JAPAN INTERNATIONAL COOPERATION AGENCY

BASIC DESIGN PACKAGE OF

RECOMMENDABLE WASTEWATER TREATMENT PLANT

FOR

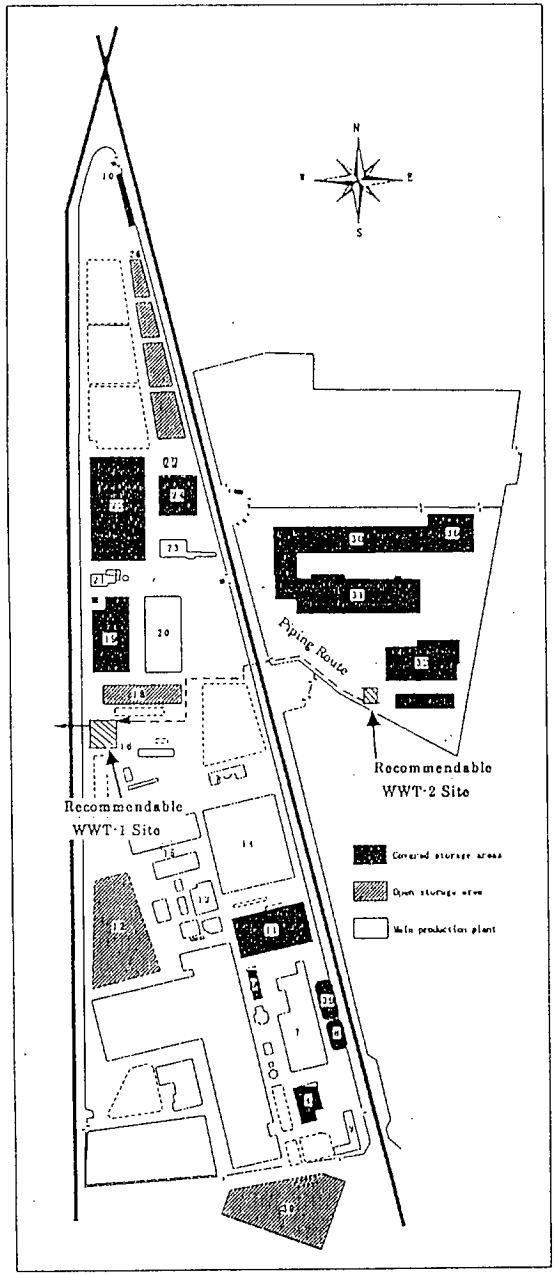
EL NASR CO. FOR STEEL PIPES AND FITTINGS

February 2000

CHIYODA DAMES AND MOORE CO.

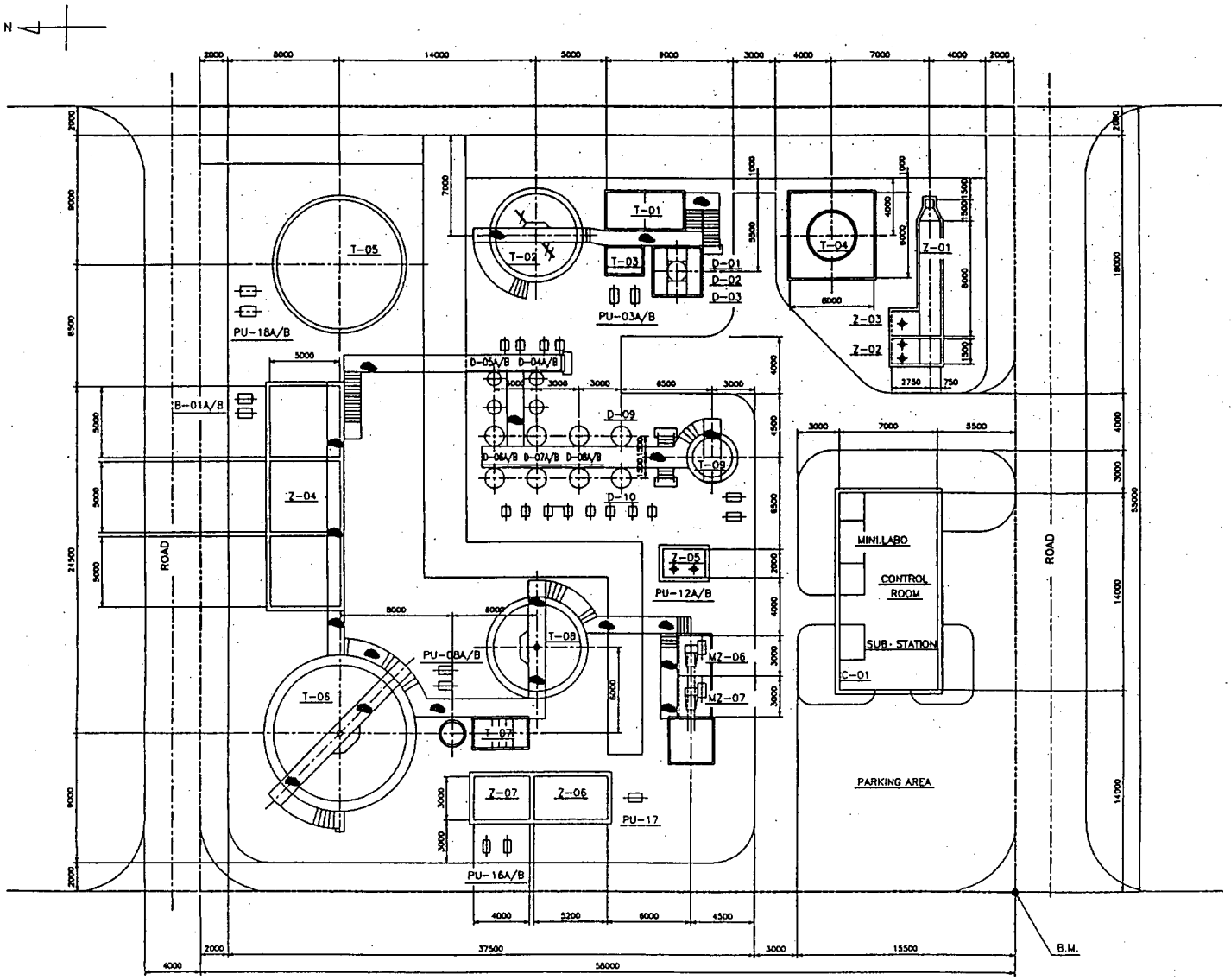
CHIYODA CORPORATION

BD-1



1. Galvanising plant (0.5-4 inch pipes)
2. Pipe workshop
3. 0.5-4 inch pipe mill
4. Main spare parts store
5. Administration
6. Electric substation
7. Small fittings foundry (includes chemical store)
8. Galvanising plant (small fittings)
9. Covered store for waste oils
10. Product store (0.5-4 inch pipe)
11. Store for foundry raw matrials
12. Product store (pipes) and scrap yard
13. Water cooling systm (0.5-4 inch pipes
14. Garage (includes car workshop)
15. Workshop
16. Transport department
17. Clinic
18. Product store (pipe fitting)
19. Large fitting foundry
20. Large fittings finishing area/workshop
21. Coolong for foundries
22. Casting foundries
23. Administration
24. Central material store
25. Main electrical substation
26. Coke store, scrap and limestion
27. Raw material store (coils)
28. Raw material store (coils)
29. Product stores (2-8 inch and spiral pipes)
30. Spiral pipe mill (6-18 and6-60 inch)
31. 2-8 inch pipemill
32. Painting shop
33. Old spiral pipe mill (6-24 inch)
34. Raw material store (coils)
35. Fuel dispensing station
36. Oxygen plant
37. Central gas cylinder stire
38. Zinc dross distillation
39. Open yard for waste dry solids (core sand, slag, etc)

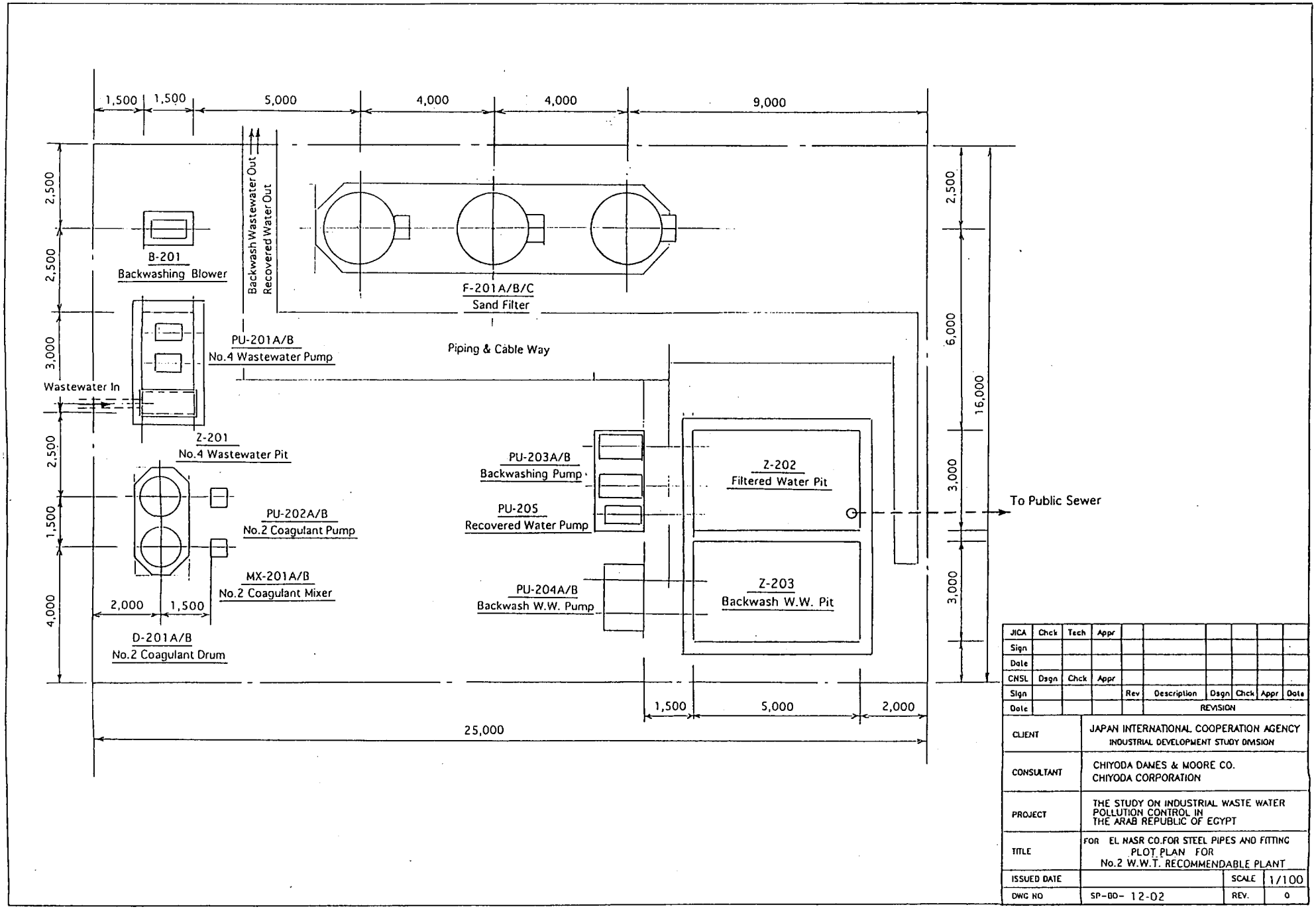
EL NASR CO. FOR STEEL PIPES & FITTINGS
LOCATION OF WASTEWATER TREATMENT PLANT
DWG. NO. SP-BD-12-00



Equipment NO.	Service	Equipment NO.	Service
T-01	Neutralization Tank	PU-08A/B	Sludge Circulation Pump
T-02	No.1 Sedimentation Tank	PU-09A/B	No.2 Lime Pump
T-03	Neutralized W.W. Tank	PU-10A/B	Coagulant Pump
T-04	Skimmed Oil Tank	PU-11A/B	Coagulant Aid Pump
T-05	Equalization Tank	PU-12A/B	Sludge Feed Pump
T-06	No.2 Sedimentation Tank	PU-13	Settling Aid Pump
T-07	Coagulation/Flocculation	PU-14A/B	Centrifuge Feed Pump
T-08	No.3 Sedimentation Tank	PU-15A/B	Filter Aid Pump
T-09	Sludge Thickener	PU-16A/B	W.W.Return Pump
		PU-17	T.W.Reuse Pump
D-01	Lime Hopper	PU-18	Equalized Water Pump
D-02	No.1 Lime Drum		
D-03	Lime Receiver	B-01A/B	AP Blower
D-04A/B	Nutrient(N) Drum		
D-05A/B	Nutrient(P) Drum	C-01	Al Compressor
D-06A/B	No.2 Lime Drum		
D-07A/B	No.1 Coagulant Drum	MZ-01	Lime Feeder
D-08A/B	Coagulant Aid Drum	MZ-02	No.1 Sludge Rake
D-09	Settling Aid Drum	MZ-03	No.2 Sludge Rake
D-10	Filtered Aid Drum	MZ-04	No.3 Sludge Rake
		MZ-05	No.4 Sludge Rake
Z-01	Oil Separator	MZ-06	No.1 Centrifuge
Z-02	Oil Separator T.W. Pit	MZ-07	No.2 Centrifuge
Z-03	Skimmed Oil Pit	MZ-08	Belt Conveyor
Z-04	Aeration Basin		
Z-05	Sludge Pit	MX-01	No.1Lime Mixer
Z-06	Treated Water Pit	MX-02A/B	Nutrient(N) Mixer
Z-07	Wastewater Pit	MX-03A/B	Nutrient(P) Mixer
		MX-04A/B	No.2 Lime Mixer
PU-01A/B	No.1 Lime Pump	MX-05A/B	No.1 Coagulant Mixer
PU-02A/B	No.1 Sludge Pump	MX-06A/B	Coagulant Aid Mixer
PU-03A/B	Neutralized W.W. Pump	MX-07	Coagulation Mixer
PU-04A/B	Oil Separator T.W. Pump	MX-08	Flocculation Mixer
PU-05	Recovered Oil Pump	MX-09	Settling Aid Mixer
PU-06A/B	Nutrient(N) Pump	MX-10	Filter Aid Mixer
PU-07A/B	Nutrient(P) Pump		

JICA	Chck	Tech	Appr							
Sign										
Date										
CMSL	Dsgn	Chck	Appr							
Sign				Rev	Description	Dsgn	Chck	Appr	Date	
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 EL NASR CO.FOR STEEL PIPES AND FITTINGS PLOT PLAN FOR No.1 W.W.T. RECOMMENDABLE PLANT
ISSUED DATE	SCALE 1/150
DWG NO	SP-BD-12-01 REV. 0



JICA	Chck	Tech	Appr						
Sign									
Date									
CNSL	Dsgn	Chck	Appr						
Sign				Rev	Description	Dsgn	Chck	Appr	Date
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 EL NASR CO.FOR STEEL PIPES AND FITTING PLOT PLAN FOR No.2 W.W.T. RECOMMENDABLE PLANT
ISSUED DATE	SCALE 1/100
DWG NO	SP-BD- 12-02 REV. 0

TANK

- CONE ROOF TANK
- OPEN TANK

DRUMS

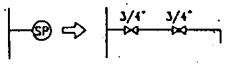
- HORIZONTAL TYPE
- VERTICAL TYPE
- VERTICAL TYPE(OPEN)

PUMP, BLOWER, ETC

- CENTRIFUGAL PUMP
- RECIPROCATING PUMP
- ROOT BLOWER
- EJECTOR
- MIXER
- BELT CONVEYOR
- BELT CONVEYOR
- ELECTRIC HOIST
- TANK CAR
- DUMP TRUCK
- MOTOR DRIVEN

SAMPLING CONNECTION

SAMPLING CONNECTION FOR WATER FROM PIPE LINE

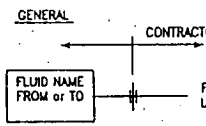


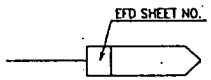
SYMBOLS OF LINE

- MAIN PROCESS LINE
- PROCESS LINE (& UTILITY LINE etc.)
- UTILITY LINE, SUPPLEMENTARY LINE
- IMAGINARY LINE, BURIED LINE
- CENTER LINE
- BOUNDARY LINE
- DESIGNATES PIPING CLASS CHANGES OR APPLICABLE LOW.
- INCLINED

LINE IDENTIFICATION

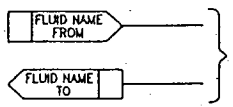
GENERAL

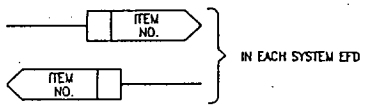




BREAK DOWN OF EFD-EFD

PROCESS LINE





SYMBOLS OF LINE

- GATE VALVE
- GLOBE VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- BALL VALVE
- NEEDLE VALVE
- DIAPHRAGM VALVE
- COCK VALVE
- 3WAY VALVE
- SAFETY VALVE
- FLANGE CONNECTION
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- BLIND
- SPECTACLE BLIND
- FLEXIBLE TUBE
- BELLOWS EXPANTION JOINT
- SLEEVE EXPANTION JOINT
- C — HOSE CONNECTION
- RO — RESTRICTION ORIFICE

SYMBOLS OF EQUIPMENT

- Y-TIPE STRAINER
- T-TYPE STRAINER
- TEMPORARY STRAINER
- SEWER DRAIN
- FLOW DETECTOR
- SG — SIGHT GLASS
- FOOT VALVE
- S.P. — SPOOL PIECE

SYMBOLS OF EQUIPMENT

- EYE SHOWER
- SHOWER
- SILENCER
- M — MAN HOLE
- H — HAND HOLE
- SG — SIGHT GLASS
- LINE MIXER
- Y_D — TO OILY SEWER
- Y_R — TO RAINY SEWER

SYMBOLS OF FLUID

SYMBOL	SERVICE
CA	CAUSTIC
AI	INSTRUMENT AIR
AS	SERVICE AIR
WCS	COOLING WATER SUPPLY
WCR	COOLING WATER RETURN
WD	DRINKING WATER
WI	INDUSTRIAL WATER
WR	RECOVERED WATER
WW	WASTE WATER
HCL	HCL
CHL	CHEMICAL

ABBREVIATION

SV	SAFETY VALVE
B/L	BATTERY LIMIT
ATM	ATMOSPHERE
MFR	MANUFACTURER
MISC	MISCELLANEOUS
T.S	TEMPORARY STRAINER
NC	NOMAL CLOSE
NO	NOMAL OPEN
FC	FAILURE CLOSE
FO	FAILURE OPEN
BW	BUTT WELD

JICA	Chck	Tech	Appr						
Sign									
Date									
CNSL	Dsgn	Chck	Appr						
Sign				Rev	Description	Dsgn	Chck	Appr	Dc
Date					REVISION				

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENC 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 ENGINEERING FLOW DIAGRAM LEAD SHEET(1/2)
ISSUED DATE	SCALE: None
DWG NO	REV.: 0

TANK

- CONE ROOF TANK
- OPEN TANK

DRUMS

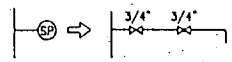
- HORIZONTAL TYPE
- VERTICAL TYPE
- VERTICAL TYPE(OPEN)

PUMP,BLOWER,ETC

- CENTRIFUGAL PUMP
- RECIPROCATING PUMP
- ROOT BLOWER
- EJECTOR
- MIXER
- BELT CONVEYOR
- BELT CONVEYOR
- ELECTRIC HOIST
- TANK CAR
- DUMP TRUCK
- MOTOR DRIVEN

SAMPLING CONNECTION

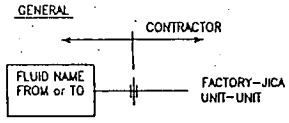
SAMPLING CONNECTION FOR WATER FROM PIPE LINE

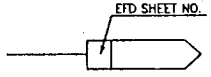


SYMBOLS OF LINE

- MAIN PROCESS LINE
- PROCESS LINE (& UTILITY LINE etc.)
- UTILITY LINE SUPPLEMENTARY LINE
- IMAGINARY LINE, BURIED LINE
- CENTER LINE
- BOUNDARY LINE
- DESIGNATES PIPING CLASS CHANGES OR APPLICABLE LOW.
- INCLINED

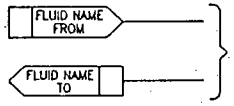
LINE IDENTIFICATION

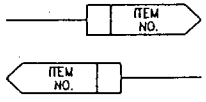




BREAK DOWN OF EFD~EFD

PROCESS LINE





SYMBOLS OF LINE

- GATE VALVE
- GLOBE VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- BALL VALVE
- NEEDLE VALVE
- DIAPHRAGM VALVE
- COCK VALVE
- 3WAY VALVE
- SAFETY VALVE
- FLANGE CONNECTION
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- BLIND
- SPECTACLE BLIND
- FLEXIBLE TUBE
- BELLOWS EXPANTION JOINT
- SLEEVE EXPANTION JOINT
- HOSE CONNECTION
- RESTRICTION ORIFICE (RO)

SYMBOLS OF EQUIPMENT

- Y-TIPE STRAINER
- T-TYPE STRAINER
- TEMPORARY STRAINER
- SEWER DRAIN
- FLOW DETECTOR
- SIGHT GLASS (SG)
- FOOT VALVE
- SPOOL PIECE (S.P.)

SYMBOLS OF EQUIPMENT

- EYE SHOWER
- SHOWER
- SILENCER
- MAN HOLE (M)
- HAND HOLE (H)
- SIGHT GLASS (SG)
- LINE MIXER
- TO OILY SEWER (Y_D)
- TO RAINY SEWER (Y_R)

SYMBOLS OF FLUID

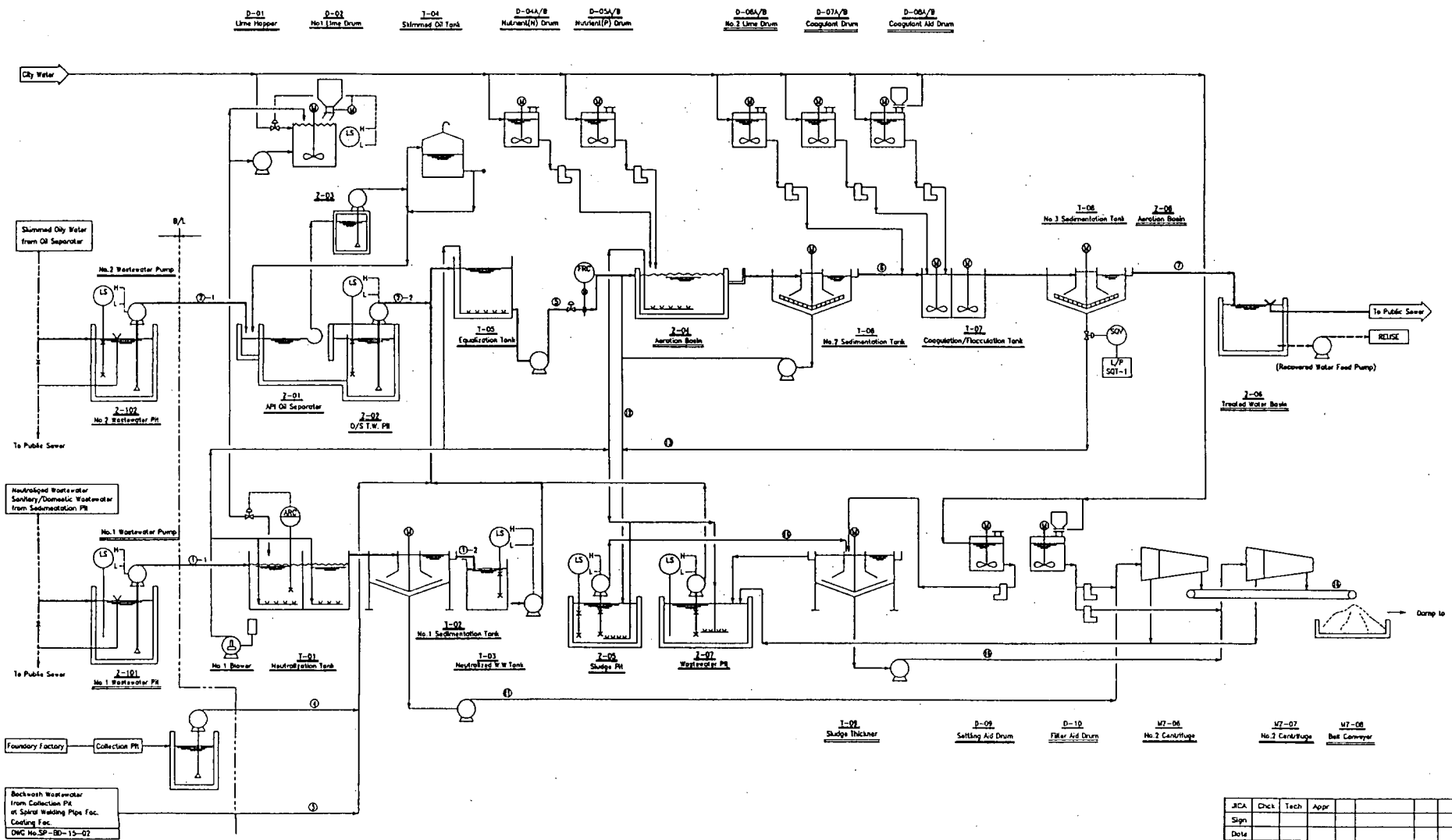
SYMBOL	SERVICE
CA	CAUSTIC
AI	INSTRUMENT AIR
AS	SERVICE AIR
WCS	COOLING WATER SUPPLY
WCR	COOLING WATER RETURN
WD	DRINKING WATER
WI	INDUSTRIAL WATER
WR	RECOVERED WATER
WW	WASTE WATER
HCL	HCL
CHL	CHEMICAL

ABBREVIATION

(SV)	SAFETY VALVE
B/L	BATTERY LIMIT
ATM	ATMOSPHERE
MFR	MANUFACTURER
MISC	MISCELLANEOUS
T.S	TEMPORARY STRAINER
NC	NOMAL CLOSE
NO	NOMAL OPEN
FC	FAILURE CLOSE
FO	FAILURE OPEN
BW	BUTT WELD

JICA	Chck	Tech	Appr						
Sign									
Date									
CNSL	Dsgn	Chck	Appr						
Sign				Rev	Description	Dsgn	Chck	Appr	D
Date					REVISION				

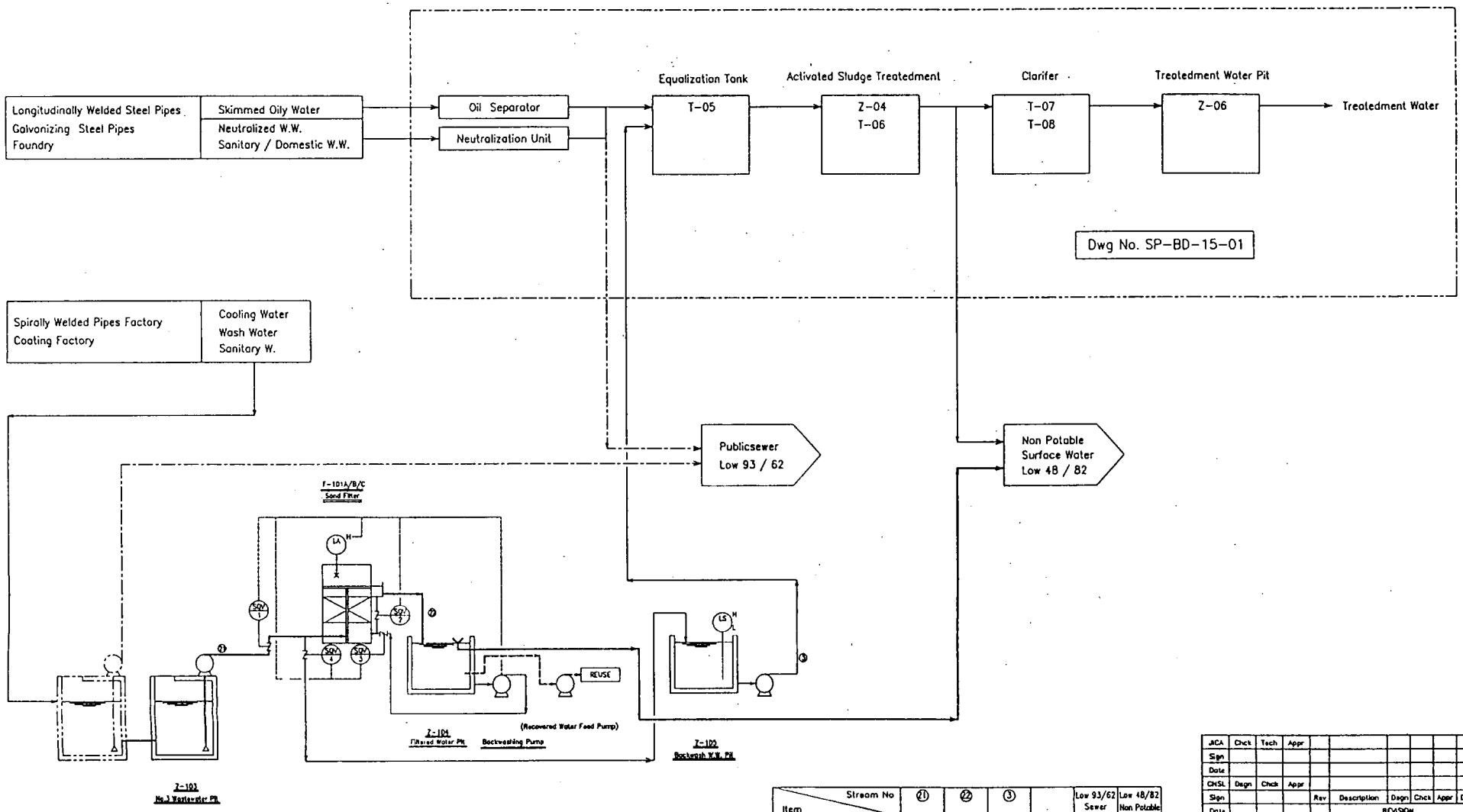
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENC INDUSTRIAL DEVELOPMENT STUDY DMSION
CONSULTANT	CHIYODA DAMES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR ENGINEERING FLOW DIAGRAM LEAD SHEET(1/2)
ISSUED DATE	SCALE: None
DWG NO	REV.: 0



Item \ Stream No		①-1	①-2	②-1	②-2	③	④	⑤	⑥	⑦	⑪	⑫	⑬	⑭	⑮	⑯		Law 93/62 Sewer	Law 48/32 Non Potable (Industrial)
Flow Rate Av.	[m³/D]	960	⟶	720	⟶	48	120	1848	⟶	⟶	24.0	51.1	5.5	56.6	11.4	4.5			
Flow Rate Av.	[m³/h]	40	⟶	30	⟶	2.0	5	77	⟶	⟶	3.0	2.13	0.23	2.4	1.9	0.7			
Flow Rate Max	[m³/h]	48	⟶	36	⟶	3.0	10	77	⟶	⟶									
pH	[-]	2-6	6.5-7.5	7-8	⟶	6.5-8	6.5-8	6.5-8	⟶	7-8	7-8	6.5-8	7-8	7-8	7-8	7-8		6-10	6-9
SS	[mg /L]	250	⟶	200	⟶	550	30	224	30	<30	5,000	8,000	10,000	8,200	40,000	200,000		<500	60
BOD	[mg /L]	100	⟶	100	⟶	186	30	98	30	<30								<400	60
COD	[mg /L]	200	⟶	200	⟶	496	80	200	50	<50								<700	100
Oil & Grease	[mg /L]	5	⟶	1000	30	83	5	17	5	3								<100	10
Pb	[mg /L]	0.1	⟶	0.1	⟶	1.0	Nil	⟶	⟶	⟶								——	——
Zn	[mg /L]	50	⟶	Nil	⟶	Nil	Nil	⟶	⟶	⟶								<10	——
Water Temperature	[°C]	20-35	⟶	20-35	⟶	20-35	20-35	⟶	⟶	⟶								<40	35

JICA	Chck	Tech	Appr						
Sign									
Date									
CHSL	Dsgn	Chck	Appr						
Sign				Rev	Description	Dsgn	Chck	Appr	Date
Date				REVISION					

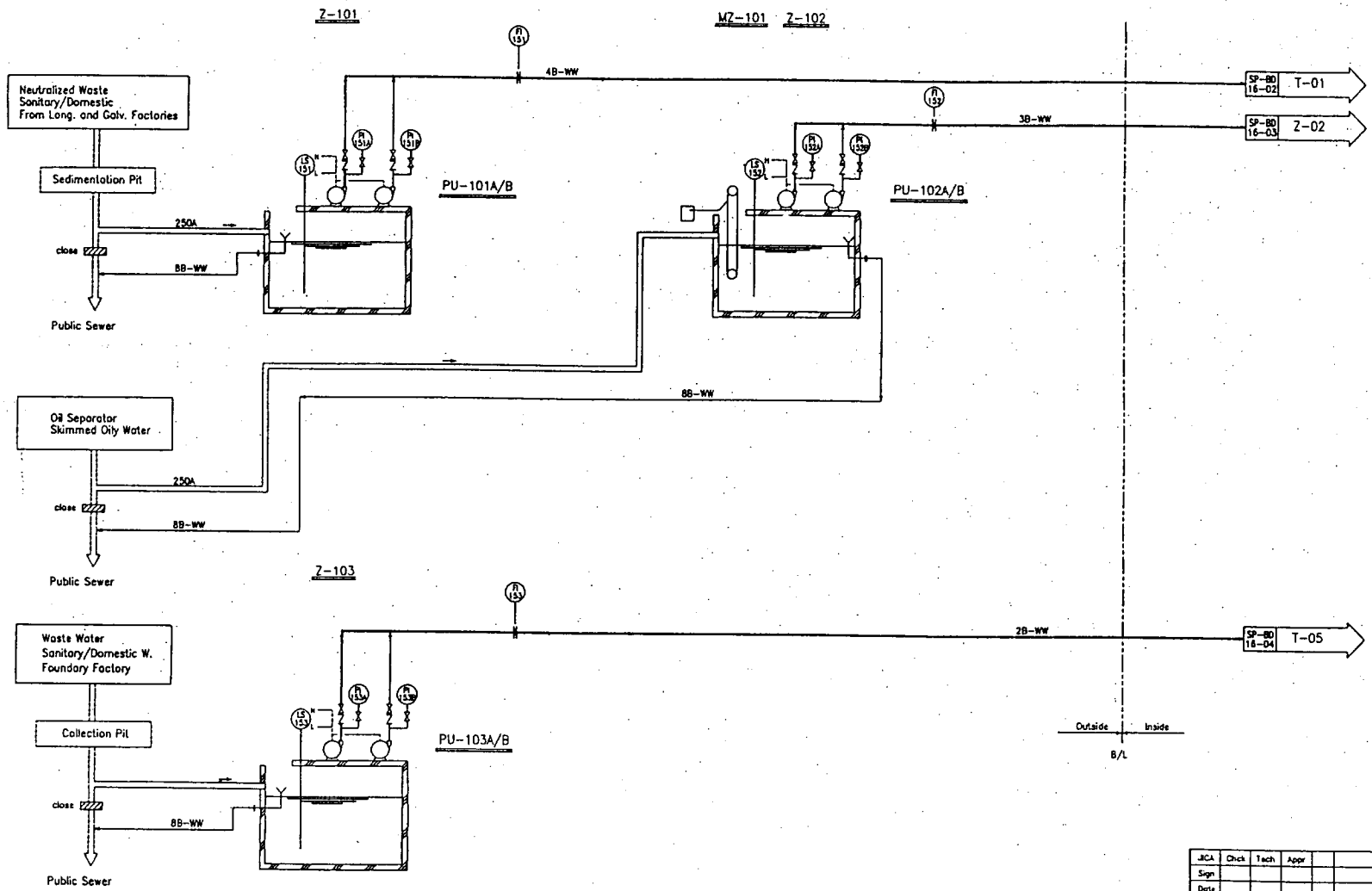
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION
CONSULTANT	CHIYODA DAMES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR EL NASR CO.FOR STEEL PIPES AND FITTINGS PROCESS FLOW DIAGRAM FOR W.W.T. DEMONSTRATION PLANT(1/2)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-15-01 REV. 0



Item	Stream No		①	②	③		Low 93/62 Sewer	Low 48/82 Non Potable
Flow Rate Av.	[m³/D]		1200	1200	48			
Flow Rate Av.	[m³/h]		50	50	2.0			
Flow Rate Max	[m³/h]		150	150	3.0			
pH	[-]		6.5-8	6.5-8	6.5-8		6-10	6-9
SS	[mg /L]		30	10	550		<500	60
BOD	[mg /L]		30	<30	186		<400	60
COD	[mg /L]		80	<80	496		<700	100
Oil & Grease	[mg /L]		5	3	83		<100	10
Pb	[mg /L]		0.1	<0.1	1.0		—	—
Zn	[mg /L]		Nil	Nil	Nil		<10	—
Water Temperature	[°C]		20-35	→	20-35		<40	35

JICA	Chck	Tech	Appr							
Sign										
Date										
CNSL	Dsgn	Chck	Appr							
Sign				Rev	Description	Dsgn	Chck	Appr	Date	
Date				REVISION						

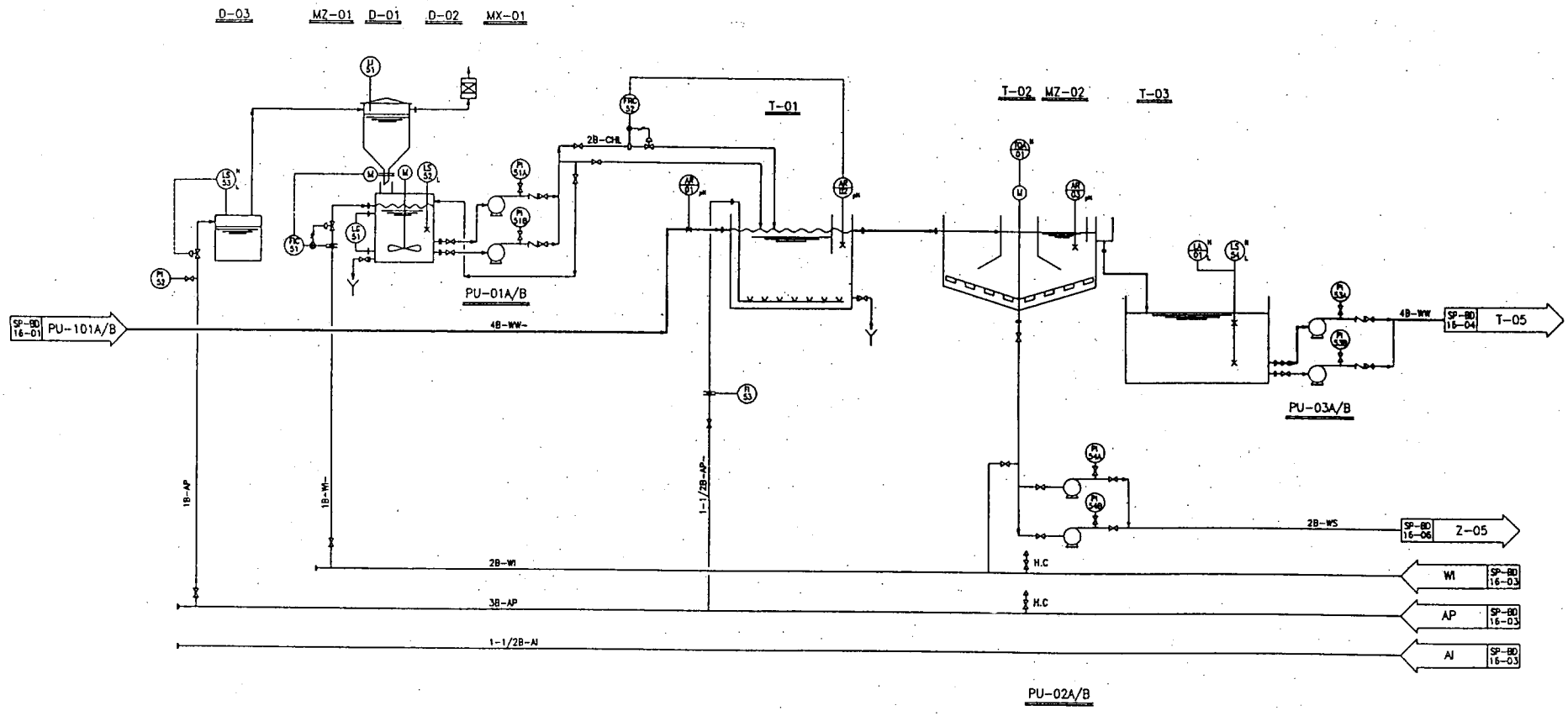
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION
CONSULTANT	CHIYODA DAMES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR EL NASR CO.FOR STEEL PIPES AND FITTINGS PROCESS FLOW DIAGRAM FOR W.W.T. DEMONSTRATION PLANT(2/2)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-15-01 REV. 0



ITEM No.	Z-101	Z-102	Z-103	PU-101A/B	PU-102A/B	PU-103A/B	MZ-101
SERVICE	No.1 Wastewater Pit	No.2 Wastewater Pit	No.3 Wastewater Pit	No.1 Wastewater Pump	No.2 Wastewater Pump	No.3 Wastewater Pump	Belt Oil Skimmer
SIZE(m)	4.0mWx5.0mLx3.5mH	3.0mWx5.0mLx3.0mH	2.0mWx3.0mLx3.5mH	48m³/hx30mHx11kW	36m³/hx25mHx7.5kW	12m³/hx25mHx2.2kW	W=300,0.4kW
DESIGN PRESS(MPa)	Full Water	Full Water	Full Water	1.0	1.0	1.0	None
DESIGN TEMP.(°C)	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.
MATERIAL/TYPE	RC/Open Basin	RC/Open Basin	RC/Open Basin	SCS/Centri.Vertical	SCS/Centri.Vertical	SCS/Centri.Vertical	Vertical

JICA	Chick	Tech	Appr							
Sign										
Date										
CNSL	Dsgn	Chck	Appr							
Sign				Rev	Description	Dsgn	Chck	Appr	Date	
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 EL NASR CO. FOR STEEL PIPES AND FITTINGS ENGINEERING FLOW DIAGRAM FOR No.1 W.W.T. RECOMMENDABLE PLANT(1/8)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-16-01 REV. 0

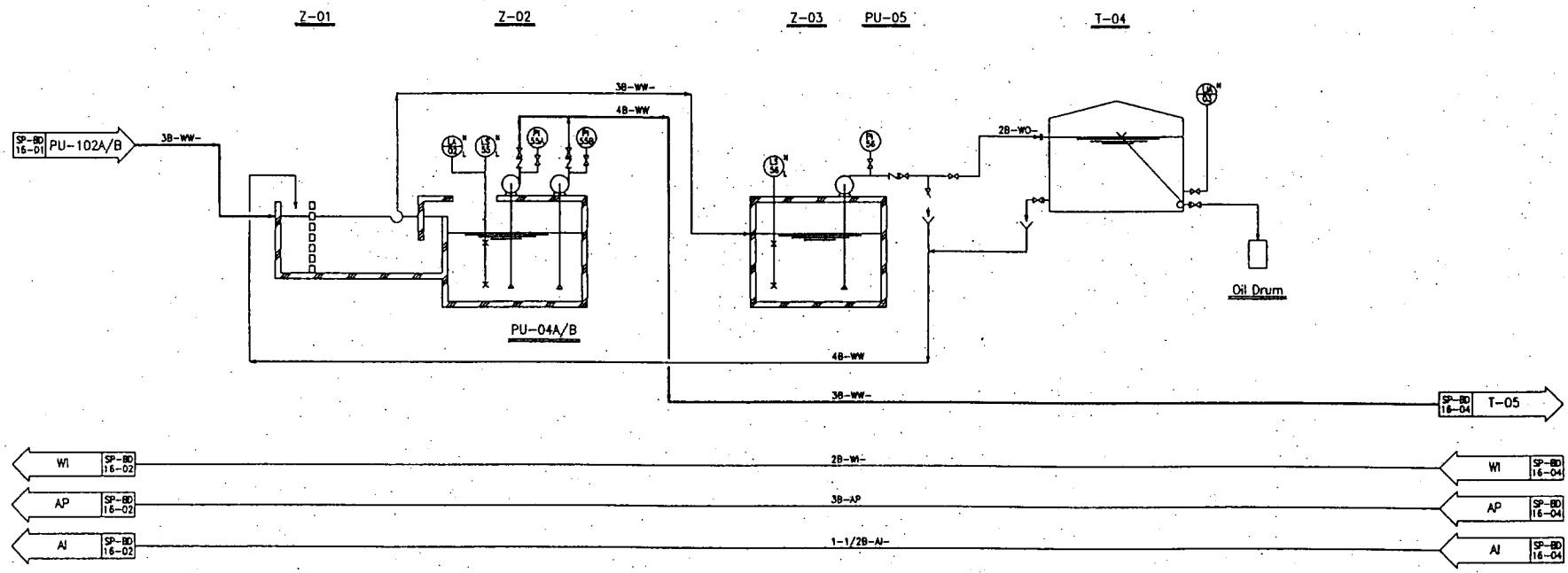


ITEM No.	PU-03A/B	MX-01
SERVICE	Neutralized W.W.Pump	No.1 Lime Mixer
SIZE(m)	48m³/hx18mHx5.5kW	1.5kW.L=1.2m
DESIGN PRESS(MPa)	0.5	Full Water
DESIGN TEMP.(°C)	Amb.	Amb.
MATERIAL/TYPE	SCS/Centri.Hortz.	CS/Verti.

ITEM No.	D-01	D-02	D-03	T-01	T-02	T-03	MZ-01	MZ-02	PU-01A/B	PU-02A/B
SERVICE	Lime Hopper	No.1 Lime Drum	Lime Receiver	Neutralization Tank	No.1 Sedimentation Tank	Neutralized W.W.Tank	Lime Feeder	No.1 Sludge Rake	No.1 Lime Pump	No.1 Sludge Pump
SIZE(m)	1.3mlDx1.5mH	1.5mlDx1.5mH	1.4mlDx1.5mH	2.6mWx5.2mLx3.0mH	5.8mlDx3.0mH	2.5mWx3.2mLx3.0mH	30kgx0.75kW	1.5kW	10L/minx0.5MPax0.75kW	4m³/hx30mHx2.2kW
DESIGN PRESS(MPa)	0.5	Full Water	0.5	Full Water	Full Water	Full Water	0.5	None	0.5	0.5
DESIGN TEMP.(°C)	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.
MATERIAL/TYPE	CS/Cylidrical Verti.	CS/Cylidrical Verti.	CS/	CS+Resin Lining	CS+Resin Lining/Circul.	CS+Lining	CS/Disc	CS/Center Drive	Cl/Centri.Horiz.	SCS/Centri.Horiz.

JICA	Chck	Tech	Appr							
Sign										
Date										
CHSL	Dsgn	Chck	Appr							
Sign				Rev	Description	Dsgn	Chck	Appr	Date	
Date				REVISION						

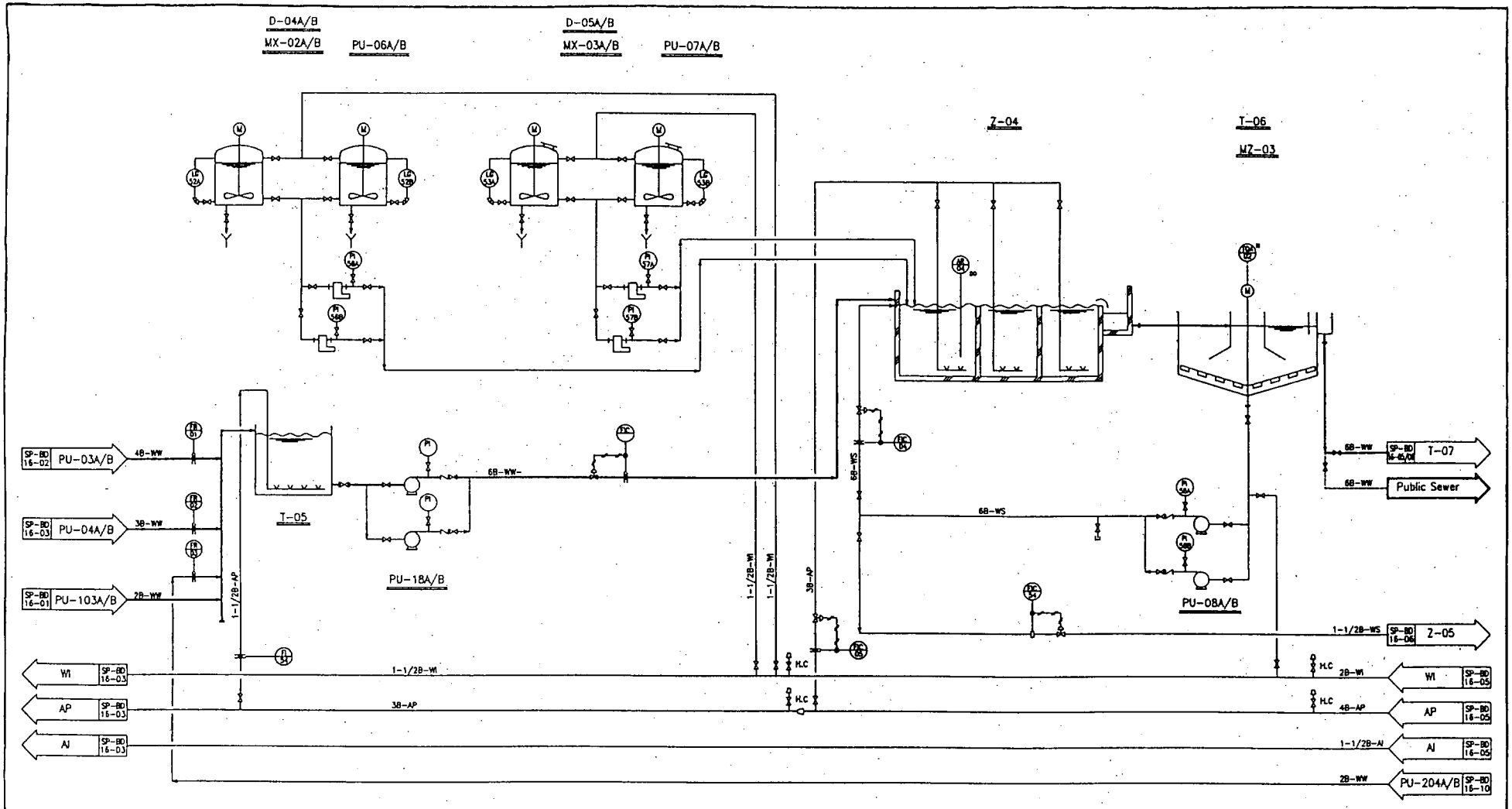
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION
CONSULTANT	CHIYODA DAMES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR EL NASR CO. FOR STEEL PIPES AND FITTINGS ENGINEERING FLOW DIAGRAM FOR No.1 W.W.T. RECOMMENDABLE PLANT(2/8)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-16-02 REV. 0



ITEM No.	Z-01	Z-02	Z-03	T-04	PU-04A/B	PU-05
SERVICE	Oil Separator	Oil Separator T.W.PH	Skimmed Oil PH	Skimmed Oil Tank	Oil Separator T.W.Pump	Recovered Oil Pump
SIZE(m)	1.5mWx8.0mLx1.0mD	2.4mWx2.5mLx3.0mD	1.5mWx2.0mLx3.0mD	3.4mDx6.1mH	36m³/hx18mHx5.5kW	15m³/hx15mHx2.2kW
DESIGN PRESS(MPa)	Full Water	Full Water	Full Water	Full Water	1.0	1.0
DESIGN TEMP.(°C)	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.
MATERIAL/TYPE	RC/API	RC/Open Basin	RC/Closed Basin	CS/Cone Roof Tank	SCS/Centri.Verti.	CI/Centri.Verti.

JICA	Chck	Tech	Appr							
Sign										
Date										
CHSL	Dsgn	Chck	Appr							
Sign				Rev	Description	Dsgn	Chck	Appr	Date	
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 EL NASR CO. FOR STEEL PIPES AND FITTINGS ENGINEERING FLOW DIAGRAM FOR No.1 W.W.T. RECOMMENDABLE PLANT(3/8)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-16-03 REV. 0

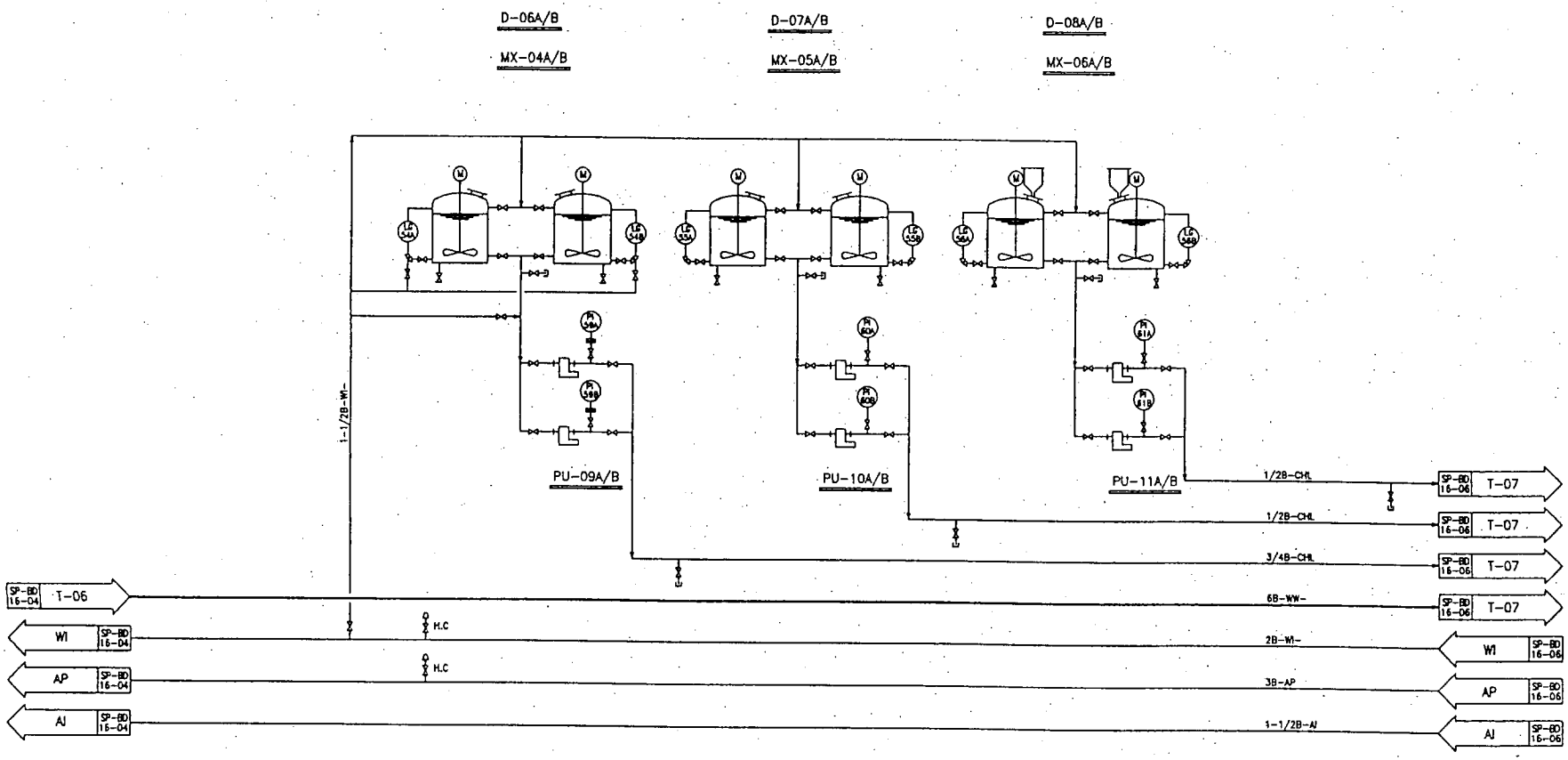


ITEM No.	PU-18A/B	T-06
SERVICE	Equalized Water Pump	No2.Sedimentation Tank
SIZE(m)	80m³/hx10mHx5.5kW	9.67mDx4.0mH
DESIGN PRESS(MPa)	1.0	Full Water
DESIGN TEMP.(°C)	Amb.	Amb.
MATERIAL/TYPE	SCS/Centri.Horizontal	CS+Epoxy/Circular

ITEM No.	T-05	D-04A/B	D-05A/B	Z-04	MX-02A/B	MX-03A/B	MZ-03	PU-06A/B	PU-07A/B	PU-08A/B
SERVICE	Equalization Tank	Nutrient(N)Drum	Nutrient(P)Drum	Aeration Basin	Nutrient(N)Mixer	Nutrient(P)Mixer	No.2 Sludge Rake	Nutrient(N) Pump	Nutrient(P) Pump	Sludge Circulation Pump
SIZE(m)	8.71mDx7.6mH	0.7mDx1.5mH	0.7mDx1.5mH	5.0mWx15mLx3.5mH	0.4kW,L=1.0m	0.4kW,L=1.0m	1.5kW	0.1L/minx0.5MPax0.4kW	0.1L/minx0.5MPax0.4kW	36m³/hx12mHx3.7kW
DESIGN PRESS(MPa)	Full Water	Full Water	Full Water	Full Water	None	None	None	1.0	1.0	1.0
DESIGN TEMP.(°C)	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.
MATERIAL/TYPE	CS/Open Top Tank	CS/Cylindrical	CS+HRL/Cylindrical	RC/Rectangular	SUS/Verti	SUS/Verti	CS+Epoxy/C. Driven	SCS/Diaphragm	SCS/Diaphragm	SCS/Centri.Horizontal

JICA	Chck	Tech	Appr						
Sign									
Date									
CNSL	Dsgn	Chck	Appr						
Sign				Rev	Description	Dsgn	Chck	Appr	Date
Date					REVISION				

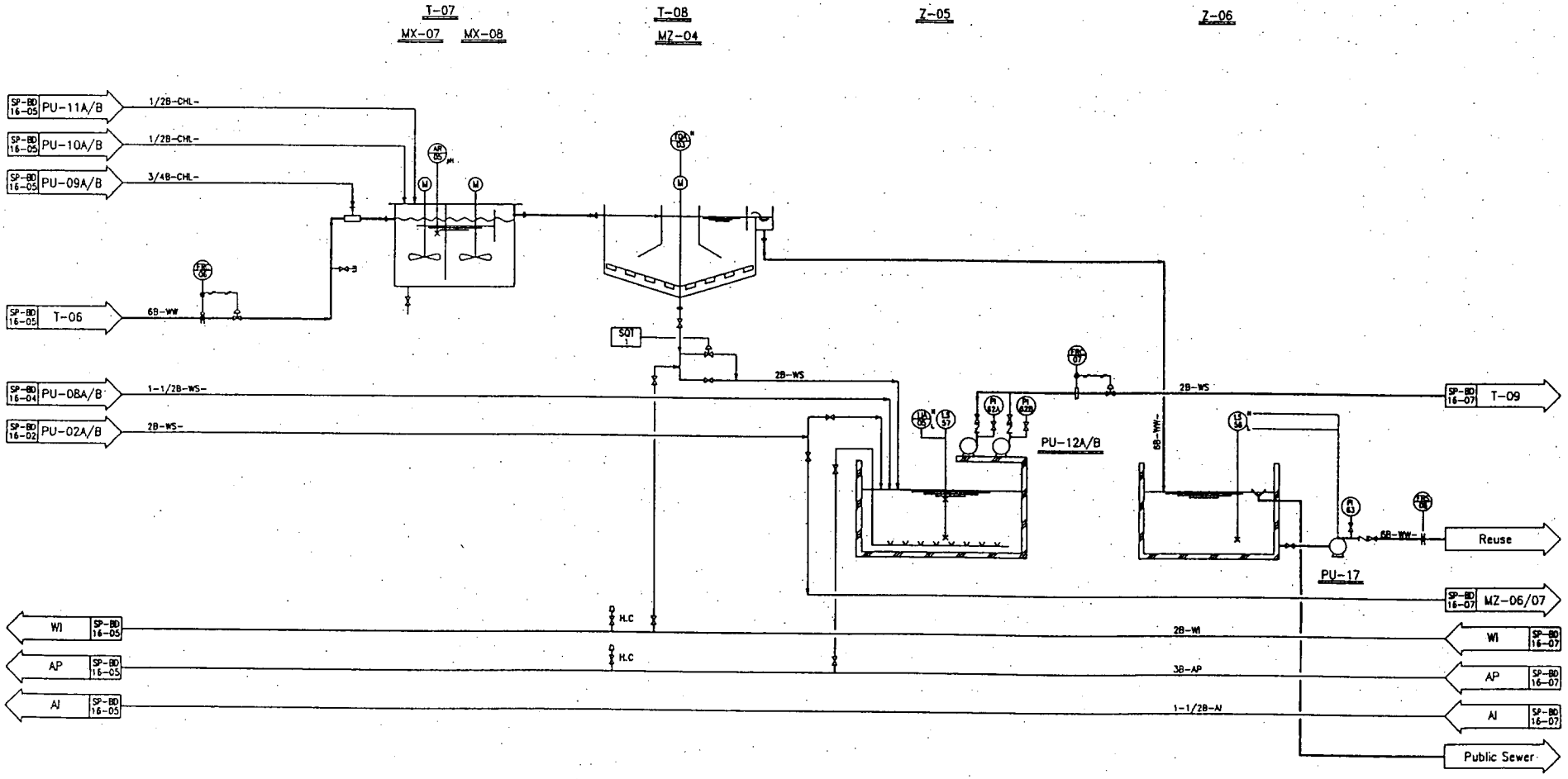
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION
CONSULTANT	CHIYODA DAMES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR EL NASR CO. FOR STEEL PIPES AND FITTINGS ENGINEERING FLOW DIAGRAM FOR No.1 W.W.T. RECOMMENDABLE PLANT(4/8)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-16-04 REV. 0



ITEM No.	D-06A/B	D-07A/B	D-08A/B	MX-04A/B	MX-05A/B	MX-06A/B	PU-09A/B	PU-10A/B	PU-11A/B
SERVICE	No.2 Lime Drum	No.1 Coagulant Drum	Coagulant Aid Drum	No.2 Lime Mixer	Coagulant Mixer	Coagulant Aid Mixer	No.2 Lime Pump	Coagulant Pump	Coagulant Aid Pump
SIZE(m)	1.4mIDx1.8mH	1.2mIDx1.8mH	1.2mIDx1.5mH	1.5kW,L=1.2m	0.75kW,L=1.2m	0.75kW,L=1.0m	0.6L/minx0.5MPaxo.75kW	0.3L/minx0.5MPaxo.4kW	0.3L/minx0.5MPaxo.4kW
DESIGN PRESS(MPa)	Full Water	Full Water	Full Water	None	None	None	1.0	1.0	1.0
DESIGN TEMP.(℃)	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.
MATERIAL/TYPE	CS/Vert.	CS+HRL/Vert.	CS/Vert.	SUS/Vertical	SUS/Vertical	SUS/Vertical	TFL/Diaphragm	SCS/Plunger	SCS/Plunger

JICA	Chck	Tech	Appr						
Sign									
Date									
CNSL	Dsgn	Chck	Appr						
Sign				Rev	Description	Dsgn	Chck	Appr	Date
Date				REVISION					

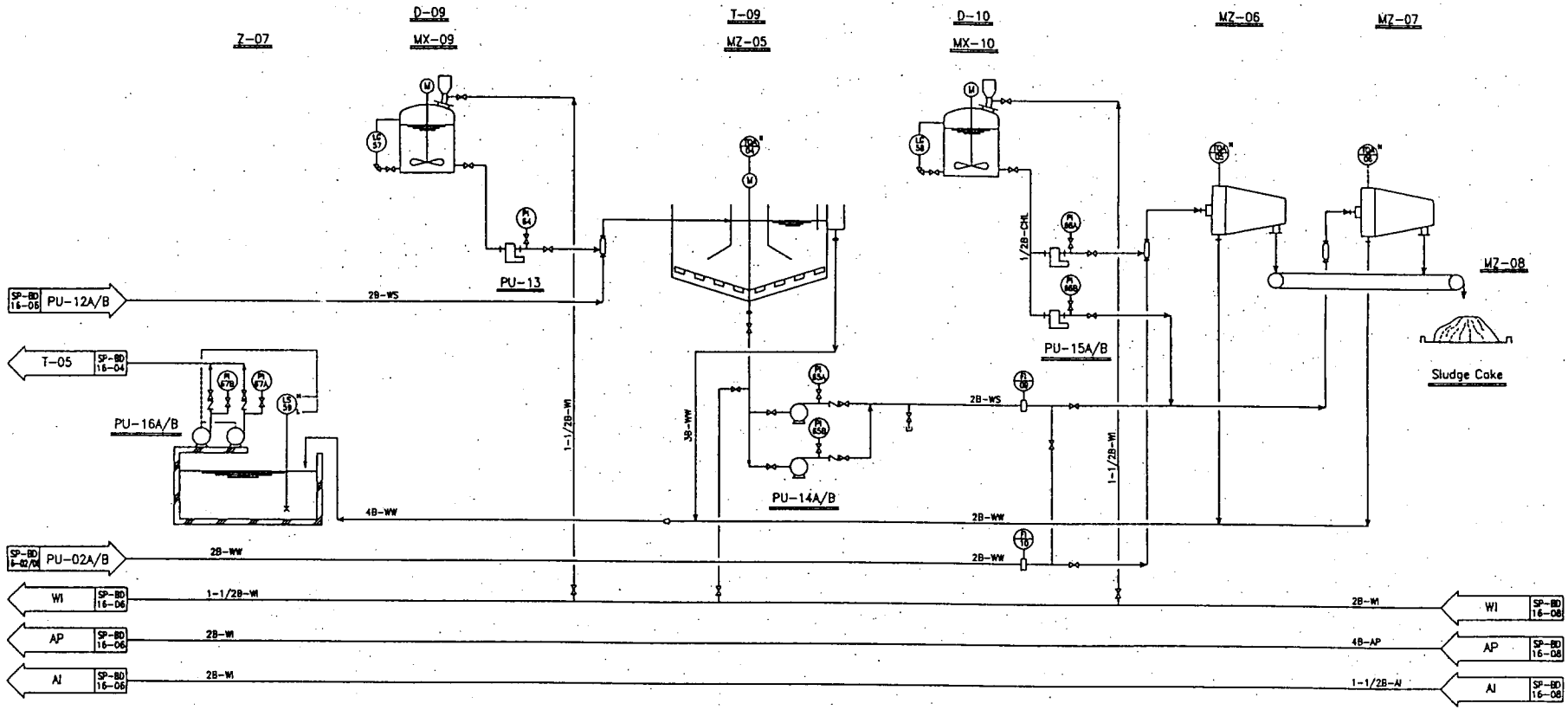
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION
CONSULTANT	CHIYODA DAMES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR EL NASR CO. FOR STEEL PIPES AND FITTINGS ENGINEERING FLOW DIAGRAM FOR No.1 W.W.T. RECOMMENDABLE PLANT(S/B)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-16-05 REV. 0



ITEM No.	T-07	T-08	Z-05	Z-06	MX-07	MX-08	MZ-04	PU-12A/B	PU-17
SERVICE	Coagulation/Flocculation Tank	No.3 Sedimentation Tank	Sludge Pit	Treated Water Pit	Coagulation Mixer	Flocculation Mixer	No.3 Sludge Rake	Sludge Feed Pump	T.W.Reuse Pump
SIZE(m)	1.4mWx2.8mLx6.1mH	5.8mDx4.5mH	2.0mWx3.0mLx3.0mD	3.0mWx5.2mLx2.5mD	2.2kW,L=1.5m	2.2kW,L=1.5m	1.5kWx5.1mø	$2m^3/hx15mHx2.2kW$	$60m^3/hx30mHx15kW$
DESIGN PRESS(MPa)	Full Water	Full Water	Full Water	Full Water	None	None	None	1.0	1
DESIGN TEMP.(°C)	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.
MATERIAL/TYPE	CS+Epoxy/Rectangular	CS+Epoxy/Rectangular	RC/Open	RC/Open	SUS/Vertical	SUS/Vertical	CS+Epoxy/Center Drive	SCS/Centri.Verti.	SCS/Centri.Horiz.

JICA	Chck	Tech	Appr						
Sign									
Date									
CMSL	Dsgn	Chck	Appr						
Sign				Rev	Description	Dsgn	Chck	Appr	Date
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 EL NASR CO. FOR STEEL PIPES AND FITTINGS ENGINEERING FLOW DIAGRAM FOR No.1 W.W.T. RECOMMENDABLE PLANT(6/8)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-16-06 REV. 0

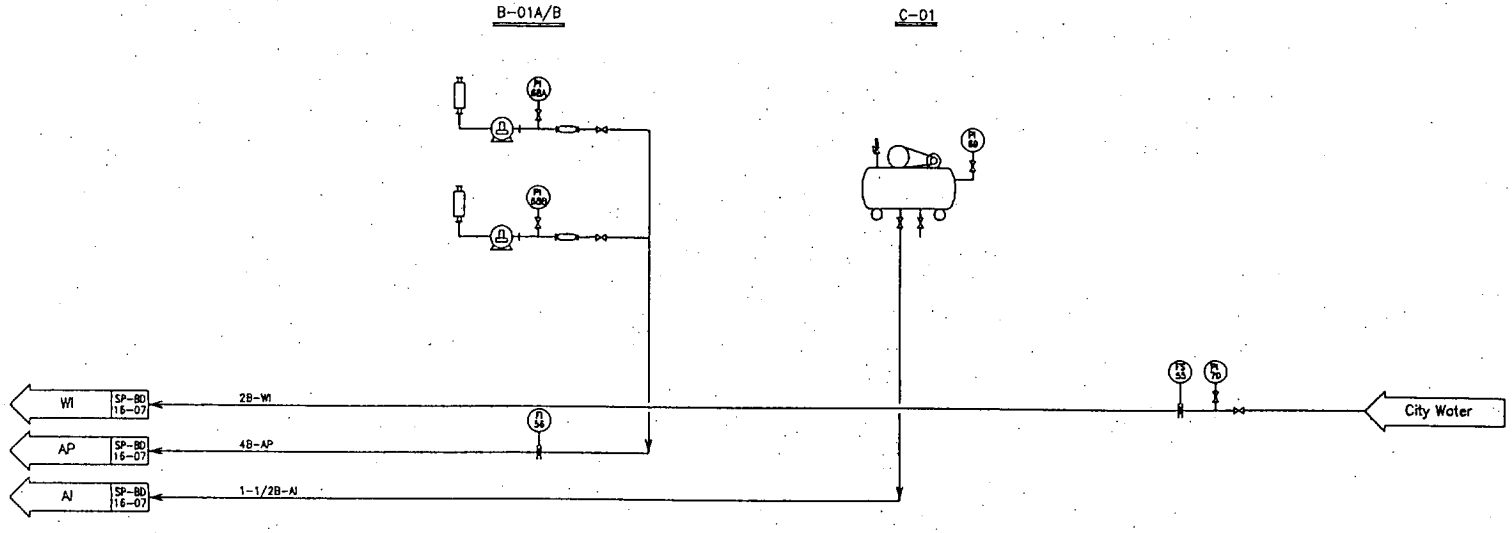


ITEM No.	PU-13	PU-14A/B	PU-15A/B	PU-16A/B	Z-07
SERVICE	Settling Aid Pump	Centrifuge Feed Pump	Filter Aid Pump	W.W.Return Pump	Wastewater Pit
SIZE(m)	0.1L/minx0.5MPaxO.4kW	1.5m³/hx15mHx3.7kW	3.0L/minx0.5MPaxO.75kW	5.0m³/hx15mHxO.75kW	3.0mWx6.0mLx3.0mH
DESIGN PRESS(MPa)	1.0	1.0	1.0	1.0	Full Water
DESIGN TEMP.(°C)	Amb.	Amb.	Amb.	Amb.	Amb.
MATERIAL/TYPE	SCS/Plunger	SCS/Horizontal	SCS/Plunger	SCS/Centri.Verti.	RC/Open Basin

ITEM No.	D-09	T-09	D-10	MZ-06	MZ-07	MZ-08	MX-09	MZ-05	MX-10
SERVICE	Settling Aid Drum	Sludge Thickener	Filter Aid Drum	No1.Centrifuge	No2.Centrifuge	Belt Conveyer	Settling Aid Mixer	No.4 Sludge Rake	Filter Aid Mixer
SIZE(m)	0.7mDx1.0mH	3.2mDx3.0mH	1.2mDx1.5mH	3.0m³/hx15kW	1.5m³/hx7.5kW	20kg/min,L=6m	0.75kW,L=0.8m	0.75kW	0.75kW,L=1.2m
DESIGN PRESS(MPa)	Full Water	Full Water	Full Water	1.0	1.0	None	None	None	None
DESIGN TEMP.(°C)	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.	Amb.
MATERIAL/TYPE	CS/Verti.	CS+Epoxy/C.Driven	CS/Verti.	SCS/Horizontal	SCS/Horizontal	CS/Holizontal	SUS/Verti.	CS+Epoxy/C.Drive	SUS/Verti.

JICA	Chck	Tech	Appr						
Sign									
Date									
CHSL	Dsgn	Chck	Appr						
Sign				Rev	Description	Dsgn	Chck	Appr	Date
Date					REVISION				

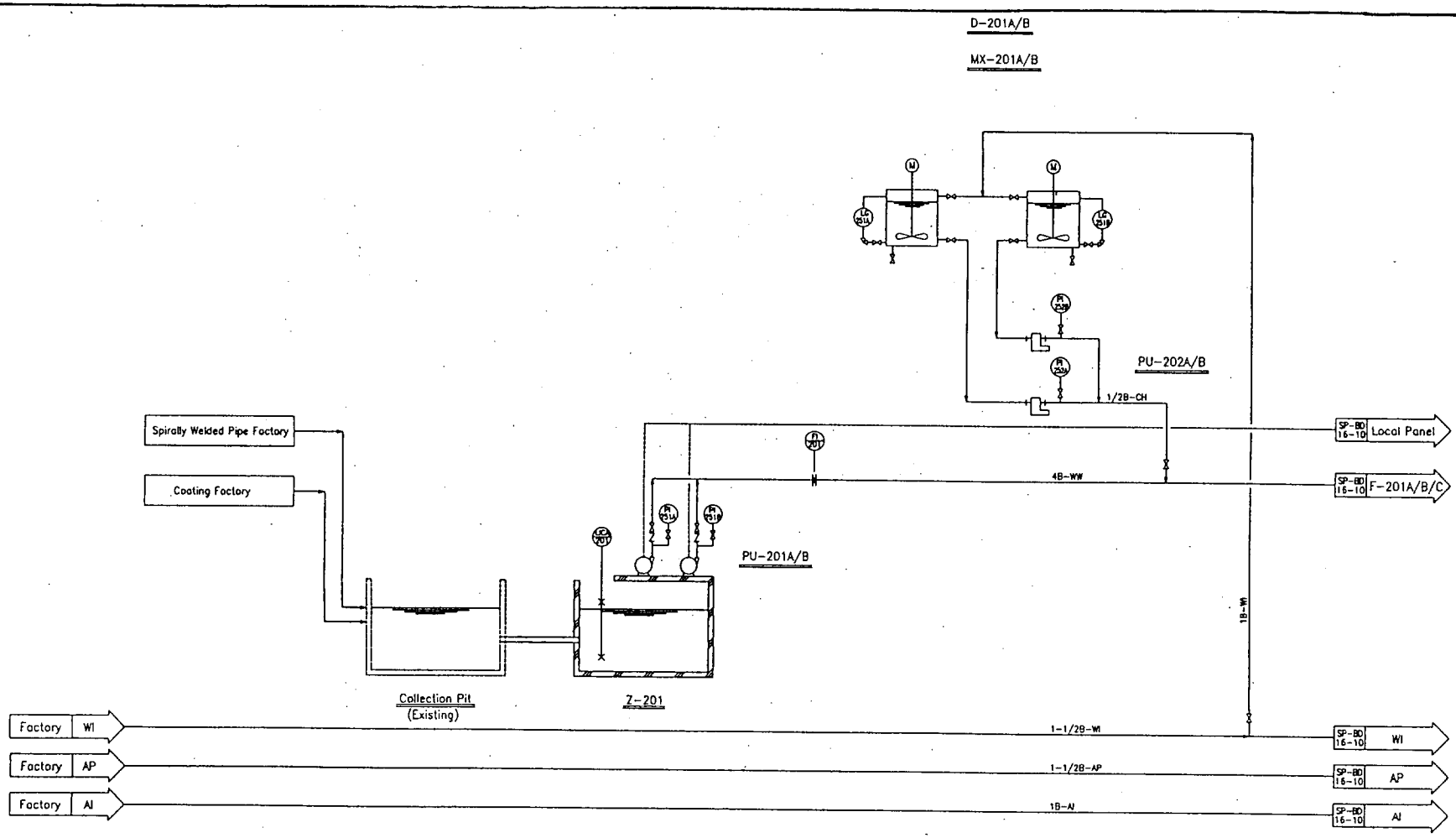
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION
CONSULTANT	CHIYODA OAMES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR EL NASR CO. FOR STEEL PIPES AND FITTINGS ENGINEERING FLOW DIAGRAM FOR No.1 W.W.T. RECOMMENDABLE PLANT(7/8)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-16-07 REV. 0



ITEM No.	B-01A/B	C-01
SERVICE	AP Blower	AI Compressor
SIZE(m)	9.5Nm³/min×7mH×15kW	0.3m³/min×0.7MPa×1.5kW
DESIGN PRESS(MPa)	1	1
DESIGN TEMP.(°C)	200	200
MATERIAL/TYPE	CI/Root	CI/Rotary

JICA	Chck	Tech	Appr							
Sign										
Date										
CNSL	Dsgn	Chck	Appr							
Sign				Rev	Description	Dsgn	Chck	Appr	Date	
Date				REVISION						

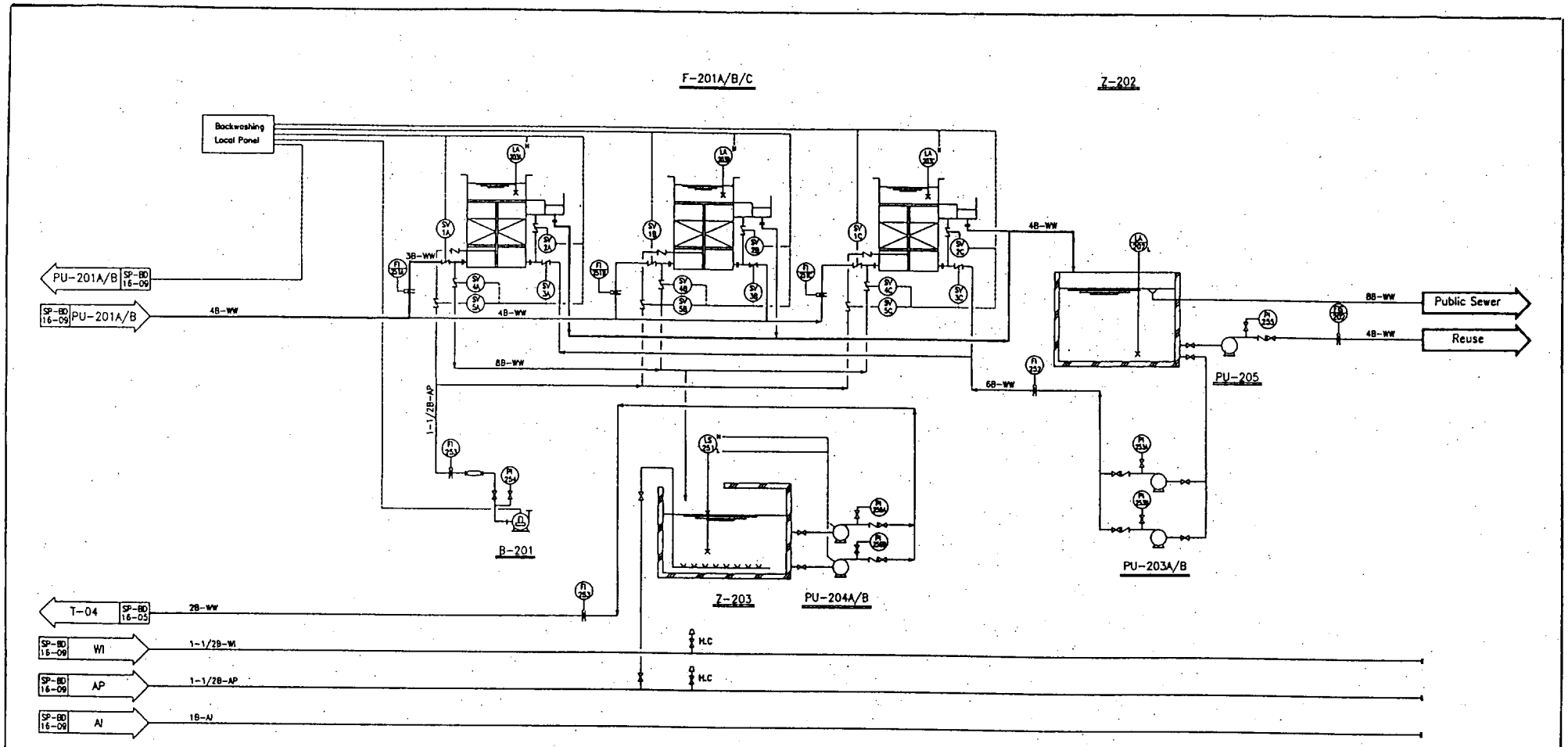
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION
CONSULTANT	CHIYODA DAMES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR EL NASR CO. FOR STEEL PIPES AND FITTINGS ENGINEERING FLOW DIAGRAM FOR No.1 W.W.T. RECOMMENDABLE PLANT(8/8)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-16-08 REV. 0



ITEM No.	D-201A/B	MX-201A/B	PU-202A/B	Z-201	PU-201A/B
SERVICE	No.2 Coagulant Drum	No.2 Coagulant Mixer	No.2 Coagulant Pump	No.4 Wastewater Pit	No.4 Wastewater Pump
SIZE(m)	1.2mIDx1.5mH	0.75kW,t=1.2m	0.5L/minx0.5MPaxO.4kW	1.5mWx3.0mLx3.5mD	60m³/hx12mHx5.5kW
DESIGN PRESS(MPa)	Full Water	none	1	Full Water	1
DESIGN TEMP.(°C)	Amb.	Amb.	Amb.	Amb.	Amb.
MATERIAL/TYPE	CS+HRL/Verti.	SUS/Verti.	SCS/Plunger	RC/Open Basin	SCS/Centri.Verti.

JICA	Chck	Tech	Appr						
Sign									
Date									
CNSL	Dsgn	Chck	Appr						
Sign				Rev	Description	Dsgn	Chck	Appr	Date
Date				REVISION					

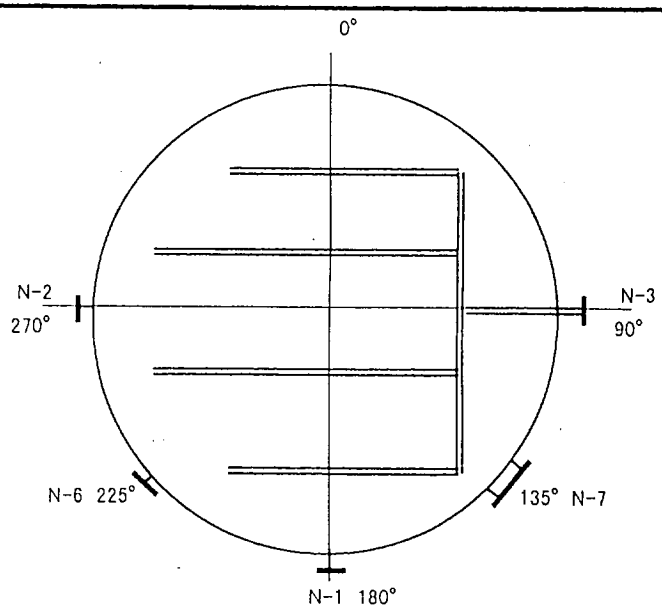
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY INDUSTRIAL DEVELOPMENT STUDY DIVISION
CONSULTANT	CHIYODA DAWES & MOORE CO. CHIYODA CORPORATION
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR EL NASR CO. FOR STEEL PIPES AND FITTINGS ENGINEERING FLOW DIAGRAM FOR No.2 W.W.T. RECOMMENDABLE PLANT(1/2)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-16-09 REV. 0

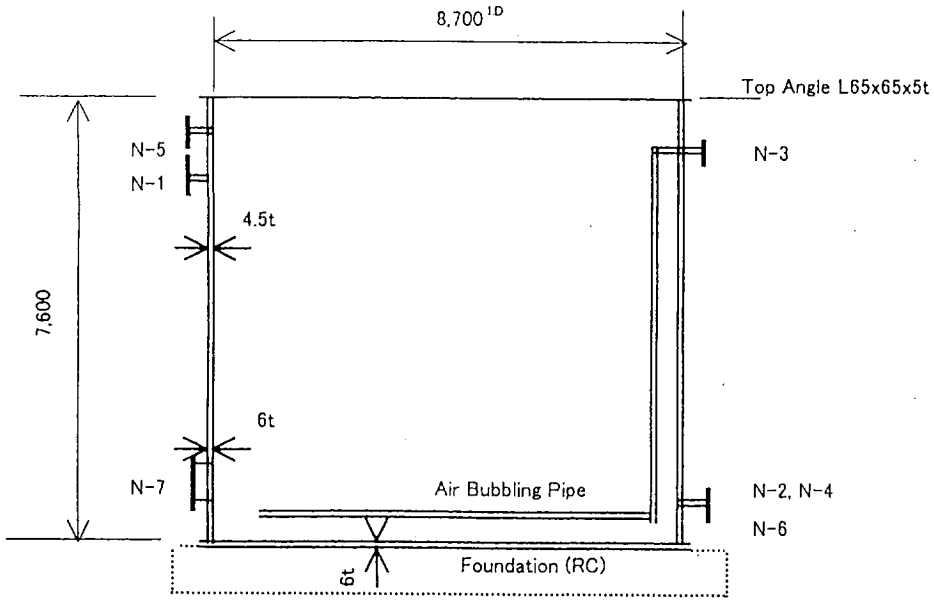


ITEM No.	F-201A/B/C	Z-202	B-201	Z-203	PU-204A/B	PU-203A/B	PU-205
SERVICE	Sand Filter	Filtered Water Pit	Backwashing Blower	Backwash W.W. Pit	Backwash W.W. Feed Pump	Backwashing Pump	Recovered Water Pump
SIZE(m)	2.1mIDx4.5mH	3.0mWx5.0mLx3.0mD	3.0Nm³/minx5mHx5.5kW	3.0mWx5.0mLx3.0mH	5.0m³/hx40mHx1.5kW	155m³/hx12mHx11kW	60m³/hx30mHx11kW
DESIGN PRESS(MPa)	Full Water	Full Water	1	Full Water	1	1	1
DESIGN TEMP.(°C)	Amb.	Amb.	200	Amb.	Amb.	Amb.	Amb.
MATERIAL/TYPE	CS+Epoxy/Gravity	RC/Open	CI/Roof	RC/Open Basin	SCS/Centri.Horiz.	SCS/Centri.Horiz.	SCS/Centri.Horiz.

JICA	Chck	Tech	Appr						
Sign									
Date									
CMSL	Dsgn	Chck	Appr						
Sign				Rev	Description	Dsgn	Chck	Appr	Date
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 EL NASR CO. FOR STEEL PIPES AND FITTINGS ENGINEERING FLOW DIAGRAM FOR No.2 W.W.T. RECOMMENDABLE PLANT(2/2)
ISSUED DATE	SCALE: None
DWG NO	SP-BD-16-10 REV. 0



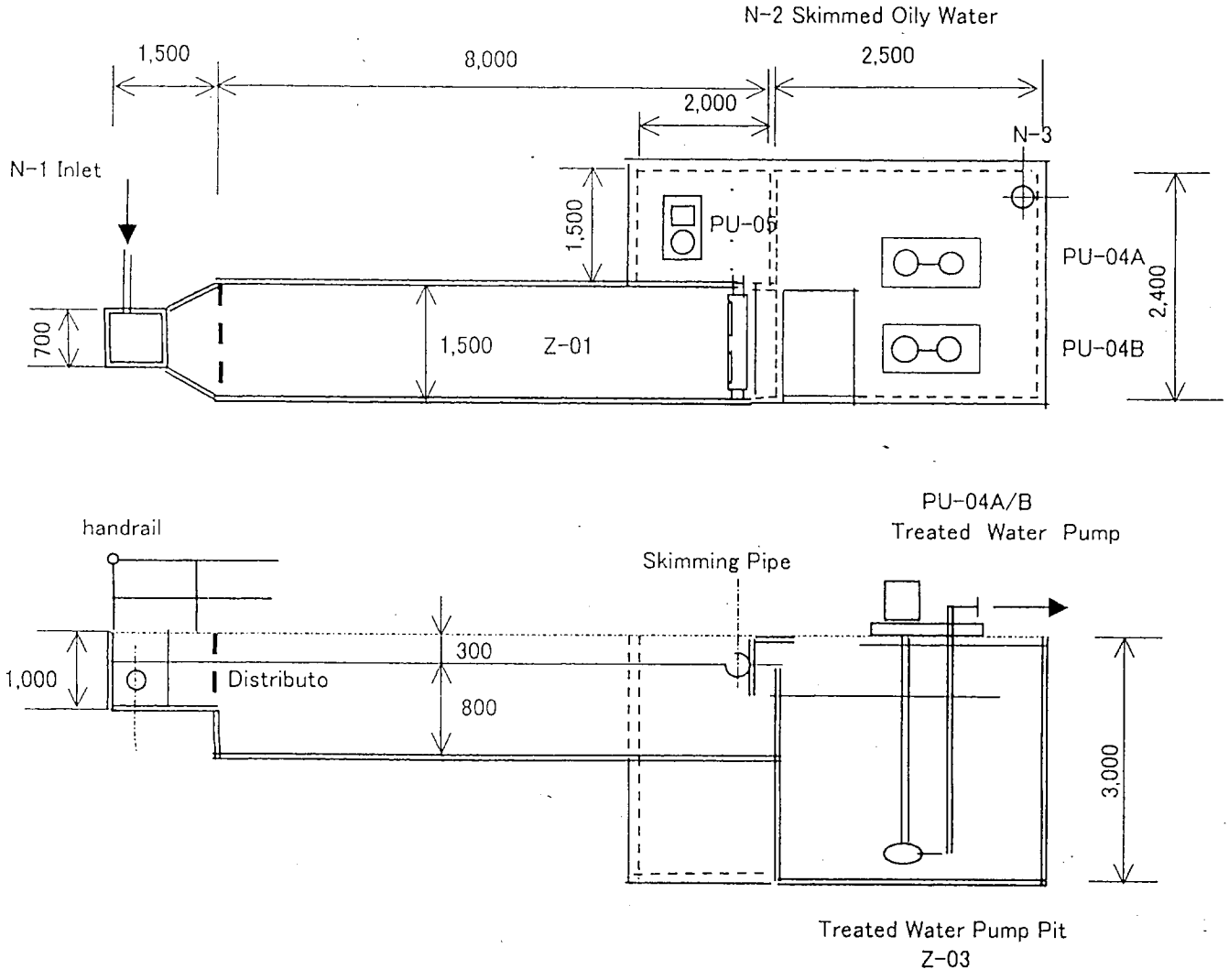


NOTE:
1)Type: Cylindrical Tank
(Open Top Tank)
2)Materials: Carbon Steel
inside Epoxy Coating
3)Accessories: Stairway
Inside Ladder
Air Bubbling
Tube

Loading Data
Weight Empty: 14.5ton
Full Water 450ton

No	Name	Size	No	Note
N-7	Manhole	500A	1	
N-6	Level Instrument	6B	1	
N-5	Over Flow	8B	1	
N-4	Drain	4B	1	
N-3	Bubbling Air Inlet	2B	1	
N-2	Raw Water Outlet	6B	2	
N-1	Raw Water inlet	6B	1	

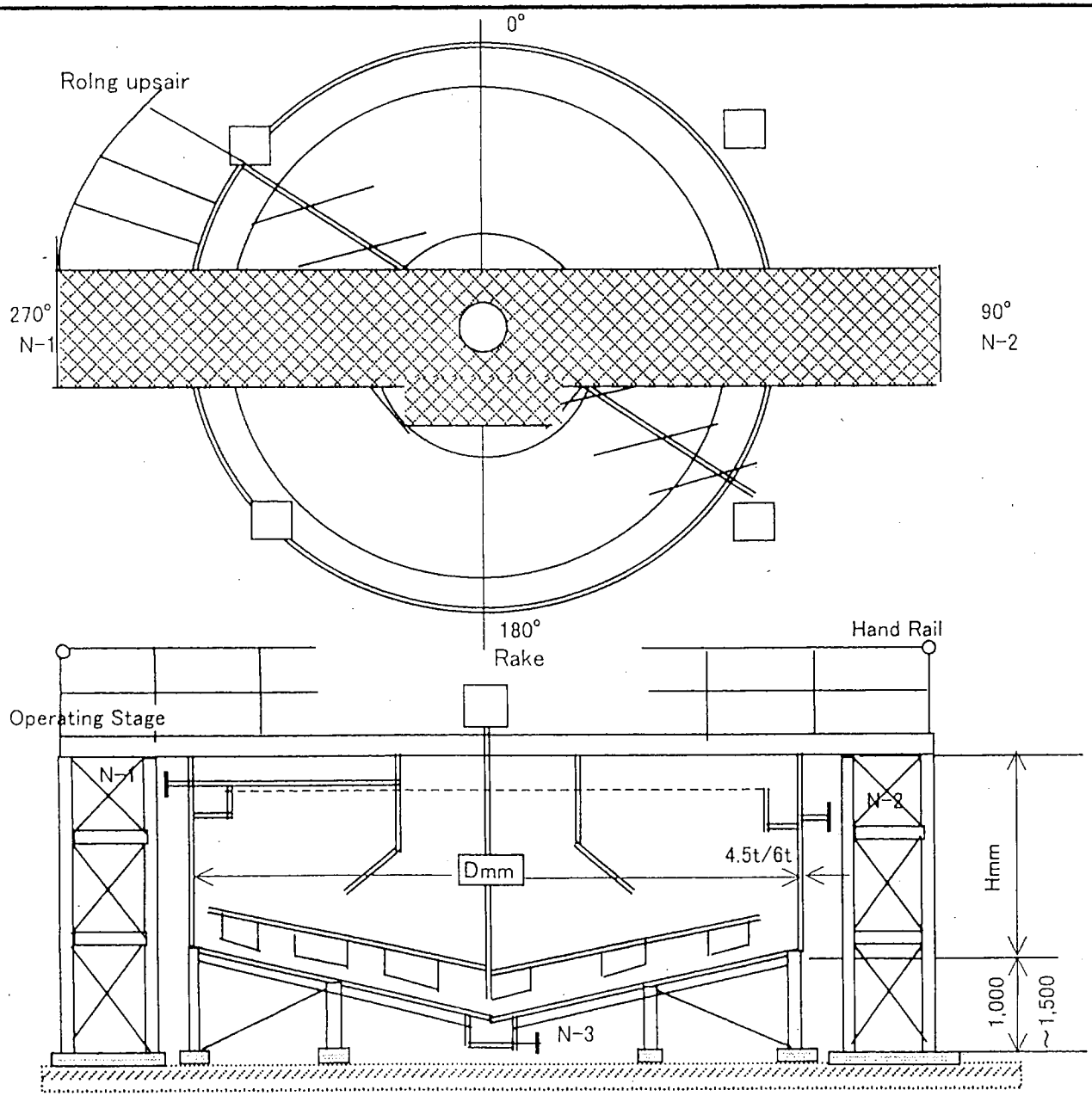
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
TYTLE	FOR: EL NASR Co. for STEEL PIPES & FITTINGS 450 m^3 EQUALIZATION TANK (T-5) WASTEWATER TREATMENT PLANT
DWG. NO	SP - BD - 22 - SK01 REV.0



NOTE:
Material: Reinforced Concrete
Accessories: Skimming Pipe
Hand rail, Inside Ladder
Option: Flight Scraper (Surface, Bottom)

Nozzle No	Name	Size	No	Note
N-3	Level Instrument	6B	1	
N-2	Skimmed Oily	6B	1	
	Water Outlet			
N-1	Raw Water inlet	6B	1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
TYTLE	FOR: EL NASR STEEL PIPES & FITTINGS OIL SEPARATOR (Z-01/03/04) WASTEWATER TREATMENT PLANT
DWG. NO	SP - BD - 51 - SK01 REV.0

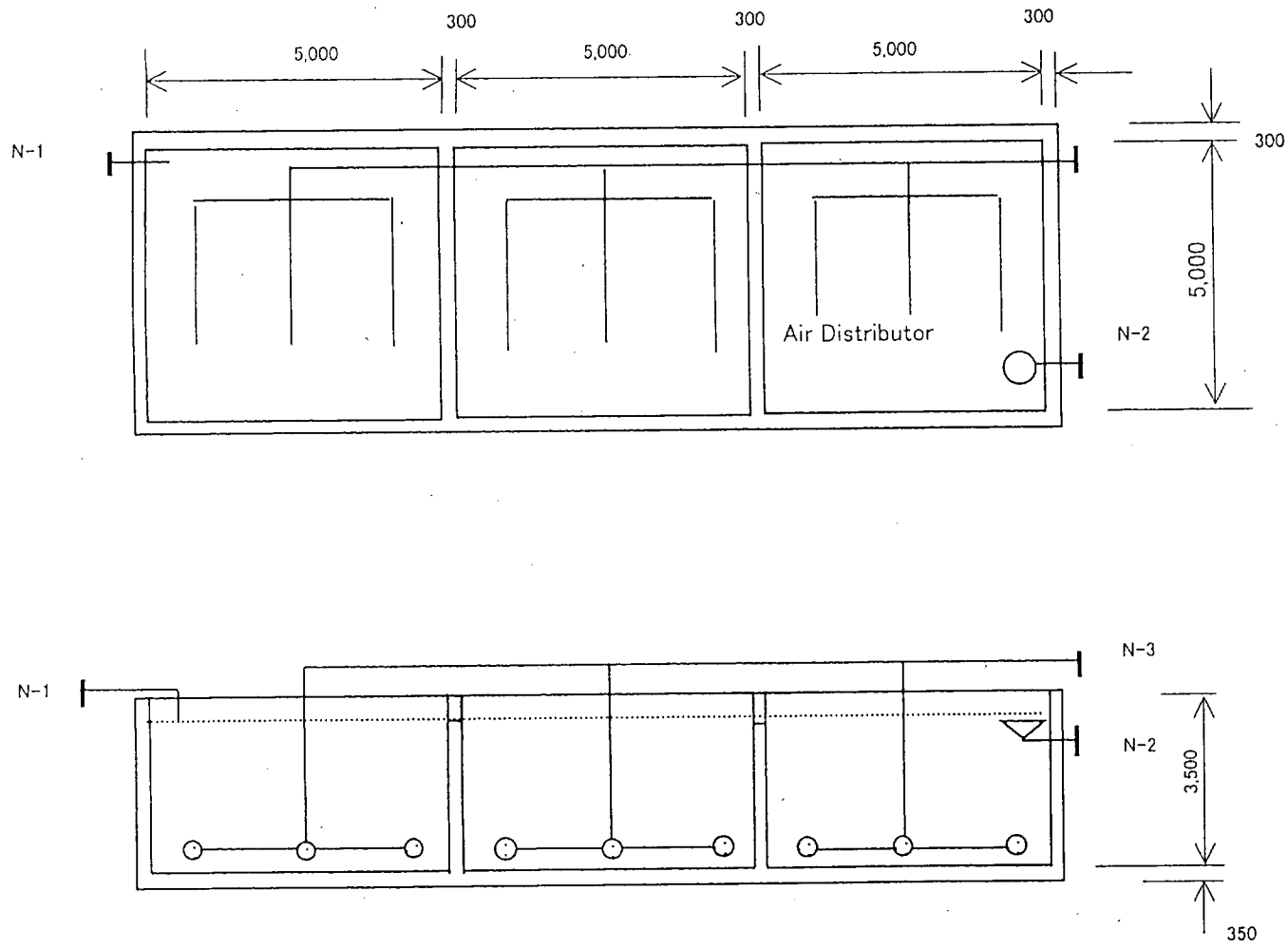


Materials: Carbon Steel/Epoxy coatir
Accessories: Sludge Collection Rake
Operating Stage
Stairway

T-02: No.1 Sedimentation Tank
D=5,811 H=3,000
T-06: No.2 Sedimentation Tank
D=9,688 H=4,000
T-08: No.3 Sedimentation Tank
D=5,811 H=3,000

Nozzle No	Name	Size	No	Note
N-3	Sludge Outlet	6B	1	
N-2	Treated Water Outle	6B	1	
N-1	Raw Water inlet	6B	1	

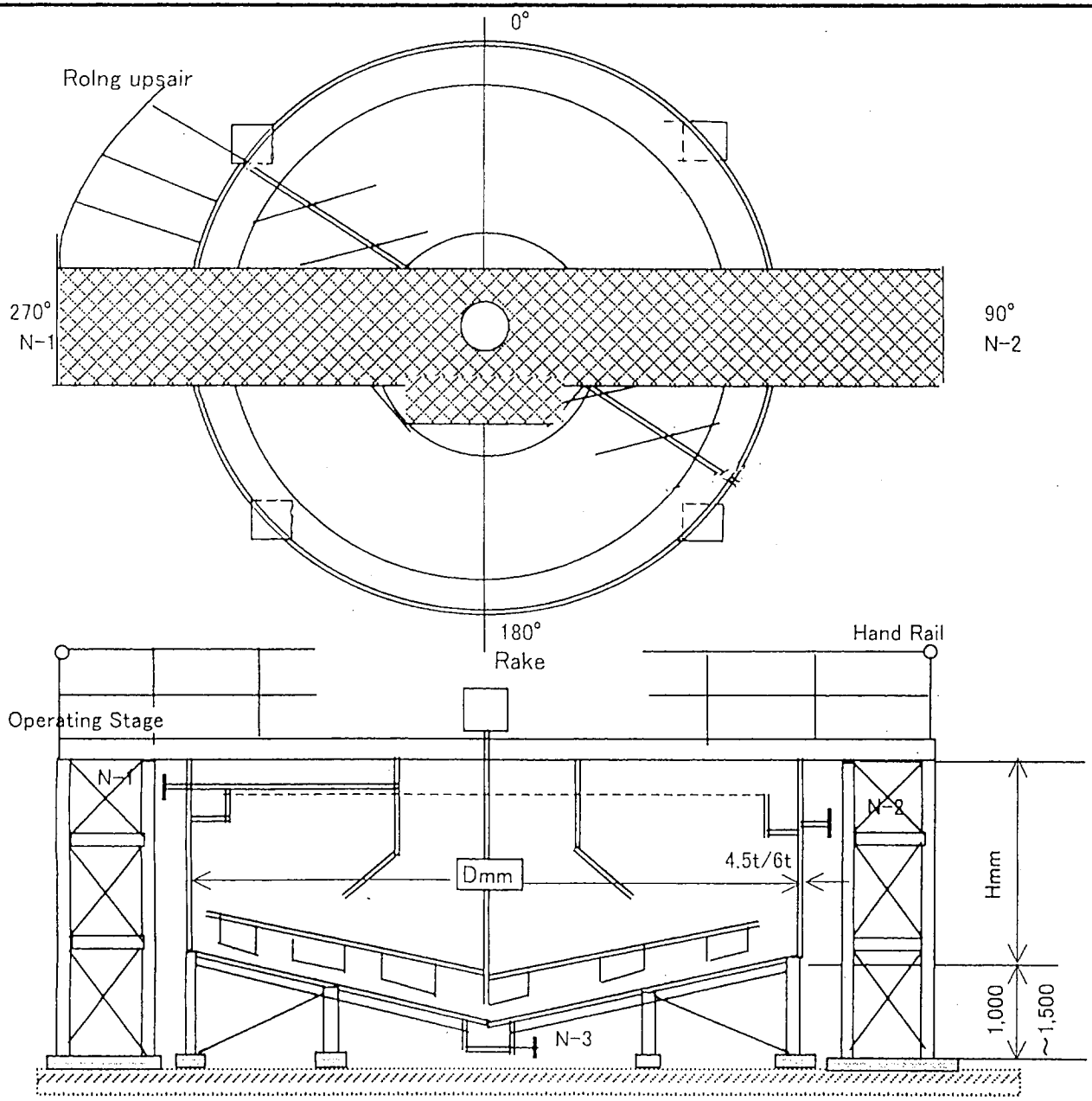
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENC
TYTLE	FOR: EL NASR STEEL PIPES & FITTINGS OIL SEPARATOR (Z-01) WASTEWATER TREATMENT PLANT
DWG. NO	SP - BD - 22 - SK02 REV.0



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

Nozzle No	Name	Size	No	Note
N-3	Air Inlet	3B	1	
N-2	T. Water Outlet	6B	1	
N-1	Inlet	6B	1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENC
TYTLE	FOR: EL NASR CO. FOR STEEL PIPES & FITTIN AERATION BASIN (Z-04) WASTEWATER TREATMENT PLANT
DWG. NO	SP - BD - 51 - SK02 REV.0

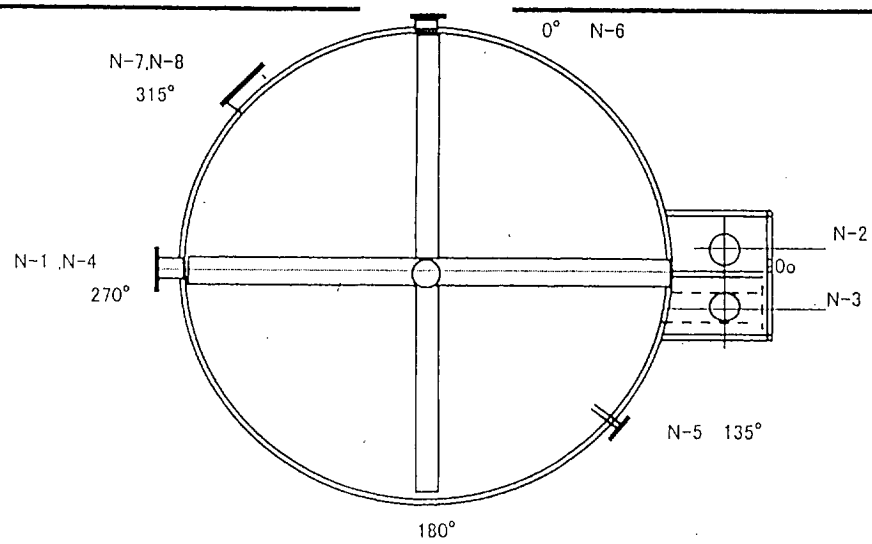


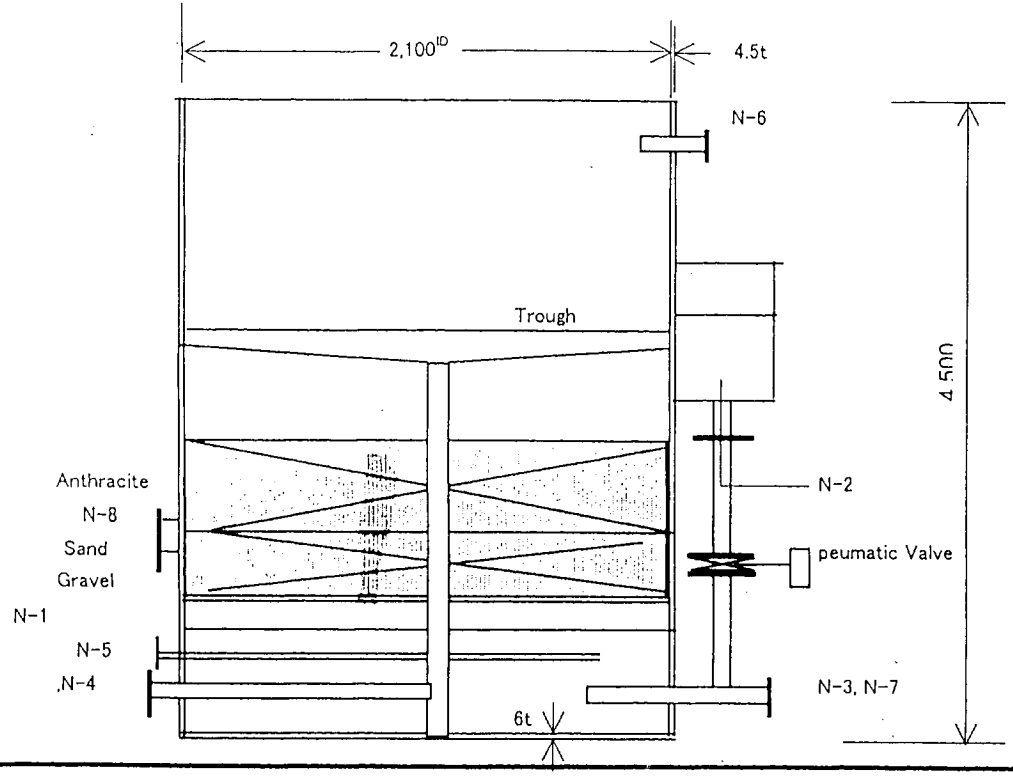
Materials: Carbon Steel/Epoxy coatin
Accessories: Sludge Collection Rake
Operating Stage
Stairway

T-02: No.1 Sedimentation Tank
D=5,811 H=3,000
T-06: No.2 Sedimentation Tank
D=9,688 H=4,000
T-08: No.3 Sedimentation Tank
D=5,811 H=3,000

Nozzle No	Name	Size	No	Note
N-3	Sludge Outlet	6B	1	
N-2	Treated Water Outle	6B	1	
N-1	Raw Water inlet	6B	1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
TYTLE	FOR: EL NASR CO. FOR STEEL PIPES & FITTINGS SEDIMENTATION TANK (T-02/06/08) WASTEWATER TREATMENT PLANT
DWG. NO	SP - BD - 22 - SK02 REV.0





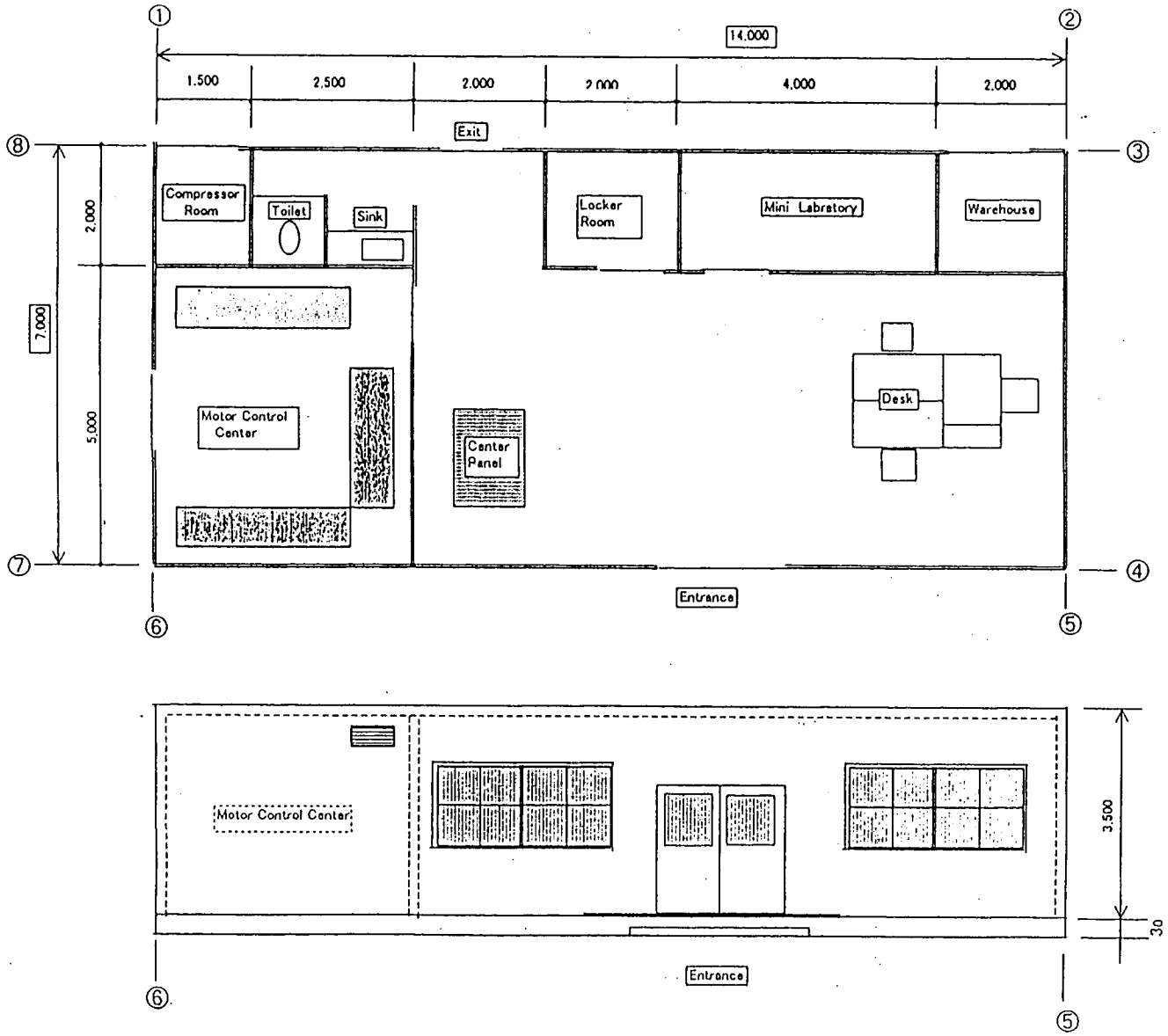
Material: Carbon steel/Epoxy Coating

Filter Media: Anthracite + Sand/Gravel

Accessories: Operating Stage
Ladder

No	Name	Size	No	Note
N-8	Handhole	200A	1	
N-7	Manhole	500A	1	
N-6	Over Flow	6B	1	
N-5	Air Inlet	4B	1	
N-4	B.W.Water Outlet	8B	1	
N-3	B. Water Inlet	8B	1	
N-2	F.Water Outlet	4B	1	
N-1	C.Water Inlet	4B	1	

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
TYTLE	FOR: EL NASR CO. FOR STEEL PIPES & FITTINGS SAND FILTER (F-01A/B/C) WASTEWATER TREATMENT PLANT
DWG. NO	SP - BD - 22 - SK03 REV.0



JICA	Chck	Tech	Appr						
Appr									
Date									
CTS	Dsgn	Chck	Appr						
Appr				Rev	Description	Dsgn	Chck	Appr	Date
Date				Revision					

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 Nominated Factory W.W.T Cotrol Room
ISSUED	SCALE: None
DWG: 00-BD-56-01	REV: 0

INDUCTION MOTOR LIST

DOC. NO. : SP-BD-60-L1-(1/3)

CLIENT : Japan International Cooperation Agency

PROJECT : The Study on Industrial Waste Water Plant

PLANT : El Nasr Co. for Steel Pipes & Fittings

WASTE W. : Industrial W.W./Sanitary·Domestic W.W.

REV	1	2	3	MADE	
BY				CKD	
APVE				APVE	
DATE				DATE	

Motor No.	Service	No. Required	Type	Output Estimato	Output Final	Speed Chrst	Revolution	Pole / r.p.m	V-Φ-Hz	Time Rating	Starting Currrent	Starting Torque	Insulation	Enclose.	Cable	Mounting	Drive	Bearing	Acc.	Location	Color Finish	Remarks
PU-01-A/B-M	No.1 Lime Pump	2	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	D			OD		
PU-02A/B-M	No.1 Sludge Pump	2	SC	2.2		C	CW	4 / 1500	380-3-50	C				TEFC		H	D			OD		
PU-03A/B-M	Neutralized W.W. Pump	2	SC	5.5		C	CW	4 / 1500	380-3-50	C				TEFC		H	D			OD		
PU-04A/B-M	Oil Separator T.W. Pump	2	SC	5.5		C	CW	4 / 1500	380-3-50	C				TEFC		V	D			OD		
PU-05-M	Recovered Oil Pump	1	SC	1.5		C	CW	4 / 1500	380-3-50	C				TEFC		V	D			OD		
PU-06A/B-M	Nutrient(N) Pump	2	SC	0.4		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
PU-07A/B-M	Nutrient(P) Pump	2	SC	0.4		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
PU-08A/B-M	Sludge Circulation Pump	2	SC	3.7		C	CW	4 / 1500	380-3-50	C				TEFC		H	D			OD		
PU-09A/B-M	No.2 Lime Pump	2	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
PU-10A/B-M	Coagulant Pump	2	SC	0.4		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
PU-11A/B-M	Coagulant Aid Pump	2	SC	0.4		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
PU-12A/B-M	Sludge Feed Pump	2	SC	2.2		C	CW	4 / 1500	380-3-50	C				TEFC		V	D			OD		
PU-13-M	Settling Aid Pump	1	SC	0.4		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
PU-14A/B-M	Centrifuge Feed Pump	2	SC	3.7		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
PU-15A/B-M	Filter Aid Pump	2	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
PU-16A/B-M	W.W. Return Pump	2	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		V	D			OD		
PU-17-M	T.W. Return Pump	1	SC	15		C	CW	4 / 1500	380-3-50	C				TEFC		H	D			OD		
PU-18A/B-M	Equalized Water Pump	2	SC	5.5		C	CW	4 / 1500	380-3-50	C				TEFC		H	D			OD		
B-01A/B-M	AP Blower	2	SC	15		C	CW	4 / 1500	380-3-50	C				TEFC		H	B			OD		
C-01-M	Al Compressor	1	SC	1.5		C	CW	4 / 1500	380-3-50	C				TEFC		B	B			ID		
MZ-01-M	Lime Feeder	1	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
MZ-02-M	No.1 Sludge Rake	1	SC	1.5		C	CW	4 / 1500	380-3-50	C				TEFC		V	G			OD		
MZ-03-M	No.2 Sludge Rake	1	SC	1.5		C	CW	4 / 1500	380-3-50	C				TEFC		V	G			OD		
MZ-04-M	No.3 Sludge Rake	1	SC	1.5		C	CW	4 / 1500	380-3-50	C				TEFC		V	G			OD		
MZ-05-M	No.4 Sludge Rake	1	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		V	G			OD		
MZ-06-M	No.1 Centrifuge	1	SC	15		C	CW	2 / 3000	380-3-50	C				TEFC		H	D			OD		
MZ-07-M	No.2 Centrifuge	1	SC	7.5		C	CW	2 / 3000	380-3-50	C				TEFC		H	D			OD		
MZ-08-M	Belt Conveyor	1	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	B			OD		

Notes:

1. Type : SC = Squirrel Cage. W = Wound Rotor.
2. Speed : C = Constant. M = Multi. A = Adjustable. V = Varying.
3. Revolution Direction : Direction when viewed from coupling side.
   CW = Clockwise. CCW = Counter-Clockwise.
4. Voltage : Rated Voltage
5. Time Rating : C = Continuouse. ST = Short Time. P = Periodic.
6. Enclosure : TEFC = Totally-Enclosed Fan-Cooled.
   DR = Drip-Proof.
7. Cable(or Wire) : T = Top. B = Bottom. S = Side. H = Hub for conduit tube or flexible tube.
8. Mounting : H = Horizontal. V = Vertical
9. Drive : D = Direct. B = Belt. C = Chain. G = Gear.
10. Location : ID = Indoor. OD = Outdoor.

INDUCTION MOTOR LIST

DOC. NO. :SP-BD-60-L1-(2/3)
CLIENT :Japan International Cooperation Agency
PROJECT :The Study on Industrial Waste Water Plant
PLANT :El Nasr Co. for Steel Pipes & Fittings
WASTE W. :Industrial W.W./Sanitary·Domestic W.W.

REV	1	2	3	MADE	
BY				CKD	
APVE				APVE	
DATE				DATE	

Motor No.	Service	No. Required	Type	Output Estimate	Output Final	Speed Chrst	Revolution	Pole / r.p.m	V-Φ-Hz	Time Rating	Starting Currrent	Starting Torque	Insulation	Enclose	Cable	Mounting	Drive	Bearing	Acc.	Location	Color Finish	Remarks
MX-01-M	Urea Tank Mixer	1	SC	1.5		C	CW	4 / 1500	380-3-50	C				TEFC		V	G			OD		
MX-02A/B-M	Nutrient(N) Mixer	2	SC	0.4		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
MX-03A/B-M	Nutrient(P) Pump	2	SC	0.4		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
MX-04A/B-M	NO.2 Lime Mixer	2	SC	1.5		C	CW	4 / 1500	380-3-50	C				TEFC		V	G			OD		
MX-05A/B-M	No.1 Coagulant Mixer	2	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
MX-06A/B-M	Coagulant Aid Mixer	2	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
MX-07-M	Coagulation Mixer	1	SC	2.2		C	CW	4 / 1500	380-3-50	C				TEFC		V	G			OD		
MX-08-M	Flocculation Mixer	1	SC	2.2		C	CW	4 / 1500	380-3-50	C				TEFC		V	G			OD		
MX-09-M	Settling Aid Mixer	1	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
MX-10-M	Filter Aid Mixer	1	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
PU-101A/B-M	No.1 Wastewater Pump	2	SC	11		C	CW	2 / 3000	380-3-50	C				TEFC		V	D			OD		
PU-102A/B-M	No.2 Wastewater Pump	2	SC	7.5		C	CW	2 / 3000	380-3-50	C				TEFC		V	D			OD		
PU-103A/B-M	No.3 Wastewater Pump	2	SC	2.2		C	CW	4 / 3000	380-3-50	C				TEFC		V	D			OD		
MZ-101-M	Bolt Oil Skimmer	1	SC	0.4		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		

Notes:
1. Type : SC = Squirrel Cage. W = Wound Rotor.
2. Speed : C = Constant. M = Multi. A = Adjustable. V = Varying.
3. Revolution Direction : Direction when viewed from coupling side. CW = Clockwise. CCW = Counter-Clockwise.
4. Voltage : Rated Voltage
5. Time Rating : C = Continuouse. ST = Short Time. P = Periodic.
6. Enclosure : TEFC = Totally-Enclosed Fan-Cooled. DR = Drip-Proof.
7. Cable(or Wire) : T = Top. B = Bottom. S = Side. H = Hub for conduit tube or flexible tube.
8. Mounting : H = Horizontal. V = Vertical
9. Drive : D = Direct. B = Belt. C = Chain. G = Gear.
10. Location : ID = Indoor. OD = Outdoor.

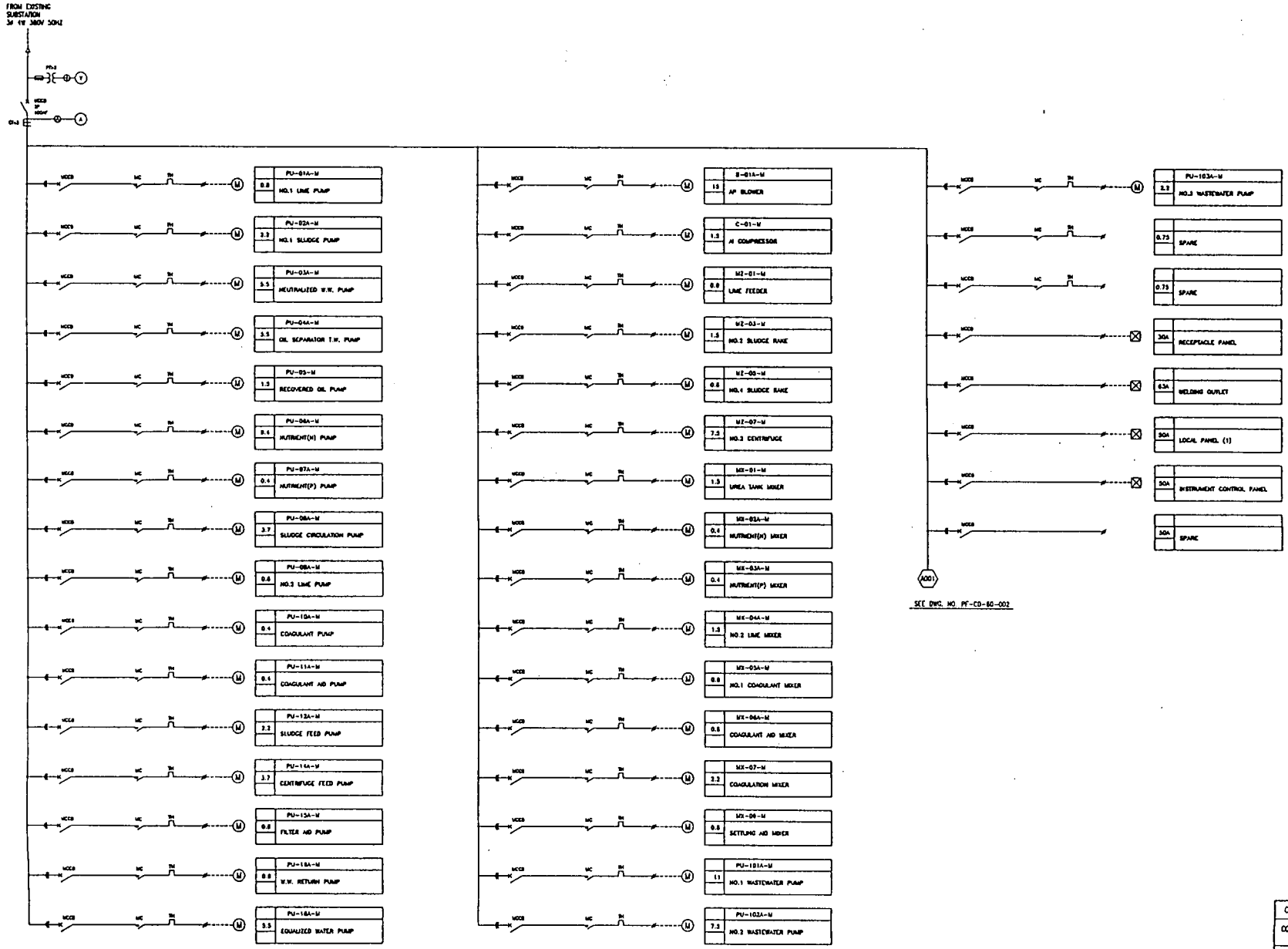
INDUCTION MOTOR LIST

DOC. NO. :SP-BD-60-L1-(3/3)
CLIENT :Japan International Cooperation Agency
PROJECT :The Study on Industrial Waste Water Plant
PLANT :El Nasr Co. for Steel Pipes & Fittings
WASTE W. :Industrial W.W./Sanitary·Domestic W.W.

REV	1	2	3	MADE	
BY				CKD	
APVE				APVE	
DATE				DATE	

Motor No.	Service	No. Required	Type	Output Estimate	Output Final	Speed Chrst	Revolution	Pole / r.p.m	V-Φ-Hz	Time Rating	Starting Currrent	Starting Torque	Insulation	Enclose.	Cable	Mounting	Drive	Bearing	Acc.	Location	Color Finish	Remarks
PU-201A/B-M	No.4 Wastewater Pump	2	SC	5.5		C	CW	4 / 1500	380-3-50	C				TEFC		V	D			OD		
PU-202A/B-M	No.2 Coagulant Pump	2	SC	0.4		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
PU-203A/B-M	Backwashing Pumpr	2	SC	11		C	CW	4 / 1500	380-3-50	C				TEFC		H	D			OD		
PU-204A/B-M	Backwash W.W. Pump	2	SC	1.5		C	CW	2 / 3000	380-3-50	C				TEFC		H	D			OD		
PU-205A/B-M	Sottling Aid Mixer	1	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	D			OD		
B-201-M	Backwashing Blower	1	SC	5.5		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		
MX-201A/B-M	No.2 Coagulant Mixer	2	SC	0.8		C	CW	4 / 1500	380-3-50	C				TEFC		H	G			OD		

Notes:
1. Type : SC = Squirrel Cage. W = Wound Rotor.
2. Speed : C = Constant. M = Multi. A = Adjustable. V = Varying.
3. Revolution Direction : Direction when viewed from coupling side.
CW = Clockwise. CCW = Counter-Clockwise.
4. Voltage : Rated Voltage
5. Time Rating : C = Continuouse. ST = Short Time. P = Periodic.
6. Enclosure : TEFC = Totally-Enclosed Fan-Cooled.
DR = Drip-Proof.
7. Cable(or Wire) : T = Top. B = Bottom. S = Side. H = Hub for conduit tube or flexible tube.
8. Mounting : H = Horizontal. V = Vertical
9. Drive : D = Direct. B = Belt. C = Chain. G = Gear.
10. Location : ID = Indoor. OD = Outdoor.



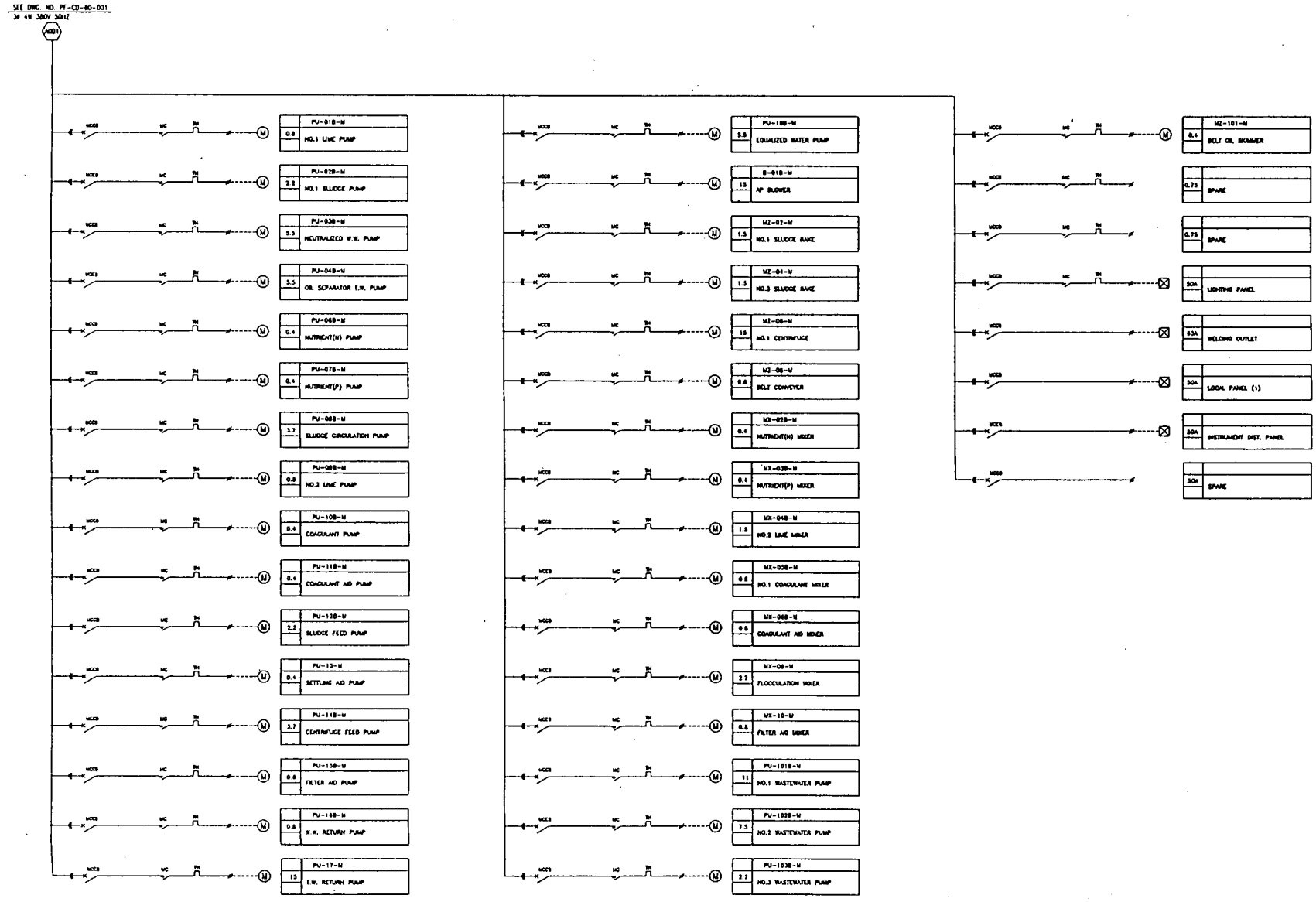
BD-29

Rev.No	Description	Dsgn.	Chck.	Appr.	Date
	REVISION				

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
CONSULTANT	CHIYODA OAKES AND MOORE CO. CHIYODA CORP.
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	FOR EL NASR CO. FOR STEEL PIPES & FITTINGS NO.1 UNIT SINGLE LINE DIAGRAM 380V MOTOR CONTROL BOARD (1/2)

JICA	Chck	Chck	Appr
Sign			
Date			
Consult	Dsgn	Chck	Appr.
Sign			
Date			

ISSUED DATE		SCALE	NONE
DWG NO.	PF-CO-60-001	REV.	0

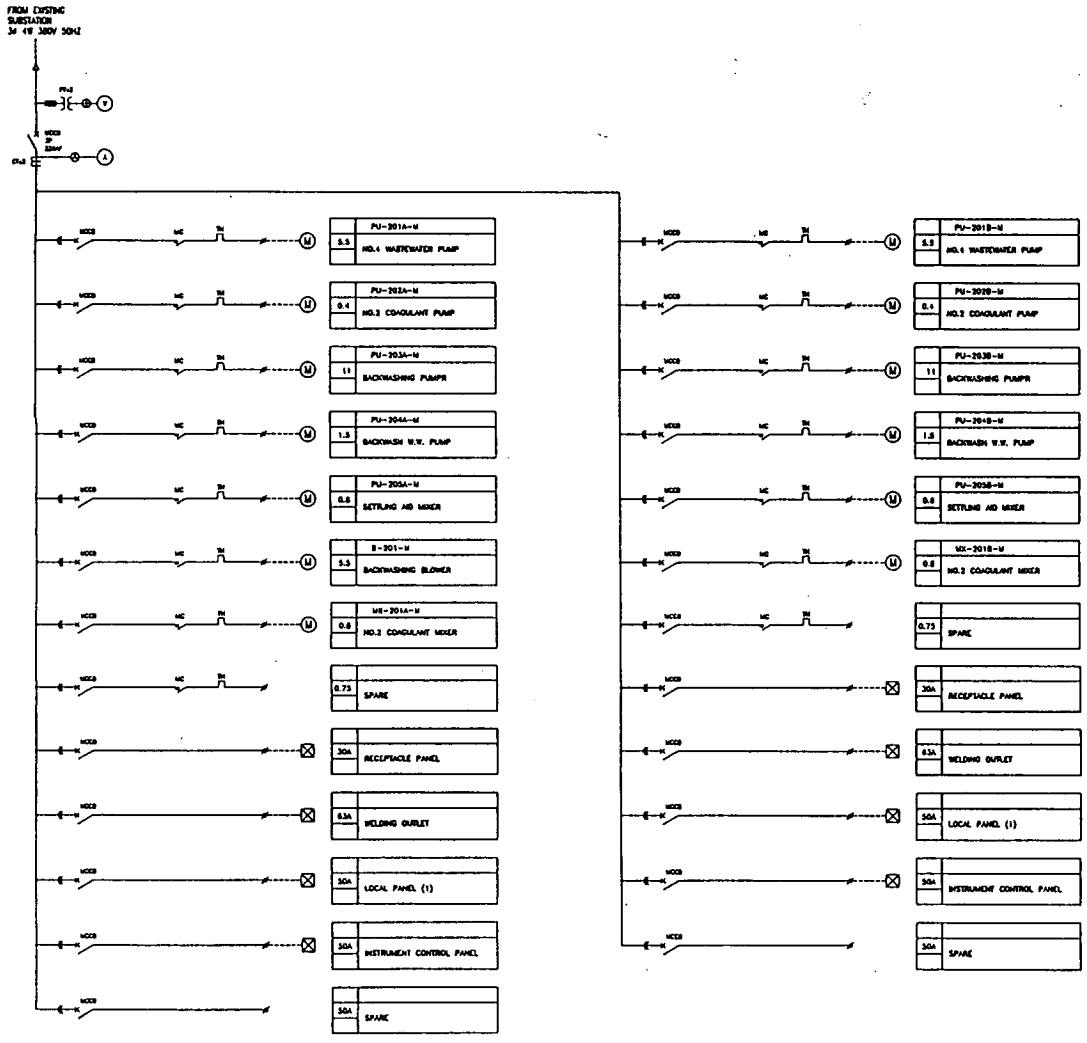


BD-30

Rev.No	Description	Dsgn.	Chck.	Appr.	Date
	REVISION				

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
CONSULTANT	CHIYODA DAMES AND MOORE CO. CHIYODA CORP.
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	for EL NASR CO. FOR STEEL PIPES & FITTINGS NO.1 WWT SINGLE LINE DIAGRAM 380V MOTOR CONTROL BOARD (2/2)
ISSUED DATE	SCALE: NONE
DWG NO.	PF-CO-80-002 REV. 0

JICA	Chck	Chck	Appr
Sign			
Date			
Consult	Dsgn	Chck	Appr
Sign			
Date			



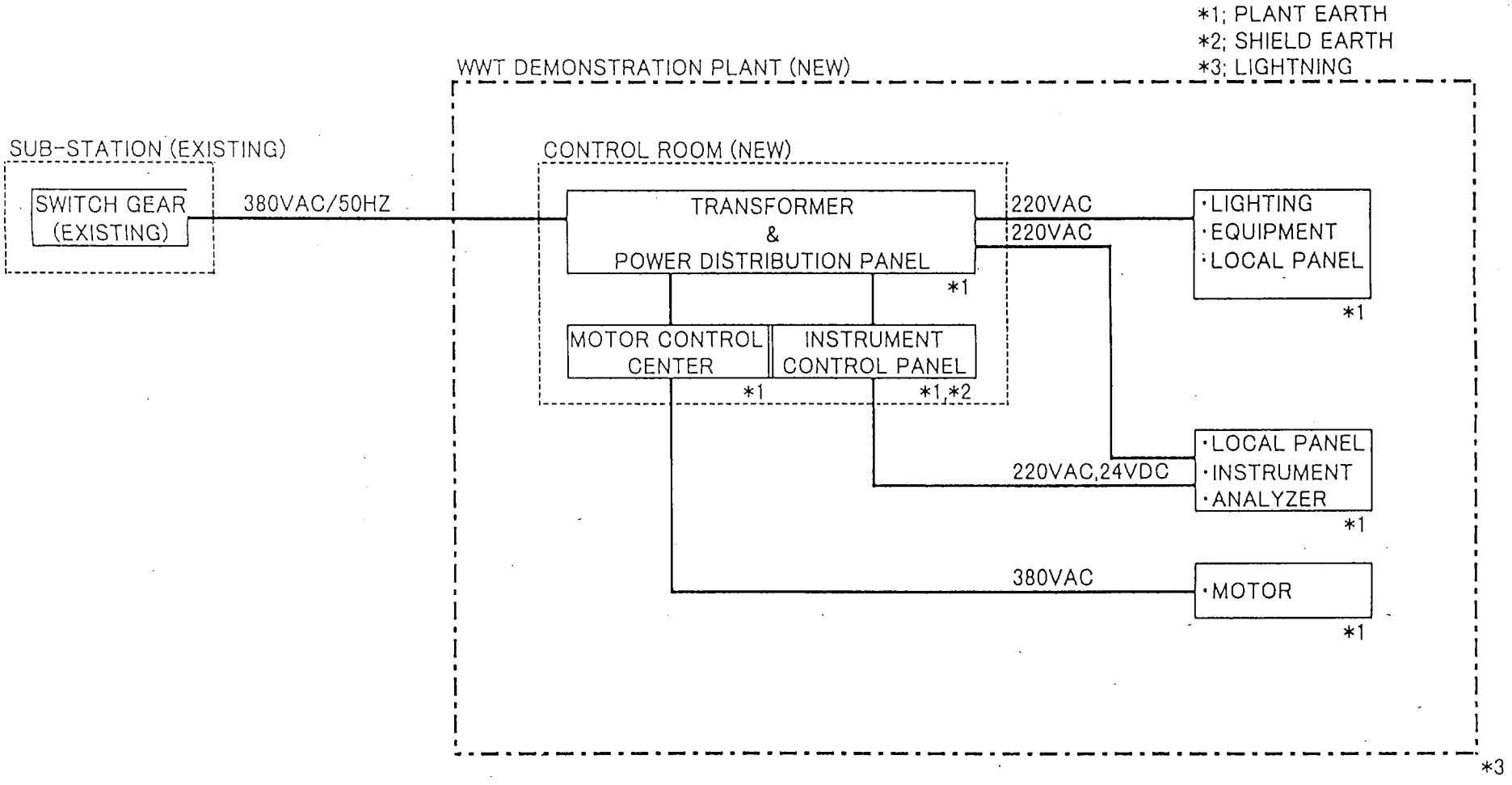
Rev No	Description	Dsgn.	Chck.	Appr.	Date

REVISION

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENCY
CONSULTANT	CHIYODA DAMES AND MOORE CO. CHIYODA CORP.
PROJECT	THE STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT
TITLE	for EL NASR CO. FOR STEEL PIPES & FITTINGS NO.2 WWT SINGLE LINE DIAGRAM 380V MOTOR CONTROL BOARD
ISSUED DATE	SCALE: NONE
DWG NO.	PF-CD-60-003 REV. 0

JICA	Chck	Chck	Appr.
Sign			
Date			
Consul.	Dsgn	Chck	Appr.
Sign			
Date			

CONFIGURATION OF ELECTRICAL & INSTRUMENTATION SYSTEM FOR DEMONSTRATION PLANT



EQUIPMENT LIST for El Nasr Co. for Steel Pipes & Fittings

Doc. No. SP-BD-L-01-(1/6)

CLIENT :Japan International Cooperation Agency

PROJECT :The Study on Ind. W. W. Pollution Control

PLANT :W.W.T. Recommendation Plant

WASTE W. :Industrial Wastewater/Sanitary W.

REV	1	2	3	MADE	
BY				CKD	
APVE				APVE	
DATE				DATE	

Equipment NO.	Service	No. Req'd	Type of Equipment	Remarks
T-01	Neutralization Tank	1	Rectangular	Carbon Steel/Resin
			2.6mWx5.2mLx3.0mH	Lining
T-02	No.1 Sedimentation Tank	1	Circular	Carbon Steel/Resin
			5.8mIDx3.0mH	Lining
T-03	Neutralized W.W. Tank	1	Rectangular	Carbon Steel/Resin
			2.5mWx3.2mLx3.0mH	Lining
T-04	Skimmed Oil Tank	1	Cone Roof Tank	Carbon Steel
			3.4mIDx6.1mH	
T-05	Equalization Tank	1	Open Top Tank	Carbon Steel/Epoxy
			8.71mIDx7.6mH	Coating
T-06	No.2 Sedimentation Tank	1	Circular	Carbon Steel/Epoxy
			9.67mIDx4.0mH	Coating
T-07	Coagulation/Flocculation	1	Rectangular	Carbon Steel/Epoxy
	Tank		1.4mWx2.8mLx6.1mH	Coating
T-08	No.3 Sedimentation Tank	1	Circular	Carbon Steel/Epoxy
			5.8mIDx4.5mH	Coating
T-09	Sludge Thickener	1	Circular	Carbon Steel/Epoxy
			3.2mIDx3.0mH	Coating
D-01	Lime Hopper	1	Cylindrical, Vrtical	Carbon Steel
			1.3mIDx1.5mH	
D-02	No.1 Lime Drum	1	Cylindrical, Vertical	Carbon Steel
			1.5mIDx1.5mH	
D-03	Lime Receiver	1	Cylindrical, Horizontal	Carbon Steel
			1.4mIDx1.5mH	
D-04A/B	Nutrient(N) Drum	2	Cylindrical, Vertical	Carbon Steel
			0.7mIDx1.5mH	
D-05A/B	Nutrient(P) Drum	2	Cylindrical, Vertical	C.S + H.R. Lining
			0.7mIDx1.5mH	
D-06A/B	No.2 Lime Drum	2	Cylindrical, Vertical	Carbon Steel
			1.4mIDx1.8mH	
D-07A/B	No.1 Coagulant Drum	2	Cylindrical, Vertical	C.S.+H.R.Lining
			1.2mIDx1.8mH	

NOTE:

EQUIPMENT LIST for El Nasr Co. for Steel Pipes & Fittings

Doc. No. SP-BD-L-01-(2/6)

CLIENT :Japan International Cooperation Agency

PROJECT :The Study on Ind. W. W. Pollution Control

PLANT :W.W.T. Recommendation Plant

WASTE W. : Industrial Wastewater/Sanitary W.

REV	1	2	3	MADE	
BY				CKD	
APVE				APVE	
DATE				DATE	

Equipment NO.	Service	No. Req'd	Type of Equipment	Remarks
D-08A/B	Coagulant Aid Drum	2	Cylindrical, Vertical	Carbon Steel
			1.2mIDx1.5mH	
D-09	Settling Aid Drum	1	Cylindrical, Vertical	Carbon Steel
			0.7mIDx1.0mH	
D-10	Filtered Aid Drum	1	Cylindrical, Vertical	Carbon Steel
			1.2mIDx1.5mH	
D-201A/B	NO.2 Coagulant Drum	2	Cylindrical, Vertical	C.S.+H.R.Lining
			1.2mIDx1.5mH	
Z-101	No.1 Wastewater Pit	1	Open Basin/Underground	R.C. (out of Battery)
			4.0mWx5.0mLx3.5mH	
Z-102	No.2 Wastewater Pit	1	Open Basin/Underground	R.C. (out of Battery)
			3.0mWx5.0mLx3.0mH	
Z-103	No.3 Wastewater Pit	1	Open Basin/Underground	R.C. (out of Battery)
			2.0mWx3.0mLx3.5mH	
Z-01	Oil Separator	1	API Standard/underground	R.C.
			1.5mWx1.0mDx8.0mL	
Z-02	Oil Separator T.W. Pit	1	Open Basin/Underground	R.C.
			2.4mWx2.5mLx3.0mD	
Z-03	Skimmed Oil Pit	1	Closed Basin/Underground	R.C.
			1.5mWx2.0mLx3.0mD	
Z-04	Aeration Basin	1	Rectangular/Aboveground	R.C.
			5.0mWx15.0mLx3.5mH	with Air Bubbling
Z-05	Sludge Pit	1	Rectagular/Underground	R.C.
			2.0mWx3.0mLx3.0mD	
Z-06	Treated Water Pit	1	Rectangular/Aboveground	R.C.
			3.0mWx5.2mLx2.5mH	
Z-07	Wastewater Pit	1	Rectangular/Underground	R.C.
			3.0mWx6.0mLx3.0mH	
Z-201	No.4 Wastewater Pit	1	Open Basin/Underground	R.C.
			1.5mWx3.0mLx3.5mH	
Z-202	Filtered Water Pit	1	Rectangular/Aboveground	R.C.
			3.0mWx5.0mLx3.0mH	

NOTE:

EQUIPMENT LIST for El Nasr Co. for Steel Pipes & Fittings

Doc. No. SP-BD-L-01-(3/6)

CLIENT :Japan International Cooperation Agency

PROJECT :The Study on Ind. W. W. Pollution Control

PLANT :W.W.T. Recommendation Plant

WASTE W. : Industrial Wasterwater/Sanitary W.

REV	1	2	3	MADE	
BY				CKD	
APVE				APVE	
DATE				DATE	

Equipment NO.	Service	No. Req'd	Type of Equipment	Remarks
Z-203	Backwash W.W. Pit	1	Rectangular/Underground	R.C.
			3.0mWx5.0mLx3.0mH	
PU-101A/B	No.1 Wastewater Pump	2	Centri. Vertical , L=3.5m	SCS
			$48m^3$/hx30mHx11kW	Outside of Battery
PU-102A/B	NO.2 Wastewater Pump	2	Centri. Vertical , L=3m	SCS
			$36m^3$/hx25mHx7.5kW	Outside of Battery
PU-103A/B	NO.4 Wastewater Pump	2	Centri. Vertical , L=3m	SCS
			$12m^3$/hx25mHx2.2kW	Outside of Battery
PU-01A/B	No.1 Lime Pump	2	Centri. Horizontal	CI
			10L/minx0.5MPax0.75kW	
PU-02A/B	No.1 Sludge Pump	2	Centri. Horizontal	SCS
			$4m^3$/hx30mHx2.2kW	
PU-03A/B	Neutralized W.W. Pump	2	Centri. Horizontal	SCS
			$48m^3$/hx18mHx5.5kW	
PU-04A/B	Oil Separator T.W. Pump	2	Centri. Vertical	SCS
			$36m^3$/hx18mHx5.5kW	
PU-05	Recovered Oil Pump	1	Centri. Vertical	CI
			$15m^3$/hx15mHx2.2kW	
PU-06A/B	Nutrient(N) Pump	2	Recipro. Plunger	SCS
			0.1L/minx0.5MPax0.4kW	
PU-07A/B	Nutrient(P) Pump	2	Recipro. Plunger	SCS
			0.1L/minx0.5MPax0.4kW	
PU-08A/B	Sludge Circulation Pump	2	Centri. Horizontal	SCS
			$36m^3$/hx12mHx3.7kW	
PU-09A/B	No.2 Lime Pump	2	Recipro. Diaphragm	Teflon/SCS
			0.6L/minx0.5MPax0.75kW	
PU-10A/B	Coagulant Pump	2	Recipro. Plunger	SCS
			0.3L/minx0.5MPax0.4kW	
PU-11A/B	Coagulant Aid Pump	2	Recipro. Plunger	SCS
			0.3L/minx0.5MPax0.4kW	
PU-12A/B	Sludge Feed Pump	2	Centri. Vertical	SCS
			$2m^3$/hx15mHx2.2kW	

NOTE:

EQUIPMENT LIST for El Nasr Co. for Steel Pipes & Fittings

Doc. No. SP-BD-L-01-(4/6)

CLIENT :Japan International Cooperation Agency

PROJECT :The Study on Ind. W. W. Pollution Control

PLANT :W.W.T. Recommendation Plant

WASTE W. :Industrial Wastewater/Sanitary W.

REV	1	2	3	MADE	
BY				CKD	
APVE				APVE	
DATE				DATE	

Equipment NO.	Service	No. Req'd	Type of Equipment	Remarks
PU-13	Settling Aid Pump	1	Recipro. Plunger	SCS
			0.1L/minx0.5MPax0.4kW	
PU-14A/B	Centrifuge Feed Pump	2	Centri. Horizontal	SCS
			1.5m^3/hx15mHx3.7kW	
PU-15A/B	Filter Aid Pump	2	Recipro. Plunger	SCS
			3L/minx0.5MPax0.75kW	
PU-16A/B	W.W.Return Pump	2	Centri. Vertical	SCS
			5m^3/hx15mHx0.75kW	
PU-17	T.W. Reuse Pump	1	Centri.Horizontal	SCS
			60m^3/hx30mHx15kW	
PU-18A/B	Equalized Water Pump	2	Centri.Horizontal	SCS
			80m^3/hx10mHx5.5kW	
PU-201A/B	No.4 Wastewater Pump	2	Centri. Vertical ,L=3m	CI
			60m^3/hx12mHx5.5kW	Coating Factory
PU-202A/B	No.2 Coagulant Pump	2	Recipro.	SCS
			0.5L/min.x0.5MPax0.4kW	Coating Factory
PU-203A/B	Backwashing Pump	2	Centri. Horizontal	CI
			155m^3/hx12mHx11kW	Coating Factory
PU-204A/B	Backwash W.W.Feed Pump	2	Centri. Horizontal	CI
			5m^3/hx40mHx1.5kW	Coating Factory
PU-205	Recovered Water Pump	1	Centri. Horizontal,L=3m	CI
			60m^3/hx30mHx11kW	Coating Factory
B-01A/B	AP Blower	2	Root	CI
			9.5Nm^3/minx7mHx15kW	
B-201	Backwashing Blower	2	Root	CI
			3.0Nm^3/minx5mHx5.5kW	
C-01	AI Compressor	2	Baby Compressor	CI, with Air Tank
			0.3m^3/minx0.7MPax1.5kW	
MZ-101	Belt Oil Skimmer	1	Vertical	SUS
			0.4kWx0.7MPax0.75kW	
MZ-01	Lime Feeder	1	Disc	CS
			30kg/hx0.75kW	

NOTE:

EQUIPMENT LIST for El Nasr Co. for Steel Pipes & Fittings

Doc. No. SP-BD-L-01-(5/6)

CLIENT :Japan International Cooperation Agency

PROJECT :The Study on Ind. W. W. Pollution Control

PLANT :W.W.T. Recommendation Plant

WASTE W. : Industrial Wasterwater/Sanitary W.

REV	1	2	3	MADE	
BY				CKD	
APVE				APVE	
DATE				DATE	

Equipment NO.	Service	No. Req'd	Type of Equipment	Remarks
MZ-02	No.1 Sludge Rake	1	Center Driven	CS+Epoxy Coating
			1.5kW	
MZ-03	No.2 Sludge Rake	1	Center Driven	CS+Epoxy Coating
			1.5kW	
MZ-04	No.3 Sludge Rake	1	Center Driven	CS+Epoxy Coating
			1.5kW	
MZ-05	No.4 Sludge Rake	1	Center Driven	CS+Epoxy Coating
			0.75kW	
MZ-06	No.1 Centrifuge	1	Horizontal	SCS
			$3m^3$/hx15kWx3,000rpm	
MZ-07	No.2 Centrifuge	1	Horizontal	SCS
			$1.5m^3$/hx7.5kWx3,000rpm	
MZ-08	Belt Conveyer	1	Horizontal	CS+Rubber
			20kg/minx0.75kW	
MX-01	No.1 Lime Mixer	1	Vertical	SUS
			1.5kW, L=1.2m	
MX-02A/B	Nutrient(N) Mixer	2	Vertical	SUS
			0.4kW, L=1.0m	
MX-03A/B	Nutrient(P) Mixer	2	Vertical	SUS
			0.4kW, L=1.0m	
MX-04A/B	No.2 Lime Mixer	2	Vertical	SUS
			1.5kW, L=1.2m	
MX-05A/B	No.1 Coagulant Mixer	2	Vertical	SUS
			0.75kW, L=1.2m	
MX-06A/B	Coagulant Aid Mixer	2	Vertical	SUS
			0.75kW, L=1.0m	
MX-07	Coagulation Mixer	1	Vertical	SUS
			2.2kW, L=1.5m	
MX-08	Flocculation Mixer	1	Vertical	SUS
			2.2kW, L=1.5m	
MX-09	Settling Aid Mixer	1	Vertical	SUS
			0.75kW, L=0.8m	

NOTE:

EQUIPMENT LIST for El Nasr Co. for Steel Pipes & Fittings

Doc. No. SP-BD-L-01-(6/6)

CLIENT :Japan International Cooperation Agency

PROJECT :The Study on Ind. W. W. Pollution Control

PLANT :W.W.T. Recommendation Plant

WASTE W. : Industrial Wastewater/Sanitary W.

REV	1	2	3	MADE	
BY				CKD	
APVE				APVE	
DATE				DATE	

Equipment NO.	Service	No. Req'd	Type of Equipment	Remarks
MX-10	Filter Aid Mixer	1	Vertical	SUS
			0.75kW, L=1.2m	
MX-201A/B	No.2 Coagulant Mixer	2	Vertical	SUS
			0.75kW, L=1.2m	
F-201ABC	Sand Filter	3	Vertical, Cylindrical, Open	CS+Epoxy coating
			$25m^3/h$, 2.1mIDx4.5mH	Anthracite + Sand

NOTE:

INSTRUMENT LIST for EL. NASR Co. for STEEL PIPES and FITTINGS

Doc. No. SP-BD-L2-(1/4)

CLIENT :Japan International Cooperation Agency

PROJECT :The Study on Industrial W. W. Pollution Contro

PLANT :W.W.T. DEMONSTRATION PLANT

WASTE W. Process Water & Sanitary/Domestic Water

REV	1	2	3	MADE	
BY				CHKD	
APVE				APVE	
DATE				DATE	

Instrument NO.	Service	No. Req'd	Type of Instrument	Remarks
AR-01	pH Analyzer	1	Electrode, inline	Inlet of T-01
			pH 1-10	C.P.
AR-02	pH Analyzer	1	Electrode	Surface T-01
			pH 1-10	C.P.
AR-03	pH Analyzer	1	Electrode	Outlet T-02
			pH 1-10	C.P.
AR-04	DO Analyzer	1	Electrode	Z-04
			0-15mg/L as O_2	C.P.
AR-05	pH Analyzer	1	Electrode	Outlet T-07
			pH 4-9	C.P.
FR-01	Flow Recorder	1	Orifice, 4B	Outlet of PU-04
			0-60m^3/h, WW	C.P.
FR-02	Flow Recorder	1	Orifice, 3B	Outlet of PU-05
			0-45m^3/h, WW	C.P.
FR-03	Flow Recorder	1	Orifice, 1-1/2B	Outlet of PU-204
			0-5m^3/h, WW	C.P.
FIC-04	Flow Conroller	1	Electro-magnetic, 6B	Outlet of PU-08
			0-60m^3/h, WS	C.P.
FIC-05	Flow Conroller	1	Orifice, 3B	Inlet of Z-04
			0-10Nm^3/min, AP	C.P.
FRC-06	Flow Recorder/Controller	1	Orifice, 6B	Inlet of T-07
			0-90m^3/h, WW	C.P.
FRC-07	Flow Recorder/Controller	1	Electro-magnetic, 2B	Outlet of PU-12
			0-5m^3/h, WS	C.P.
FRS-08	Flow Integrated Indicator	1	Orifice, 6B	Outlet of PU-17
			0-90m^3/h, WW	C.P.
			0-1,000,000m^3/c	

NOTE: C.P. =Centter Panel Mount

INSTRUMENT LIST for EL. NASR Co. for STEEL PIPES and FITTINGS

Doc. No. SP-BD-L2-(2/4)
CLIENT :Japan International Cooperation Agency
PROJECT :The Study on Industrial W. W. Pollution Contro
PLANT :W.W.T. DEMONSTRATION PLANT
WASTE W. Process Water & Sanitary/Domestic Water

REV	1	2	3	MADE	
BY				CHKD	
APVE				APVE	
DATE				DATE	

Instrument NO.	Service	No. Req'd	Type of Instrument	Remarks
FI-09	Flow Indicator	1	Orifice, 4B	Inlet of MZ-061
			$5m^3/h$, WS	Center Panel Mount
FI-10	Flow Indicator	1	Electro-magnetic, 2B	Inlet of MZ-07
			$5m^3/h$, WS	C.P.
FIC-51	Flow Controller	1	Orifice, 1B	Inlet of D-02
			$3m^3/h$, WI	
FRC-52	Flow Controller	1	Electro-magnetic, 2B	Inlet of T-01
			$1m^3/h$, 10% Lime	
FI-53	Flow Indicator	1	Orifice, 1-1/2B	Inlet of T-01
			$5Nm^3/min$, AP	
FI-54	Flow Indicator	1	Orifice, 1-1/2B	Inlet of T-05
			10N/min, AP	
FS-55	Flow Integrator	1	Rotor Type for WD supply	Intake of WD
			2B,	
FI-56	Flow Indicator	1	Orifice, 4B	Outlet of B-01
			10N/min, AP	
FI-151	Flow Indicator	1	Orifice, 4B	Outlet of PU-101
			$60m^3/h$, WW	
FI-152	Flow Indicator	1	Orifice, 3B	Outlet of PU-102
			$45m^3/h$, WW	
FI-201	Flow Indicator	1	Orifice, 4B	Outlet of PU-201
			$90m^3/h$, WW	L.P.
FIS-202	Flow Integrator	1	Orifice, WW	Outlet of PU-205
			$90m^3/h$, WW	L.P.
FI-251A-C	Flow Inficator	3	Orifice, WW	Inlet of F-201ABC
			$50m^3/h$, 3B	
FI-252	Flow Indicator	1	Orifice, WW	Outlet of PU-203
			$180m^3/h$, 8B	
FI-253	Flow Indicator	1	Orifice, WW	Outlet of PU-204
			5m3/h, WS	

NOTE: C.P. =Center Panel Mount
L.P. =Local Panel Mount

INSTRUMENT LIST for EL. NASR Co. for STEEL PIPES and FITTINGS

Doc. No. SP-BD-L2-(3/4)

CLIENT :Japan International Cooperation Agency

PROJECT :The Study on Industrial W. W. Pollution Contro

PLANT :W.W.T. DEMONSTRATION PLANT

WASTE W. Process Water & Sanitary/Domestic Water

REV	1	2	3	MADE	
BY				CHKD	
APVE				APVE	
DATE				DATE	

Instrument NO.	Service	No. Req'd	Type of Instrument	Remarks
LA-01	Level Alarm	1	Float	T-03
			H-L	C.P.
LA-02	Level Alarm	1	Float	Z-02
			H-L	C.P.
LIA-03	Level Indicator/Alarm	1	Displacer	T-04
			H-Alarm	C.P.
LIA-04	Level Indicator/Alarm	1	Displacer	T-05
			H-Alarm	C.P.
LIA-05	Level Indicator/Alarm	1	Displacer	Z-05
			H-L Alarm	C.P.
LICA-201	Level Controller/Alarm	1	Float	Z-201
			H-L Alarm	L.P.
LA-202	Level Alarm	1	Float	Z-202
			L-Alarm	L.P.
LA-203ABC	Level Alarm	3	Electrode	F-201ABC
			H-Alarm	L.P.
LI-51	Level Indicator	1	Lime Pouder	D-01
LS-52	Level Switch	1	Lime 10% Milk	D-02
LS-53	Level Switch	1	Lime Pouder	D-03
LS-54	Level Switch	1	Float, WW, H-L	T-03
LS-55	Level Switch	1	Float, WW, H-L	Z-02
LS-56	Level Switch	1	Float, WW, H-L	Z-03
LS-57	Level Switch	1	Float, WW, H-L	Z-05
LS-58	Level Switch	1	Float, WW, H-L	Z-06
LS-59	Level Switch	1	Float, WW, H-L	Z-07
LS-151	Level Switch	1	Float, WW, H-L	Z-101
LS-152	Level Switch	1	Float, WW, H-L	Z-102
LS-251	Level Switch	1	Float, WW, H-L	Z-203

NOTE: C.P. =Center Panel Mount
L.P. =Local Panel Mount

INSTRUMENT LIST for EL. NASR Co. for STEEL PIPES and FITTINGS

Doc. No. SP-BD-L2-(4/4)

CLIENT :Japan International Cooperation Agency

PROJECT :The Study on Industrial W. W. Pollution Contro

PLANT :W.W.T. DEMONSTRATION PLANT

WASTE W. Process Water & Sanitary/Domestic Water

REV	1	2	3	MADE	
BY				CHKD	
APVE				APVE	
DATE				DATE	

Instrument NO.	Service	No. Req'd	Type of Instrument	Remarks
LG-51	Level Gage	1	Tubular, L=1.5m	D-03
LG-52AB	Level Gage	2	Tubular, L=1.5m	D-04AB
LG-53AB	Level Gage	2	Tubular, L=1.5m	D-05AB
LG-54AB	Level Gage	2	Tubular, L=1.8m	D-06AB
LG-55AB	Level Gage	2	Tubular, L=1.8m	D-07AB
LG-56AB	Level Gage	2	Tubular, L=1.8m	D-08AB
LG-57	Level Gage	1	Tubular, L=1.0m	D-09
LG-58	Level Gage	1	Tubular, L=1.5m	D-10
LG-251AB	Level Gage	2	Tubular, L=1.5m	D-201AB
TQA-1	Torque Alarm	1	Limit Switch, kg-m	T-02
TQA-2	Torque Alarm	1	Limit Switch, kg-m	T-06
TQA-3	Torque Alarm	1	Limit Switch, kg-m	T-08
TQA-4	Torque Alarm	1	Limit Switch, kg-m	T-09
TQA-5	Torque Alarm	1	Limit Switch, kg-m	MZ-06
TQA-6	Torque Alarm	1	Limit Switch, kg-m	MZ-07
PI	For Lime milk and Sludge		Diaphragm Type	
	Pumps			
PI	Others		Buldon Tube Type	

NOTE: C.P.=Center Panel Mount
L.P.=Local Panel Mount

Phase 1 Study

Overall Schedule for Implementation of Demonstration Plant (Preliminary)

Dec. 11, 1999

Major Activities for Implementation	1999			2000												2001												2002					
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
1 Preparatory Activities before Bid for Supply and Construction of Demonstration Plant																																	
1.1 Selection of Demonstration Factory	11/24'99 ○																																
1.2 Compilation of Detailed Design Package, including: - List of Materials and Equipment - List of Construction works																																	
1.3 Short Listing of Suppliers who can supply the Plant as a whole																																	
1.4 Short Listing of Construction Contractors in Egypt to be qualified by JICA																																	
1.5 Agreement for Implementation of Phase 2 Study between JICA and Egyptian Side																																	
1.6 Contract between JICA and Phase 2 Study Team									○																								
2 Supply of the Plant																																	
2.1 Selection of the Plant Supplier by Competitive Bid										○																							
2.2 Design Verification and Development by Supplier																																	
2.3 Procurement of Materials and Equipment by Supplier																																	
2.4 Manufacturing and Preassembling as necessary																																	
2.5 Inspection and Test before Shipment																			○														
2.6 Shipping																			·····	○													
3 Construction of the Plant																																	
3.1 Selection of Construction Contractor by Qualification by JICA and Study Team										○																							
3.2 Site Preparation and Temporary Facilities Installation																																	
3.3 Civil & Building Works: including Foundations, Concrete Basins, Control Room, Underground Piping, etc.																																	
3.4 Shop fabrication and installation of Locally procured Tanks, Structures, Pipes, etc.																																	
3.5 Unloading, Customs Clearance, Inland Transportation of Imported Mat'l & Eq																																	
3.6 Receiving, Storing																																	
3.7 Equipment Installation																																	
3.8 Piping																																	
3.9 Electrical																																	
3.10 Instrumentation																																	
3.11 Painting																																	
3.12 Precommissioning																																	
3.13 Mechanical Completion																											○						
3.14 Commissioning																																	
4 Operation of the Plant																																	
4.1 Performance Test																																	
4.2 Operation and Demonstration																																	→

ESTIMATION COST FOR EL NASR CO. for STEEL PIPES FITTINGS

		Yen Portion [¥1000]	LE Portion [LE]	Total
1	Direct Cost			
	1.1. Equipment & Materials			
	(1)Machinary	98,100		
	(2)Piping Materials	10,500		
	(3)Electrical Equipment & Materials	26,000		
	(4)Instrument & Materials	34,000		
	(5)Mini. Labo. Analizer & Others	4,700		
	1. 1 Sub-total	173,300	0	
	1.2. Field Work Cost			
	(1) Steel Tank & Drum		967,000	
	(2) Equipment Installation		142,000	
	(3) Piping		842,000	
	(4) Civil Work (Foundation, Pit, Pave)		1,494,000	
	(5) Building, Shelter, Steel Structure		541,000	
	(6) Lining, Coating, Painting		537,000	
	(7) Electrical, Instrumentation		498,000	
	(8) Commissioning/ Test		50,000	
	1. 2 Sub-Toatal	0	5,071,000	
2	Indirect Cost			
	(1) Export Packing, Ocean Transport	18,100		
	(2) Import Duty, Inland Transport*1		1,407,353	
	(3) Temporary Facilities*2		304,260	
	(4) Sub-contractor Expense*3		1,267,750	
	(5) Insurance, Social Tax*4		369,354	
	(6) Supervisor Expense	10,000		
	2. Sub-Total	28,100	3,348,717	
3	(1 + 2) Total	201,400	8,419,717	
	(1 + 2) Total [¥1000]	201,400	286,270	487,670
	[LE]	5,923,529	8,419,717	14,343,246

Note: Above cost includes outside battery except utilities supply.

*1: {(1.1Sub-total) + 2(1)} x 25%

*2: (1.2) x 6%

*3: (1.2) x 25%

*4:[[1.1)+(1.2)]+{2(1)+2(2)+2(3)+2(4)}] x 2.7%

Unit Cost for Estimation of W.W.T. Demonstration Plant (Reference)

Factory Name: El Nasr Co. for Steel Pipes and Fittings.
Design Case: Basic Design

1. Major Equipment

Equipment Name	Unit Cost [x10^{3}Yen]	Note
(1) Acid water pumps	1,500	Material: SCS
(2) Filter	3,000	3 sets
(3) Sludge Rake	6,000	1 set
(4) Centrifuge	10,000	1 sets
(5) Motor Control Center	16,500	
(7) Center Control Panel	3,000	1 set

2. Field Work

Work Item	unit	unit Cost[LE]	Note
(1) Site Preparation	[m^2]	8	
(2) Civil (Earth Work)	[m^3]	34	
(3) RC Work	[m^3]	1,500	Foundation, Water Basin
(3) Storage Tank	[ton]	3,430	Equalization Tank, Chemical tank Neutralization Tanks
(4) Structural Steel	[ton]	2,000	Pipe rack, Operating Stage
(5) Equipment Installation	[ton]	400	Pumps, Clarifier rakes, Dehydrator
(6) Piping	[ton]	3,970	Except valves
	[in-m]	30	Except valves
(7) Painting	[m^2]	50	
(8) Local Building	[m^2]	2,600	W.W.T Control Room
(9) Electrical	[cable-m]	3	

2000.1.13

Running Cost-EL NASR CO. FOR STEEL PIPES & FITTINGS

* Unit cost is not fixed yet

Items	Treating Capacity (m^3/h)	Feeding Ratio (mg/L)	Consump. (kg/h)	Unit Cost (LE/kg)	Cost-1 (LE/h)	Cost-2 (LE/day)	Cost-3 LE/year)	Unit Cost (LE/m^3)	Remarks
1 Chemical Cost									
1) Alum $=Al_2(SO_4)_2 \cdot 18H_2O$(Clarifier)	77	30	2.31	0.3	0.69	17	5,489		
* 2) Lime = $Ca(OH)_2$ (Neutralization)	30	1000	30	0.1	3.00	72	23,760		
3) Polymer-A (Clarifier)	77	0.3	0.02	27	0.62	15	4,940		
4) Polymer-A (Thickener)	2.34	100	0.23	27	6.32	152	50,039		
5) Polymer-B (No.1 Centrifuge)	60	1%	0.6	27	16.20	130	42,768		
Polymer-B (No.2 Centrifuge)	75	1%	0.75	28	21.00	168	55,440		
5) $CO(NH_2)_2$	77	110	8.47	0.6	5.08	122	40,249		
* 6) H_3PO_4	77	30	2.31	0.6	1.39	33	10,977		
7) NaOCl	77	4	2.31	0.385	0.89	21	7,044		
Sub-Total	77	—	—	—	55.19	729	240,705	0.717	
2 Filter Media	Loading	Loss	Loss/h						
* 1) Anthracite (3 Sets)	10.5 m^3	20 %/year	2.1	1	2.10	50	16,632	0.027	
* 2) Sand (3 Sets)	4.2 m^3	10 %/year	0.5	0.3	0.15	4	1,188	0.005	
* 3) Activated Carbon (1 Set)	0m^3	14 days	0.0	14.7	0.00	0	0	0	
Sub-Total	—	—	—	—	2.25	54	17,820	0.029	
			kWh/d	LE/kWh					
3 Power Consumption			2,120	0.12	10.60	254.40	83,952	0.138	
			m^3/day	m^3					
4 Industrial Water or Potable Water			50	0.7	1.46	35.00	11,550	0.019	
			Person/d	LE/P/year					
5 Operator	4 Person*3 Shift+1s		16	10,000	20.20	484.85	160,000	0.262	
6 Maintenance Fee					44.56	1069.52	352,940	0.579	
(Plant Cost * 3 %/year) 400,000,000*0.03/34=352,940 LE									
Total Operation Cost	—	—	—	—	134.27	2,627.17	866,967	1.74	

Power Consumption

Tag No.	kW	Operation	Consump.
PU-01	0.75	24	18.00
PU-02	2.2	24	52.80
PU-03	5.5	24	132.00
PU-04	5.5	24	132.00
PU-05	2.2	2	4.40
PU-06	0.4	24	9.60
PU-07	0.4	24	9.60
PU-08	3.7	24	88.80
PU-09	0.75	24	18.00
PU-10	0.4	24	9.60
PU-11	0.4	24	9.60
PU-12	2.2	24	52.80
PU-13	0.4	24	9.60
PU-14	3.7	8	29.60
PU-15	0.75	8	6.00
PU-16	0.75	24	18.00
PU-17	15	24	360.00
PU-18	5.5	12	66.00
PU-101	11	24	264.00
PU-102	7.5	24	180.00
PU-103	2.2	24	52.80
PU-201	5.5	24	132.00
PU-202	0.4	24	9.60
PU-203	11	1	11.00
PU-204	1.5	24	36.00
B-01	15	24	360.00
B-201	5.5	1	5.50
C-01	0.75	12	9.00
MZ-01	0.75	24	18.00
MZ-02	1.5	24	36.00
MZ-03	1.5	24	36.00
MZ-04	1.5	24	36.00
MZ-05	0.75	24	18.00
MZ-06	15	9	135.00
MZ-07	7.5	7	52.50
MZ-08	0.75	9	6.75
MZ-101	0.75	24	18.00
MX-01	1.5	24	36.00
MX-02	0.4	2	0.80
MX-03	0.4	2	0.80
MX-04	1.5	24	36.00
MX-05	0.75	2	1.50
MX-06	0.75	2	1.50
MX-07	2.2	24	52.80
MX-08	2.2	24	52.80
MX-09	0.75	2	1.50
MX-10	0.75	8	6.00
MX-201	0.75	24	18.00
Total	—	—	2,650.25 kWh/d
Actual Consumption		0.8	2120.2 kWh/d

Client: JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

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

Factory Name: EL NASR CO. FOR STEEL PIPES AND FITTINGS

BASIC DESIGN

Document Title:

STUDY REPORT

FOR

W.W.T. RECOMMENDABLE PLANT

Issued Date: September 2000

Consultant: JICA STUDY TEAM

CHIYODA DAMES AND MOORE CO.

CHIYODA CORPORATION

1. Purpose

The Study Report aims to explain about the important design concepts that studied through the basic design of Waste Water Treatment (W.W.T.) Recommendable Plant in El Nasr Co. for Steel Pipes and Fittings (hereinafter NSP) that is developed and revised the conceptual design submitted in November 1999.

2. Demonstration Plant and Recommendable Plant

2.1 Demonstration Plant

(1) Selection of the Companies

- The basic design is proceeded to 3 Companies including El Nasr Co. for Steel Pipes and Fittings (NSP) nominated as Demonstration Plant on 5th October 1999 meeting.
- The Factories are selected based on the following criteria (M/M on June 2. 1999):
  - (a) Factories that are in need of improvement in their anti-pollution measures;
  - (b) Factories that are typical so that the recommended wastewater treatment systems can be expected to be diffused to other factories in Egypt;
  - (c) Factories that are interested in designing or upgrading the wastewater management;
  - (d) Factories that are financially able (either self-financing or from other financial resources) to adopt the recommendations on the appropriate waste water treatment system;
  - (e) Factories which similar projects by other donors are not under way.
- One factory that is satisfactory to the stipulated conditions will be selected as Demonstration Plant Factory by JICA and Egyptian Side.

(2) Waste Water Treatment Systems

The appropriate industrial waste water treatment systems ("the Systems") for Demonstration Plant may include in-process systems and the Systems will be prepared based on the following conditions:

- The Systems are of adequate technical level so that they will be to be adopted and spread widely in the Arab Republic of Egypt;
- The waste water treatment plants, constructed on the basis of the Systems, will be easily maintained locally and be operated at a low cost;
- The Systems will not necessarily treat whole waste water discharged from the factories.

2.2 Recommendable Plant

The conceptual design of the Demonstration Plant submitted on November 1999, Egyptian side suggested to JICA Study Team as follows;

(1) All wastewater generated in the Company (Factories Complex) should be treated.
   −The demonstration plant has been designed to treat a part of wastewater in the Factories (approx. 40%).

(2) The target of treated water should be applied to the realistic wastewater discharge regulation in Egyptian Law.
   −In the conceptual design, the target of treated water of the demonstration plant has been the most stringent discharge regulation(Law 48/82 Underground Reservoir & Nile Branches/Canals.
   But, NSP is applied to Law93/62 Discharge to Sewer System at present.

The Team agreed basically with the Egyptian comments. As a result, in the basic design of the System, the recommendable plant for wastewater treatment (W.W.T.) is prepared instead of the Demonstration Plant for NPS Factory considering the above comments. But, the target of treated water is adopted Law 48/82 Non Potable Surface Water (Industrial) considering enforcement of regulation in future.

3. Basic Design

The basic design was proceeded based on the conceptual design and 2nd supplemental wastewater survey result, then modified based on the following comments by the Egyptian Side:

(1) The W.W.T plant should be designed so as to treat all wastewaters from NSP Factory.

(2) The target of treated water quality should not be applied to Law 48/82 regulation, because the treated water of NSP Factory is discharged to the public sewer.
   But, in the basic design, Law 48/82 Non Potable Surface Water (Industrial) is applied considering to enforce the more stringent regulation in the future.

The following design drawings and documents were prepared:

1) Process Flow Diagram (PFD)
2) Engineering Flow Diagram (EFD)
3) Layout
4) Skeleton Drawings of Major Equipment
5) Single Line Diagram for Motor Control Board

6) Equipment List, Instrument List, Motor List

7) Plant Construction Cost, Running Cost

4. Existing Wastewater System

The existing wastewater sewer system of NSP Factory is shown on the attached drawing-1.

(1) NSP Factory locates at two areas both side of the public road.
Wastewaters in the main factory are discharged to the public sewer A and B.

(2) Wastewaters in another factory (Spiral welded pipes, Coating factory) are discharged to the public sewer C, in which the wastewater of Military Factory flows from upstream.

5. Design Conditions

5.1 Wastewater to be treated

· The following wastewaters were selected and studied as the wastewater to be treated by Demonstration Plant in the Factory:

(1) RW-1: Outlet of Sedimentation Pit A
(Neutralized wastewater and Sanitary/Domestic wastewater from Long Welded Pipes Factory)

(2) RW-2: Skimmed Oily Water from Cooling Water Oil Separator

· And the following wastewaters are added for the recommendable plant design:

(3) RW-4: Outlet of Sedimentation Pit B
(Wastewater from Foundry Factory including sanitary /domestic wastewater)

(4) RW-4: Outlet of Collection Pit
(Wastewater from Spiral long welded pipes Factory and Coating Factory)

5.2 Flow rate and Qualities of Wastewater

Wastewater flow rate and qualities are shown on the following Table-1:

Table 1 Flow rate and Water Qualities

	RW-1	RW-2	RW-3	RW-4
FlowRate Max [m^3/h]	50	40	10	150
Av. [m^3/h]	40	30	5	50
pH [-]	2 - 7	7 - 8	6.5 - 8	6.5 - 8
BOD [mg/L]	100	100	30	30
COD [mg/L]	200	200	80	80
SS [mg/L]	250	200	30	30
Oil &Grease [mg/L]	5	1000	5	5
TDS [mg/L]	5800	400	390	390
Water Temp [℃]	25 - 35	25 - 35	25 -30	25 - 35

[Discussion]

(1) The wastewater to be treated by the Demonstration Plant is selected RW-1 (Outlet of Neutralization Unit) and RW-2 (Skimmed oily Water of Oil Separator), because pH of RW-1 and Oil & Grease of RW-2 do not meet the regulation.

(2) RW-3 and RW-4 will be treated by the Recommendable Plant to improve the disposed wastewater qualities to the Public Sewer.

5.2 Target of Treated Water

Table 2 Target of Treated Water Qualities

	Target	Law 93/62 Discharge to Sewer System		Law 48/82 Non Potable Surface Water(Industrial)
		as modified by Decree 9/89	as modified by Decree 44/2000	
pH [-]	6.5 – 8.5	6 - 10	6 – 9.5	6 - 9
BOD [mg/L]	30	< 400	600	< 60
COD [mg/L]	50	< 700	1100	< 100
SS [mg/L]	30	< 500	800	60
Oil & Grease [mg/L]	1	< 100	100	10
TDS [mg/L]	-----	2000		2000
Zinc [mg/L]	0.1	< 10		n/a
Water Temp [℃]	35	< 40	43	35

Note. n/a= not applicable

[Discussion]

(1) The wastewater from NSP is discharged to the Public Sewer. The regulation of wastewater to the public sewer is too mild, water quality items over the regulation may be 「pH」 「Oil & Grease」 .

(2) But, the recommendable plant will be applied to the regulation disposal to non-potable canal/drainage considering to be strengthened the regulation.

6. System Design

6.1 Treating System

The following two treating systems are recommended;

(1) Main Wastewater Treating System (No.1 W.W.T.)

No.1 W.W.T. will be installed in the main Factory.

(2) No.2 Wastewater Treating System (No.2 W.W.T.)

No.2 W.W.T will be installed in the Coating Factory separately, because

1) Wastewater from Spiral Welded Pipe Factory and Coating Factory (RW-4) is discharged to Sewer C. But, Sewer C is contaminated wastewater from Military Factory on the way to the End of Pipe at the main Factory.

2) Before contamination, Wastewater (RW-4) will be treated in the Coating Factory.

3) Treated water will be disposed to the Public Sewer through the Sewer C, and only backwashed wastewater will be sent to No.1 W.W.T.

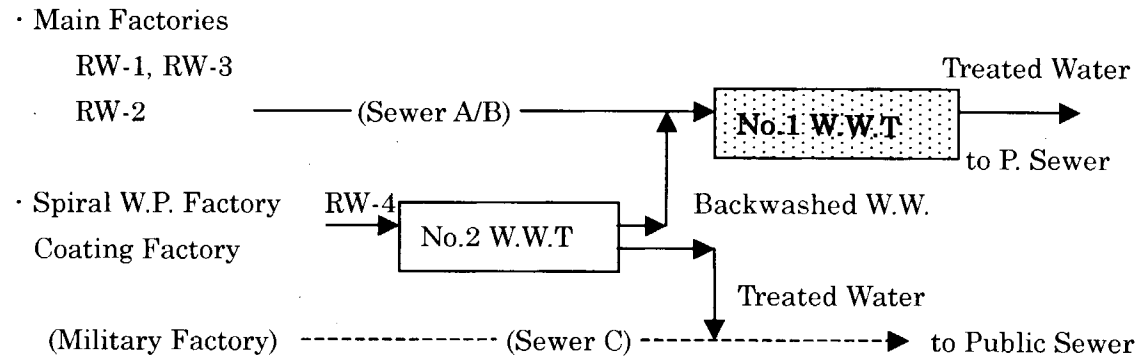


Fig.-1 Wastewater Flow Scheme

6.3 Collection of Wastewater

(1) RW-1

No.1 Wastewater Pit with 2 sets of pumps is provided beside Sedimentation Pit of Sewer A.

(2) RW-2

No.2 Wastewater Pit with 2 sets of pumps is provided beside the existing Oil Separator.

In this case, it is recommended to install a belt oil skimmer in the pit to remove floating /accumulating oil in the pit.

But, it may be possible to fed to the new Oil Separator in No.1 W.W.T. directly using the outlet height of the existing oil separator.

(3) RW-3

No.4 Wastewater Pit with 2 sets of pumps is provided beside Sedimentation Pit of Sewer B.

(4) RW-4

No.4 Wastewater Pit is provided beside the Collection Pit in the corner of Coating Factory. It may be possible to use the existing collection pit instead of No.4 Wastewater Pit.

6.3 Treating Unit

Wastewater treatment system consists of the following treating units;

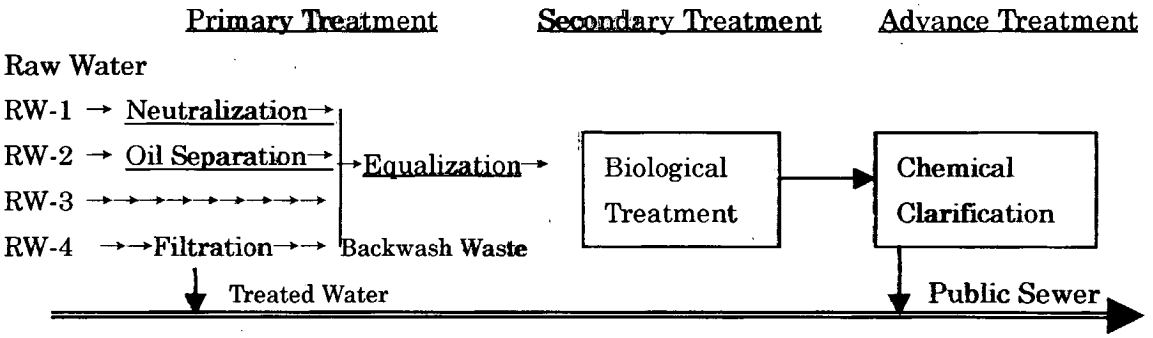


Fig.-2 Wastewater Treating System Flow

(1) Primary treatment

(1-1) Neutralization Unit for RW-1

1) Purpose

The existing Neutralization Unit is old and operated manually, so that it is not always operated under adequate condition.

(a) Neutralization = pH control (pH 7～8)

(b) Removal of dissolved Fe = less than 0.1mg/L

(c) Removal of Zn = Less than 0.1mg/L

Therefore additional New Neutralization Unit is provided as primary treatment in No.1 W.W.T.

2) Specification, Design Base

(a) The neutralization unit consists of Neutralization Tank, No.1 Sedimentation Tank, Neutralized W.W. Tank and Lime injection unit.

(b) These tanks are made of carbon steel with resin lining. Carbon steel is easier to fabricate at shop and field, and more inexpensive than other materials such as stainless steel, reinforced concrete, FRP and titan. etc.

(c) The volume of neutralization tank is 30-minute retention time of average

flow rate to neutralize wastewater completely.

(d) Air from a blower is blown to the bottom of neutralization tank to accelerate neutralization and oxidation.

(e) Lime $Ca(OH)_2$ is used as an alkali agent that is used at the existing neutralization plant. Lime is more effective as alkali, inexpensive and safer to handle than other alkali agents such as caustic soda (NaOH), sodium carbonate (Na_2CO_3), caustic lime (CaO), etc.

(f) lime injection unit consists of Lime Drums with mixers and chemical pumps.

(1-2) Oil Separator for RW-2

1) Purpose

(a) In general, skimmed oil in an oil separator is recovered and reused. But the skimmed oily water in the existing Oil Separator is disposed to the Public Sewer directly. That is not only to load to the Public Sewage Treatment Plant but also to lose much valuable oil. So that, a gravity type of oil separator is provided as primary treatment in No.1 W.W.T.

(b) Skimmed oily water from the oil separator is separated oil and wastewater in a tank by gravity.

(c) Floated oil is recovered and may be reused as fuel or renewal oil.

2) Specification, Design Base

(a) Oil separator is designed based on the API (American Petroleum Institute) manual. That more simple, inexpensive, easier to operate than PPI (Parallel Plate Interceptor) and CPI (Corrugated Plate Interceptor).

(b) The basin is made of reinforced concrete.

(c) Diameter of oil globe to be removed: 150 μ
Oil contents: approx. 30 mg/L (expected by experience)

(d) A CRT (Cone Roof Tank) of carbon steel is provided to separate oil and water from skimmed oily water

(1-3) Sand Filter for RW-4

1) Purpose

(a) RW-4 is not so polluted, therefore sand filter is applied to remove suspended solids in wastewater.

(b) Coagulant (alum) is injected in the inlet of filters in order to increase clearness of filtered water and to backwash filter media easily.

(c) Filtered water is disposed to the Sewer C, or may be reused in the Factories.

(d) Backwashed wastewater is sent to No.1 W.W.T. via Backwashed Wastewater

Pit.

2) Specification, Design Base

(a) Type: A gravity type of rapid sand filter

(b) Shape: Vertical cylindrical

(c) Materials: Carbon steel with epoxy coating

(d) Filter Media:

- Upper Layer: Anthracite (Dia. 1.2－1.5mm) x 0.7－1.0m thickness
- Lower Layer: Sand (Dia. 0.5－0.7mm) x 0.4－0.6m thickness

(e) Required No.: 3 sets (2 filters are running normally and one (1) is stand-by.)

(f) Filtration Rate: 180－240 $m^3/m^2/day$ = 7.5－10 $m^3/m^2/hour$

Filter for wastewater is designed in general.

(g) Filter (media) is backwashed by water and air automatically, periodically.

- Operation Period: Filtration 18－24 hours/cycle
  Backwashing 15－20min./cycle
- Backwashing: Air Bubbling + Water

3) Backwashed Wastewater

Table-3 Flow rate and Quality of Backwashed Wastewater

	Influent to Filter RW-4	Backwashed W.W. RW-4'
Flow Rate [m^3/h]	Max. 160 Ave. 50	2.0
pH [-]	6.5 - 8	6.5 - 8
SS [mg/L]	30	550
BOD [mg/L]	30	186
COD [mg/L]	80	496
Oil & Grease [mg/L]	5	83

(1-4) Equalization Tank for RWs

1) Purpose

(a) Pre-treated water of RW-1, RW-2, and RW-3, filter backwashed wastewater of RW-4 are fed to Equalization Tank with an air bubbling device. But, these wastewaters are not continuous flow, not constant water qualities.

(b) To treat wastewaters satisfactorily, stably, wastewaters are stored in the Equalization Tank and equalized in quality and quantity using air bubbling.

2) Specification, Design Base

(a) Shape: Open top tank of circular and vertical type, installed above ground.

(b) Materials: Carbon steel with resin lining on the inner surface.

(c) Volume: equal to 4－6 hour-retention time of maximum flow rate in general.

(d) Attachment: Air bubbling devices (blower, air distributing pipes)

(2) Secondary Treatment: Activated Sludge Treatment

1) Purpose

(a) As secondary treatment, biological treatment is applied to remove organic matters in the equalized wastewater.

(b) In case of wastewater contained various metals, chemical clarifier is utilized before biological treatment, but it may not be necessary to provide it.

(c) In the aeration basin, BOD, COD of wastewater are reduced by means of oxidizing and decomposing organic matters by micro aerobic bacteria.

(d) Slurry consisting bacteria group is separated supernatant (treated water) and sludge at the sedimentation tank.

2) Specification, Design Base

(a) Biological treatment unit consists of Aeration Basin and Sedimentation Tank, Chemical injection devices as an auxiliary.

(b) Aeration basin:

- Shape: Rectangular, above ground
- Materials: Reinforced concrete with corrosion proof
- Operating Conditions in general:

  Retention Time: 4－6 hours of average flow rate

  Dissolved oxygen; 2 mg/L as O

  Contents Ratio: BOD: N(nitrogen)as T-N: P(phosphorus)as T-P

  = 100: 5: 1
- Oxygen supplies; air bubbling device by a blower
- Nutrient injection devices; Chemical drums, mixers and pumps

  Nutrient $CO(NH_2)_2$ as N

  H_3PO_4 as P

(c) Sedimentation Tank:

- Shape: Circular, Vertical, above ground
- Materials: Carbon steel with epoxy coating
- Operating Conditions in general

  Surface load: 24 $m^3/m^2/day$ = 1.0 $m^3/m^2/hour$
- Attachment: Steel structure bridge hanging a sludge collecting rake.

(d) The following water qualities are expected as treated water of activated sludge treatment;

- BOD 20 mg/L
- COD 30 mg/L
- SS 30 mg/L

3) Reason to select Activated Sludge Treatment

(a) High organic matters (BOD, COD) are contained in wastewater. Therefore, it is required to remove these organic matters under the discharge regulation (Law 48/82)

(b) In order to remove organic matters, biological treatment (aerobic, anaerobic), activated carbon adsorption are applicable. Aerobic biological treatment may be most effective considering concentration of BOD, COD and economic point of view.

(c) As aerobic biological treatment, there are various type of activated sludge treatment, fixed sludge treatment, trickling filter and oxidation ditch.

(d) In this basic design, the activated sludge treatment is applied considering to be most basic, standard, applicable widely and inexpensive.

(e) Fixed sludge treatment is used generally for industrial wastewater treatment recently.
But, it does not use because that structure, packing media and design conditions of fixed sludge treating plants are deferent based on know-how of each maker.

(3) Advantage Treatment: Chemical Clarifier

1) Purpose

(a) Chemical Clarifier is provided to remove suspended solids (carry-over) in the treated water of the Biological Treating Unit as advantage treatment.

(b) Treated water is discharged to the public sewer. And sludge from the bottom of sedimentation tank is sent to the sludge treating unit.

(c) But, it is not always necessary to provide it as long as the biological-treating unit is operated satisfactorily.

2) Specification, Design Base

(a) Chemical clarifier unit consists of coagulation and flocculation tank, clarifier and chemical injection device as auxiliary.

(b) Coagulation, flocculation tank

- Shape: Circular, vertical, above ground
- Materials: Carbon steel with epoxy coating
- Volume: 30 min.-retention time of average flow rate
  It is required for floc formation and floc growth acceleration completely.
- Attachment: Vertical mixer and flocculator

(c) Clarifier

- Shape: Circular, vertical, above ground
- Materials: Carbon steel with epoxy coating

- Surface Load: 3 $m^3/m^2/h$ (as experimental value)
- Attachment: Steel structural bridge hanging a sludge collecting rake

(d) Chemical Injection Unit

- The following chemicals are used as coagulant:

  Coagulant Alum=$Al_2(SO_4)_3 \cdot 18H_2O$

  Coagulation Aid Polymer (Cation or Anion)
- The unit consists of chemical drums with mixers and reciprocating pumps.

(e) SS contents in treated water is expected less than 20 mg/L.

(4) Sludge Treatment

1) Purpose

(a) Sludge is generated from the following treating units;

- Neutralization Unit: No.1 Sedimentation Tank bottom
- Biological Treating Unit: No.2 Sedimentation Tank bottom
- Chemical Clarifier: No.3 Sedimentation Tank bottom

(b) Solids content in sludge is approx. 0.5～2.0% that is almost all water. Therefore, sludge is thickened in the Thickener, and then dehydrated by centrifuges.

(c) The sludge cake should be disposed to the specified landfill under management. Supernatant of thickener and filtrate of centrifuge are sent back to the equalization tank to re-treat.

2) Specification, Design Base

(a) The sludge treating unit consists of a sludge thickener, centrifuges and chemical injection unit.

(b) Sludge Thickener:

- Shape: Open top tank, circular and vertical type, above ground
- Materials: Carbon steel with epoxy coating on the inner surface
- Surface load: 12 $m^3/m^2/day$ = 0.5 $m^3/m^2/hour$ (as experimental value)
- Expected SS contents: 2－5 %

(d) Dehydrator

- Type: Horizontal, screw decanter type of centrifuge
- Materials: Stainless steel
- Expected SS content of Sludge Cake: 15－20 % (85－80% of water content)
- Centrifuges are installed in a shelter.

(d) Chemical Injection Unit

- Polymer (Cation or Anion) is used for coagulant aid for dehydration.
- The unit consists of chemical drums with mixers and reciprocating pumps.

(5) Electrical, Instrumental Design

1) Electrical Design

(a) Primary power cables (380V-AC x 3 phase x 50 HZ) will be laid between the switch gear at the existing electric substation and a receiving/distributing board, transformer at the new electric substation in the W.W.T. control room.

(b) Secondary power cables (380V-AC) will be laid between MCC (Motor Control Center) at the new substation in the W.W.T. control room and each motors of equipment.

(c) Lighting cables (220V-AC) will be laid between a transformer, distribution board and each lighting implements.

(d) Earthwork is required for steel equipment, piping and structure adequately.

(e) NSP is requested to design and construct primary power supplying work between the existing substation and the receiving board at the new substation in the W.W.T. control room.

2) Instrumental Design

(a) The center instrument panel will be installed at the W.W.T. control room. Indicators, recorders, alarms and sequence timers, etc. will be mounted on the board, and W.W.T. system will be designed so as to operated automatically by the control panel.

(b) Control cables (220V-AC, 24V-DC) will be laid between a transformer, center panel and each instruments at field.

(c) Electric implements and instruments should be applied to tropical and dust proof type.

(d) Control valves will be operated pneumatically by compressed air.

6. Technical Provision for Basic Design

6.1 Location of Plant

(1) Major equipment of wastewater treatment plant shall be installed outdoors.

(2) Arrangement of equipment, piping and instrumentation shall be determined in consideration of easy operation and of a sufficient access for maintenance.

(3) The area of wastewater treatment plant shall be classified as a non-hazardous area.

6.2 Special Requirement

(1) The plants shall be designed so as to operate for 330 days a year continuously.

(2) The plants shall be operated automatically by the control panel in the control room.

(3) The control room shall be built in the W.W.T. area, and it shall consist of a control panel room, MCC (motor control center) room, mini-laboratory, toilet, locker room, warehouse, etc.
But, a control room for No.2 W.W.T. are not provided assuming that the existing buildings can be utilized.

(4) One spare pump shall be provided for each continuous running pump.

(5) Each chemical drum shall be designed to be seven (7) days stock at normal operation basically.

7. Discussion

7.1 Disposal to Public Sewer

At present, whole wastewater from NSP is disposed to the Public Sewer; therefore Law 84/92 of disposal to public sewer is applied (Refer to Table 2). Public Sewage Treatment Plant aims to treat sanitary/domestic wastewater from residential area mainly. In this point of view, industrial wastewater contaminated metals; mineral oil etc. is unfavorable to the Public Sewage Plant consisting of biological treatment.

Comparing to the disposal regulation, it may be not always necessary to provide the new wastewater treating plant unless pH control and oil removal is maintained completely by the existing treating units. But, it may be very difficult, so that it is recommended to provide the new neutralization unit and oil separator, as minimum.

Table 3 Regulation of Disposal to Public Sewer

	Law 93/62 (EGYPT)		Law of Sewage JAPAN
	as modified by Decree 9/89	as modified by Decree 44/2000	
pH [-]	6 – 10	6 – 9.5	5 – 9
BOD [mg/L]	< 400	600	< 300 / 600
COD [mg/L]	< 700	1100	None
SS [mg/L]	< 500	800	< 300 / 600
Oil & Grease [mg/L]	< 100	100	<5 mineral <30 animal & plants
Total N [mg/L]	<100 as NH_3		< 240
Total P [mg/L]	< 30 as PO_4	25	< 32
TDS [mg/L]	< 2,000		None
Water Temp. [℃]	< 400	43	< 45

Major differences between Egyptian Regulation and Japanese are as follows;

(1) Japanese regulation does not specify COD and TDS.

(2) Concerning to Oil & Grease, Japanese Regulation is more stringent than Egypt, because oil especially mineral oil is harmful to bacteria using in the biological-treating unit.

7.2 Total Dissolved Solids (TDS)

TDS is regulated in Wastewater Discharge Regulation in Egypt.

Acid rinsing wastewater from Long Welded Pipes Factory in NSP contains high level of HCl. Therefore, wastewater after neutralized is very high contents of TDS, such as 3,000~6,000 mg/L.

Neutralized wastewater may be diluted by other wastewater, but it may not always meet the regulation of TDS.

The countermeasures of remove TDS are applied to desalination such as RO (reverse osmosis), ion exchange resin/membrane, evaporator, etc., that are not only economical in investment and running cost but also generation of condensed waste liquid as residue.

7.3 Save water consumption

In case of reuse treated water in the factories, it should be studied to be used satisfactorily in water qualities, especially TDS.

The most important countermeasure is always to save the consumption of city water in the Factory.

8. Performance Guarantee

The basic design of W.W.T. of NSP Factory is designed on our survey data during limited short period and given data by NSP. This basic design procedure may be useful for W.W.T. design.

But, it is recommended that the existing production plants including utility supply system should be improved in wastewater discharge points of view in addition to the existing W.W.T. As a result, if new W.W.T. will be designed and constructed by yourself after some improvements, it is required to verify and settle the design conditions based on supplemental wastewater survey, then the detail design should be proceeded to be satisfied of the specified performance of the plant.

This recommendable basic design is only for reference. Therefore, the Study Team can not guarantee the plant performance if anybody will construct the new plant based on this basic design package in the future.

Client: JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

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

Factory Name: EL NASR CO. FOR STEEL PIPES AND FITTINGS

BASIC DESIGN

Document Title:

CALCULATION SHEET FOR W.W.T. RECOMMENDABLE PLANT

Issued Date: September 2000

Consultant: JICA STUDY TEAM

CHIYODA DAMES AND MOORE CO.

CHIYODA CORPORATION

1. Object

This design calculation sheet is applied to the study of W.W.T. Recommendation Plant planning for 「**El Nasr Co. for Steel Pipes and Fittings** 」.

2. Wastewater to be treated

(1) RW-1:「 Neutralization Unit Outlet」+「Sanitary/Domestic of Foundry」
(2) RW-2: Skimmed Oily Water of C.W. Oil Separator
(3) RW-3: Wastewater in the Collection Pit from Foundary Factory
(4) RW-4: Wastewater in the Collection Pit from Spiral Pipe/Coating Factories

3. Design Conditions

(1) The existing facilities of wastewater sources should be maintained, repaired, as original or revised design basis.
(2) Waste management system in the Factory should be organized, and operated adequatly under the responsible managers.
(3) Suitable routine works, periodical maintainances should be conducted in the whole company.
(4) Quality and quantity of RW-3 are assumptivel data as same as RW-4, because there was no flow during water sampling.
(5) Calcutation result figures may be changed in the layout planning stage.

4. Contents of Wastewater Treating Facility

(1) Pre-treatment : Neutralization Unit, Oil Separator, Equalization Tank
(2) Primary Treatment: Chemical Clarifier, Sand Filter
(3) Secondary Treatment: Activated Sludge Treatment

5. Design Basis

5.1 Quality and Quantity of Influent Wastewater: Shown on Table-1.

5.2 Quality and Quantity of Treated Water

The following regulations are applied to Basic Design.

(1) Existing Plant: Law93/62 Discharge to Sewer System
(2) Recommendation Plant: Law48/82 Non Potable Surface Water (Industrial)

Table－1 Design Basis of Wastewater Quality and Quantity

	Raw Water 1	Raw Water 2	Raw Water 4	Raw Water 3	Law48/82
Flow Rate Av. [m^3/h]	40	30	50	5	
Flow Rate Max [m^3/h]	50	40	150	10	
pH [-]	2 ~7	7 ~8	6.5 ~8	6.5 ~8	6 ~9
SS [mg/L]	250	200	30	30	60
BOD [mg/L]	100	100	30	30	60
COD [mg/L]	200	200	80	80	100
Oil&Grease [mg/L]	5	1,000	5	5	10
TDS [mg/L]	5,800	400	390	390	2,000
Water Temp. [℃]	25 ~35	25 ~35	25 ~30	25 ~35	35

6. Unit Design

6.1. Wastewater Collection (Out of Battery)

6.1.1 No.1 Waste Water Pit

(1) Purpose

Raw water 1 is taken from the outlet of Sedimentation Pit and is stored to pump up to the new Neutralization Unit.

(2) Design Conditions

1) Wastewater: Outlet of the Sedimentation Pit
2) Flow Rate(Q) 40 m^3/h = 0.67 m^3/min
3) Retention Time: 30 min.
4) Shape、Materials、No. : Rectangular、RC(Semi-Underground)、 1 set

(3) Sizing

(3-1) No.1 Wastwater Pit (Z-101)

1) Req'd Vol. 20 m^3
2) Effictive Height 1 m(take)
3) Cross Sectional Area Ac= Q/Ah= 20 m^2

Take: $4,000^W \times 5,000^L \times 1,500^H$*

* Actual height is based on the depth of buried pipe.

(3-2) No.1 Wastewater Pump (PU-101AB)

1) Capacity Allowance 20 % Design Flow Rate 48 m^3/h
2) Required Total Head 15 m (take)
3) efficiency of pump 0.6
4) Motor Allowance 0.3
5) Motor Power 4.24 kW→ 5.5 kW PU-101AB=48m^3/hx0.15MPax5.5kW

6.1.2 No.2 Waste Water Pit

(1) Purpose

Raw water 2 is taken from the outlet of Oil Separator and is stored to pump up to the new Oil Separator.

(2) Design Conditions

1) Wastewater: : Outlet pipe of the Oil Separator
2) Flow Rate(Q) 30 m^3/h = 0.5 m^3/min
3) Retention Time: 30 min.
4) Shape、Materials、No. : Rectangular、RC(Semi-Underground)、 1 set

(3) Sizing

(3-1) No.2 Wastewater Pit (Z-102)

1) Required Vol. Av= 15 m^3
2) Effective H of Pit Ah= 1 m(take)
3) Cross Section Area Ac= Q/Ah= 15 m^2

Take: $3,000^W \times 5,000^L \times 1,500^H$*

* Actual height is based on the depth of buried pipe.

(3-2) No.2 Wastewater Pump (PU-102AB)

1) Capacity Allowance 20 % Design Flow Rate 36 m^3/h

2) Required Total Head	15	m (take)			
3) efficiency of pump	0.6				
4) Motor Allowance	0.3				
5) Motor Power	3.18	kW→	3.7	kW	PU-102AB=36m^3/hx0.15MPax3.7kW

6.2 Pre-treatment

6.2.1 Neutralization Unit

(1)Purpose

To neutralize Wastewater which is not neutralized by the existing Neutralization Unit completely.

(2)Design Conditions

1)Wastewater: Neutralization Unit Outlet and Sanitary/Domestic Wastewater from Foundry.

2)Flow Rate:

Neutralization Unit	30	m^3/h	0.5	m^3/min
Sanitary/Domestic W.	10	m^3/h	0.17	m^3/min
Total	40	m^3/h	0.67	m^3/min

(3)Sizing

(3-1) Neutralization Tank (T-01)

1) Reaction Time	1	h			
2) Reactor Vol.	40	m^3			
3) Reactor effct. Height	3	m (take)			
4) Reactor Area	13.33	m^2			
5) Length =	2	width	W=	2.58	

Width x Length = 2.6m x5.2m T-01=2.6m x 5.2m x 3.5mH

(3-2) No.1 Sedimentation Tank (T-02)/No.1 Sludge Pump(PU-02)

1) Settling velocity	36	$m^3/m^2/d$	1.5	$m^3/m^2/h$	
2) Tank Surface Area	26.67	m^2			
3) Diameter of Tank:	5.83	m →	5.8	m (Standard)	
4) Retention Time	2	h (take)			
5) Tank Vol.	80	m^3			
6) Height(linear)	3.03	m →	3	m	
7) Sludge/Treated Water	2.5	%	(based on settling test)		
8) Sludge generation rate	1	m^3/h=	20	kg/h as SS content	20 kg/m^3
9) Sludge Storage Height	1	m (take)			
10) Sludge Storage Vol.	28.26	m^3			
11) Sludge Retention Time	28.26	h	T-02=5.8mID x 3.0mH(linear)		
12) Sludge Draw-off Period	8	hours/d			
13) Pump Capacity	3	m^3/h	PU-02=4m^3/hx20mHx		

(3-3) Lime Feeder(MZ-01)/No.1 Lime Pump (PU-01AB)

1) Lime Requirement	1	g-Lime/L-W.W.			
	30	kg/h			
2) Lime Milk Conc.	5	%→	0.05	kg/L	MZ-01= 30kg/h
3) Lime Milk Feed Rate	600	L/h→	10	L/min	PU-01AB=10L/minx0.5MPax0.75kW

(3-4) Lime Hopper (D-01)

1) Required Lime	1	day		
	720	kg/d		
2) Density	0.5	kg/L		
3) Allowance	30	%		
4) Hopper Vol.	1872	L→	2,000	L
5) Hopper Height	1.5	m (take)		
Hopper Cross Section Area	1.33	m^2		
Hopper Diameter	1.30	m→	1.3	m D-01=1.3$m^{I.D.}$x1.5m^{H}

(3-5) No.1 Lime Drum (D-02)

1) Lime Conc.	10	%	100	kg/m^3
2) Preparation Period	8	h		
3) Required Lime	240	kg		
4) Drum Vol.	2.4	m^3		
5) Drum Height (Take)	1.5	m		
Diameter	1.43	m→	1.45	m D-02=1.45$m^{I.D.}$x1.5m^{H}

(3-6) Neutralized W.W. Tank (T-03))

1) Retention Time	30	min	
2) Required Vol.	20	m^3	
3) Effective H of Pit	2.5	m(take)	
4) Cross Section Area	Ac= Q/Ah=	8	m^2

Take: 2.5m^{W}×3.2m^{L}×3.0m^{H}

(3-7) Neutralized W.W. Pump (PU-03AB)

1) Capacity=	48	m^3/h,	Head=	18	mH(take)
2) Motor Power=	5.09	kW→	5.5	kW	PU-03=48m^3/hx18mHx5.5kW

6.2.2 Oil Separator

(1) Object

To remove floatable oil from the skimmed oily water of existing Oil Separator

(2) Design Conditions

1) Wastewater: Wastewater from PU-02AB

2) Flow Rater:Qm 30 m^3/h= 0.5 m^3/min

3) Design Base: API Standard

4) Wastewater

(a)Water Temp. 30 ℃

(b)Specific gravity of Water: Sw 0.995

(c)Absolute viscosity: μ 0.0076 poise

(e)Maximum allowable holizontal velocity :VH=15Vt, not exceed 3f/min.

5) Oil globles in wastewater

(a)Oil globules to be remove: 150 μ = 0.015 cm

(b)Specific gravity of Oil: So 0.9

(c)Rate of rise in wastewater: Vt 0.30 f/min= 0.09 m/min

(d)Maximum allowable VH: 4.52 f/min >3f/min

2 f/min(take) 0.61 m/min

6) Design Factors

(a)For turbulence with:VH/Vt 6.64

(b)Turbulence and Short-circuit Factor: 1.43 (Fig.5-3 of Manual)

(3) Sizing

(3-1) Oil Separator (Z-01)

1) Minimum Cross-section Area: Ac=Qm/VH 0.83 m^2

2) Width: 1.2 m (take) 1.5 m

3) Depth(effct.): 0.69 m→ 0.8 m

4) Length: 7.60 m→ 8 m

API Separator: 1.5m^W x 0.8m^Dx 8.0m^L (1channel)

(3-2) Oil Separator T.W. Pit (Z-02)

1) Retention Time 30 min

2) Required Vol. 15 m^3

3) Effective H of Pit 2.5 m(take)

4) Cross Section Area Ac= Q/Ah= 6 m^2

Take: 2.4m^W×2.5m^L×3.0m^H

(3-3) Skimmed Oil Pit (Z-03)

1) Design Conditions Oil Contents in Wastewater 1 L/m^3

Oil Contents in Skimmed Water 10 %

2) Quantity of Skimmed Oily Wat 7.2 m^3/d

3) Retention Time 1 day

4) Required Vol. 7.2 m^3

5) Effective H of Pit 2.5 m(take)

6) Cross Section Area Ac= Q/Ah= 2.88 m^2

Take: 1.5m^W×2.0m^L×3.0m^H

(3-4) Skimmed Oil Tank (T-04)

1) Retention Time 7 days

2) Required Vol. 50.4 m^3

3) Height 6 m(take) Reruired Area 8.4 m^2

4) Diameter of Tank: 3.27 m→ 3.4 m (Standard)

T-03=3.4m^{ID}x6.0m^H

(3-5) Oil Separator T.W. Pump (PU-4)

1) Capacity= 36 m^3/h, Head= 18 mH(take)

2) Motor Power= 3.81 kW→ 5.5 kW PU-04=36m^3/hx18mHx5.5kW

(3-6) Recovered Oil Pump (PU-05)

1) Design Conditions Working Hour= 1 h/day

1) Capacity= 7.2 m^3/h→ 10 m^3/h Head= 15 mH(take)

2) Motor Power= 1.06 kW→ 1.5 kW PU-05=10m^3/hx15mHx1.5kW

6.3 Equakization Tank

(1) Object

To equalize quality and quantity of 2 wastewaters.

(2) Design Conditions

1) Quantity and Quality of Wastewater: Shown on Table-2

2) Shape: Open Top Tank, Materials: CS /Epoxy Coating , Required No.: 1 set

3) Retention Time: 5 h

4) Others: Air bubbling device

Table-2 Quantity and Quality of Wastewater

	RW -1	RW -2	BackWash W.W.	RW -3	Equalized W.
Flow Rate [m^3/h]	40	30	2	5	77
pH [-]	6 ~7.5	7 ~8	6.5 ~8	6.5 ~8	6.5 ~8
SS [mg/L]	250	200	550	30	224
BOD [mg/L]	100	100	186	30	98
COD [mg/L]	200	200	496	80	200
Oil&Grease [mg/L]	5	30	83	5	17

(3) Sizing

A. Equalization Tank

1) Required Vol.: 385 m^3

2) Height: H= 7.6 m (take)

3) Section Area: A= 50.66 m^2 D= 8.03 m→ 8.71 m(Standard)

Take: $8.71m^{ID} \times 7.6m^{H}$

B. Air Bubbling Device

1) Required Air (design base): 3 $Nm^3/m^2/h$

2) Required Air Quantity: 151.97 Nm^3/h= 3 Nm^3/min(take)

6.4 Biological Treating Unit (Activated Sludge Treatment)

(1) Purpose

To remove Organic Substances (BOD,COD) by aerobic micro bacterias.

(2) Design Conditions

1) Wastewater: Equalized Wastewater

2) Treating Method: Activated Sludge Treatment

3) Capacity: 77 m^3/h

4) Water Quality:

Table-4 Water Quality

	Inlet	Outlet	Law93/62 Sewer System	Law48/82 Non Potable
pH [-]	6.5~8	6.5~8	6 ~10	6~9
SS [mg/L]	224	30	< 500	60
BOD [mg/L]	98	30	< 400	60
COD [mg/L]	200	50	< 700	100
Oil & Grease [mg/L]	17	5	< 100	10
Water Temp. [℃]	20~35	20~35	< 40	35

5) Shape, Materials, Req'd No.

(a) Aeration Basin: Rectangular/Above ground, RC, 1 set

(b) Sedimentation Basin: Circular/Above ground, CS+Epoxy coating, 1 set

6) Chemicals

N and P are injected in case of lack of nutrient.

(3) Sizing

(3-1) Aeration Basin(Z-04)

1) BOD Loading 0.5 kg-BOD/m^3/day (take)

2) Vol. of Basin Vas= 250.18 m^3

3) Height of Basin Has= 3.5 m(take) Aas= 71.48 m^2

L= 3 W (take) W= 4.88 m→ 5 m

L= 15 m

Take: $5.0^{mW} \times 15.0^{L} \times 3.5^{H}$

4) BOD Removal : R_{BOD}= 125.09 kg/day

5) MLSS : Ca= 2,000 mg/L

(3-2) No.2 Sedimentation Basin(T-06)

1) Surface Loading Las= 1 $m^3/m^2/h$ (take)= 24 $m^3/m^2/day$

2) Surface Area Ass= 77 m^2

3) Height of Basin Hss= 3 m (take)

4) Vol. of Basin Vss= 231 m^3 Tss= 3 h

5) Diameter of Basin: Dss= 9.90 m → 10 m

Take: $10m^{ID} \times 4.0m^{H}$ Act.Surf.Loading= 0.98 $m^3/m^2/h$

(3-3) Surplus Sludge

1) BOD→SS Conversin Rate 0.4 (take)

2) Sludge from Act. Sludge T. Wss= 2.08 kg/h from BOD

Wss= 14.94 kg/h from SS

Total Wss= 17.02 kg/h

SS content 8 kg/m^3(take) 2.13 m^3/h= 51.07 m^3/d

(3-4) Air Requirement for Aeration

1) Oxygen Demand: W_{O2}= a*R_{BOD}+b*Sa = 95.07 kg/day

a= BOD Factor = 0.55 kg-O_2/kg-O_2

b= MLVSS Factor= 0.07

Sa= 0.75*MLSS*Vol.of Basin/1,000= 375.26

R_{BOD}= BOD Removal = 125.09 kg/day

2) Required Air : Qair= (W_{O2}*3.57m^3/kg-O_2*1.3)/(0.08*24*60)

= 3.54 Nm^3/min→ 3.6 Nm^3/min

: Misceranious Purpose 1 Nm^3/min

3) Blower(B-01) Qta= 9.12 Nm^3/min

Take: 9.5Nm^3/minx7mHx15kW

(3-5) Sludge Circulation Pump(PU-08)

1) Return Sludge Ratio Rs= Ca/(Cr-Ca) = 33.33 %

2) Pump Capacity 33.4 m^3/h PU-08=36m^3/hx12mHx3.7kW

(3-6) Nutrient as N $CO(NH_2)_2$ Injection Unit

1) Dosage : BOD : N = 100 : 5

: BOD : $CO(NH_2)_2$ = 100 : 11

2) Concentration : 12.5 wt %
3) Specific gravity: 1.069
4) Injection rate : Q_{CO}= 4.3 L/h (PU-06)
5) Storage Vol. : V_{CO}= 0.7 m^3 (7days)
6) Dimension : Take: 0.9m^{ID}X1.2m^{H} (D-04)

(3-7) Nutrient as P H_3PO_4 Injection Unit
1) Dosage : BOD : P = 100 : 1
: BOD : H_3PO_4 = 100 : 3
2) Conc. : 12.5 wt %
3) Specific gravity: 1.189
4) Injection rate : Q_{ph}= 1.1 L/h (PU-07)
5) Storage Vol. : V_{ph}= 0.2 m^3 (7days)
6) Dimension : Take: 0.9m^{ID}X1.2m^{H} (D-05)

6.4 Chemical Clarifier

(1) Purpose

To remove Suspended Solids(SS), slice of oil and color. Clarifier is not necessary, because A.S.Treated Water meets to the Regulation.

(2) Design Conditions
1) Wastewater: W.W. after equalized in T-04.
2) Capacity: 77 m^3/h
3) Water Quality of Inlet and outlet of Clarifier: Shown on Table-3.
4) Chemicals: (a)Coagulant= $Al_2(SO4)_3$
(b)pH Controller=$Ca(OH)_2$
(c)Coagulant Aid=Polymer

Table-3 Water Quality

		A.S T. Water	Out let of Clarifier	Law93/62 Sewer System	Law48/82 Non Potable
Flow Rate	[m^3/h]	77	77		
pH	[-]	6.5 ~8	7 ~8	6 ~10	6 ~9
SS	[mg/L]	30	20	< 500	60
BOD	[mg/L]	30	25	< 400	60
COD	[mg/L]	50	45	< 700	100
Oil&Grease	[mg/L]	3	2	< 100	10

(3) Sizing

(3-1) Treated Water Pit(Z-06)
1) Retention Time: 30 min
2) Req'd Vol. of Pit 38.5 m^3
3) Dimension H= 2.5 m(take) A= 15.40 m^2
W= 3 m L= 5.13 m Z-06=3.0mWx5.2mLx3mH

(3-2) Coagulation Part(T-07)
1) Rapid Mixing Time 3 min (take)
2) Reruired Vol. Vfl= 3.85 m^3

3) Shape=Cylindrical, Vertical, Materials=CS/Epoxy Coating
Required No. 1 Set

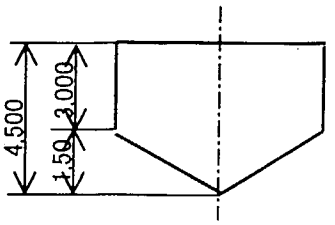
4) Demension: Hfl= 2 m (take) Req'd Area 1.93 m^2
D= 1.57 m→ 1.60 m
Take: $1.5m^{ID} x 2.0m^{H}$

(3-3) Flocculation (+T-07)

1) Slow Mixing Time 20 min (take)
2) Required Vol. Vfl= 25.67 m^3
3) Shape=Rectangular, Vertical, Materials=CS/Epoxy Coating
Required No. 1 Set
4) Demension: Hfl= 3 m (take) Req'd Area 8.56 m^2
L= 2 W (take) W= 2.07 m, L= 4.14 m
T-07= $2.1m^{W} x 4.2m^{L} x 3.0m^{H}$

(3-4) No.3 Sedimentation Basin(T-08)

1) Surface Load Ls= 3 $m^3/m^2/h$ (take)
2) Req'd Area As= 25.67 m^2
3) Shape=Circular, Materials=CS/Epoxy Coating, Req'd No. 1 Set
4) Retention Time Ts= 1 h (take)= 60 min
5) Req'd Vol. Vs= 77 m^3 H= 3.00 m
6) Dimensions D = 5.72 m→ 5.8 m(Standard)
Take: $5.8m^{ID} \times 4.5m^{H}$ (linear=3.0m)
<Act. Surface Load = 2.92 $m^3/m^2/h$ >



(3-5) Sludge Draw-off

1) SS Removal 2.31 kg/h= 55.44 kg/d
2) Concentration of SS in Draw-off Sludge 0.75 %(take)= 10 kg/m^3
3) Sludge Draw-off 0.23 m^3/h 0.30 %

(3-6) Coagulant $Al_2(SO_4)_3 \cdot 18H_2O$ Injection Unit

1) Dosing Rate: 30 mg/L, Max. 50 mg/L
2) Concentration: 20 wt % = 222.4 g/L
3) Specific Gravity: 1.112
4) Injection Rate: Q_{PO}= 10.4 L/h= 0.17 L/min (PU-10)
5) Drum Vol. : V_{PO}= 1.7 m^3 (for 7days)
Height: H_{PO}= 1.5 m (take) A_{PO}= 1.16 m^2
Diameter D_{PO}= 1.2 m
Take: $1.2m^{ID} \times 1.5m^{H} \times 2$ sets (D-07)

(3-7) pH Controller: $Ca(OH)_2$ Injection Unit

1) Dosing Rate: 20 mg/L, Max. 50 mg/L
2) Concentration: 10 wt % = 100 g/L
3) Specific Gravity: 1
4) Injection Rate: Q_{PO}= 15.4 L/h= 0.26 L/min (PU-09)
5) Drum Vol. : V_{PO}= 2.6 m^3 (for 7days)
Height: H_{PO}= 1.5 m (take) A_{PO}= 1.72 m^2
Diameter D_{PO}= 1.5 m

Take: 1.4m^{ID}×1.5m^{H}×2 sets (D-06)

(3-8) Coagulant Aid: Polymer Injection Unit

1) Dosing Rate: 0.3 mg/L, Max. 0.5 mg/L

2) Concentration: 0.5 wt % = 5 g/L

3) Specific Gravity: 1

4) Injection Rate: Q_{P0}= 7.7 L/h= 0.13 L/min (PU-11)

5) Drum Vol. : V_{P0}= 1.3 m^3 (for 7days)

Height: H_{P0}= 1.2 m (take) A_{P0}= 1.08 m^2

Diameter D_{P0}= 1.2 m

Take: 1.2m^{ID}×1.5m^{H}×2 sets (D-08)

6.5 Sand Filter Unit

(1) Purpose

To remove overflow floc(SS) from RW-3, and reuse for Cooling Water

(2) Design Conditions

1) Wastewater: Wastewater in Collection Pit in Spiral Weldeing Factory.

2) Capacity 50 m^3/h= 25 m^3/h× 3 sets (1 stand-by)

3) Water Quality

Table-5 Water Quality

	Inlet	Outlet	Law93/62	Law48/82
pH [-]	6.5~8	6.5~8	6 ~10	6~9
SS [mg/L]	30	10	< 500	60
BOD [mg/L]	30	< 30	< 400	60
COD [mg/L]	80	< 80	< 700	100
Oil & Grease [mg/L]	5	2	< 100	10
Water Temp. [℃]	20~35	20~35	< 40	35

4) Shape: Cylindrical/Vertical/Gravity Type,

Materials: Carbon Steel + Epoxy coating, Req'd No.: 3 sets (1 stand-by)

5) Filter Media: Anthracite + Sand/Gravel

6) Backwashing: Air(Blower) + Water (Pump)

(3) Sizing

(3-1) No.3 Wastewater Pit(Z-201)

1) Retention Time: 15 min(take)

2) Existing Collection Pit: 3mx5mx3mD= 45 m^3

3) Required Vol.: 12.5 m^3 Net Retention Time= 69 min

4) Dimension: Depth= 3 m(take) Area= 4.17 m^2

L= 2 W W= 1.44 m Z-103=1.5mx3.0mx3.5mD

(3-2) Sand Filter(F-01ABC)

1) Filter Velocity Vf= 180 m/day= 7.5 m/h (take)

2) Filter Area/Diameter Af= 3.33 m^2 Df= 2.06 m

3) Height: Hf= Upper of Trough 1 m

<Linear part> Trough 0.3 m

Trough-Anthracite 0.7

Anthracite	0.7	m
Sand+Gravel	0.8	m
Support+Under	0.7	m
Allowance	0.3	m
Total Height	4.5	m

Take: 2.1 m^{ID} x 4.5 m^{H} → 3.46 m^2(net)

(3-3) Filtered Water Pit (Z-202)

1) Vol. of Pit Vfb= 45 min (take) 37.5 m^3

2) Depth of Pit Hfb= 2.5 m (take) Surface Area 15 m^2

3) L= 2 W(take) W= 2.74 m L= 5.48 m

Take: 3.0m^{W} × 5.0m^{L} × 3.0m^{H}

(3-4) Backwashing Pump(PU-203)

1) Backwashing Velocity Ubw= 40 m/h (take)

2) Backwashing Flow rate Qbw= 138.47 m^3/h

3) Backwashing Time Tbw= 10 min(take)

4) Backwashing Water Vbw= 23.08 m^3/h/Cycle

5) Backwashing Pump Qp= 152.32 m^3/h Hp= 12 mH(take)

P= 9.93 kW→ 11 kW PU-203=155m^3/hx12mHx11kw

(3-5) Backwashing W.W. Pit(Z-203)

1) Vol. of Pit Vfb= 1.5 Backwashing water 34.62 m^3

2) Depth of Pit Hfb= 2.5 m (take) Surface Area 13.85 m^2

3) L= 2 W(take) W= 2.63 m L= 5.26 m

Take: 3m^{W} × 5.0m^{L} × 3.0m^{H}

(3-6) Backwash Blower(B-201)

1) Backwash Air Rate 20 Nm^3/m^2/h

2) Req'd Air 1.4 m^3/min→ Blower=1.5Nm^3/minx5mHx3.7kW

(3-7) Backwash wastewater Feed

1) Max. Backwashing W.W. 34.62 m^3/C Av. Backwashing W.W. 23.08 m^3/C

2) Treating Time: 23 h/d Backwash 2 times/d

3) Av. Flow Rate: 2.01 m^3/h Max.Flow Rate 3.01 m^3/h

4) SS to be removed: 24 kg/d SS Contents: 0.52 kg/m^3

SS contents in WW RW-3 30 mg/L → 550 mg/L

5) BOD removal 10 % BOD to be removed 3.6 kg/d= 0.16 kg/m^3

BOD contents in WW RW-3 30 mg/L → 186 mg/L

6) COD removal 10 % BOD to be removed 9.6 kg/d= 0.416 kg/m^3

COD Contents in WW RW-3 80 mg/L → 496 mg/L

7) Oil to be removed 3.6 kg/d Oil Contents 0.078 kg/m^3

Oil Contents in WW 5 mg/L → 83 mg/L

6.5 Sludge Treating Unit

(1)Purpose

To reduce sludge volume by thickening and dewatering

(2)Design Conditions

1) Sludge: (a)Neutralizaton sludge (direct No.1 Centrifuge)
(b)Activated surplus sludge
(c)Clarifier Sludge (only design)

2) Thickener=conineous operation
Centrifuge=6h/day operation

(3)Sizing

(3-1) Sludge Thickener(T-09)

1) Surface Load Lss= 60 kg/m²/d= 2.5 kg/m²/h
Draw-off Sludge Conc. 40 kg/m³
SS Contents of Overflow 300 mg/L= 0.3 kg/m³

2) Sludge Rate (In)

(a)Act.Sludge Treat.	Lac=	17.02	kg/h	2.13	m³/h
(b)Clarifier	Lcl=	2.31	kg/h=	0.23	m³/h
Total	Lto=	19.33	kg/h	2.36	m³/h

SS Conc.av= 8.20 kg/m³

(feed)			(overflow)	
2.36	m³/h		1.89	m³/h
19.33	kg/h	→→ Sludge Thickener →→	0.57	kg/h
8.20	kg/m³		0.3	kg/m³

↓ (conc. Sludge)

Draw-off ratio 19.84 % of feed

0.468	m³/h
18.72	kg/h
40	kg/m³

3) Req'd Surface Area Ath= 7.73 m² Df= 3.14 m
4) Thickener Height Water Retention 4 h (take) ,Hc= 1.22 m
Sludge Retention 18 h (take) ,Hs= 1.09 m
Take: 3.2m^ID×2.5m^H

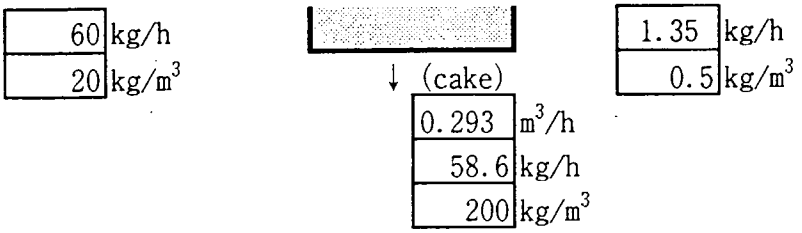
(3-2) Polymer Injection Unit for Thickener

1) Dosage 300 mg/L
2) Concentration 0.1 wt %= 1 g/L (D-09)
3) Specific gravity 1
4) Req'd Polymer 0.71 g/h= 0.71 L/h (PU-13)
5) Req'd Vol. V_{p0}= 0.04 m³ (7days)
6) Demension : Take: 0.4mID×1.0m^H×2 sets

(3-3) NO.1 Centrifuge

1) Sludge Feed Rate: (Sludge generation/day)/ 8 h Operation
1.00 m³/h= 20 kg/h Centrifuge Cap.=1.5 m³/h
2) Solid content of Cake 20 %= 200 kg/m³
Solid content of Water 500 mg/L 0.5 kg/m³

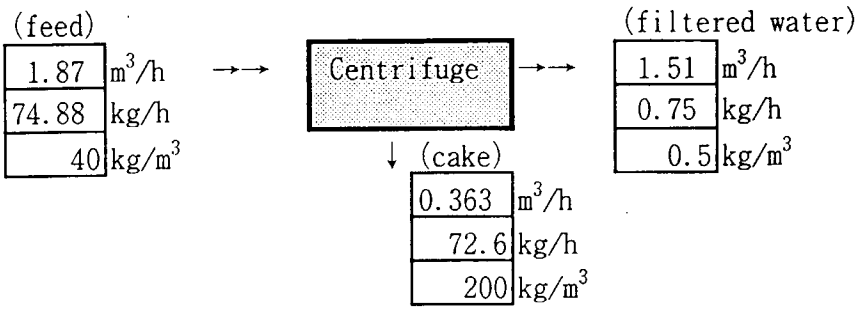
(feed)			(filtered water)	
3.00	m³/h	→→ Centrifuge →→	2.71	m³/h



3) Sludge cake ratio 9.77 % of Feed Sludge
4) Generation of Cake 2.34 m^3/d

(3-4) NO.2 Centrifuge

1) Sludge Feed Rate: (Sludge generation/day)/ 6 h Operation
0.47 m^3/h= 18.72 kg/h Centrifuge Cap.=2.0 m^3/h
2) Solid content of Cake 20 %= 200 kg/m^3
Solid content of Water 500 mg/L 0.5 kg/m^3



3) Sludge cake ratio 19.39 % of Feed Sludge
4) Generation of Cake 2.18 m^3/d

(3-5) Polymer Injection Unit for Centrifuge

1) Dosage 1 % as Dry SS= 0.60 kg/h
2) Concentration 1 wt %= 10 g/L
3) Specific gravity 1
4) Injection rate Q_{p0}= 60 L/h= 1.00 L/min (PU-15)
5) Req'd Vol. V_{p0}= 1.08 m^3 (for 3days)
6) Drum Dimension Hpo= 1.50 m (take) Apo= 0.72 m^2
Dpo= 0.96 m
: Take: 1.2m^{ID}x1.8m^{H}, 1 set (D-10)

6.6 Sterilization

(1)Purpose

To sterilize treated water including sanitary wastewater

(2)Design Condition

1) Wastewater: Filtered water
2) Disinfictant: NaCLO Conc 12 wt% Sp.Gra 1.0155
3) Dosage 4 mg/L (Max. 6mg/L)
4) Contact Time 15 min

(3) Sizing

1) Injection Rate 1.64 L/h

2) Req'd Drum Vol. 0.28 m^3 (for 7days)

3) Drum Dimension: Take: $0.6m^{ID} \times 1.0m^{H}$

4) Sterilization Basin Vol. 12.5 m^3

5) Basin Dimension H= 2.5 m (take) A= 5 m^2

Take: $2.0m^{W} \times 3.5m^{L} \times 2.5m^{H}$