

REPUBLIC OF ANGOLA
MINISTRY OF ENERGY AND WATER

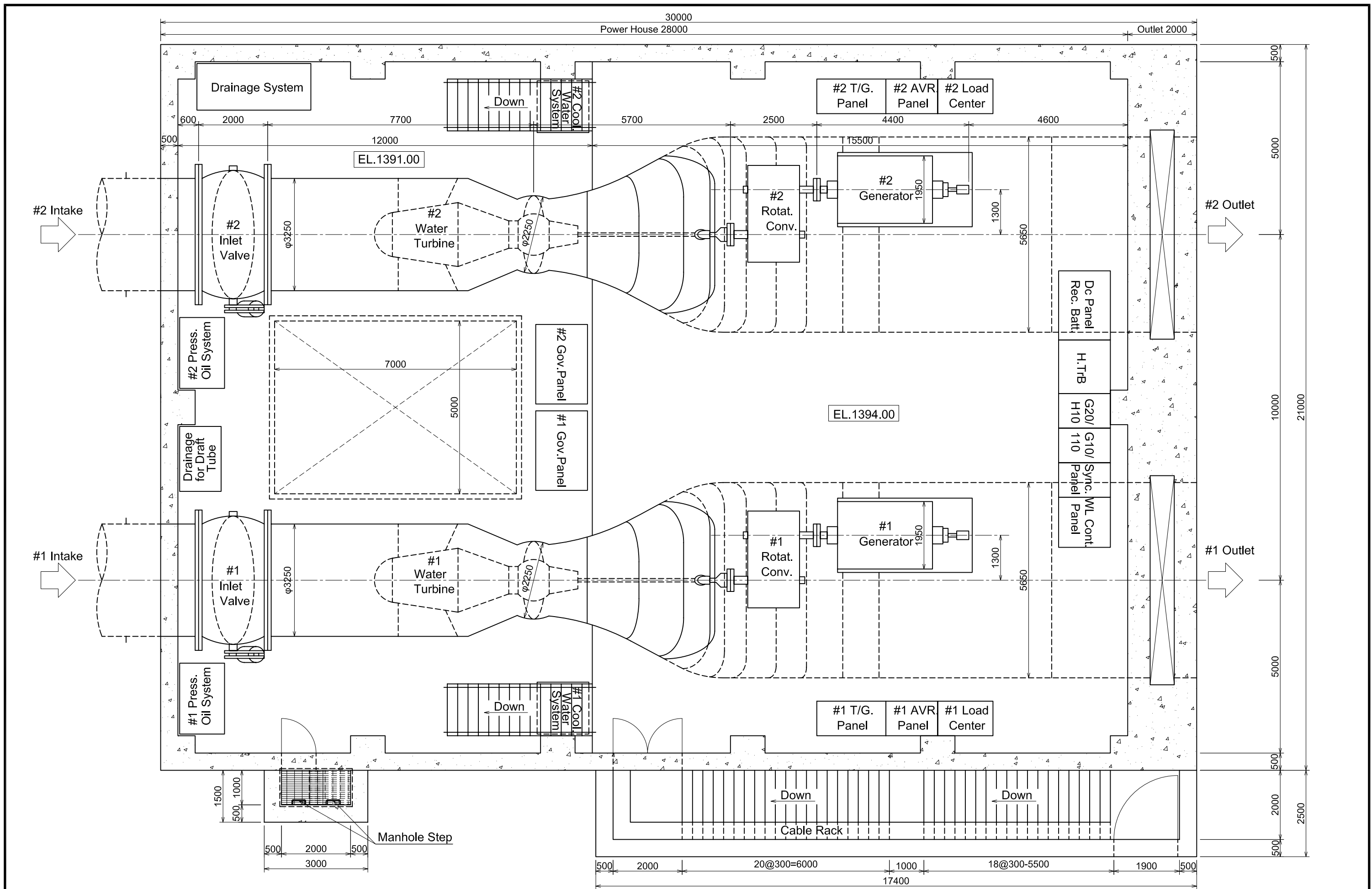


JAPAN INTERNATIONAL
COOPERATION AGENCY
NEWJEC Inc.

Project & Location
THE PREPARATORY SURVEY ON
RURAL ELECTRIFICATION DEVELOPMENT
IN THE REPUBLIC OF ANGOLA

Drawing Title
CUTATO HYDRO POWER STATION
SINGLE LINE DIAGRAM

DWG No.
E-001
7.Apr.2011



REPUBLIC OF ANGOLA
MINISTRY OF ENERGY AND WATER

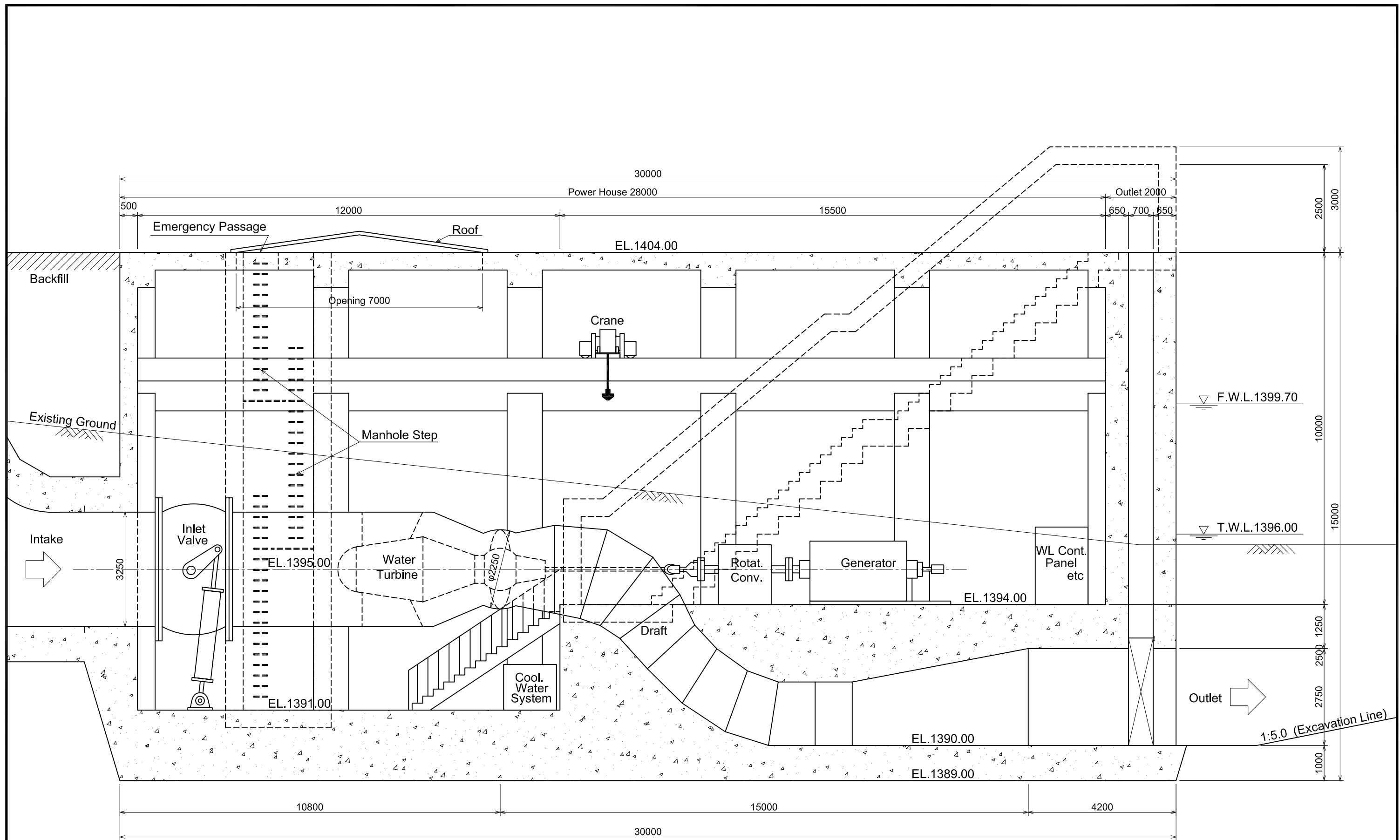


JAPAN INTERNATIONAL
COOPERATION AGENCY
NEWJEC Inc.

Project & Location
THE PREPARATORY SURVEY ON
RURAL ELECTRIFICATION DEVELOPMENT
IN THE REPUBLIC OF ANGOLA

Drawing Title
CUTATO HYDRO POWER STATION
POWER HOUSE LAYOUT
(S = 1/100)

DWG No.
E-002
7.Apr.2011



REPUBLIC OF ANGOLA
MINISTRY OF ENERGY AND WATER

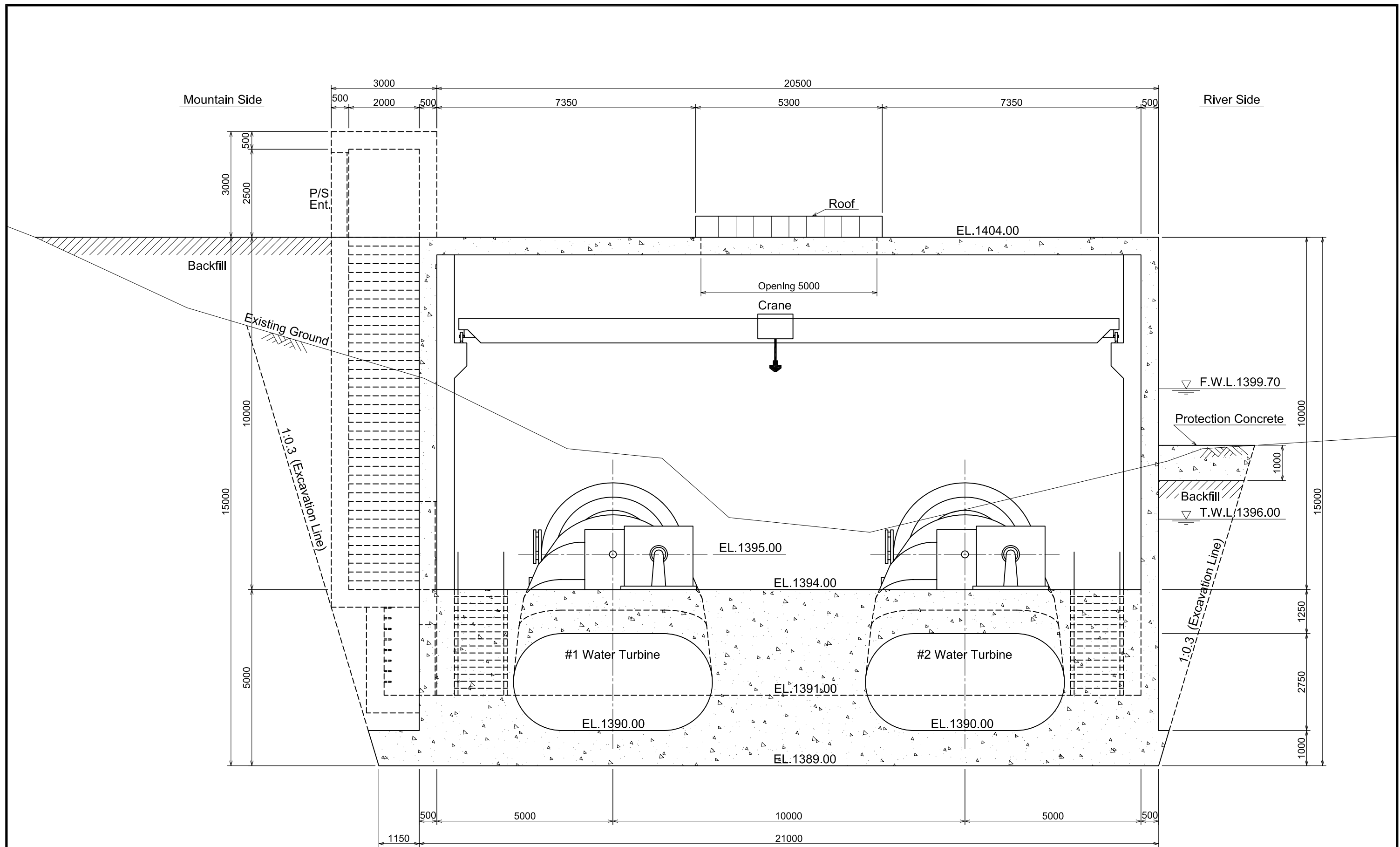


JAPAN INTERNATIONAL
COOPERATION AGENCY
NEWJEC Inc.

Project & Location
THE PREPARATORY SURVEY ON
RURAL ELECTRIFICATION DEVELOPMENT
IN THE REPUBLIC OF ANGLA

Drawing Title
CUTATO HYDRO POWER STATION
VERTICAL SECTION FOR POWER HOUSE
(S = 1/100)

DWG No.
E-003
7.Apr.2011



REPUBLIC OF ANGOLA
MINISTRY OF ENERGY AND WATER

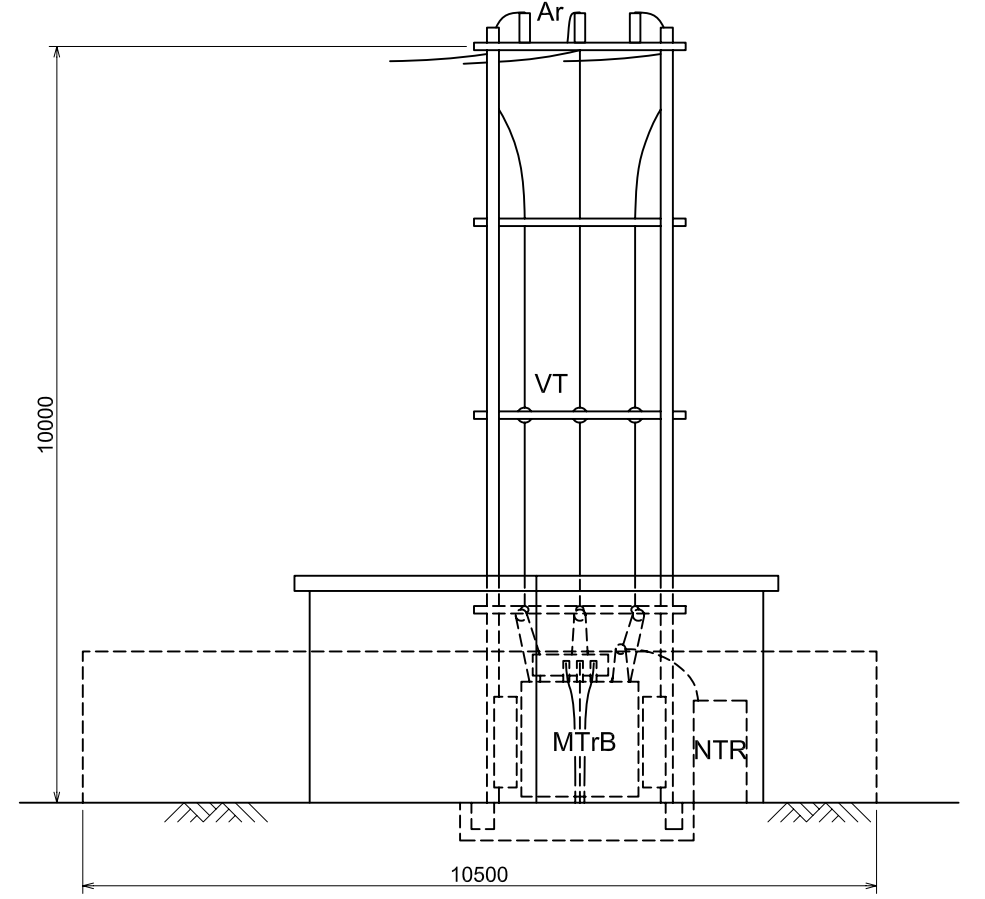
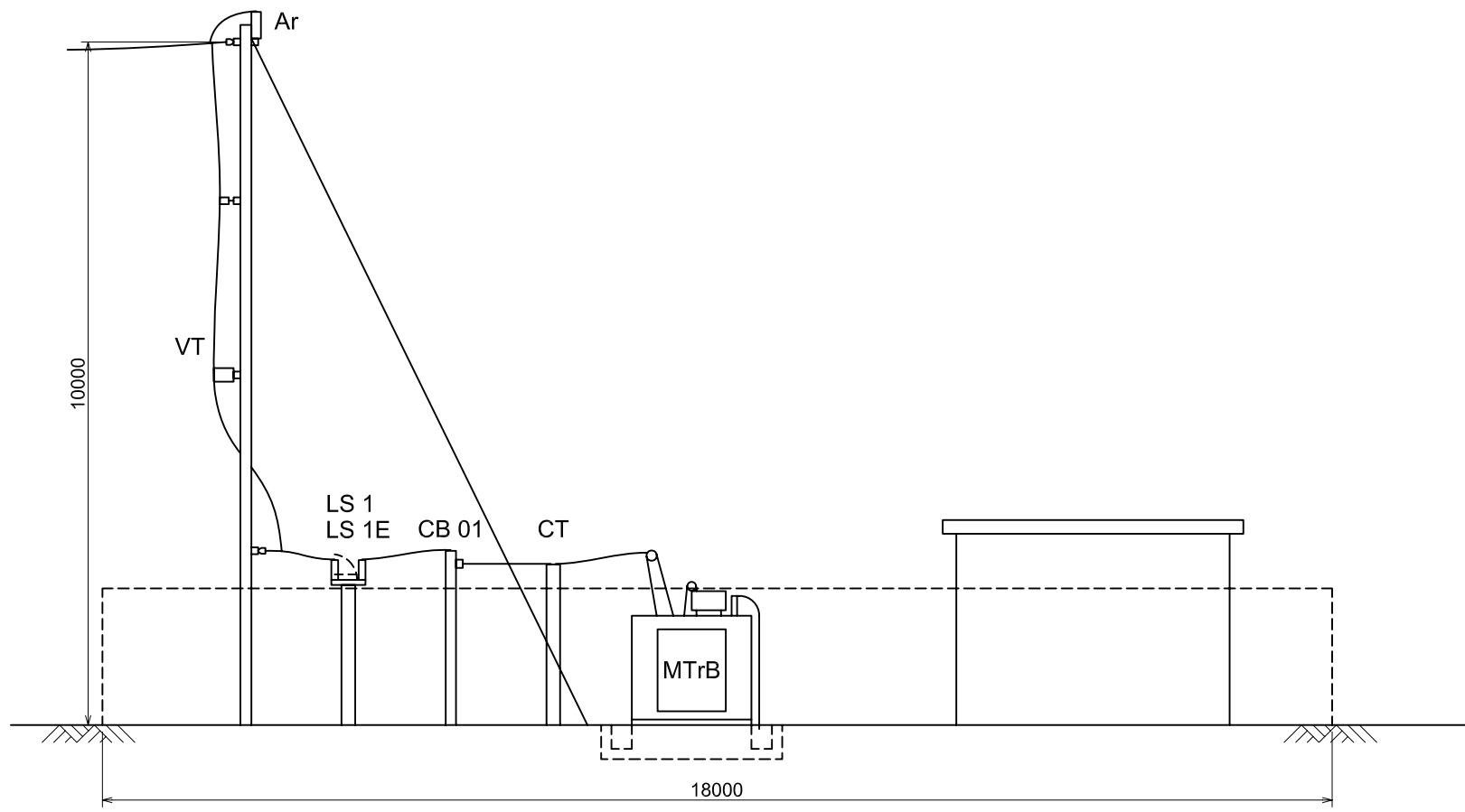
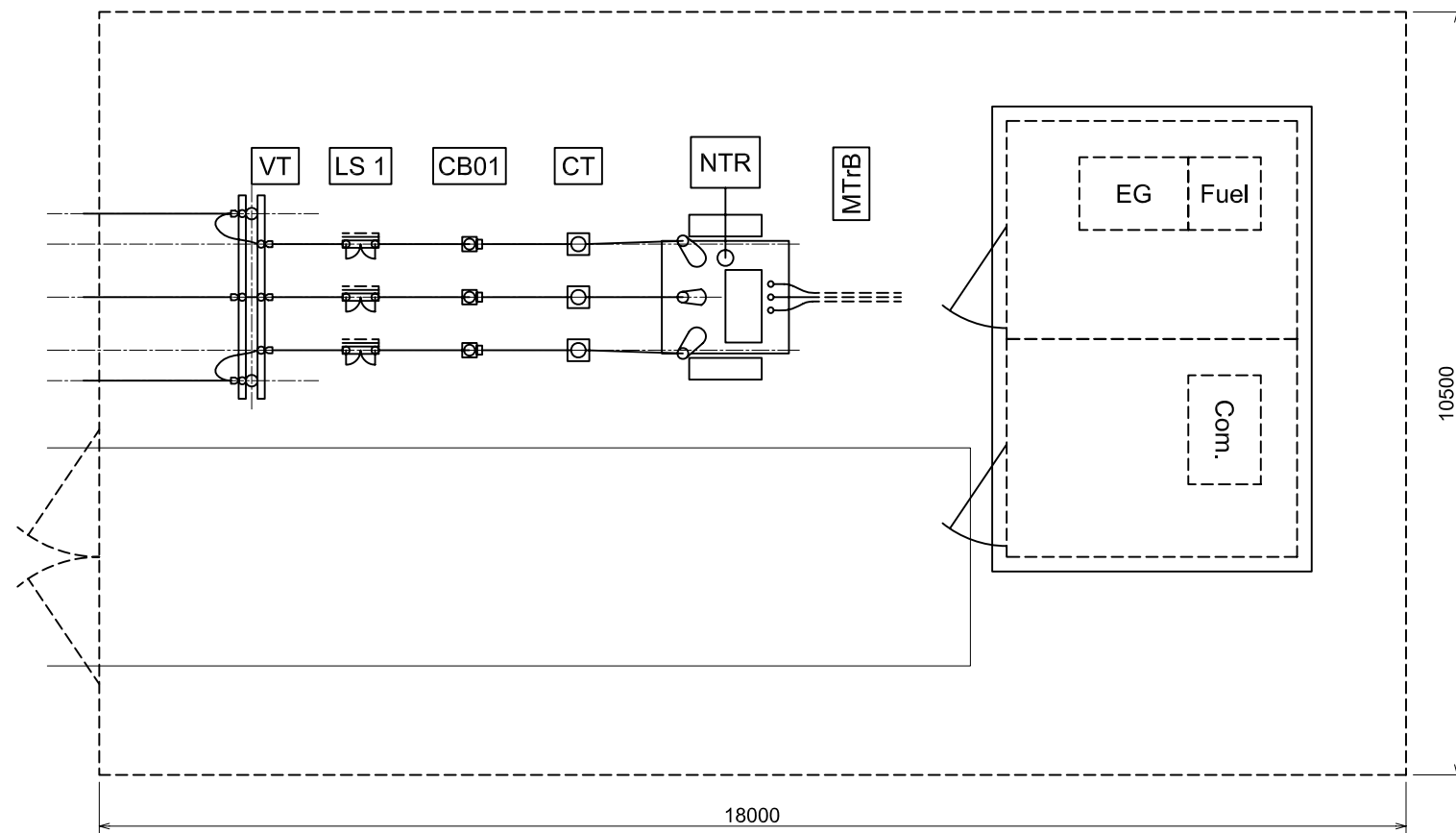


JAPAN INTERNATIONAL
COOPERATION AGENCY
NEWJEC Inc.

Project & Location
THE PREPARATORY SURVEY ON
RURAL ELECTRIFICATION DEVELOPMENT
IN THE REPUBLIC OF ANGLA

Drawing Title
CUTATO HYDRO POWER STATION
CROSS SECTION FOR POWER HOUSE
(S = 1/100)

DWG No.
E-004
7.Apr.2011



REPUBLIC OF ANGOLA
MINISTRY OF ENERGY AND WATER



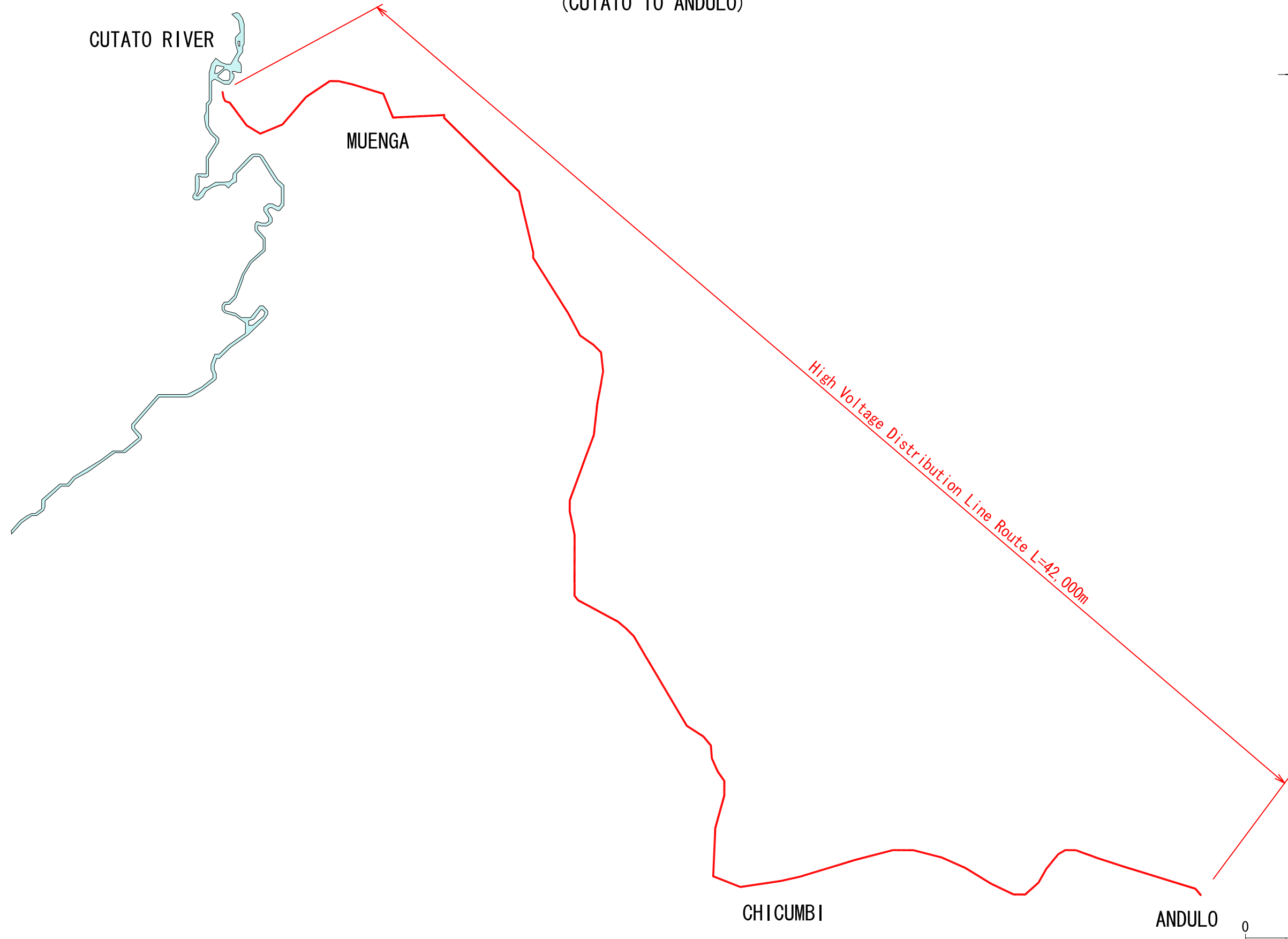
JAPAN INTERNATIONAL
COOPERATION AGENCY
NEWJEC Inc.

Project & Location
THE PREPARATORY SURVEY ON
RURAL ELECTRIFICATION DEVELOPMENT
IN THE REPUBLIC OF ANGOLA

Drawing Title
CUTATO HYDRO POWER STATION
SUBSTATION LAYOUT
(S = 1/100)

DWG No.
E-005
7.Apr.2011

HIGH VOLTAGE DISTRIBUTION LINE ROUTE S=1/100,000
(CUTATO TO ANDULO)



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MINISTRY OF ENERGY AND WATER

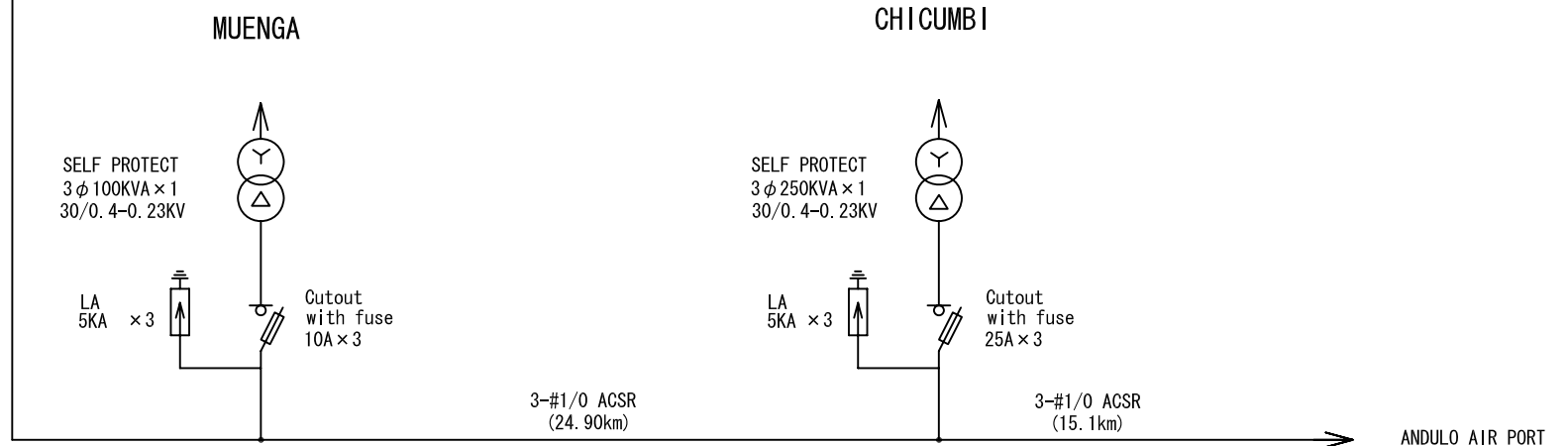
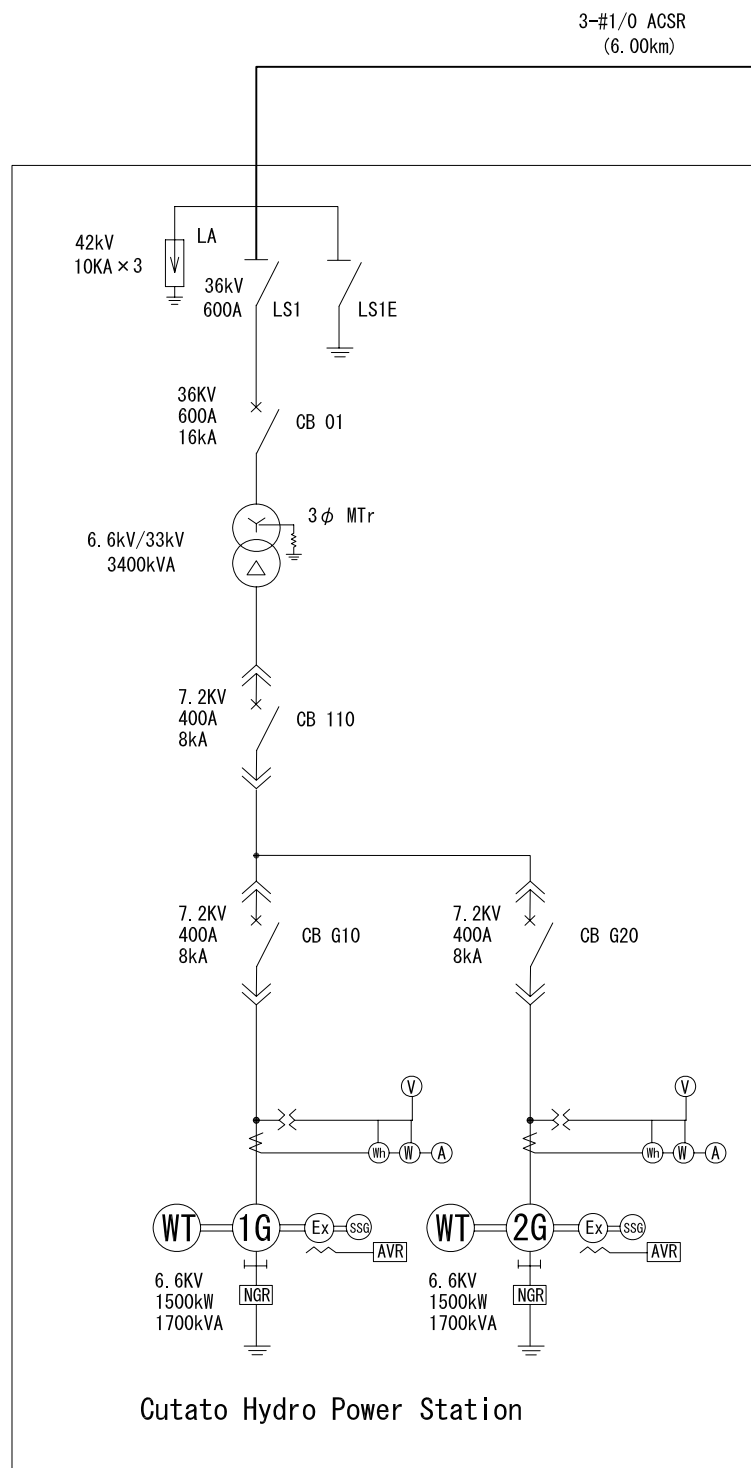


JAPAN INTERNATIONAL
COOPERATION AGENCY
NEWJEC Inc.

Project & Location
THE PREPARATORY SURVEY ON
RURAL ELECTRIFICATION DEVELOPMENT
IN THE REPUBLIC OF ANGLA

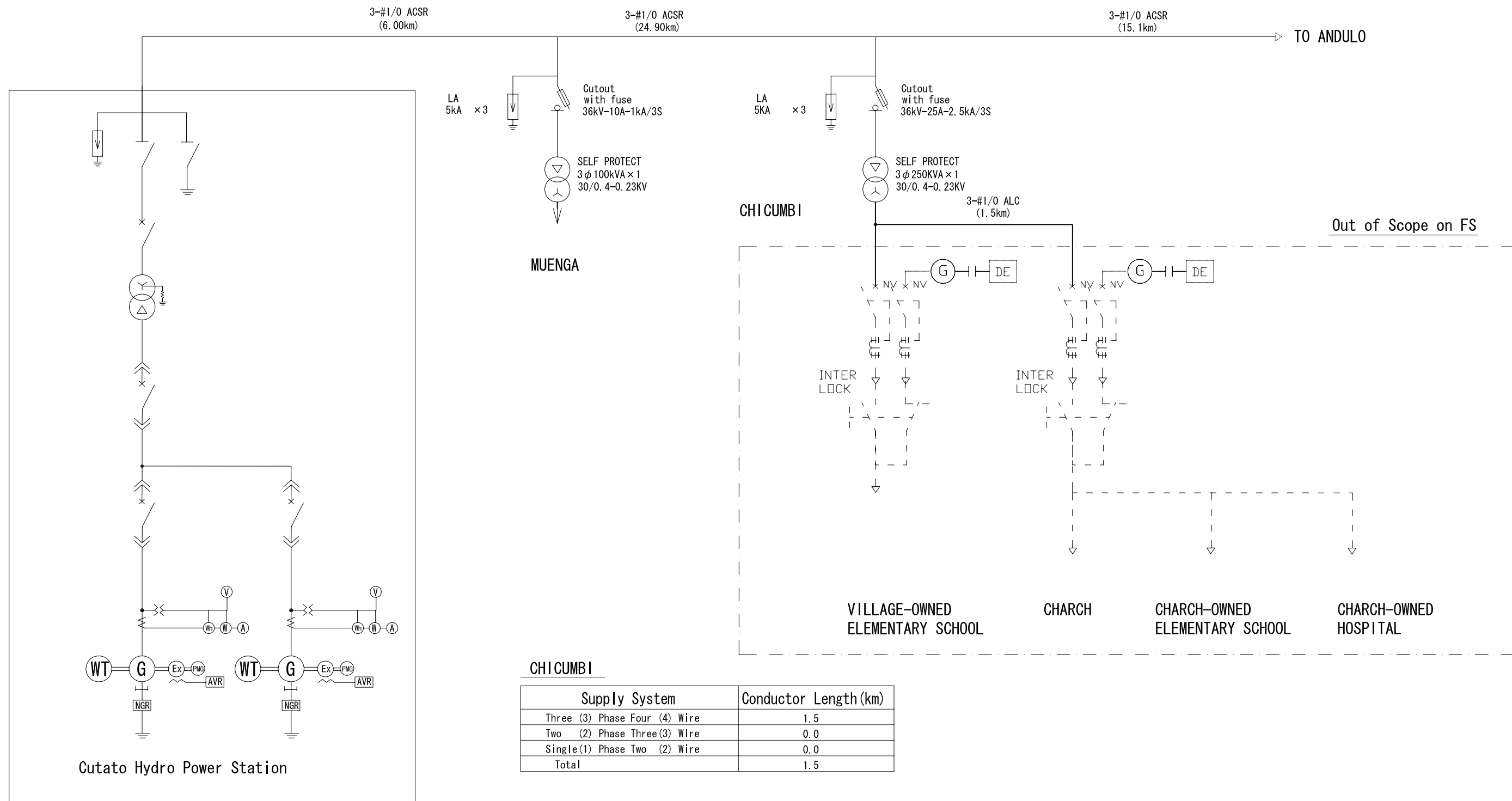
Drawing Title
DISTRIBUTION LINE ROUTE
CUTATO TO ANDULO
(1/100,000)

DWG No.
T-001
7.Apr.2011



ANGOLA CUTATO - ANDULO

Supply System	Conductor Length(km)
Three (3) Phase Four (4) Wire	46.0
Two (2) Phase Three(3) Wire	0.0
Single(1) Phase Two (2) Wire	0.0
Total	46.0



Cutato Hydro Power Station

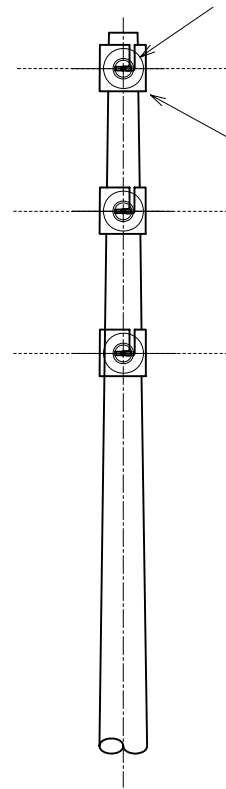
CHICUMBI

Supply System	Conductor Length (km)
Three (3) Phase Four (4) Wire	1.5
Two (2) Phase Three (3) Wire	0.0
Single (1) Phase Two (2) Wire	0.0
Total	1.5

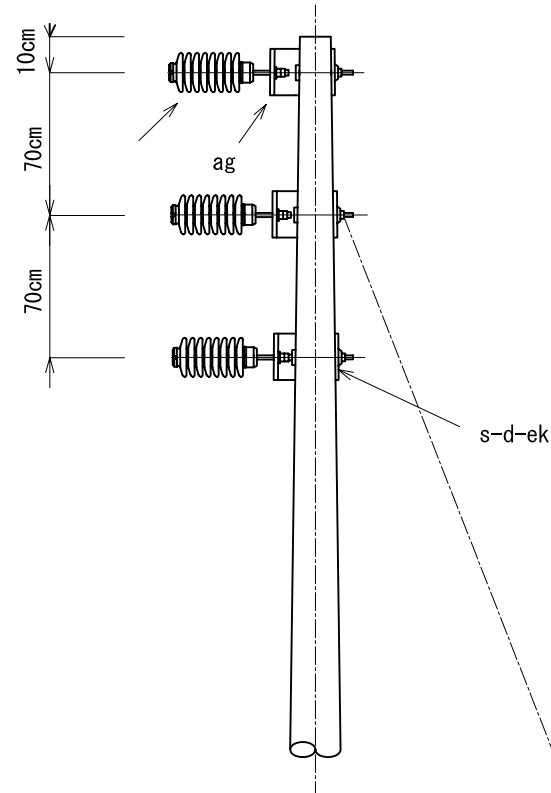
POLE DRAWING (CUTATO - ANDULO)

30kV. THREE PHASE 0° TO 5° ANGLE (VERTICAL TYPE)

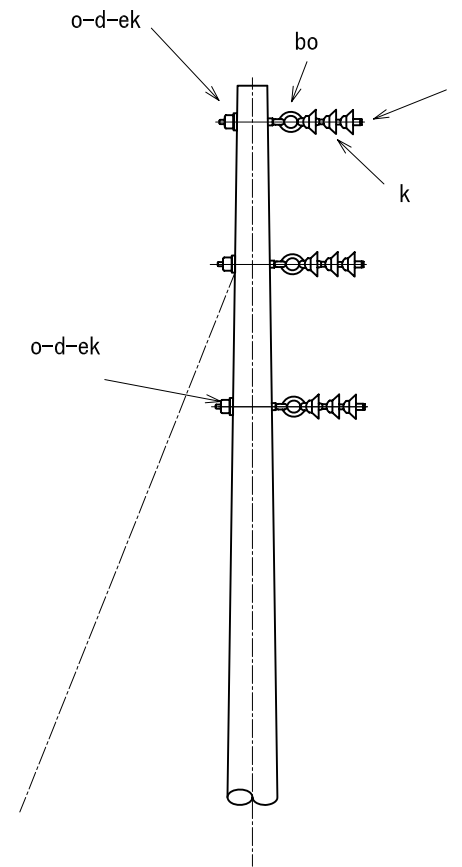
30kV, THREE PHASE 30° TO 60° ANGLE (VERTICAL TYPE)



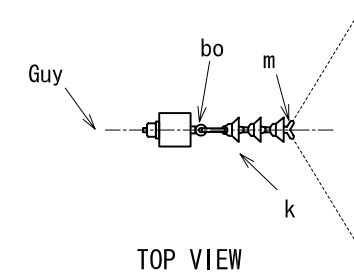
ELEVATION



SIDE VIEW



ELEVATION

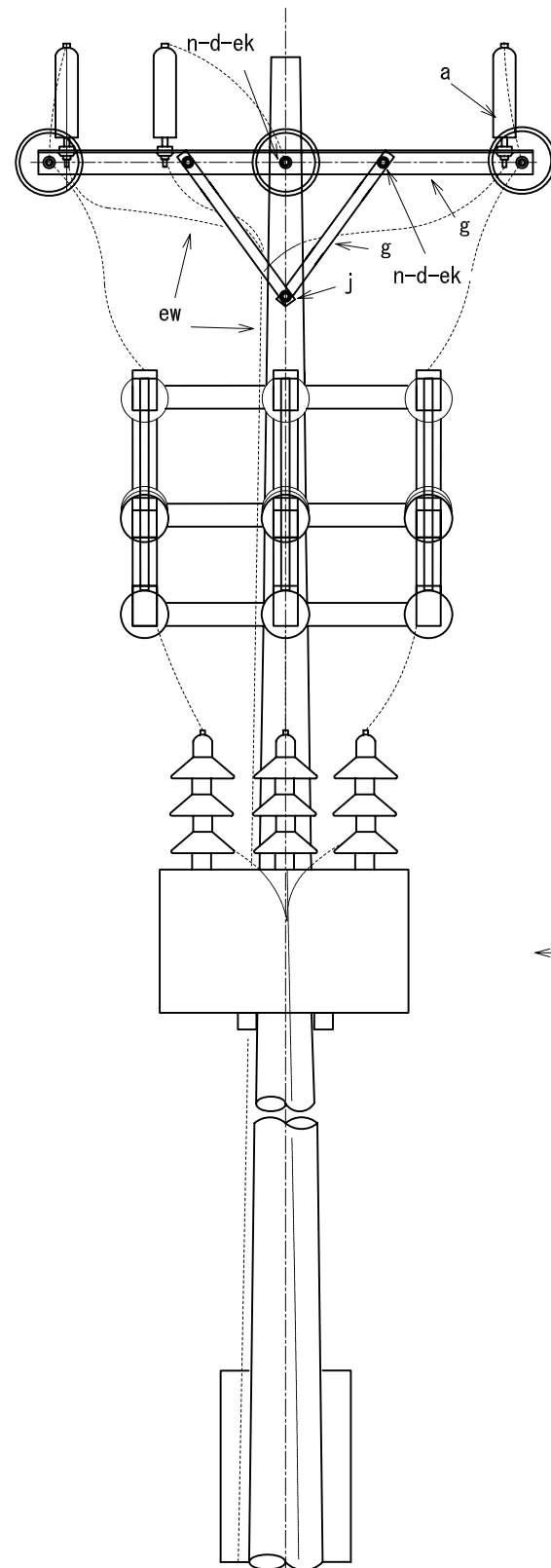


TOP VIEW

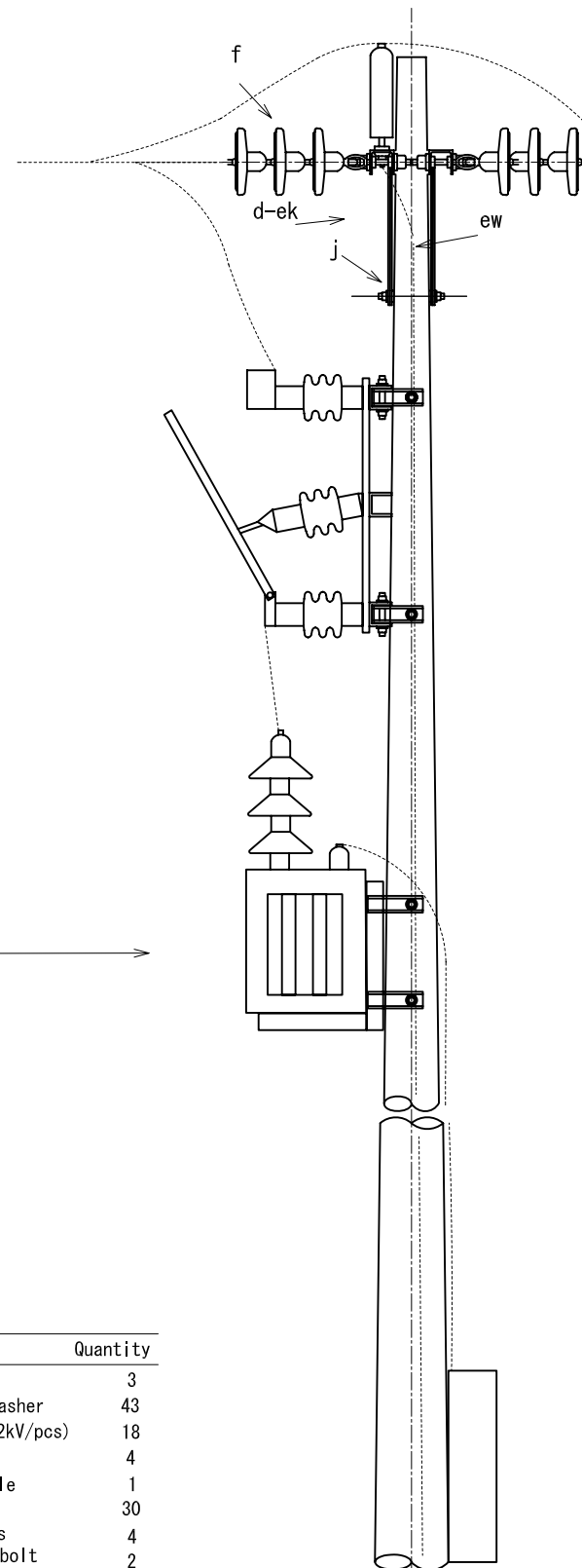
Item	Materials
a-	Line Post Pin Type Insulator
ag-	Angle
d-	hole washer
s-	Single arm bolt
ek-	lock nut

Item	Materials
d-	Hole washer
k-	Suspension insulator
o-	Eye bolt
m-	Suspension clamp
bo-	Anchor shackle
ek-	locknuts

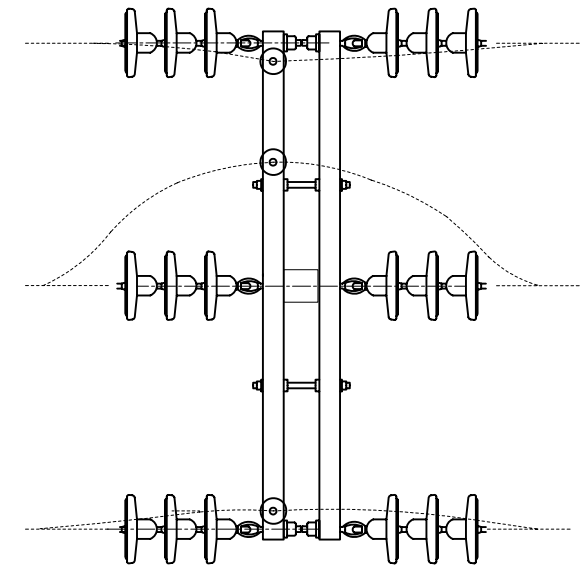
POLE TR & CUT OUT SW INSTALLATION VIEW (100kVA) FOR MUENGA 30kV. THREE PHASE



FRONT VIEW



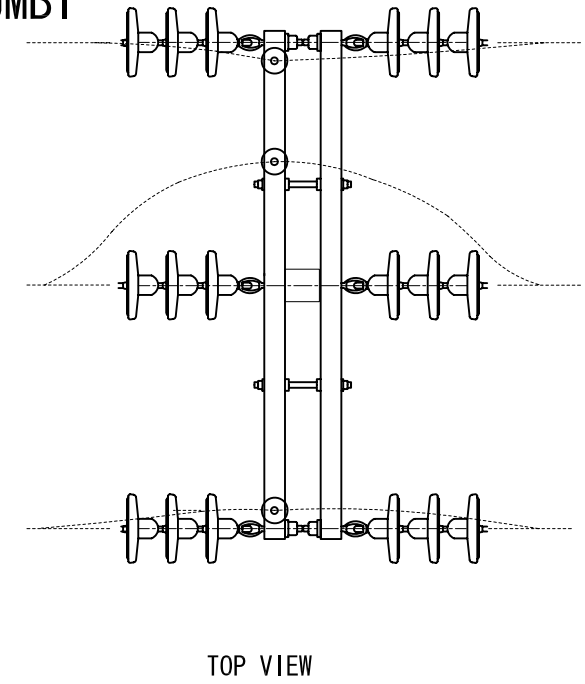
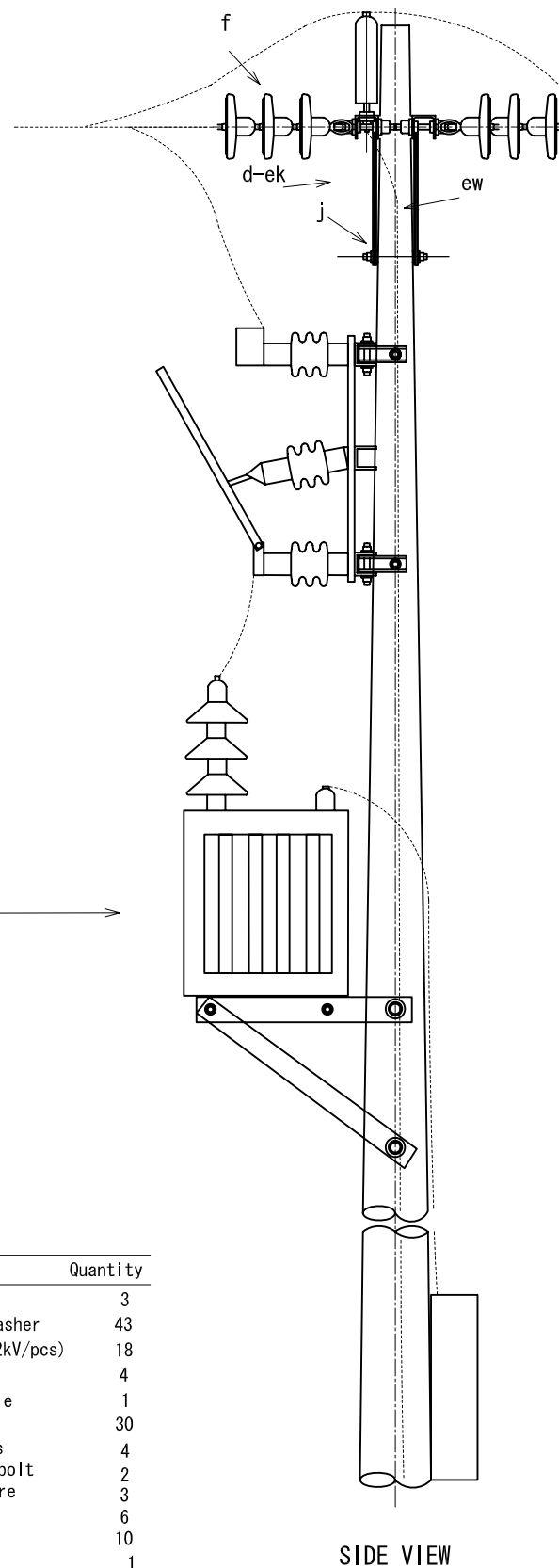
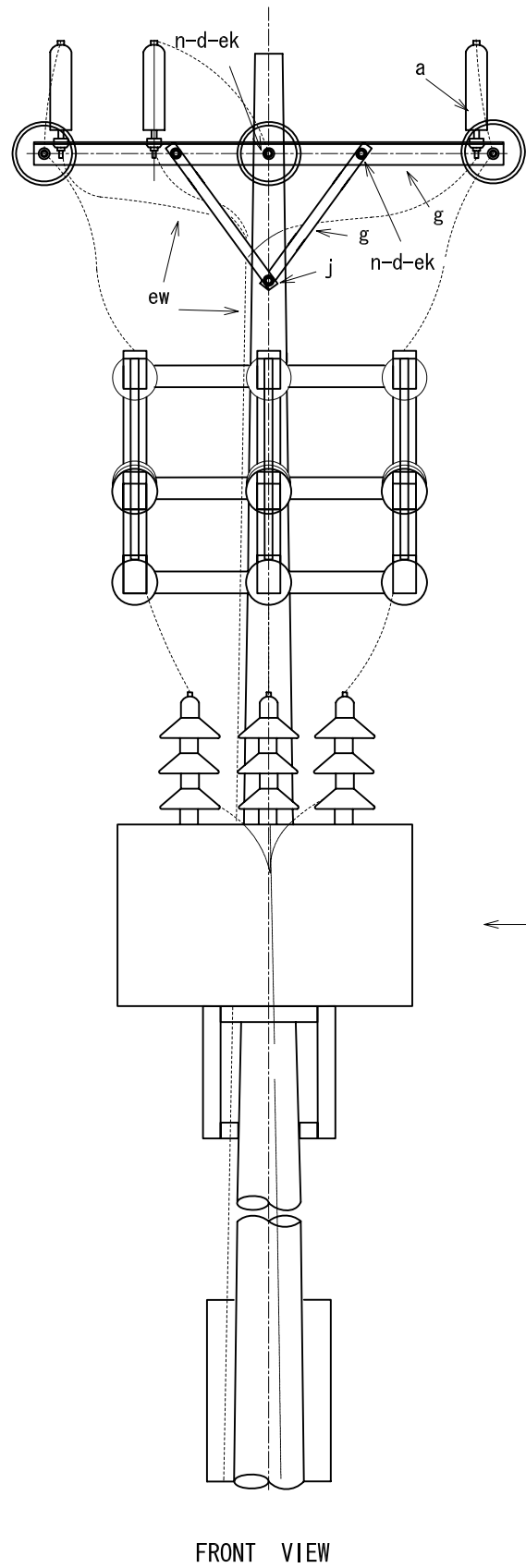
SIDE VIEW



TOP VIEW

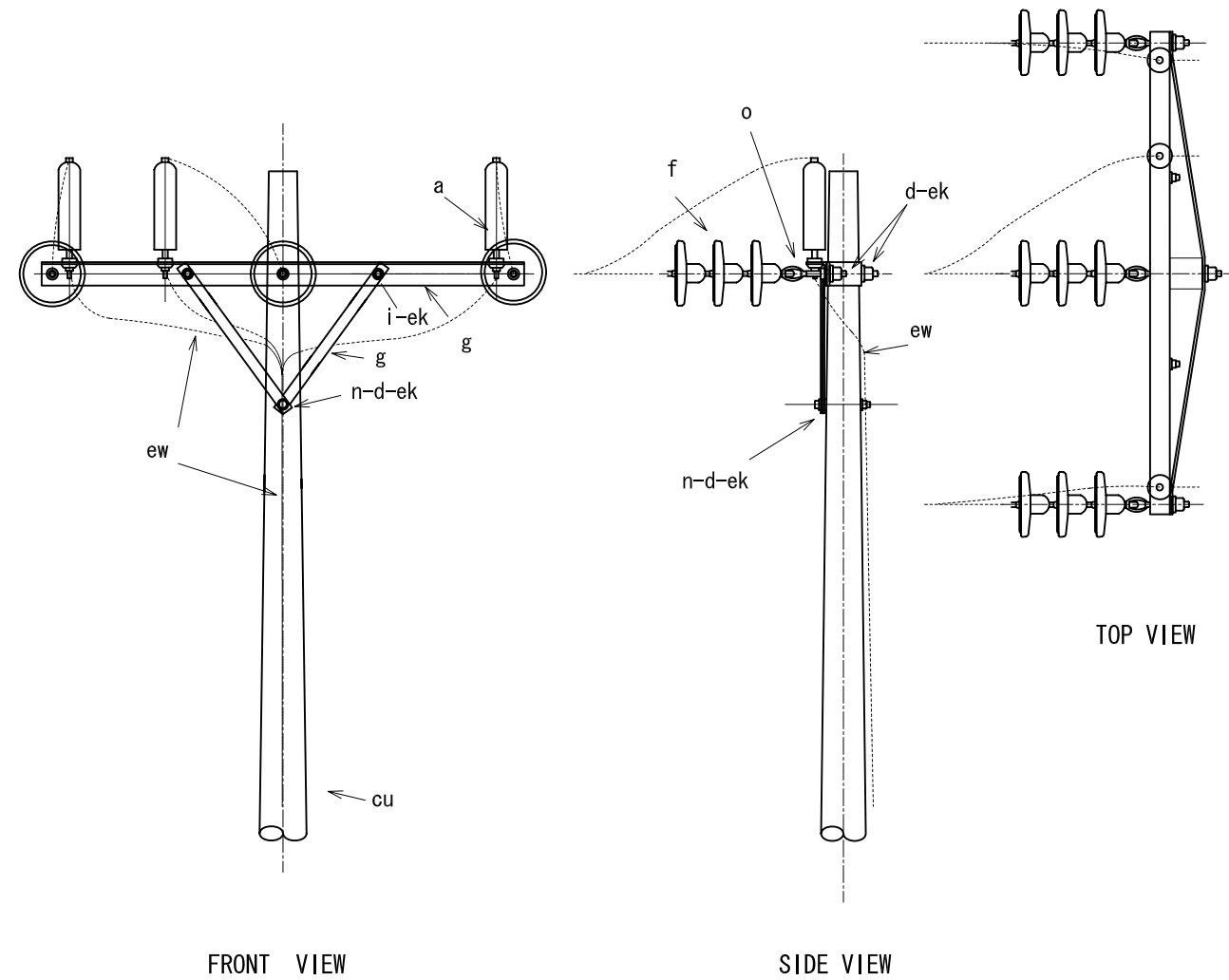
Item	Materials	Quantity
a-	Surrge Arrester	3
d-	Hole washer	43
f-	Insulator (12kV/pcs)	18
g-	Cross beam	4
cu-	Concrete pole	1
ek-	Locknuts	30
i-	Carriage bolts	4
n-	Double arm bolt	2
ew-	Grand earth wire	3
o-	Eye bolt	6
s-	Single arm bolt	10
tr-	Transformer	1

POLE TR & CUT OUT SW INSTALLATION VIEW (250kVA) FOR CHICUMBI
30kV. THREE PHASE,



Item	Materials	Quantity
a-	Surge Arrester	3
d-	Hole washer	43
f-	Insulator (12kV/pcs)	18
g-	Cross beam	4
cu-	Concrete pole	1
ek-	Locknuts	30
i-	Carriage bolts	4
n-	Double arm bolt	2
ew-	Grand earth wire	3
o-	Eye bolt	6
s-	Single arm bolt	10
tr-	Transformer	1

END POLE
30kV. THREE PHASE 0° TO 5° ANGLE



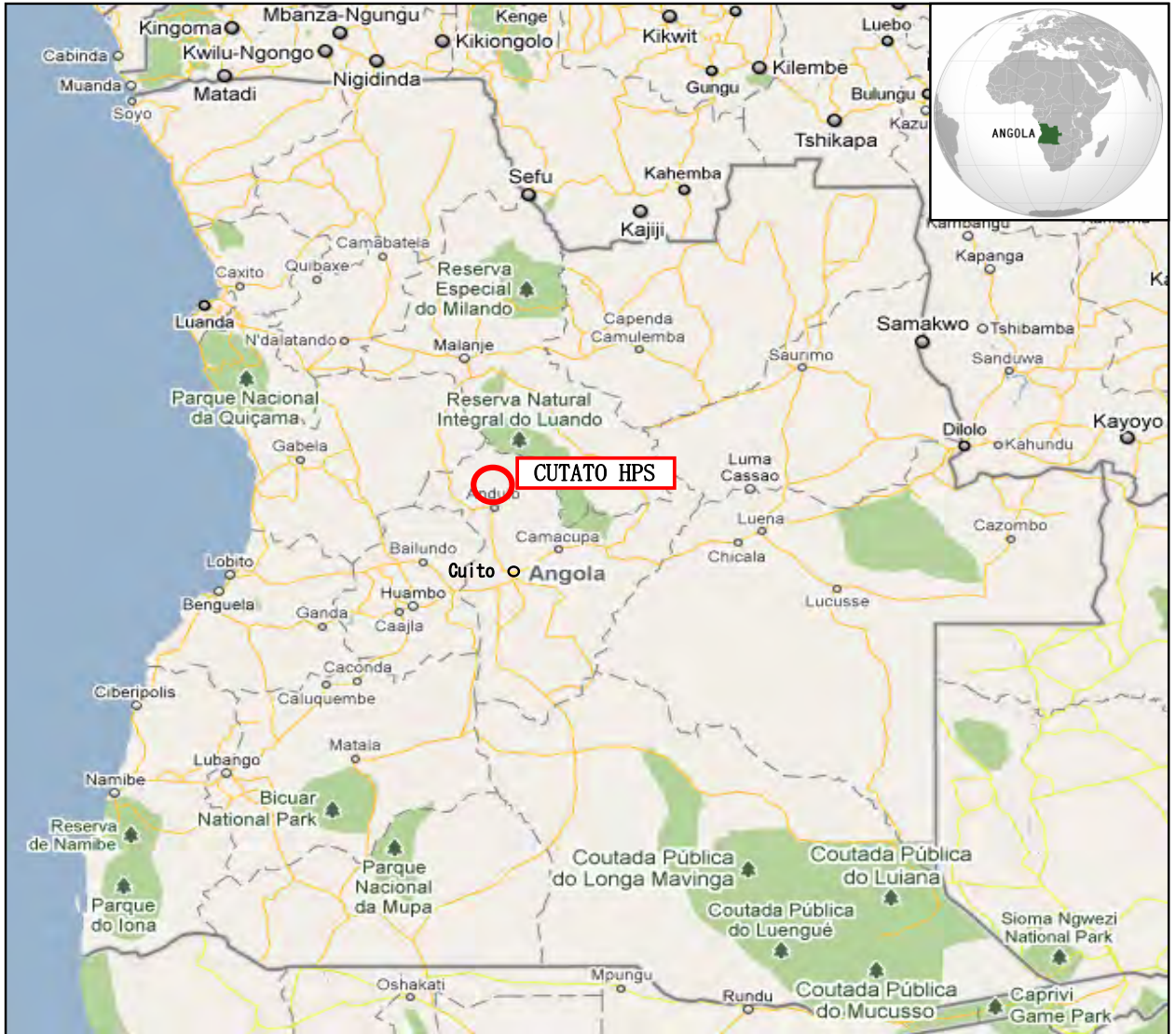
Item	Materials	Quantity
a-	Surrge Arrester	3
d-	Hole washer	16
f-	Insulator (12kV/pcs)	9
g-	Cross beam	2
cu-	Concrete pole	1
ek-	Locknuts	9
i-	Carriage bolts	2
n-	Double arm bolt	0
ew-	Grand earth wire	3
o-	Eye bolt	3
s-	Single arm bolt	1

添付資料 2

Cutato 水力発電所計画概要

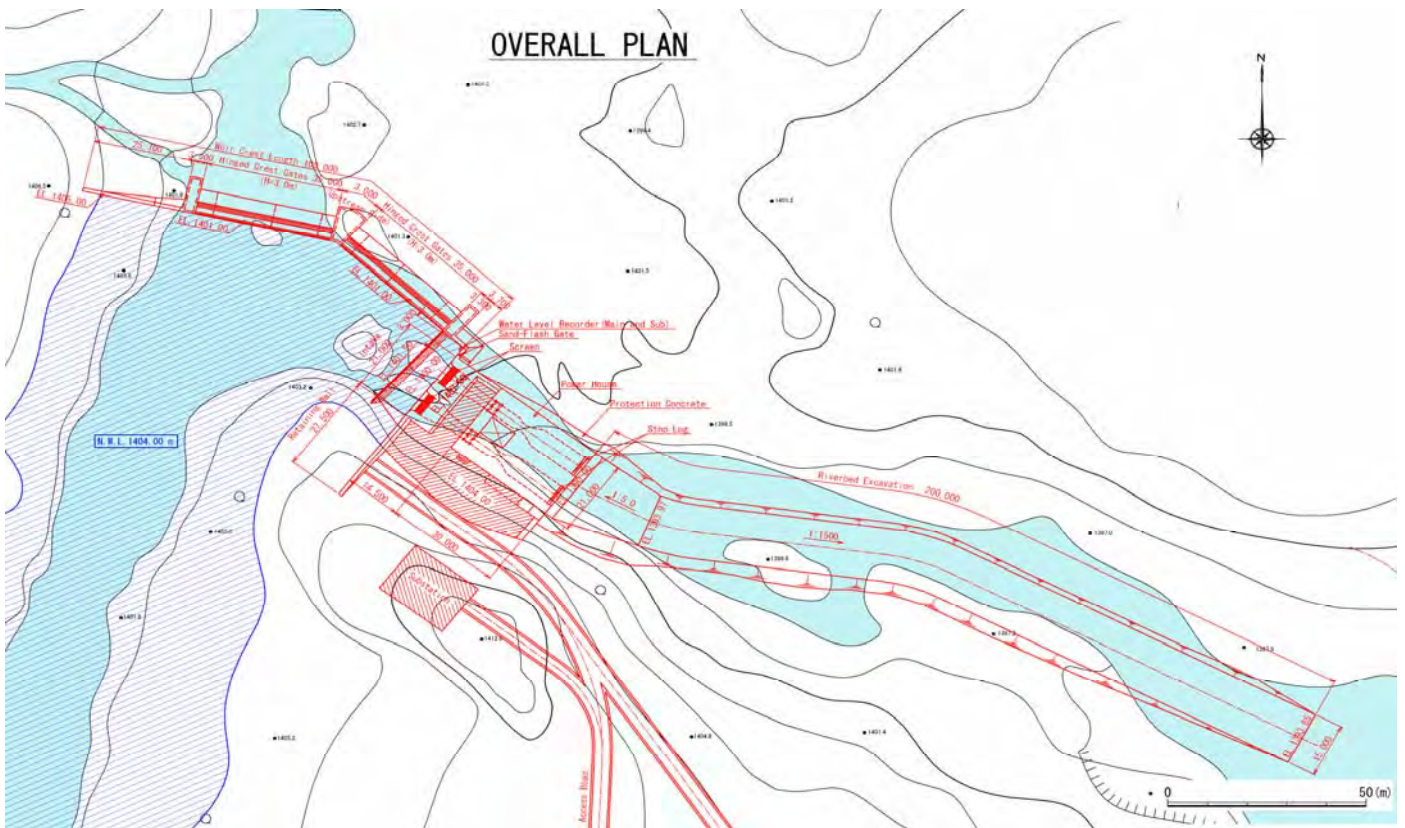
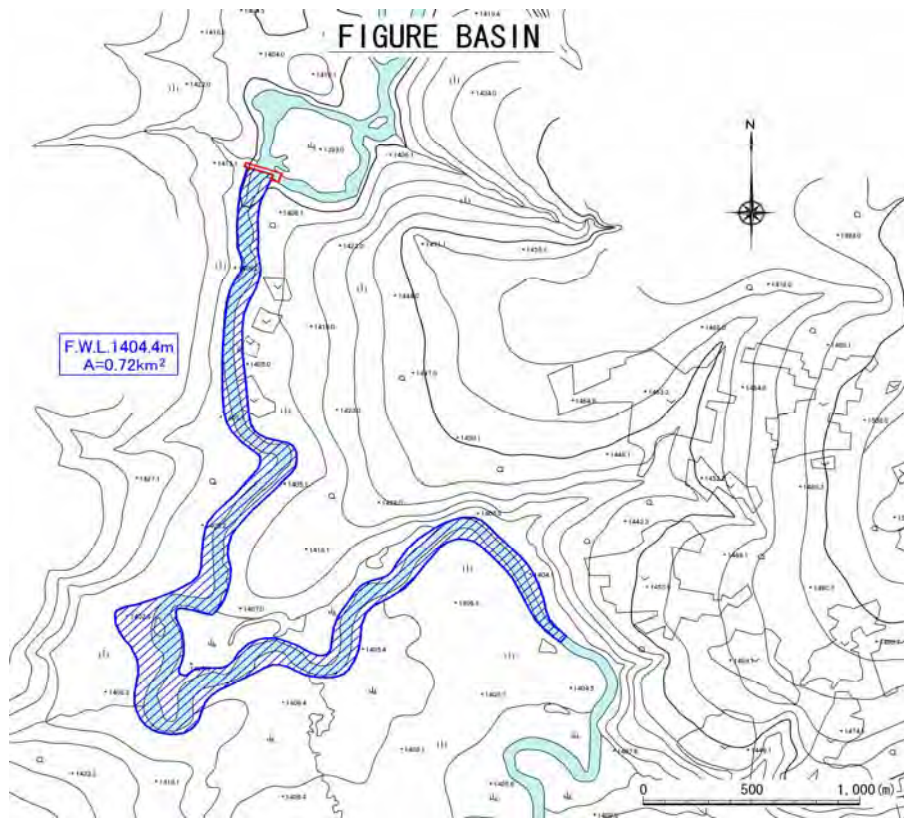
CUTATO HPS (Hydro Power Station)

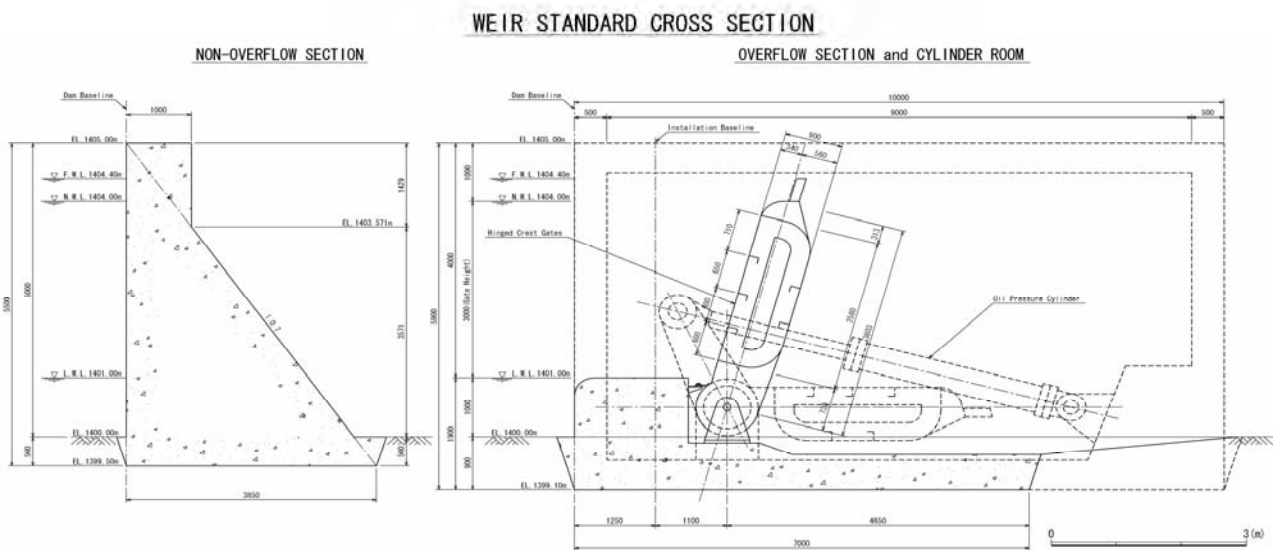
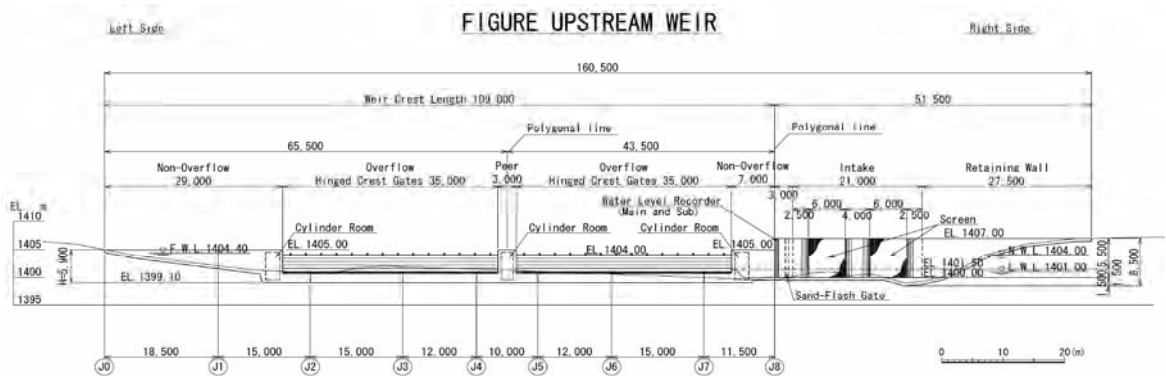
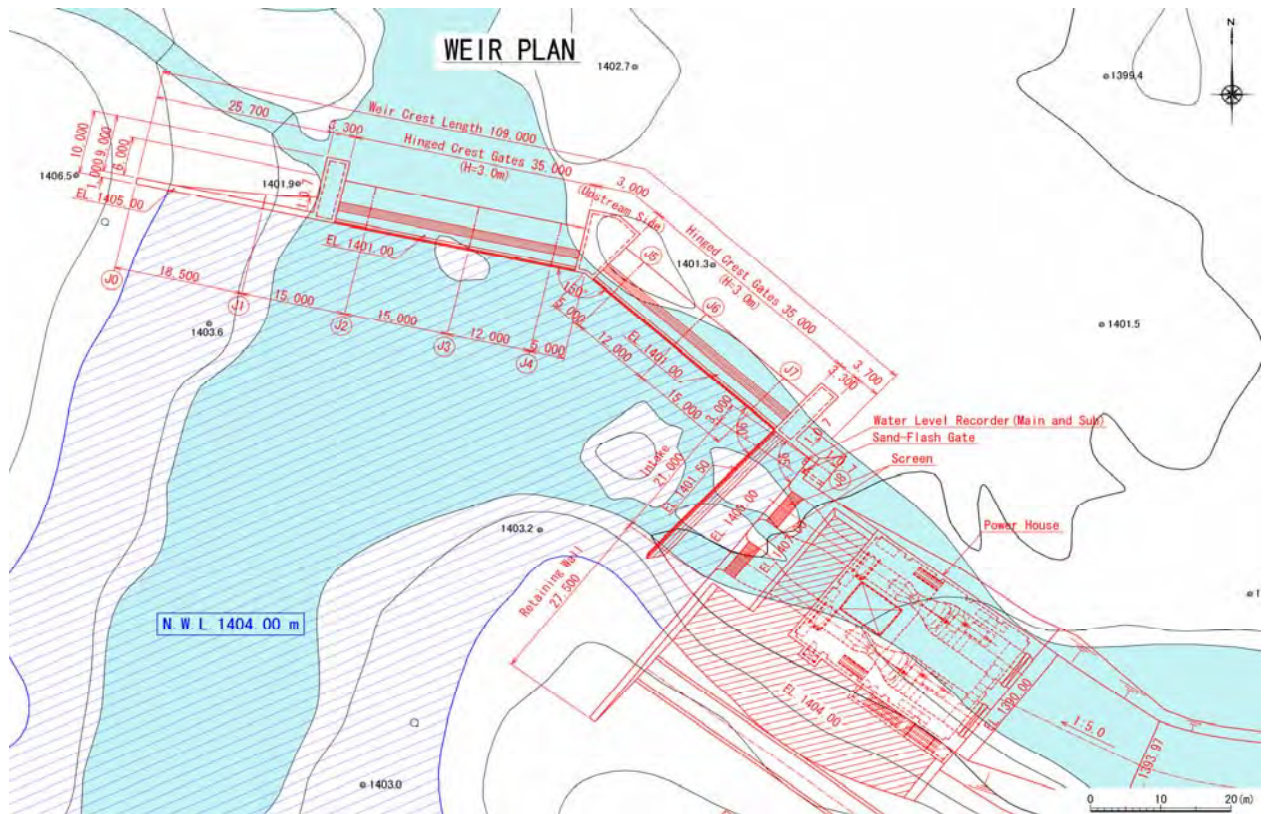
FIGURE LIST OF CONSTRUCTION WORK

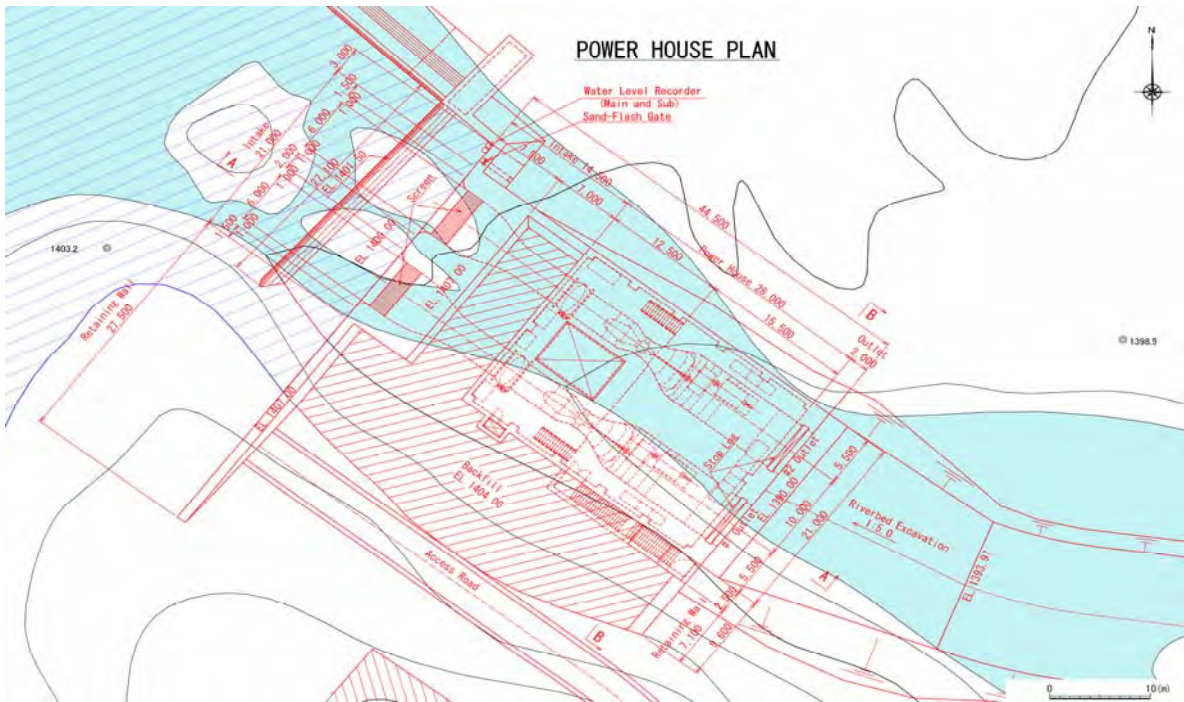


REPUBLIC OF ANGOLA
MINISTRY OF ENERGY AND WATER

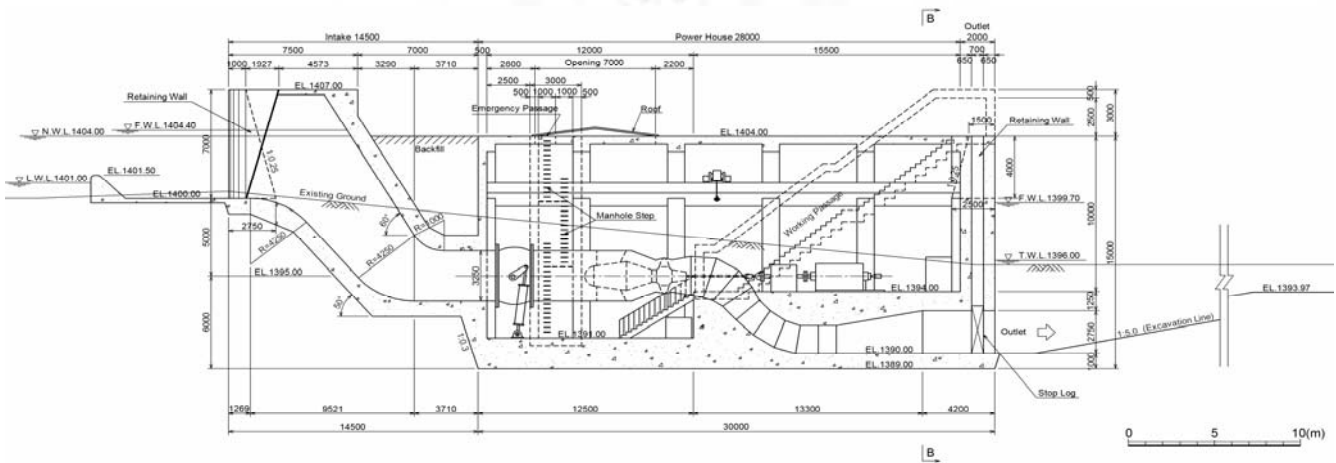
Jun. 2011



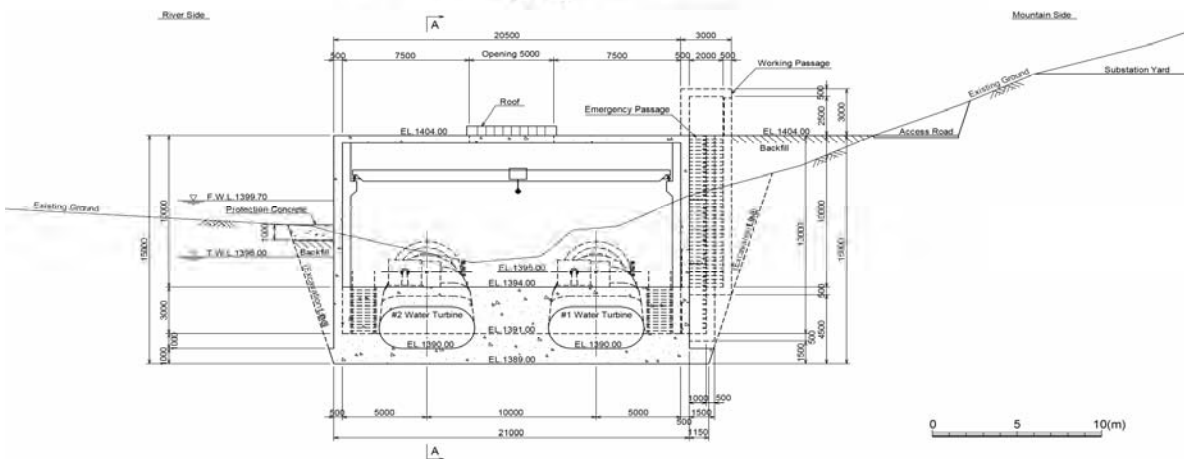


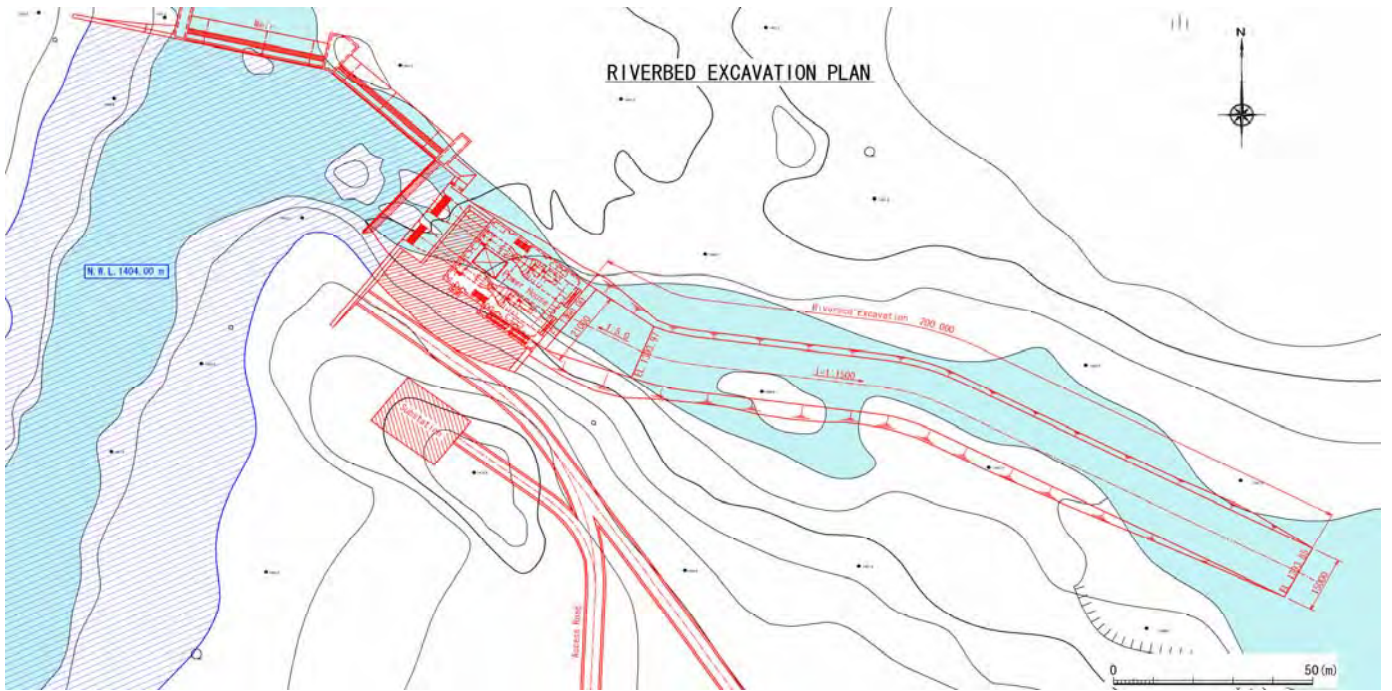


**VERTICAL SECTION FOR POWER HOUSE
(A - A)**

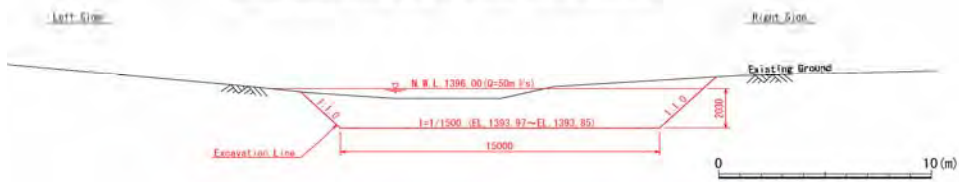


**CROSS SECTION FOR POWER HOUSE
(B - B)**





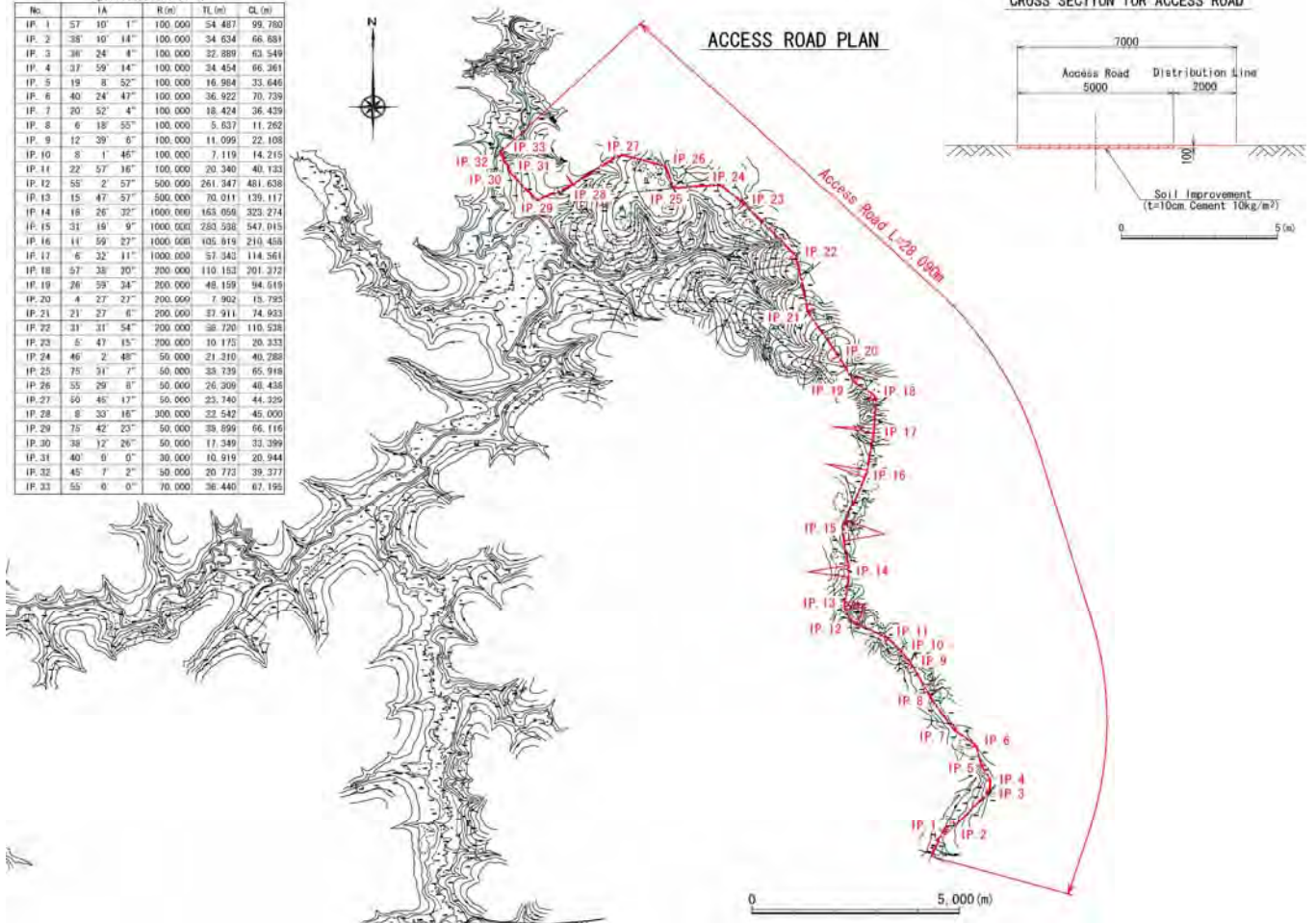
CROSS SECTION FOR RIVERBED EXCAVATION



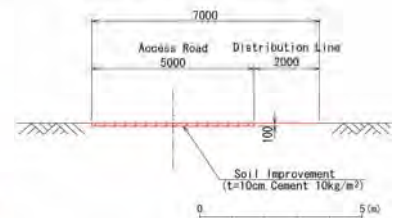
Specifications of IP

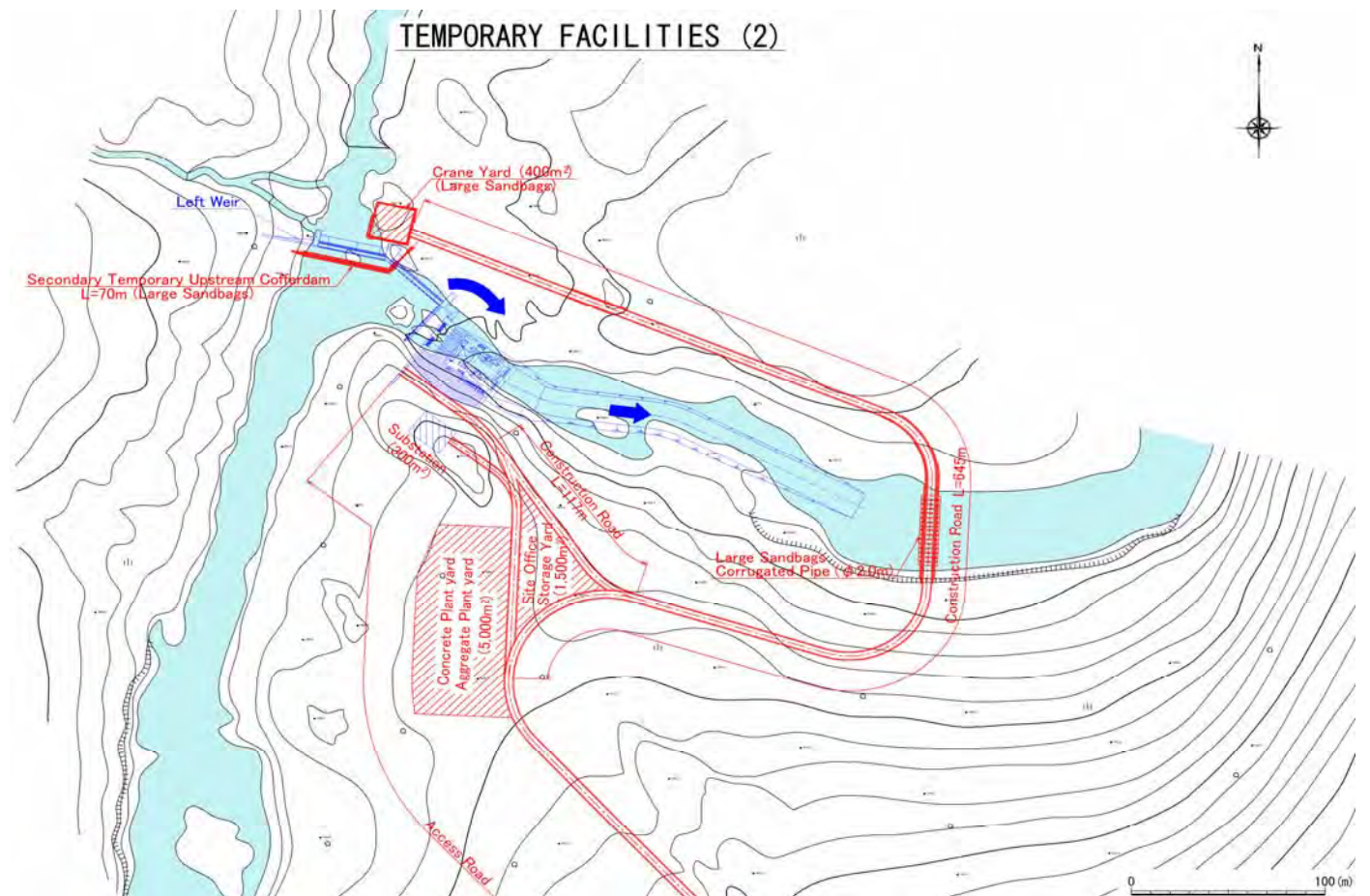
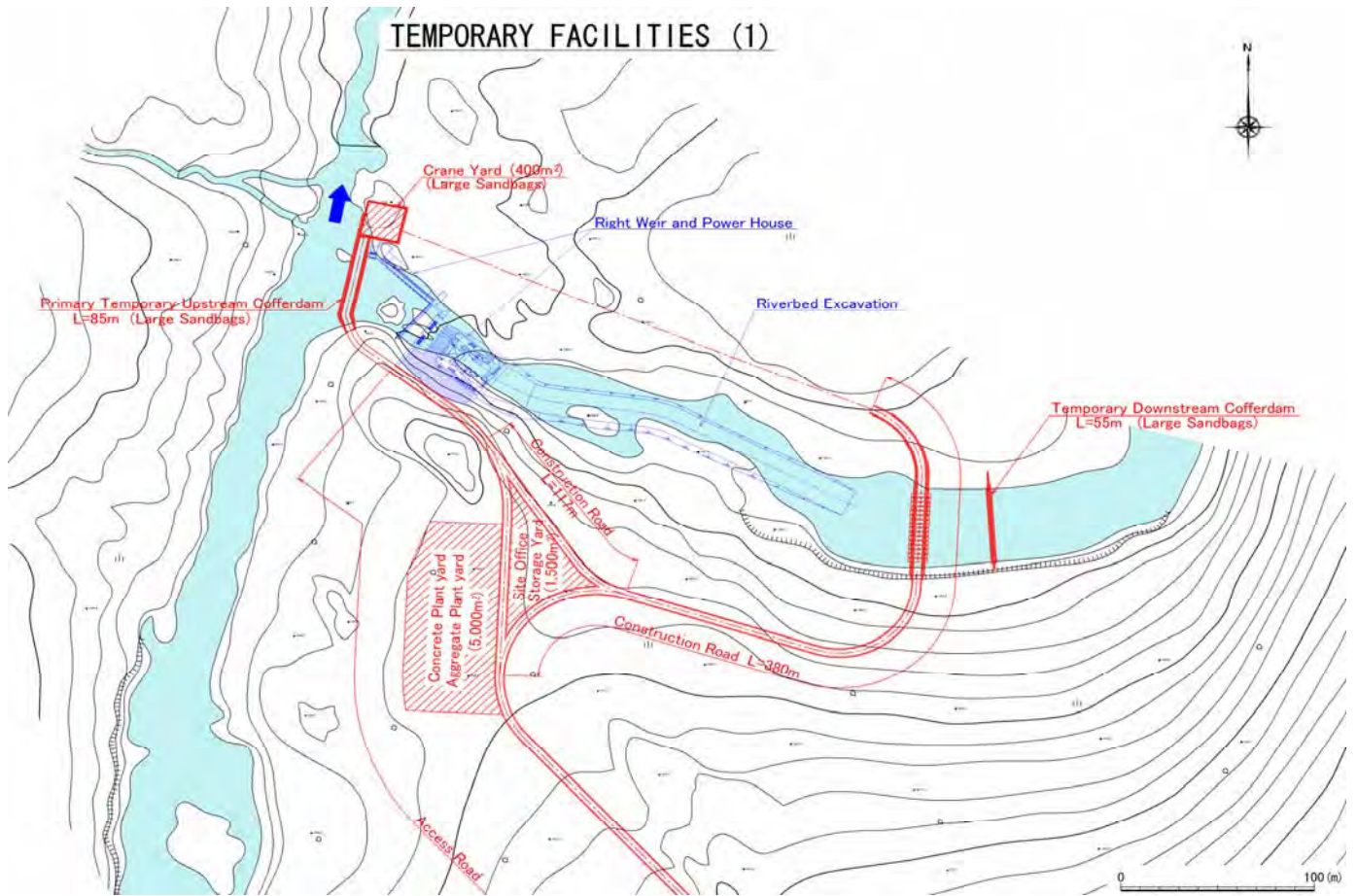
No.	IA	IB	IC	TL (m)	CL (m)
IP. 1	57° 10' 1"	100,000	54,487	99,780	
IP. 2	38° 10' 14"	100,000	34,634	66,681	
IP. 3	38° 24' 4"	100,000	32,889	63,549	
IP. 4	37° 59' 14"	100,000	34,454	66,361	
IP. 5	19° 8' 52"	100,000	16,984	33,646	
IP. 6	40° 24' 47"	100,000	36,922	70,739	
IP. 7	20° 52' 4"	100,000	18,424	36,439	
IP. 8	6° 18' 55"	100,000	5,637	11,262	
IP. 9	12° 39' 6"	100,000	11,099	22,198	
IP. 10	8° 1' 46"	100,000	7,119	14,215	
IP. 11	22° 57' 16"	100,000	20,340	40,133	
IP. 12	53° 2' 57"	500,000	261,347	481,638	
IP. 13	15° 47' 57"	500,000	70,011	139,117	
IP. 14	16° 26' 32"	1000,000	163,656	323,274	
IP. 15	31° 16' 9"	1000,000	283,938	547,015	
IP. 16	11° 59' 27"	1000,000	105,919	210,458	
IP. 17	6° 32' 11"	1000,000	57,343	114,561	
IP. 18	57° 38' 20"	200,000	110,153	201,272	
IP. 19	26° 59' 34"	200,000	48,159	94,619	
IP. 20	4° 27' 27"	200,000	7,902	15,795	
IP. 21	21° 27' 6"	200,000	27,911	54,933	
IP. 22	31° 31' 54"	200,000	38,720	77,528	
IP. 23	5° 47' 15"	200,000	10,175	20,333	
IP. 24	46° 2' 48"	50,000	21,210	40,788	
IP. 25	75° 51' 7"	50,000	33,739	65,918	
IP. 26	55° 29' 8"	50,000	26,309	49,438	
IP. 27	50° 45' 17"	50,000	23,740	44,199	
IP. 28	8° 33' 16"	300,000	22,542	45,000	
IP. 29	75° 42' 23"	50,000	39,896	69,116	
IP. 30	38° 12' 26"	50,000	17,349	33,399	
IP. 31	40° 0' 0"	30,000	10,919	20,944	
IP. 32	45° 7' 2"	50,000	20,773	39,277	
IP. 33	55° 0' 0"	70,000	36,440	67,195	

ACCESS ROAD PLAN

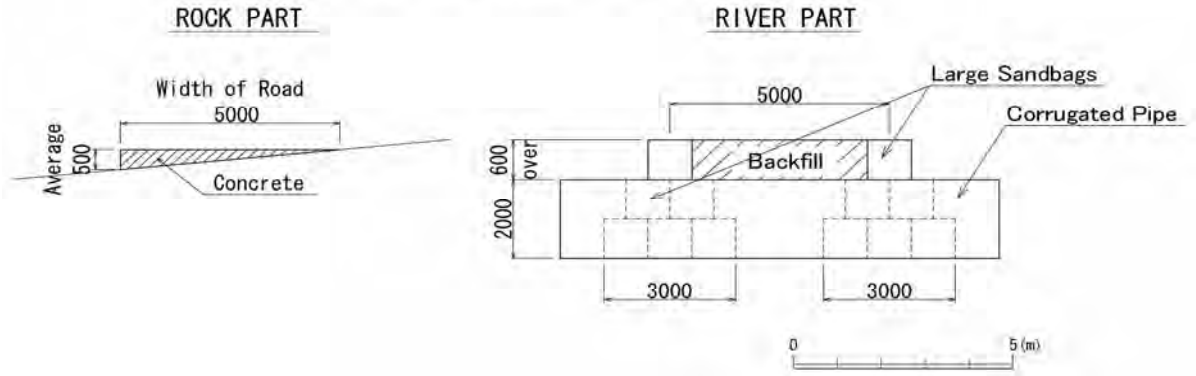


CROSS SECTION FOR ACCESS ROAD

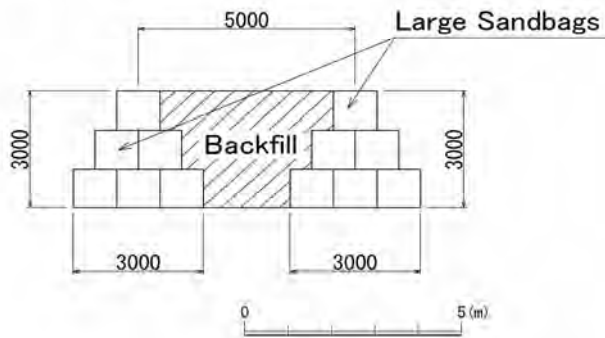




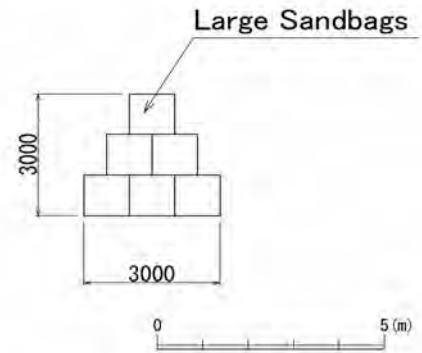
CROSS SECTION FOR CONSTRUCTION ROAD



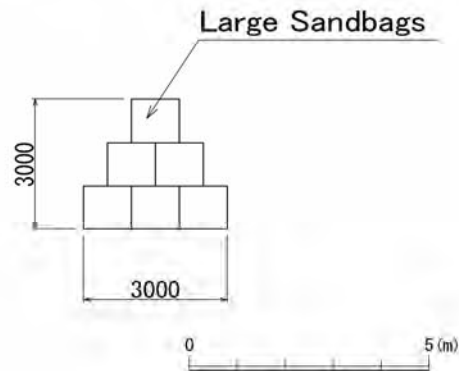
CROSS SECTION FOR PRIMARY TEMPORARY UPSTREAM COFFERDAM



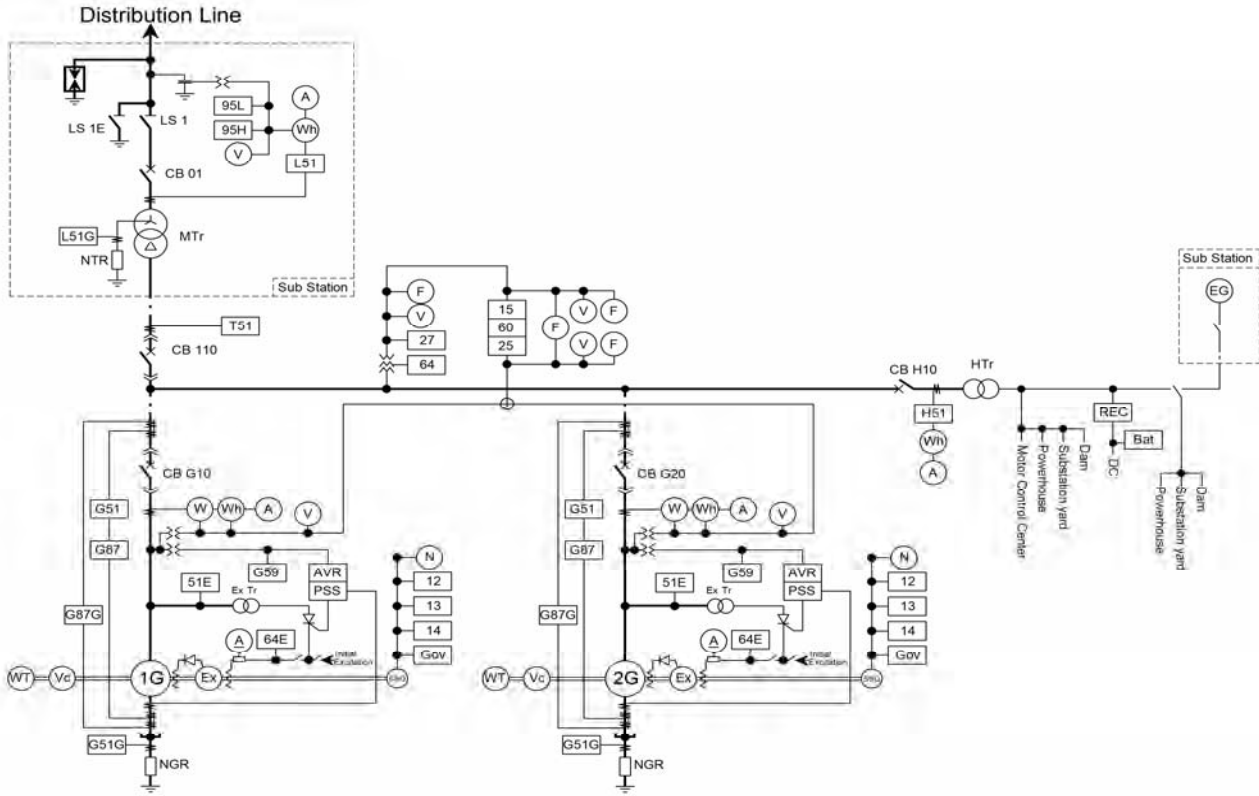
CROSS SECTION FOR TEMPORARY DOWNSTREAM COFFERDAM



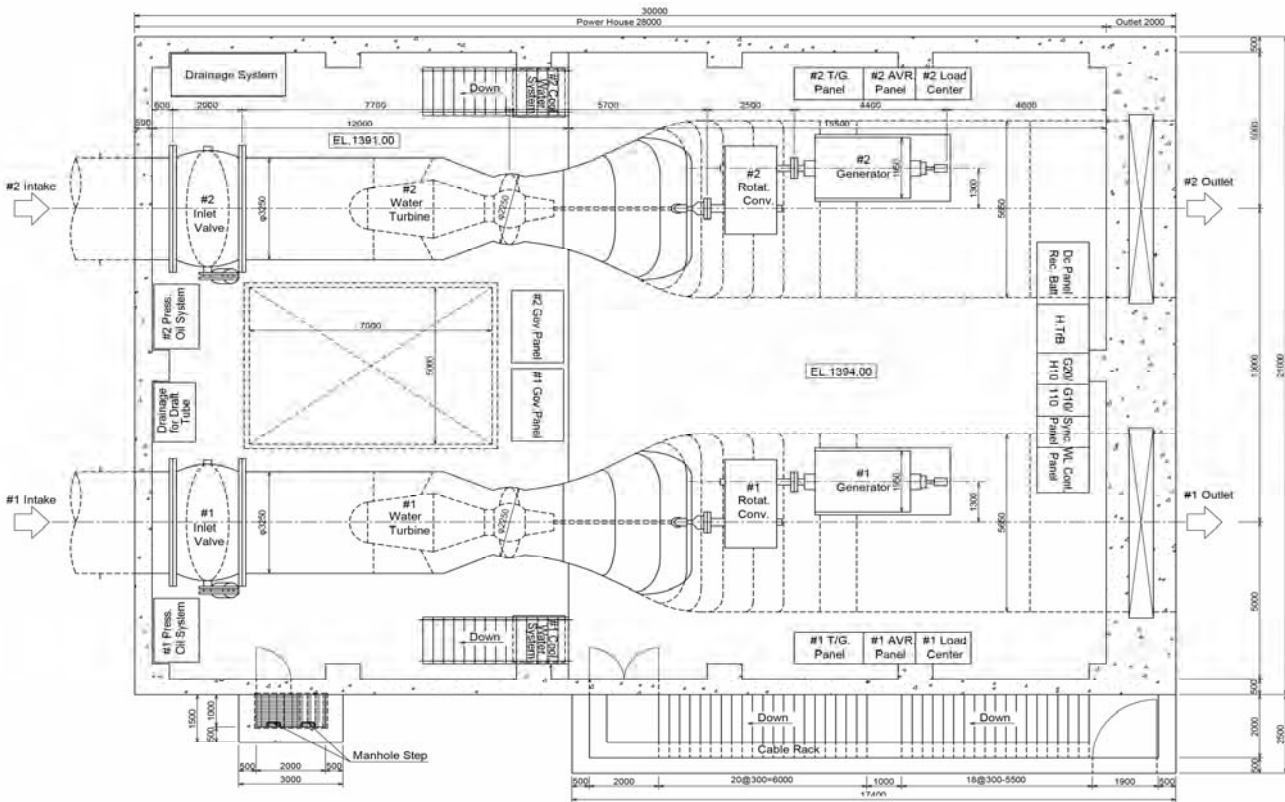
CROSS SECTION FOR SECONDARY TEMPORARY UPSTREAM COFFERDAM



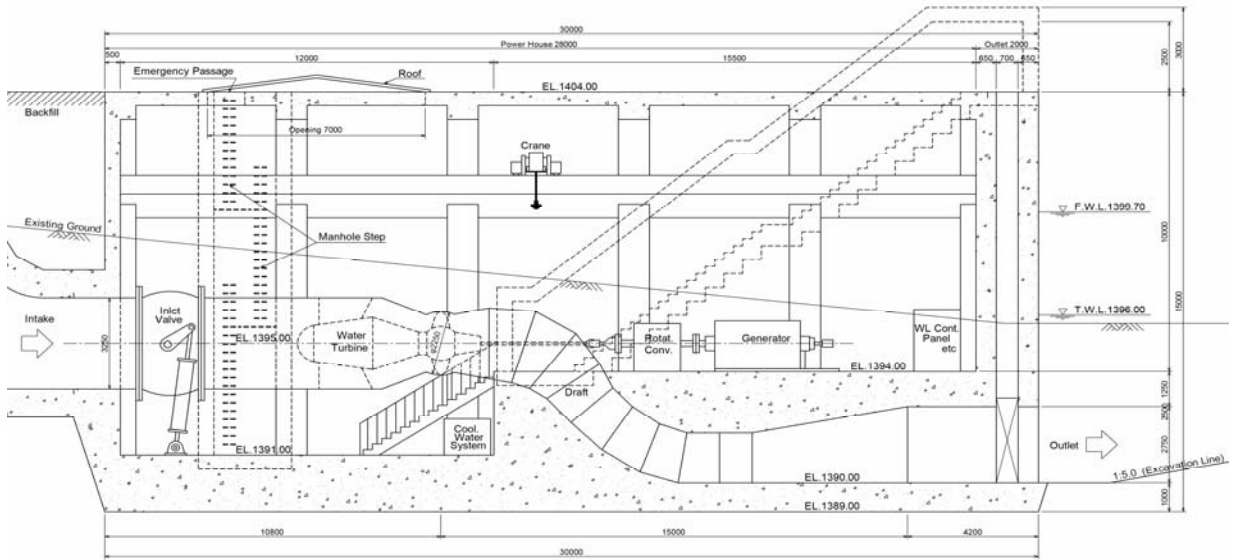
SINGLE LINE DIAGRAM



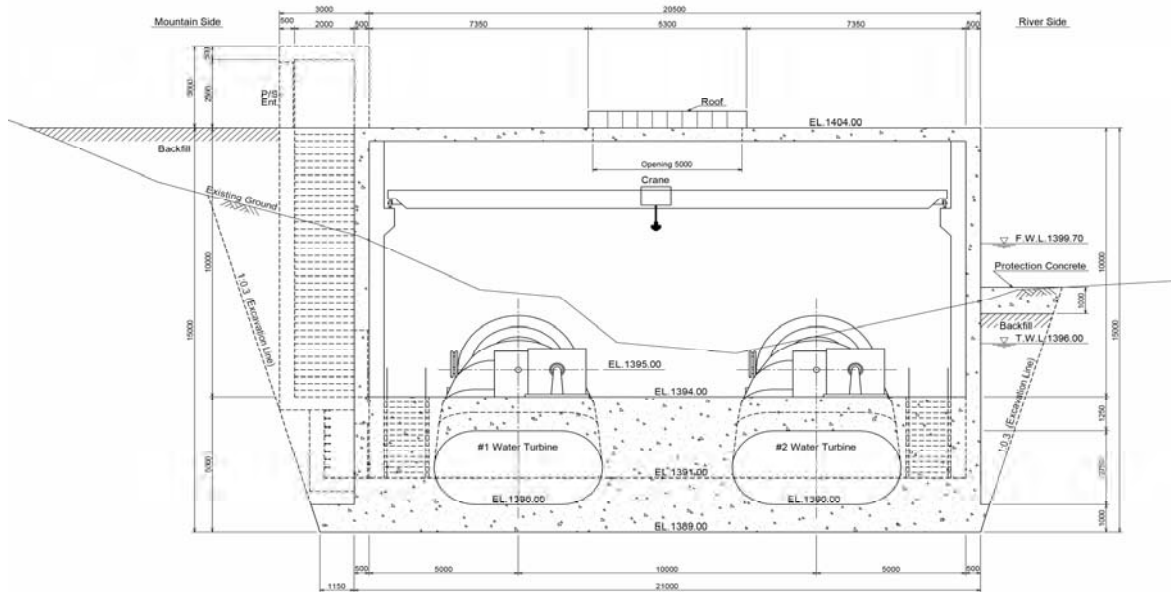
POWER HOUSE LAYOUT



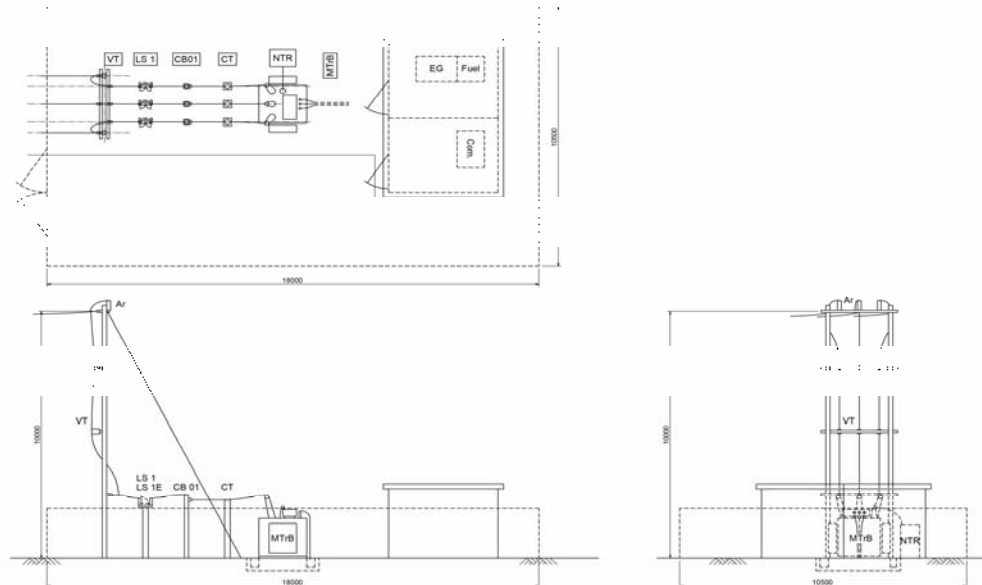
VERTICAL SECTION FOR POWER HOUSE

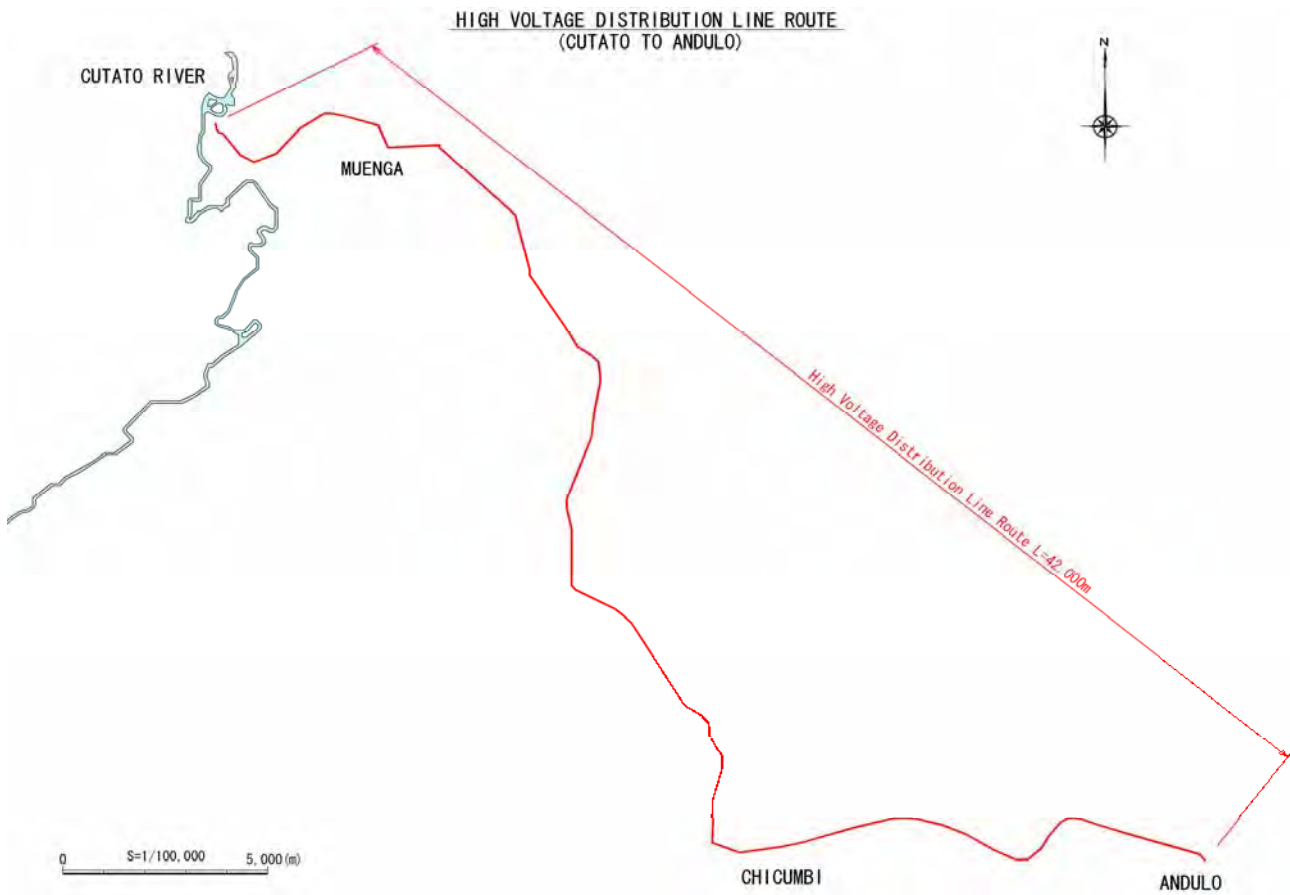


CROSS SECTION FOR POWER HOUSE

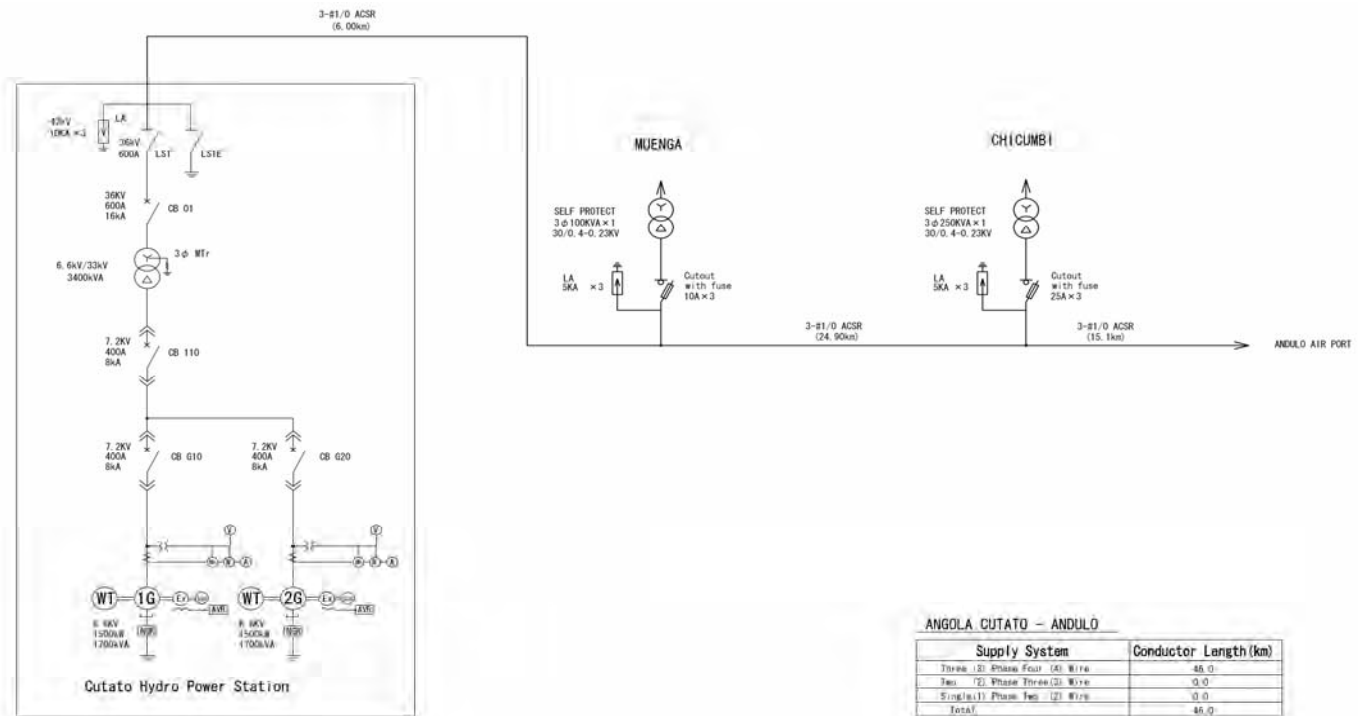


SUBSTATION LAYOUT

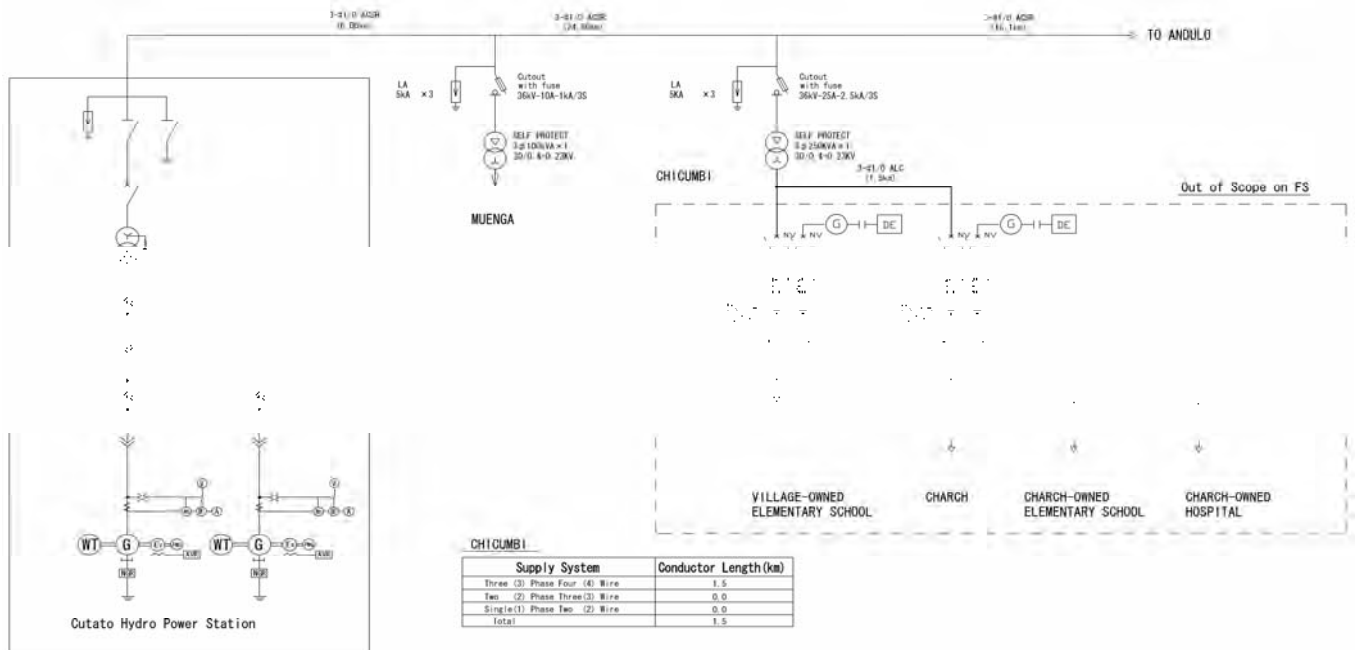




DISTRIBUTION LINE (30kV) FROM CUTATO TO ANDULO



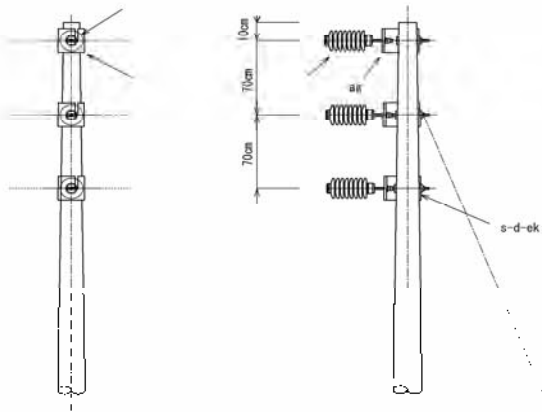
DISTRIBUTION LINE(400-230V) LOW VOLTAGE FOR CHICUMBI



POLE DRAWING (CUTATO – ANDULO)

30kV, THREE PHASE 0° TO 5° ANGLE (VERTICAL TYPE)

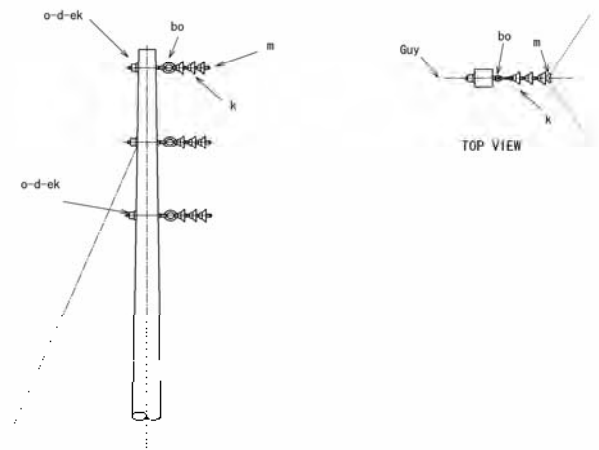
30kV, THREE PHASE 30° TO 60° ANGLE (VERTICAL TYPE)



ELEVATION

SIDE VIEW

Item	Materials
a-	Line Post Pin Type Insulator
ag-	Angle
d-	hole washer
s-	Single arm bolt
ek-	lock nut

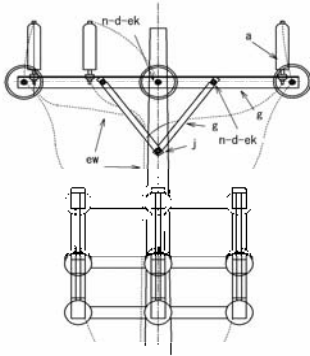


ELEVATION

TOP VIEW

Item	Materials
b-	1/2" hole washer
k-	Suspension insulator
o-	Eye bolt
m-	Suspension clamp
bo-	Anchor shackle
ek-	locknuts

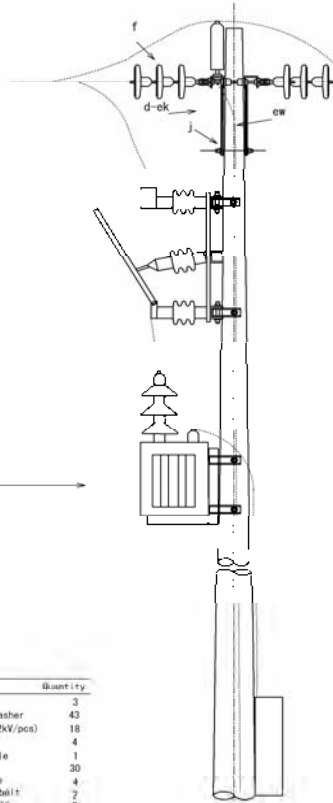
POLE TR & CUT OUT SW INSTALLATION VIEW (100kVA) FOR MUENGA
30kV, THREE PHASE



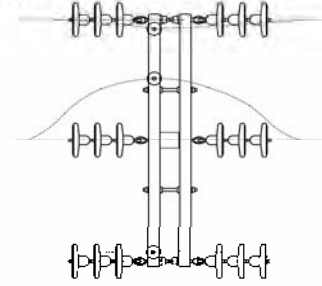
FRONT VIEW

← f →

Item	Materials	Quantity
a-	Surge Arrester	3
d-	Hole washer	43
f-	Insulator (12kV/pcs)	18
g-	Cross beam	4
cu-	Concrete pole	1
ek-	Locknuts	30
l-	Carriage bolts	4
n-	Double arm bolt	2
ow-	Grand earth wire	3
o-	Eye bolt	6
st-	Single arm bolt	10
tr-	Transformer	1

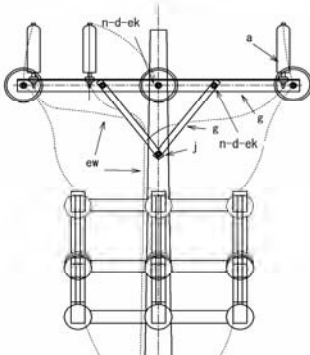


SIDE VIEW



TOP VIEW

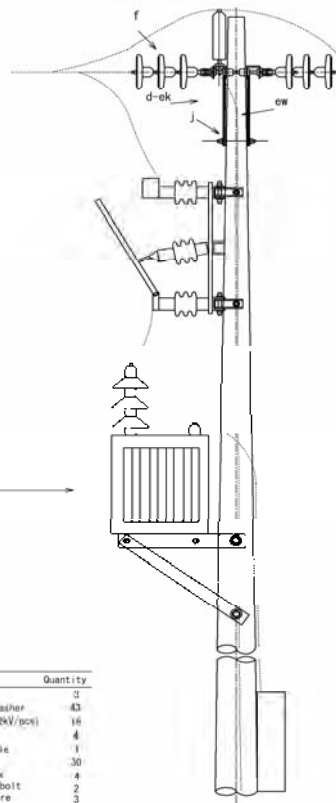
POLE TR & CUT OUT SW INSTALLATION VIEW (250kVA) FOR CHICUMBI
30kV, THREE PHASE



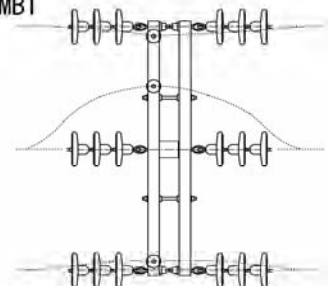
FRONT VIEW

← f →

Item	Materials	Quantity
a-	Surge Arrester	3
d-	Hole washer	43
f-	Insulator (12kV/pcs)	18
g-	Cross beam	4
cu-	Concrete pole	1
ek-	Locknuts	30
l-	Carriage bolts	4
n-	Double arm bolt	2
ow-	Grand earth wire	3
o-	Eye bolt	6
s-	Single arm bolt	10
tr-	Transformer	1

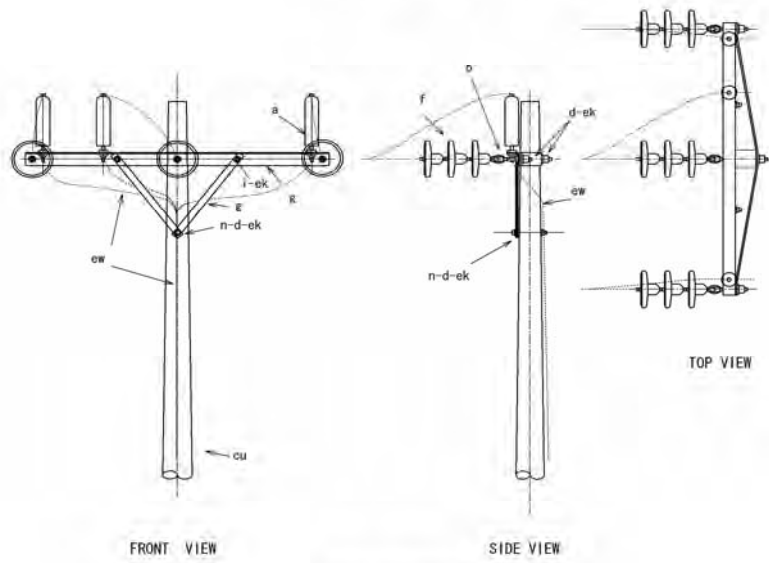


SIDE VIEW



TOP VIEW

END POLE
30kV. THREE PHASE 0° TO 5° ANGLE



Item	Materials	Quantity
a-	Surge Arrester	3
d-	Hole washer	16
f-	Insulator (12kV/pcs)	9
e-	Cross beam	2
cu-	Concrete pole	1
ek-	Locknuts	9
i-	Carriage bolts	2
n-	Double arm bolt	0
ow-	Grand earth wire	3
o-	Eye bolt	3
s-	Single arm bolt	1

CUTATO HSP Work

The damage from the civil war, which had been continued until 2002, to the power supply of Angola was extremely serious. And the lack of well working power stations is the most serious problem to economic growth and poverty reduction of the country.

This CUTATO HPS is proposed for rural electrification and wealth of regional area.

Item	CUTATO HydroPower Station	Remarks
Type	Run-of-River Type	
Max. Discharge	50 m ³ /s	
Gross Head	8.0 m	
Effective Head	7.5 m	
Max. Output	3 MW (1.5 MW × 2 units)	
Annual Generated Energy	21.1 GWh	
Catchment Area	9,400 km ²	
Weir		
Type	Concrete Gravity	
Height	4.0 m	
Volume	970 m ³	
Design Flood	560 m ³ /s	
F. W. L	EL. 1404.4 m	
Pondage Area	0.72 km ²	
Spillway Gates	2 sets of Hinged Crest Gate Width: 35.0 m, Height: 3.0 m	
Sand Drain Gates	1 set of Manual Slide Gate Width: 0.5 m, Height: 0.5 m	
Intake		
Width	21.0 m	
Length	14.5 m	
Height	7.0 m	
Screen	2 sets, Width: 6.0 m, Height: 7.25 m	
Power House	Semi-underground type	Access Rord 28km(Width:5.0m)
Width	21.0 m	
Length	28.0 m	
Height	15.0 m	
Machine Hall EL.	EL. 1391.0 m & EL. 1394.0	
Outlet		
Width	21.0 m	
Length	2.0 m	
Height	15.0 m	
Outlet Gates	1 set of Stop Log Width: 6.0 m, Height: 3.0 m	
Turbine	(sS-type Tubular HK-1RT)	
Capacity	1,500 kW	
Frequency	50 Hz	
Unit number	2 units	
Main Transformer		(Sub Station)
Capacity	3,400 kVA	
Voltage	6.6 kV / 33 kV	
Unit number	1 unit	
Transmission - Distribution Line	30 kV	
Number	1	
Length	31 km (Cutato-Chicumbi) 15 km (Chicumbi-Andulo) total 46 km (Cutato - Andulo)	

