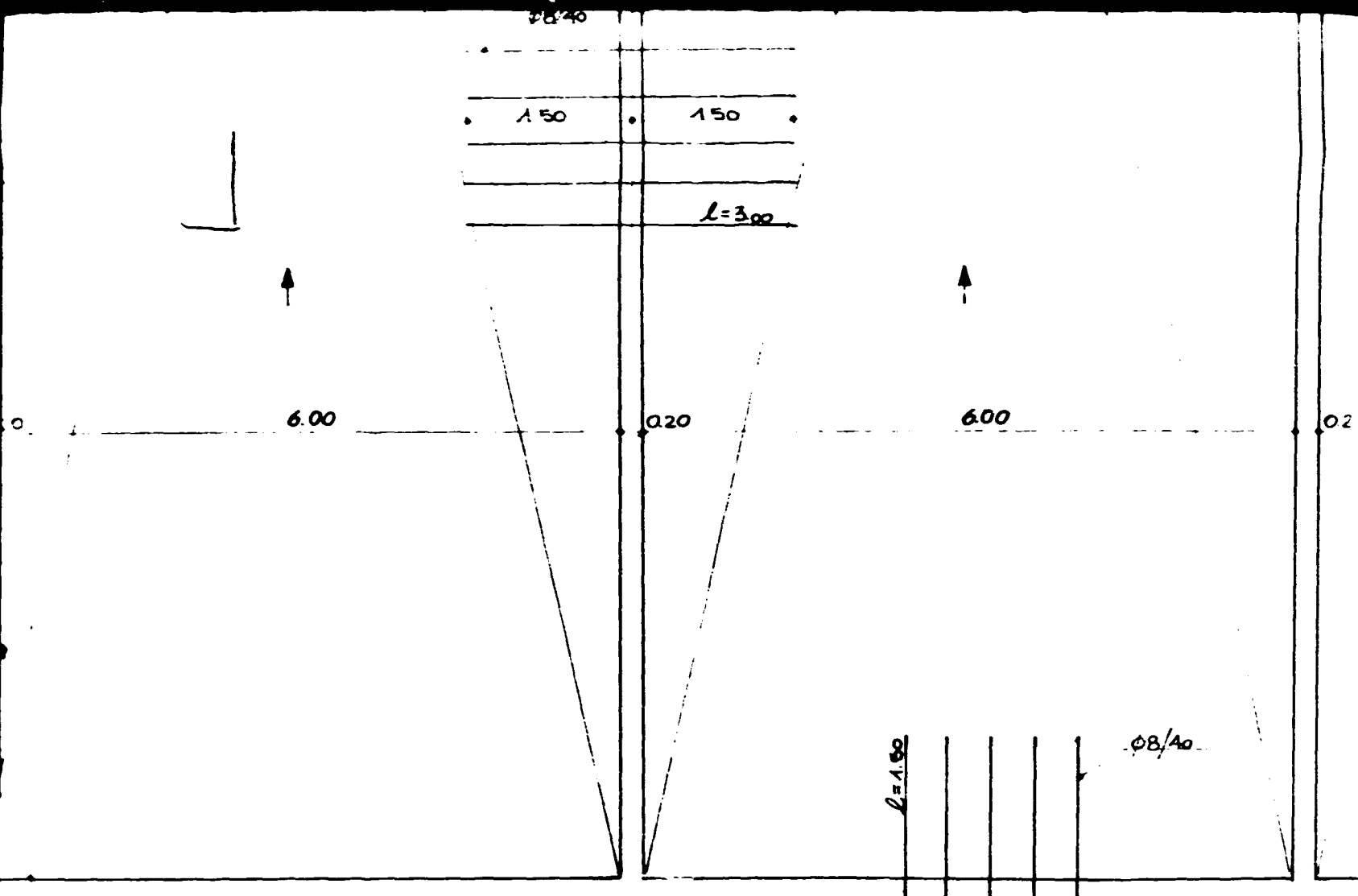
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57.40

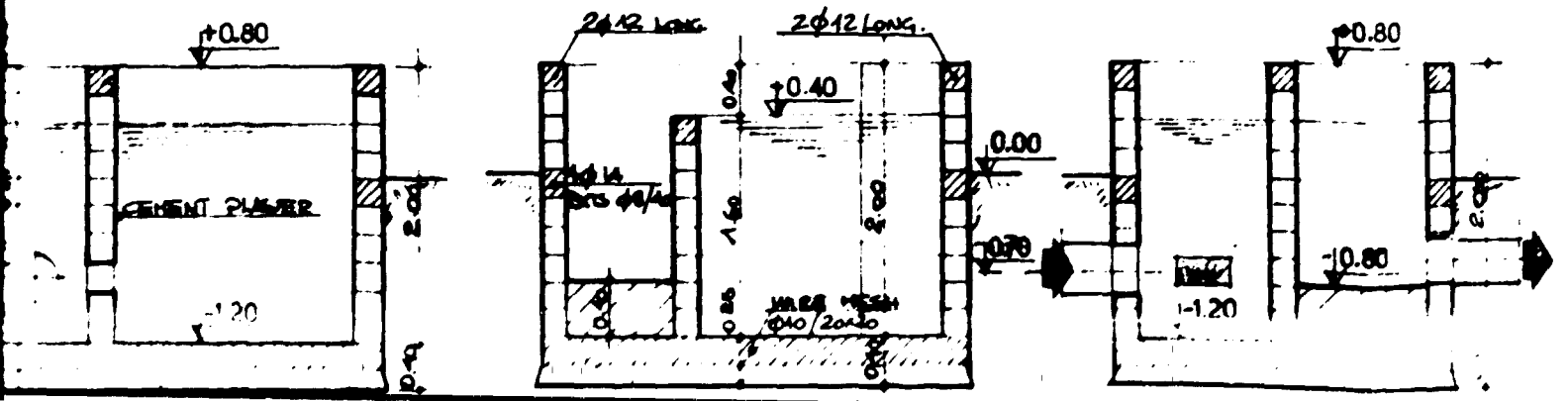


2016

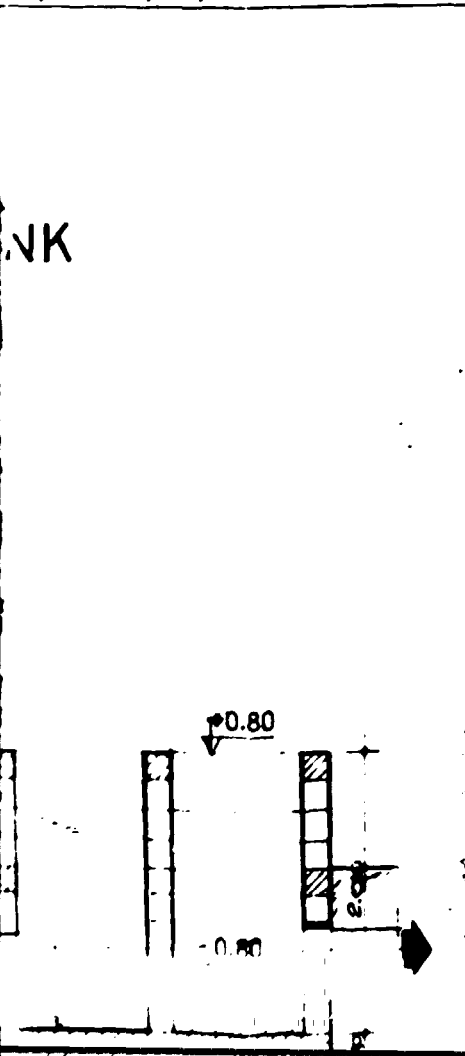
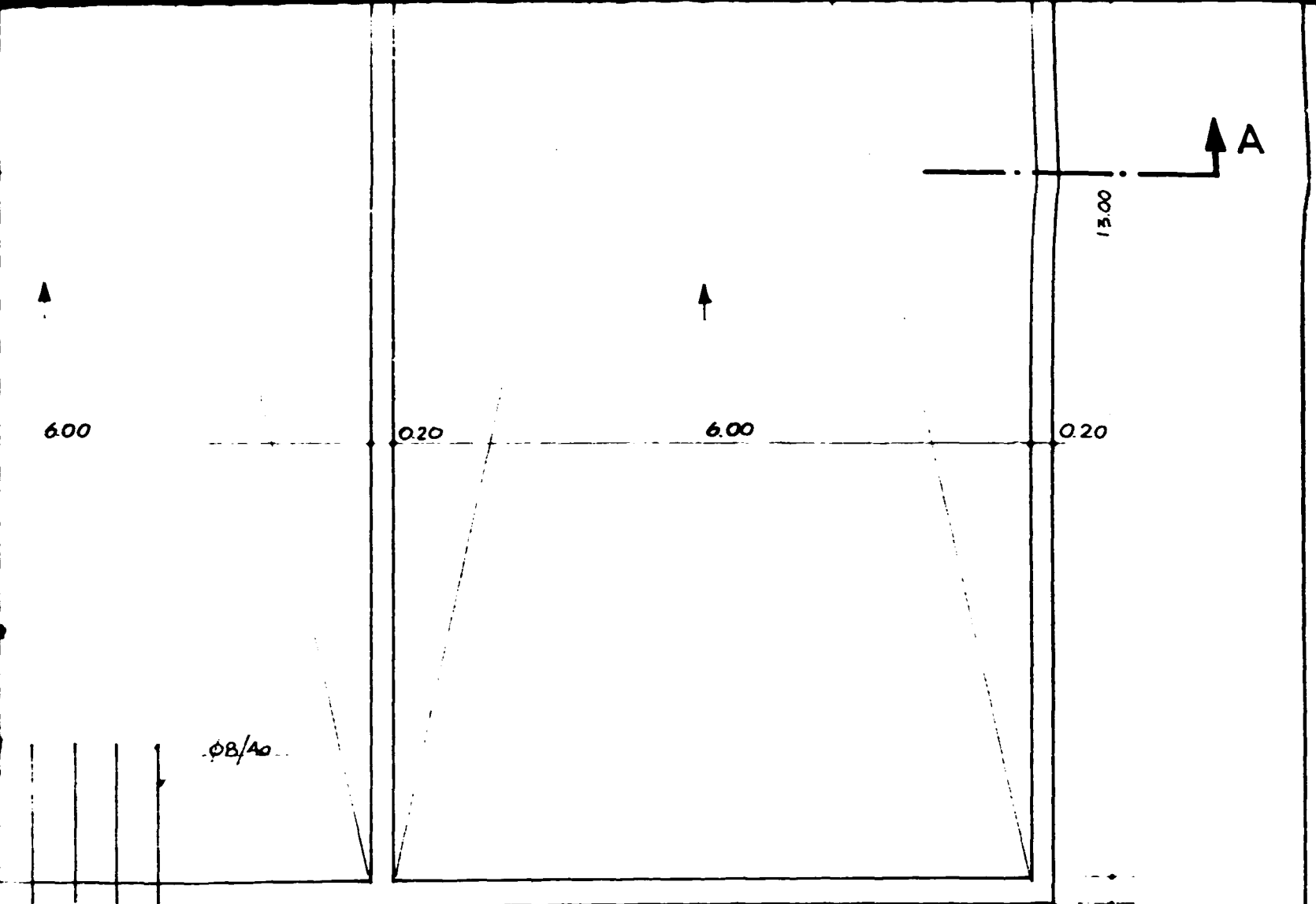


CHLORINATION TANK

SECTION 7



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CONTRACT n. 89/163: UNIDO PROJECT SI/ETH/89/901

**Combolcha tannery:
waste water treatment plant**

**National Leather and Shoe Corporation
Addis Ababa - Ethiopia**

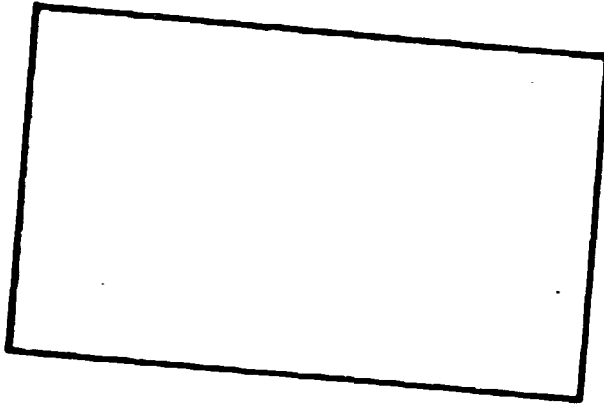
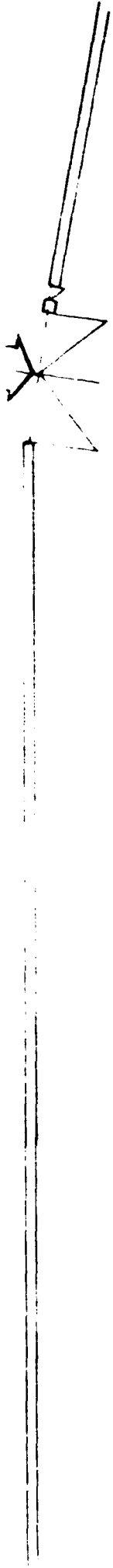
"STUDIO TECNICO G. GIUSEPPE CLOFFARD" - FLORENCE ITALY

Advisors
Mr. Giuseppe Cloffard
Mr. Mauro Carbonari

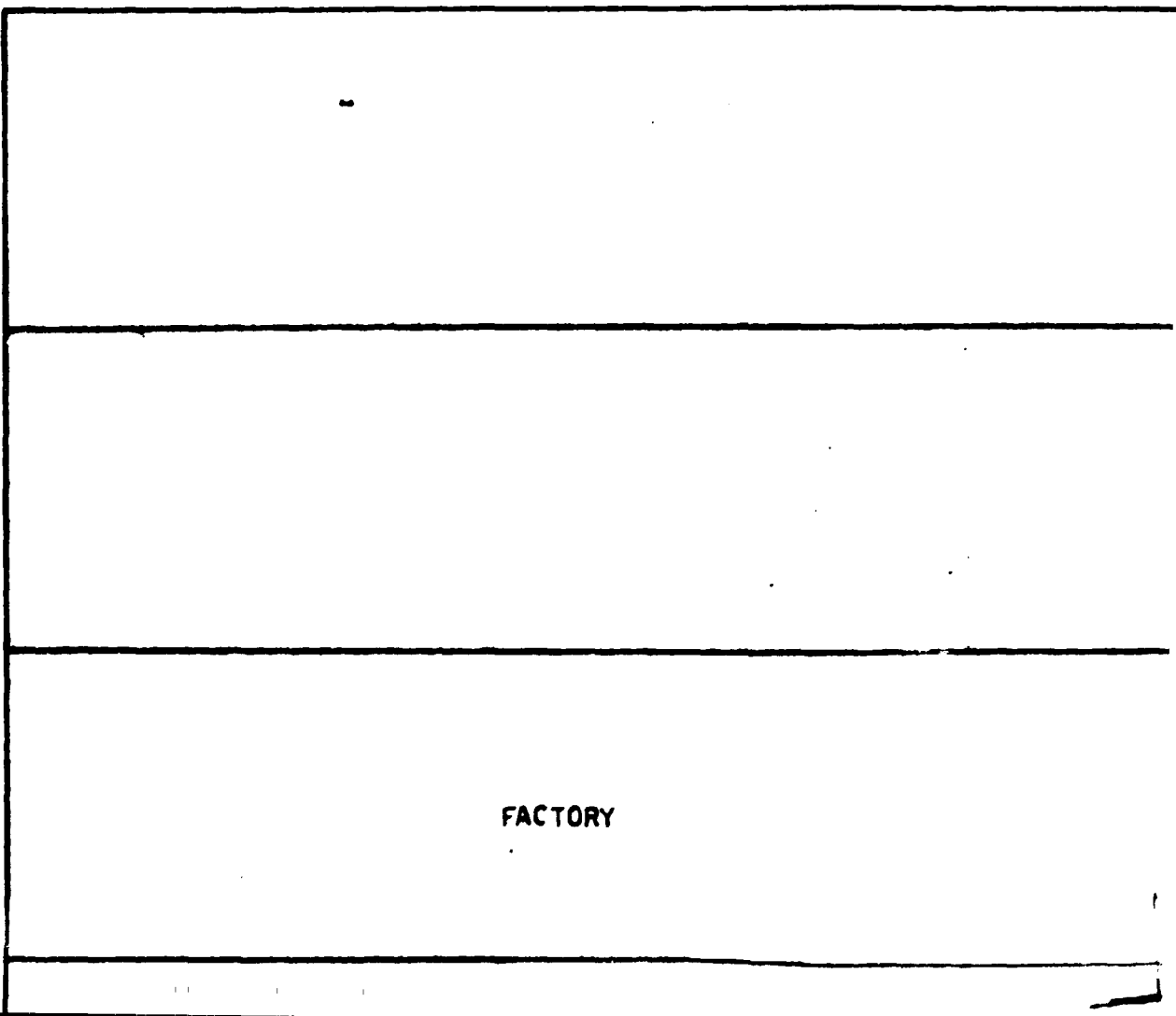
March 1990

**1:50
Sludge drying beds**

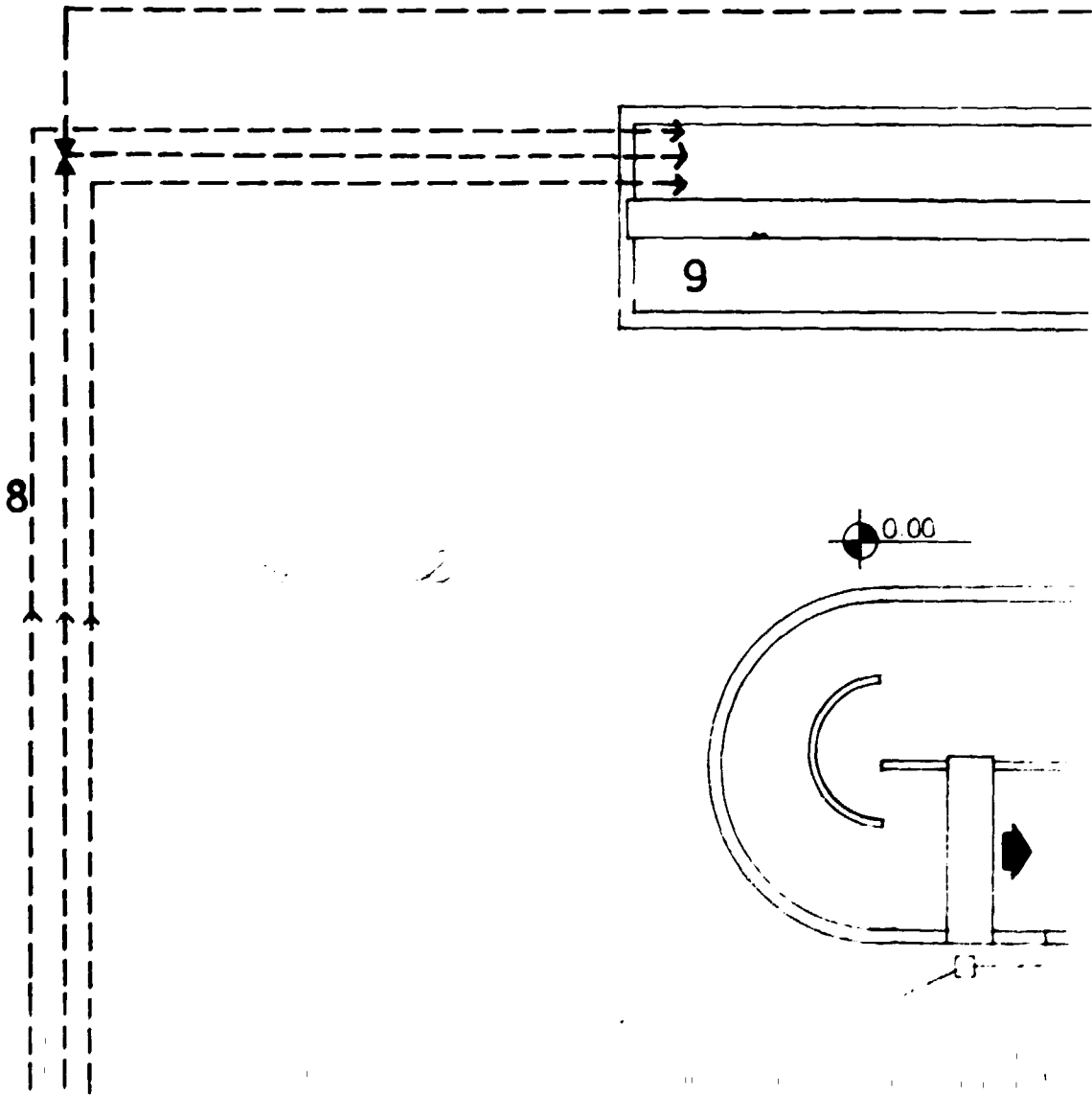
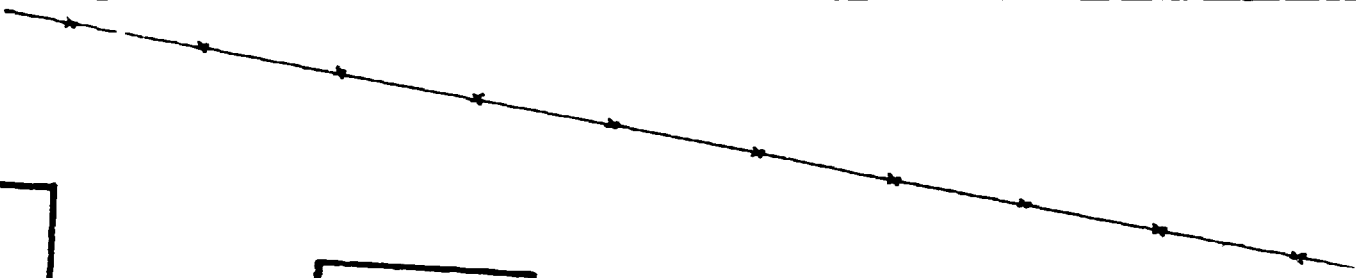
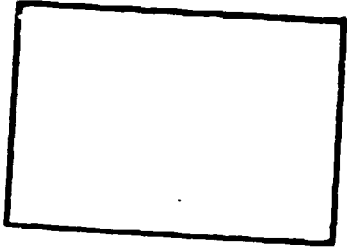
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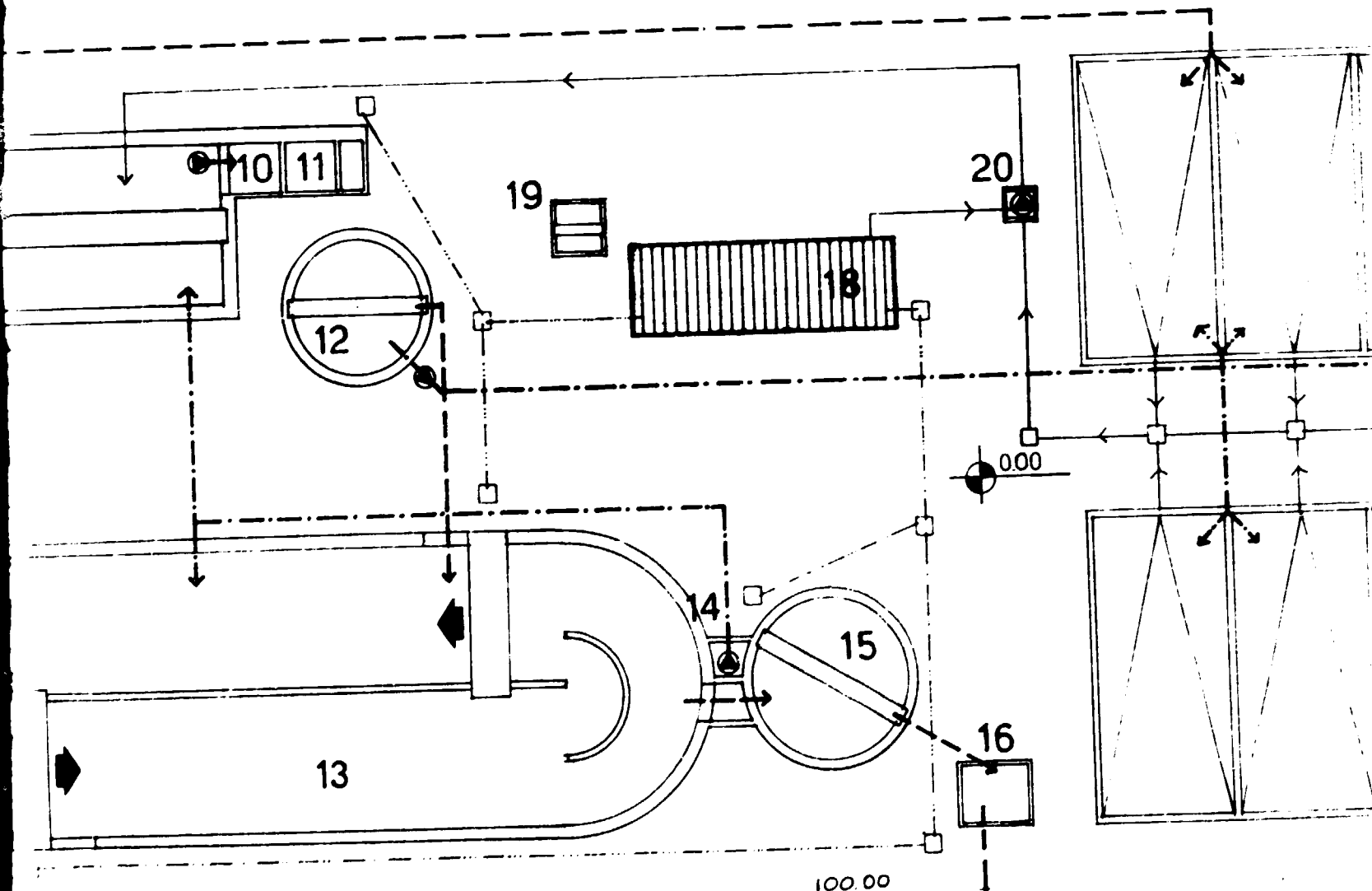
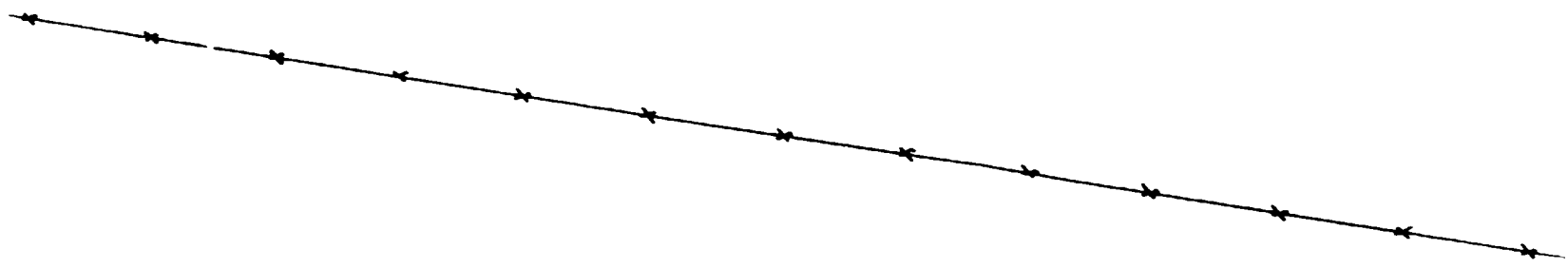


Y
A

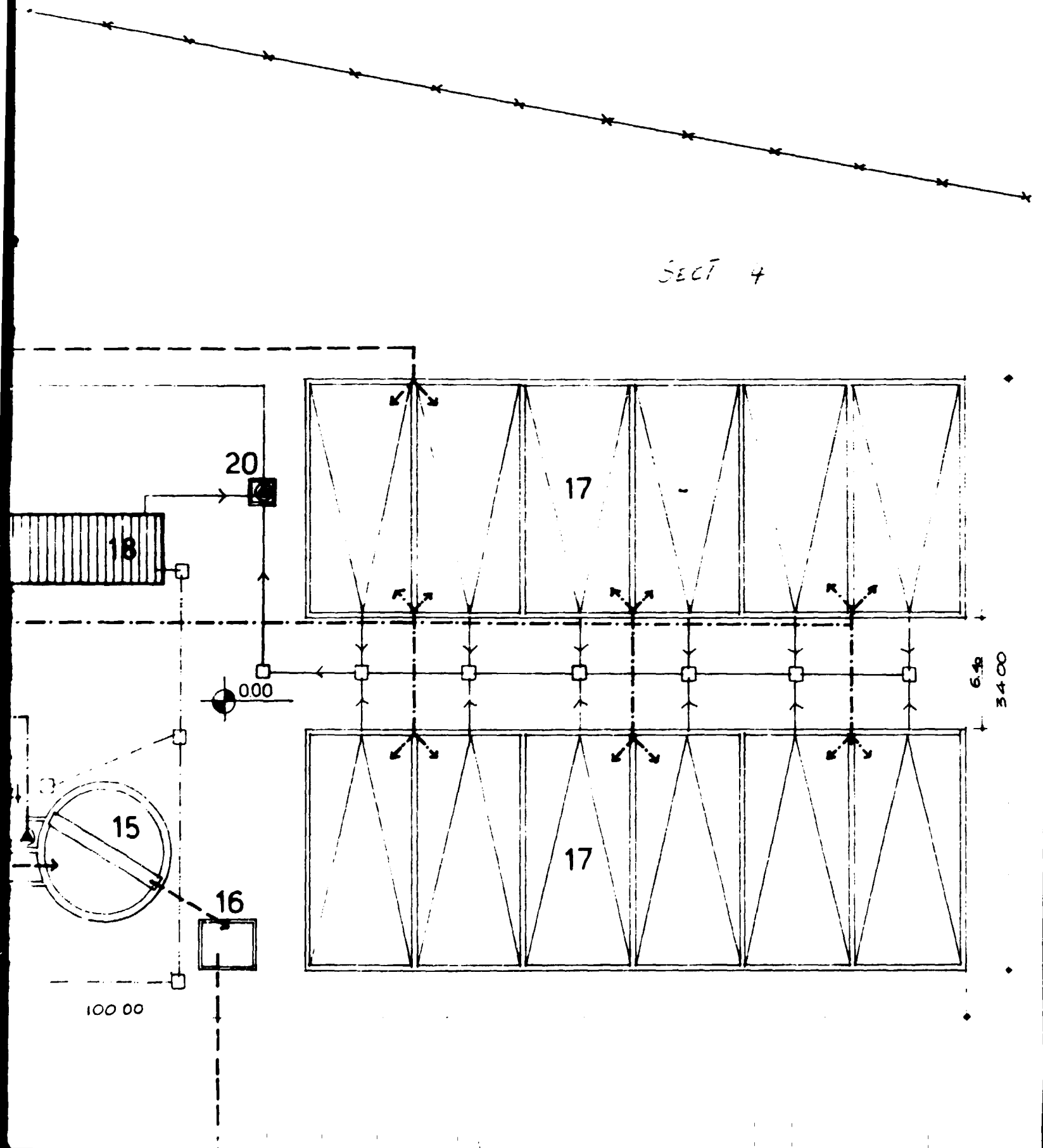


FACTORY





SECT 4



FACTORY

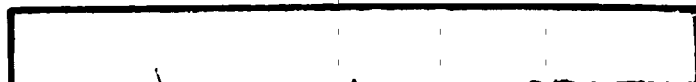
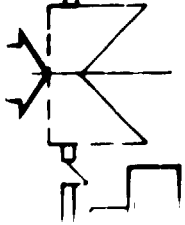
Soaking

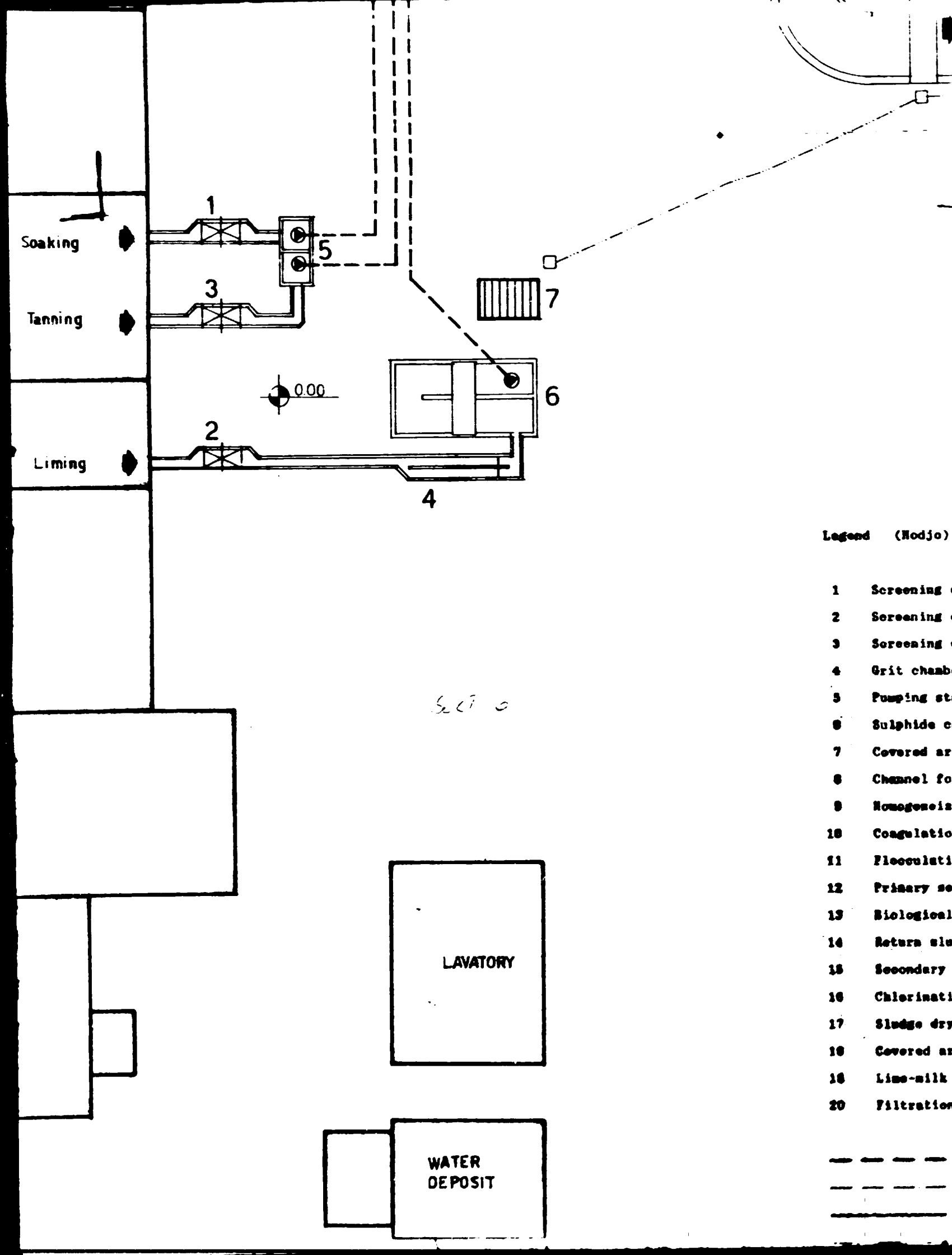
Tanning

Liming

BUREAU

SECTION





Soaking

Tanning

Liming

1

3

2

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7

6

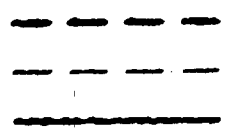
See

LAVATORY

WATER
DEPOSIT





Legend (Hodjo)

- 1 Screening
- 2 Screening
- 3 Screening
- 4 Grit chamb
- 5 Pumping st
- 6 Sulphide c
- 7 Covered ar
- 8 Channel fo
- 9 Homogeneis
- 10 Coagulatio
- 11 Flocculati
- 12 Primary se
- 13 Biological
- 14 Return slu
- 15 Secondary
- 16 Chlorinati
- 17 Sludge dry
- 18 Covered an
- 19 Lime-milk
- 20 Filtration



Legend (Modjo)

- 1 Screening chamber (soaking waste)
- 2 Screening chamber (lining waste)
- 3 Screening chamber (tanning waste)
- 4 Grit chamber
- 5 Pumping station
- 6 Sulphide catalytic oxidation tank
- 7 Covered area for equipment
- 8 Channel for pipe installation
- 9 Homogenisation tank
- 10 Coagulation tank
- 11 Flocculation tank
- 12 Primary sedimentation tank
- 13 Biological oxidation ditch
- 14 Return sludge pit
- 15 Secondary sedimentation tank
- 16 Chlorination contact chamber
- 17 Sludge drying beds
- 18 Covered area for equipment
- 19 Lime-milk preparation tank
- 20 Filtration water collecting pit

-  Waste water line
 Sludge line
 Filtration water line
 Electrical cable line

 Pump

MODJO RIVER

CONTRACT N. 88/108 UNIDO PROJECT SI/ETH/88/901

**Modjo tannery:
waste water treatment plant**

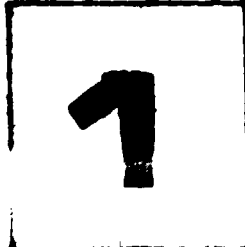
**National Leather and Shoe Corporation
Addis Ababa - Ethiopia**

"STUDIO TECNICO Dr. GIUSEPPE CLOFFERO" - FLORENCE ITALY

Advisors
Mr. Giuseppe Clodero
Mr. Mauro Carlini

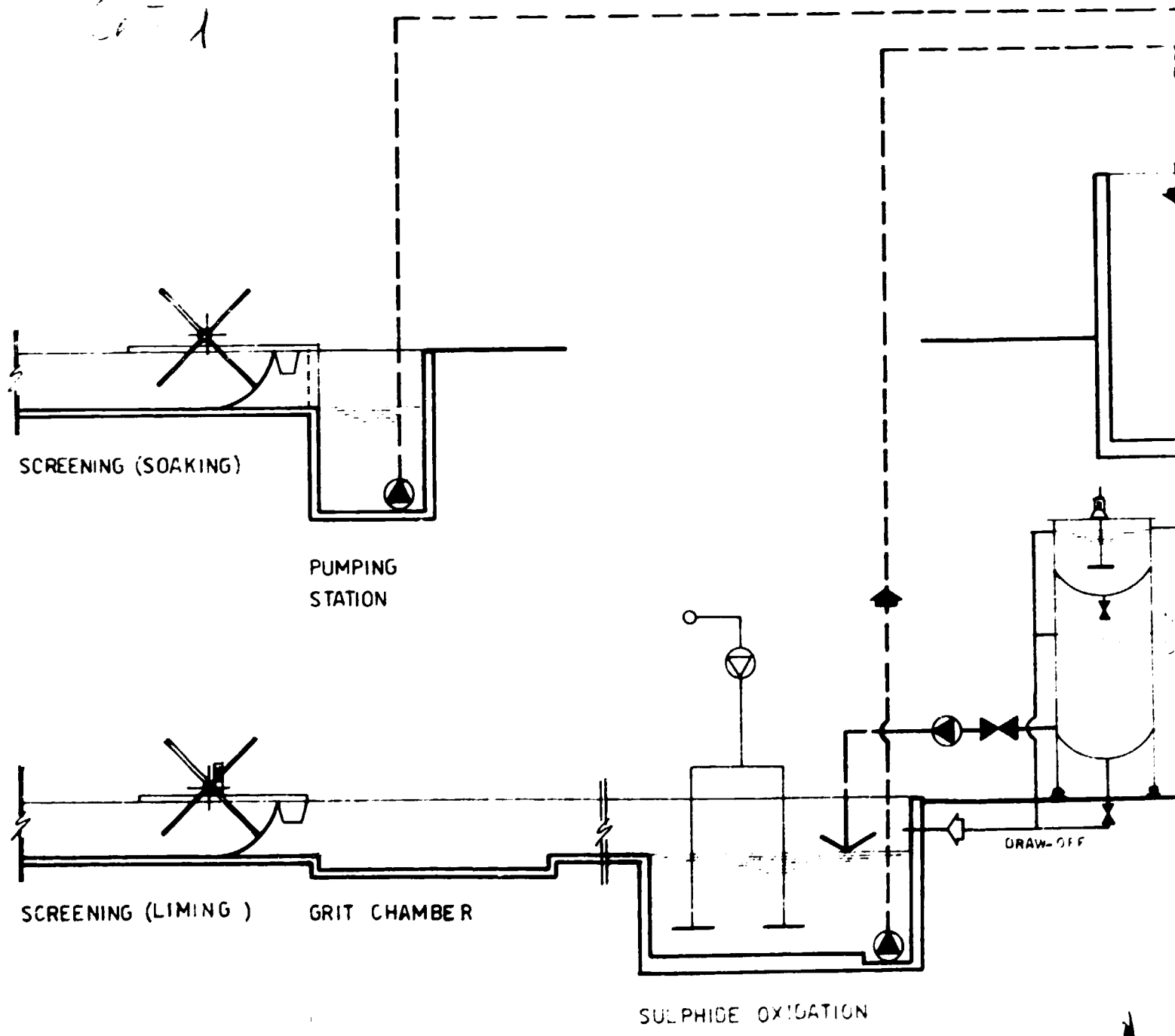
March 1990

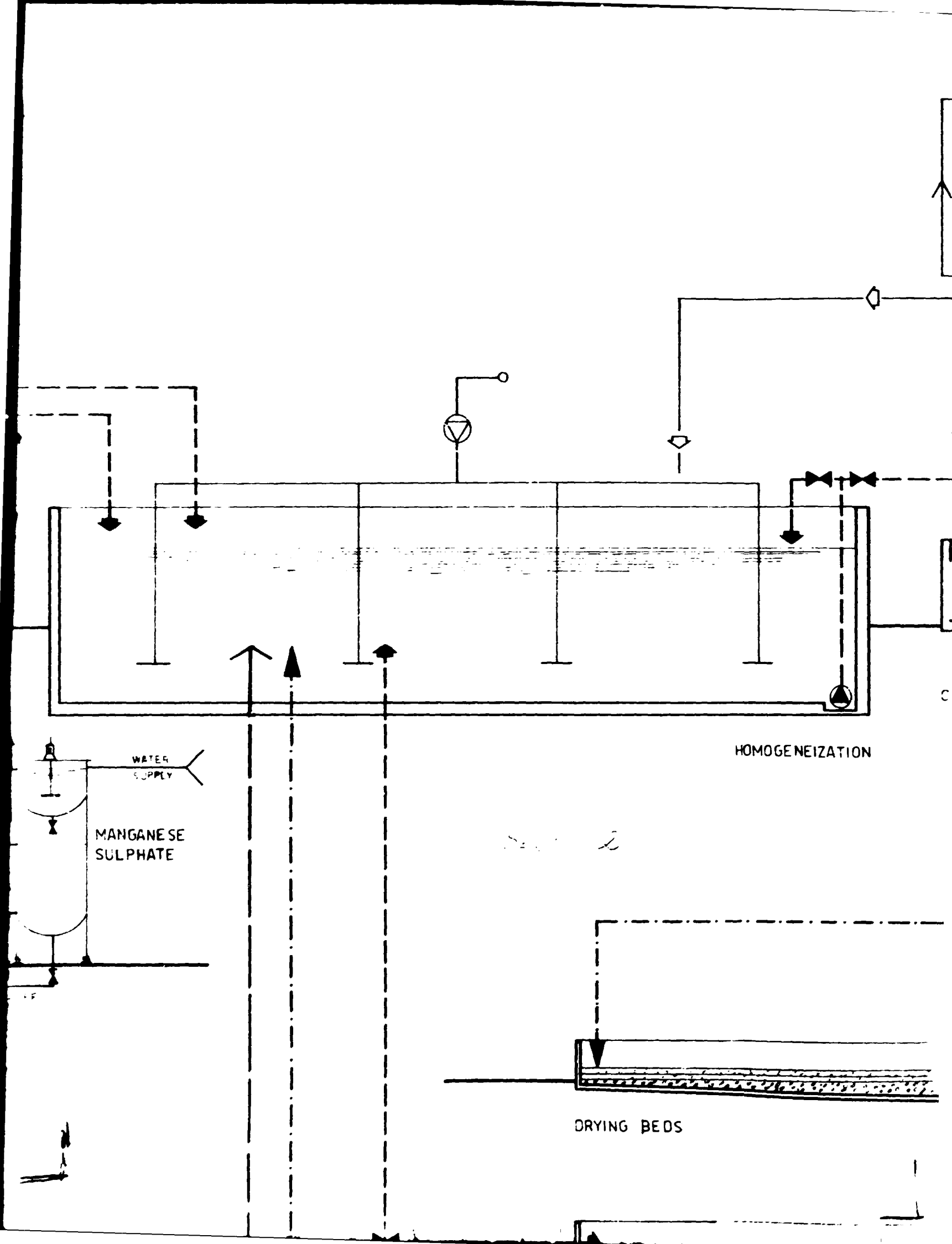
**1 : 250
Plan layout**

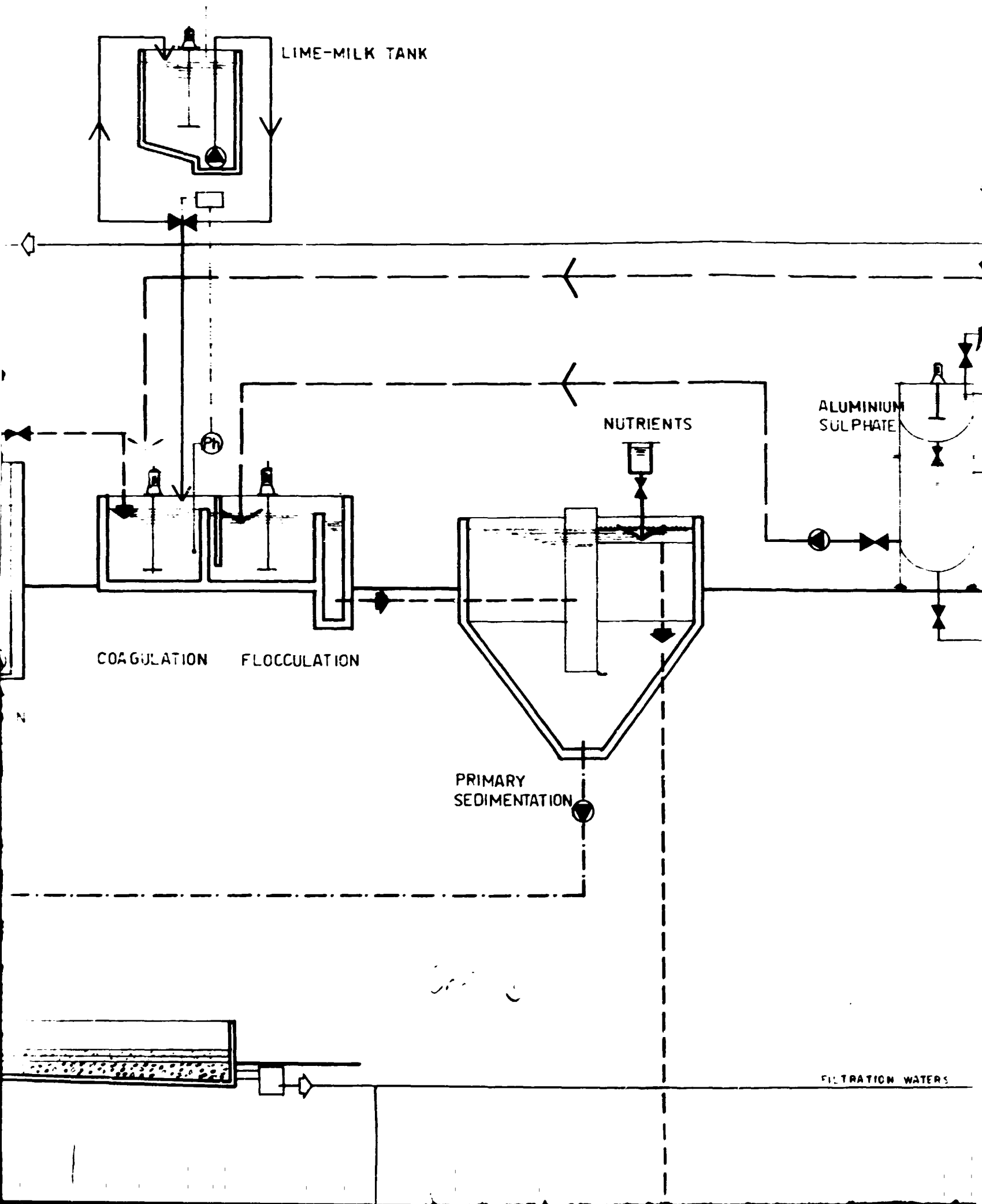


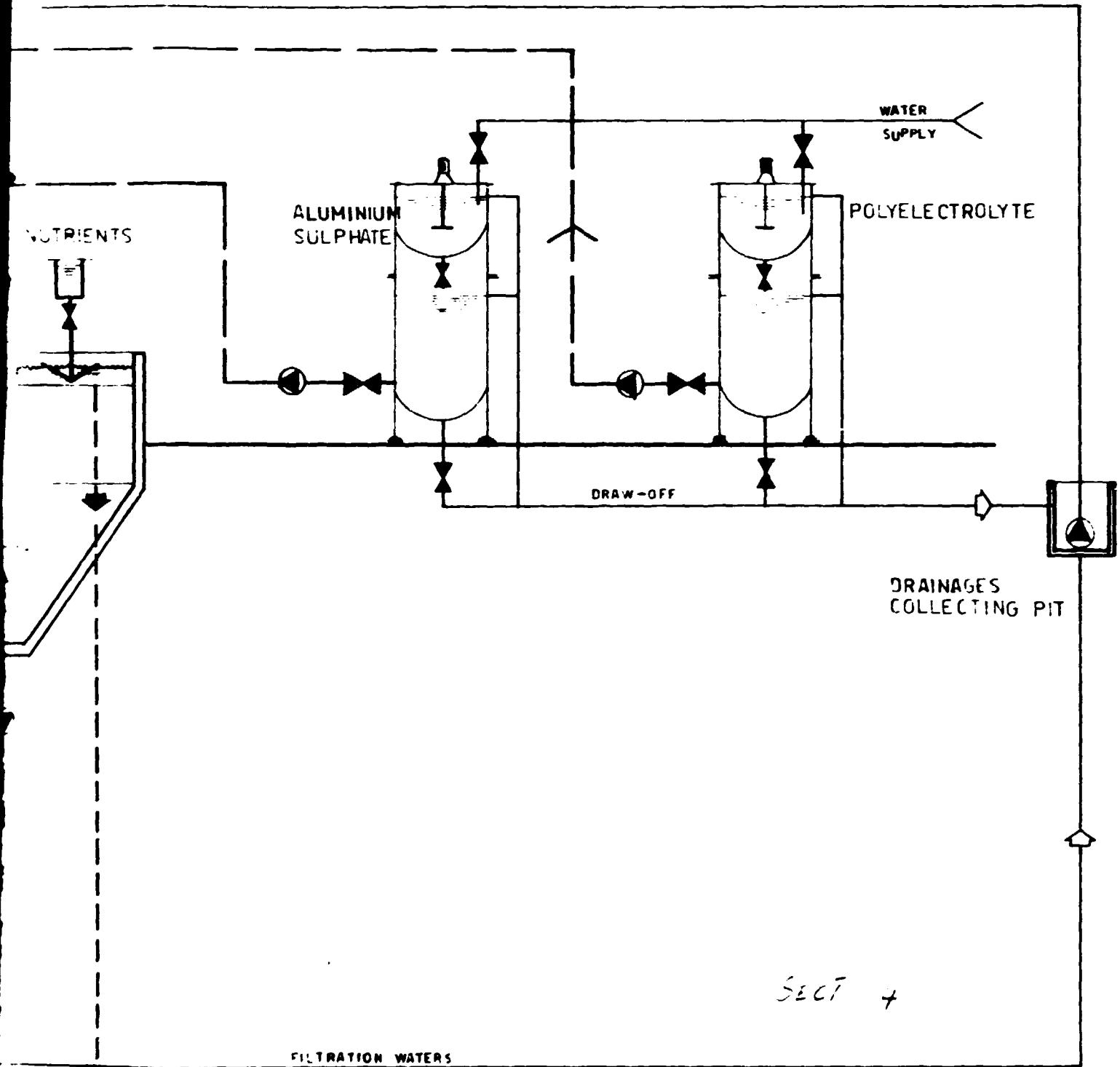
TO RIVER

2071

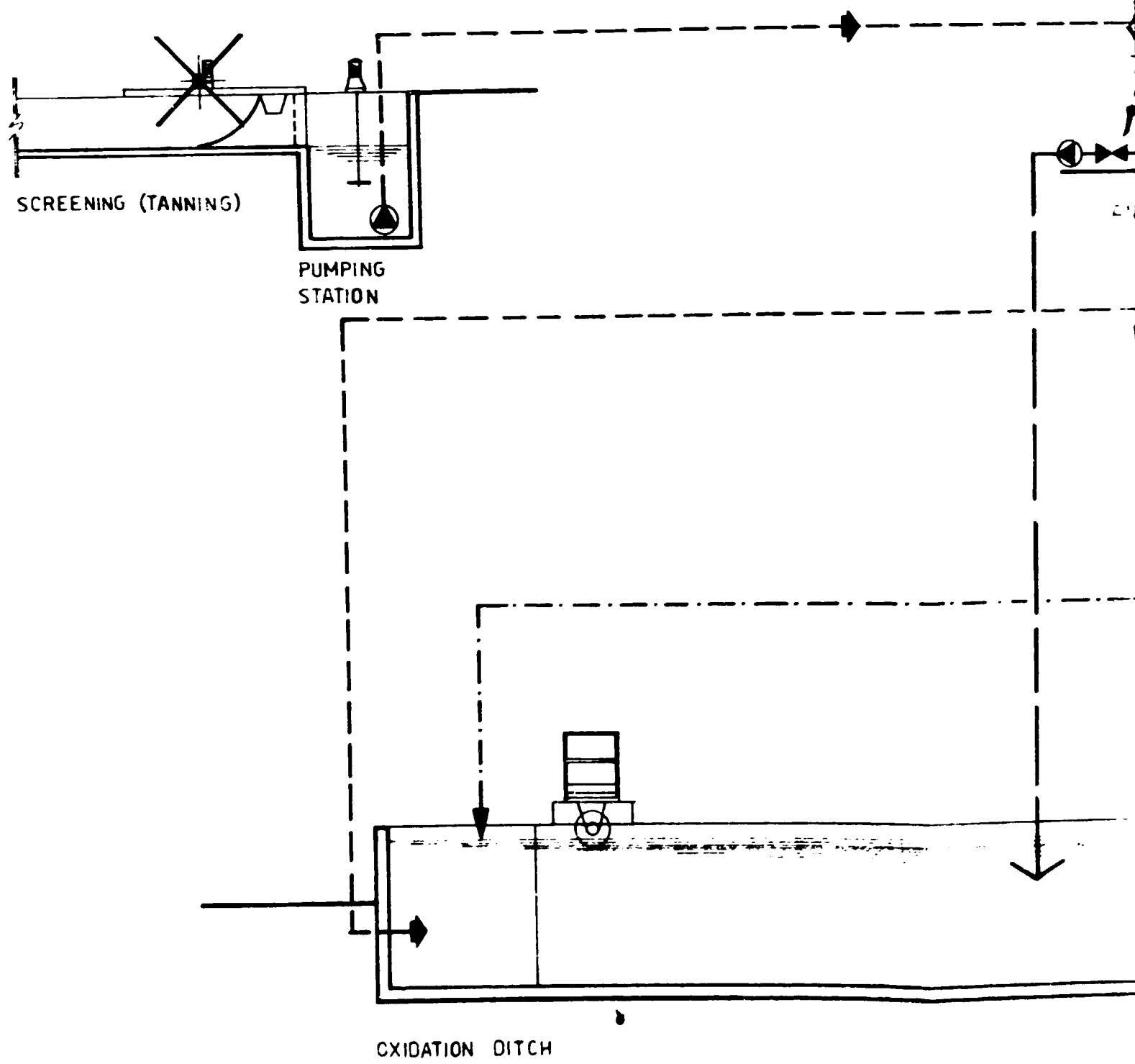
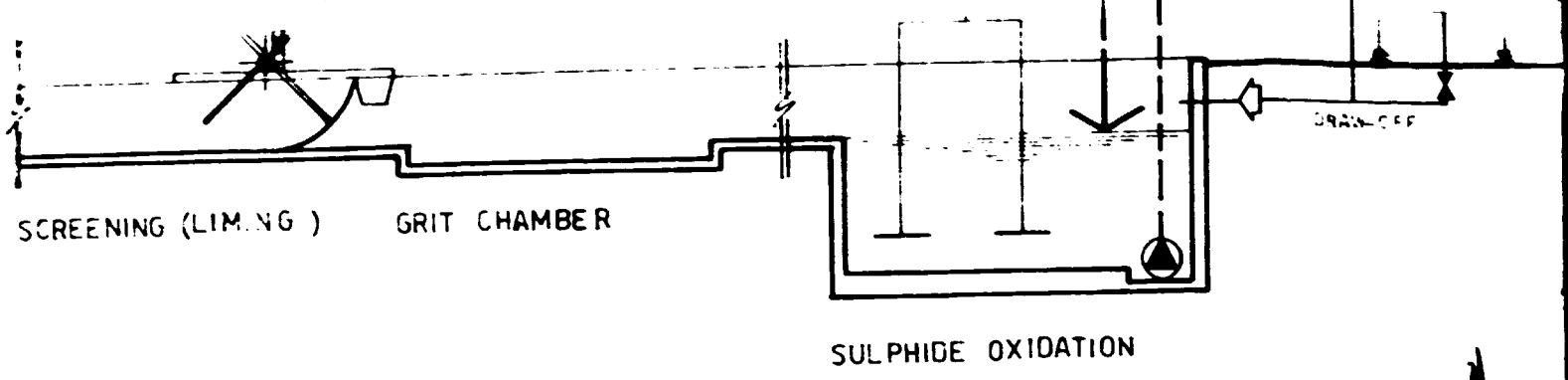




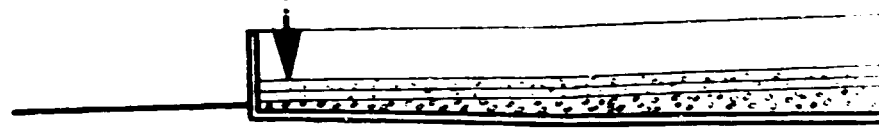
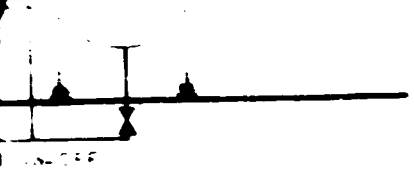




SECT +



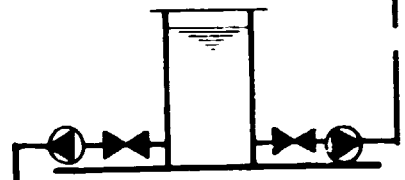
SECT 5



DRYING BEDS



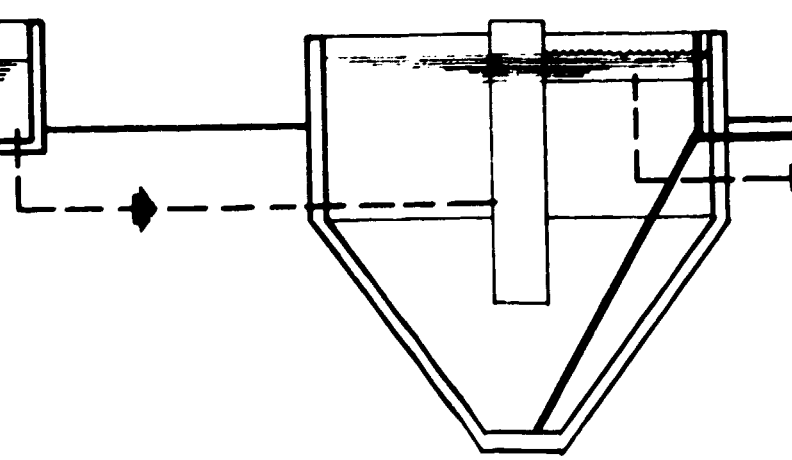
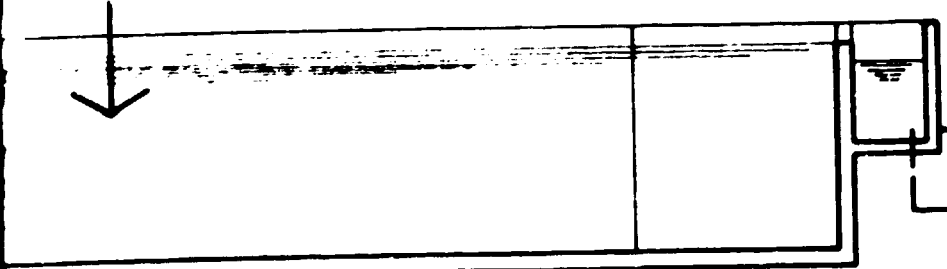
DRYING BEDS FOR WASTE CHROME



ANTI FOAM

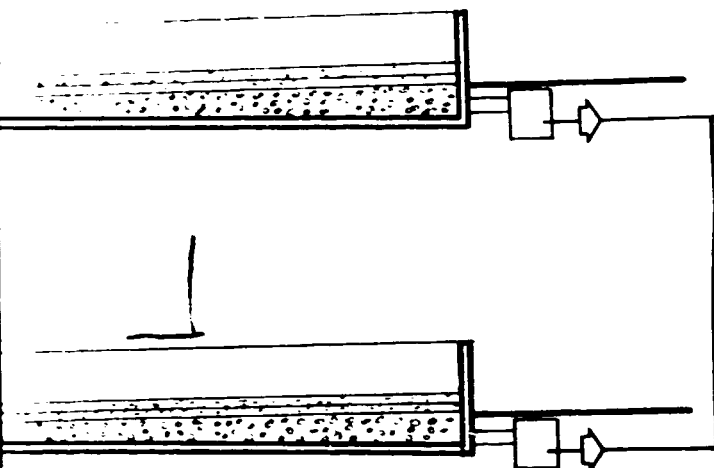
SUPERNATANT FROM PRIMARY TREATMENT

ACTIVATED SLUDGE RECYCLE

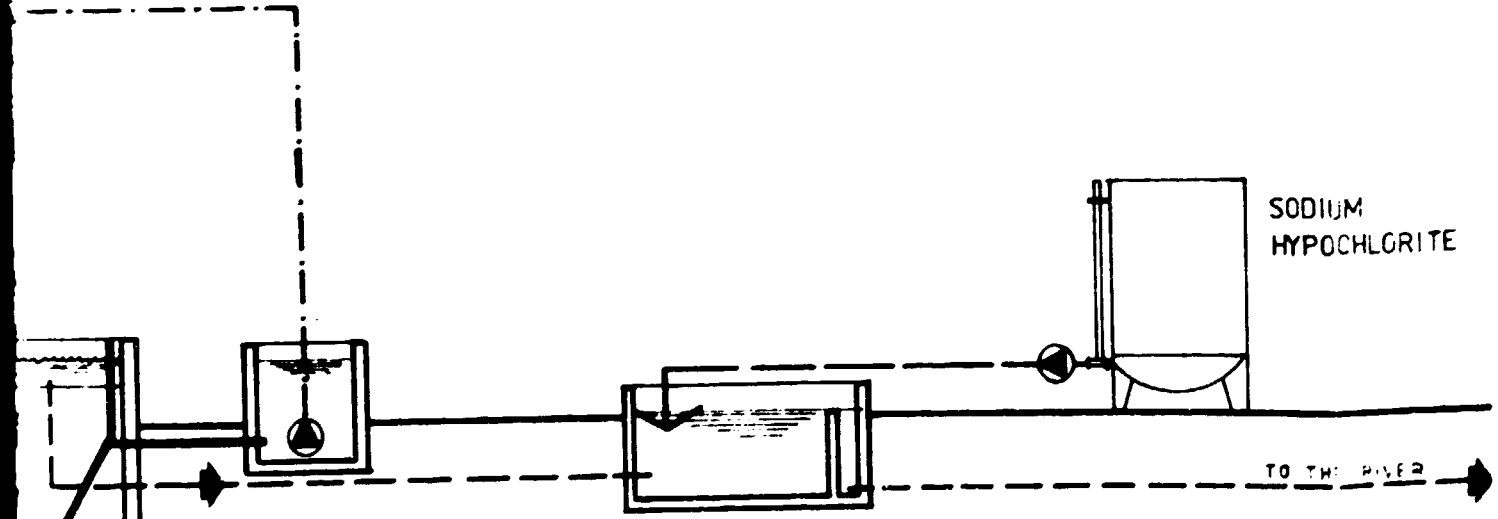
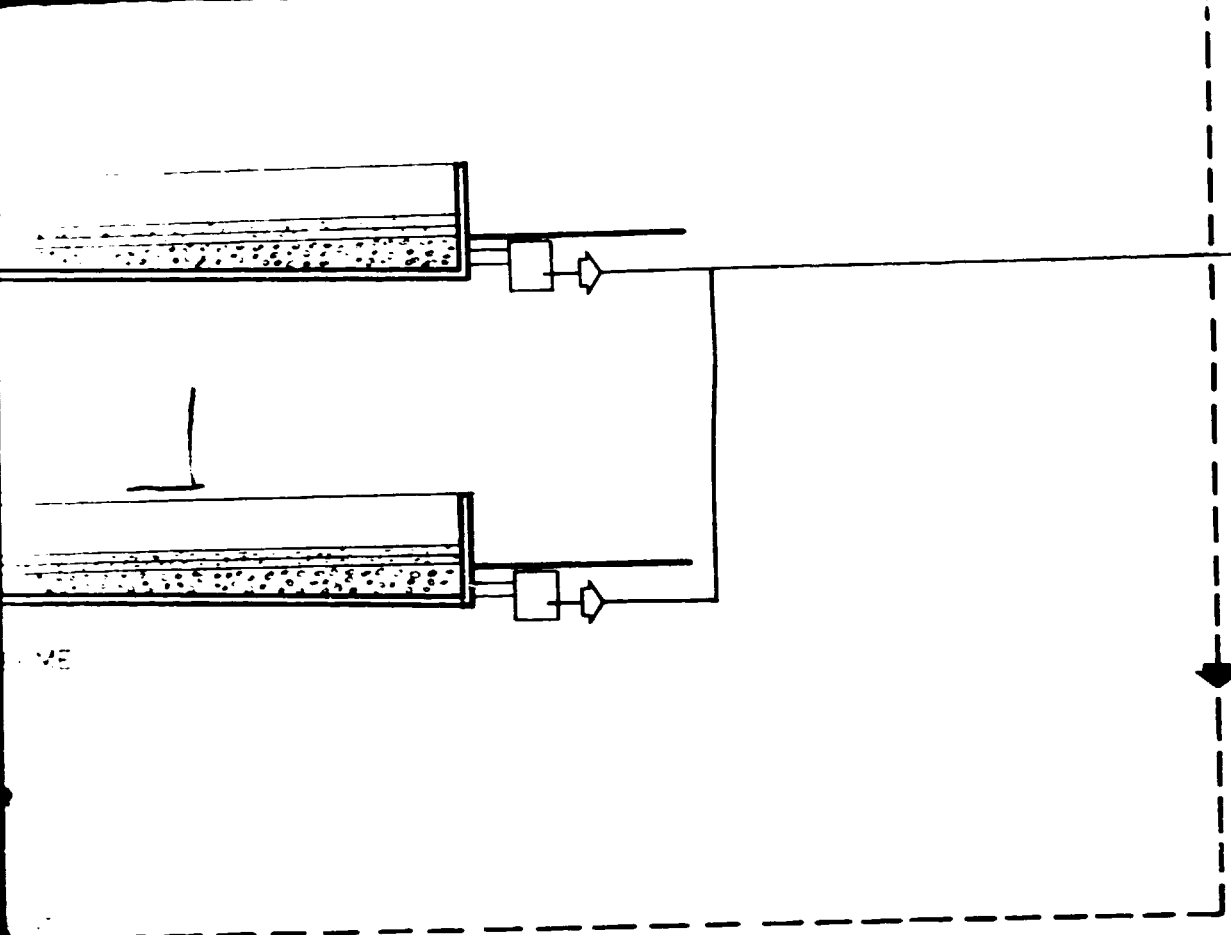


927 0

FILTRATION WATER



ME



RETURN
SLUDGE PIT

CHLORINATION

SODIUM
HYPOCHLORITE

TO THE RIVER

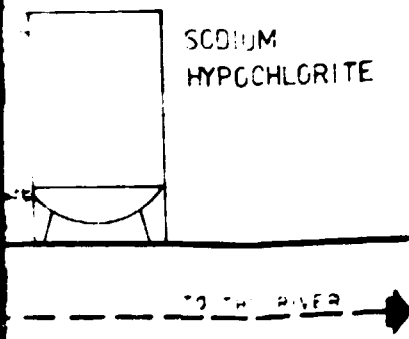
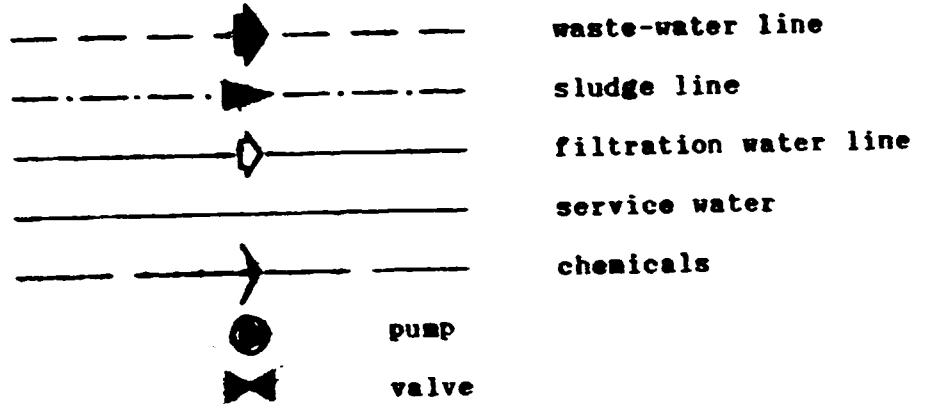
CONTRAF

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"STUD
Adviser
Mr. Cha
Mr. Me

SYMBOLOLOGY



CONTRACT n. 89/169: UNIDO PROJECT SI/ETH/89/901

Modjo tannery: waste water treatment plant

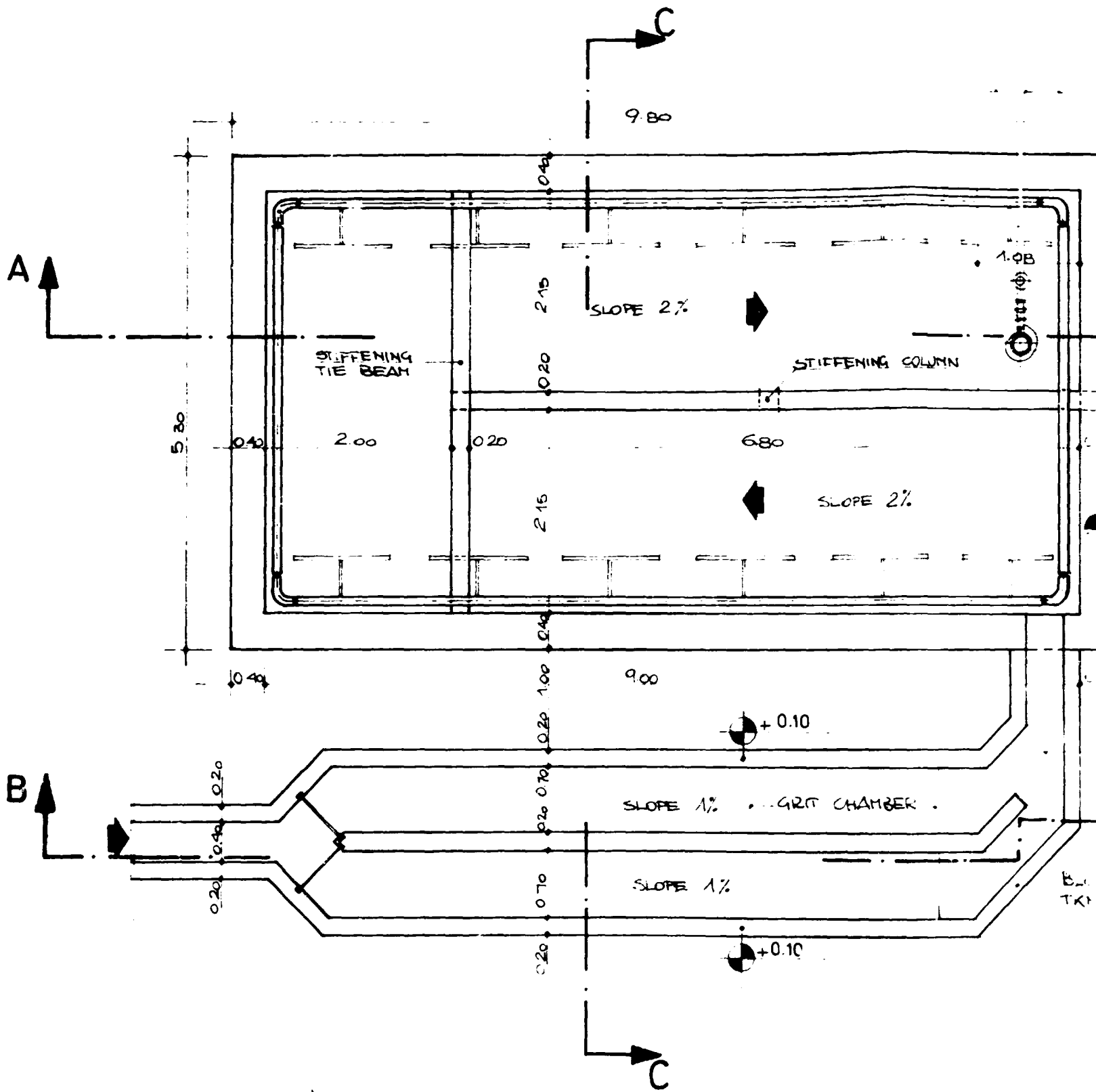
National Leather and Shoe Corporation
Addis Ababa - Ethiopia

"STUDIO TECNICO Dr. GIUSEPPE CLOFFERO" - FLORENCE ITALY

Advisors
Mr. Giuseppe Cloffero
Mr. Mauro Carbonari

March 1990

Process flowsheet

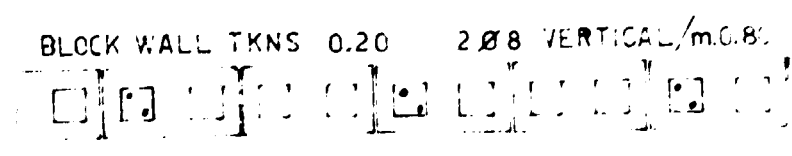
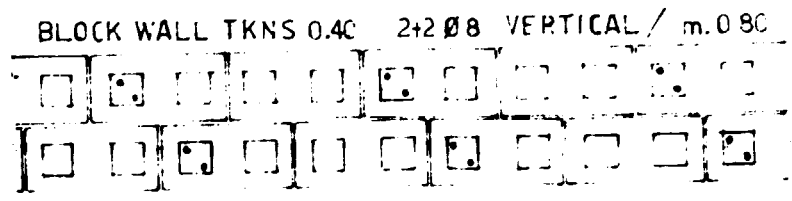
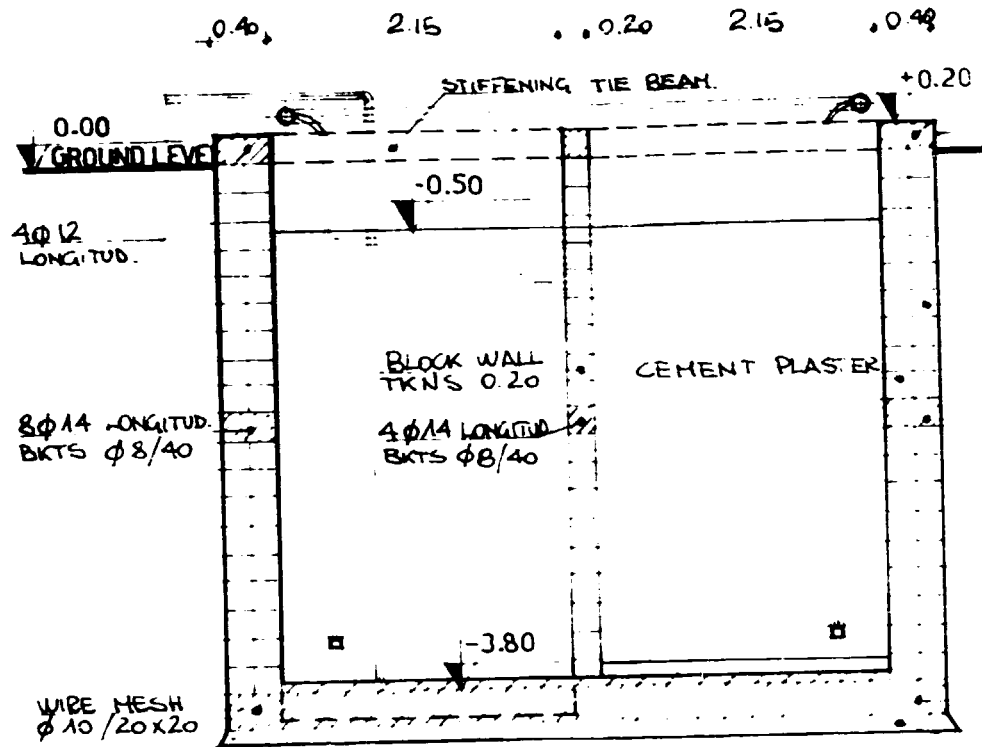
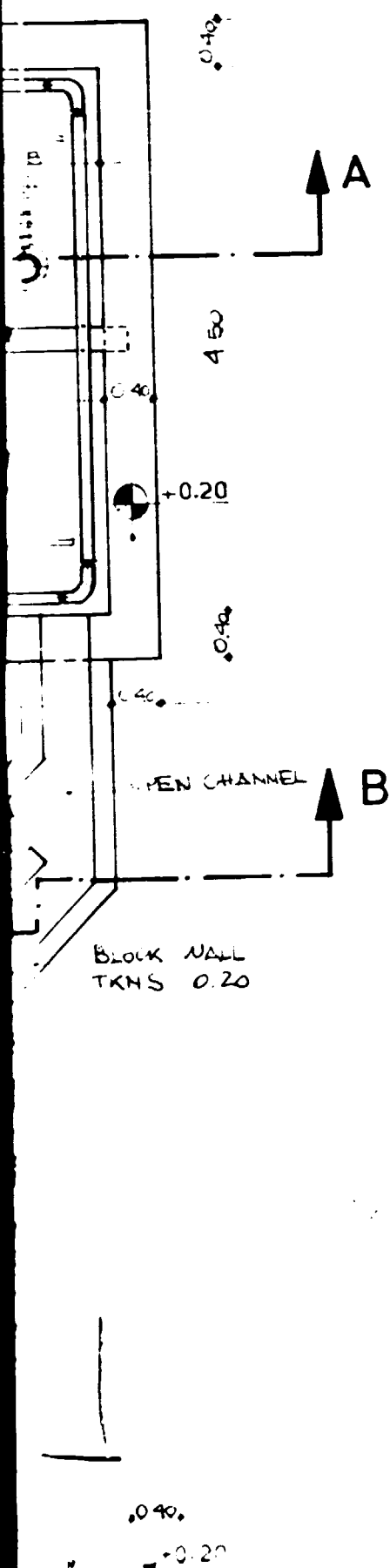


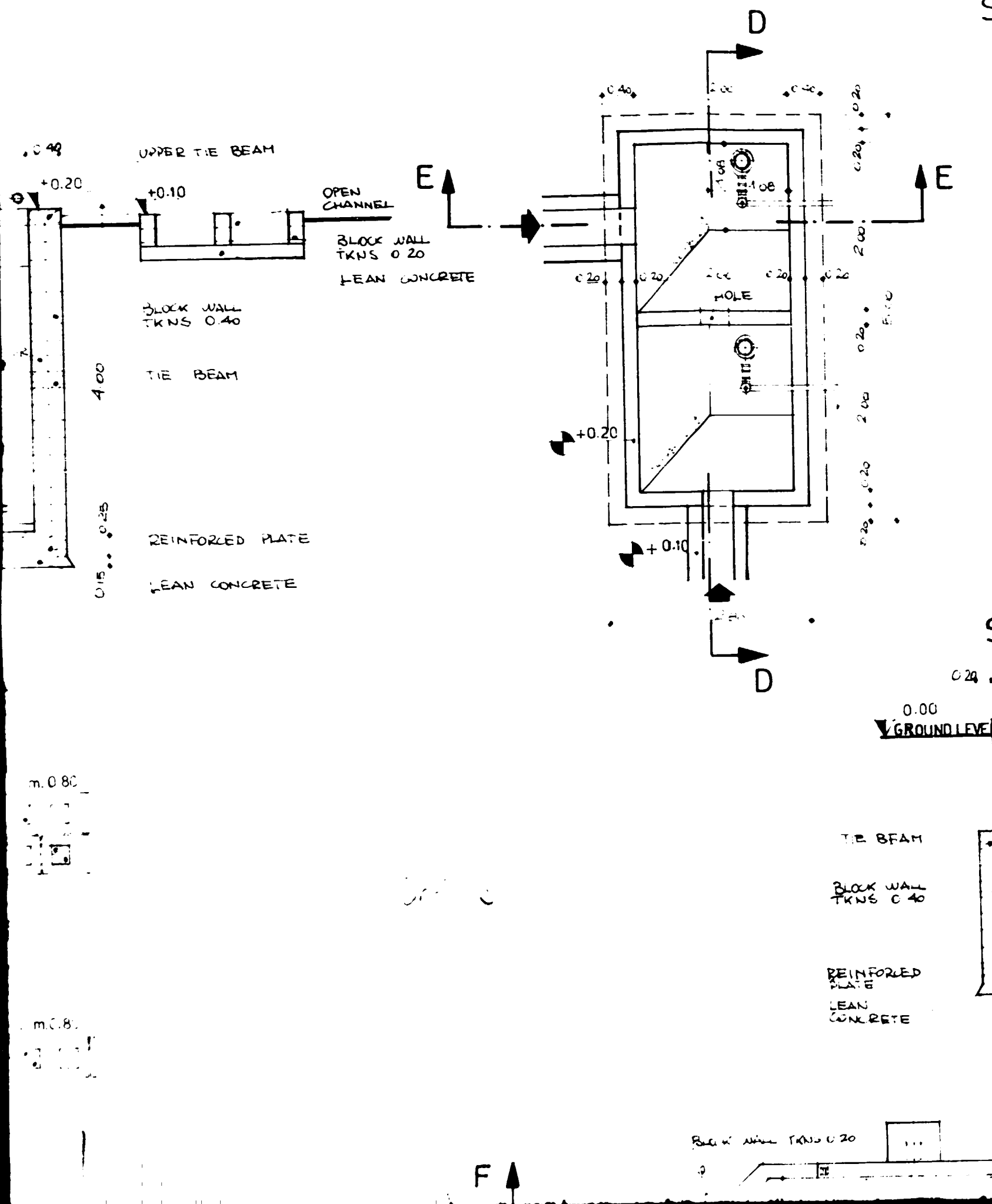
SECTION A-A

GROUND LEVEL

2-1-1

SECTION C-C





m. 0.80

m. 0.80

TIE BEAM

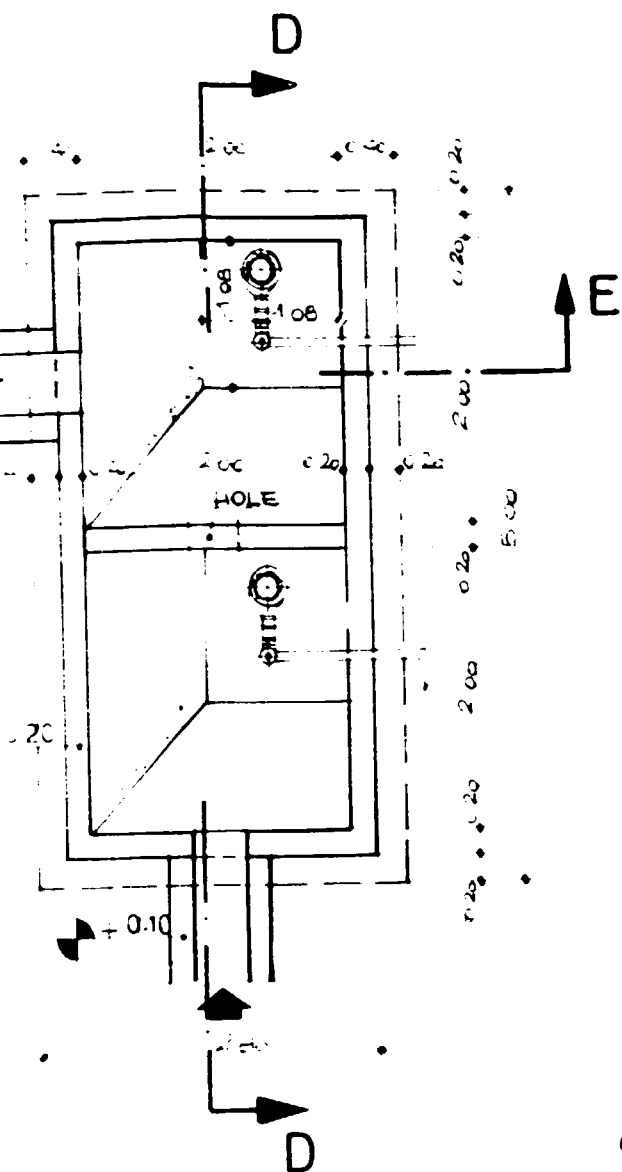
BLOCK WALL
TKNS 0.40

REINFORCED
PLATE
LEAN
CONCRETE

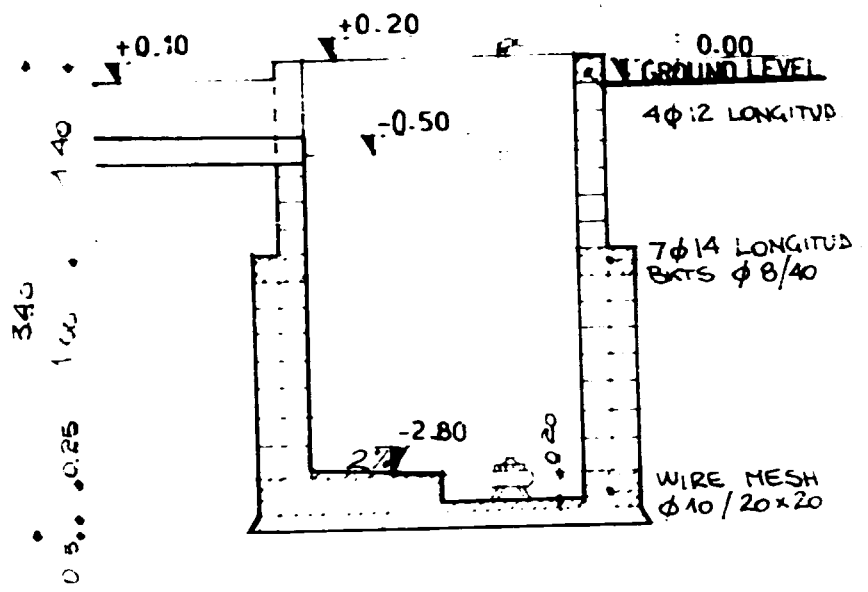
Block wall TKNS 0.20

F ↑

SECTION E-E

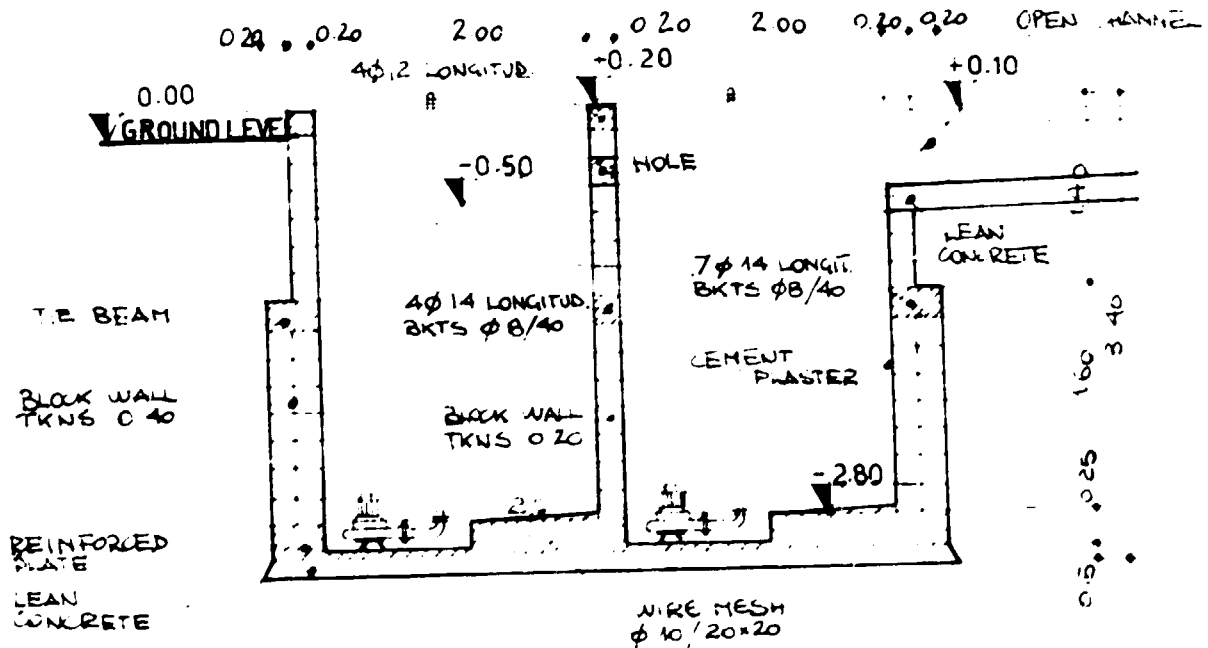


0.20, 0.20 2.00 0.20, 0.20

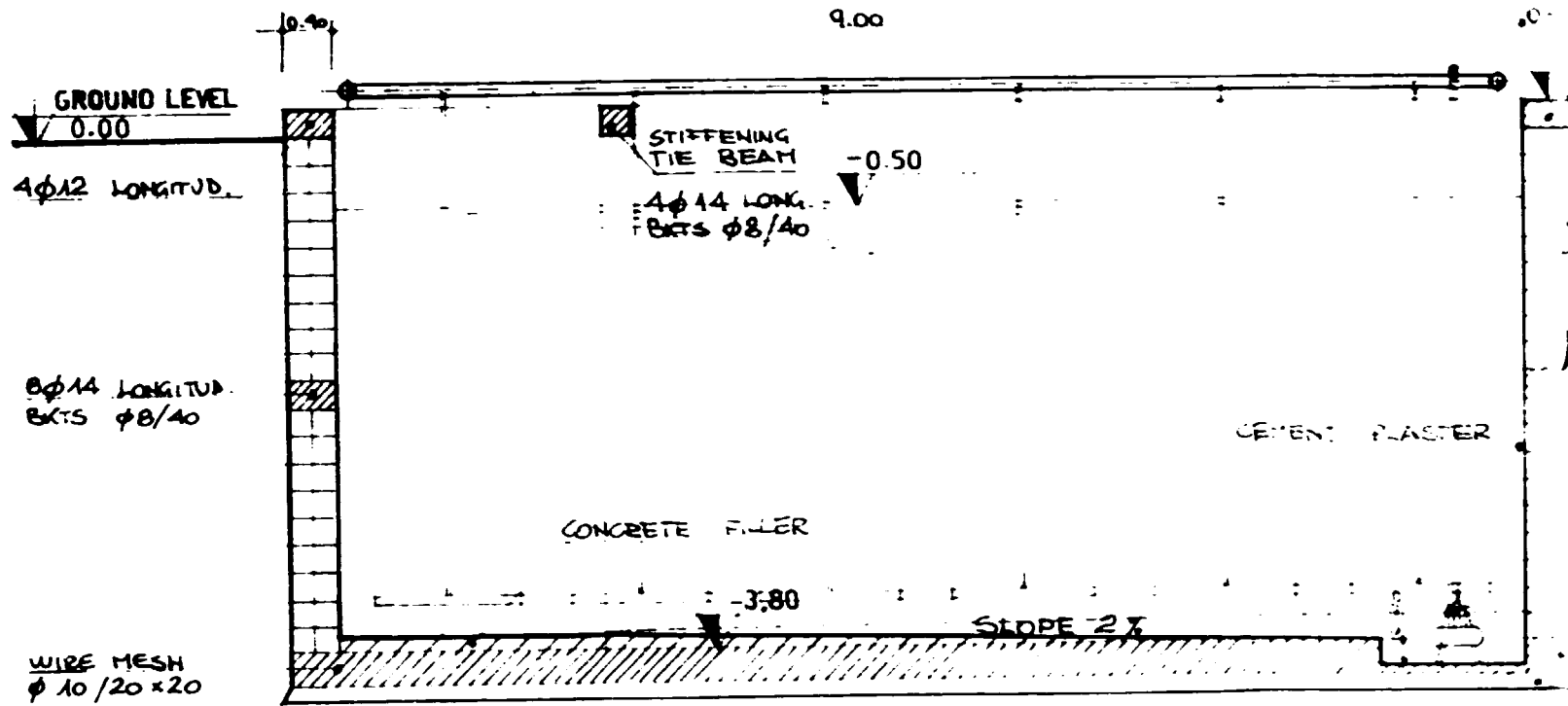


SECT 4

SECTION D-D

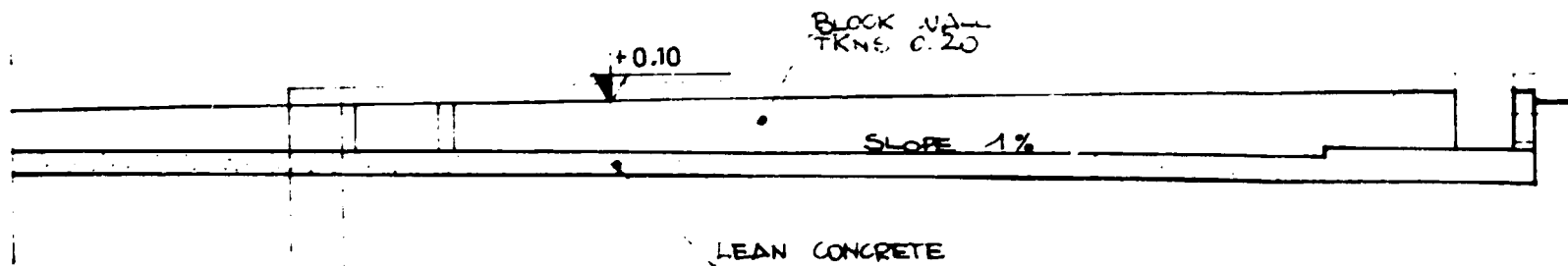


SECTION A-A

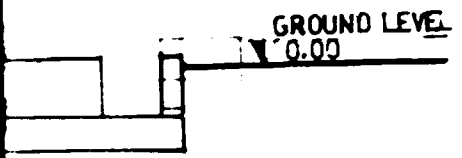
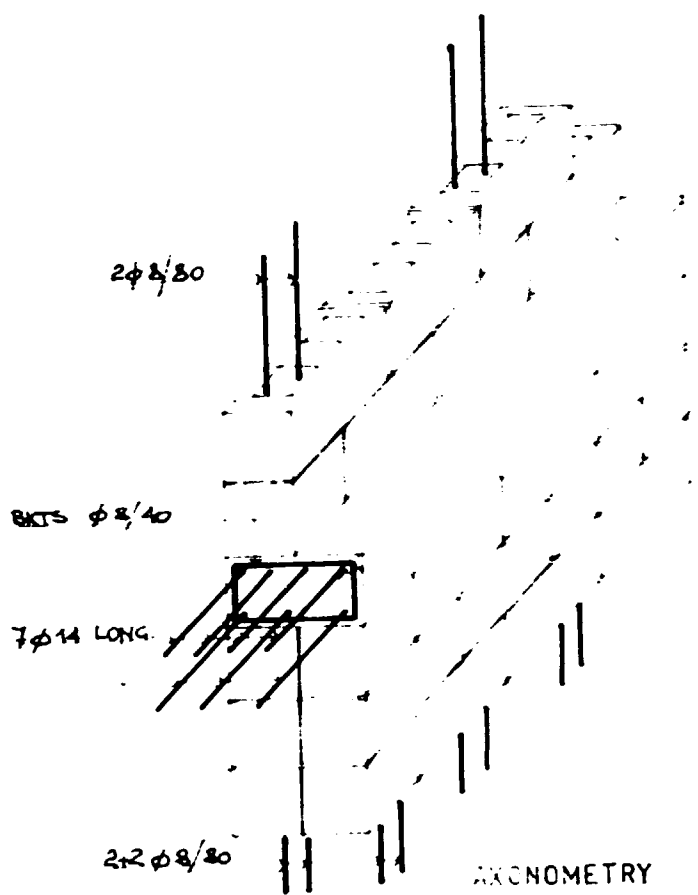
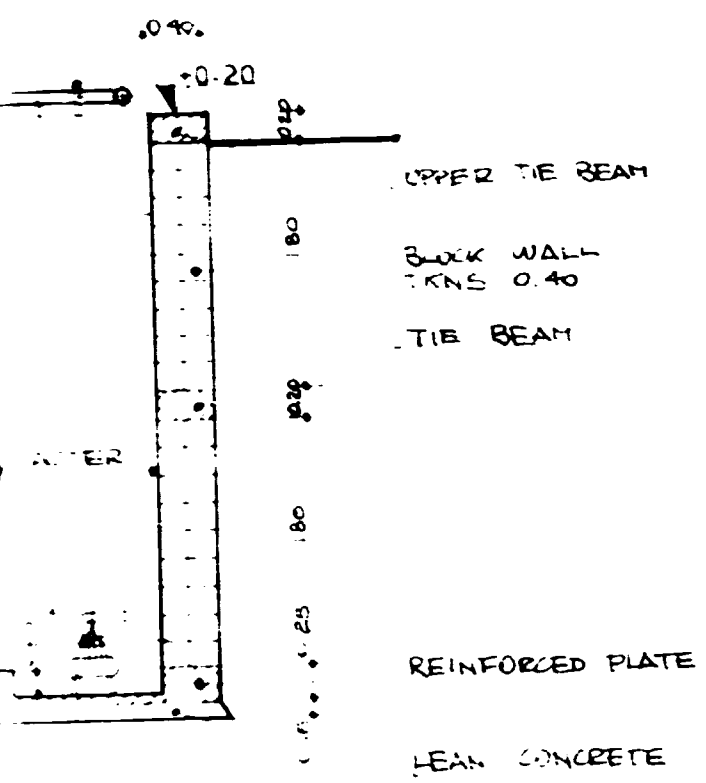
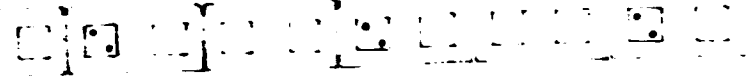


SECTION

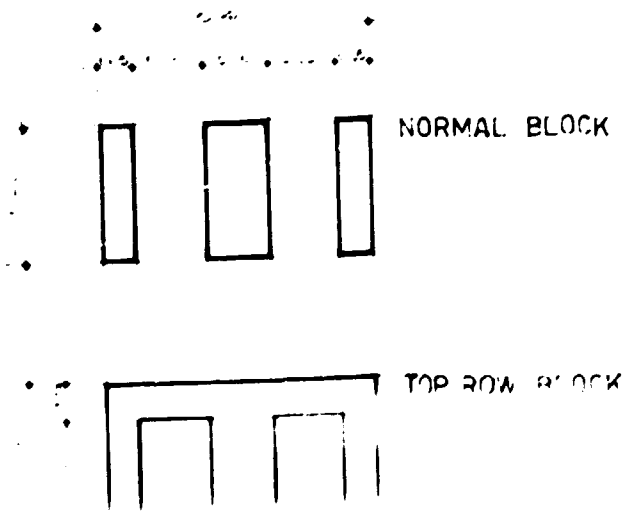
SECTION B-B

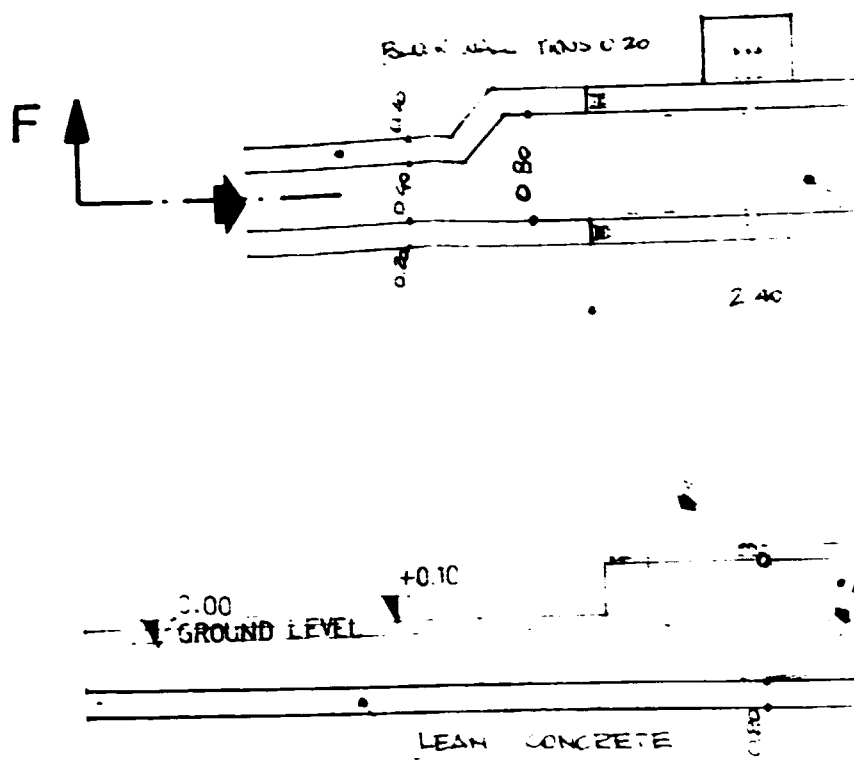


BLOCK WALL THNS 0.20 2Ø8 VERTICAL m.c.B.



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SECT 7

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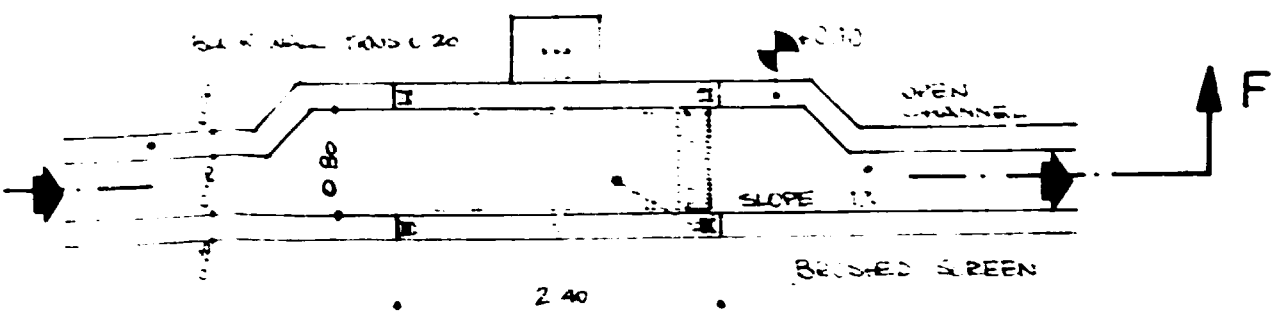
"STUDIO"
Adviser
Mr. Gius
Mr. M...

1 : 50

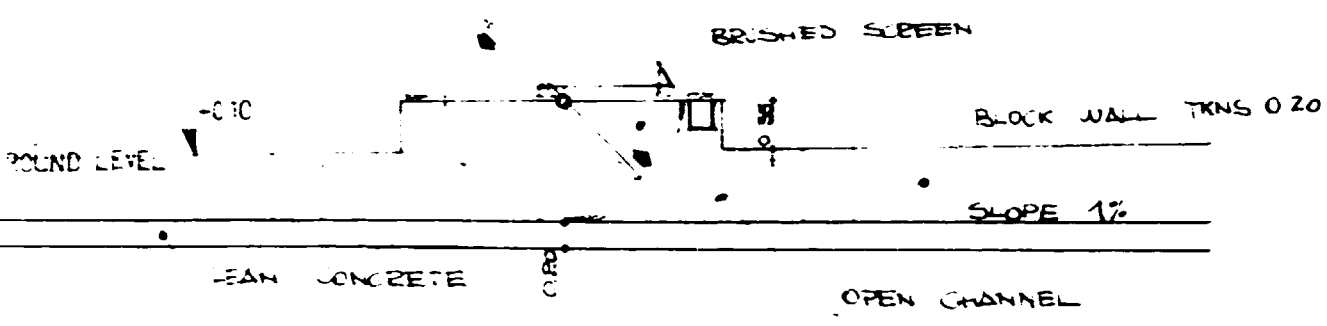
Sulph

LOCK

LOCK



SECTION F-F



CONTRACT n. 89/169: UNDO PROJECT SI/ETH/89/901

**Modjo tannery:
waste water treatment plant**

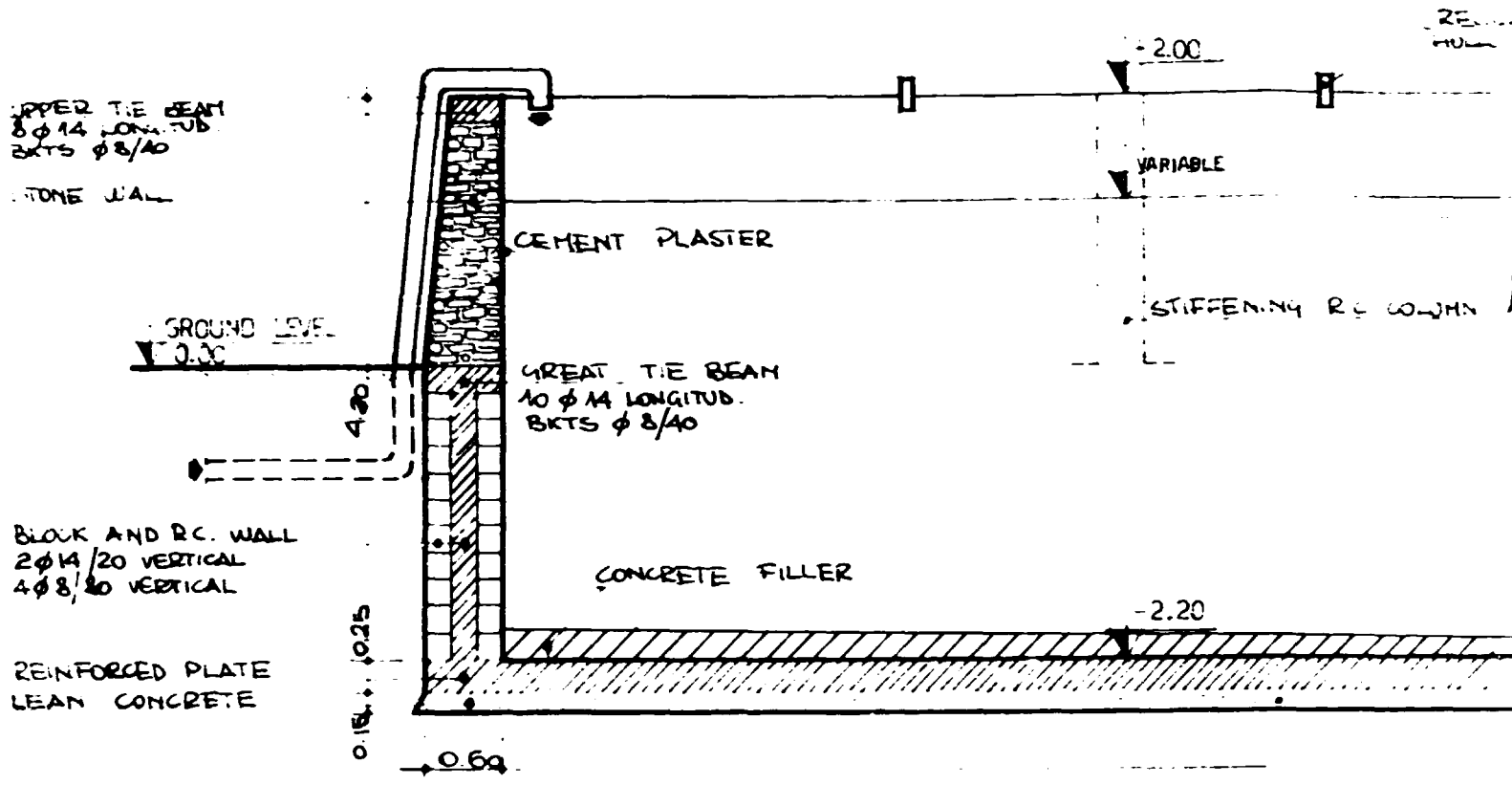
**National Leather and Shoe Corporation
Addis Ababa - Ethiopia**

"STUDIO TECNICO Dr. GIUSEPPE CLONFERO" - FLORENCE ITALY
 Advisers:
 Mr. Giuseppe Clonfero
 Mr. Mauro Carbonari

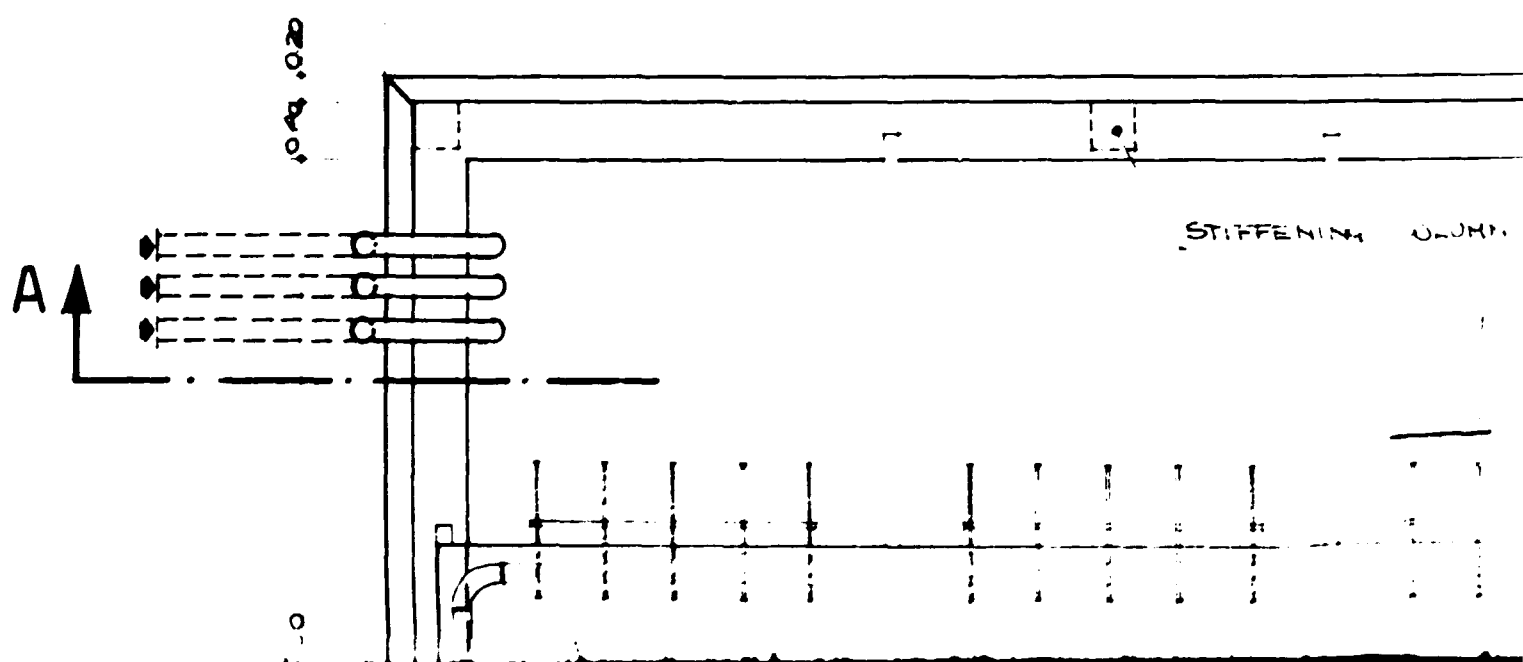
March 1990

1 : 50
Screening and grit chambers
Pumping station
Sulphide catalytic oxidation tank

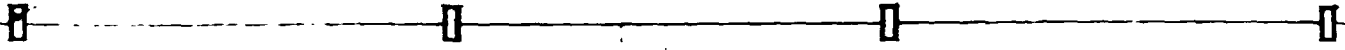
SECTION A-A



351



REMAINING
HOLLOW SECTION



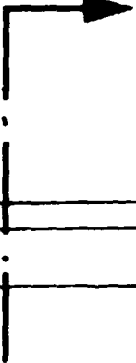
RY R. COLUMN

SLOPE 1%

22.50

WIRE MESH
φ 10 / 20x20

B

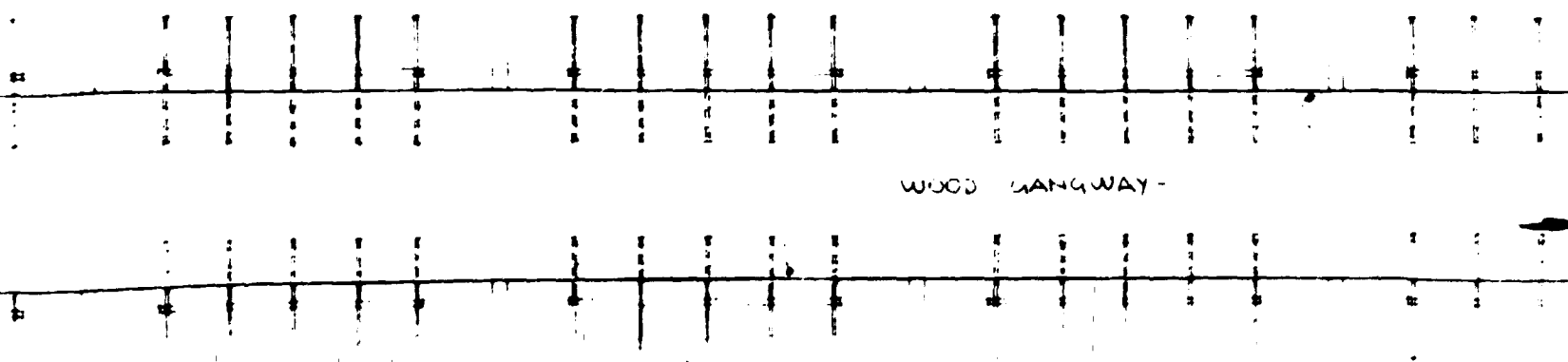


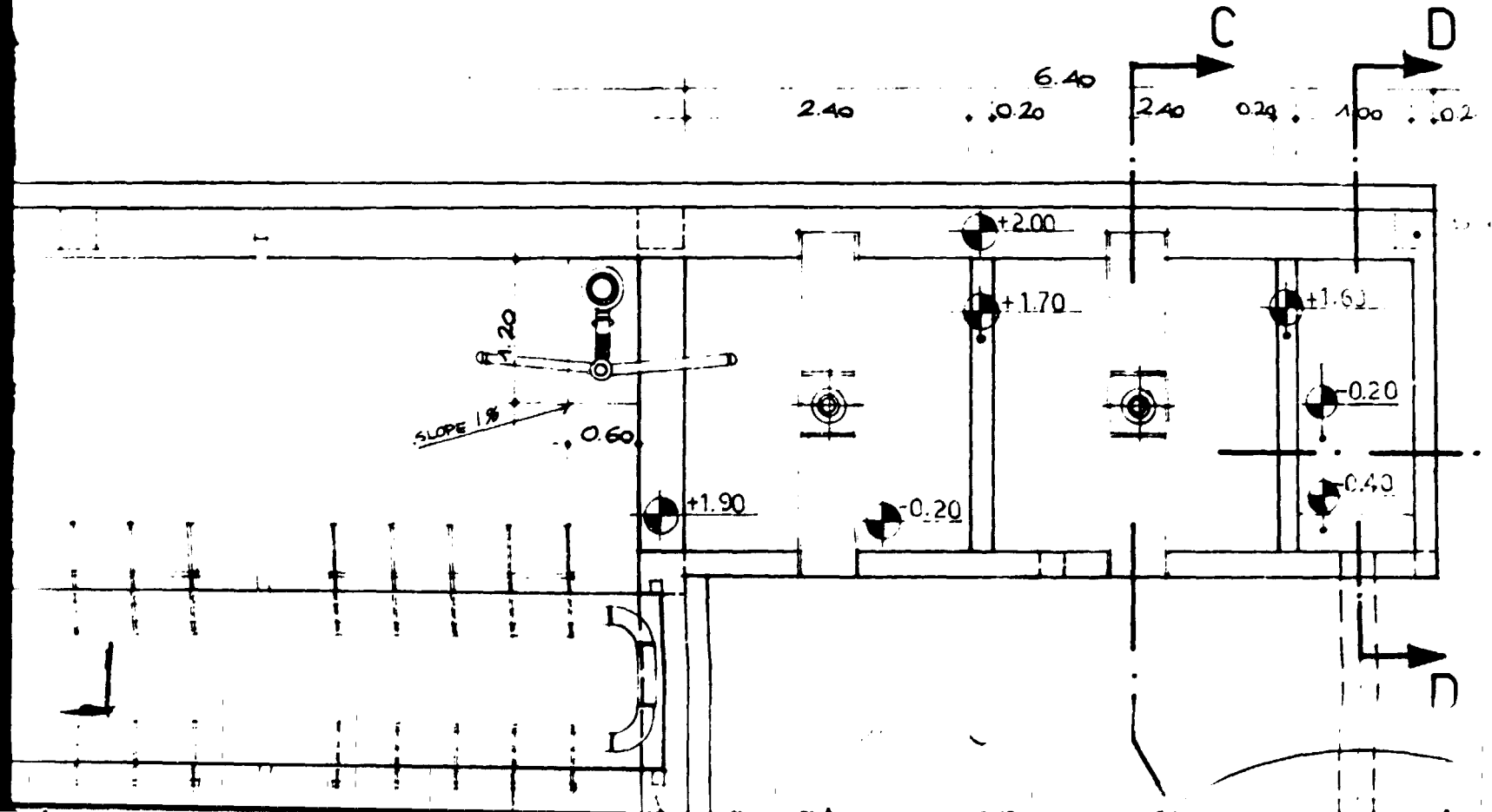
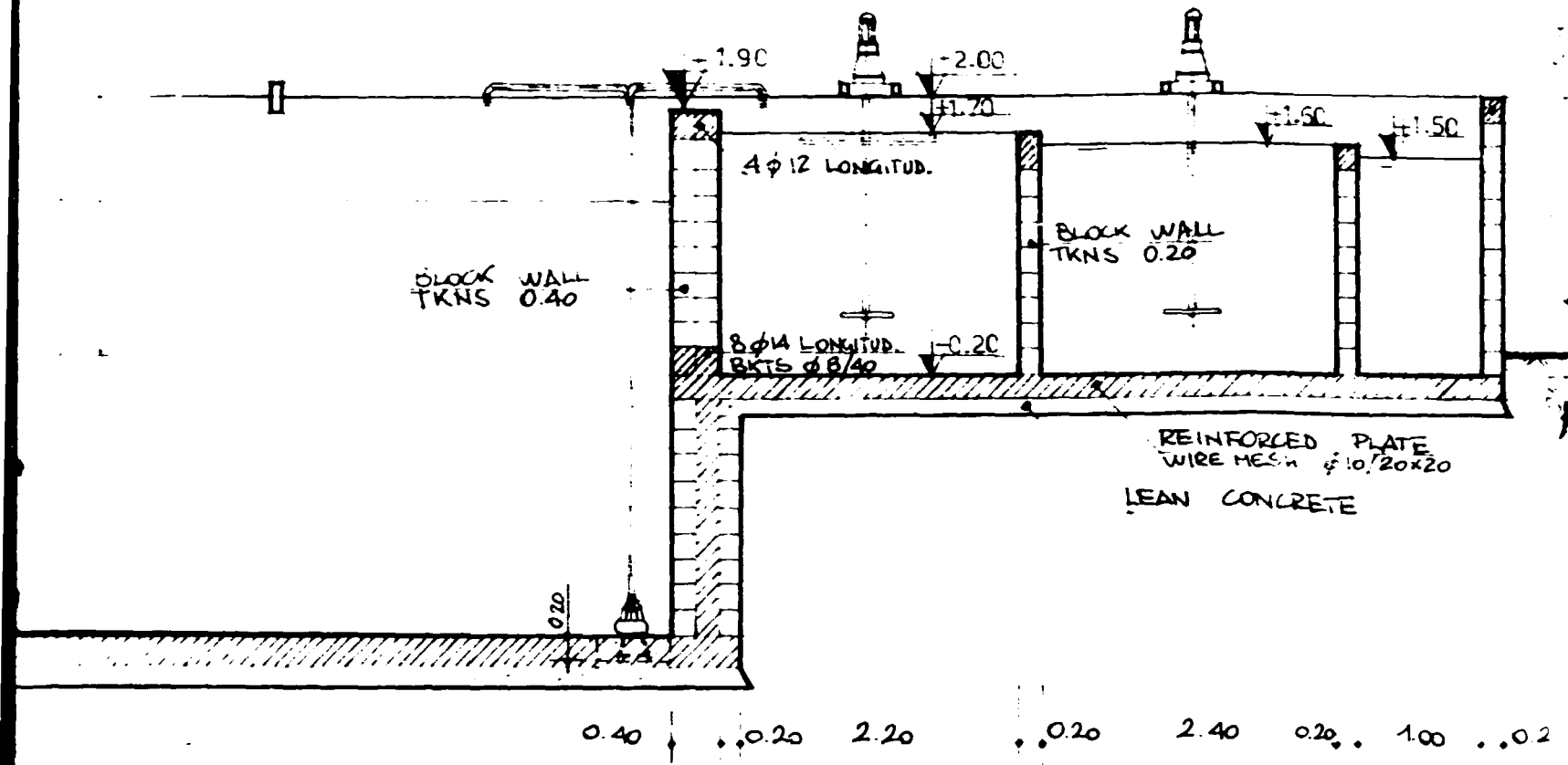
23.50

REINFORCING COLUMN

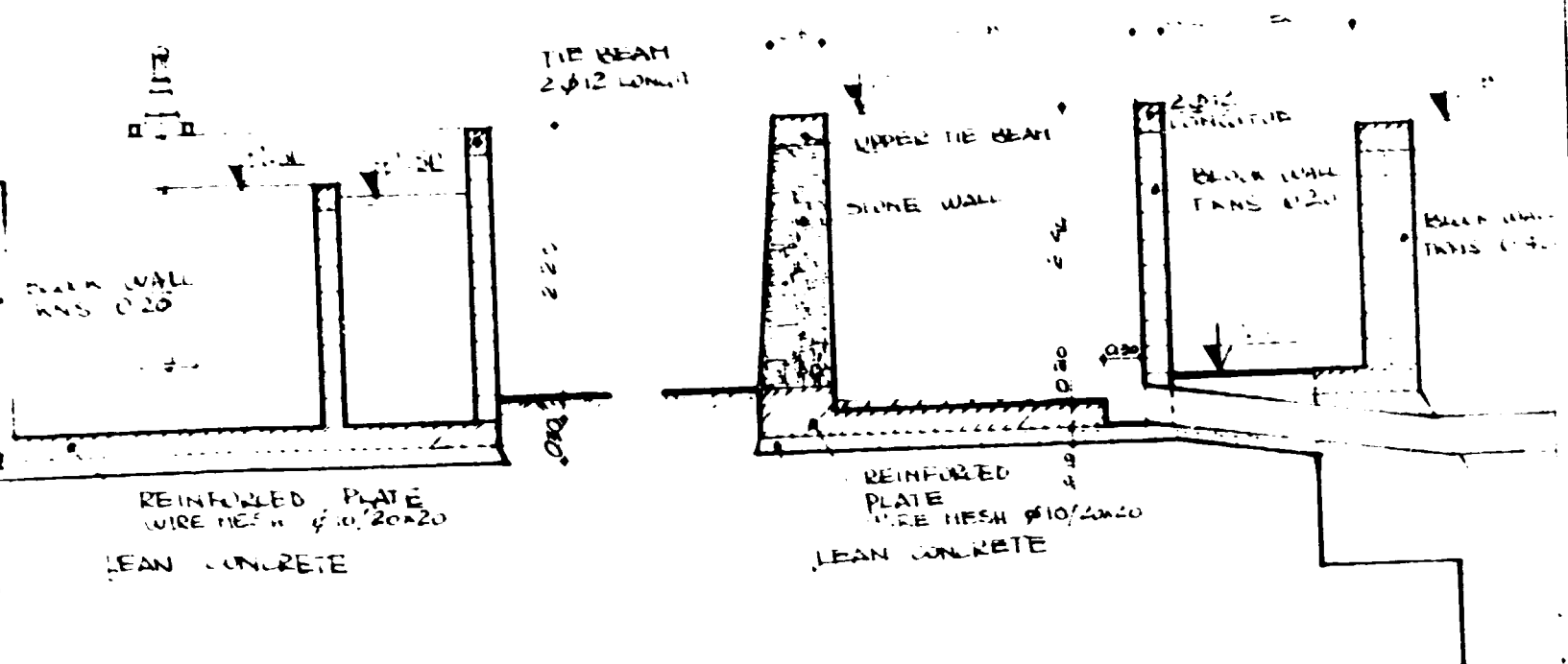
R.W.S.

WOOD GANGWAY

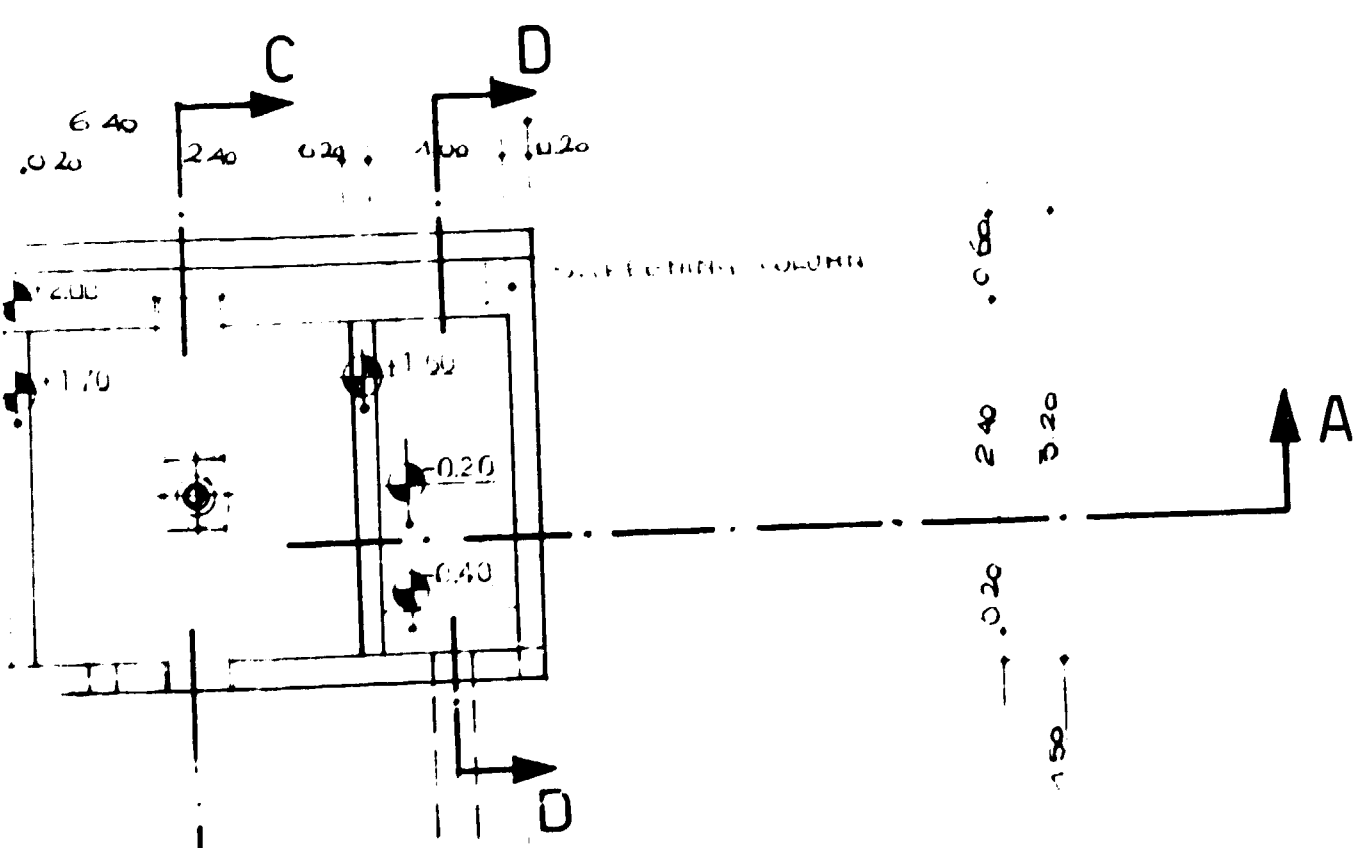


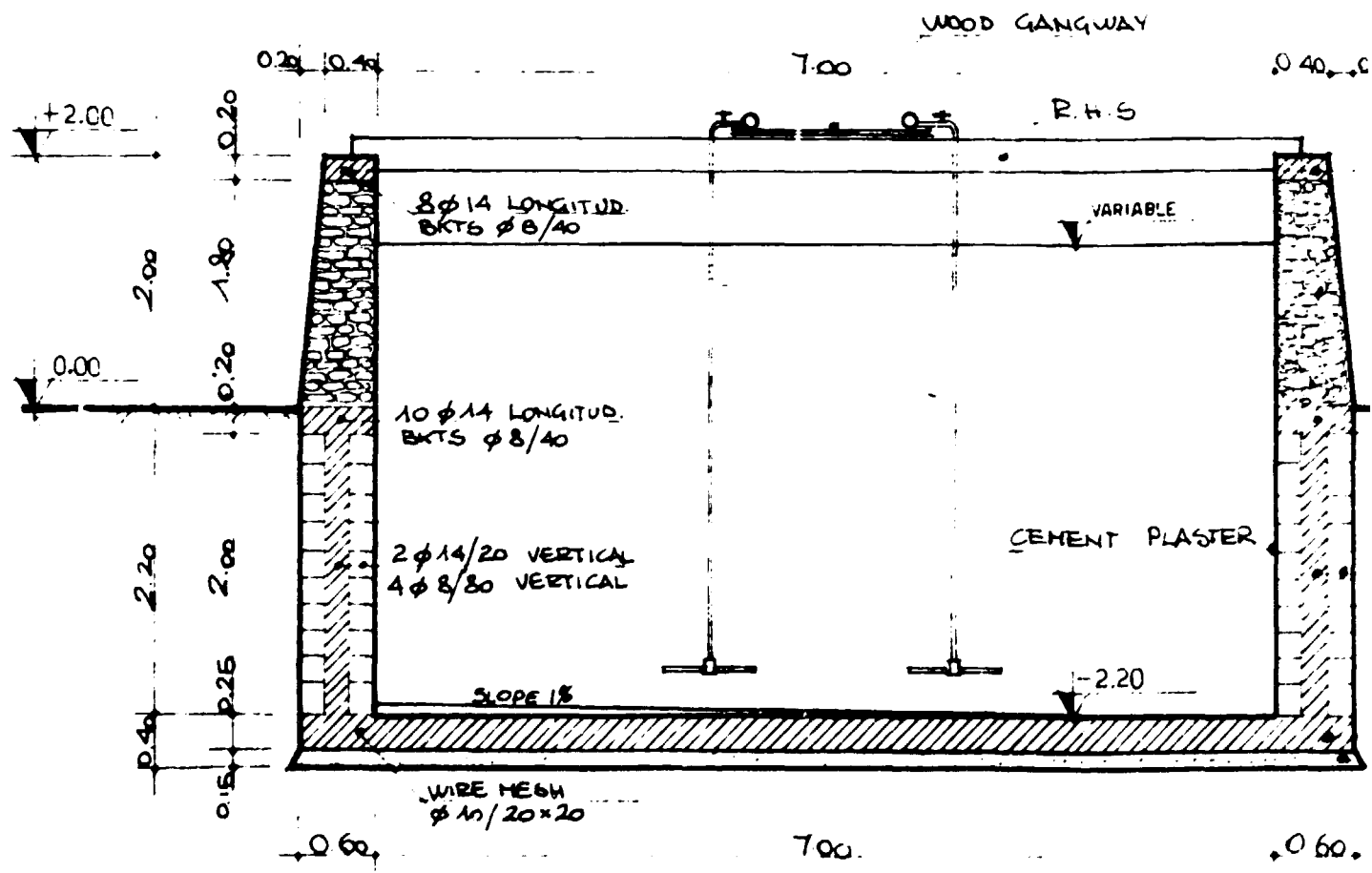
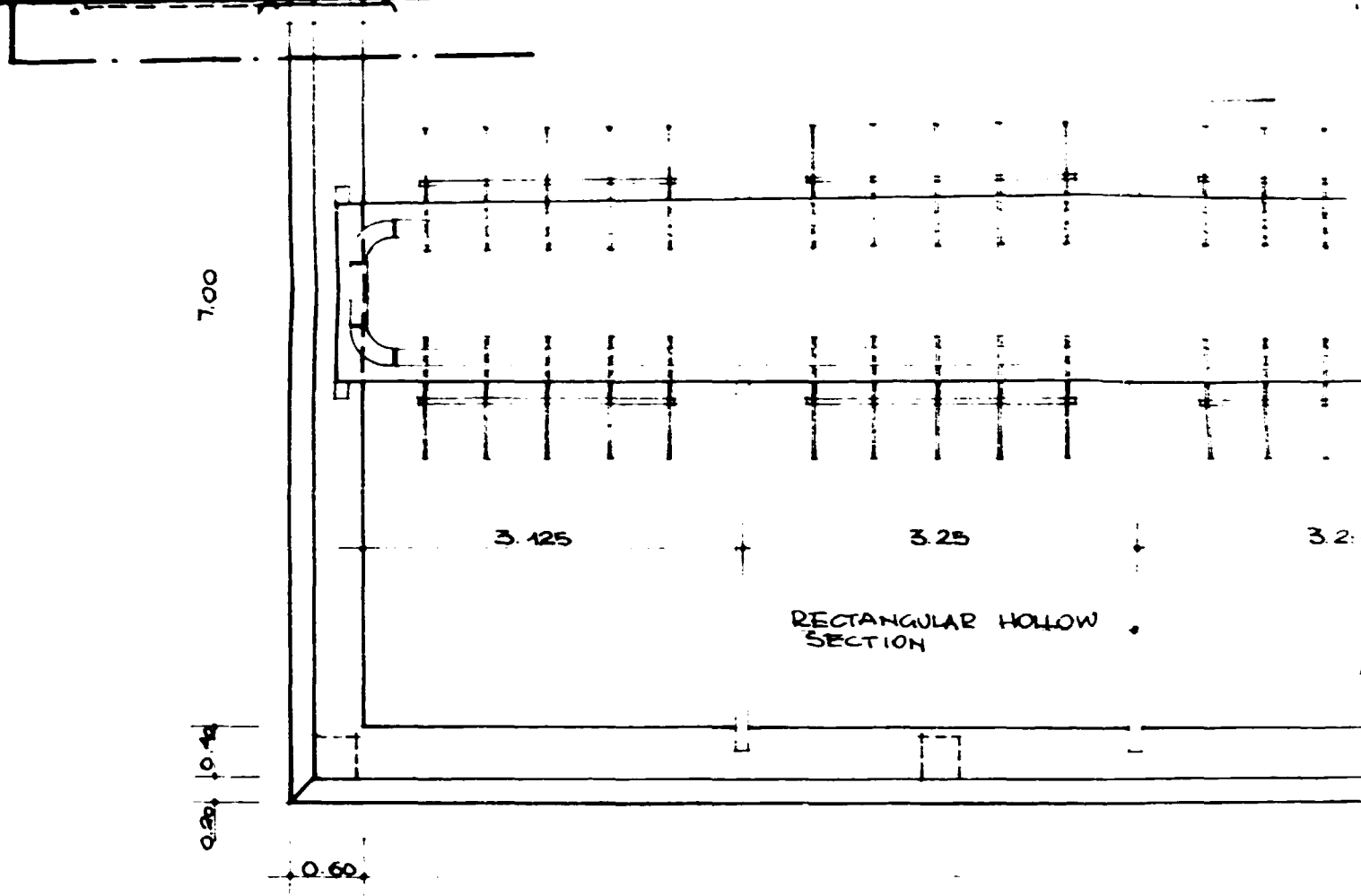


SECTION D-D

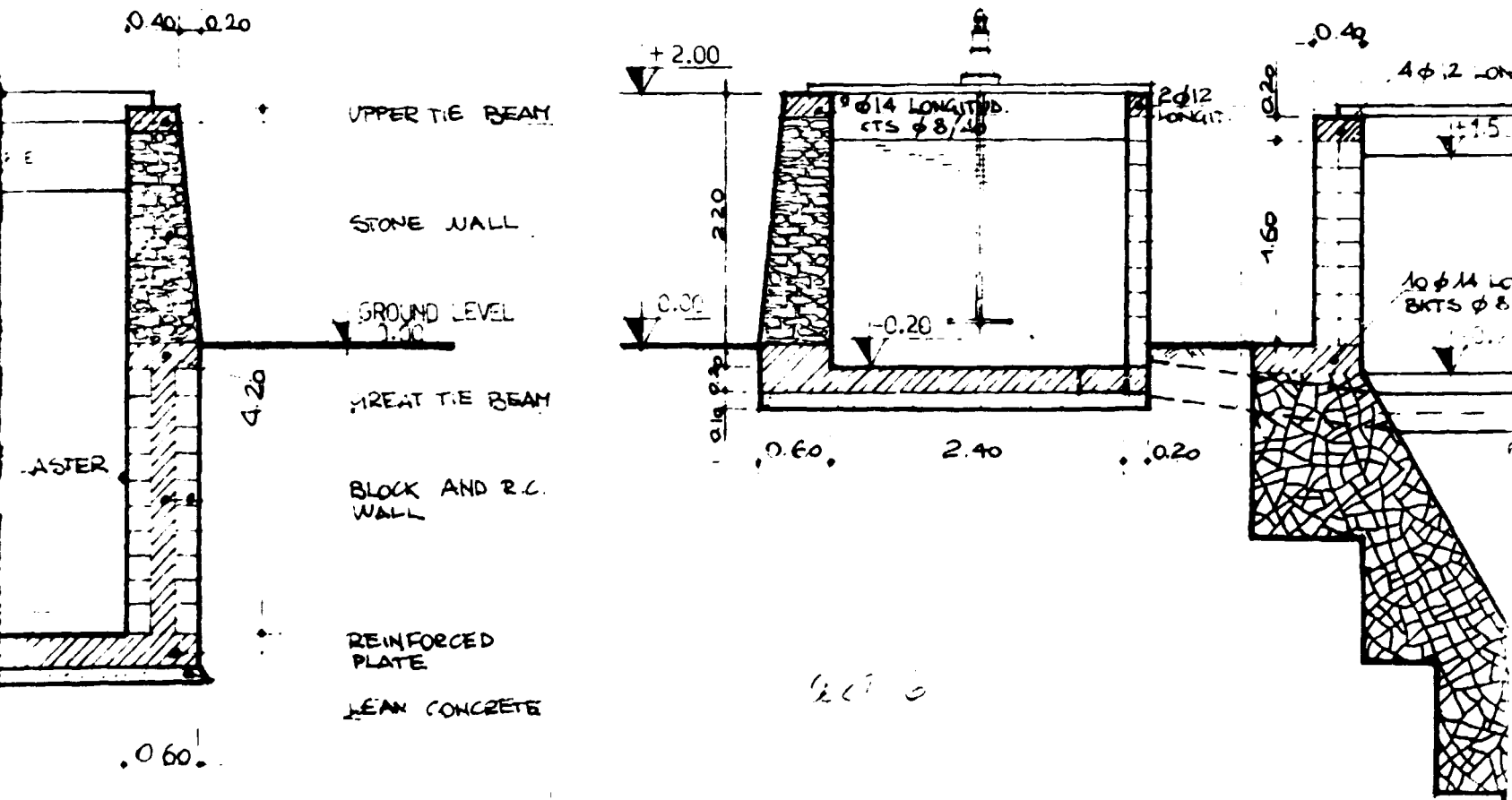
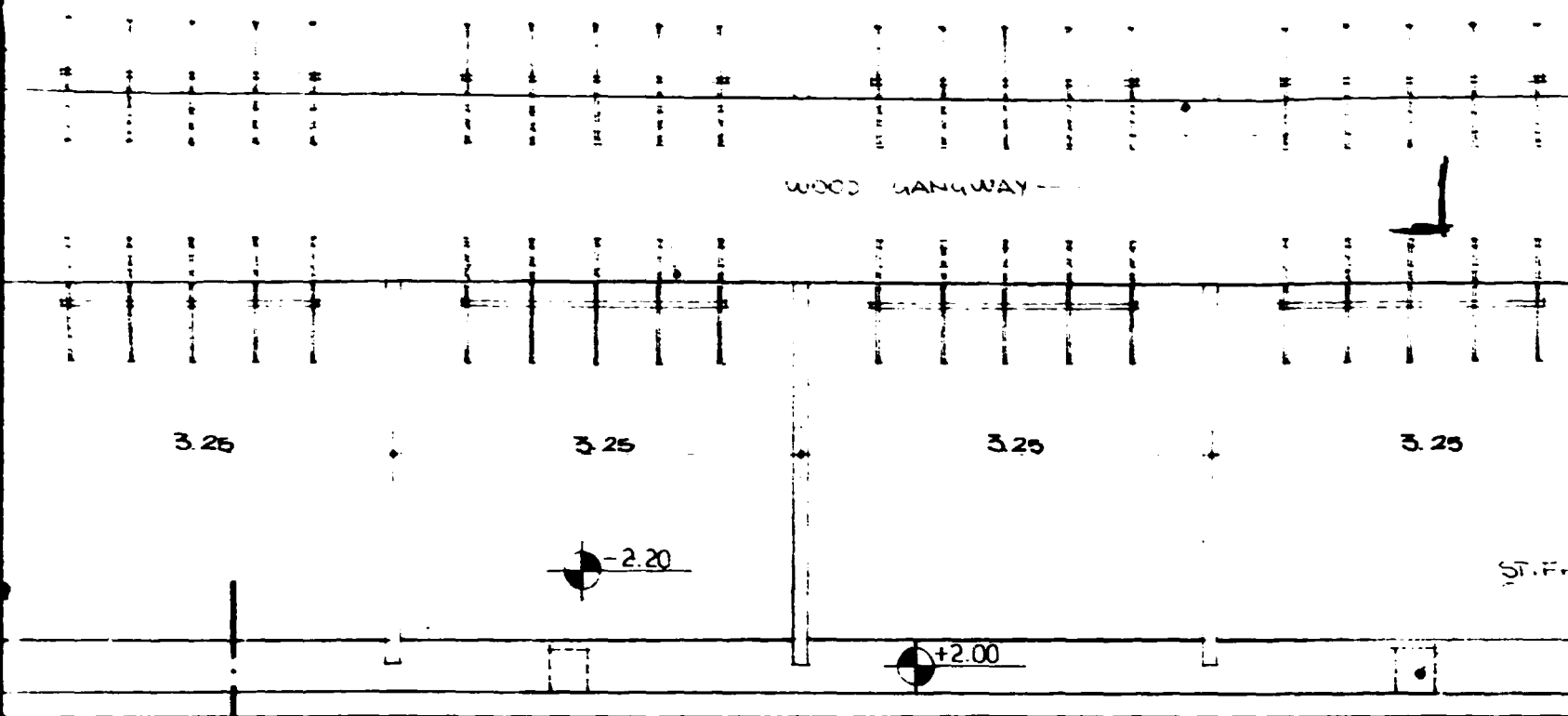


0.20 2.40 0.20 1.00 0.20

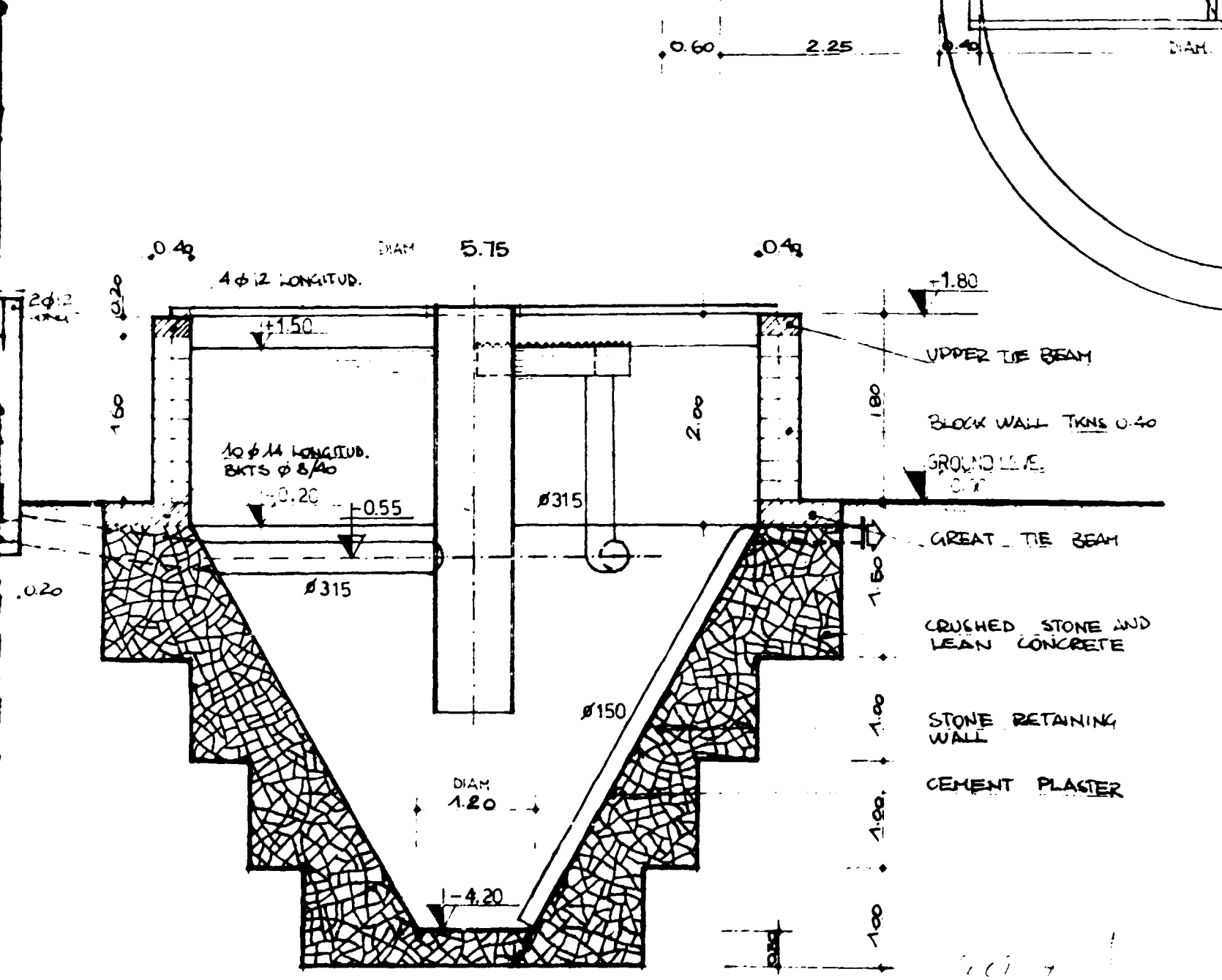
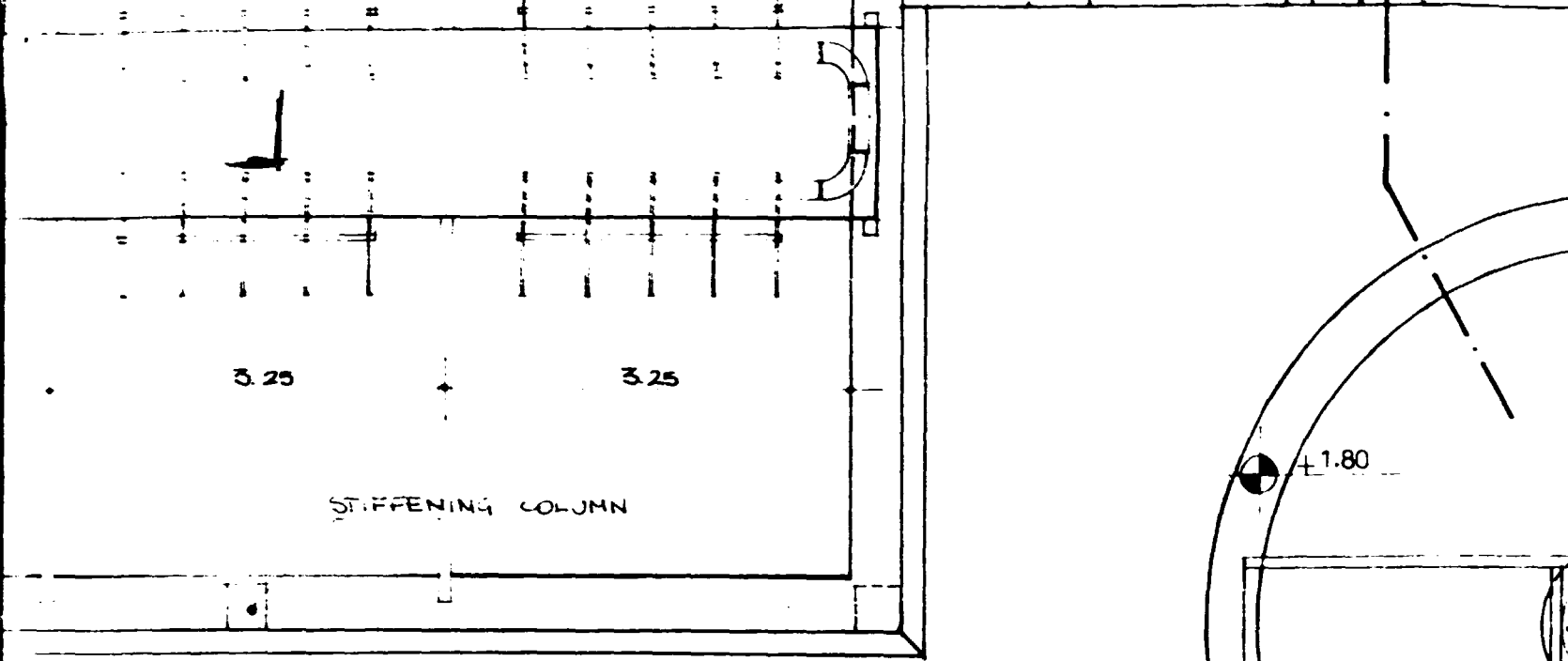




SECTION R-D



SECTION C-C

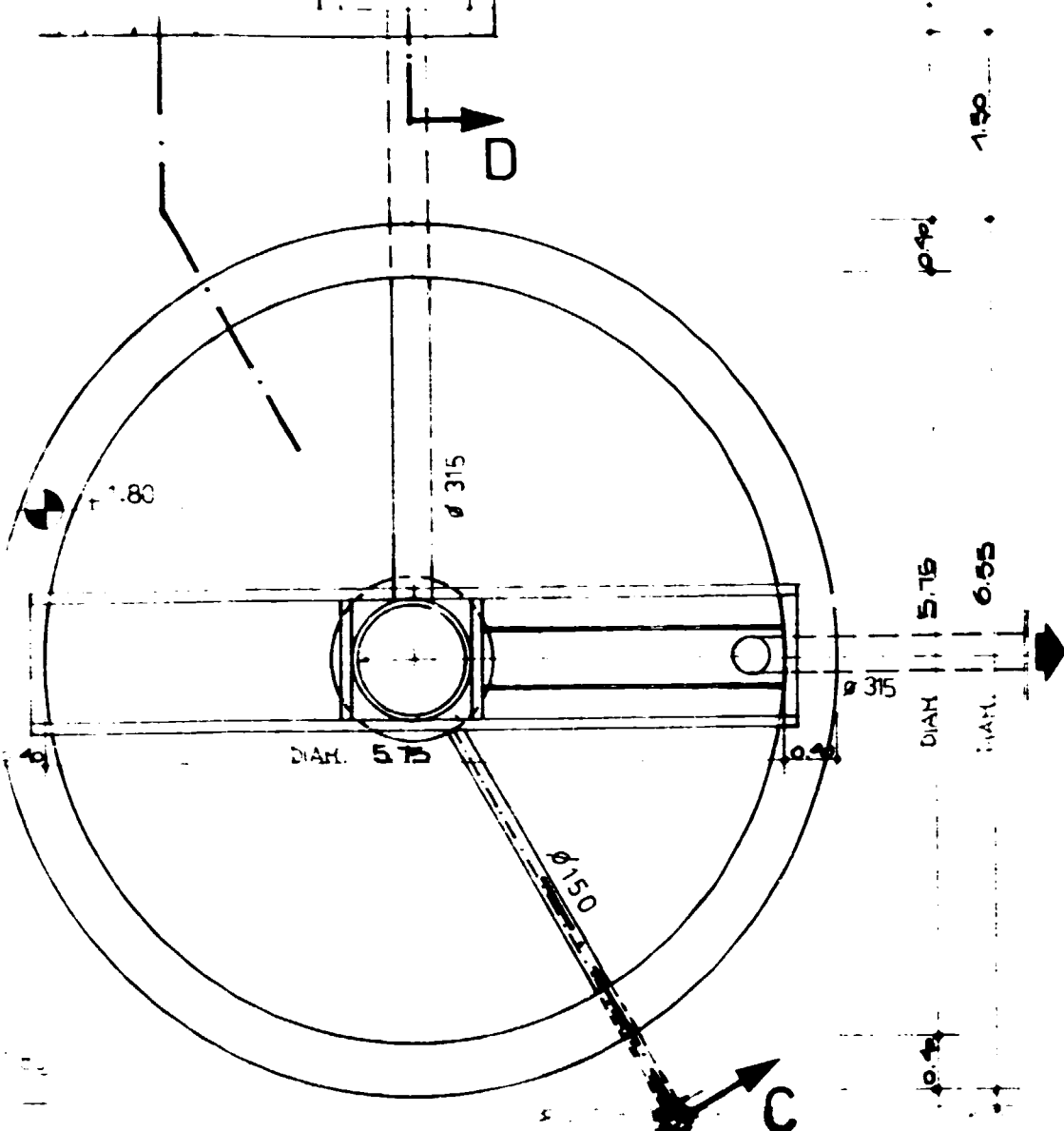


0.85, 0.60, 0.60,

DIAM 3.25

0.60, 0.60, 0.85,

- UPPER TIE BEAM
- BLOCK WALL THKNS 0.40
- GROUND LEVEL
- GREAT TIE BEAM
- CRUSHED STONE AND LEAN CONCRETE
- STONE RETAINING WALL
- CEMENT PLASTER



PER THE BEAM
 WALL THICKNESS 0.40
 BEAT THE BEAM
 FINISHED STONE AND
 AN CONCRETE
 ONE RETAINING
 ALL
 GEMENT PLASTER

CONTRACT n. 89/189: UNIDO PROJECT SI/ETH/89/901

**Modjo tannery:
 waste water treatment plant**

**National Leather and Shoe Corporation
 Addis Ababa - Ethiopia**

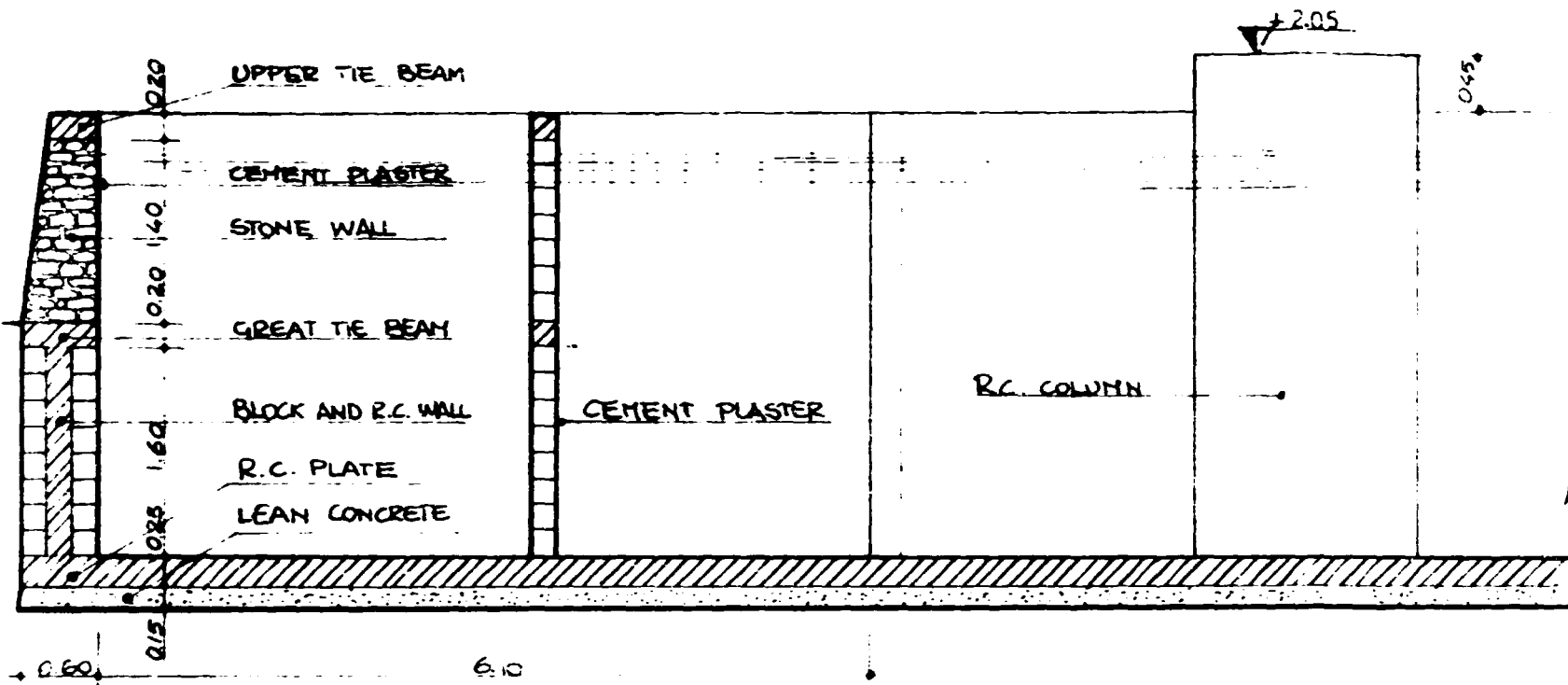
"STUDIO TECNICO S. GIUSEPPE CLOFFINO" - FLORENCE ITALY
 Architects
 Mr. Giuseppe Cloffino
 Mr. Mauro Cocchiari

March 1990

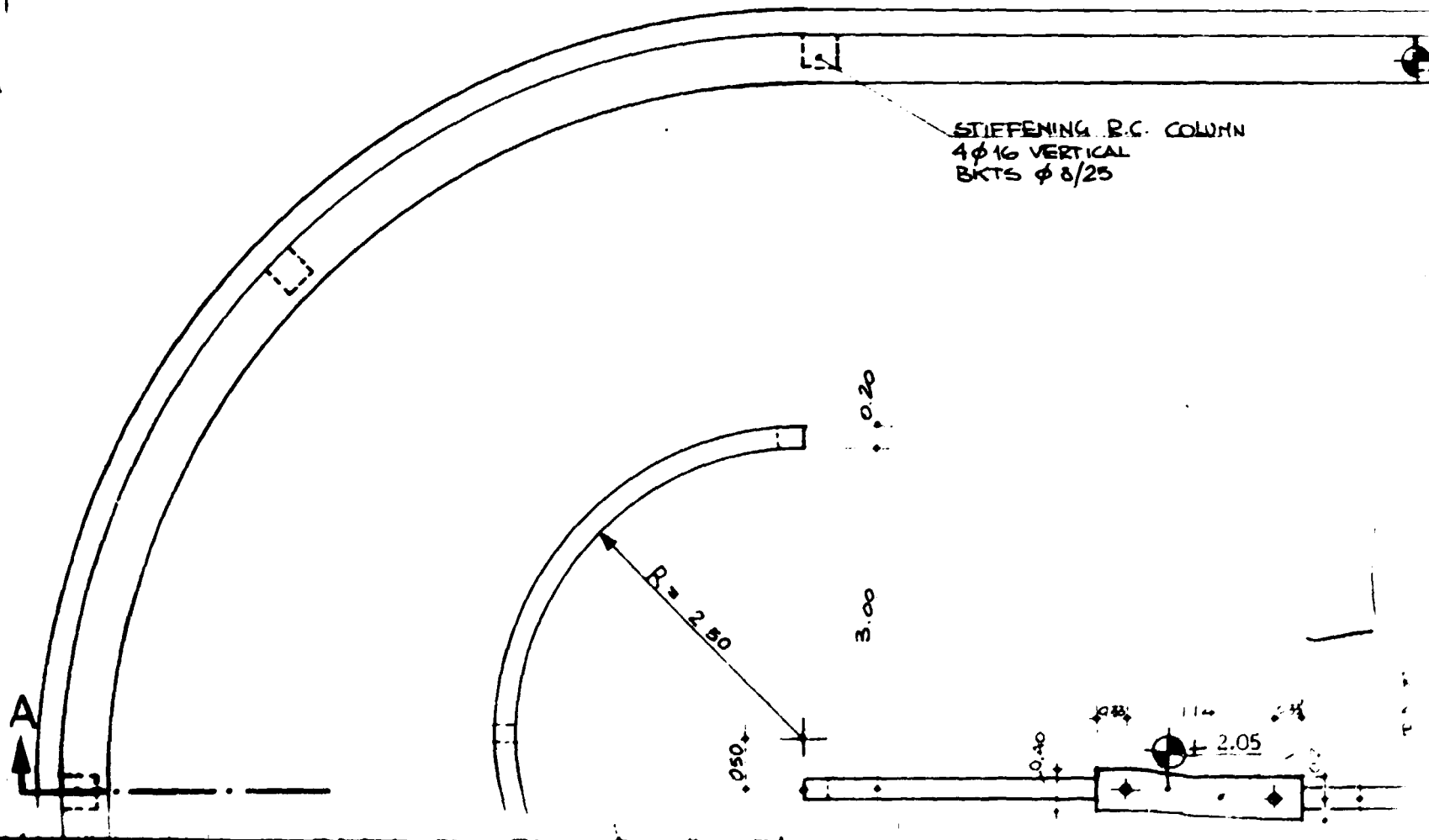
**1:30
 Homogenization tank
 Coagulation and flocculation tanks
 Primary sedimentation tank**

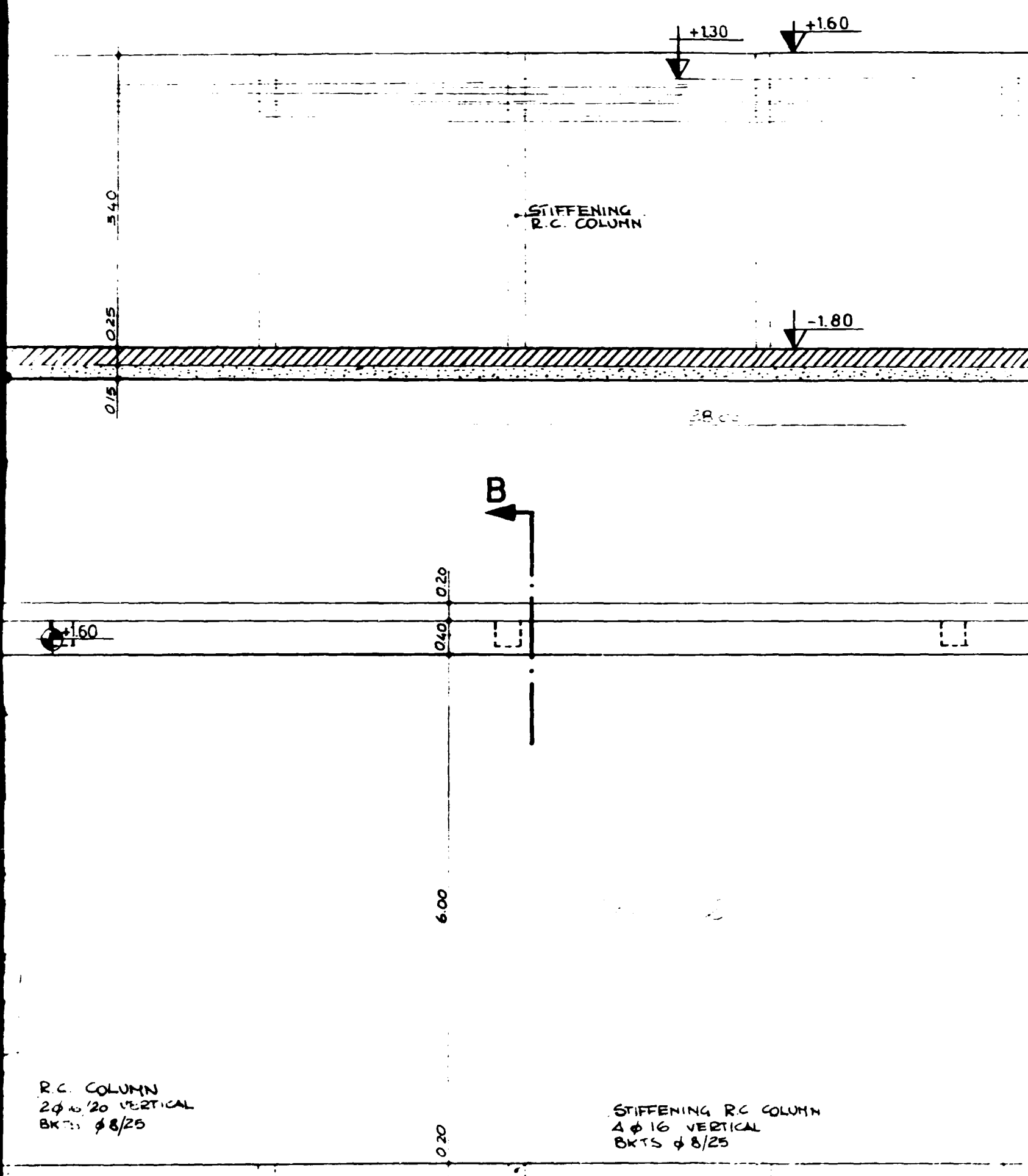
4

SECTION A-A



2-1





STIFFENING R.C. COLUMN

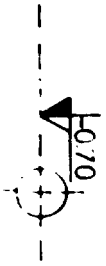
R.C. COLUMN
 2 ϕ 12 VERTICAL
 BKTS ϕ 8/25

STIFFENING R.C. COLUMN
 4 ϕ 16 VERTICAL
 BKTS ϕ 8/25

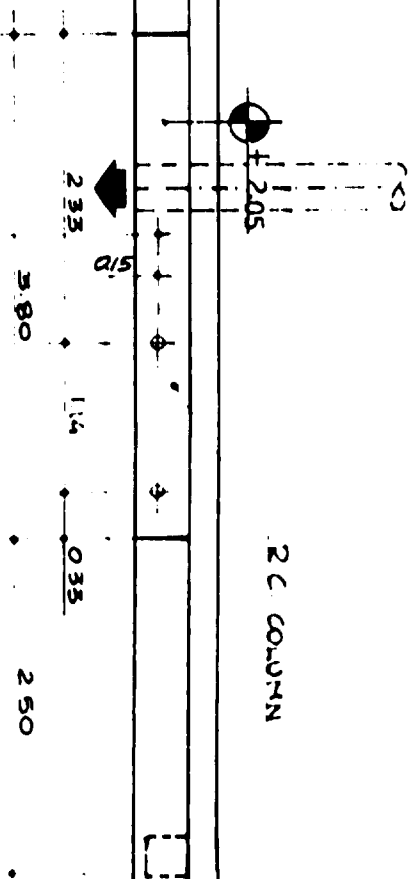
R.C. COLUMN

+2.05

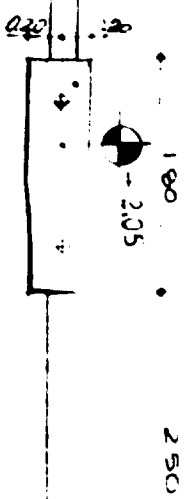
R.C. COLUMN
2φ16/20
VERTICAL



2 C COLUMN

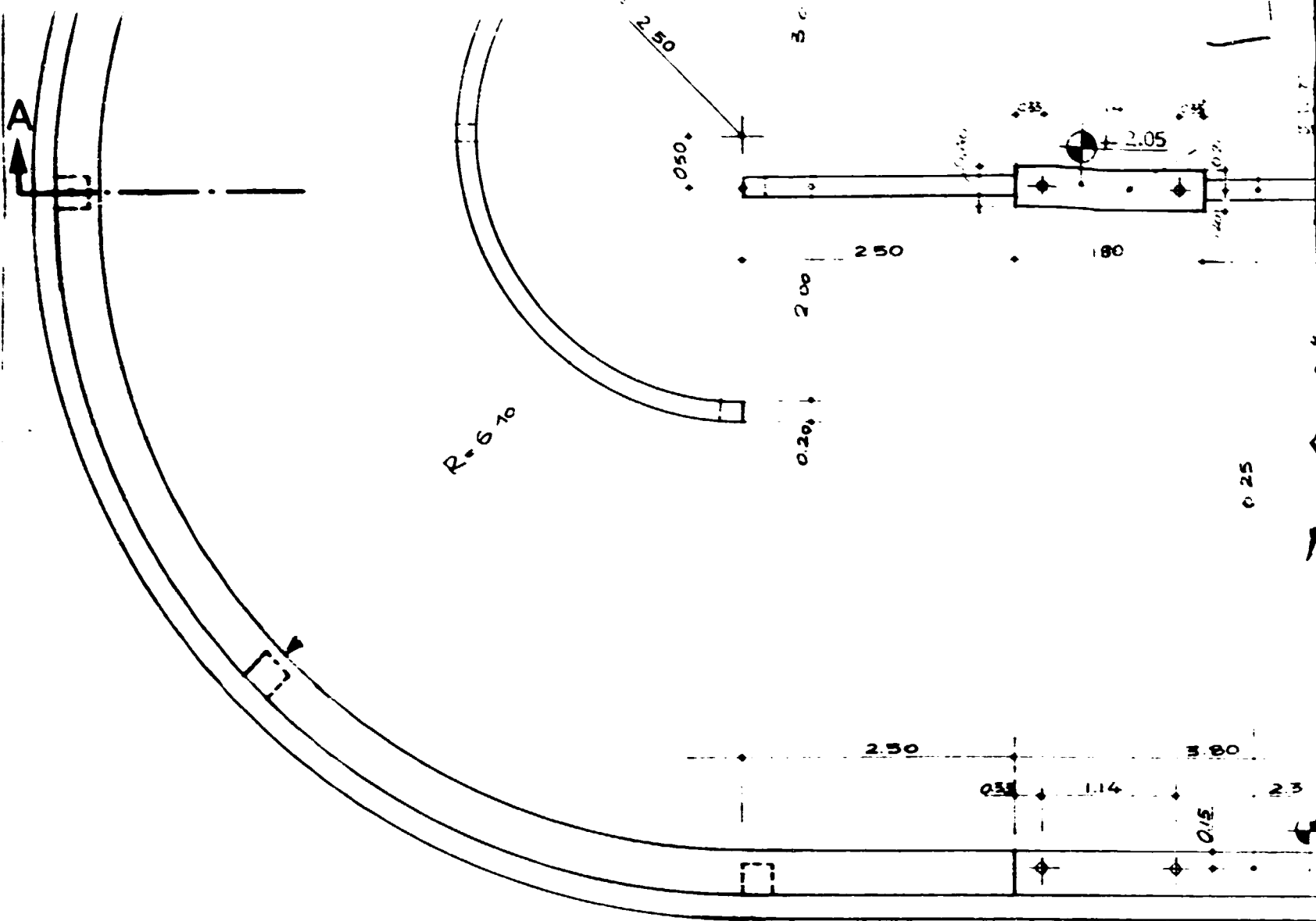


R.C. COLUMN
2φ16/20 VERTICAL
BRTS φ8/25

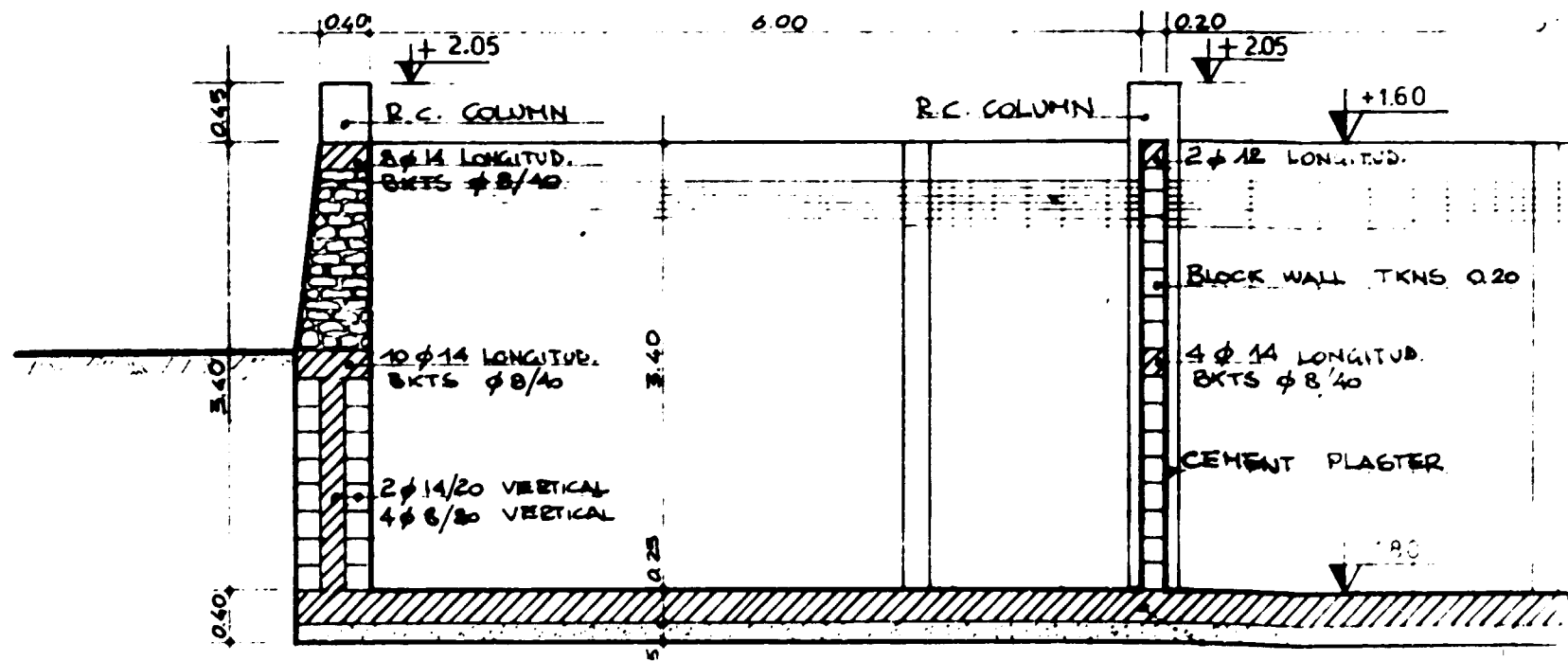


2 00





SECTION B-B



R.C. COLUMN
 2 ϕ 16/20 VERTICAL
 BKTS ϕ 8/25

STIFFENING R.C. COLUMN
 4 ϕ 16 VERTICAL
 BKTS ϕ 8/25

14.40

0.20

6.00

2.33

+2.05

R.C. COLUMN
 2 ϕ 16/20 VERTICAL
 BKTS ϕ 8/25

STIFFENING R.C. COLUMN
 4 ϕ 16 VERTICAL
 BKTS ϕ 8/25

0.40

0.20

41.40

B

6.00

0.40

BKTS ϕ 8/40
 $l = 1.15$

+1.30

1.20

- 0.20 UPPER TIE BEAM
- 1.40 STONE WALL
- 0.20 GROUND LEVEL 0.00
- 1.60 GREAT TIE BEAM
- 0.25 BLOCK AND R.C. WALL
- 5.00 R.C. PLATE
- LEAN CONCRETE

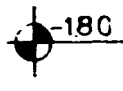
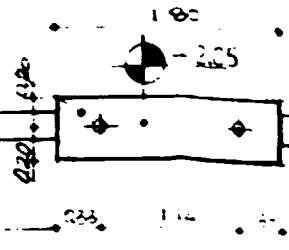
2.00

DETAIL

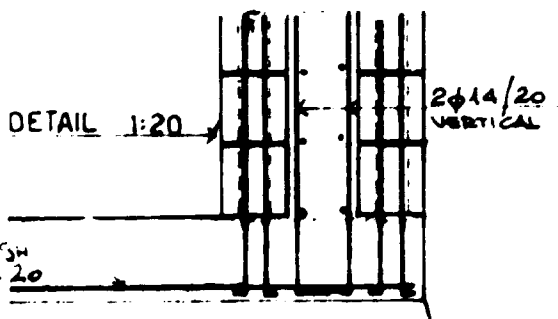
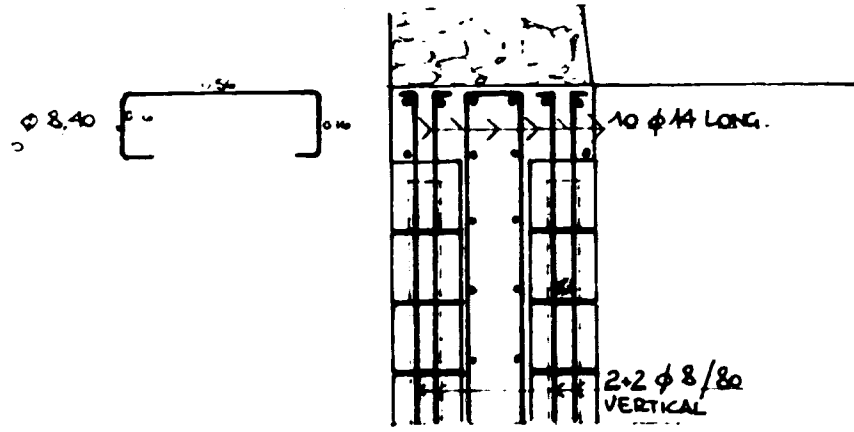
W. RE. TIE IN
 ϕ 10/20x20

R.C COLUMN
 2φ16/20 VERT. CAL
 BKTS φ8/25

250



COLUMN



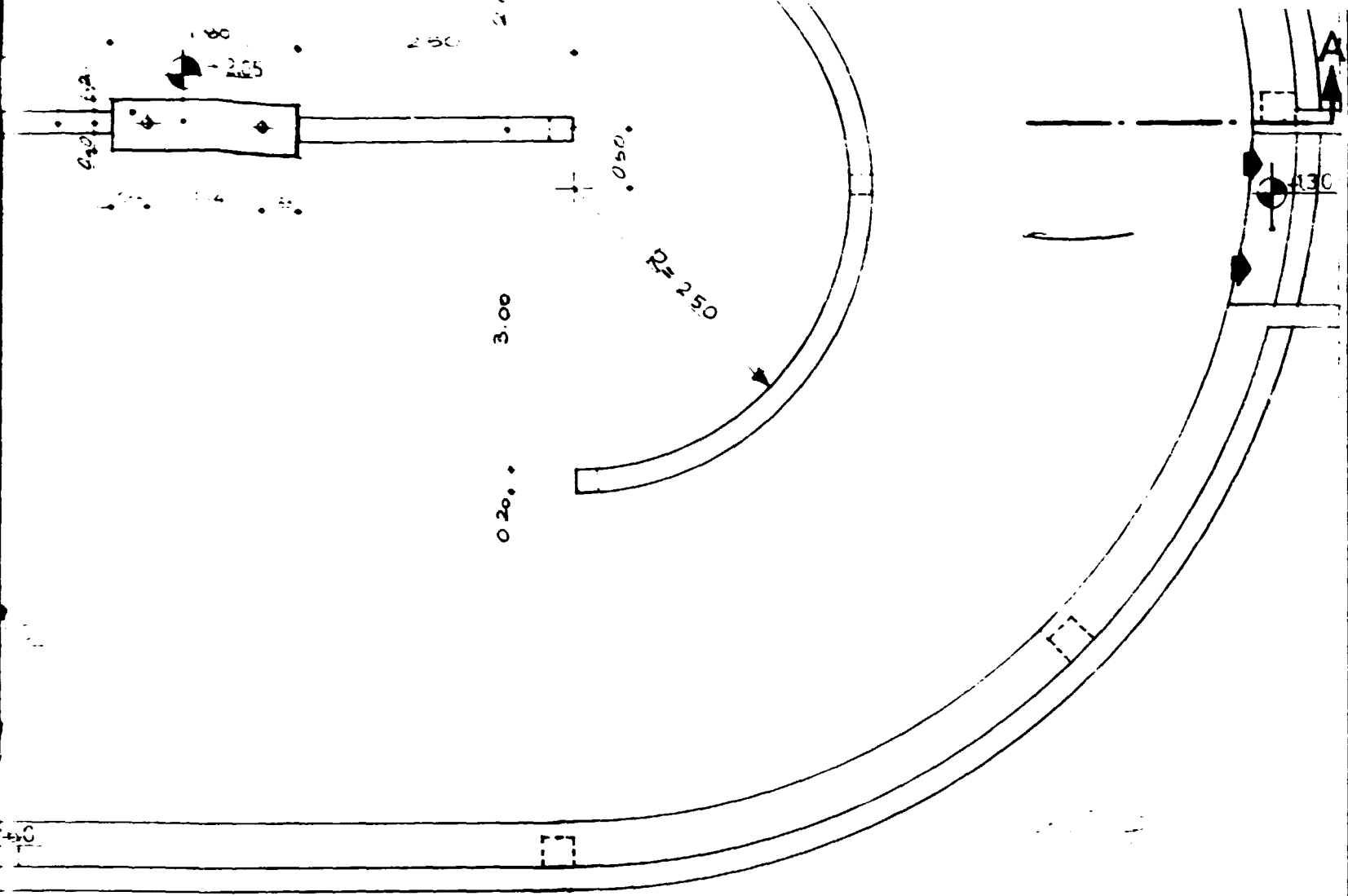
CONTRACT

Mod
 wast

Nation
 Addis

"STUDIO"
 Advisers
 Mr. Gluse
 Mr. Maur

1 : 50



CONTRACT n. 89/169: UNIDO PROJECT SI/ETH/89/901

**Modjo tannery:
waste water treatment plant**

**National Leather and Shoe Corporation
Addis Ababa - Ethiopia**

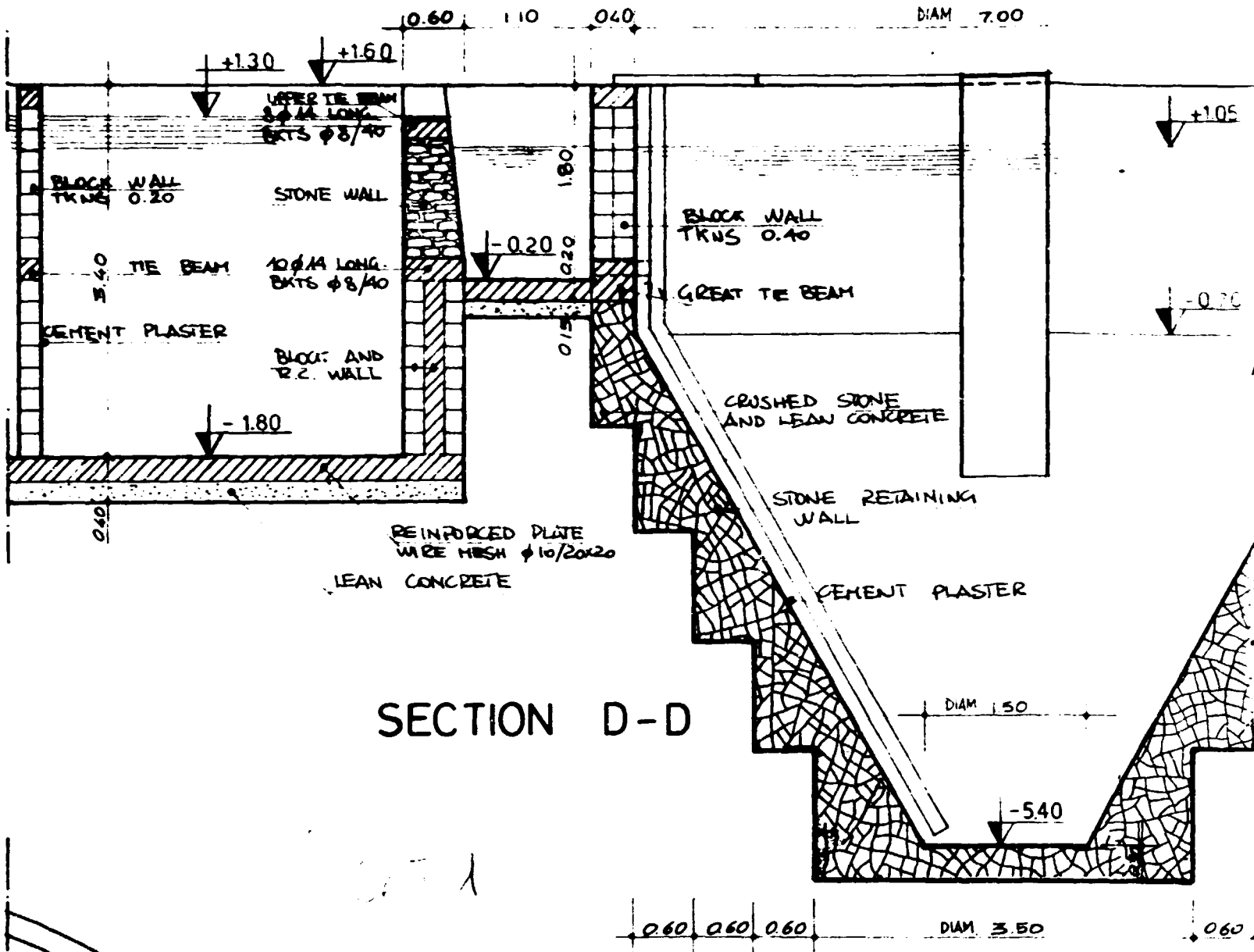
"STUDIO TECNICO Dr. GIUSEPPE CLONFERO" - FLORENCE ITALY

**Advisers
Mr. Giuseppe Clonfero
Mr. Mauro Carbonari**

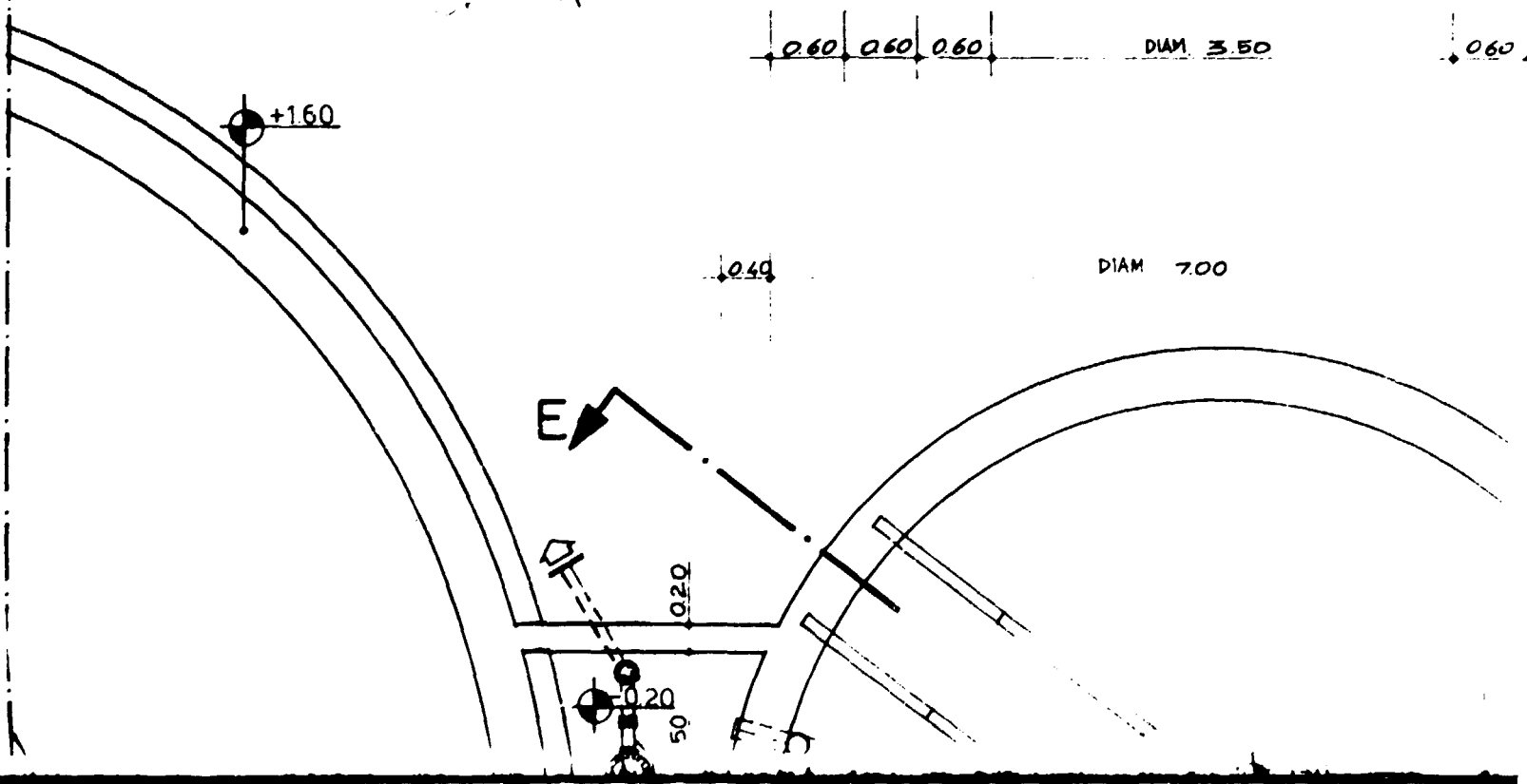
March 1990

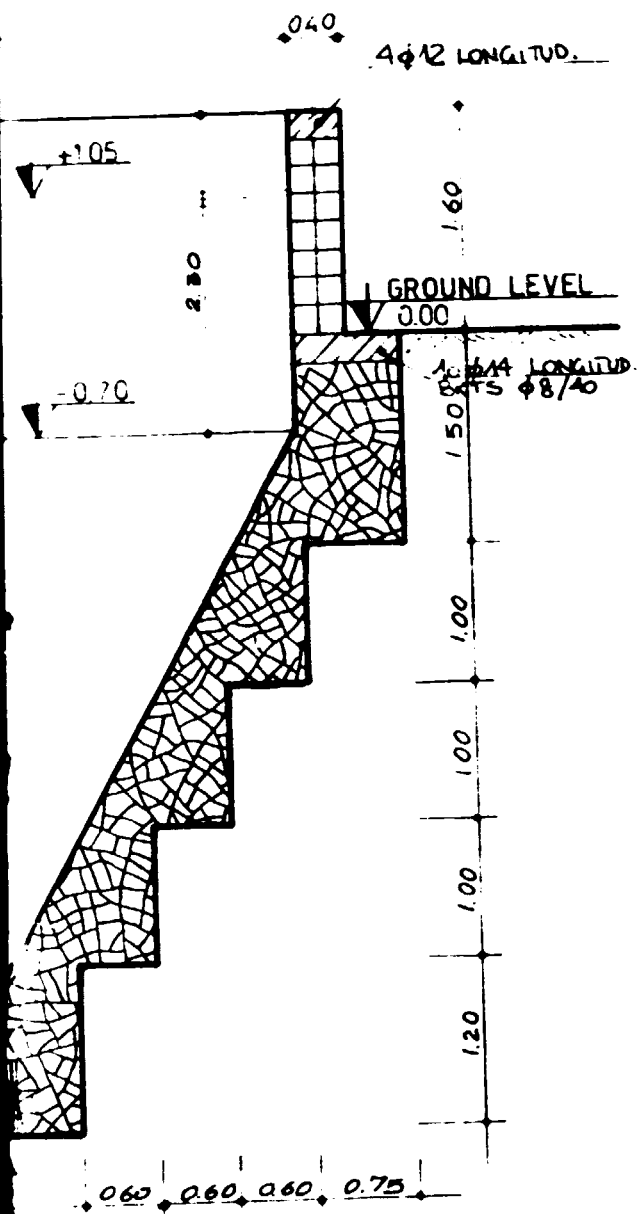
**1 : 50
Biological oxidation ditch**

5

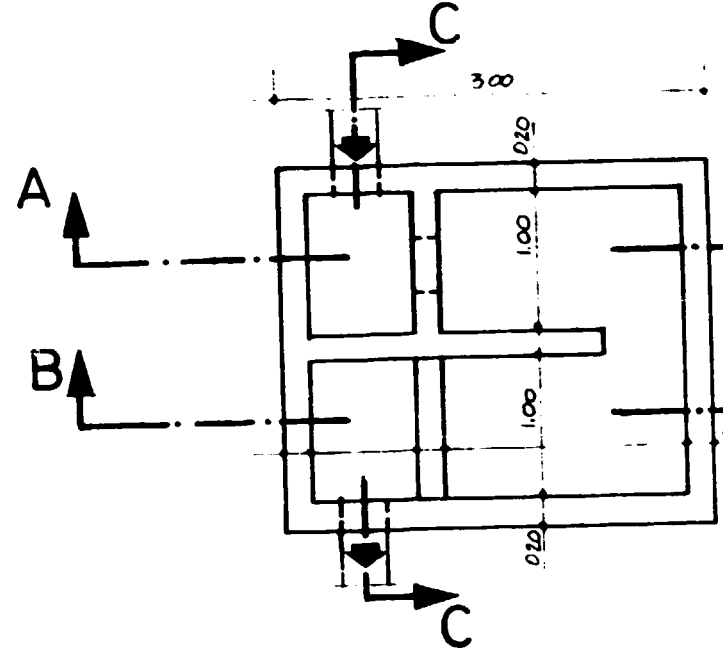


SECTION D-D

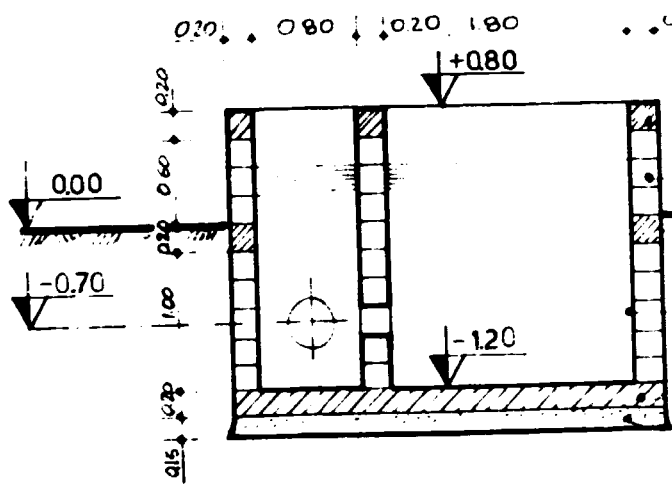




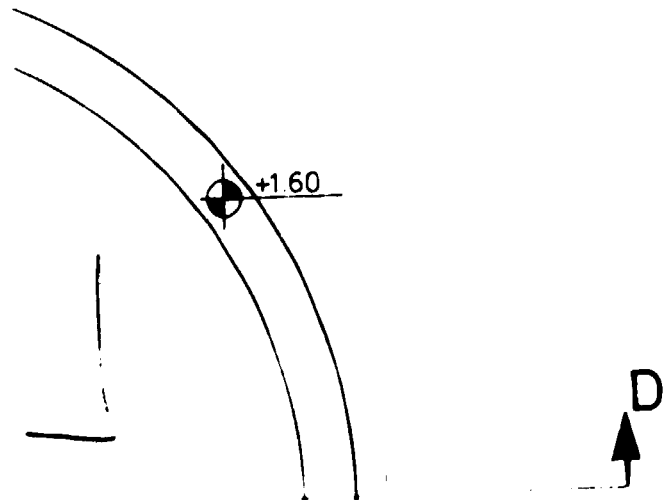
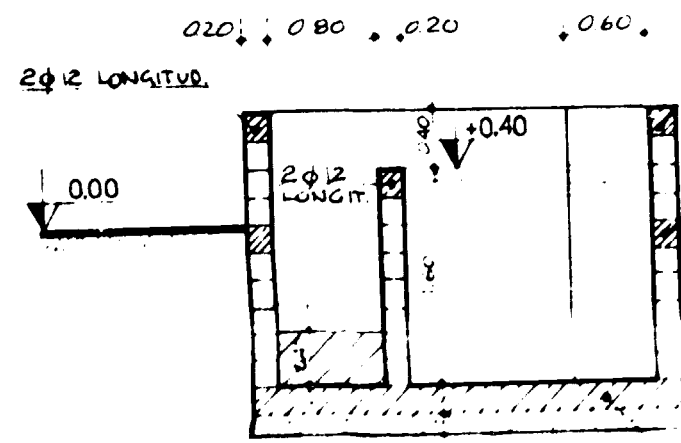
CHLORINATION TANK



SECTION A-A

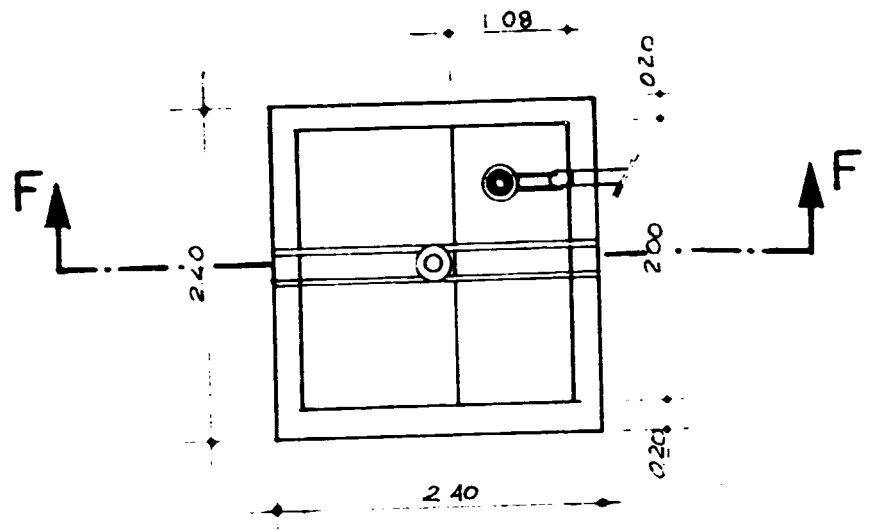
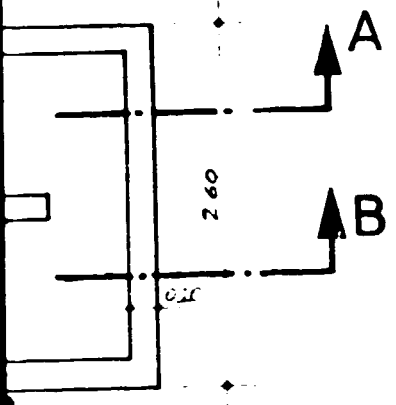


SECTION B-B

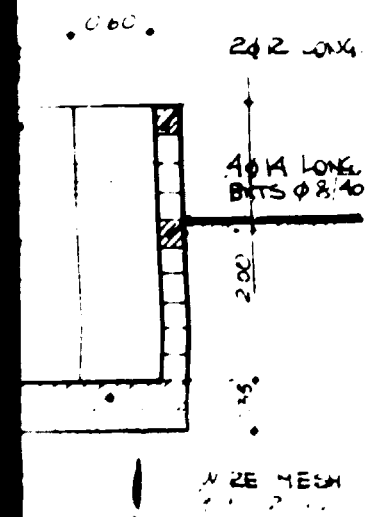
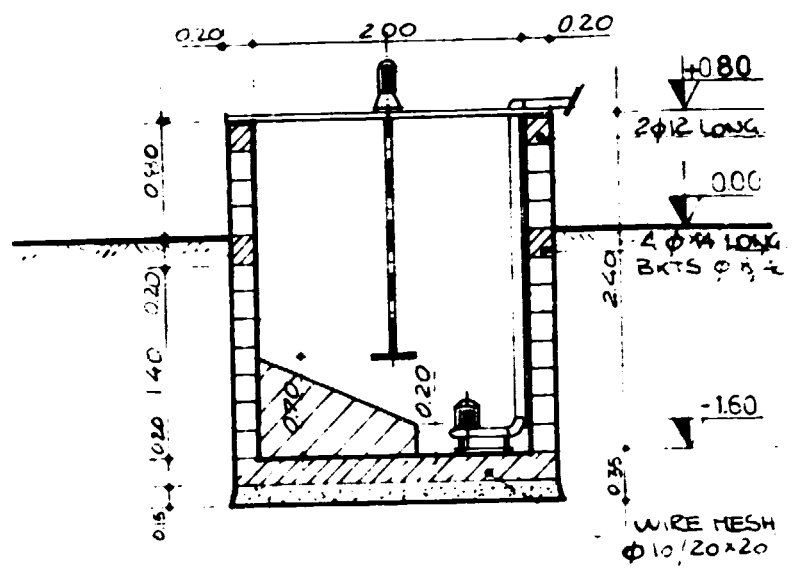
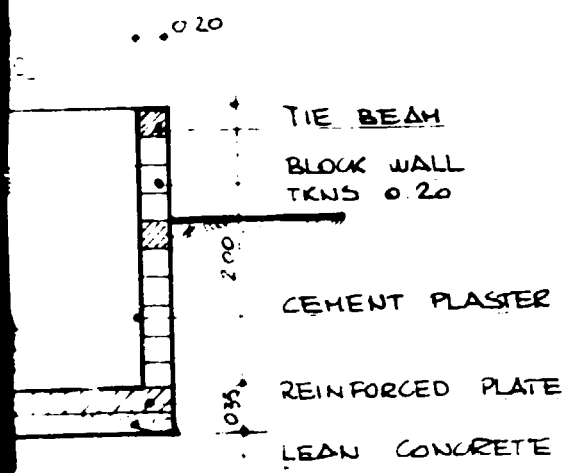


INK

LIME-MILK TANK

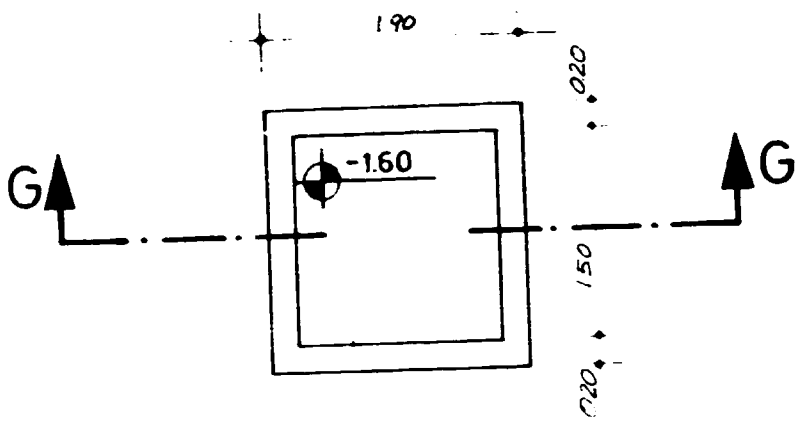
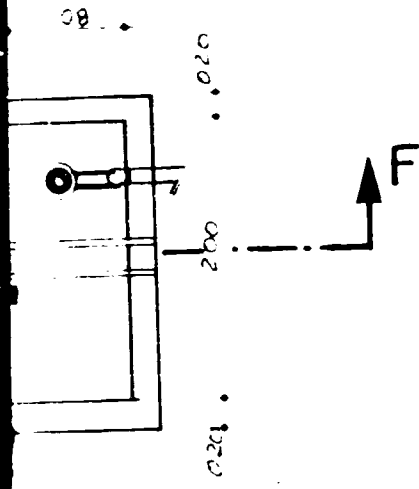


SECTION F-F

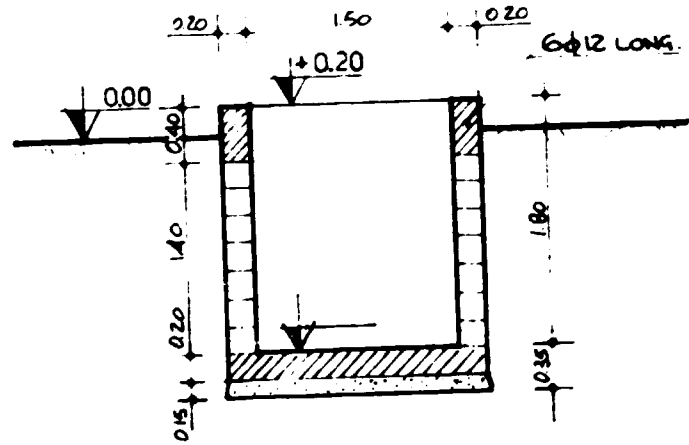
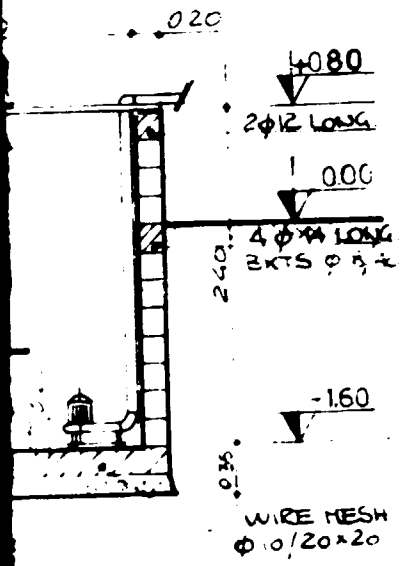


K

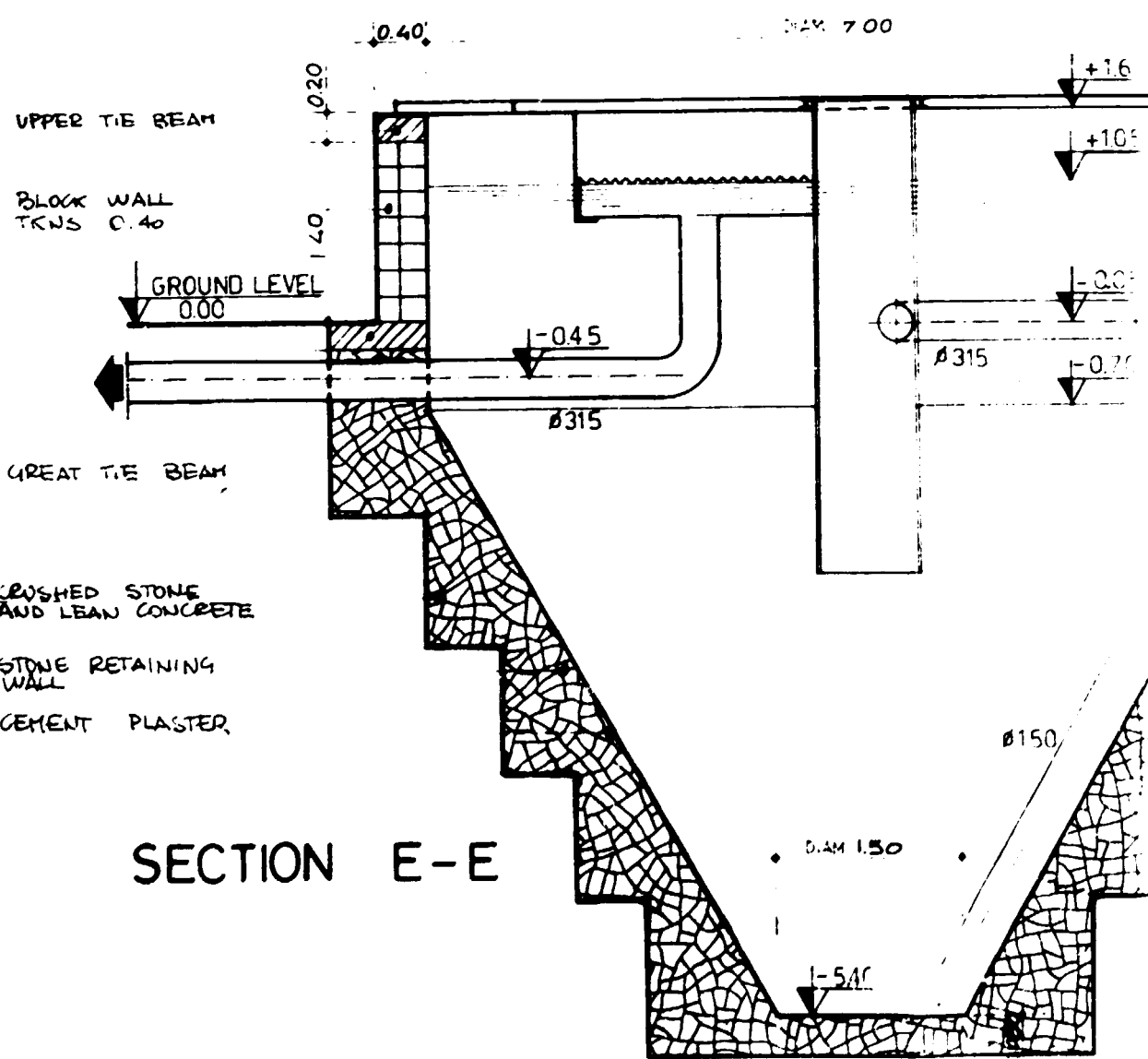
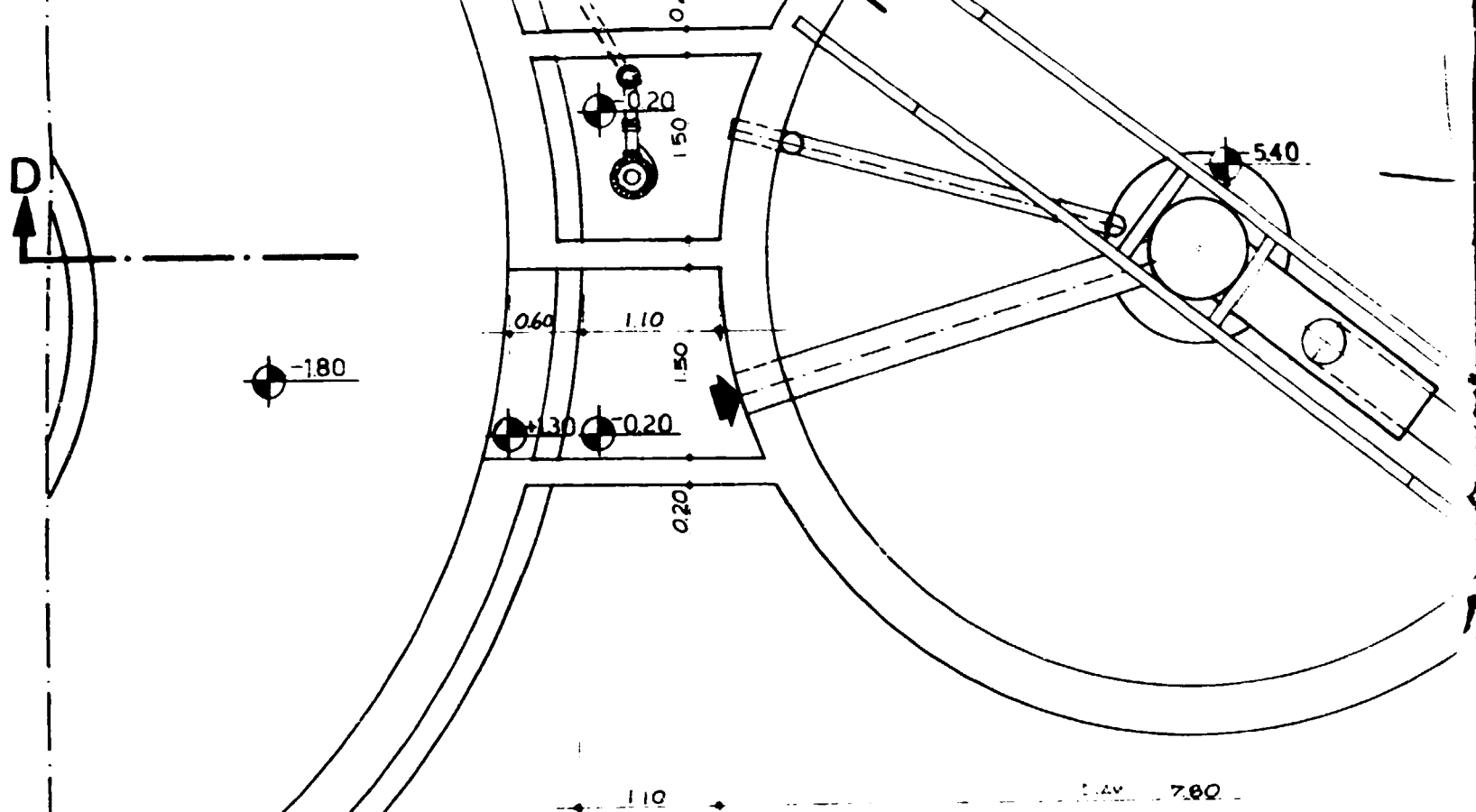
COLLECTING PIT



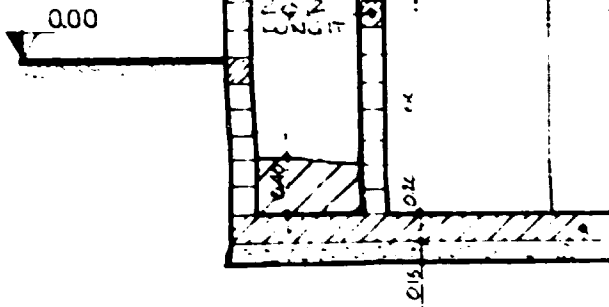
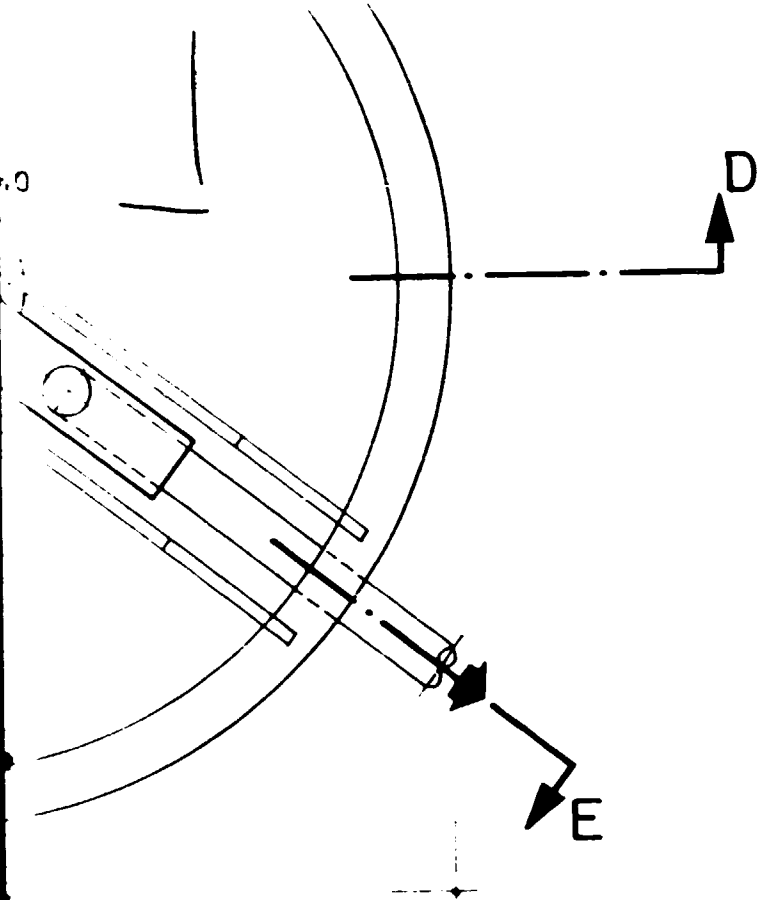
SECTION G-G



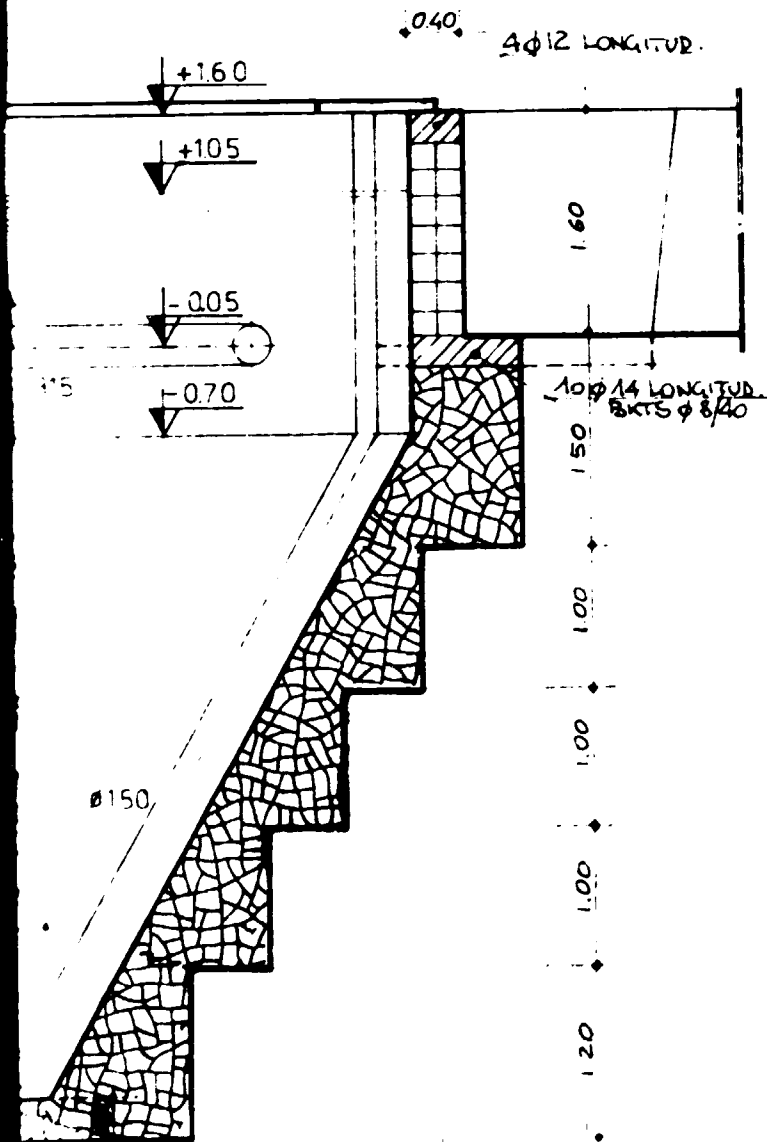
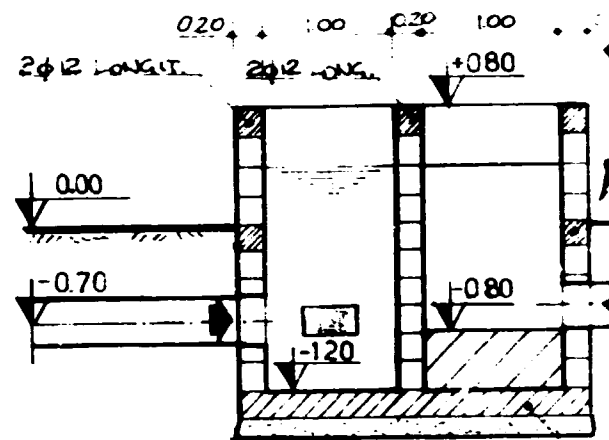
SECT +



SECT F

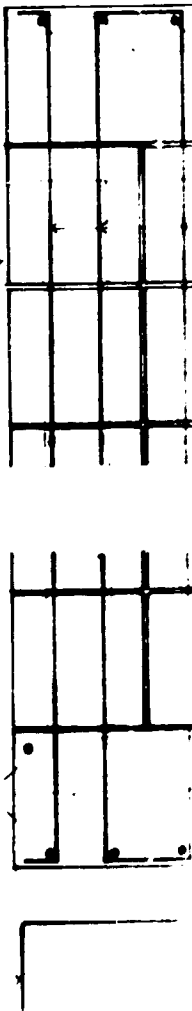


SECTION C-C



200

DETAIL 1:10



$10\phi 14$
LONGITUD.

$8\phi 8/40$
STIRRUPS

10
BRTS $\phi 8/40$

200

1035

WIRE MESH
 $\phi 10/20 \times 20$

C-C

100 0.20

+080

4 $\phi 14$ LONGITUD.
BRTS $\phi 8/40$

200

-060

-080

120

1035

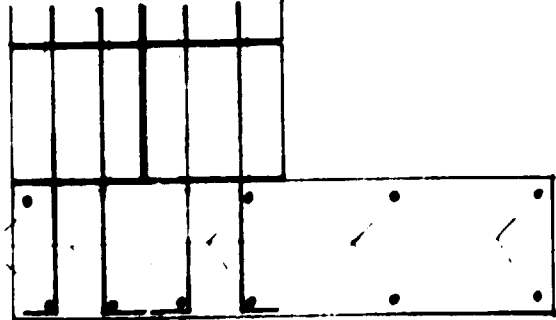
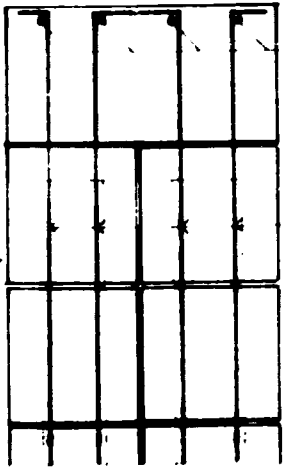
WIRE MESH
 $\phi 10/20 \times 20$

4 $\phi 12$ LONG.

2+2 $\phi 8$ VERT. /m 0.20

110

1077



CONTRACT n. 89/169: UNIDO PROJECT SI/ETH/89/901

**Modjo tannery:
waste water treatment plant**

**National Leather and Shoe Corporation
Addis Ababa - Ethiopia**

"STUDIO TECNICO Dr. GIUSEPPE CLONFERO" - FLORENCE ITALY

**Advisors
Mr. Giuseppe Clonfero
Mr. Mauro Carbonari**

March 1990

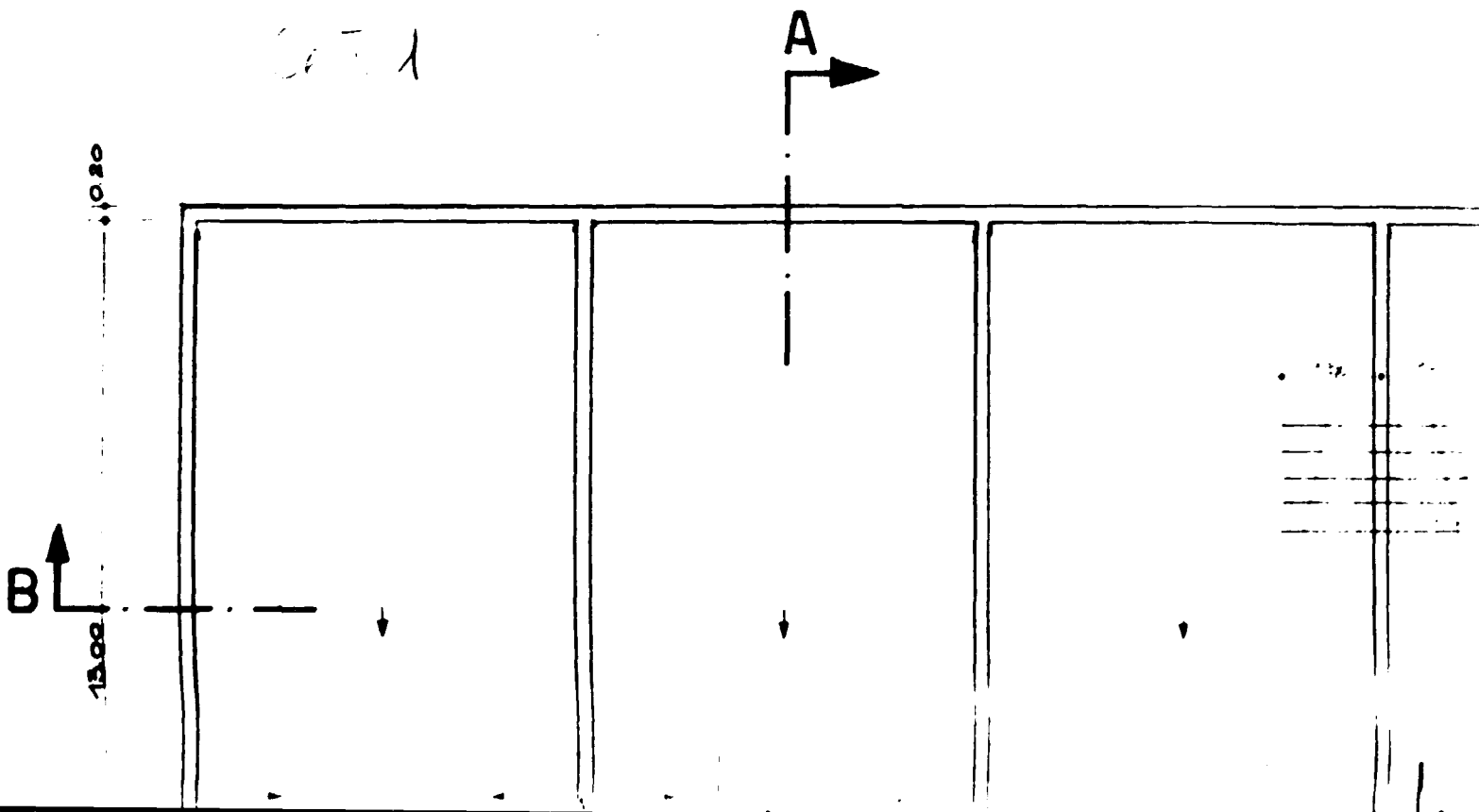
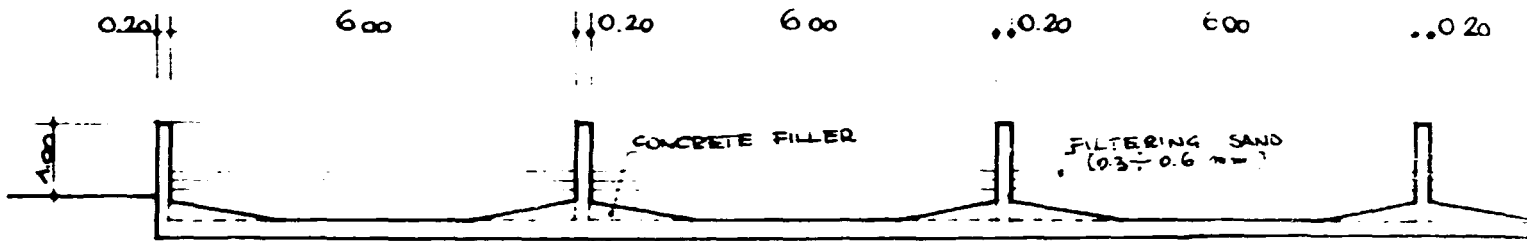
**1 : 50
Sludge return pit
Secondary sedimentation tank
Chlorination and lime-milk tanks**

6

SECTION A-A



SECTION B-B



..0.20

13.00

..0.20



+1.00

GROUND LEVEL
0.00

..0.20

6.00

..0.20

6.00

..0.20

6.00

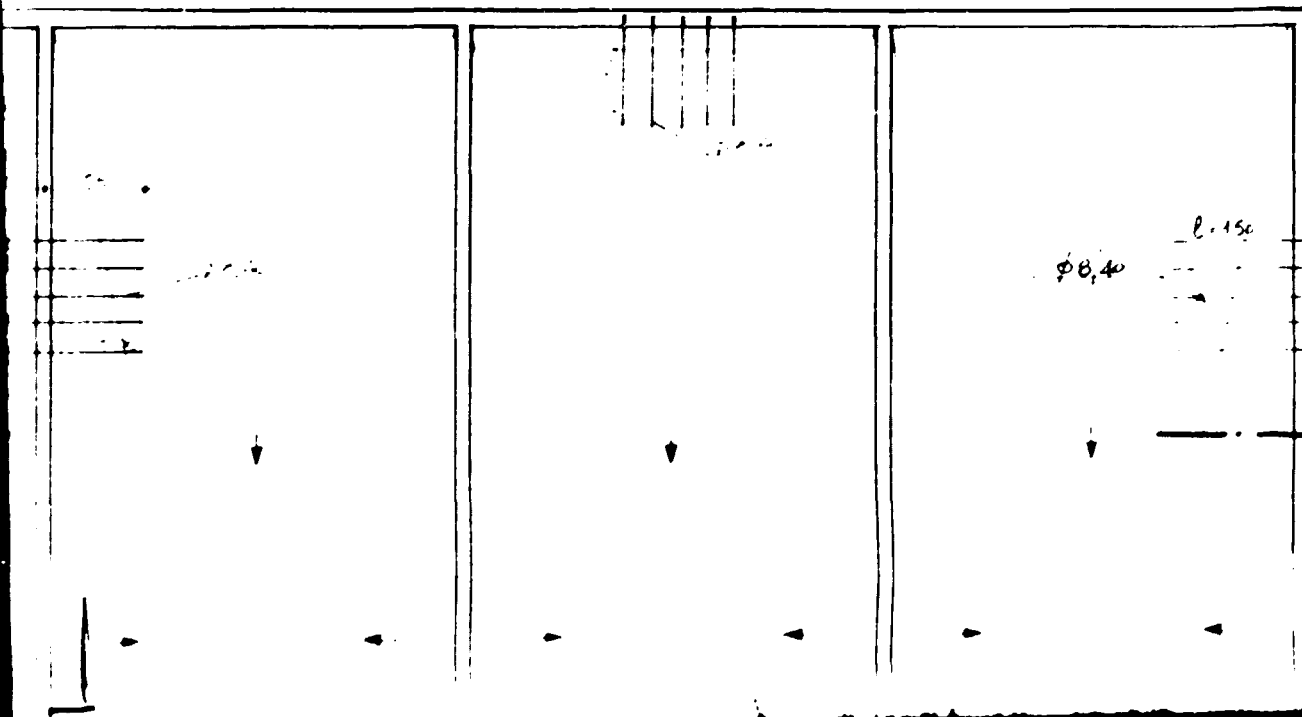
..0.20

+1.00

GROUND LEVEL
0.00

CRUSHED STONE
(15 - 20 mm)

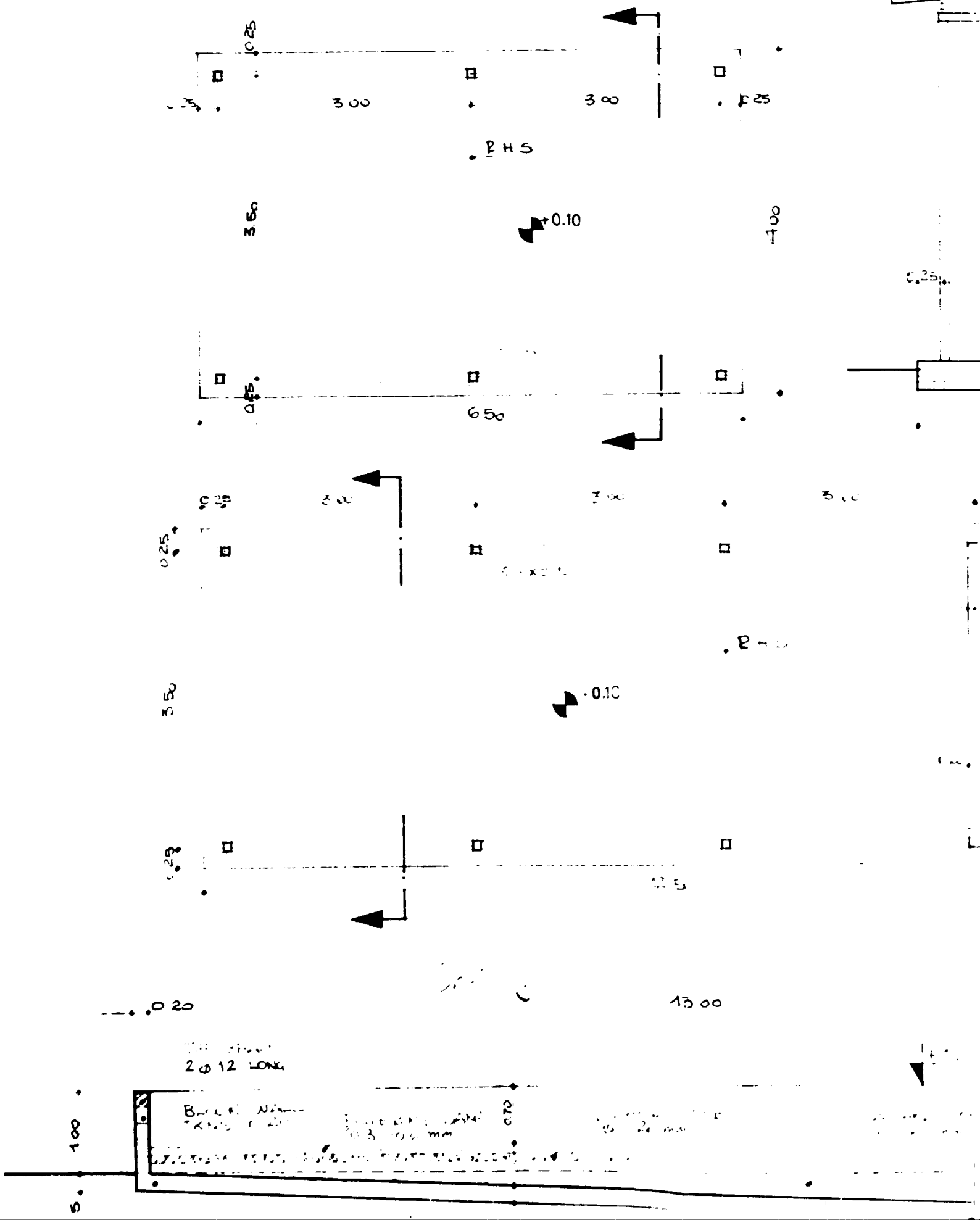
CRUSHED STONE
(40 - 80 mm)

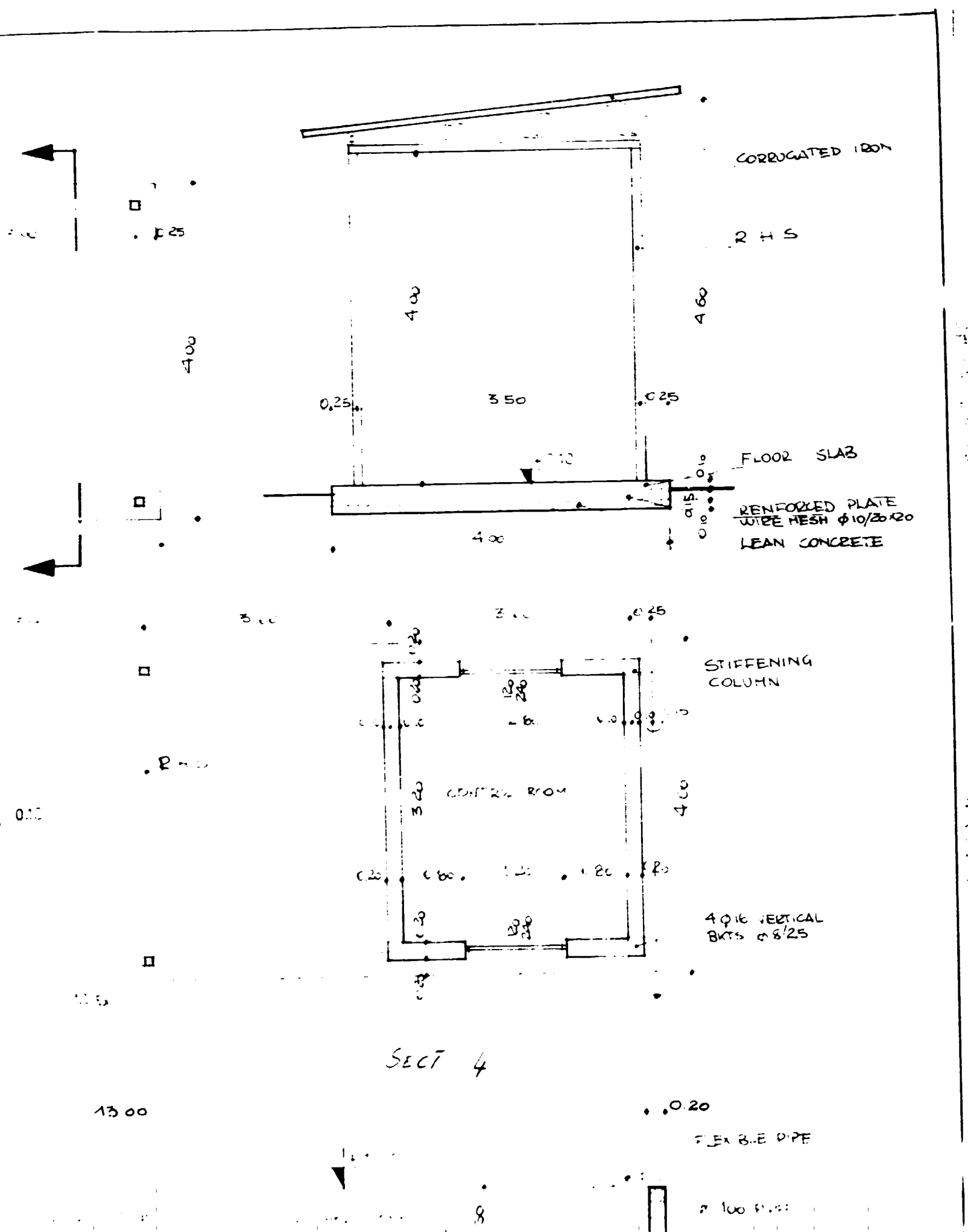


13.40

B

COVERED AREAS PLANTS AND SECTION





CORROGATED IRON

RHS

FLOOR SLAB

REINFORCED PLATE
W/ WIRE MESH $\phi 10/20 \times 20$
LEAN CONCRETE

STIFFENING
COLUMN

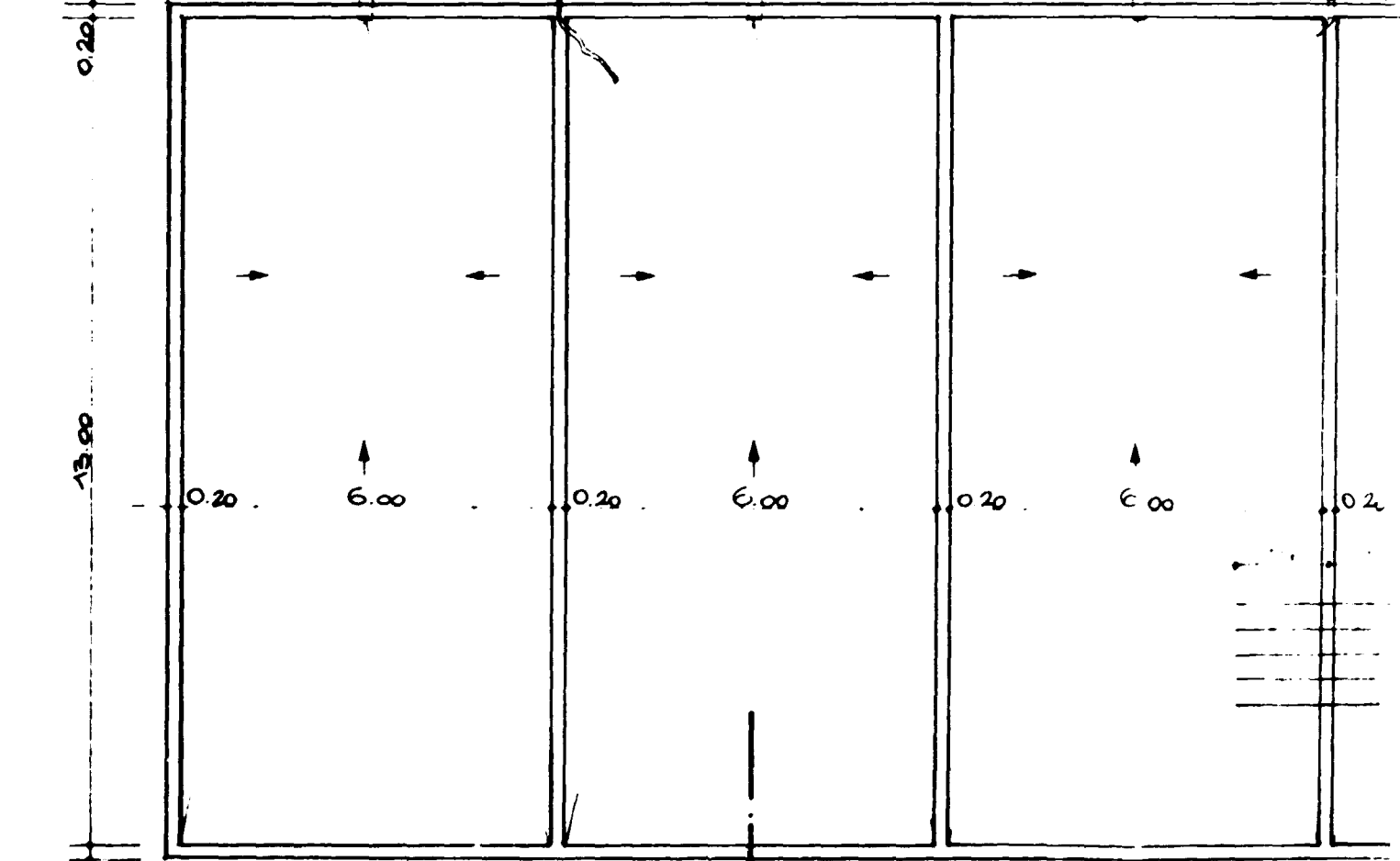
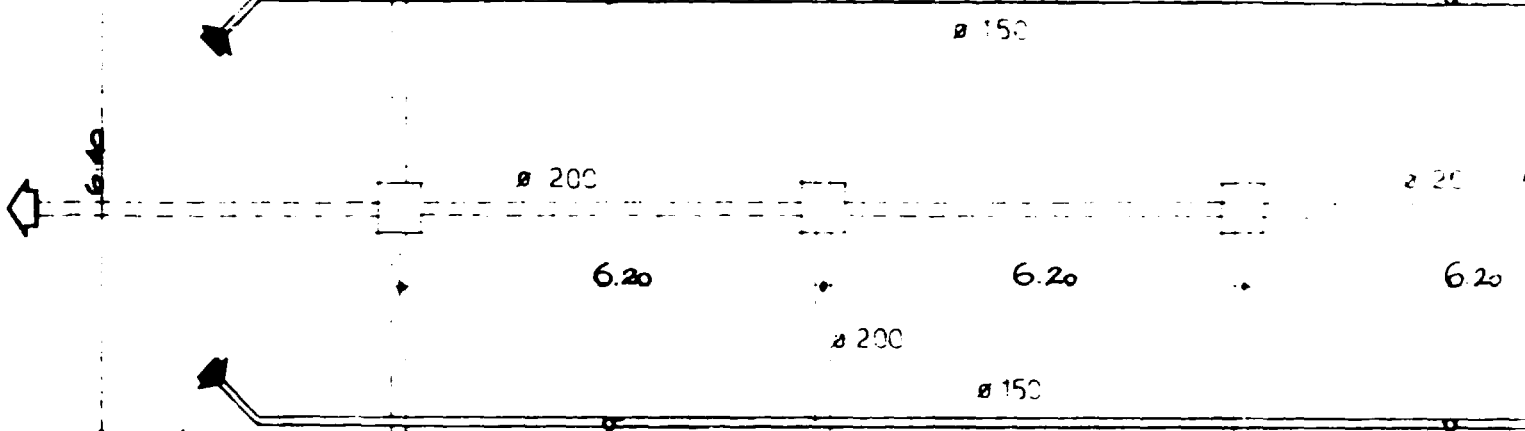
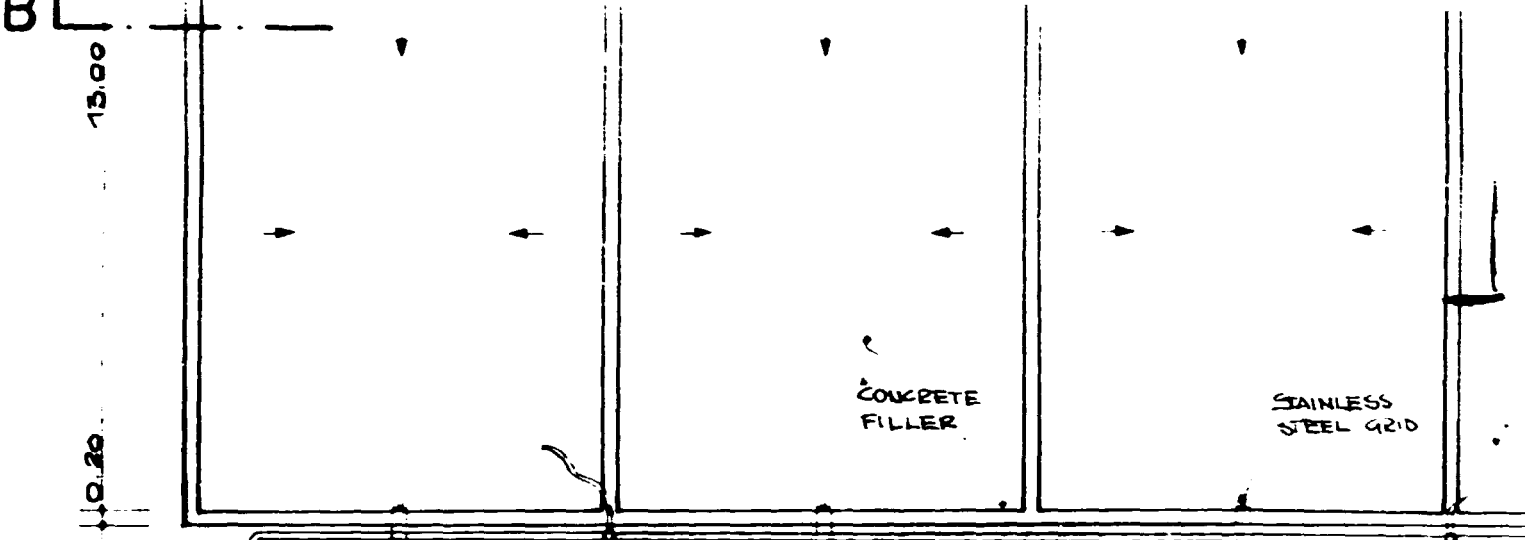
CONTROL ROOM

4 $\phi 16$ VERTICAL
BARS $\phi 8/25$

SECT 4

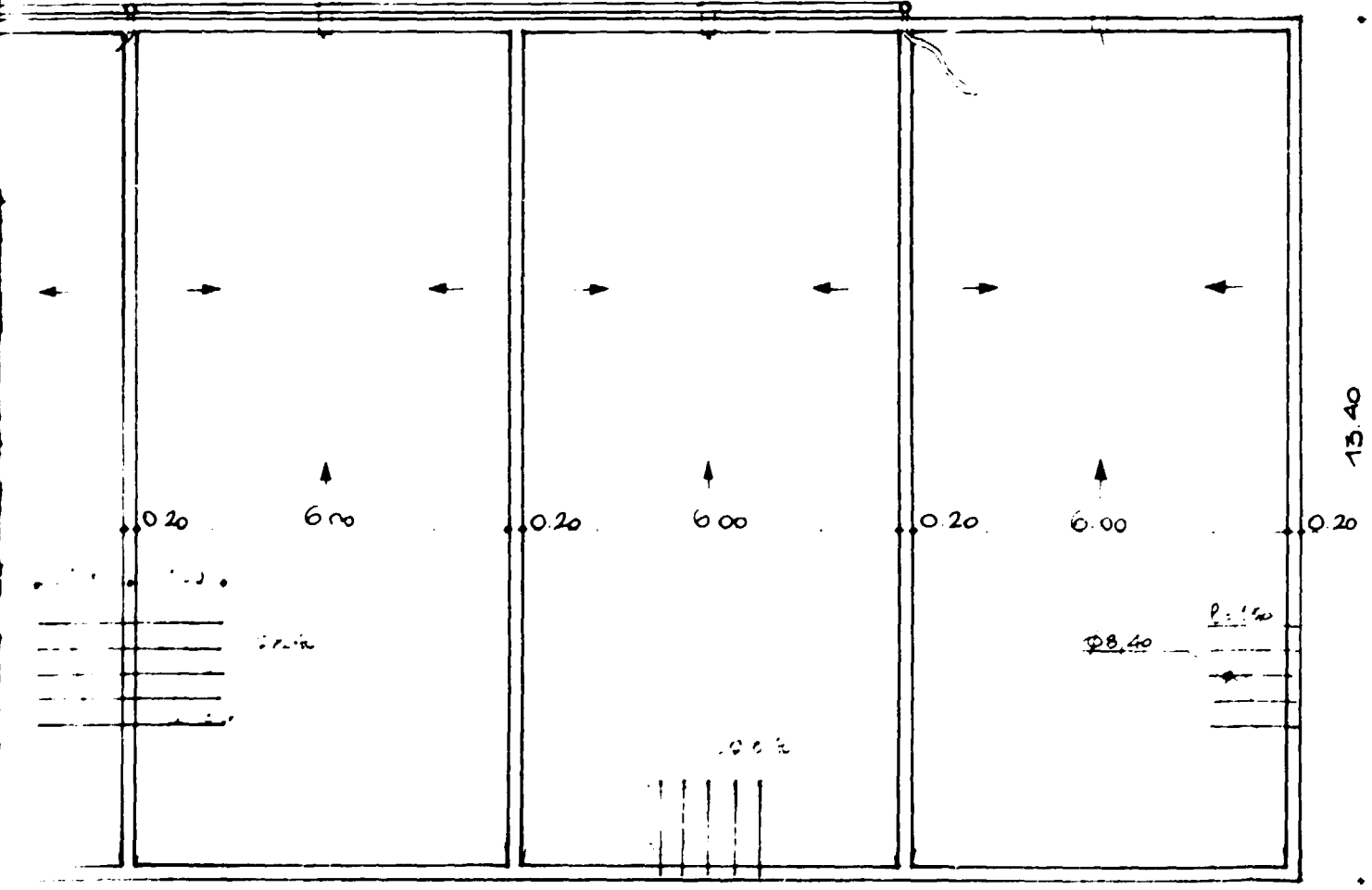
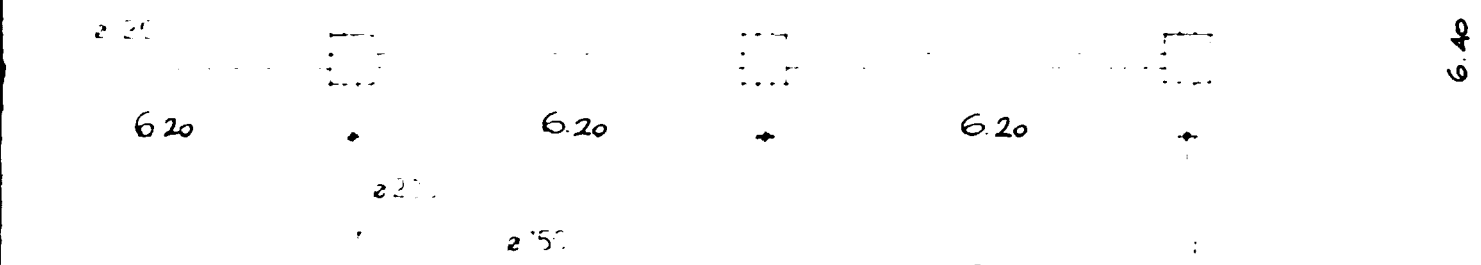
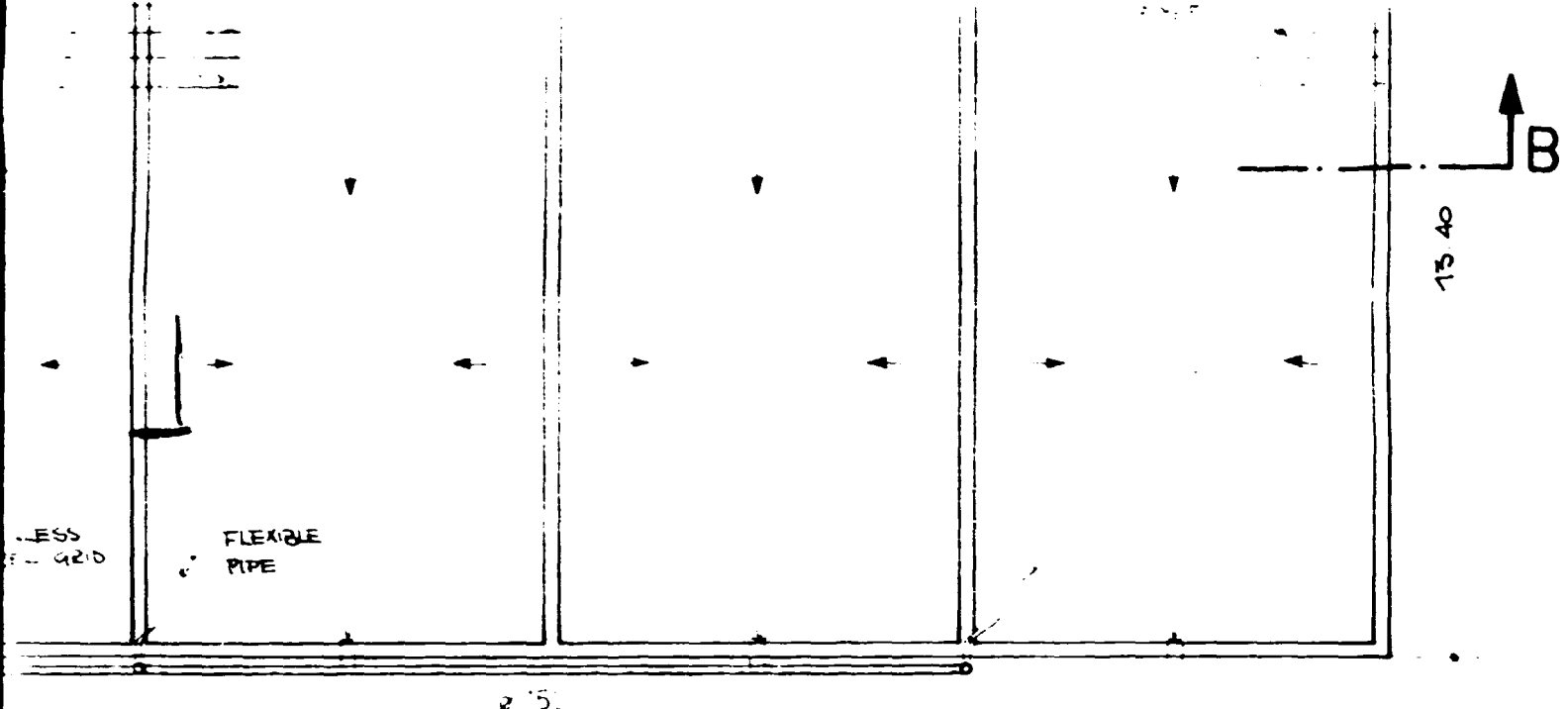
FLEXIBLE PIPE

1.00



3740

A

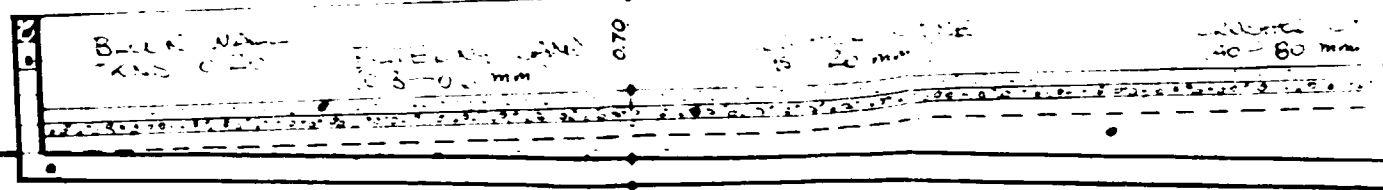




13.00

0.20

20 12 LONG



LEAN CONCRETE AND REINFORCEMENT RODS

13.40

1.00

0.25

0.70

0.25

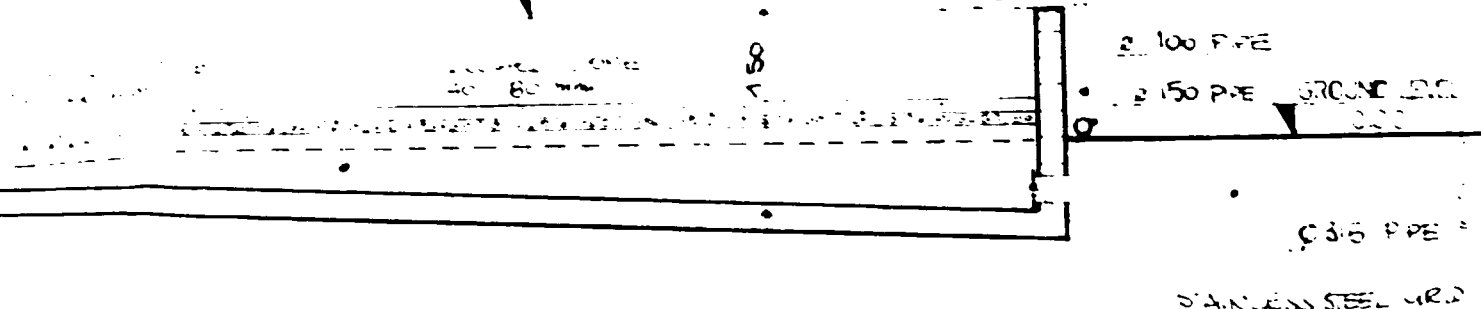
1007

CONTRACT

**Modjo
waste v**

**Nationa
Addis A**

Advisors:
Mr. Girma



13 40

CONTRACT n. 89/169: UNIDO PROJECT SI/ETH/89/901

**Modjo tannery:
waste water treatment plant**

**National Leather and Shoe Corporation
Addis Ababa - Ethiopia**

"STUDIO TECNICO Dr. GIUSEPPE CLONFERO" - FLORENCE ITALY

**Advisers:
Mr. Giuseppe Clonfero
Mr. Mauro Carbonari**

March 1990

**1 : 100 1 : 50
Sludge drying beds
Covered areas**

