① Outdoor Lighting

Outdoor lights will be installed around the pump house, at key sites for the night inspection/maintenance of the water reservoir and valves and along the premise road.

② Drainage System

Because of the extremely low rainfall level at the Project Site, rainwater drained from the road by means of the cross-grade will be left for natural infiltration. Meanwhile, water overflow from the water reservoir, water drain from the cleaning of the bottom of the water reservoir, water drain from the pump gland and treated water from the septic tank attached to the office will join together on the premises and will be discharged to the public sewer system under the road in front of the water distribution station by means of the gravity method.

2.3.2.4 Water Distribution Pipe Procurement Plan

The plan to provide the water distribution pipes under the Project is prepared in the following manner based on the principles described in 2.3.2.1-(3).

(1) Water Distribution Network Plan

1) Water Distribution Routes

The subject area of the new water distribution network under the Project consists of those residential areas where the water distribution network currently does not exist and those areas which are expected to become residential areas by the year 2005, excepting the following areas.

- Areas where the water distribution network already exists
- Areas where the water distribution network is currently under construction
- Areas for which a water distribution network construction plan of Giza City and/or GOGCWS exists with a firm decision on its implementation

The water distribution routes are selected based on the following conditions.

- Routes reflecting the present and future stages of urban development in Giza using roads where the laying of water distribution pipes is possible
- Routes forming a stable water supply network

- Introduction of water distribution blocks within each distribution zone

The water distribution pipes are classified into the following two categories.

- Water Distribution Main : conveys clean water to the water distribution branch pipes and has no service pipe
- Water Distribution Branch Pipes : distributes water from the main to users through service pipes

2) Water Distribution Network

① Design Conditions

The design conditions of the water distribution pipes are given in Table 2-3-19.

Table 2-3-19 Design Conditions of Water Distribution Pipes

Item	Design Conditions
1. Design Maximum Daily Water Supply Volume	• No. 1 Basin: 66,400 m^3/day • No. 2 Basin: 51,600 m^3/day
2. Design Maximum Hourly Water Distribution Volume	• Time factor: 1.3
3. Minimum Dynamic Water Pressure at End of Distribution Branch Pipe	• 2.0 kg/cm^2 (head: 20 m)
4. Pipe Type	• Ductile cast iron pipe
5. Minimum Diameter	• 100 m
6. Auxiliary Facilities	
(1) Valve	• Butterfly valve : ϕ 400 mm or larger • Sluice valve : upto ϕ 400 mm
(2) Air Valve	• Double-outlet air valve : for all diameters
(3) Fire Plug	• Double-outlet fire plug : ϕ 300 mm or larger • Single-outlet fire plug : ϕ 150 mm or larger

② Network Analysis

Based on the design conditions given in Table 2-3-19, an appropriate network is examined as shown in Fig. 2-3-12 (routes and pipe diameters). See Appendix 9 for the network analysis.

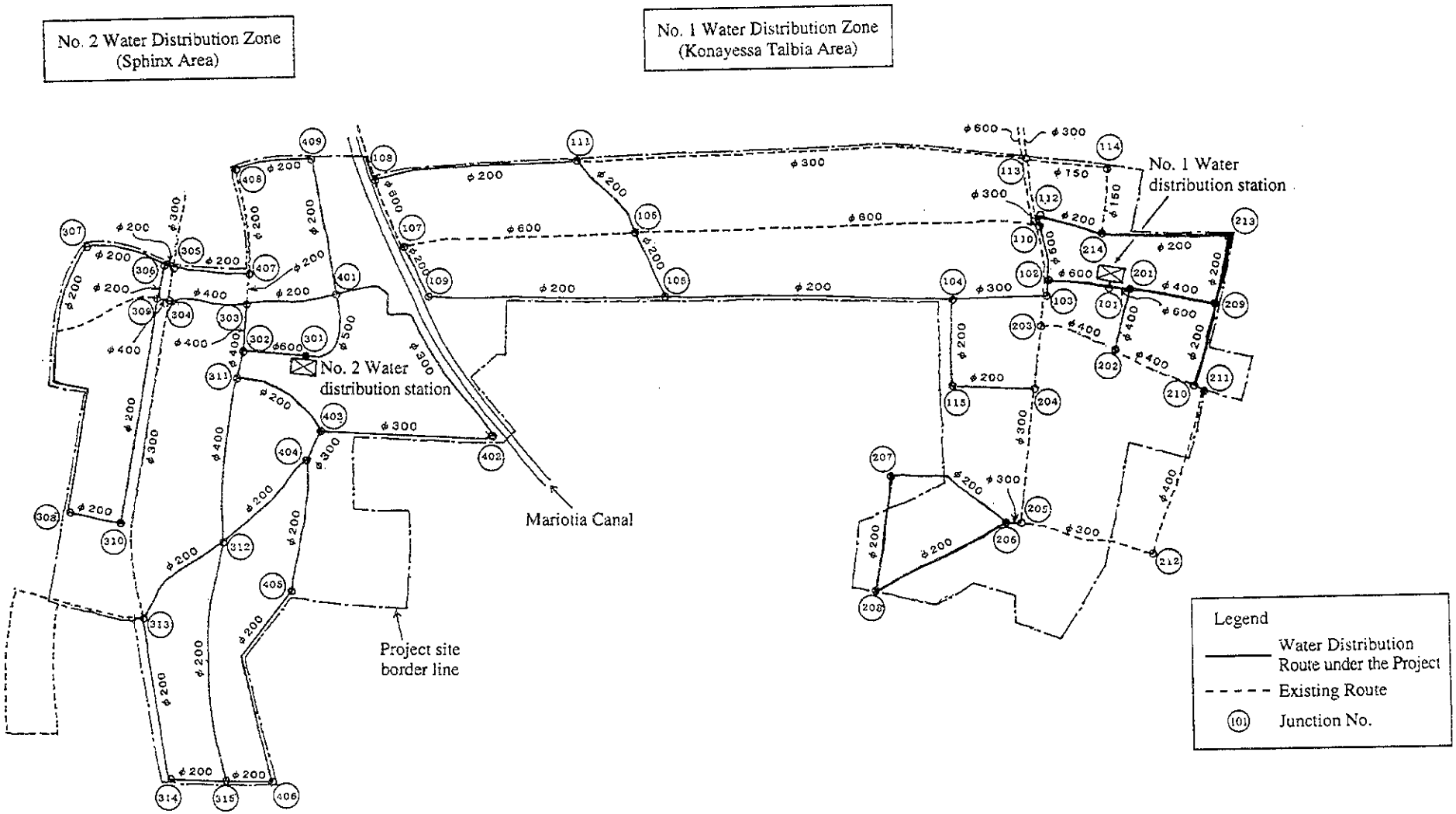


Fig. 2-3-12 Examination Chart of Water Distribution Network

(2) Total Length of Water Distribution Pipes

The total length of the water distribution pipes required for the development of the water distribution network covering the Project Site based on the scope of the new water distribution network described in (1)-1) above is shown in Table 2-3-20.

Table 2-3-20 Total Length of Water Distribution Pipes Required to Cover Project Site

	Pipe Diameter (mm)	Total Length (m)
No. 1 Basin	600	450
	500	300
	400	860
	300	600
	200	9,490
	150	12,150
	100	55,950
	Sub-Total	79,800
No. 2 Basin	600	300
	500	400
	400	1,710
	300	2,260
	200	12,040
	150	7,370
	100	43,490
	Sub-Total	67,570
Total		147,370

(3) Self-Funding Capability of Giza City

In the case of the previous project (First and Second Monib Projects), Giza City (Giza municipal authority) used its own funds to lay the water distribution and sewer pipes provided by Japan and to procure and lay those pipes which were not included in the scope of the Japanese grant aid. It has also conducted the procurement and laying of pipes for various projects of a similar scale to the previous project. Table 2-3-21 outlines the development of the water supply and sewerage systems under the previous project.

Table 2-3-21 Development of Water Supply and Sewerage Systems Under Previous Project

Subject	Total Length	Pipe Diameter (mm)	Pipe Type	Division of Work	Extent of Work	
					Procurement	Laying Work
Water Supply Branch Line	75 km	300 ~ 600	DCI	Japan	39 km	-
		100 ~ 200	PVC			
		300 ~ 500	DCI	Giza City	36 km	75 km
		100 ~ 200	PVC			
Sewerage Branch Line	67 km	200 ~ 600	Clay	Japan	37 km	-
		200 ~ 600	Clay	Giza City	30 km	67 km
		Total				142 km

Notes: DCI - ductile cast iron;
PVC - polyvinyl chloride

The Giza municipal authority completed the work shown in Table 2-3-21 in approximately two years and six months. The total length of the laying work was 142 km which is similar to the planned laying length under the Project. As sewer pipes requiring a laying depth twice as deep as that of water distribution pipes accounted for some 47% of the work under the previous project, the Giza municipal authority is judged to have sufficient financial and technical capability to conduct the required pipe laying work under the Project in a reasonable time.

Moreover, the Giza municipal authority procured 46% of the required pipes by its own funding of some LE 15 million (approximately ¥600 million). It may, therefore, be possible for the Giza municipal authority to fund the procurement of some of the pipes among those shown in Table 2-3-17.

(4) Scope of Pipe Procurement

Given the results of previous projects and the need for the Egyptian side to promote self-help efforts, it will be necessary for the Giza municipal authority to finance the procurement of the 100 mm and 150 mm diameter pipes for the branch water distribution lines under the Project. Accordingly, the scope of the Japanese procurement of pipes for the Project is restricted to water distribution mains with a diameter of 200 mm or larger as shown in Table 2-3-22.

Table 2-3-22 Total Length of Water Distribution Pipes to be Procured by Japanese Side for the Project

Pipe Diameter (mm)	Total Length (m)
600	750
500	700
400	2,570
300	2,860
200	21,530
Total	28,410

In addition to the above pipes, the scope of Japanese procurement for the Project includes such auxiliary equipment as gate valves, air valves, and specials.

2.3.2.5 Basic Design Drawings

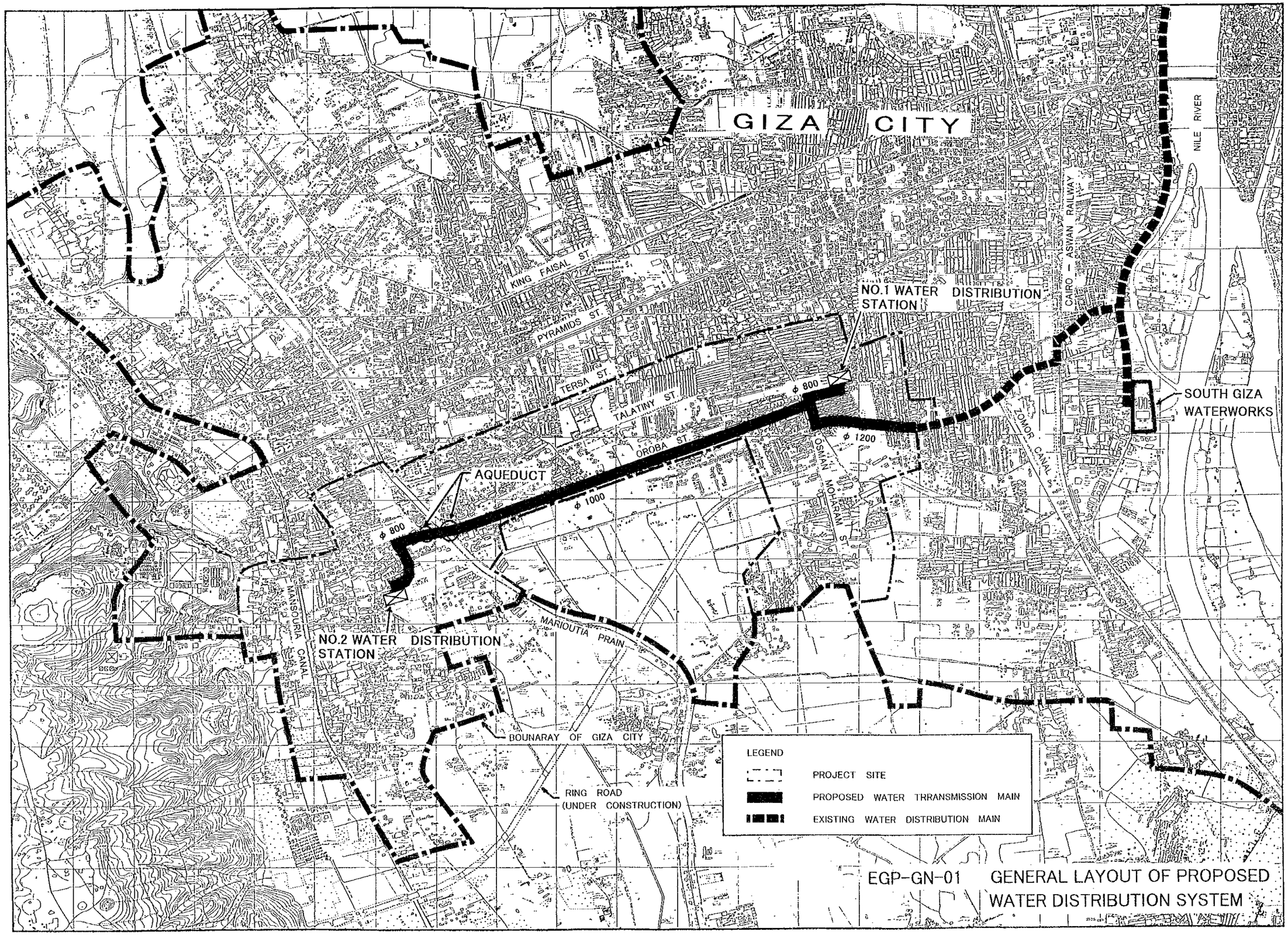
The following Basic Design Drawings are prepared for the planned facilities under the Project.

EGP-GN-O1 General Layout of Proposed Water Distribution System
EGP-GN-02 Basic Flow of Proposed Facilities

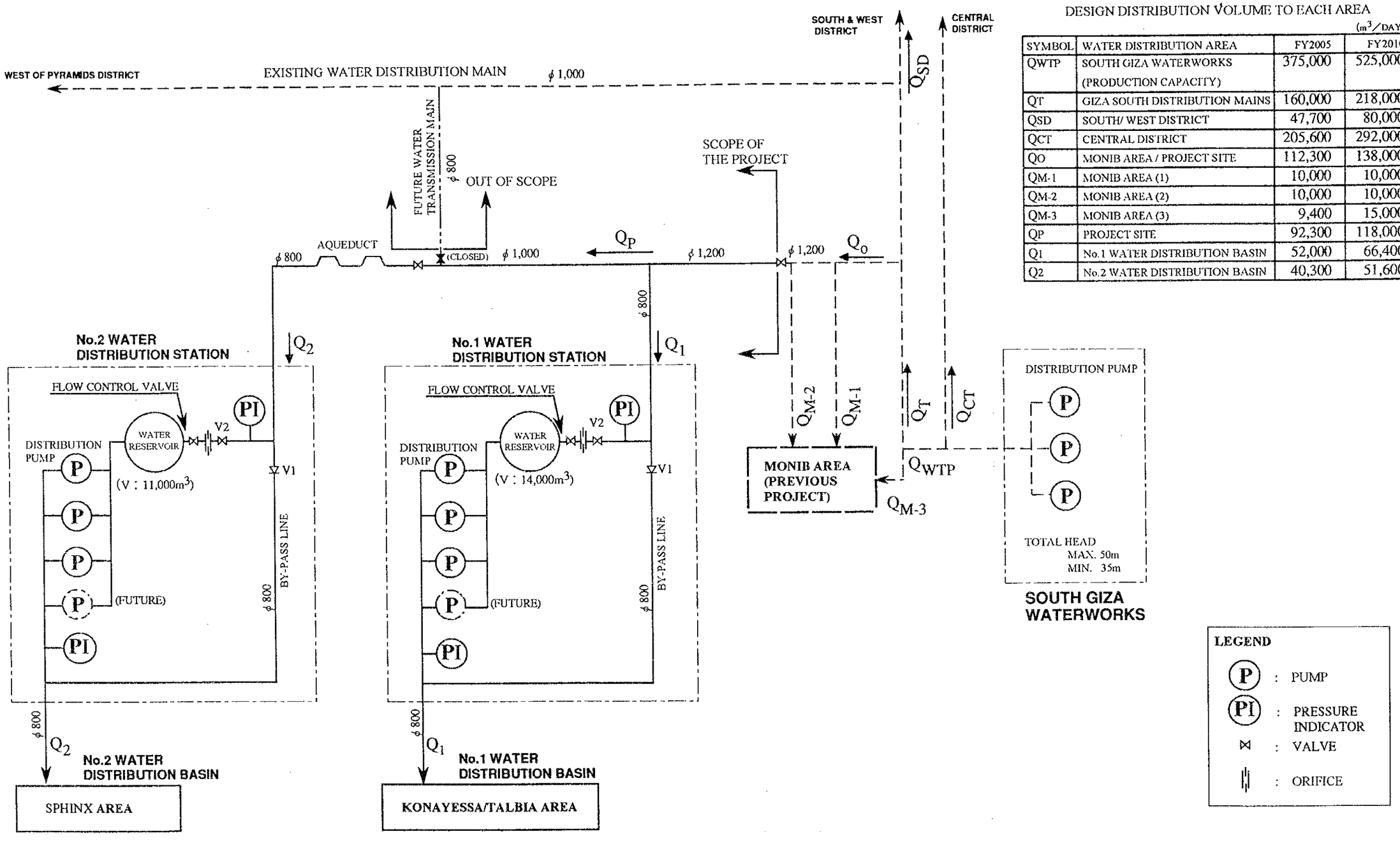
EGP-TM-01 Plan of Water Transmission Main
EGP-TM-02 Standard Structure of Auxiliary Facilities (1/3)
EGP-TM-03 Standard Structure of Auxiliary Facilities (2/3)
EGP-TM-04 Standard Structure of Auxiliary Facilities (3/3)
EGP-TM-05 Aqueduct No. 1 – Plan and Section
EGP-TM-06 Aqueduct No. 2 – Plan and Section

EGP-WD-01 General Layout of No. 1 Water Distribution Station
EGP-WD-02 General Layout of No. 2 Water Distribution Station
EGP-WD-03 No. 1 Water Reservoir – Plan and Section
EGP-WD-04 Piping System of No. 1 Water Reservoir
EGP-WD-05 No. 2 Water Reservoir – Plan and Section
EGP-WD-06 Piping System of No. 2 Water Reservoir
EGP-WD-07 Distribution Pump Station – Plan
EGP-WD-08 Distribution Pump Station – Sections

EGP-WD-09	Flow Chart of Distribution Pump Station
EGP-WD-10	Single Line Diagram for No. 1 Distribution Pump Station
EGP-WD-11	Single Line Diagram for No. 2 Distribution Pump Station
EGP-WD-12	Distribution Pump House – Plan
EGP-WD-13	Distribution Pump House – Sections
EGP-WD-14	Distribution Pump House – Elevations



EGP-GN-01 GENERAL LAYOUT OF PROPOSED WATER DISTRIBUTION SYSTEM



DESIGN DISTRIBUTION VOLUME TO EACH AREA

(m^3/DAY)

SYMBOL	WATER DISTRIBUTION AREA	FY2005	FY2010
QWTP	SOUTH GIZA WATERWORKS (PRODUCTION CAPACITY)	375,000	525,000
QT	GIZA SOUTH DISTRIBUTION MAINS	160,000	218,000
QSD	SOUTH/ WEST DISTRICT	47,700	80,000
QCT	CENTRAL DISTRICT	205,600	292,000
QO	MONIB AREA / PROJECT SITE	112,300	138,000
QM-1	MONIB AREA (1)	10,000	10,000
QM-2	MONIB AREA (2)	10,000	10,000
QM-3	MONIB AREA (3)	9,400	15,000
QP	PROJECT SITE	92,300	118,000
Q1	No.1 WATER DISTRIBUTION BASIN	52,000	66,400
Q2	No.2 WATER DISTRIBUTION BASIN	40,300	51,600

EGP-GN-02 BASAIC FLOW OF PROPOSED FACILITIES

LEGEND

PROPOSED WATER TRANSMISSION MAIN (ϕ800 ~ ϕ1200)

VALVE

AIR RELIEF VALVE

WASH OUT

EXISTING WATER SUPPLY PIPELINE

DETAIL "B"

DETAIL "C"

DETAIL "A"

NO.1 WATER DISTRIBUTION STATION

NO.2 WATER DISTRIBUTION STATION

"A"

"B"

"C"

ϕ800 × 430m

ϕ1200 × 990m

ϕ1000 × 3150m

ϕ800 × 840m

BOUNDART OF PROJECT SITE

BOUNDARY OF GIZA CITY

EGP-TM-01 PLAN OF WATER TRANSMISSION MAIN

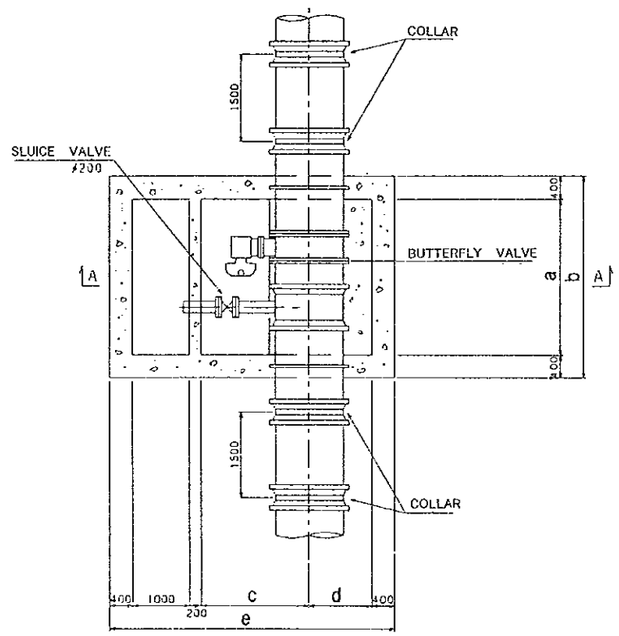
VALVE CHAMBR (TYPICAL)

(DIA.800～1200)

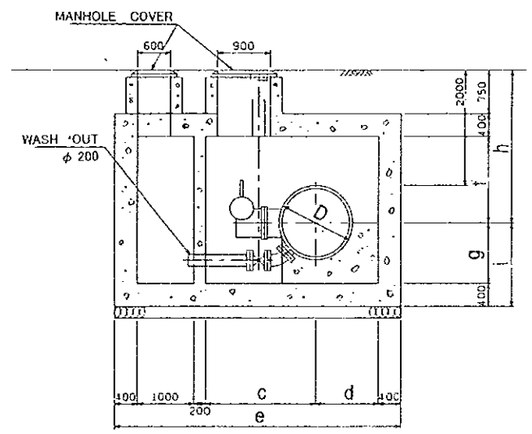
BUTTERFLY VALVE CHAMBER

S=1:100

PLAN



SECTION A-A



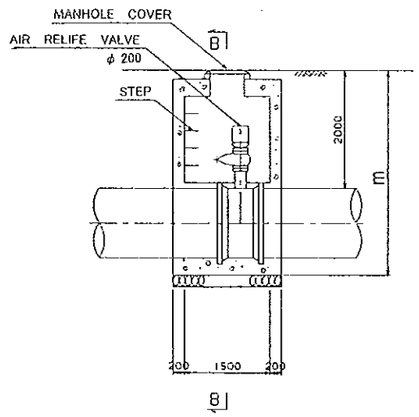
DIMENSIONS

D	φ 800	φ 1000	φ 1200
a	2500	2700	2700
b	3300	3500	3500
c	1500	1900	1900
d	1000	1100	1100
e	4500	5000	5000
f	1250	1350	1450
g	1000	1200	1200
h	2400	2500	2600
i	1400	1600	1600

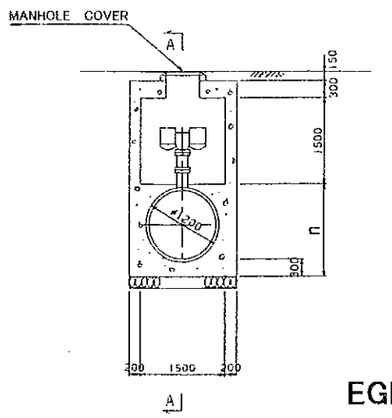
AIR RELIEF VALVE CHAMBER (TYPICAL)

S=1:100

SECTION A-A



SECTION B-B



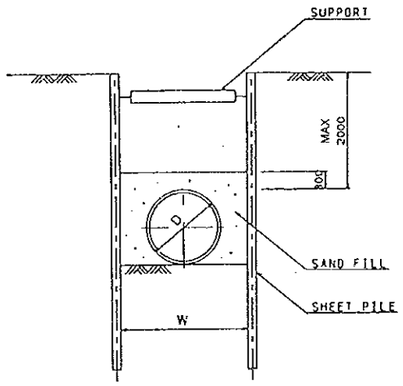
DIMENSIONS

D	φ 800	φ 1000	φ 1200
m	3100	3350	3550
n	1150	1400	1600

EGP-TM-02 STANDARD STRUCTURE OF ANCILLARY EQUIPMENT (1/3)

TYPICAL SECTION OF PIPE LAYING

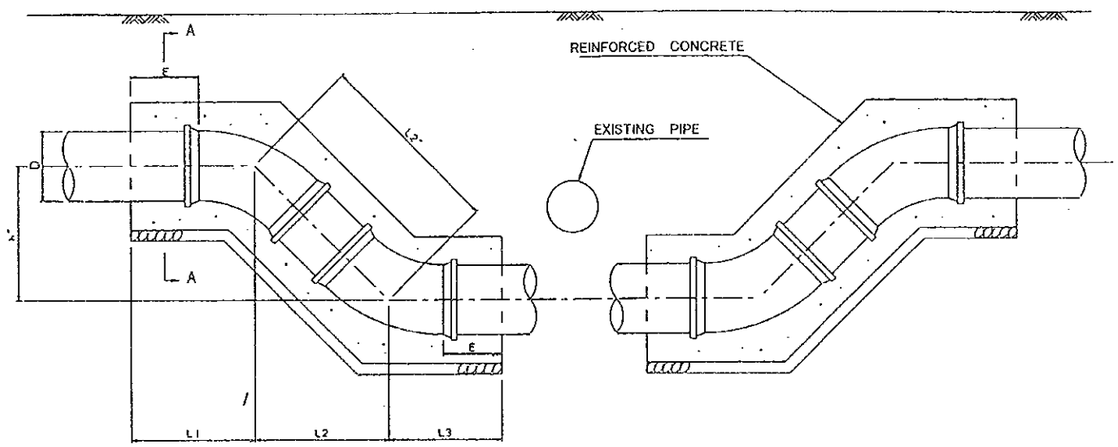
S=1:100



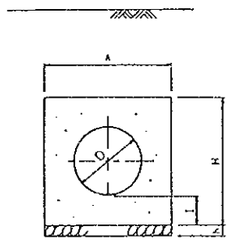
D	W
1200	2200
1000	2000
800	1800

TYPICAL SECTION OF PIPE CROSSING

SECTION



SECTION A-A

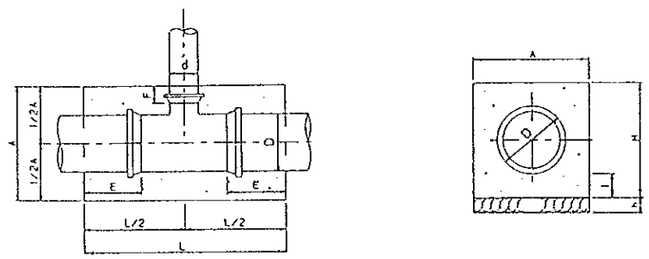


D	A	E	H	h'	h''	L1	L2	L3	L2'	I
1200	2000	1450	2000	300	2000	2000	2000	2000	2828	370
1000	1750	1290	1750	300	2000	1750	2000	1750	2828	350
800	1460	1050	1460	300	2000	1460	2000	1460	2828	310

IN CASE OF T-CONNECTION

PLAN

SECTION

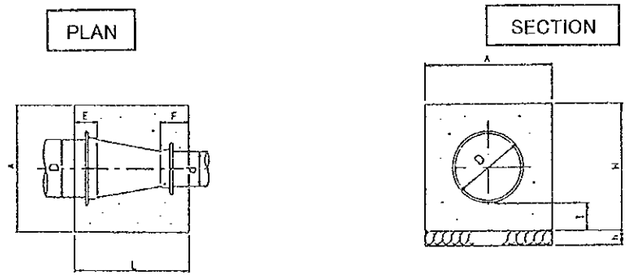


D×d	A	H	L	E	F	h	I
1200×1000	2350	2350	2350	525	390	300	550
1000×800	1950	1950	1950	330	310	300	450

IN CASE OF TAPER

PLAN

SECTION



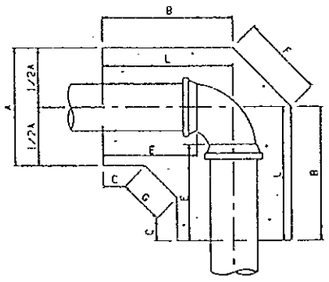
D×d	A	H	L	E	F	h	I
1200×800	2300	2300	2300	710	710	300	520
1000×800	1650	1650	1650	585	585	300	300

EGP-TM-03 STANDARD STRUCTURE OF ANCILLARY EQUIPMENT (2/3)

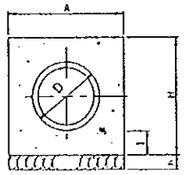
ANCHOR BLOCK STANDARD FOR WATER TRANSMISSION MAIN

IN CASE OF 90° BEND

PLAN



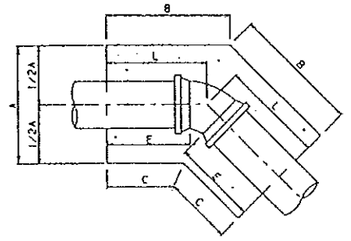
SECTION



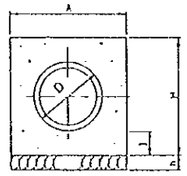
D	A	B	C	E	F	G	H	h	L	I
1200	2300	4640	3290	3420	1630	285	1750	300	4640	250
1000	2100	4640	3390	3620	1485	285	1750	300	4640	350
800	1650	1650	630	830	1170	285	1650	300	1650	400

IN CASE OF 45° BEND

PLAN



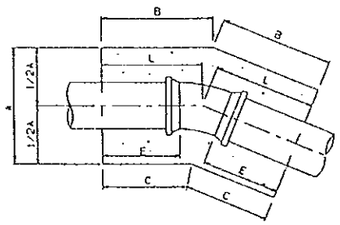
SECTION



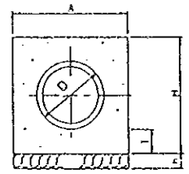
D	A	B	C	E	H	h	L	I
1200	2300	3230	2275	2200	1750	300	2750	250
1000	2100	3185	2315	2290	1750	300	2750	350
800	1200	1450	950	830	1200	300	1200	180

IN CASE OF 22 1/2° BEND

PLAN



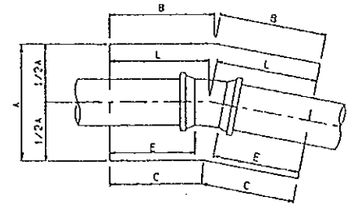
SECTION



D	A	B	C	E	H	h	L	I
1200	2300	1530	1070	1015	1750	300	1300	250
1000	2100	1510	1090	1060	1750	300	1300	350
800	1200	720	480	405	1200	300	600	180

IN CASE OF 11 1/4° BEND

PLAN



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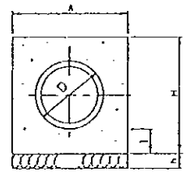
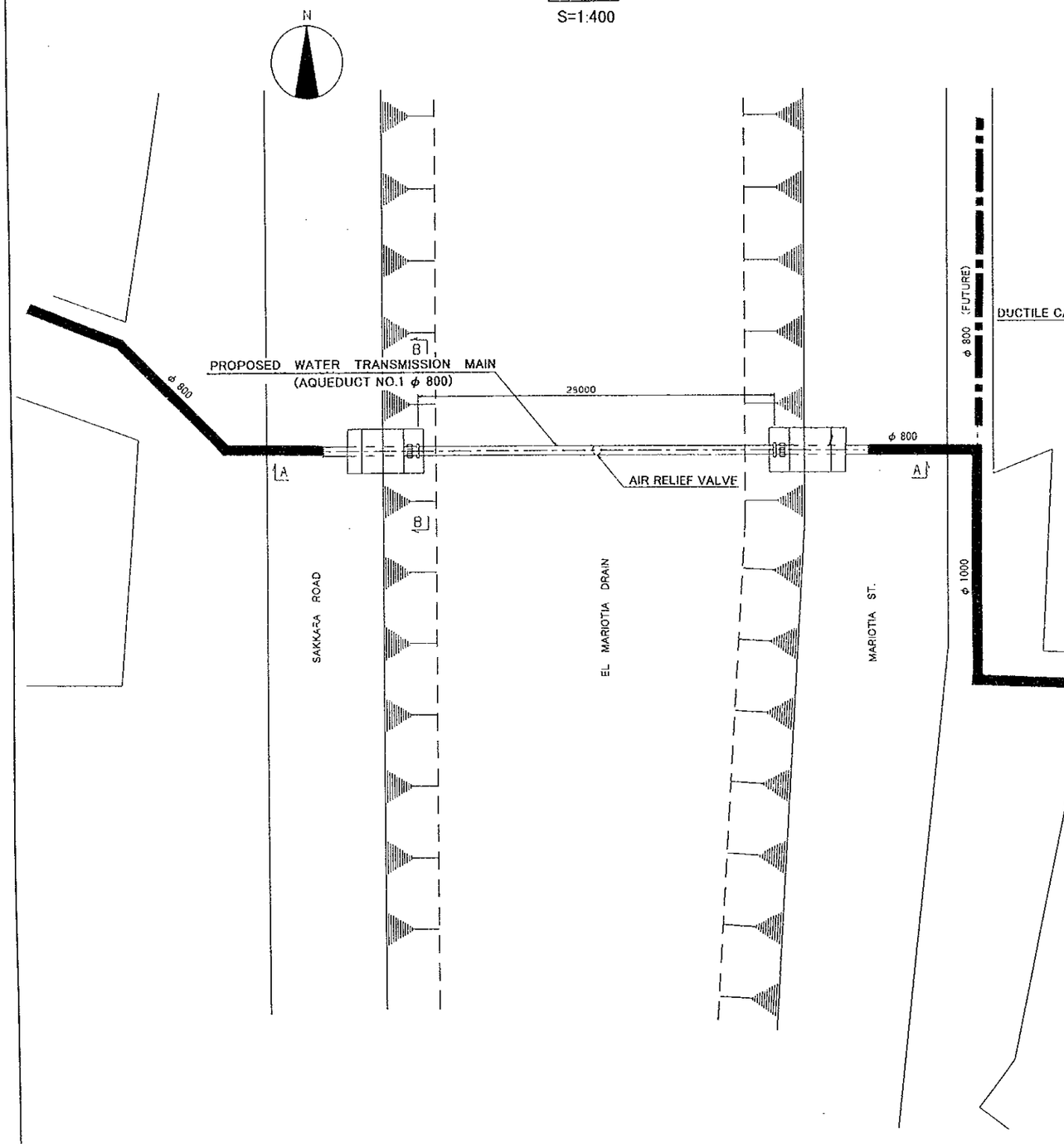


D	A	B	C	E	H	h	L	I
1200	1650	880	720	650	1650	300	800	200
1000	1400	670	530	470	1400	300	600	180
800	1200	660	540	490	1200	300	600	180

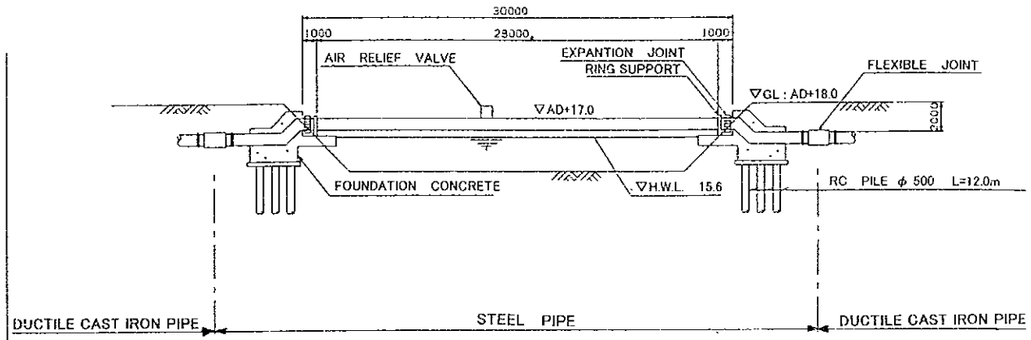
EGP-TM-04 STANDARD STRUCTURE OF ANCILLARY EQUIPMENT (3/3)

CANAL CROSSING - AQUEDUCT NO.1

PLAN
S=1:400



SECTION A-A
S=1:400



SECTION B-B
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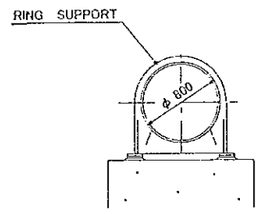
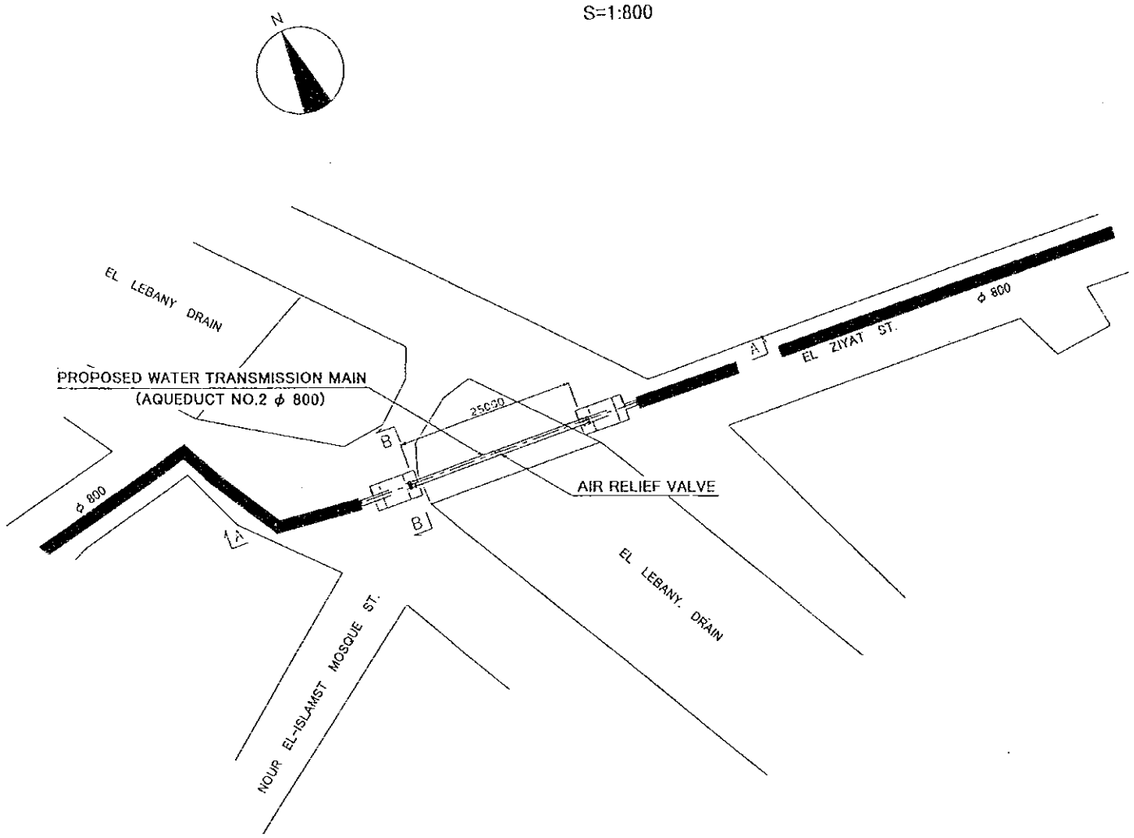


EGP-TM-05 AQUEDUCT NO.1 - PLAN & SECTION

CANAL CROSSING - AQUEDUCT NO.2

PLAN

S=1:800



SECTION A-A

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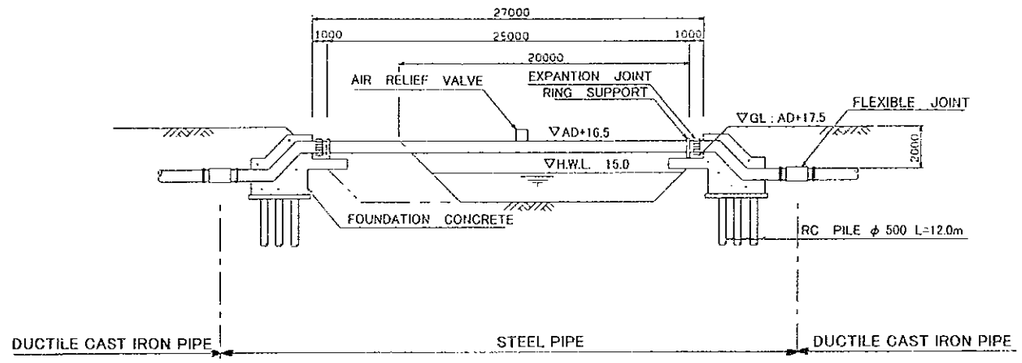
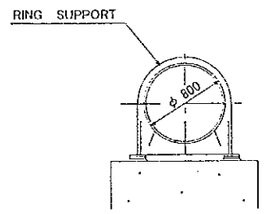


SECTION B-B

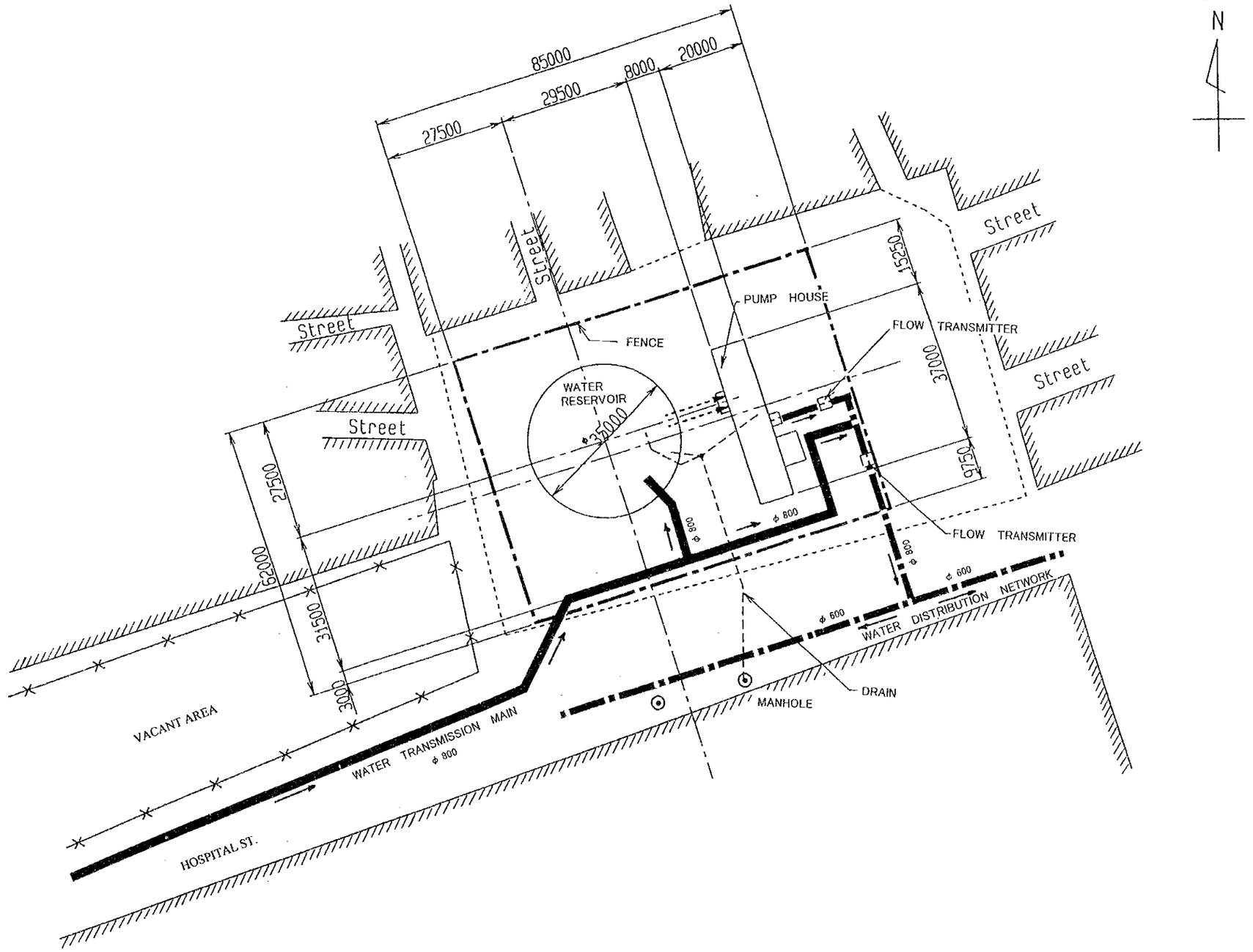
S=1:60



EGP-TM-06 AQUEDUCT NO.2 - PLAN & SECTION

GENERAL LAYOUT OF NO.1 WATER DISTRIBUTION STATION

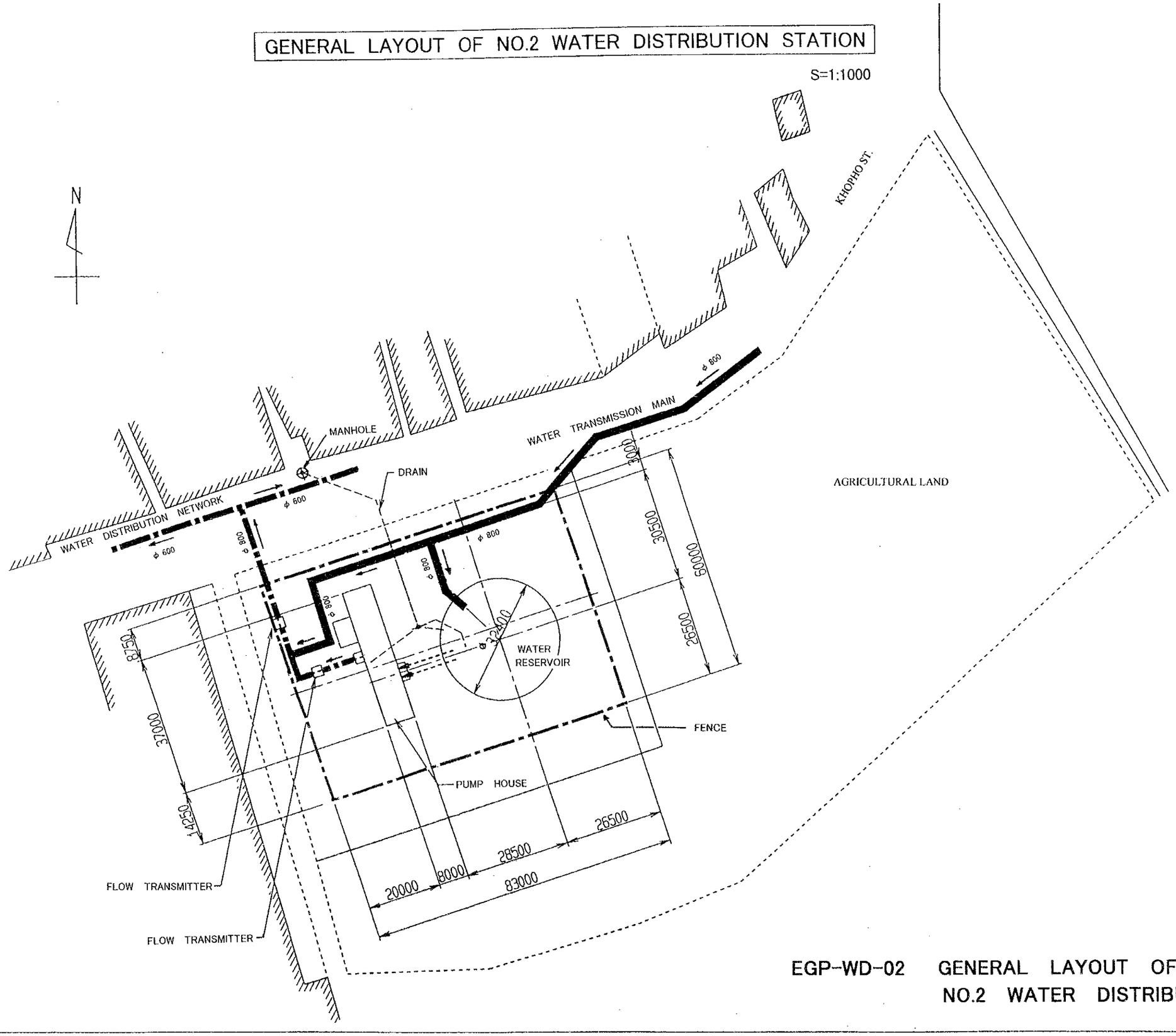
S=1:1000



EGP-WD-01 GENERAL LAYOUT OF NO.1 WATER DISTRIBUTION STATION

GENERAL LAYOUT OF NO.2 WATER DISTRIBUTION STATION

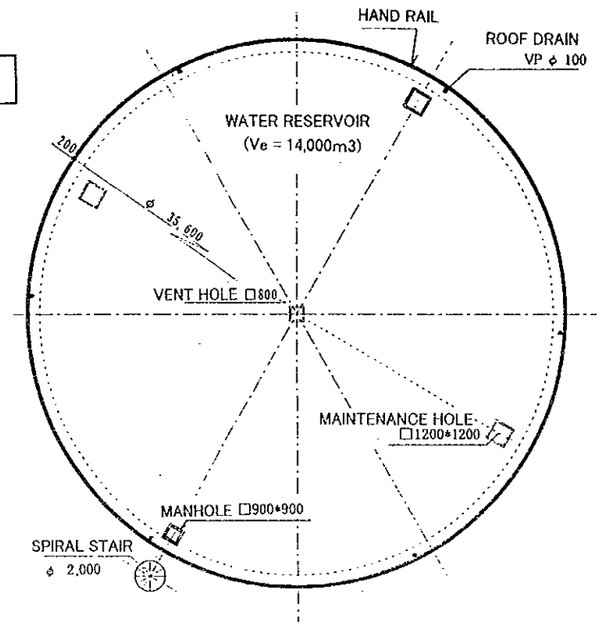
S=1:1000



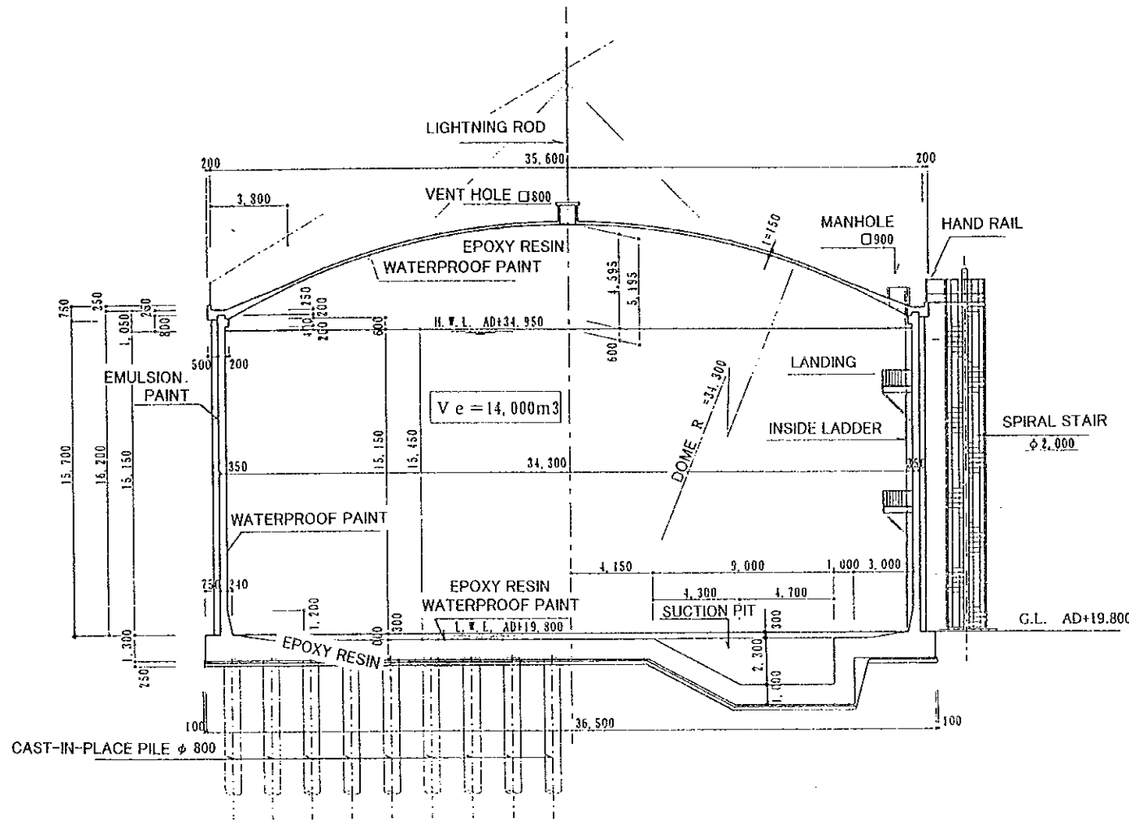
EGP-WD-02 GENERAL LAYOUT OF NO.2 WATER DISTRIBUTION STATION

NO.1 WATER RESERVOIR

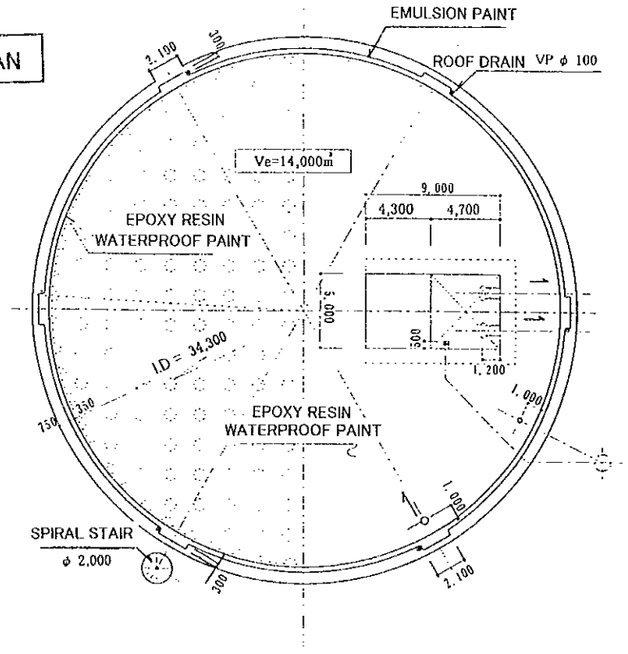
ROOF PLAN
S=1:400



SECTION
S=1:300



BOTTOM PLAN
S=1:400

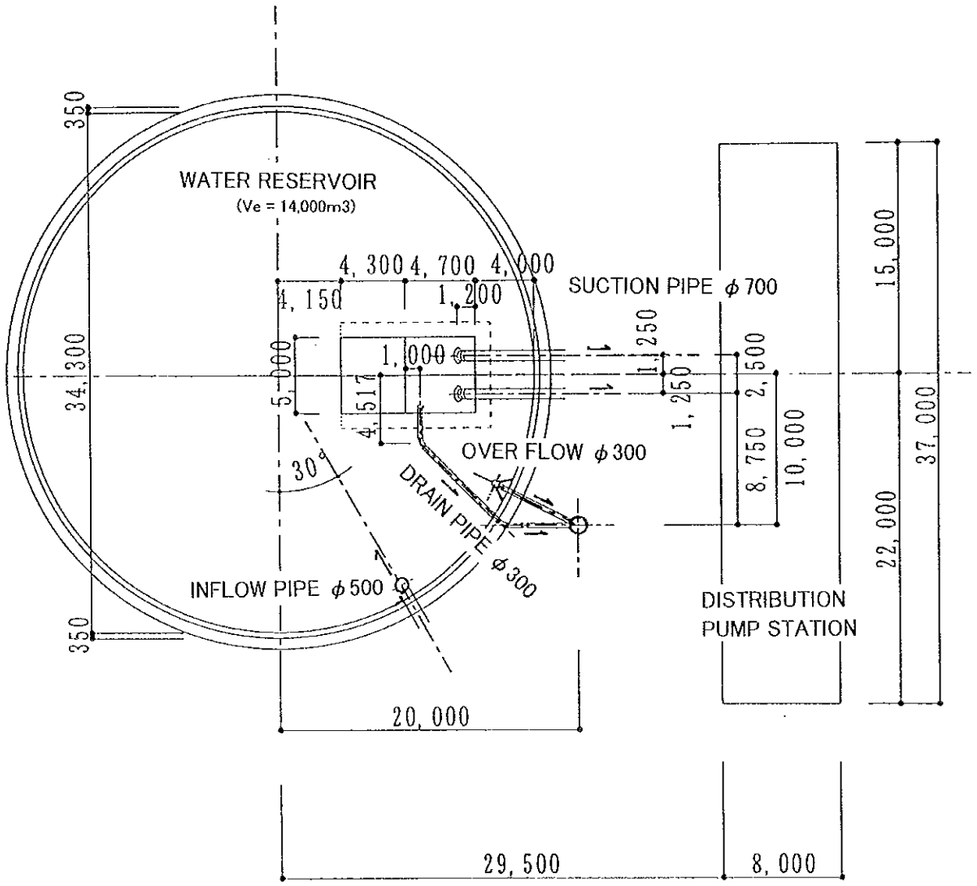


EGP-WD-03 NO.1 WATER RESERVOIR
PLAN AND SECTION

NO.1 WATER RESERVOIR

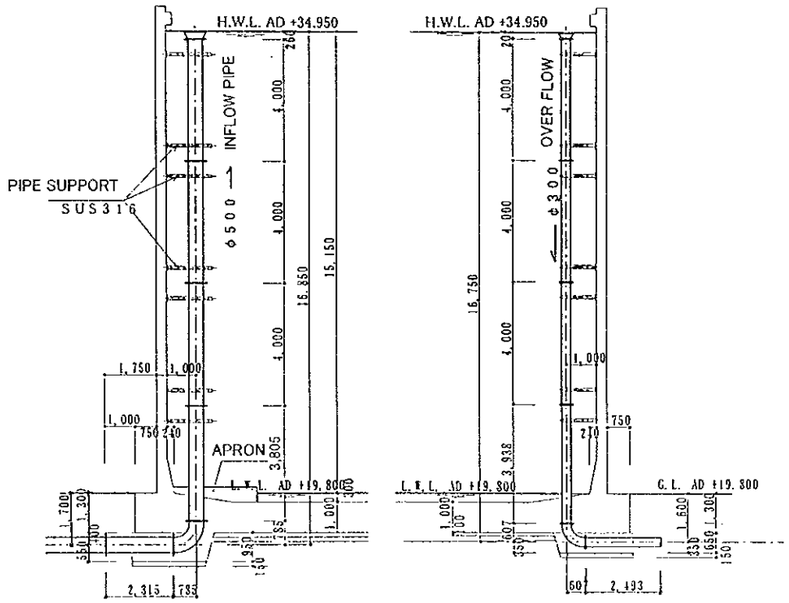
PIPING ARRANGMENT

S=1:400



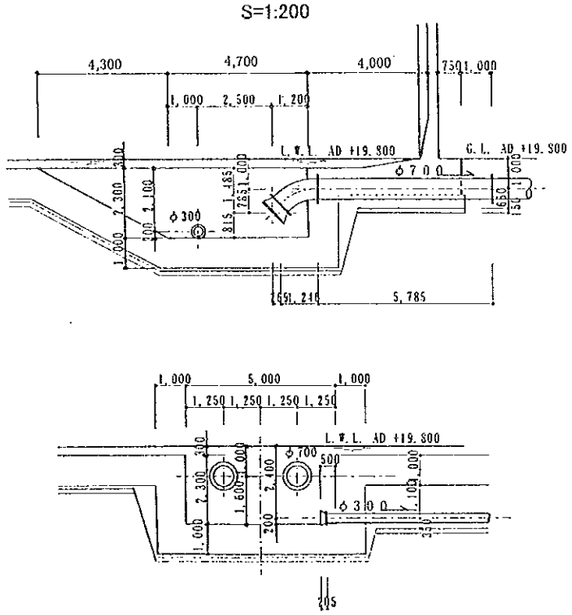
DETAIL OF INFLOW / OVER FLOW PIPES

S=1:200



DETAIL OF SUCTION PIPES

S=1:200

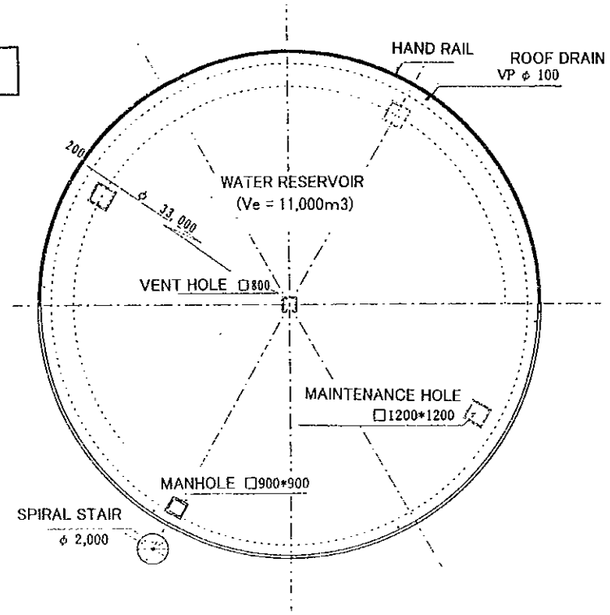


EGP-WD-04 PIPING SYSTEM OF NO.1 WATER RESERVOIR

NO.2 WATER RESERVOIR

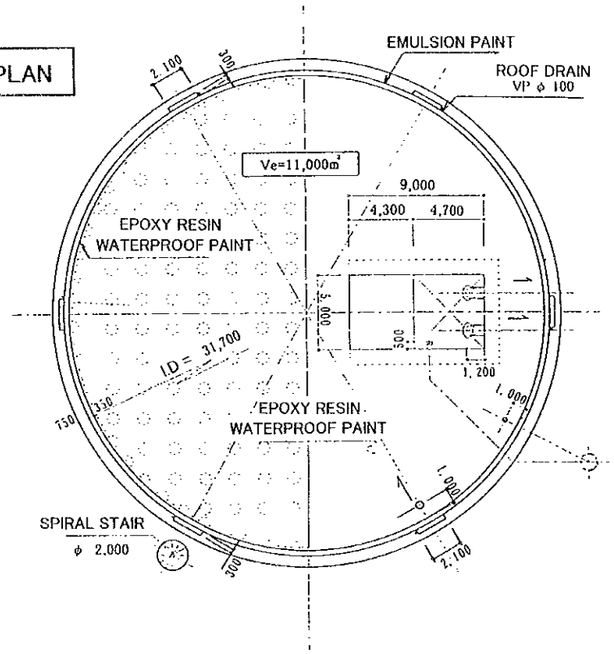
ROOF PLAN

S=1:400



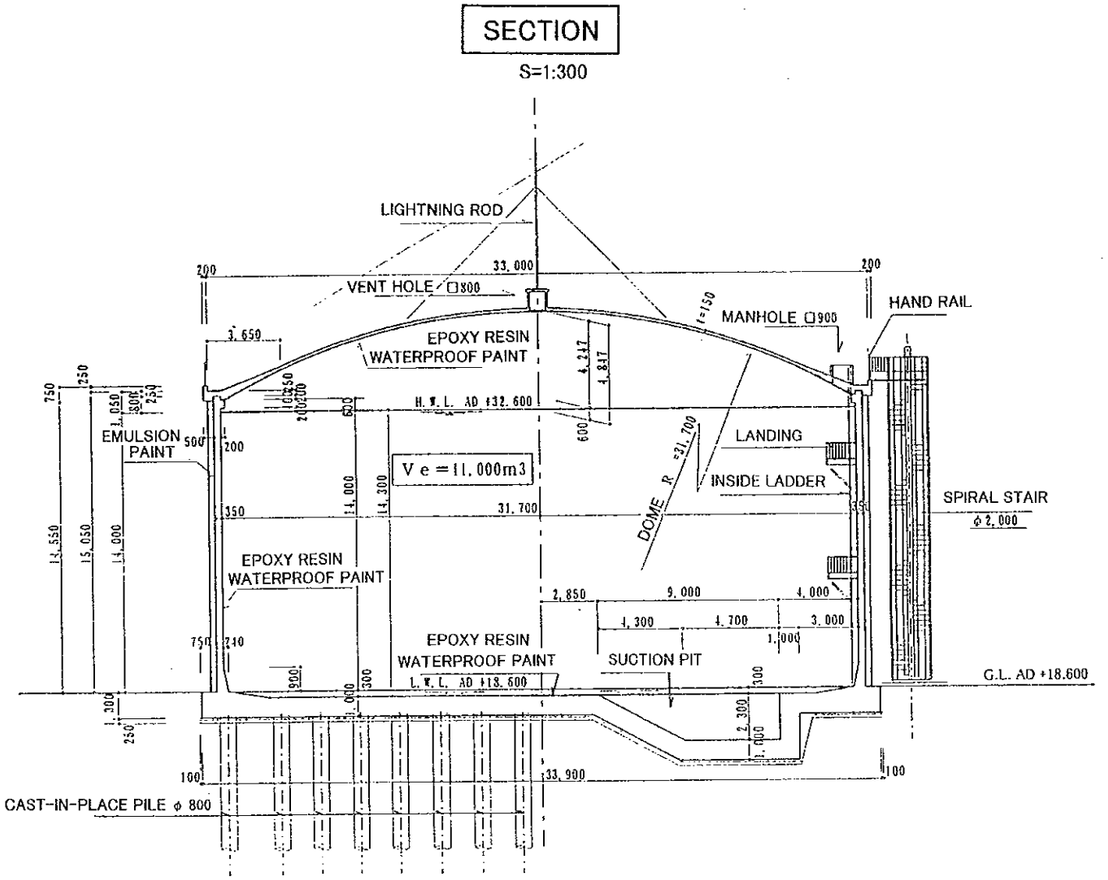
BOTTOM PLAN

S=1:400



SECTION

S=1:300

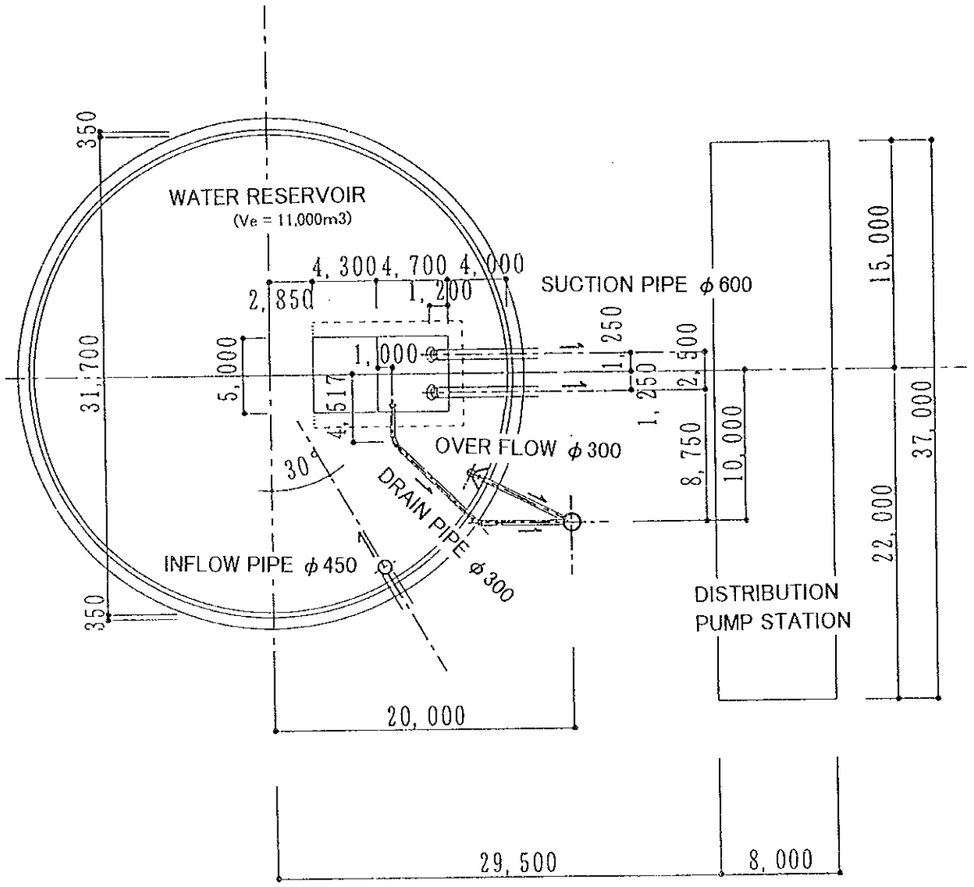


EGP-WD-05 NO.2 WATER RESERVOIR
PLAN AND SECTION

NO.2 WATER RESERVOIR

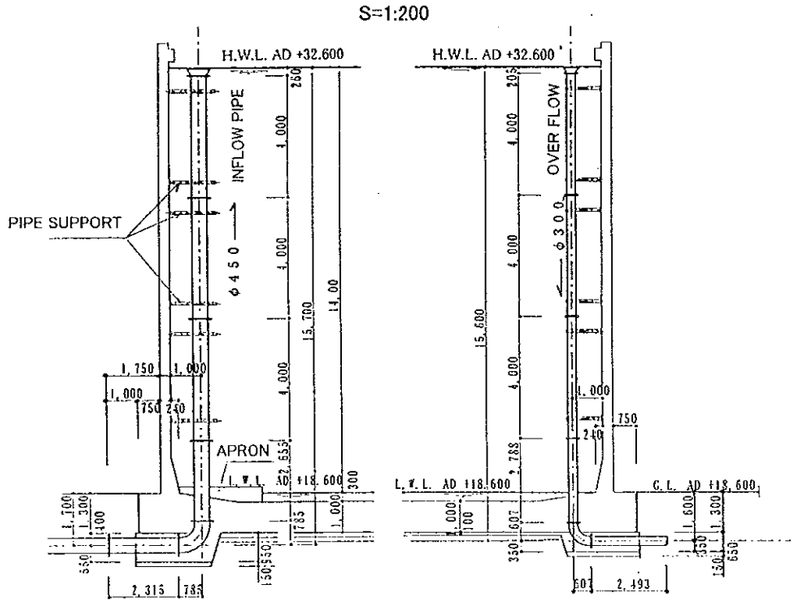
PIPING ARRANGMENT

S=1:400



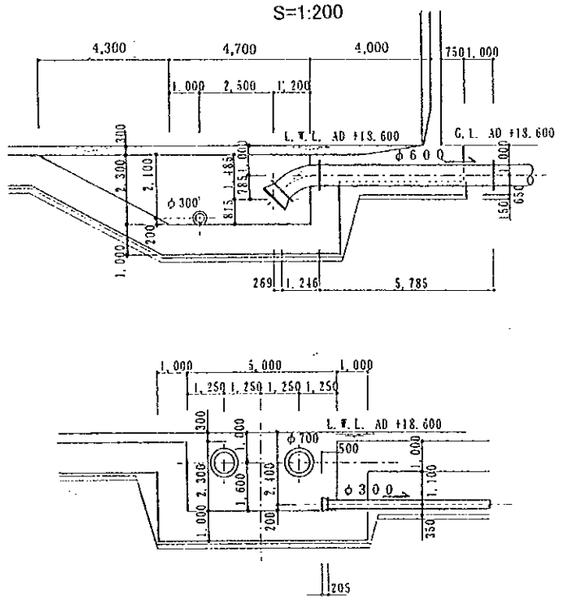
DETAIL OF INFLOW / OVER FLOW PIPES

S=1:200



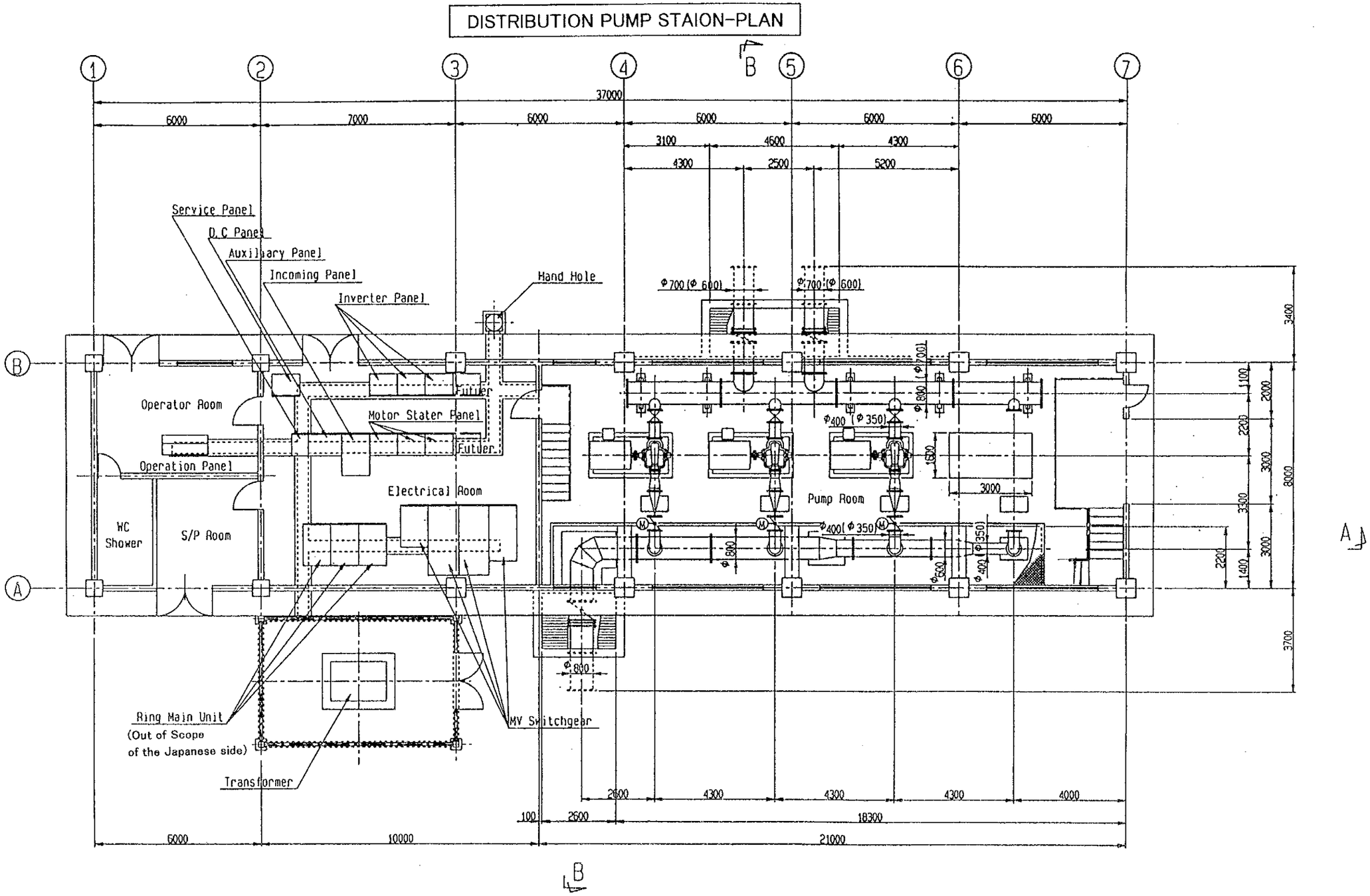
DETAIL OF SUCTION PIPES

S=1:200



EGP-WD-06 PIPING SYSTEM OF NO.2 WATER RESERVOIR

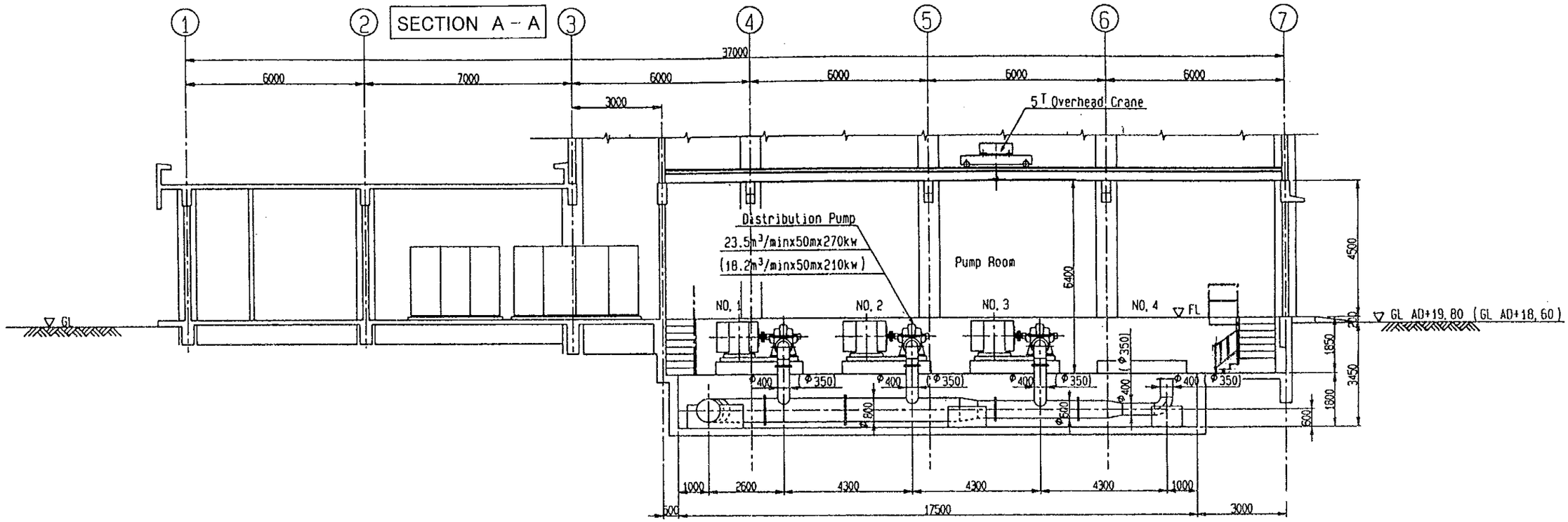
DISTRIBUTION PUMP STAION-PLAN



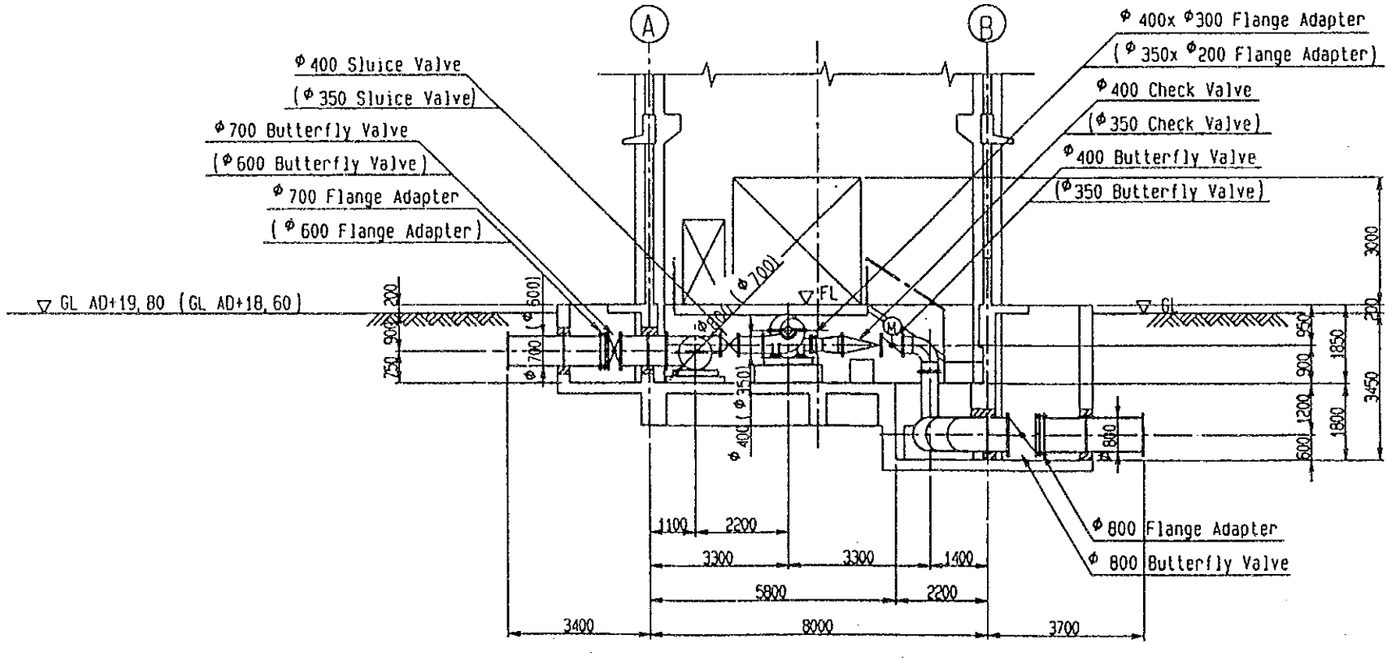
NOTE : FIGURES IN ( ) SHALL BE APPLIED FOR NO.2 DISTRIBUTION PUMP STATION.

EGP-WD-07 DISTRIBUTION PUMP STATION - PLAN

SECTION A - A

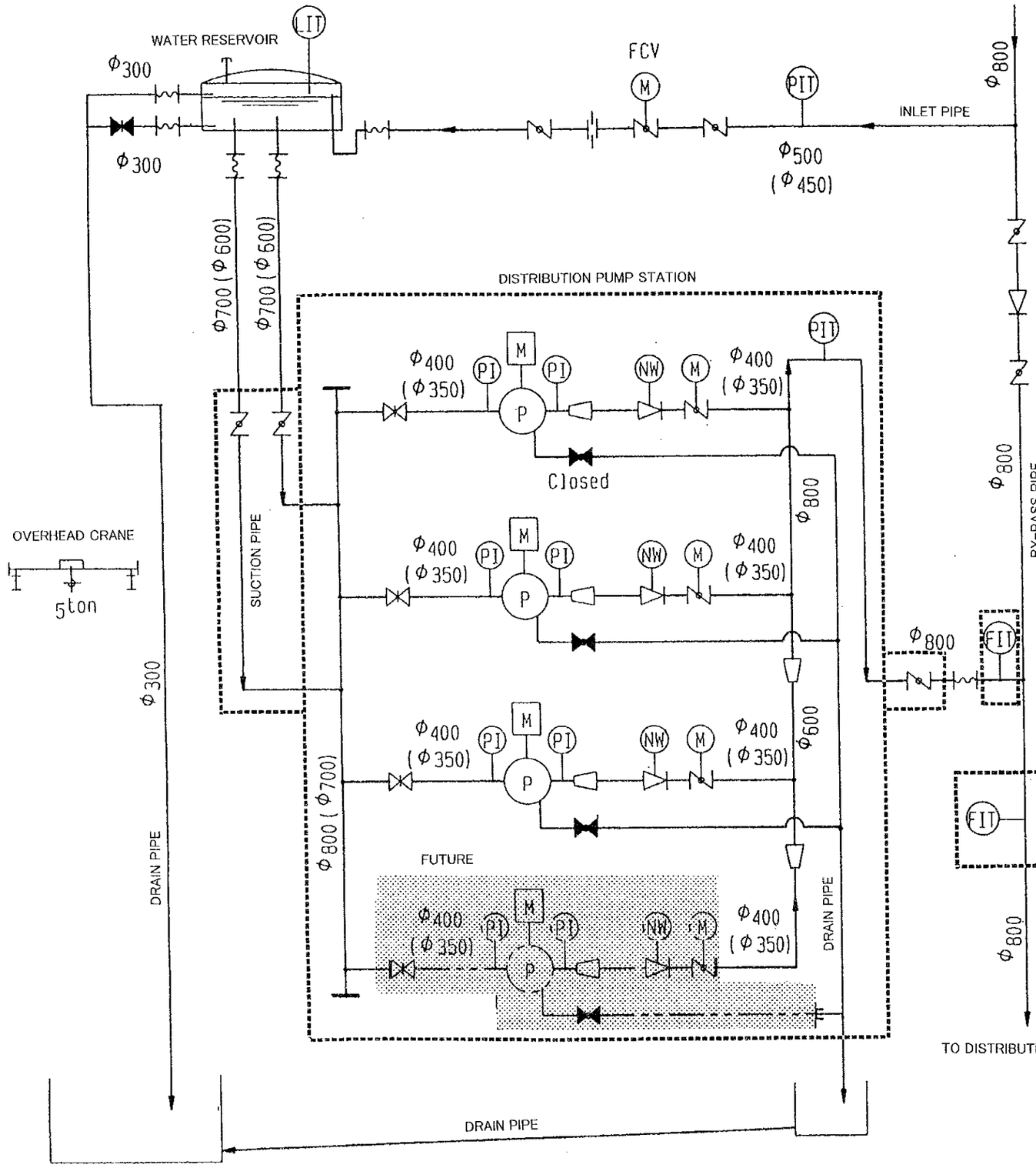


SECTION B - B



NOTE : FIGURES IN ( ) SHALL BE APPLIED FOR NO.2 DISTRIBUTION PUMP STATION.

EGP-WD-08 DISTRIBUTION PUMP STATION - SECTIONS

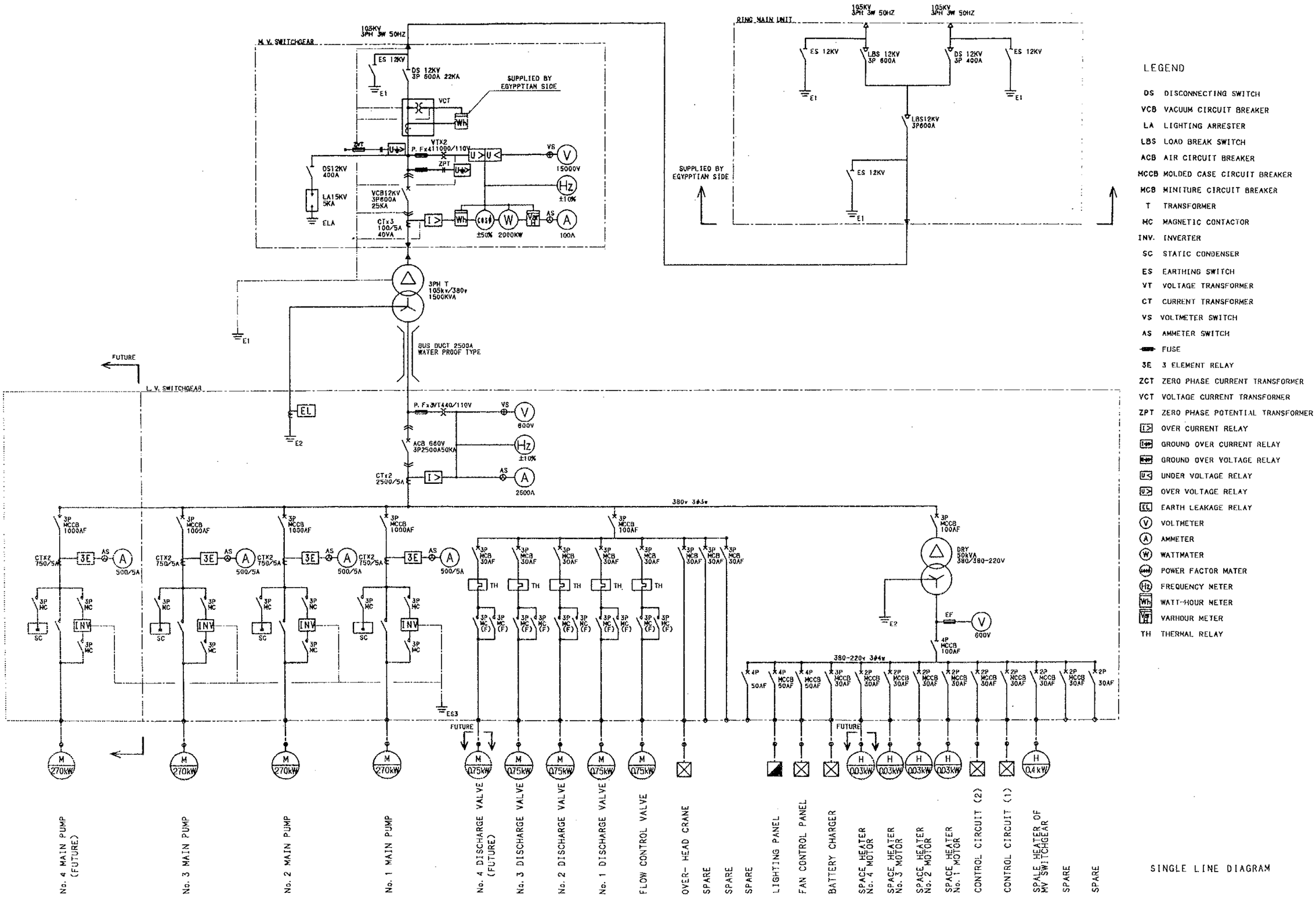


LEGEND

P — M	Pump, Motor
	Sluice Valve
	Butterfly Valve
	Globe Valve
	Check Valve
M	Motor Operated
PI	Press. Indicator
PIT	Press.Indicator & Transmitter
FIT	Flow Indicator & Transmitter
LIT	Water Level Indicator & Transmitter
NW	No Water Detector
	Flexible Pipe
	Orifice

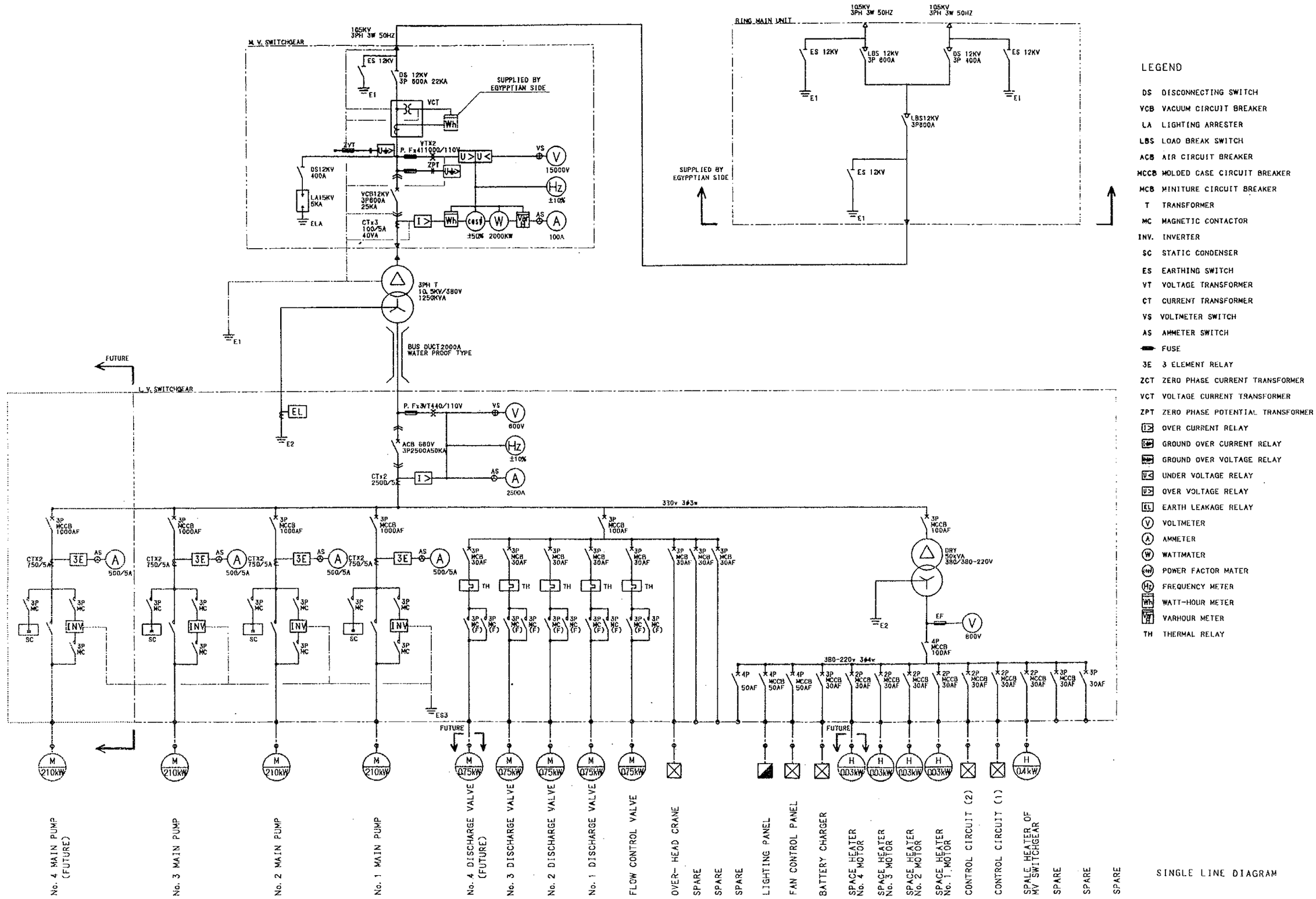
NOTE : FIGURES IN ( ) SHALL BE APPLIED FOR NO.2 DISTRIBUTION PUMP STATION.

EGP-WD-09 FLOW CHART OF DISTRIBUTION PUMP STATION



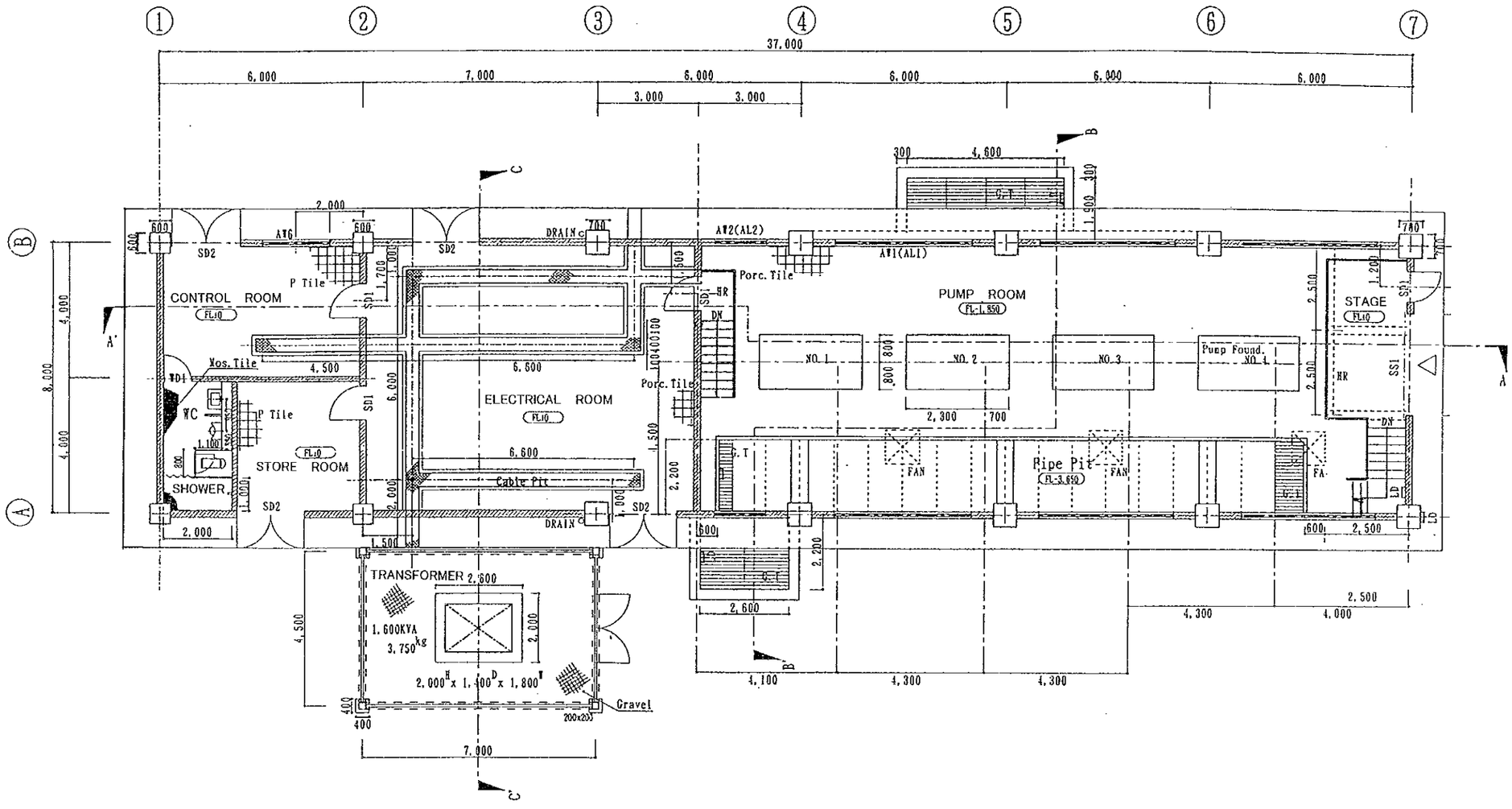
SINGLE LINE DIAGRAM

EGP-WD-10 SINGLE LINE DIAGRAM FOR NO.1 DISTRIBUTION PUMP STATION



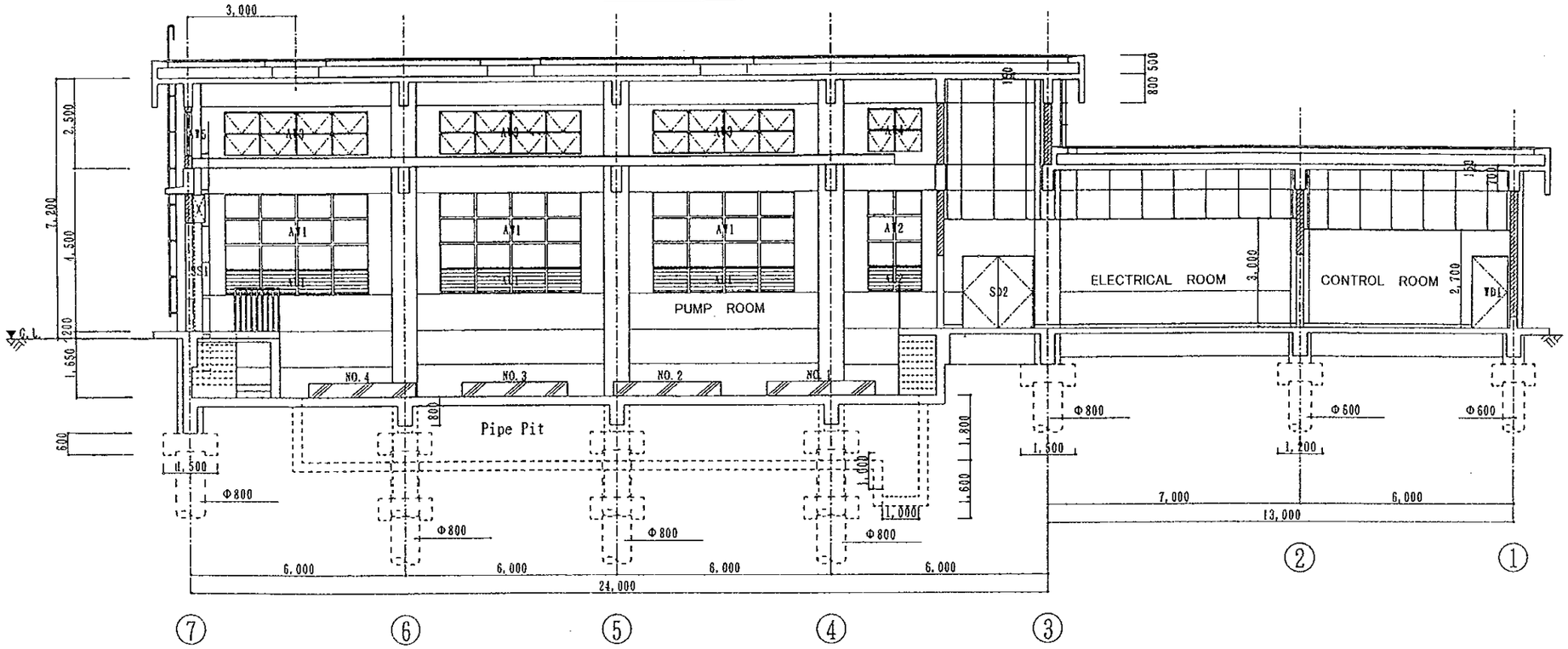
EGP-WD-11 SINGLE LINE DIAGRAM FOR NO.2 DISTRIBUTION PUMP STATION

DISTRIBUTION PUMP HOUSE PLAN

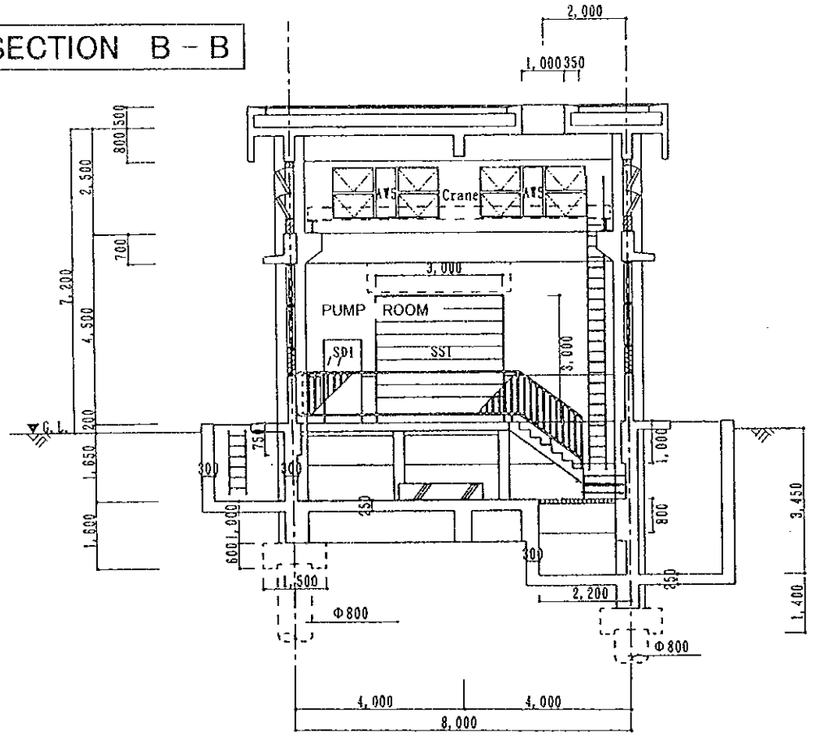


EGP-WD-12 DISTRIBUTION PUMP HOUSE-PLAN

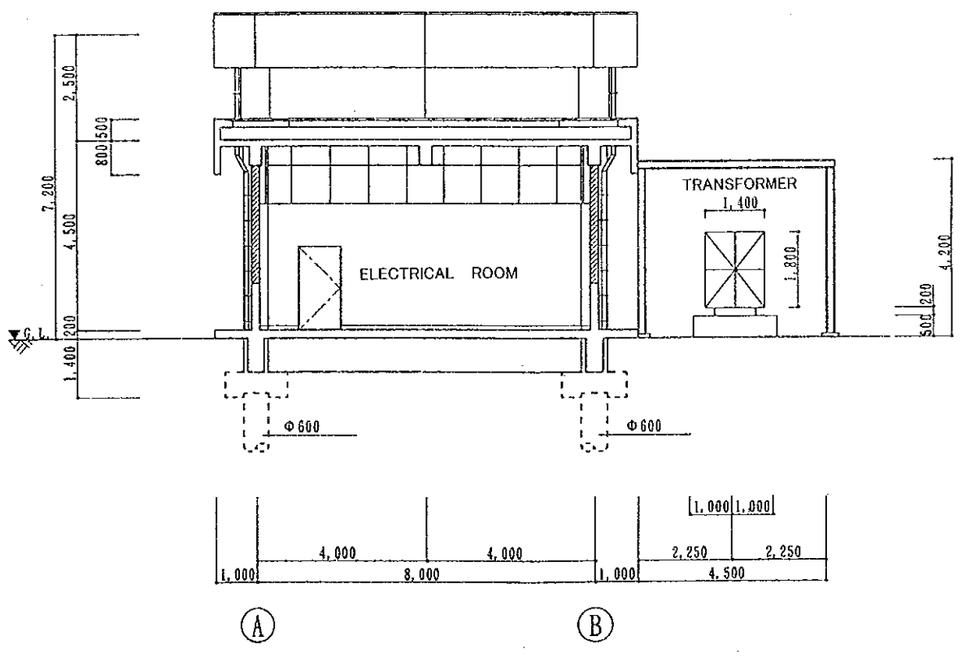
SECTION A - A



SECTION B - B

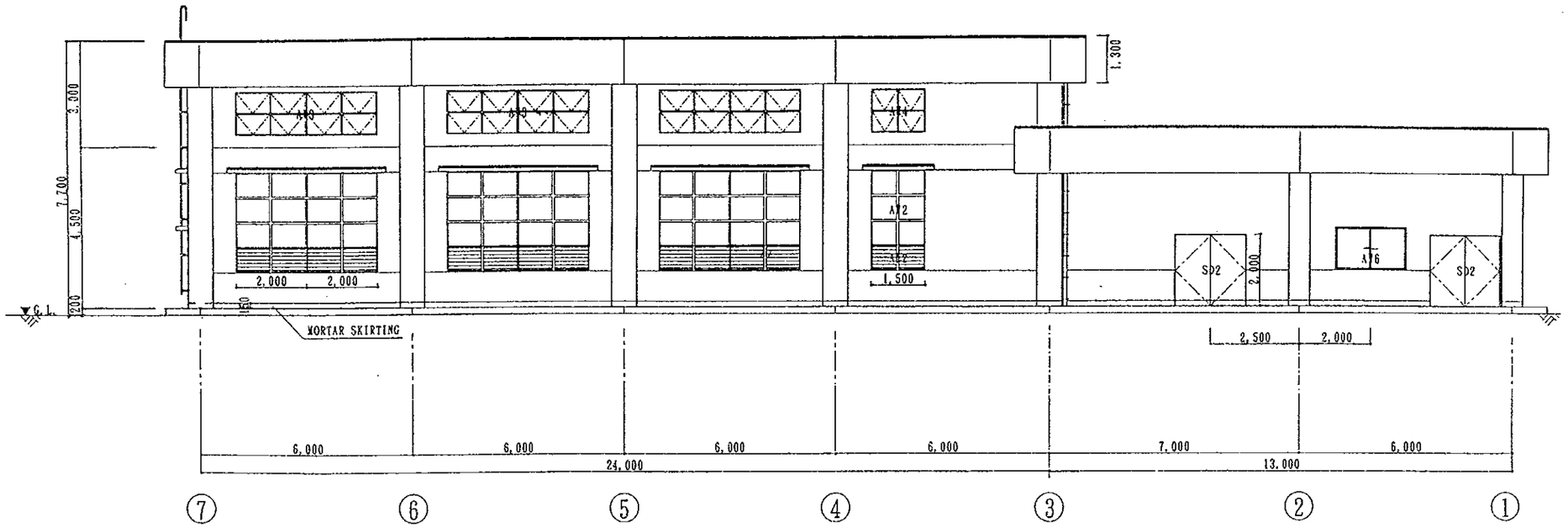


SECTION C- C

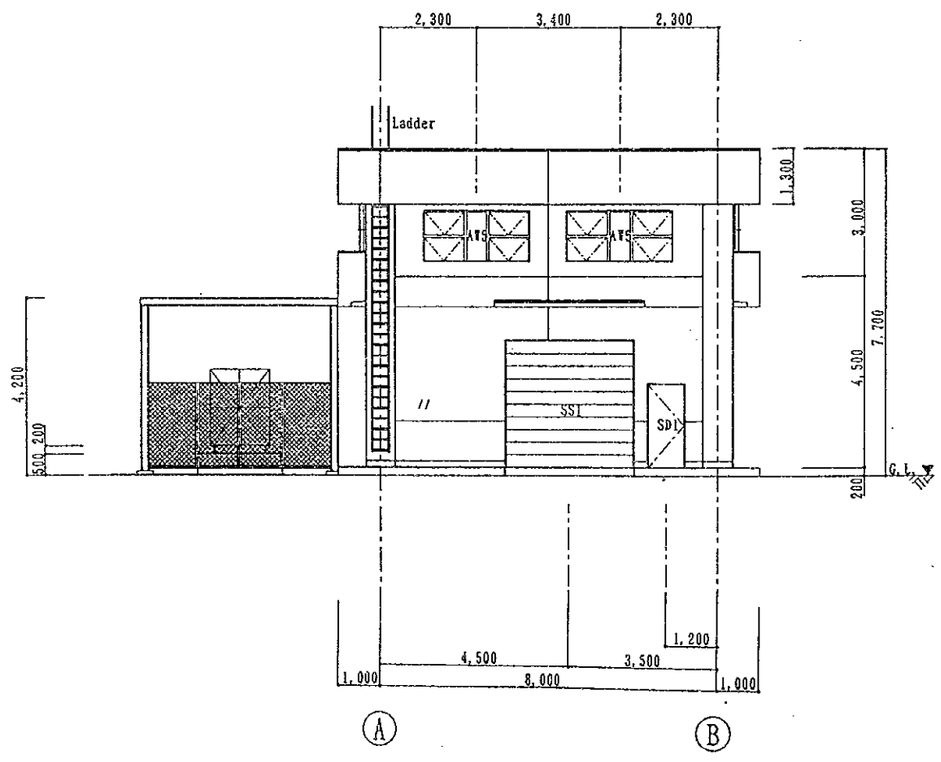


EGP-WD-13 DISTRIBUTION PUMP HOUSE-SECTIONS

ELEVATION - FRONT VIEW



ELEVATION - SIDE VIEW



EGP-WD-14 DISTRIBUTION PUMP HOUSE-ELEVATIONS