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18540

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

CONTRACT N.89/169

PROJECT SI/ETH/89/901

FINAL REPORT

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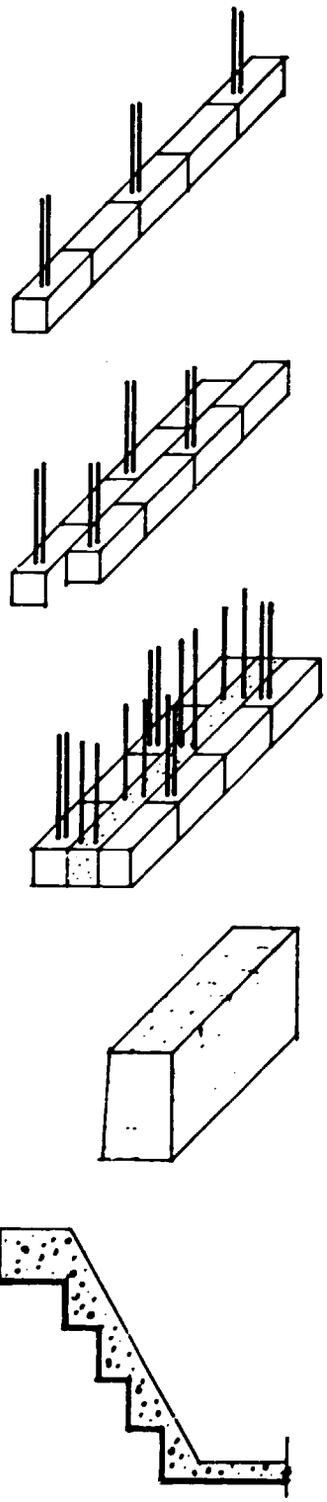

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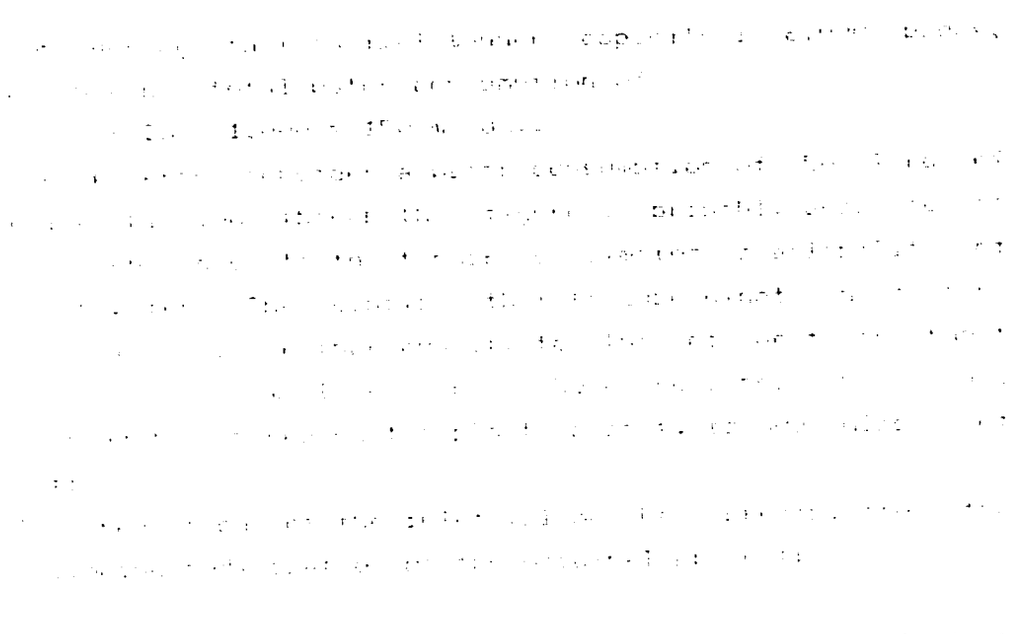

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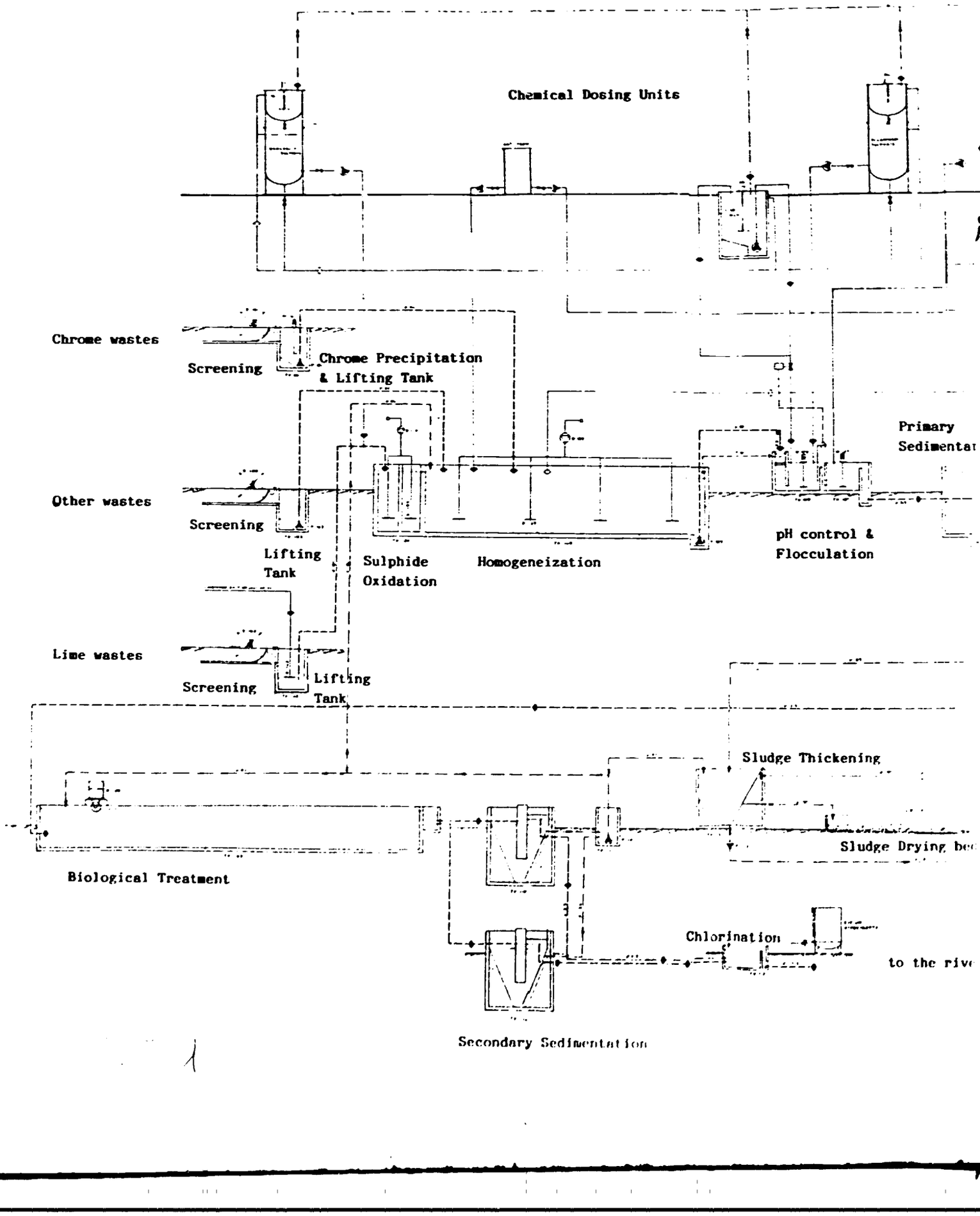
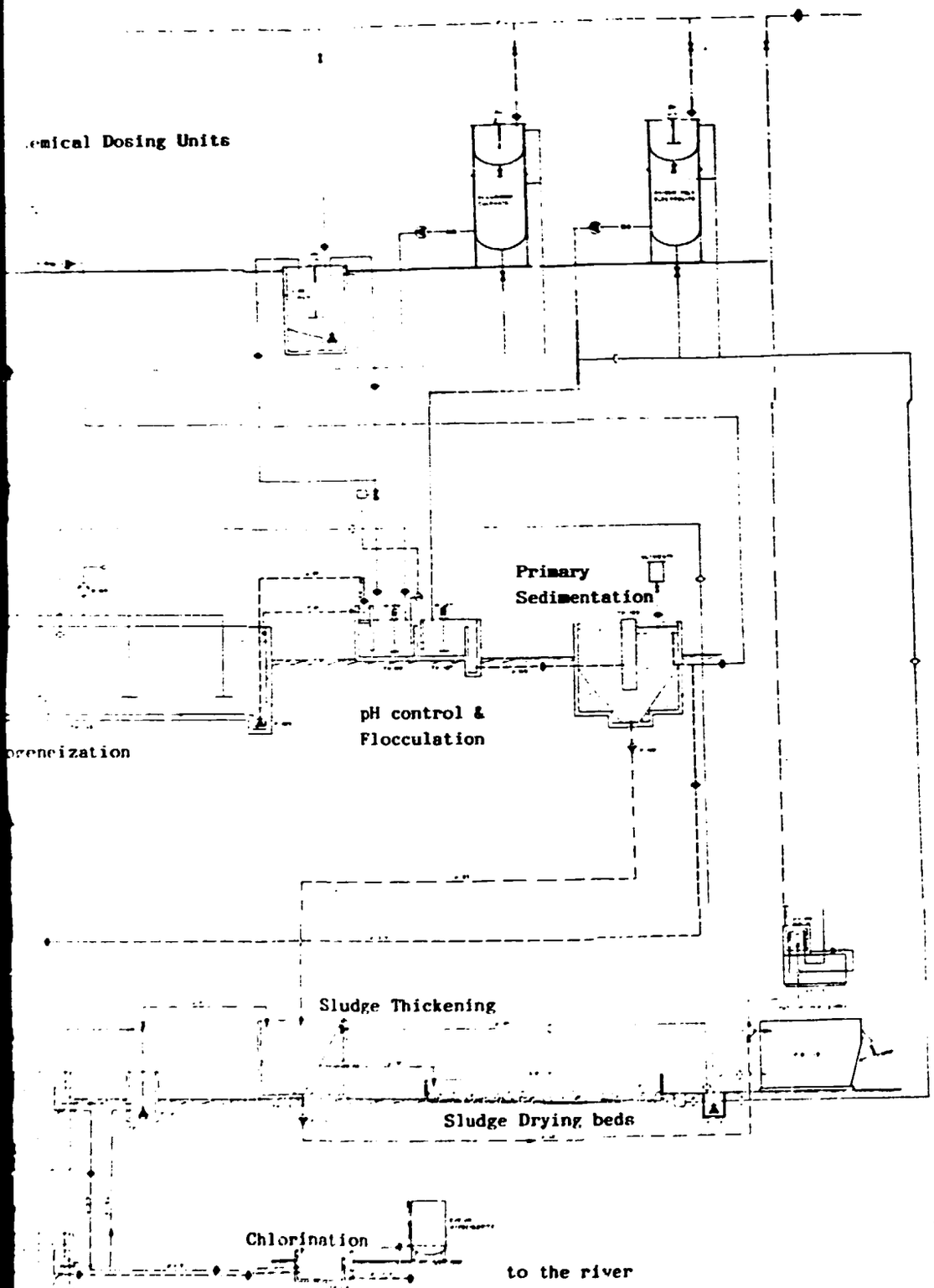
1.


Chemical Dosing Units
Chrome wastes
Screening
Chrome Precipitation
& Lifting Tank
Other wastes
Screening
Lifting
Tank
Sulphide
Oxidation
Homogeneization
pH control &
Flocculation
Primary
Sedimentat
Lime wastes
Screening
Lifting
Tank
Sludge Thickening
Sludge Drying be
Biological Treatment
Chlorination
to the rive
Secondary Sedimentation

ANNEX A



SYMBOLOGY

DITTA: NATIONAL LEATHER - SHOE CORPORATION ADDIS ABABA - ETHIOPIA MODJO

DESCRIZIONE:

Tannery waste water treatment plant

Process flowsheet

data	scala	dis	verif	Foglio	Fogli
01 10 '88	/	G Bursac	S Stortz		

N° TAVOLA

2

N° PROGETTO

862 /

ANNEX B

Extract from supply contract of Impianti Sacchiero

STANDARD TO BE MET

1) R a w

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 "
SETTLEABLE 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 "
S.S.....	30 - 40 "
SULPHIDE.....	-
AMMONIA.....	20 "
CHROMIUM	0,6 - 0 "
PHENOLS.....	0,1 - 0,15 "
SETT LEABLE SOLIDS.....	500 "

ANNEX C

ANNEX D

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 (Incutrol-Hach or similar).

Chemicals :

- Lithium Hydroxide Powder Pillows (HACH) 100 pieces x 3
- Nitrification Inibitor (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 cruciable 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,hoven,desiccator,muffle,vacuum pump,etc.) and chemicals.

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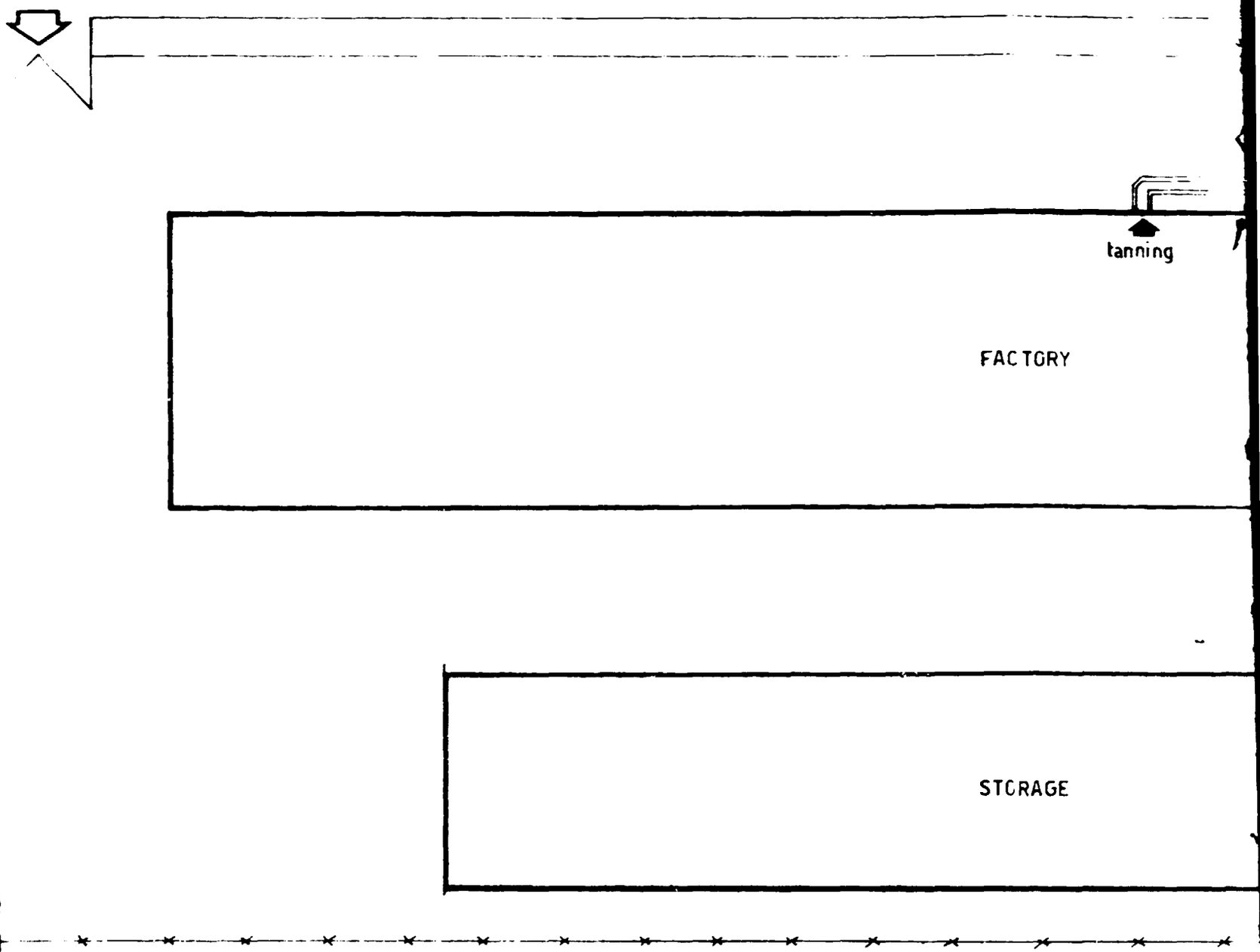
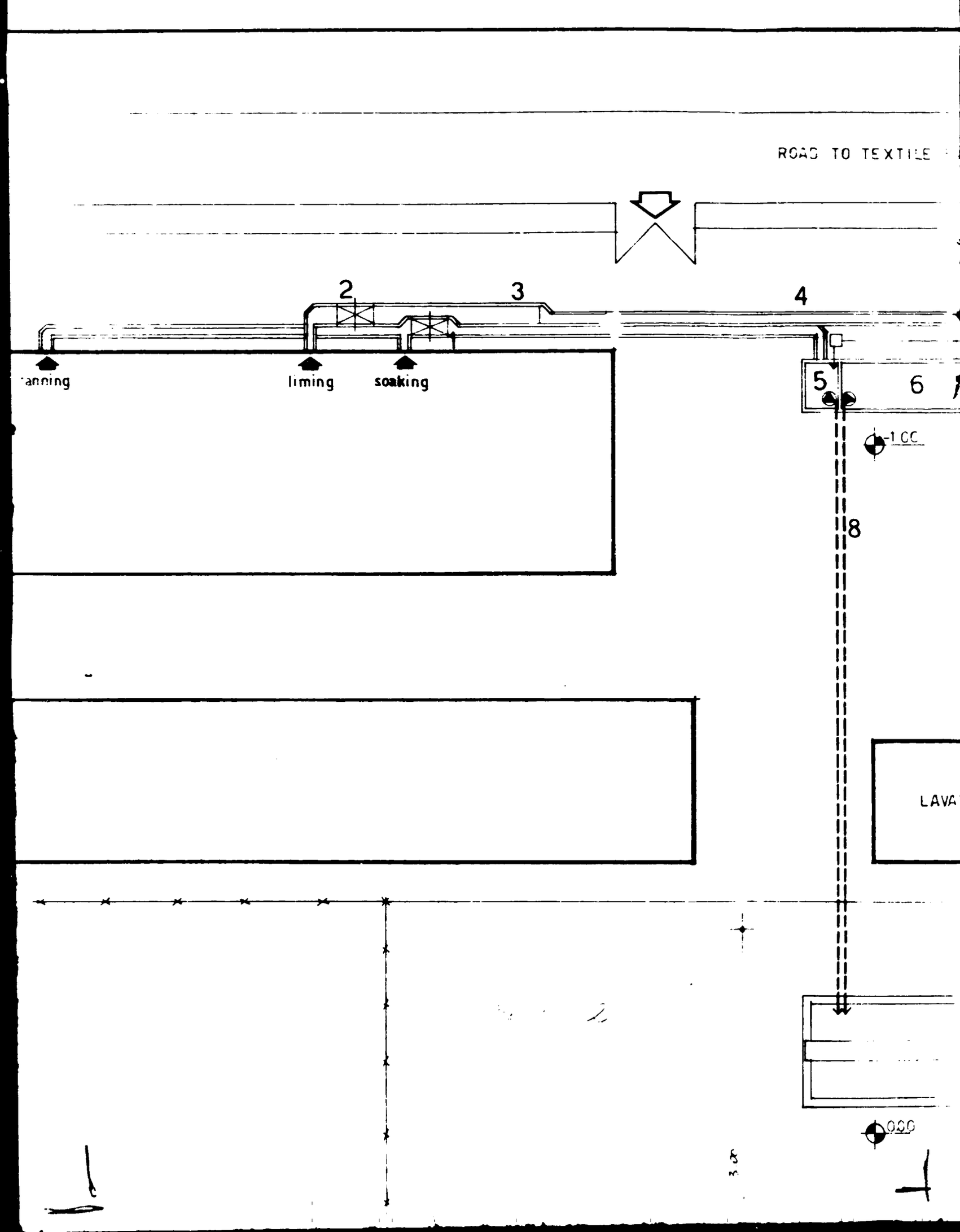
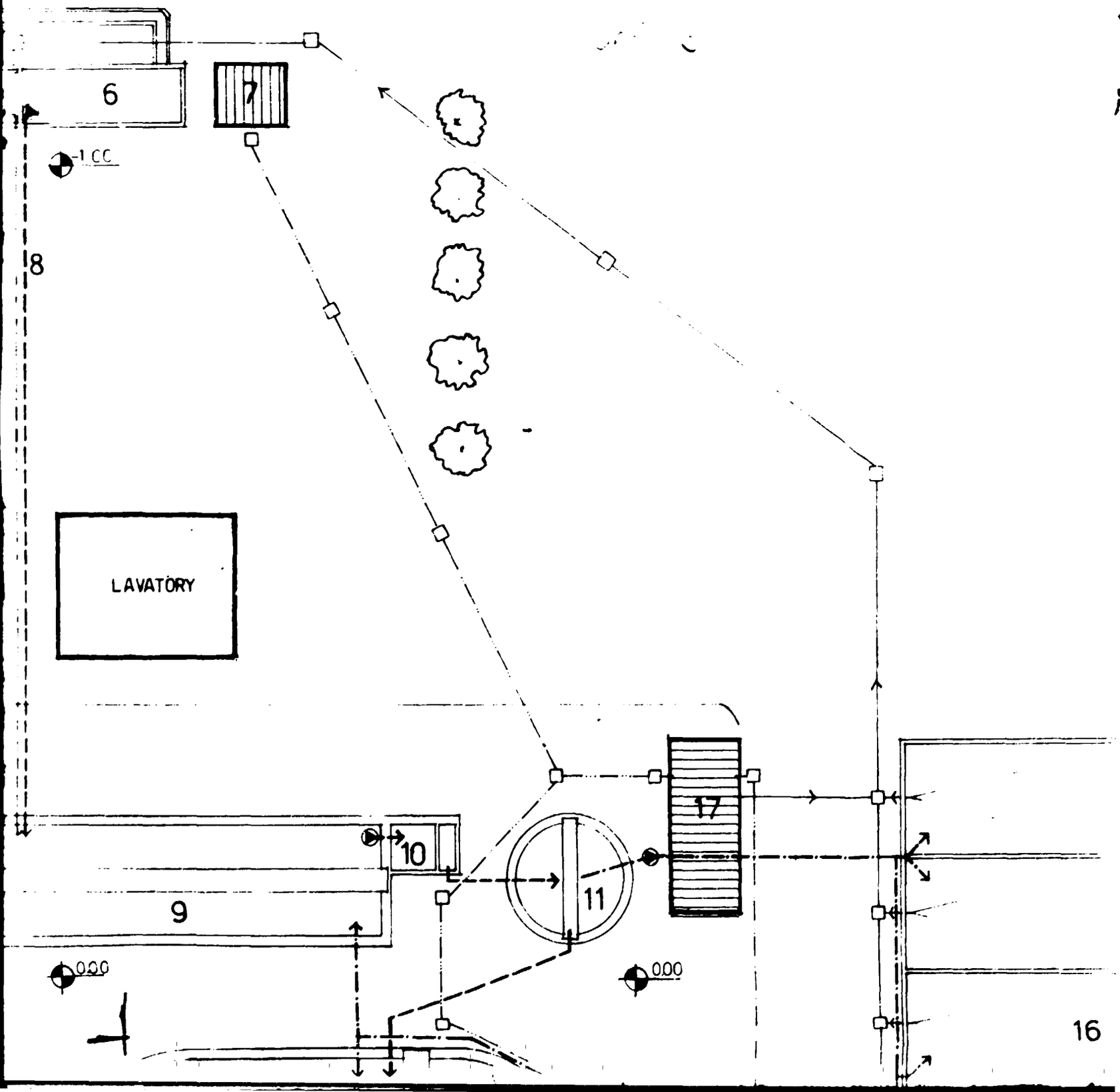
ANNEX F

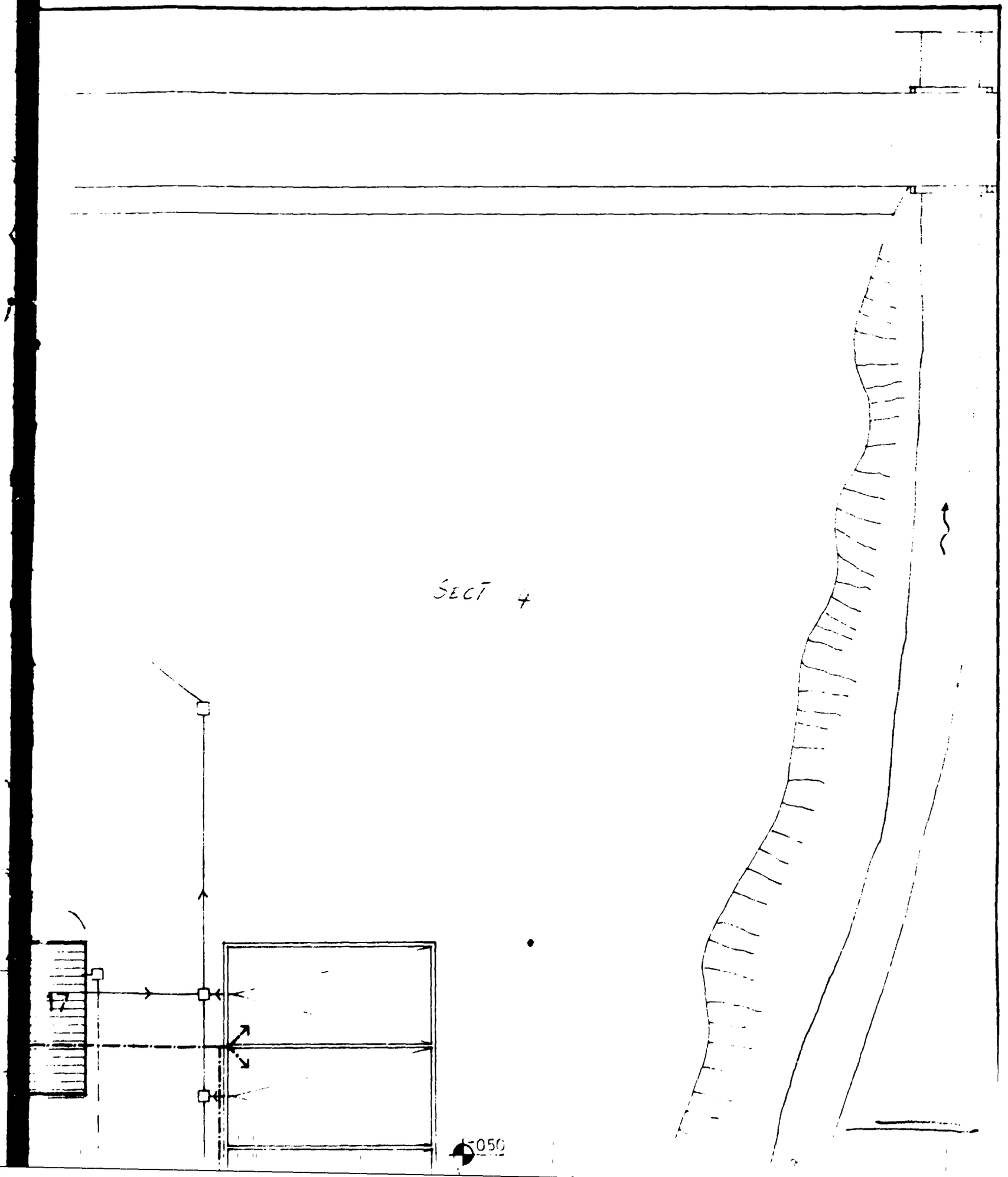
LIST OF UTILIZED SYMBOLS&ABBREVIATIONS

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


tanning
FACTORY
STORAGE


ROAD TO TEXTILE
2
3
4
anning
liming
soaking
5
6
1 CC
8
LAVA
000


6
7
-1.00
8
LAVATORY
17
10
11
9
0.00
0.00
16


SECT 4
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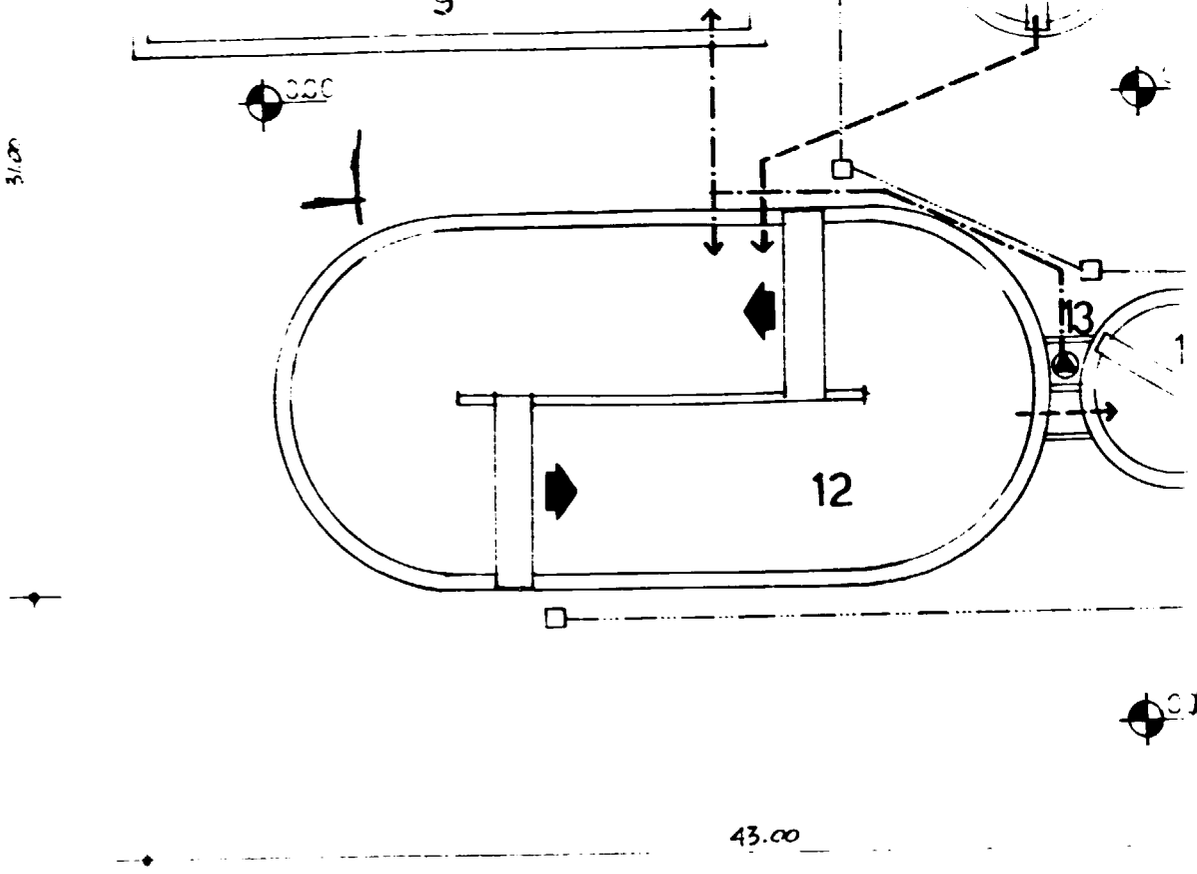
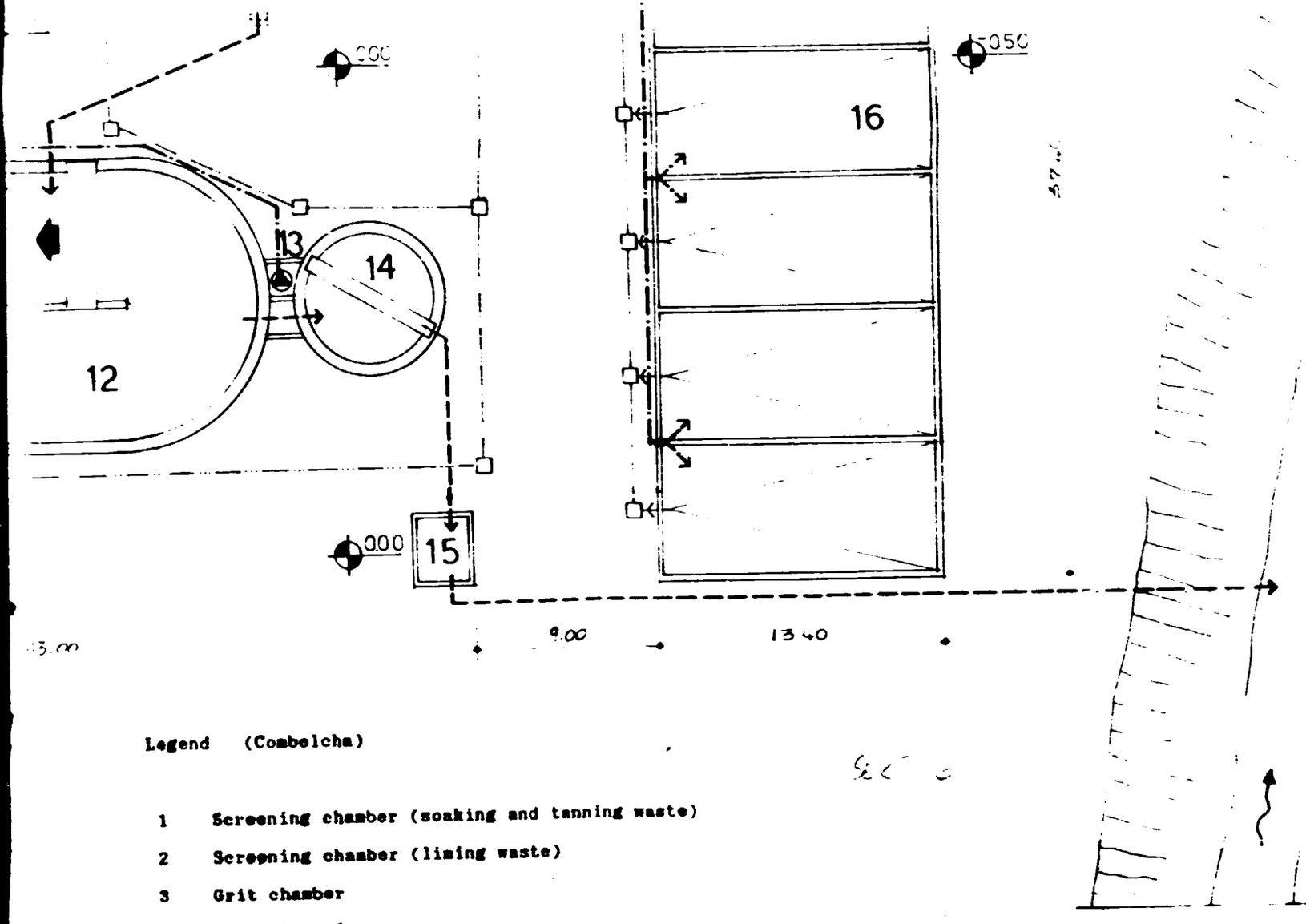


Legend (Combolcha)

1 Screening chambe
2 Screening chambe
3 Grit chamber
4 Open channels
5 Pumping station
6 Sulphide catalyt
7 Covered area for
8 Channel for pipe
9 Homogeneization
10 Flocculation tan
11 Primary sediment
12 Biological oxid
13 Return sludge p
14 Secondary sedim
15 Chlorination co
16 Sludge drying b
17 Covered area fo

Wast
Slud
Filt
Elec
Pump



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 Homogeneization 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

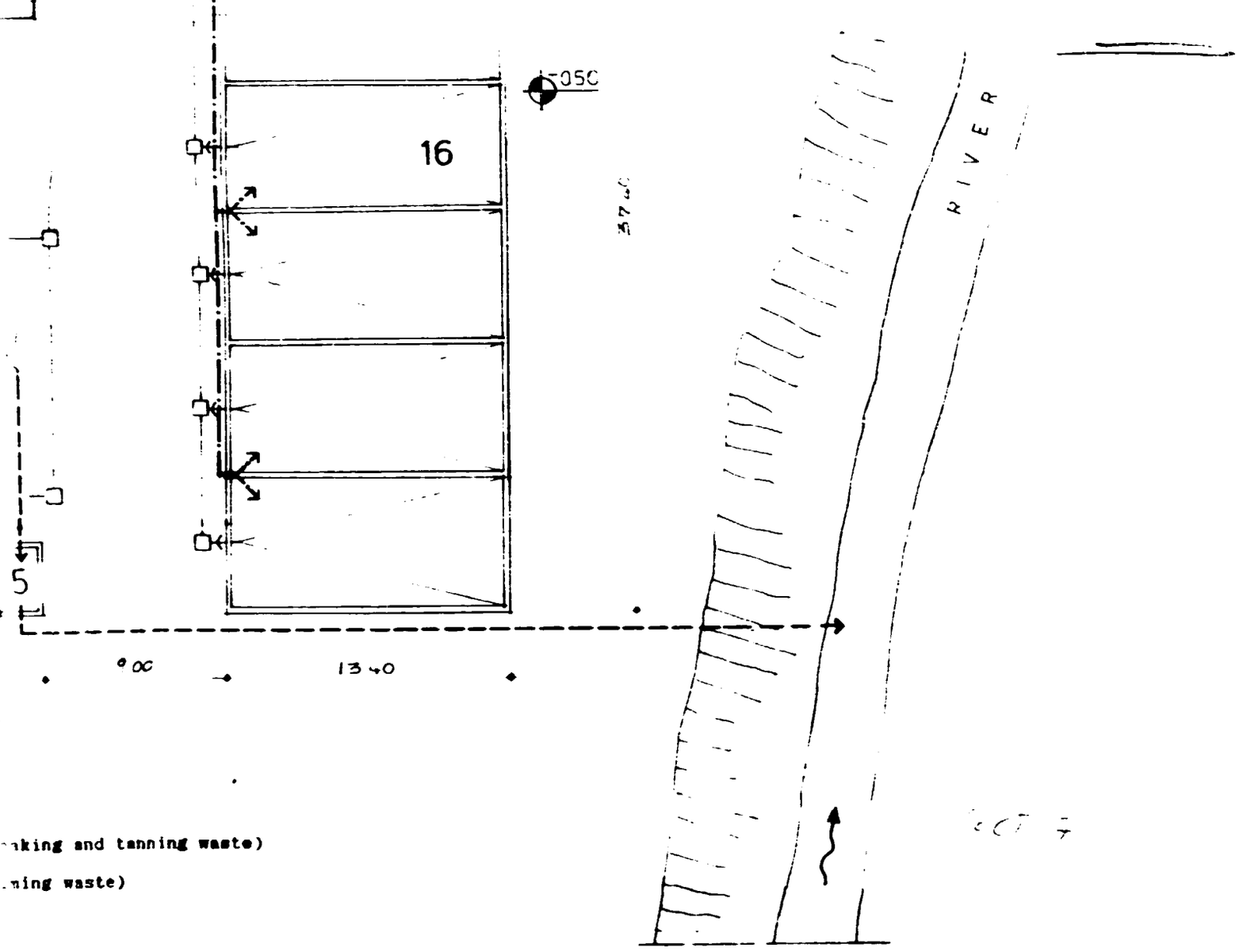
CONTRACT n. 89/169/ UNIDO PROJE

Combolcha tannery: waste water treatmen

National Leather and Sho
Addis Ababa - Ethiopia

"STUDIO TECNICO Dr. GIUSEPPE CLONFE
Advisers:
Mr. Giuseppe Clonfero
Mr. Mauro Carbonari

1 : 250
Plan layout



aking and tanning waste)

ning waste)

idation tank

ment

allation

tank

ditch

n tank

hamber

ment

line

water line

cable line

CONTRACT n. 89/169 UNIDO PROJECT SI/ETH/88/801

Combolcha tannery: waste water treatment plant

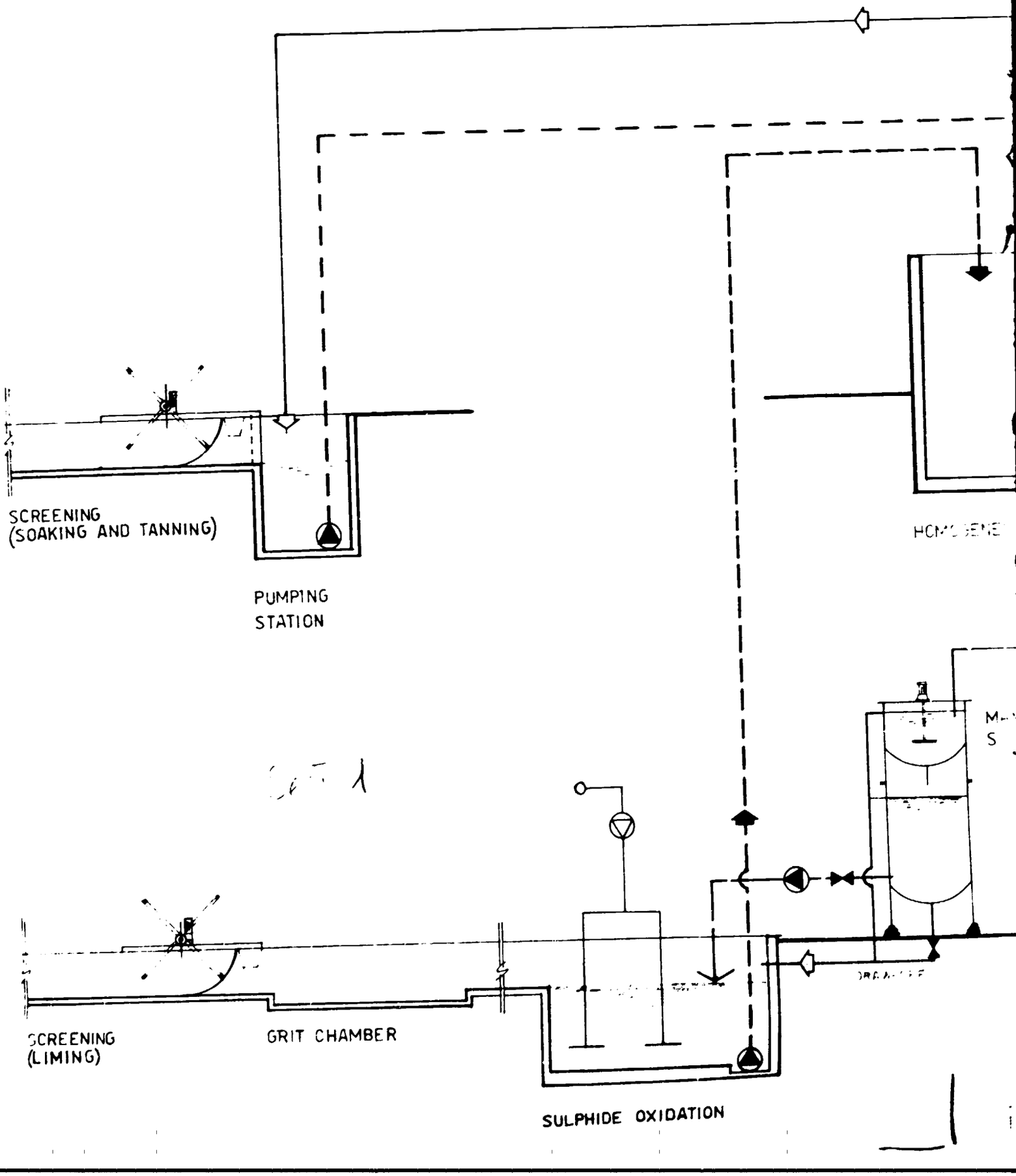
National Leather and Shoe Corporation Addis Ababa - Ethiopia

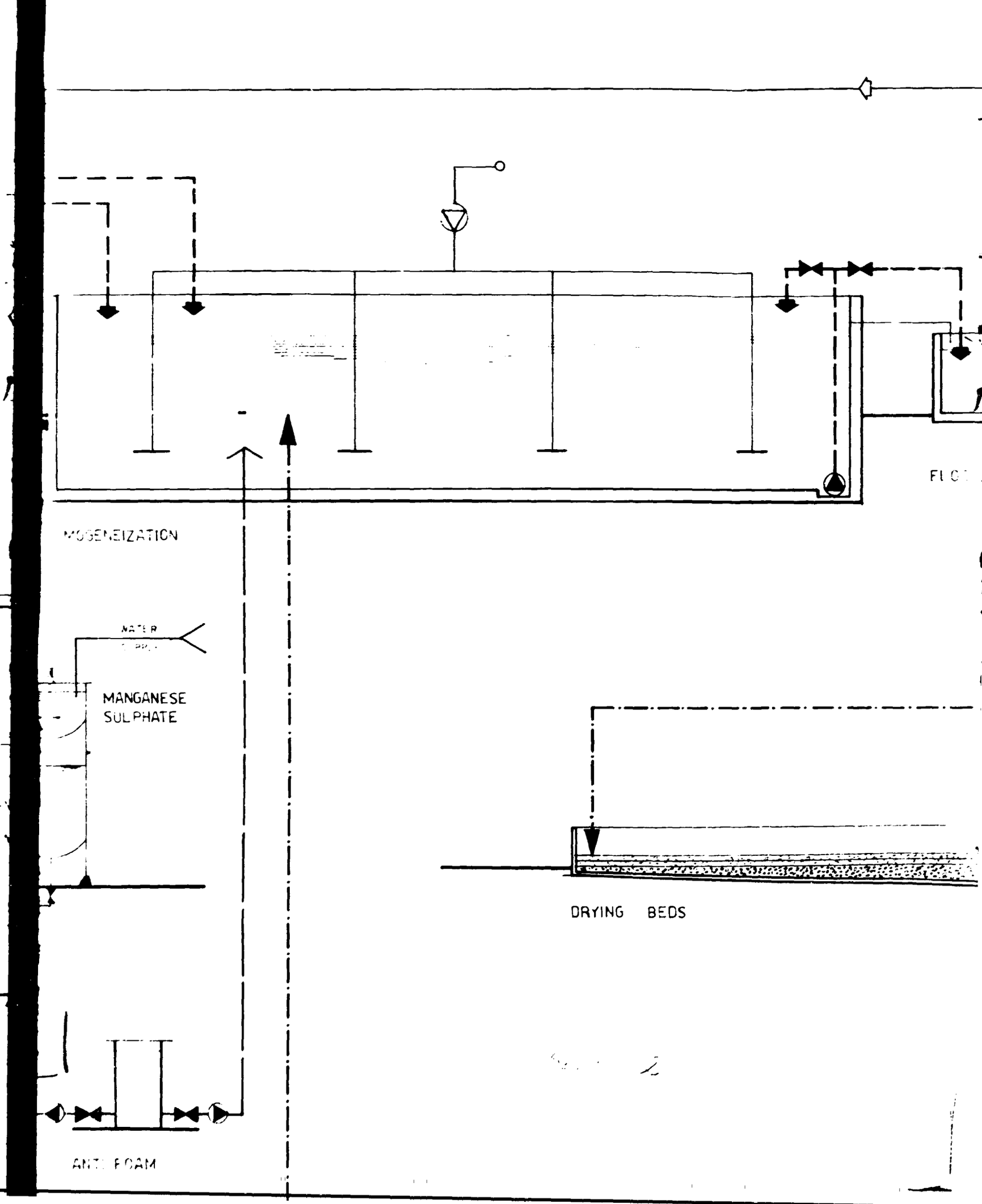
"STUDIO TECNICO Dr. GIUSEPPE CIONFERO" - FLORENCE ITALY
Advisers:
Mr. Giuseppe Cionfero
Mr. Mauro Carbonari

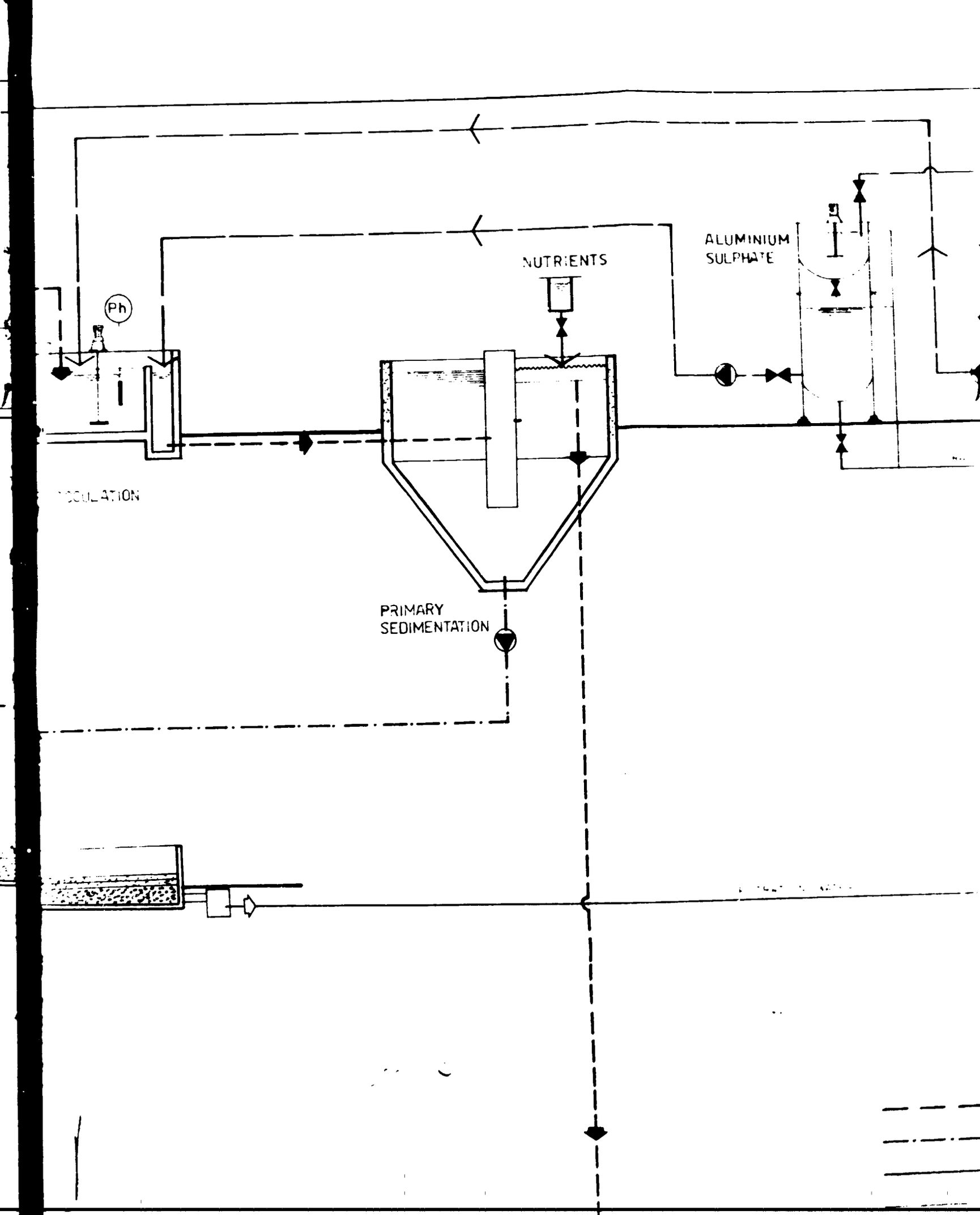
March 1990

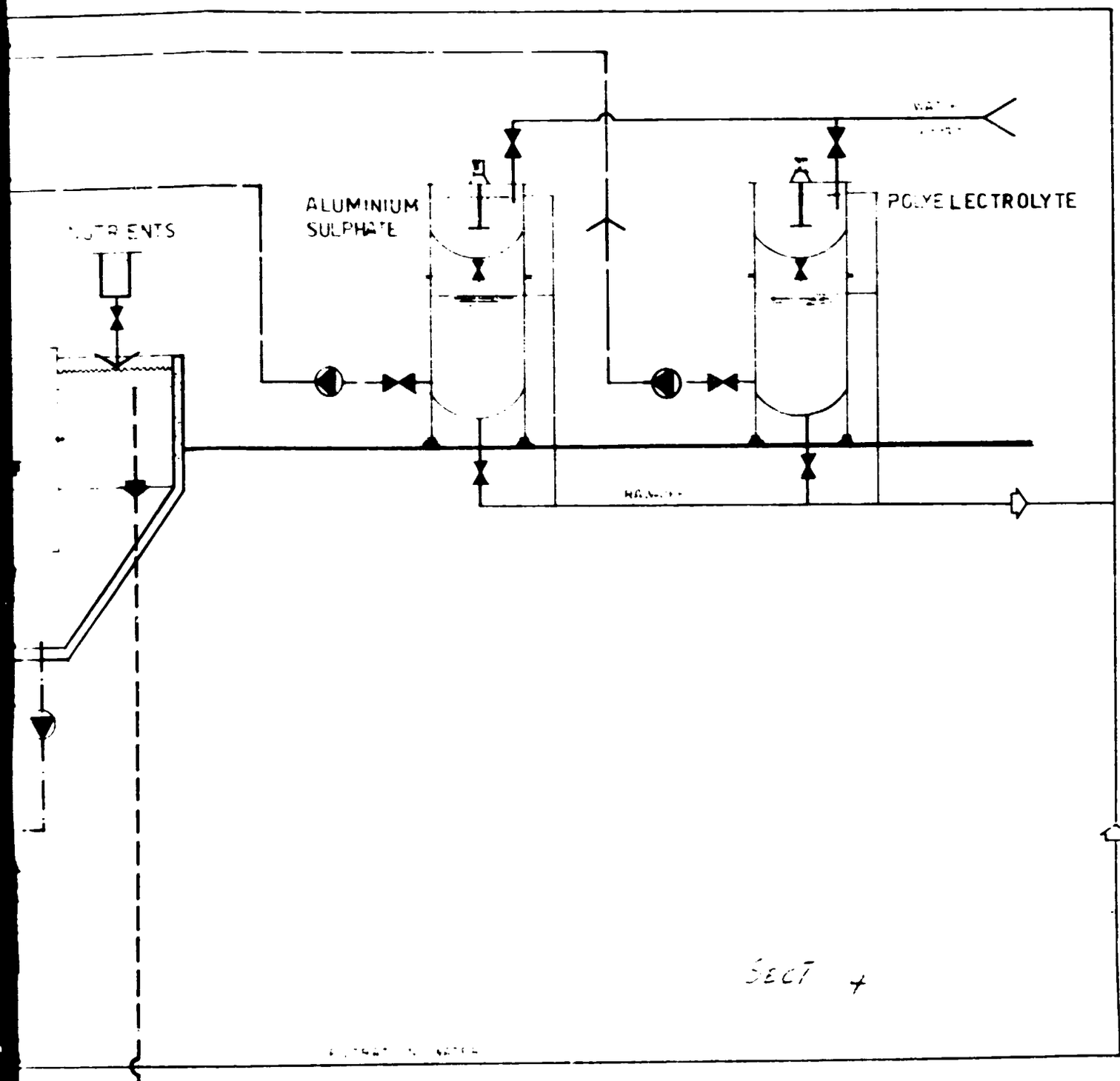
1 : 250
Plan layout

1


SCREENING
(SOAKING AND TANNING)
PUMPING
STATION
SCREENING
(LIMING)
GRIT CHAMBER
SULPHIDE OXIDATION


MOGENEIZATION
MANGANESE
SULPHATE
DRYING BEDS


ALUMINIUM
SULPHATE
NUTRIENTS
Ph
PRIMARY
SEDIMENTATION



SECT 4

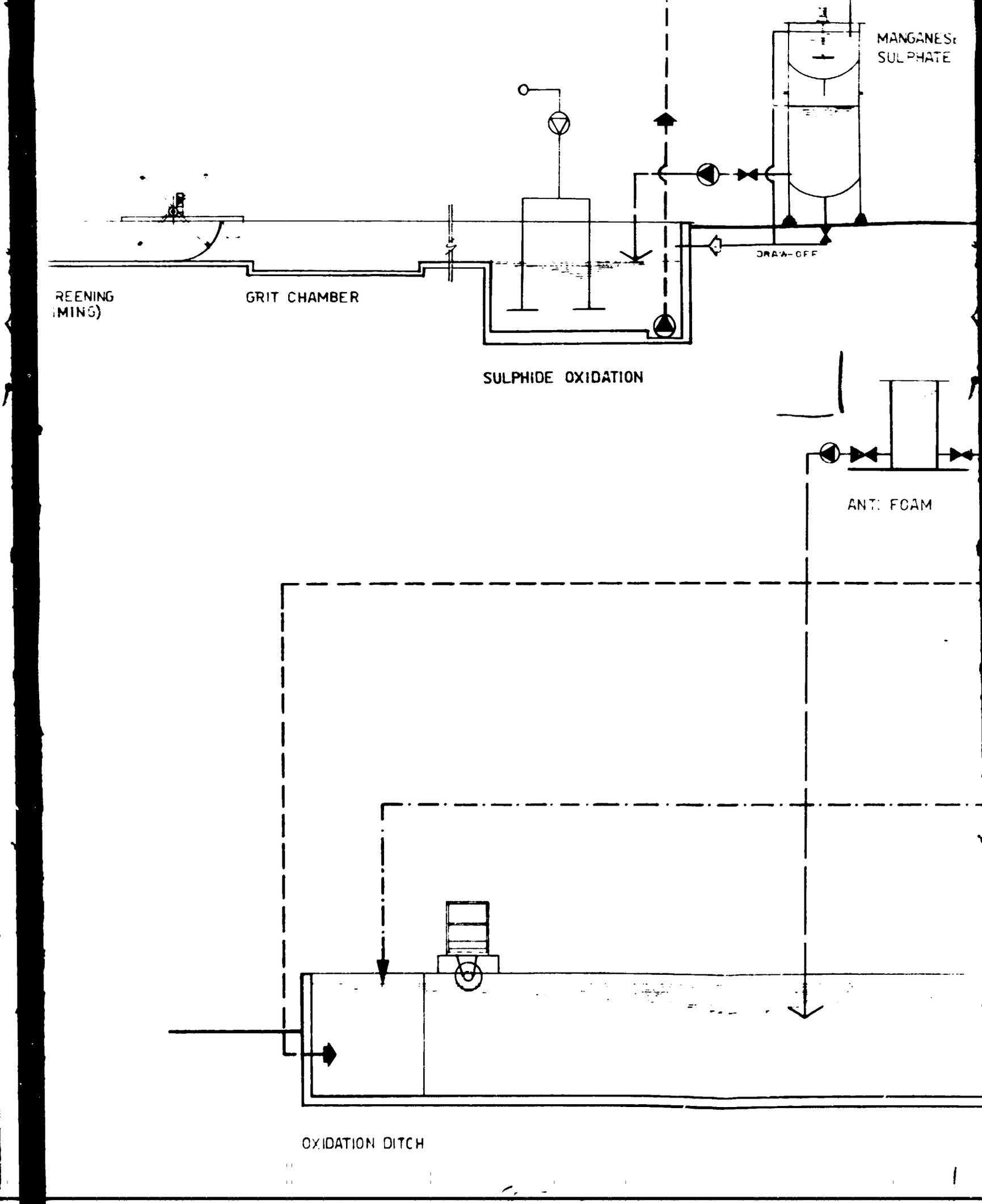
SYMBOLOGY

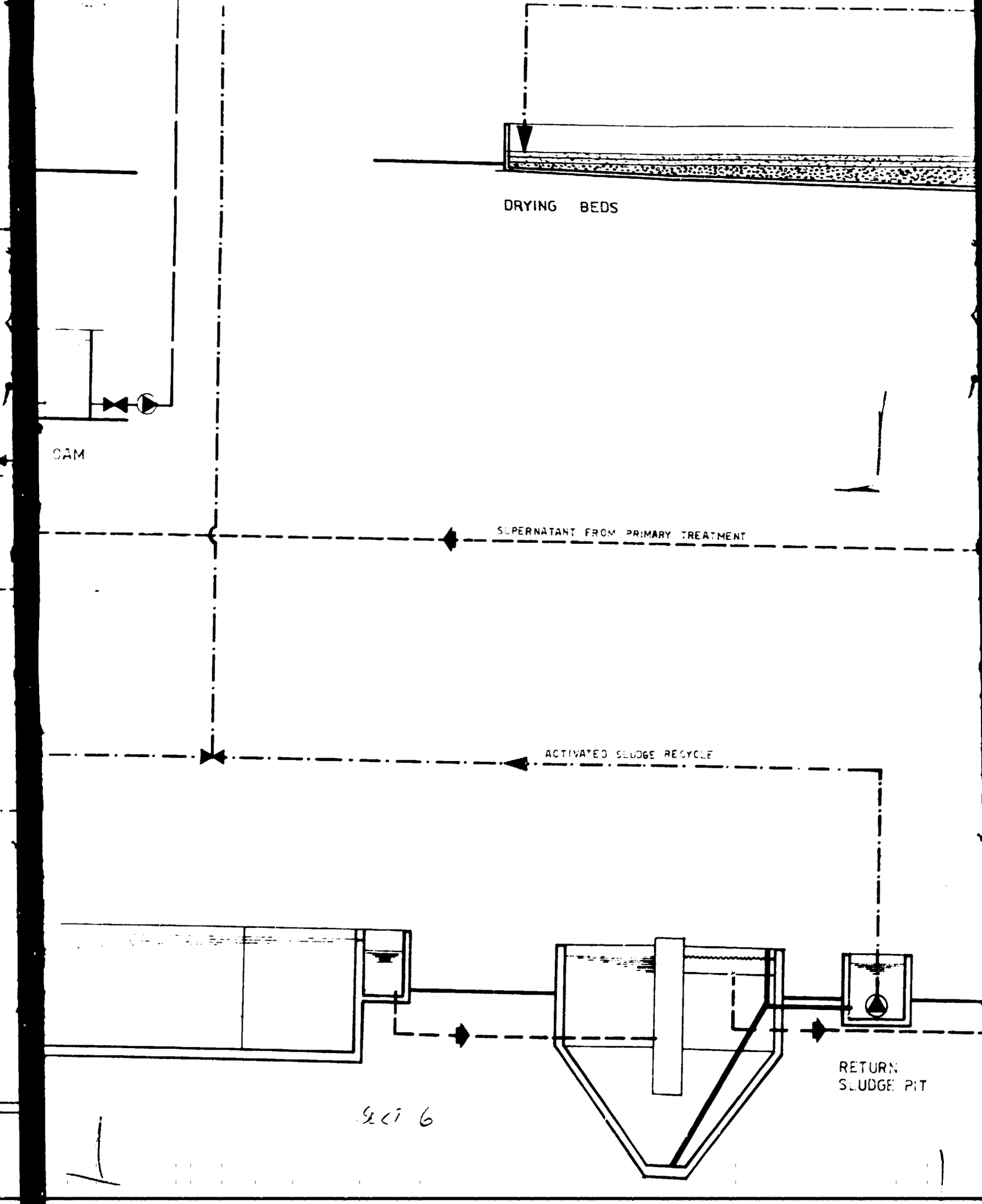
waste-water line

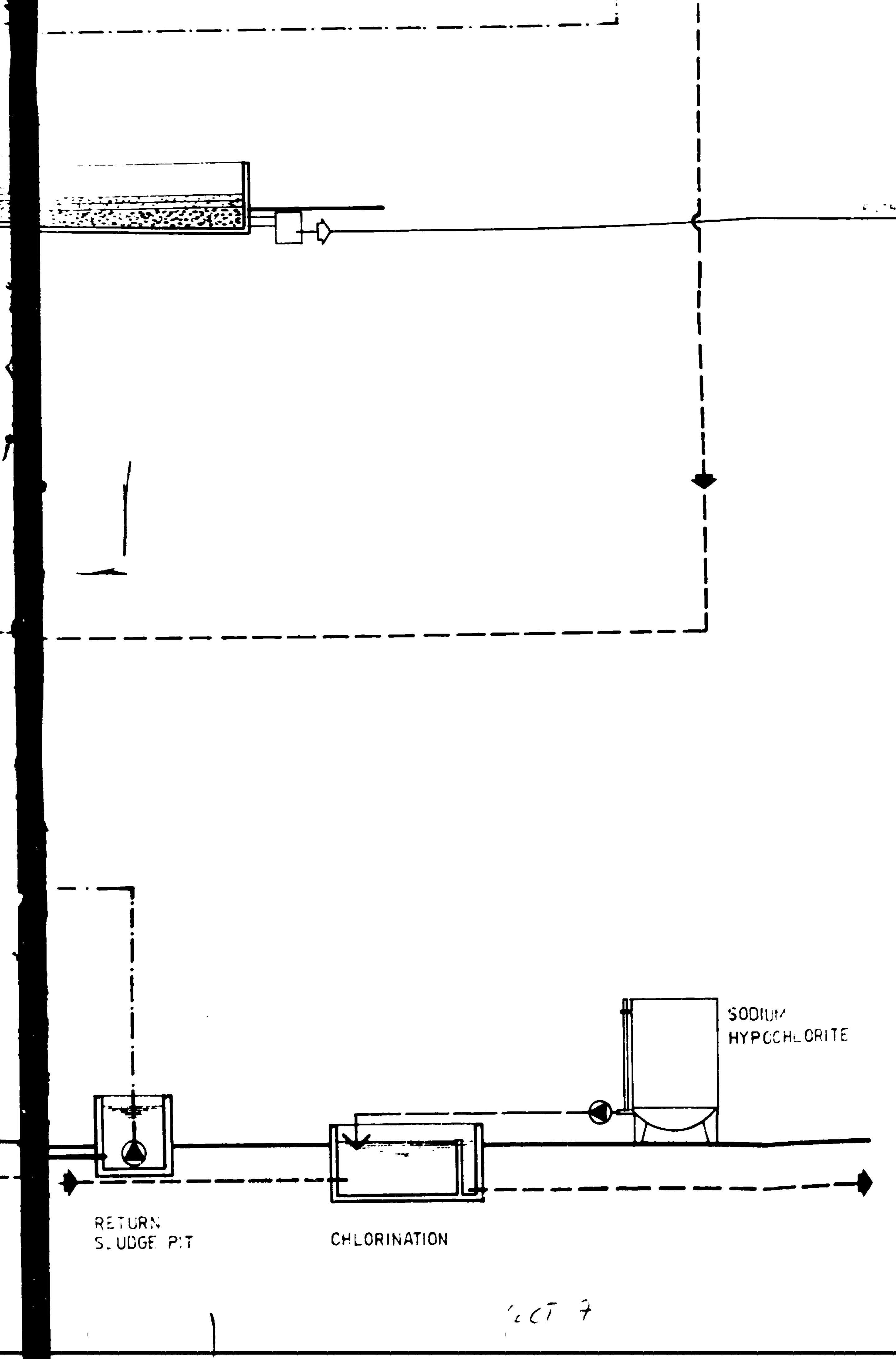
sludge line

filtration water line

service water


MANGANESE
SULPHATE
DRAW-OFF
REENING
MING)
GRIT CHAMBER
SULPHIDE OXIDATION
ANTI FOAM
OXIDATION DITCH


DRYING BEDS
SAM
SUPERNATANT FROM PRIMARY TREATMENT
ACTIVATED SLUDGE RECYCLE
RETURN
SLUDGE PIT



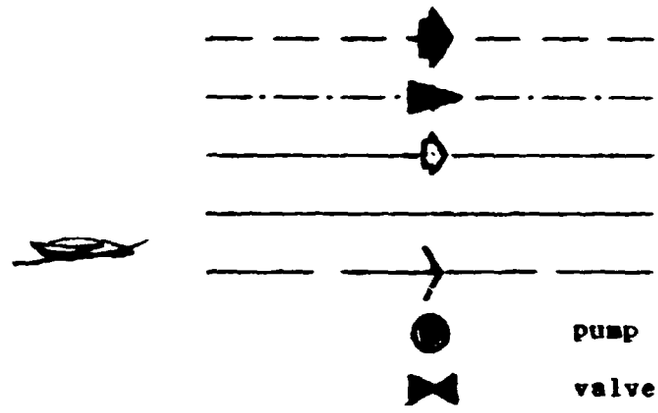
CONTRACT n. 89

Combolch
waste wat

National Le
Addis Abab

"STUDIO TECNICO
Advisors
Mr. Giuseppe Cionfo

SYMBOLOGY



SODIUM HYPOCHLORITE

CONTRACT n. 89/189: UNIDO PROJECT SI/ETH/88/801

Combolcha tannery: waste water treatment plant

National Leather and Shoe Corporation Addis Ababa - Ethiopia

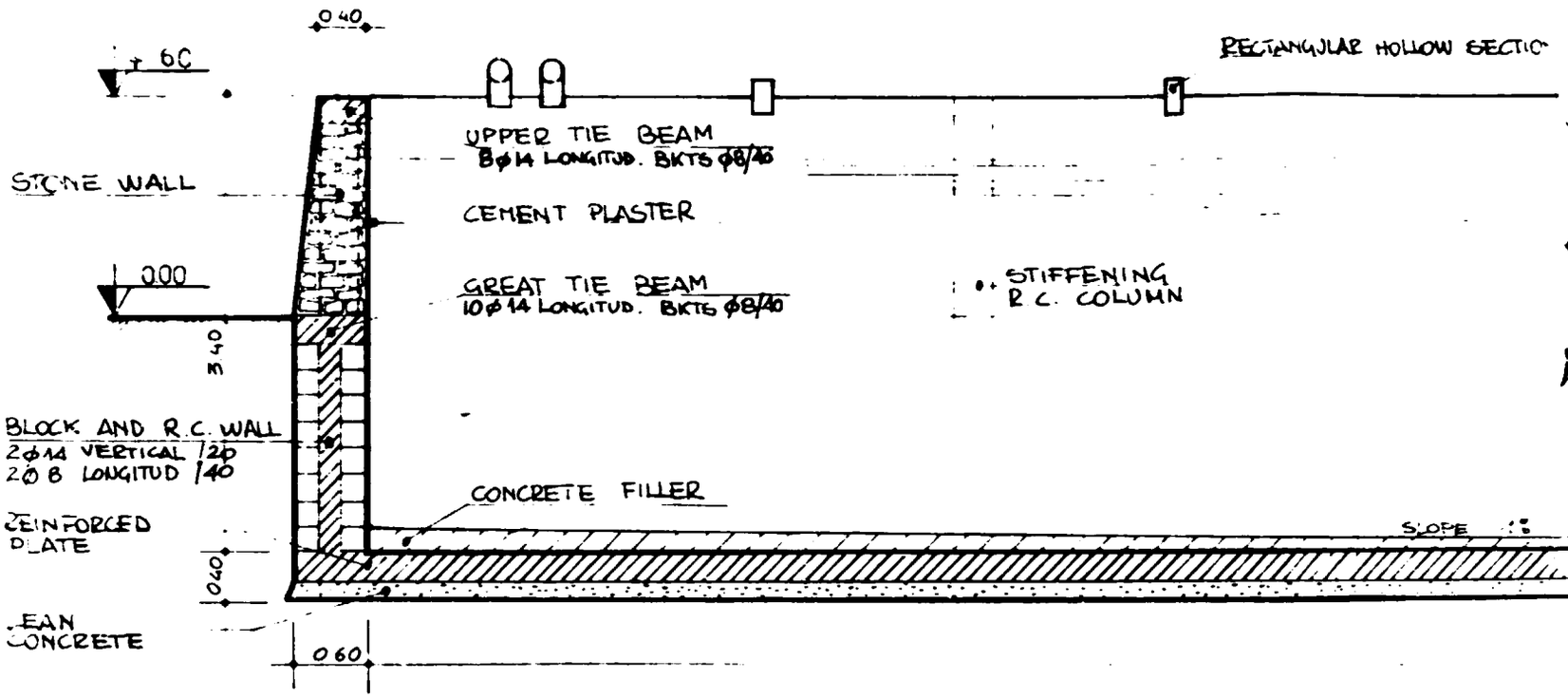
"STUDIO TECNICO Dr. GIUSEPPE CIONFERO" - FLORENCE ITALY
Advisers:
Mr. Giuseppe Cionfero
Mr. Mauro Carbonari

March 1990

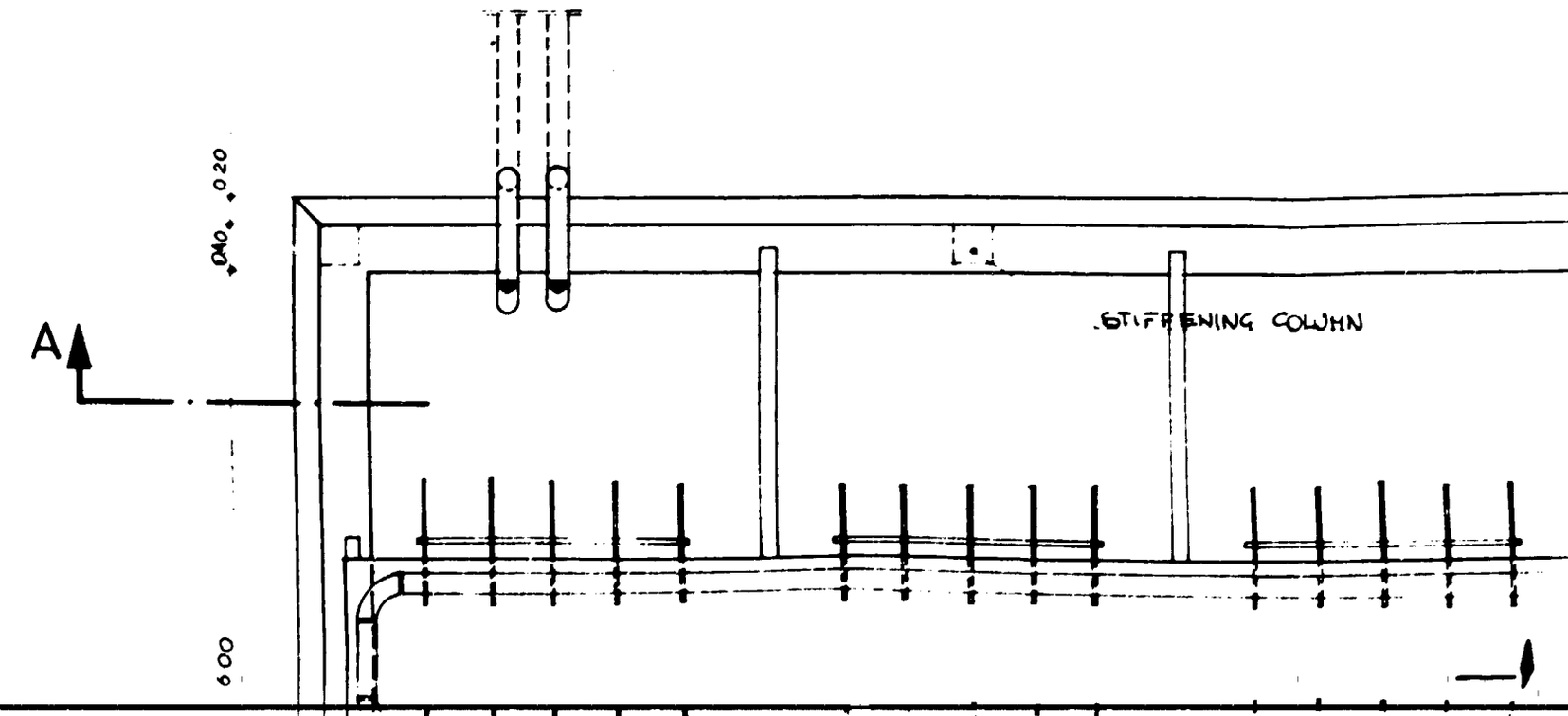
Process flowsheet

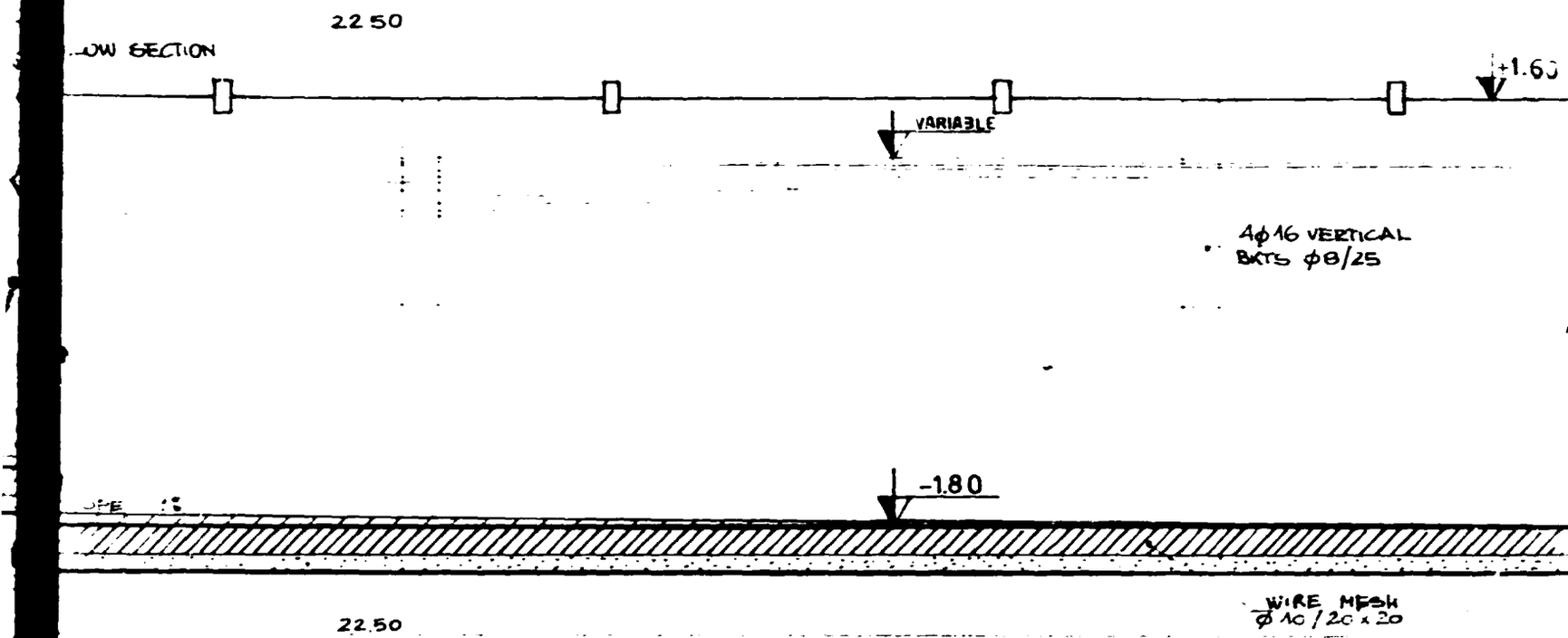
2

SECTION A-A

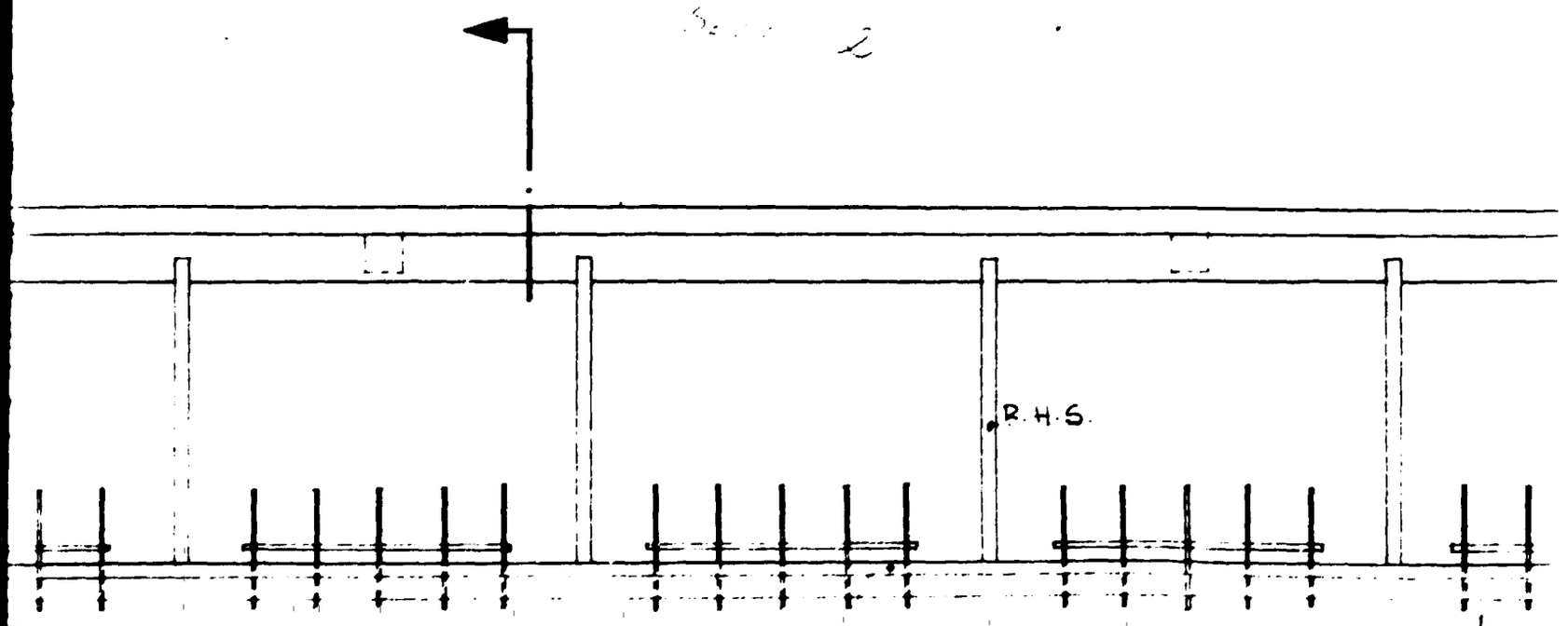


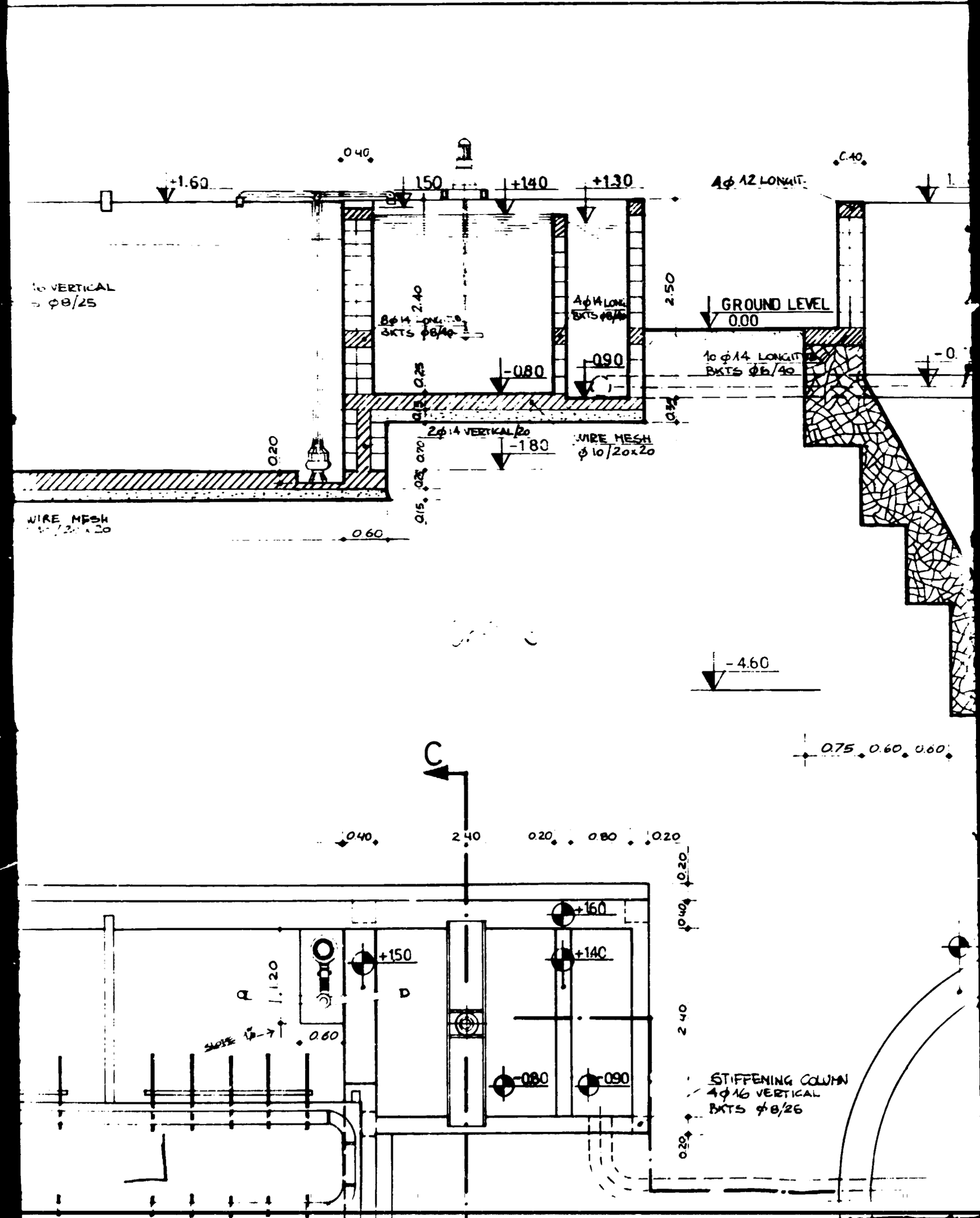
SCALE 1

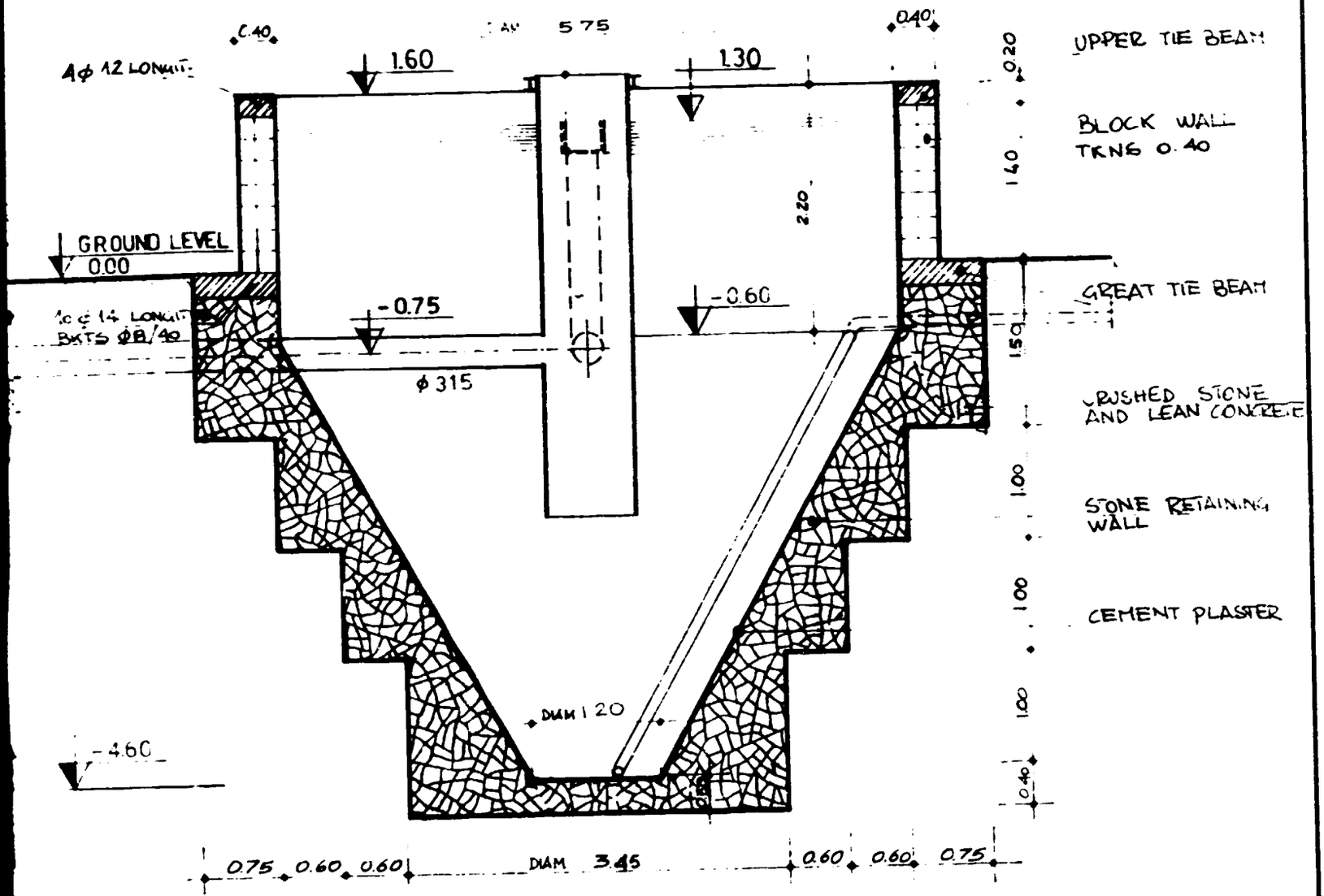



22 50
..OW SECTION
+1.60
VARIABLE
4φ16 VERTICAL
BRTS φ8/25
-1.80
WIRE MESH
φ 10 / 20 x 20
22.50

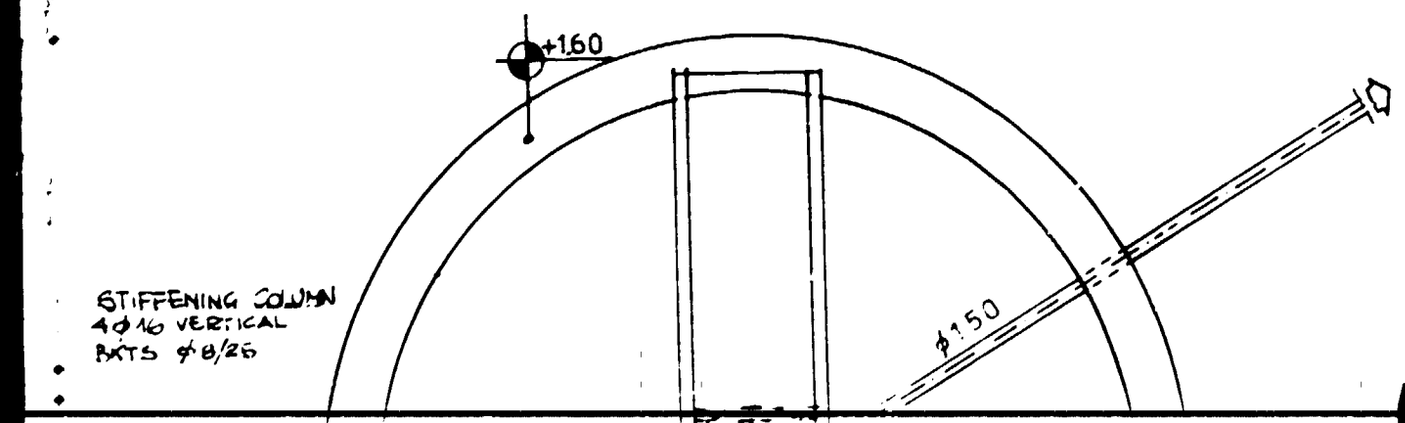
B

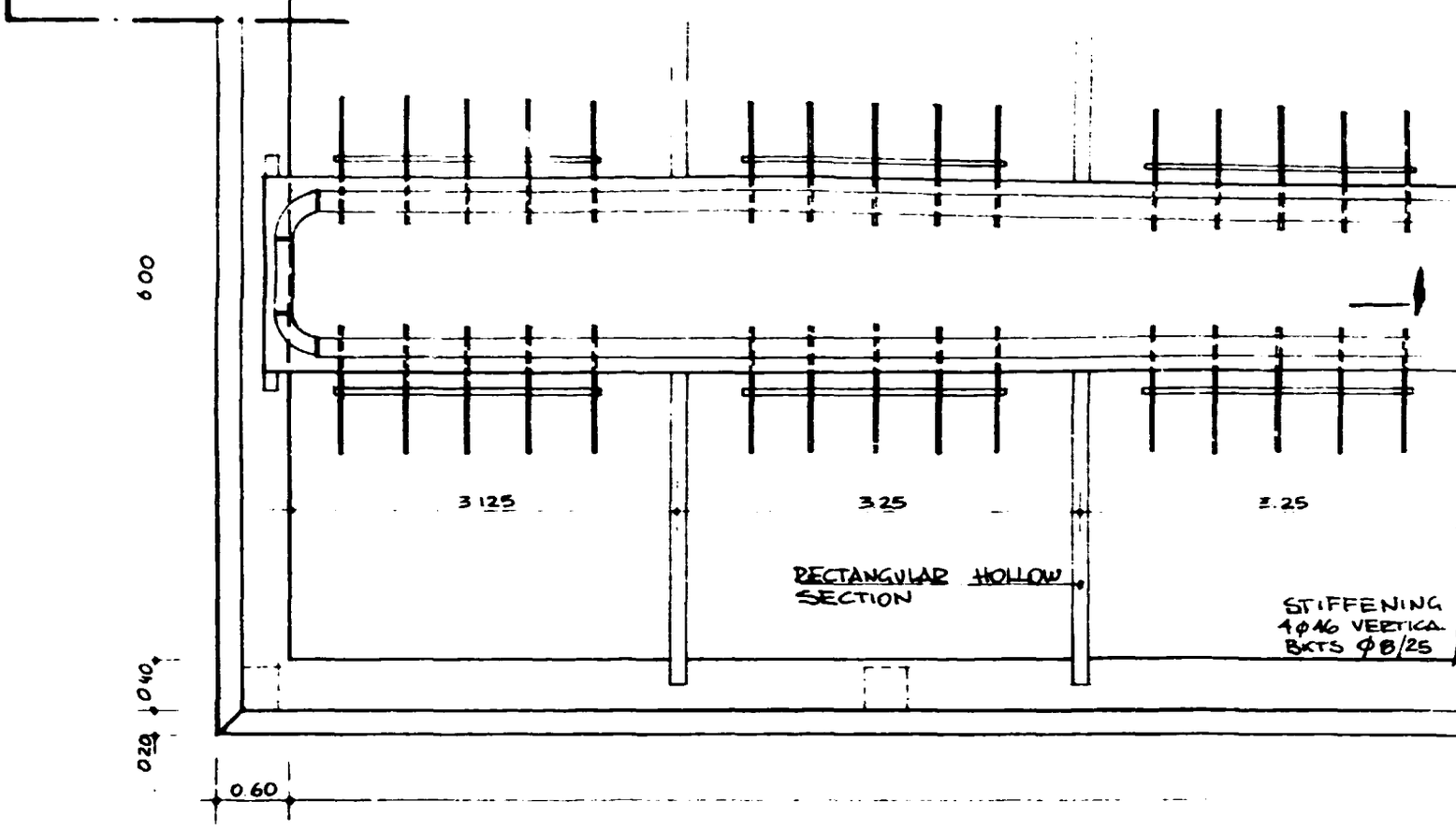

R.H.S.


+1.60
150
+140
+130
4φ 12 LONGIT.
GROUND LEVEL
0.00
2.50
2.40
-080
090
-180
-4.60
WIRE MESH
φ 10/20x20
2φ 14 VERTICAL/20
0.60
0.75
0.60
0.60
2.40
0.20
0.80
0.20
+160
+150
+140
-080
-090
STIFFENING COLUMN
4φ 16 VERTICAL
BXTS φ 8/26
SLOPE 1:1.20
0.60


C.40
DIAM 5.75
0.40
4φ 12 LONGIT.
1.60
1.30
0.20
UPPER TIE BEAM
BLOCK WALL
TKNS 0.40
1.40
2.20
GROUND LEVEL
0.00
-0.75
-0.60
GREAT TIE BEAM
1.50
φ 315
CRUSHED STONE
AND LEAN CONCRETE
1.00
STONE RETAINING
WALL
1.00
CEMENT PLASTER
1.00
DIAM 1.20
-4.60
0.40
0.75
0.60
0.60
DIAM 3.45
0.60
0.60
0.75

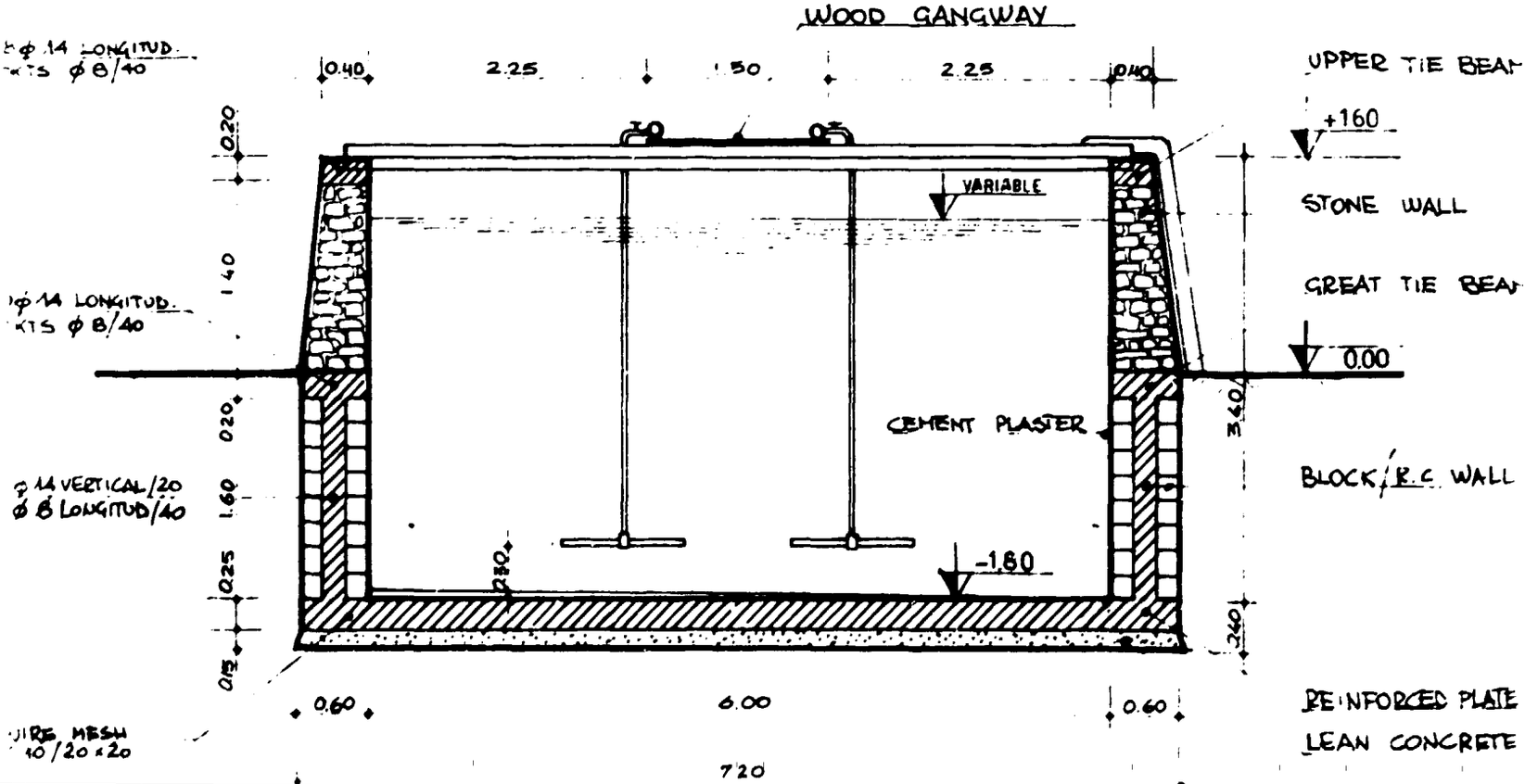
SECT +

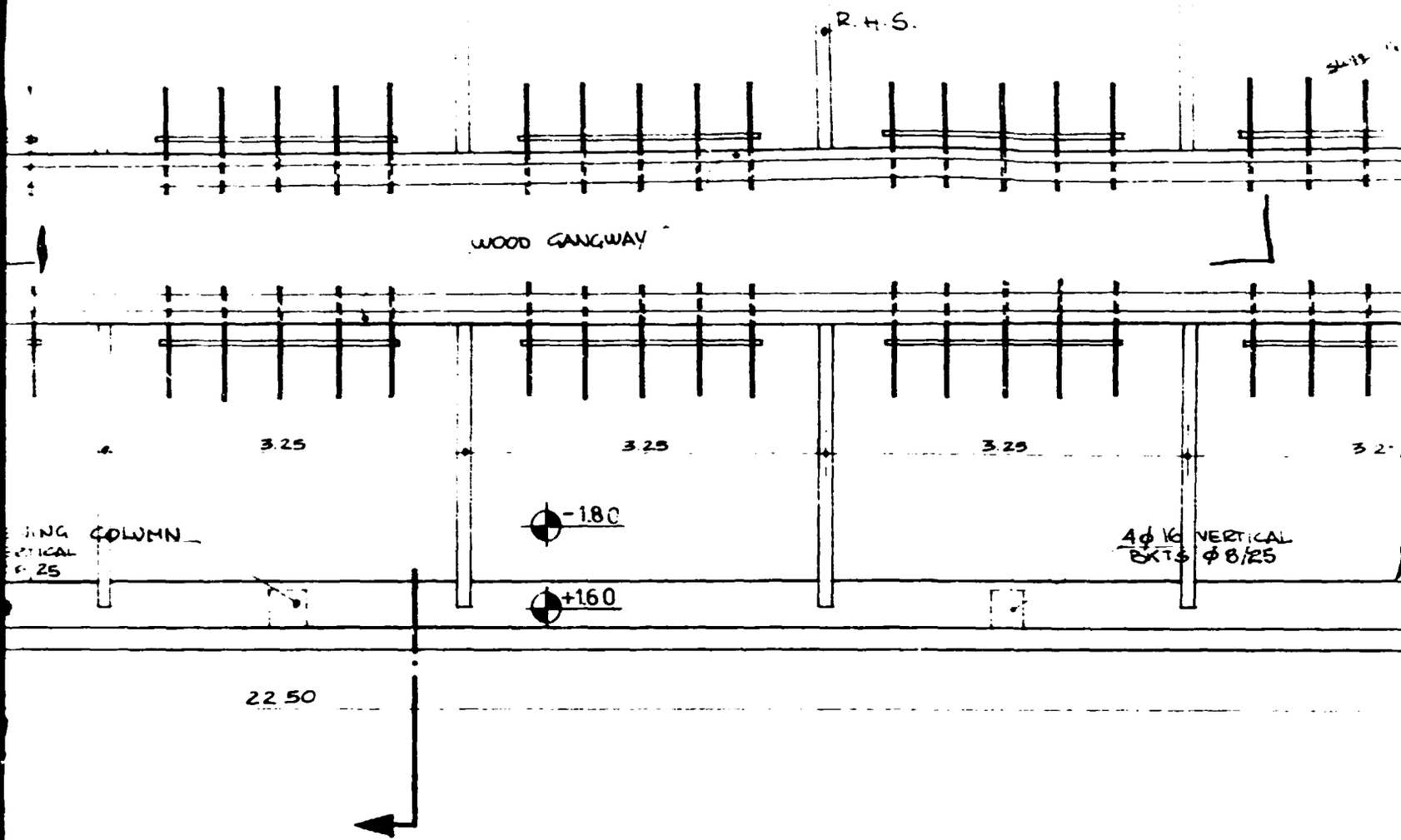

+1.60
STIFFENING COLUMN
4φ16 VERTICAL
BXTS φ8/25
φ150



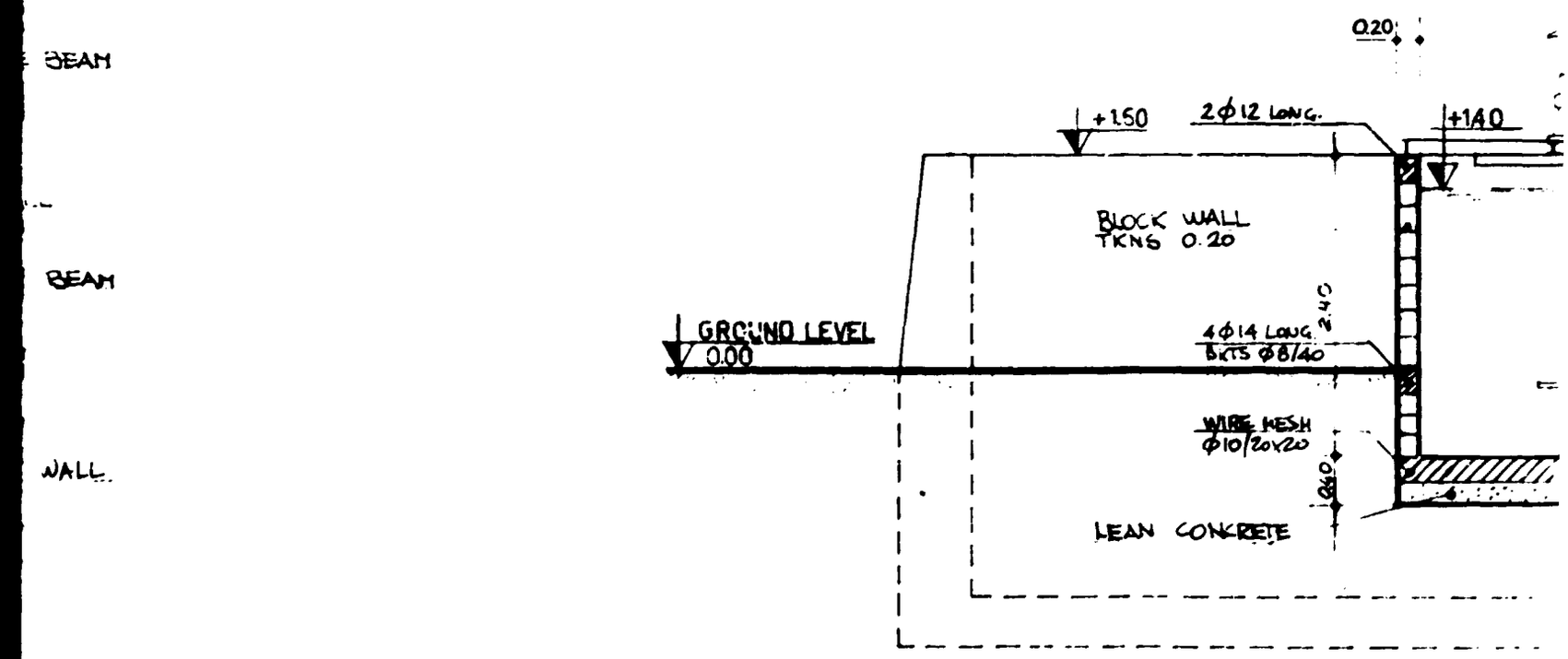
SECTION C-C

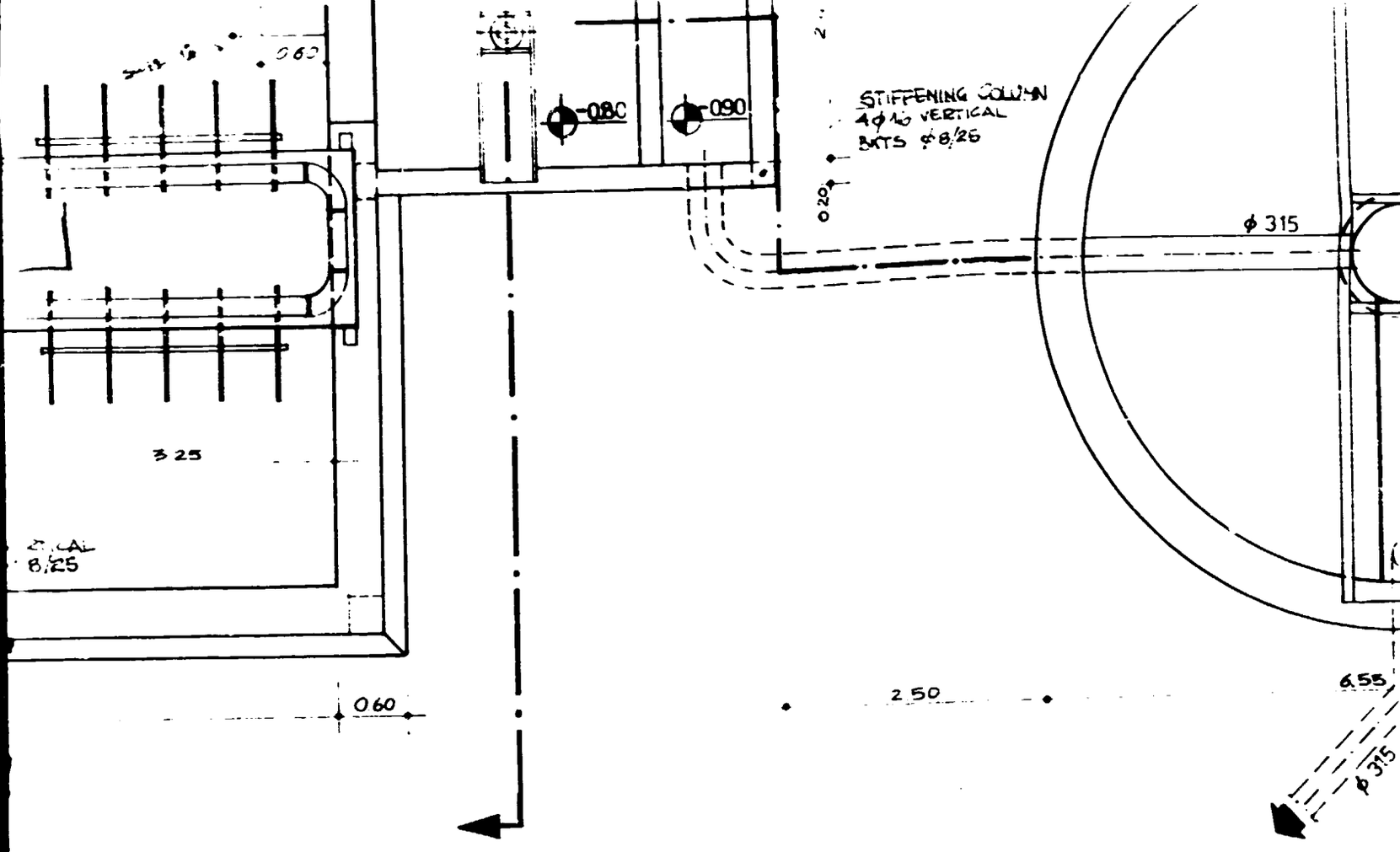
SECTION B-B

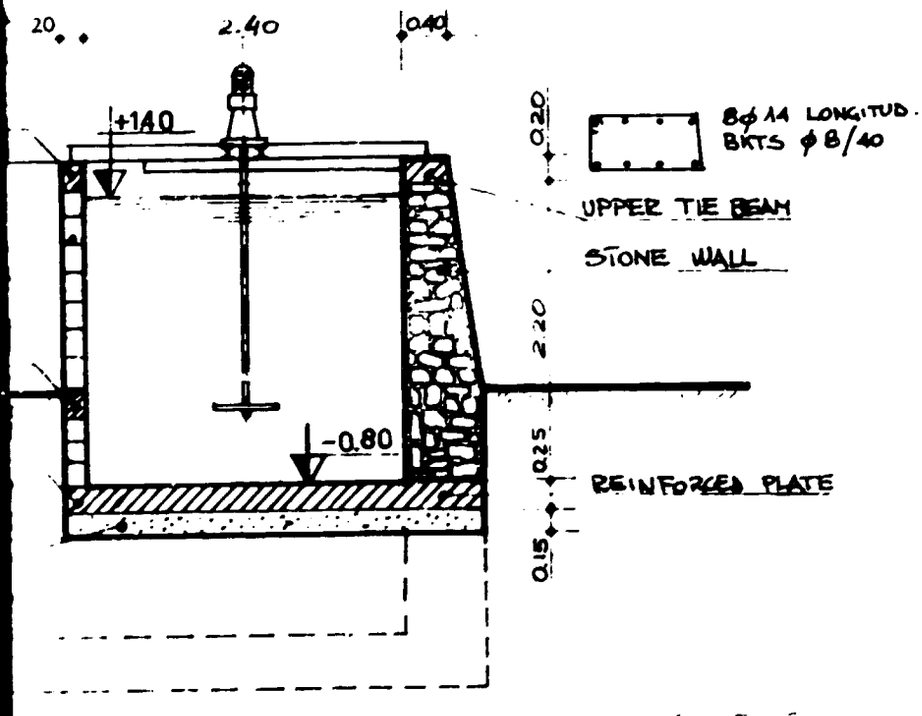



R.H.S.
WOOD GANGWAY
3.25
3.25
3.25
-1.80
+1.60
4φ 16 VERTICAL
BKTS φ 8/25
22.50
B

SECTION C-C


0.20
+1.50
2φ12 LONG.
+1.40
BLOCK WALL
TKNS 0.20
2.40
GROUND LEVEL
0.00
4φ14 LONG.
BKTS φ8/40
WIRE MESH
φ10/20x20
0.60
LEAN CONCRETE





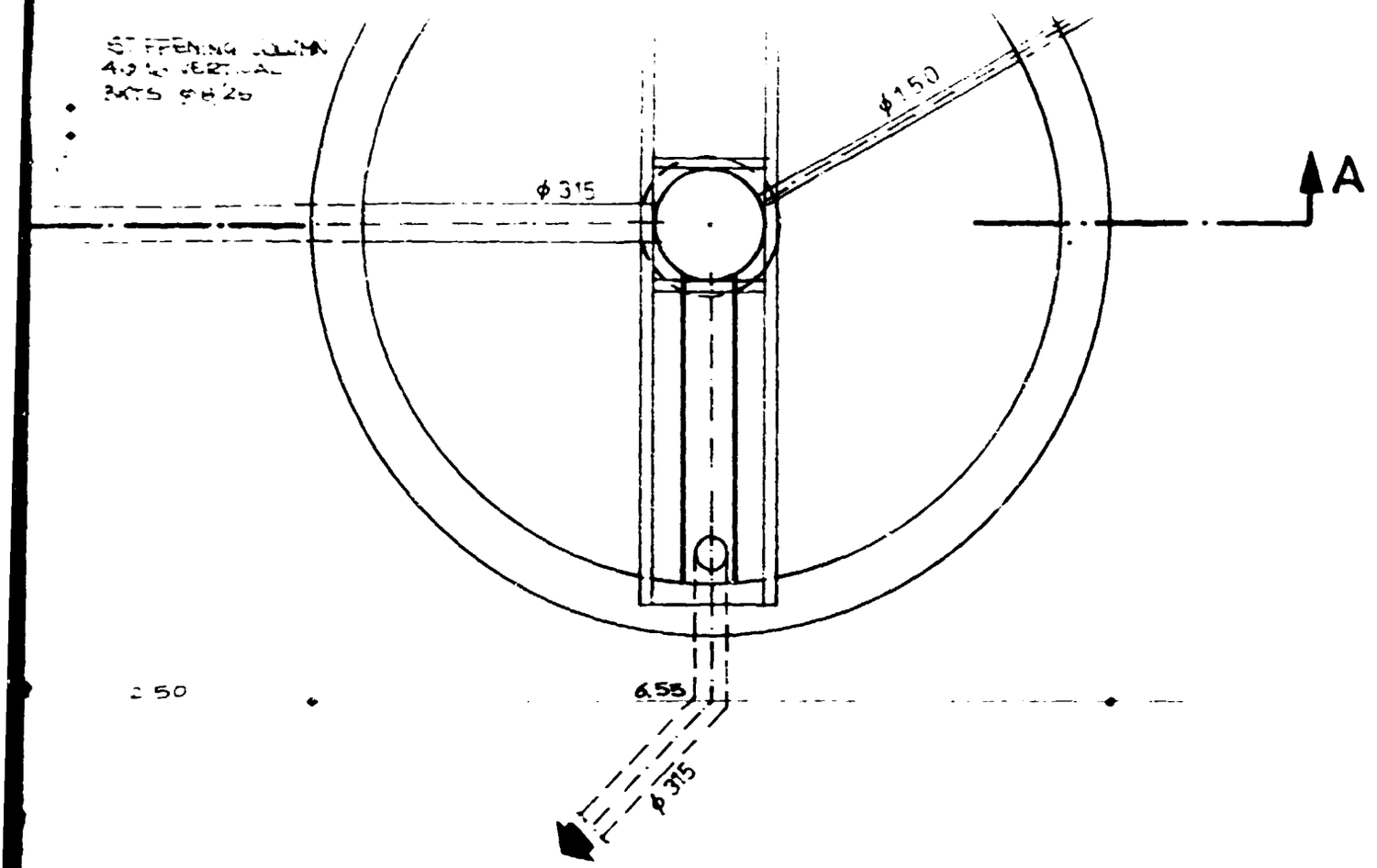
CONTRACT

Combol
waste w

National
Addis Ab

"STUDIO TEC
Advisors
Mr. Giuseppe C
Mr. Mauro Ca

1 : 50
Homogenis
Flocculation



CONTRACT n. 88/1008: UNIDO PROJECT SI/ETH/88/801

Combolcha tannery: waste water treatment plant

National Leather and Shoe Corporation Addis Ababa - Ethiopia

"STUDIO TECNICO Dr. GIUSEPPE CIAMBERINI" - FLORENCE ITALY

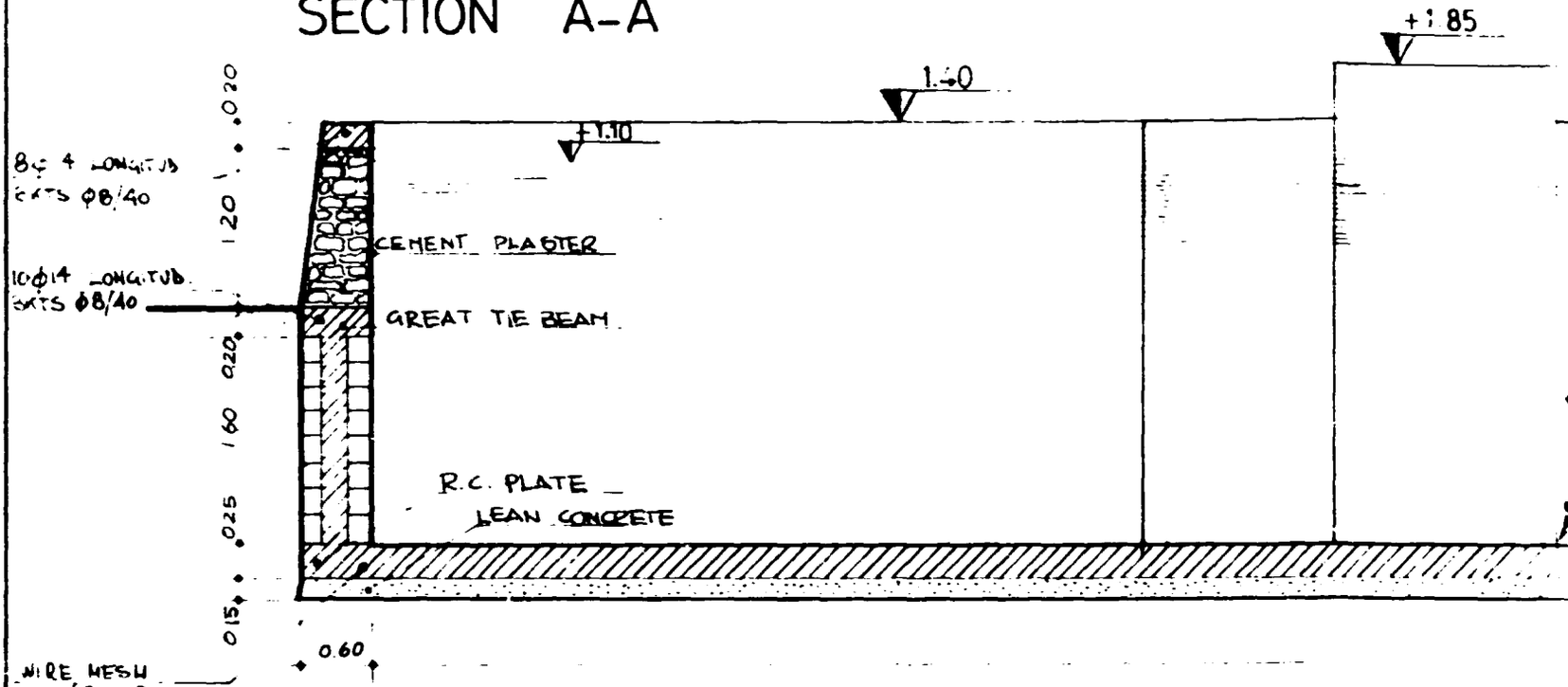
Advisors
Mr. Giuseppe Ciambelli
Mr. Filippo Corbisiero

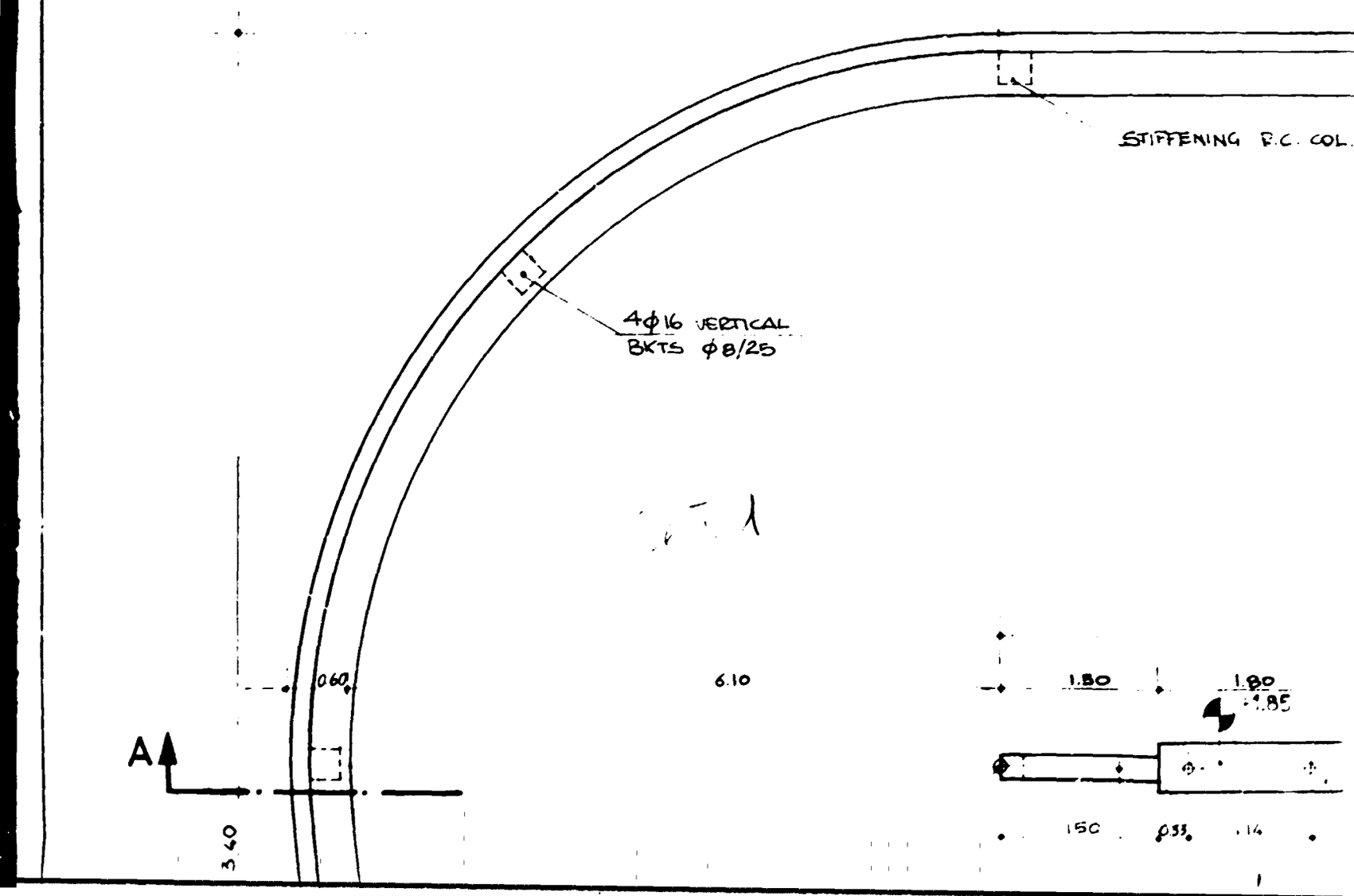
March 1990

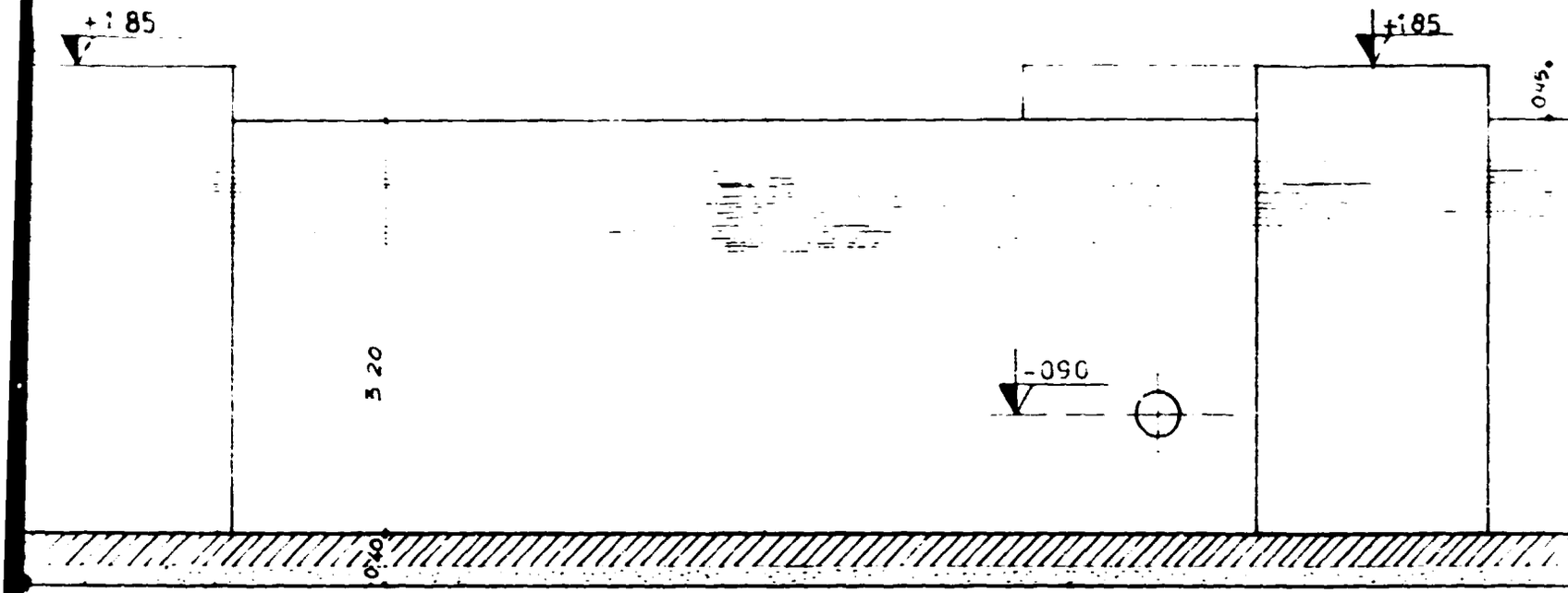
4

Sedimentation tank
Thickener tank
Primary sedimentation tank

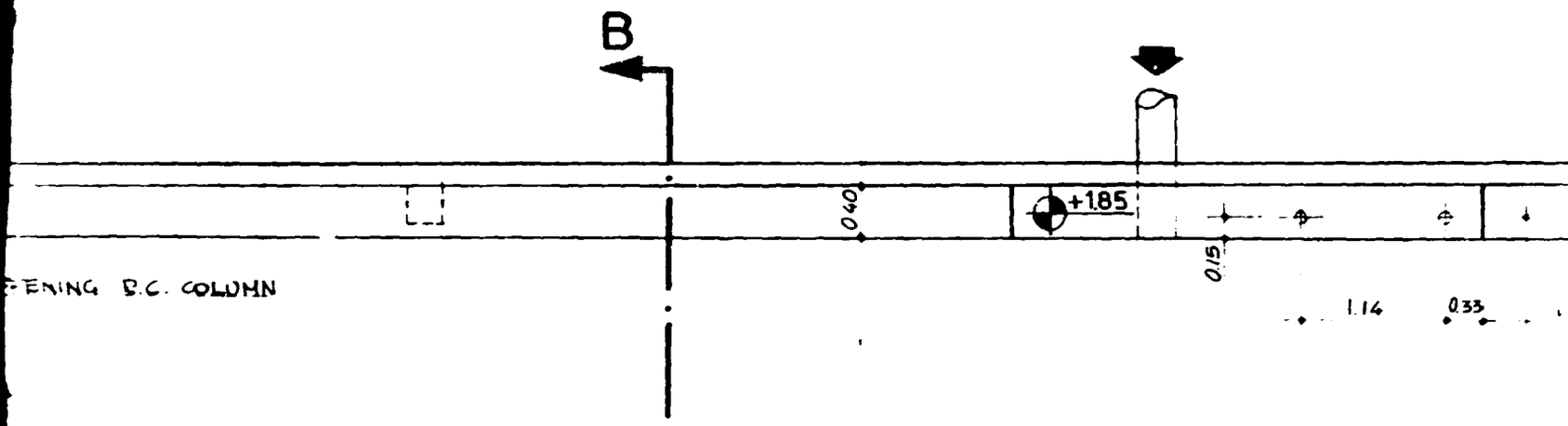
SECTION A-A


+1.85
1.40
+1.10
8ϕ 4 LONGITUD
BKTS ϕ8/40
10ϕ14 LONGITUD
BKTS ϕ8/40
CEMENT PLASTER
GREAT TIE BEAM
R.C. PLATE
LEAN CONCRETE
020
120
020
160
025
015
0.60
WIRE MESH
ϕ 10/20 x 20


STIFFENING R.C. COL.
4ϕ16 VERTICAL
BKTS ϕ8/25
A
A
0.60
6.10
1.80
1.80
1.85
3.40
150
033
14



27.20



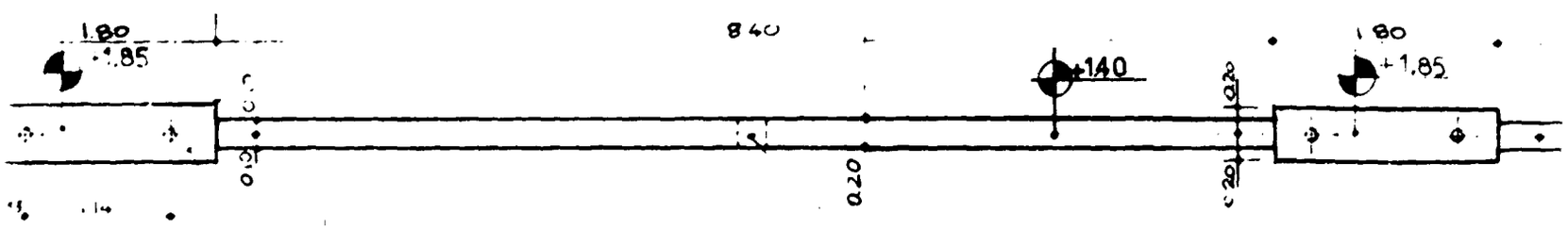
ENING R.C. COLUMN

6.00

6.25

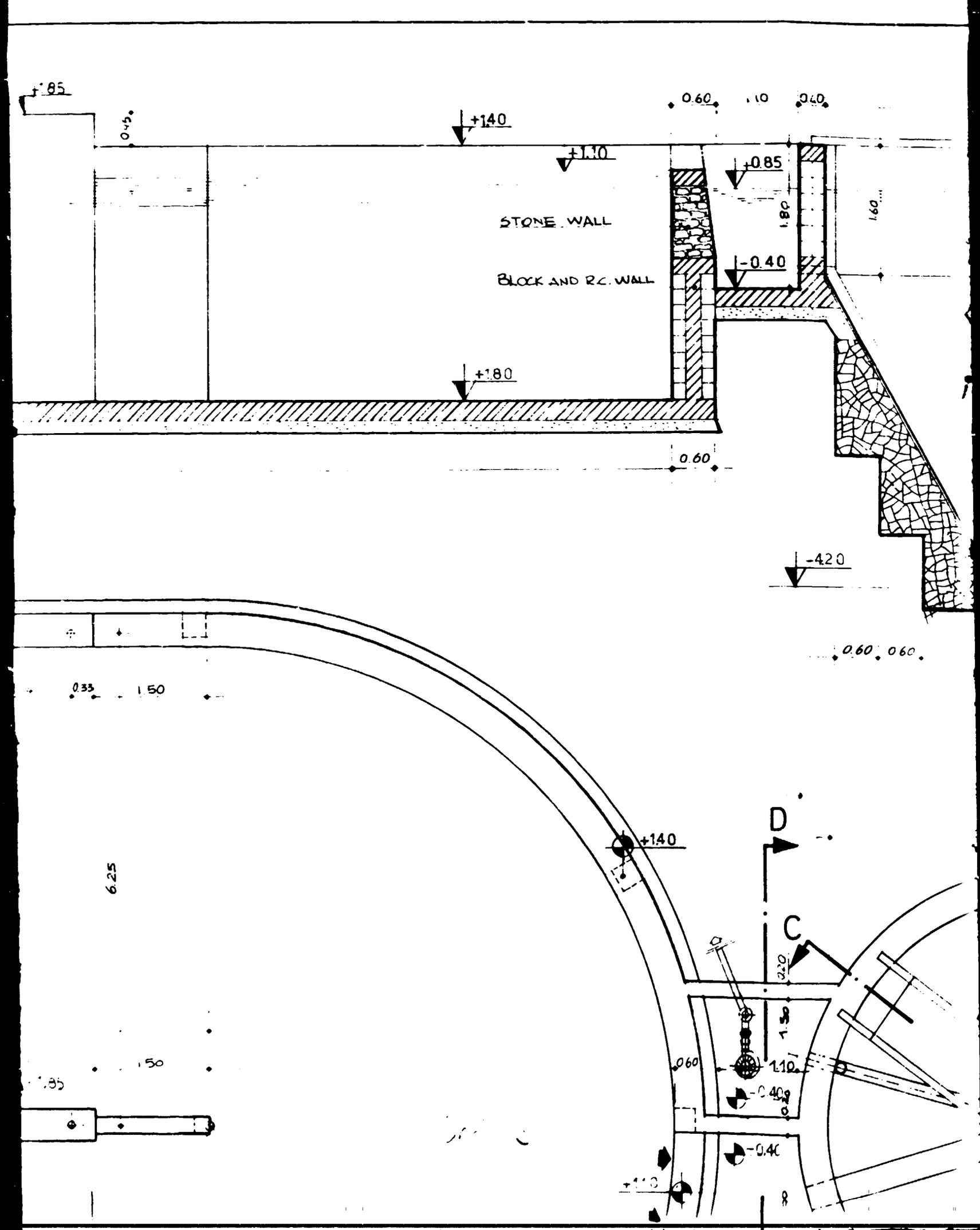
15.00

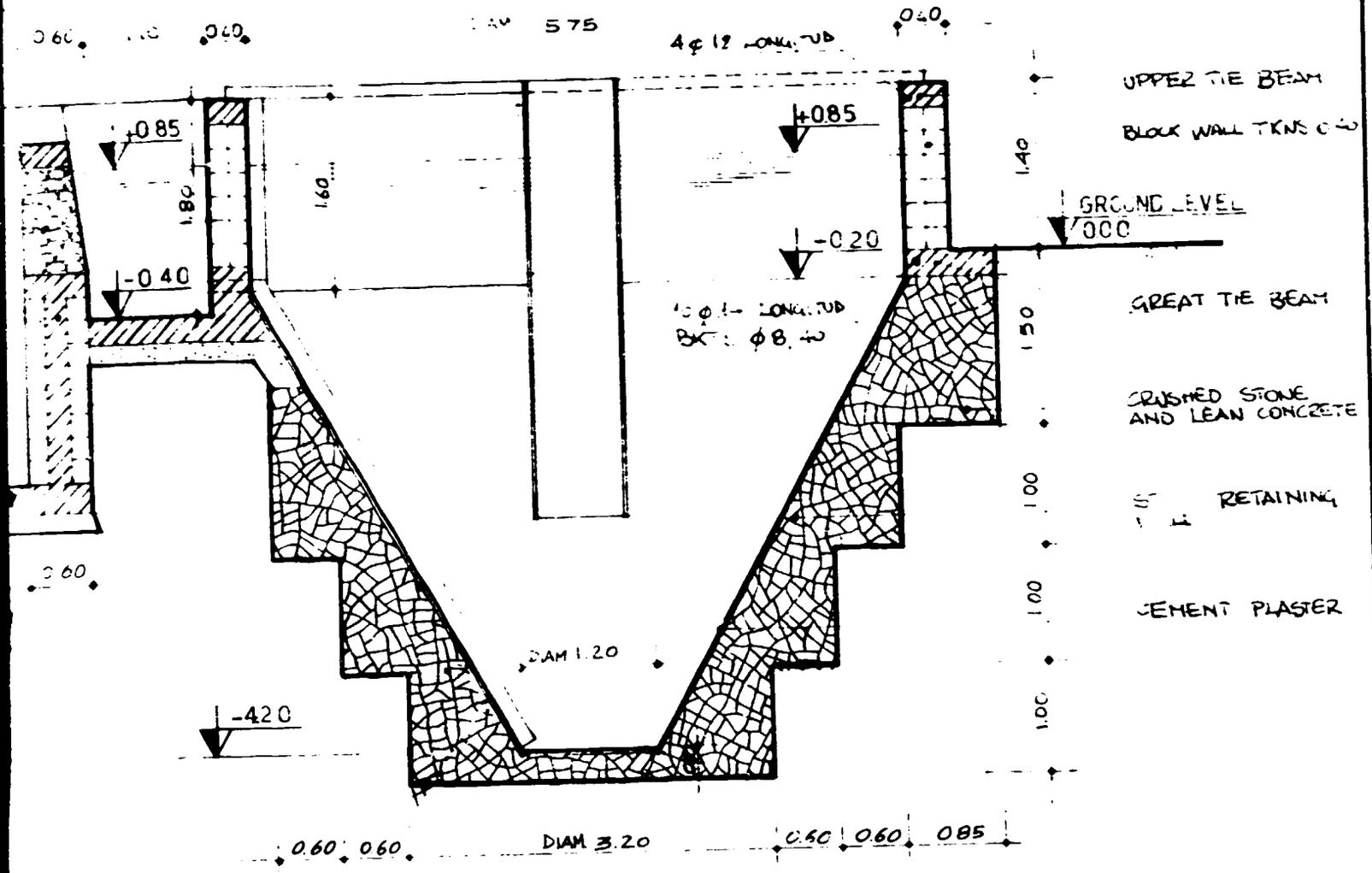
8.40

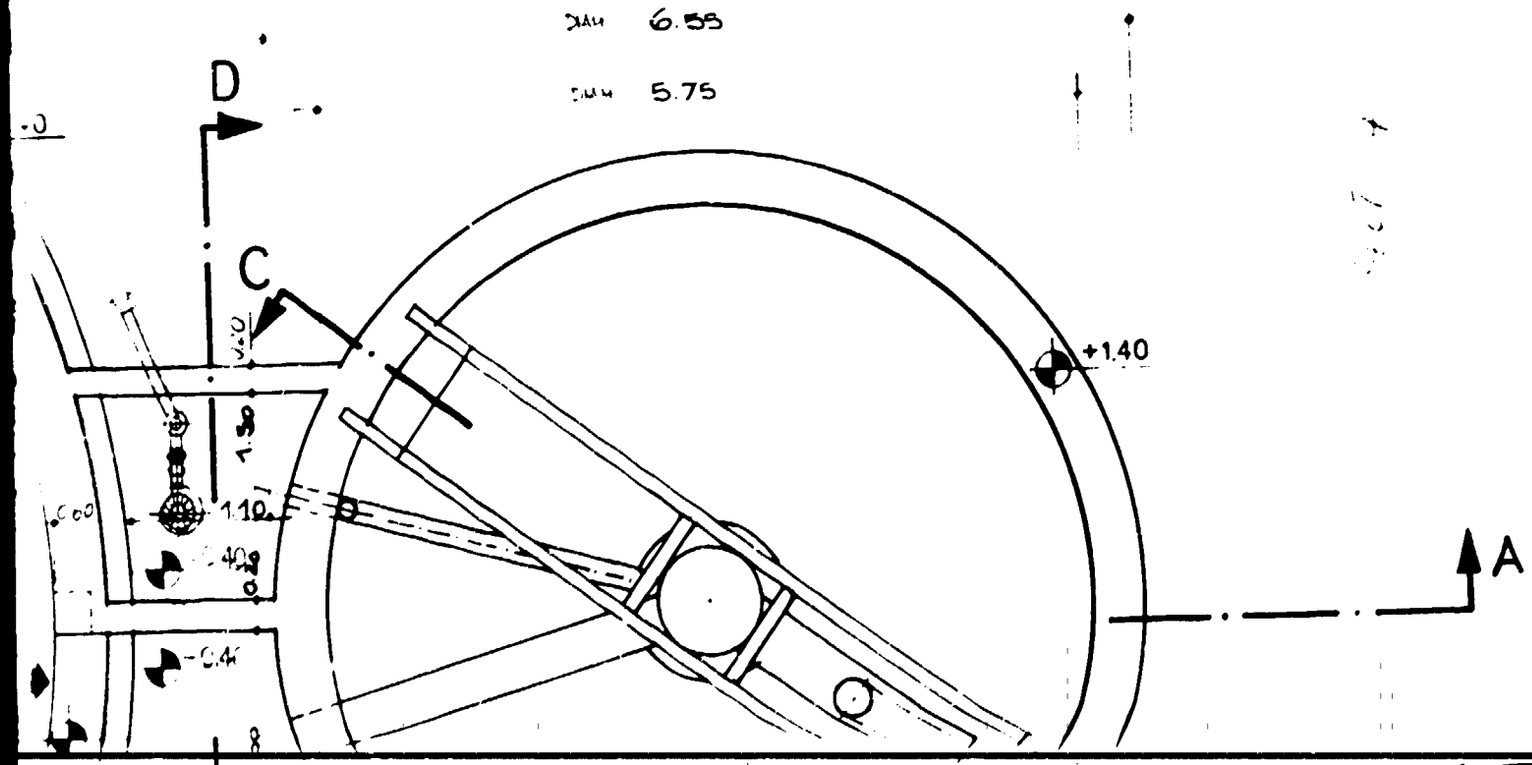


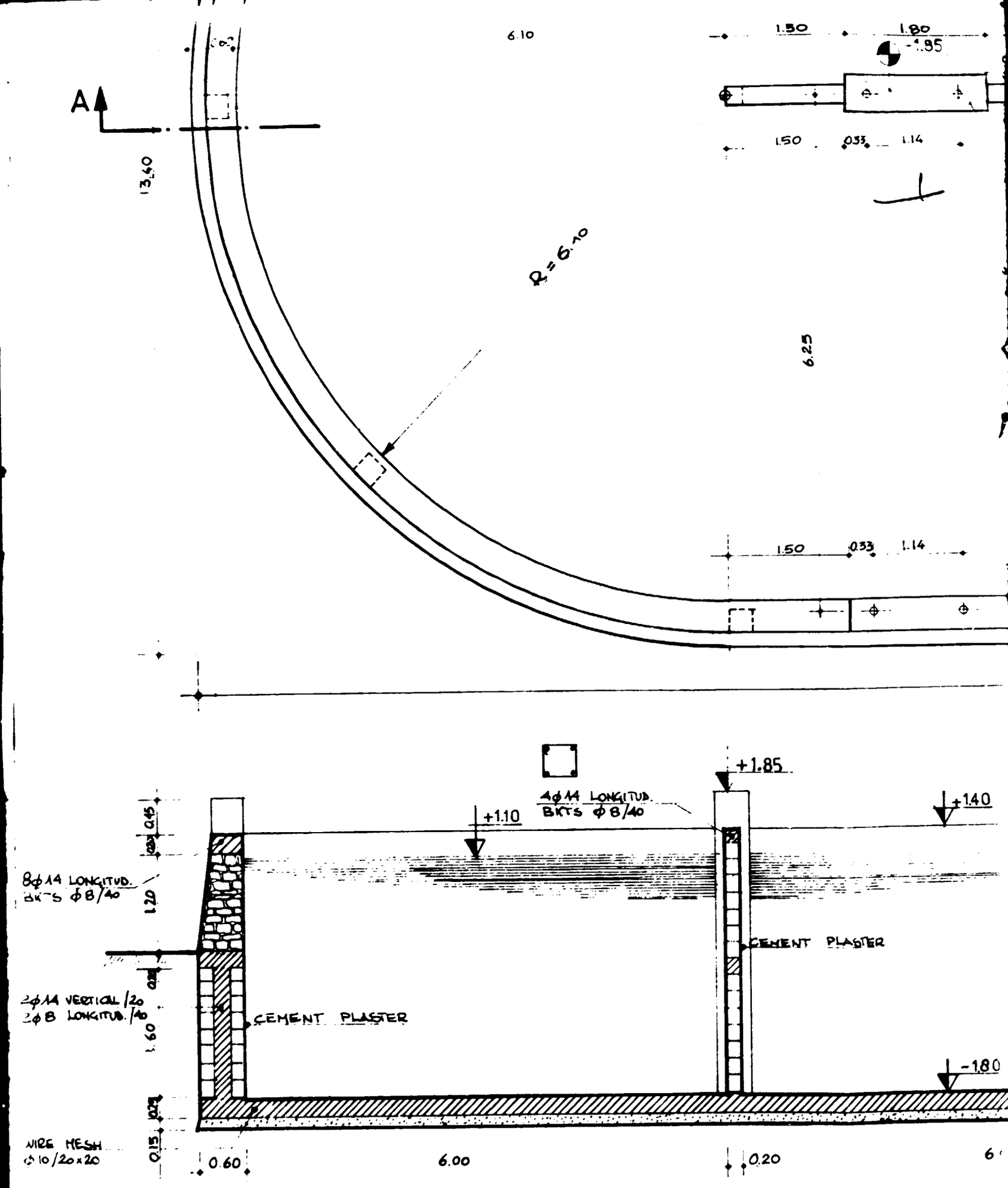
R.C. COLUMN

4 ϕ 16 VERTICAL
BARS ϕ 8 @ 25


+1.85
0.42
+1.40
+1.10
0.60
1.10
0.40
+0.85
STONE WALL
BLOCK AND R.C. WALL
1.80
1.60
-0.40
+1.80
0.60
-4.20
0.60
0.60
0.33
1.50
6.25
+1.40
D
C
2.20
1.50
0.60
1.10
-0.40
-0.40
+1.10
1.50
1.85

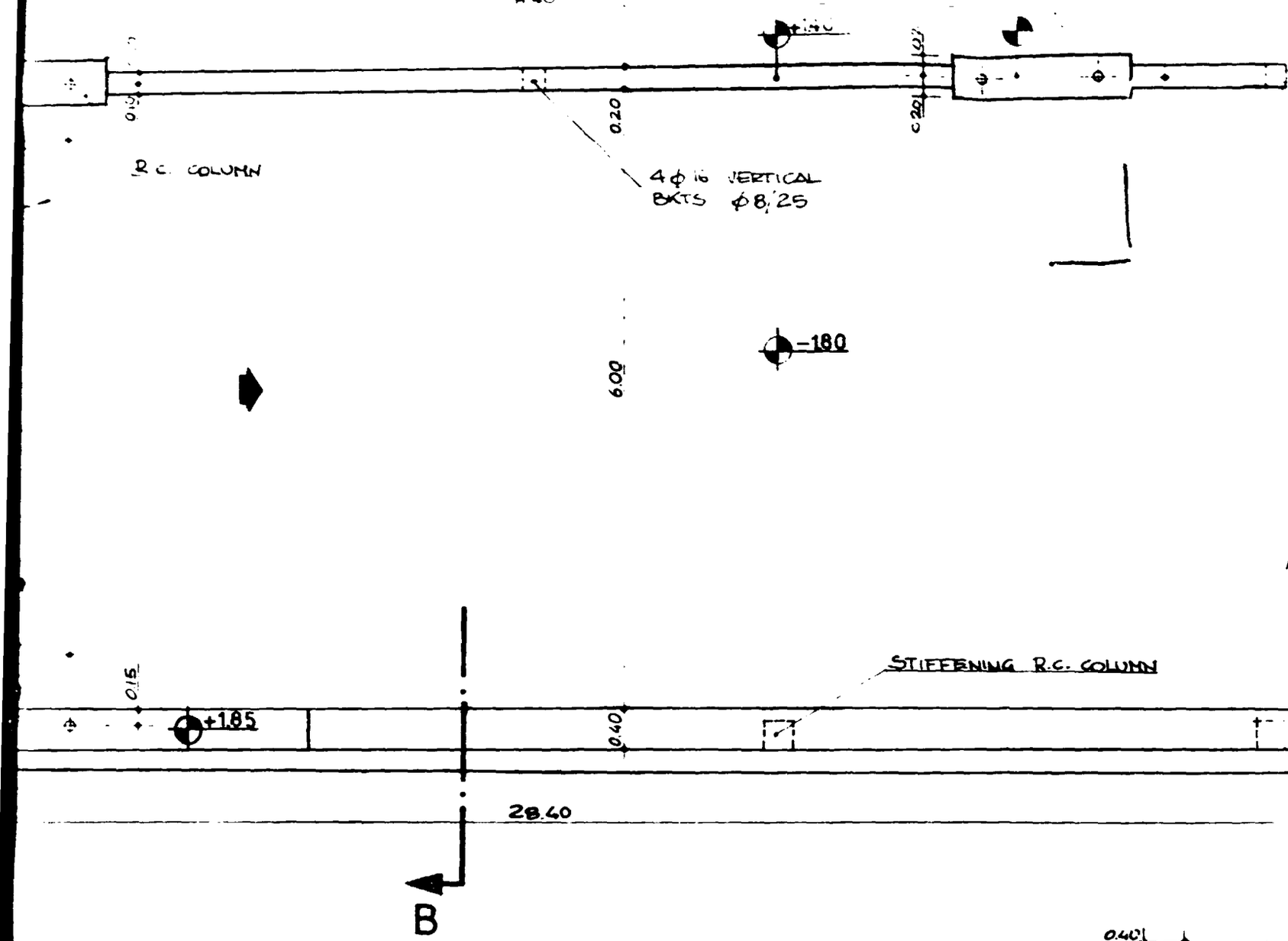

4 ϕ 12 LONGITUD
UPPER TIE BEAM
BLOCK WALL TKNS 0.20
+0.85
-0.20
GROUND LEVEL
±0.00
-0.40
GREAT TIE BEAM
CRUSHED STONE AND LEAN CONCRETE
RETAINING
CEMENT PLASTER
DIAM 1.20
-4.20
DIAM 3.20
0.60
0.85
1.40
1.50
1.00
1.80
1.60

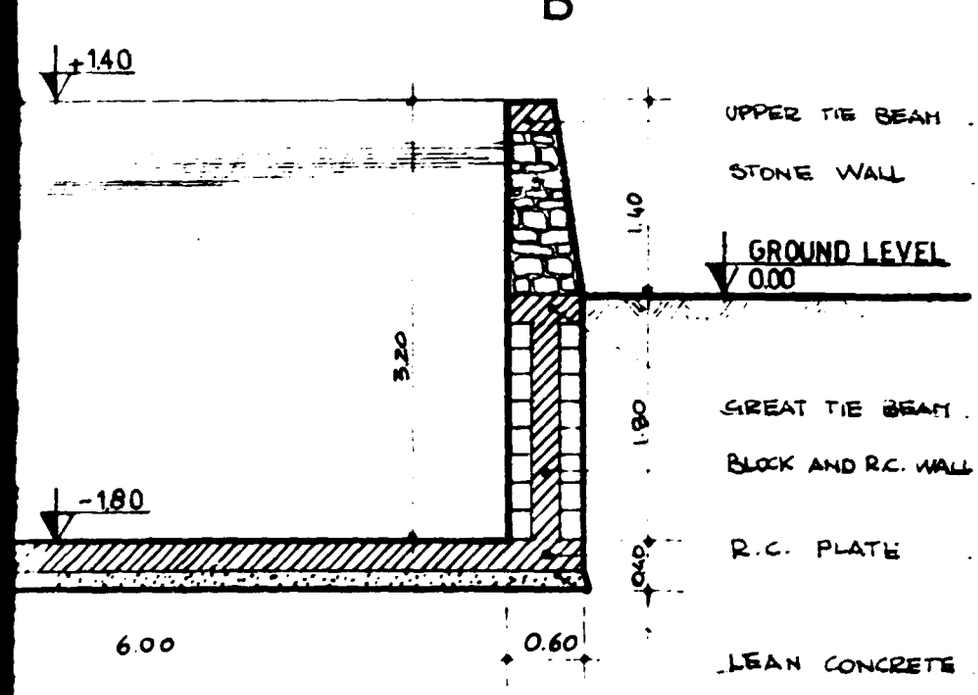

DIAM 6.55
DIAM 5.75
D
C
A
+1.40
1.10
-0.40
-0.40

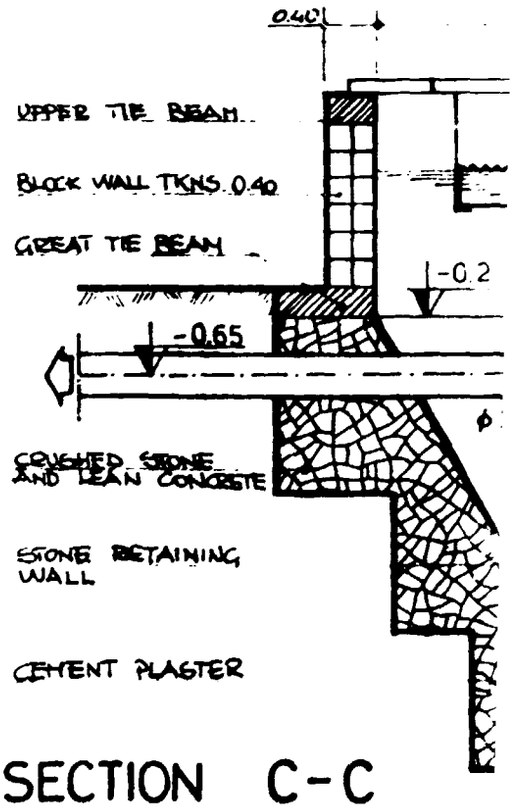


SECTION B-B

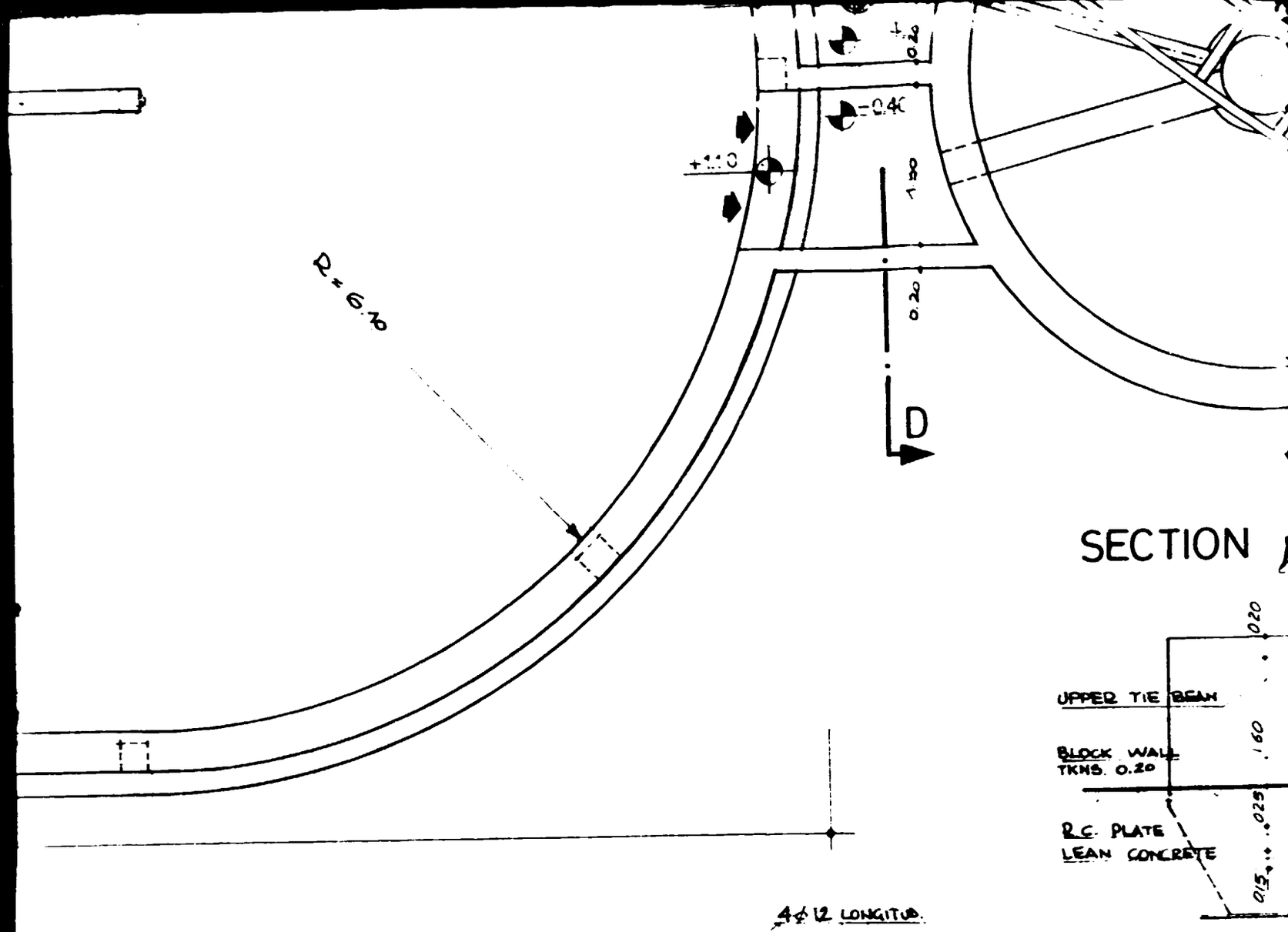
SECT


R.C. COLUMN
4 ϕ 16 VERTICAL
BKTS ϕ 8/25
-1.80
6.00
0.15
+1.85
0.40
STIFFENING R.C. COLUMN
28.40
B

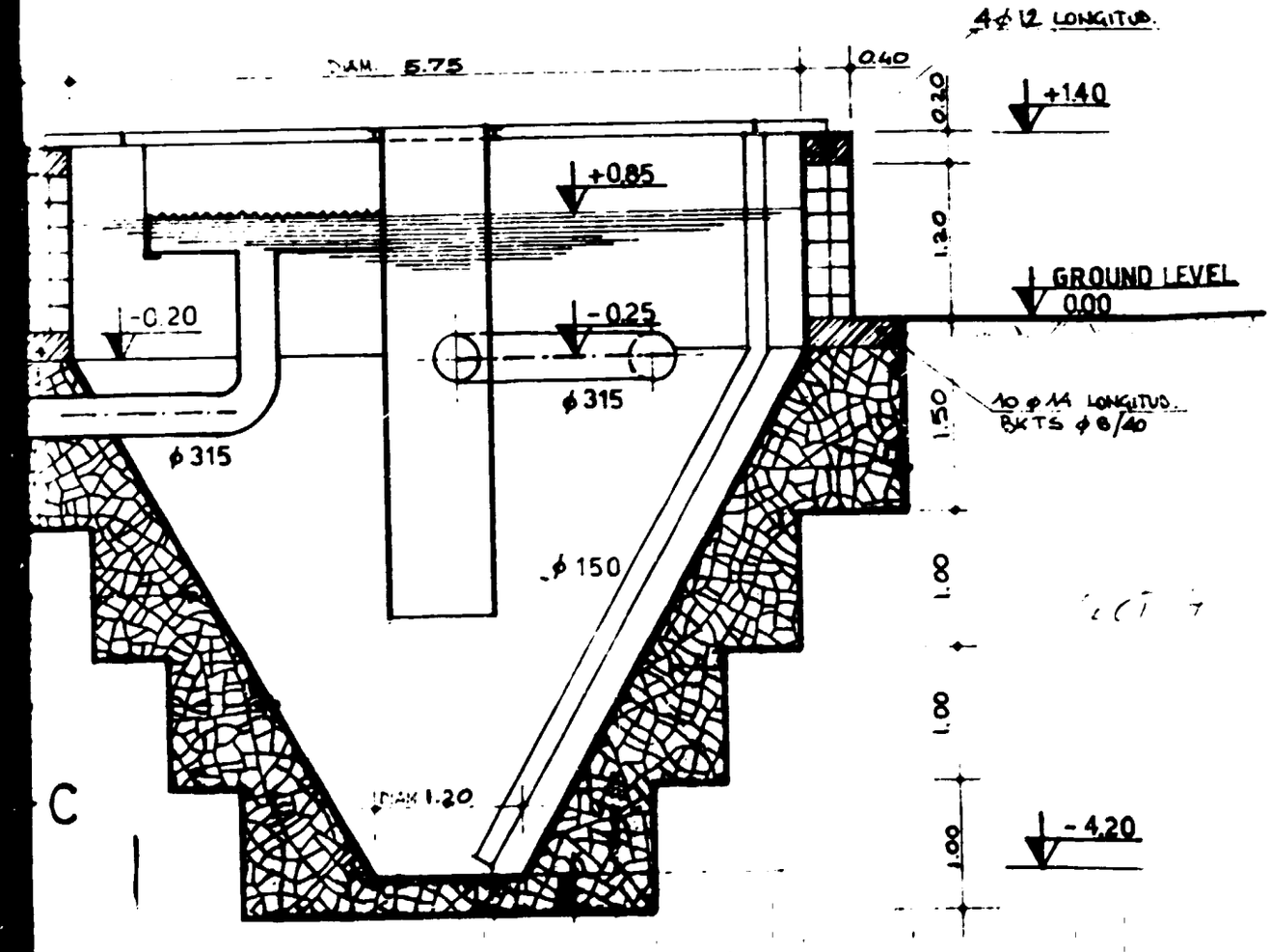

+1.40
UPPER TIE BEAM
STONE WALL
1.40
GROUND LEVEL
0.00
3.20
GREAT TIE BEAM
1.80
BLOCK AND R.C. WALL
-1.80
R.C. PLATE
0.40
6.00
0.60
LEAN CONCRETE


0.40
UPPER TIE BEAM
BLOCK WALL TKNS. 0.40
GREAT TIE BEAM
-0.2
-0.65
CRUSHED STONE AND LEAN CONCRETE
STONE RETAINING WALL
CEMENT PLASTER

SECTION C-C



SECTION



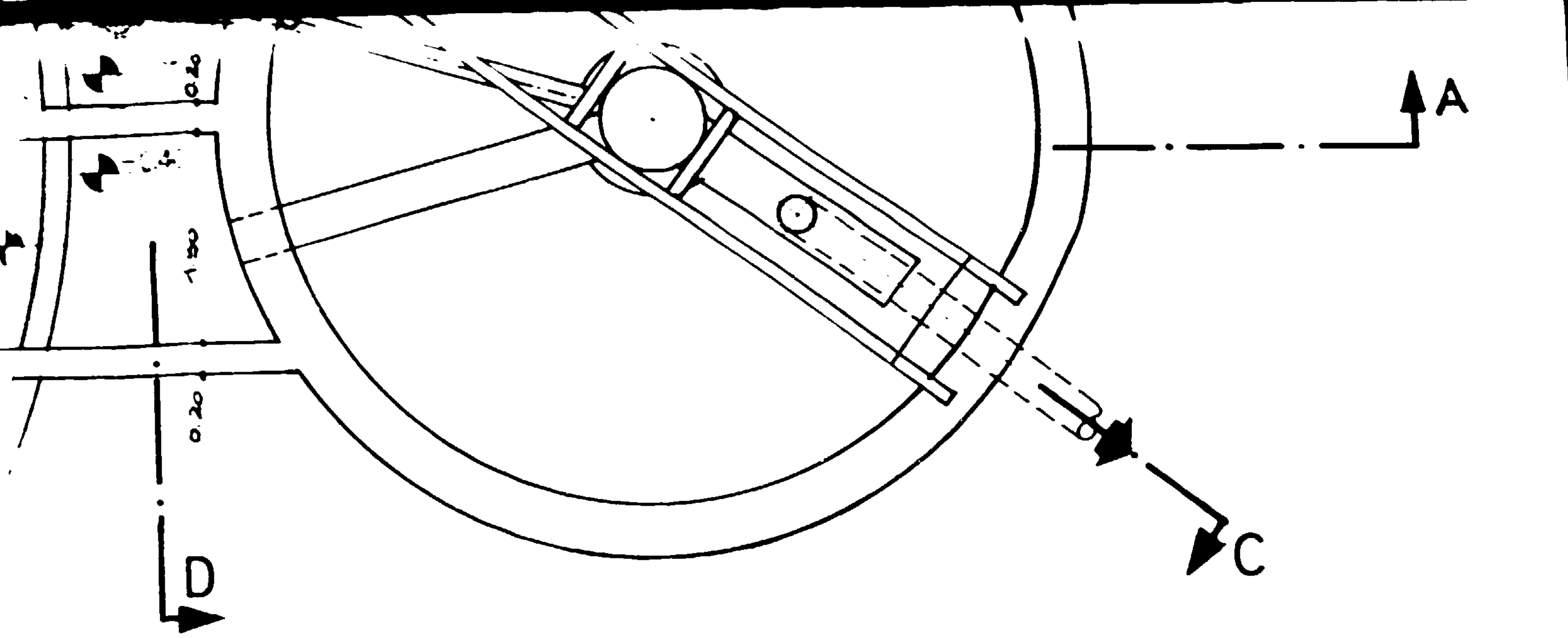
CONTRACT n

Combol
waste w

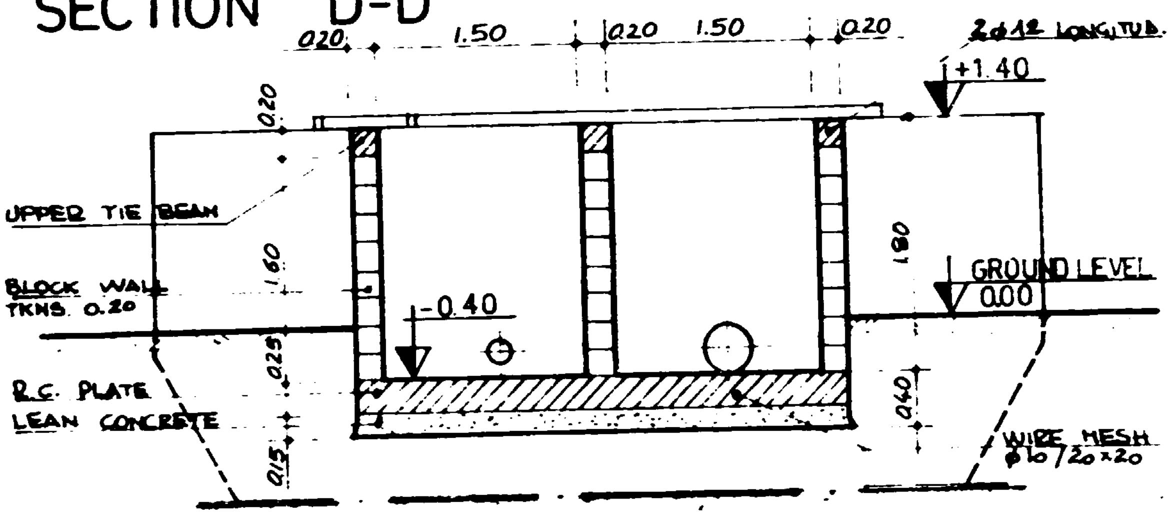
National
Addis Ab

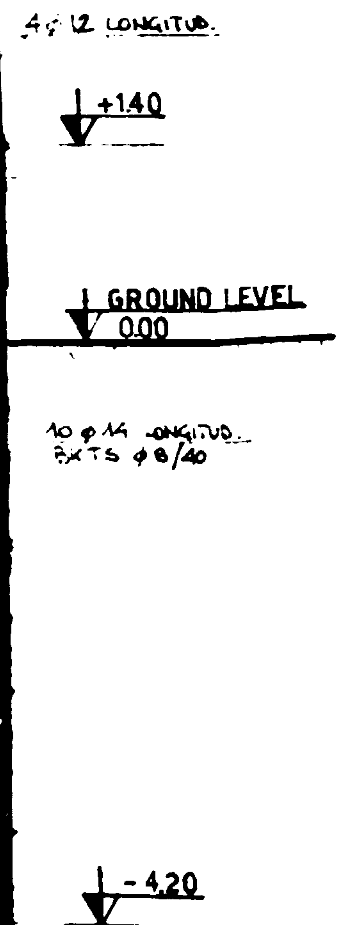
"STUDIO TEC
Advisors
Mr. Giuseppe C
Mr. Mauro Co

1 : 20
Hydrological
Sections sho
Scale plan



SECTION D-D





CONTRACT n. [illegible] [illegible] PROJECT [illegible]/ETH/[illegible]

Combolcha tannery: waste water treatment plant

National Leather and Shoe Corporation Addis Ababa - Ethiopia

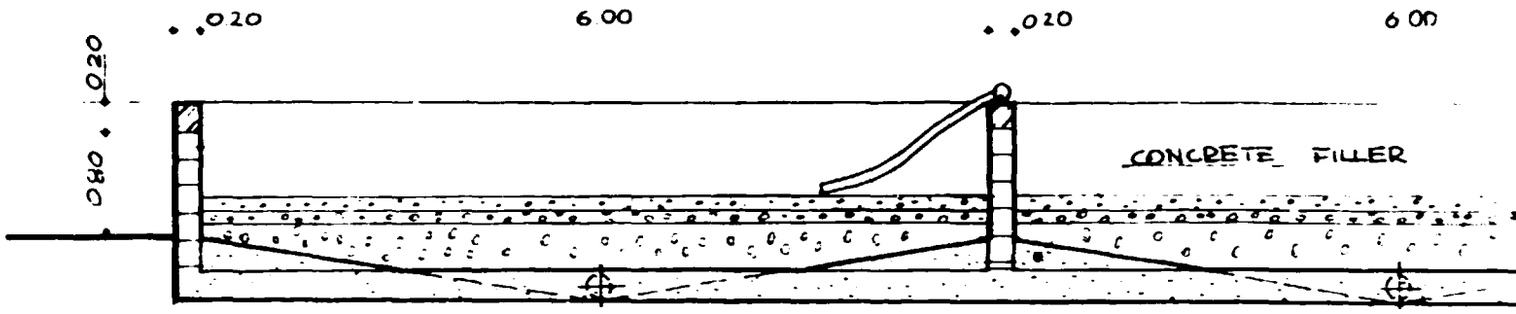
"[illegible]" - FLORENCE ITALY

[illegible]

[illegible]

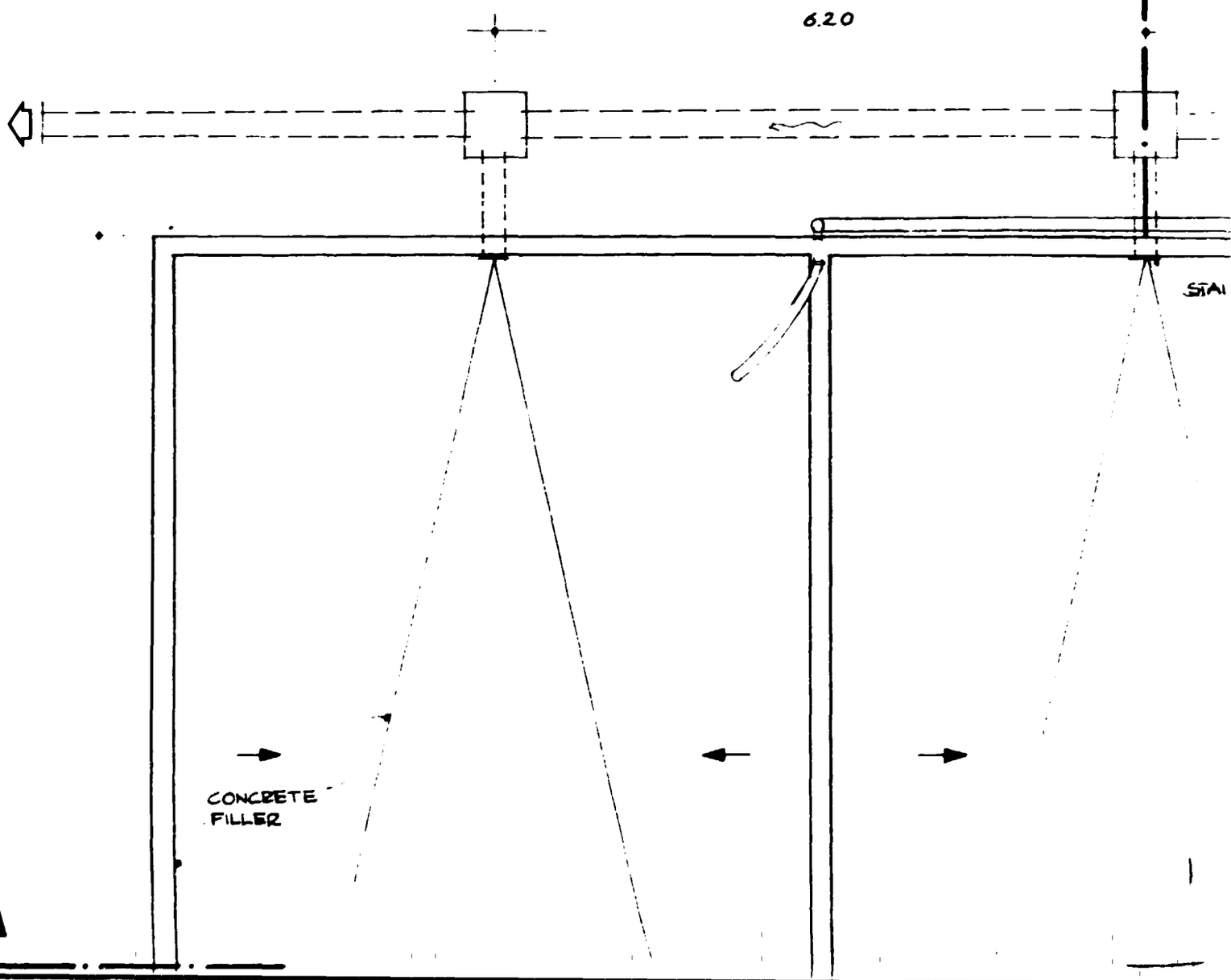
5

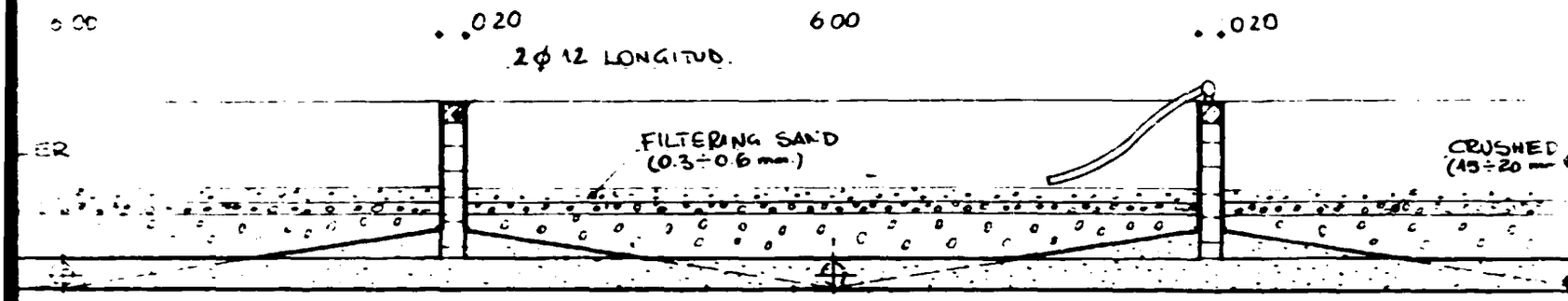
SECTION A-A

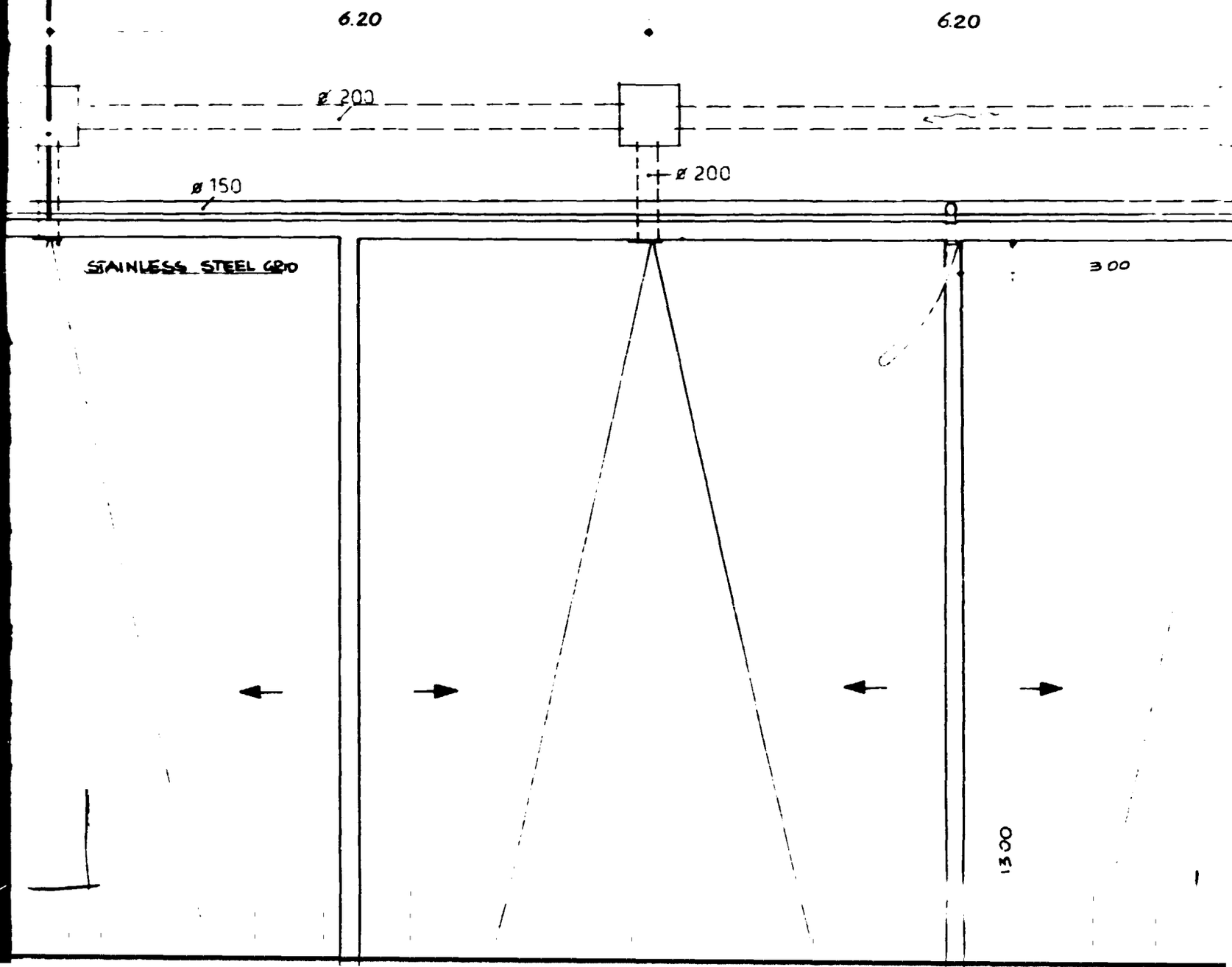


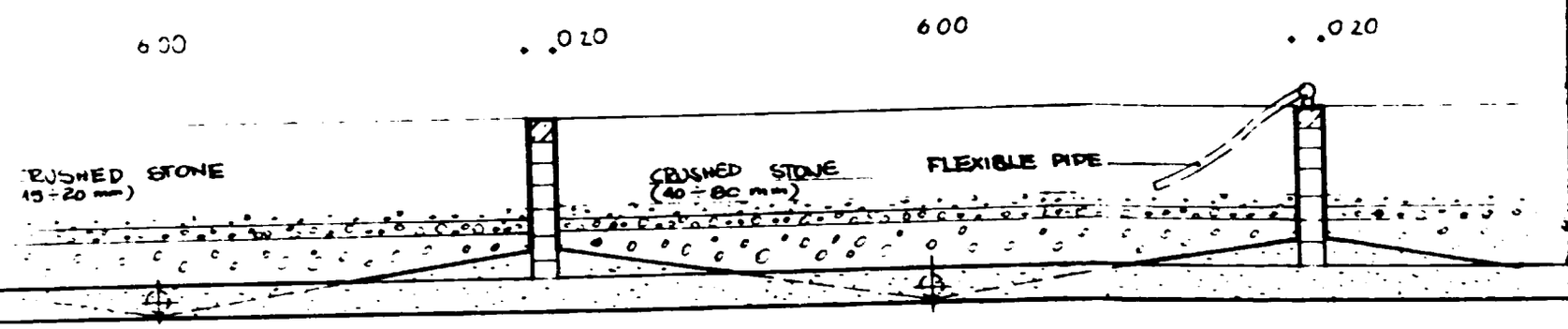
B

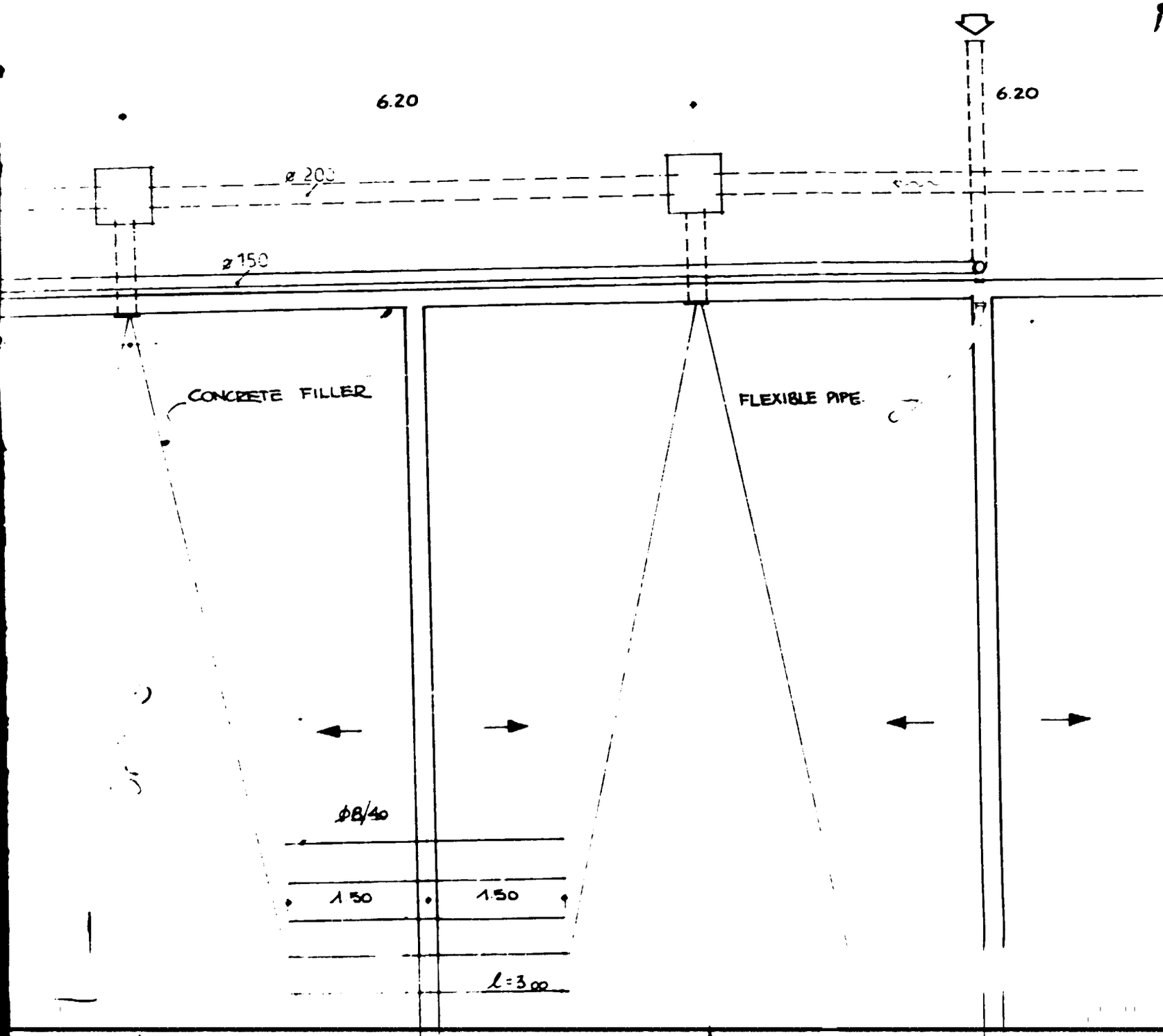
6.20

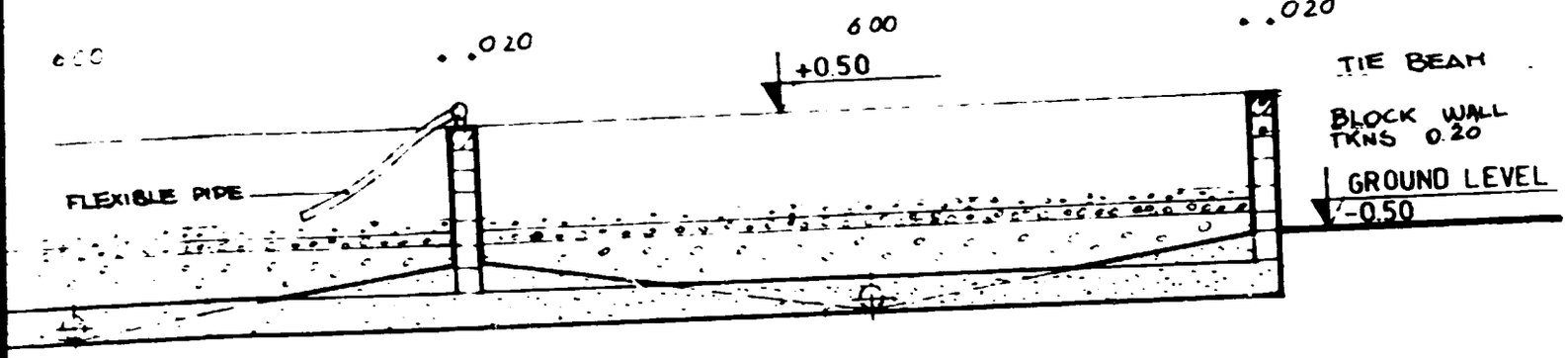


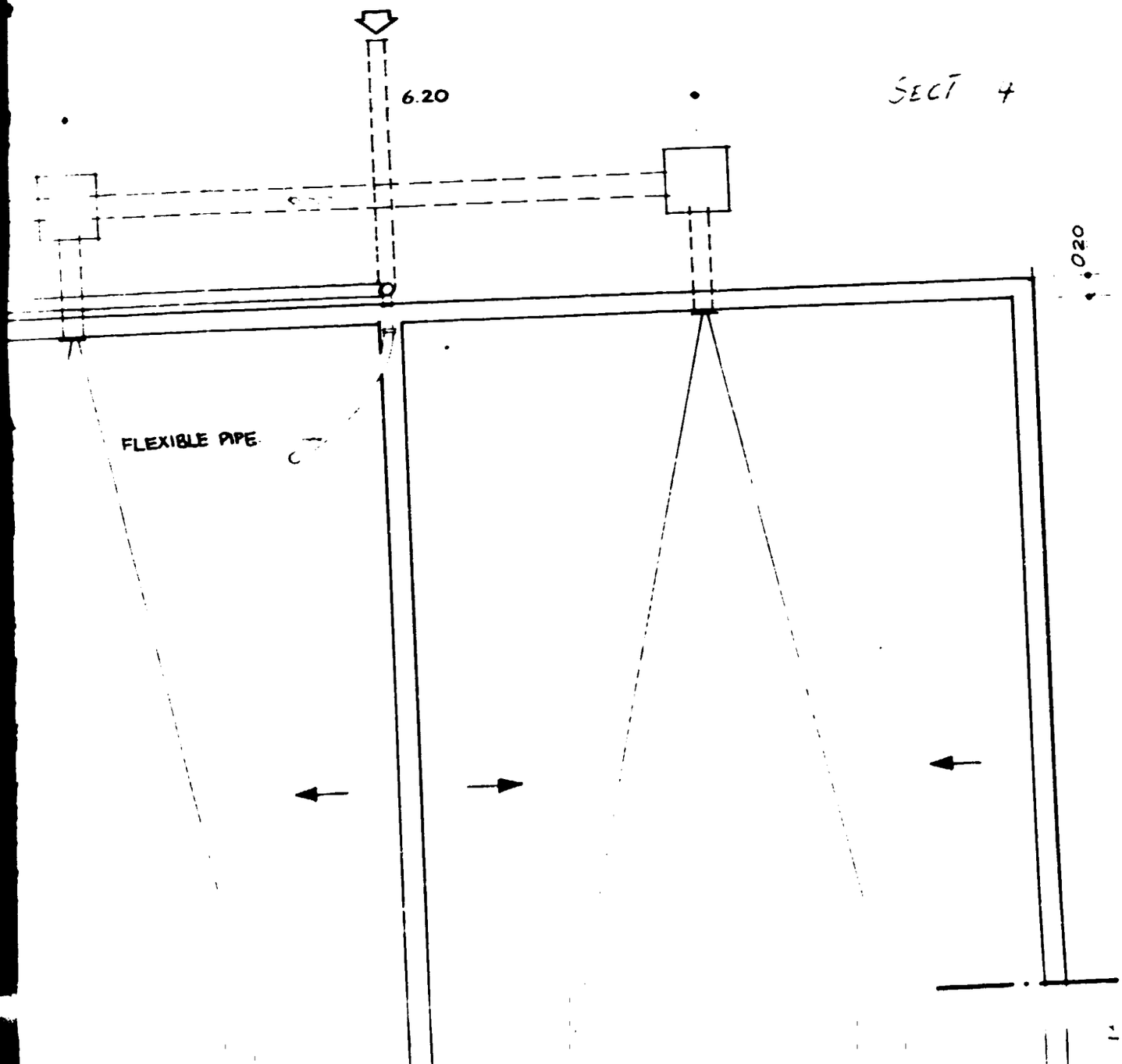

0.00
0.20
6.00
0.20
2 ϕ 12 LONGITUD.
FILTERING SAND
(0.3÷0.6 mm.)
CRUSHED

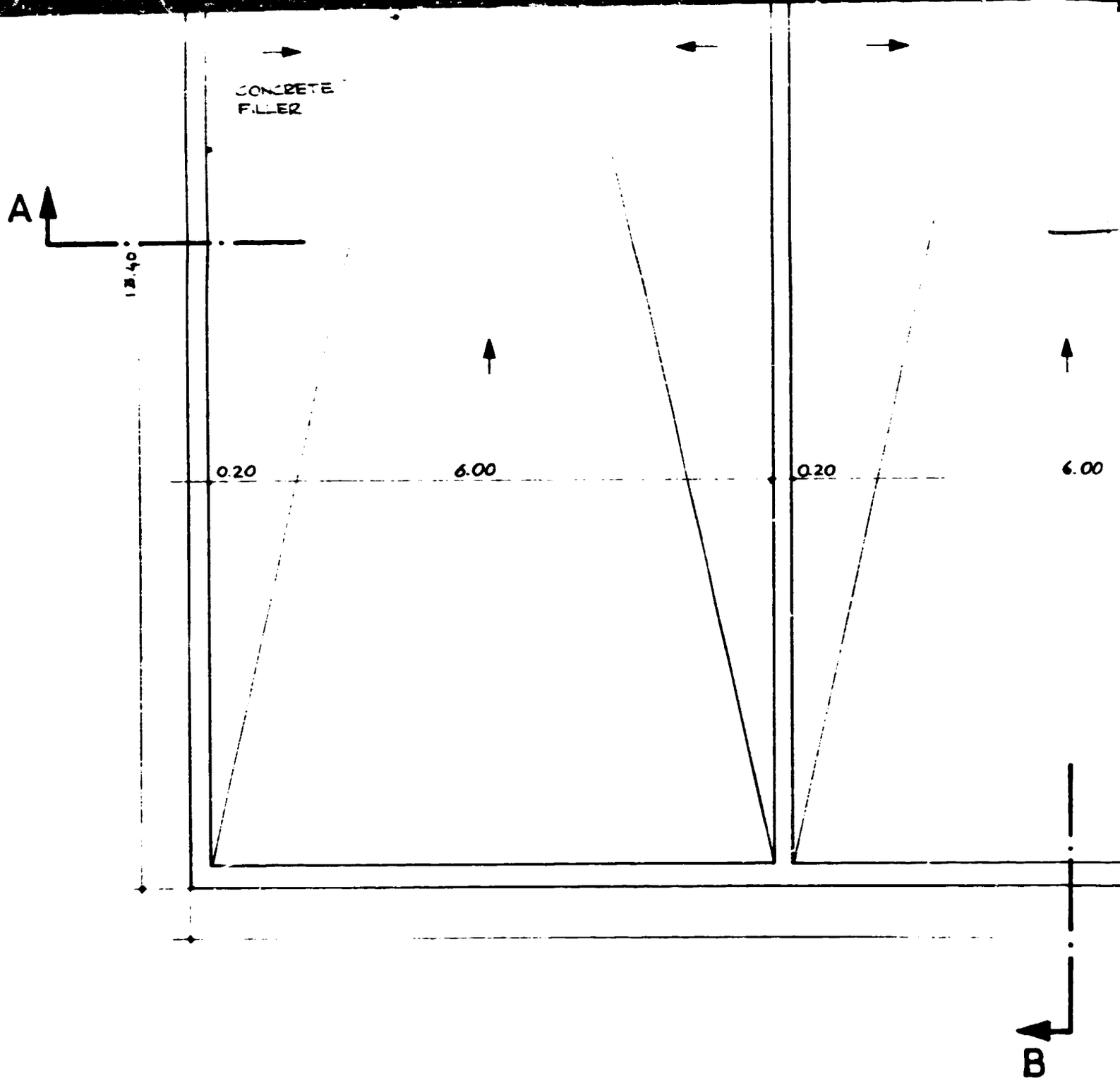

6.20
6.20
ø 200
ø 150
ø 200
STAINLESS STEEL GRID
3.00
13.00


6.00
0.20
6.00
0.20
CRUSHED STONE
(15÷20 mm)
CRUSHED STONE
(40÷80 mm)
FLEXIBLE PIPE

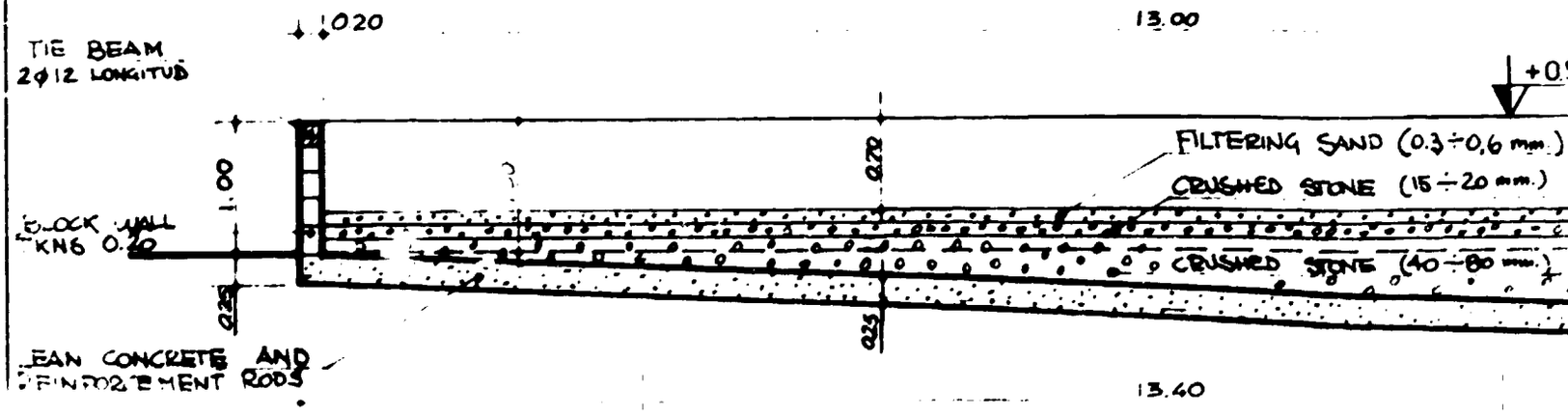

6.20
6.20
ø 200
ø 150
CONCRETE FILLER
FLEXIBLE PIPE
ØB/40
1.50
1.50
l=3.00

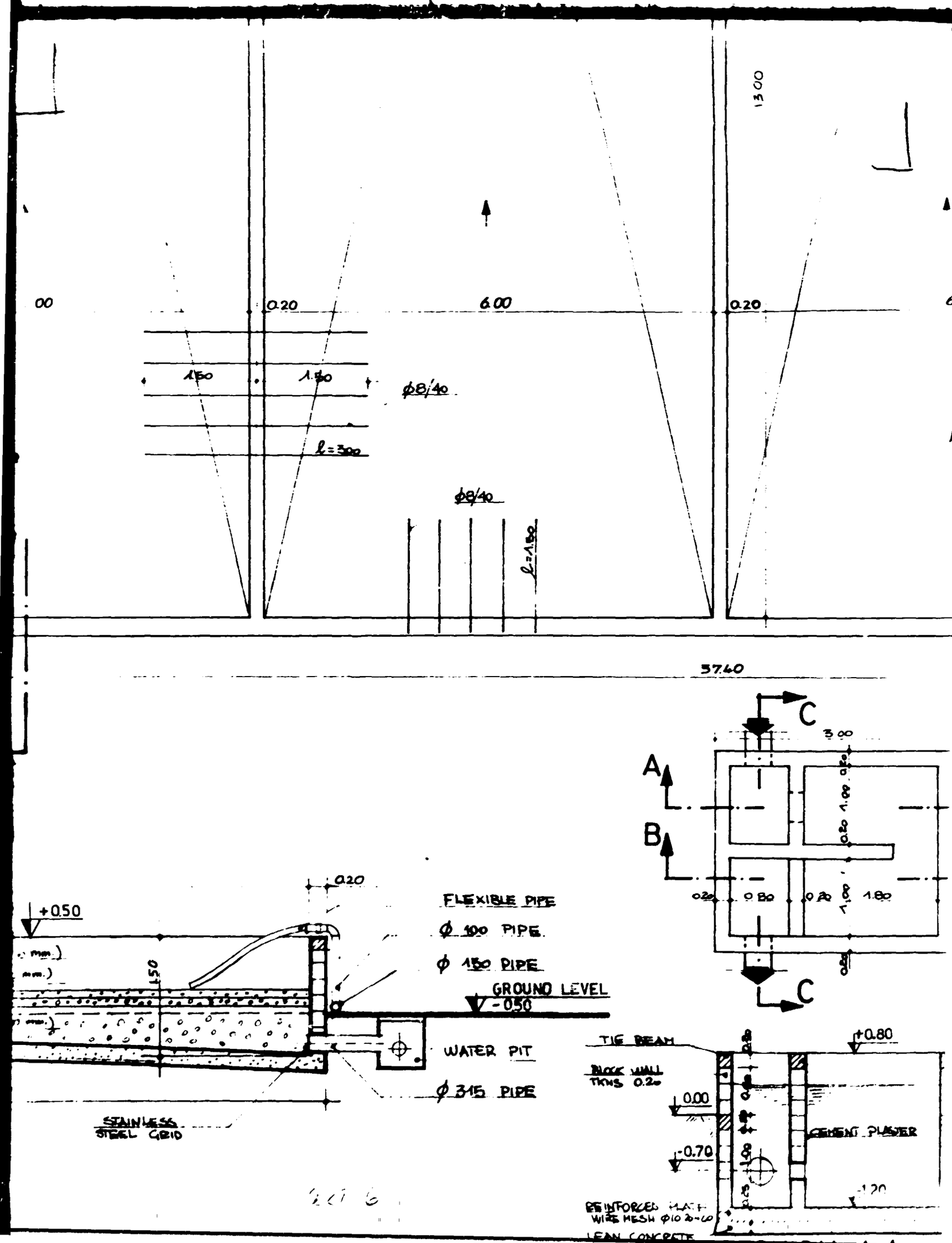

.020
6.00
.020
+0.50
TIE BEAM
BLOCK WALL
TKNS 0.20
FLEXIBLE PIPE
GROUND LEVEL
-0.50

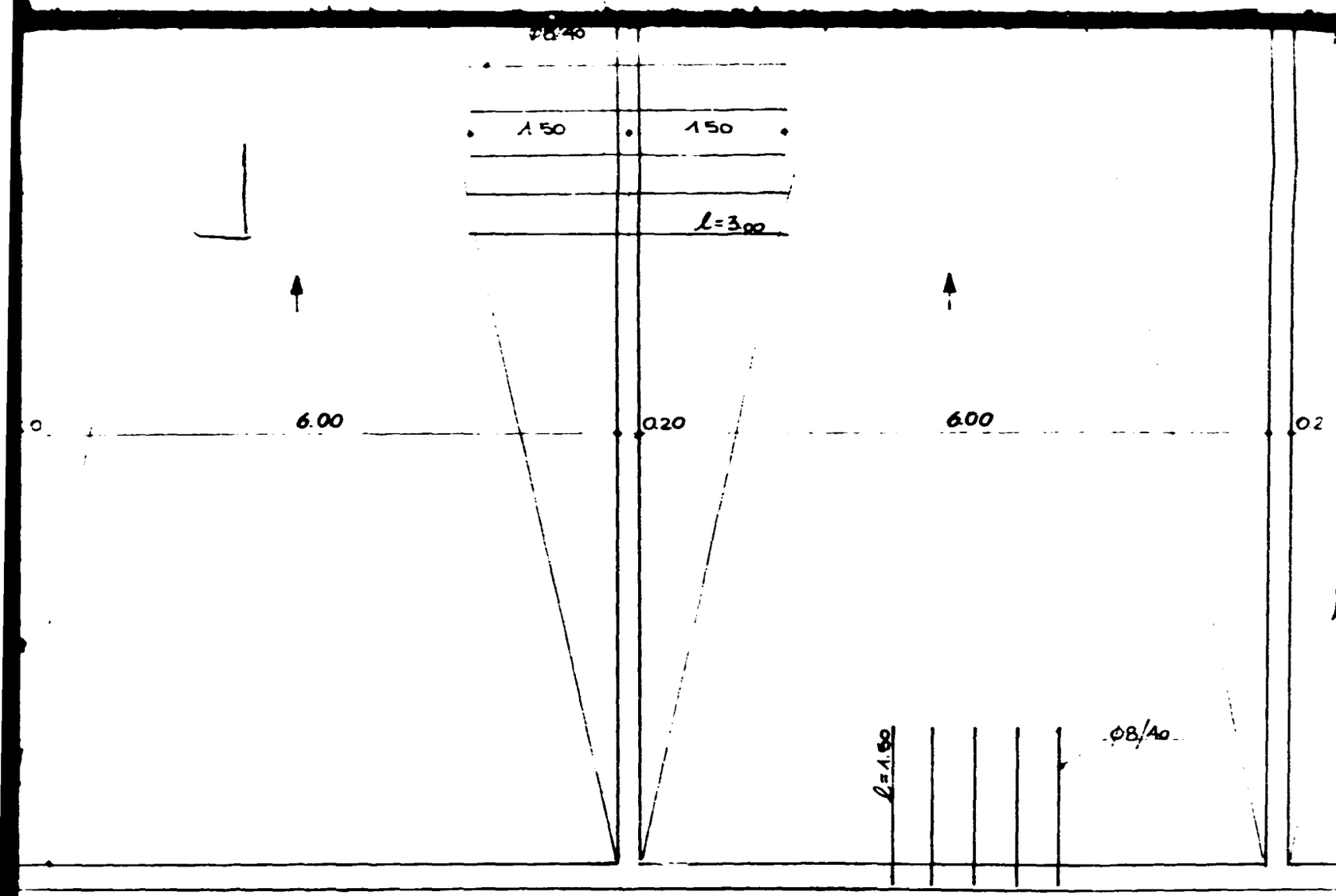

6.20
SECT 4
.020
FLEXIBLE PIPE
A


CONCRETE
FILLER
A
13.40
0.20
6.00
0.20
6.00
B

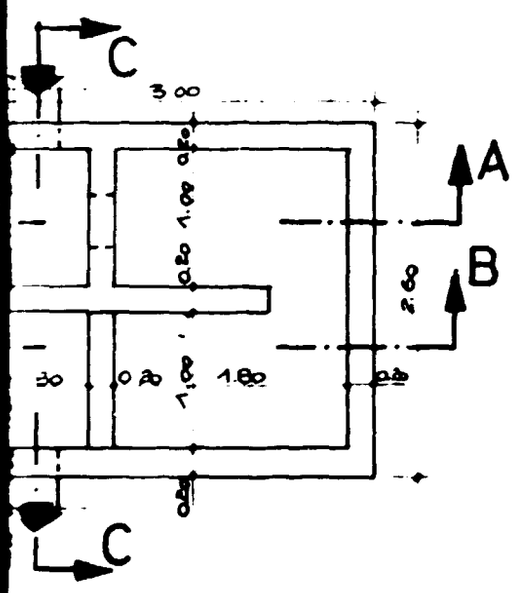
SECTION B-B

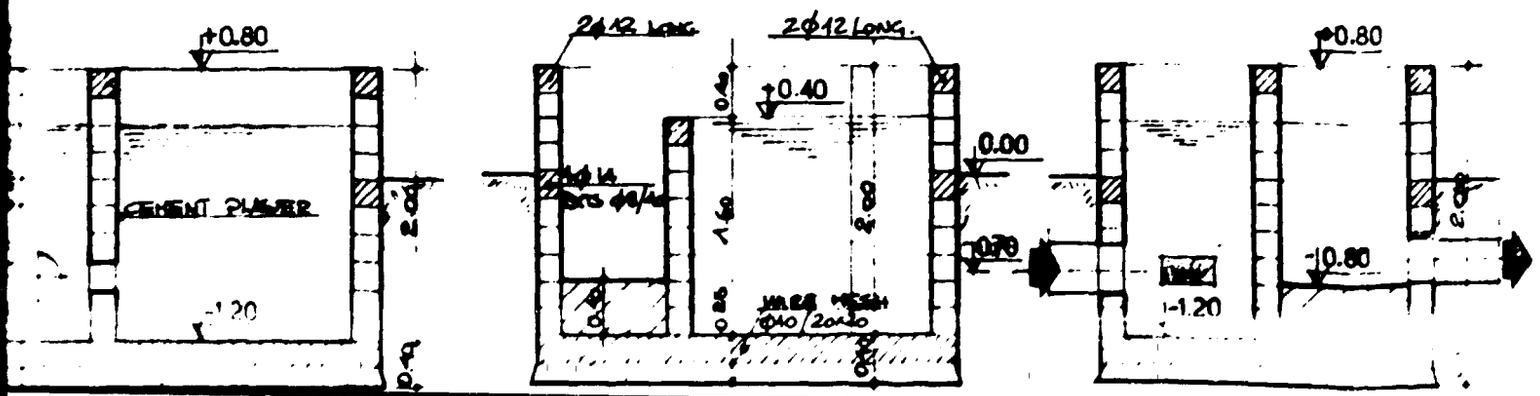

0.20
13.00
TIE BEAM
2φ12 LONGITUD
1.80
0.20
FILTERING SAND (0.3÷0.6 mm.)
CRUSHED STONE (15÷20 mm.)
BLOCK WALL
KNG 0.20
CRUSHED STONE (40÷80 mm.)
0.25
0.25
LEAN CONCRETE AND
REINFORCEMENT RODS
13.40

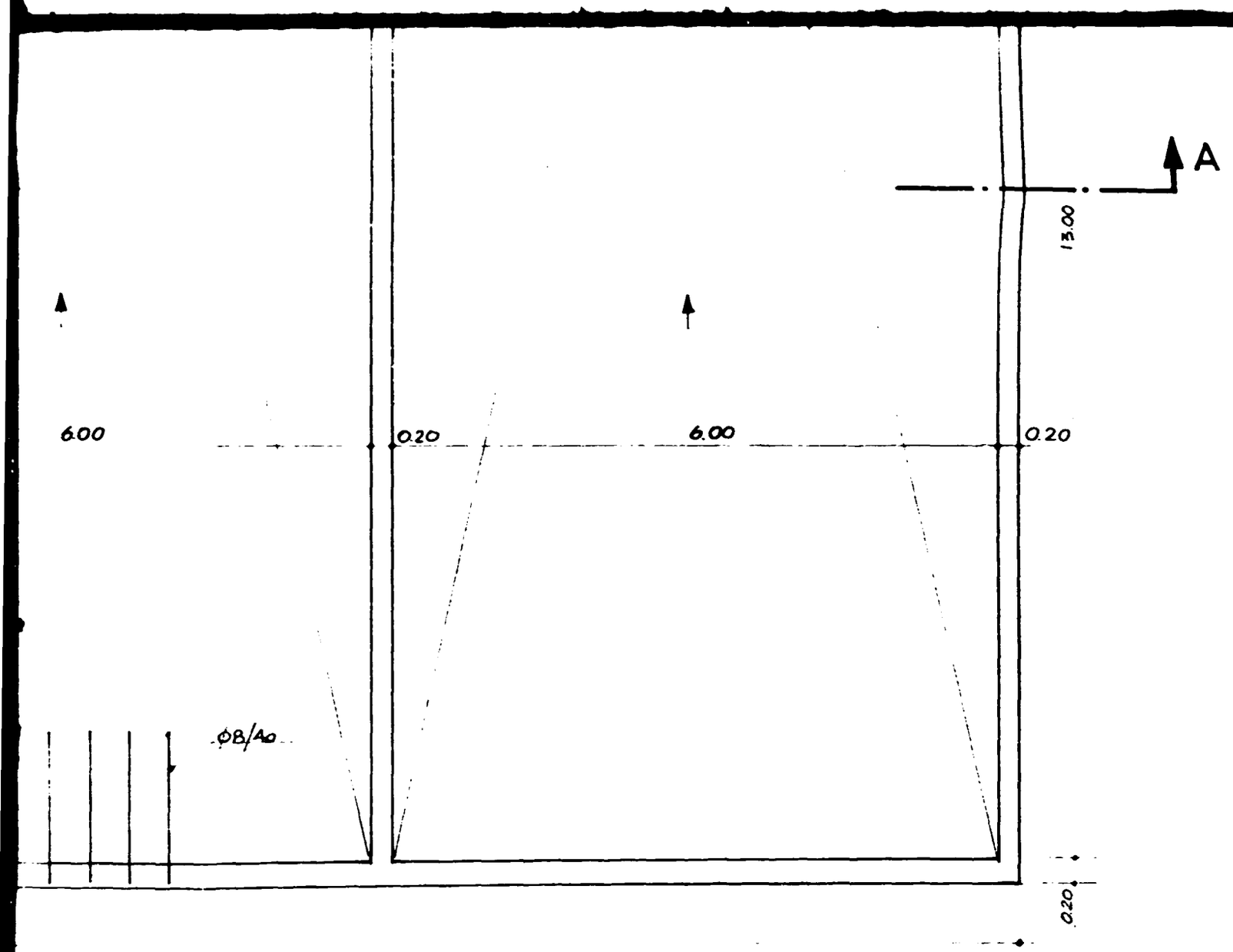

13.00
00
0.20
6.00
0.20
1.50
1.50
ϕ8/40
ℓ=300
ϕ8/40
ℓ=1.80
37.40
C
3.00
A
B
1.80
0.20
0.80
0.20
0.80
1.80
C
0.20
+0.50
FLEXIBLE PIPE
ϕ 100 PIPE
ϕ 150 PIPE
GROUND LEVEL
-0.50
150
WATER PIT
ϕ 315 PIPE
STAINLESS STEEL GRID
TIE BEAM
+0.80
BLOCK WALL THKS 0.20
0.00
-0.70
CEMENT PLASTER
-1.20
REINFORCED MAT: WIRE MESH ϕ10 20×20
LEAN CONCRETE



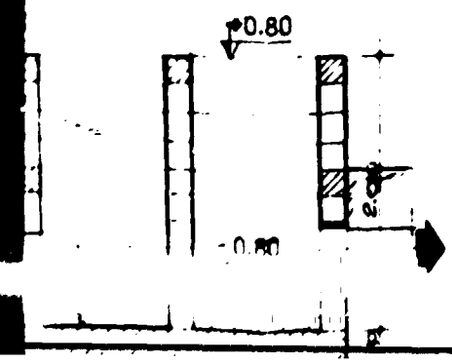
CHLORINATION TANK







NK



CONTRACT n. 89/162: UNIDO PROJECT SI/ETH/89/901

Combolcha tannery: waste water treatment plant

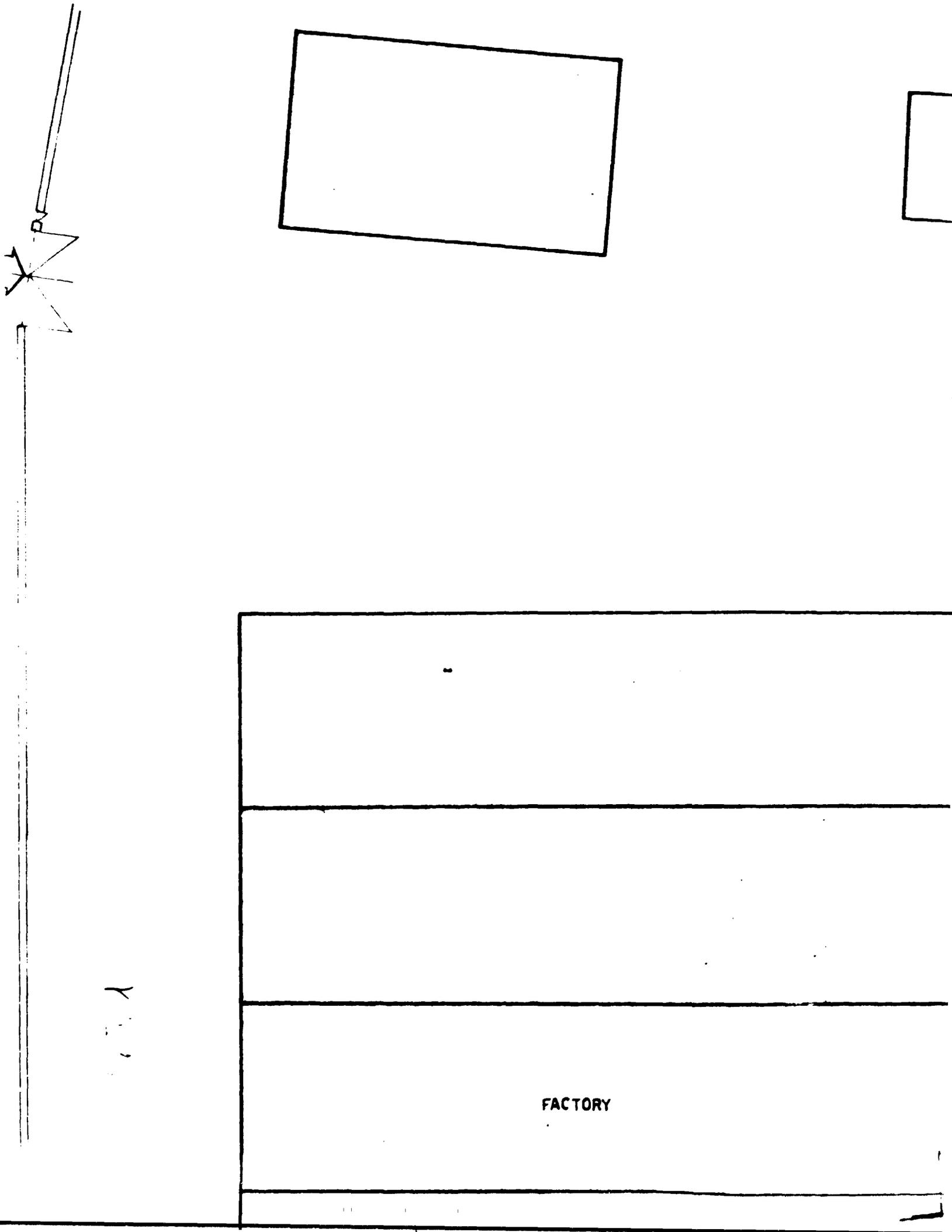
National Leather and Shoe Corporation Addis Ababa - Ethiopia

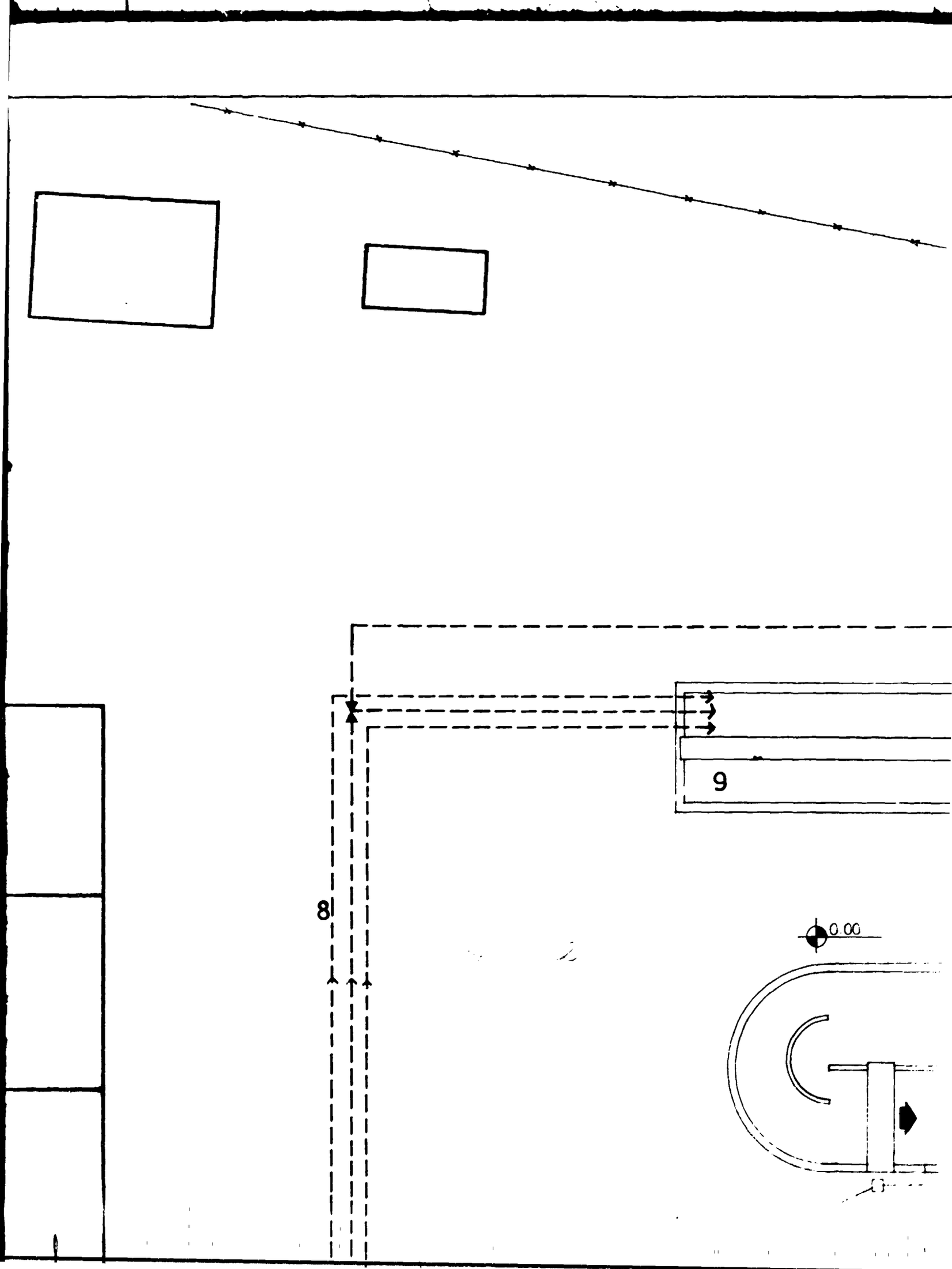
"STUDIO TECHNICO Dr. GIUSEPPE CLEMENTINO" - PLASTICS ITALY
Advisors
Mr. Giuseppe Clementino
Mr. Mauro Carbonari

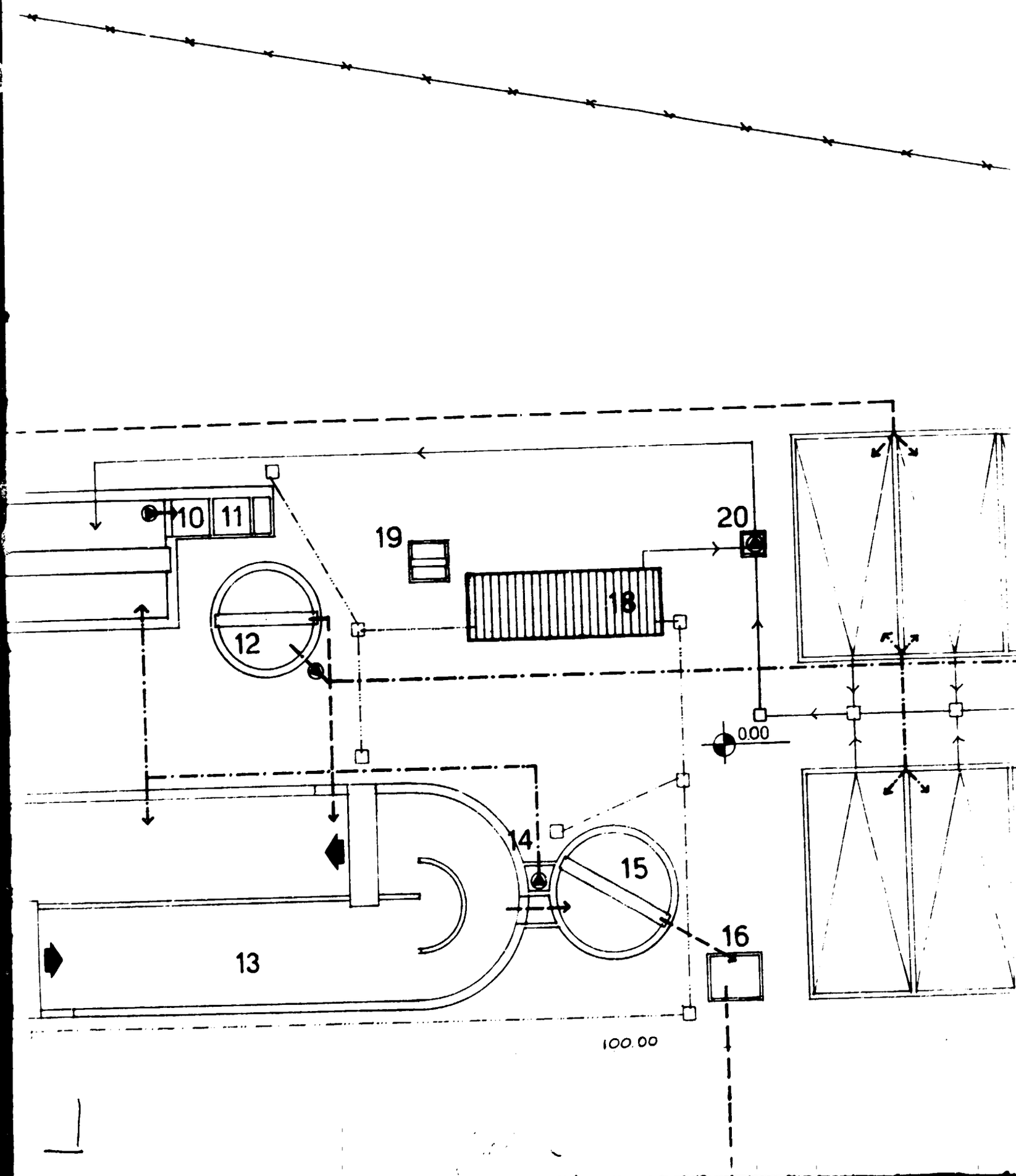
March 1990

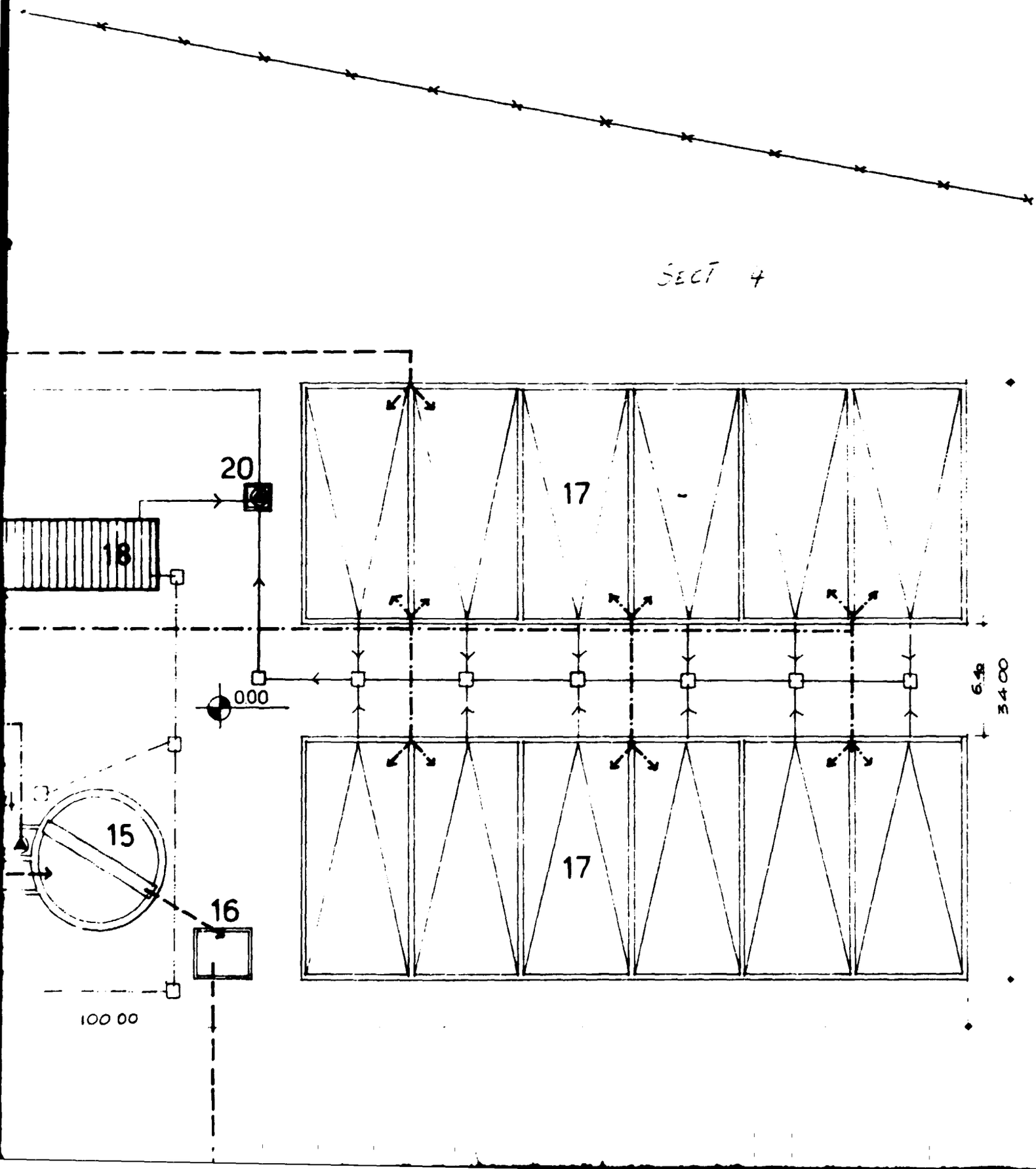
1 : 50
Sludge drying beds

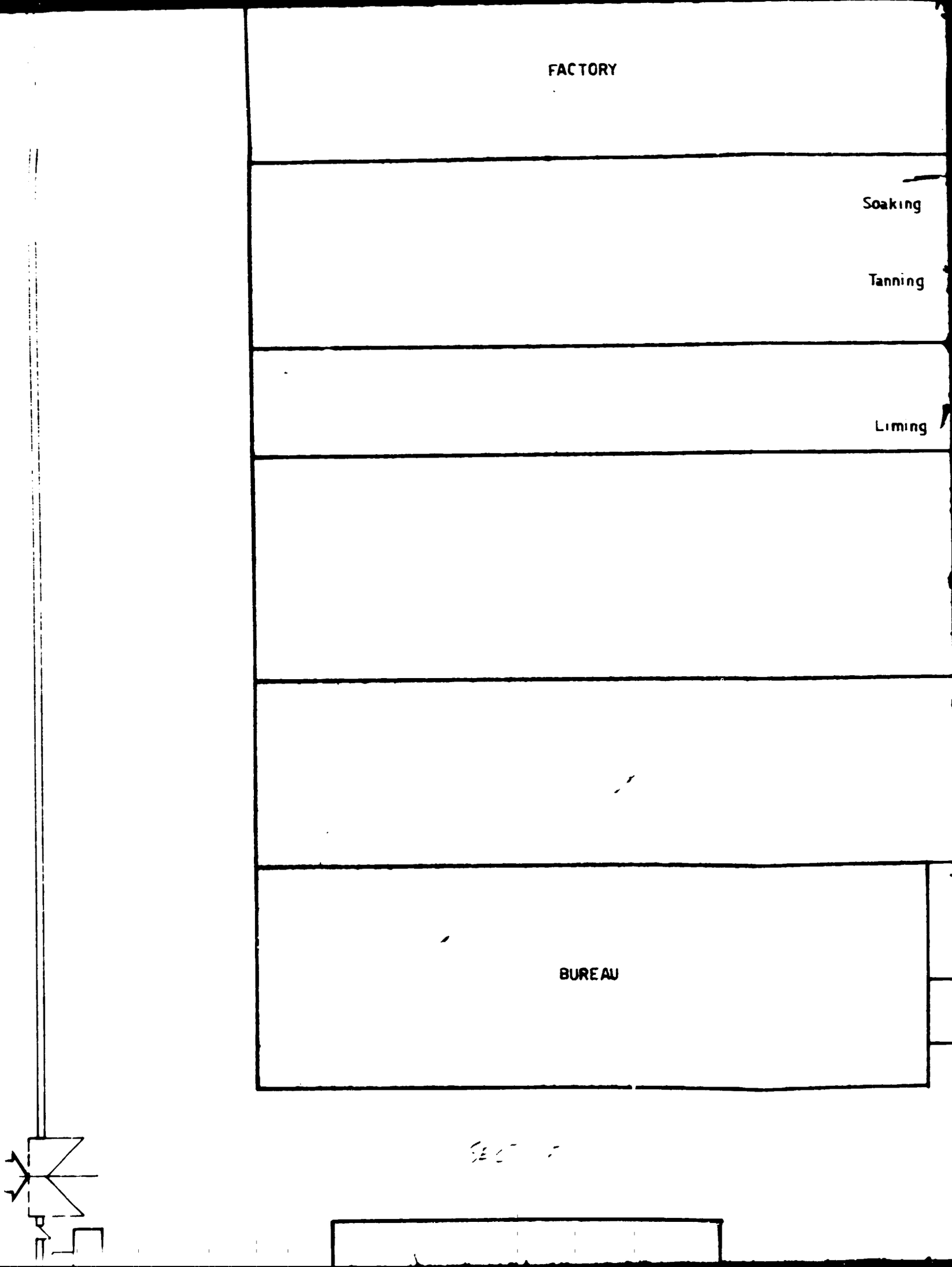
6

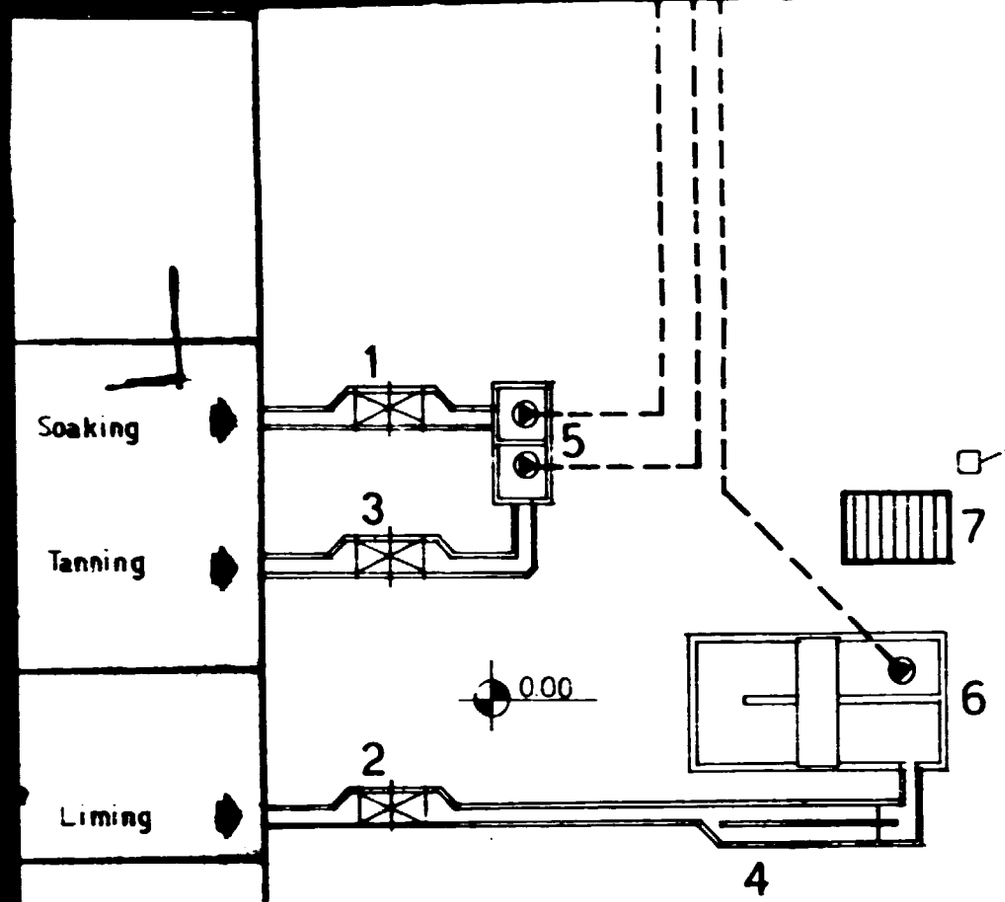

FACTORY


9
8
0.00


10
11
19
20
18
12
0.00
14
15
16
13
100.00


SECT 4
20
18
17
17
000
6.40
3400
15
16
100 00


FACTORY
Soaking
Tanning
Liming
BUREAU



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 ar
19 Lime-milk
20 Filtratio

LAVATORY

WATER DEPOSIT

100 00

1

Legend (Modjo)

1 Screening chamber (soaking waste)
2 Screening chamber (liming 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

100 00

CONTRACT n. [illegible] UNIDO PROJECT SI/ETH/[illegible]/901

Modjo tannery:
waste water treatment plant

National Leather and Shoe Corporation
Addis Ababa - Ethiopia

STUDIO TECNICO Dr. GIUSEPPE CLOSTERCIO - FLORENCE ITALY

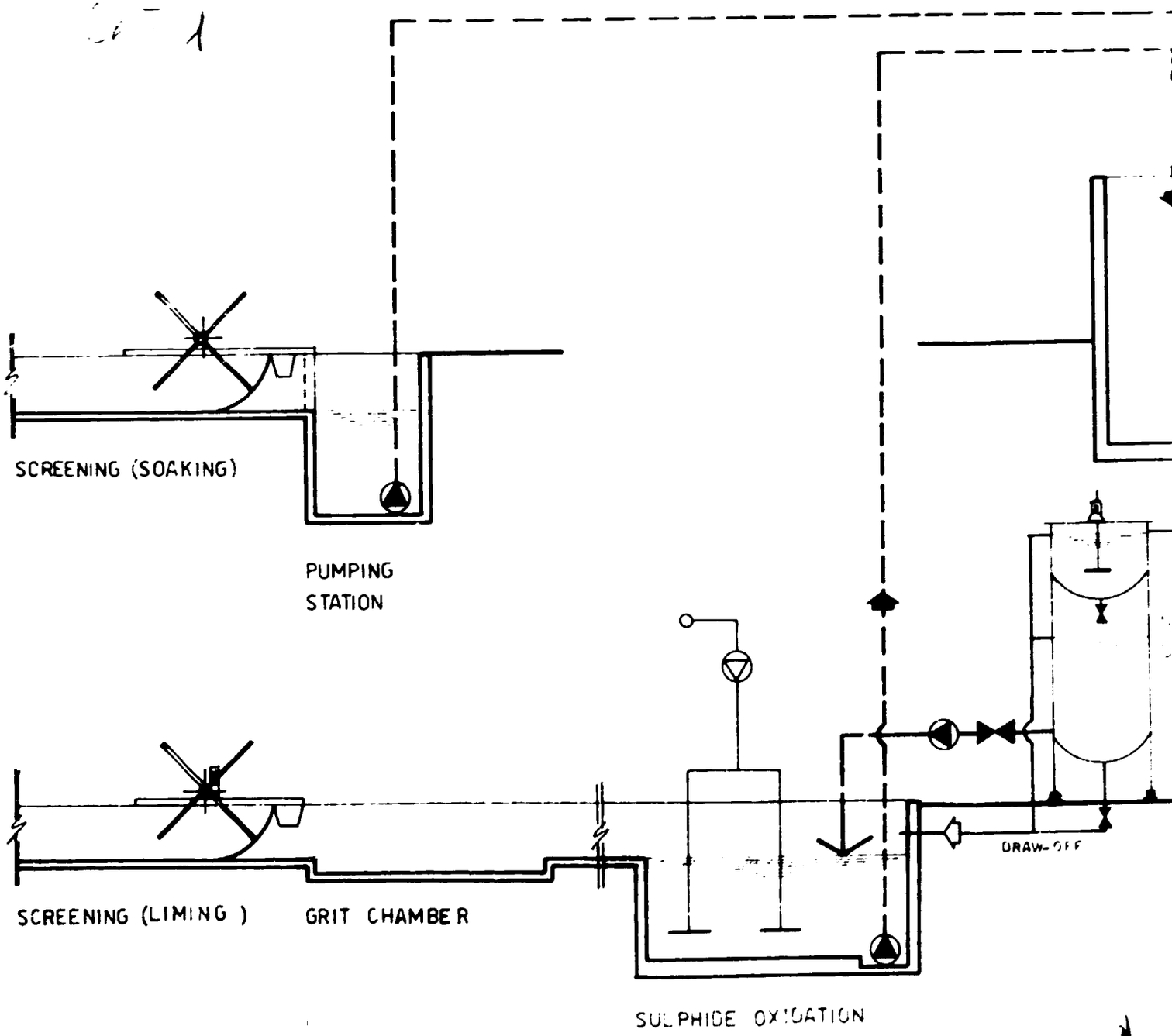
Advisors:
Mr. Giuseppe Closters
Mr. Mauro Carbonari

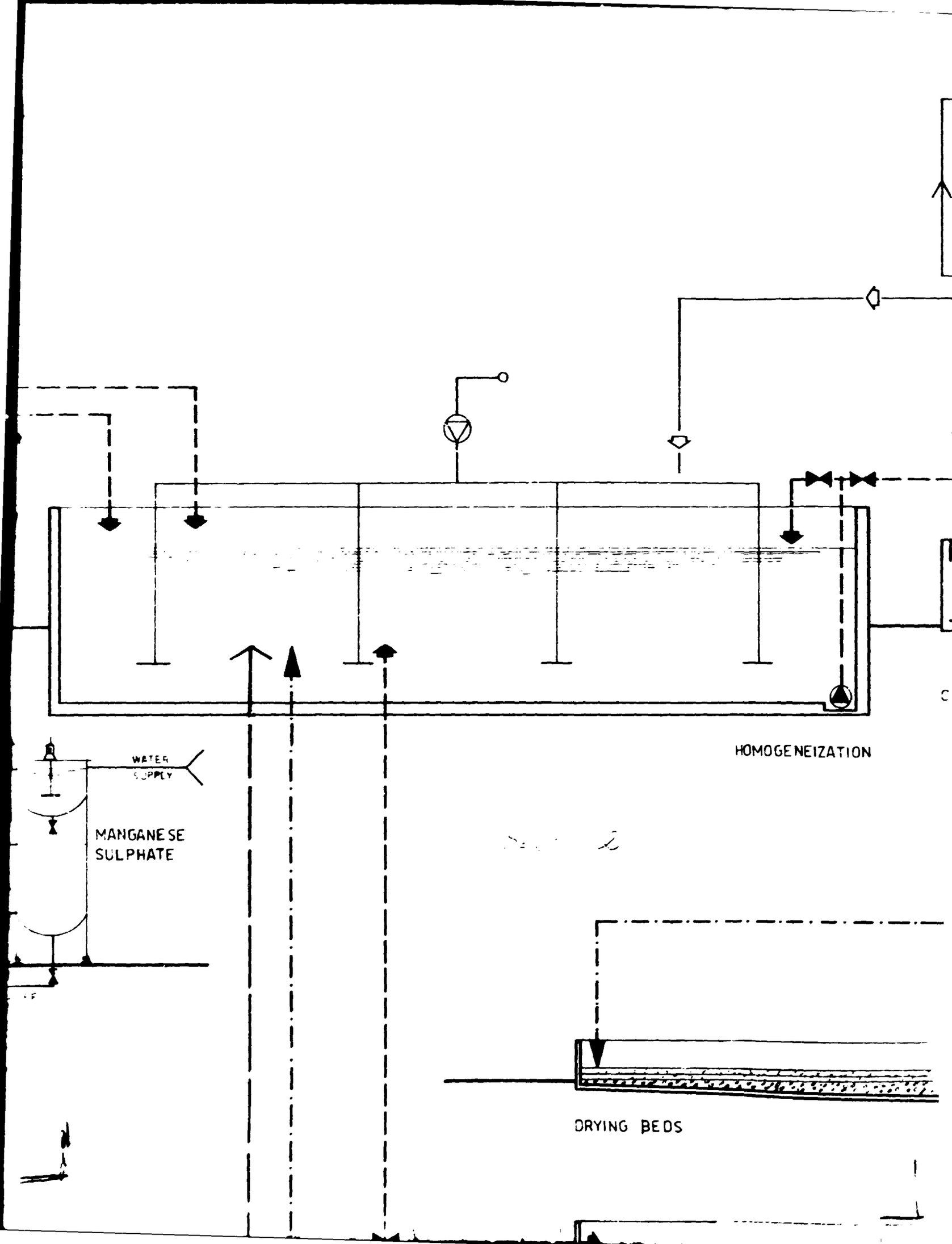
March 1990

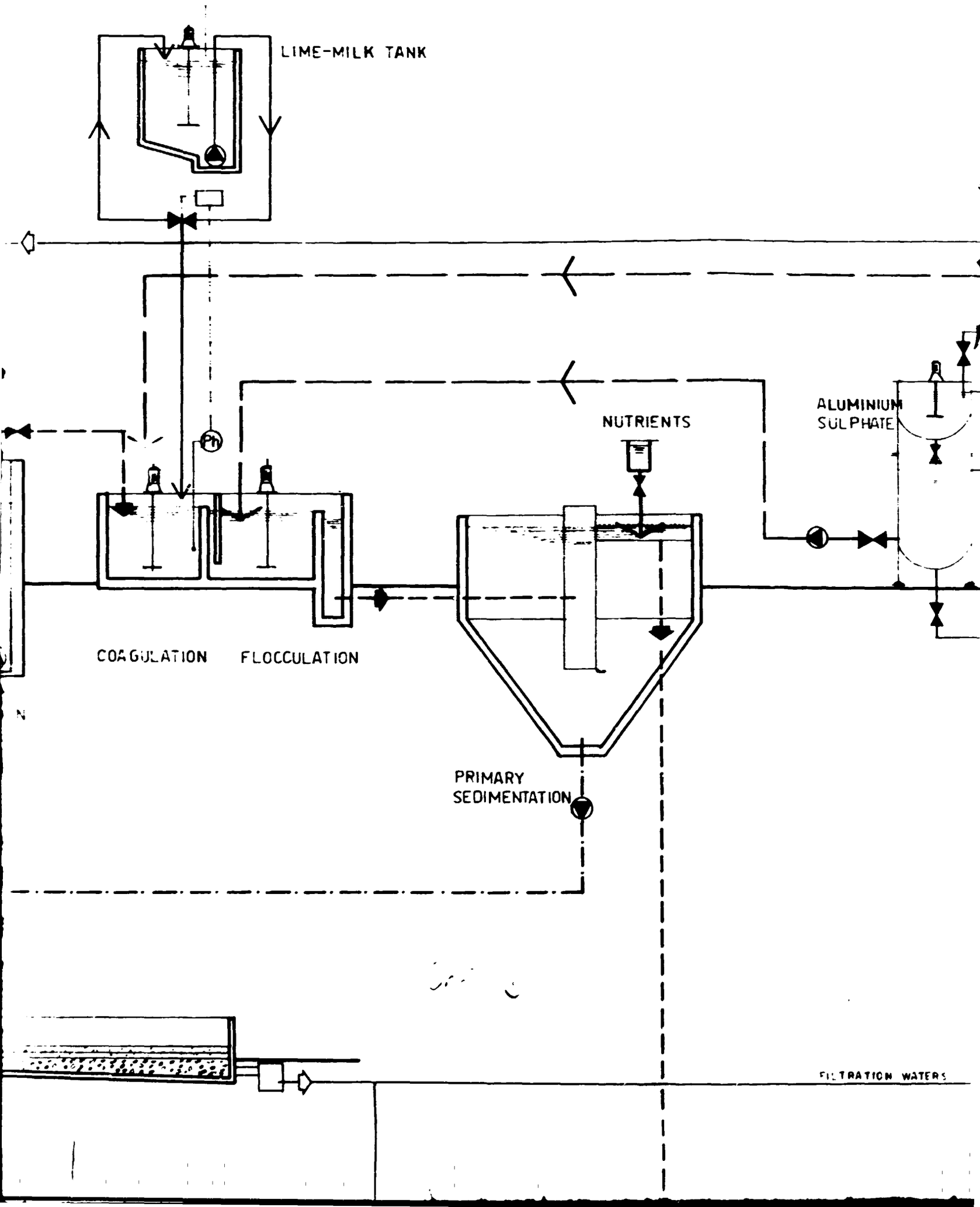
1 : 250
Plan layout

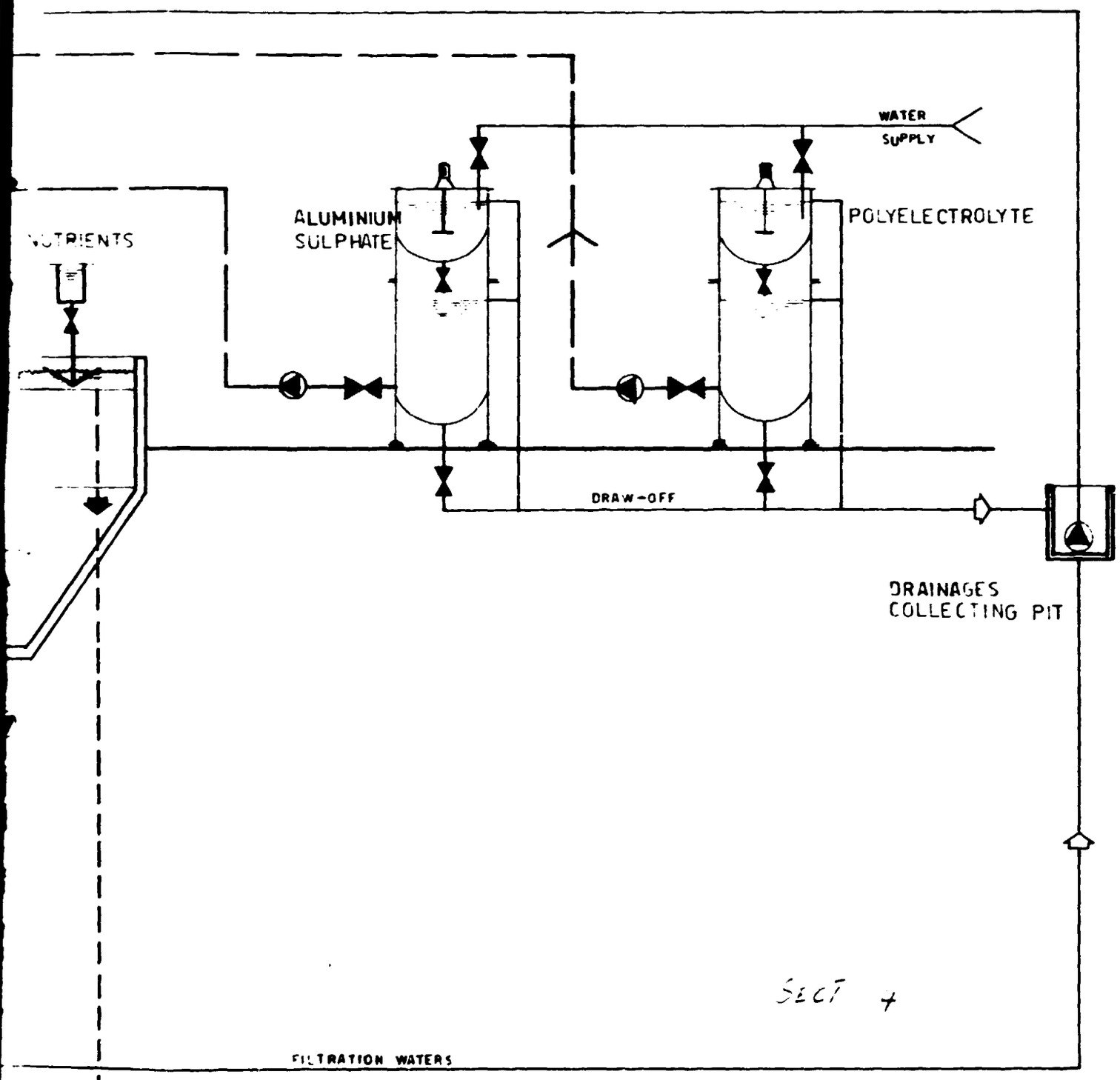
1

TO RIVER

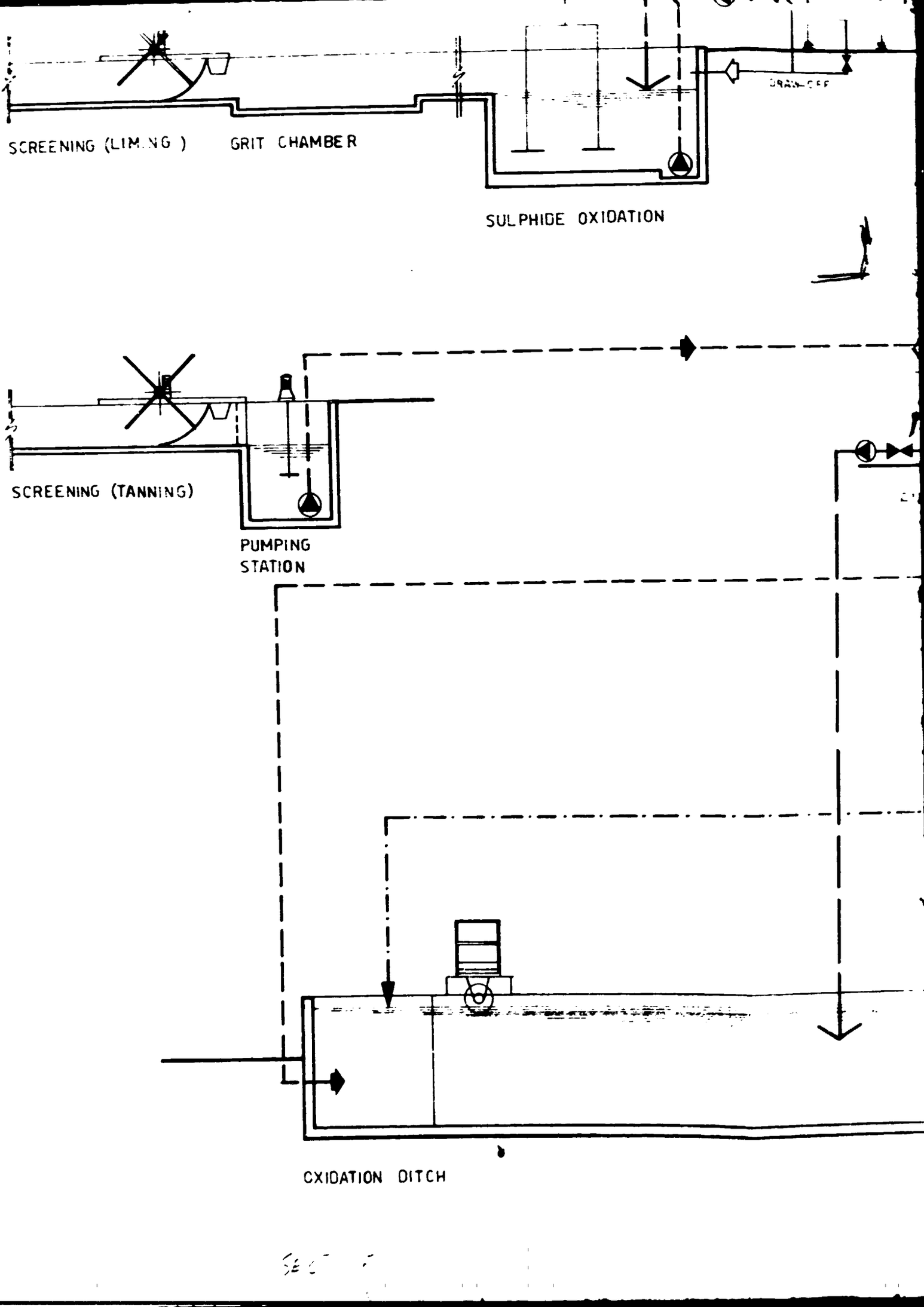

SCREENING (SOAKING)
PUMPING
STATION
SCREENING (LIMING)
GRIT CHAMBER
SULPHIDE OXIDATION
DRAW-OFF

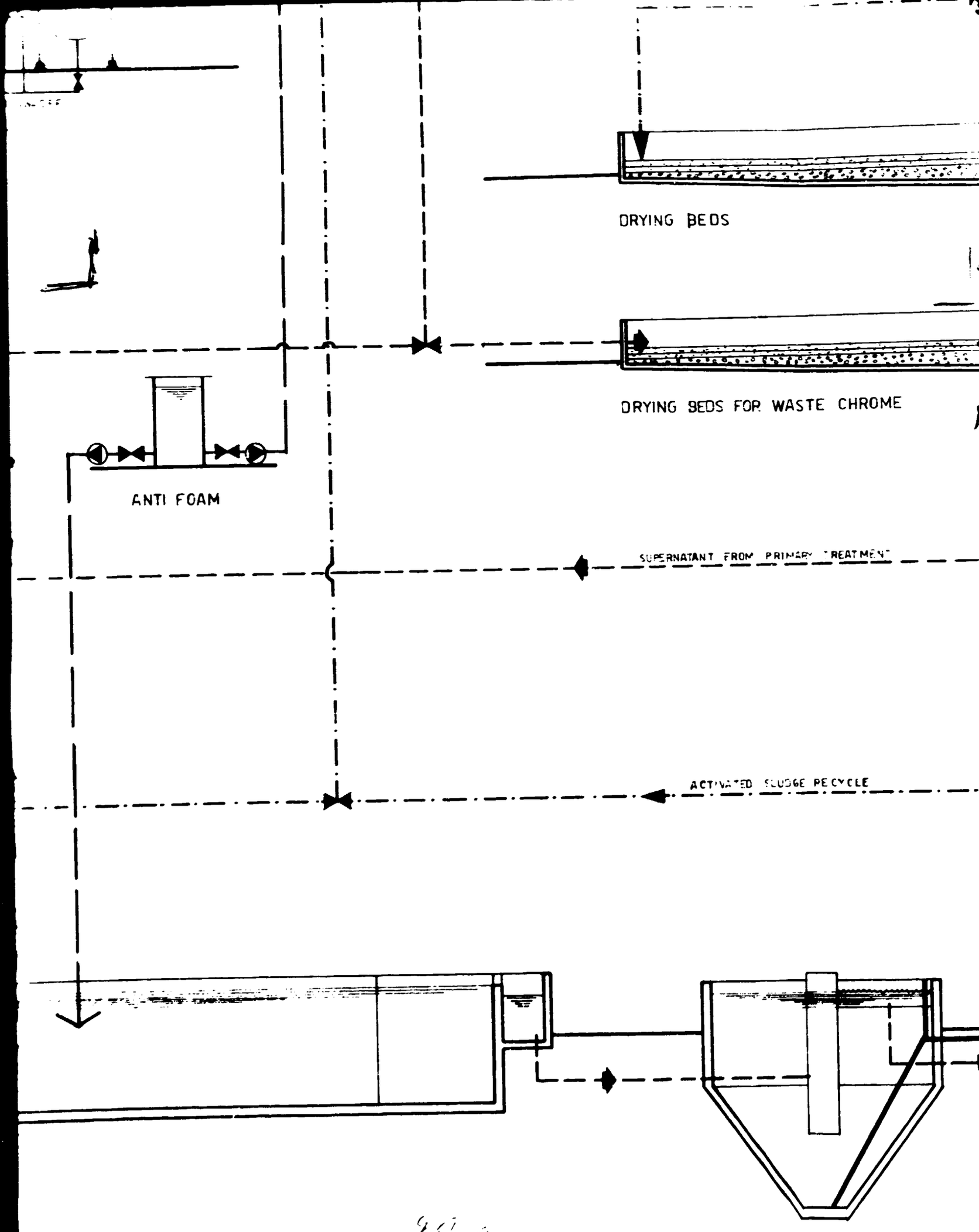

WATER SUPPLY
MANGANESE SULPHATE
HOMOGENEIZATION
DRYING BEDS

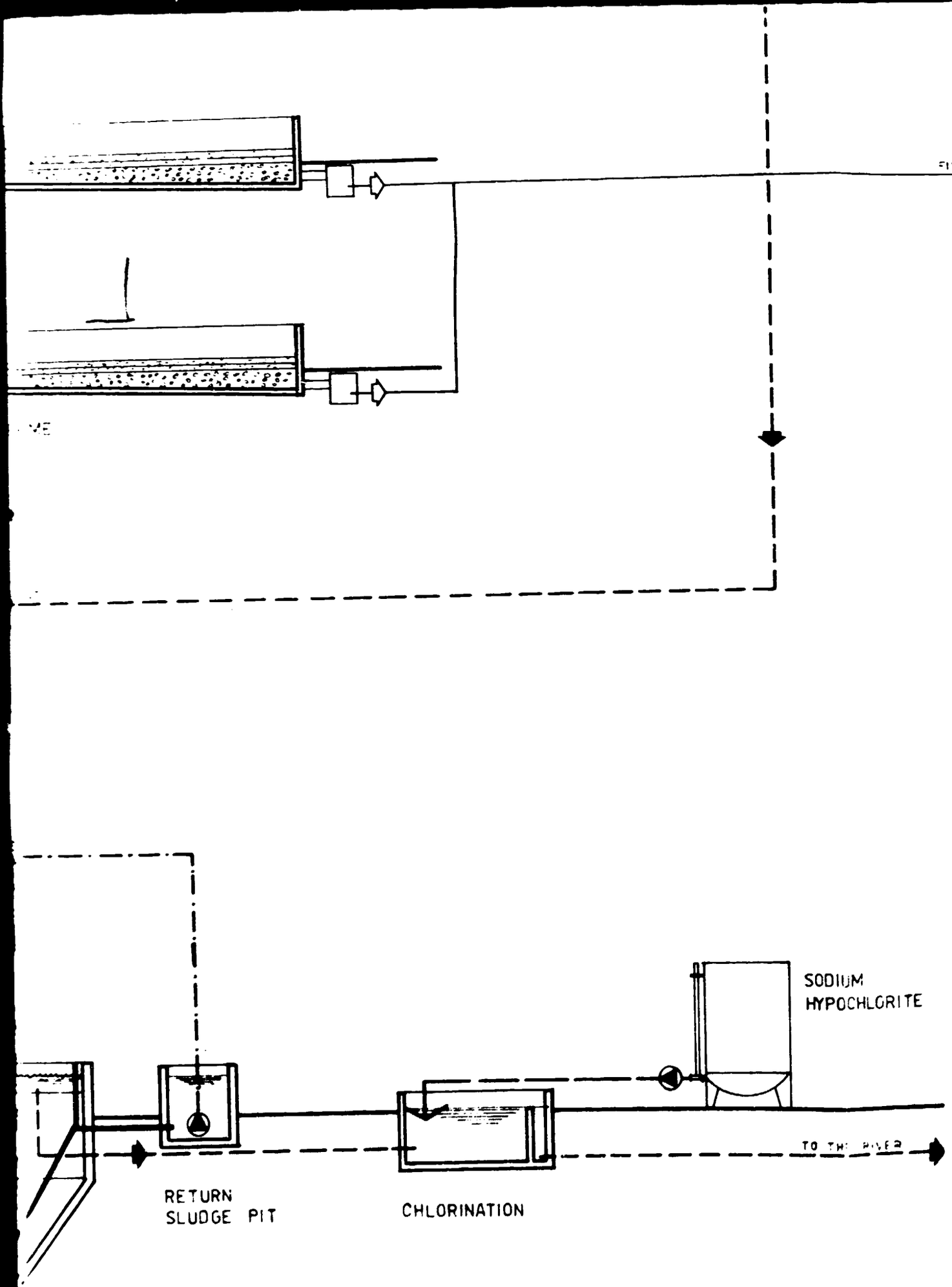

LIME-MILK TANK
NUTRIENTS
ALUMINIUM SULPHATE
COAGULATION
FLOCCULATION
PRIMARY SEDIMENTATION
FILTRATION WATERS


WATER
SUPPLY
ALUMINIUM
SULPHATE
POLYELECTROLYTE
DRAW-OFF
DRAINAGES
COLLECTING PIT
FILTRATION WATERS

SECT 4

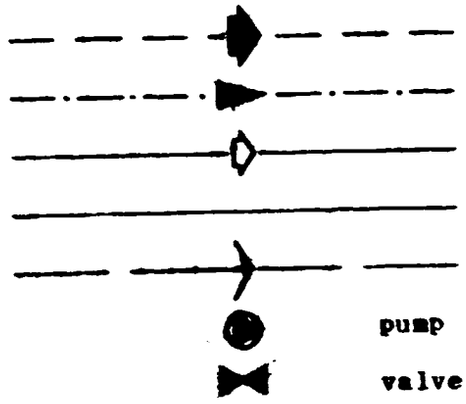

SCREENING (LIMING)
GRIT CHAMBER
SULPHIDE OXIDATION
SCREENING (TANNING)
PUMPING
STATION
OXIDATION DITCH


DRYING BEDS
DRYING BEDS FOR WASTE CHROME
ANTI FOAM
SUPERNATANT FROM PRIMARY TREATMENT
ACTIVATED SLUDGE RECYCLE


FILTRATION WATE
SODIUM
HYPOCHLORITE
TO THE RIVER
RETURN
SLUDGE PIT
CHLORINATION

FILTRATION WATERS

SYMBOLOGY



waste-water line

sludge line

filtration water line

service water

chemicals

pump

valve

SODIUM HYPOCHLORITE

TO THE RIVER

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

Modjo tannery: waste water treatment plant

National Leather and Shoe Corporation Addis Ababa - Ethiopia

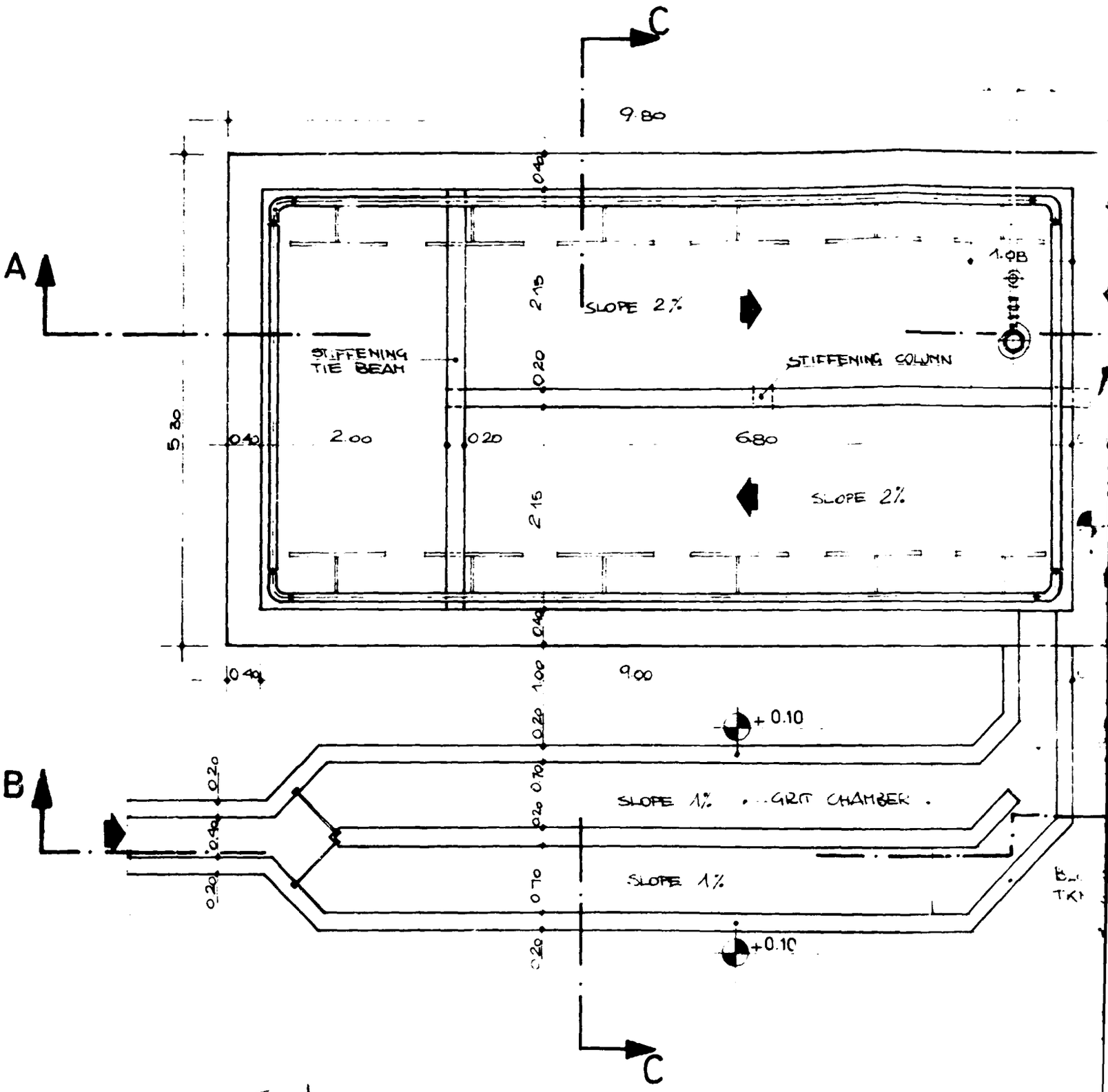
"STUDIO TECNICO Dr. GIUSEPPE CLONFERO" - FLORENCE ITALY

Advisors
Mr. Giuseppe Cleodaro
Mr. Mauro Carbonari

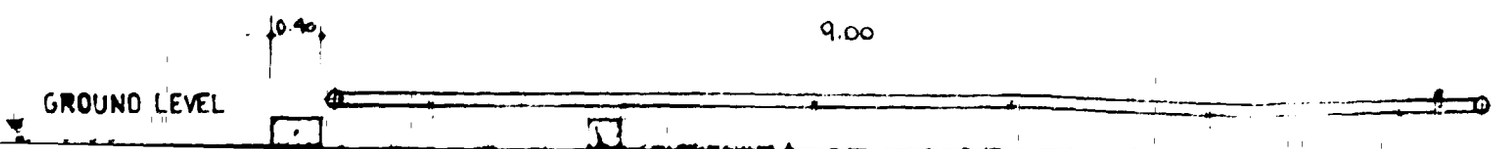
March 1990

Process flowsheet

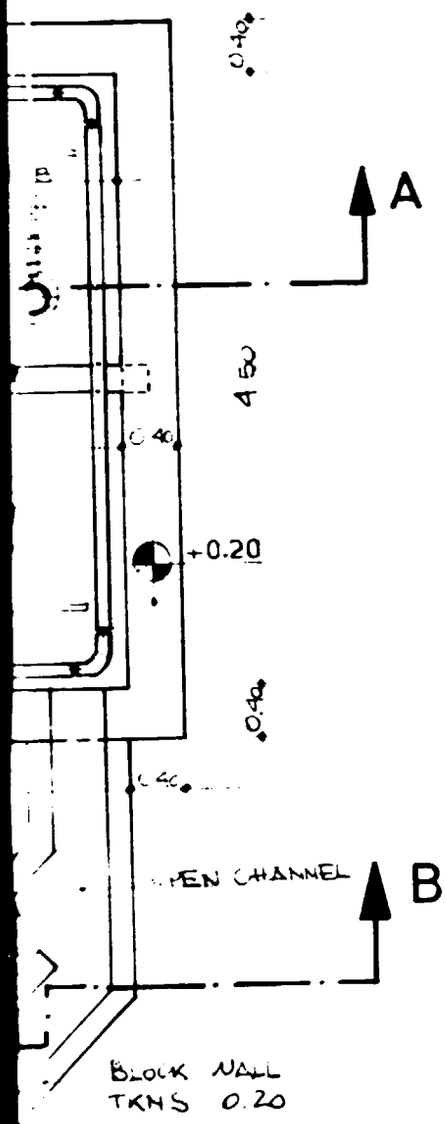
2

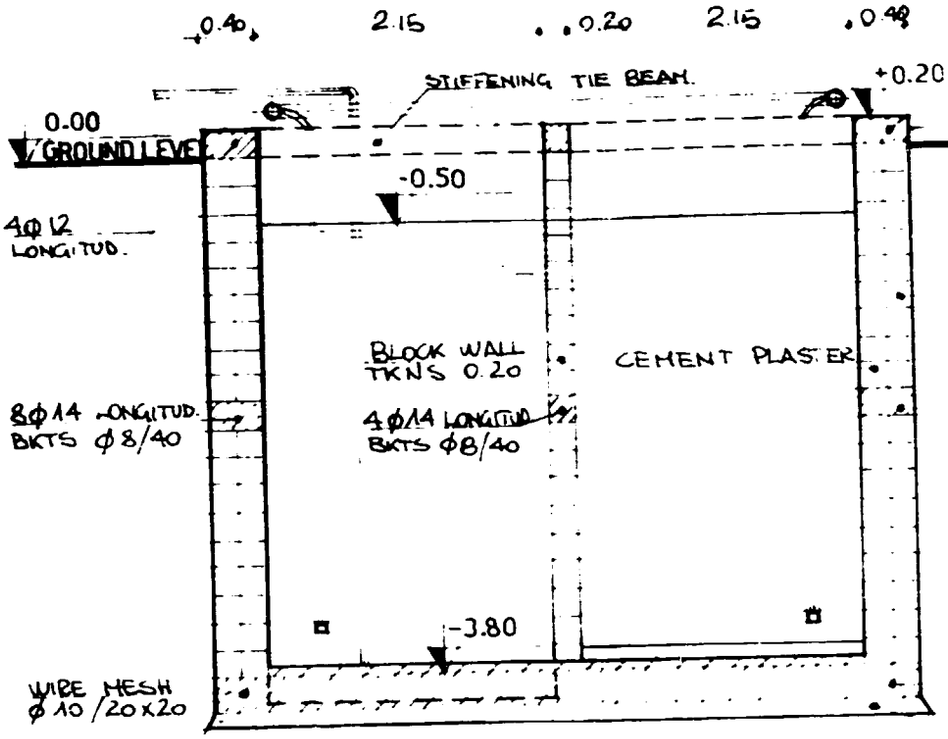

C
9.80
A
0.40
2.15
SLOPE 2%
1.08
STIFFENING TIE BEAM
0.20
STIFFENING COLUMN
5.30
0.40
2.00
0.20
6.80
2.15
SLOPE 2%
0.40
0.40
1.00
9.00
0.20
+0.10
B
0.20
0.70
0.20
0.40
SLOPE 1% . GRIT CHAMBER .
0.20
0.70
SLOPE 1%
0.20
+0.10
C

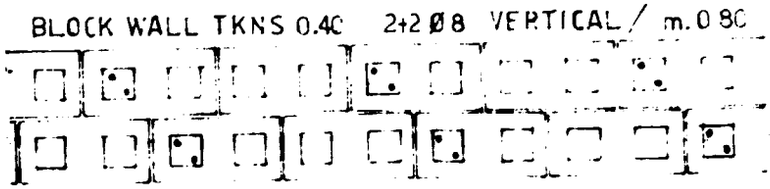
SECTION A-A

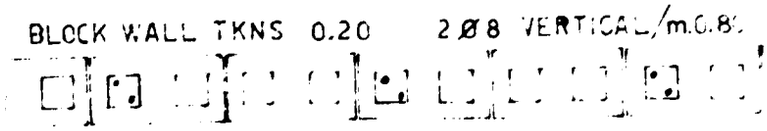

0.40
9.00
GROUND LEVEL

SECTION C-C



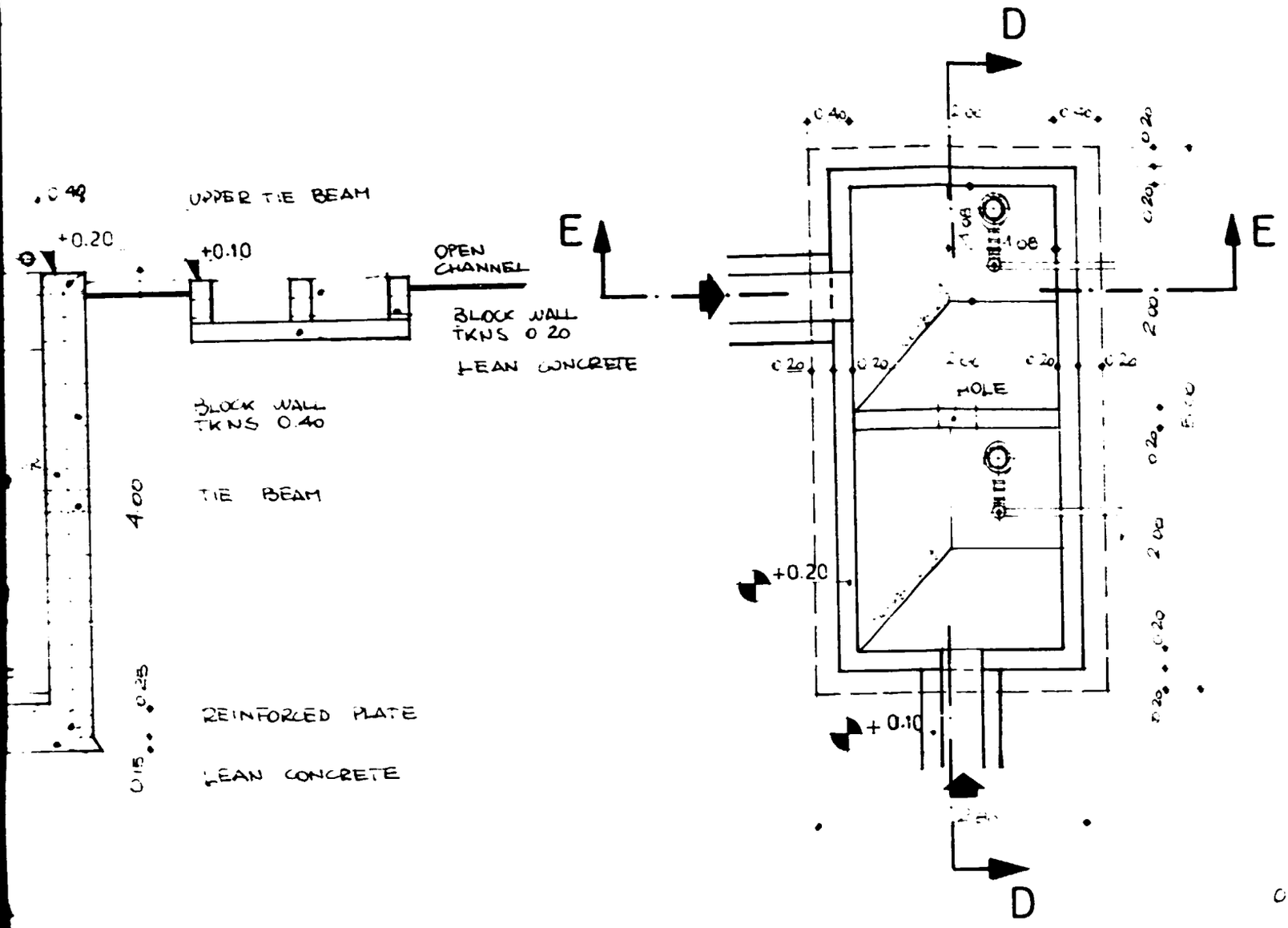






0.40

+0.20



0.00
GROUND LEVEL

TIE BEAM

BLOCK WALL TKNS 0 40

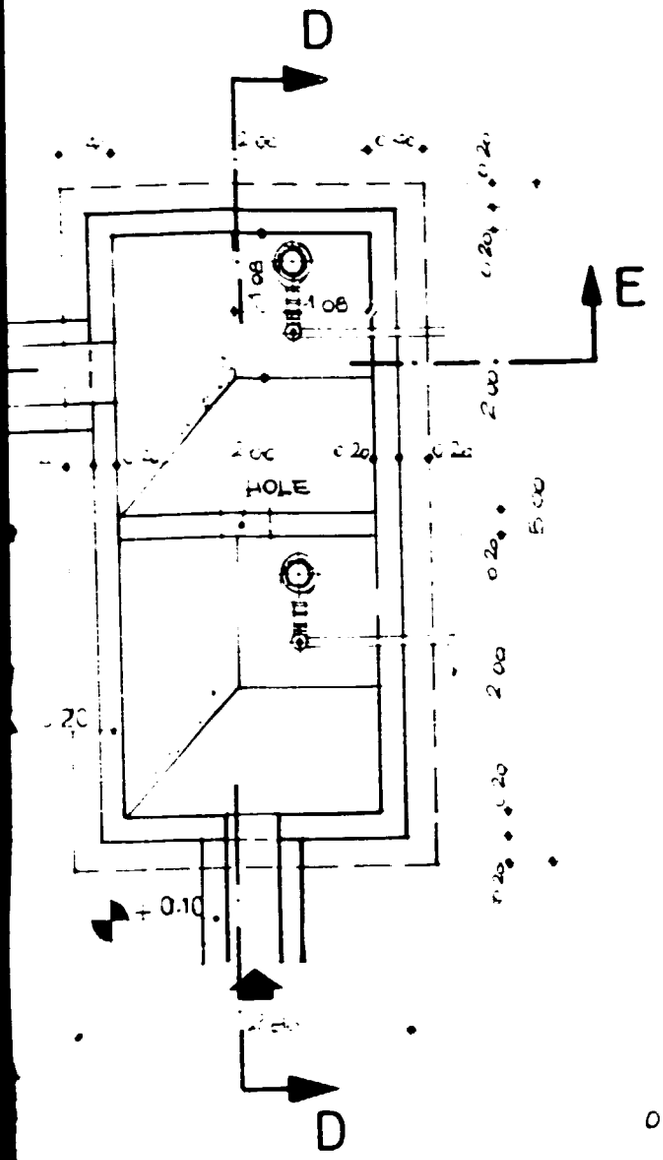
REINFORCED PLATE

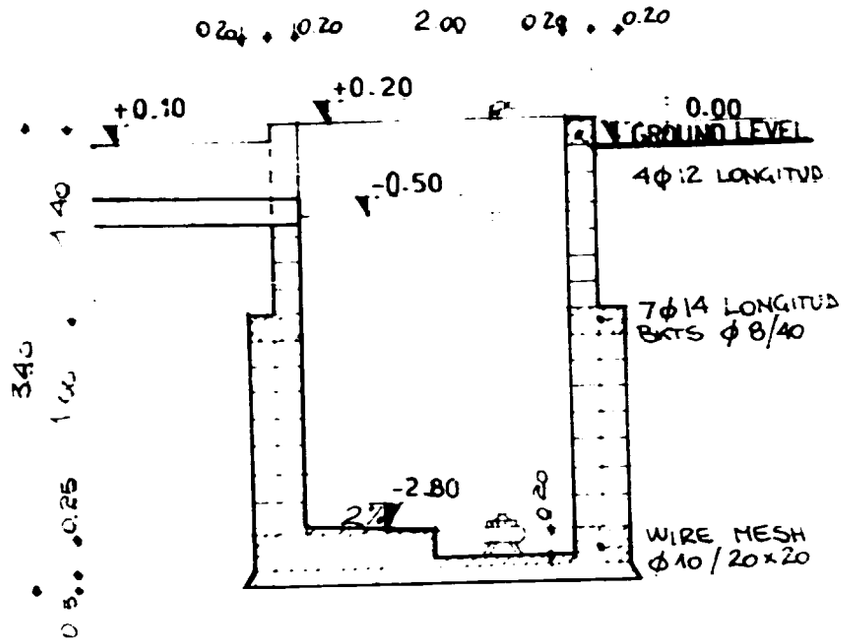
LEAN CONCRETE

BLOCK WALL TKNS 0 20

F

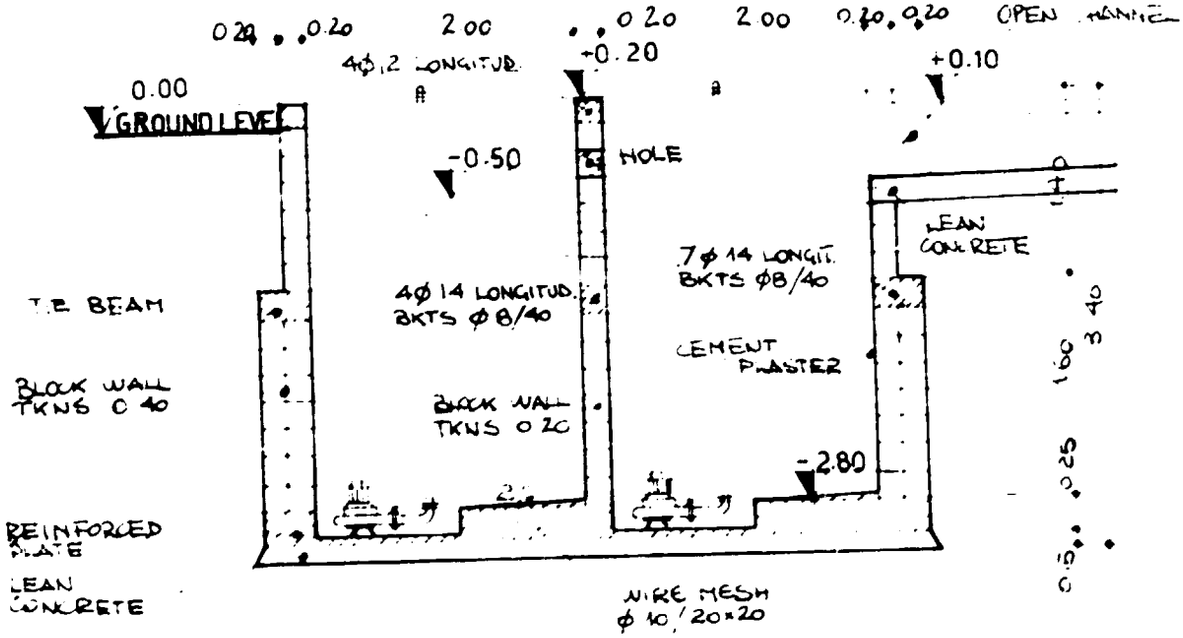
SECTION E-E



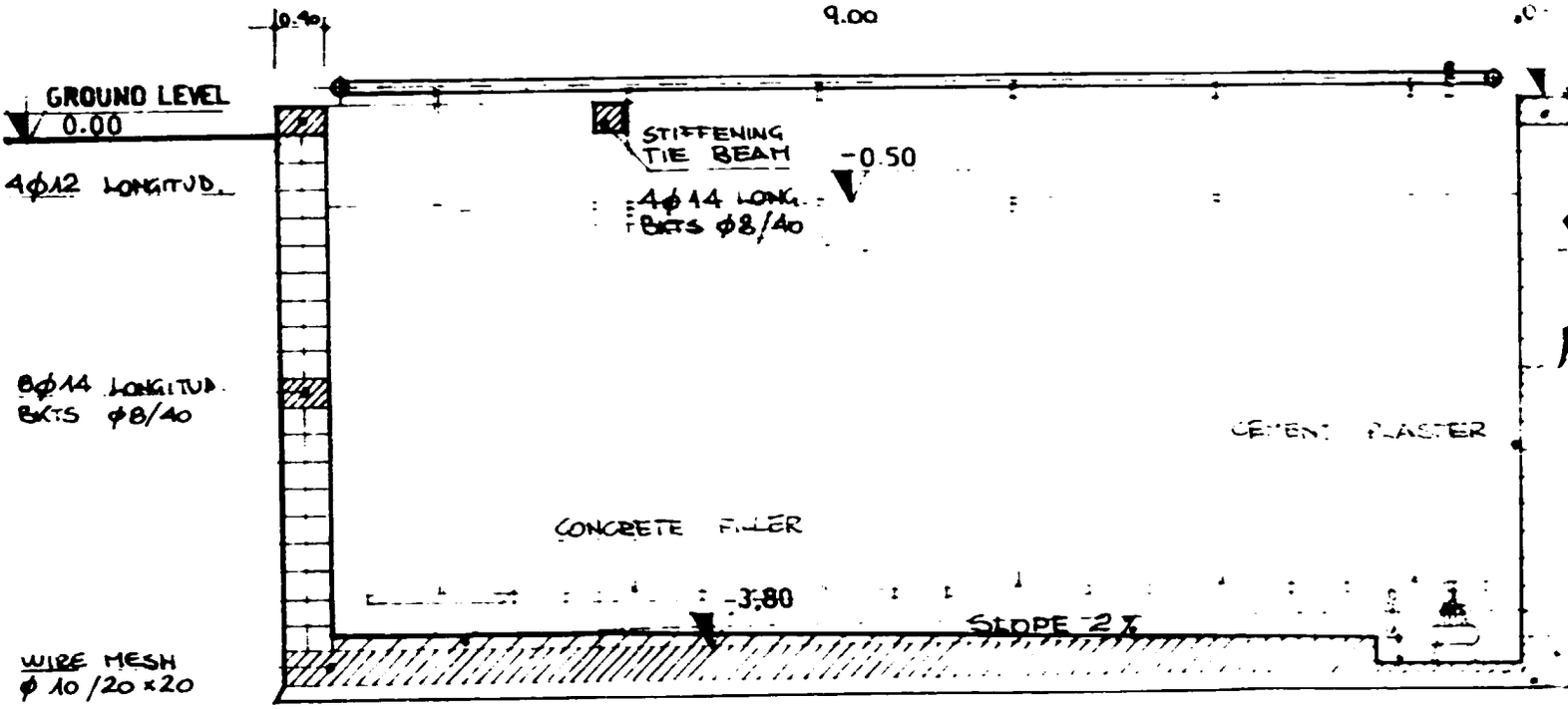


SECT 4

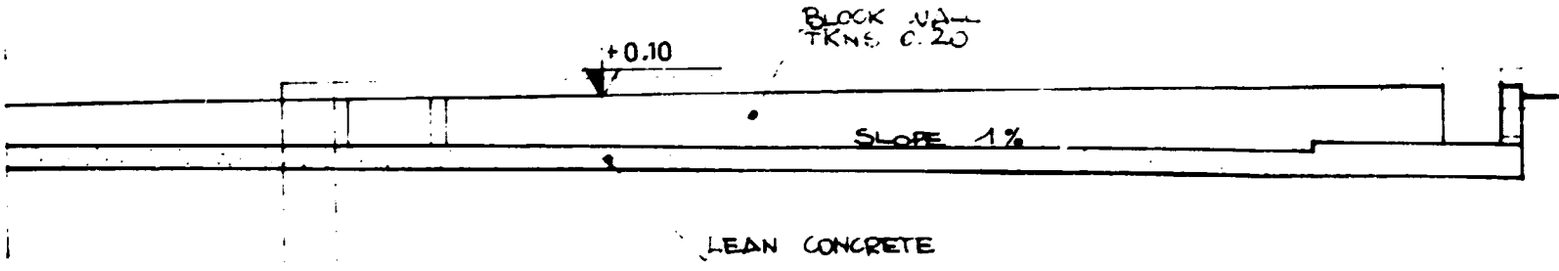
SECTION D-D



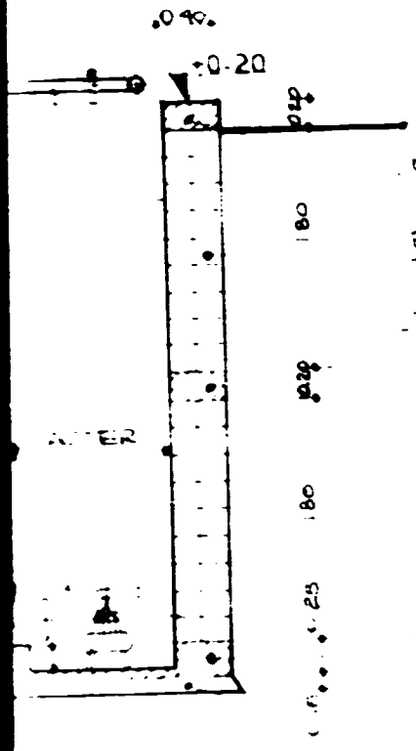
SECTION A-A

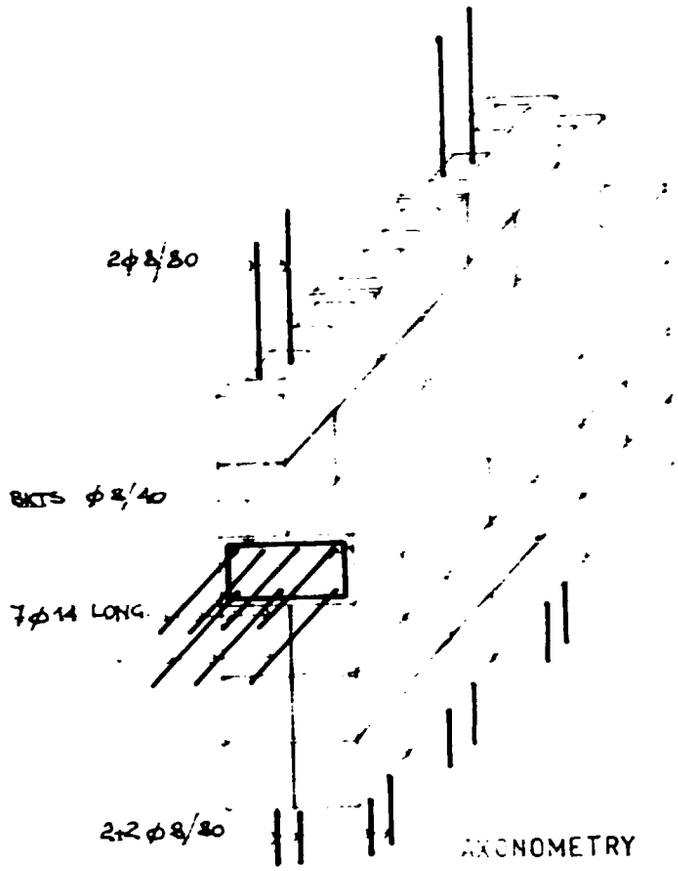


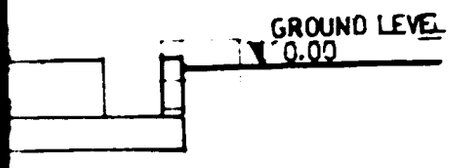
SECTION B-B

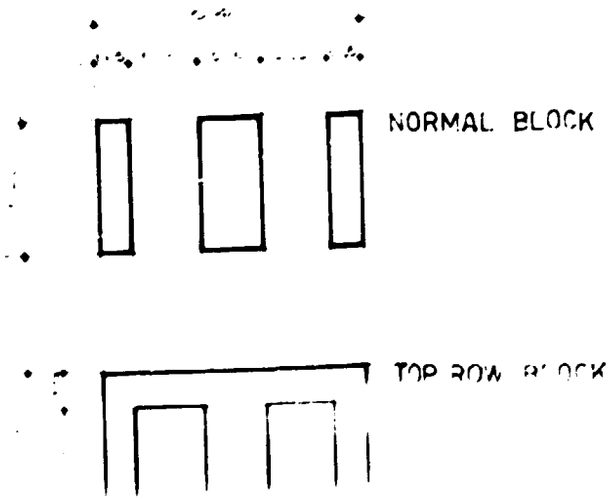


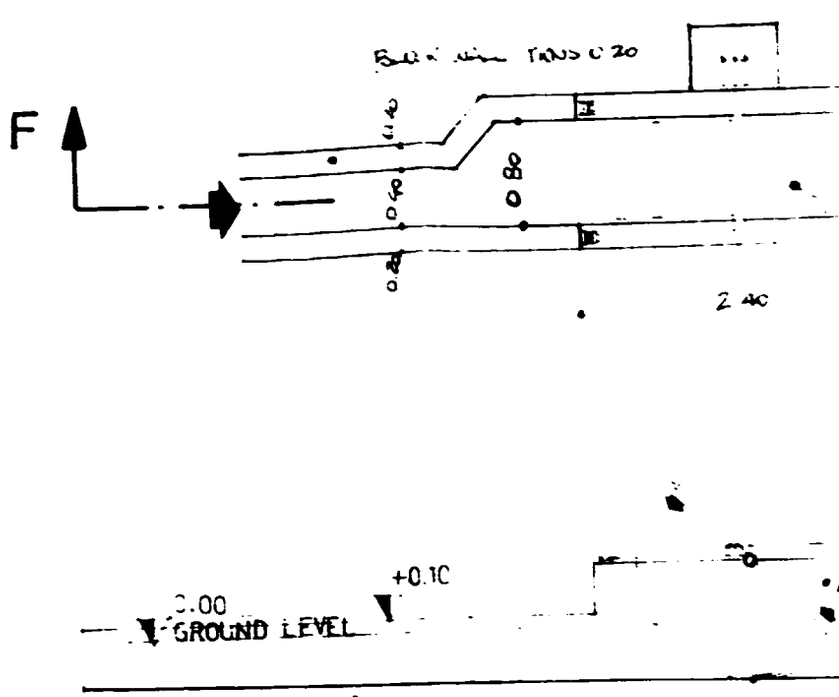
BLOCK WALL TKNS 0.20 2Ø8 VERTICAL m.c.s.











CONTRAC

Mod
wast

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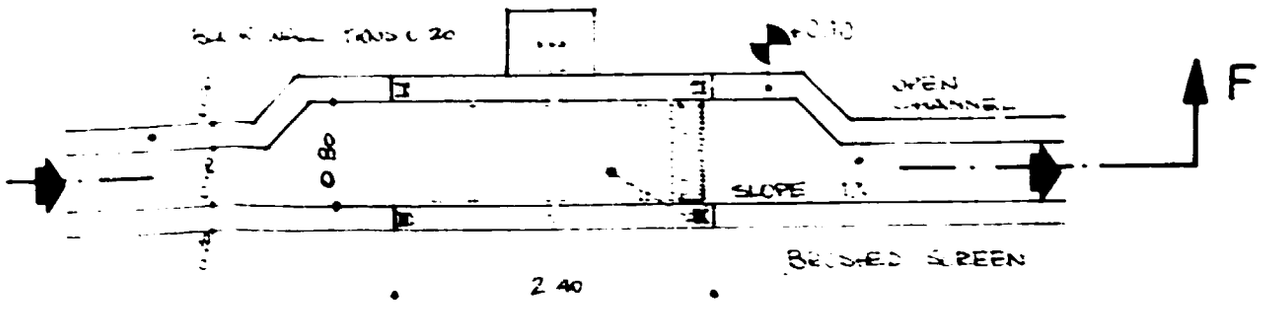
Addis

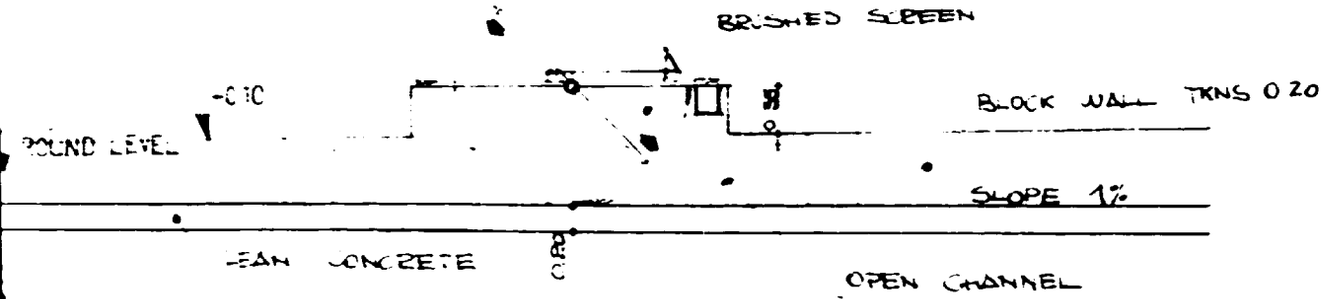
"STUDI
Adviser
Mr. Gius
Mr. Mu

1 : 50

Sulph



SECTION F-F



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

Modjo tannery: waste water treatment plant

National Leather and Shoe Corporation Addis Ababa - Ethiopia

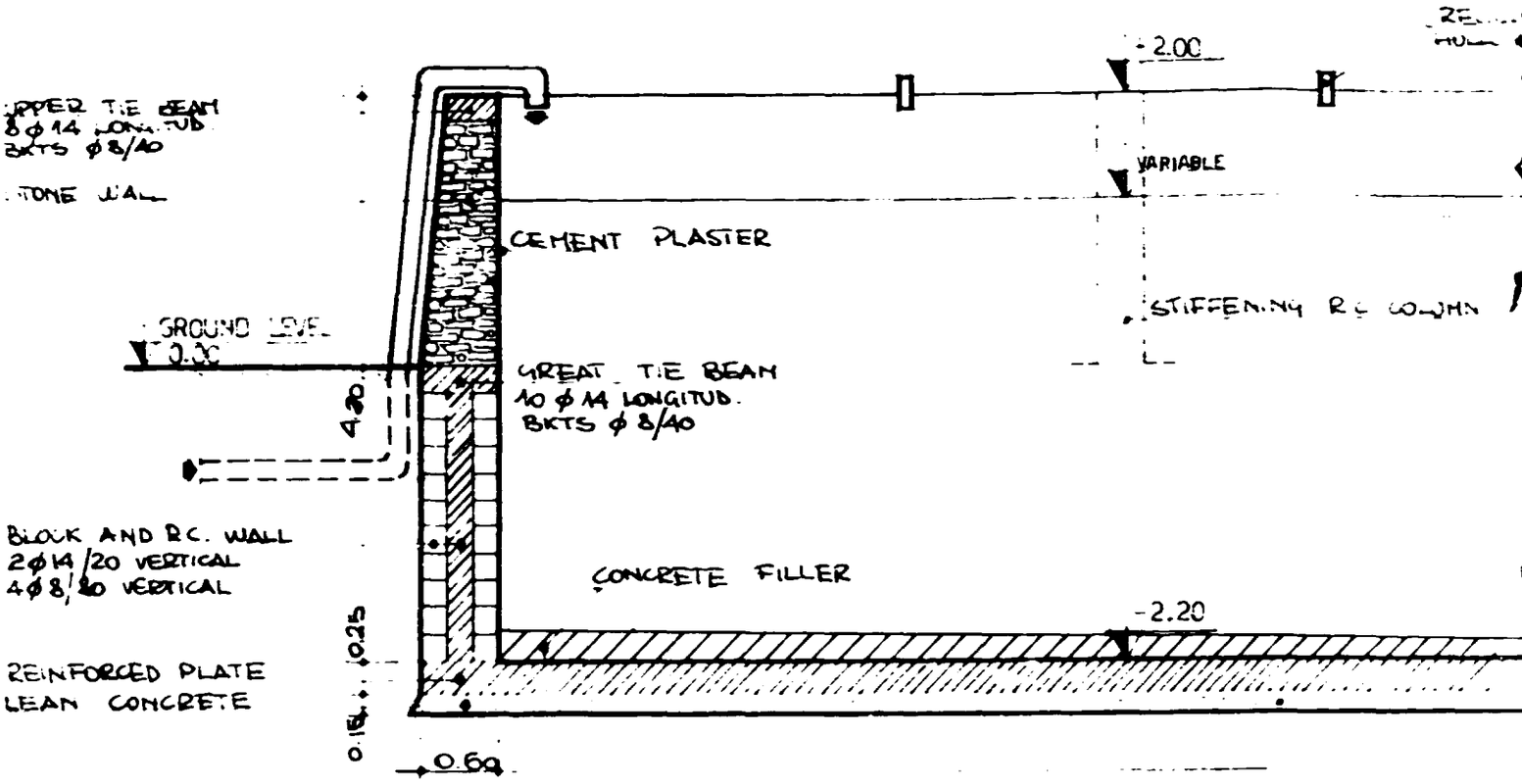
"STUDIO TECNICO Dr. GIUSEPPE CLONFERO" - FLORENCE ITALY
Advisers:
Mr. Giuseppe Clonfero
Mr. Mauro Carbonari

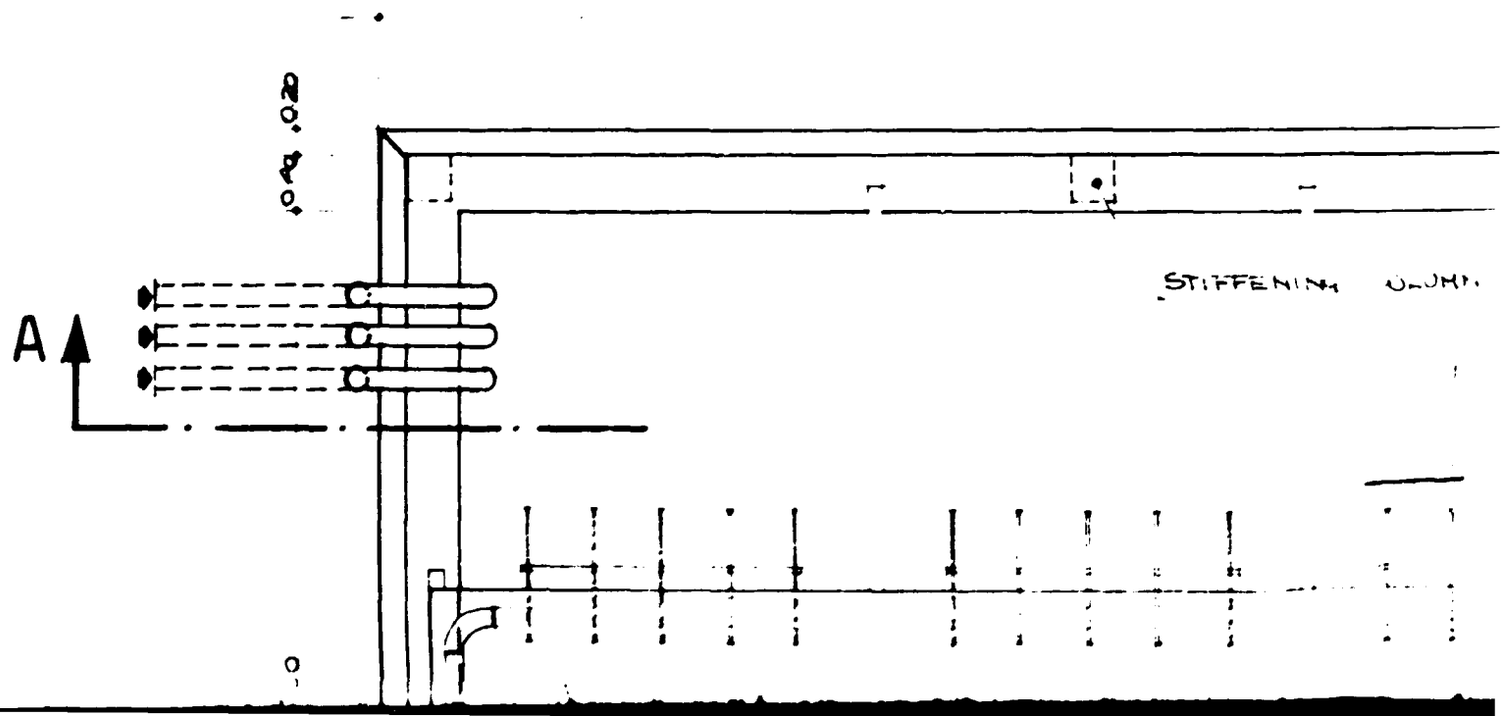
March 1990

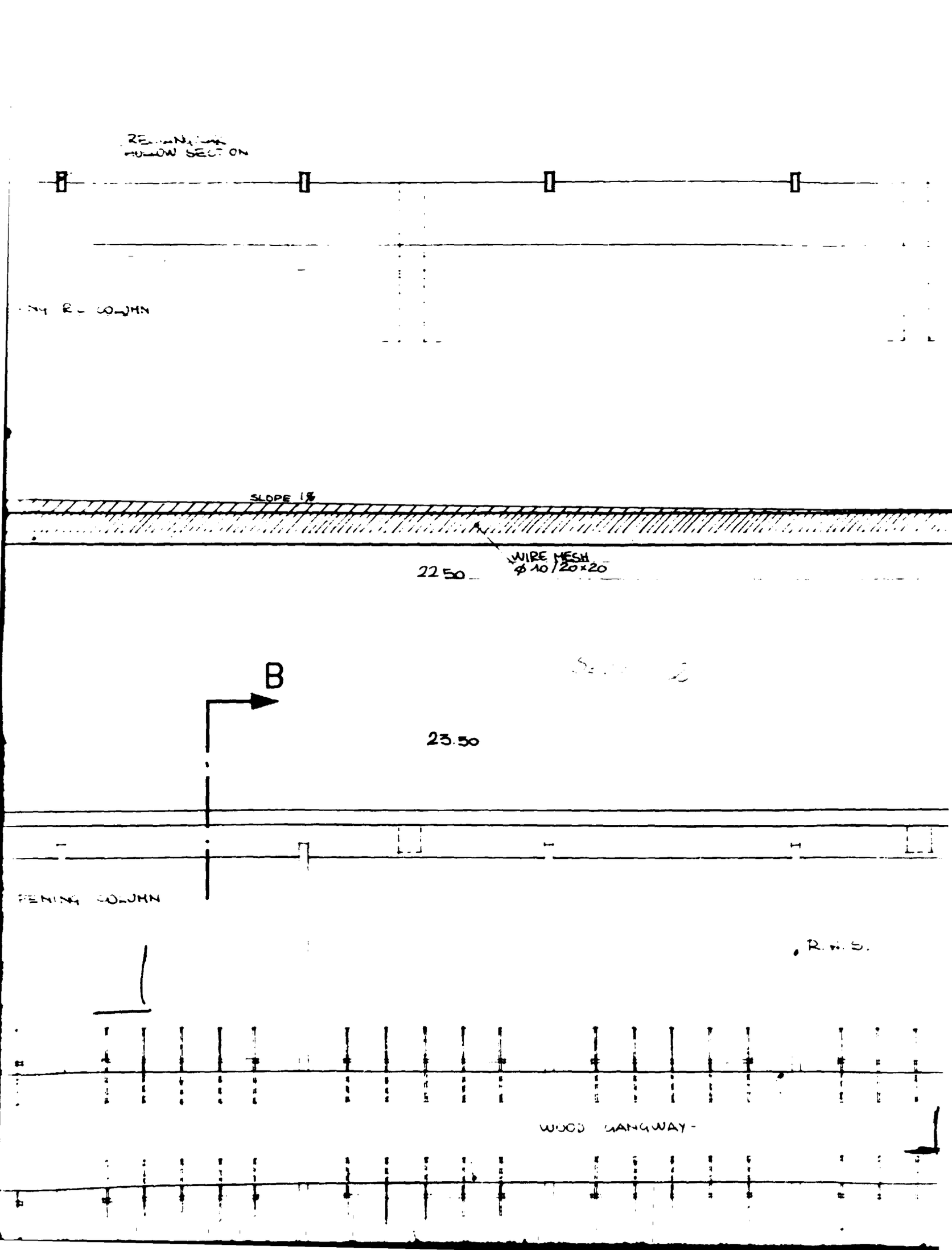
1 : 50
Screening and grit chambers
Pumping station
Sulphide catalytic oxidation tank

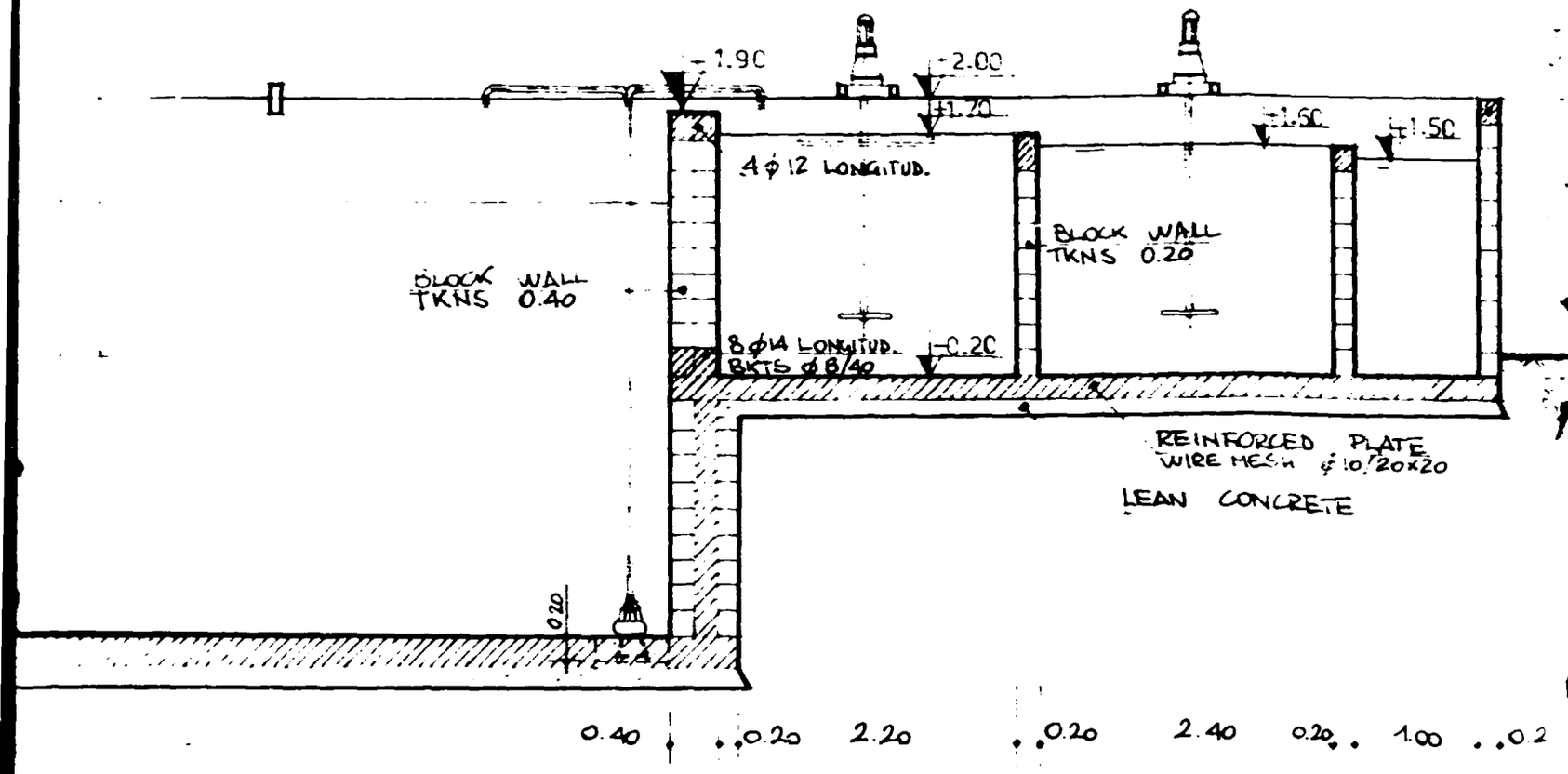
3

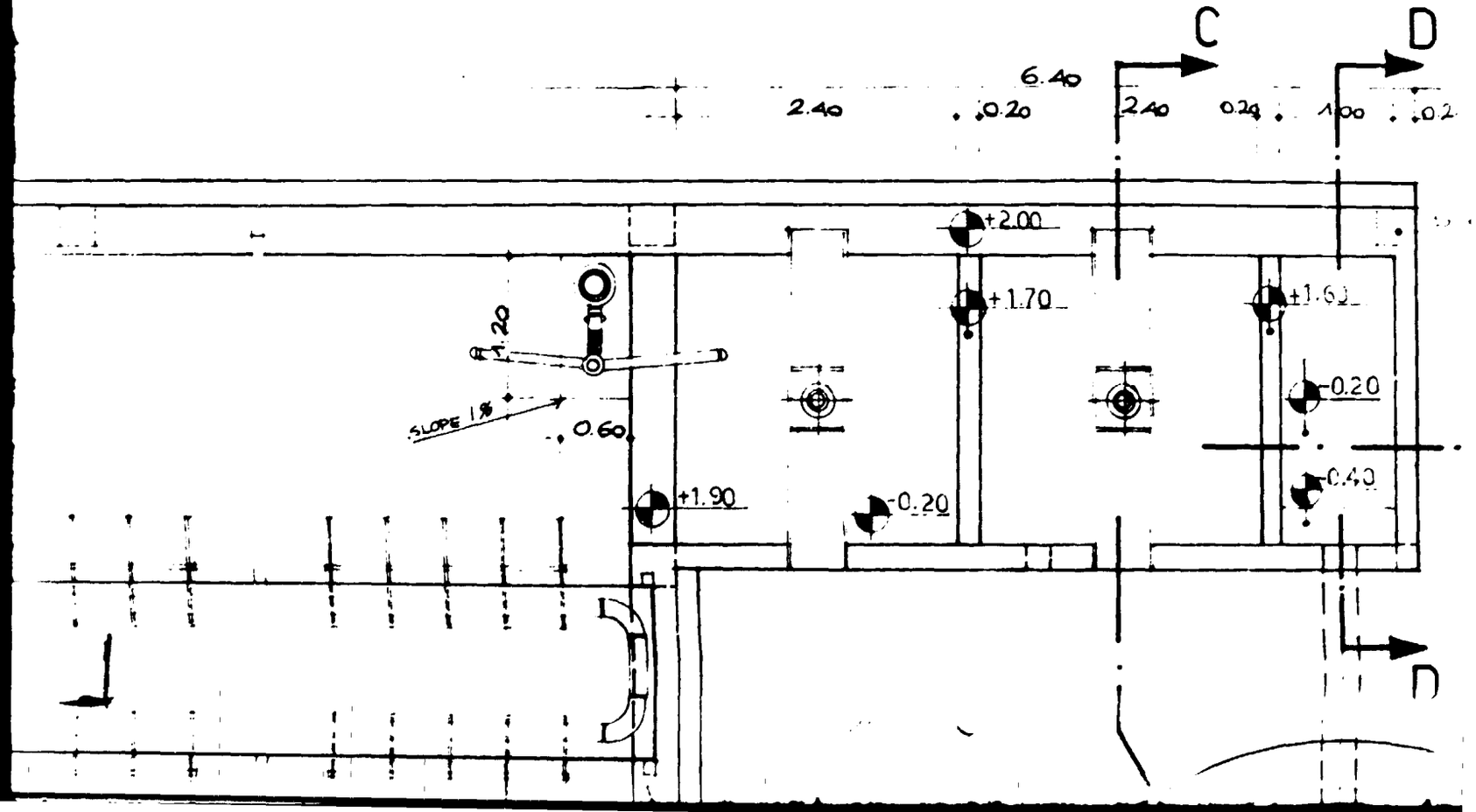
SECTION A-A


-2.00
VARIABLE
CEMENT PLASTER
STIFFENING R.C. COLUMN
GROUND LEVEL
0.00
GREAT TIE BEAM
10 ϕ 14 LONGITUD.
BKTS ϕ 8/40
4.20
BLOCK AND R.C. WALL
2ϕ14/20 VERTICAL
4ϕ8/20 VERTICAL
CONCRETE FILLER
-2.20
REINFORCED PLATE
LEAN CONCRETE
0.25
0.60

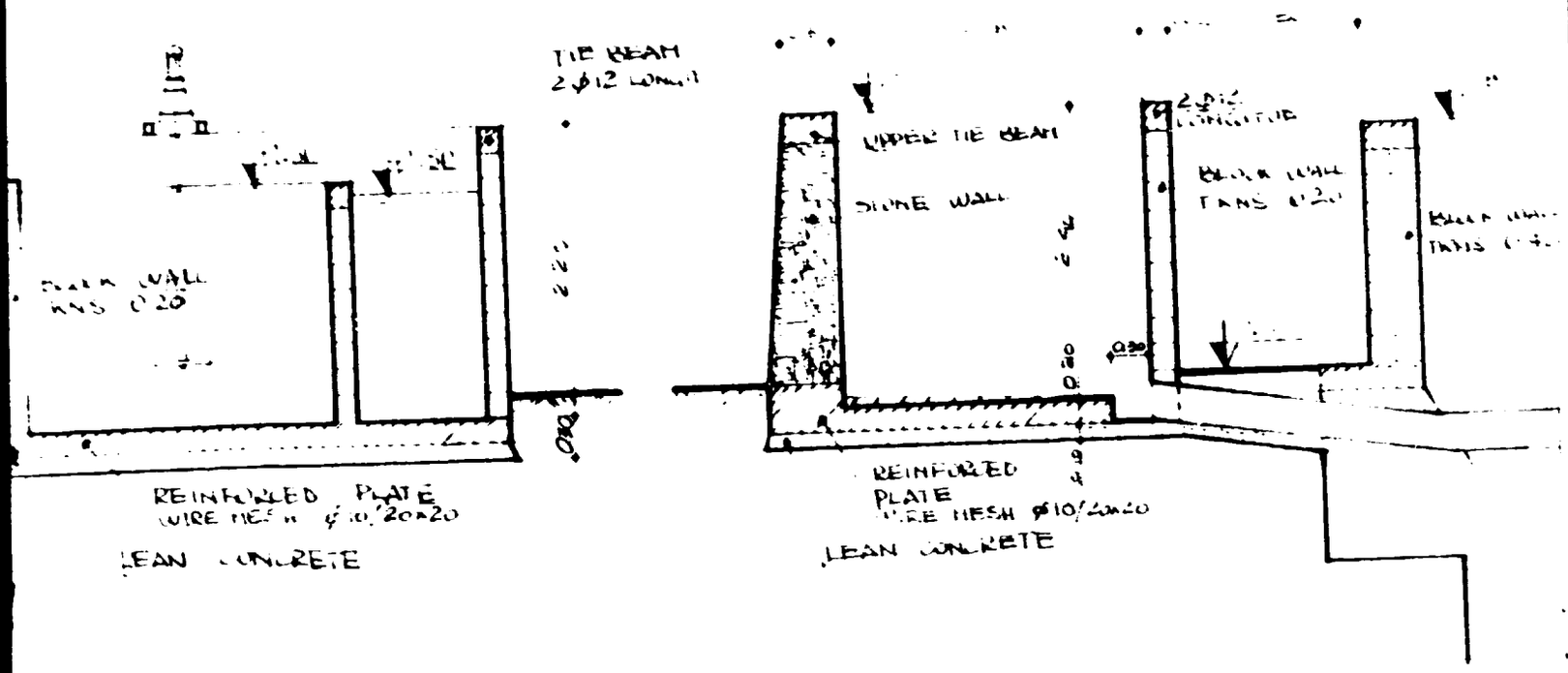

0.20
STIFFENING COLUMN
A


HOLLOW SECTION
SLOPE 1%
WIRE MESH
Ø 10/20×20
22.50
B
23.50
R.W.S.
WOOD GANGWAY

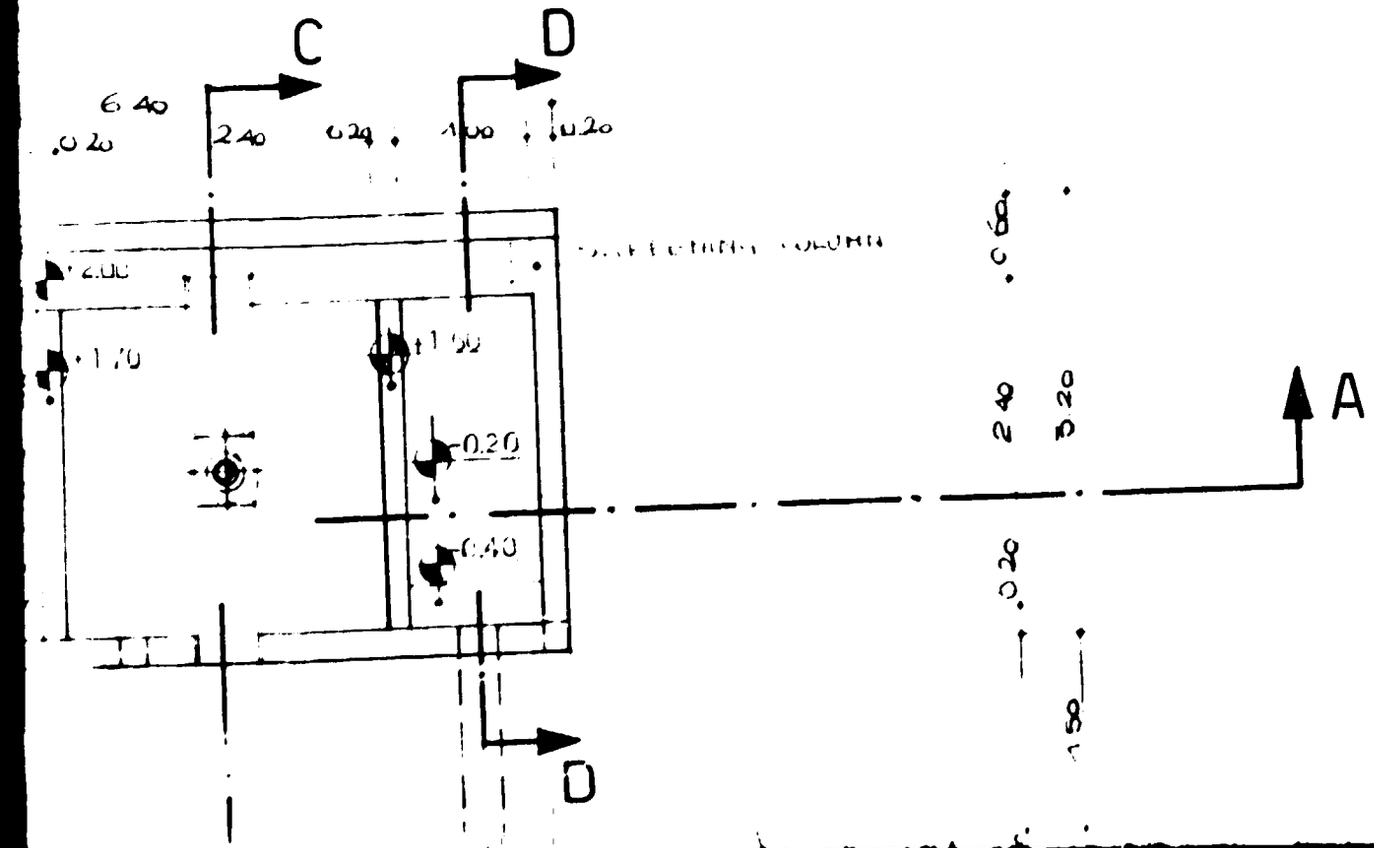

-1.90
-2.00
+1.20
-1.60
+1.50
4 ϕ 12 LONGITUD.
BLOCK WALL
TKNS 0.40
BLOCK WALL
TKNS 0.20
8 ϕ 14 LONGITUD.
BKTS ϕ 8/40
-0.20
REINFORCED PLATE
WIRE MESH ϕ 10/20x20
LEAN CONCRETE
0.20
0.40
0.20
2.20
0.20
2.40
0.20
1.00
0.2

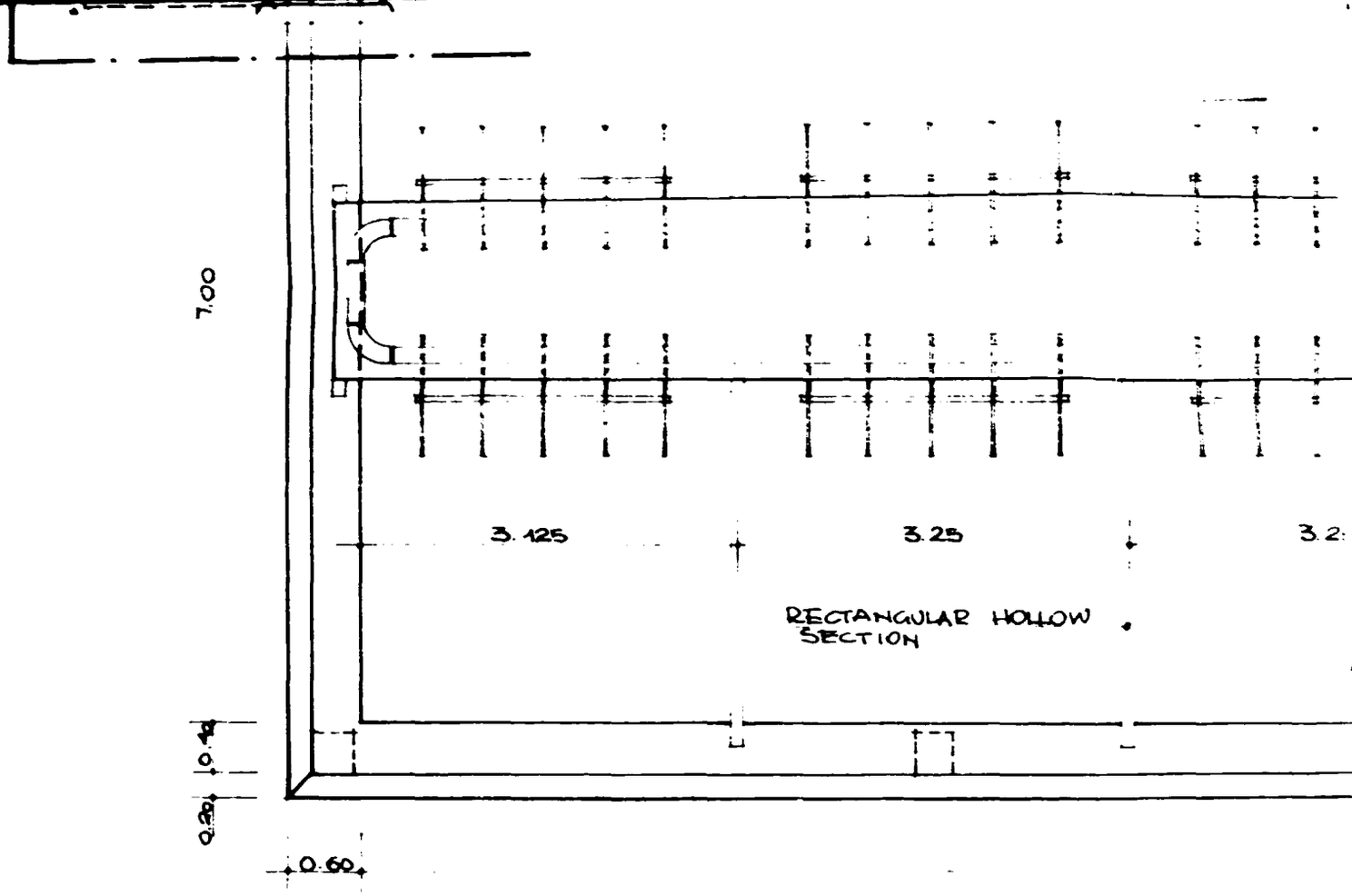

C
D
6.40
2.40
0.20
2.40
0.20
1.00
0.2
+2.00
+1.70
+1.60
-0.20
-0.40
+1.90
-0.20
0.20
SLOPE 1%
0.60
D

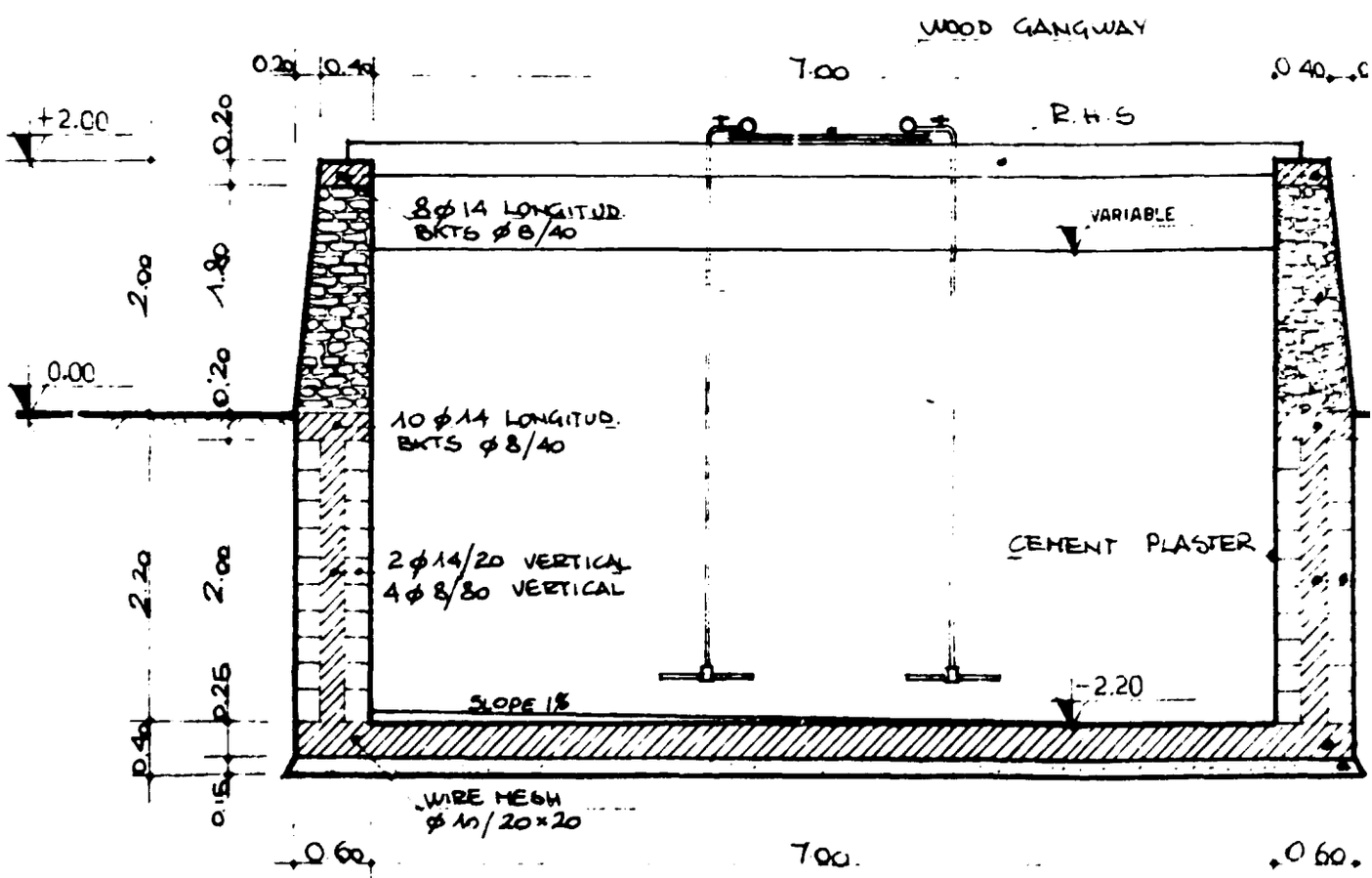
SECTION D-D



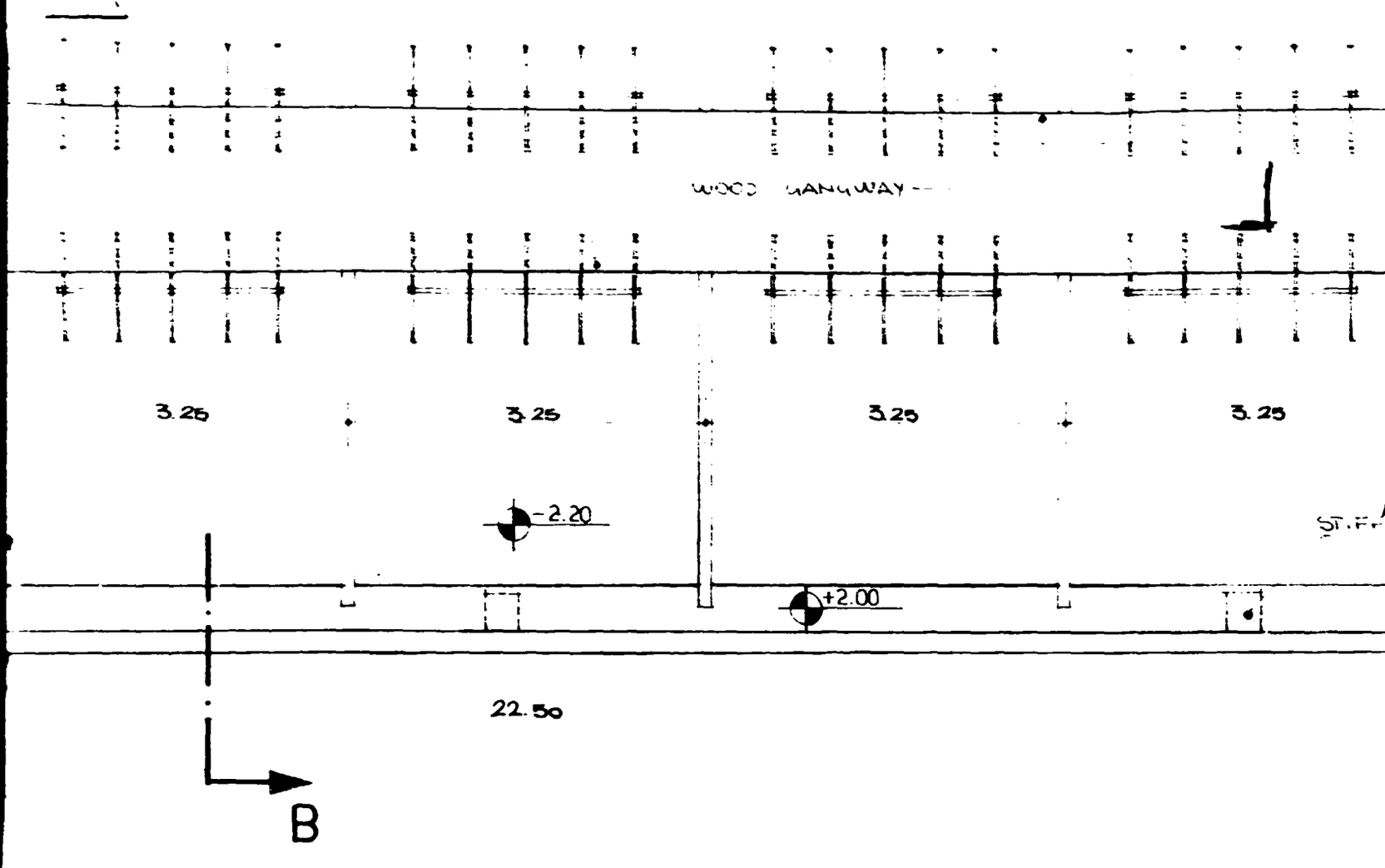
.020 2.40 .020 1.00 .020

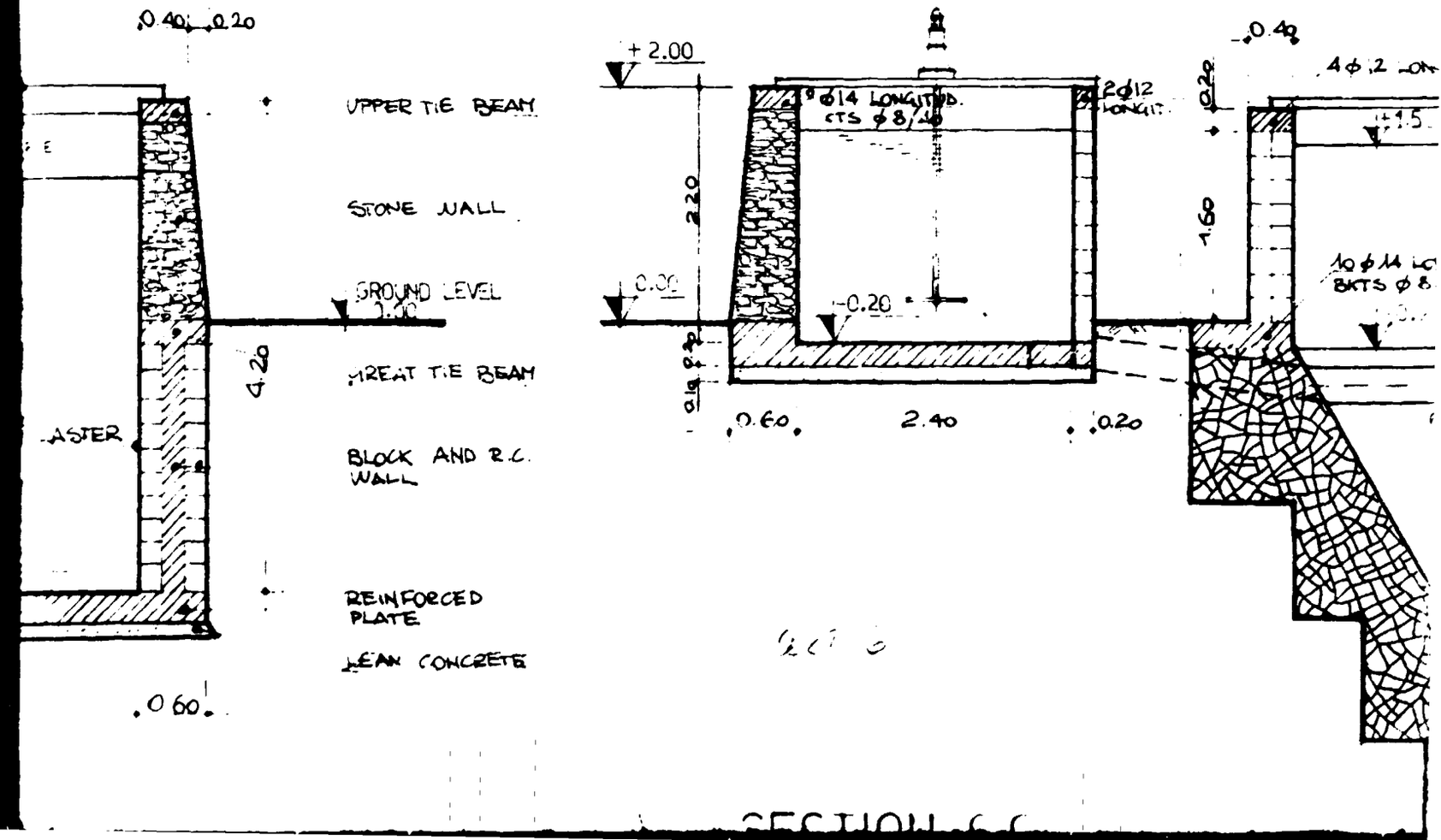



7.00
3.125
3.25
3.2
RECTANGULAR HOLLOW SECTION
0.60

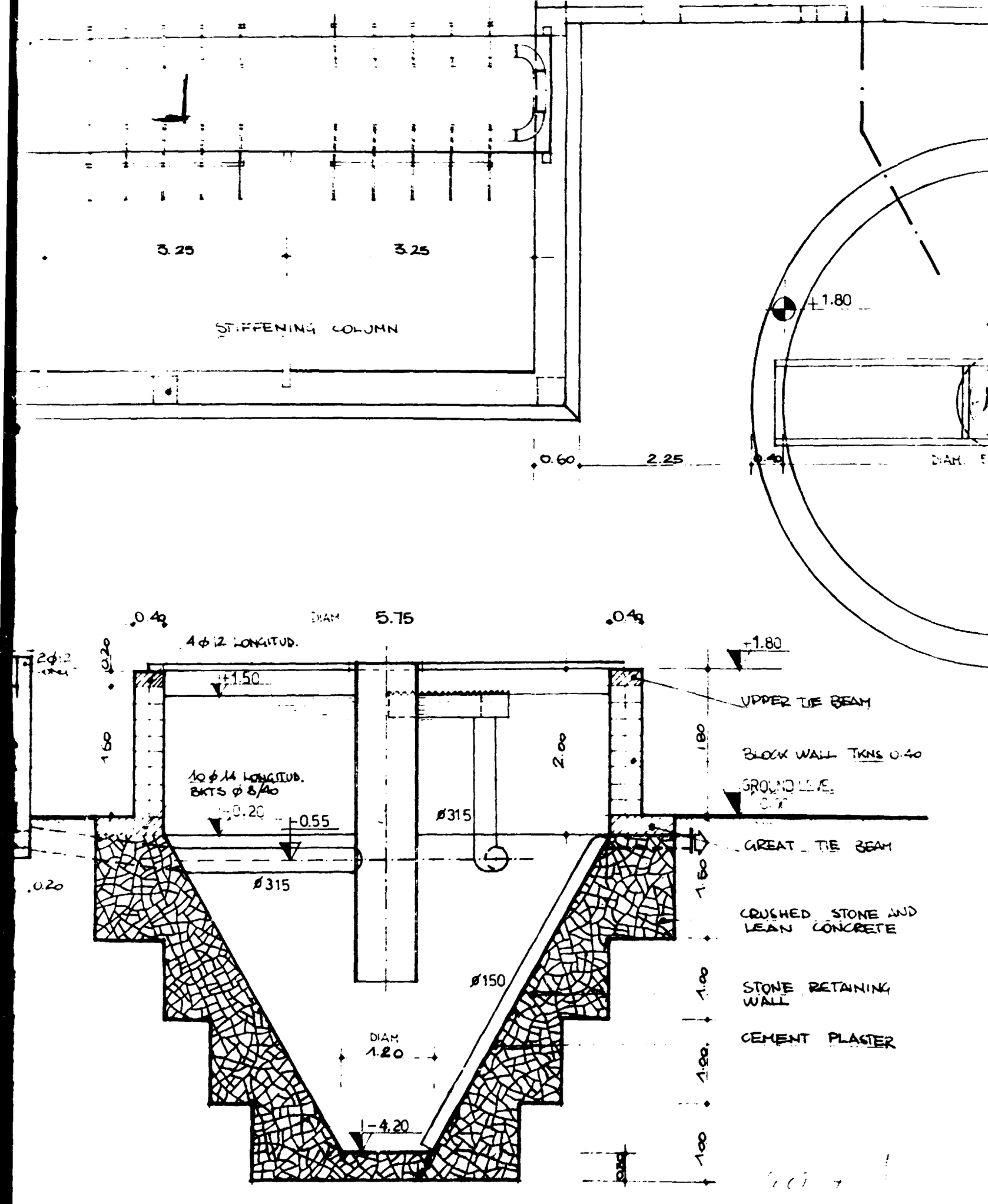

WOOD GANGWAY
0.20
0.40
7.00
0.40
+2.00
0.20
R.H.S
8φ14 LONGITUD.
BKTS φ8/40
VARIABLE
2.00
1.80
0.00
0.20
10φ14 LONGITUD.
BKTS φ8/40
2φ14/20 VERTICAL
4φ8/80 VERTICAL
CEMENT PLASTER
2.20
2.00
SLOPE 1%
-2.20
0.25
0.40
0.15
WIRE MESH
φ10/20×20
0.60
7.00
0.60

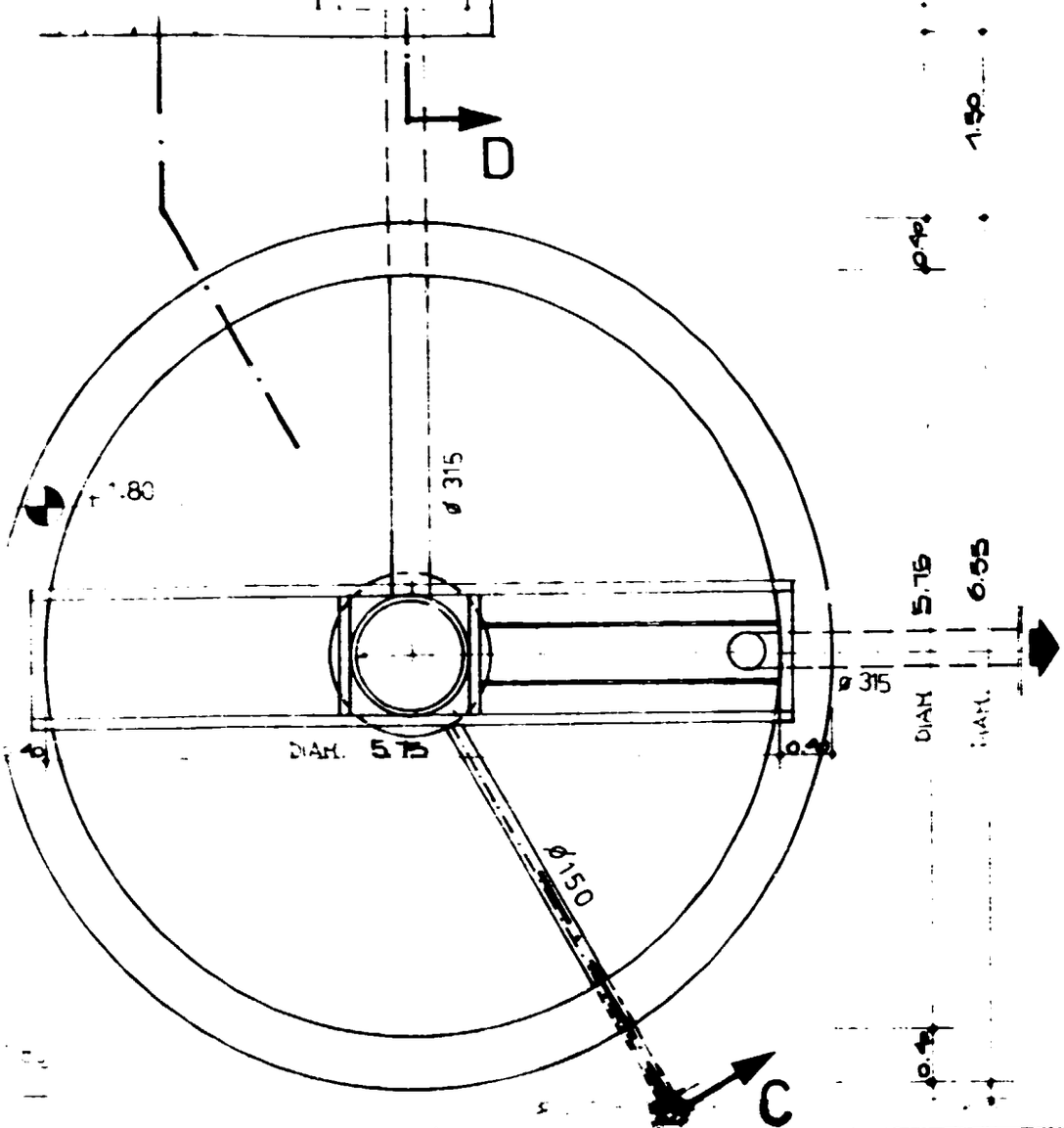
SECTION B-B


WOOD GANGWAY
3.25
3.25
3.25
3.25
-2.20
+2.00
22.50
B


0.40
0.20
UPPER TIE BEAM
STONE WALL
GROUND LEVEL
4.20
GREAT TIE BEAM
BLOCK AND R.C. WALL
REINFORCED PLATE
LEAN CONCRETE
0.60
+2.00
2.20
0.00
-0.20
0.20
0.60
2.40
0.20
0.40
1.50
1.5

SECTION C-C


3.25
3.25
STIFFENING COLUMN
0.60
2.25
+1.80
DIAM
0.40
DIAM 5.75
0.40
4 ϕ 12 LONGITUD.
2ϕ12
0.20
+1.50
1.80
10 ϕ 14 LONGITUD.
BKTS ϕ 8/40
+0.20
+0.55
ø315
ø315
0.20
2.80
+1.80
UPPER TIE BEAM
1.80
BLOCK WALL TKNS 0.40
GROUND LINE
GREAT TIE BEAM
1.80
CRUSHED STONE AND LEAN CONCRETE
ø150
1.00
STONE RETAINING WALL
CEMENT PLASTER
DIAM 1.20
+4.20
1.00
0.85
0.60
0.60
0.85
DIM 325
0.60
0.60
0.85



...ER TIE BEAM

...X WALL THKNS 0.40

...

...EAT TIE BEAM

...GHED STONE AND ...AN CONCRETE

...ONE RETAINING ...ALL

...MENT PLASTER

CONTRACT n. 89/169: UNIDO PROJECT SI/ETH/89/801

Modjo tannery: waste water treatment plant

National Leather and Shoe Corporation Addis Ababa - Ethiopia

...STUDIO TECNICO Dr. GIUSEPPE CLONFERO" - FLORENCE ITALY

Architects

Ing. Giuseppe Clonfero

Mr. Mauro Cardamuri

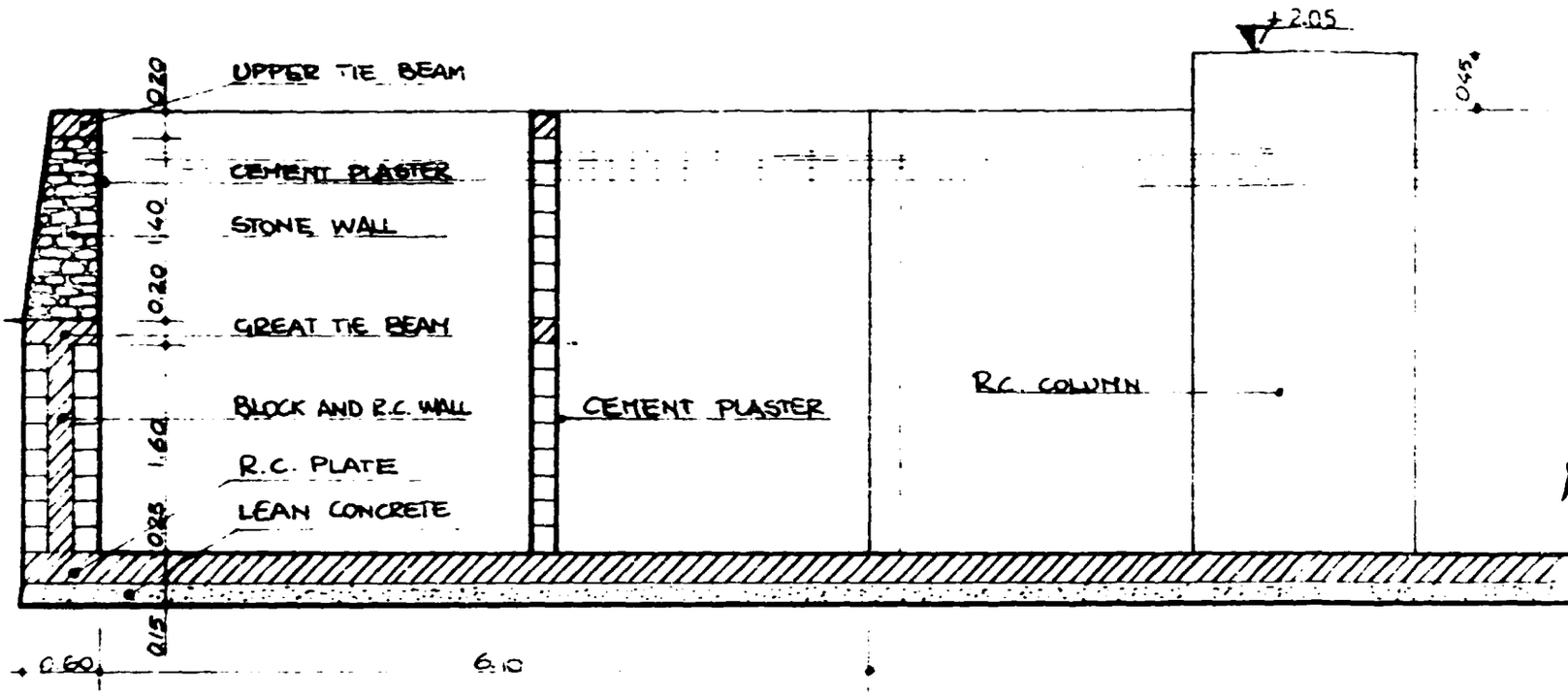
March 1990

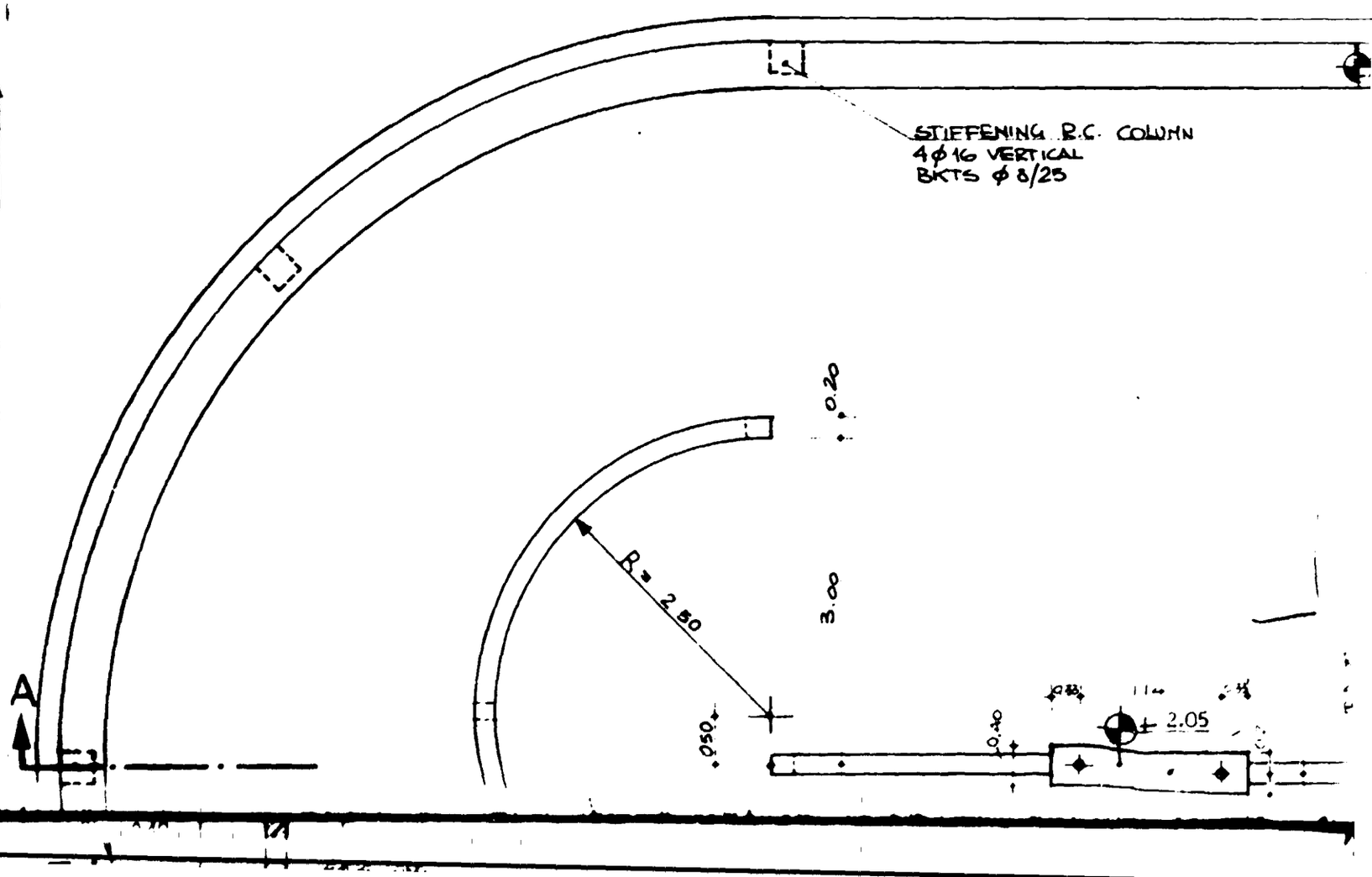
1 : 50

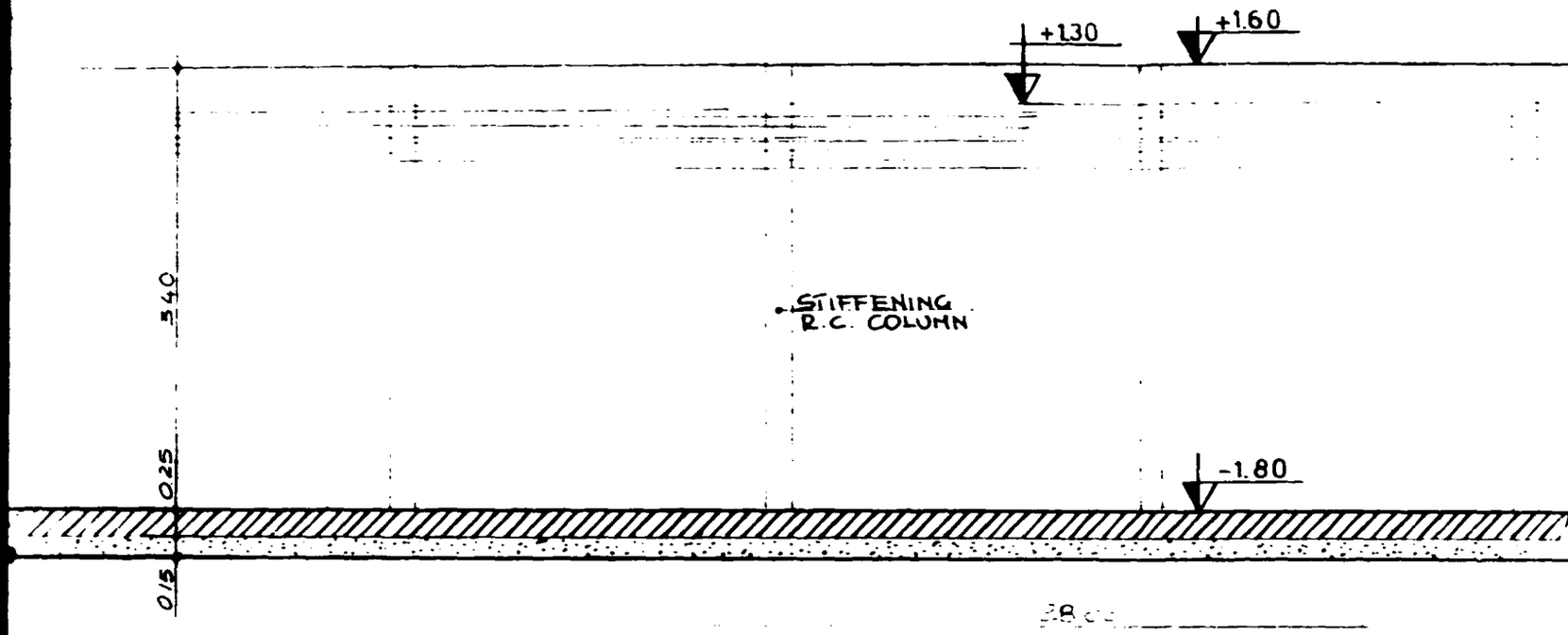
Homogenization tank
Coagulation and flocculation tanks
Primary sedimentation tank

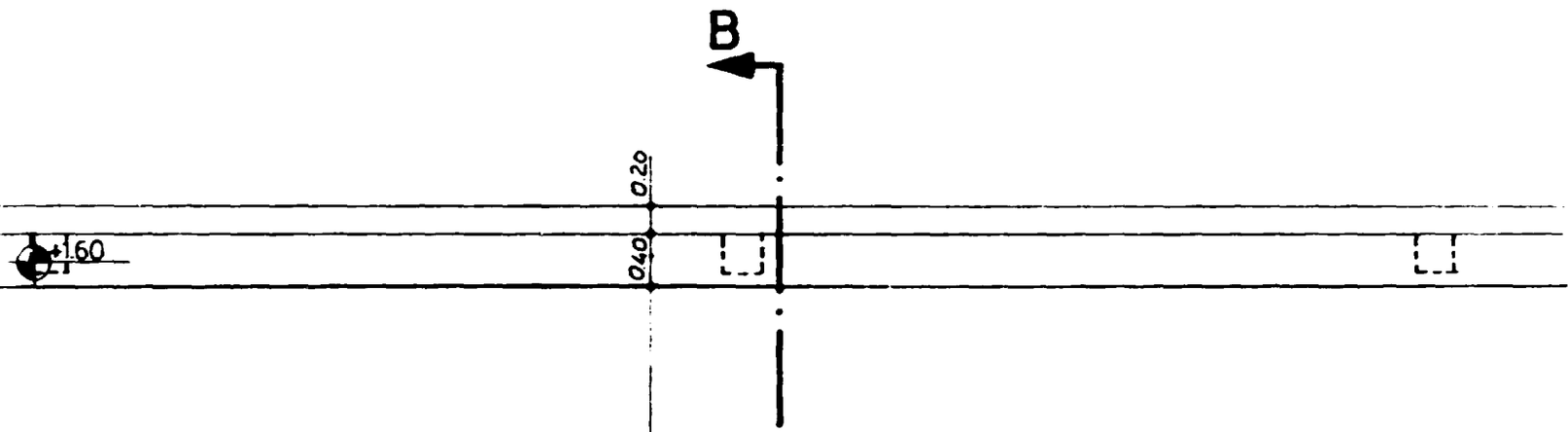
4

SECTION A-A


+2.05
UPPER TIE BEAM
0.20
CEMENT PLASTER
STONE WALL
1.40
0.20
GREAT TIE BEAM
BLOCK AND R.C. WALL
1.60
R.C. PLATE
LEAN CONCRETE
0.25
0.15
0.60
6.10
CEMENT PLASTER
R.C. COLUMN
0.45


STIFFENING R.C. COLUMN
4 ϕ 16 VERTICAL
BKTS ϕ 8/25
0.20
R = 2.50
3.00
0.50
A
+2.05
0.40



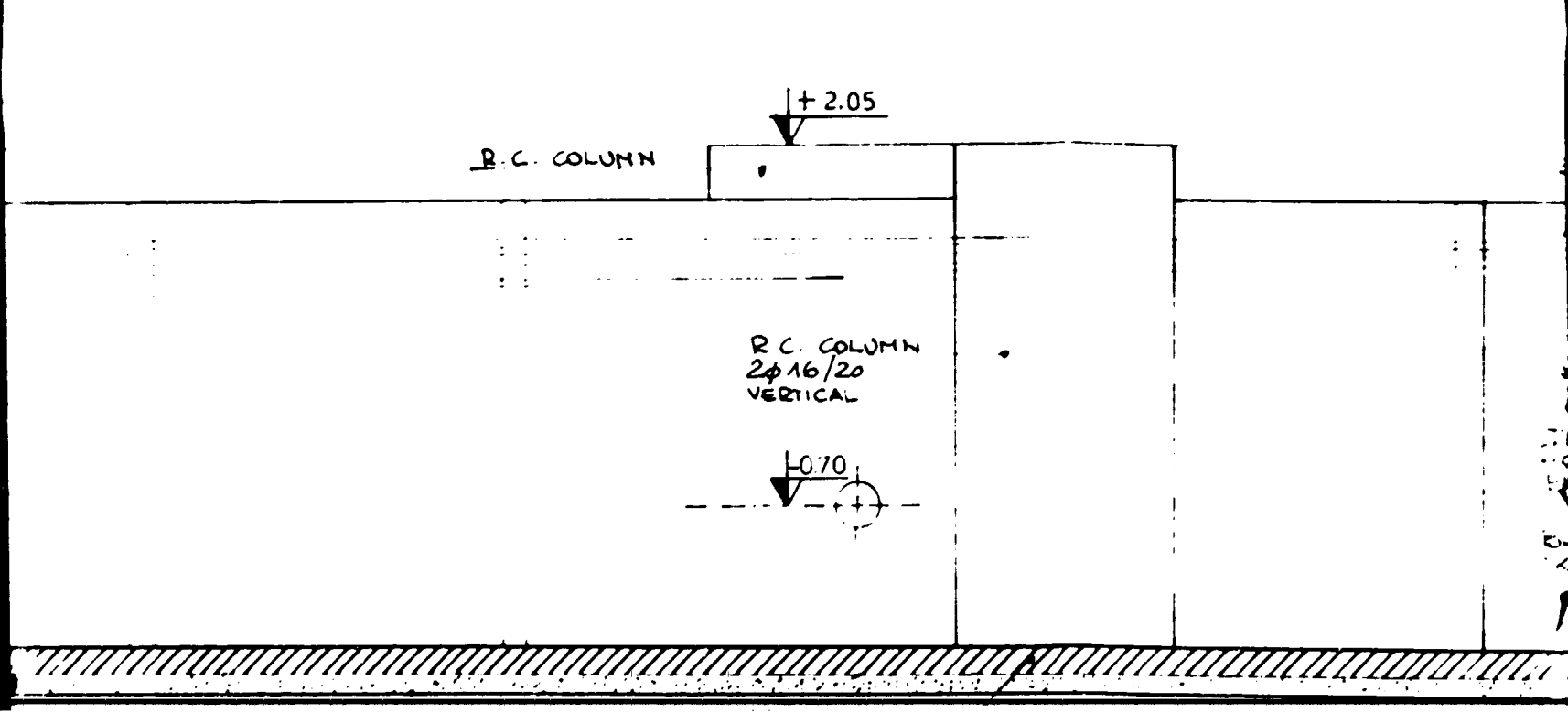


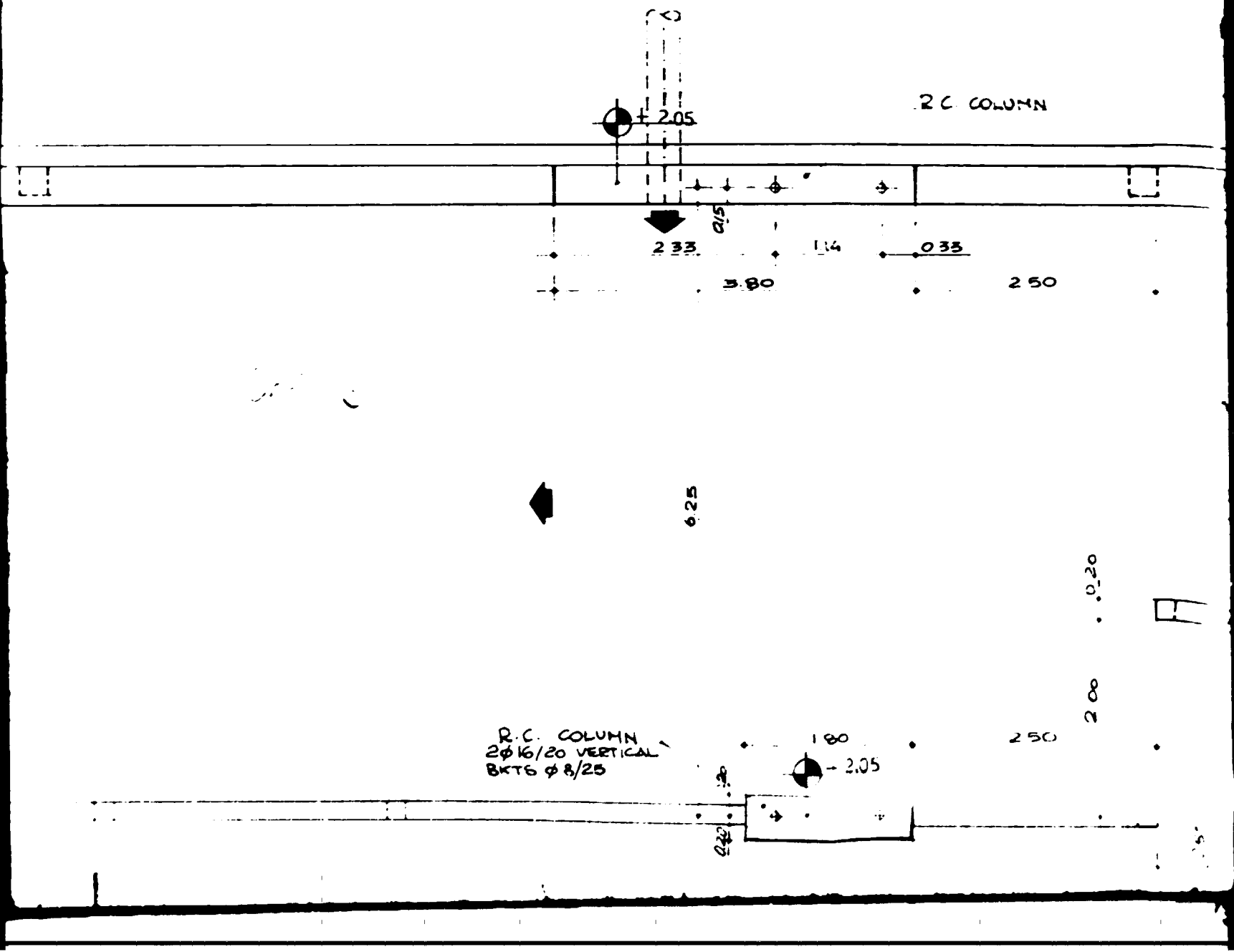
6.00

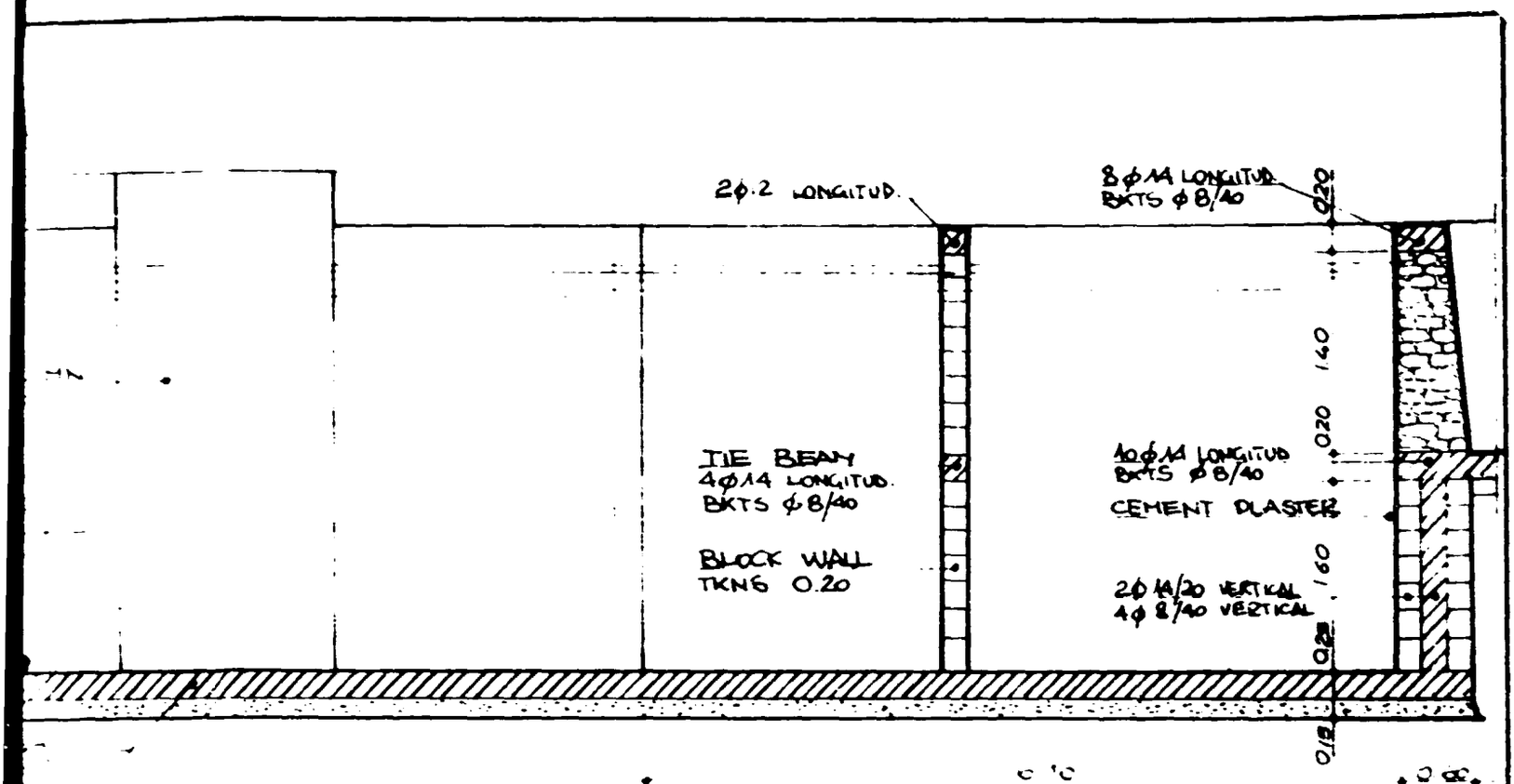
R.C. COLUMN
2 ϕ 20 VERTICAL
BKTS ϕ 8/25

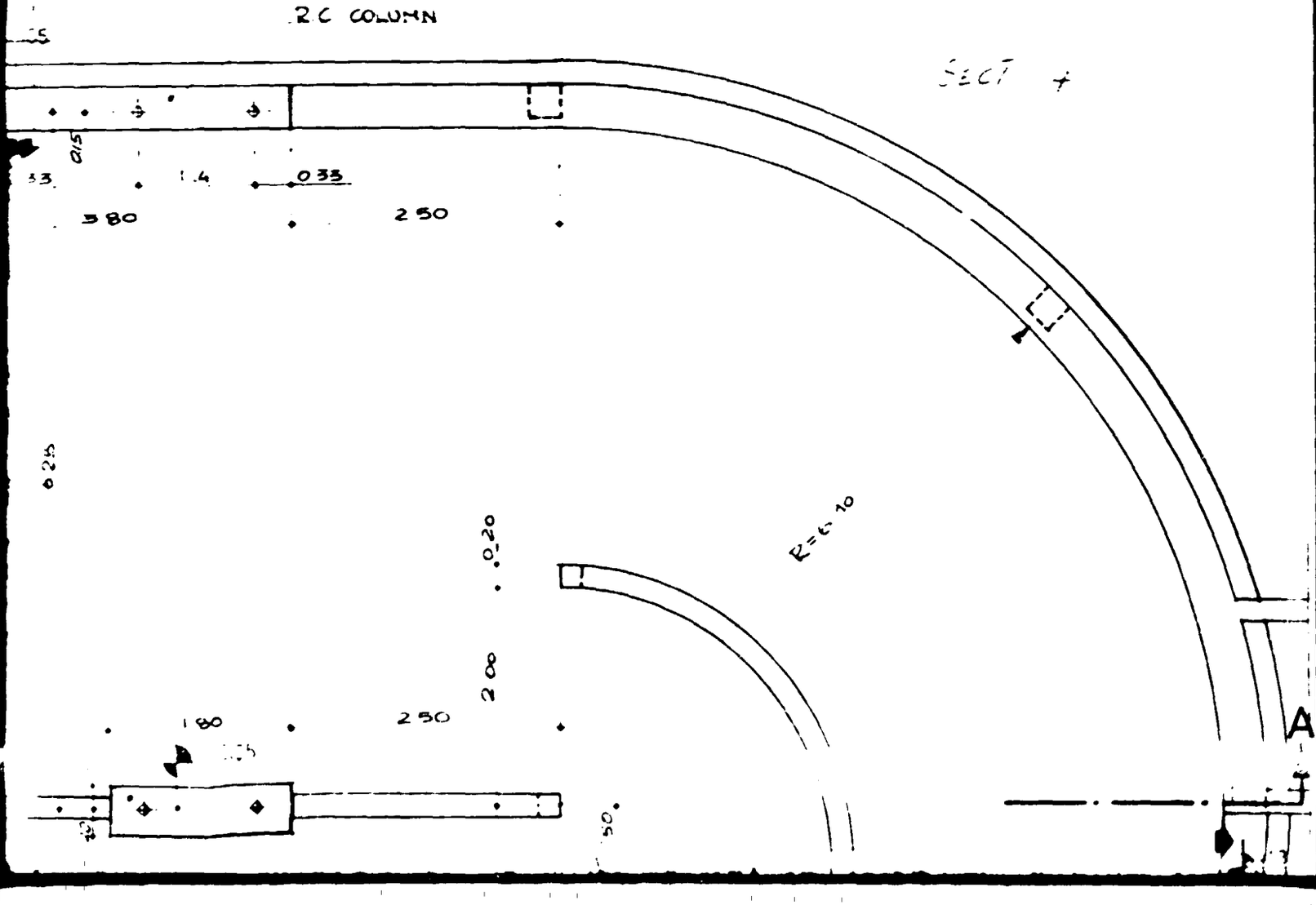
STIFFENING R.C COLUMN
4 ϕ 16 VERTICAL
BKTS ϕ 8/25

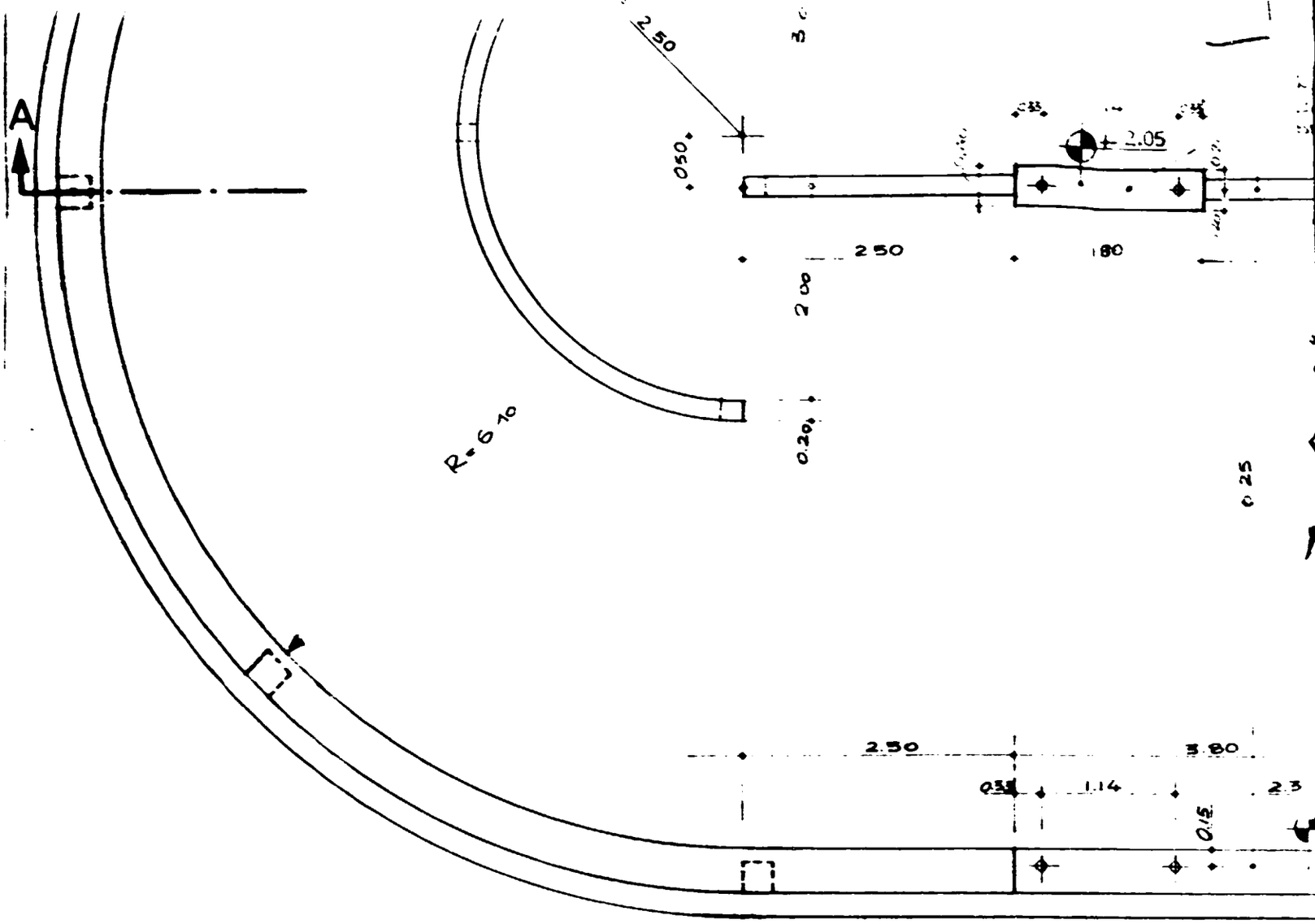
0.20


+ 2.05
R.C. COLUMN
R C. COLUMN
2φ16/20
VERTICAL
-0.70

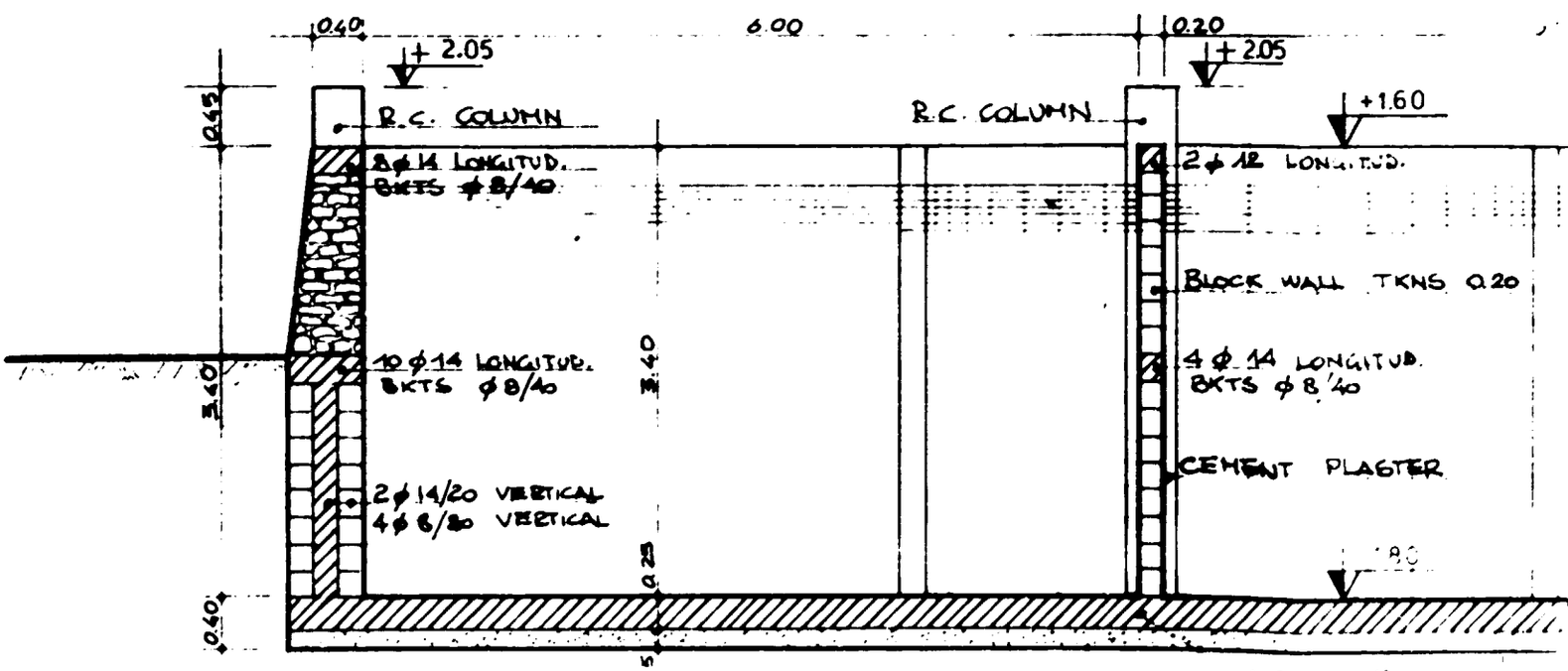

2C COLUMN
+2.05
0.15
2.33
1.14
0.33
3.80
2.50
6.25
0.20
2.00
R.C. COLUMN
2φ16/20 VERTICAL
BKTS φ8/25
1.80
2.50
+2.05
0.20


2φ.2 LONGITUD.
8φ14 LONGITUD.
BKTS φ8/40
020
140
020
160
020
TIE BEAM
4φ14 LONGITUD.
BKTS φ8/40
BLOCK WALL
TKNG 0.20
10φ14 LONGITUD
BKTS φ8/40
CEMENT PLASTER
2φ14/20 VERTICAL
4φ8/40 VERTICAL


RC COLUMN
SECT
015
033
140
035
380
250
025
020
200
R=0.10
180
250
A


A
2.50
+ 2.05
2 50
1 80
2 00
0.20
R=6.10
2.50
3.80
1.14
2.3
0.15

SECTION B-B


0.40
6.00
0.20
+ 2.05
+ 2.05
+1.60
R.C. COLUMN
R.C. COLUMN
8 ϕ 14 LONGITUD.
BKTS ϕ 8/40
2 ϕ 12 LONGITUD.
BLOCK WALL TKNS 0.20
10 ϕ 14 LONGITUD.
BKTS ϕ 8/40
4 ϕ 14 LONGITUD.
BKTS ϕ 8/40
CEMENT PLASTER
2 ϕ 14/20 VERTICAL
4 ϕ 6/20 VERTICAL
3.40
0.40
0.25

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

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

020

14 40

6.00

2.33

+ 2.05

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

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

040

020

41.40

B

BKTS φ 8/40
ℓ = 1.15

6.00

040

+1.30

020

UPPER TIE BEAM

STONE WALL

1.40

GROUND LEVEL
0.00

020

GREAT TIE BEAM

1.60

BLOCK AND R.C. WALL

CEMENT PLASTER

025

R.C. PLATE

5.

LEAN CONCRETE

DETAIL

φ 10/20 x 20

R.C COLUMN
2φ16/20 VERT.CAL
BKTS φ 8/25

180

250

-225

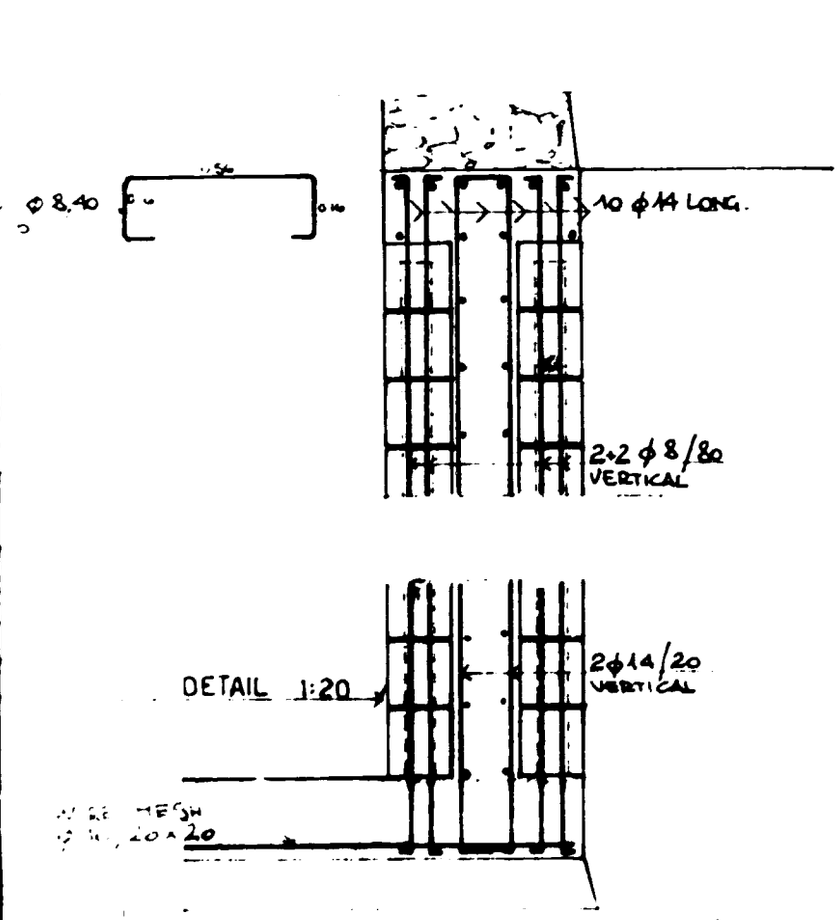
420

235

-180

COLUMN

-160



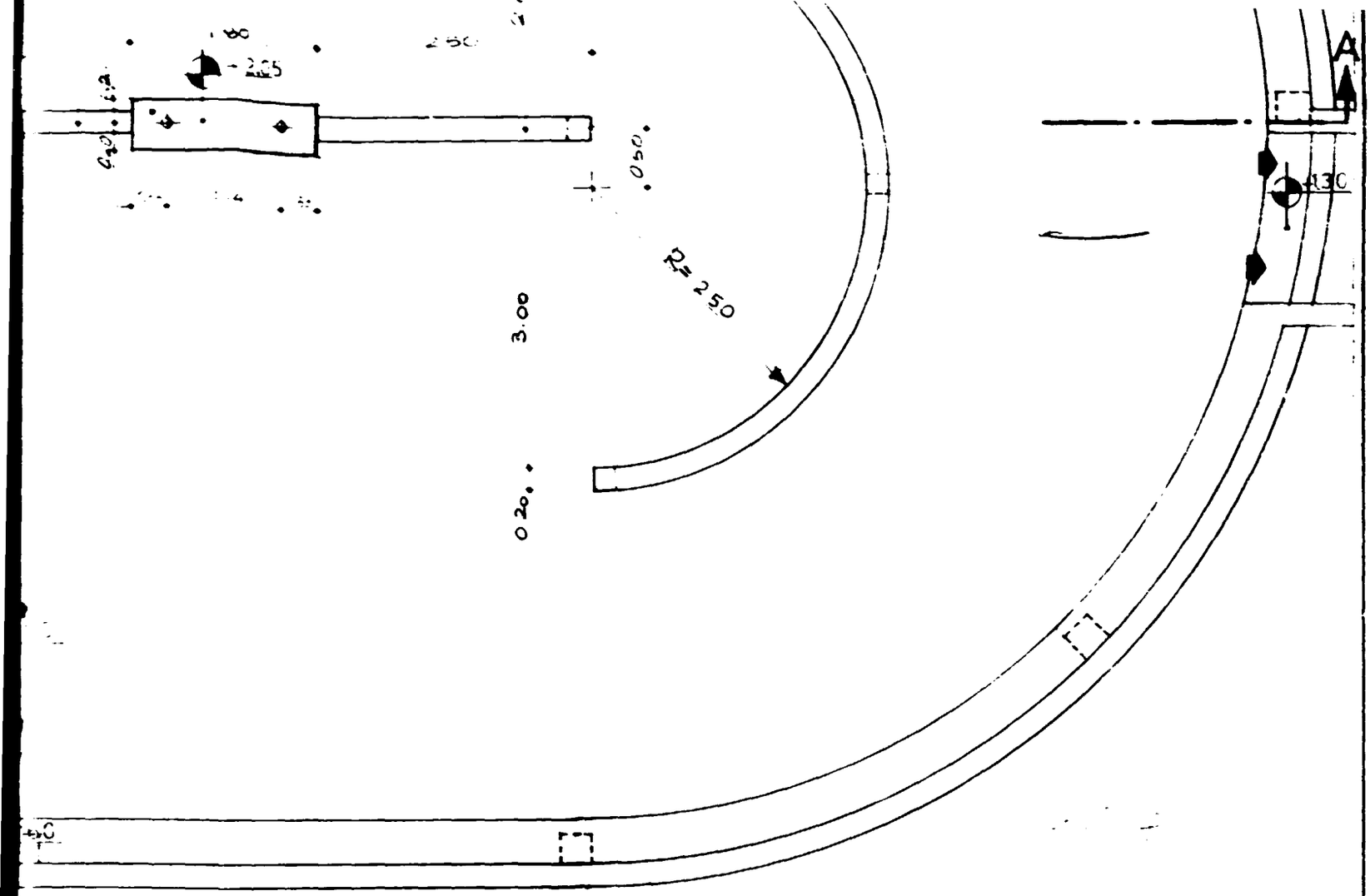
CONTRAC

Mod
wast

Nation
Addis

"STUDIC
Advisers
Mr. Giuse
Mr. Maur

1 : 50



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

Modjo tannery: waste water treatment plant

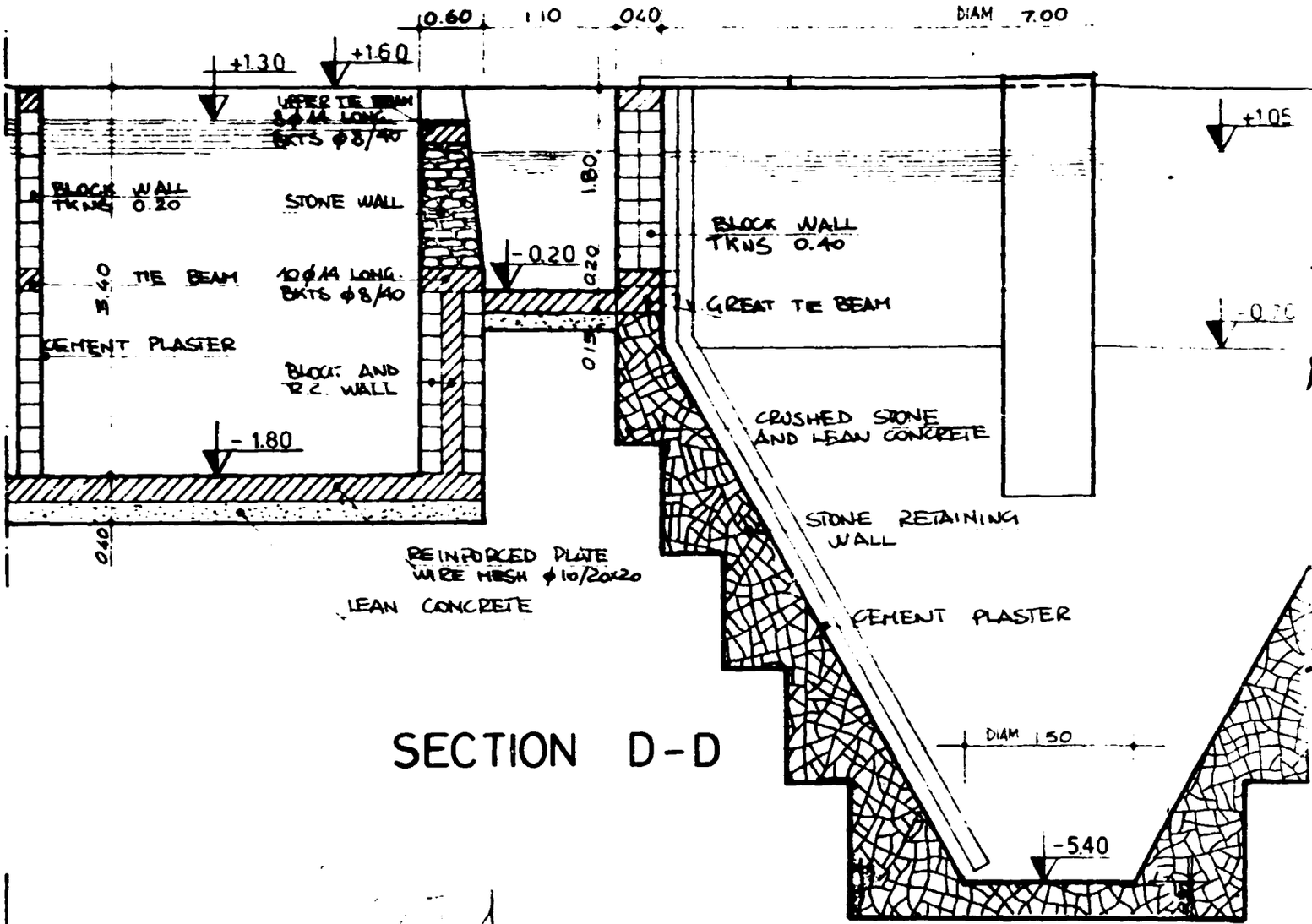
National Leather and Shoe Corporation Addis Ababa - Ethiopia

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

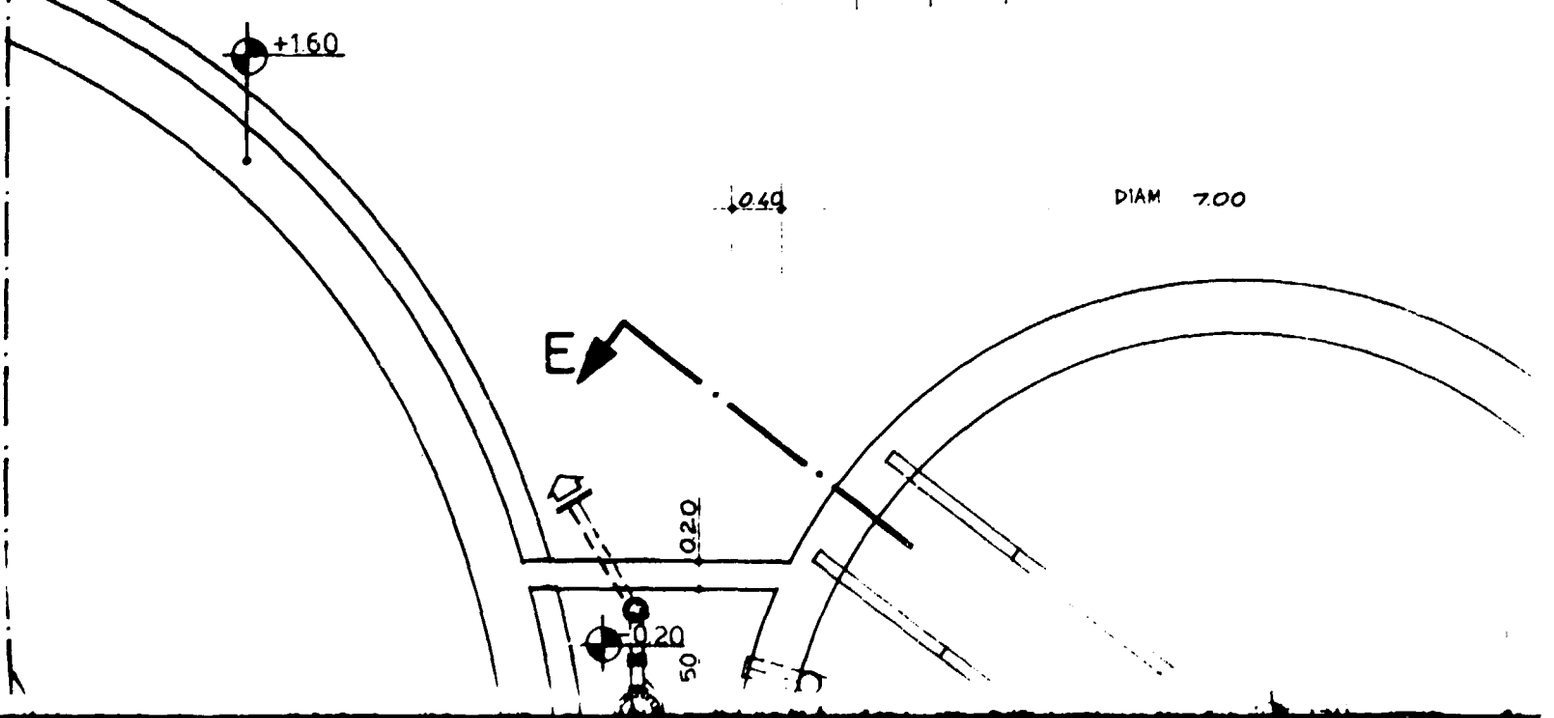
March 1990

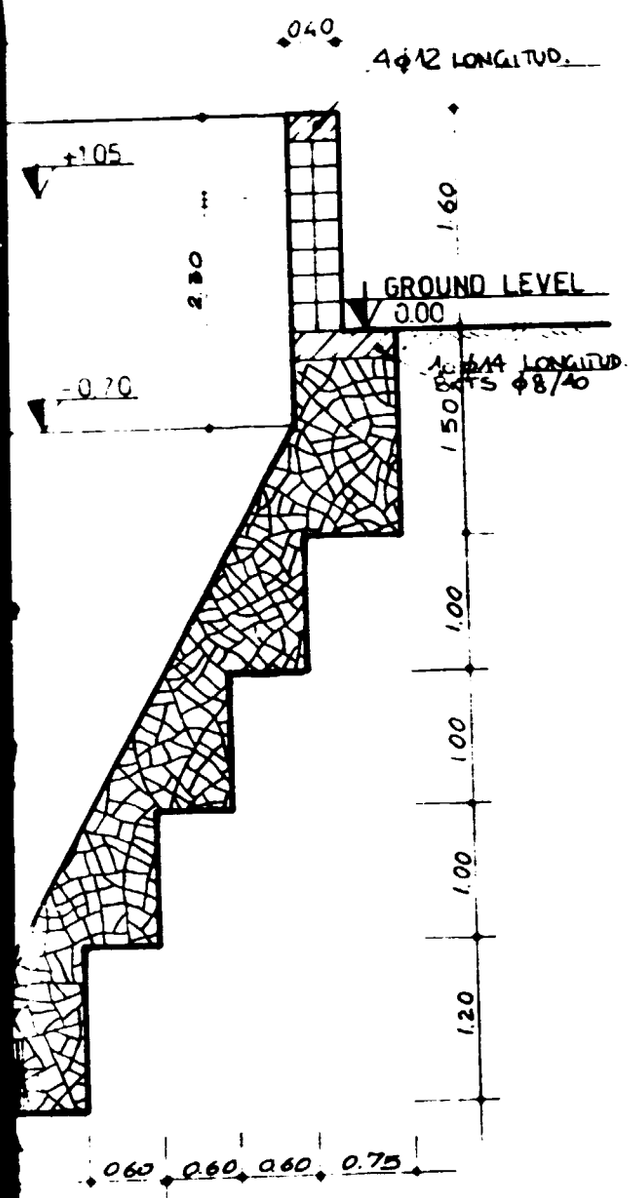
1 : 50
Bilogical oxidation ditch

5

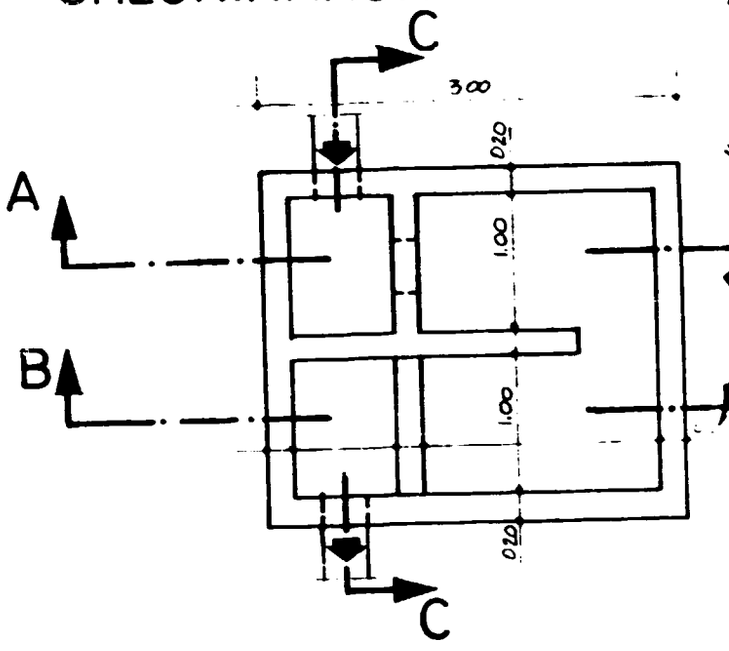

0.60
1.10
0.40
DIAM 7.00
+1.30
+1.60
UPPER TIE BEAM
8 ϕ 14 LONG.
BKTS ϕ 8/40
BLOCK WALL
TKNS 0.20
STONE WALL
1.80
TIE BEAM
10 ϕ 14 LONG.
BKTS ϕ 8/40
CEMENT PLASTER
BLOCK AND
R.C. WALL
-0.20
0.20
0.15
-1.80
0.40
REINFORCED PLATE
WIRE MESH ϕ 10/20x20
LEAN CONCRETE
+1.05
BLOCK WALL
TKNS 0.40
GREAT TIE BEAM
-0.20
CRUSHED STONE
AND LEAN CONCRETE
STONE RETAINING
WALL
CEMENT PLASTER
DIAM 1.50
-5.40
0.60
0.60
0.60
DIAM 3.50
0.60

SECTION D-D

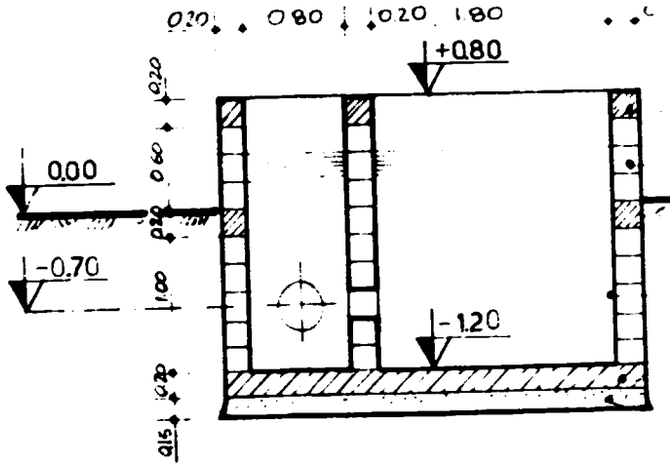

+1.60
0.40
DIAM 7.00
E
0.20
-0.20
50



CHLORINATION TANK

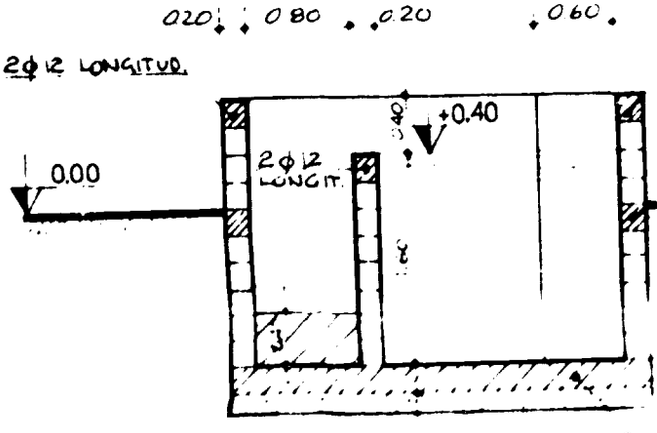


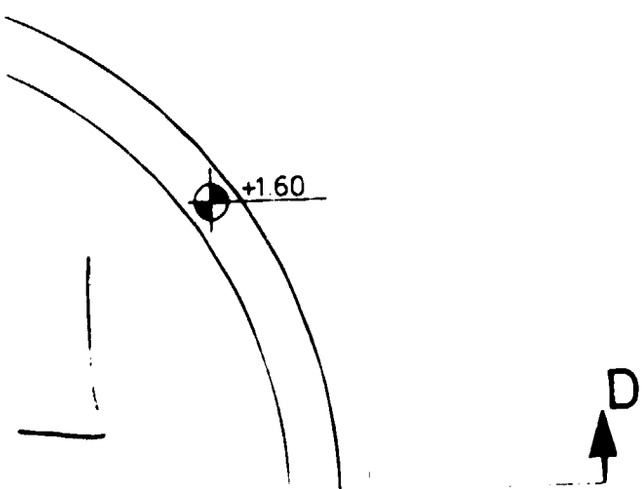
SECTION A-A



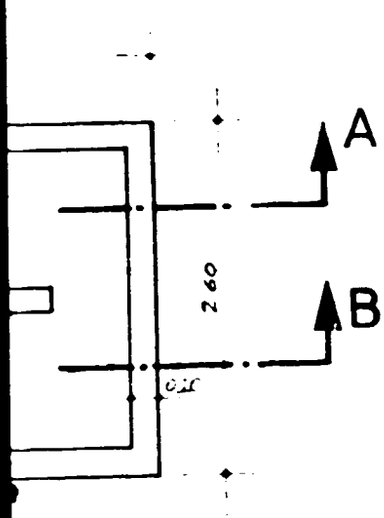
.040

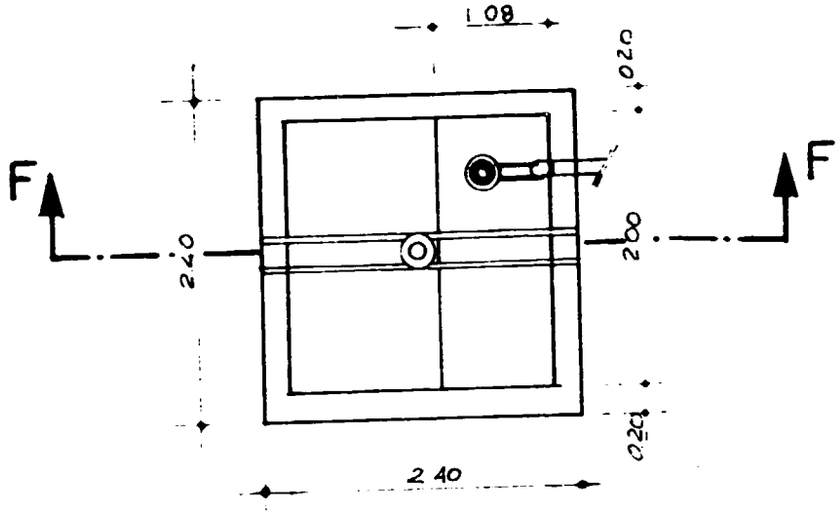
SECTION B-B



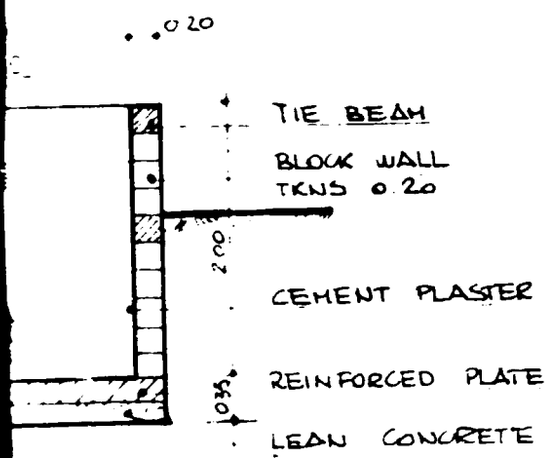


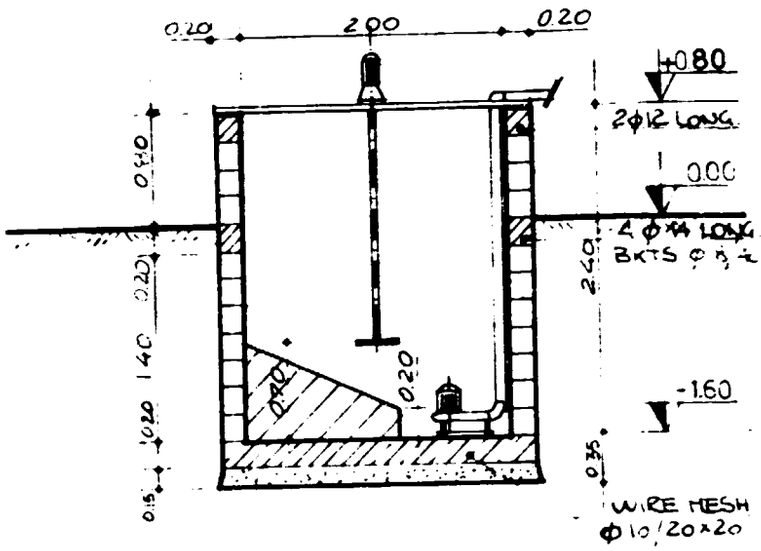
LIME-MILK TANK

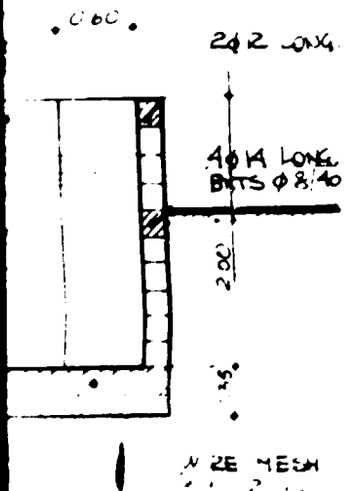




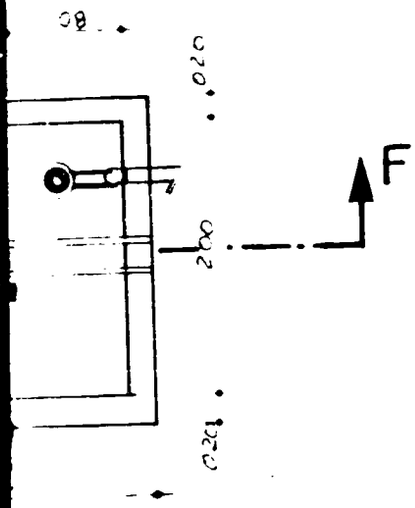
SECTION F-F

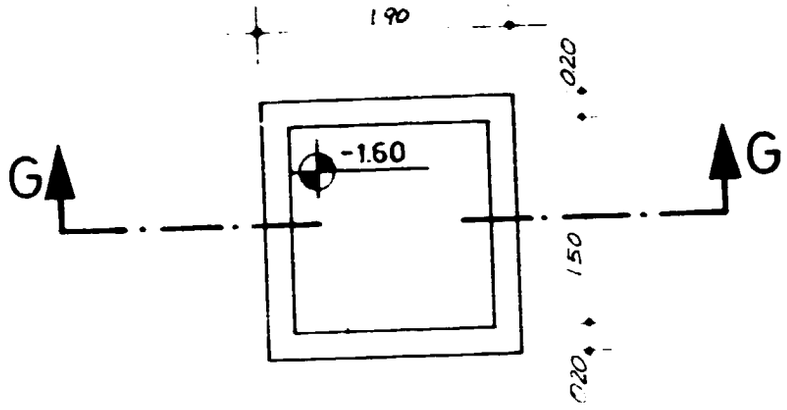




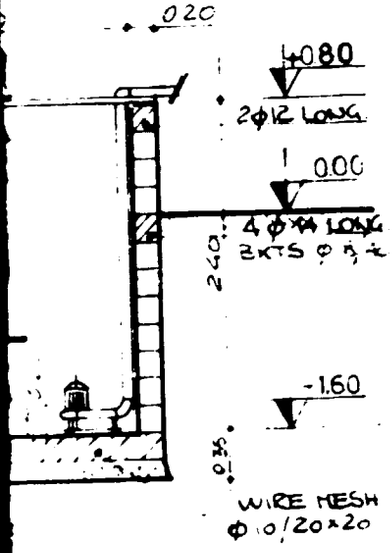


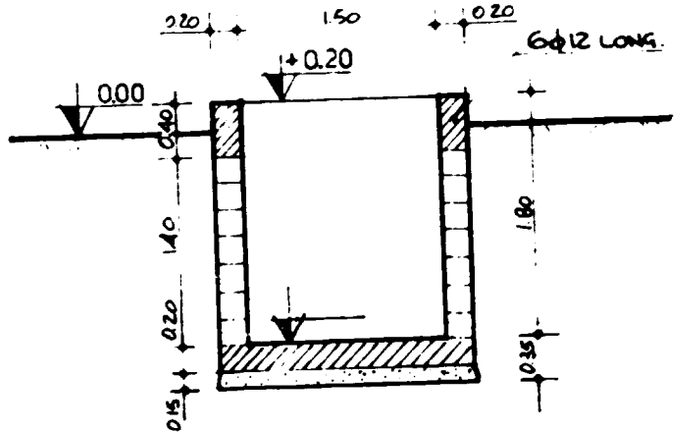
COLLECTING PIT



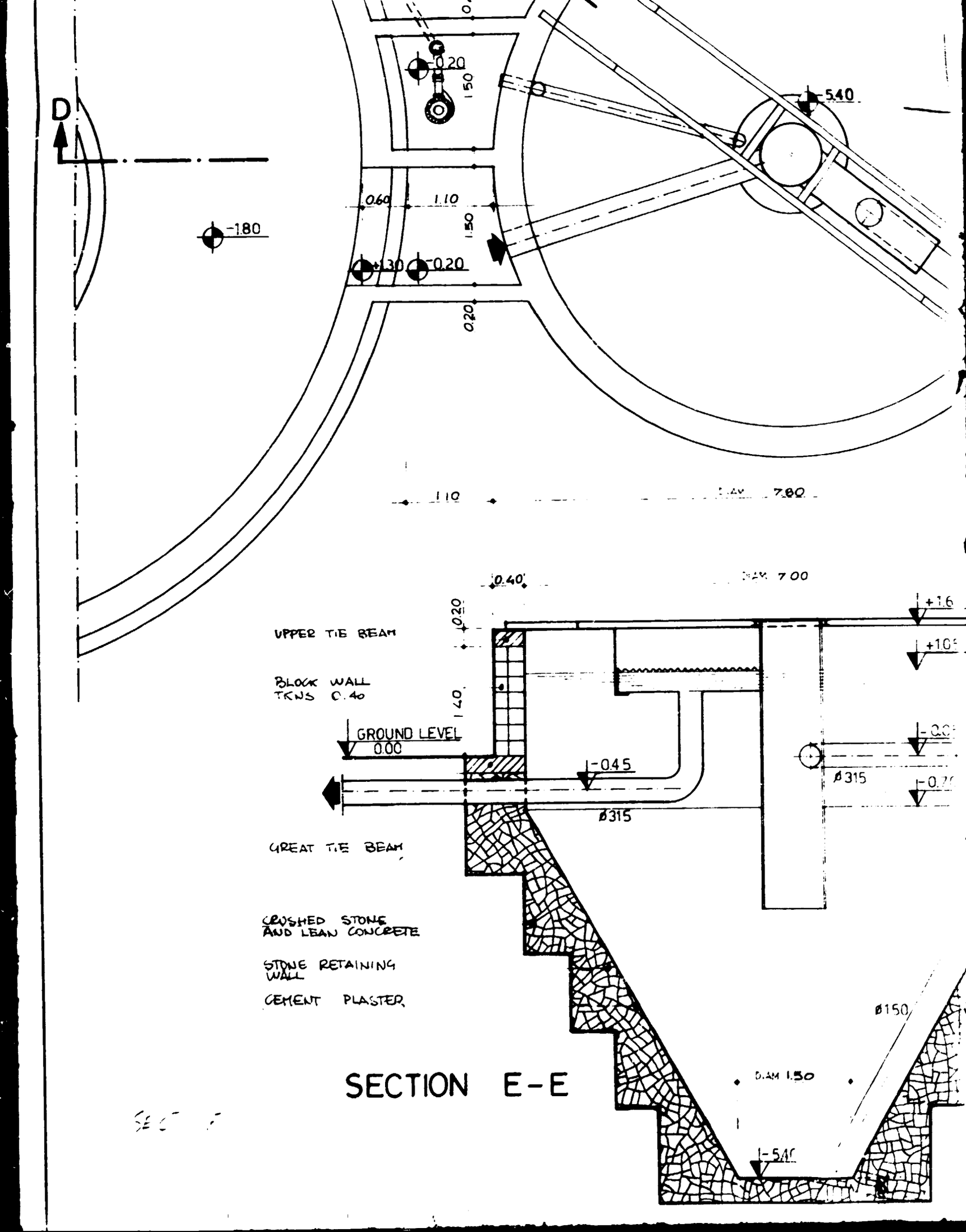


SECTION G-G

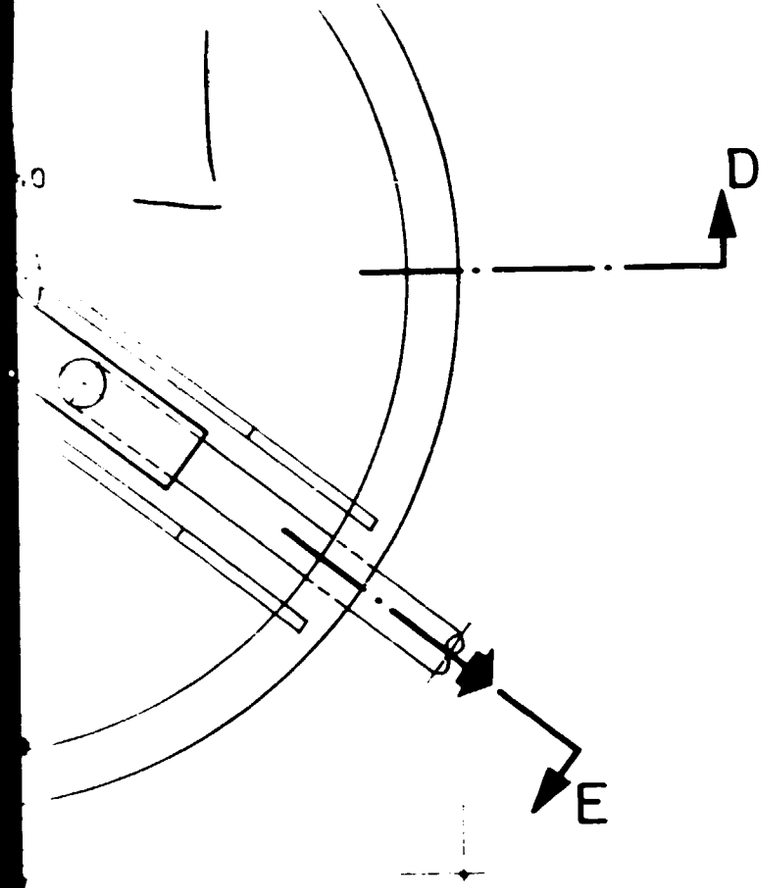


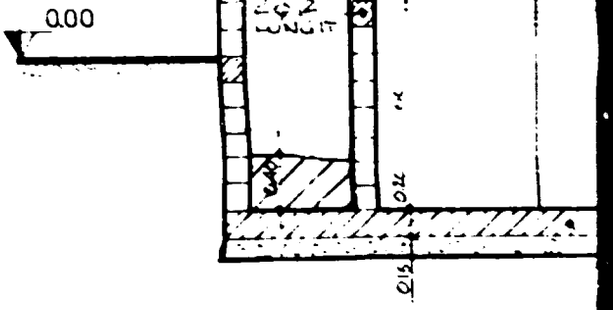


SECT 4

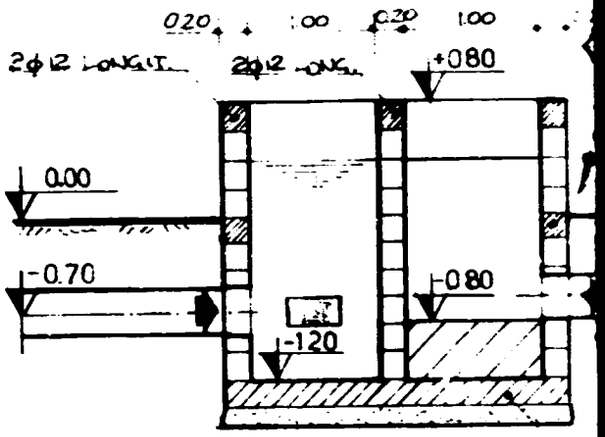

D
-0.20
1.50
5.40
0.60
1.10
1.50
-1.80
+1.30
-0.20
0.20
1.10
7.80
0.40
MAX. 7.00
+1.6
0.20
UPPER TIE BEAM
BLOCK WALL
TKNS 0.40
1.40
GROUND LEVEL
0.00
-0.45
Ø315
Ø315
GREAT TIE BEAM
CRUSHED STONE
AND LEAN CONCRETE
STONE RETAINING
WALL
CEMENT PLASTER
Ø150
DIAM 1.50
-5.40

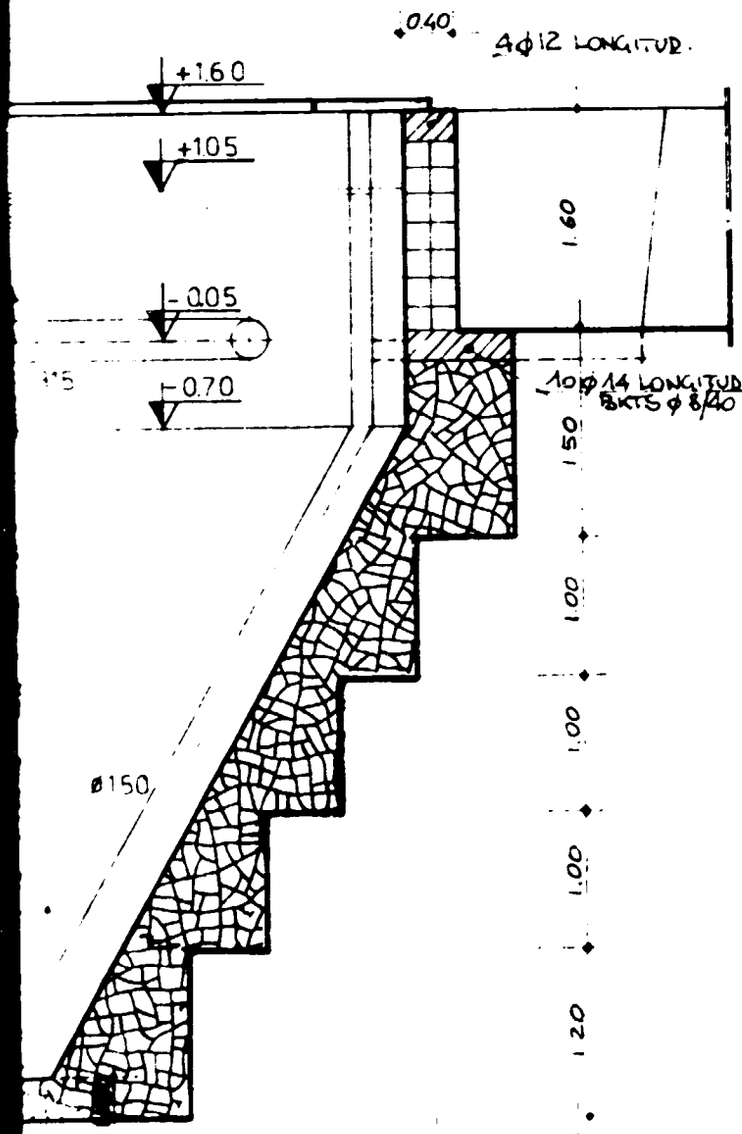
SECTION E-E

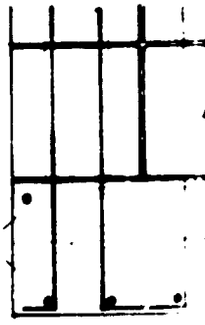




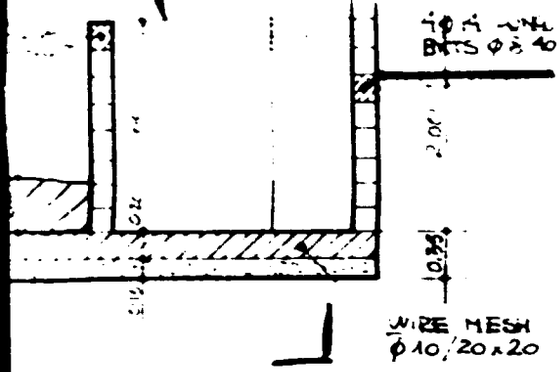
SECTION C-C



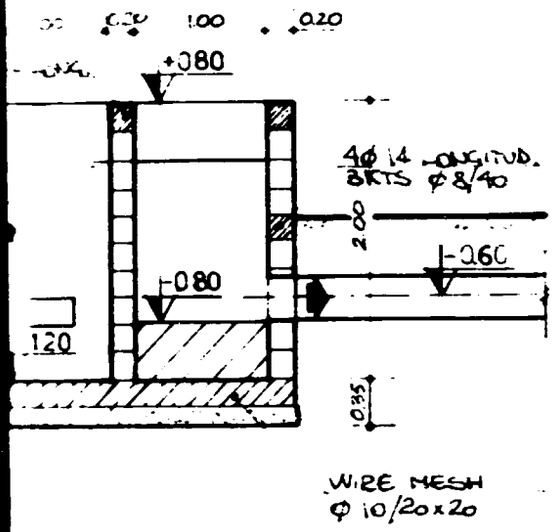


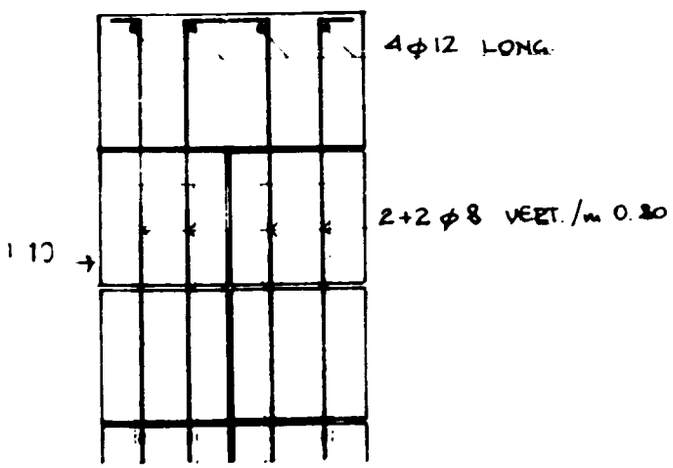


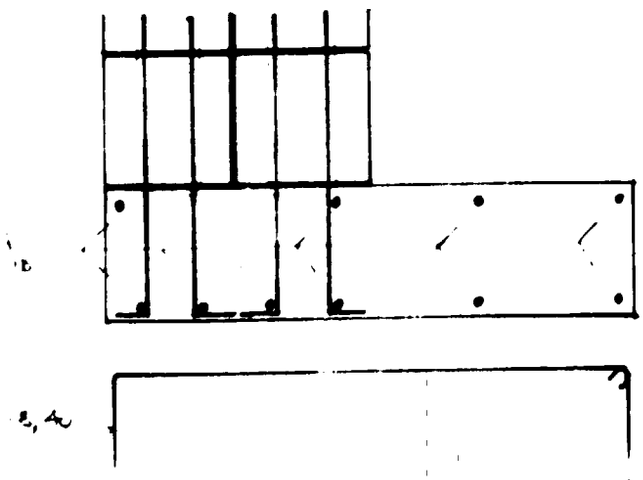
8KTS φ 8/40


BRTS φ 8/40
WIRE MESH
φ 10/20 x 20

C-C


+080
4φ 14 LONGITUD.
BRTS φ 8/40
-060
-080
120
WIRE MESH
φ 10/20x20


4φ 12 LONG.
2+2 φ 8 VERT. /m 0.20
1.10



CONTRACT n. 89/169: UNIDO PROJECT SI/ETH/88/801

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

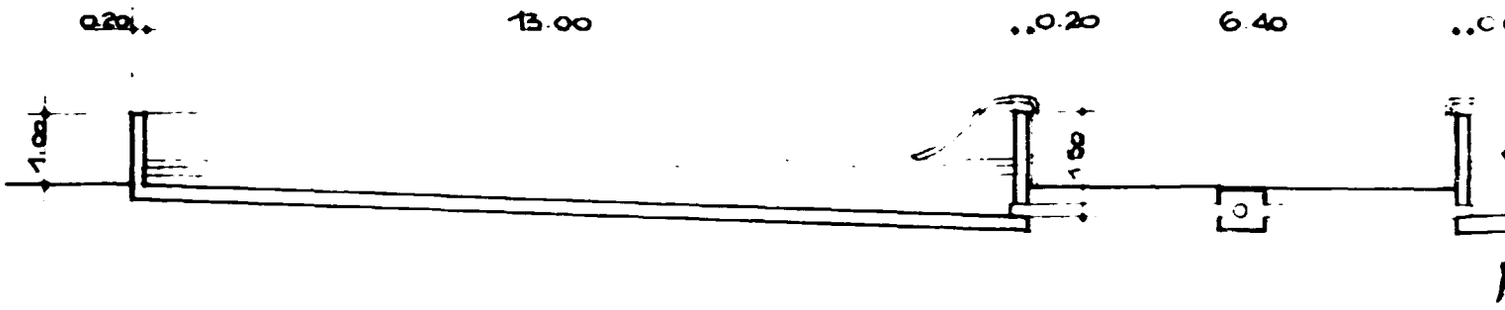
March 1990

1 : 50

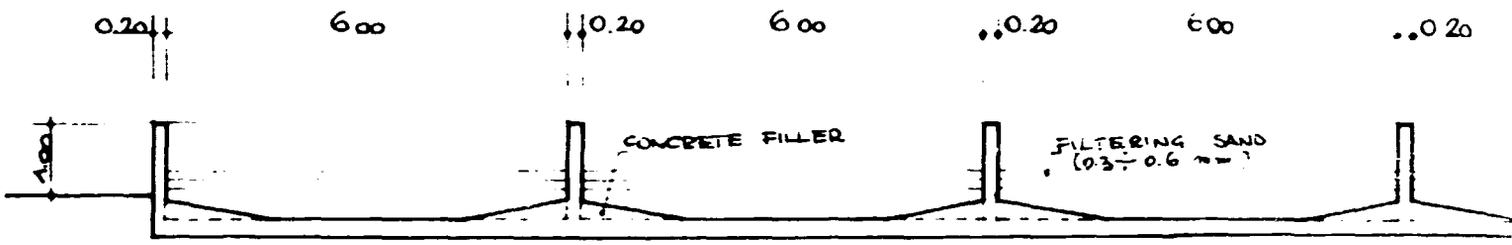
Sludge return pit
Secondary sedimentation tank
Chlorination and lime-milk tanks

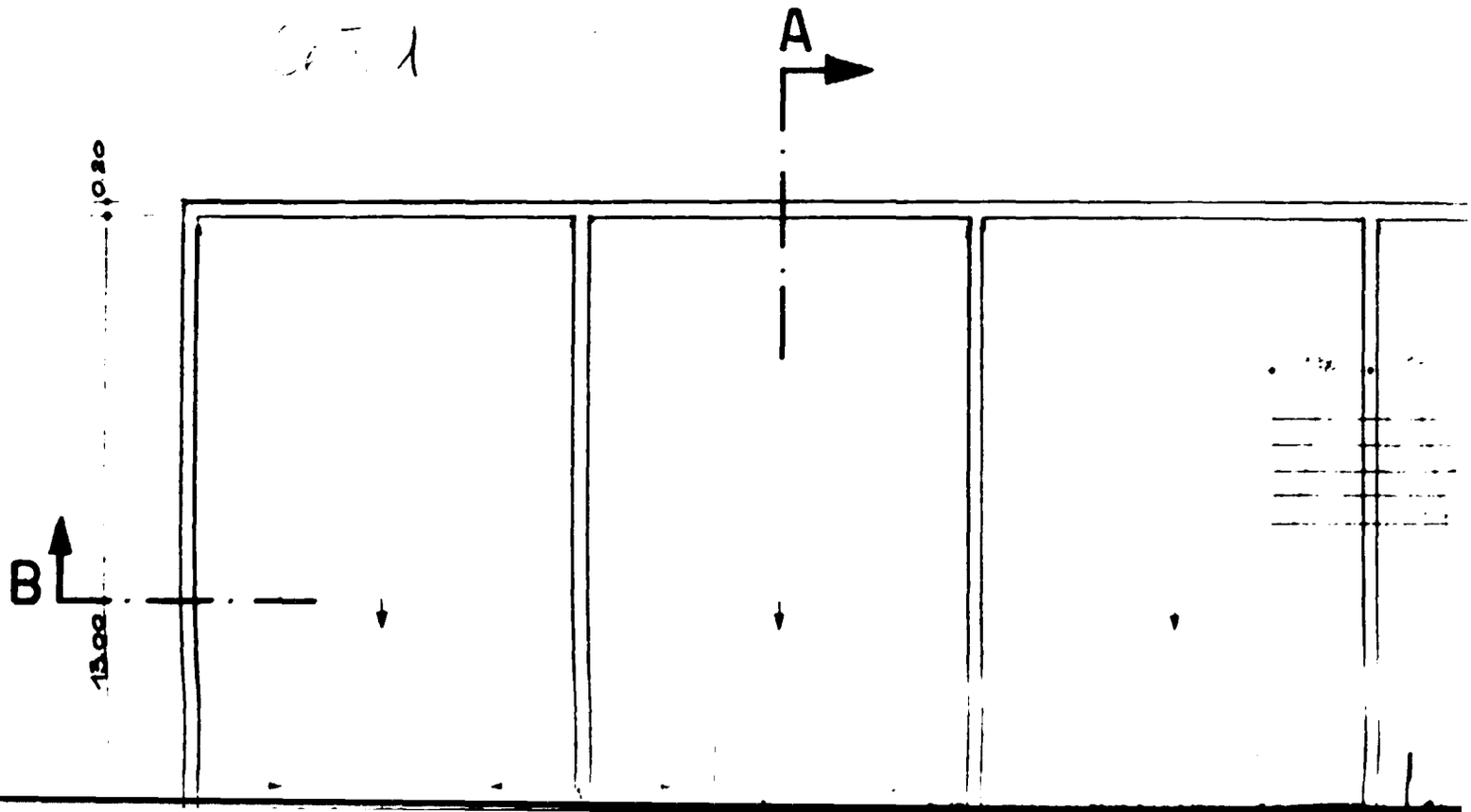
6

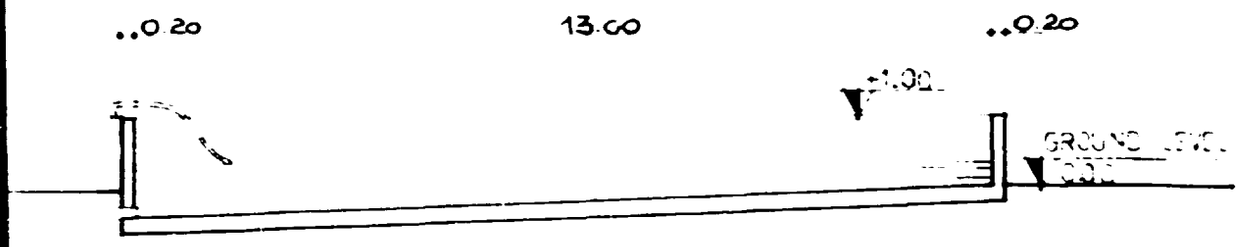
SECTION A-A

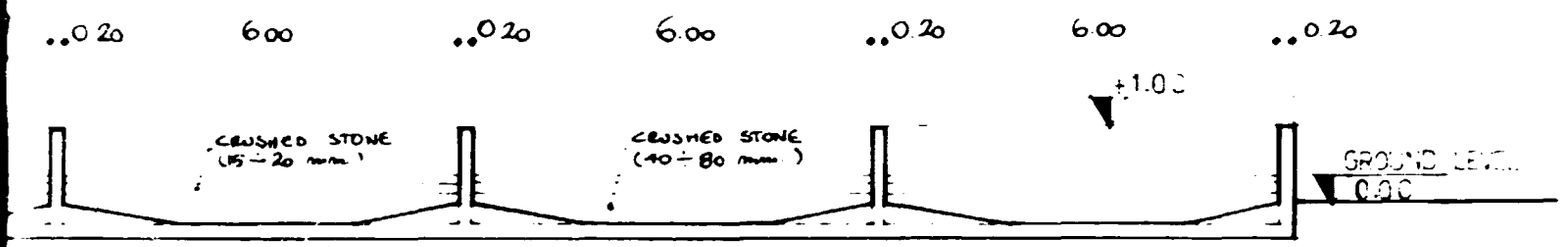


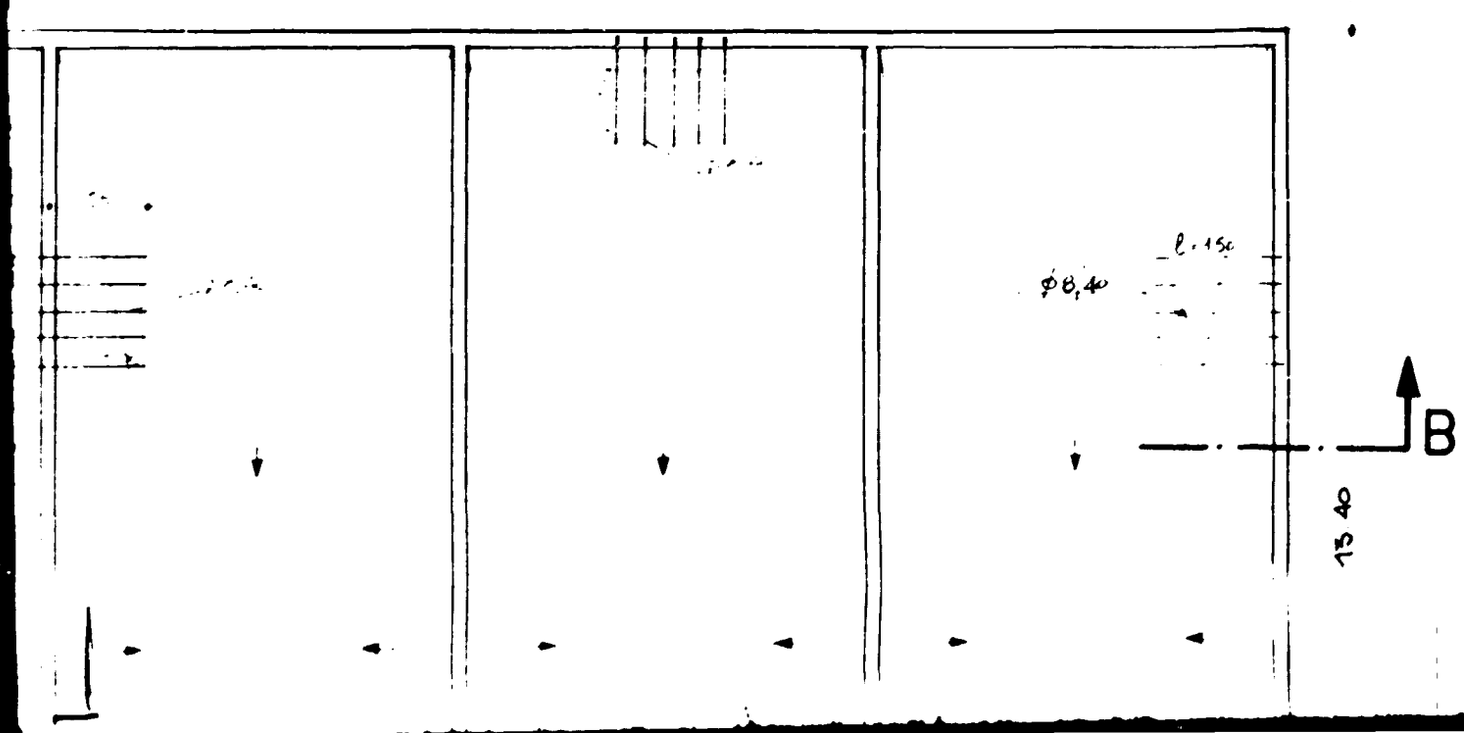
SECTION B-B



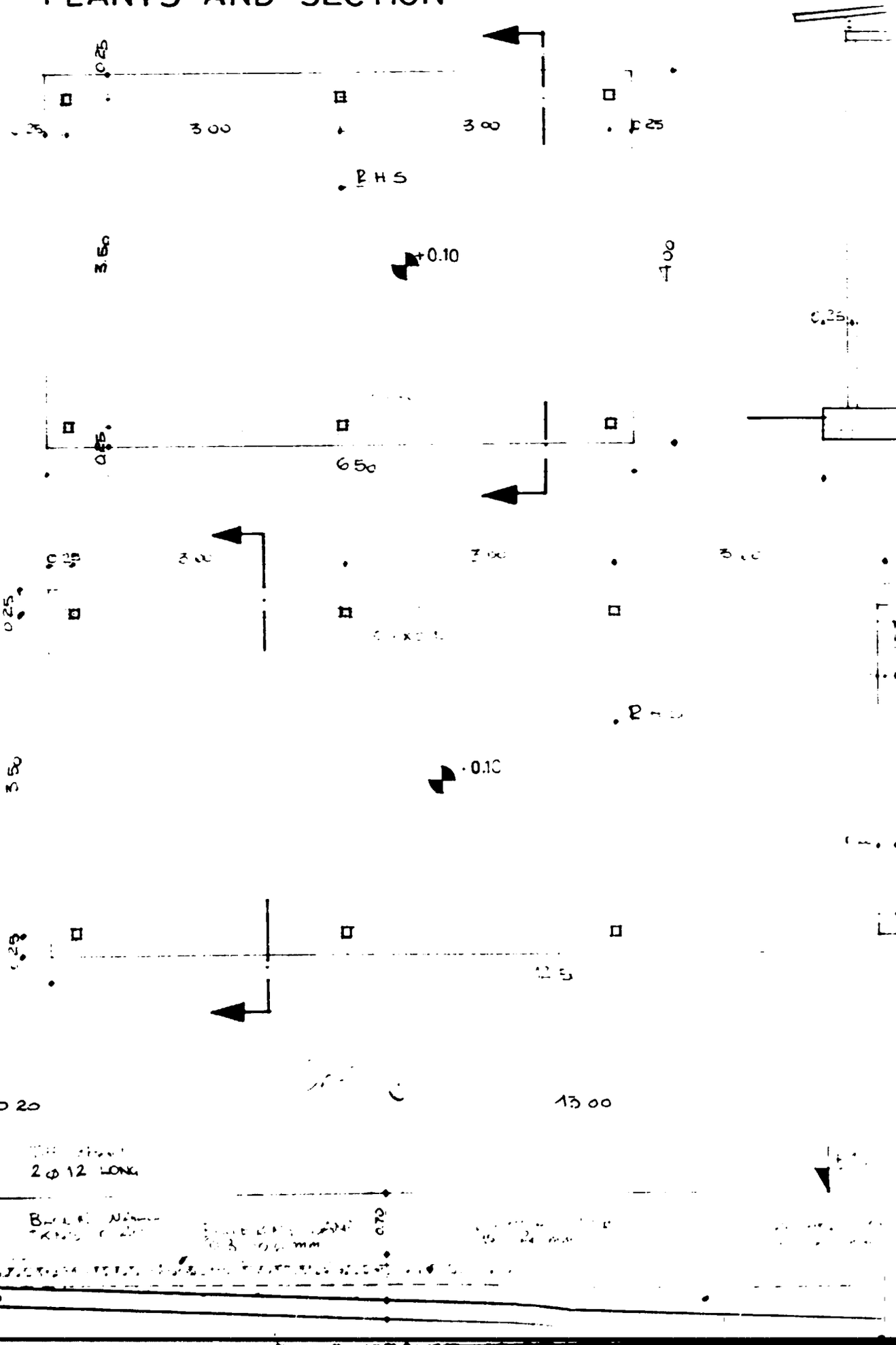


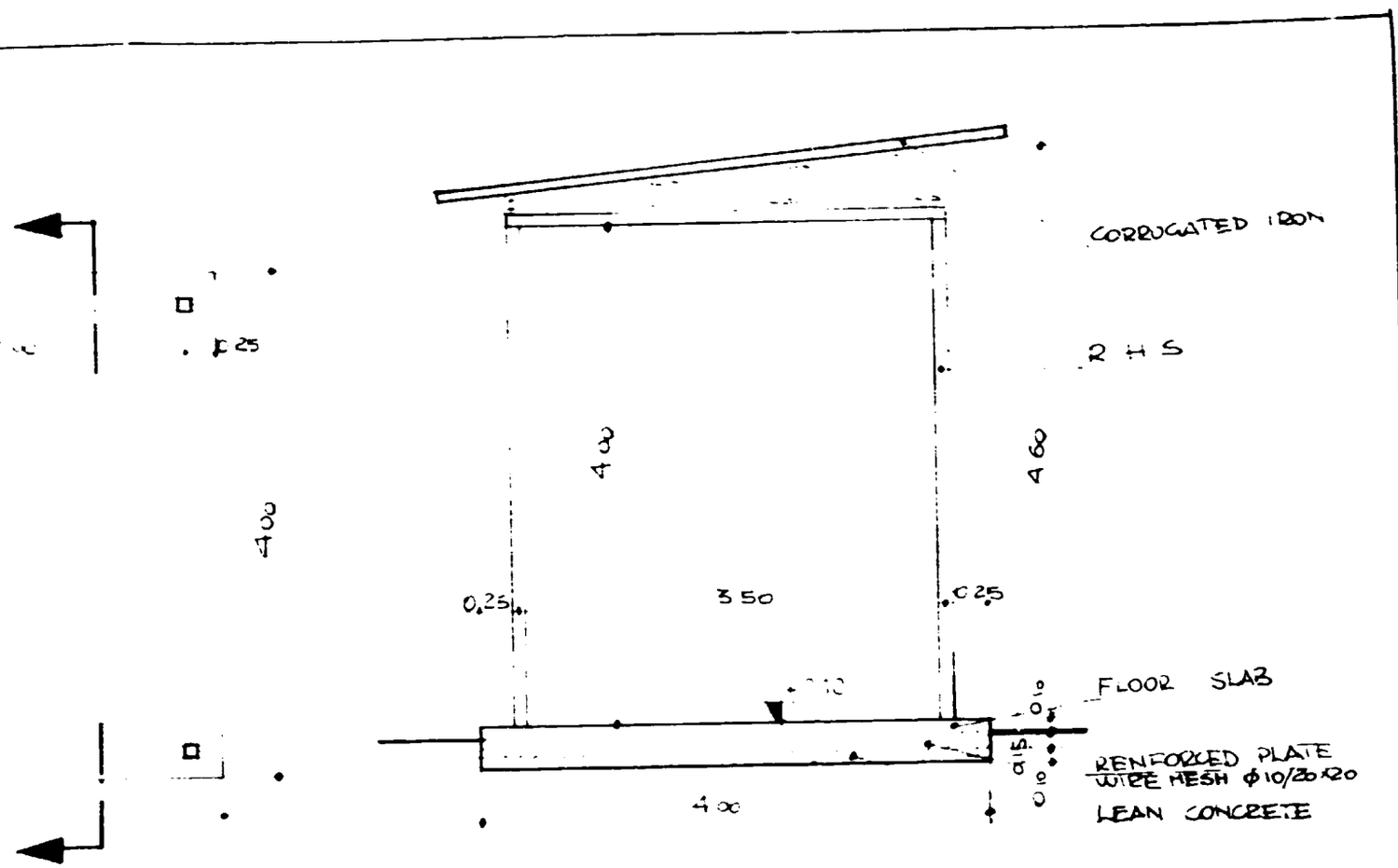

..0.20
13.00
..0.20
+1.00
GROUND LEVEL
0.00

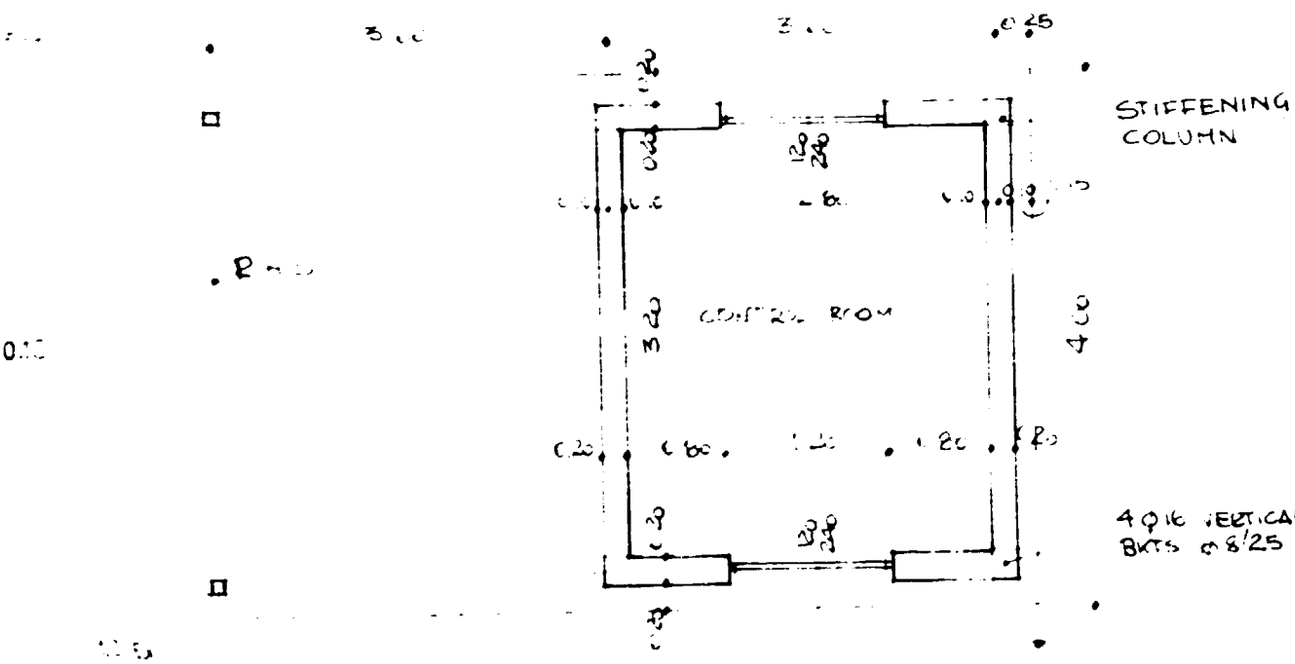

..0.20
6.00
..0.20
6.00
..0.20
6.00
..0.20
+1.00
CRUSHED STONE
(15 ÷ 20 mm)
CRUSHED STONE
(40 ÷ 80 mm)
GROUND LEVEL
0.00


ϕ8,40
l = 15c
B
13.40

COVERED AREAS
PLANTS AND SECTION





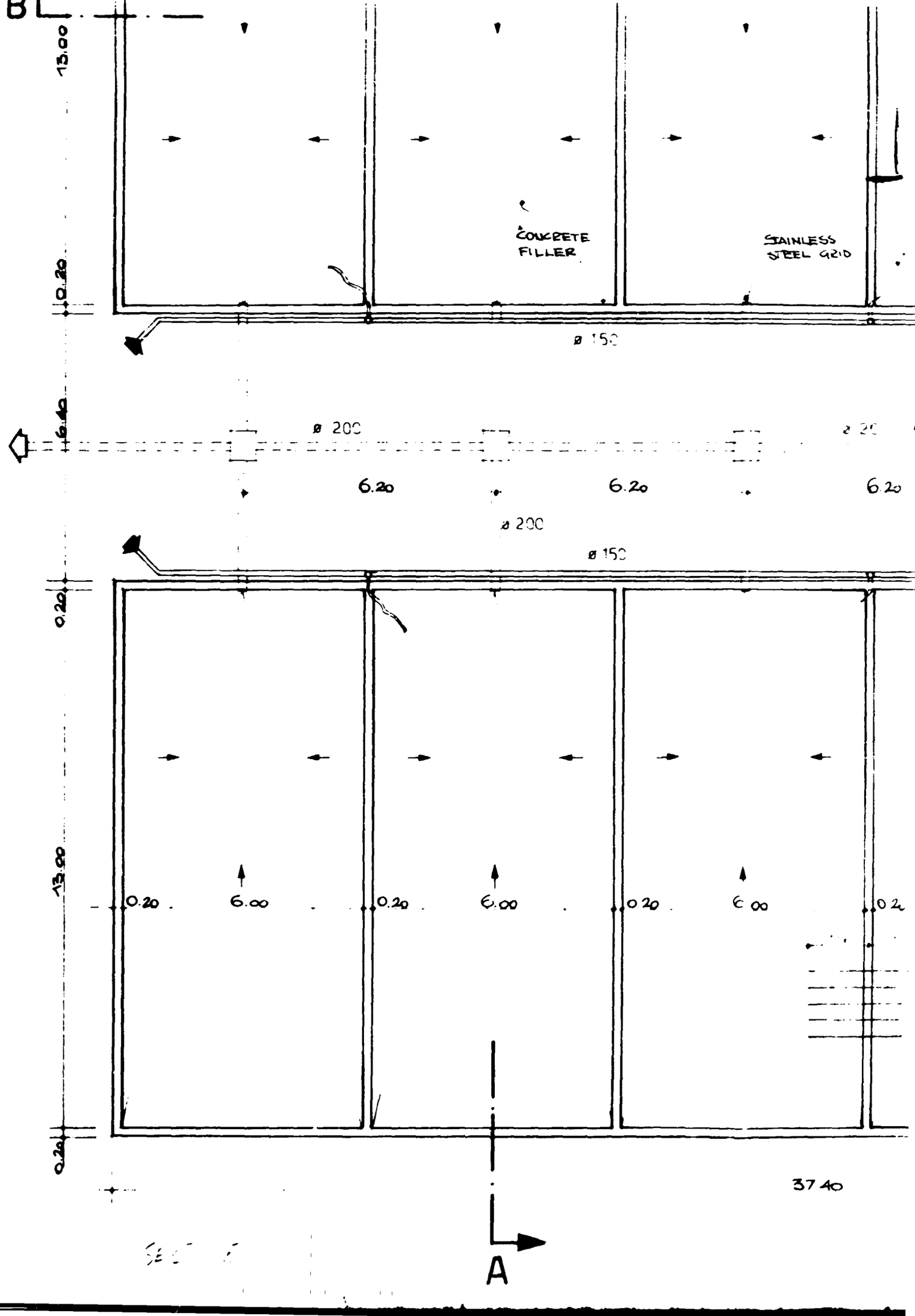


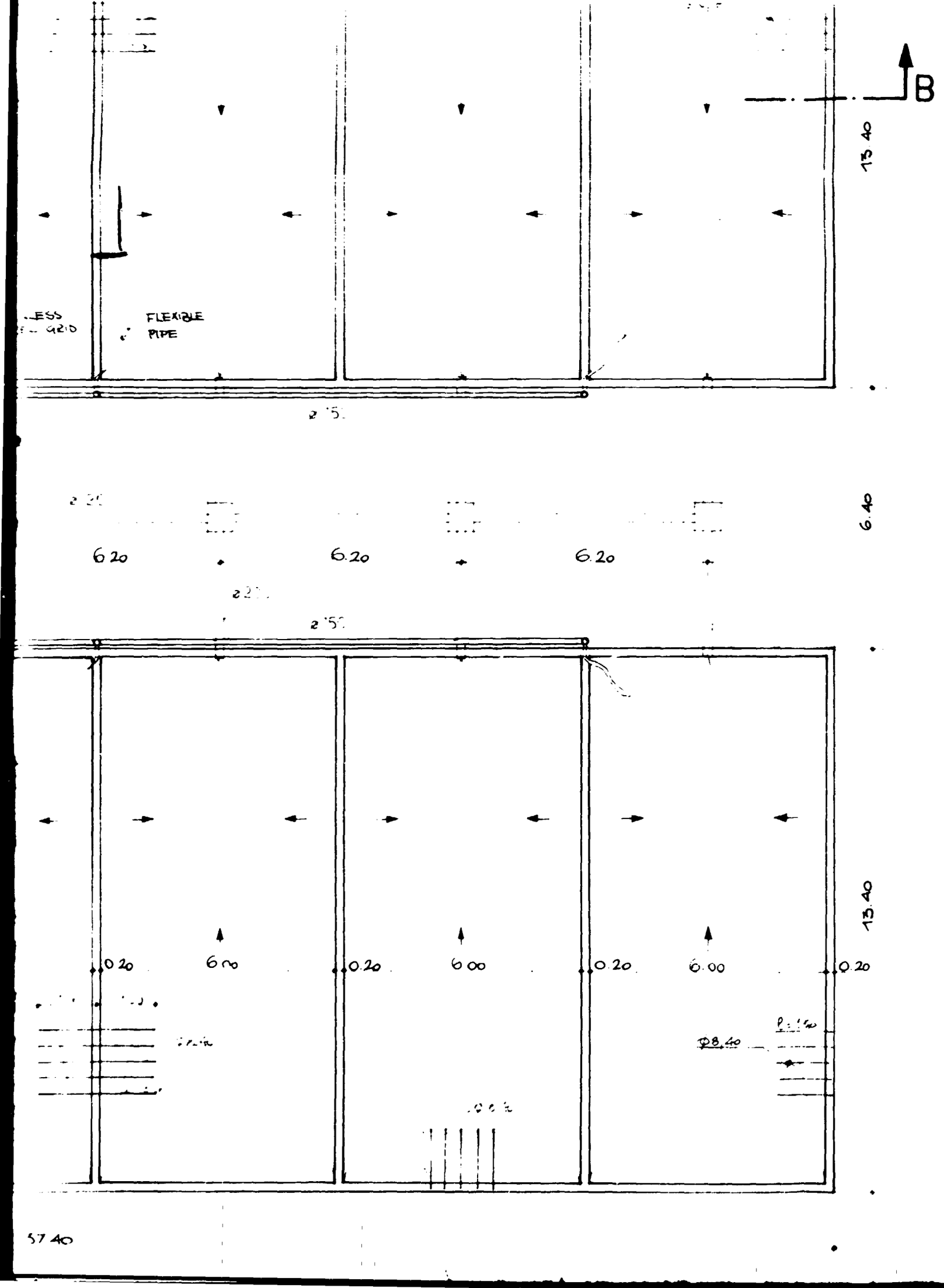
SECT 4

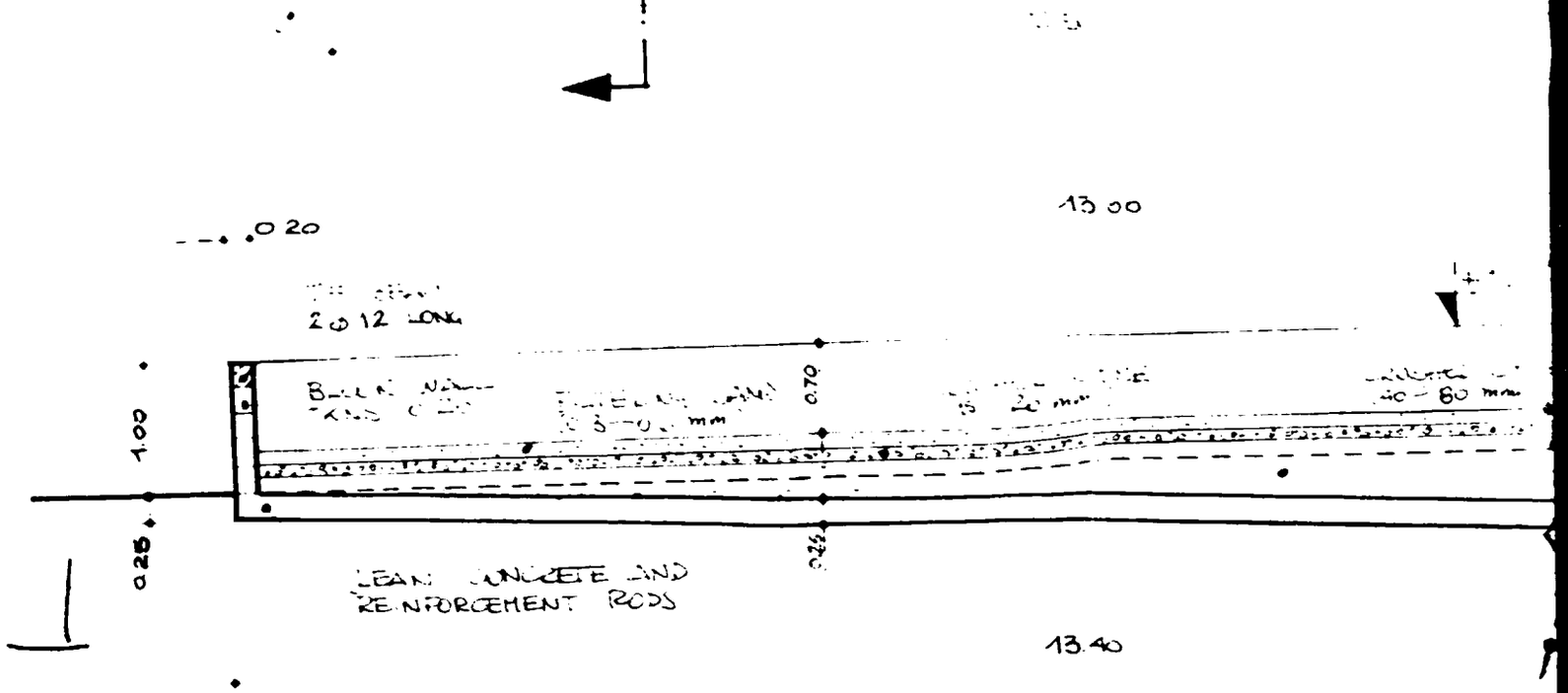
13 00

0.20

FLEXIBLE PIPE


B
13.00
0.20
CONCRETE FILLER
STAINLESS STEEL GRID
ø 150
6.40
ø 200
6.20
6.20
6.20
ø 200
ø 150
0.20
13.00
0.20
0.20
6.00
0.20
6.00
0.20
6.00
37.40
A


B
13.40
FLEXIBLE
PIPE
6.40
6.20
6.20
6.20
0.20
6.00
0.20
6.00
0.20
6.00
0.20
13.40
57.40

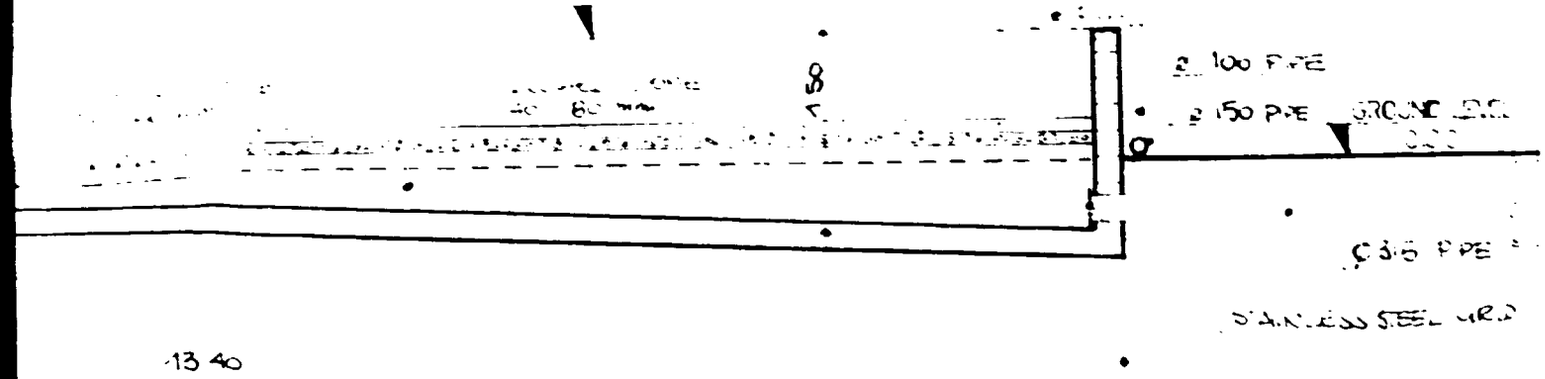


CONTRACT

Modjo
waste

Nationa
Addis A

Advisers:



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

7