

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF PUBLIC ENTERPRISES (MOPE)
EGYPTIAN ENVIRONMENTAL AFFAIRS AGENCY (EEAA)

**STUDY ON INDUSTRIAL WASTE WATER
POLLUTION CONTROL
IN THE ARAB REPUBLIC OF EGYPT**

**MANSOURA CO. FOR RESINS AND CHEMICALS
DESIGN PACKAGE**

DECEMBER 2000

**CHIYODA-DAMES & MOORE CO., LTD.
CHIYODA CORPORATION**

MPI

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Document Title CONCEPTUAL DESIGN REPORT

Company Name MANSOURA CO. FOR RESINS AND CHEMICALS

Document No. RC - CD - 00 - 01 REV. 0

Project Name THE STUDY ON INDUSTRIAL WASTE WATER
POLLUTION CONTROL IN
THE ARAB REPUBLIC OF EGYPT

Client JAPAN INTERNATIONAL COOPERATION AGENCY
INDUSTRIAL DEVELOPMENT STUDY DIVISION

Consultant CHIYODA DAMES AND MOORE CO.
CHIYODA CORPORATION

ISSUED DATE 1999. 11. 12

JICA

	CHCK'D	TECH. APR	APPR'D
SIGN			
DATE			

CONSULTANT

	PRP'D	CHCK'D	APPR'D
SIGN	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
DATE	<i>11/10 '99</i>	<i>11/10 '99</i>	<i>Nov. 11 '99</i>

Mansoura Co. for Resins and Chemicals

1. General Outline

1.1 Factory Profile

- (1) Address : Sandoob EL Mansoura, U.A.R.
(130km north of Cairo)
- (2) Capital : 21 million L.E.
- (3) Total Sales (Revenue) : 15 million L.E./Year
- (4) Number of Employees : 350
- (5) Area : Factory 113,000 m²
Structure 83,000 m²
- (6) Operation Hours : 24 hrs x 330 days x 3 shifts

1.2 Production Process

- (1) Production Process :

Please refer to attached Fig.- 1, 2 & 3.

- 1) Formaldehyde Plant (Fig. - 1)
- 2) Urea Formaldehyde Moulding Powder Plant (fig. - 2)
- 3) Phenol Formaldehyde Moulding Powder Plant (fig. - 3)
- 4) Condensation Plant (fig. - 4)

* Phenol- formaldehyde resin

- (a) Process licensor : SUMITOMO Bakelite co.,(JAPAN)
- (b) Equipment supply & construction: SUMITOMO machinery co.(Japan)
- (c) Type of reaction : Batch type operation
- (d) Raw materials : Imported from Korea and
South America
- Formaldehyde : Self supply

Typical flow diagram of "Phenol-Formaldehyde Resin Plant" is as follows;

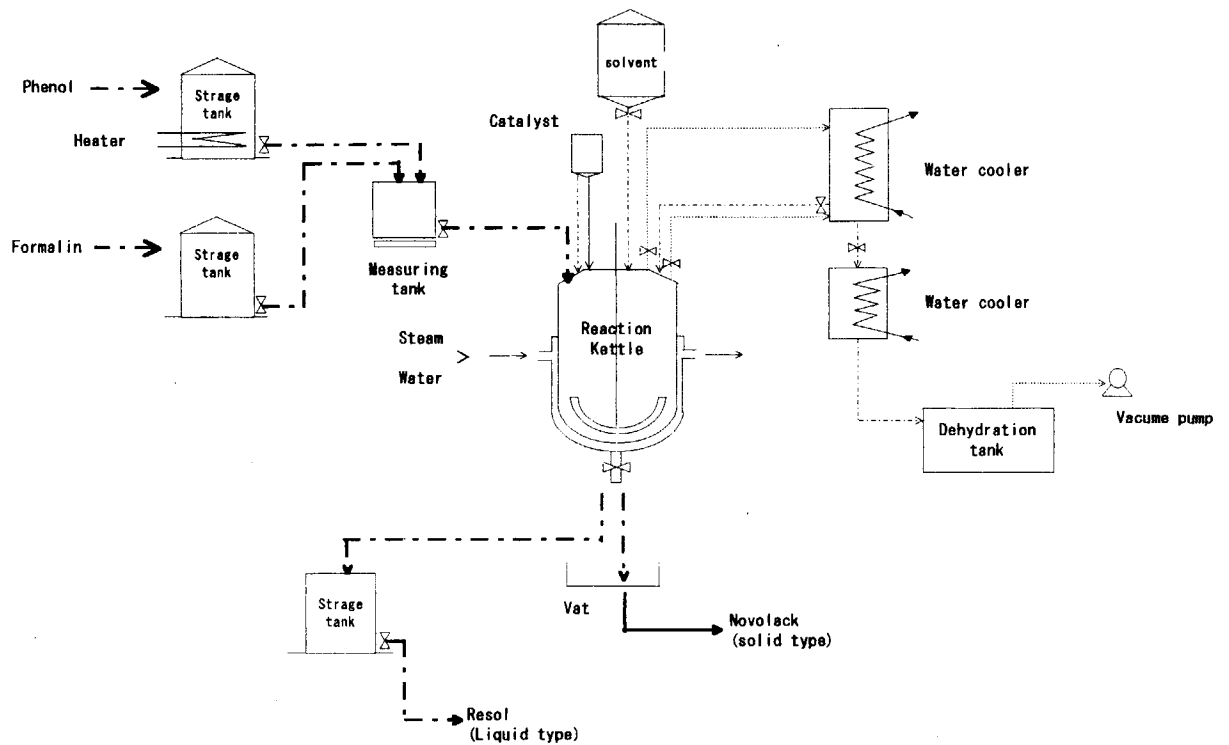


Fig 1 Typical flow diagram of Phenol-Formaldehyde Resin Plant

*** Formaldehyde**

- (a) Process licensor : LUMMUS (USA)
- (b) Equipment supply & construction: Korean Engineering Co.
- (c) Type of reaction : Air excess type in oxidation reaction
- (d) Type of catalyst : Metal oxide catalyst (Iron oxide & Mo oxide)
- (e) Raw materials : Methanol (supply from Fertilizer factory in Mansoura)

(2) Annual Production(1997/1998)

- 1) Formaldehyde : 12,000 Ton/Year
- 2) Phenol Formaldehyde Resin : 1,000 Ton/Year
- 3) Urea Formaldehyde Resin – 60 % : 8,000 Ton/Year
- 4) Urea Formaldehyde Resin – 85 % : 4,000 Ton/Year
- 5) Phenol Formaldehyde Moulding : 1,500 Ton/Year
- 6) Furan resin : .300 Ton/Year

1.3 Others

- (1) Privatization Plan: Still under Study.
- (2) Intention to share the cost of Demo-plant: No.
- (3) This company belongs to the Holding Company for Mining and Refractory.

2. Waste Water Survey

2.1 Factory Survey

- (1) Date : Sep.13 – Sep.20, 1999.
(Sampling & Flow Measurement Sep.14, 15)

- (2) Person in charge

- * JICA Study Team T. Yasukawa (Eng. of WWT)
T. Sakamoto (Eng. of Process), and others
- *Mansoura Co. Mr. Abd El Fattah Mohamed Agwa
Mr. Mohamed Ellassid Youssir
- *TIMS Mr. Samiel Hammad Hassen, and others

2.2 Questionnaire

The answer sheets of questionnaire concerning the company outline was received at site survey.

2.3 Existing Waste Water Sewer System

Refer to DWG. NO. RC-CD-15-01.

- (1) 500 m³/d of city water is used as industrial water, sanitation water and cooling tower make-up water, industrial water is not received.
- (2) Waste water is pumped up to drainage canal near by the factory and sanitary waste water are discharged to the public sewage.
- (3) A part of cooling water is recycled through the special type of cooling tower.
Recycle cooling water flow rate is 350m³/h normally.
- (4) No discharge fee of waste water is required.

2.4 Waste Water Sampling, Flow Measurement and Analysis

- (1) Based on the results of discussion with the Factory and sewer survey at site, 5 sampling points were selected. And sampling/flow measurement method were Agreed mutually, then sampling work was started.
- (2) Number of sample and sample collection frequency are as follow;
 - Three (3) composite sampling (6 hs-period x 4 times)

- One (1) grab sampling from formalin plant waste water(1 time)
 - One (1) grab composite sampling (8 hs-period x 3 times)
- (3) Flow rate and water qualities (pH, Turbidity, Electric conductivity, Dissolved Oxygen, Salinity, Water temperature) were measured at field every sampling time. The results of field measurement are shown on Table 1.
- (4) Sampling Point: 5 Points (Refer to DWG. NO. RC-CD-15-01)
- Detail of water qualities were analyzed at TIMS laboratory, the results are shown on Table 2.

Table 1-1 Flow rate/Water Quality measured at Site (Sep.14&15,1999)

Sampling Time	① Formalin unit				② Condensate Plant					
	15:15			Av.	15:35	15:45	21:45	3:00	9:00	Av.
Flow rate [m ³ /h]	---									31.0
pH [-]	7.0				9.7	6.7	6.3	6.0	7.6	6.83
Turbidity [unit]	40				30	40	60	20	20	33
EC [μ S/cm]	1,700				2900	1300	1400	1200	1000	1225
DO [mg/L]	6.2				0.8	0.0	7.5	4.3	4.9	4.4
Salinity [%]	0.1				0.8	0.1	0.1	0.1	0.0	0.3
CODMn(P)[mg/L]	>100				>100		>100	>100	>100	>100
W. Temp [°C]	38				60	60	34	30	32	39

Note 1: ① is one grab sampling only.

2: COD_{Mn}(P) shows the analysis data by Pack Test.

Table 1-2 Flow rate/Water Quality measured at Site (Sep.14&15, 1999)

Sampling Time	③ Novolac				④ Semi-in before EP					
	16:00	22:30	6:00	Av.	16:15	22:15	3:00	9:10	Av.	
Flowrate[m ³ /h]				0.1					40.0	
pH [-]	6.2	6.8	6.6	6.53	10.4	6.2	6.7	6.5	7.45	
Turbidity[[unit]	30	280	20	110	10	180	20	30	60	
EC [μ S/cm]	1400	600	750	817	6600	1400	1200	1100	2575	
DO [mg/L]	5.3	4.1	1.7	37	4.5	7.4	4.6	2.2	4.7	
Salinity [%]	0.1	0.0	0.0	0.03	0.3	0.1	0.1	0.1	0.15	
CODMn(P)[mg/L]	>100	>100	>100	>100	50	>100	>100	>100	>100	
W. Temp [°C]	37	48	45	48	55	36	31	31	38	

Table 1-3 Flow rate/Water Quality measured at Site(Sep.14 & 15,1999)

	⑤ End of Pipes (All Wastewater)							
Sampling Time	16:25	22:25	3:00	9:15	Av.			
Flowrate[m ³ /h]					52.8			
pH [-]	10.50	6.3	7.5	6.5	7.7			
Turbidity[unit]	60	40	80	60	60			
EC [μ S/cm]	3,300	1,500	830	1,100	1,683			
DO [mg/L]	7.3	4.3	6.8	3.7	5.5			
Salinity [%]	0.2	0.1	0.1	0.0	0.1			
CODMn(P)[mg/L]	50	>100	>100	>100	>100			
W. Temp [°C]	37	35	34	33	35			

Table 2 Analysis Results of Waste water Quality

Sampling No	①	②	③	④	⑤
Point	Folmalin Unit	Condensate Plant	Novlac Unit	Semi-in Before EP	End of Pipes
Item					
pH [-]	7.00	7.40	6.70	7.45	7.70
SS [mg/L]	2	62	8	40	38
TDS [mg/L]	320	2,420	420	3,340	640
BOD ₅ [mg/L]	---	---	---	---	1,260
CODcr [mg/L]	81,280	147,783	127,450	123,153	2,463
Oil&Grease[mg/L]	---	Nil	200	20	Nil
PO ₄ ³⁻ [mg/L]					Nil
T-N [mg/L]					6
Phenols [mg/L]		146	25,650	808	458
ABS [mg/L]					02
MPN [ea/100ml]					Nil
HCHO [mg/L]	732	368	246	280	93
W. Temp [°C]	38	39	43.3	38.3	34.8

* Analyzed by TIMS Laboratory.

3. Conceptual Design

3. Conceptual Design

3.1 Philosophy of Conceptual design

(1) Conceptual design 1

Conceptual design 1 (CD-1) shows the recommendable wastewater treating system to all wastewaters in the Factory to meet the wastewater disposal regulation to Nile River (Law No.48/1982) and water saving point of view.

(2) Conceptual design 2

Conceptual design 2 (CD-2) shows the study of wastewater treating system, in case that the demonstration plant will be applied in the factory by JICA.

Therefore, wastewaters for conceptual design were selected the following points of view:

- Quality: Wastewater should be treated by the treating system consisting of various treating unit processes.
- Quantity: Flow rate(plant capacity) to be treated within limited JICA budget,
and wastewater are discharged continuously as possible.
- The plants of wastewater source are operated constantly as possible.

3.2 Conceptual Design 1

Recommendable wastewater treating system for Mansoura Co. for Resins and Chemicals is same as CD-2 (refer to CD-2) because wastewater flow rate is limited.

3.3 Conceptual Design 2

Refer to DWG. No. RC-CD-15-02/03/04.

(1) Design Basis

1) Premises:

Waste liquid such as "Regeneration waste of Formalin Plant" and "Novolak resin solid Resin" of phenol formaldehyde are separated completely, and treated adequately.

2) Waste water:

- (a) Process waste water
- (b) Sanitary waste water

3) Flow rate: Max. 30 m³/h

4) Wastewater quality

Shown on Table 3.

Table 3 Water Quality

	Stream	Raw Water Clarifier Inlet	Treated Water Filter Outlet	Nile Regulation Law of No.48
pH	[-]	6~7	6~9	6~9
BOD	[mg/L]	1,300	20	20
COD	[mg/L]	2,400	30	30
SS	[mg/L]	100	1	30
Water Temp.	[°C]	35	30	<35

The treated water qualities shall meet or under the discharge waste water regulation to Nile River(Law No.48/1982).

(2) Waste Water Treatment System

Refer to DWG. NO. RC-CD-15-03 & RC-CD-15-04

1) Pre-treatment

[Equalization Tank]

- (a) 150m³ tank of carbon steel with resin coating (or made of resin) is provided to equalize wastewater quality and quantity as possible.
- (b) Air by a blower is blown into the Tank to mix wastewater.

2) Primary treatment

[Clarifier Unit]

30 m³/h - conventional type, 1 set,

- Coagulation/Flocculation Vessel: made of carbon steel/epoxy
- Sedimentation Tank: made of carbon steel/epoxy

Sludge collecting Rake

- Chemical injection system: Drums, Mixers, Pumps

- (a) Clarifier is provided to remove suspended solids, color, some metals and slice of oil as flocs.
- (b) Alum(aluminum sulfate) as coagulant, lime as pH controller, and polymer as coagulant aid are used.

Preparation work of these chemicals is necessary every 3-7 days.

- (c) Supernatant of Clarifier(sedimentation tank) is fed to Biological

treatment plant.

(e) Settled sludge on the bottom of Clarifier is discharged to Dewatering Unit automatically, periodically.

3) Secondary Treatment

[Activated Sludge Treating Unit]

30 m³/h – standard activated sludge method, 1set,

• Aeration basin: made of reinforced concrete

Aeration devices (blower, air distributors)

• Clarifier(Sedimentation tank): carbon steel/epoxy

Sludge collection rake/sludge draw-off timer set

• Chemical injection system: drums, mixers, pumps

(a) Organic matters in the wastewater are oxidized and decomposed by micro bacteria in Aeration Basin.

(b) Air(oxygen) is blown into the Basin and nutrient such as NH₃PO₄ is injected, if lack of nutrient (N, P).

(c) Slurry consisting of micro bacteria floc is separated supernatant and sludge in Clarifier.

(d) Settled sludge on the bottom of Clarifier is discharged to Dewatering Unit periodically, automatically.

(e) Treated water(supernatant of Clarifier) will meet to the wastewater disposal regulation of Nile River(Law No.48/1982).

4) Advanced Treatment

(a) Filter Unit

• Sand Filter: Capacity 15 m³/h , 3 sets (1set stand-by),
made of carbon steel/epoxy , pressure type
Filter media Anthracite + Sand/Gravel

• Backwashing Unit Backwashing pumps, blowers
Backwash wastewater Pit(concrete basin)

i) Filters are provided to remove micro flocs carried-over from the sedimentation basin of Clarifier Unit. As a result, suspended solids, BOD/COD depending on SS, a slice of oil are removed.

Then, filtered water is fed to Activated Carbon Filter.

ii) Filter unit is not always required in water quality point of view, it is provided as a demonstration unit process to polish clarified water.

iii) A filter is backwashed once 18-24hrs by air and treated water automatically.

iv) Backwash wastewater is returned to Equalization Tank, then treated again.

(b) Activated Carbon Filter Unit:

• A/C Filter

30 m³/h - pressure type, 2sets (1set stand-by)

made of carbon steel/epoxy, pressure type

Filter media Activated carbon (granular type) + Sand

• Backwashing unit Treated water basin(concrete), pumps

i) A/C Filters are provided to polish filtered water and to remove (adsorb) organic matters indicated as BOD/COD/phenol.

ii) When pressure drop at the filter layer reaches to the specified pressure or once 24-48hrs, the filter is backwashed by treated water automatically.

iii) Backwash wastewater is returned to Equalization Tank through Wastewater pit to treat again.

6) Sludge Treatment Unit:

• Sludge Thickener (carbon steel/epoxy)

• Centrifuge (horizontal type, stainless steel)

• Chemical Dosing Unit (Drums, mixers, pumps)

(a) Solids content of sludge from Clarifier and Sedimentation Basin of activated sludge treating unit are around 1wt% (10g/L)..

(b) To reduce sludge volume, Thickener is provided to condense sludge (2-5% solid content) and Centrifuge (day-time operation normally) is provided to dewater from sludge.

(d) Solids content in the sludge cake will be expected 15-20wt%, that is approx. 85-80% of water content.

7) Local Control Room

(a) The control room (Approx. 6m x 12m, ground floor only) is built at the demonstration plant area.

(b) The room consists of a control panel room and an electricity distribution panel room , rest room for operators, toilet, sink locker, etc..

(c) Chemical storage room is also provided.

8) Electricity

(a) Electricity (380V AC x 3 phase x 50HZ) is received from Sub-station at the Formalin Factory sub-station through underground buried cable along the road. Cable length is more than 500m.

(b) Approx. 200kVA electricity is used for power, lighting, control for

instrument for wastewater treating unit, and air conditioning in the control room.

(3) Disposal of sludge

Pollutants in wastewater are removed, and dewatered cake generates finally at the wastewater treatment plant. Wastewater in the Factory may contain formalin, phenols, some chemicals not to be removed completely.

Therefore, such toxic chemicals should be analyzed periodically. If they are not found, dewatered sludge cake can be dumped the specified place under management but, if found, dewater sludge should be dumped as ash after burning by an incinerator.

(4) Location of Demonstration Plant

Location of Demonstration Plant was selected the left side area of entrance gate by Mansoura Co. and JICA Study Team at site, where is used as parking area now (Refer to Fig. 3).

The place is approx. 500m far from "end of pipe" of wastewater sewer

(5) Discussion of reuse treated water

Wastewater will be treated and polished by the wastewater treating units including Activated Carbon Filter. Therefore, treated water quality meets to Nile River Regulation, and to reuse for cooling water.

(6) Budgetary Cost Estimation

1) Conditions of Estimation

(a)Major mechanical equipment, electrical equipment, instrument, and valves are purchased out of Egypt (Japan or Europe).

(b)Bulk materials such as pipe and fittings, re-bar, cable are purchased in Egypt.

(c) Large vessels (larger than 3.0m) and tanks is erected at site.

Sand filters made of carbon steel and filter media are purchased from Japan.

(d) Large basins are constructed of reinforced concrete.

(e) Field works are conducted by Egyptian contractors under supervising by Japanese consultants.

(f) Construction at site is proceeded as the standard schedule.

2) Cost estimation

Shown on Table 4

Table 4 Budgetary Cost Estimation

	Yen Portion	LE Portion	
	[x10 ³ Yen]	[LE]	[x10 ³ Yen]
1. Equipment & Materials			
(1) Mechanical	93,000		
(2) Elec./Instrument	62,000		
(3) Transportation	18,000		
Sub-Total(1)	173,000		
2. Construction(w/Local Mat.)			
(1) Civil/Architecture		1,796,000	
(2) Installation/Piping		417,000	
(3) Elec./Instrument		660,000	
(4) Commissioning		7,200	
Sub-Total(2)		2,880,200	98,000
3. Indirect Cost			
(1) Contractor Expenses		720,050	24,480
(2) Supervision Expenses			10,000
Sub-Total(3)		720,050	34,480
Total Cost		305,480 [x10 ³ Yen]	

Note: 1) Exchange Rate 1 LE = 34 Yen

2) Indirect Cost = Direct Cost (Field Portion) x 0.25

3) Excluded Supervision Fee by Japanese consultant

4) Demarcation of Scope of Work between Egyptian and Japanese Sides has not been decided yet.

(7) Standard Schedule :

Standard schedule is shown on Table 5, but it is not so easy schedule.

It is scheduled so as to be passed Egypt custom without any delay.

Table 5 Standard Construction Schedule

Item	Month						
	1	3	5	7	9	11	13
Detail Design	*						
1) Procurement		*****					
2) Transportation			*****				
3) Civil Work			*****				
4) Instal./Piping				*****			
5) Elec./Instrument					*****		
6) Control Room			*****				
7) Commissioning						**	
Demonstration Operation							*

4. Recommendations of Feasible Improvement for Environmental Aspect

4.1 Production Facilities

It is important that toxic phenol and formaldehyde, which contain high concentration are completely removed from disposal liquid from dehydration units in resin manufacturing process, before wastewater treatment for disposal.

And it is the good solution for improvement of environment and energy saving that waste liquid is separated completely, and burnt by an incinerator.

To solution the above , it is recommended as follows:

- (1) It will be treated by extraction by solvent (for example tri-chloro-ethylene) to recover phenol from the disposal liquid of dehydration unit
- (2) The high heat valued disposal liquid after extraction will be burnt in a boiler or sludge incinerator.

4.2 Waste Water Treatment

(1) Waste liquid treatment

Regeneration wastewater(liquid) from formalin plant and phenol resins plant must be separated from wastewater completely and be burnt by a boiler or incinerator.

(2) Suitable routine work

- 1) Appearance (such as color, clearness, smell, floating matters, etc.) of inlet and outlet water should be checked visually at routine work, and be taken suitable action, if necessary.
- 2) The accumulated scum and sludge, etc in the sewer ditch should always be cleaned by removing.

(3) Reduction loss steam

It was found at site survey that steam is exhausted into the sewer. As a result, water temperature was higher than 60°C. It is not only very dangerous for working atmosphere but also waste energy, that is loss money.

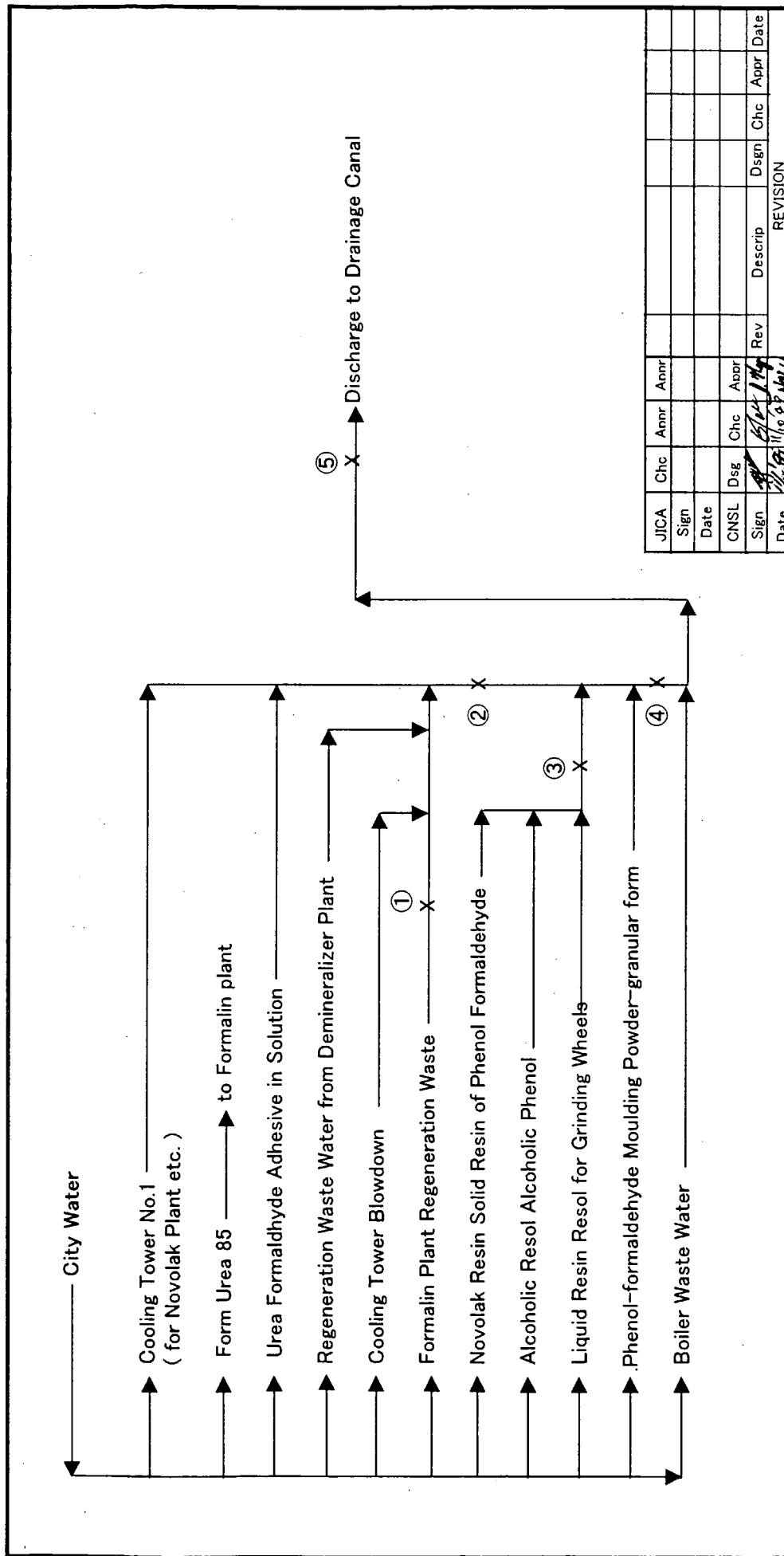
It is recommended to be considered countermeasures such as equipping or replacing of steam traps urgently.

(4) Air Pollution

Frankly speaking, atmosphere condition at working area is extremely bad. During discussion at some plant side, all members felt eye-ache, and oozed tears. Working condition in atmosphere is improved for health management urgently.

DRAWING LIST OF CONCEPTUAL DESIGN
[MANSOURA CO. FOR RESINS AND CHEMICALS]

NO	DRAWING NAME	DWG. NO.	REV.	DATE	NOTE
1	FLOW SHEET				
1)	SCHEMATIC DIAGRAM OF WASTE WATER FLOW	RC-CD-15-01	0	1999.10.13	
2)	CONCEPTUAL DESIGN OF WASTE WATER FLOW	RC-CD-15-02	0	1999.10.13	
3)	BLOCK FLOW DIAGRAM OF W.W.T. DEMONSTRATION PLANT	RC-CD-15-03	0	1999.10.14	
4)	CONCEPTUAL DESIGN OF WASTE WATER TREATMENT	RC-CD-15-04	0	1999.10.13	
2	PLOT PLAN				
1)	LOCATION OF W.W.T. DEMONSTRATION PLANT		0		
2)	PLOT PLAN FOR CONCEPTUAL DESIGN OF W.W.T. DEMONSTRATION PLANT	RC-CD-12-01	0	1999.10.13	
3)	POWER CABLE ROUTE FOR DEMONSTRATION PLANT	(Fig. -3)			
3	PROCESS PLANT				
1)	FORMALDEHYDE PLANT	(Fig.-1)			
2)	FLOW SHEET FOR UREA-FORMALDEHYDE MOOLDING POWDER PLANT	(Fig-2)			
NOTE:					



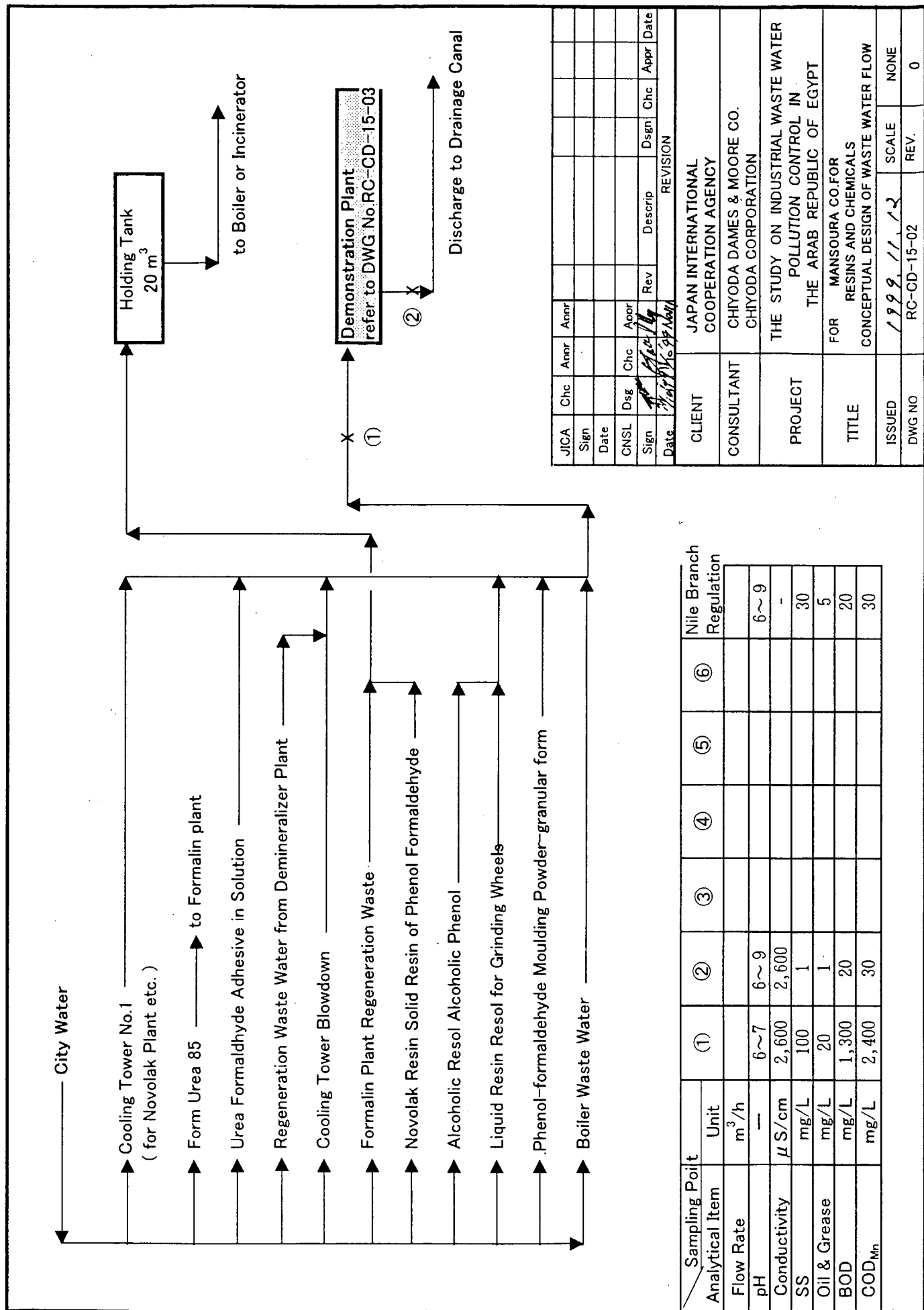
Sampling Point	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Analytical Item							
Flow Rate	0.6	36	0.08	40	52		
pH	7	6.83	6.53	7.45	7.7		
Conductivity	1,700	1,628	817	2,575	1,683		
Turbidity	40	33	330	60	60		
Water Temp.	38	39	43	38	35		
Salinity	0.1	0.3		0.15			
COD _{Mn} **	> 100	> 100	> 100	> 100	> 100		

* : Field Measurement(Average) ** : Pack Test

JICA	Chc	Annr	Annr	Chc	Annr	Chc	Annr	Chc	Annr
Sign									
Date									
CNSL	Dsg	Chc	Abpr	Rev	Dsgn	Chc	Appr	Date	
Sign									
Date									

REVISION	
Chc	Annr
Dsgn	Chc
Rev	Dsgn
Chc	Appr
Date	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
CONSULTANT	CHIYODA DAMES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR MANSOURA CO.FOR RESINS AND CHEMICALS SCHEMATIC DIAGRAM OF WASTE WATER FLOW
ISSUED	1999.11.12
DWG.NO	RC-CD-15-01
SCALE	NONE
REV.	0

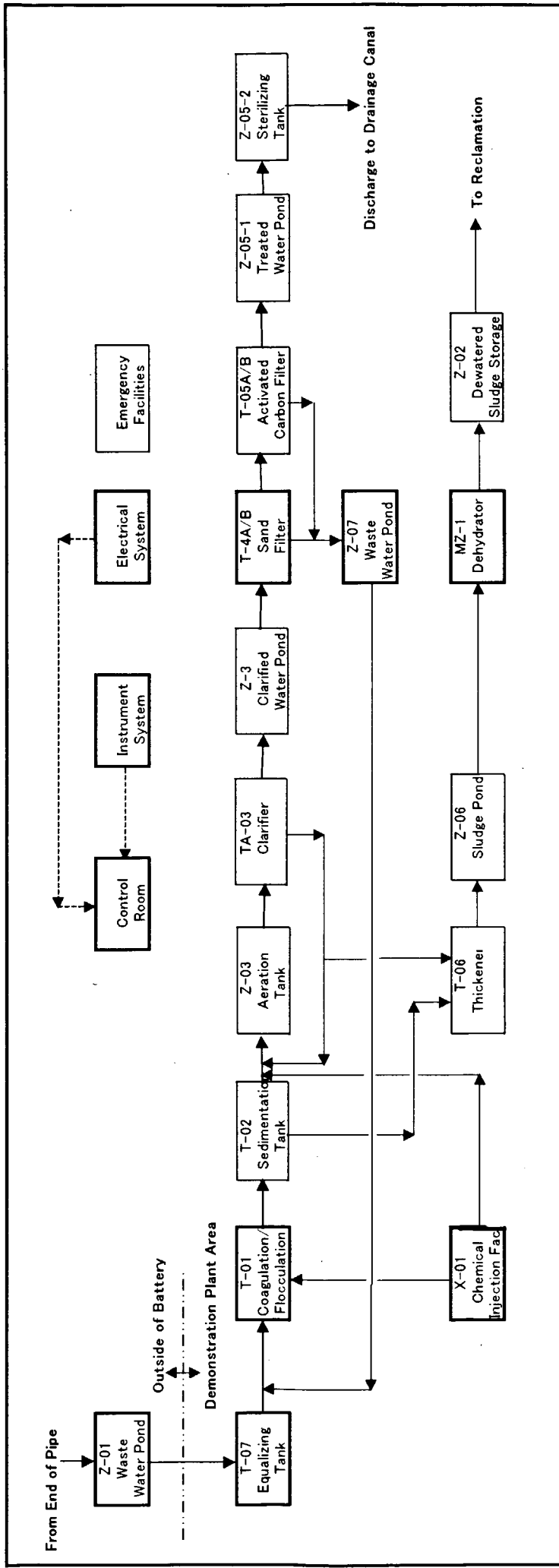


JICA	Chc	Annr	Annr	Annr
Sign				
Date				
CNSL	Dsg	Chc	Appr	
Sign				
Date				

REVISION	
Rev	Date
1	11/16/02
2	11/16/02

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
CONSULTANT	CHIYODA DAMES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR MANSOURA CO. FOR RESINS AND CHEMICALS CONCEPTUAL DESIGN OF WASTE WATER FLOW
ISSUED	1999/11/12
DWG NO	RC-CD-15-02
SCALE	NONE
REV.	0

Sampling Point	Unit	(1)	(2)	(3)	(4)	(5)	(6)	Nile Branch Regulation
Flow Rate	m ³ /h							
pH	—	6~7	6~9					6~9
Conductivity	μ S/cm	2,600	2,600					-
SS	mg/L	100	1					30
Oil & Grease	mg/L	20	1					5
BOD	mg/L	1,300	20					20
COD _{Mn}	mg/L	2,400	30					30



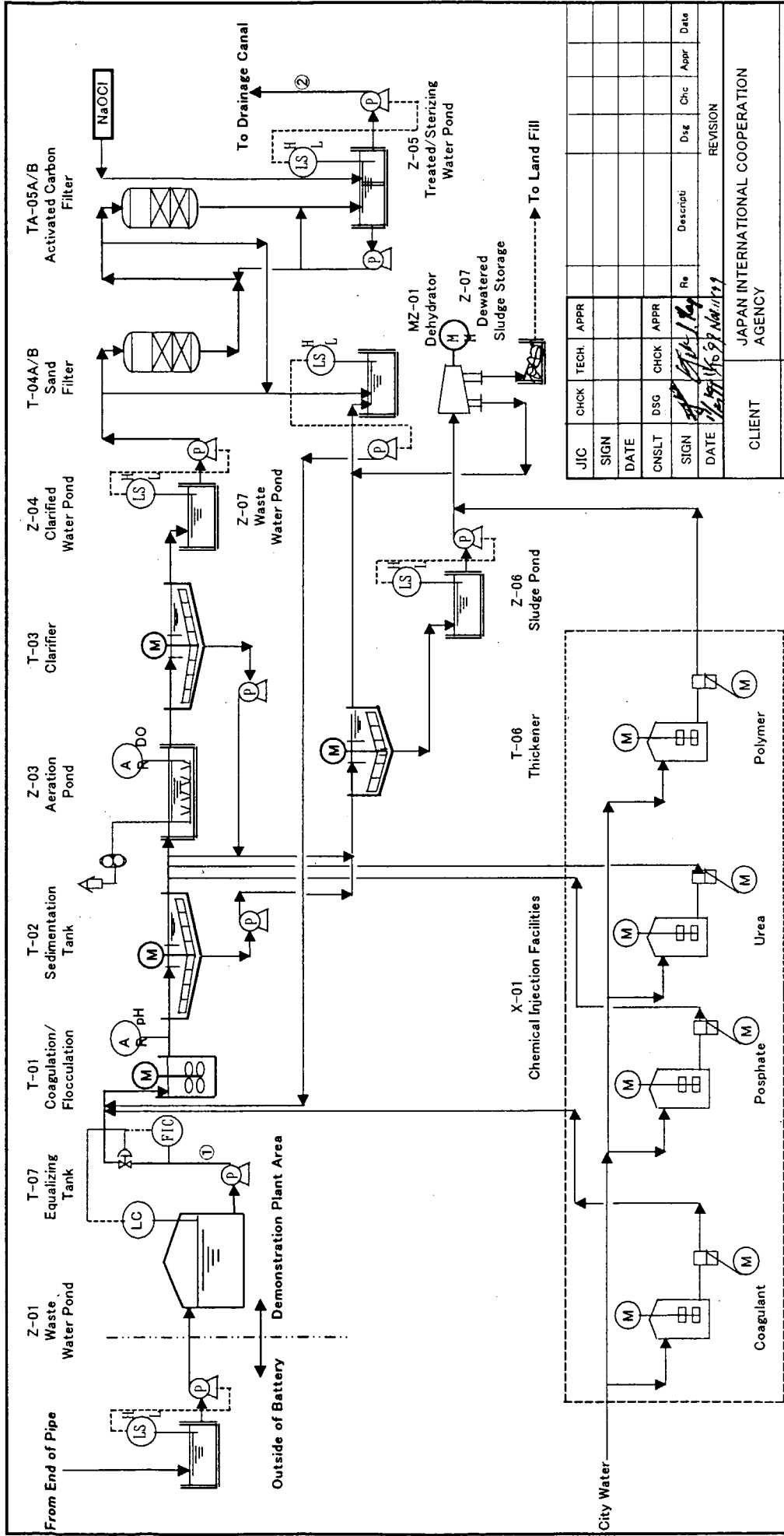
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SIGN									
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CHSLT	DSG	CHK	APPR						
SIGN									
DATE									

REVISION

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION
CONSULTANT	CHIYODA DAMES & MOORE CO.
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR MANSOURA CO. FOR RESINS AND CHEMICALS BLOCK FLOW DIAGRAM OF W.W.T. DEMONSTRATION PLANT
ISSUED DATE	1999.11.12
DWG NO	RC - CD - 15 - 03
SCALE	NONE
REV.	0

Component of Facilities

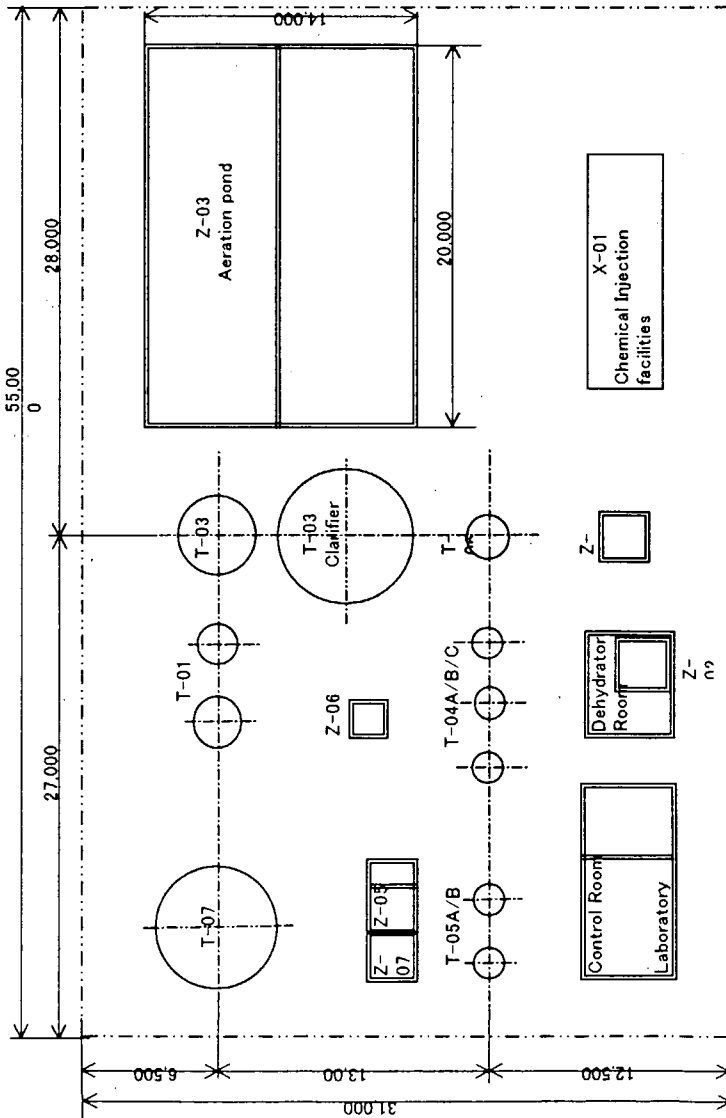
Number	Item	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
	Waste Water Pond										
	Equalizing Pond										
	API Type Oil Separator										
	Coagulation/Flocculation										
	Sedimentation Tank										
	Oxidation Tank										
	Clarifier Treatment										
	Sand Filter										
	Filtered Water Pond										
	Sterilization Tank/Pond										
	Thickener										
	Sludge pond										
	Backwashed Water Pond										
	Dehydrator										
	Dehydrator										
	Chemical Injection Fac										
	Emergency Facility										
	Instrument System										
	Electrical System										
	Control Room										
Number	Item	21	22	23	24	25	26	27	28	29	30
	Activated Carbon Filter										



JIC	CHK	TECH	APPR	Re	Descr	Dsg	Chc	Apr	Date

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
CONSULTANT	CHYODA DAMES & MOORE CO. CHYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR MANSOURA CO.FOR RESINS AND CHEMICALS PROCESS FLOW DIAGRAM OF W.W.T. DEMONSTRATION PLANT
ISSUED	1999.11.12 SCAL NONE
DWG NO	RC-CD-15-04 REV. 0

Stream No.	Analytical Item	Unit	(1)	(2)	(3)	(4)	Nile branch Regulation
	Flow Rate	m ³ /h	30	30			
	pH		6~7	6~9			6~9
	Conductivity	μ S/cm	2,600	2,600			-
	SS	NTU	100				30
	Oil & Grease	mg/L	20	1			5
	BOD	mg/L	1,300	20			20
	COD	mg/L	2,400	30			30



- T-01 Coagulation Tank /Flocculation Tank
1,430' x 2,000' x 3' & 2,860' x 3,000' x 15' m³
- T-02 Sedimentation Tank
4,000' x 4,500' x 45' m³
- T-03 Clarifier
7,000' x 4,000' x 120' m³
- T-04A/B/C Sand Filter
1,600' x 4,000' x 8' m³
- T-05A/B Activated Carbon Filter
1,600' x 4,500' x 9' m³
- T-06 Thickener
2,400' x 4,000' x 13' m³
- T-07 Equalizing Tank
5,811' x 6105' x 120' m³
- Z-01 Waste Water Pond
4,000' x 4,000' x 2,000' x 120' m³
- Z-02 Dewatered Sludge Storage
3,000' x 3,000' x 2,000' x 14' m³
- Z-03 Aeration Pond
14,000' x 20,000' x 5,800' x 1,400' m³
- Z-04 Clarified Water Pond
2,000' x 2,000' x 3,000' x 8' m³
- Z-05 Treated/Sterilizing Water Pond
3,000' x 4,000' x 3,000' x 24' m³
- Z-06 Sludge Pond
2,000' x 2,000' x 3,000' x 8' m³
- Z-07 Waste Water Pond
3,000' x 2,500' x 3,000' x 15' m³
- MZ-01 Dehydrator
- X-01 Chemical Injection

JIC	CHK	TECH	APPR	Rev.	Description	Dwg	Chc	Appr	Date
SIGN									
DATE									
CNSLT	DSG	CHK	APPR						
SIGN									
DATE									
REVISION									
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY								
CONSULTANT	CHUYODA DAMES & MOORE CO. CHUYODA CORPORATION								
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT								
TITLE	FOR MANSOURA CO.FOR RESINS AND CHEMICALS PLOT PLAN FOR W. W. T. DEMONSTRATION PLANT								
ISSUED	1999. 11. 12								
DWG NO	RC-CD-12-01								
	SCAL 1/250								
	REV. 0								

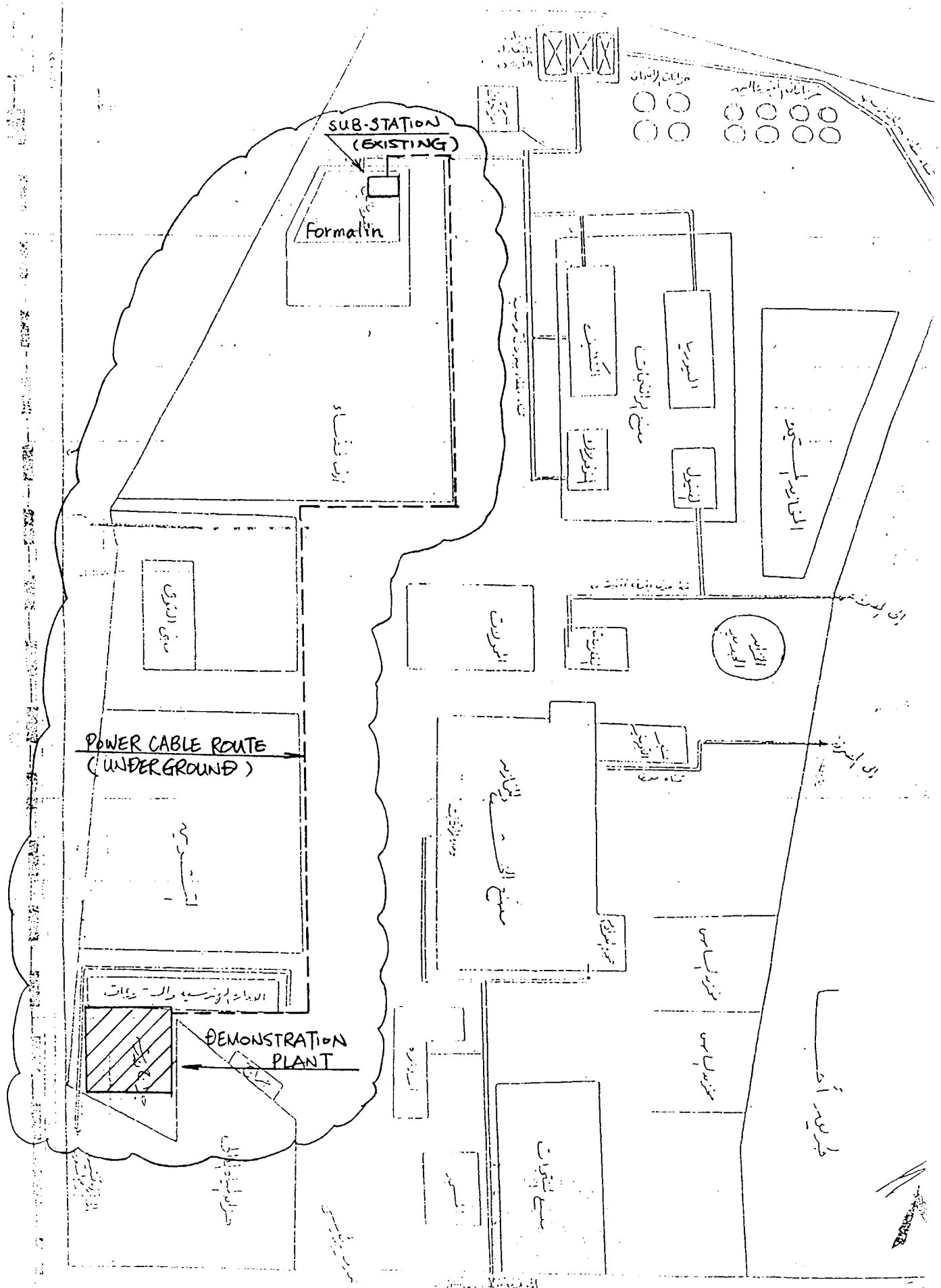
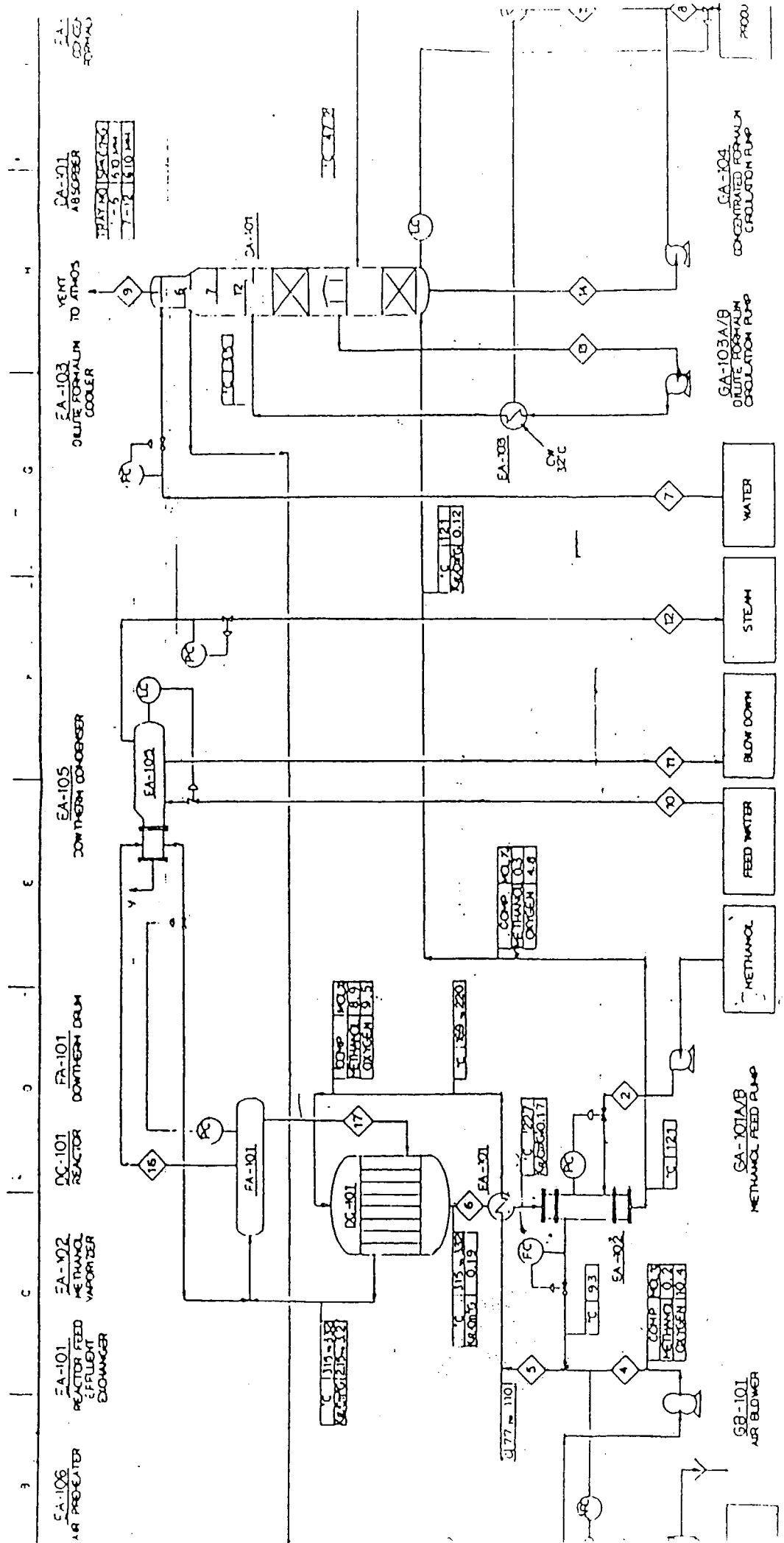


FIG. 3 POWER CABLE ROUTE FOR DEMONSTRATION PLANT.

Fig. - 1 Formaldehyde plant



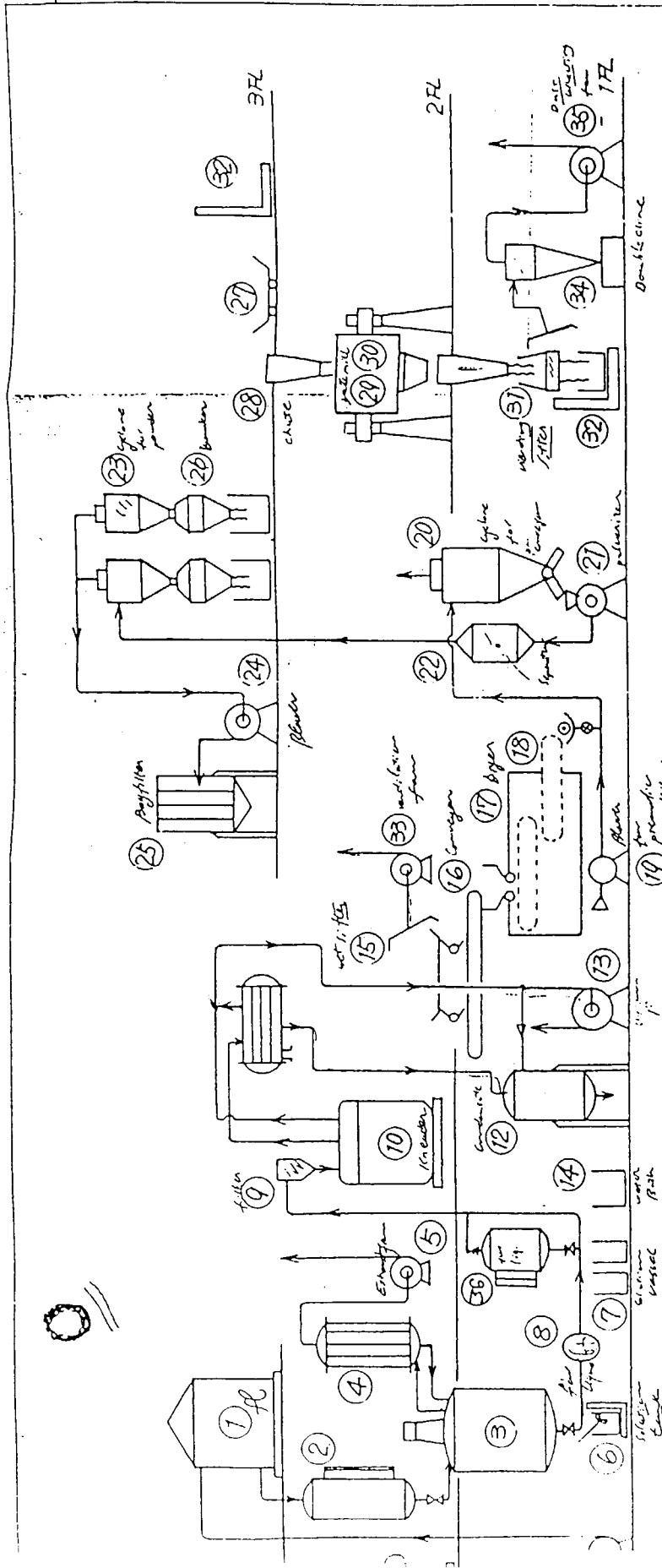



Fig. - 2

 SUMITOMO		BAKELITE CO., LTD. TOKYO, JAPAN		
FLOW SHEET FOR UREA-FORMALDEHYDE Moulding Powder Plant				
SCALE	///.///.	DRAWN	DESIGNED	APPROVED
DATE	1967. 1. 30	K. Hasegawa	M. Tamura	K. Ishikawa
CLASS.		DRAWING NO.	FIGURE NO.	
				FIGURE 4.1

ITEM	EQUIPMENT	ITEM	EQUIPMENT
15	WET SIFTER	20	BALL MILL (1200L)
16	CONVEYOR	30	BALL MILL (800L)
17	CONTINUOUS DRYER	31	VIBRATING SIFTER
18	SCREW CONVEYOR	32	WEIGHING MACHINE
19	BLOWER FOR PNEUMATIC CONVEYOR	33	VENTILATION FAN
20	CYCLONE FOR PNEUMATIC CONVEYOR	34	DOUBLE CONE
21	PULVERIZER	35	DUST COLLECTING FAN
22	SEPARATOR	36	MEASURING TANK FOR LIQUID
23	CYCLONE FOR POWDER		
24	BLOWER		
25	BAG FILTER		
26	BUNKER		
27	PORTER LIFT		
28	CHUTE		

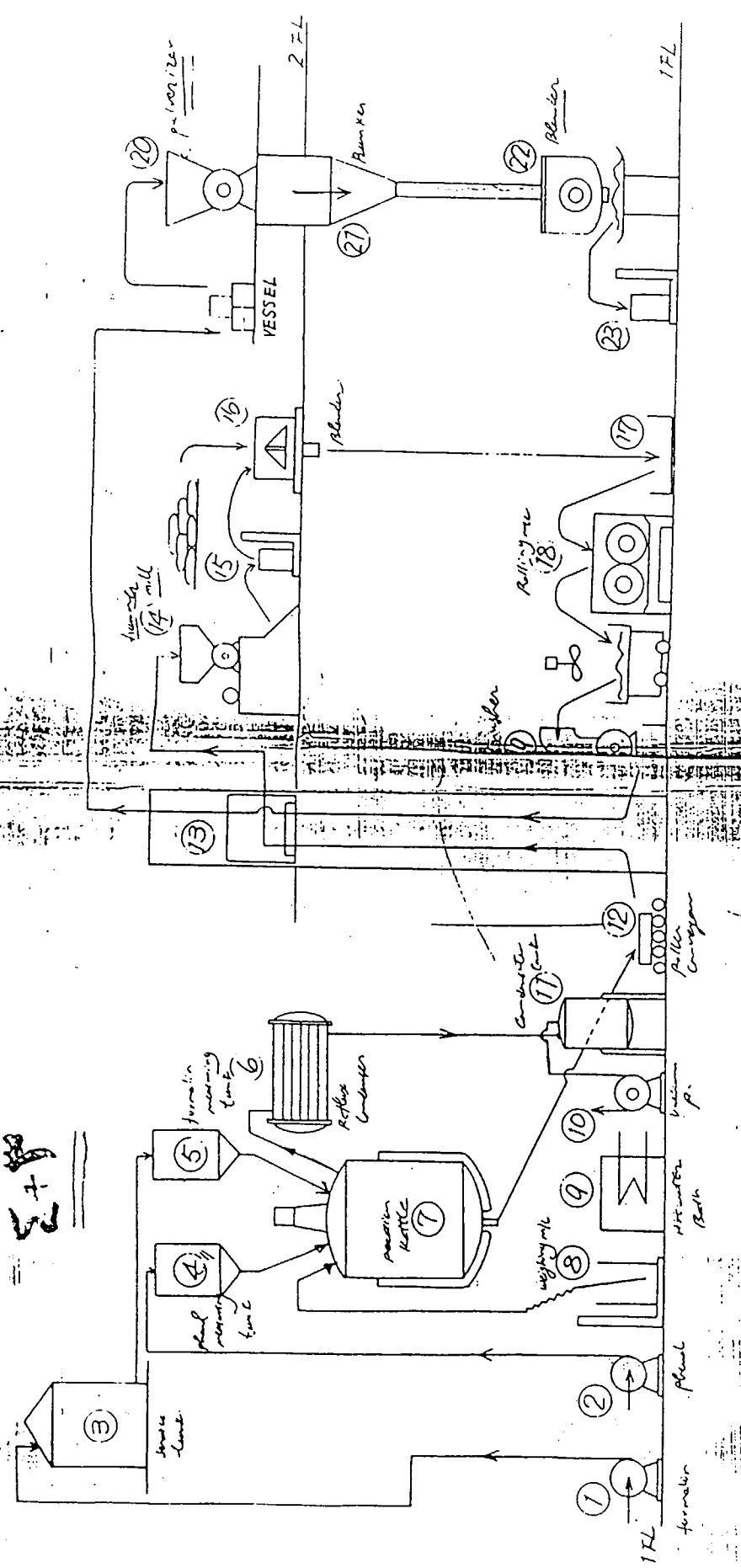
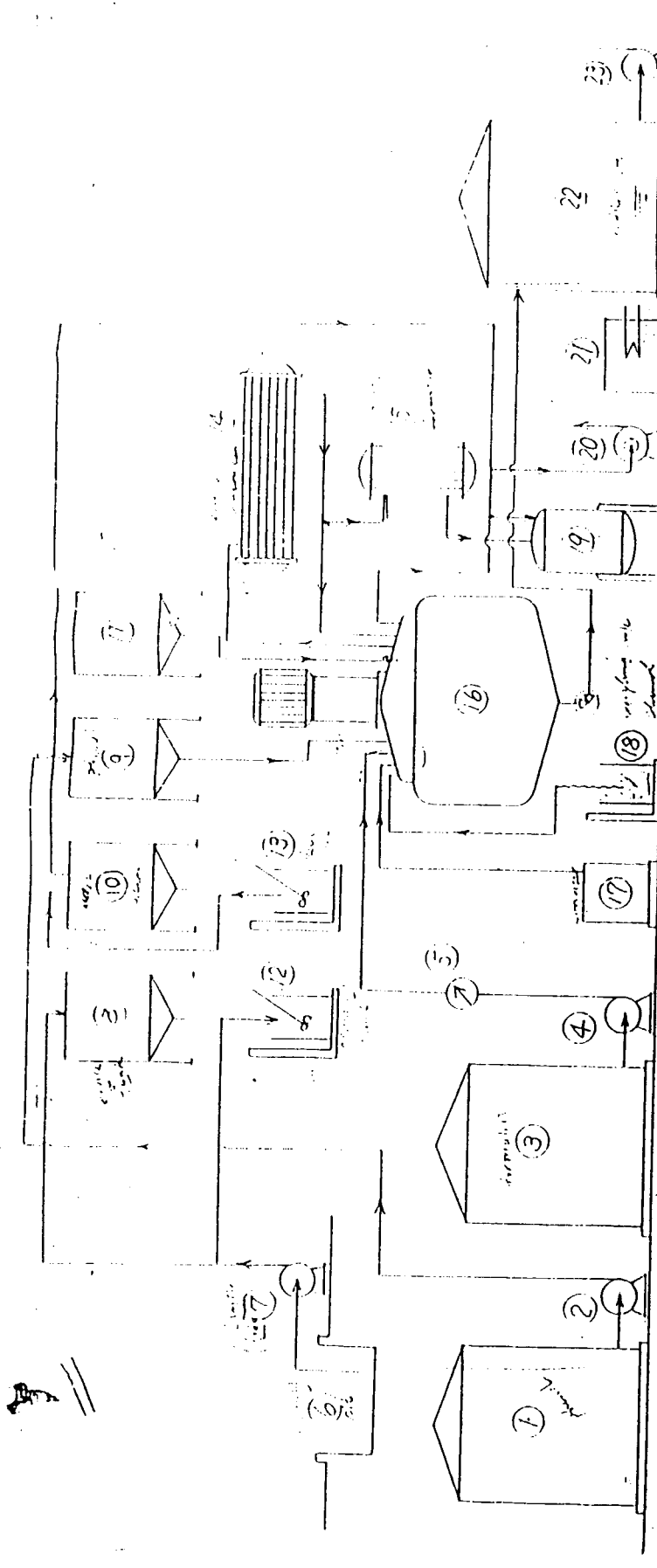


FIG - 3

SUMITOMO		BAKELITE CO., LTD. TOKYO, JAPAN	
FLOW SHEET FOR PHENOL FORMALDEHYDE MOULDING POWDER PLANT			
SCALE	/ . / . / .	DRAWN	DESIGNED APPROVED
DATE	1967. 1. 30	& Checked	H. Tamura K. Ishikawa
CLASS.		DRAWING NO.	FIGURE 5.1

ITEM	EQUIPMENT	ITEM	EQUIPMENT
1	PUMP FOR FORMALIN	21	BUNKER
2	PUMP FOR PHENOL	22	BLENDER
3	FORMALIN SERVICE TANK	23	WEIGHING MACHINE FOR POWDER
4	PHENOL MEASURING FUNNEL		
5	FORMALIN MEASURING TANK		
6	REFLEX CONDENSER		
7	REACTION KETTLE		
8	WEIGHING MILL		
9	WEIGHING TANK		
10	HAMMER MILL		
11	CONDENSATE TANK		
12	ROLLER CONVEYOR		
13	LIFT		
14	WEIGHING MACHINE		
15	BLENDER		
16	VAPOR ROLLING MACHINE		
17	WEIGHING MACHINE		
18	ROLLER CONVEYOR		
19	SCRUSHER		
20	PULVERIZER		



ITEM	EQUIPMENT	ITEM	EQUIPMENT	ITEM	EQUIPMENT
1	STORAGE TANK FOR BENZOL	10	SERVICE TANK FOR ACETIC ACID	19	TANK FOR CONDENSED WATER
2	PUMP FOR BENZOL	11	MEASURING TANK FOR WATER	20	VACUUM PUMP
3	STORAGE TANK FOR SODA SOLUTION	12	MEASURING TANK FOR SODA SOLUTION	21	WATER BATH
4	PUMP FOR SODA SOLUTION	13	SOLUTION TANK FOR SODA	22	STORAGE TANK FOR ADHESIVE
5	PUMP FOR SODA SOLUTION	14	SOLUTION TANK FOR SODA	23	PUMP FOR ADHESIVE
6	CONDENSER	15	SEPARATOR		
7	FILTER	16	SEPARATOR		
8	COMPRESSOR	17	SEPARATOR		
9	WEIGHING MACHINE	18	SEPARATOR		

SUMITOMO BAKELITE CO. LTD. TOKYO, JAPAN

SCALE: 1/100

DATE: 1917 / 1 / 30

CLASS: DRIVING NO. FIGURE 3-4

DESIGNED: APPROVED:

Table-1 EQUIPMENT LIST for Mansoura Co. for Resins and Chemicals

(1/2)

CLIENT : Japan International Cooperation Agency
 PROJECT : The Study on Industrial Waste Water Plant
 PLANT : Monsoura Co. for Resins and Chemicals
 WASTE W. : End of Pipe(Sanitary Waste W. + Waste Water)

REV	1	2	3	MADE	<i>[Signature]</i>
BY				CKD	<i>[Signature]</i>
APVE				APVE	<i>[Signature]</i>
DATE				DATE	<i>Oct. 10 '99</i>

Equipment NO.	Service	No. Req'd	Type of Equipment	Remarks
T-01	Coagulation Tank	1	Vertical Cylindrical Type	Carbon Steel/Epoxy
	/Flocculation Tank		1,430 ^φ × 2,000 ^H × 3 m ³ & 2,860 ^φ × 3,000 ^H × 15 m ³	Coating
T-02	Sedimentation Tank	1	Vertical Cylindrical Type	Carbon Steel/Epoxy
			4,000 ^φ × 4,500 ^H × 45 m ³	Coating
T-03	Clarifier	1	Vertical Cylindrical Type	Carbon Steel/Epoxy
			7,000 ^φ × 4,000 ^H × 120 m ³	Coating
T-04A/B/C	Sand Filter	3	Vertical Cylindrical Type	Carbon Steel/Epoxy
			1,600 ^φ × 4,000 ^H × 8 m ³	Coating
T-05A/B	Activated Carbon Filter	2	Vertical Cylindrical Type	Carbon Steel/Epoxy
			1,600 ^φ × 4,500 ^H × 9 m ³	Coating
T-06	Thickener	1	Vertical Cylindrical Type	Carbon Steel/Epoxy
			2,400 ^φ × 4,000 ^H × 13 m ³	Coating
T-07	Equalizing Tank	1	Vertical Horizontal Type	Carbon Steel/Epoxy
			5,811 ^φ × 6105 ^H × 120 m ³	Coating
Z-01	Waste Water Pond	1	Vertical Square Type	Reinforced Concrete
			4,000 ^W × 4,000 ^L × 2,000 ^H × 120 m ³	
Z-02	Dewatered Sludge Storage	1	Vertical Square Type	Reinforced Concrete
			3,000 ^W × 3,000 ^L × 2,000 ^H × 14 m ³	
Z-03	Aeration Pond	1	Vertical Rectangular Type	Reinforced Concrete
			14,000 ^W × 20,000 ^L × 5,800 ^H × 1,400 m ³	
Z-04	Clarified Water Pond	1	Vertical Square Type	Reinforced Concrete
			2,000 ^W × 2,000 ^L × 3,000 ^H × 8 m ³	

Note:

Table-2 INSTRUMENT LIST for Mansoura Co. for Resins and Chemicals

(1/1)

CLIENT : Japan International Cooperation Agency
 PROJECT : The Study on Industrial Waste Water Plant
 PLANT : Monsoura Co. for Resins and Chemicals
 WASTE W. : End of Pipe(Sanitary Waste W. + Waste Water)

REV	1	2	3	MADE	<i>Belmond</i>
BY				CKD	<i>O.M.</i>
APVE				APVE	<i>J. Nag.</i>
DATE				DATE	<i>Oct 10 '99</i>

Equipment NO.	Service	No. Req'd	Type of Equipment	Remarks
FIC-01	Sedimentation line	1	10 m ³ /h~50 m ³ /h Flow Indicating Controller	
LC-01	Equalizing Pond	1	1,000 mm~1,500 mm Level Controller	
pH-01	Sedimentation line	1	pH 4~10 pH Analyzer	
DO-01	Aeration Pond	1	0~10 mg/L Disolved Oxygen Analyzer	
LS-01	Waste Water Pond	1	500 mm~1,000 mm Level Switch	
LS-02	Clarified Water Pond	1	1,000 mm~1,500 mm Level Switch	
LS-03	Trated Water pond	1	1,000 mm~2,000 mm Level Switch	
LS-04	Backwashed Waste Water P.	1	500 mm~2,000 mm Level Switch	
LS-05	Sludge Pond	1	500 mm~2,000 mm Level Switch	

Note:

DOCUMENT TITLE: STANDARD SKETCH DRAWINGS OF

W.W.T. MAJOR EQUIPMENT

DOCUMENT NO. STD - CD - 20/50-01 REV. 0

PROJECT: THE STUDY ON INDUSTRIAL WASTE WATER

POLLUTION CONTROL IN

THE ARAB REPUBLIC OF EGYPT

CLIENT: JAPAN INTERNATIONAL COOPERATION AGENCY

INDUSTRIAL DEVELOPMENT STUDY DIVISION

CONSULTANT: CHIYODA DAMES AND MOORE CO.

CHIYODA CORPORATION

ISSUED DATE: 1999. 10. 18

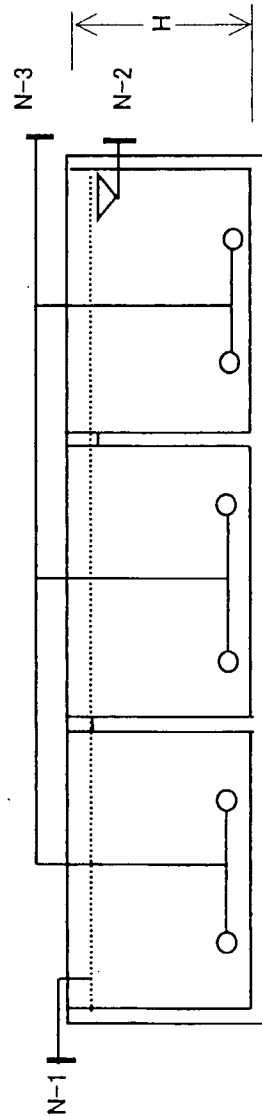
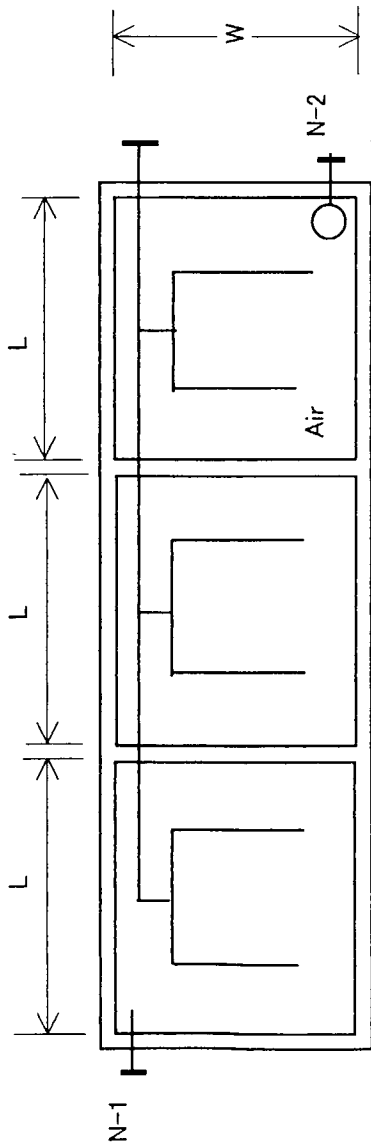
JICA

	CHCK'D	TECH.	APPR'D
SIGN			
DATE			

CONSULTANT

	DSGN	CHCK'D	APPR'D
SIGN	<i>Stak</i>	<i>Stak</i>	<i>J. Hay</i>
DATE	<i>Oct. 18, '99</i>	<i>Oct. 18, '99</i>	<i>Nov. 11, '99</i>

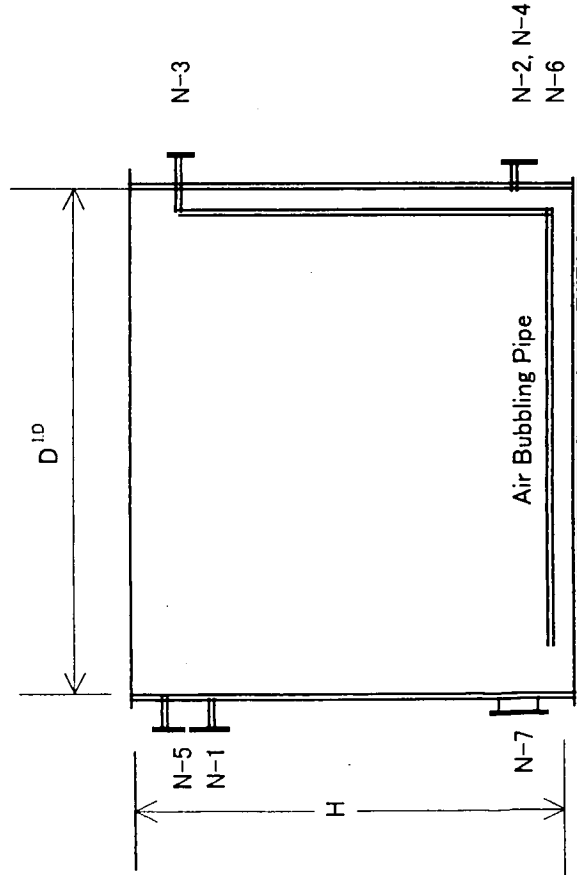
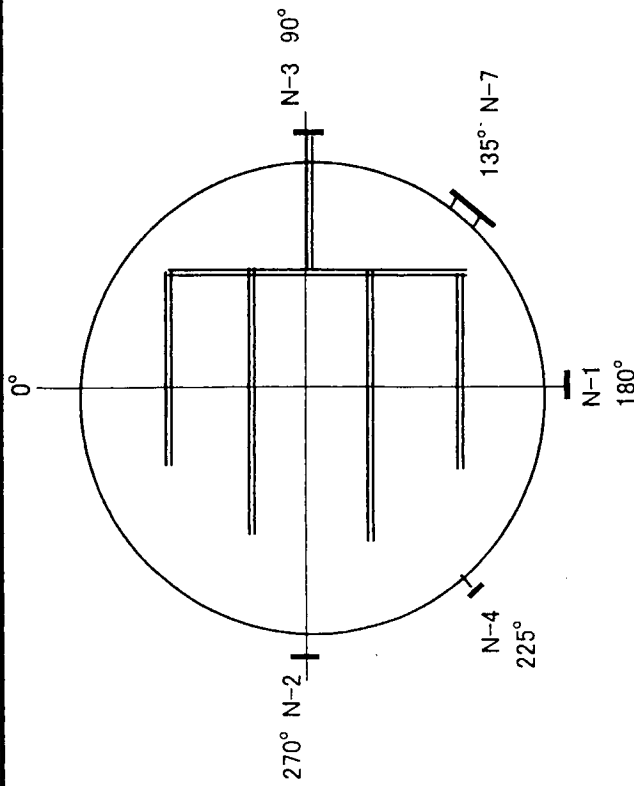
Materials: Reinforced Concrete
 Accessories: Operating Stage
 Stairway
 Air Distributing pipings



N-4				
N-3	Air Inlet		1	
N-2	Treated Water Outlet		1	
N-1	Raw Water inlet		1	
Nozzle No	Name	Size	No	Note

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY		
TITLE	FOR: WASTE WATER TREATMENT UNIT STANDARD DRAWING OF _____ m ³ /h AERATION BASIN (Z-2)		
DWG. NO.	STD - CD - 50 - SK02 REV.0		

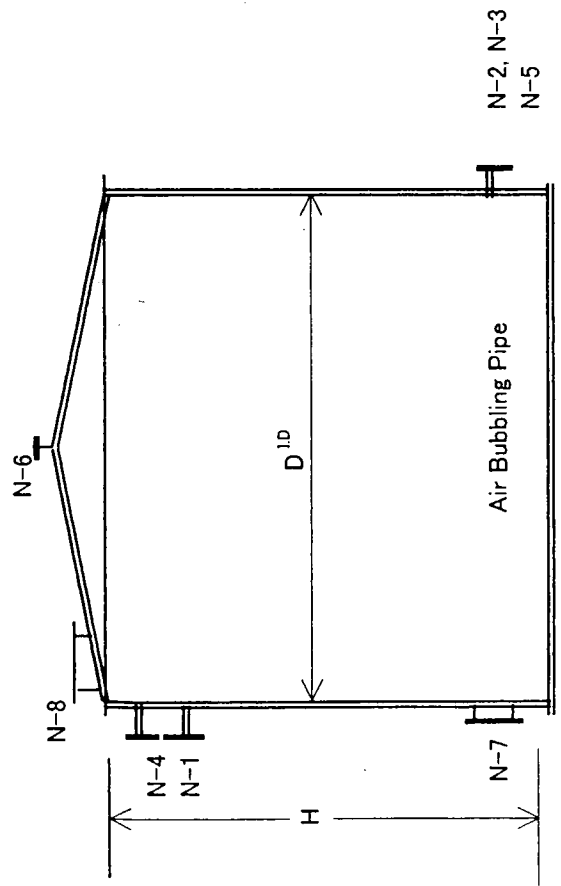
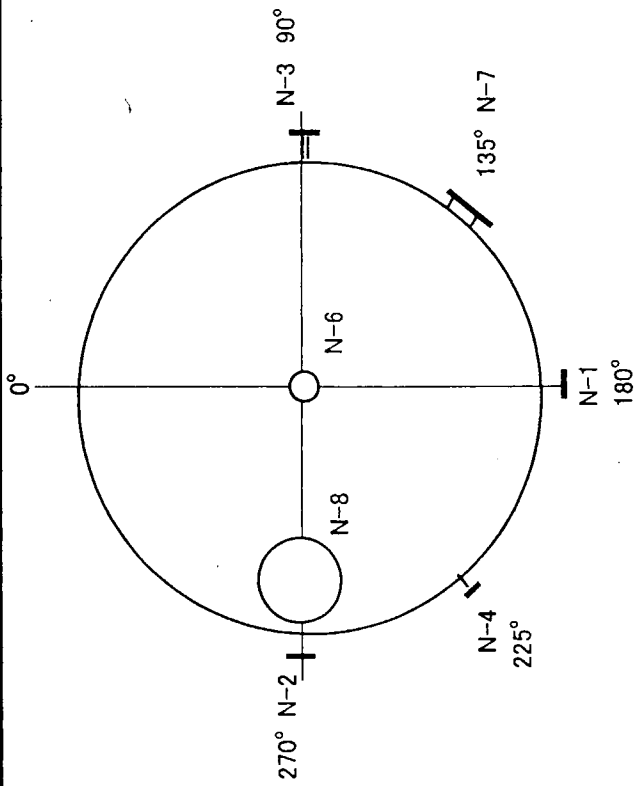
- 1) Type: Cylindrical Tank
(Open Top Tank)
- 2) Materials: Carbon Steel
inside Epoxy Coating
- 3) Accessories: Stairway



Nozzle No	Name	Size	No	Note
N-7	Manhole	500A	1	
N-6	Level Instrument		1	
N-5	Over Flow		1	
N-4	Drain		1	
N-3	Bubbling Air Inlet		1	
N-2	Raw Water Outlet		1	
N-1	Raw Water inlet		1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY		
TITLE	FOR: WASTE WATER TREATMENT UNIT STANDARD DRAWING OF _____m ³ EQUALIZATION TANK (T-1)		
DWG. NO.	STD - CD - 22 - SK01 REV.0		

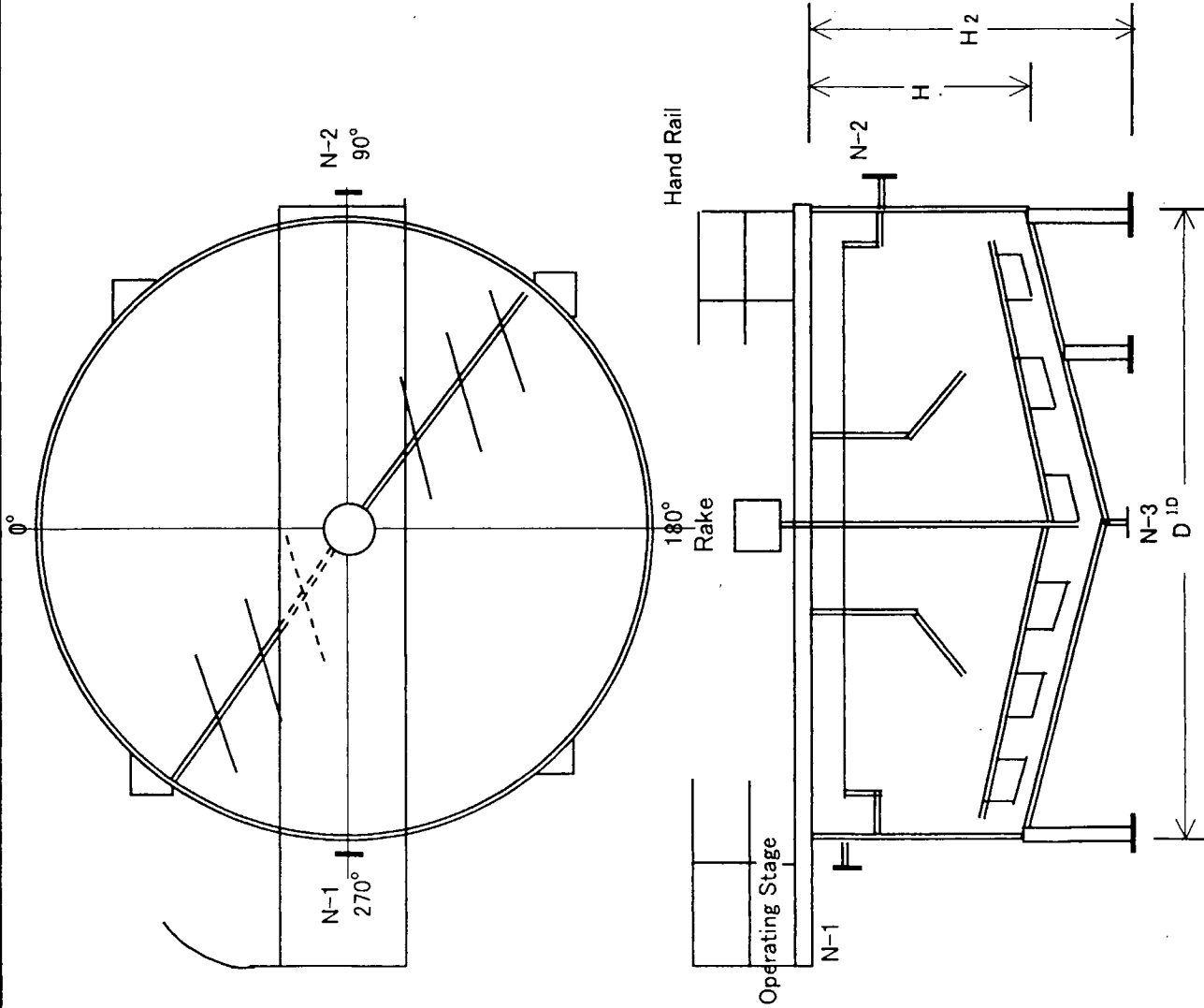
- 1) Type: Cylindrical Tank
(Cone Roof Tank)
- 2) Materials: Carbon Steel
inside Epoxy Coating
- 3) Accessories: Stairway



Nozzle No	Name	Size	No	Note
N-8	Roof Manhole	450A	1	
N-7	Manhole	500A	1	
N-6	Air Vent		1	
N-5	Level Instrument		1	
N-4	Over Flow		1	
N-3	Drain		1	
N-2	Raw Water Outlet		1	
N-1	Raw Water inlet		1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
TITLE	FOR: WASTE WATER TREATMENT UNIT STANDARD DRAWING OF _____m ³ STORAGE TANK (T-2)
DWG. NO.	STD - CD - 22 - SK02 REV.0

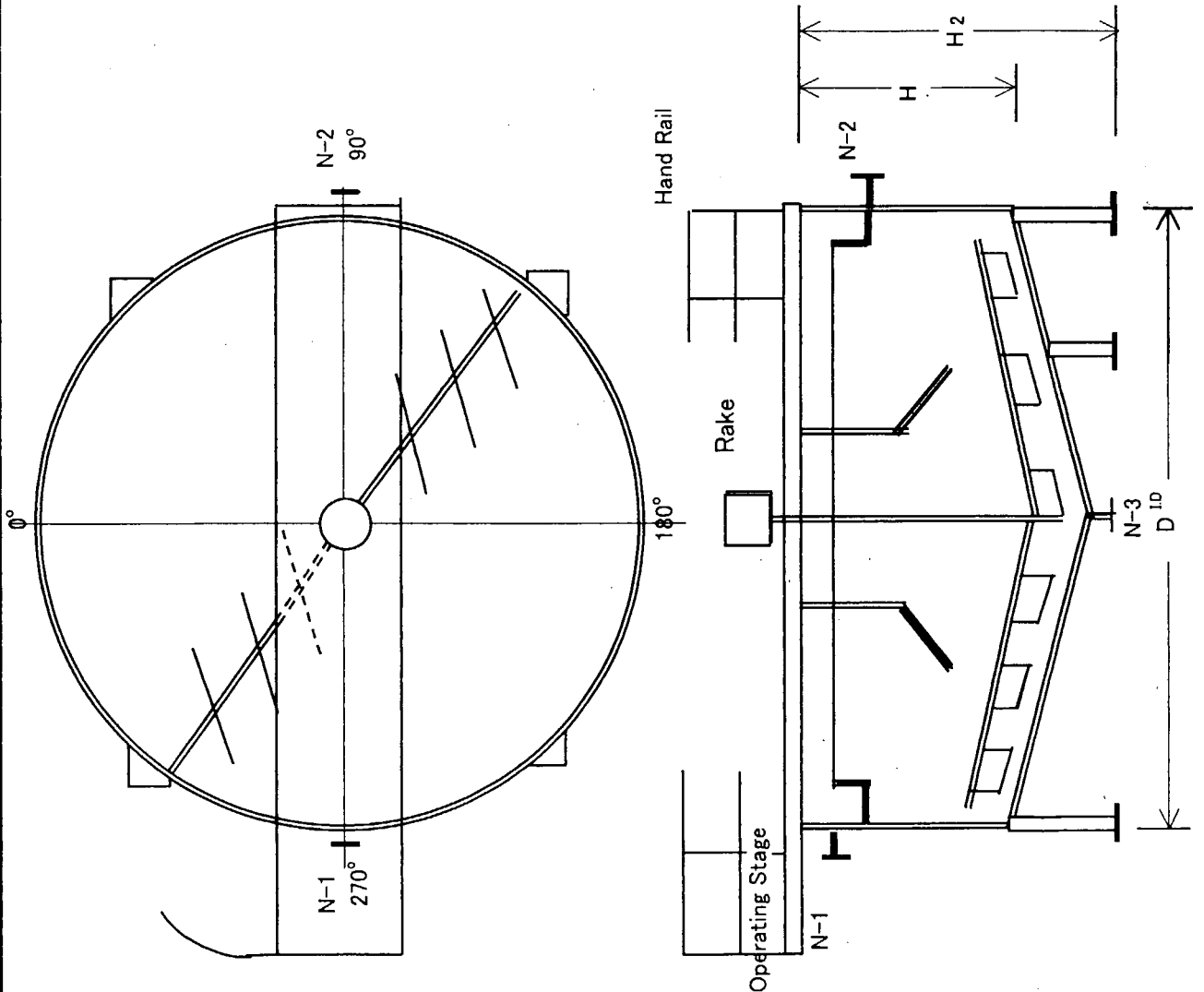
Materials: Carbon Steel/Epoxy coating
 Accessories: Sludge Collection Rake
 Operating Stage
 Stairway



Nozzle No	Name	Size	No	Note
N-4				
N-3	Sludge Outlet		1	
N-2	Treated Water Outlet		1	
N-1	Raw Water inlet		1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY	
TYTLE	FOR: WASTE WATER TREATMENT UNIT STANDARD DRAWING OF _____m ³ /h CLARIFIER (MZ-1)	
DWG. NO.	STD - CD - 29 - SK01	REV.0

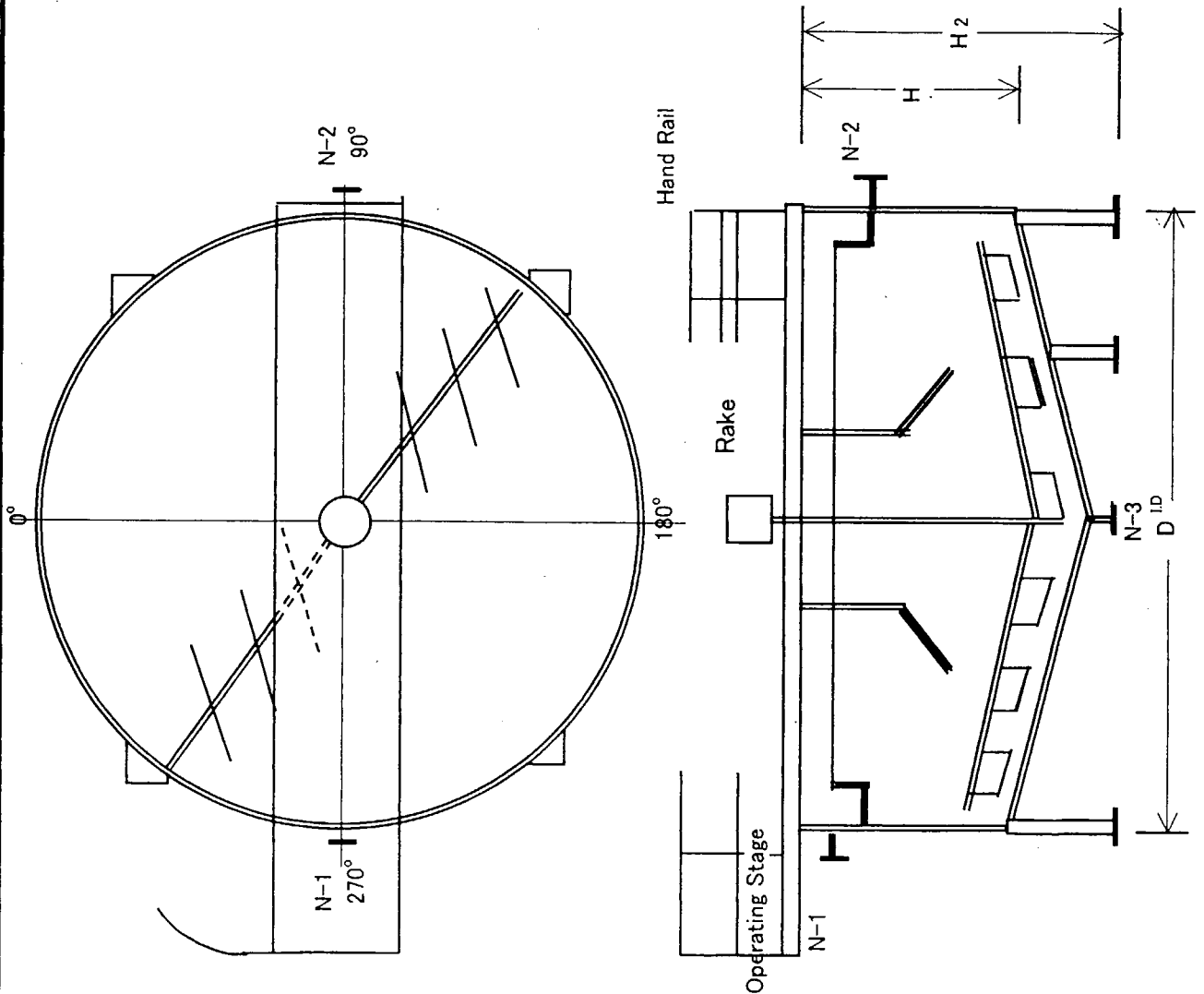
Materials: Carbon Steel/Epoxy coating
 Accessories: Sludge Collection Rake
 Operating Stage
 Stairway



Nozzle No	Name	Size	No	Note
N-4				
N-3	Sludge Outlet		1	
N-2	Treated Water Outlet		1	
N-1	Raw Water inlet		1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY			
TYTLE	FOR: WASTE WATER TREATMENT UNIT STANDARD DRAWING OF _____m ³ /h A. S. SEDIMENTATION TANK (MZ-2)			
DWG. NO.	STD - CD - 29 - SK02 REV.0			

Materials: Carbon Steel/Epoxy coating
 Accessories: Sludge Collection Rake
 Operating Stage
 Stairway



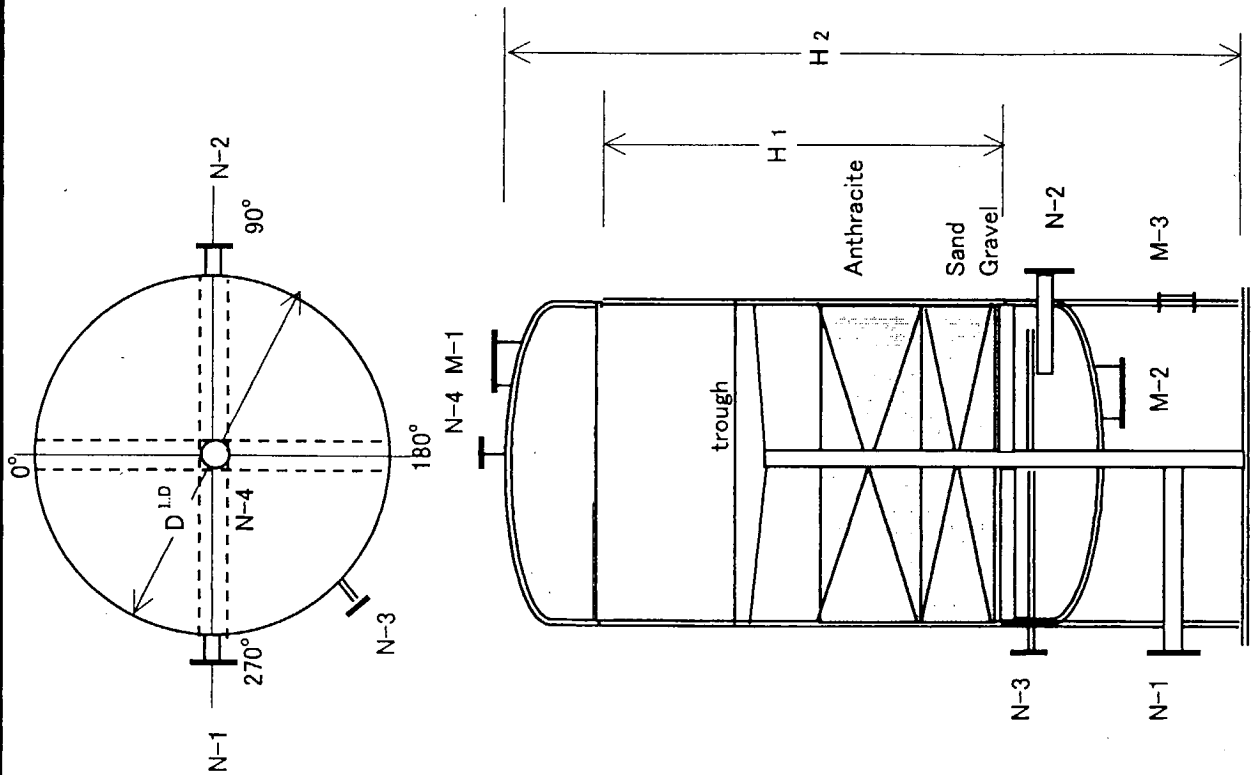
Nozzle No	Name	Size	No	Note
N-4				
N-3	Sludge Outlet		1	
N-2	Treated Water Outlet		1	
N-1	Raw Water inlet		1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY		
TITLE	FOR: WASTE WATER TREATMENT UNIT STANDARD DRAWING OF _____m ³ /h SLUDGE THICKENER (MZ-3)		
DWG. NO.	STD - CD - 29 - SK03	REV.0	

Materials: Carbon Steel/Epoxy Coating

Filter Media: Anthracite + Sand/Gravel

Accessory: Operating Stage Ladder



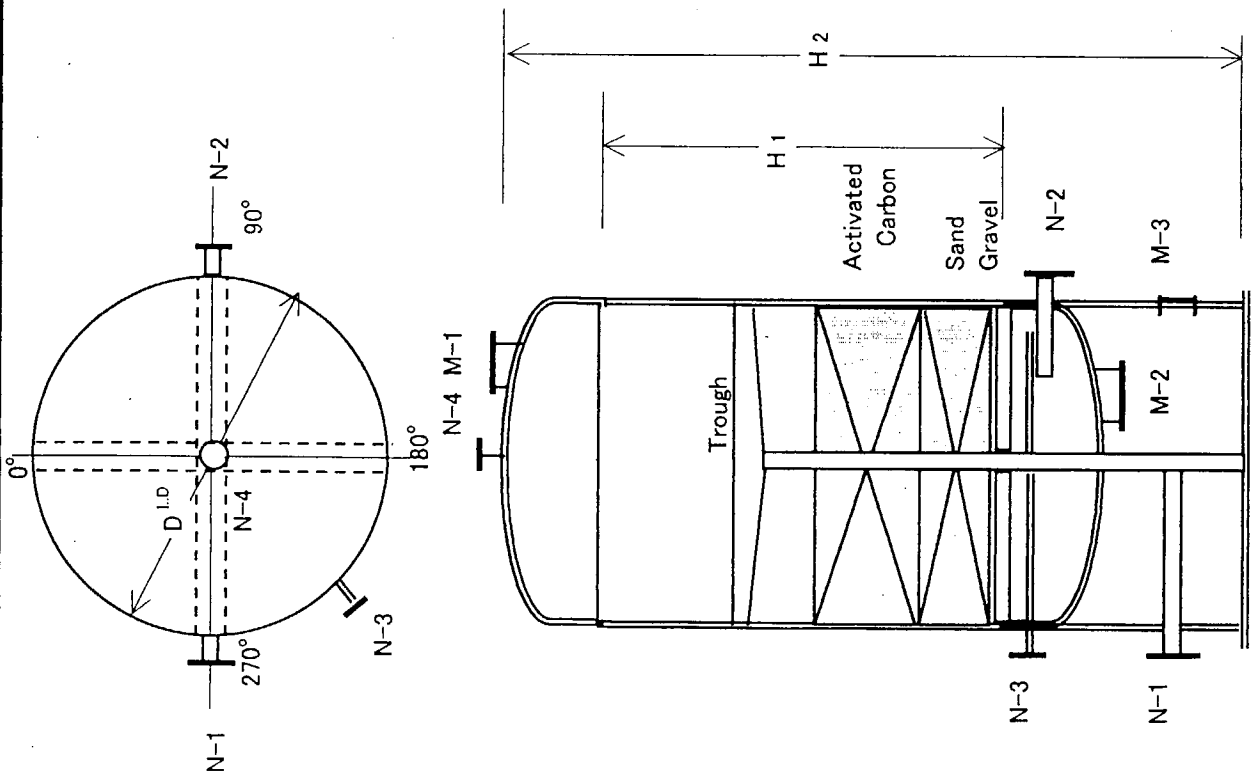
Nozzle No	Name	Size	No	Note
M-3	Manhole	500A	1	
M-2	Manhole	500A	1	
M-1	Manhole	500A	1	
N-4	Auto Air Vent		1	
N-3	Air Inlet		1	
N-2	Filtered Water Outlet/		1	
	Backwash Water Inlet		1	
N-1	Clarified Water inlet/		1	
	Backwash Waste Ouklet		1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY		
TITLE	FOR: WASTE WATER TREATMENT UNIT STANDARD DRAWING OF _____m ³ /h SAND FILTER (F-1) (PRESSURE TYPE)		
DWG. NO.	STD - CD - 29 - SK04		REV.0

Materials: Carbon Steel/Epoxy Coating

Filter Media: Activated Carbon+Sand/Gravel

Accessories: Operating Stage Ladder



Nozzle No	Name	Size	No	Note
M-3	Manhole	500A	1	
M-2	Manhole	500A	1	
M-1	Manhole	500A	1	
N-4	Auto Air Vent		1	
N-3	Air Inlet		1	
N-2	Filtered Water Outlet/		1	
	Backwash Water Inlet		1	
N-1	Clarified Water inlet/		1	
	Backwash Waste Outlet		1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY		
TYTLE	FOR: WASTE WATER TREATMENT UNIT STANDARD DRAWING OF _____m ³ /h ACTIVATED CARBON FILTER (F-2) (PRESSURE TYPE)		
DWG. NO.	STD - CD - 29 - SK05	REV.0	

JAPAN INTERNATIONAL COOPERATION AGENCY

BASIC DESIGN PACKAGE OF

RECOMMENDABLE WASTEWATER TREATMENT PLANT

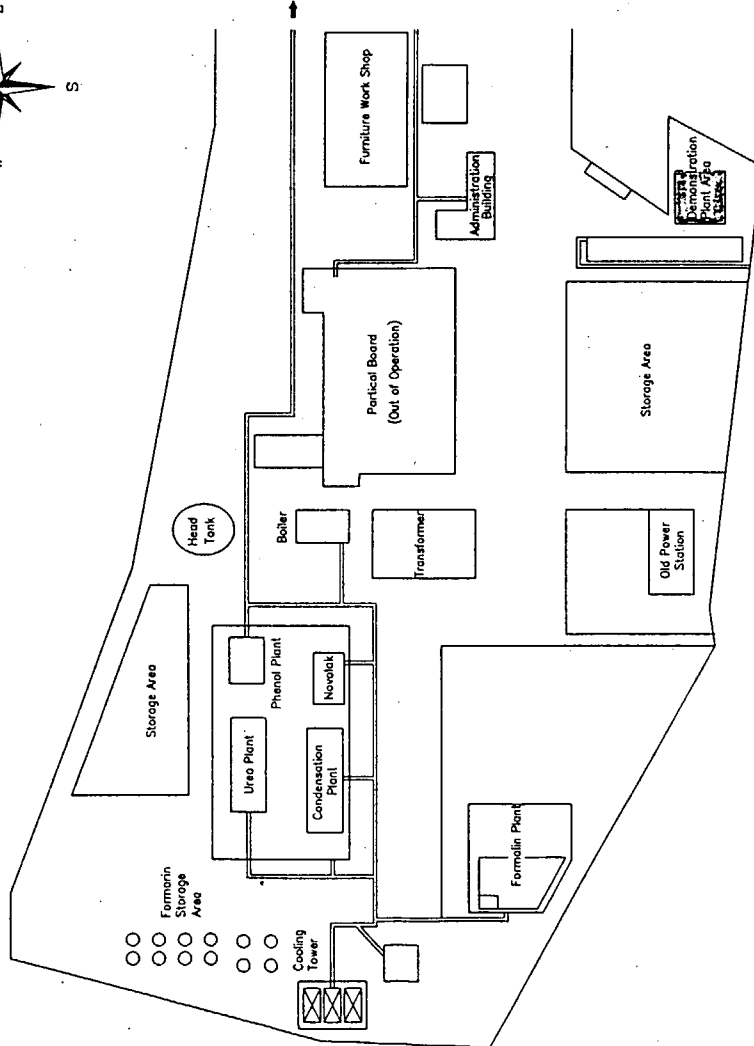
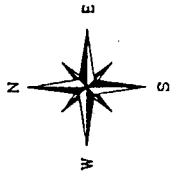
FOR

MANSOURA CO. FOR RESINS AND CHEMICALS

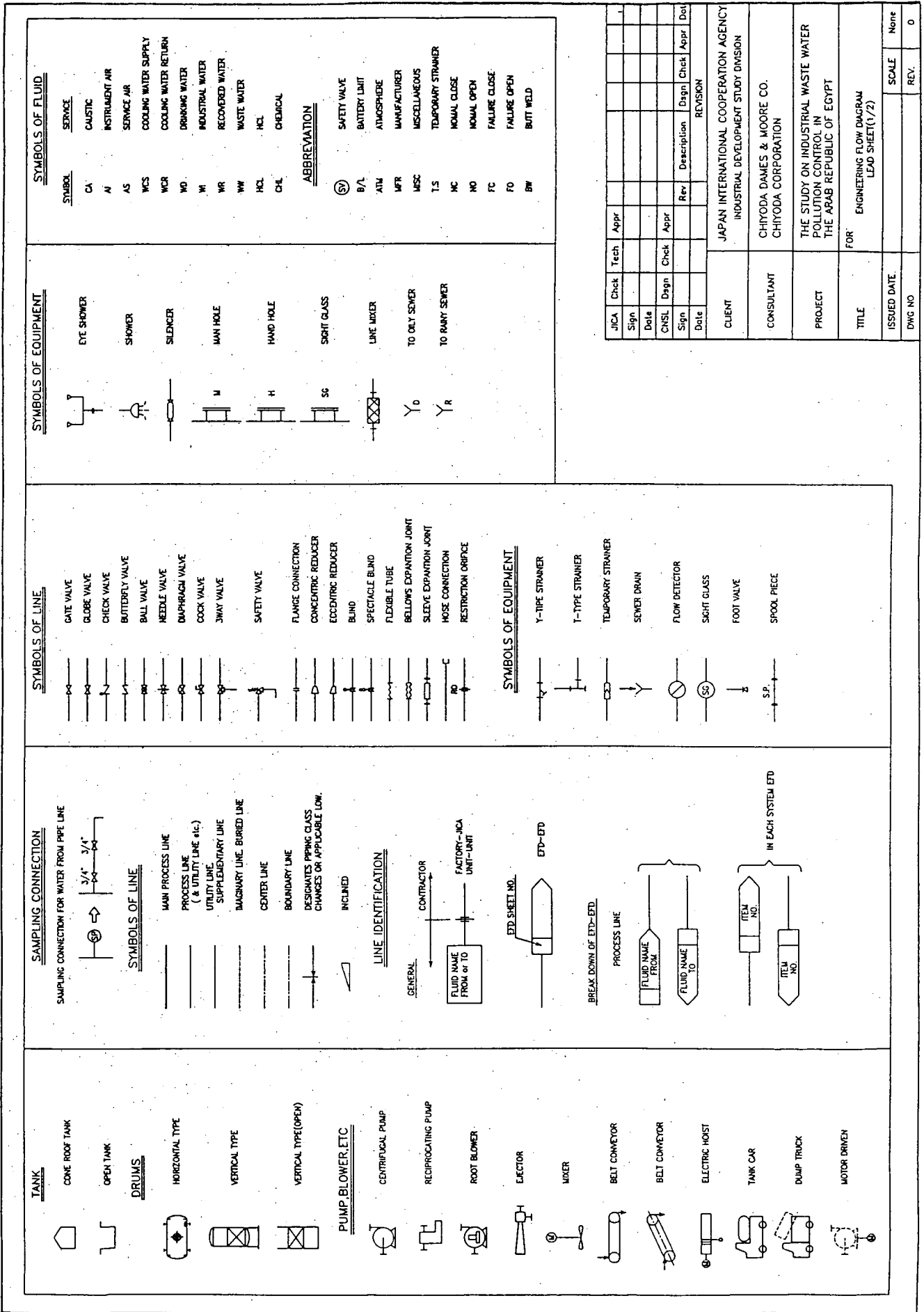
February 2000

CHIYODA DAMES AND MOORE CO.

CHIYODA CORPORATION



JICA Sign	Check	Tech	Appr	Date	CNSL	Dagn	Check	Appr	Date	Rev	Description	Dagn	Check	Appr	Date
REVISION															
CLIENT JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION															
CONSULTANT CHIYODA DAMES & MOORE CO. CHIYODA CORPORATION															
PROJECT THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT															
TITLE FOR MANSOURA CO., FOR RESINS AND CHEMICALS LOCATION OF RECOMMENDABLE W.W.T. PLANT															
ISSUED DATE														SCALE	
DWG NO														REV.	
RC-BD-SK-01														0	



INSTRUMENT SYMBOLS AND LEGEND

1. INSTRUMENT LINE SYMBOLS
 PNEUMATIC SIGNAL
 ELECTRIC SIGNAL

2. GENERAL INSTRUMENT SYMBOLS
 LOCALLY MOUNTED
 MOUNTED ON BOARD
 MOUNTED ON LOCAL BOARD
 TRANSMITTER
 LAMP
 INSTRUMENT IN MAIN PANEL

3. CONTROL VALVE ACTUATOR SYMBOLS
 DAMPER
 CYLINDER WITH SPRING
 CYLINDER WITH SPRING
 SOLENOID
 MOTOR
 WITH HAND WHEEL
 WITH HAND WHEEL
 WITH LIGHT SWITCH

4. SYMBOLS FOR SELF-ACTUATED REGULATORS
 BACKPRESSURE REGULATOR SELF-CONTAINED
 PRESSURE-REDUCING REGULATOR SELF-CONTAINED
 BACKPRESSURE REGULATOR WITH EXTERNAL PRESSURE TAP
 PRESSURE-REDUCING REGULATOR WITH EXTERNAL PRESSURE TAP

5. SYMBOLS FOR TEMPERATURE, FLOW AND LEVEL INSTRUMENTS
 5-1-TEMPERATURE
 TEMPERATURE CONNECTION WITH WELL
 TEMPERATURE INDICATOR FILLED SYSTEM TYPE
 BIMETALLIC TYPE THERMOMETER OR OTHER LOCAL UNCLASSIFIED TEMPERATURE INDICATOR
 TEMPERATURE TRANSMITTER
 THERMOCOUPLE DETECTOR
 TEMPERATURE SWITCHES (DOUBLE ELEMENT)
 TEMPERATURE INDICATOR (SINGLE ELEMENT PARALLEL CONNECTION IN CONTROL ROOM)

5-2-PRESSURE
 PRESSURE INDICATOR DIRECT CONNECTION
 PRESSURE INDICATOR WITH INTERNAL PROTECTOR WITH FILLED SYSTEM
 ORifice-FLANGE ASSEMBLY
 VENTURy OR FLOW NOZZLE
 TURBINE OR PROPELLER TYPE PRIMARY ELEMENT
 FLOW RESTRICTION ORIFICE
 ROTAMETER TYPE FLOW INDICATOR
 POSITIVE DISPLACEMENT TYPE FLOW TOTALIZING INDICATOR
 WASHCET FLOW METER TYPE FLOW TOTALIZING INDICATOR

5-4-LEVEL
 TANK
 LEVEL SWITCH
 TANK
 LEVEL TRANSMITTER (INTERNAL FLOAT TYPE OR INTERNAL DISPLACER TYPE)
 TANK
 LEVEL TRANSMITTER (EXTERNAL DISPLACER TYPE)
 CAPACITANCE TYPE (D/P CELL TYPE)
 DRYING TYPE LEVEL TRANSMITTER WITH INTEGRAL SENSOR

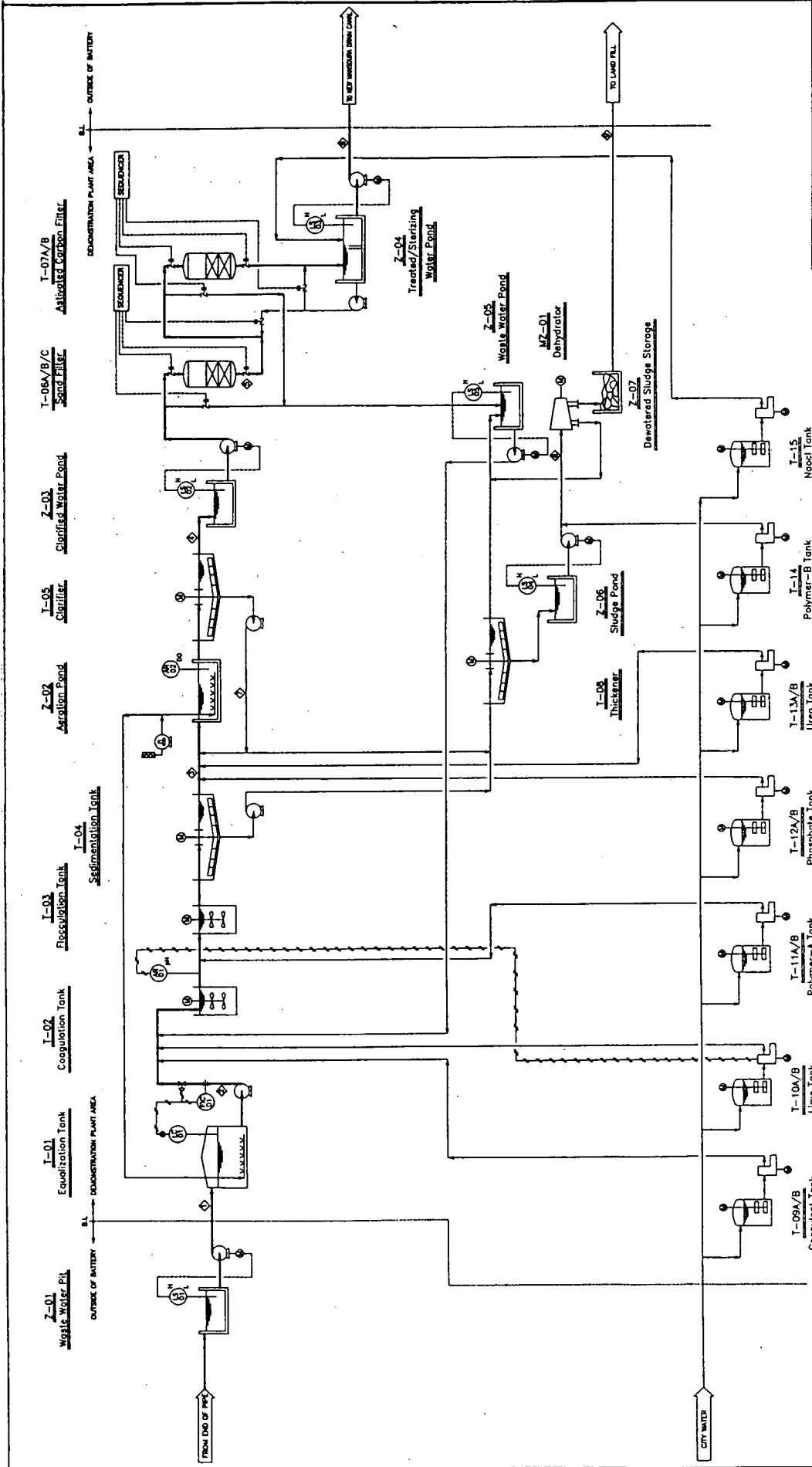
LEVEL INDICATOR (FLOAT TYPE)
LEVEL INDICATOR (RAPE TYPE)
ORICE GLASS

5-5-OTHERS
 DAMPER
 SAFETY VALVE
 SOLENOID VALVE
 SOLENOID VALVE WITH MANUAL RESET
 PURGE

FUNCTIONAL IDENTIFICATION LETTERS

LETTER	PROCESS VARIABLE / FIRST LETTER	FUNCTION / SUCCEEDING LETTER
A	ANALYSIS	ALARM
B	BURNER FLAME	
C	ELECTRICAL CONDUCTIVITY	CONTROL
D	DENSITY	
E	ELECTRIC VARIABLE	MEASURING ELEMENT
F	FLOW RATE	
G	GEOMETRICAL GAUGING	LOCAL INDICATE
H	HAND	HAND OPERATE
I		INDICATE
J		COMPUTER CONTROL
K	LEVEL	LOADING
L	LEVEL	LOGGING
M	MEASURE OR HUMIDITY	
N	FREQUENCY	
O	PRESSURE	SAMPLING POINT
P	CALORIC	INTEGRATE OR TOTALISE
R	SPEED REVOLUTION OR TORQUE	RECORD
S	SPEED REVOLUTION OR TORQUE	SWITCHING/SEQUENCE TRANSMIT
T	TEMPERATURE	TRANSMIT
U	UNCLASSIFIED OR MULTIPLE VARIABLE	UNCLASSIFIED OR MULTIPLE FUNCTION
V	VELOCITY	VALVE DAMPER OR LOWER WEIGHT OR FORCE
W	WEIGHT OR FORCE	WELL
X	OTHER VARIABLE	OTHER FUNCTION
Y		COMPUTE OR RELAY
Z		SAFETY OR EMERGENCY

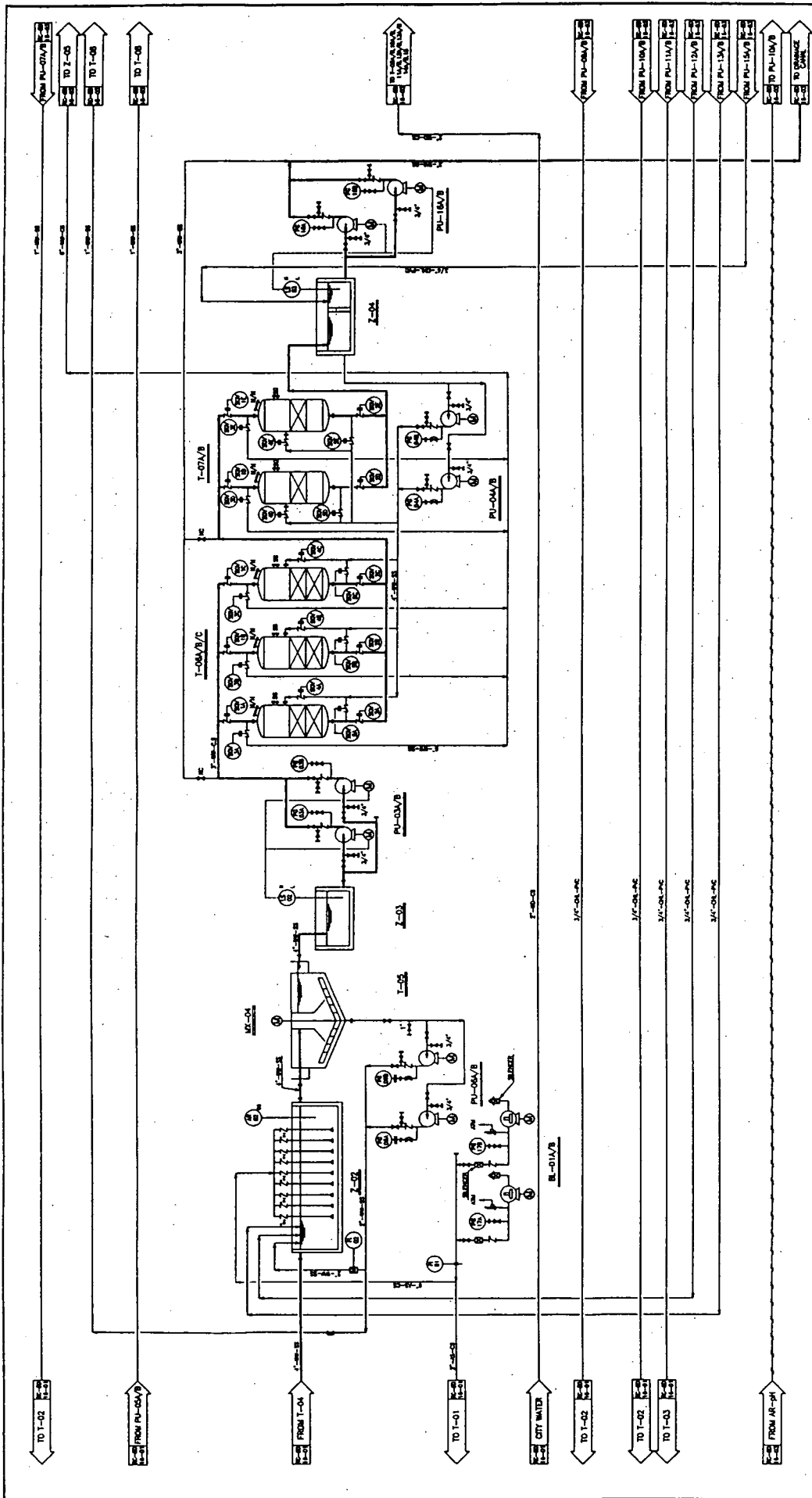
JICA Sign	Check	Tech	Appr
Sign			
Date			
CHSL	Deign	Check	Appr
Sign	Deign	Check	Appr
Date			
REVISION			
Rev	Description	Deign	Check
Date			
JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION			
CLIENT			
INDUSTRIAL DEVELOPMENT STUDY DIVISION			
CONSULTANT			
CHYODA DAMES & MOORE CO. CHYODA CORPORATION			
PROJECT			
THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT			
TITLE			
FOR ENGINEERING FLOW DIAGRAM LEAD SHEET(2/2)			
ISSUED DATE	SCALE	None	
DWG NO	REV.	0	



Rev	Chg	Appr	Appr	Rev	Chg	Appr	Appr	Rev	Chg	Appr	Appr
Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date

CLIENT: JAPAN INTERNATIONAL COOPERATION AGENCY
 INDUSTRIAL DEVELOPMENT STUDY DIVISION
 CONSULTANT: CHRYDIA DAMES & MOORE CO.
 CHRYDIA CORPORATION
 PROJECT: THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
 FOR MANSOURA CO. FOR RESINS AND CHEMICALS
 PROCESS FLOW DIAGRAM OF W.W.T. DEMONSTRATION PLANT
 ISSUED DATE: _____ SCALE: _____
 Dwg No: S-BD-15-01 REV: 0

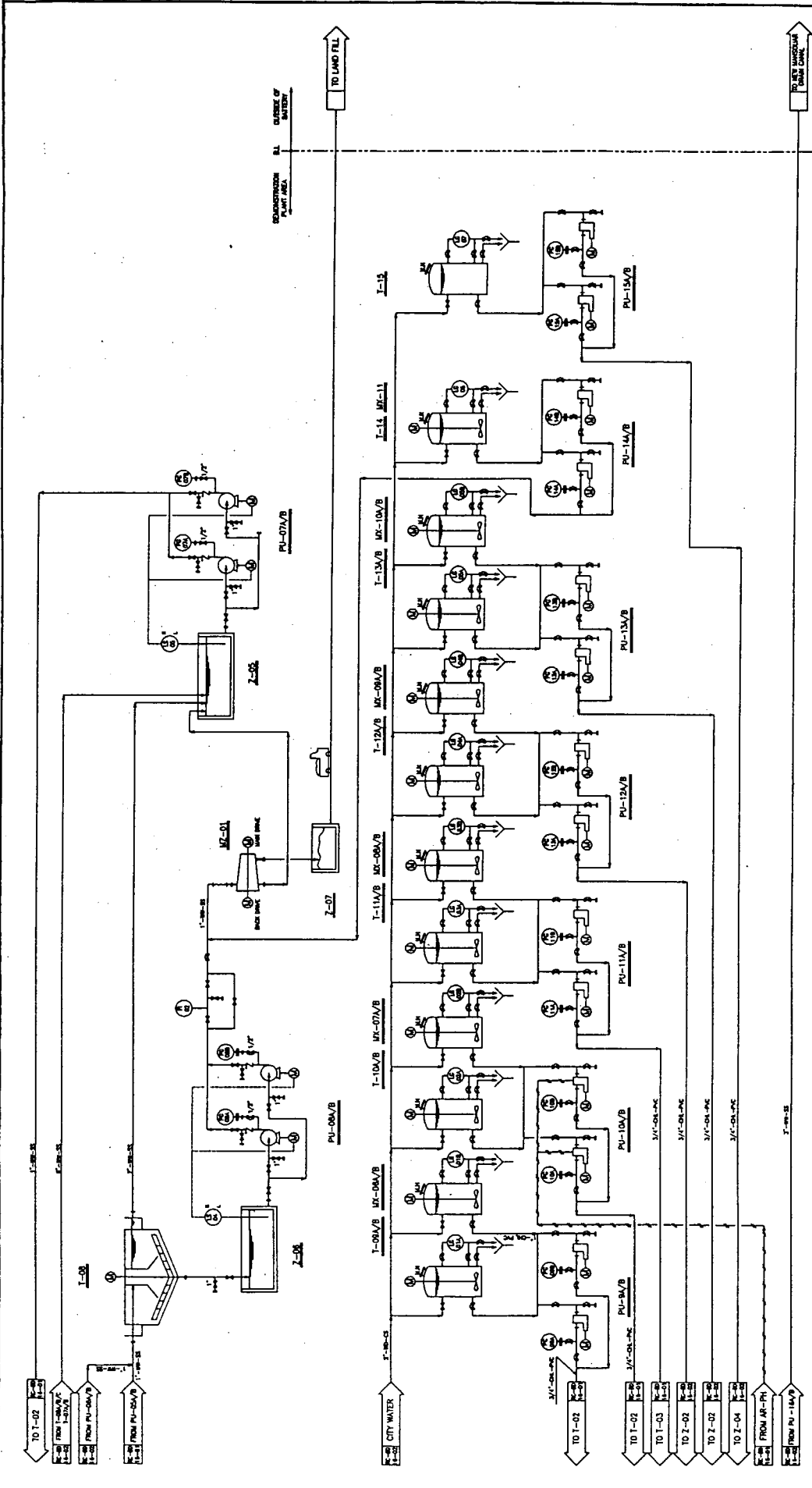
Item	Stream No	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Max flow Regulation
Flow Rate MAX	[m ³ /d]	40	30	—	—	—	—	7.5	0.4	73kg/h	—
Flow Rate Av.	[m ³ /h]	30	30	—	—	—	—	7.5	0.4	73kg/h	—
pH	[—]	6-7	7-8	6-7	6-7	6-9	6-7	6-7	6-7	6-9	—
Conductivity	[μs/cm]	2,000	2,000	2,000	—	—	—	—	—	—	—
SS	[mg/L]	100	100	20	20	5	1	10,000	30,000	150,000	50
Oil & Grease	[mg/L]	20	20	5	3	2	1	3	—	—	10
BOD	[mg/L]	1,300	1,300	1,000	50	30	20	—	—	—	60
CODCr	[mg/L]	2,400	2,400	2,200	100	80	30	—	—	—	100
Phenol	[mg/L]	460	460	460	0.5	0.005	—	—	—	—	0.005



Rev.	Drawn	Check	Approved	Date

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION	
CONSULTANT	CHYODA DAMES & MOORE CO. CHYODA CORPORATION	
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER TREATMENT PLANT FOR THE ARAB REPUBLIC OF EGYPT	
TITLE	FOR MANSOURIA CO. FOR DRINKING AND CHEMICALS WASTE TREATMENT PLANT	
DESIGNED DATE	BASED DESIGN OF WASTE WATER TREATMENT PLANT (1984/01/27)	
DWG. NO.	W-14-03	REV. 0

Item No.	Service	Size (m)	Design Press (kg/cm ²)	Design Temp.	Material/Type
7-02	Aeration Pond	14.0x20.0x3.0 (DxLxH)	0.5	35	Vertical
7-03	Clarified Water Pond	2.0x2.0x3.0 (DxLxH)	0.5	35	R.C./Open
7-04	Treated/Reserve Water Pond	3.0x4.0x3.0 (DxLxH)	0.5	35	R.C./Open
1-05	Clarifier	7.0x14.0x3.0 (DxLxH)	0.5	35	C.S./Epoxy Coating
1-06A/B/C	Sand Filter	1.0x1.0x0.8 (DxLxH)	0.3	35	C.S./Epoxy Coating
1-07A/B	Activated Carbon Filter	1.0x1.0x0.8 (DxLxH)	0.3	35	C.S./Epoxy Coating
PU-03A/B	Filler Feed Pump	30m ³ /Hr (15m ³ /min)	3.5	35	SCS13/Centrifugal
PU-04A/B	Backwash Pump	60m ³ /Hr (30m ³ /min)	3.5	35	SCS13/Centrifugal
PU-05A/B	Return Sludge Pump	15m ³ /Hr (7.5m ³ /min)	3.5	35	SCS13/Centrifugal
PU-15A/B	Treated Water Pump	30m ³ /Hr (15m ³ /min)	3.5	35	SCS13/Centrifugal
B-01A/B	Boiler	3.0x3.0x3.0 (DxLxH)	3.5	35	FC/Steel Type



NO.	CHKD	TRNG	APPR	DATE	REV.	DESCRIPTION	DRGN	CHKD	APPR	DATE

CLIENT	PROJECT	TITLE	ISSUED DATE	DWG NO	SCALE	REV.
JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY PROGRAM	THE TREATMENT OF INDUSTRIAL WASTE WATER POLLUTION CONTROL OF EGYPT FOR MANSOURA CO. FOR RESINS AND CHEMICALS BY CHYODA CORPORATION	BASIC DESIGN OF WASTE WATER ENGINEERING (LOW DRAINAGE)		RC-18-11-03		0

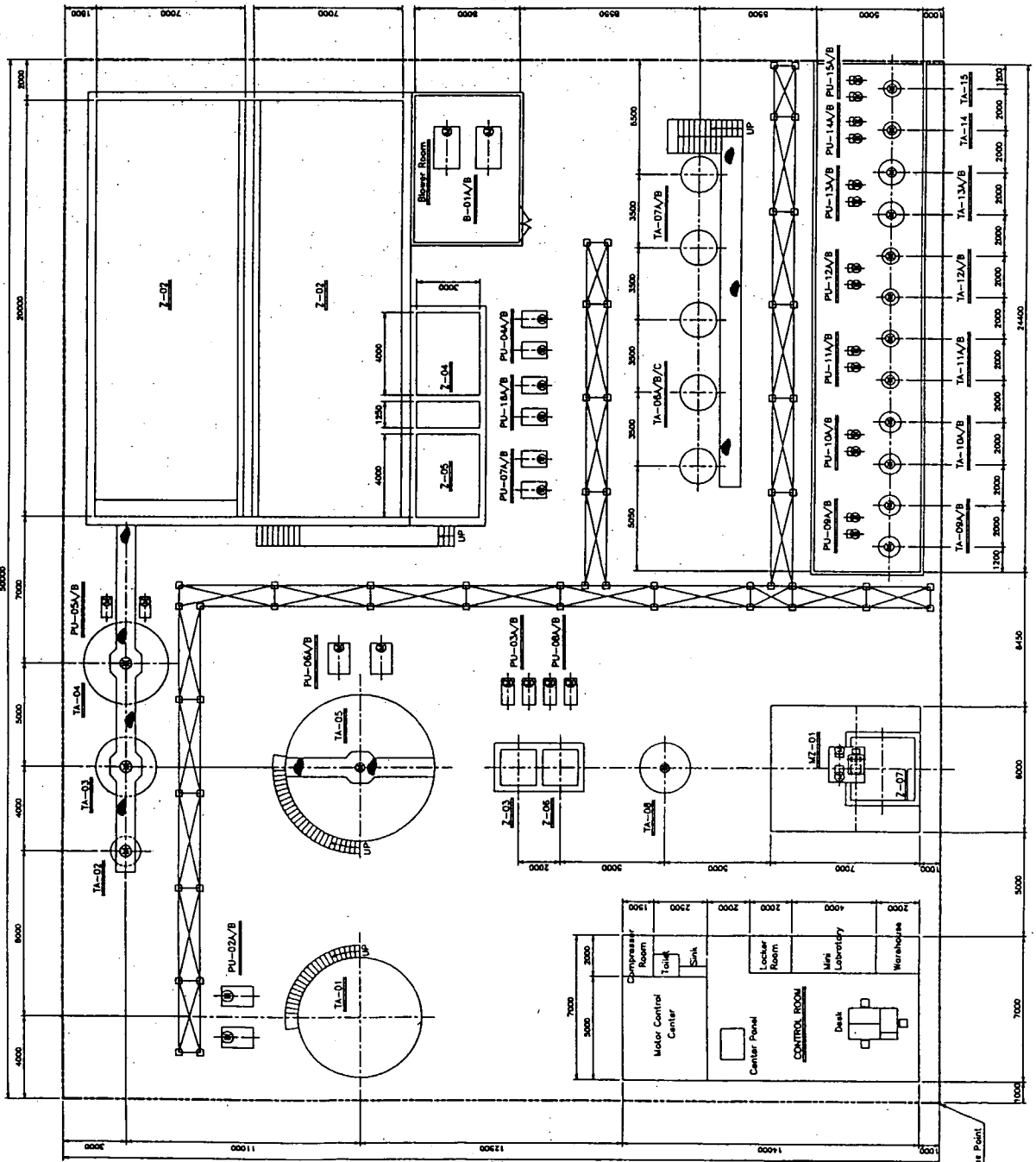
Item No.	PU-01A/B	PU-02A/B	PU-03A/B	PU-04A/B	PU-05A/B	PU-06A/B	PU-07A/B	PU-08A/B	PU-09A/B	PU-10A/B	PU-11A/B	PU-12A/B	PU-13A/B	PU-14A/B	PU-15A/B
Service	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump
Capacity	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)
Power	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Material	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron

Item No.	I-01	I-02	I-03	I-04	I-05	I-06	I-07	I-08	I-09	I-10	I-11	I-12	I-13	I-14	I-15
Service	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump	Compressed Pump
Capacity	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)	7.7 (m³/Min)
Power	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Material	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron

Equipment No.	Symbol	Service	Quantity	Unit	Type of Equipment
1	11	Compressor Tank	1	Set	M.P. (200/150) Tank
2	11	Compressor Tank	1	Set	M.P. (200/150) Tank
3	11	Compressor Tank	1	Set	M.P. (200/150) Tank
4	11	Compressor Tank	1	Set	M.P. (200/150) Tank
5	11	Compressor Tank	1	Set	M.P. (200/150) Tank
6	11	Compressor Tank	1	Set	M.P. (200/150) Tank
7	11	Compressor Tank	1	Set	M.P. (200/150) Tank
8	11	Compressor Tank	1	Set	M.P. (200/150) Tank
9	11	Compressor Tank	1	Set	M.P. (200/150) Tank
10	11	Compressor Tank	1	Set	M.P. (200/150) Tank
11	11	Compressor Tank	1	Set	M.P. (200/150) Tank
12	11	Compressor Tank	1	Set	M.P. (200/150) Tank
13	11	Compressor Tank	1	Set	M.P. (200/150) Tank
14	11	Compressor Tank	1	Set	M.P. (200/150) Tank
15	11	Compressor Tank	1	Set	M.P. (200/150) Tank
16	11	Compressor Tank	1	Set	M.P. (200/150) Tank
17	11	Compressor Tank	1	Set	M.P. (200/150) Tank
18	11	Compressor Tank	1	Set	M.P. (200/150) Tank
19	11	Compressor Tank	1	Set	M.P. (200/150) Tank
20	11	Compressor Tank	1	Set	M.P. (200/150) Tank

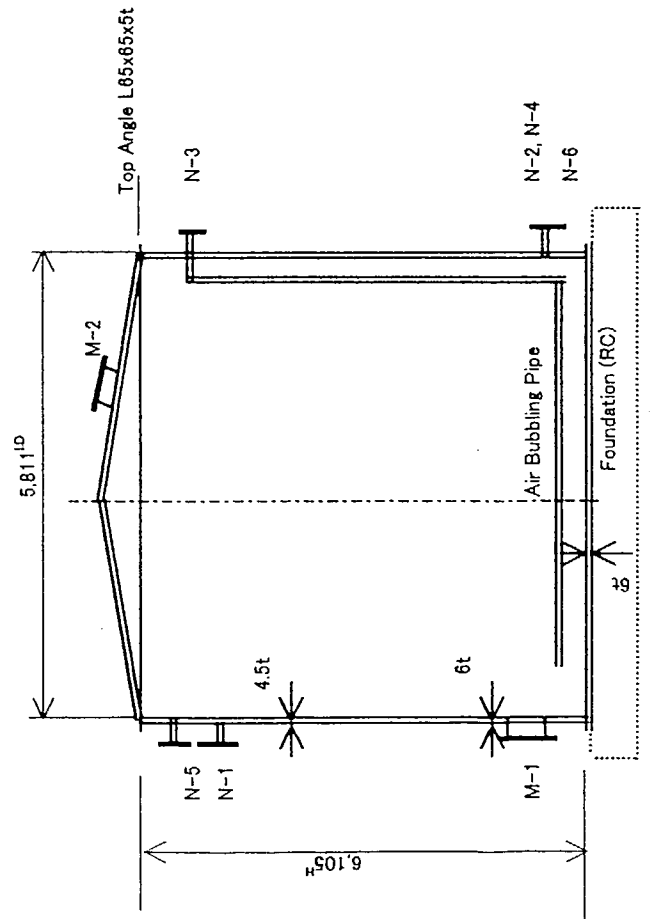
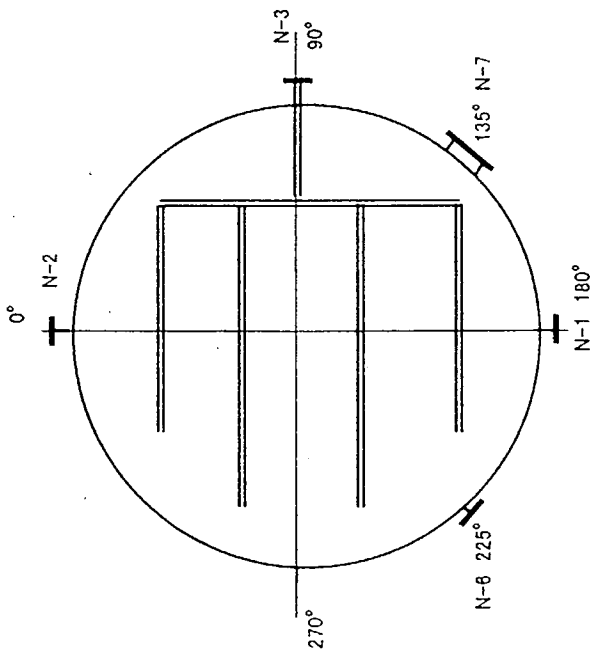
REVISION		
No.	Description	Date

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION
CONSULTANT	CHYODA DAIES & MOORE CO. CHYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL AT THE ARAB REPUBLIC OF EGYPT
TITLE	FOR MAHULABA CO. FOR RESINS AND CHEMICALS BASE DESIGN OF WASTE WATER PLOT PLAN
DESIGN DATE	NOV-80-12-01
DWG NO	SCALE 1/100
REV.	D



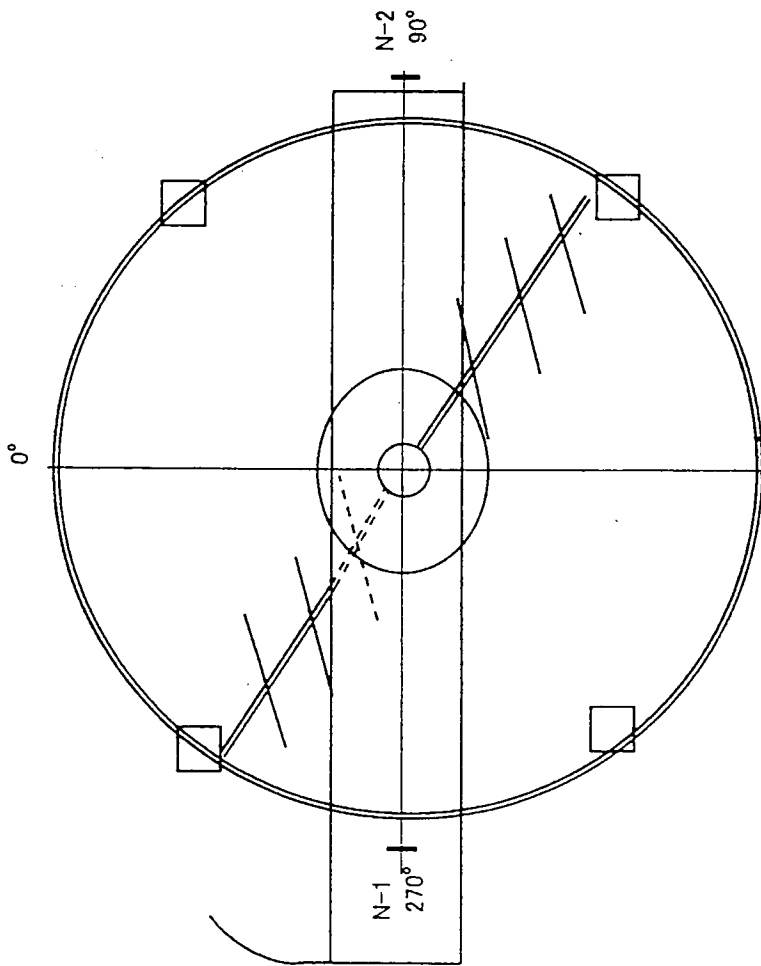
NOTE:
 1) Type : Vertical Cylindrical Tank
 (Open Top Tank)
 2) Materials : Carbon Steel,
 inside Epoxy Coating
 3) Accessories: Stairway
 Inside Ladder
 Air Bubbling Tube

Loading Data :
 : Empty Weight 9.7 ton
 : Full Water 130 ton



No	Name	Size	No	Note
M-2	Manhole	500Φ	1	
M-1	Manhole	500Φ	1	
N-6	Level Instrument	2"	1	
N-5	Over Flow	4"	1	
N-4	Drain	2"	1	
N-3	Bubbling Air Inlet	2"	1	
N-2	Raw Water Outlet	4"	1	
N-1	Raw Water inlet	4"	1	

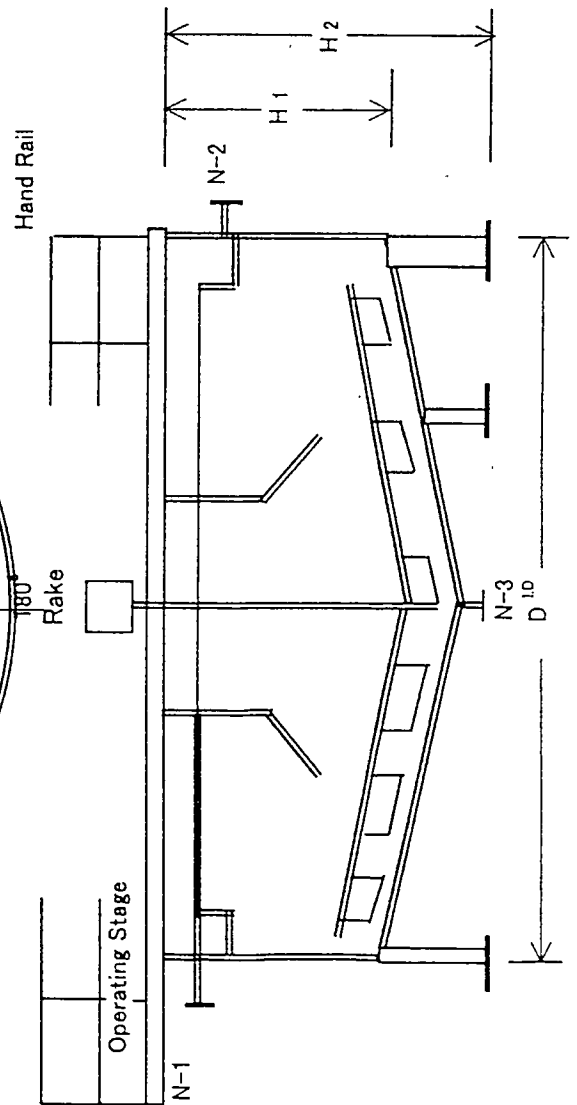
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY		
TITLE	FOR: MANSOURA CO., FOR RESINS AND CHEMICALS 120 m ³ EQUALIZATION TANK (T - 01) WASTEWATER TREATMENT PLANT		
DWG. NO	RC - BD - 22 - SK01	REV.	0



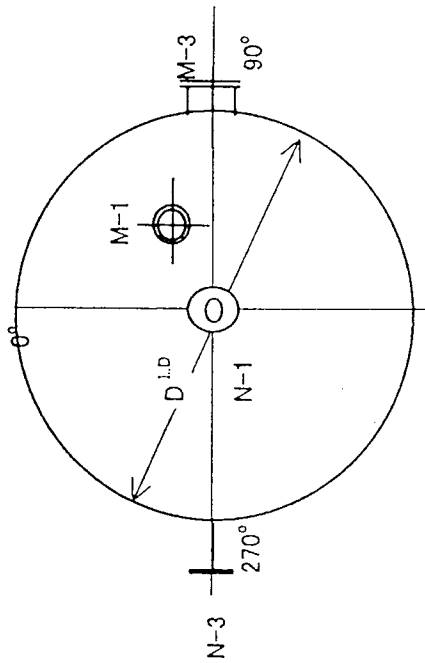
NOTE:
 1) Type : Vertical Cylindrical Tank
 (Open Top Tank)
 2) Materials : Carbon Steel
 inside Epoxy Coating
 3) Accessories: Stairway
 Inside Ladder
 Air Bubbling Tube

Equipment No	Service	D	H ₁	H ₂	W ₁	W ₂
T-04	Sedimentation Tank	4,000	3,500	4,500	3.2	48.2
T-05	Clarifier	7,000	3,000	4,000	6.2	128.2
T-08	Thickener	2,400	3,000	4,000	1.5	14.5

W₁ : Empty Weight ton
 W₂ : Full Water ton



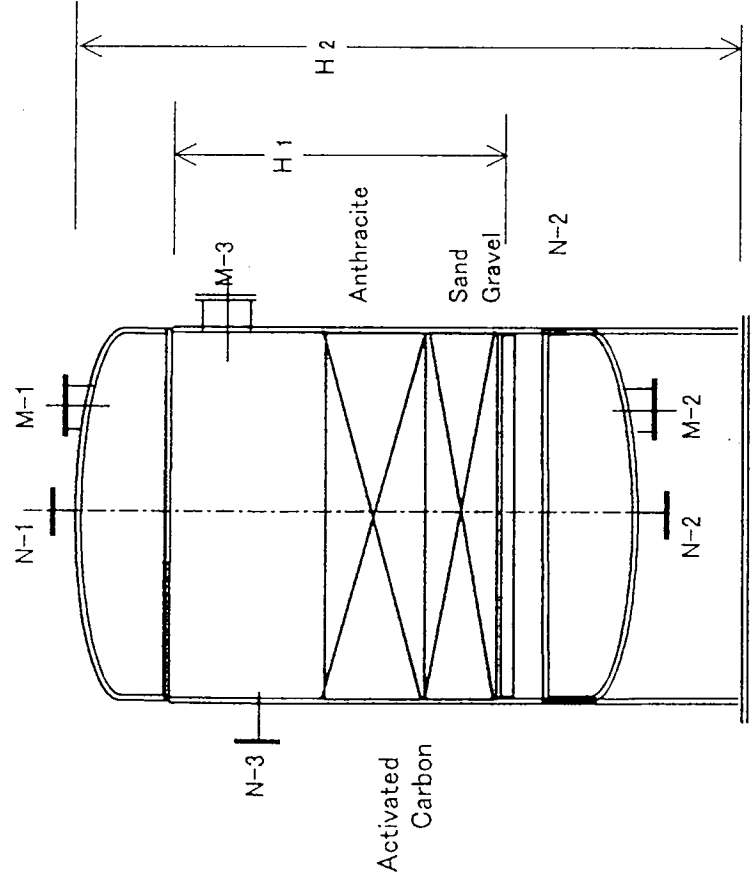
N-4						
N-3	Sludge Outlet	2B	1			
N-2	Water Outlet	6B	1			
N-1	Water inlet	6B	1			
No	Name	Size	No	No	Note	
CLIENT JAPAN INTERNATIONAL COOPERATION AGENCY						
FOR: MANSOURA CO. FOR RESINS AND CHEMICALS						
TYTLE SEDIMENTATION TANK, CLARIFIER & THICKENER						
DWG. NO WASTEWATER TREATMENT PLANT						
RC - BD - 22 - SK02					REV.	0



Equipment No	Service	D	H ₁	H ₂	W ₁	W ₂
T-06A/B/C	Sand Filter	1,800	4,000	8,000	8.9	18.5
T-05A/B	Activated Carbon Filter	1,800	4,500	8,500	8.8	17.8

NOTE:
 1) Type : Vertical Cylindrical Tank
 (Open Top Tank)
 2) Materials : Carbon Steel
 Inside Epoxy Coating
 3) Accessories: Stairway
 Inside Ladder
 Air Bubbling Tube

W₁ : Empty Weight ton
 W₂ : Full Water ton

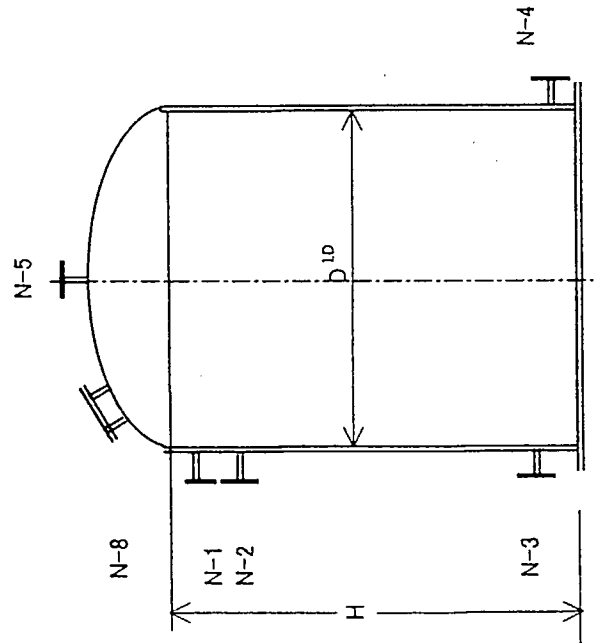
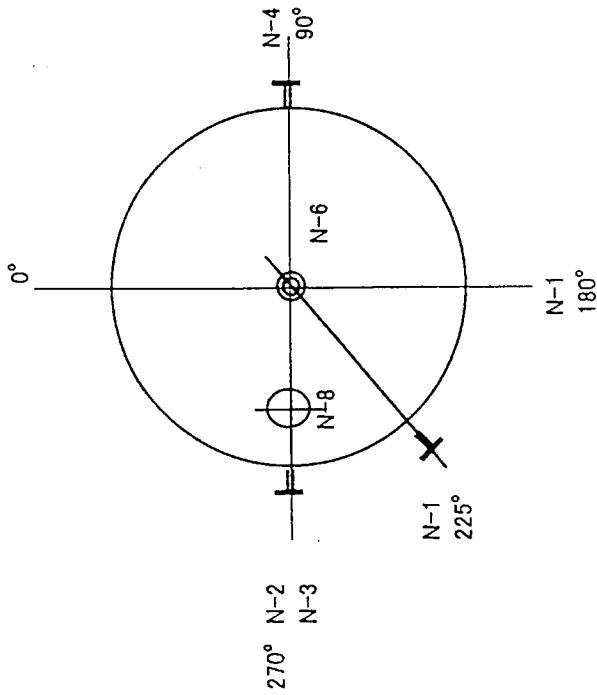


M-3	Manhole	500Φ	1			
M-2	Manhole	500Φ	1			
M-1	Manhole	500Φ	1			
N-3	Surface Wash water Inlet	2"	1			
N-2	Filtered Water Outlet/ Backwash Water Inlet	4"	1			
N-1	Clarified Water inlet/ Backwash Waste Outlet	6"	1			
No	Name	Size	No	No	Note	
CLIENT : JAPAN INTERNATIONAL COOPERATION AGENCY						
FOR: MANSOURA CO., FOR RESINS AND CHEMICALS						
TYTLE : SAND FILTER & ACTIVATED CARBON FILTER						
WASTEWATER TREATMENT PLANT						
DWG. NO	RC - BD - 22 - SK03				REV.	0

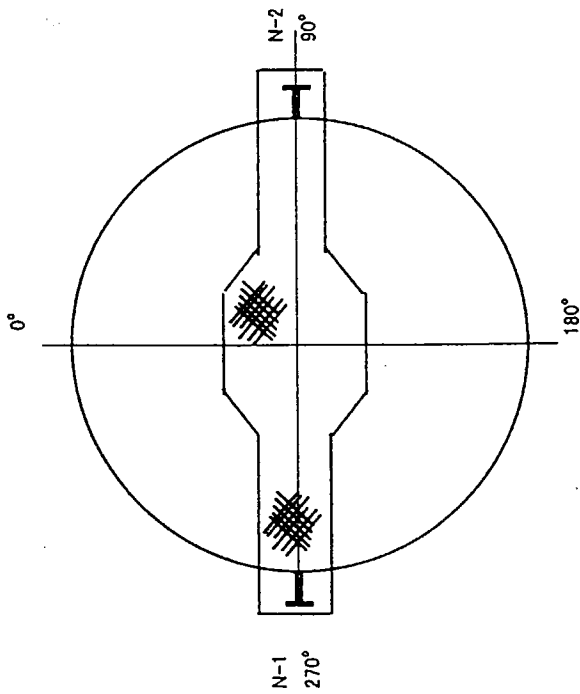
NOTE: : Vertical Cylindrical Tank
 1)Type : Vertical Cylindrical Tank
 2)Materials : FRP
 3)Accessories: Level Gage
 Man-hole

Equipment No	Service	D	H ₁	H ₂	W ₁	W ₂
T-09A/B	Coagulation Tank	1,000	1,300	6,000	0.08	1
T-10A/B	Lime Tank	1,000	1,300	6,500	0.08	1
T-11A/B	Polymer-A Tank	800	1,000	6,000	0.04	0.5
T-12A/B	Phosphate Tank	800	1,000	6,500	0.04	0.5
T-13A/B	Urea Tank	1,200	1,800	6,000	0.1	2
T-14A/B	Polymer-B Tank	800	1,000	6,500	0.04	0.5
T-15A/B	NaOCl Tank	800	1,000	6,000	0.04	0.5

W₁ : Empty Weight ton
 W₂ : Full Water ton



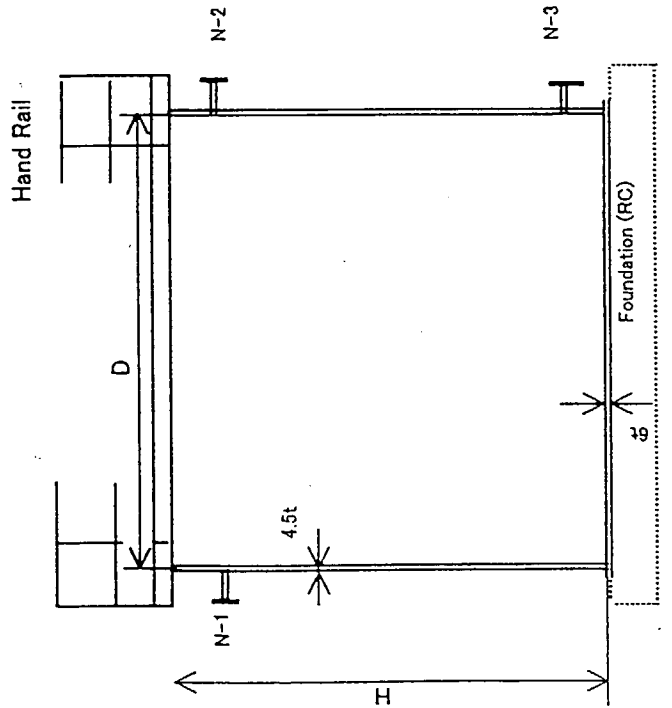
M-1	Manhole	400 Φ	1
N-5	Vent	1"	1
N-4	Drain	1"	1
N-3	Level Gage	3/4"	1
N-2	Level Gage	3/4"	1
N-1	Water Inlet	1"	1
No	Name	Size	No
CLIENT : JAPAN INTERNATIONAL COOPERATION AGENCY			
FOR: MANSOURA CO.,FOR RESINS AND CHEMICALS			
CHEMICAL TANK			
TYTLE : WASTEWATER TREATMENT PLANT			
DWG. NO	RC - BD - 22 - SK04	REV.	0



NOTE:
 1) Type : Vertical Cylindrical Tank
 (Open Top Tank)
 2) Materials : Carbon Steel
 inside Epoxy Coating
 3) Accessories: Stairway

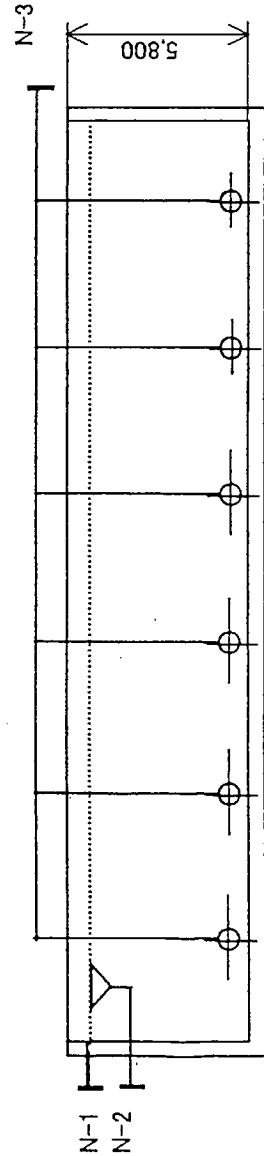
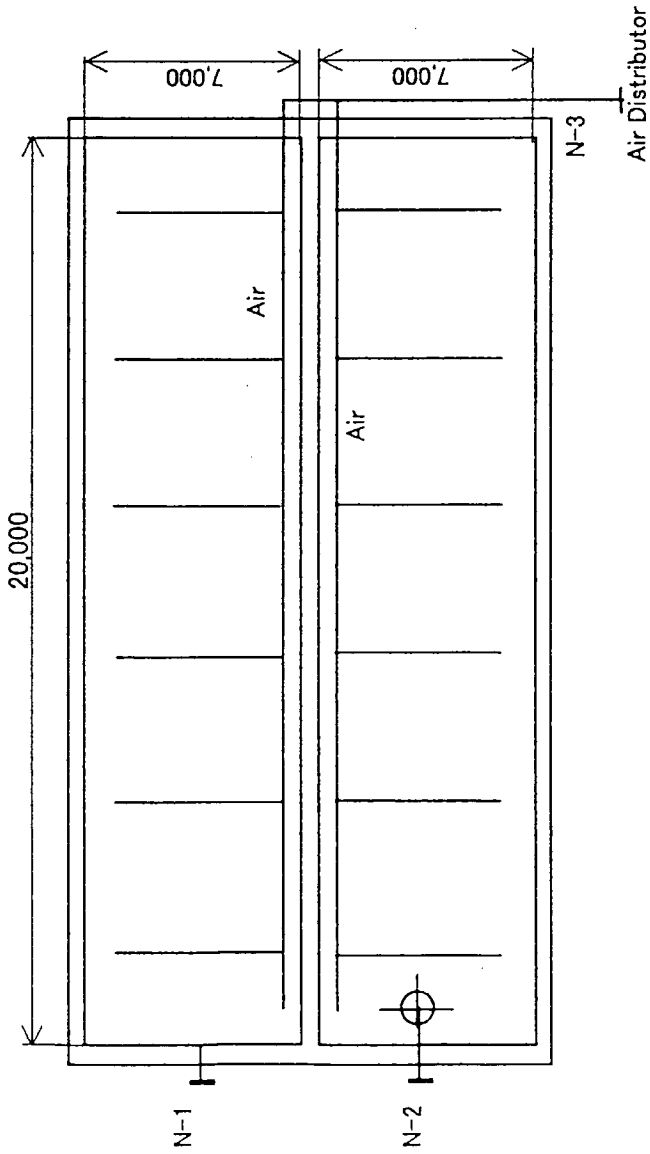
Equipment No	Service	D	H	W ₁	W ₂
T-02	Coagulant Tank	1,430	2,000	1	4
T-03	Flocculation Tank	2,800	3,000	3	18

W₁ : Empty Weight ton
 W₂ : Full Water ton



N-3	Drain	1"	1	
N-2	Water Outlet	4"	1	
N-1	Water Inlet	4"	1	
No	Name	Size	No	Note
CLIENT : JAPAN INTERNATIONAL COOPERATION AGENCY				
FOR: MANSOURA CO., FOR RESINS AND CHEMICALS				
COAGULATION/FLOCCULATION TANK (T-02/03)				
WASTEWATER TREATMENT PLANT				
DWG. NO	RC - BD - 22 - SK05			REV.0

Material : Reinforced Concrete
 Accessories : Operating Stage
 Stairway
 Air Distributing pipings



N-3	Drain	1"	1
N-2	Water Outlet	4"	1
N-1	Water Inlet	4"	1
No	Name	Size	No
Note			
CLIENT JAPAN INTERNATIONAL COOPERATION AGENCY			
TYTLE FOR: MANSOURA CO.,FOR RESINS AND CHEMICALS			
AERATION POND (Z-02)			
WASTEWATER TREATMENT PLANT			
DWG. NO	RC - BD - 22 - SK08	REV.0	