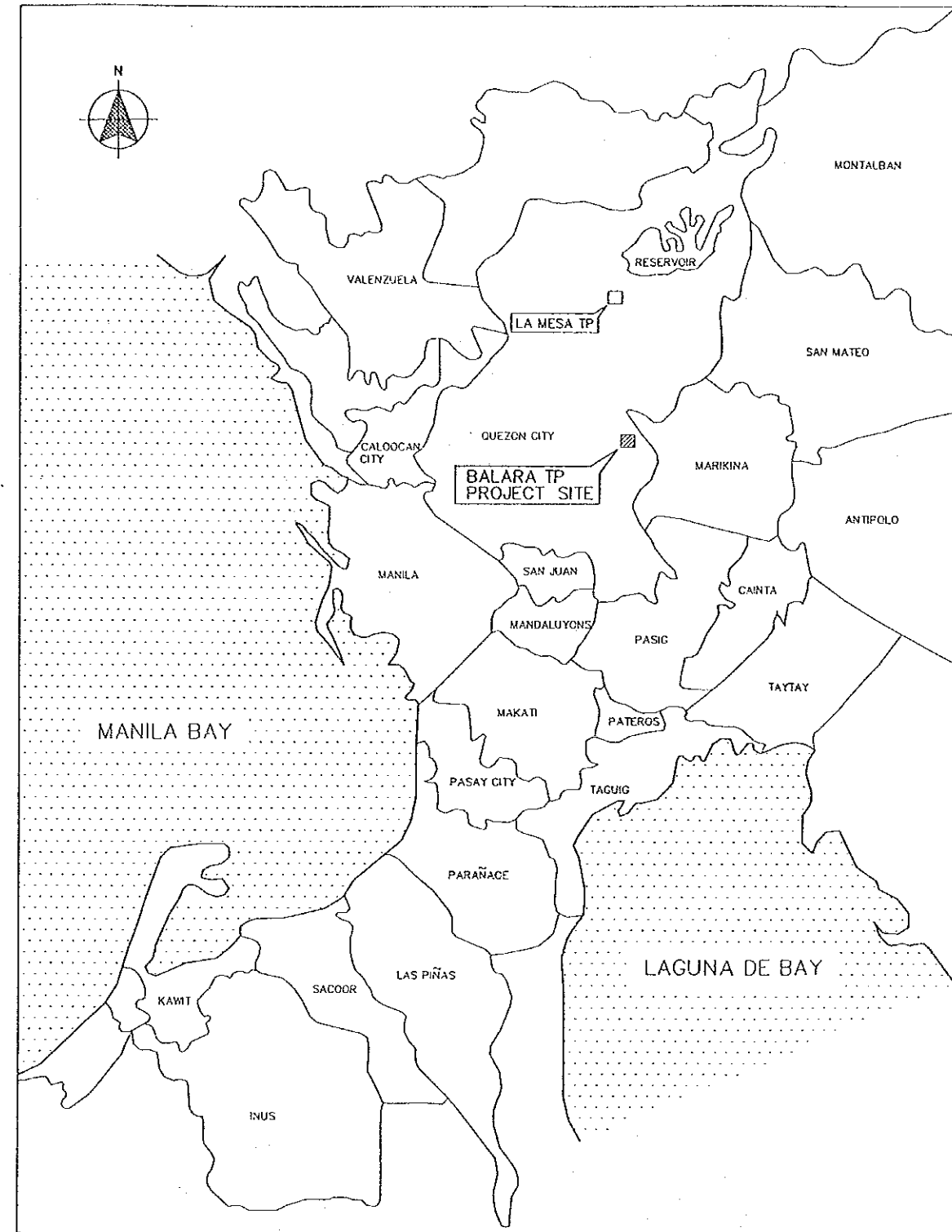
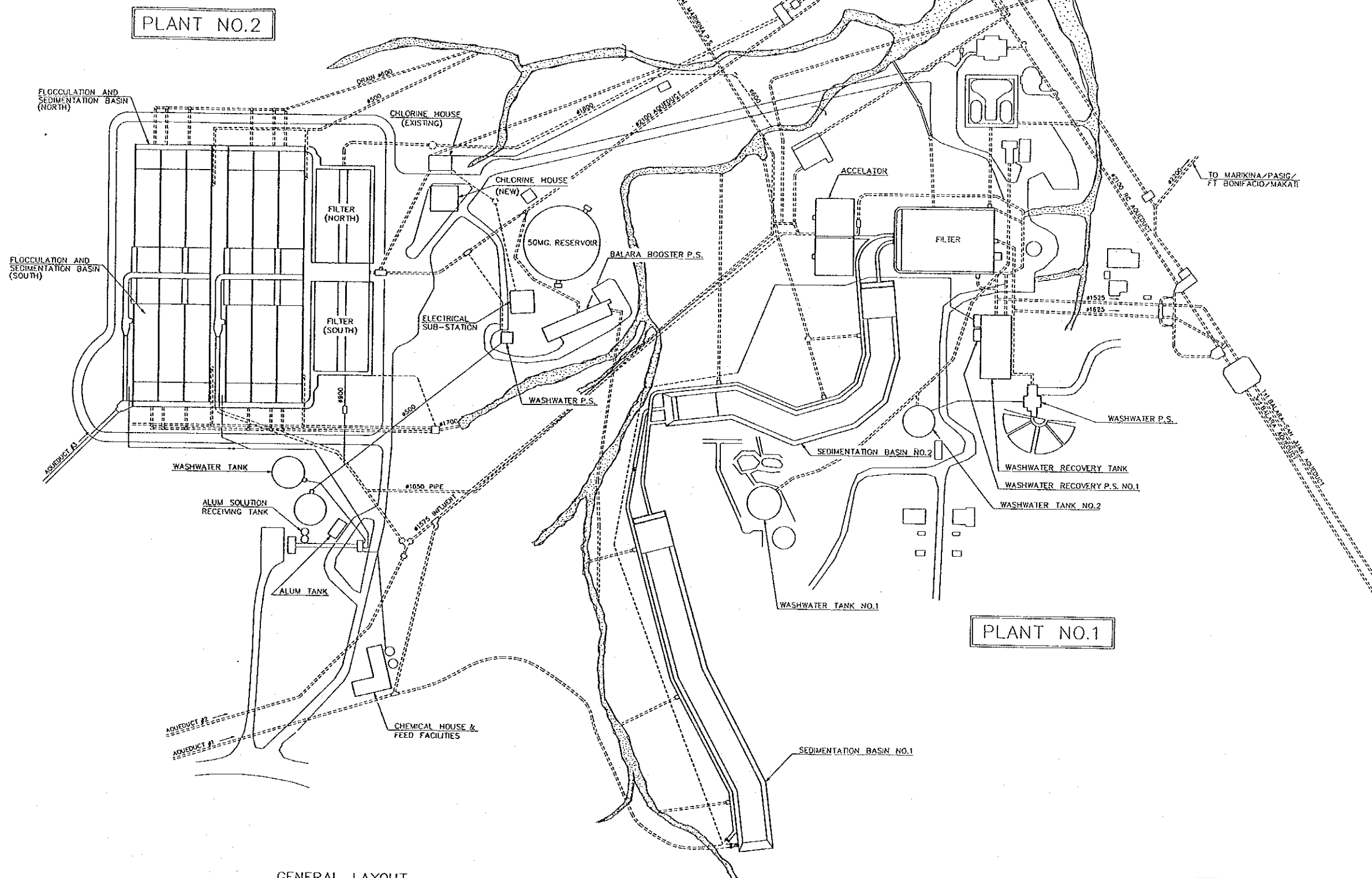


THE REPUBLIC OF THE PHILIPPINES



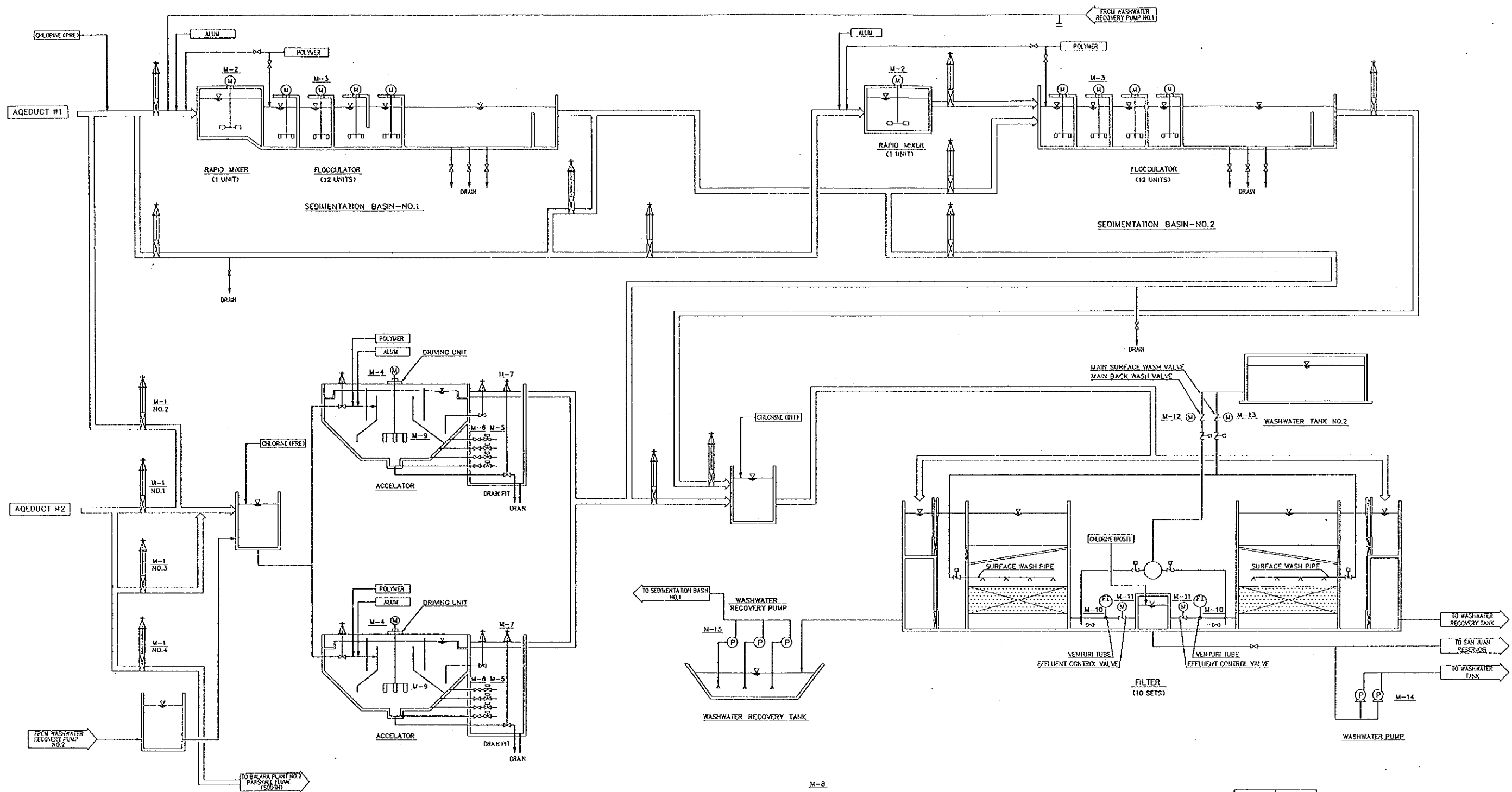
LOCATION MAP OF THE PROJECT SITE

TITLE	DWG. NO.
LOCATION MAP	M-1
現場位置圖	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



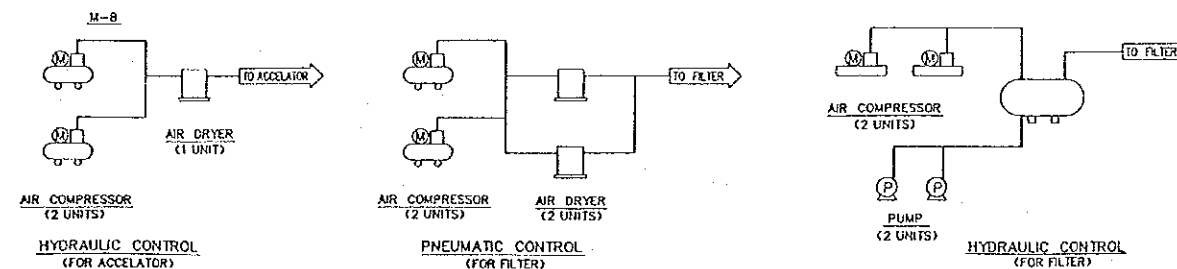
GENERAL LAYOUT
S=1/1500

TITLE	DWG. NO.
GENERAL LAYOUT	M-2
全体配置図	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	

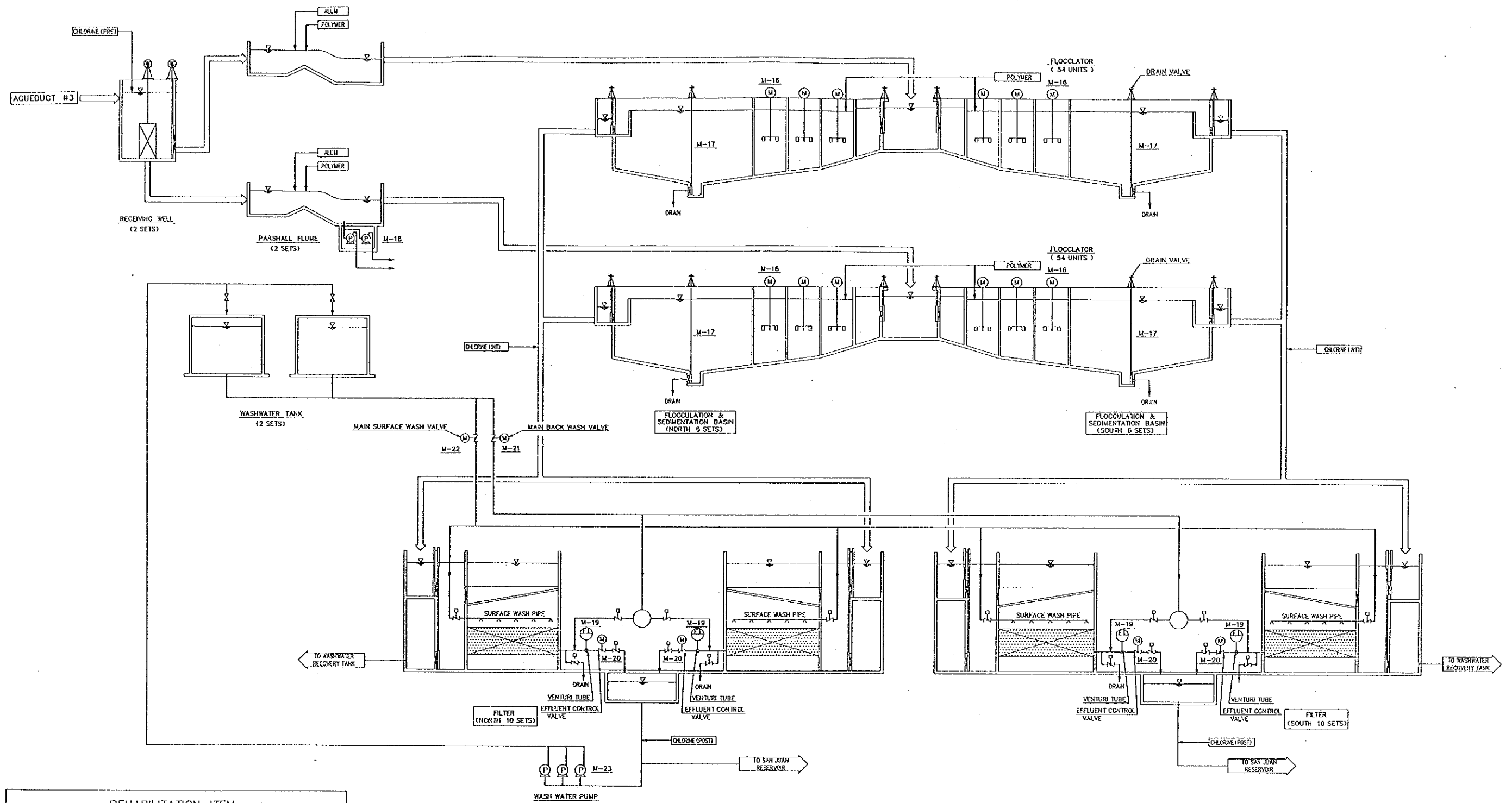


REHABILITATION ITEM			
EQUIP. NO.	EQUIPMENT NAME	Q'TY	SPECIFICATIONS
PLANT NO.1			
M-1	AQEDUCT GATE	4 units	TYPE: MANUALLY OPERATED TYPE SIZE: W2200mmxH2200mm
M-2	RAPID MIXER	2 units	TYPE: VERTICAL TURBINE TYPE
M-3	FLOCCULATOR	24 units	TYPE: VERTICAL TYPE
M-4	DRIVING UNIT OF ACCELERATORS	2 units	TYPE: WORMGEAR TYPE
M-5	SLUDGE DRAIN VALVE	8 units	TYPE: PNEUMATIC DIAPHRAGM VALVE SIZE: DIA.150mm
M-6	SLUDGE GATE VALVE	6 units	TYPE: MANUALLY OPERATED VALVE SIZE: DIA.150mm
M-7	QUICK OPEN VALVE	2 units	TYPE: MANUALLY OPERATED VALVE SIZE: DIA.150mm

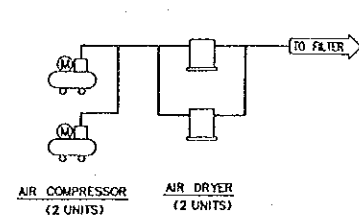
EQUIP. NO.	EQUIPMENT NAME	Q'TY	SPECIFICATIONS
M-8	AIR COMPRESSOR	2 units	CAPACITY: 150 liters/min
M-9	STEEL MEMBERS OF ACCELERATORS	2 sets	MATERIALS: MILD STEEL
M-10	VENTURI TUBE	10 units	SIZE: DIA.500mm
M-11	EFFLUENT CONTROL VALVE	10 units	TYPE: MOTOR OPERATED BUTTERFLY VALVE SIZE: DIA.500mm
M-12	MAIN BACKWASH VALVE	1 unit	TYPE: MOTOR OPERATED BUTTERFLY VALVE SIZE: DIA.800mm
M-13	MAIN SURFACE WASH VALVE	1 unit	TYPE: MOTOR OPERATED BUTTERFLY VALVE SIZE: DIA.450mm
M-14	WASHWATER PUMP	2 units	TYPE: HORIZONTAL CENTRIFUGAL TYPE CAPACITY: 7.3m ³ /min HEAD: 23m
M-15	WASHWATER RECOVERY PUMP	3 units	TYPE: HORIZONTAL CENTRIFUGAL TYPE CAPACITY: 3.6m ³ /min HEAD: 15m



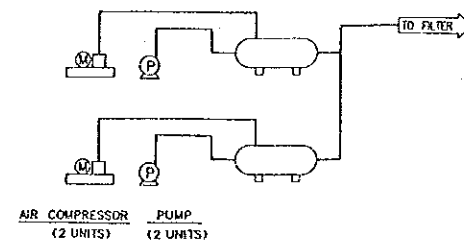
TITLE	DWG. NO.
FLOW DIAGRAM (PLANT NO.1)	M-3
フローシート (プラント NO.1)	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



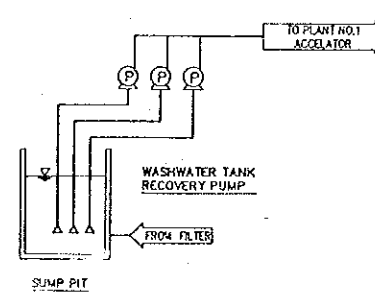
REHABILITATION ITEM			
EQUIP. NO.	EQUIPMENT NAME	Q'TY	SPECIFICATIONS
	PLANT NO.2		
M-16	FLOCCULATOR	108 units	TYPE: VERTICAL TYPE
M-17	SHAFT SUPPORT OF DRAIN VALVE	12 units	MATERIALS: MILD STEEL
M-18	FLUSHING PUMP	2 units	TYPE: HORIZONTAL CENTRIFUGAL TYPE CAPACITY: 0.8m ³ /min HEAD: 20m
M-19	VENTURI TUBE	20 units	SIZE: DIA.500mm
M-20	EFFLUENT CONTROL VALVE	20 units	TYPE: MOTOR OPERATED BUTTERFLY VALVE SIZE: DIA.500mm
M-21	MAIN BACKWASH VALVE	1 unit	TYPE: MOTOR OPERATED BUTTERFLY VALVE SIZE: DIA.1000mm
M-22	MAIN SURFACE WASH VALVE	1 unit	TYPE: MOTOR OPERATED BUTTERFLY VALVE SIZE: DIA.450mm
M-23	WASHWATER PUMP	3 units	TYPE: HORIZONTAL CENTRIFUGAL TYPE CAPACITY: 7.3m ³ /min HEAD: 23m



PNEUMATIC CONTROL (FILTER)

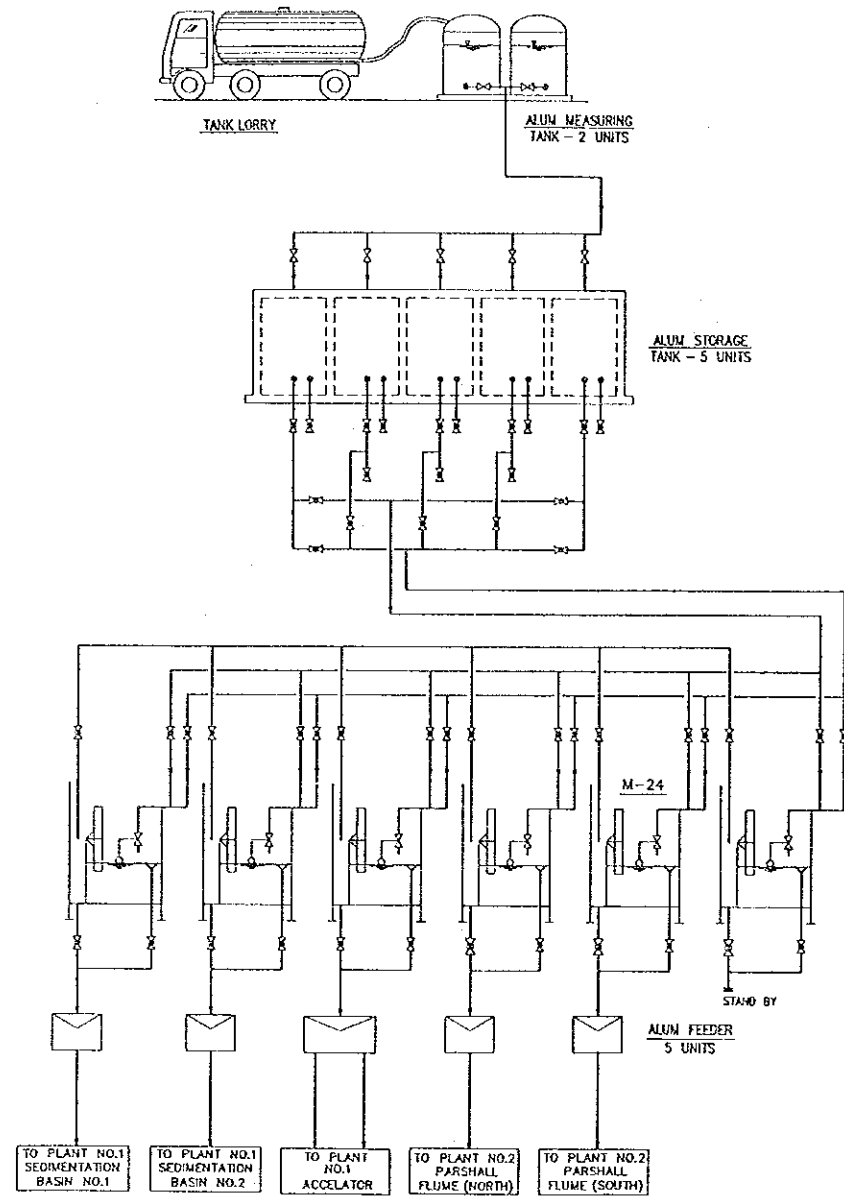


HYDRAULIC CONTROL (FILTER)

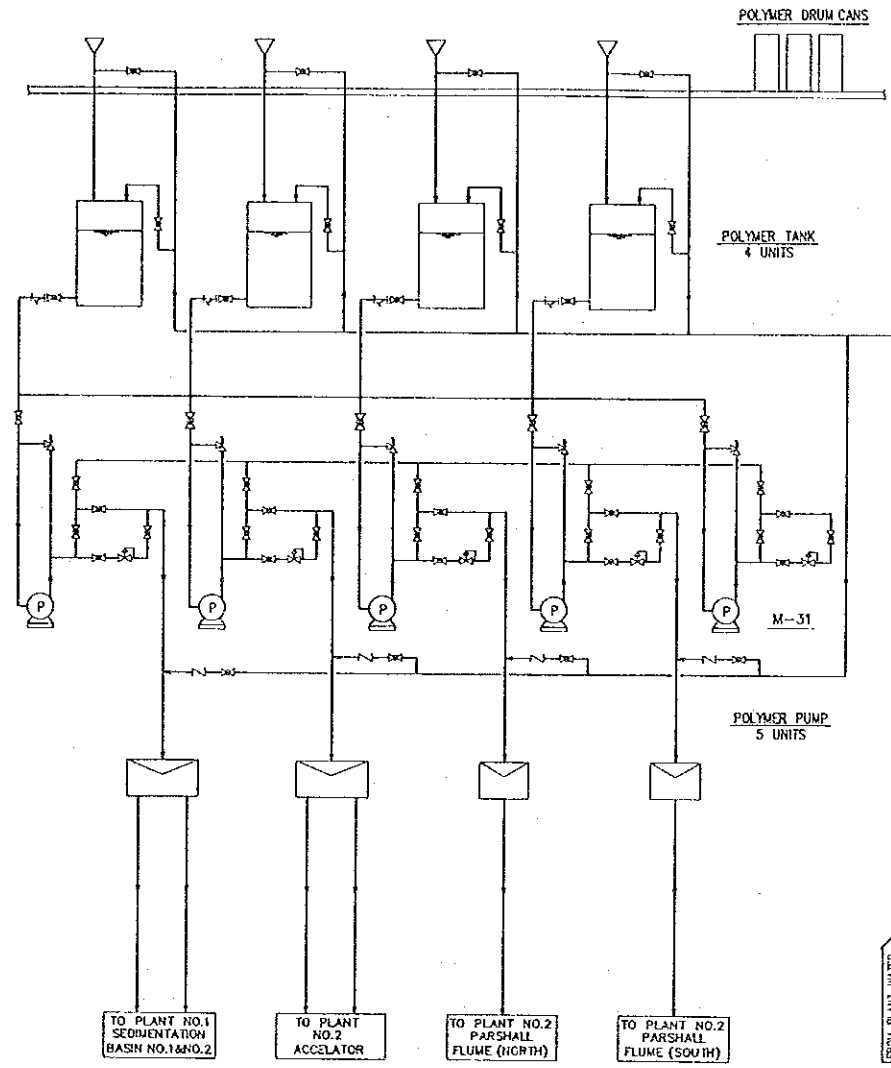


TITLE	DWC. NO.
FLOW DIAGRAM (PLANT NO.2)	M-4
フローシート (プラント NO.2)	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	

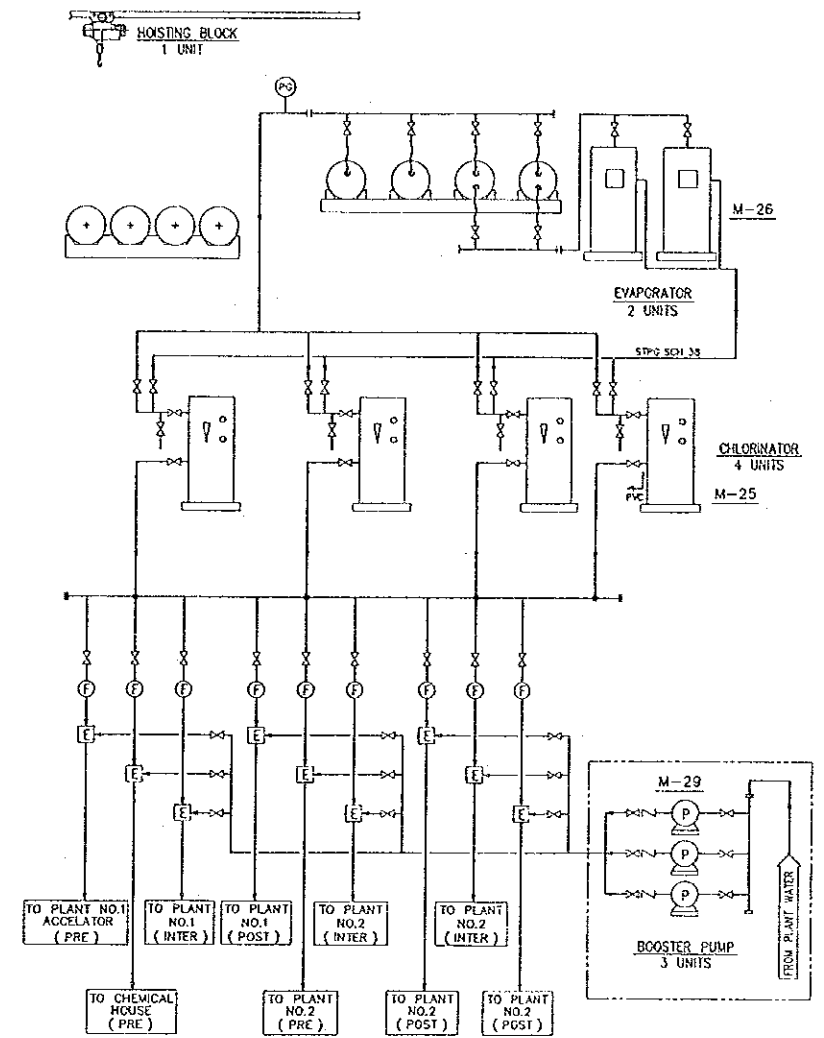
ALUM DOSING FACILITIES



POLYMER DOSING FACILITIES



CHLORINATION FACILITIES

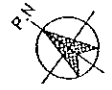


REHABILITATION ITEM

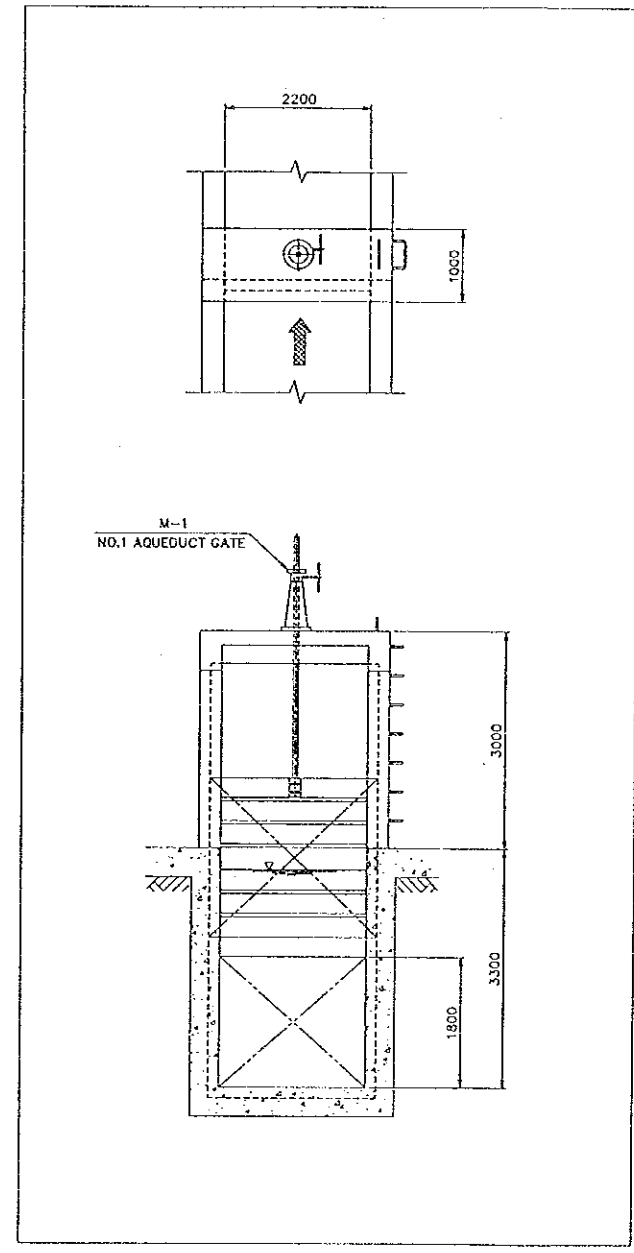
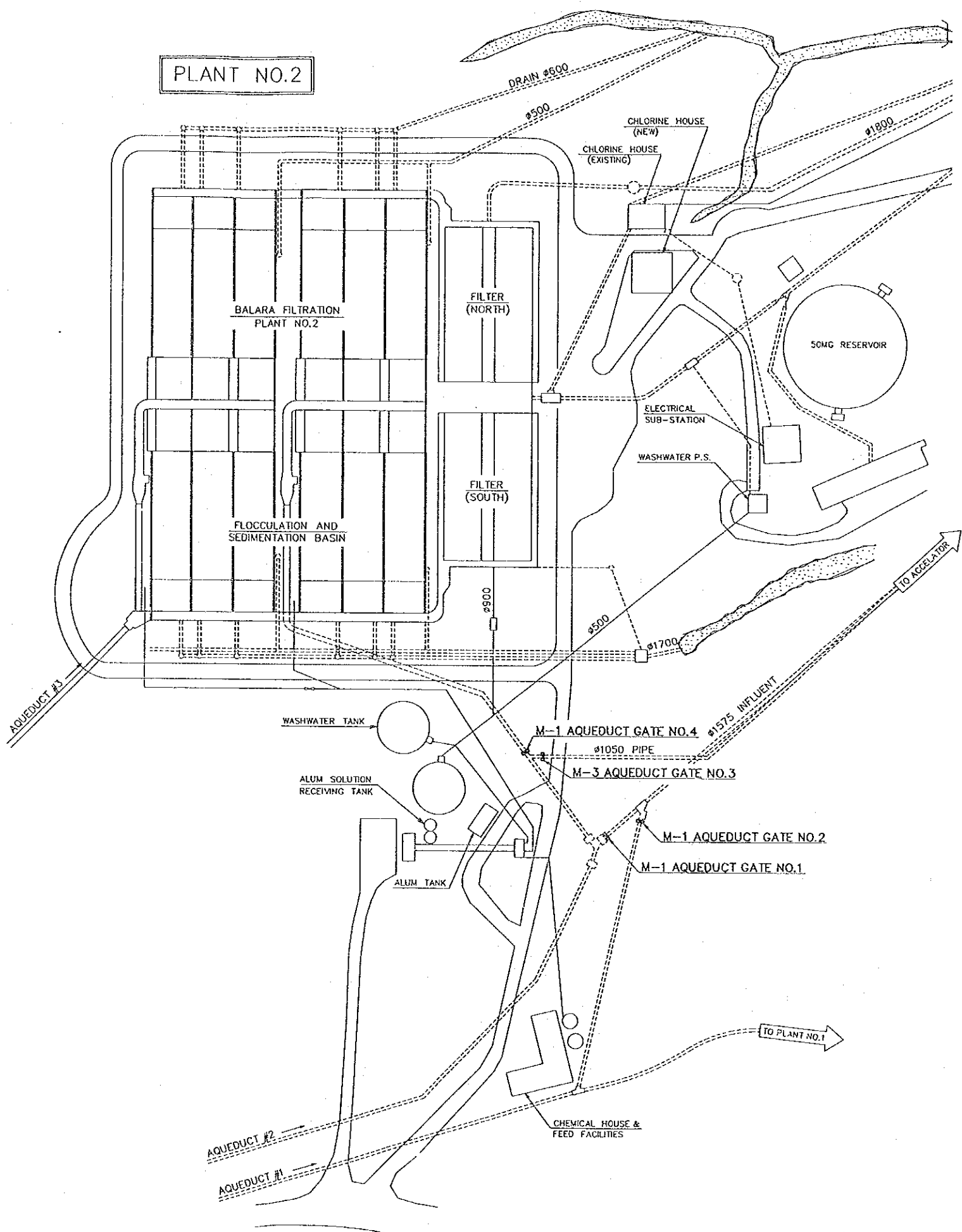
EQUIP. NO.	EQUIPMENT NAME	Q'TY	SPECIFICATIONS
CHEMICALS			
M-24	ALUM FEEDER	6 units	TYPE: VARIABLE SPEED TRANSMISSION CAPACITY: 20 liters/min
M-25	CHLORINATOR	4 units	TYPE: MANUALLY OPERATED TYPE CAPACITY: 150 kg/H
M-26	EVAPORATOR	2 units	TYPE: VERTICAL TYPE
M-27	GAS LEAK DETECTOR	3 units	TYPE: WALL MOUNTED TYPE

EQUIP. NO.	EQUIPMENT NAME	Q'TY	SPECIFICATIONS
M-28	EXHAUST FAN	3 units	TYPE: PROPELLER TYPE
M-29	BOOSTER PUMP	3 units	TYPE: HORIZONTAL CENTRIFUGAL TYPE CAPACITY: 2.0m ³ /min HEAD: 40m
M-30	WEIGHING SCALE	2 units	TYPE: LOADCELL TYPE CAPACITY: 2 TON
M-31	POLYMER FEEDER	5 units	TYPE: DIAPHRAGM PUMP CAPACITY: 3.0 liters/min

TITLE	DWG. NO.
FLOW DIAGRAM (CHEMICAL FACILITIES)	M-5
フローシート (薬品注入設備)	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



PLANT NO.2



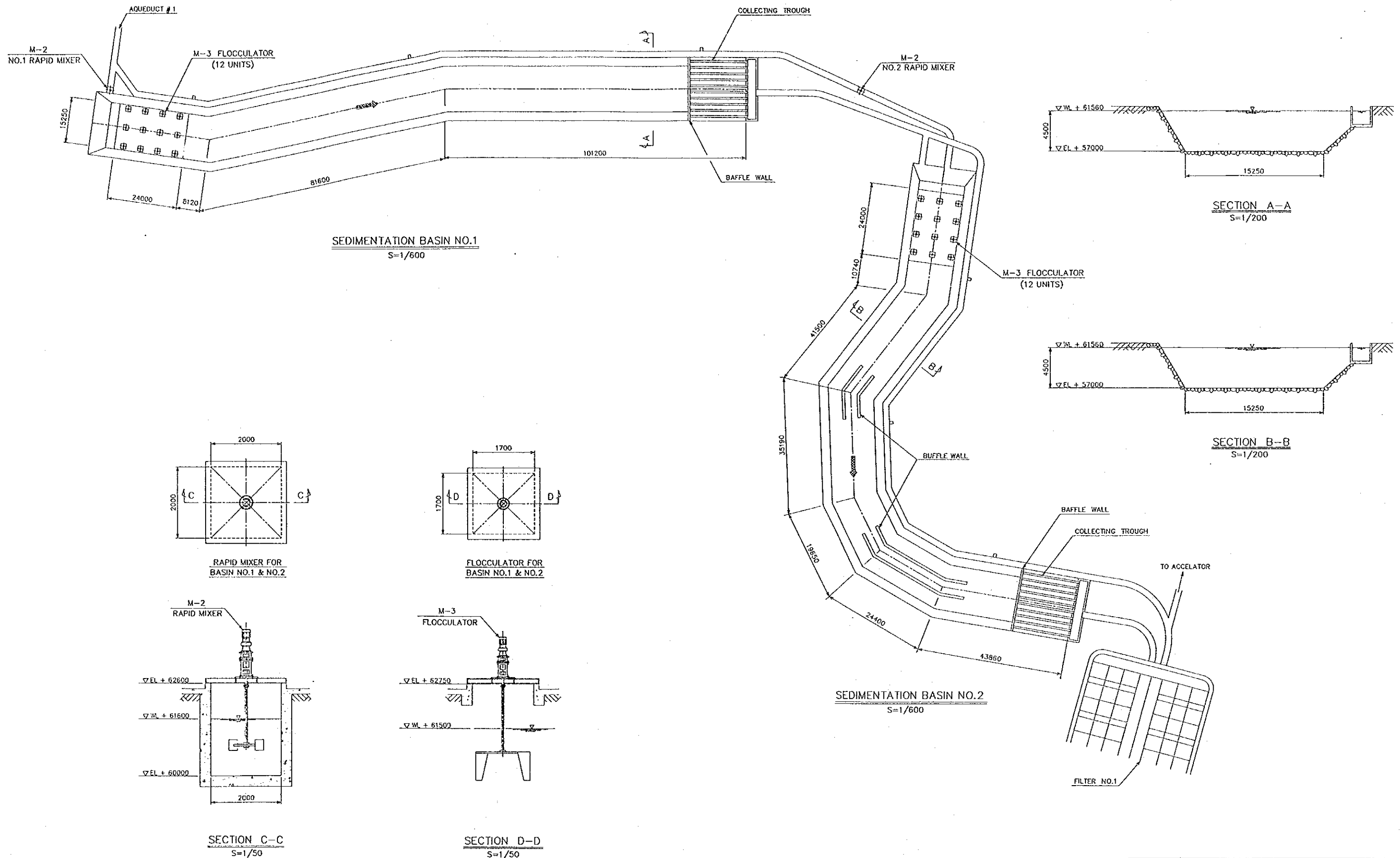
DETAIL OF GATE
GATE NO.1 TO NO.4
S=1/50

REMARKS:
1) S.R MEANS THE "SCOPE OF REHABILITATION ITEM."

REHABILITATION ITEM		
EQUIP. NO.	EQUIPMENT NAME	Q'TY
	PLANT NO.1	
M-1	AQUEDUCT GATE	4 units

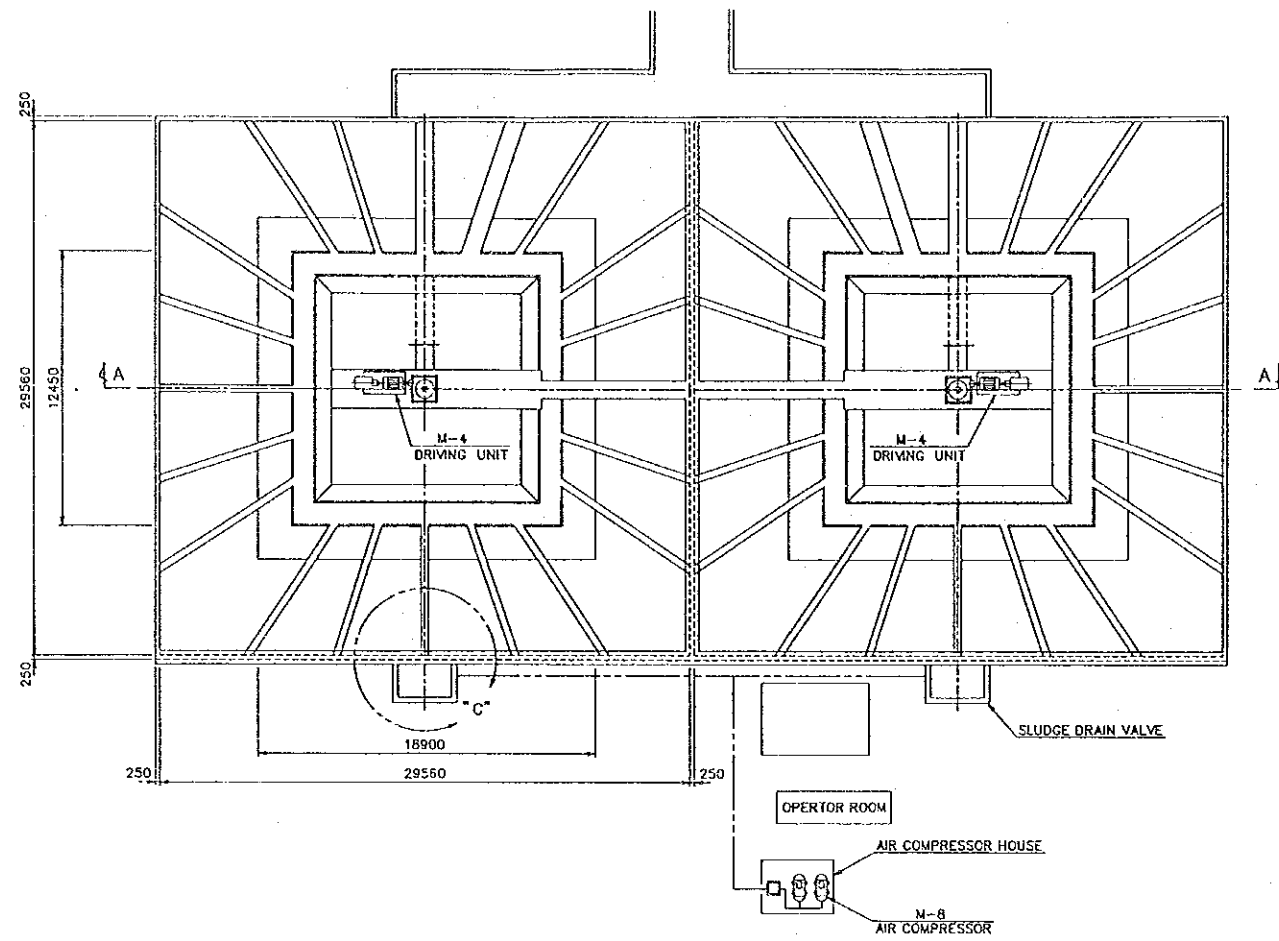
TITLE	OWG. NO.
PLANT NO.1 AQUEDUCT GATE	M-6
湧水渠流入ゲート	

THE PROJECT FOR THE REHABILITATION
OF THE BALARA WATER TREATMENT PLANT

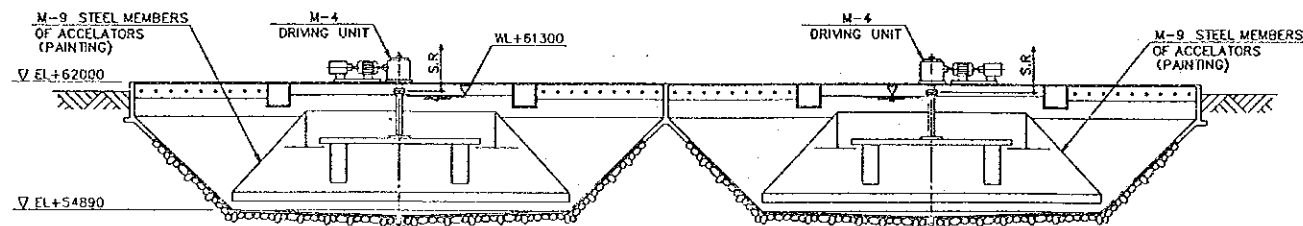


REHABILITATION ITEM		
EQUIP NO.	EQUIPMENT NAME	Q'TY
	PLANT NO.1	1
M-2	RAPID MIXER	2 units
M-3	FLOCCULATOR	24 units

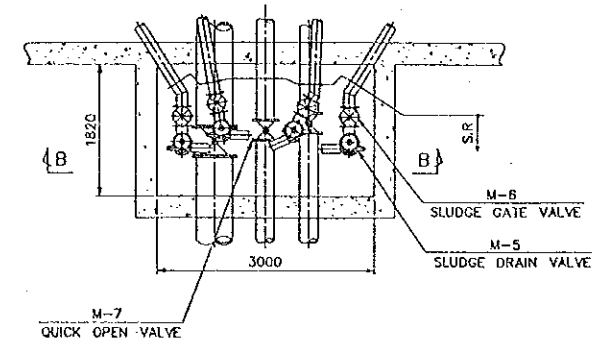
TITLE	DWG. NO.
PLANT NO.1 FLOCCULATION & SEDIMENTATION FACILITIES フロック形成池・沈澱池	M-7
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



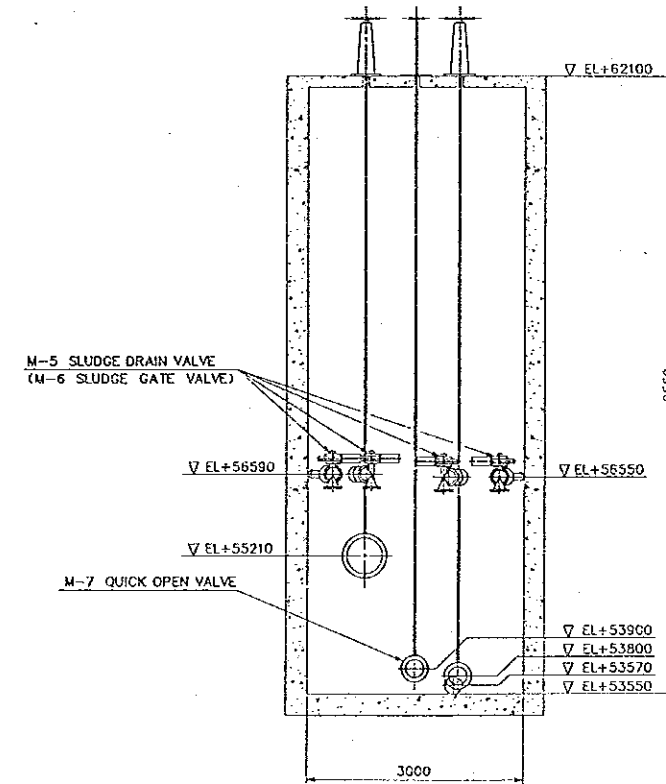
ACCELERATORS PLAN
S=1/200



SECTION A-A
S=1/200



DETAIL OF "C"
SLUDGE DRAIN VALVE
S=1/50

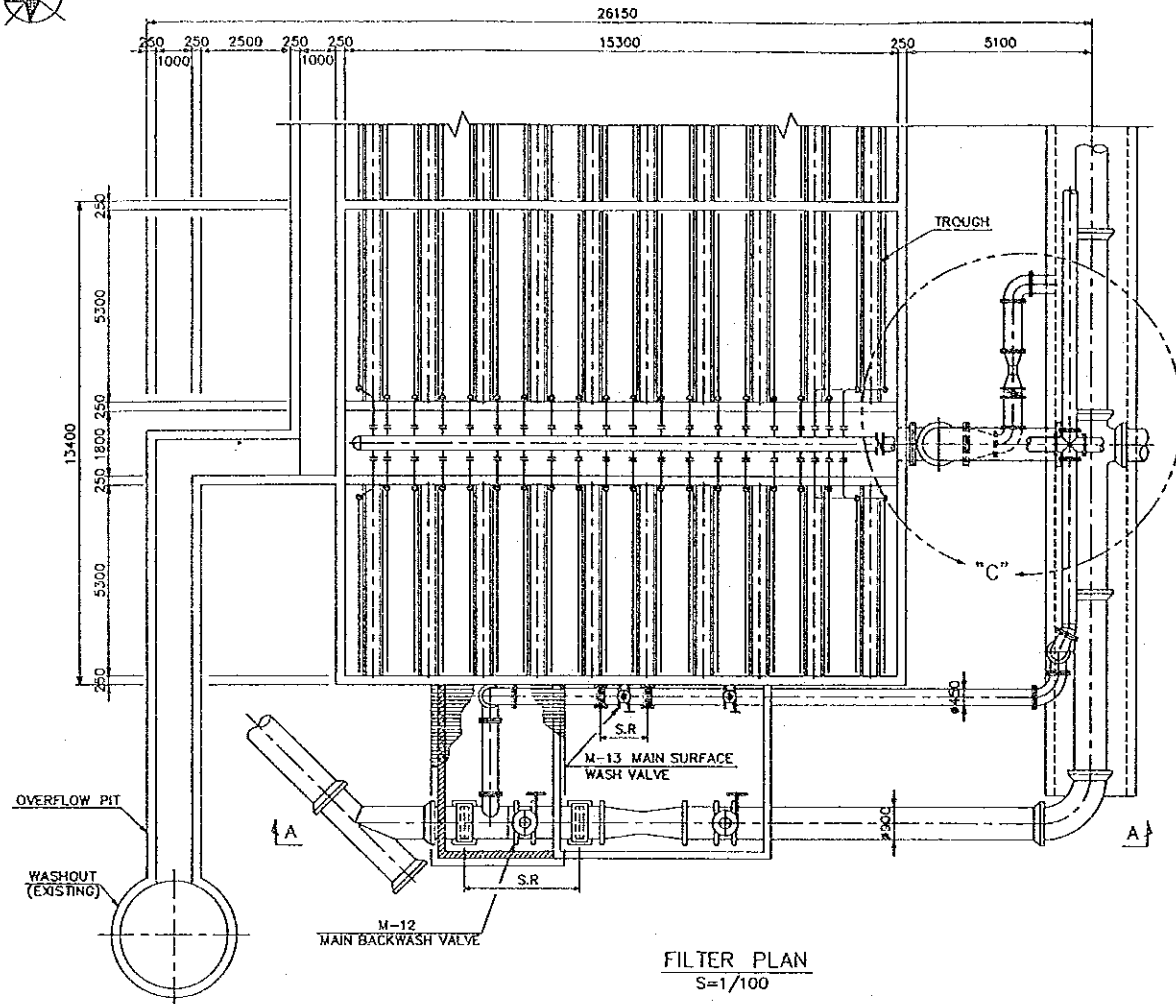


SECTION B-B
S=1/50

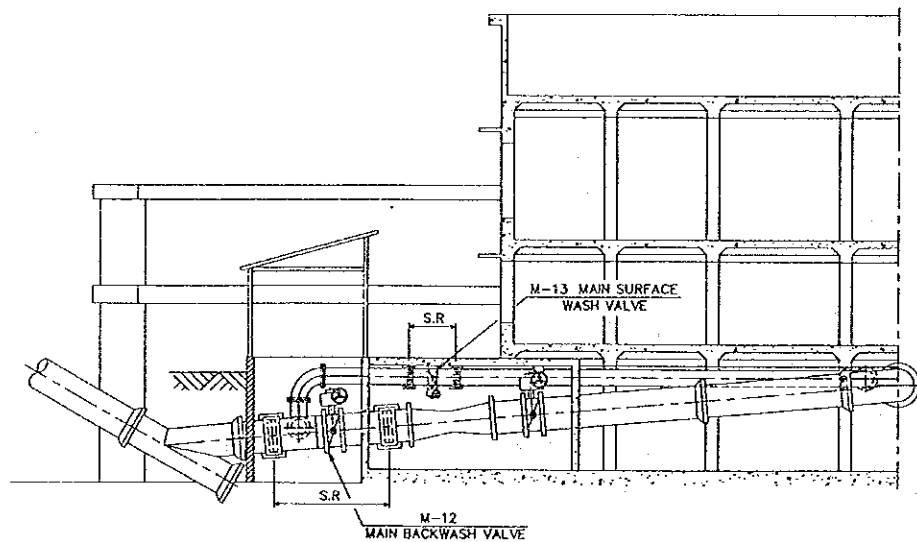
REHABILITATION ITEM		
EQUIP. NO.	EQUIPMENT NAME	Q'TY
PLANT NO.1		
M-4	DRIVING UNIT OF ACCELERATORS	2 units
M-5	SLUDGE DRAIN VALVE	8 units
M-6	SLUDGE GATE VALVE	8 units
M-7	QUICK OPEN VALVE	2 units
M-8	AIR COMPRESSOR	2 units
M-9	STEEL MEMBERS OF ACCELERATORS	2 sets

REMARKS:
1) S.R MEANS THE "SCOPE OF REHABILITATION ITEM."

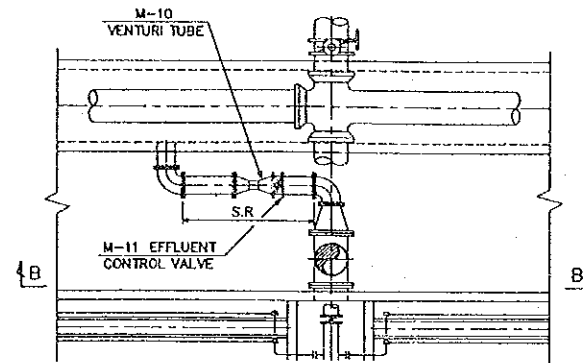
TITLE	DWG. NO.
PLANT NO.1 ACCELERATORS	M-8
アクセレーター	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



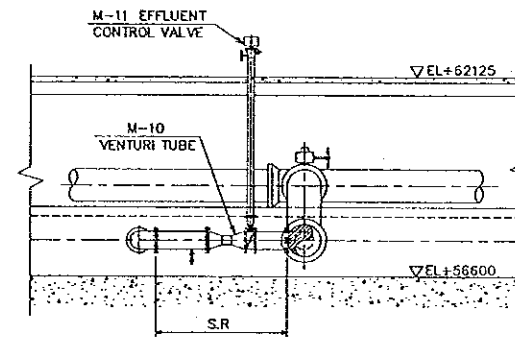
FILTER PLAN
S=1/100



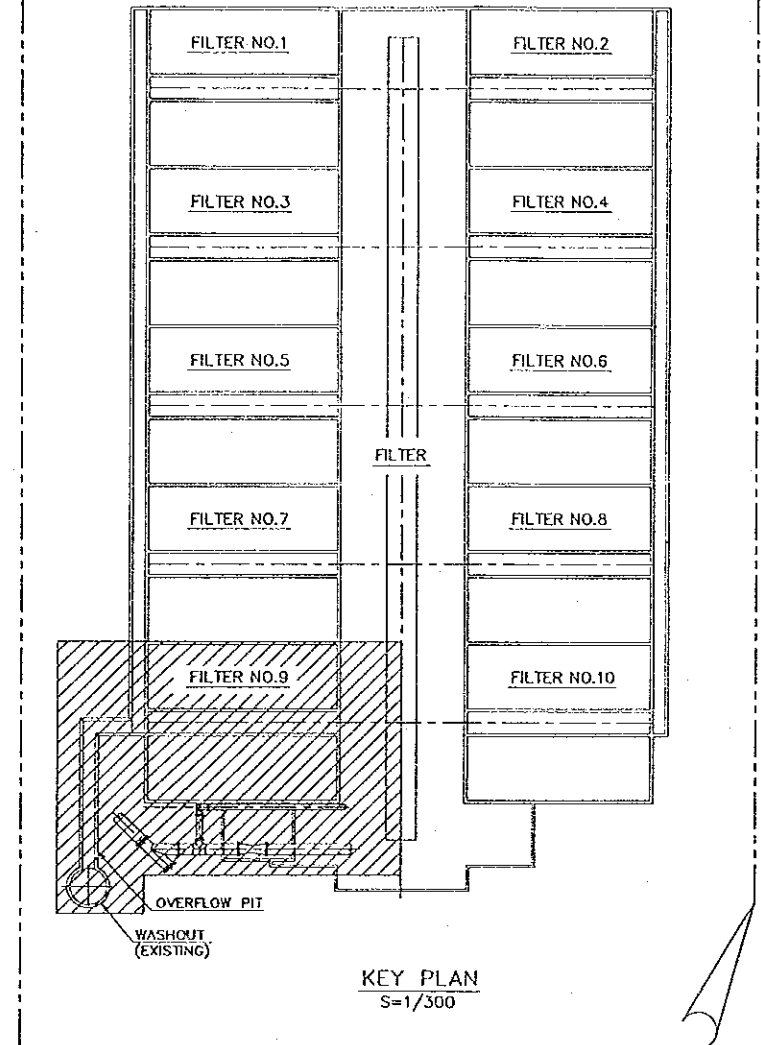
SECTION A-A
S=1/100



EFFLUENT CONTROL VALVE
DETAIL OF "C"
S=1/100



SECTION B-B
S=1/100



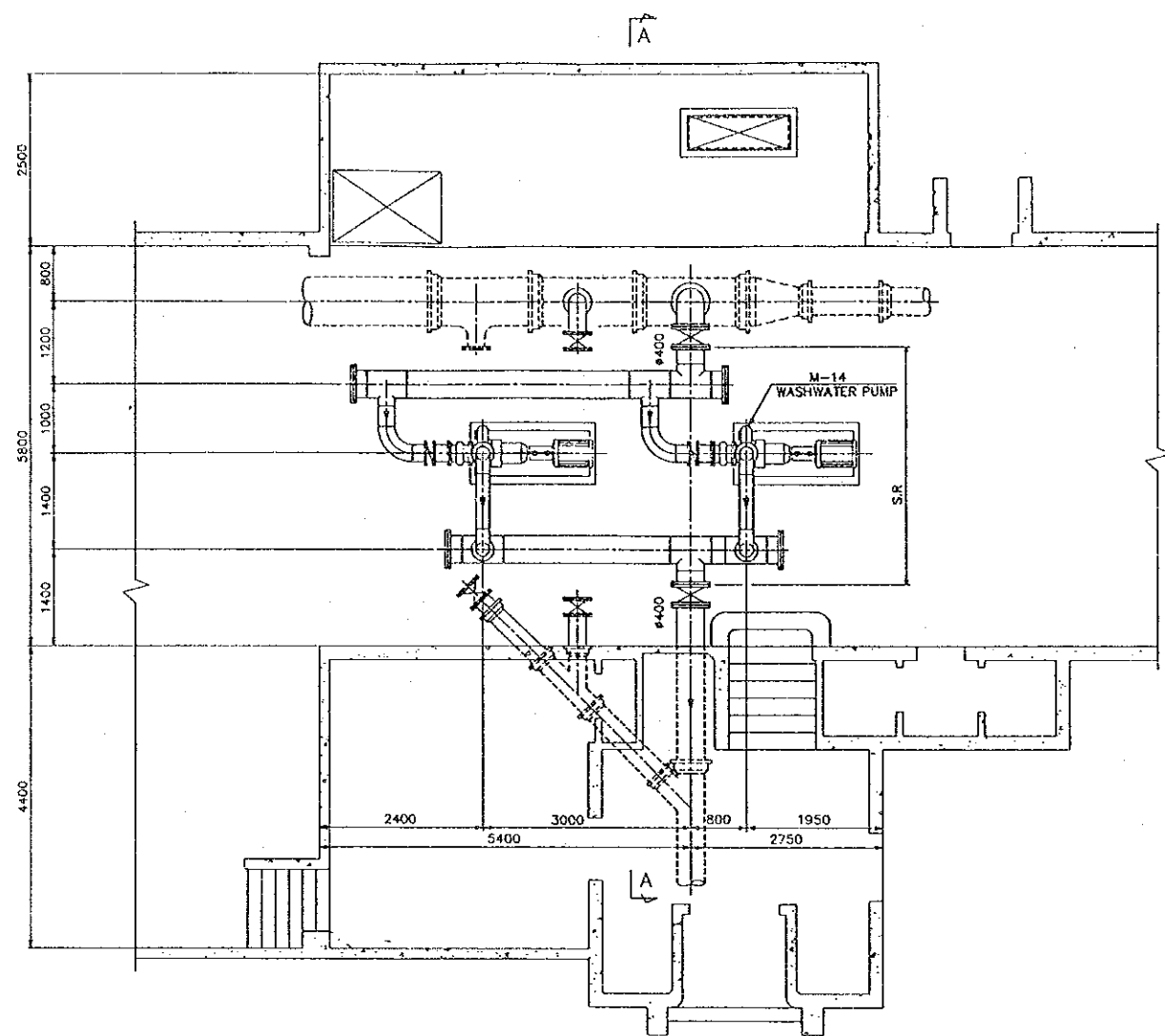
KEY PLAN
S=1/300

REMARKS :

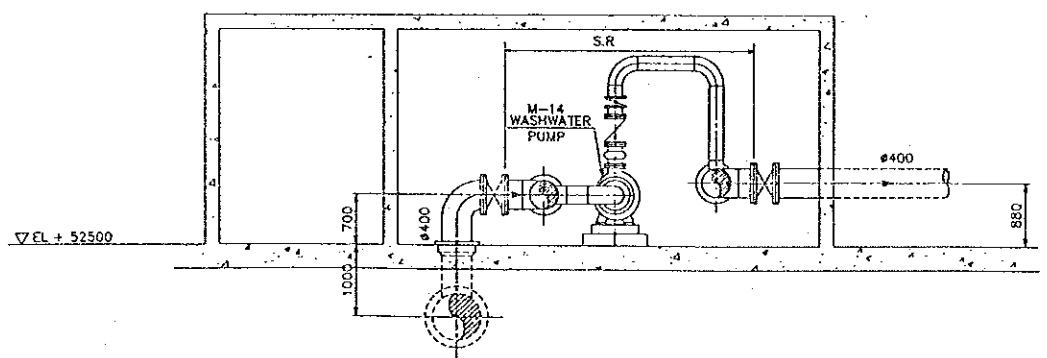
1) S.R. MEANS THE " SCOPE OF REHABILITATION ITEM. "

REHABILITATION ITEM		
EQUIP NO.	EQUIPMENT NAME	Q'TY
	PLANT NO.1	
M-10	VENTURI TUBE	10 units
M-11	EFFLUENT CONTROL VALVE	10 units
M-12	MAIN BACKWASH VALVE	1 unit
M-13	MAIN SURFACE WASH VALVE	1 unit

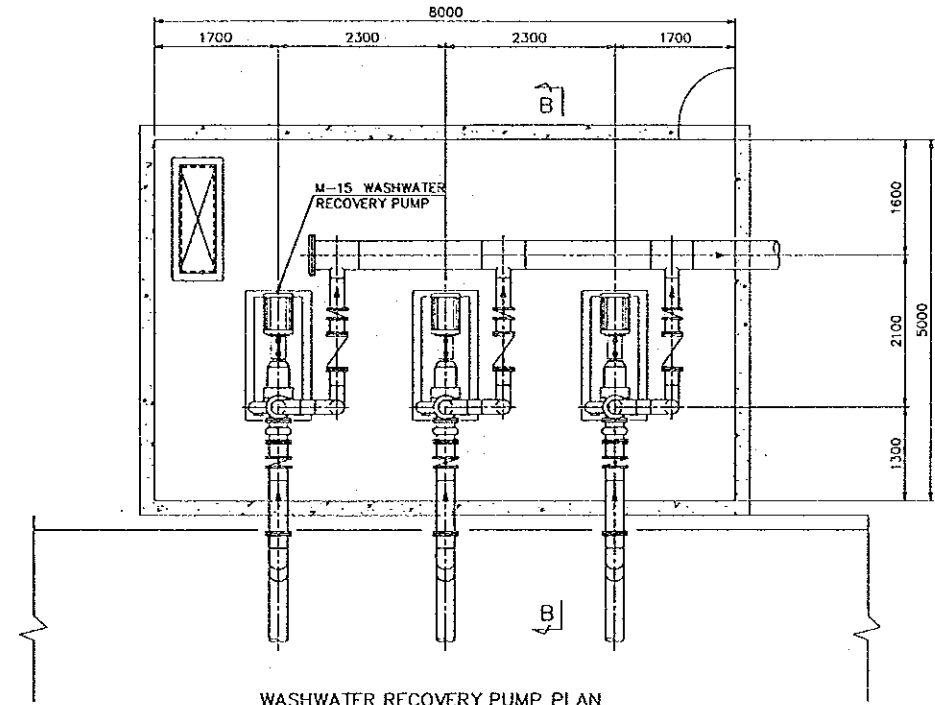
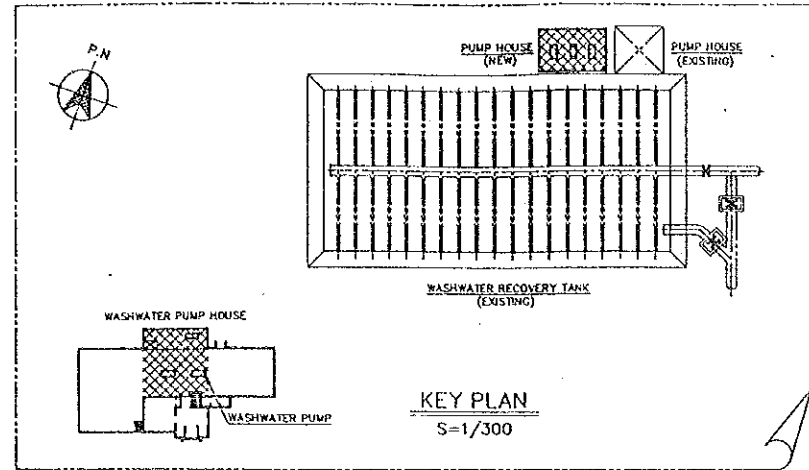
TITLE	DWG. NO.
PLANT NO.1 FILTRATION FACILITIES	M-9
ろ過池	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



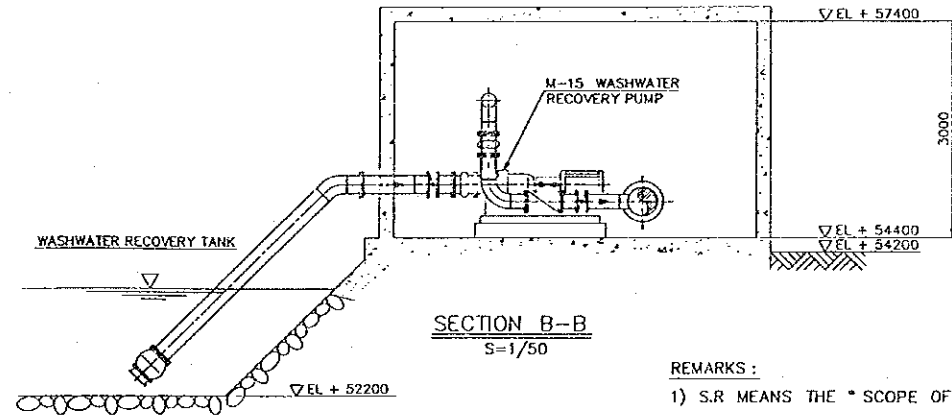
WASHWATER PUMP PLAN
S=1/50



SECTION A-A
S=1/50



WASHWATER RECOVERY PUMP PLAN
S=1/50

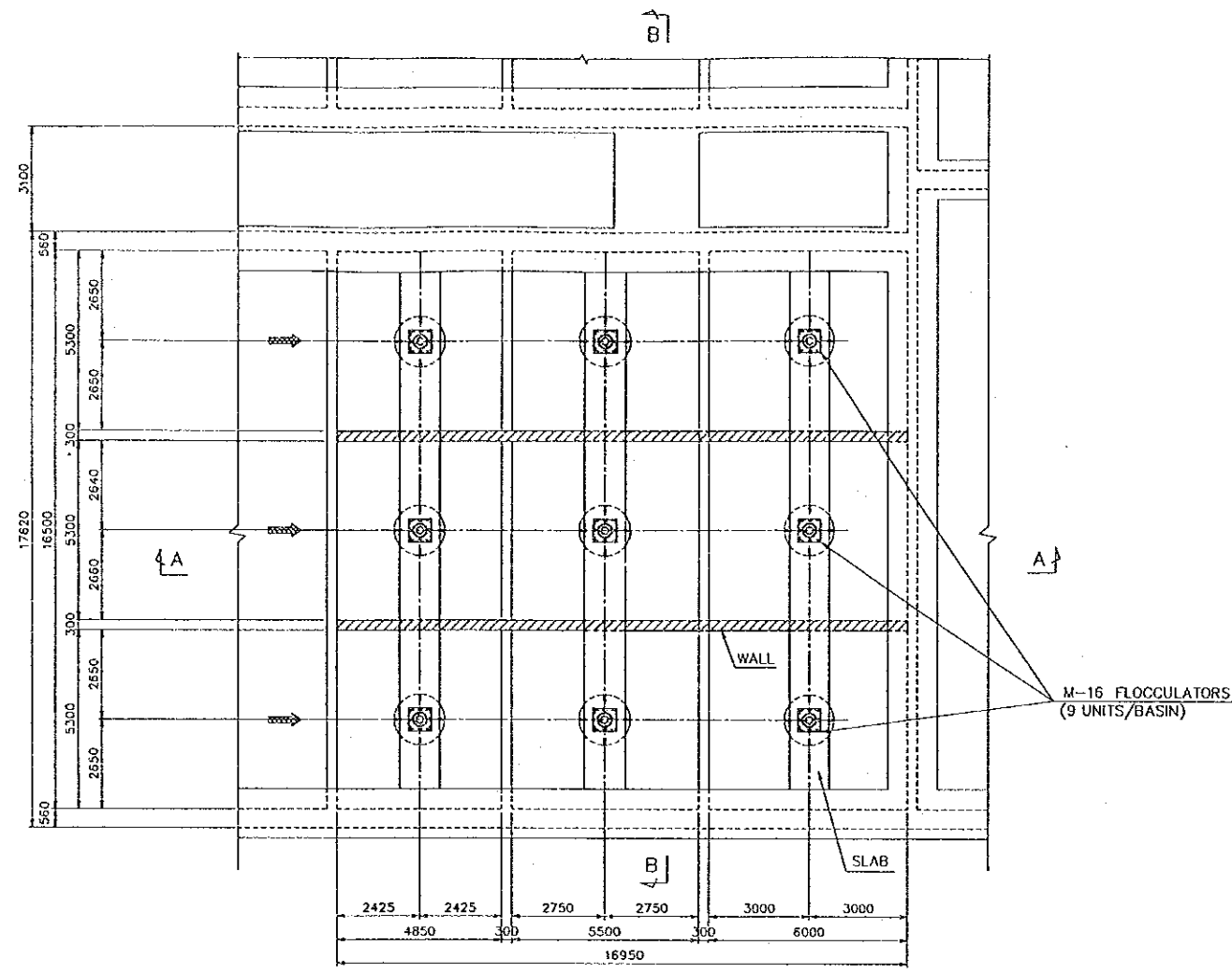
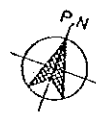


SECTION B-B
S=1/50

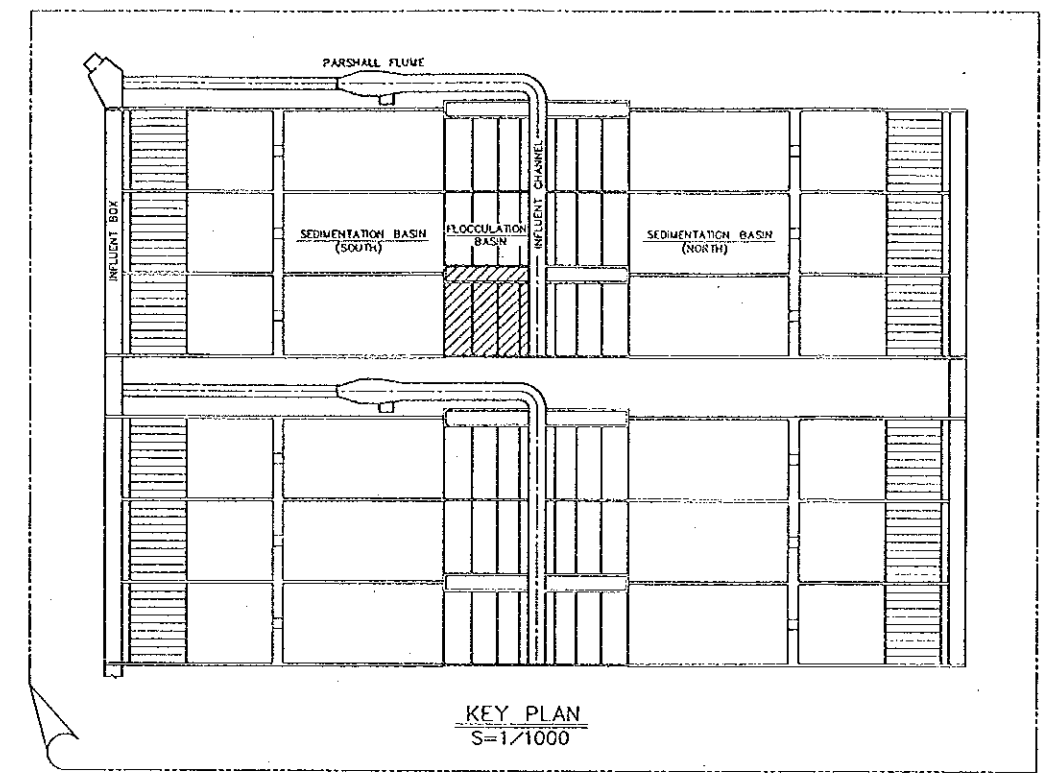
REMARKS:
1) S.R. MEANS THE "SCOPE OF REHABILITATION ITEM."

REHABILITATION ITEM		
EQUIP. NO.	EQUIPMENT NAME	Q'TY
	PLANT NO.1	
M-14	WASHWATER PUMP	2 units
M-15	WASHWATER RECOVERY PUMP	3 units

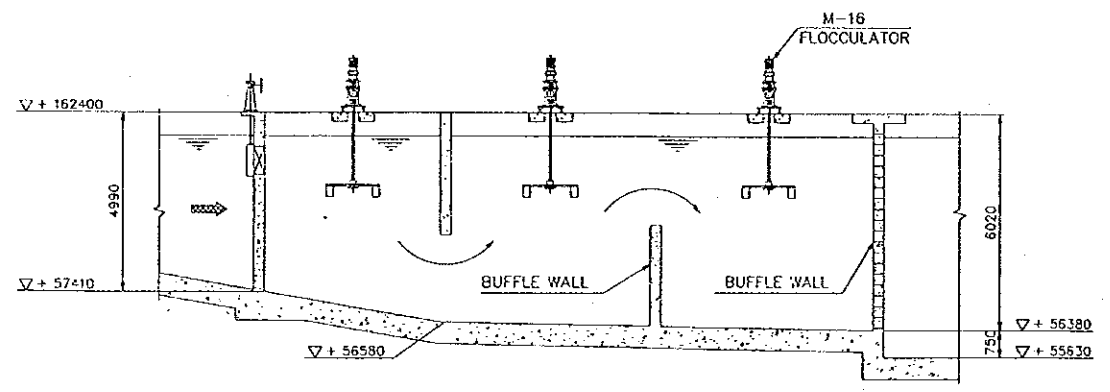
TITLE		DWG. NO.
PLANT NO.1 WASHWATER & WASHWATER RECOVERY PUMP		M-10
洗浄水ポンプ・洗浄排水回収ポンプ		
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT		



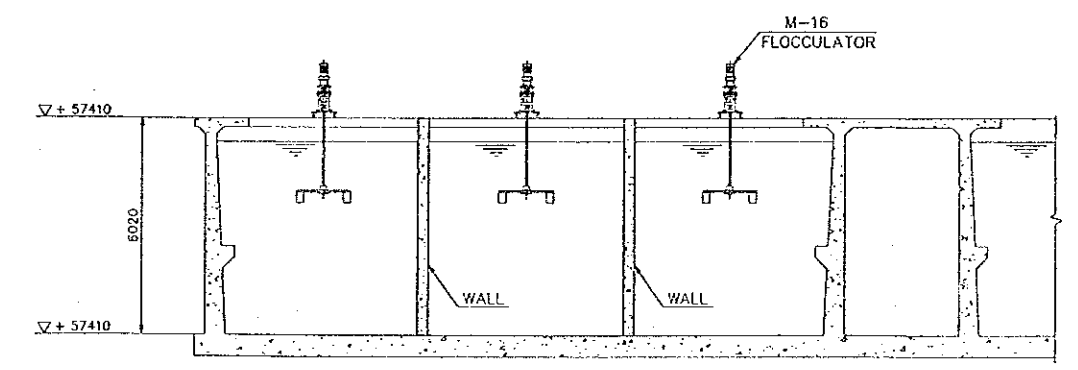
FLOCCULATION BASIN PLAN
S=1/100



KEY PLAN
S=1/1000



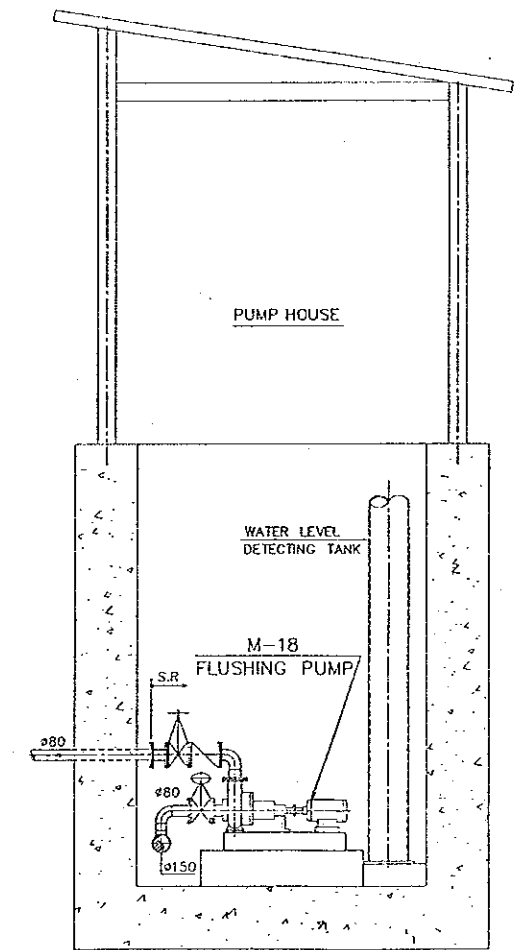
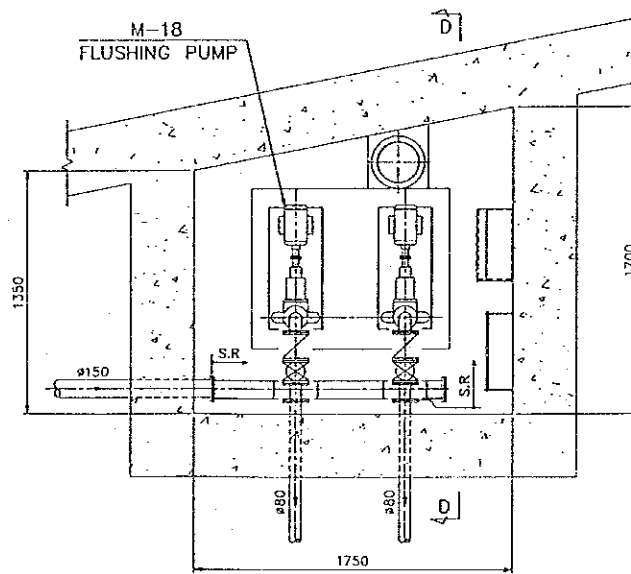
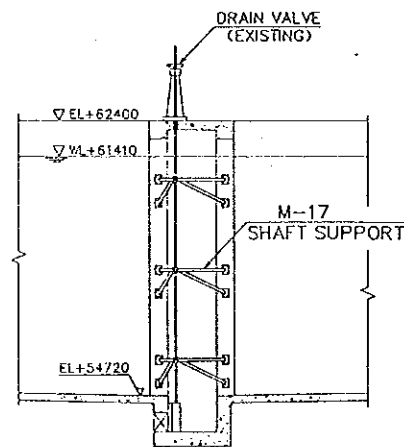
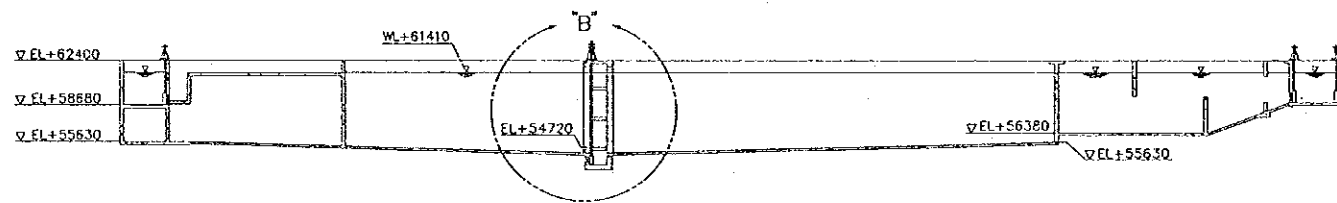
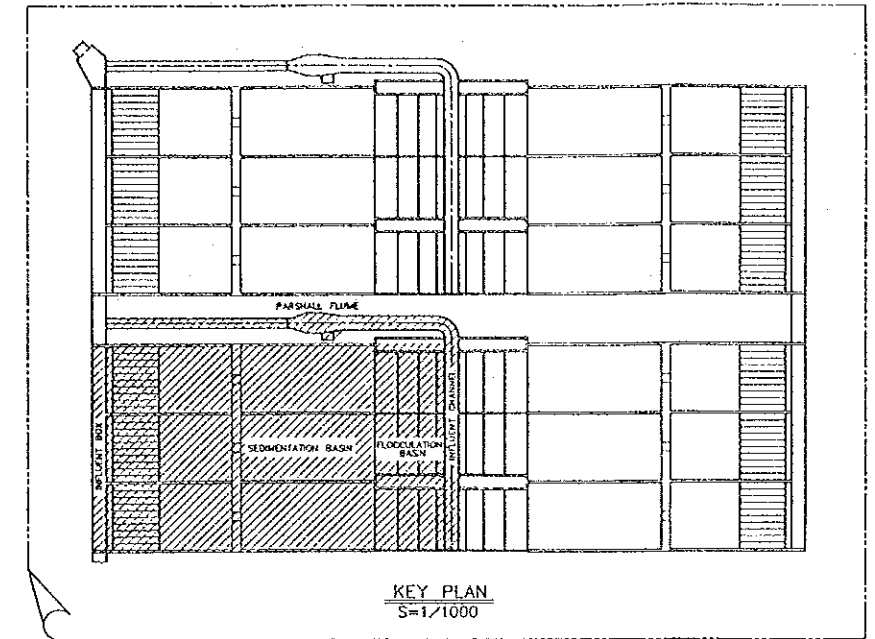
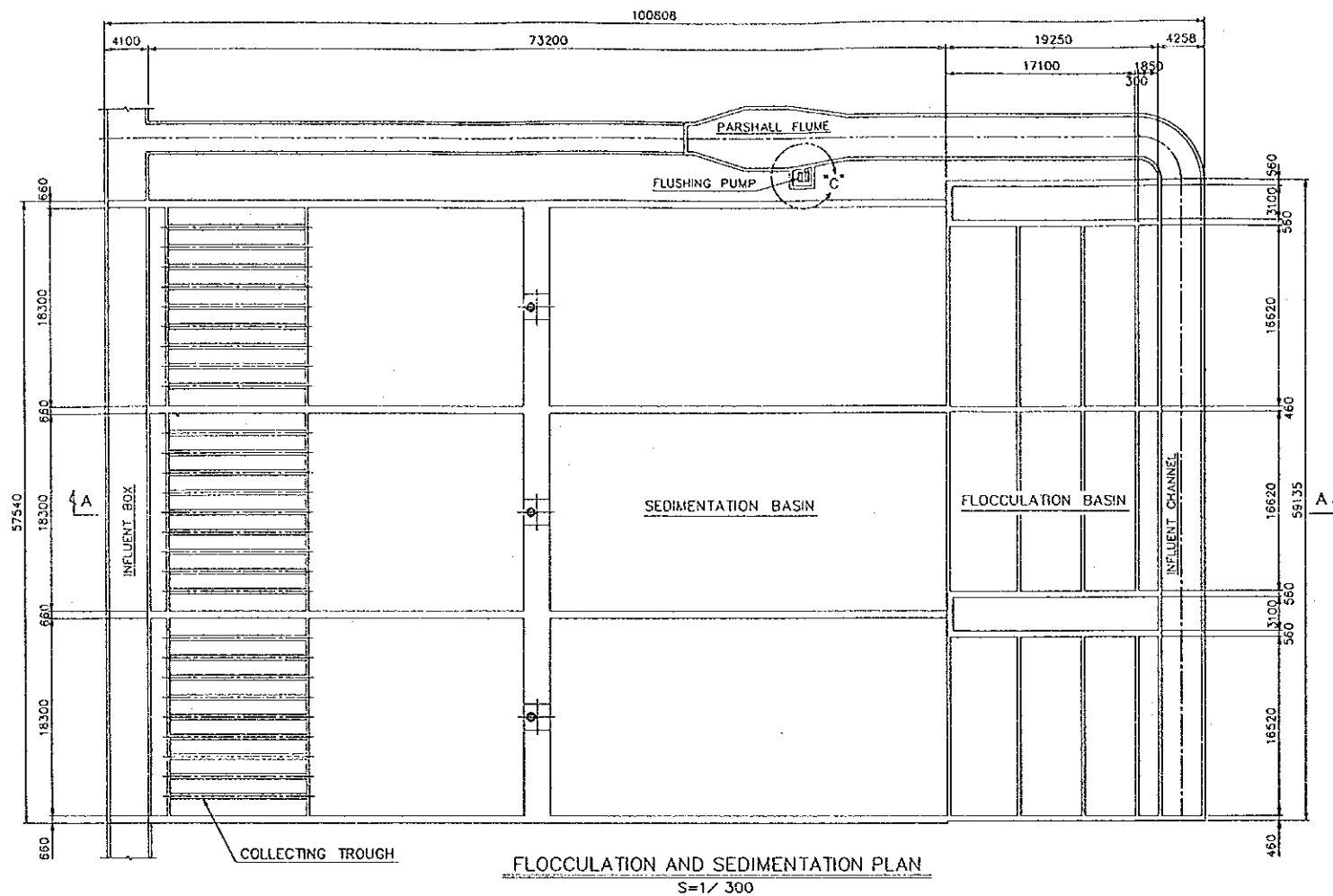
SECTION A-A
S=1/100



SECTION B-B
S=1/100

REHABILITATION ITEM		
EQUIP. NO.	EQUIPMENT NAME	Q'TY
	PLANT NO.2	
M-16	FLOCCULATOR	108 units

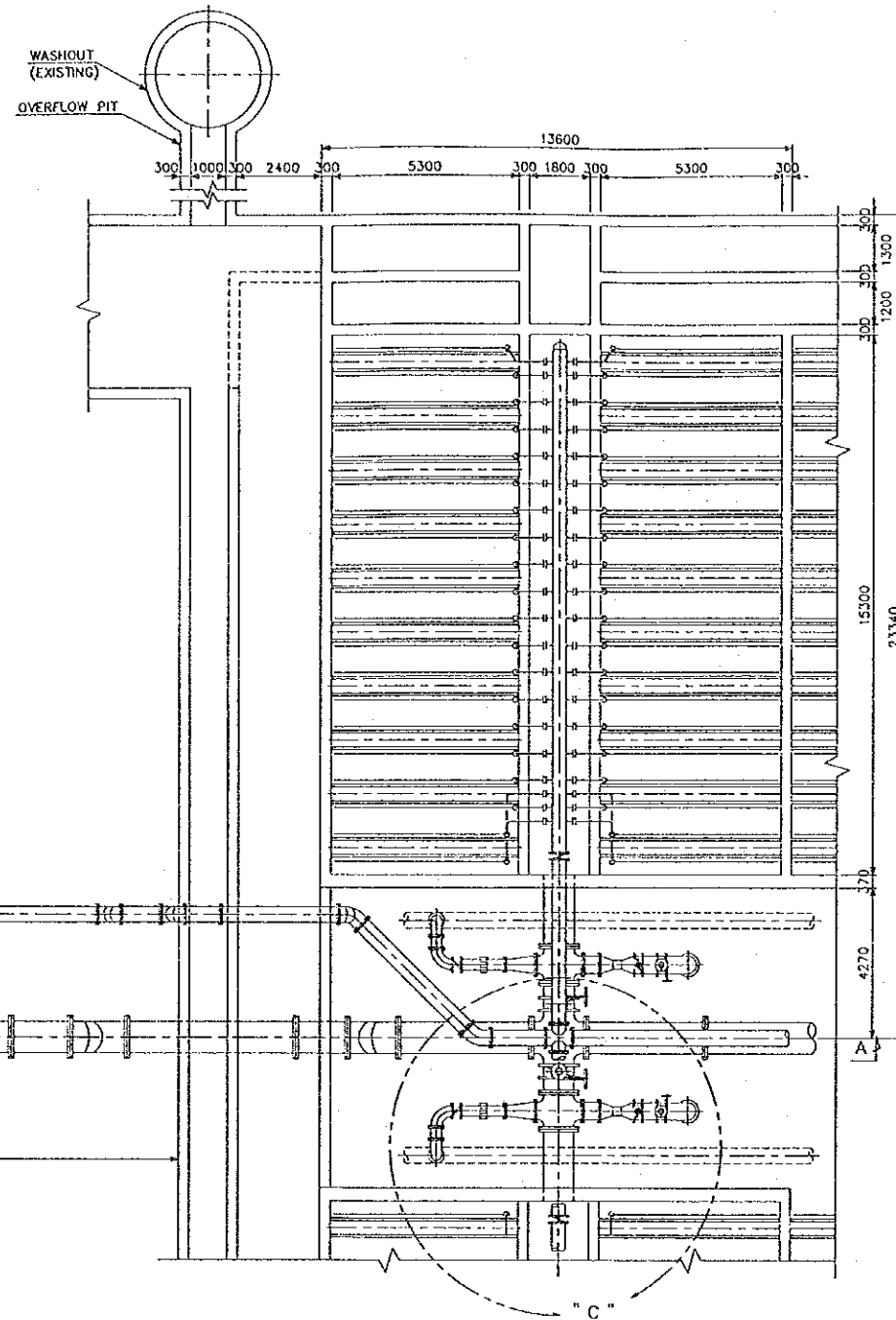
TITLE	DWG. NO.
PLANT NO.2 FLOCCULATION FACILITIES フロック形成池	M-11
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



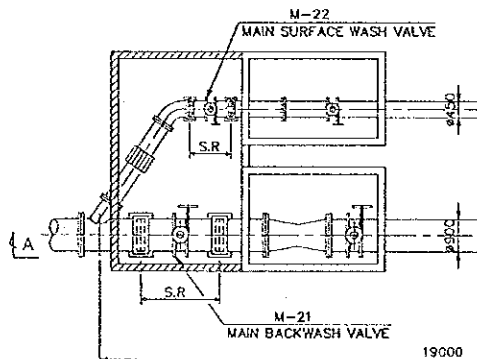
REMARKS:
1) S.R. MEANS THE "SCOPE OF REHABILITATION ITEM."

REHABILITATION ITEM		
EQUIP. NO.	EQUIPMENT NAME	Q'TY
	PLANT NO.2	
M-17	SHAFT SUPPORT OF DRAIN VALVE	12 units
M-18	FLUSHING PUMP	2 units

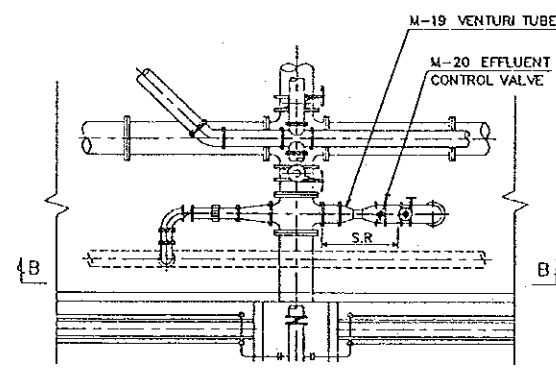
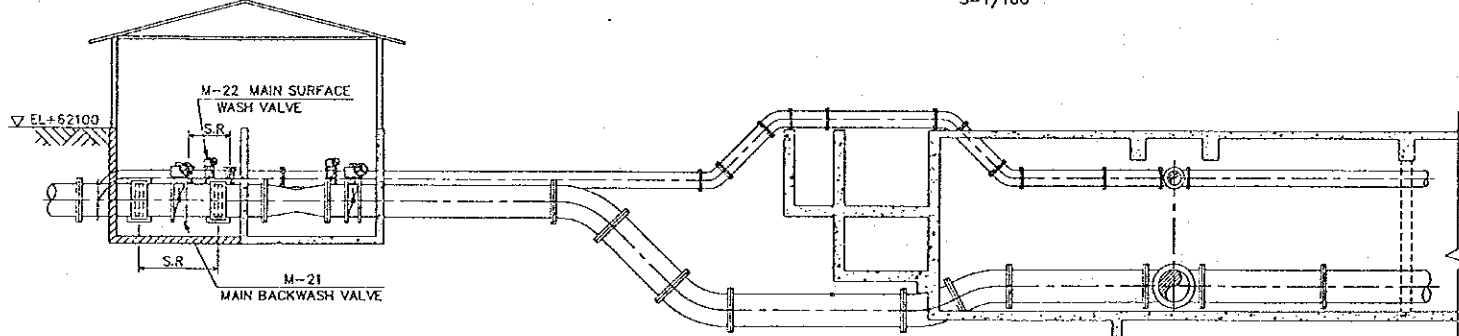
TITLE	DWG. NO.
PLANT NO.2 SEDIMENTATION FACILITIES	M-12
沈澱池	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



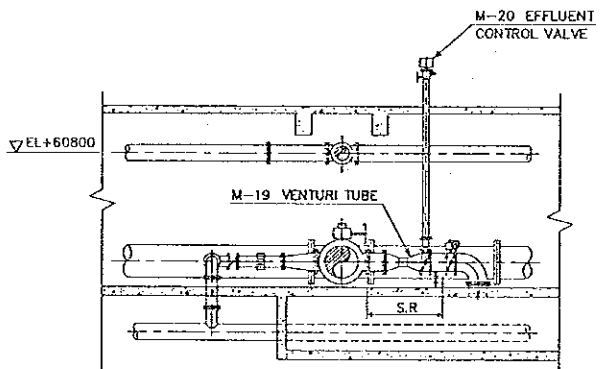
FILTER PLAN
S=1/100



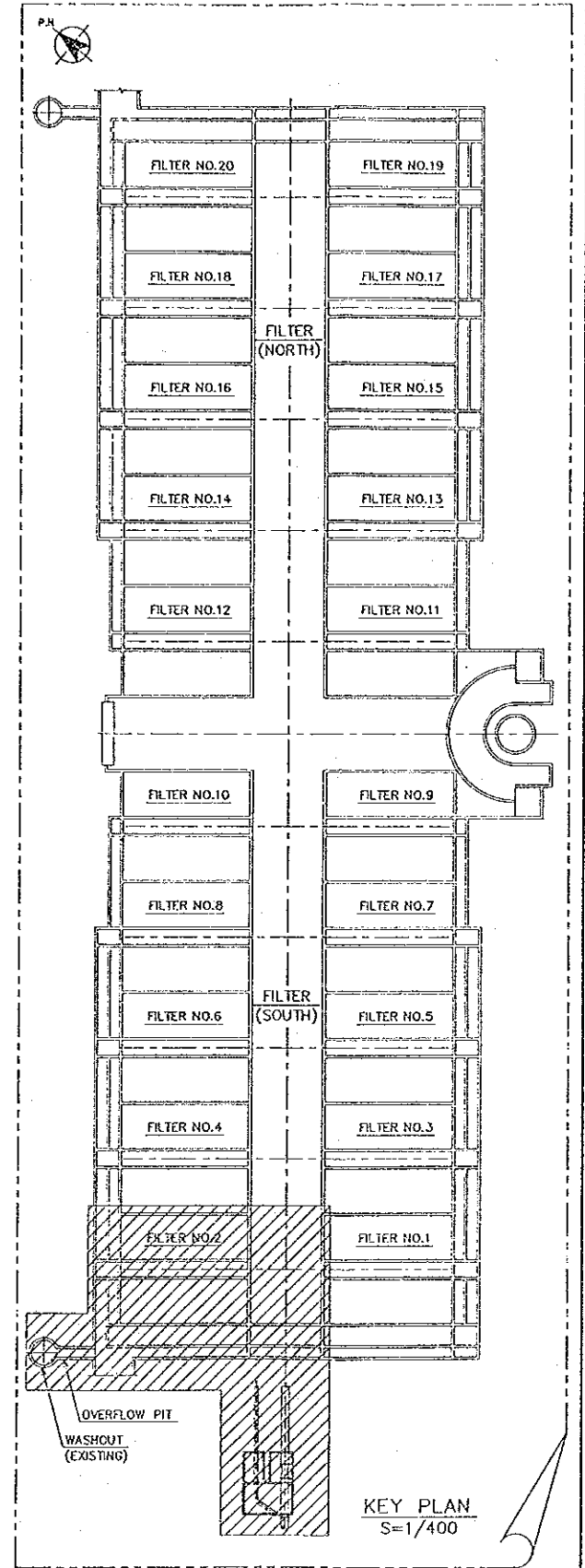
SECTION A-A
S=1/100



EFFLUENT CONTROL VALVE
DETAIL OF "C"
S=1/100



SECTION B-B
S=1/100

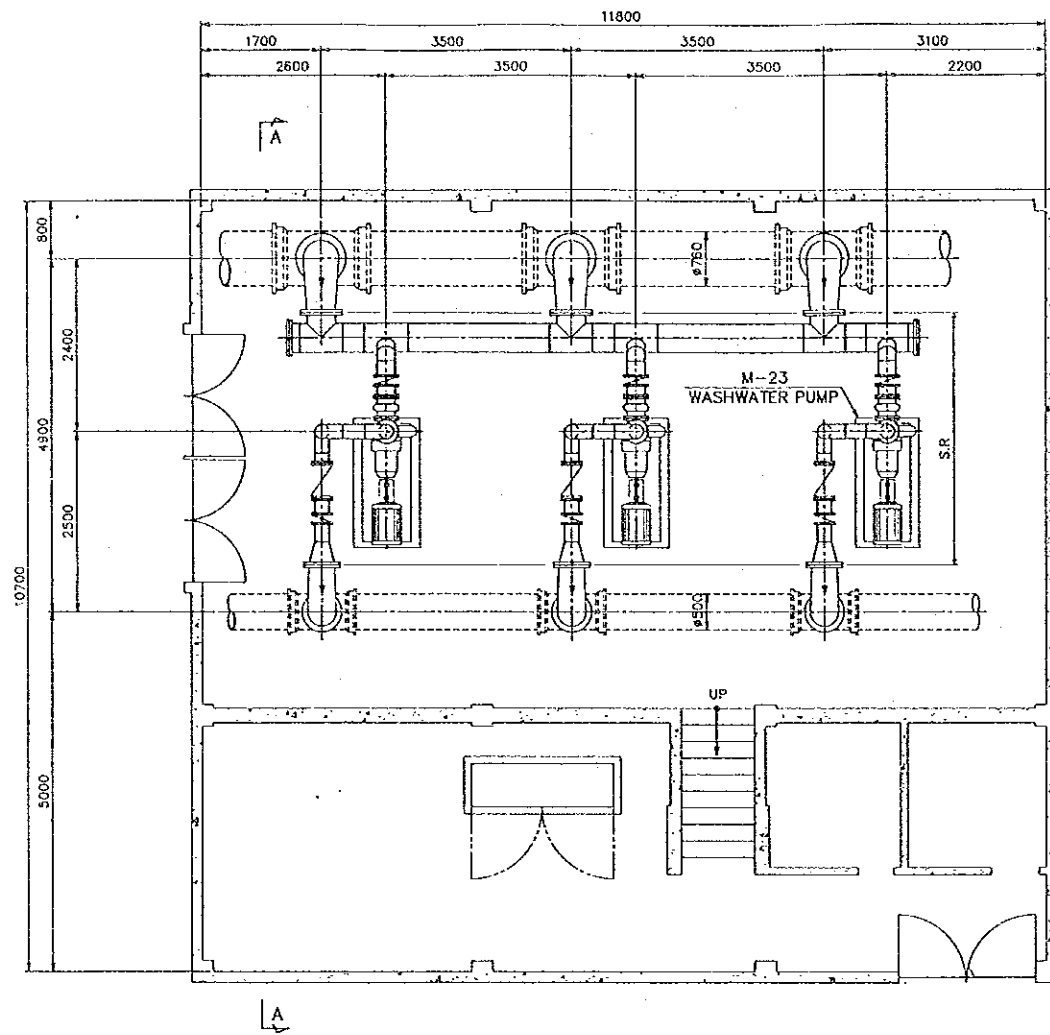


KEY PLAN
S=1/400

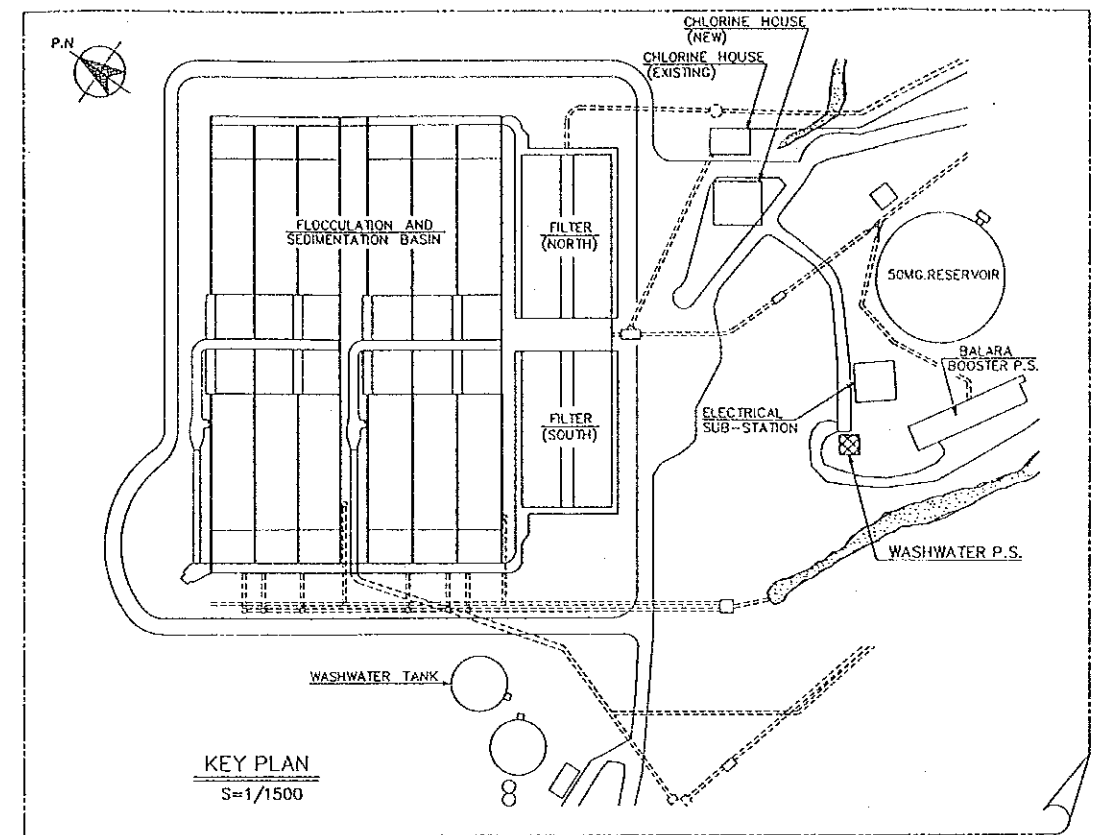
REMARKS:
1) S.R. MEANS THE "SCOPE OF REHABILITATION" P.M.

REHABILITATION ITEM		
EQUIP. NO.	EQUIPMENT NAME	Q'TY
	PLANT NO. 2	
M-19	VENTURI TUBE	20 units
M-20	EFFLUENT CONTROL VALVE	20 units
M-21	MAIN BACKWASH VALVE	1 unit
M-22	MAIN SURFACE WASH VALVE	1 unit

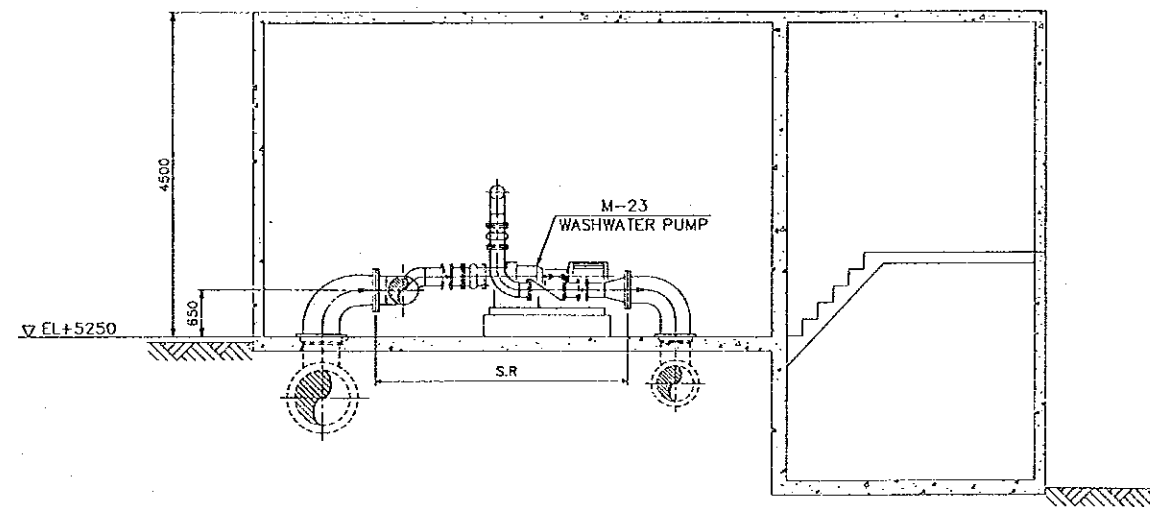
TITLE	DWG. NO.
PLANT NO. 2 FILTRATION FACILITIES ろ過池	M-13
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



WASHWATER PUMP PLAN
S=1/50



KEY PLAN
S=1/1500

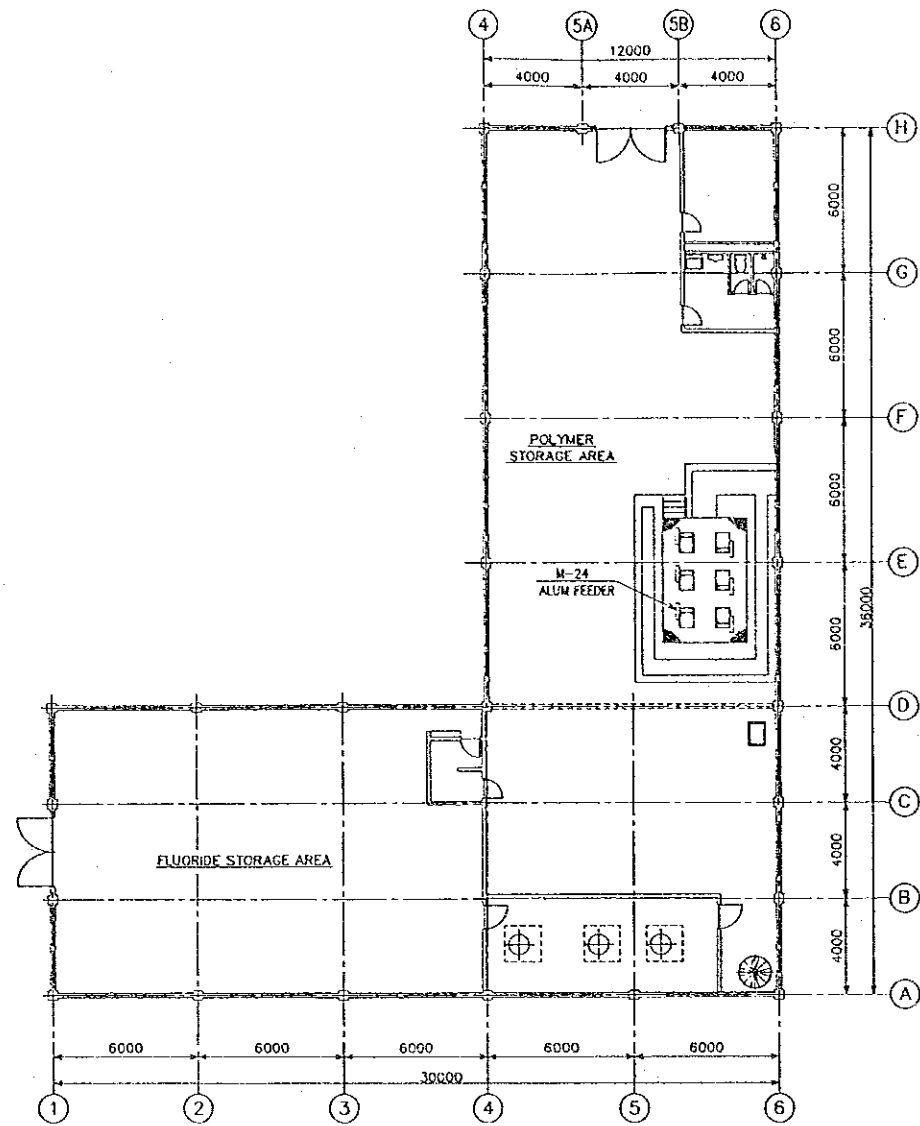


SECTION A-A
S=1/50

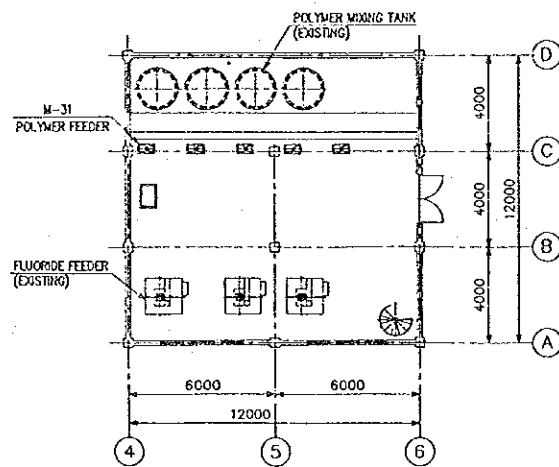
REMARKS:
1) S.R. MEANS THE "SCOPE OF REHABILITATION ITEM."

REHABILITATION ITEM		
EQUIP. NO.	EQUIPMENT NAME	Q'TY
	PLANT NO.2	
M-23	WASHWATER PUMP	3 units

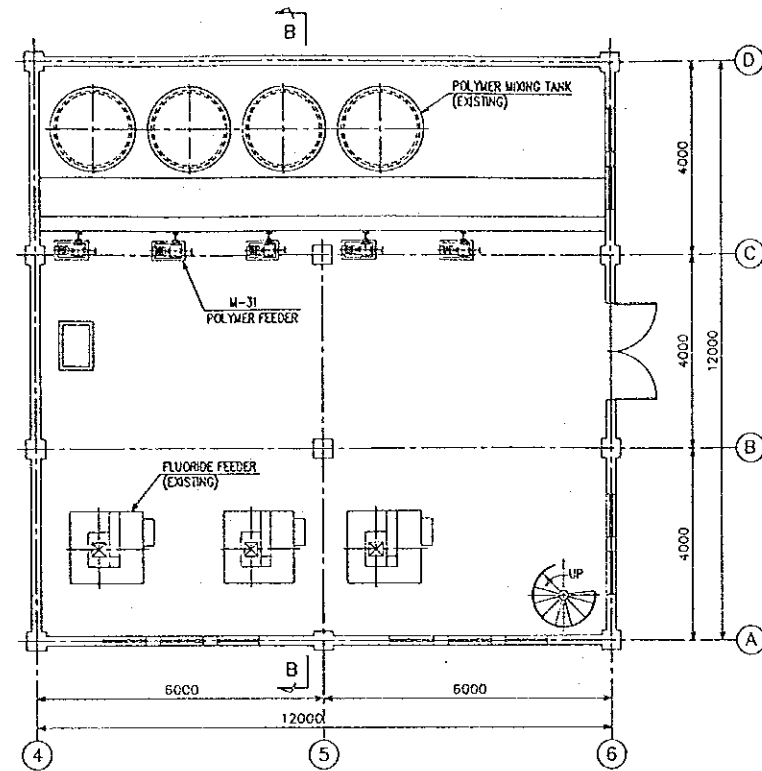
TITLE	DWG. NO.
PLANT NO.2 WASHWATER PUMP 洗浄水ポンプ	M-14
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



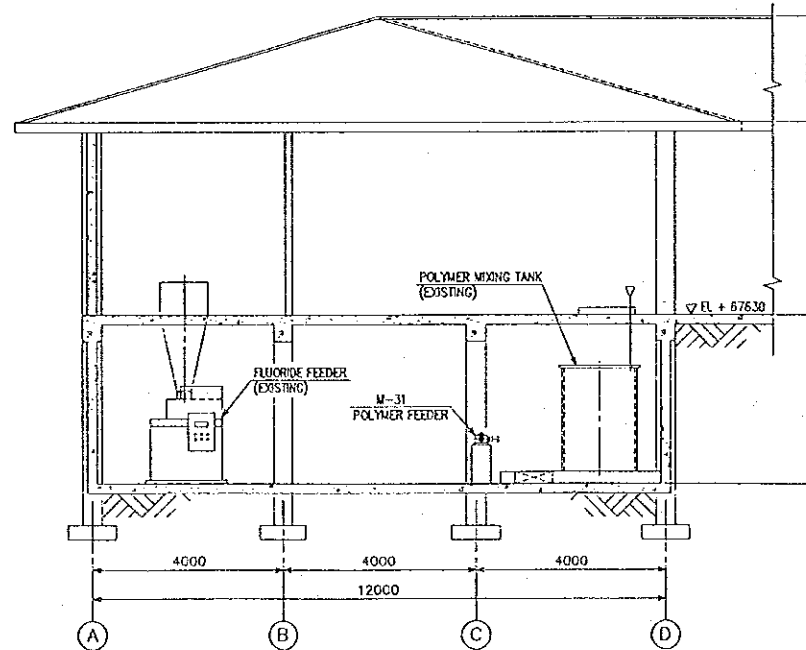
UPPER FLOOR PLAN
S=1/150



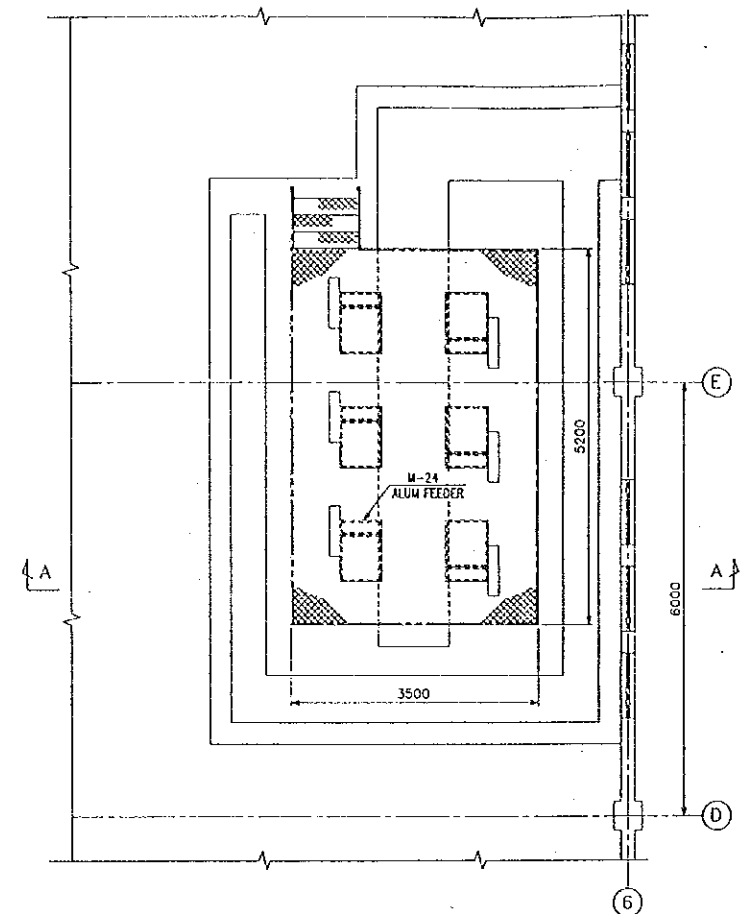
GROUND FLOOR PLAN
S=1/150



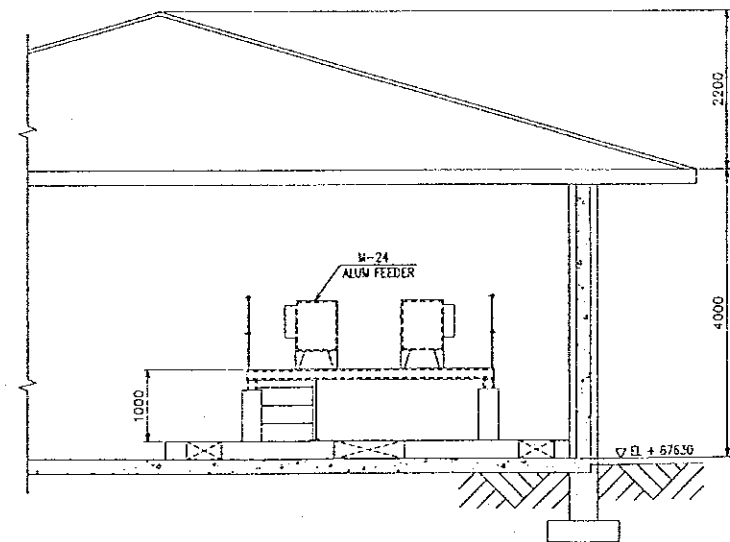
DETAIL OF GROUND FLOOR PLAN
S=1/100



SECTION B-B
S=1/100



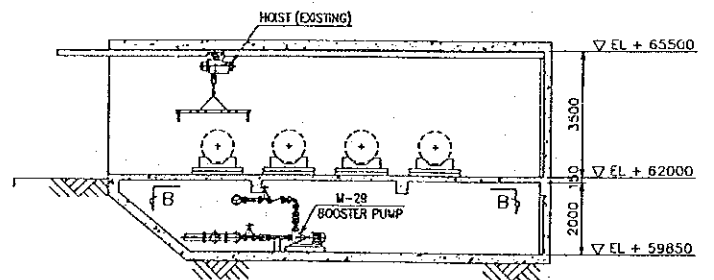
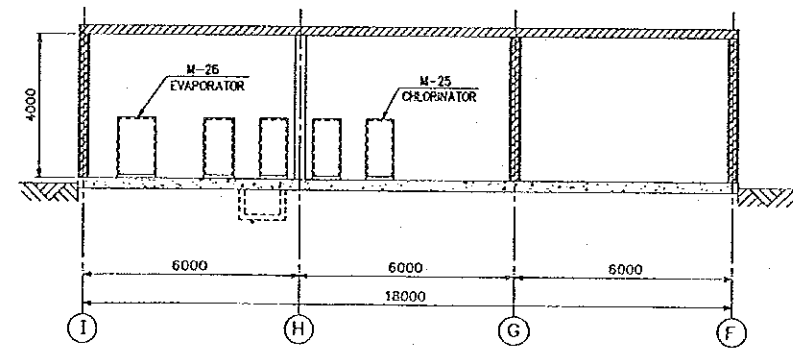
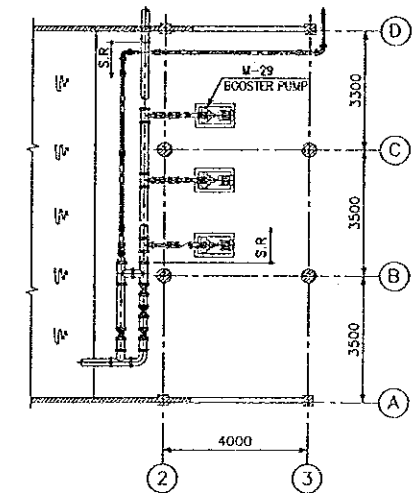
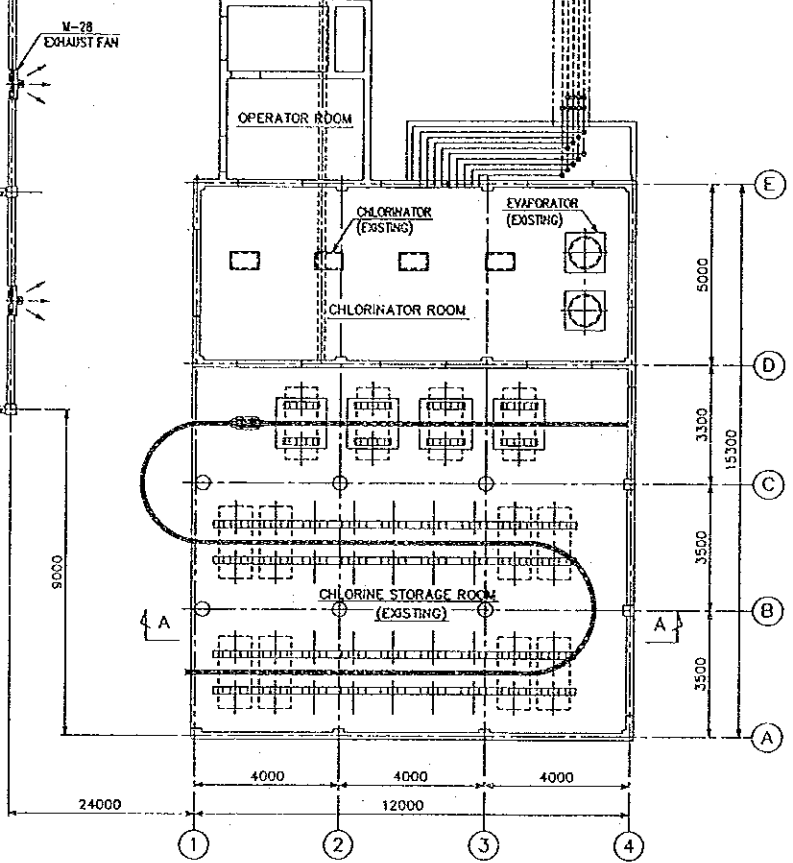
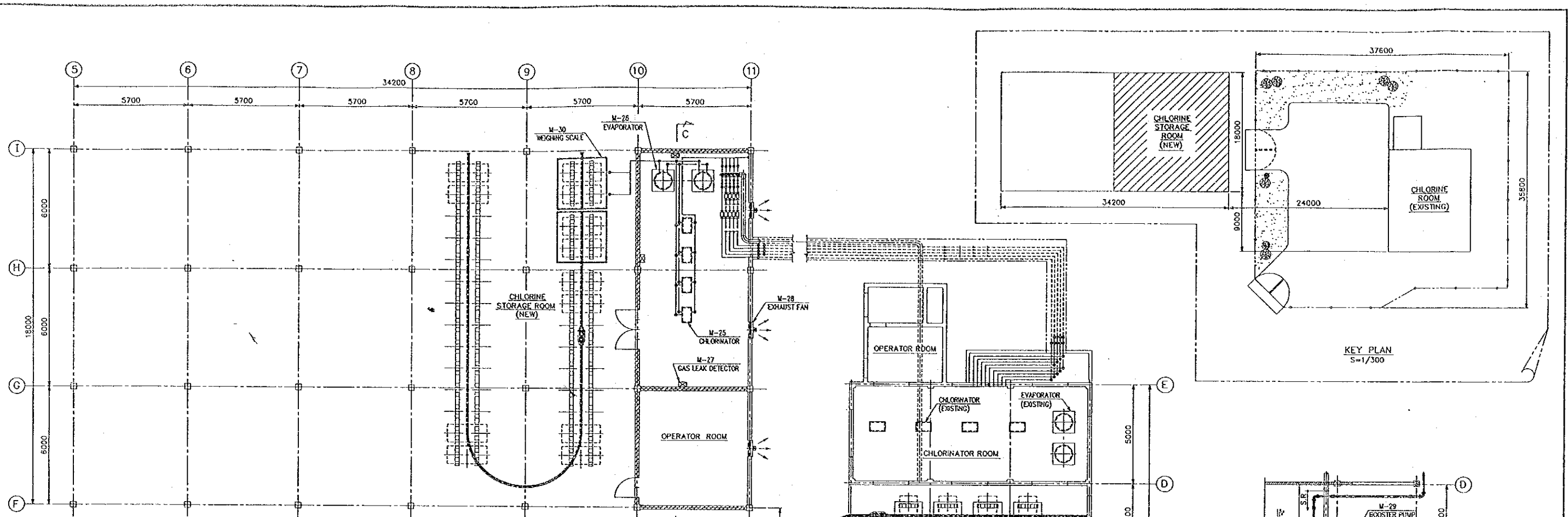
DETAIL OF ALUM FEEDER
S=1/50



SECTION A-A
S=1/50

REHABILITATION ITEM		
EQUIP. NO.	EQUIPMENT NAME	Q'TY
CHEMICALS		
M-24	ALUM FEEDER	6 units
M-31	POLYMER FEEDER	5 units

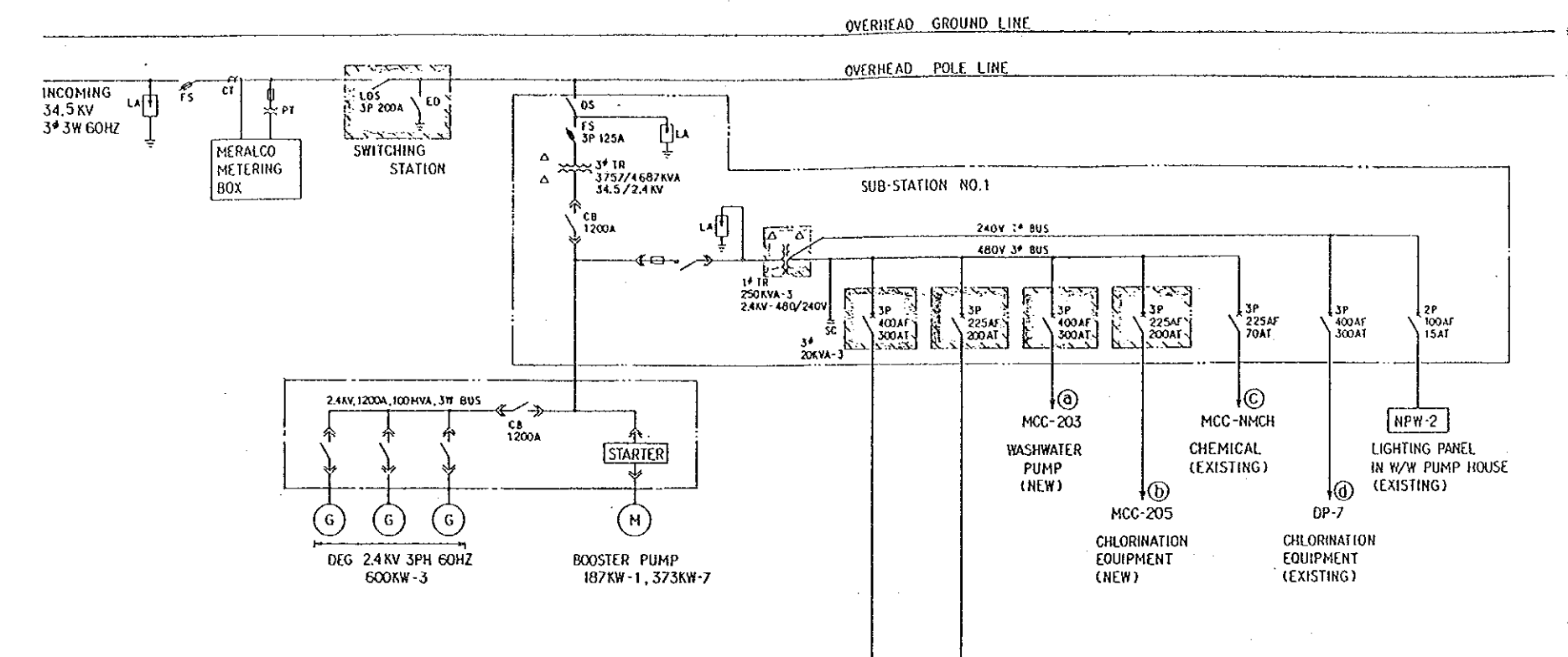
TITLE	OWG. NO.
CHEMICAL FACILITIES (ALUM & POLYMER)	M-15
薬品注入設備 (硫酸バンド、ポリマー)	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



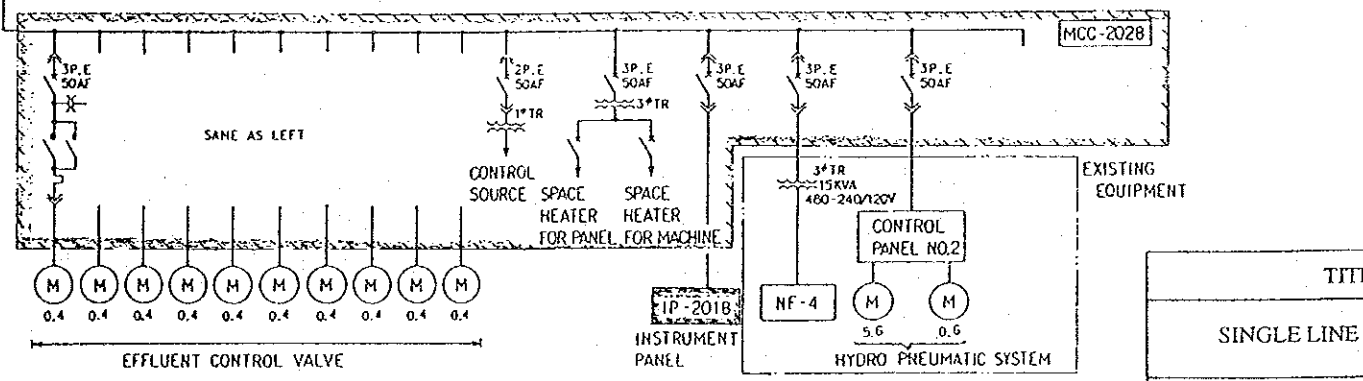
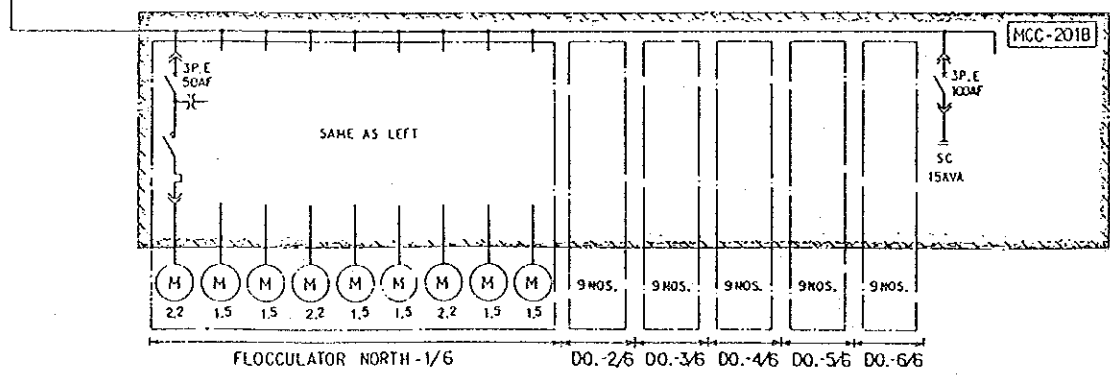
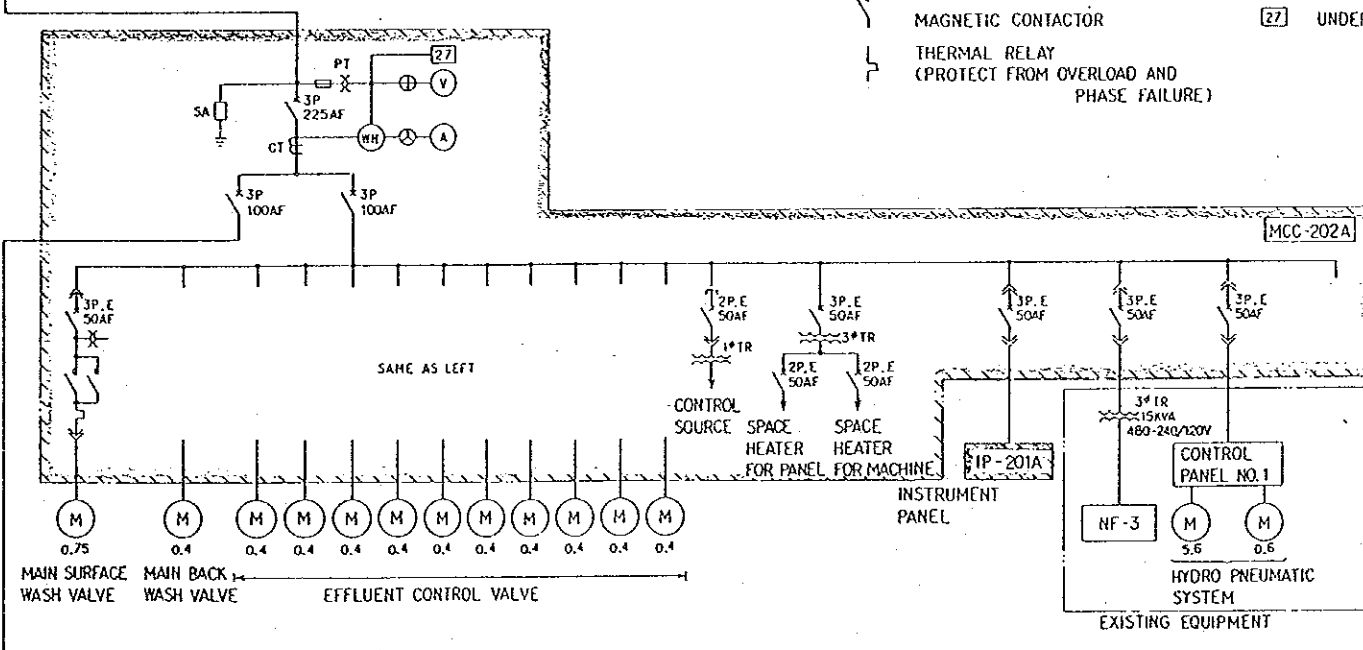
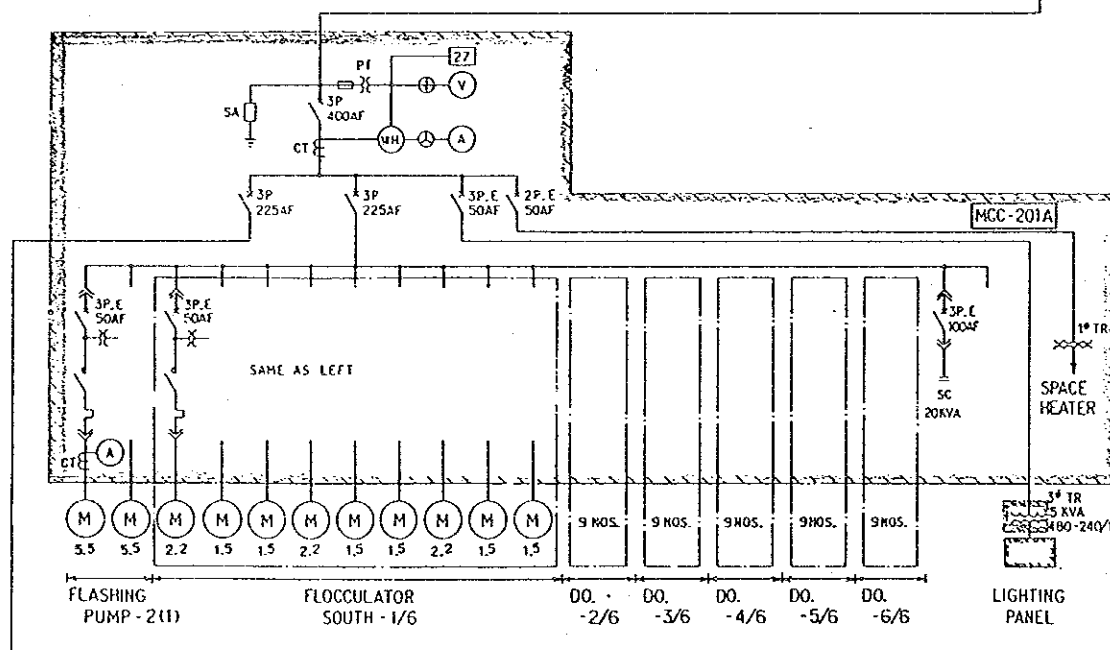
REHABILITATION ITEM		
EQUIP. NO.	EQUIPMENT NAME	QTY
CHEMICALS		
M-25	CHLORINATOR	4 units
M-26	EVAPORATOR	2 units
M-27	GAS LEAK DETECTOR	3 units
M-28	EXHAUST FAN	3 units
M-29	BOOSTER PUMP	3 units
M-30	WEIGHING SCALE	2 units

REMARKS:
 1) S.R MEANS THE "SCOPE OF REHABILITATION ITEM."

TITLE	DWG. NO.
CHEMICAL FACILITIES (CHLORINE)	M-16
薬品注入設備 (構築)	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



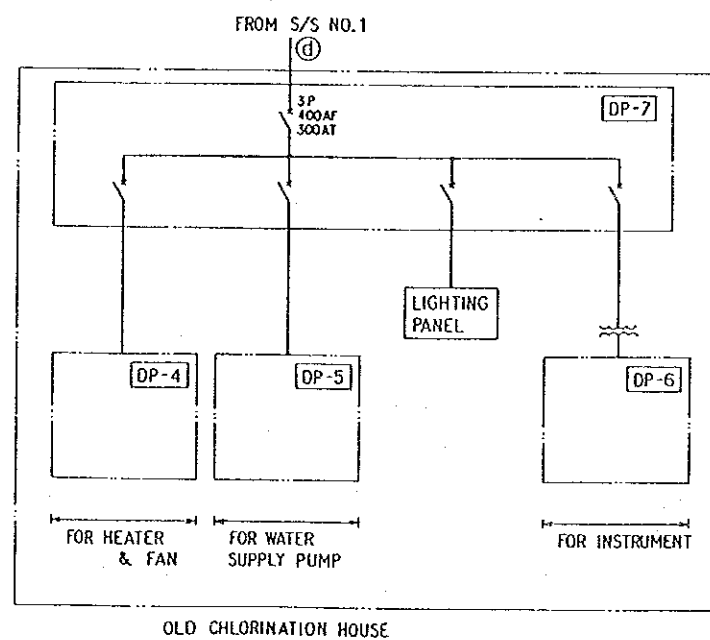
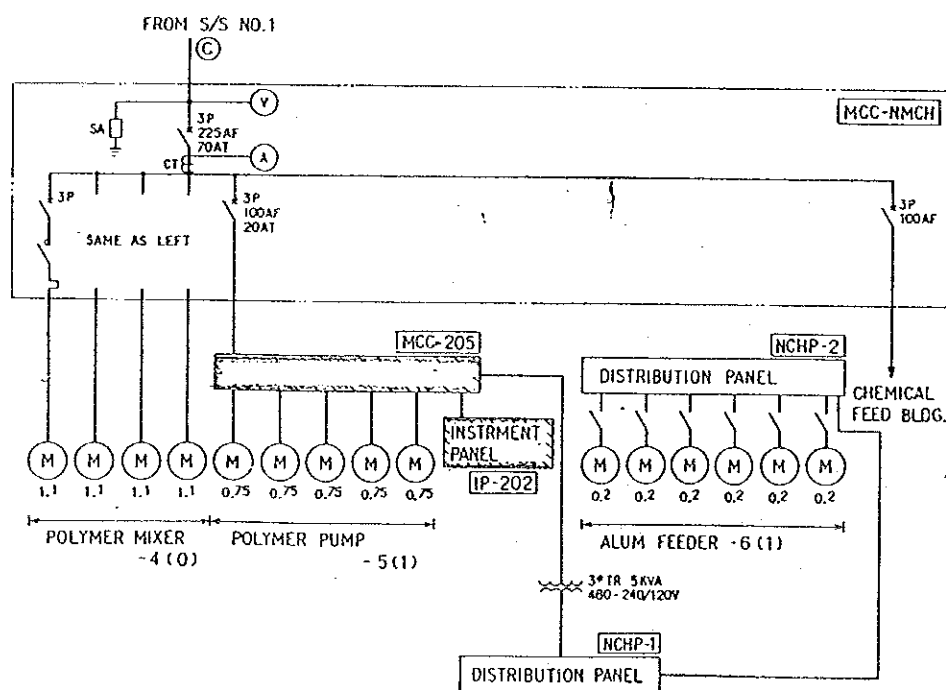
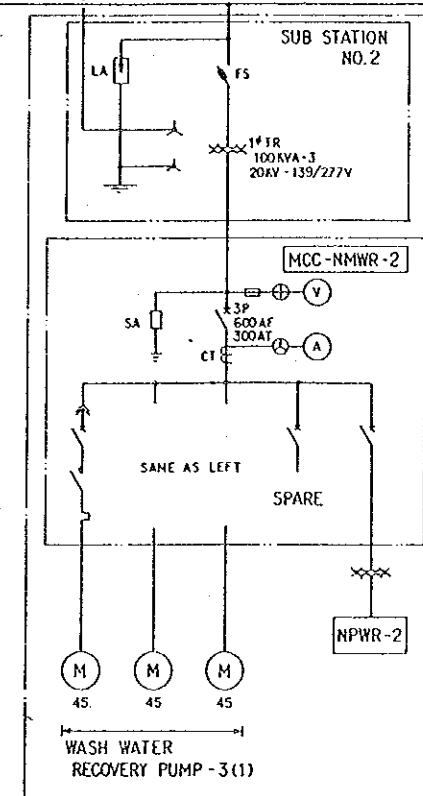
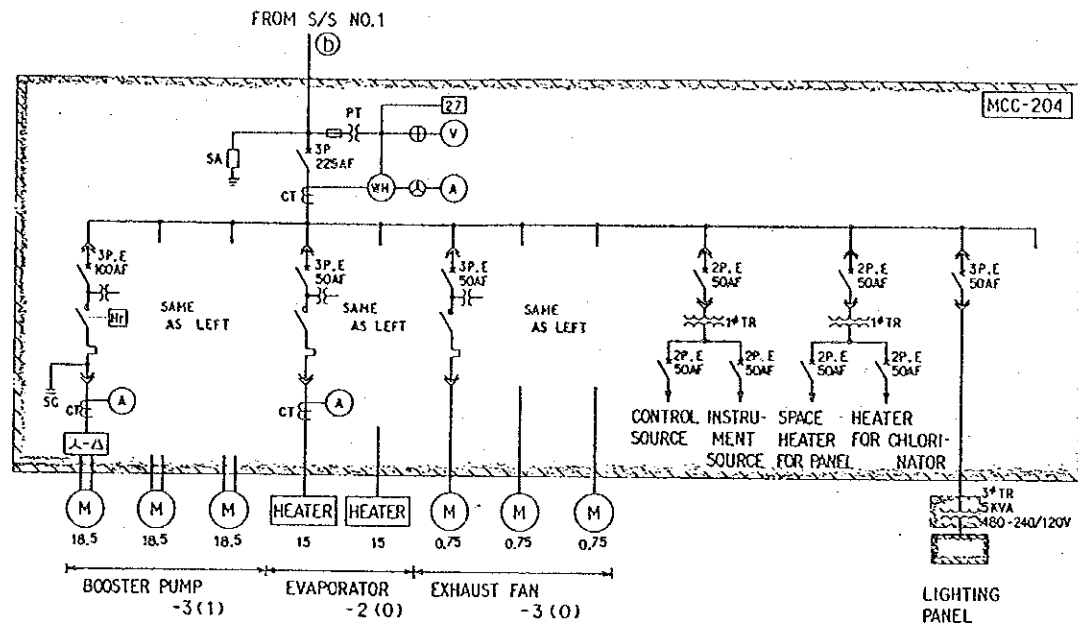
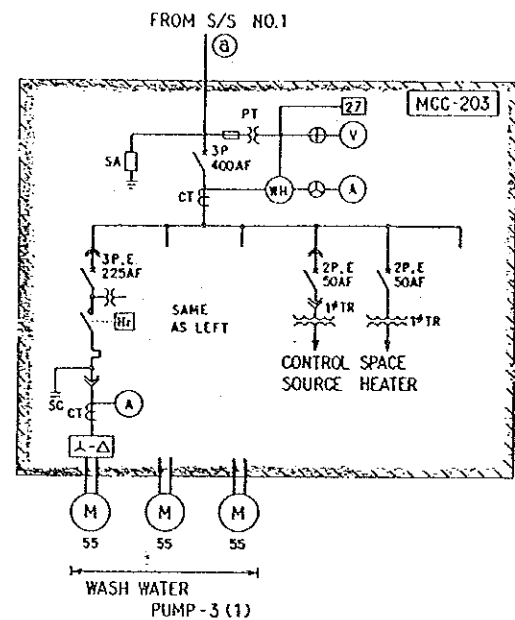
- LEGEND (1)
- EXISTING PANEL/EQUIPMENT
 - NEW PANEL/EQUIPMENT
- LEGEND (2)
- GROUND
 - LIGHTNING ARRESTER
 - FUSE DISCONNECT SWITCH
 - CURRENT TRANSFORMER
 - POTENTIAL TRANSFORMER/OPERATION TRANSFORMER
 - FUSE
 - LOAD DISCONNECT SWITCH
 - POWER TRANSFORMER
 - SWITCH (GENERAL)
 - MOLDED CASE CIRCUIT BREAKER (E: WITH EARTH LEAKAGE RELAY)
 - EARTH DEVICE
 - MAGNETIC CONTACTOR
 - THERMAL RELAY (PROTECT FROM OVERLOAD AND PHASE FAILURE)
 - SURGE ABSORBER
 - CAPACITOR
 - DRAWOUT TYPE
 - DIRECT ON LINE STARTER
 - STAR-DELTA STARTER
 - AUTO-TRANSFORMER
 - MOTOR
 - GENERATOR
 - AMMETER
 - AMMETER SWITCH
 - VOLTMETER
 - VOLTMETER SWITCH
 - WATT-HOUR METER
 - HOUR METER
 - UNDER VOLTAGE RELAY



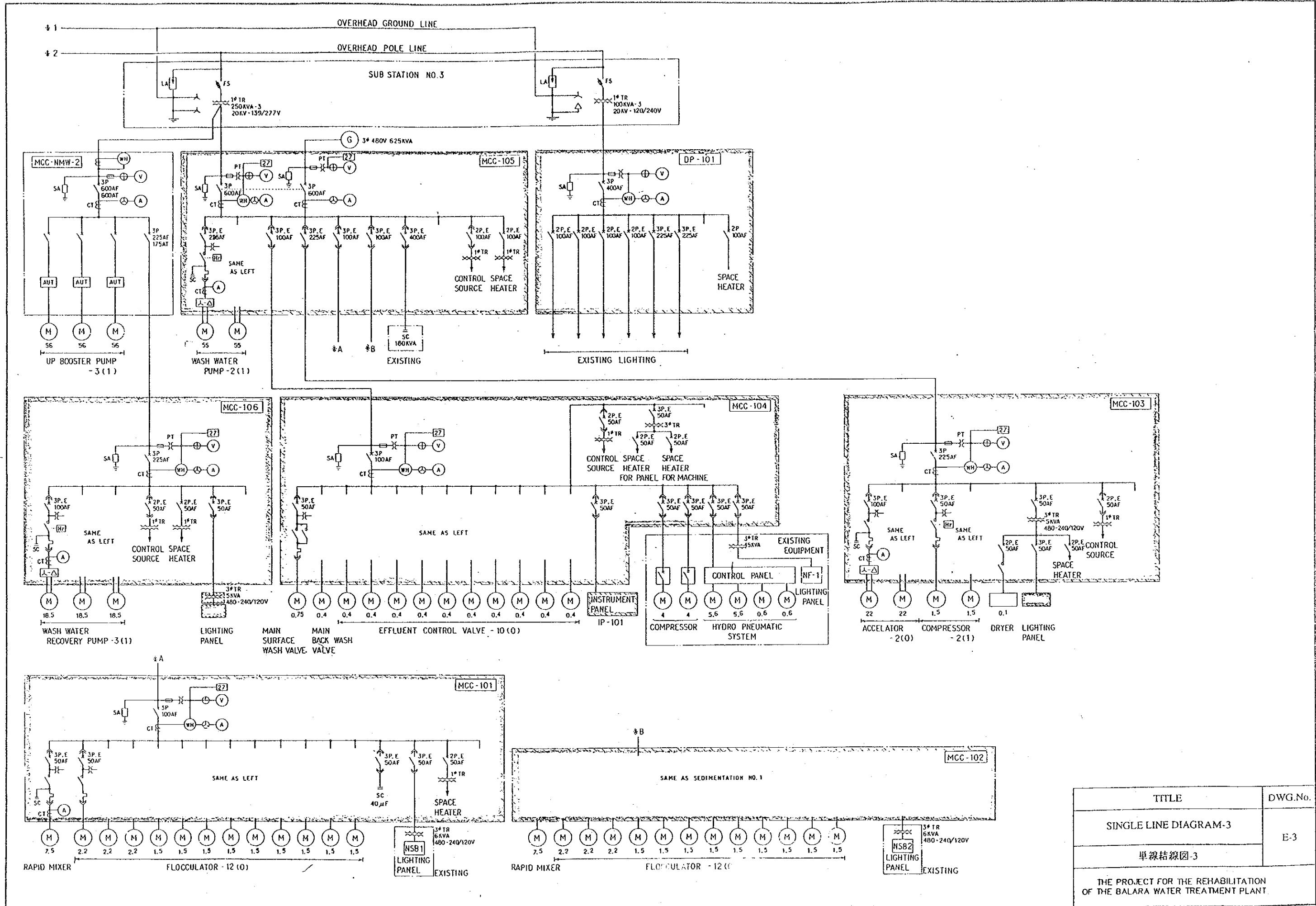
TITLE	DWG.No.
SINGLE LINE DIAGRAM-1	E-1
單線結線圖-1	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	

OVERHEAD GROUND LINE

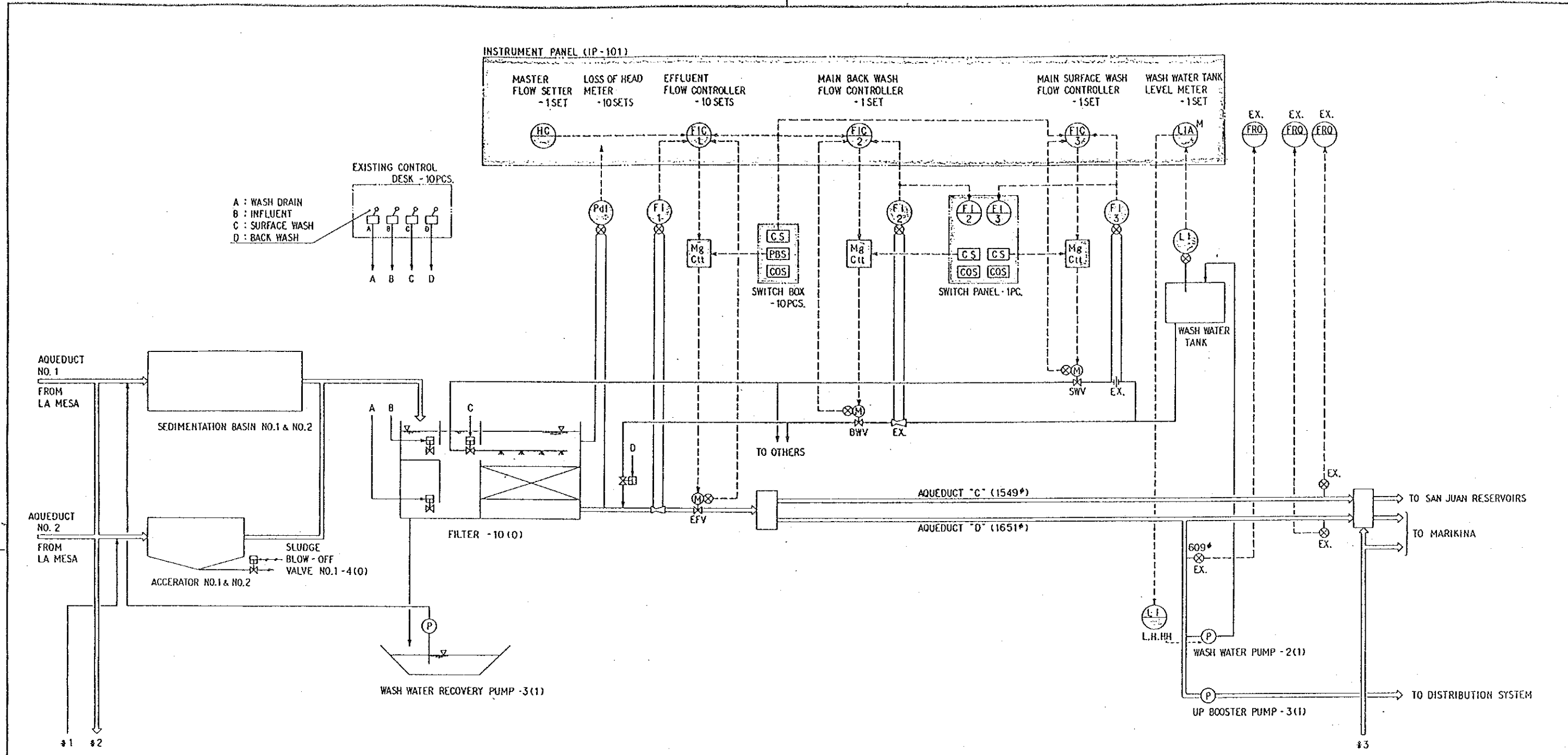
OVERHEAD POLE LINE



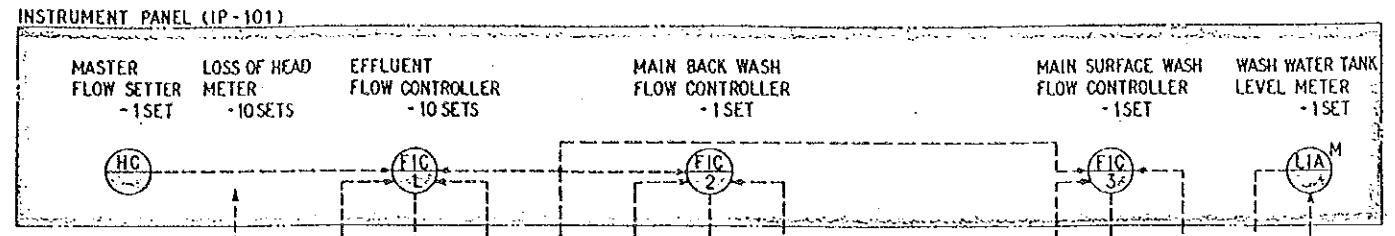
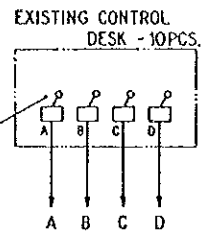
TITLE	DWG.No.
SINGLE LINE DIAGRAM-2	E-2
單線結線圖-2	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



TITLE	DWG.No.
SINGLE LINE DIAGRAM-3	E-3
單線結線圖-3	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT.	



A : WASH DRAIN
 B : INFLUENT
 C : SURFACE WASH
 D : BACK WASH



LEGEND (1)

- EX. EXISTING INSTRUMENT
- NEW INSTRUMENT/PANEL/SWITCH BOX
- ELECTRICAL SIGNAL
- AIR SIGNAL
- WATER SIGNAL
- TRANSMITTER/DETECTOR
- PANEL MOUNTED INSTRUMENT
- LOCAL INSTRUMENT

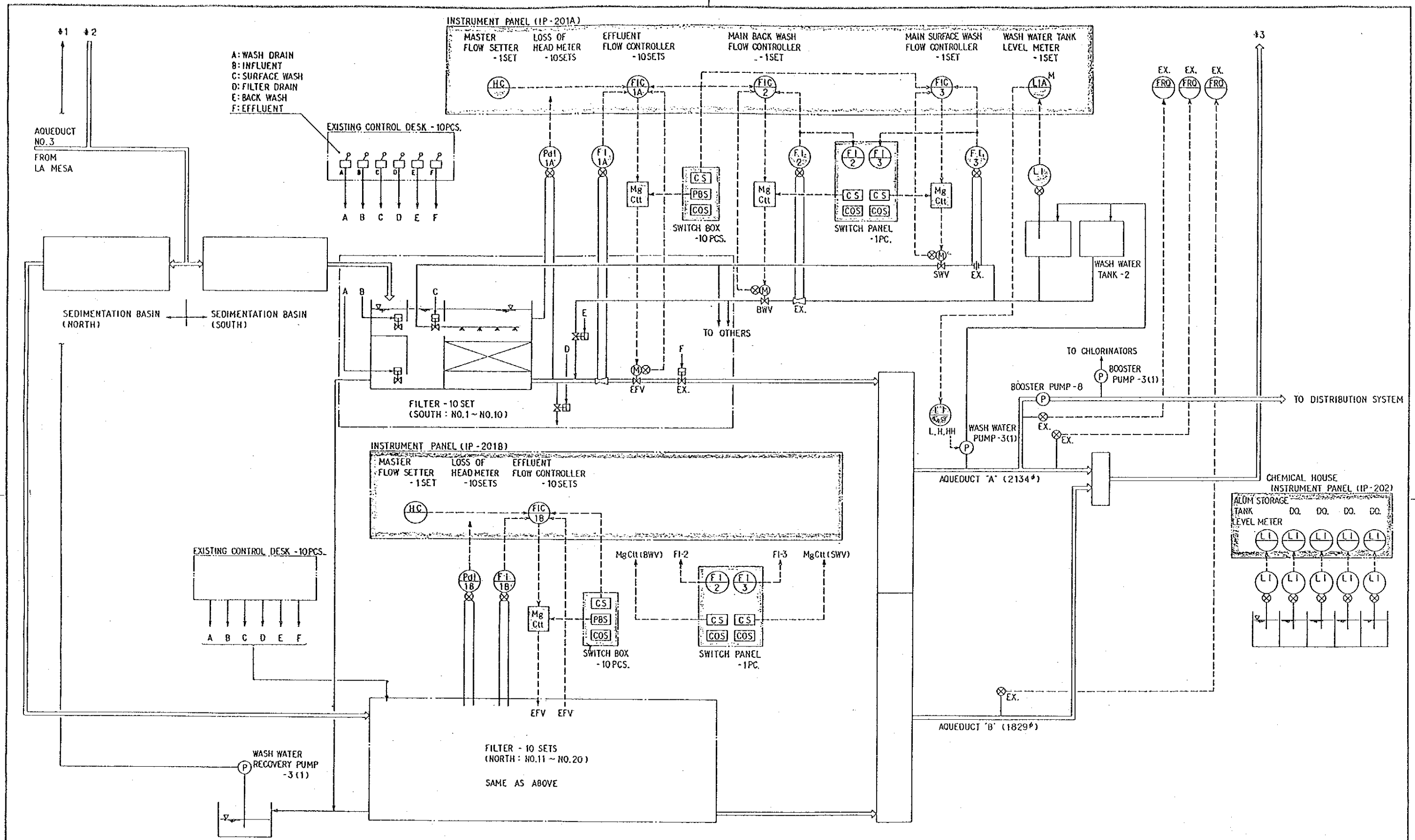
LEGEND (2)

- ORIFICE
- VENTURI METER
- L.M.H.
LOW, MIDDLE, HIGH
- MOTOR
- PUMP
- MOTOR VALVE

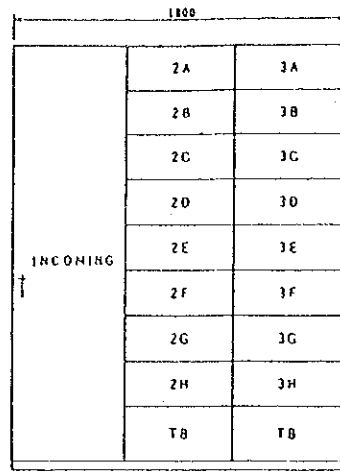
- HYDRAULIC CYLINDER VALVE
- PNEUMATIC CYLINDER VALVE
- F : FLOW
L : LEVEL
H : HAND CONTROL
I : INDICATE
C : CONTROL
Q : QUANTITY
A : ALARM

- Mg Ctt MAGNETIC CONTACTOR
- CS CONTROL SWITCH
- COS CHANGEOVER SWITCH
- PBS PUSH BUTTON SWITCH

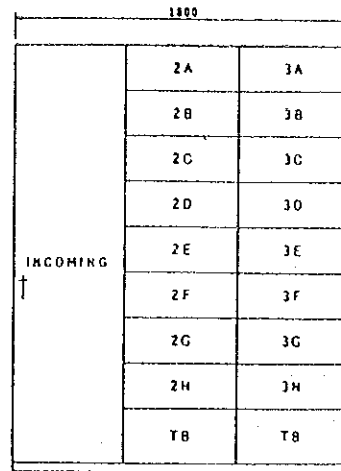
TITLE	DWG.No.
INSTRUMENTATION FLOW DIAGRAM-1	E-4
計装フロー-1	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



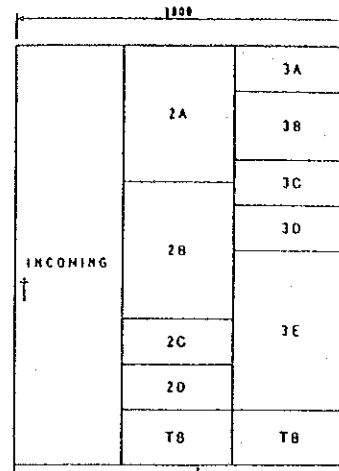
TITLE	DWG.No.
INSTRUMENTATION FLOW DIAGRAM-2	E-5
計装フロー-2	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



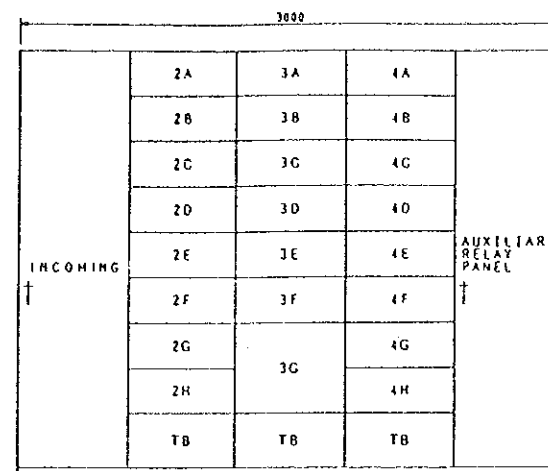
SEDIMENTATION BASIN NO. 1 MCC/PLANT NO. 1
MCC-101 (S-1/20)



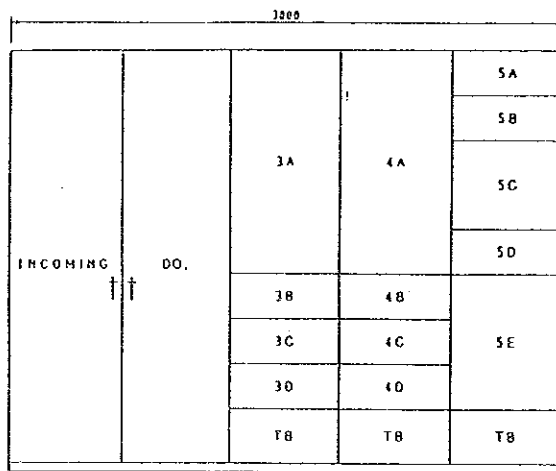
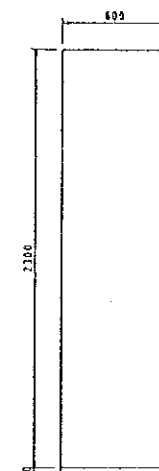
SEDIMENTATION BASIN NO. 2 MCC/PLANT NO. 1
MCC-102 (S-1/20)



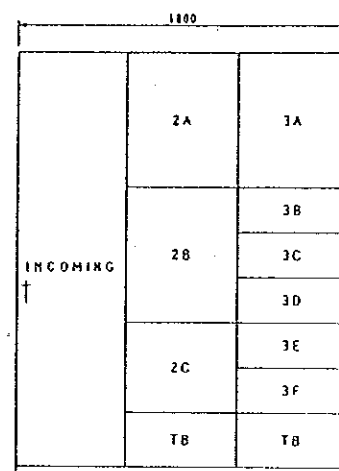
ACCELERATOR MCC/PLANT NO. 1
MCC-103 (S-1/20)



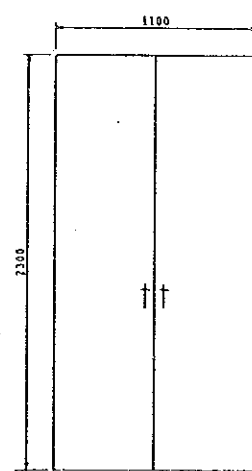
FILTER MCC/PLANT NO. 1
MCC-104 (S-1/20)



WASHWATER PUMP MCC/PLANT NO. 1
MCC-105 (S-1/20)



WASHWATER RECOVERY PUMP MCC/PLANT NO. 1
MCC-106 (S-1/20)

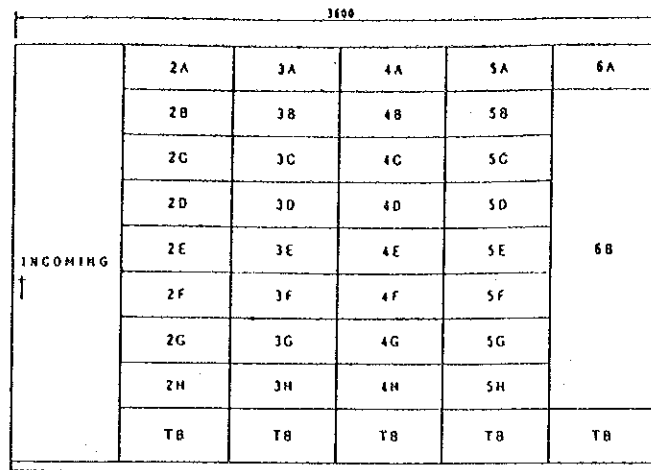


DISTRIBUTION PANEL/PLANT NO. 1
DP-1 (S-1/20)

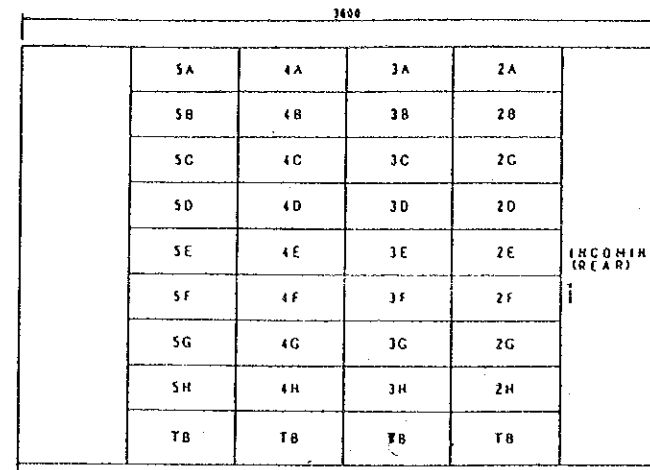


MCC-101		MCC-102		MCC-103		MCC-104		MCC-105		MCC-106	
NO	DESCRIPTION	NO	DESCRIPTION	NO	DESCRIPTION	NO	DESCRIPTION	NO	DESCRIPTION	NO	DESCRIPTION
2A	RAPID MIXER	2A	RAPID MIXER	2A	ACCELERATOR NO. 1	2A	EFFLUENT CONTROL VALVE NO. 1	4A	COMPRESSOR PANEL NO. 1	3A	WASHWATER PUMP NO. 1
2B	FLOCCULATOR NO. 1	2B	FLOCCULATOR NO. 1	2B	ACCELERATOR NO. 2	2B	DO. NO. 2	4B	DO. NO. 2	3B	CONTROL SOURCE
2C	DO. NO. 2	2C	DO. NO. 2	2C	COMPRESSOR NO. 1	2C	DO. NO. 3	4C	HYDRO PNEUMATIC CONTROL PANEL	3C	1# TRANSFORMER FOR CONTROL SOURCE
2D	DO. NO. 3	2D	DO. NO. 3	2D	COMPRESSOR NO. 2	2D	DO. NO. 4	4D	LIGHTING PANEL NF-1	3D	(VACANCY)
2E	DO. NO. 4	2E	DO. NO. 4			2E	DO. NO. 5	4E	(VACANCY)	3E	FEEDER FOR SC
2F	DO. NO. 5	2F	DO. NO. 5			2F	MAIN SURFACE WASH VALVE	4F	(VACANCY)		
2G	DO. NO. 6	2G	DO. NO. 6			2G	MAIN BACK WASH VALVE	4G	(DO.)		
2H	DO. NO. 7	2H	DO. NO. 7			2H	INSTRUMENT PANEL	4H	(DO.)		
3A	FLOCCULATOR NO. 8	3A	FLOCCULATOR NO. 8	3A	CONTROL SOURCE	3A	EFFLUENT CONTROL VALVE NO. 6			4A	WASHWATER PUMP NO. 2
3B	DO. NO. 9	3B	DO. NO. 9	3B	1# TRANSFORMER FOR CONTROL SOURCE	3B	DO. NO. 7			4B	(VACANCY)
3C	DO. NO. 10	3C	DO. NO. 10	3C	SPARE	3C	DO. NO. 8			4C	(VACANCY)
3D	DO. NO. 11	3D	DO. NO. 11	3D	(VACANCY)	3D	DO. NO. 9			4D	(DO.)
3E	DO. NO. 12	3E	DO. NO. 12	3E	SEQUENCE FOR SLUDGE VALVE	3E	DO. NO. 10				
3F	LIGHTING PANEL	3F	LIGHTING PANEL			3F	CONTROL SOURCE				
3G	(VACANCY)	3G	(VACANCY)			3G	1# TRANSFORMER FOR CONTROL SOURCE				
3H	PRIMARY OF CAPACITOR	3H	PRIMARY OF CAPACITOR								

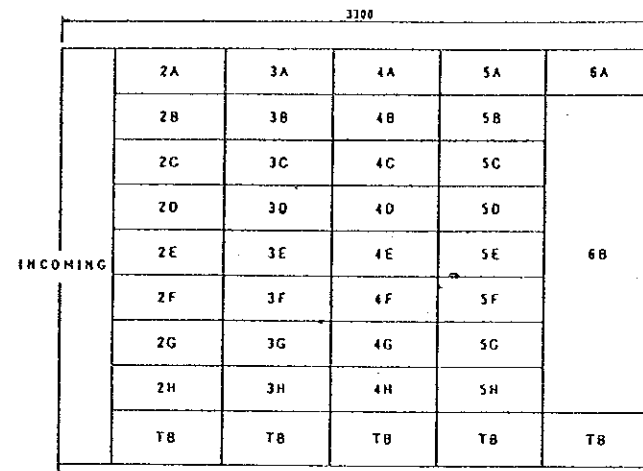
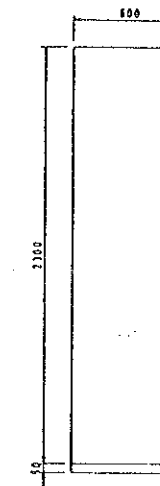
TITLE	DWG.No.
ELECTRICAL PANELS-1	E-6
盤圖-1	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



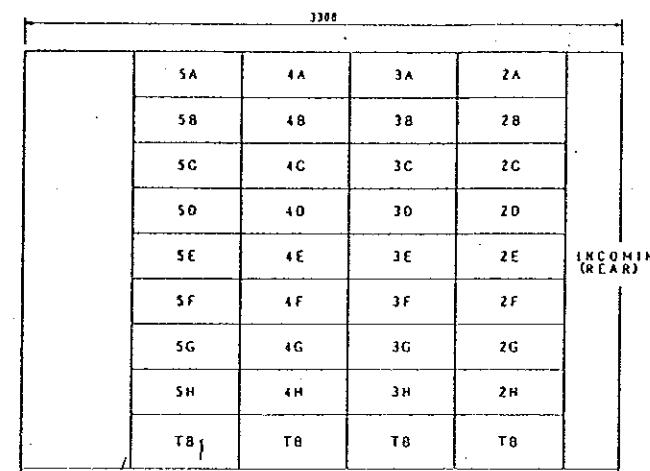
SEDIMENTATION BASIN SOUTH MCC/PLANT NO. 2
MCC-201A (FRONT VIEW) (S-1/28)



SEDIMENTATION BASIN SOUTH MCC/PLANT NO. 2
MCC-201A (REAR VIEW) (S-1/28)



SEDIMENTATION BASIN NORTH MCC/PLANT NO. 2
MCC-201B (FRONT VIEW) (S-1/28)



SEDIMENTATION BASIN NORTH MCC/PLANT NO. 2
MCC-201B (REAR VIEW) (S-1/28)

MCC-201B (REAR VIEW)

NO	DESCRIPTION	NO	DESCRIPTION
2A	FLOCCULATOR S-4/6-1	4A	FLOCCULATOR S-5/6-8
2B	DO. -2	4B	DO. -9
2C	DO. -3	4C	FLOCCULATOR S-6/6-1
2D	DO. -4	4D	DO. -2
2E	DO. -5	4E	DO. -3
2F	DO. -6	4F	DO. -4
2G	DO. -7	4G	DO. -5
2H	DO. -8	4H	DO. -6
3A	FLOCCULATOR S-4/6-3	5A	FLOCCULATOR S-6/6-7
3B	FLOCCULATOR S-5/6-1	5B	DO. -8
3C	DO. -2	5C	DO. -9
3D	DO. -3	5D	(VACANCY)
3E	DO. -4	5E	(DO.)
3F	DO. -5	5F	(DO.)
3G	DO. -6	5G	(DO.)
3H	DO. -7	5H	(DO.)

MCC-201A (FRONT VIEW)

NO	DESCRIPTION	NO	DESCRIPTION
2A	FLOCCULATOR N-1/6-1	4A	FLOCCULATOR N-2/6-8
2B	DO. -2	4B	DO. -9
2C	DO. -3	4C	FLOCCULATOR N-3/6-1
2D	DO. -4	4D	DO. -2
2E	DO. -5	4E	DO. -3
2F	DO. -6	4F	DO. -4
2G	DO. -7	4G	DO. -5
2H	DO. -8	4H	DO. -6
3A	FLOCCULATOR N-4/6-3	5A	FLOCCULATOR N-5/6-7
3B	FLOCCULATOR N-5/6-1	5B	DO. -8
3C	DO. -2	5C	DO. -9
3D	DO. -3	5D	FLUSHING PUMP NO. 1
3E	DO. -4	5E	DO. NO. 2
3F	DO. -5	5F	(VACANCY)
3G	DO. -6	5G	(VACANCY)
3H	DO. -7	5H	(DO.)

6A	PRIMARY OF CAPACITOR
6B	CAPACITOR

MCC-201A (REAR VIEW)

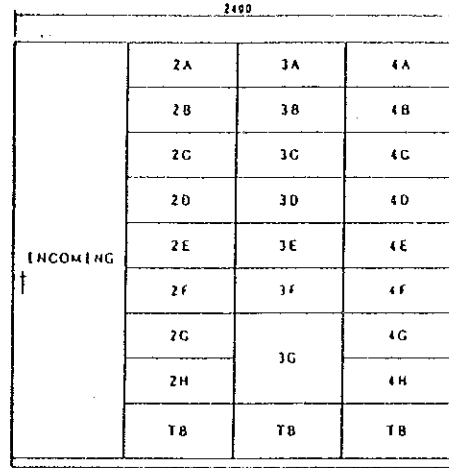
NO	DESCRIPTION	NO	DESCRIPTION
2A	FLOCCULATOR N-4/6-1	4A	FLOCCULATOR N-5/6-8
2B	DO. -2	4B	DO. -9
2C	DO. -3	4C	FLOCCULATOR N-6/6-1
2D	DO. -4	4D	DO. -2
2E	DO. -5	4E	DO. -3
2F	DO. -6	4F	DO. -4
2G	DO. -7	4G	DO. -5
2H	DO. -8	4H	DO. -6
3A	FLOCCULATOR N-4/6-3	5A	FLOCCULATOR N-6/6-7
3B	FLOCCULATOR N-5/6-1	5B	DO. -8
3C	DO. -2	5C	DO. -9
3D	DO. -3	5D	CT
3E	DO. -4	5E	CT
3F	DO. -5	5F	(VACANCY)
3G	DO. -6	5G	(DO.)
3H	DO. -7	5H	(DO.)

MCC-201B (FRONT VIEW)

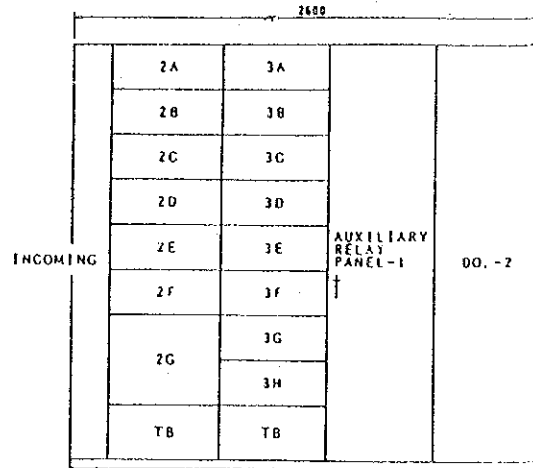
NO	DESCRIPTION	NO	DESCRIPTION
2A	FLOCCULATOR S-1/6-1	4A	FLOCCULATOR S-2/6-8
2B	DO. -2	4B	DO. -9
2C	DO. -3	4C	FLOCCULATOR S-3/6-1
2D	DO. -4	4D	DO. -2
2E	DO. -5	4E	DO. -3
2F	DO. -6	4F	DO. -4
2G	DO. -7	4G	DO. -5
2H	DO. -8	4H	DO. -6
3A	FLOCCULATOR S-4/6-3	5A	FLOCCULATOR S-6/6-7
3B	FLOCCULATOR S-5/6-1	5B	DO. -8
3C	DO. -2	5C	DO. -9
3D	DO. -3	5D	(VACANCY)
3E	DO. -4	5E	(VACANCY)
3F	DO. -5	5F	(DO.)
3G	DO. -6	5G	(DO.)
3H	DO. -7	5H	(DO.)

6A	PRIMARY OF CAPACITOR
6B	CAPACITOR

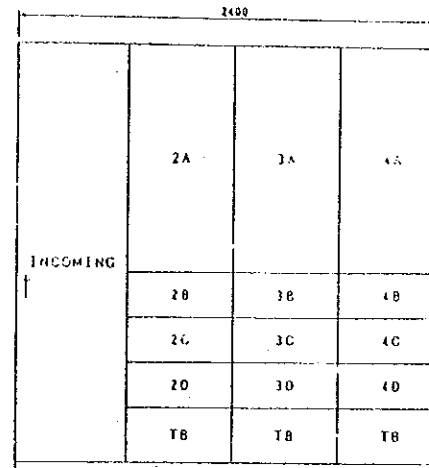
TITLE	DWG.No.
ELECTRICAL PANELS-2	E-7
盤図-2	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



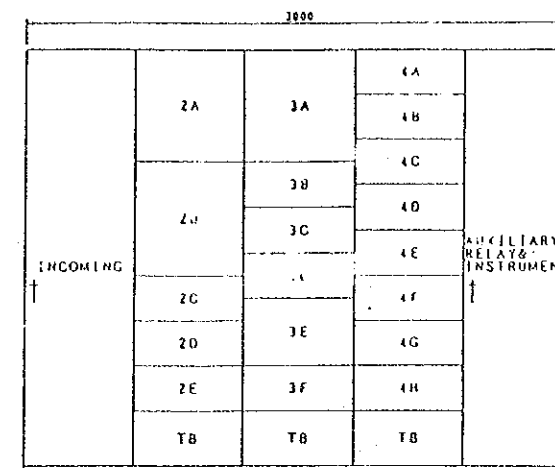
FILTER MCC/PLANT NO. 2
MCC-202A (S-1/24)



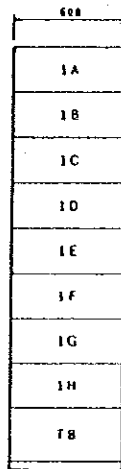
FILTER MCC/PLANT NO. 2
MCC-202B (S-1/24)



WASHWATER PUMP MCC/PLANT NO. 2
MCC-203 (S-1/24)



CHLORINATION MCC/PLANT NO. 2
MCC-204 (S-1/24)



POLYMER PUMP MCC/PLANT NO. 2
MCC-205 (S-1/24)

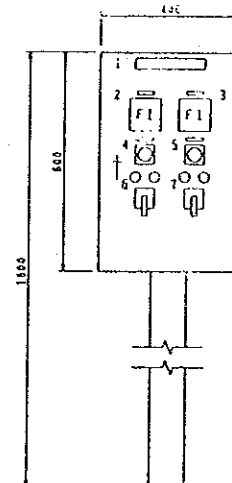
NO	DESCRIPTION
1A	POLYMER PUMP NO. 1
1B	DO. NO. 2
1C	DO. NO. 3
1D	DO. NO. 4
1E	DO. NO. 5
1F	INSTRUMENT PANEL
1G	FEEDER OF 3 ϕ TR
1H	PRIMARY OF SC



LOCAL SWITCH BOX
(TYPE-1) (S-1/14)



LOCAL SWITCH BOX
(TYPE-2) (S-1/14)



LOCAL OPERATION PANEL
(TYPE-3) (S-1/14)

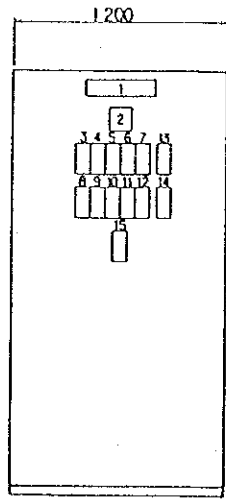
NO.	DESCRIPTION	NO.	DESCRIPTION
1	NAME PLATE	5	MANUAL/SEMI-AUTOMATIC (FOR B.W.)
2	SURFACE WASH WATER FLOW INDICATOR	6	CLOSE/STOP/OPEN (OPERATION SWITCH FOR MAIN SURFACE WASH VALVE AT MANUAL MODE)
3	BACK WASH WATER FLOW INDICATOR	7	DO. (FOR MAIN BACK WASH VALVE)
4	MANUAL/SEMI-AUTOMATIC (MODE CHANGE-OVER SWITCH FOR SURFACE WASH)	8	

LOCAL SWITCH BOX/OPERATION PANEL

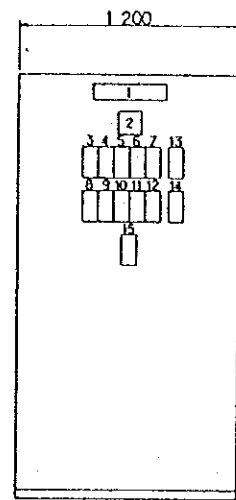
TYPE OF BOX/PANEL	NAME OF PLANT	NAME OF MACHINE	QTY OF BOX/PANEL	LINKED PANEL			
				NAME	MARK		
1	NO. 1	RAPID MIXER	1PC.	SEDIMENTATION BASIN NO. 1 MCC	MCC-101		
		FLOCCULATOR	12PCS.		DO. NO. 2 MCC	MCC-102	
		RAPID MIXER	1PC.			ACCELERATOR MCC	MCC-103
		FLOCCULATOR	12PCS.	SEDIMENTATION BASIN SOUTH MCC	MCC-201A		
		DO.	5PCS.	DO. NORTH MCC	MCC-201B		
		FLUSHING PUMP	2PCS.	DO. SOUTH MCC	MCC-201A		
		BOOSTER PUMP	3PCS.	CHLORINATION MCC	MCC-205		
		POLYMER PUMP	5PCS.	POLYMER PUMP	MCC-205		
		2	NO. 1	EFFLUENT CONTROL VALVE NO. 1 TO NO. 10	10PCS.	FILTER MCC	MCC-104
				DO.	10PCS.	DO.	MCC-202A
DO. NO. 11 TO NO. 20	10PCS.			DO.	MCC-202B		
3	NO. 1	MAIN SURFACE WASH VALVE	1PC.	DO.	MCC-104		
		MAIN BACK WASH VALVE	1PC.	DO.	MCC-104		
	NO. 2	MAIN SURFACE WASH VALVE	2PCS.	DO.	MCC-202A		
		MAIN BACK WASH VALVE	2PCS.	DO.	MCC-202A		

MCC-202A			MCC-202B			MCC-203			MCC-204		
NO	DESCRIPTION	NO	DESCRIPTION	NO	DESCRIPTION	NO	DESCRIPTION	NO	DESCRIPTION	NO	DESCRIPTION
2A	EFFLUENT CONTROL VALVE NO. 1	4A	HYDRO PNEUMATIC CONTROL PANEL	2A	EFFLUENT CONTROL VALVE NO. 11	2A	WASHWATER PUMP NO. 1	2A	BOOSTER PUMP NO. 1	4A	HEATER
2B	DO. NO. 2	4B	LIGHTING PANEL NF-3	2B	DO. NO. 12	2B	CONTROL SOURCE	2B	DO. NO. 2	4B	(VACANCY)
2C	DO. NO. 3	4C	(VACANCY)	2C	DO. NO. 13	2C	1 ϕ TRANSFORMER FOR CONTROL SOURCE	2C	EXHAUST FAN NO. 1	4C	(DO.)
2D	DO. NO. 4	4D	(DO.)	2D	DO. NO. 14	2D	(VACANCY)	2D	DO. NO. 2	4D	(DO.)
2E	DO. NO. 5	4E	(DO.)	2E	DO. NO. 15			2E	DO. NO. 3	4E	(DO.)
2F	MAIN SURFACE WASH VALVE	4F	(DO.)	2F	CONTROL SOURCE					4F	(DO.)
2G	MAIN BACK WASH VALVE	4G	(DO.)	2G	1 ϕ TRANSFORMER FOR CONTROL SOURCE	3A	WASHWATER PUMP NO. 2			4G	(DO.)
2H	(VACANCY)	4H	(DO.)			3B	SPARE	3A	BOOSTER PUMP NO. 3	4H	(DO.)
3A	EFFLUENT CONTROL VALVE NO. 6			3A	EFFLUENT CONTROL VALVE NO. 16	3C	(VACANCY)	3B	EVAPORATOR NO. 1		
3B	DO. NO. 7			3B	DO. NO. 17	3D	(DO.)	3C	DO. NO. 2		
3C	DO. NO. 8			3C	DO. NO. 18			3D	CONTROL SOURCE		
3D	DO. NO. 9			3D	DO. NO. 19			3E	1 ϕ TRANSFORMER FOR CONTROL SOURCE		
3E	DO. NO. 10			3E	DO. NO. 20	4A	WASHWATER PUMP NO. 3	3F	LIGHTING		
3F	CONTROL SOURCE			3F	HYDRO PNEUMATIC CONTROL PANEL	4B	(VACANCY)				
3G	1 ϕ TRANSFORMER FOR CONTROL SOURCE			3G	LIGHTING PANEL NF-4	4C	(DO.)				
				3H	(VACANCY)	4D	(DO.)				

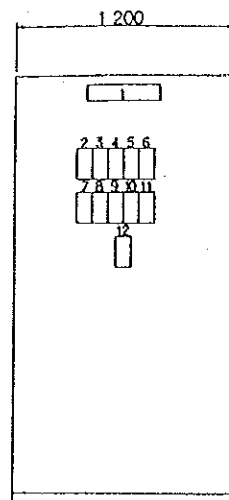
TITLE	DWG.No.
ELECTRICAL PANELS-3	E-8
盤圖-3	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



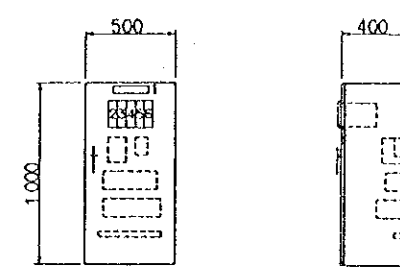
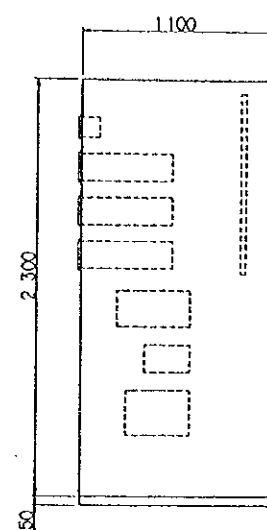
FILTER INSTRUMENT
PANEL/PLANT NO.1
IP-101 (S-1/20)



FILTER INSTRUMENT
PANEL/PLANT NO.2
IP-201A (S-1/20)



FILTER INSTRUMENT
PANEL/PLANT NO.2
IP-201B (S-1/20)



CHEMICAL INSTRUMENT
PANEL/PLANT NO.2
IP-202 (S-1/20)

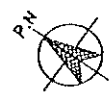
NO.	DESCRIPTION
1	NAME PLATE
2	WASH WATER TANK LEVEL INDICATOR
3	RATE OF FLOW CONTROLLER FOR FILTER NO. 1
4	DO. NO. 2
5	DO. NO. 3
6	DO. NO. 4
7	DO. NO. 5
8	DO. NO. 6
9	DO. NO. 7
10	DO. NO. 8
11	DO. NO. 9
12	DO. NO. 10
13	MAIN SURFACE WASH FLOW CONTROLLER
14	MAIN BACK WASH FLOW CONTROLLER
15	RATE OF FLOW MASTER SETTER

NO.	DESCRIPTION
1	NAME PLATE
2	WASH WATER TANK LEVEL INDICATOR
3	RATE OF FLOW CONTROLLER FOR FILTER NO. 1
4	DO. NO. 2
5	DO. NO. 3
6	DO. NO. 4
7	DO. NO. 5
8	DO. NO. 6
9	DO. NO. 7
10	DO. NO. 8
11	DO. NO. 9
12	DO. NO. 10
13	MAIN SURFACE WASH FLOW CONTROLLER
14	MAIN BACK WASH FLOW CONTROLLER
15	RATE OF FLOW MASTER SETTER

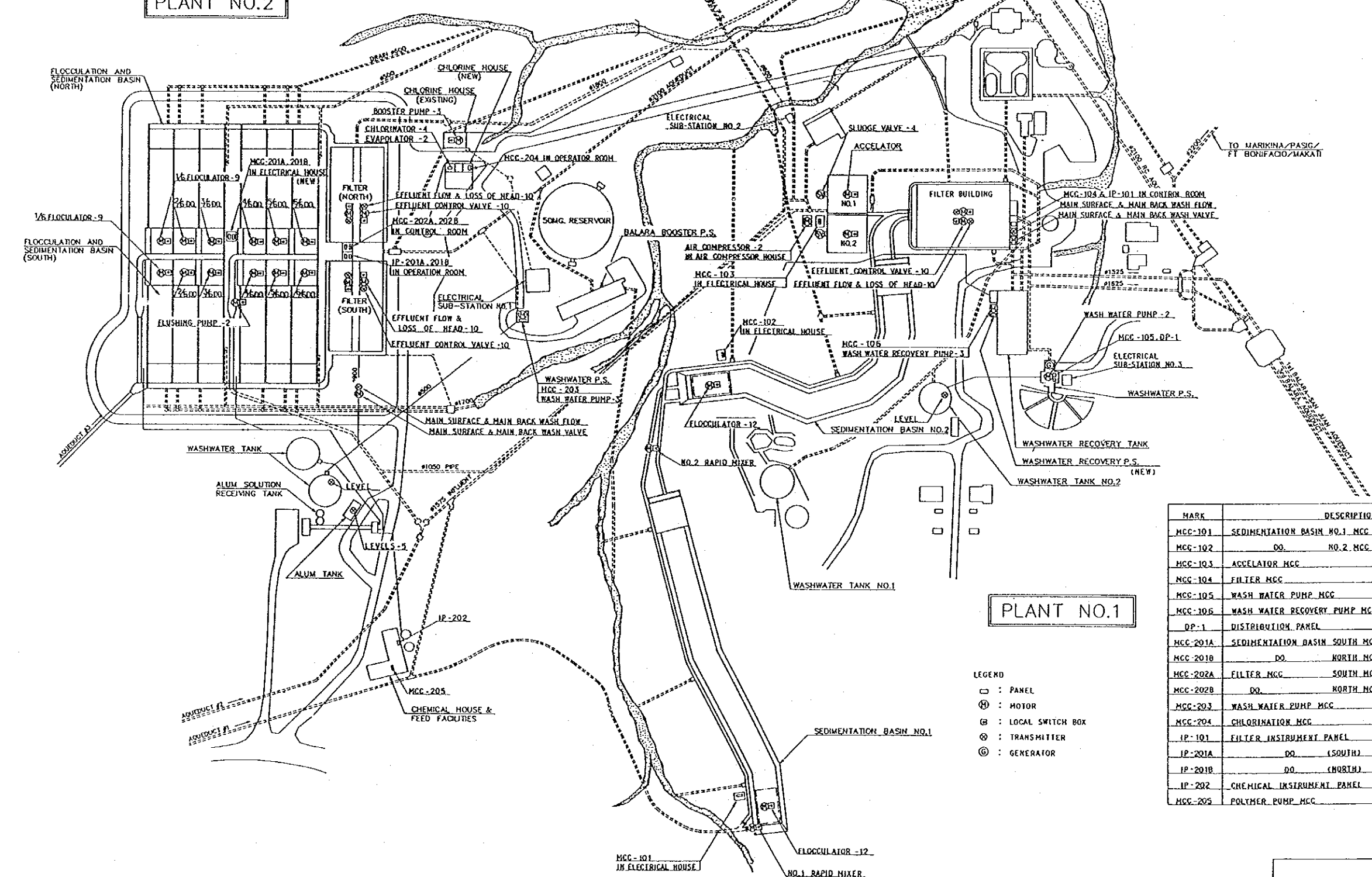
NO.	DESCRIPTION
1	NAME PLATE
2	RATE OF FLOW CONTROLLER FOR FILTER NO. 11
3	DO. NO. 12
4	DO. NO. 13
5	DO. NO. 14
6	DO. NO. 15
7	DO. NO. 16
8	DO. NO. 17
9	DO. NO. 18
10	DO. NO. 19
11	DO. NO. 20
12	RATE OF FLOW MASTER SETTER

NO.	DESCRIPTION
1	NAME PLATE
2	ALUM TANK LEVEL INDICATOR NO. 1
3	DO. NO. 2
4	DO. NO. 3
5	DO. NO. 4
6	DO. NO. 5

TITLE	DWG.No.
ELECTRICAL PANELS-4	E-9
盤図-4	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	



PLANT NO.2



PLANT NO.1

- LEGEND
- : PANEL
 - ⊕ : MOTOR
 - ⊗ : LOCAL SWITCH BOX
 - ⊕ : TRANSMITTER
 - ⊙ : GENERATOR

MARK	DESCRIPTION	REMARKS
MCC-101	SEDIMENTATION BASIN NO.1 MCC / PLANT NO.1	
MCC-102	DO. NO.2 MCC / DO.	
MCC-103	ACCELERATOR MCC / DO.	
MCC-104	FILTER MCC / DO.	
MCC-105	WASH WATER PUMP MCC / DO.	
MCC-106	WASH WATER RECOVERY PUMP MCC / DO.	
DP-1	DISTRIBUTION PANEL / DO.	
MCC-201A	SEDIMENTATION BASIN SOUTH MCC / PLANT NO.2	
MCC-201B	DO. NORTH MCC / DO.	
MCC-202A	FILTER MCC SOUTH MCC / DO.	
MCC-202B	DO. NORTH MCC / DO.	
MCC-203	WASH WATER PUMP MCC / DO.	
MCC-204	CHLORINATION MCC / DO.	
IP-101	FILTER INSTRUMENT PANEL / PLANT NO.1	
IP-201A	DO. (SOUTH) / PLANT NO.2	
IP-201B	DO. (NORTH) / DO.	
IP-202	CHEMICAL INSTRUMENT PANEL / DO.	
MCC-205	POLYMER PUMP MCC / DO.	

GENERAL LAYOUT
S=1/1500

TITLE	DWG.No.
LOCATION PLAN OF ELECTRICAL FACILITIES	E-10
電気設備配置図	
THE PROJECT FOR THE REHABILITATION OF THE BALARA WATER TREATMENT PLANT	

4.4 Implementation Plan

4.4.1 Implementation Policies and Conditions

The MWSS will be the agency responsible for the implementation of the Project. The implementation system is shown in Fig. 4.4.1.

For the smooth implementation of the Project, a Project Team should be organized exclusively as the counterparts of the consultants and the supervision engineers. Ordinarily, it would be the Design Department that takes charge of the detailed design until the Project tendering. The Construction Department, on the other hand, supervises construction work.

The Project Team would take charge of the following roles:

- i) Management of the Project
- ii) Coordination with the MWSS (Design Department, Construction, etc.) and related outside organization
- iii) Coordination of the detailed design work and tendering procedure.
- iv) Implementation of additional examination and investigation by the counterparts in cooperation with the consultants and supervising engineers, if necessary.

The implementation of Japan's Grant Aid is extended in accordance with the Exchange of Notes (E/N) for the Project between the GOP and the Government of Japan. The banking arrangement (B/A) between the GOP and an authorized Japanese foreign exchange bank is concluded in accordance with the Notes.

After the B/A, a consultancy contract for detail design and supervisory services is concluded between the GOP and a Japanese consulting firm. The Government of Japan checks whether the consulting contract is eligible under the Grant Aid program and verifies it.

Then, a contract for the implementation of the Project is concluded between

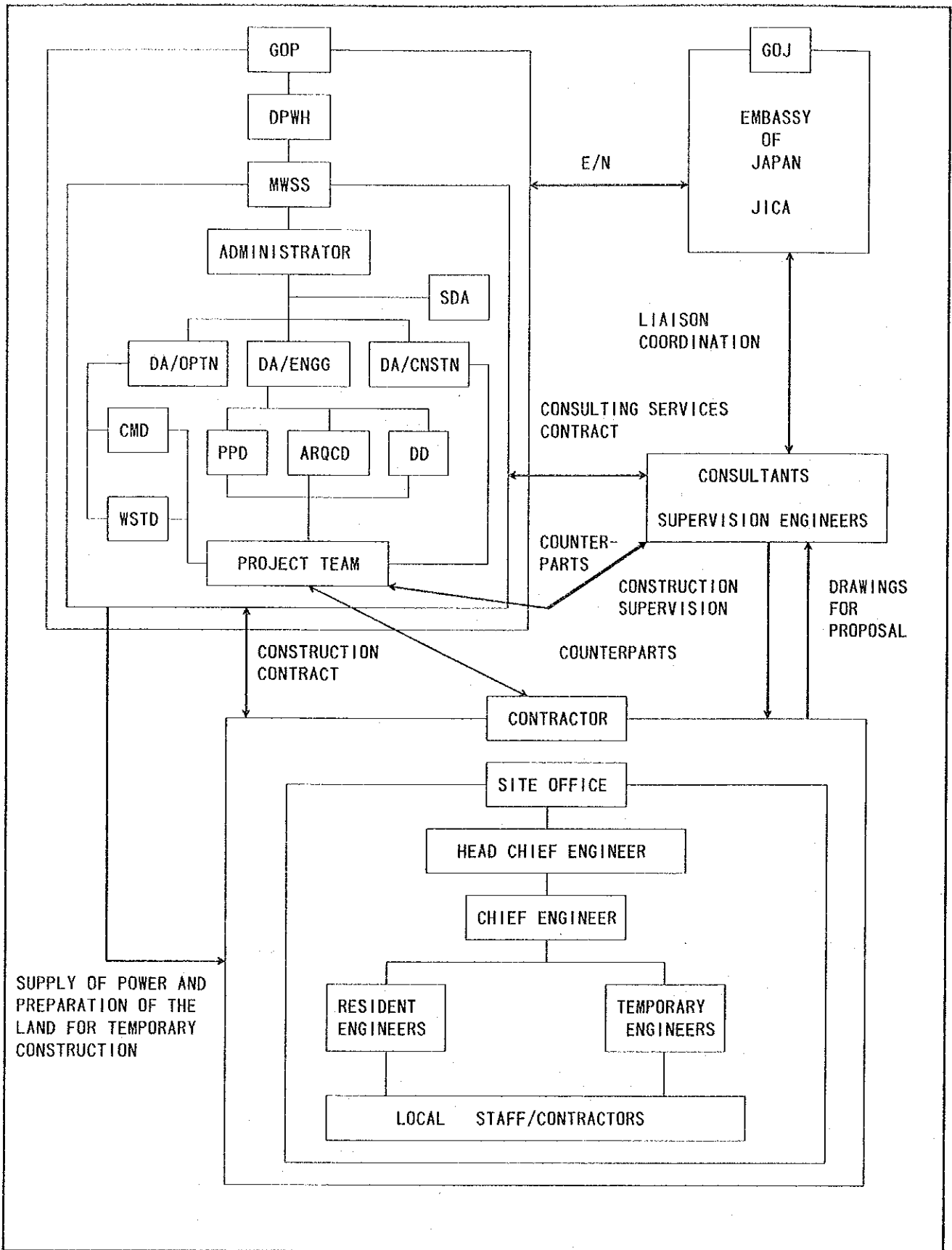


FIG. 4.4.1 ORGANIZATION CHART FOR IMPLEMENTATION OF THE PROJECT

the GOP and a selected Japanese construction firm. The Government of Japan checks and verifies the contract for the implementation of the Project in the same manner as for consultancy services.

The preparation of the detailed design, the provision for assistance to the MWSS on tendering and the Project construction supervision will be provided by a Japanese consulting company.

Almost all of the rehabilitation works are for the replacement of facilities. It is recommended that the Project construction should be undertaken by a water treatment facility manufacturer.

During the construction period, resident engineers headed by a head chief engineer will be assigned full-time by the Japanese construction contractor to supervise the overall rehabilitation works (see Figure 4.4.1). Engineers in specific fields such as civil, mechanical, and electrical will assist the equipment installation and test operation.

The Project, under the Japanese Grant Aid Programme, is planned to be implemented continuously in two Japanese fiscal years.

4.4.2 Implementation Method

Since the Project is the rehabilitation of an existing water treatment plant, the construction method and construction schedule should be ascertained so as to minimize the period of water interruption and to prevent deterioration of the treated water quality throughout the implementation of the Project.

The project construction schedule should be planned taking into account that the rainy season falls from June to October every year. This will avoid any negative influence regarding concrete placing for the construction of the new launders and baffle walls for the sedimentation basins.

The sea transportation for cargo from Japan takes about ten days to Manila. The cargo will then be transported by road to the Balara site which is 15 km inland. Therefore, packing for those facilities/equipment which are to be transported from Japan should be durable.

4.4.3 Construction and Supervision Plan

(1) Detailed Design

The detailed design will proceed after the E/N for the detailed design between the Government of Japan and the GOP. Such a detailed design for the Project will be prepared based on the Basic Design. The detailed design prepared by the consultant will be approved by the MWSS.

(2) Tendering

Tendering will be extended in accordance with another E/N for the implementation of construction including construction supervision services by the consultant and the Project construction works. Contract documents for the Project which will be prepared by the consultant will be approved by the MWSS. The consultant will assist the MWSS in making pre-qualifying tenderers, tender announcement, accepting tender applications from tenderers, and evaluating the tenderers. After selecting a successful Japanese contractor, the MWSS will enter into a contract agreement with the contractor.

(3) Construction

The consultant will evaluate and approve the construction documents submitted by the selected contractor who will procure necessary Project materials and will assist the MWSS to implement the Project as scheduled.

The consultant will hold a series of meetings with the MWSS officials and the contractor prior to the commencement of the Project construction works and witness the shipments of the Project materials and equipment to be transported to the Project site, and will provide the contractor with instruction related to the construction works.

The consultant in close coordination with the Project team, will also supervise the Project's construction schedule, be responsible for quality control, and exert every effort to complete the Project's construction as per scheduled completion date.

4.4.4 Procurement Plan

The methods of procurement of materials necessary for the Project have been studied by comparing the Philippine and Japanese procurement methods as mentioned below. The summary of procurement plan is presented in Table 4.4.1.

Table 4.4.1 Summary of Material Procurement

Item	Procure in Japan	Procure in the Philippines
Cement		x
Reinforcing rod		x
Aggregate and bricks		x
Plywood forms	x	
Pump	X	
Water treatment facilities/equipment	x	
PVC pipe	x	
Valve	x	
Instrument	x	
Electrical equipment	x	
Construction machine		x
Construction tool	x	
Laboratory/Testing Equipment	x	
Special maintenance tools	x	

(1) Cement

Ready mixed concrete is available in the Philippines and the price of this cement is lower than importing it from Japan. Therefore, the Philippine made cement is acceptable.

(2) Reinforcing Rod

Reinforcing rod, which conforms to worldwide standards, is locally available at reasonable prices. Therefore, reinforcing rod made in the Philippines shall be adopted.

(3) Aggregate and Bricks

Aggregate and bricks are locally available and their prices are reasonable. Aggregate and bricks made in the Philippines shall be adopted.

(4) Plywood Forms

For this Project, plywood forms will be used for the concrete structure holdings for the baffle wall construction. Plywood from the Philippines is not consistent in quality and demand for the construction purposes is small since most structures in the Philippines are made of bricks. Therefore, plywood processed in Japan shall be used.

(5) Pump

Small sized or general purpose type of pumps are available in the Philippines and some pumps to be used in the Project would be small sized. However, since the reliability of delivery time and the quality of the steel materials have not been confirmed, pumps made in Japan shall be adopted.

(6) Valves

The valves, most of which are imported, are locally available. However, the specifications are limited and some specifications required for the Project are not available. Therefore, valves made in Japan shall be adopted.

(7) Water Treatment Facilities/Equipment

The water treatment facilities/equipment to be used for the Project are very special and must be manufactured according to the shop drawings. There are no locally manufactured water treatment facilities available. Therefore, facilities/equipment made in Japan shall be adopted.

(8) Pipes (PVC)

PVC pipes are manufactured in the Philippines. However, the specifications are limited and are of varying quality. Its availability in large quantities is very limited in the market, which would adversely influence the construction schedule. Therefore, pipes (PVC) made in Japan shall be adopted.

(9) Instrumentation

Most parts of the instrumentation are imported and have different standards. The availability is very limited in the market due to low production rate. Therefore, instruments made in Japan shall be adopted.

(10) Electric Equipment

The electric equipment to be used for the Project are very special and must be manufactured according to the shop drawings. Therefore, the locally available ones cannot be used.

(11) Construction Machines

Construction machines, such as concrete mixers, crane, trucks etc. are available in the local lease market and their quality is judged to be in good condition. Therefore, construction machines shall be supplied from the local market.

(12) Construction Tools

The construction tools, such as transformers, welding machines, water pumps etc. in the local lease market are not reliable. Tools shall be supplied from Japan.

(13) Laboratory Equipment and Testing Equipment

Laboratory equipment and testing equipment to be purchased for the Project are standard ones, however, they are not available locally. Therefore, such equipment is to be purchased in Japan.

(14) Special Maintenance Tools

Special maintenance tools for the facilities/equipment to be used for the Project are not available in the Philippines. Therefore, those made in Japan shall be adopted.

4.4.5 Implementation Schedule

(1) Construction Schedule

A construction schedule has been prepared as shown in Figure 4.4.2, taking into account the rainy season falls from June to October. Outdoor works such as earthworks and concrete placing will be avoided during this season.

(2) Construction Period

The construction period is determined to be a total of 19 months as shown in Fig. 4.4.2.

4.4.6 Scope of Work

The scope of work to be undertaken by each Government necessary for the implementation of the Project is shown in Table 4.4.3.

Table 4.4.3 Scope of Work to be Undertaken by Each Government

Item No.	To be Covered Description	To be Covered by the GOP	by Japan
1	To clear, level the site	x	
2	The distribution of electrical line to the site	x	
3	To construct gates and fences in and around the site	x	
4	Procurement of project materials		x
5	Transportation of project materials		x
6	Installation of project materials		x
7	Test operation		x
8	Construction supervision		x
9	O&M of the facilities after commissioning	x	
10	O&M of the equipment after commissioning	x	

FIG. 4.4.2 PROJECT IMPLEMENTATION SCHEDULE

Cumulative Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
Description	● E / N(1)					● E / N(2)	● B I D	● A G R																				
Detailed Design	[Bar chart showing duration from month 1 to 5]																											
Manufacturing/Inspection	[Bar chart showing duration from month 12 to 15]																											
Sea Transportation	[Bar chart showing duration from month 15 to 16]																											
Site Preparation	[Bar chart showing duration from month 16 to 17]																											
Plant No.1/Chemicals	[Bar chart showing duration from month 17 to 18]																											
Inland Transportation	[Bar chart showing duration from month 18 to 19]																											
Mech. Installation	[Bar chart showing duration from month 19 to 21]																											
Elec. Installation	[Bar chart showing duration from month 21 to 22]																											
Plant No.2	[Bar chart showing duration from month 22 to 23]																											
Inland Transportation	[Bar chart showing duration from month 23 to 24]																											
Mech. Installation	[Bar chart showing duration from month 24 to 25]																											
Elec. Installation	[Bar chart showing duration from month 25 to 26]																											
Test Run	[Bar chart showing duration from month 26 to 27]																											
Training	[Bar chart showing duration from month 27 to 28]																											

CHAPTER 5

PROJECT EVALUATION AND CONCLUSION

CHAPTER 5 PROJECT EVALUATION AND CONCLUSION

5.1 Effects

The following shall be the direct effects of the Plant operation with the implementation of the Project.

- (1) To be able to distribute raw water easily and properly to the Plant No.1 and No.2

The present problems caused by the deteriorated gates will be solved. Easy management of raw water distribution will be realized in cooperation with the flow meter provided by the other project, using the gate valves to be replaced.

- (2) To be able to improve the coagulation/flocculation/sedimentation processes

By provision of new rapid mixers , the coagulation process, which is to disperse the coagulant uniformly throughout the entire mass of raw water with maximum possible rapidity, will be ensured. The flocculation process will be further enhanced by new flocculators, during which the suspended particles in the water coalesce into larger masses so that they may be removed from the water in subsequent treatment processes, particularly by sedimentation. The O&M of the sedimentation tanks will be easier, which will eliminate the fluctuation of the settled water quality by periodical sludge management. Consistent sludge removal ensures settled water quality and sufficient filter run and its treatability. The weir loading rate of the existing weir of each sedimentation basin, calculated to be 5,000 cu.m/m/d, will be reduced to a standard level of 300 to 500 cu.m/m/d by construction of additional launders, eliminating the existing problems of sediment stirred up after settling and the carrying-over of light-weighted flocs to the filters.

- (3) To be able to improve filtration process

This will improve the quality of filtered water in compliance with the National Standard for Drinking Water. The present O&M difficulties due to

the deteriorated operation valves will be solved by automatic operation. Likewise, such problems caused by the differences of the operator's ability and judgment will be eliminated.

(4) To be able to feed appropriate rate of chemicals

At present, the optimum chemical dosage is initiated by the Jar Test. This however, cannot be reflected immediately in the actual operation of the chemical feeding facilities. After the rehabilitation, each chemical feed facility will be recovered and operated in connection with the flow measurement of the raw water by the new flow meters installed by MWSS, improving the treated water.

The direct effects to the Plant will be reflected to the residents of Metro Manila as follows:

(5) The improvement of the treated water quality and the treatment capacity of the Plant will be restored to the designed production capacity of 1.6 million cu.m/d which is approximately 20% higher productivity than the present production capacity of 1.35 million cu.m/d.

(6) The above qualitative and quantitative effects will benefit more than 9 million persons in the service area of 1,800 sq.km.

5.2 Conclusion

The Plant, constructed initially in 1935 with a treatment capacity of 190,000 cu.m/d, was expanded in 1958 up to a treatment capacity of 834,000 cu.m/d (Plant No.1 ; 380,000 cu.m/d and Plant No.2 ; 454,000 cu.m/d) . After several upgrades, Plant No.2 sedimentation facilities in 1965 and 1968, Plant No.2 filtration facilities in 1970, and the upgrading project in 1981, the present designed treatment capacity increased to 1.6 million cu.m/d. Some of the facilities/equipment have been used over 55 years and have deteriorated greatly since its construction. However, due to the shortage of budget of the organization concerned, only small scale replacements have been done. Even when sufficient budget was allocated, the priority of O&M implementation was not recognized for a long time. Difficulties have been encountered in operating the plant effectively such that the

deterioration of water supply has reached serious proportions.

This Project aims at improving the treated water quality of the Plant, meeting the policies of both the CORPORATE PLAN, the Metro Manila Water Supply Master Plan, and the National Plan. Its benefits will be felt by the entire MM service area where 9 million people presently live. The implementation of the Project therefore is expected to contribute to the improvement of the living and health conditions of the residents in MM.

Furthermore, combined with other on-going projects, the Balara Treatment Plant Rehabilitation Project brings much improvement of water supply condition for MM.

5.3 Recommendation

It is recommended that the Philippine side should implement the following measures to ensure maximization of the Project's effects and benefits:

5.3.1 Before the Implementation of the Project

- (1) To secure the necessary budget, especially for the O&M.
- (2) To organize a promotion committee of the Project in order to coordinate the Project smoothly.
- (3) To make efforts in public relations regarding the consumers who have overhead tanks or underground sumps on their property to improve the sanitary conditions of the distributed water in order to minimize the risk of contamination.
- (4) To carry out the proposed recommendations presented in the section 3.3.5.

5.3.2 During the Implementation of the Project

- (1) To implement those expansion works for the distribution systems which are described in section 3 to accelerate the effects of the Project.

- (2) To organize a Project Team exclusively on a full time basis for the Project consisting of several expert engineers in planning, construction and O&M to take part in the detailed design period through the construction period reflecting such results into the future O&M system.

5.3.3 After the Implementation of the Project

- (1) To improve the collection efficiency of water revenues, which is where the budget for O&M of the Plant will come from.
- (2) To secure a budgetary scheme for the future rehabilitation works of the Plants.
- (3) To implement preventive O&M regularly.
- (4) To secure a budgetary scheme sufficient for O&M.
- (5) To implement training for the officials concerned with O&M.
- (6) To develop institutional and supervisory responsibility for each facility and equipment.
- (7) To implement raw water source control in order to secure good quality raw water in the application of the existing treatment process.
- (8) To secure appropriate storerooms to keep spare parts and tools purchased under the Grant Aid at the Balara Plant.

APPENDICES

- Appendix- 1 List of Members of the Study Team**
- Appendix- 2 Study Schedule**
- Appendix- 3 List of Personnel Concerned**
- Appendix- 4 Minutes of Discussions**
 - 4-1 Minutes of Discussions (August 31, 1993)**
 - 4-2 Minutes of Discussions (November 16, 1993)**
- Appendix- 5 Field Survey Data**
 - 5-1 Existing Mechanical Facilities/Equipment Investigation**
 - 5-2 Existing Electrical Facilities/Equipment Investigation**

APPENDIX - 1

List of Members of the Study Team

LIST OF TEAM MEMBERS OF THE STUDY TEAMS
FOR
THE PROJECT FOR THE REHABILITATION
FOR
THE BALARA WATER TREATMENT PLANT

1. Field Survey Team

Field	Name	Position
Leader	Mr. Fumio Kikuchi	Deputy Director, Consultant Contract Division, Procurement Dept., JICA
Treatment Plant Planner	Mr. Yohihiko Sato	Nippon Jogesuido Sekkei Co., Ltd.
Mechanical Equipment Planner	Mr. Shijekazu Kobayashi	Nippon Jogesuido Sekkei Co., Ltd.
Electrical Equipment Planner	Mr. Jiro Kuroda	Nippon Jogesuido Sekkei Co., Ltd.

2. Draft Report Examination Team

Field	Name	Position
Leader	Mr. Katsuo Shoji	First Project Management Div. Grant Aid Project Management Dept. JICA
Treatment Plant Planner	Mr. Yoshihiko Sato	Nippon Jogesuido Sekkei Co., Ltd.
Mechanical Equipment Planner	Mr. Shijekazu Kobayashi	Nippon Jogesuido Sekkei Co., Ltd.

APPENDIX - 2

Survey Schedule

FIELD SURVEY SCHEDULE
FOR
BASIC DESIGN STUDY
ON
THE PROJECT FOR THE REHABILITATION
FOR
THE BALARA WATER TREATMENT PLANT

DATE	ACTIVITIES
August 4(Wed)	Arrival of First Batch in Manila (Mr. Kobayashi and Mr. Kuroda) Meeting at JICA Philippine Office
5(Thu)	Meeting with the MWSS Site survey Data collection
13(Fri)	Arrival of Second Batch in Manila (Mr. Sato) Meeting at JICA Manila Office
25(Wed)	Arrival of Third Batch in Manila (Mr. Kikuchi) Meeting at JICA Manila Office and Embassy of Japan in Manila
31(Tue)	Signing of Minutes of Discussions
September 1(Wed)	Leave for Tokyo (Mr. Kikuchi and Mr. Sato)
2(Thu)	Leave for Tokyo (Mr. Kobayashi and Mr. Kuroda)
<p>Note: Unless otherwise mentioned, the study team conducted the site survey, data collection, and the meeting with the MWSS.</p>	

DRAFT FINAL REPORT EXPLANATION
 FOR
 BASIC DESIGN STUDY
 ON
 THE PROJECT FOR THE REHABILITATION
 FOR
 THE BALARA WATER TREATMENT PLANT

DATE	ACTIVITIES
<i>November</i>	
10 (Thu)	Arrival of the Team in Manila (Mr. Shoji, Mr. Sato , and Mr. Kobayashi) Meeting at JICA Philippine Office and Embassy of Japan in Manila
11 (Fri)	Meeting with the MWSS and NEDA (Expalnation of a Draft Final Report)
14 (Mon)	Meeting with the MWSS and NEDA concerning Minutes of Discussions
15 (Tue)	Signing of Minutes of Discussions Report to JICA Philippine Office and Embassy of Japan in Manila of the results of discussions with the MWSS
16 (Wed)	Leave for Tokyo (Mr. Shoji, Mr. Sato, and Mr. Kobayashi) Meeting at JICA Manila Office and Embassy of Japan in Manila

APPENDIX - 3

List of Personnel Concerned

LIST OF PERSONNELS CONCERNED

• METROPORITAN WATERWORKS AND SEWERAGE SYSTEM

Mr. Teofilo I. Asuncion	Administrator
Mr. Eduardo M. del Fierro	Senior Deputy Administrator
Mr. Ruben A. Hernandez	Deputy Administrator for Construction Management
Mr. Nestor C. Fernando	Deputy Administrator for Operations
Mr. Leovigildo S. Veroy	Deputy Administrator for Engineering
Mr. Alfredo U. Tirante	Deputy Administrator for Customers Service
Ms. Loida S. Dino	Deputy Administrator for Finance
Mr. Gregorio N. Garcig	Acting Deputy Administrator for Administration

• EMBASSY OF JAPAN, PHILIPPINES

Dr. Etsuro Kashiwagi	First Secretary
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• JICA, PHILIPPINE OFFICE

Mr. Akihiko Hashimoto	Resident Representative
Mr. Atusi Fukuda	Assistant Resident Representative
Mr. Yukihiro Ejiri	Assistant Resident Representative

• JICA EXPERT

Mr. Hirotaka Honda	Dispatched to MWSS
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• MWSS COUNTERPART TEAM

Mr. Alben Q. Bukuhan	Project Coordinator
Mr. Federic B. Tumanon	Assistant Project Coordinator
Mr. Ruben D. Santos	Civil Works Construction
Mr. Miguel Ortiz	Management of Balara WTP, Chemical Treatment
Mr. Elmer Ceguerra	Treatment Plant Design
Ms. Gloria De La Cruz	Distribution Main Sampling
Mr. Ananias Hernandez	Mechanical
Mr. Dan F. Fabic	Electrical
Mr. Rogelio D. Roasa	Instrumentation
Mr. Herminigildo Castillo	Filter Plant Operation
Ms. Amparo C. Canamo	Water Analysis
Ms. Elizabeth M. Cruz	Financial/Economic Analysis
Mr. Encarnacion J. Buenaventura	Budget
Mr. Bienvenido Gaurino	Estimates

APPENDIX - 4

Minutes of Discussions

APPENDIX 4-1

**Minutes of Discussions
(August 31, 1993)**

MINUTES OF DISCUSSIONS
BASIC DESIGN
ON
THE BALARA WATER TREATMENT PLANT
REHABILITATION PROJECT
IN
THE REPUBLIC OF THE PHILIPPINES


In response to a request from the Government of the Republic of the Philippines (hereinafter referred to as "the GOP"), the Government of Japan decided to conduct a Basic Design Study on the Balara Water Treatment Plant Rehabilitation Project (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to the Republic of the Philippines a study team (hereinafter referred to as "the Team"), which was headed by Mr. Fumio KIKUCHI, Deputy Director, Consultant Contract Division, Procurement Department, JICA, and is scheduled to stay in the country from August 4 to September 2, 1993.

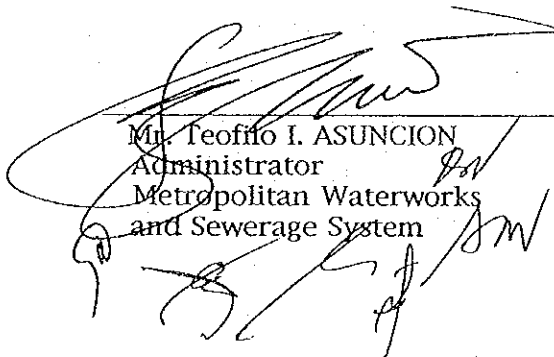
The Team held discussions with the officials concerned of the GOP and conducted a field survey at the study area.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study report.

Manila, August 31, 1993



Mr. Fumio KIKUCHI
Leader
Basic Design Study Team
JICA



Mr. Teofilo I. ASUNCION
Administrator
Metropolitan Waterworks
and Sewerage System

ATTACHMENT

1. Objectives

The objective of the Project is to rehabilitate the Balara Water Treatment Plant to ensure the supply of good quality water to the public.

2. Project site

The Project site is located at Katipunan Road, Balara, Quezon city 1105, Metro Manila, Philippines which is shown in Annex I.

3. Responsible organization, executing organization

Metropolitan Waterworks and Sewerage System (MWSS) is responsible for the administration and execution of the Project.

4. Items requested by the Government of the Philippines

After discussions with the Team, those items described in Annex II were finally requested by the Philippine side.

Moreover, the Philippine side requested to include other deteriorated items with the Project which are recommended as Level II rehabilitation in the Feasibility Study Report prepared by JICA in March, 1992.

However, the final items of the Project will be decided after further studies.

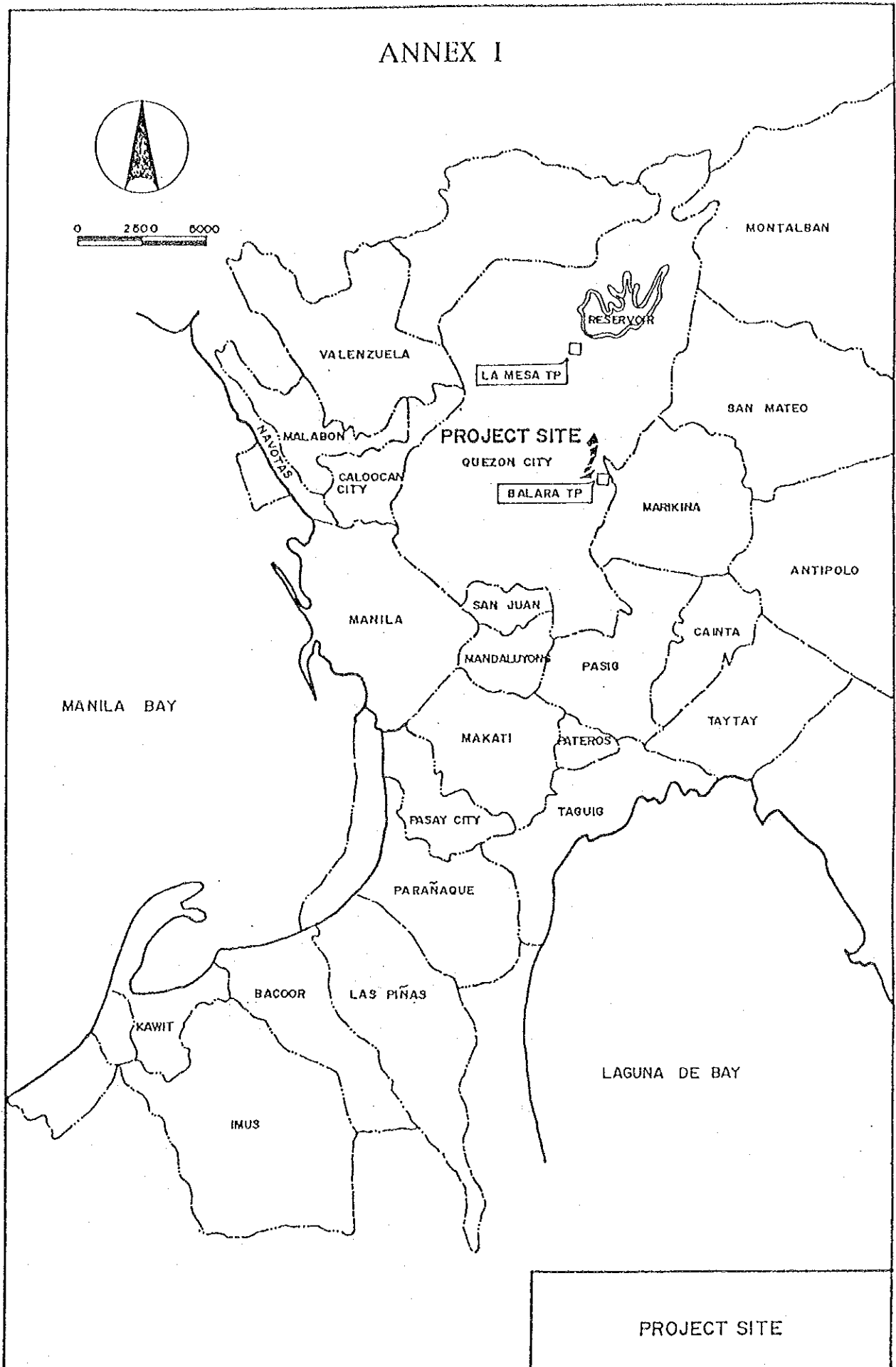
5. Japan's Grant Aid System

- (1) The GOP has understood the system of Japanese Grant Aid explained by the Team.
- (2) The Philippine side will take necessary measures, as described in Annex III for the smooth implementation of the Project, on condition that Grant Aid by the Government of Japan is extended to the Philippines.

6. Schedule of the Study

- (1) The Team will proceed to further studies in the Philippines until September 2, 1993.
- (2) Based on the Minutes of Discussions and technical examination of the study results, JICA will prepare the draft final report in English and dispatch a mission in order to explain its contents in November, 1993.
- (3) In case that the contents of the report are accepted in principle by the Philippine side, JICA will complete the final reports and send them to the GOP by the end of January, 1994.

ANNEX I



ANNEX II

The contents of the request made by the Government of the Philippines are listed below:

1. Mechanical Equipment for Plant No. 1
 - a. Aqueduct No. 1 & 2
Replacement of four (4) units of gates including headstocks
 - b. Rapid mixers
Replacement of two (2) units of rapid mixers
 - c. Flocculators
Replacement of eight (8) units of flocculators
 - d. Accelators
Replacement of two (2) sets of sludge blow-off equipment including valves
 - e. Filters
Replacement of ten (10) units of venturi tubes and effluent valves, one (1) set of main backwash valve, and one (1) set of main surface wash valve
 - f. Washwater pumps
Replacement of two (2) units of washwater pumps
 - g. Washwater recovery pumps
Replacement of three (3) units of washwater recovery pumps
2. Mechanical Equipment for Plant No. 2
 - a. Flocculators
Replacement of all flocculators
 - b. Sedimentation equipment
Replacement of shaft support for drain penstocks and two (2) units of flushing pumps
 - c. Filters
Replacement of twenty (20) units of venturi tubes and effluent valves, one (1) set of main backwash valve, one (1) set of main surface wash valve
 - d. Washwater pumps
Replacement of three (3) units of pumps
3. Mechanical Equipment for Chemical Dose
 - a. Alum dose equipment
Replacement of six (6) units of feeders
 - b. Chlorine dose equipment
Replacement of four (4) units of chlorinators, two (2) units of evaporators, three (3) units of chlorine leak detectors, three (3) units of exhaust fans, three (3) units of chlorine booster pumps, two (2) units of weighing scales, and dosing pipes
 - c. Polymer dose equipment
Replacement of five (5) units of feeders
4. Electrical Equipment for Plant No. 1
 - a. Motor control panels
Replacement of those panels for accelators, washwater pumps, and washwater recovery pumps
 - b. Distribution panels
Replacement of washwater pump panels
5. Electrical Equipment for Plant No. 2
 - a. Motor control panels

- Replacement of those panels for flocculators, washwater pumps, and washwater recovery pumps
- b. Distribution panels
Replacement of distribution panels for filter building
6. Electrical Equipment for Chemical Dose
 - a. Motor control panels
Replacement of three (3) units of motor control panels
 7. Instrumentation Equipment
 - a. Flow meter
Installation of flow meter with control for surface wash and washwater and flow meter for washwater recovery water for Plant No. 1 & 2
 - b. Level meter
Replacement of those level meters for washwater tanks for Plant No.1 & 2 and alum tanks
 - c. Loss of head devices for all filters
Replacement of thirty (30) units of loss of head devices for Plant No. 1& 2
 - d. Rate of flow control devices for all filters
Replacement of thirty (30) units of rate of flow control devices including modification
 - e. Instrument panel
Replacement and installation of new instrument panel for supervision (2 panels)
 8. Miscellaneous
 - a. Lab. equipment
Provision of the plant lab. equipment and the central lab. equipment
 - b. Testing equipment
Provision of testing equipment

ANNEX III

Necessary measures to be taken by the GOP on condition that Japan's Grant Aid is extended:

1. To secure the site for the Project.
2. To clear, level and reclaim the site prior to commencement of the Project.
3. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the site.
4. To construct the access road to the site prior to commencement of the construction.
5. To provide facilities for distribution of electricity and other incidental facilities in and around the project site.
6. To bear commissions to the Japanese foreign exchange bank for the banking services based on the banking arrangement.
7. To exempt taxes and to take necessary measures for custom clearances of the materials and equipment brought for the Project at the port of disembarkation.
8. To exempt Japanese nationals from custom duties, internal taxes and other fiscal levies which may be imposed in the Philippines with respect to the supply of the products and services under the verified contracts.
9. To accord Japanese nationals, whose services may be required in connection with the supply of the products and the services under the verified contracts, such facilities as may be necessary for the performance of their work.
10. To use and maintain properly and effectively the facilities rehabilitated and equipment purchased under the Grant Aid.
11. To bear operation and maintenance cost of facilities/equipment rehabilitated under this Project.
12. To bear all the expenses other than those to be borne by the Grant, necessary for the execution of the Project including those shown in Annex IV.
13. To organize a Project Team exclusively on full time basis for the Project consisting of several expert engineers on planning, construction, and operation and maintenance to take part in the detailed design period through construction period reflecting the results to the future operation and maintenance system.

ANNEX IV

The scope of rehabilitation work to be done by MWSS are listed below:

1. Plant NO. 1
 - a. Sedimentation
Excavation of sludge discharge creek
 - b. Accelerator
Repair of operation house
 - c. Washwater
Repair of pump house
 - d. Washwater recovery
Reconstruction of pump house

2. Plant No. 2
 - a. Sedimentation
Reinforcement of foundation of inflow headstocks and
construction of flushing pump house
 - b. Washwater
Repair of pump house

3. Electrical Equipment
 - a. Power receiving
Replacement of wooden poles for 34.5 kv O/H distribution (24
pcs)
 - b. Low voltage main service line
Replacement of O/H wires
 - c. Lighting panel for Plant No. 1
Modification of interior devices and installation of new meters
on panel at settling basin Nos. 1 & 2, filter building, and
washwater recovery pump
 - d. Interior lighting
Replacement and improvement of illumination
 - e. Street lighting
Replacement

APPENDIX 4-2

**Minutes of Discussions
(November 16, 1993)**

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
ON
THE PROJECT FOR THE REHABILITATION
OF
THE BALARA WATER TREATMENT PLANT
IN
THE REPUBLIC OF THE PHILIPPINES
(CONSULTATION ON DRAFT REPORT)

In August 1993, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study team on the Project for the Rehabilitation for the Balara Water Treatment Plant (hereinafter referred to as "the Project") to the Republic of the Philippines, and through discussions, field survey, and technical examination of the results in Japan, has prepared the draft report of the study.

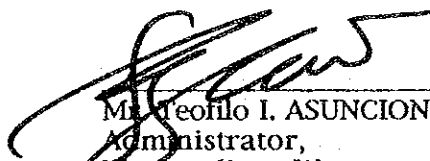
In order to explain and to consult the Philippine side on the components of the draft report, JICA sent to the Philippines a study team, which is headed by Mr. Katsuo SHOJI, First Project Management Division, Grant Aid Project Management Department, and is scheduled to stay in the country from November 10, 1993 to November 16, 1993.

As a result of discussions both parties confirmed the main items described on the attached sheets.

Manila, November 15, 1993

小路克雄

Mr. Katsuo SHOJI
Leader,
Draft Report Explanation
Team, JICA



Mr. Teofilo I. ASUNCION
Administrator,
Metropolitan Waterworks
and Sewerage System

ATTACHMENT

1. Components of Draft Report

The Government of the Philippines has agreed and accepted in principle the components of the Draft Report proposed by the team.

2. Items Requested by the Government of the Philippines

After discussions with the team, those items described in ANNEX I were finally requested by the Philippine side.

3. Japan's Grant Aid System

- (1) The Government of the Philippines has understood the system of Japanese Grant Aid explained by the team.
- (2) The Government of the Philippines will take necessary measures described in ANNEX II, for smooth implementation of the Project in case that the Grant Aid assistance by the Government of Japan is executed .

4. Further Schedule

The team will make the Final Report in accordance with the confirmed items, and send it to the Government of Philippines by the end of January, 1994.



ANNEX I

The contents of the request made by the Government of the Philippines are listed below:

1. Mechanical Equipment for Plant No. 1
 - a. Aqueduct No. 1 & 2
Improvement of intake equipment
 - b. Rapid mixers
Replacement of rapid mixers
 - c. Flocculators
Replacement of flocculators
 - d. Sedimentation
Replacement of deteriorated sedimentation equipment
 - e. Filters
Replacement of venturi tubes and effluent valves, main backwash valve, and main surface wash valve
 - f. Pump equipment
Replacement of deteriorated pumps
2. Mechanical Equipment for Plant No. 2
 - a. Flocculators
Replacement of flocculators
 - b. Sedimentation
Replacement of deteriorated sedimentation equipment
 - c. Filters
Replacement of venturi tubes and effluent valves, main backwash valve, main surface wash valve
 - d. Pump equipment
Replacement of deteriorated pumps
3. Mechanical Equipment for Chemical Dose
 - a. Alum dose equipment
Replacement of feeders
 - b. Chlorine dose equipment
Replacement of deteriorated chlorination facilities/equipment
 - c. Polymer dose equipment
Replacement of feeders
4. Electrical Equipment for Plant No. 1
 - a. Motor control centers
Replacement of those control centers which control mechanical facilities/equipment to be replaced
 - b. Distribution panel
Replacement of washwater pump panel
5. Electrical Equipment for Plant No. 2
 - a. Motor control centers
Replacement of those control centers which control mechanical facilities/equipment to be replaced
6. Electrical Equipment for Chemical Dose
 - a. Motor control centers
Replacement of those control centers for chlorination and polymer dose
7. Switching Station Facilities
 - a. 34.5KV switching station
Installation of a switching station at 34.5KV receiving point
8. Instrumentation Equipment

- a. Flow meter
Installation of flow meter with control for surface wash and backwash water for Plant Nos. 1 & 2
- b. Level meter
Replacement of those level meters for washwater tanks for Plant Nos.1 & 2 and alum storage tanks
- c. Loss of head devices for filters
Replacement of loss of head devices for Plant Nos. 1 & 2
- d. Rate of flow control devices for all filters
Replacement of rate of flow control for Plant Nos.1 & 2
- e. Instrument panel for chemical dosing facilities
Installation of a new instrumentation panel for monitoring alum storage tank level

9. Miscellaneous

- a. Laboratory equipment
Provision of the plant laboratory equipment and the central laboratory equipment
- b. Testing equipment
Provision of testing equipment

ANNEX II

Necessary measures to be taken by the Government of the Philippines in case that Japan's Grant Aid is executed:

1. To secure the site for the Project.
2. To clear, level and reclaim the site prior to commencement of the Project.
3. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the site.
4. To construct the access road to the site prior to commencement of the construction.
5. To provide facilities for distribution of electricity and other incidental facilities in and around the project site.
6. To bear commissions to the Japanese foreign exchange bank for the banking services based on the banking arrangement.
7. To exempt taxes and to take necessary measures for custom clearances of the materials and equipment brought for the Project at the port of disembarkation.
8. To exempt Japanese nationals from custom duties, internal taxes and other fiscal levies which may be imposed in the Philippines with respect to the supply of the products and services under the verified contracts.
9. To accord Japanese nationals, whose services may be required in connection with the supply of the products and the services under the verified contracts, such facilities as may be necessary for the performance of their work.
10. To use and maintain properly and effectively the facilities rehabilitated and equipment purchased under the Grant Aid.
11. To bear operation and maintenance cost of facilities/equipment rehabilitated under this Project.
12. To bear all the expenses other than those to be borne by the Grant, necessary for the execution of the Project.
13. To organize a Project Team exclusively on full time basis for the Project consisting of several expert engineers on planning, construction, and operation and maintenance to take part in the detailed design period through construction period reflecting the results to the future operation and maintenance system.
14. To secure approval from the Investment Coordinating Committee (ICC) and send copies of the approval to JICA Manila, if necessary.

APPENDIX - 5

Field Survey Data

APPENDIX 5-1

Existing Mechanical Facilities/Equipment Investigation

Appendix 5-1 EXISTING MECHANICAL FACILITIES/EQUIPMENT INVESTIGATION

The Study Team conducted an investigation of the operating conditions of the existing mechanical facilities/equipment. The results of the investigation are summarised as shown below:

Level	Description
A	Operational/Functionable without replacement
B	Need to repair /replace some parts
C	Need to replace entirely

According to the investigation, the Project involves the rehabilitation of facilities/equipment leveled B and C.

AQUEDUCT

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
1.	SLUICE GATE	QTY : 4 UNITS TYPE : MANUALLY OPERATED WITH STEEL PEDESTAL SIZE : WIDTH : 2.2 m HEIGHT: 2.2 m	1958			O	
		QTY : 1 UNIT TYPE : MANUALLY OPERATED WITH STEEL PEDESTAL SIZE : WIDTH : 1.65 m HEIGHT: 1.65 m	1958			O	

PLANT No.1 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
1.	SEDIMENTATION BASIN NO.1 STRUCTURE						
	1) RAPID MIXING	CONCRETE STRUCTURE - CHANNEL DIMENSION : 2.0m W × 2.8m D					
	2) FLOCCULATION BASIN	CONCRETE STRUCTURE WITH PARTITION DIMENSION : 32.44 mL × 21.25 mW × 5.0 mD					
	3) SEDIMENTATION BASIN	CONCRETE STRUCTURE DIMENSION: 190.2mL × 21.25mW × 5.0mD					
1.1	RAPID MIXER	QTY : 1 UNIT TYPE : VERTICAL TURBINE MOTOR OUTPUT : 7.5kw SIZE : IMPELLER DIAMETER:450mm	1981			0	
1.2	FLOCCULATOR	QTY : 12 UNITS TYPE : VERTICAL TURBINE TYPE MOTOR OUTPUT : 1.5kw SIZE : IMPELLER DIAMETER 838 mm	1981			0	
1.3	SLUICE GATE	QTY : 7 UNITS TYPE : MANUAL OPERATED SLUICE GATE SIZE : 2.0m × 2.04m	1935			0	

PLANT No.1 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
1.4	DRAIN VALVE FOR SEDIMENTATION BASIN No.1 & No.2	QTY : 6 UNITS MANUAL OPERATED GATE VALVE SIZE : I.D.600mm	1935	O			
1.5	DRAIN VALVE FOR AQUEDUCT No.2	QTY : 4 UNITS MANUAL OPERATED GATE VALVE SIZE:I.D.250mm	1935	O			
2.	SEDIMENTATION BASIN NO.2 STRUCTURE						
	1)RAPID MIXING	CONCRETE STRUCTURE - CHANNEL DIMENSION:2.0mW X 2.8mD					
	2)FLOCCULATION BASIN	CONCRETE STRUCTURE WITH PARTITION DIMENSION:32.44mL X 21.25mW X 5.0mD					
	3)SEDIMENTATION BASIN	CONCRETE STRUCTURE DIMENSION:199.4mL X 21.25mW X 5.0mD					
2.1	RAPID MIXER	QTY : 1 UNIT TYPE : VERTICAL TURBINE MOTOR OUTPUT : 7.5kw SIZE : IMPELLER DIAMETER-450mm	1981			O	

PLANT No.1 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
2.2	FLOCCULATOR	QTY : 12 UNITS TYPE : VERTICAL TURBINE TYPE MOTOR OUTPUT : 1.5kw SIZE : IMPELLER DIAMETER 838 mm	1981			O	
3.	ACCELATOR ACCELATOR BASIN	CONCRETE STRUCTURE DIMENSION:29.56m X 29.56m X 7.1mD	1958				
3.1	ACCELATOR	QTY : 2 UNITS TYPE : VERTICAL TURBINE MOTOR OUTPUT : 18.6kw	1958/1981			O	
3.2	AIR COMPRESSOR FOR THE PNEUMATIC CONTROL OF SLUDGE BLOW-OFF VALVE	QTY : 1 UNIT MOTOR OUTPUT : 1.5kw AIR RECEIVER TANK COPACITY : 227 liters	1958			O	
3.3	SLUDGE BLOW-OFF VALVE	QTY : 8 UNITS TYPE : PNEUMATIC DIAPHRAGM VALVE SIZE : O.D.180mm	1958			O	
3.4	MANUAL BLOW-OFF VALVE 1) MAIN GATE VALVE	QTY : 2 UNITS TYPE : MANUAL OPERATED SLUICE GATE SIZE:O.D.500mm	1958		O		

PLANT No.1 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
	2) QUICK OPEN VALVE	QTY : 2 UNITS TYPE : MANUAL OPERATED VALVE SIZE: O.D. 260mm	1958			O	
3.5	INFLOW GATE VALVE	QTY : 2 UNITS TYPE : MANUAL OPERATED VALVE SIZE: I.D. 1.07m	1958	O			
3.6	SLUICE GATE BETWEEN SEDIMENTATION BASINS, ACCELERATORS AND FILTER	QTY : 2 UNITS TYPE : MANUAL OPERATED SLUICE GATE SIZE : 2m X 2.08m	1935	O			
4.	FILTER STRUCTURE 1) FILTER BED	CONCRETE STRUCTURE DIMENSION: 15.3mL X (5.3+5.3)mW FILTER BED: 162m ² /bed THICKNESS OF FILTER MEDIA: ANTHRACITE: 500mm SAND: 250mm GRAVEL: 450mm					

PLANT No.1 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
4.1	VALVES						
	1)INFLUENT SLUICE GATE	QTY : 10 UNITS TYPE : HYDRAULIC OPERATED SIZE : 600mm DIA.	1935		O		
	2)WASH DRAIN SLUICE GATE	QTY : 10 UNITS TYPE : HYDRAULIC OPERATED SIZE : 600mm DIA.	1935		O		
	3)FILTER DRAIN VALVE						
	a.FILTER DRAIN VALVE-I	QTY : 16 UNITS TYPE : MANUAL OPERATED GATE VALVE SIZE : 0.D.180mm	1935		O		
	b.FILTER DRAIN VALVE-II	QTY : 16 UNITS TYPE : HYDRAULIC OPERATED GATE VALVE SIZE : 0.D.305mm	1935		O		
	4)WASHWATER VALVE	QTY : 10 UNITS TYPE : HYDRAULIC OPERATED BUTTERFLY VALVE SIZE:0.D.800mm	1981		O		
	5)EFFLUENT VALVE	QTY : 10 UNITS TYPE : HYDRAULIC OPERATED BUTTERFLY VALVE SIZE:0.D.450mm	1981			O	

PLANT No.1 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
6)	SURFACE WASH VALVE	QTY : 10 UNITS TYPE : HYDRAULIC OPERATED BUTTERFLY VALVE SIZE:0.D.457mm	1981		O		
7)	EFFLUENT MAIN VALVE	QTY : 1 UNIT TYPE : MANUAL OPERATED SIZE:1.D.1.220m	1935	O			
8)	MAIN BACKWASH VALVE	QTY : 10 UNITS TYPE : HYDRAULIC OPERATED BUTTERFLY VALVE SIZE:0.D.800mm	1981			O	
9)	MAIN SURFACE WASH VALVE	QTY : 10 UNITS TYPE : HYDRAULIC OPERATED BUTTERFLY VALVE SIZE:0.D.457mm	1981			O	
4.2	HYDRAULIC CONTROL						
1)	PUMP	QTY : 2 UNITS TYPE : CENTRIFUGAL TURBINE TYPE MOTOROUTPUT : 5.5kw	1981		O		
2)	AIR COMPRESSOR	RECIPROCATING MOTOR : 0.73kw	1981		O		
3)	PRESSURE WATER TANK	QTY : 2 UNITS CAPACITY : 2.42m ³	1958	O			

PLANT No.1 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
5.	WASHWATER PUMPING HOUSE	CONCRETE STRUCTURE DIMENSION:24.4m X 47.42m X 2.0mD					
5.1	WASHWATER PUMP	QTY : 1 UNIT TYPE : CENTRIFUGAL-VOLUTE TYPE CAPACITY : 110liters/sec HEAD : 33.5m MOTOR OUTPUT : 45kw	1949			O	
		QTY : 1 UNIT TYPE : CENTRIFUGAL-VOLUTE TYPE CAPACITY:177L/sec HEAD:21m MOTOR OUTPUT : 49kw	1968			O	
		QTY : 1 UNIT TYPE : CENTRIFUGAL-VOLUTE TYPE CAPACITY:110 liters/sec HEAD:33.5m MOTOR OUTPUT : 45kw	1949			O	

PLANT No.1 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
6.	RECOVERY PUMP STATION	STEEL FRAMED STRUCTURE DIMENSION: 14mL x 47mL					
6.1	RECOVERY PUMP	QTY : 1 UNIT TYPE : CENTRIFUGAL-VOLUTE TYPE CAPACITY : 6.6 m ³ /min HEAD : 33.5 m MOTOR OUTPUT : 45kw	1981			O	
		QTY : 1 UNIT TYPE : CENTRIFUGAL-VOLUTE TYPE CAPACITY: 6.6 m ³ /min HEAD: 33.5 m MOTOR OUTPUT : 37.3kw	1981			O	

PLANT No.2 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
1.	RECEIVING WELL	CONCRETE STRUCTURE					
2.	PARSHALL FLUME	CONCRETE STRUCTURE SIZE OF THROAT:3.658m					
3.	FLOCCULATION&SEDIMENTATION BASIN STRUCTURE						
	1)FLOCCULATION BASIN	CONCRETE STRUCTURE DIMENSION:16.02mW×19.25mL×3.5-6.2mD					
	2)SEDIMENTATION BASIN	CONCRETE STRUCTURE DIMENSION:18.3mW×73.2mL×6.77-7.68mD					
3.1	FLOCCULATOR						
	1)FLOCCULATOR FOR FLOCCULATION BASIN NO.1 (SOUTH)	QTY : 6 UNITS TYPE : HORIZONTAL TYPE MOTOR output : 3.7kw PADDLE SIZE: PADDLE No.1 : 4 PADDLES DIAMETER OF PADDLE:2.72m WOODEN PADDLE:60×90×3010mm NO. OF PADDLE:3PCS/ARM×4ARMS	1965			O	

PLANT No.2 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
		PADDLE No2. : 4 PADDLES DIAMETER OF PADDLE:3.54m WOODEN PADDLE:60×100×3070mm NO. OF PADDLE:2PCS/ARM×4ARMS PADDLE No3. : 4 PADDLES DIAMETER OF PADDLE:3.6m WOODEN PADDLE:45×150×3010mm NO. OF PADDLE:1PCS/ARM×4ARMS					
	2)FLOCCULATOR FOR FLOCCULATION BASIN NO.2 (NORTH)	QTY : 6 UNITS TYPE : HORIZONTAL TYPE MOTOR output : 3.7kw PADDLE SIZE: PADDLE NO1. : 4 PADDLES DIAMETER OF PADDLE:2.72m WOODEN PADDLE:60×90×3010mm NO. OF PADDLE:3PCS/ARM×4ARMS	1968			O	

PLANT No.2 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
3.2 VALVES	1) MAIN INFLUENT SLUICE GATE	PADDLE NO2. : 4 PADDLES	1965				
		DIAMETER OF PADDLE: 3.54m					
		WOODEN PADDLE: 60 × 100 × 3070mm					
	2) INFLUENT SLUICE GATE	NO. OF PADDLE: 2PCS/ARM × 4ARMS	1965/1968				
		PADDLE NO3. : 4 PADDLES					
		DIAMETER OF PADDLE: 3.6m					
	3) EFFLUENT SLUICE GATE	WOODEN PADDLE: 45 × 150 × 3010mm	1965/1968				
		NO. OF PADDLE: 1PCS/ARM × 4ARMS					
		QTY : 2 UNITS					
	1) MAIN INFLUENT SLUICE GATE	TYPE : MANUALLY OPERATED	1965	O			
		SIZE : 1.93 × 1.93m					
		QTY : 24 UNITS					
	2) INFLUENT SLUICE GATE	TYPE : MANUALLY OPERATED	1965/1968	O			
		SIZE : 1.35 × 1.35m					
		QTY : 24 UNITS					
	3) EFFLUENT SLUICE GATE	TYPE : MANUALLY OPERATED	1965/1968	O			
		SIZE : 1.35 × 1.35m					
		QTY : 24 UNITS					

PLANT No.2 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
3)	DRAIN SLUICE GATE	QTY : 12 UNITS TYPE : MANUALLY OPERATED SIZE:1.10×1.10m	1965/1968		O		
3.3	FLUSHING PUMP	QTY : 2 UNITS TYPE : CENTRIFUGAL-VOLTE TYPE CAPACITY: 0.8 m3/min HEAD: 20 m MOTOR OUTPUT : 18.7kw	1965/1968			O	
4.	FILTER STRUCTURE						
	1)FILTER BED	CONCRETE STRUCTURE DIMENSIONS : 15.3 mL x (5.3 + 5.3) mW FILTER BED AREA:162m2 THICKNESS OF FILTER MEDIA: ANTHRACITE:400mm SAND :400mm GRAVEL :400mm					

PLANT No.2 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
4.1	VALVES						
	1)INFLUENT SLUICE GATE	QTY : 20 UNITS TYPE : HYDRAULIC OPERATED SLUICE GATE SIZE : WIDTH:920mm : HEIGHT:760mm	1958/1970		O		
	2)WASH DRAIN SLUICE GATE	QTY : 20 UNITS TYPE : HYDRAULIC OPERATED SLUICE GATE SIZE : WIDTH:1220mm : HEIGHT:610mm	1958/1970		O		
	3)FILTER DRAIN VALVE	QTY : 20 UNITS TYPE : HYDRAULIC OPERATED SLUICE GATE SIZE:0.D.300mm	1958/1970		O		
	4)EFFLUENT VALVE	QTY : 20 UNITS TYPE : HYDRAULIC OPERATED BUTTERFLY SIZE:0.D.570mm	1980			O	
	5)EFFLUENT CONTROL VALVE	QTY : 20 UNITS TYPE : HYDRAULIC OPERATED BUTTERFLY SIZE:0.D.570mm	1958/1970			O	

PLANT No.2 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
6)	WASHWATER VALVE	QTY : 20 UNITS TYPE : HYDRAULIC OPERATED BUTTERFLY SIZE:O.D.1.00mm	1981		○		
7)	SURFACE WASH VALVE	QTY : 20 UNITS TYPE : HYDRAULIC OPERATED BUTTERFLY SIZE:O.D.457mm	1981		○		
4.2	MAIN BACKWASH VALVE	QTY : 1 UNIT TYPE : HYDRAULIC OPERATED BUTTERFLY SIZE : O.D.1.00m	1967			○	
4.3	MAIN SURFACE WASH VALVE	QTY : 1 UNIT TYPE : HYDRAULIC OPERATED BUTTERFLY SIZE : O.D.457mm	1981			○	
4.4	HYDRAULIC CONTROL						
1)	PUMP	QTY : 2 UNITS TYPE : CENTRIFUGAL - TURBINE TYPE MOTOR OUTPUT : 5.5kw	1981	○			
2)	PRESSURED WATER TANK	QTY : 1 UNIT CAPACITY : 5.4m3	1981	○			

PLANT No.2 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
4.5	PNEUMATIC CONTROL 1)AIR COMPRESSOR	QTY : 2 UNITS TYPE : RECIPROCATING	1989	O			
	2)AIR DRYER	QTY : 2 UNITS TYPE : THERMAL MASS DRYER : 0.2kw	1981		O		
5.	WASHWATER PUMPING HOUSE	CONCRETE STRUCTURE DIMENSION:					
5.1	WASH WATER PUMP	QTY : 2 UNITS TYPE : CENTRIFUGAL-VOLUTE TYPE CAPACITY: 8.7 m ³ /min HEAD: 15 m MOTOR OUTPUT : 49kw	1958			O	
		QTY : 1 UNIT TYPE : CENTRIFUGAL-VOLUTE TYPE CAPACITY: 8.7 m ³ /min HEAD: 15 m MOTOR OUTPUT : 45kw	1958			O	

PLANT No.2 MECHANICAL FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
6.	1) WASHWATER RECOVERY SUMP	CONCRETE STRUCTURE DIMENSION: 3.0m W × 19.8m W × 4.9m D					
	2) WASHWATER RECOVERY PUMP STATION	CONCRETE STRUCTURE DIMENSION: 10.5m W × 19.8m L					
6.1	WASHWATER RECOVERY PUMP	QTY : 3 UNITS TYPE : CENTRIFUGAL-VOLUTE TYPE CAPACITY: 8.7 m ³ /min HEAD: 13 m MOTOR OUTPUT : 45kw	1981			O	

CHEMICAL AND CHLORINATION FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
1.	CHEMICAL HOUSE CHEMICAL HOUSE	STEEL FRAMED STRUCTURE DIMENSION: 12mW x (36+18mL) AREA: 1 set FLOOR: 648m ²					
1.1	ALUM DOSING SYSTEM ROTODIP	QTY : 6 UNITS TYPE : VARIABLE SPEED TRANSMISSION MOTOR OUTPUT : 0.25kw	1981			○	
1.2	POLYMER DOSING SYSTEM 1) PUMP	QTY : 5 UNITS TYPE : PLUNGER TYPE MOTOR OUTPUT : 0.37kw	1981			○	
	2) MIXER	QTY : 4 UNITS TYPE : VERTICAL TYPE MOTOR OUTPUT : 1.12kw	1981	○			
	3) MIXING TANK	QTY : 4 TANKS TYPE : VERTICAL TANK SIZE : 1.70 x 2.00m CAPACITY : 4.5m ³	1981	○			

CHEMICAL AND CHLORINATION FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
1.3	FLUORIDATION SYSTEM 1)GRAVIMETRIC FEEDER	QTY : 3 UNITS TYPE : VERTICAL-COMPACT TYPE MOTOR OUTPUT : 0.20kw	1981				
	2)MIXER	QTY : 6 UNITS TYPE : VERTICAL TYPE MOTOR OUTPUT : 0.20kw 2-MIXER FOR EVERY ONE UNIT					
	3)DUST COLLECTOR BLOWER	QTY : 3 UNITS TYPE : AXIAL VANE TYPE MOTOR OUTPUT : 0.37kw					
	4)EXHAUST FAN	QTY : 3 UNITS TYPE : PROPELLER TYPE MOTOR OUTPUT : 0.25kw	1981				
2.	CHLORINE HOUSE CHLORINE HOUSE	CONCRETE STRUCTURE DIMENSION:12.2m×25.4mL					

CHEMICAL AND CHLORINATION FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
2.1	BOOSTER PUMP	QTY : 3 UNITS TYPE : CENTRIFUGAL-TURBINE TYPE CAPACITY: 1.2 m ³ /min HEAD : 40 m MOTOR OUTPUT : 15kw	1981			O	
2.2	CHLORINATOR	QTY : 4 UNITS TYPE : MANUAL TYPE GAS DISPENSER CAPACITY:150kg/h	1981			O	
2.3	EVAPORATOR	QTY : 2 UNITS TYPE : VERTICAL TYPE ELECTRIC IMMERSION HEATER:15kw CAPACITY : 150kg/h	1981			O	
2.4	CHLORINE LEAK DETECTOR	QTY : 3 UNITS WALL MOUNTED TYPE-CHLORALERT	1981			O	
2.5	LIQUID CHLORINE TANK	CIRCULAR STEEL TANK-REFILLABLE SIZE : DIAMETER:750mm LENGTH:1.70m CAPACITY : 750 liters					

CHEMICAL AND CHLORINATION FACILITIES

NO.	FACILITIES	SPECIFICATIONS	CONSTRUCTION YEAR	LEVEL			REMARKS
				A	B	C	
2.6	CHAIN HOIST	QTY : 1 UNIT TYPE : ELECTRIC OPERATED CAPACITY : 3TON	1981		0		
2.7	EXHAUST FAN	QTY : 3 UNITS TYPE : PROPELLER TYPE MOTOR OUTPUT : 0.25kw	1981			0	
2.9	WEIGHING SCALE	QTY : 4 UNITS CAPACITY : 1TON	1981			0	