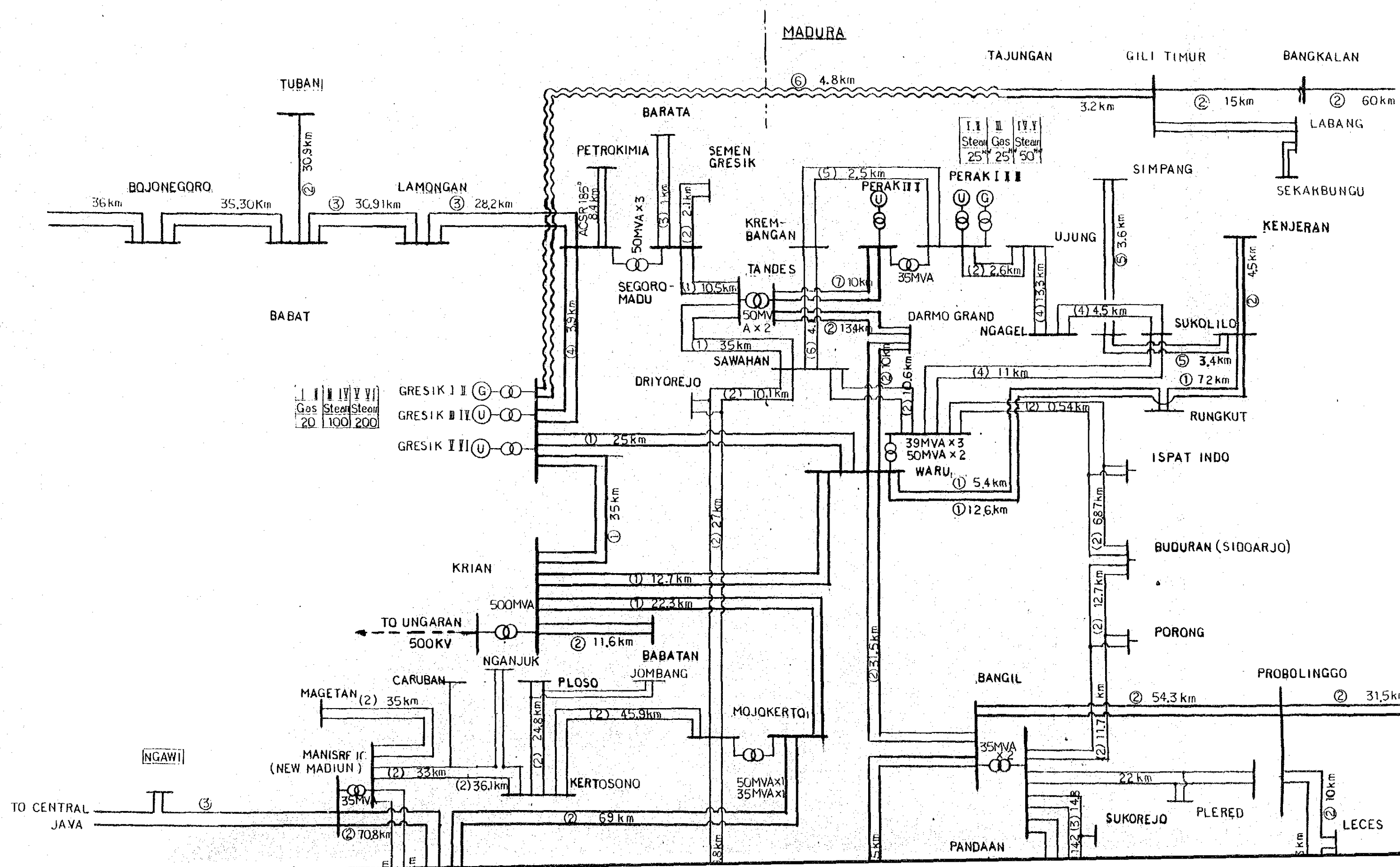
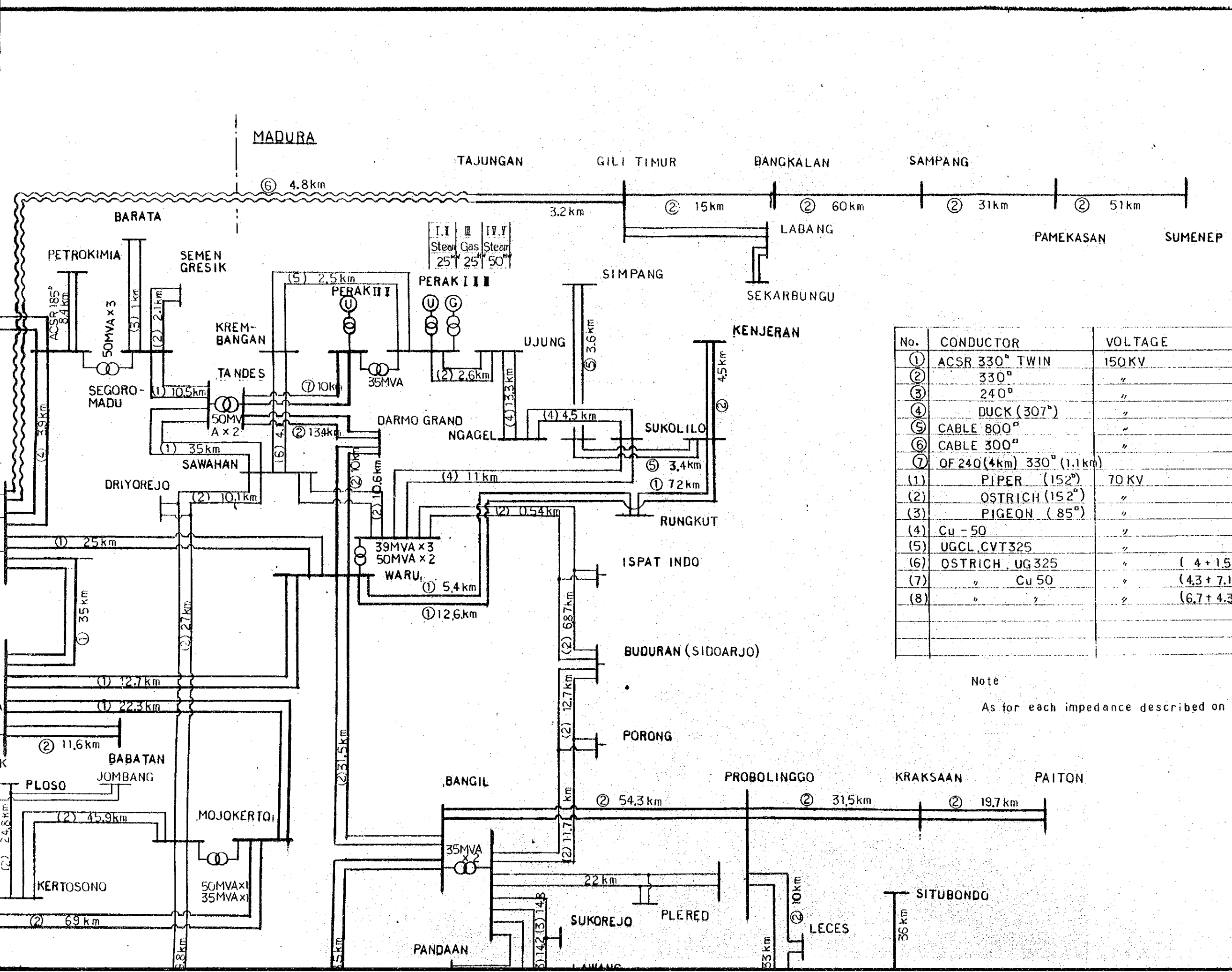


TABLE 2.4-5

Stationing of Capacitors

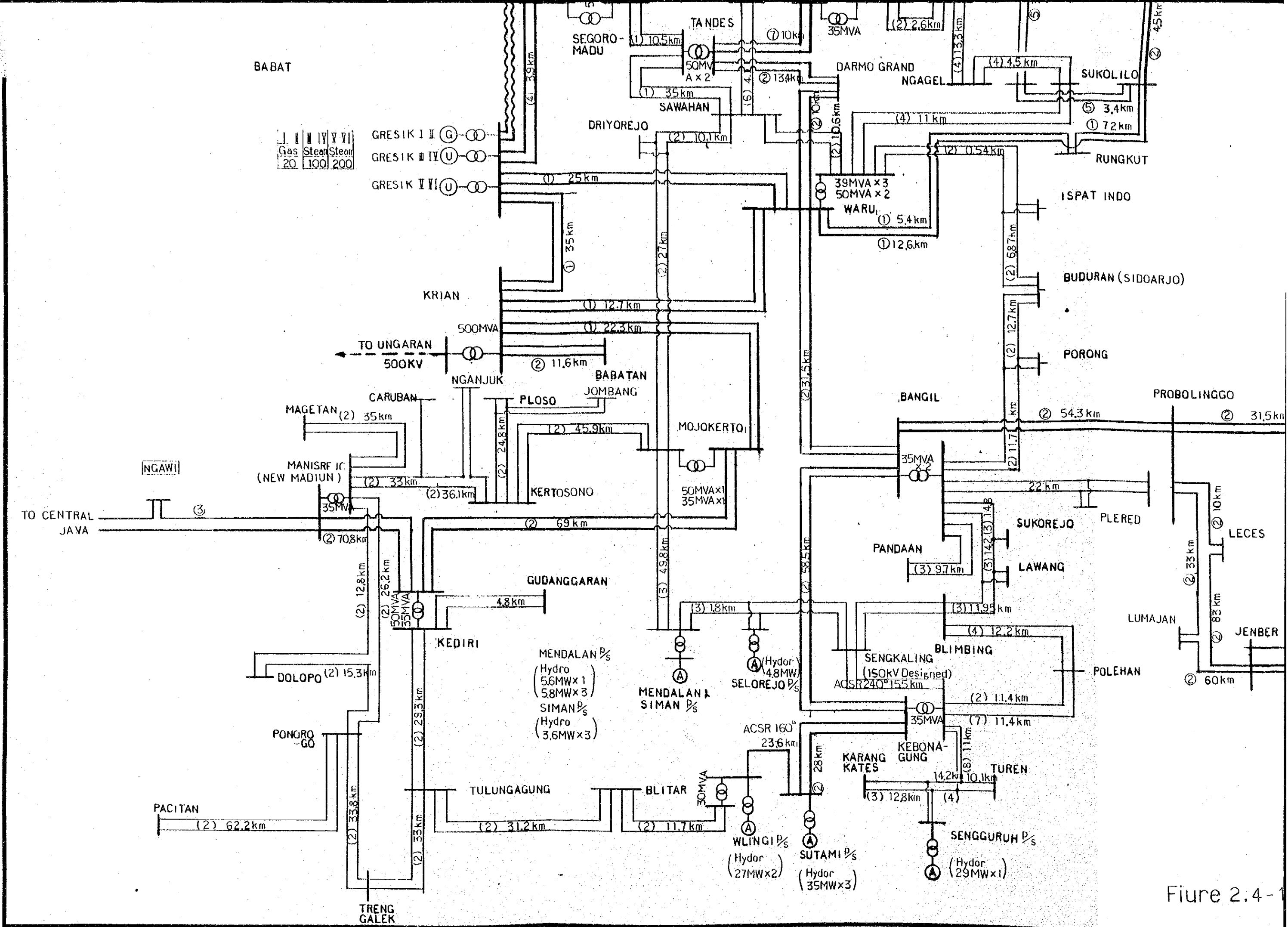
SUBSTATION	Unit(MVA)				
	Existing	Short Term (Mar. 1989)	Mid. Term (Mar. 1994)	Long Term1 (Mar. 1999)	Long Term2 (Mar. 2004)
WARU	20	20	20	20	20
PROBOLINGO	10	0	0	0	0
NGAGEL	10	10	10	10	10
JEMBER		10	10	10	20
KEDIRI		10	10	10	40
MANISREJO				10	30
TULUNGAGUNG				10	10
BLIMBING				10	20
POLEHAN				10	20
GENTENG					20
DARMO GRAND					50
SEGOROMADO					50
MOJOKERTO					100
BUDURAN					50
KARANGPILANG					50
KRENBANGAN					30
BABATAN					50
LAWANG					20
TOTAL	40	50	50	90	590
GILIMANUK		20	20	20	30





No.	CONDUCTOR	VOLTAGE
①	ACSR 330 ^o TWIN	150KV
②	330 ^o	"
③	240 ^o	"
④	DUCK (307 ^o)	"
⑤	CABLE 800 ^o	"
⑥	CABLE 300 ^o	"
⑦	OF 240(4km) 330 ^o (1.1km)	"
(1)	PIPER (152 ^o)	70 KV
(2)	OSTRICH (152 ^o)	"
(3)	PIGEON (85 ^o)	"
(4)	Cu - 50	"
(5)	UGCL CVT325	"
(6)	OSTRICH, UG 325	" (4 + 1.5 ^{km})
(7)	" Cu 50	" (4.3 + 7.1 ^{km})
(8)	" "	" (6.7 + 4.3 ^{km})

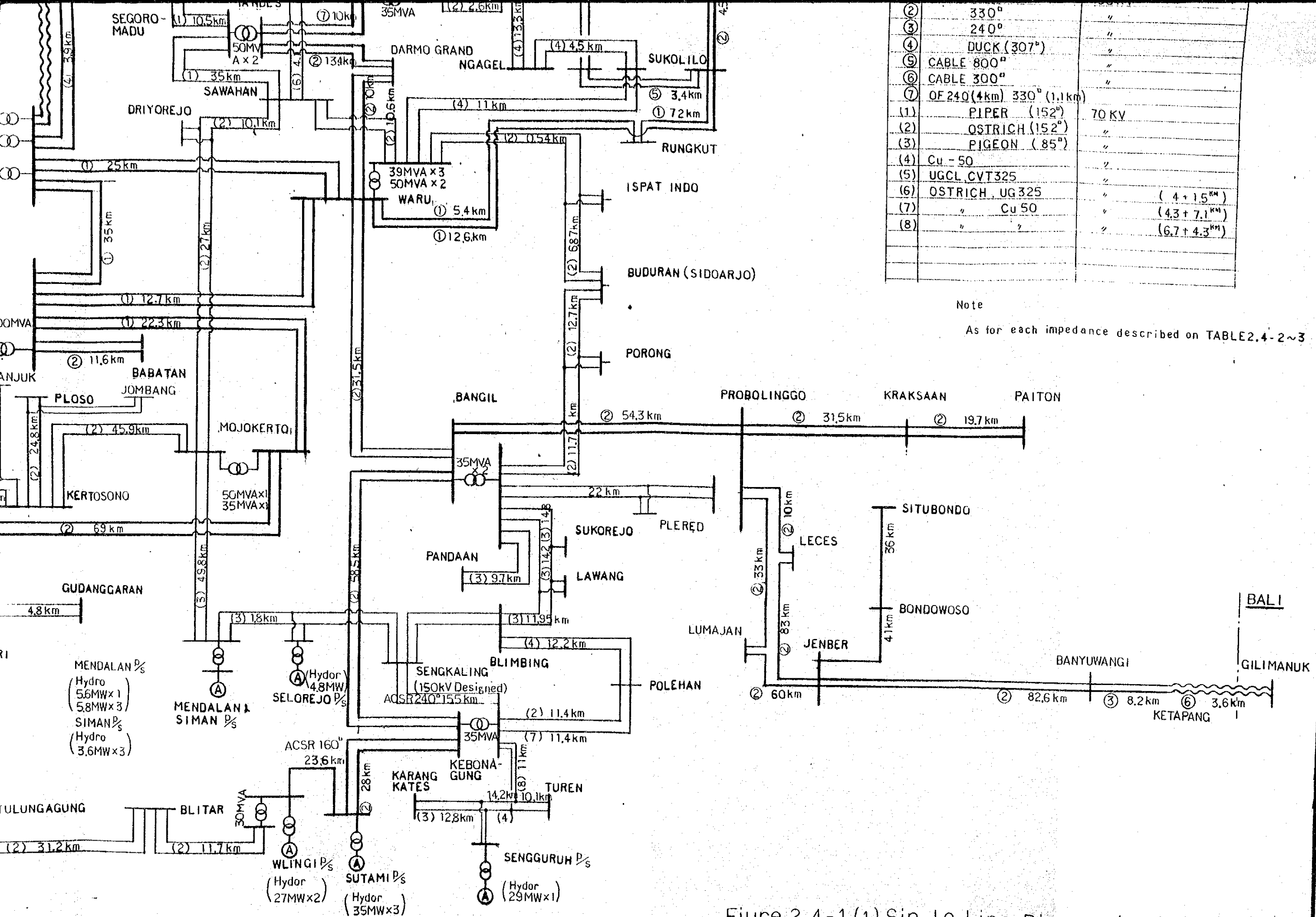
Note
As for each impedance described on TABLE 2.4-2~3



I	II	III	IV	V	VI	VII
Gas	Steam	Steam	Steam	Steam	Steam	Steam
20	100	100	200	200	200	200

Figure 2.4-1

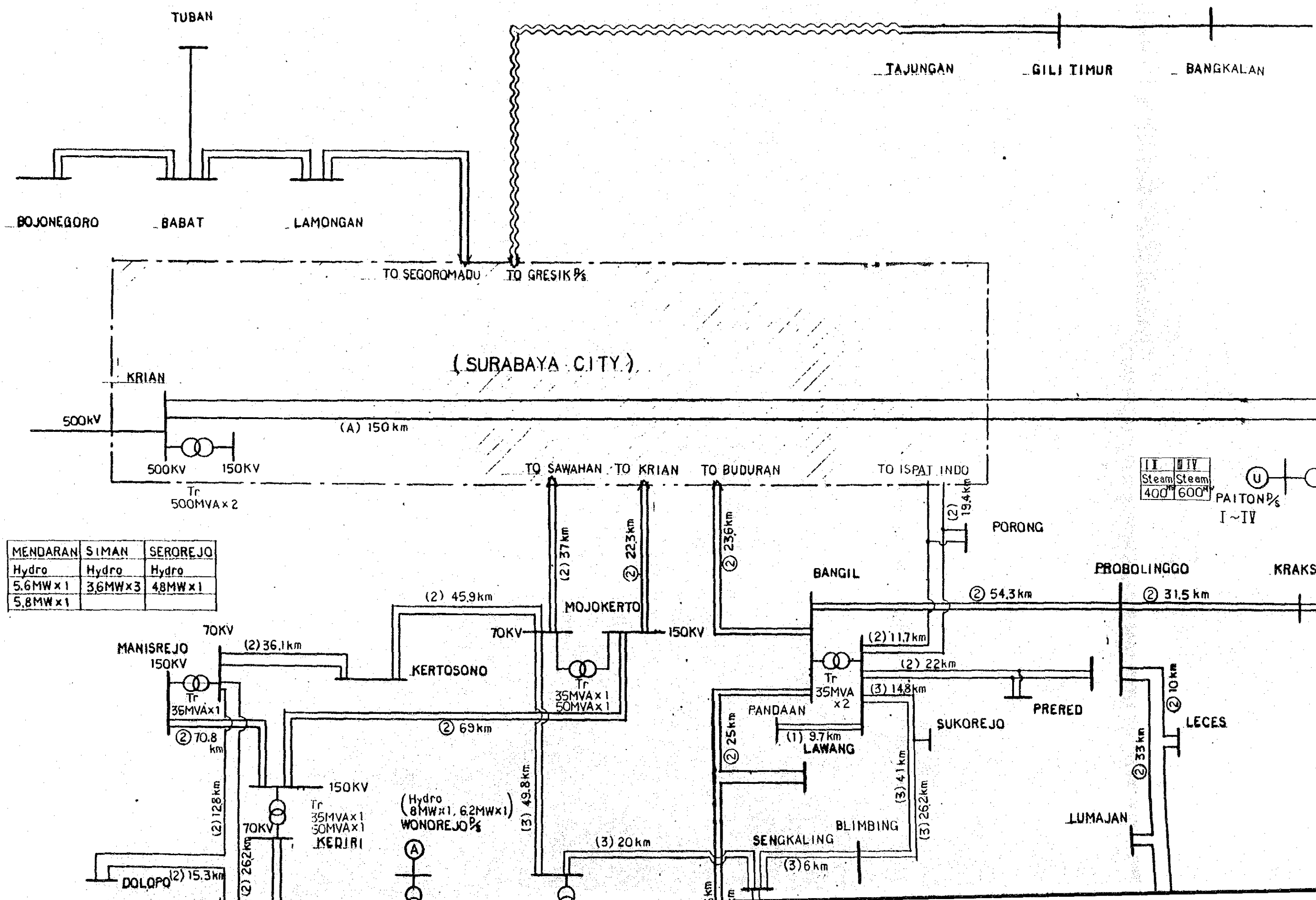
213



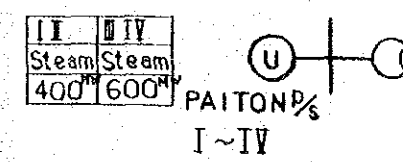
②	330 ^a	
③	240 ^a	
④	DUCK (307 ^b)	
⑤	CABLE 800 ^a	
⑥	CABLE 300 ^a	
⑦	OF 240 (4km) 330 ^b (1.1km)	
(1)	PIPER (152 ^b)	70 KV
(2)	OSTRICH (152 ^b)	
(3)	PIGEON (85 ^b)	
(4)	Cu - 50	
(5)	UGCL CVT325	
(6)	OSTRICH UG325	(4 + 15 ^{km})
(7)	" Cu 50	(4.3 + 7.1 ^{km})
(8)	" "	(6.7 + 4.3 ^{km})

Note
As for each impedance described on TABLE 2.4-2~3

Figure 2.4-1 (1) Single Line Diagram in Mar. 1989



MENDARAN	SIMAN	SEROREJO
Hydro	Hydro	Hydro
5.6MW x 1	3.6MW x 3	4.8MW x 1
5.8MW x 1		



(SURABAYA CITY)

(A) 150 km

KRIAN

500KV

500KV 150KV

Tr 500MVA x 2

TO SEGOROMADU TO GRESIK

TO SAWAHAN TO KRIAN TO BUDURAN TO ISPAT INDO

PORONG

PROBOLINGGO

KRAKSA

BANGIL

MOJOKERTO

(2) 45.9 km

(2) 37 km

(2) 22.3 km

(2) 23.6 km

(2) 54.3 km

(2) 31.5 km

MANISREJO 150KV

Tr 35MVA x 1

(2) 70.8 km

70KV

(2) 36.1 km

KERTOSONO

70KV

(2) 69 km

150KV

Tr 35MVA x 1 50MVA x 1

70KV

(Hydro 8MW x 1, 6.2MW x 1) WONOREJO

(A)

(3) 49.8 km

(3) 20 km

PANDAAN

(2) 25 km

(1) 9.7 km

LAWANG

Tr 35MVA x 2

(2) 11.7 km

(2) 22 km

(3) 14.8 km

(3) 4.1 km

(3) 26.2 km

BLIMBING

SENGKALING

(3) 6 km

SUKOREJO

PRERED

LUMAJAN

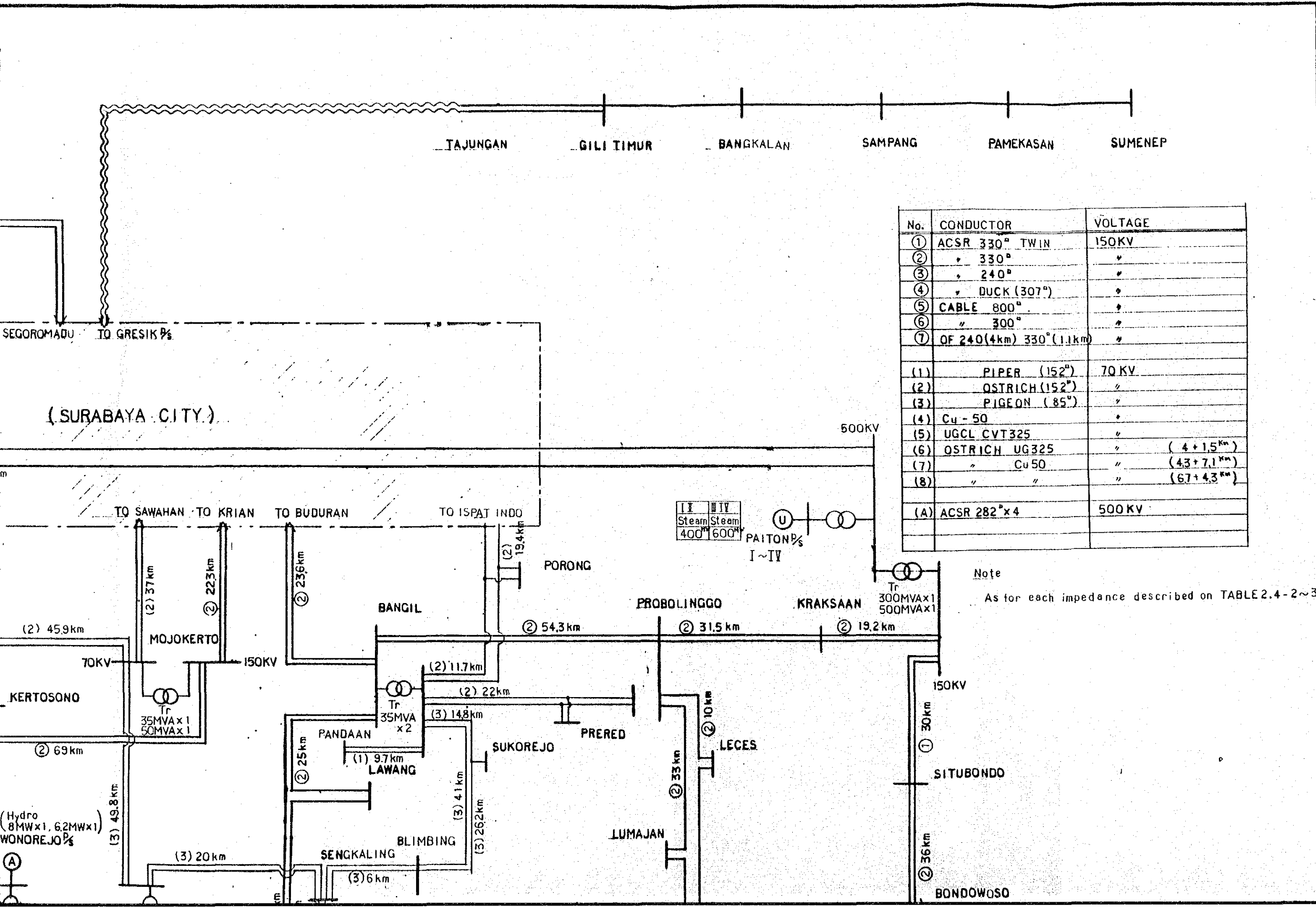
(2) 10 km

LECES

DOLOPO (2) 15.3 km

(2) 26.2 km

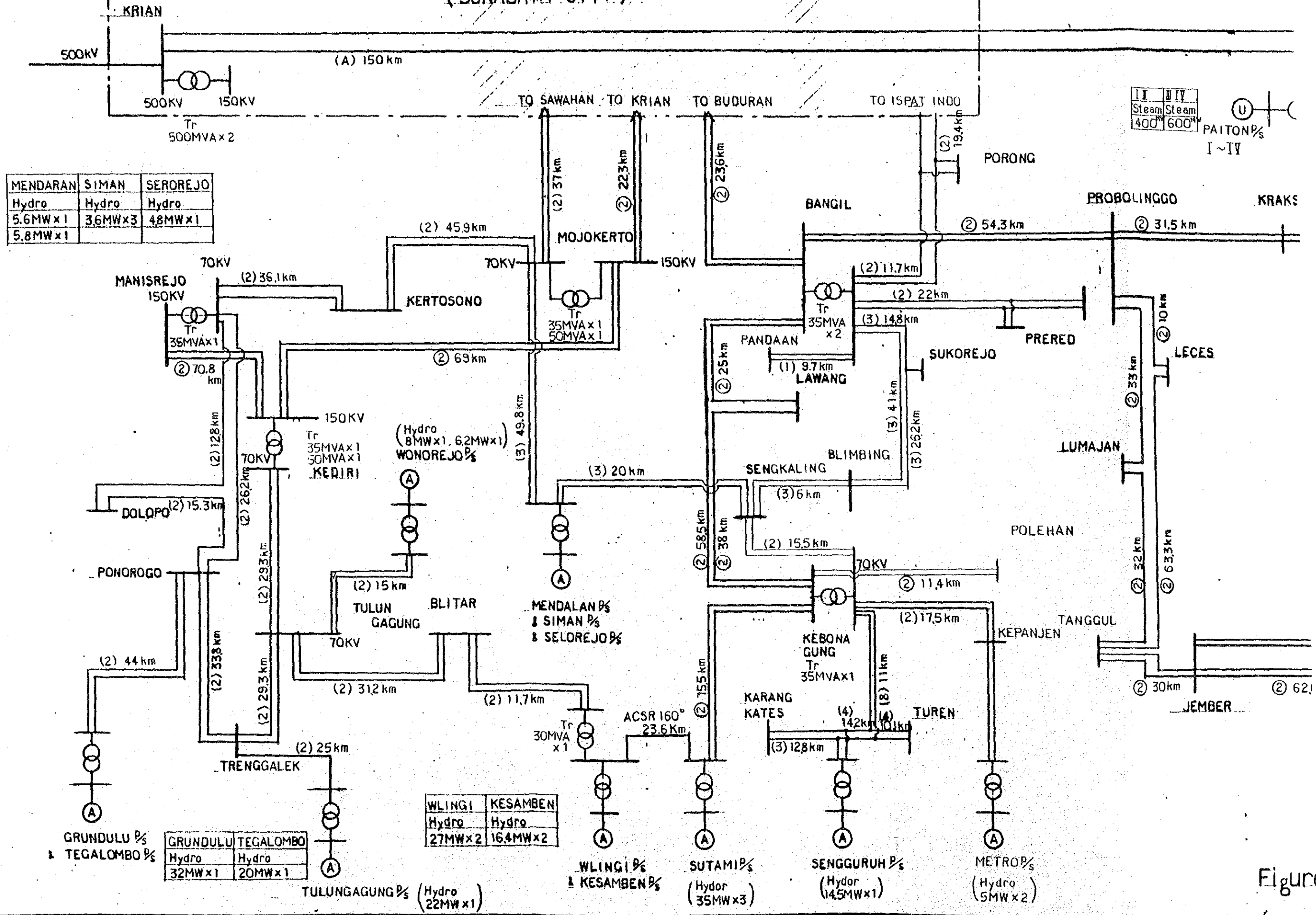
(2) 19.4 km



No.	CONDUCTOR	VOLTAGE
①	ACSR 330 ^o TWIN	150KV
②	" 330 ^o	"
③	" 240 ^o	"
④	" DUCK (307 ^o)	"
⑤	CABLE 800 ^o	"
⑥	" 300 ^o	"
⑦	OF 240(4km) 330 ^o (1.1km)	"
(1)	PIPER (152 ^o)	70 KV
(2)	OSTRICH (152 ^o)	"
(3)	PIGEON (85 ^o)	"
(4)	Cu - 50	"
(5)	UGCL CVT325	"
(6)	OSTRICH UG325	" (4+1.5 ^{km})
(7)	" Cu 50	" (43+7.1 ^{km})
(8)	" "	" (67+4.3 ^{km})
(A)	ACSR 282 ^o x4	500KV

Note
As for each impedance described on TABLE 2.4-2~3

(SURABAYA CITY.)



MENDARAN	SIMAN	SEROREJO
Hydro	Hydro	Hydro
5.6MW x 1	3.6MW x 3	4.8MW x 1
5.8MW x 1		

GRUNDULU	TEGALOMBO
Hydro	Hydro
32MW x 1	20MW x 1

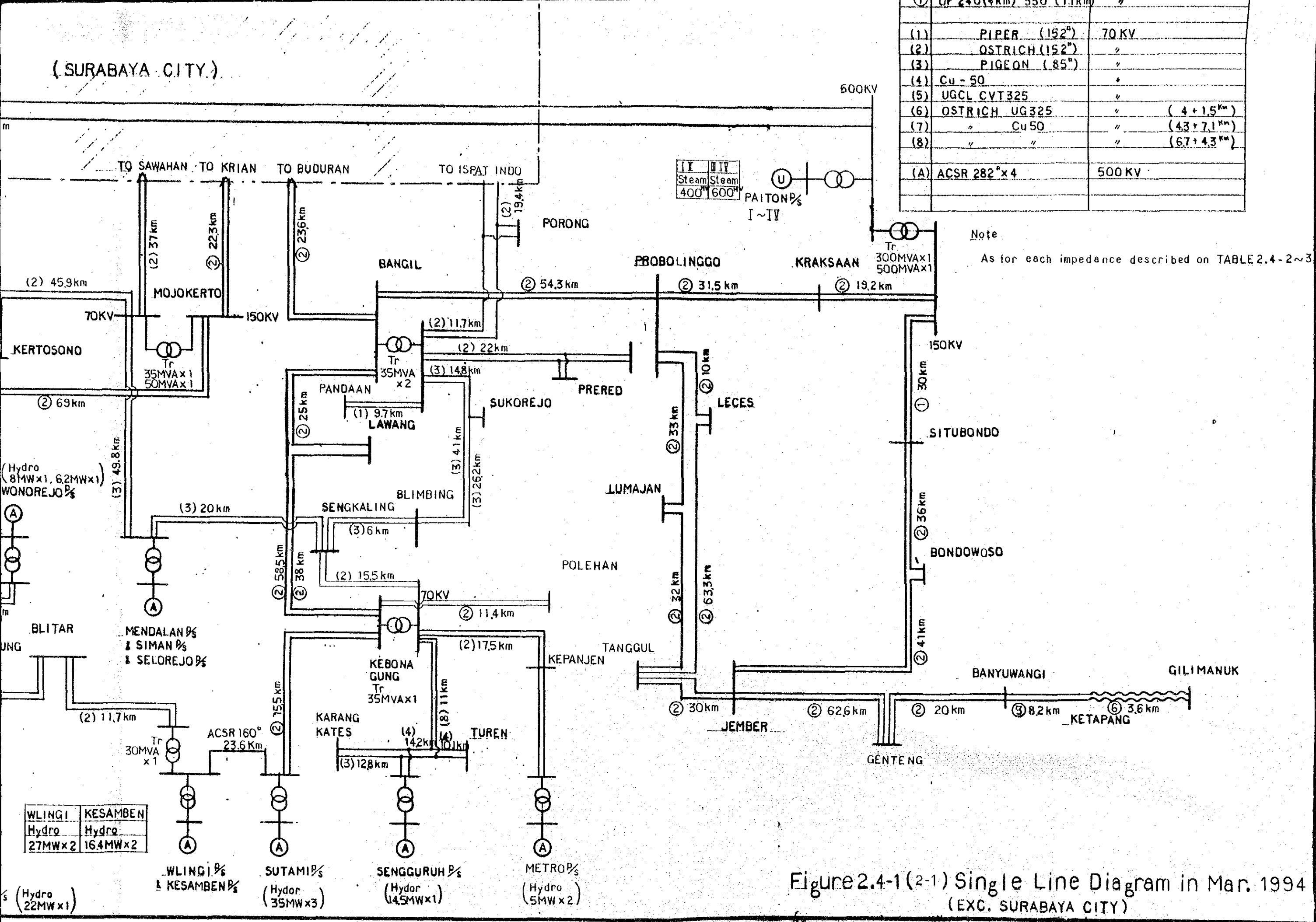
WLINGI	KESAMBEN
Hydro	Hydro
27MW x 2	16.4MW x 2

II	III	IV
Steam	Steam	
400MW	600MW	

PAITON P_s
I~IV

Figure

(SURABAYA CITY.)



(1)	PIPER (152 ³)	70 KV
(2)	OSTRICH (152 ³)	"
(3)	PIGEON (85 ³)	"
(4)	Cu - 50	"
(5)	UGCL CVT325	"
(6)	OSTRICH UG325	" (4 + 1.5 ^{km})
(7)	" Cu 50	" (4.3 + 7.1 ^{km})
(8)	" "	" (6.7 + 4.3 ^{km})
(A)	ACSR 282 ³ x4	500 KV

Note
As for each impedance described on TABLE 2.4-2~3

Figure 2.4-1 (2-1) Single Line Diagram in Mar. 1994
(EXC. SURABAYA CITY)

I	II	III	IV	V	VI
Gas	Steam	Steam	Steam	Steam	Steam
20	100	200			

I	II	III	IV	V	VI
Steam	Gas	Steam	Steam	Steam	Steam
25	25	50			

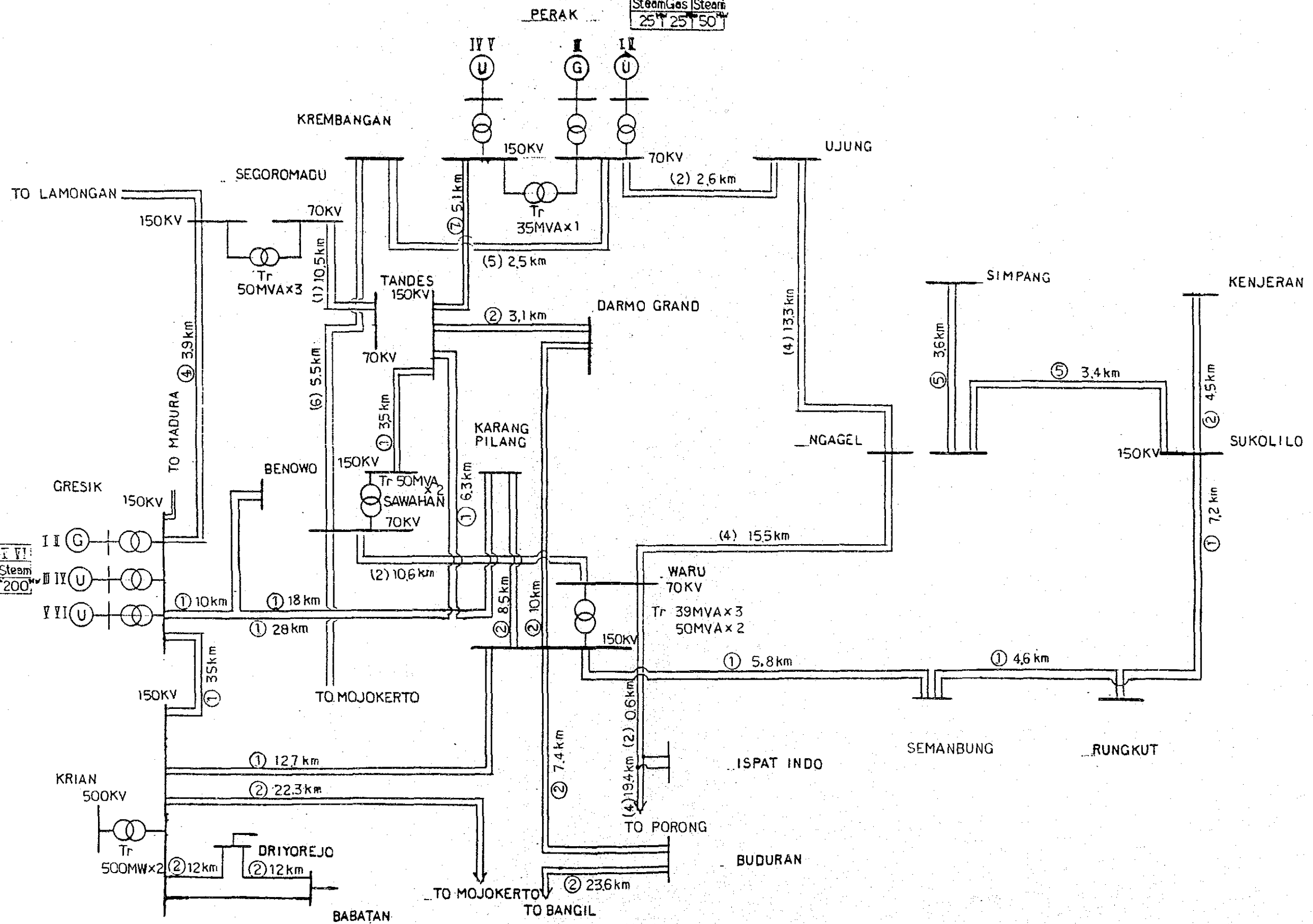
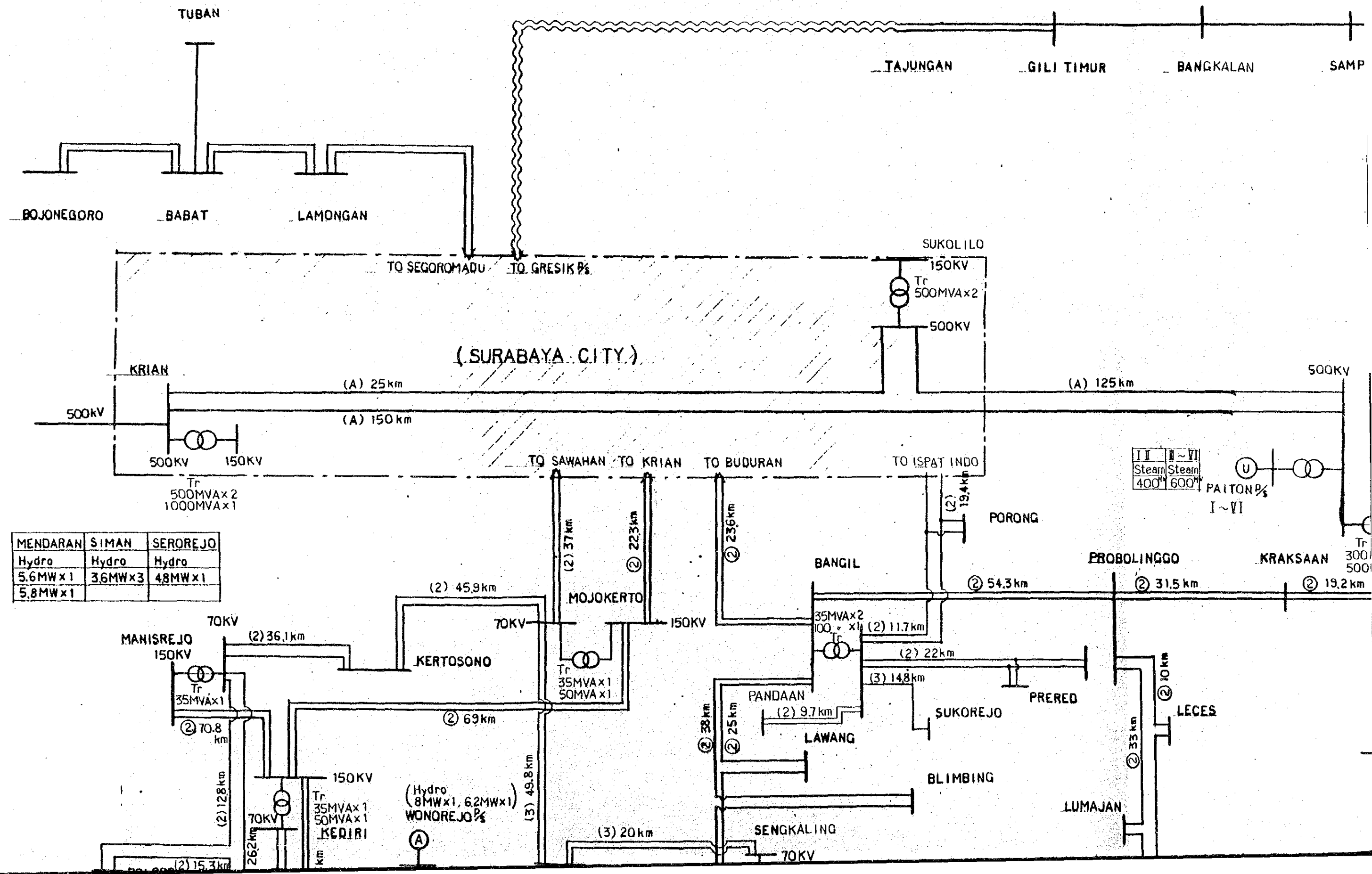


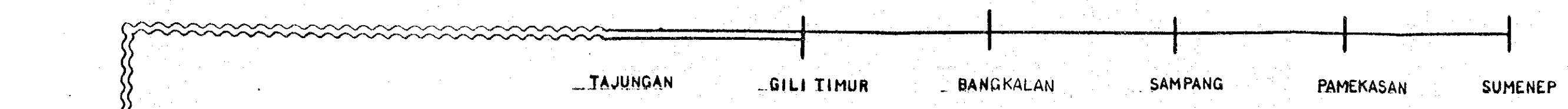
Figure 2.4-1(2-2) Single Line Diagram in Mar. 1994
(SURABAYA CITY)



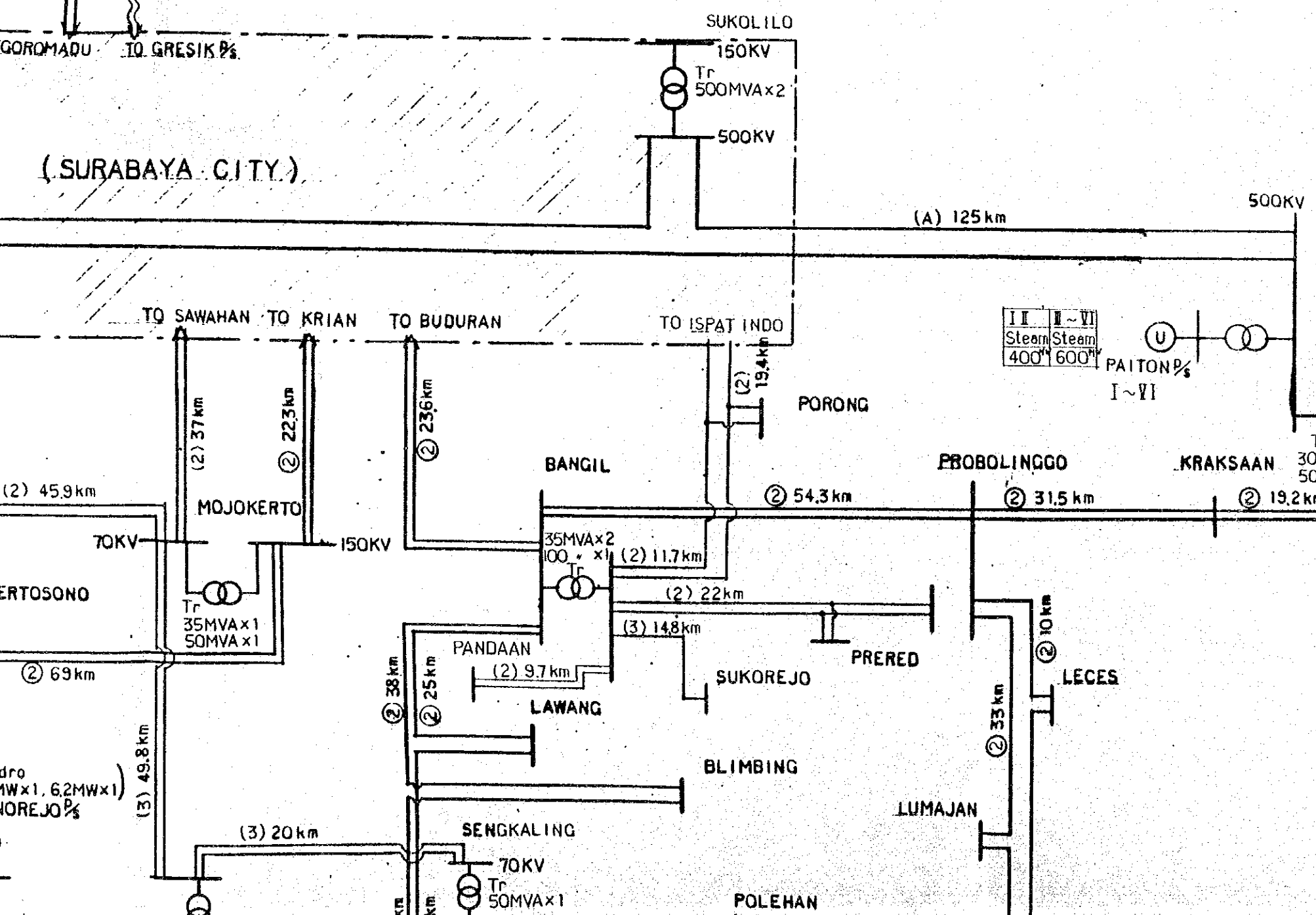
MENDARAN	SIMAN	SEROREJO
Hydro	Hydro	Hydro
5.6MW x 1	3.6MW x 3	4.8MW x 1
5.8MW x 1		

(Hydro
8MW x 1, 6.2MW x 1)
WONOREJO P/S

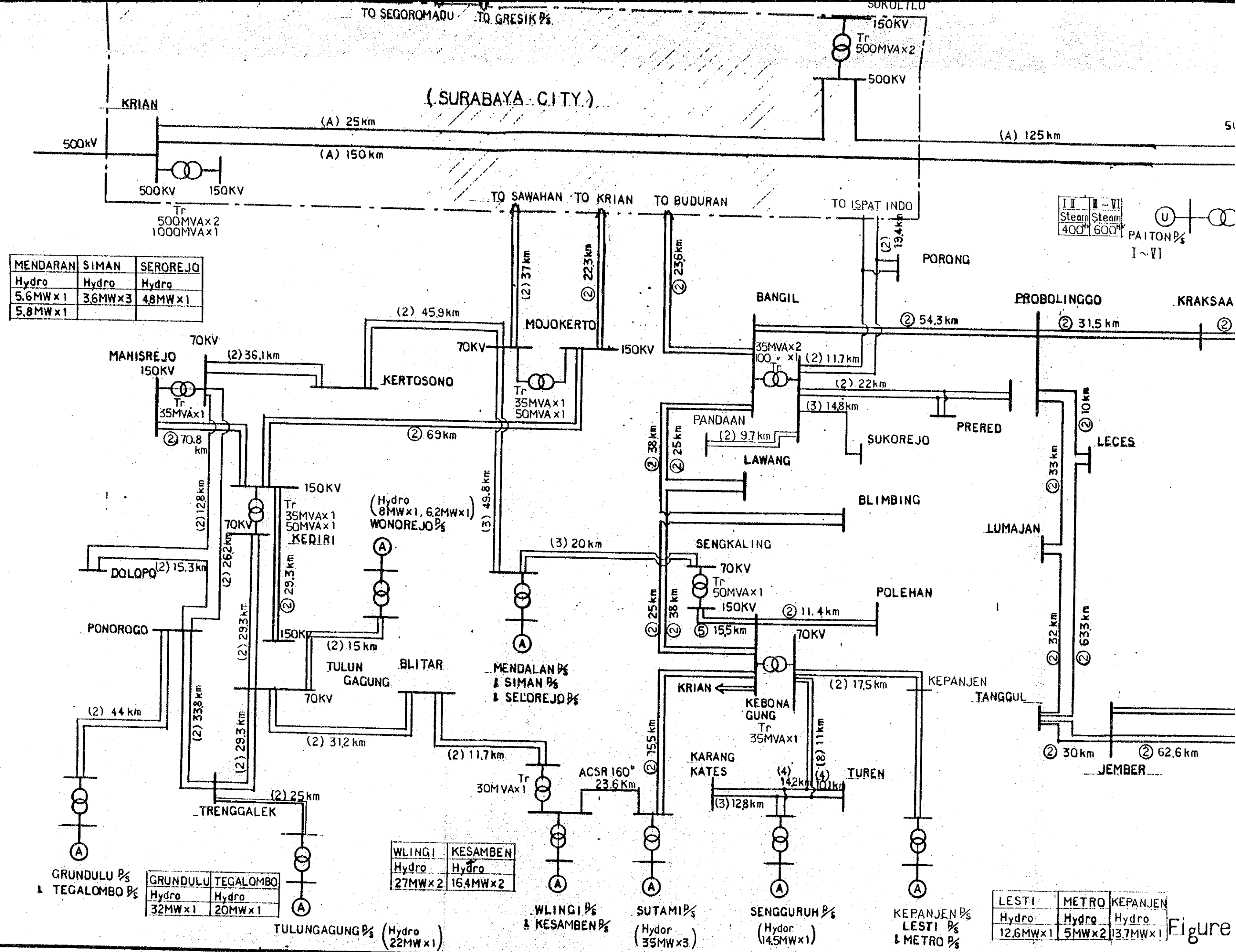
II I ~ VI
Steam Steam
400 600
PAITON P/S
I ~ VI



No.	CONDUCTOR	VOLTAGE
①	ACSR 330" TWIN	150KV
②	" 330"	"
③	" 240"	"
④	" DUCK (307")	"
⑤	CABLE 2000"	"
⑥	" 300"	"
⑦	OF 240(4km) 330"(1.1km)	"
(1)	PIPER (152")	70 KV
(2)	OSTRICH (152")	"
(3)	PIGEON (85")	"
(4)	Cu - 50	"
(5)	UGCL CVT325	"
(6)	OSTRICH UG325	" (4 + 1.5 ^{km})
(7)	" Cu 50	" (4.3 + 7.1 ^{km})
(8)	" "	" (6.7 + 4.3 ^{km})
(A)	ACSR 282" x 4	500 KV



Note
As for each impedance described on TABLE 2.4-2~3



MENDARAN	SIMAN	SEROREJO
Hydro	Hydro	Hydro
5.6MWx1	3.6MWx3	4.8MWx1
5.8MWx1		

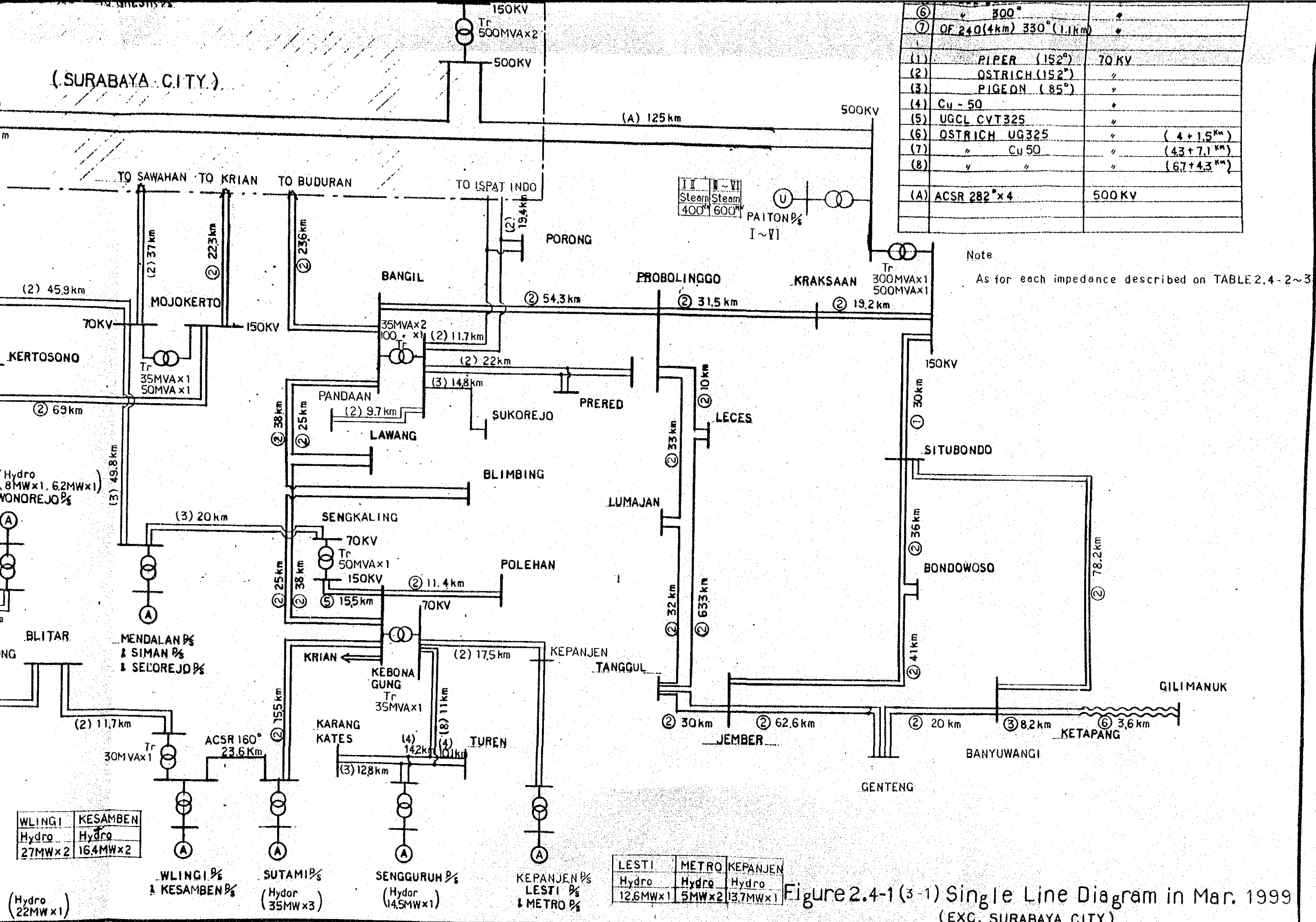
GRUNDULU	TEGALOMBO
Hydro	Hydro
32MWx1	20MWx1

WLINGI	KESAMBEN
Hydro	Hydro
27MWx2	16.4MWx2

LESTI	METRO	KEPANJEN
Hydro	Hydro	Hydro
12.6MWx1	5MWx2	13.7MWx1

Figure

(SURABAYA CITY)



⑥	300°	
⑦	OF 240(4km) 330°(1.1km)	
(1)	PIPER (152°)	70KV
(2)	OSTRICH (152°)	"
(3)	PIGEON (85°)	"
(4)	Cu - 50	"
(5)	UGCL CVT325	"
(6)	OSTRICH UG325	" (4+1.5 ^{km})
(7)	" Cu 50	" (43+7.1 ^{km})
(8)	" "	" (67+4.3 ^{km})
(A)	ACSR 282°x 4	500KV

Note
As for each impedance described on TABLE 2.4-2~3

WLINGI	KESAMBEN
Hydro	Hydro
27MWx2	164MWx2

LESTI	METRO	KEPANJEN
Hydro	Hydro	Hydro
12.6MWx1	5MWx2	137MWx1

Figure 2.4-1 (3-1) Single Line Diagram in Mar. 1999 (EXC. SURABAYA CITY)

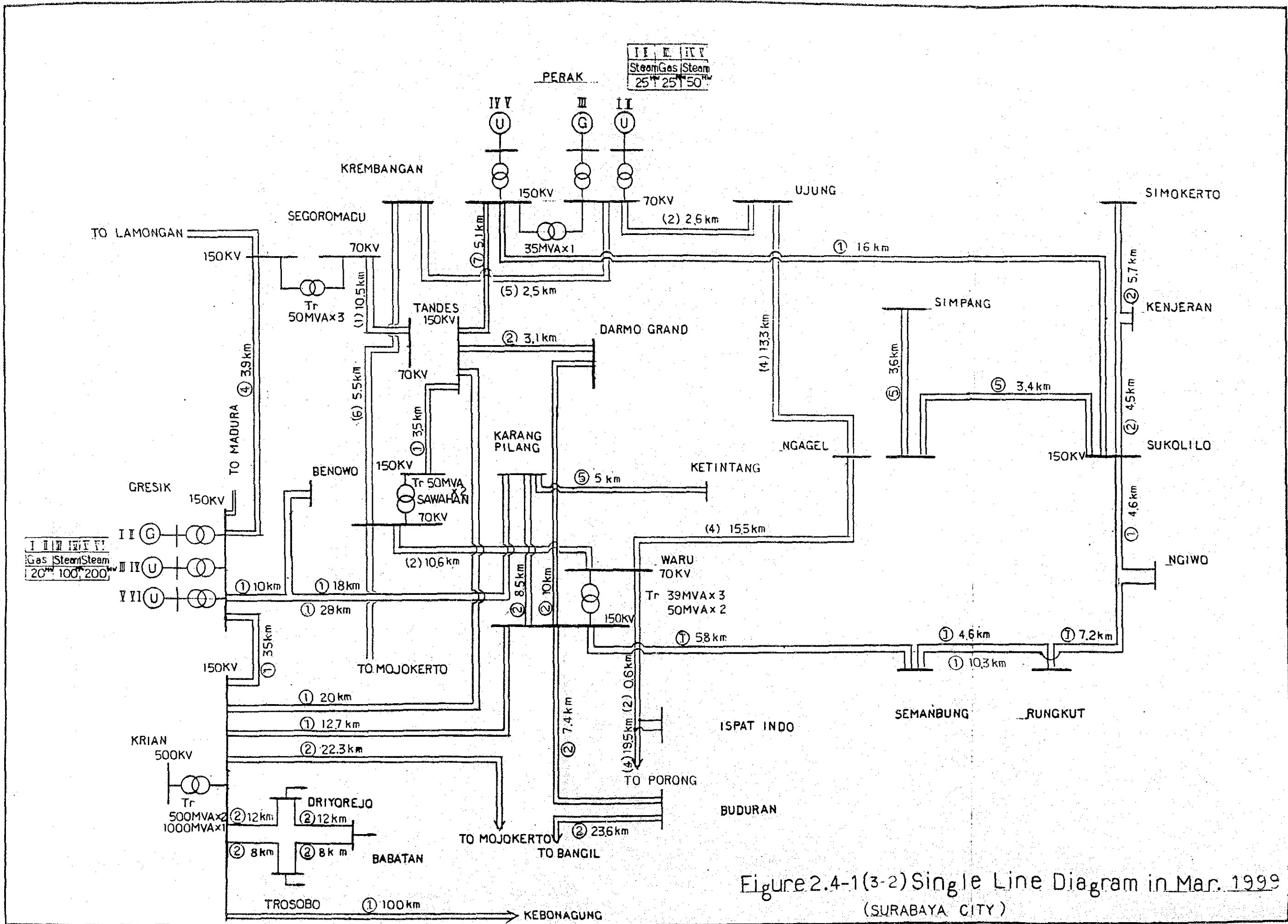
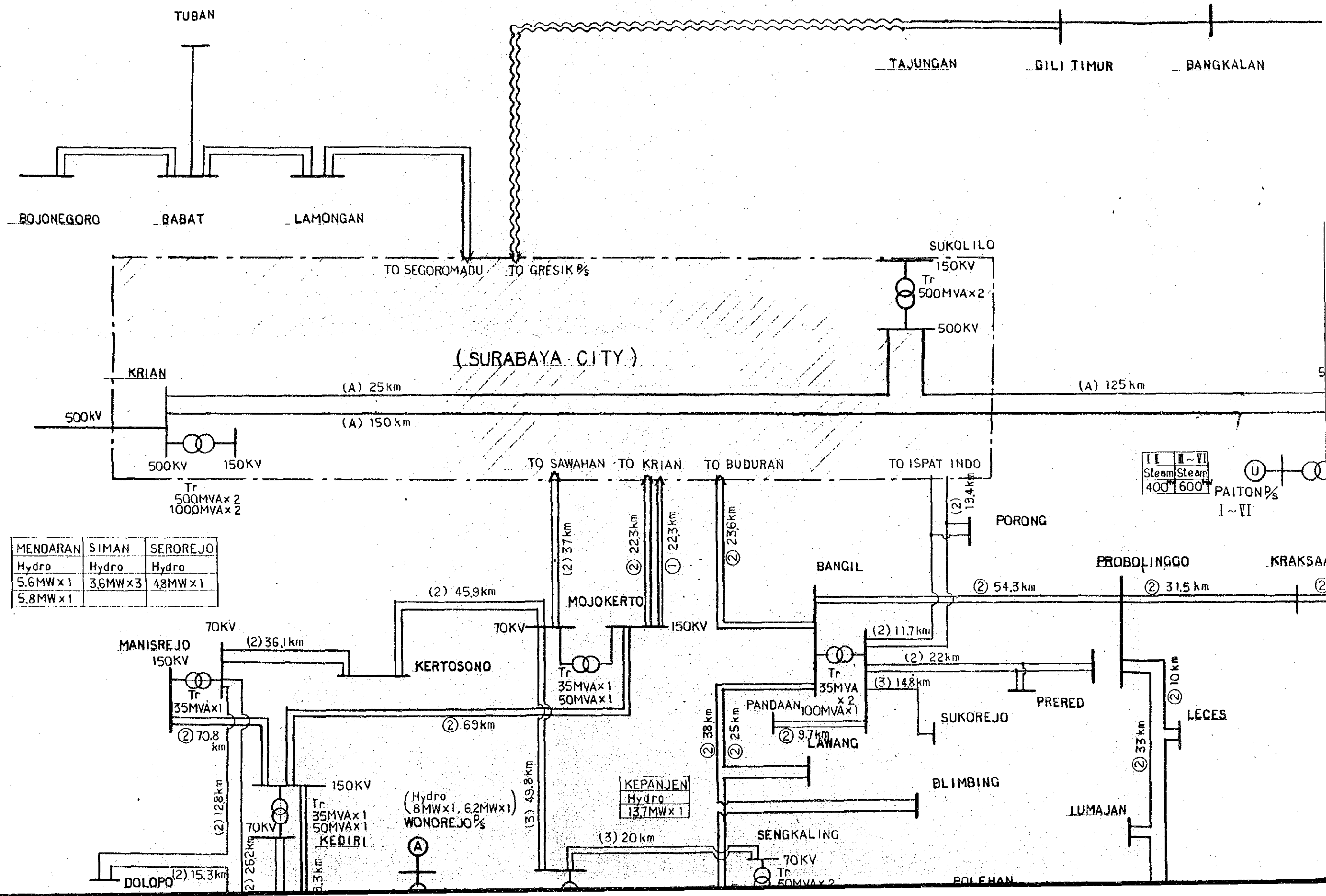
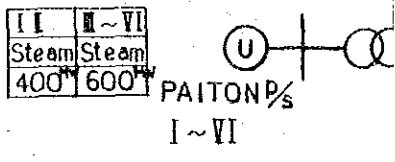


Figure 2.4-1(3-2) Single Line Diagram in Mar. 1999
(SURABAYA CITY)



MENDARAN	SIMAN	SEROREJO
Hydro	Hydro	Hydro
5.6MW x 1	3.6MW x 3	4.8MW x 1
5.8MW x 1		



(SURABAYA CITY)

TUBAN

BOJONEGORO

BABAT

LAMONGAN

TAJUNGAN

GILI TIMUR

BANGKALAN

SUKOLILO

TO SEGOROMADU TO GRESIK 1/2

150KV Tr 500MVA x 2

500KV

KRIAN

(A) 25km

(A) 125km

500KV

500KV 150KV

Tr 500MVA x 2 1000MVA x 2

TO SAWAHAN TO KRIAN TO BUDURAN TO ISPAT INDO

I I ~ VI Steam Steam 400 600

U PAITON 1/2 I ~ VI

PORONG

BANGIL

PROBOLINGGO

KRAKSA

(2) 54.3km

(2) 31.5km

(2) 45.9km

MOJOKERTO

150KV

MANISREJO 150KV

(2) 36.1km

KERTOSONO

70KV

Tr 35MVA x 1 50MVA x 1

(2) 11.7km

Tr 35MVA x 2 100MVA x 1

(2) 22km

(3) 14.8km

SUKOREJO

PRERED

(2) 10km

LECES

(2) 70.8km

Tr 35MVA x 1

(2) 69km

KEPANJEN Hydro 13.7MW x 1

(2) 38km

(2) 25km

(2) 9.7km

PANDAAN

LAWANG

BLIMBING

LUMAJAN

(2) 33km

(Hydro 8MW x 1, 6.2MW x 1) WONOREJO 1/2

(A)

(3) 20km

SENGKALING

70KV Tr 50MVA x 2

POLEHAN

DOLOPO (2) 15.3km

(2) 26.2km

Tr 35MVA x 1 50MVA x 1

70KV

150KV

KEDIRI

(13) 49.8km

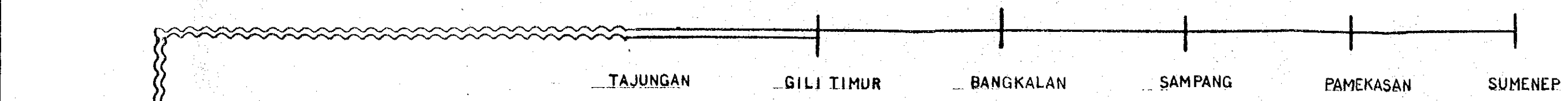
(2) 37km

(2) 22.3km

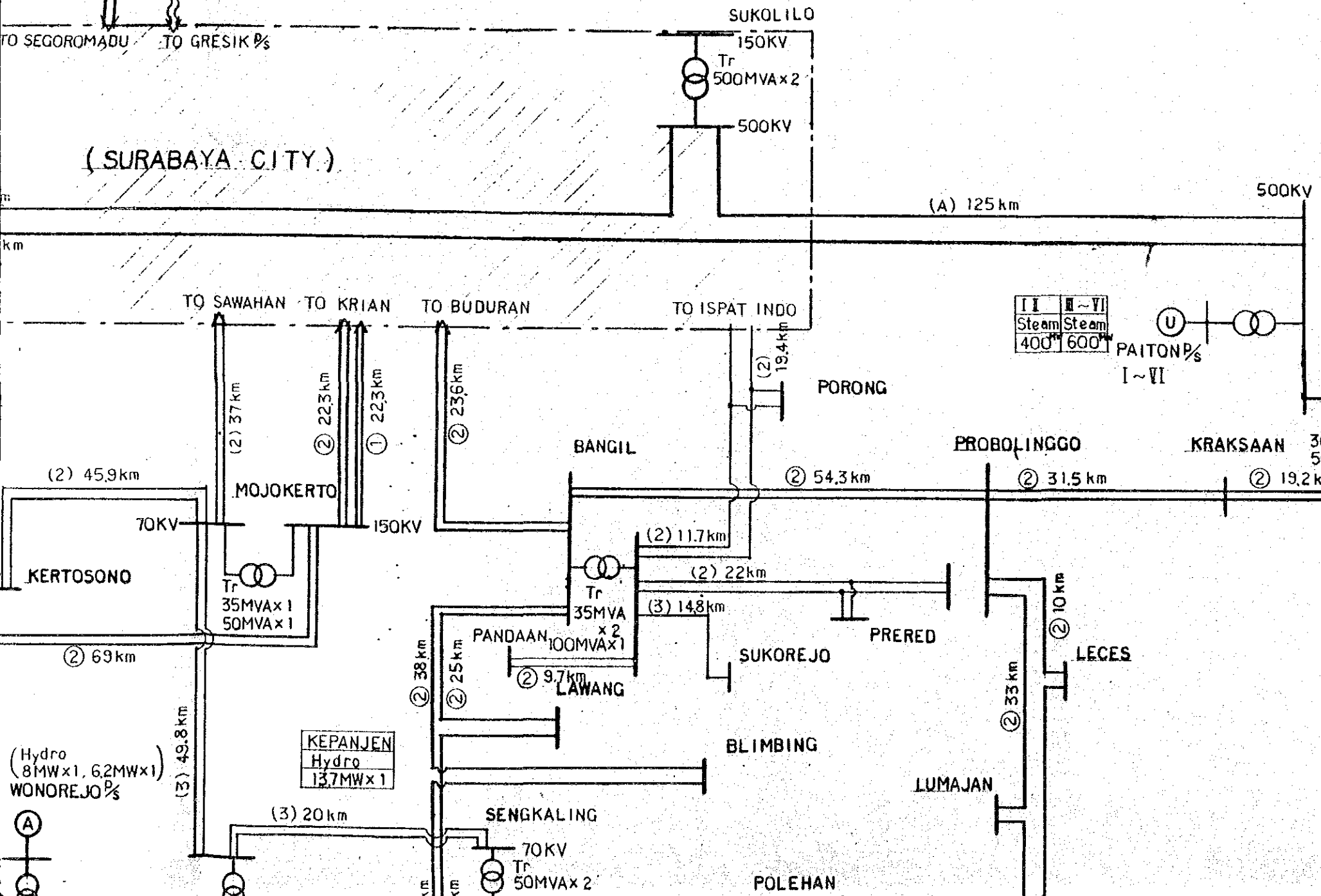
(1) 22.3km

(2) 23.6km

(2) 19.4km

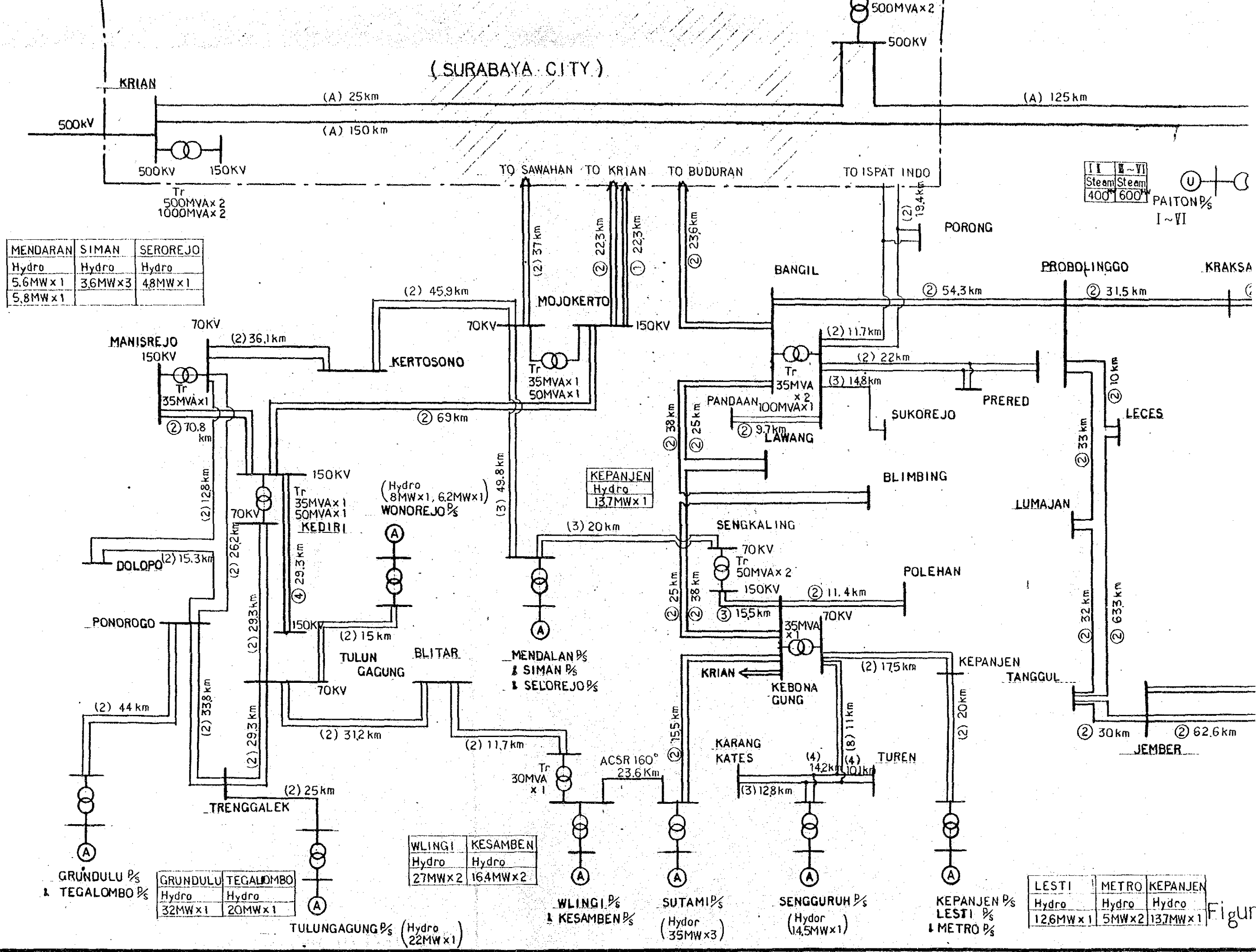


No.	CONDUCTOR	VOLTAGE
①	ACSR 330 ^o TWIN	150KV
②	" 330 ^o	"
③	" 240 ^o	"
④	" DUCK (307 ^o)	"
⑤	CABLE 2000 ^o	"
⑥	" 300 ^o	"
⑦	OF 240(4km) 330 ^o (1.1km)	"
(1)	PIPER (152 ^o)	70 KV
(2)	OSTRICH (152 ^o)	"
(3)	PIGEON (85 ^o)	"
(4)	Cu - 50	"
(5)	UGCL CVT325	"
(6)	OSTRICH UG325	" (4+1.5 ^{km})
(7)	" Cu 50	" (4.3+7.1 ^{km})
(8)	" "	" (6.7+4.3 ^{km})
(A)	ACSR 282 ^o x4	500KV



Note
As for each impedance described on TABLE 2.4-2~3

(SURABAYA CITY)



MENDARAN	SIMAN	SEROREJO
Hydro	Hydro	Hydro
5.6MW x 1	3.6MW x 3	4.8MW x 1
5.8MW x 1		

KEPANJEN
Hydro
13.7MW x 1

WONOREJO
Hydro
8MW x 1, 6.2MW x 1

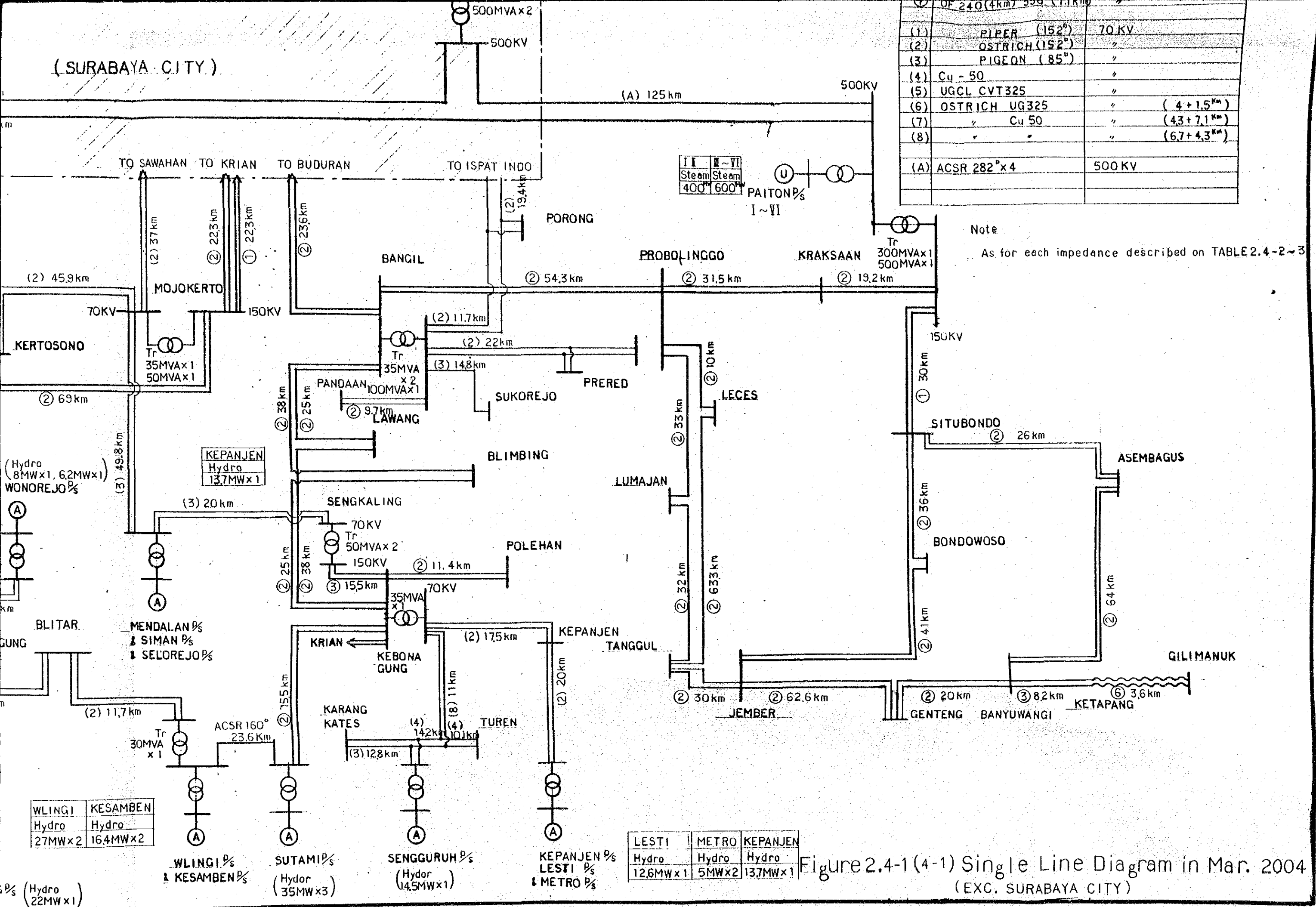
WLINGI	KESAMBEN
Hydro	Hydro
27MW x 2	16.4MW x 2

GRUNDULU	TEGALOMBO
Hydro	Hydro
32MW x 1	20MW x 1

LESTI	METRO	KEPANJEN
Hydro	Hydro	Hydro
12.6MW x 1	5MW x 2	13.7MW x 1

Figur

(SURABAYA CITY)



(1)	PIPER (152")	70KV
(2)	OSTRICH (152")	"
(3)	PIGEON (85")	"
(4)	Cu - 50	"
(5)	UGCL CVT325	"
(6)	OSTRICH UG325	(4+1.5 km)
(7)	" Cu 50	(4.3+7.1 km)
(8)	"	(6.7+4.3 km)
(A)	ACSR 282" x 4	500KV

Note
As for each impedance described on TABLE 2.4-2~3

WLINGI	KESAMBEN
Hydro	Hydro
27MW x 2	16.4MW x 2

LESTI	METRO	KEPANJEN
Hydro	Hydro	Hydro
12.6MW x 1	5MW x 2	137MW x 1

Figure 2.4-1 (4-1) Single Line Diagram in Mar. 2004
(EXC. SURABAYA CITY)

I	II	III	IV	V	VI	VII
Gas	Steam	Steam	Steam	Steam	Steam	Steam
20	100	200	200	200	200	200

I	II	III	IV	V	VI	VII
Steam	Gas	Steam	Steam	Steam	Steam	Steam
25	25	50	50	50	50	50

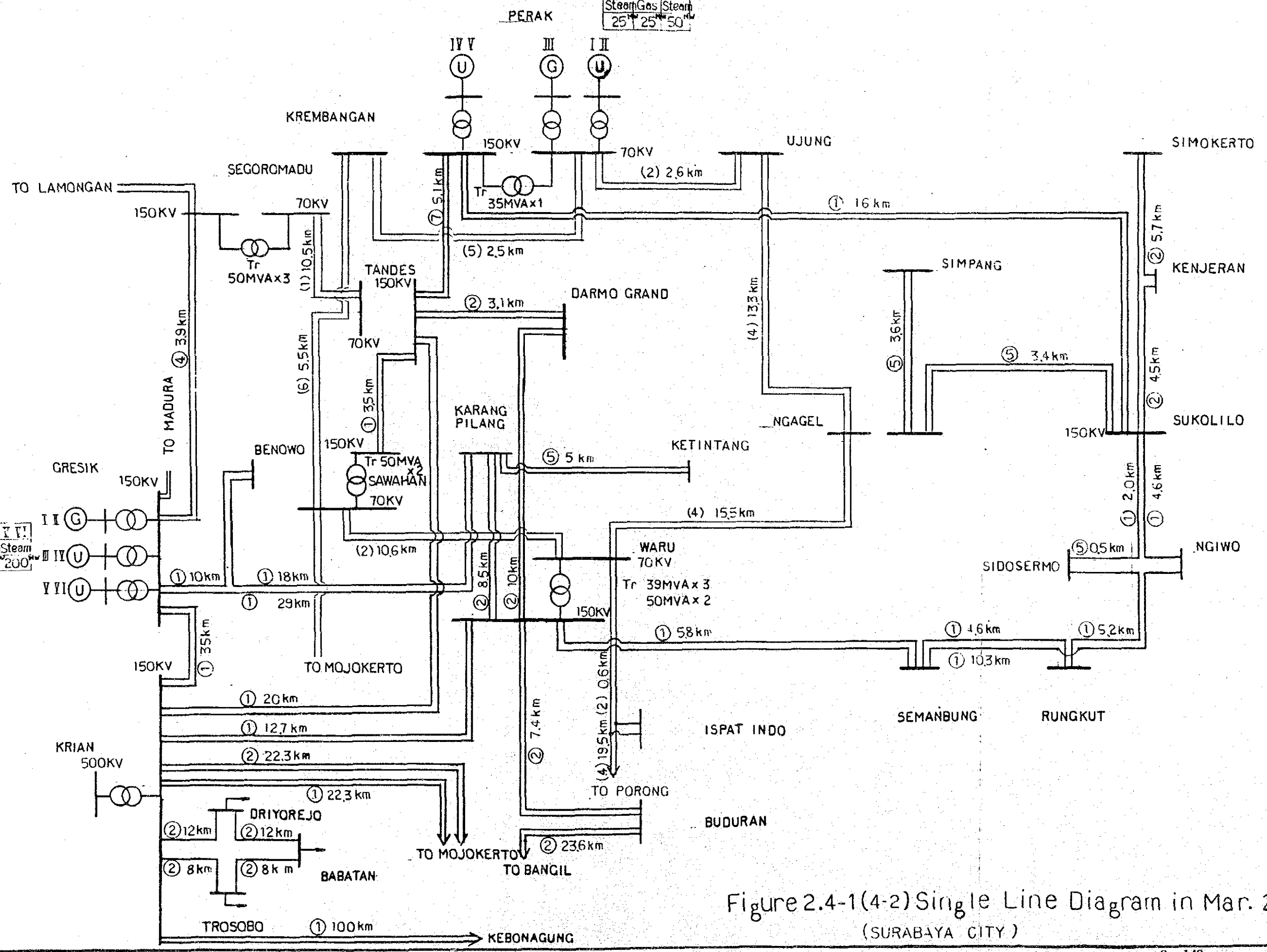
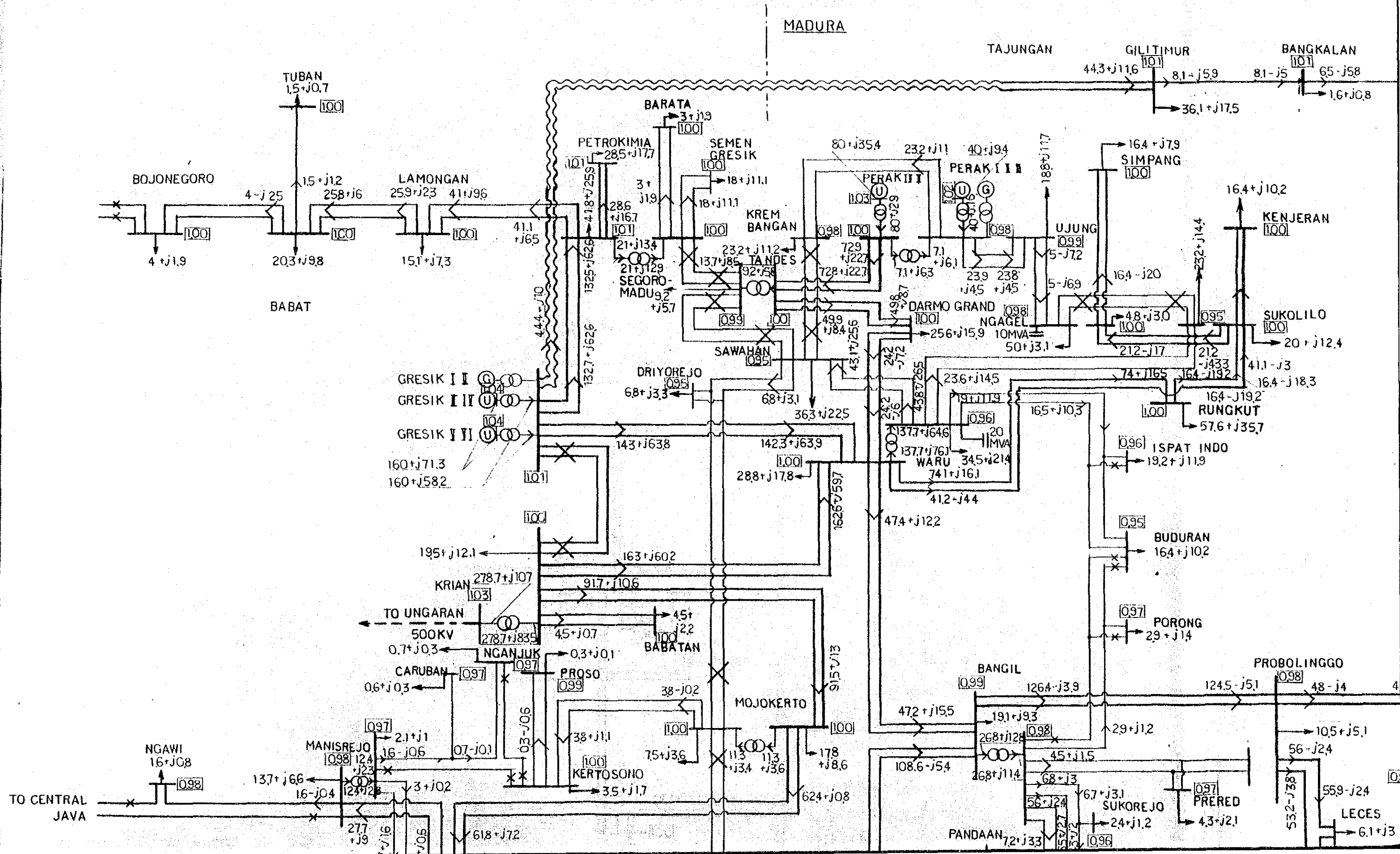
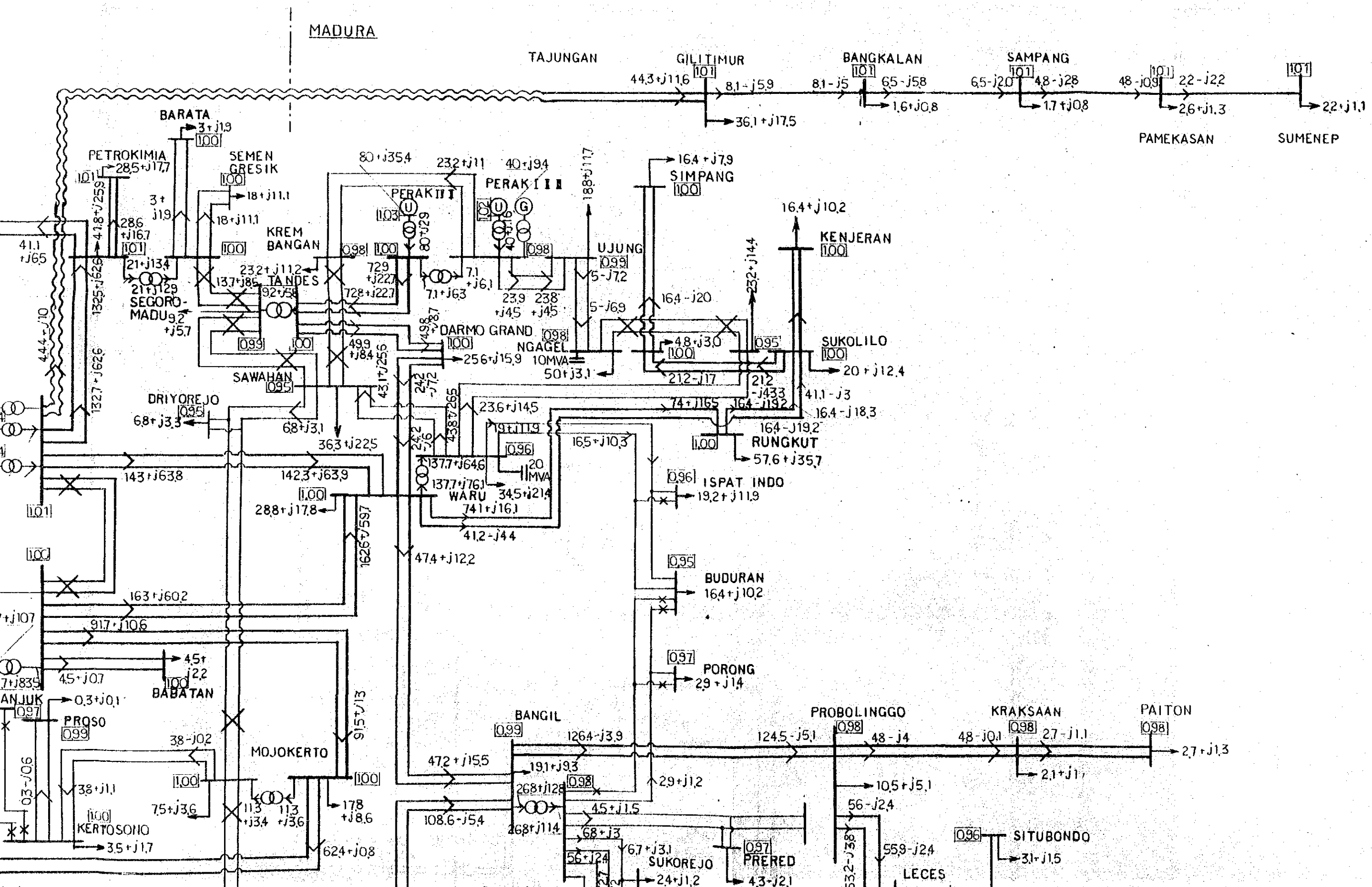


Figure 2.4-1(4-2) Single Line Diagram in Mar. 2004
(SURABAYA CITY)





MADURA

TAJUNGAN

GILITIMUR

BANGKALAN

SAMPANG

PAMEKASAN

SUMENEP

BARATA

PETROKIMIA

SEMEN GRESIK

KREM BANGAN

TANDES

PERAK I

PERAK II

DARMO GRAND

NGAGEL

UJUNG

SIMPANG

KENJERAN

SUKOLILO

SAWAHAN

DRIYOREJO

WARU

10MVA

20MVA

164-J19.2

RUNGKUT

ISPAT INDO

BUDURAN

PORONG

BANGIL

PROBOLINGGO

KRAKSAAN

PAITON

MOJOKERTO

BABATAN

PRQSO

KERTOSOHO

SUKOREJO

PREED

LECES

SITUBONDO

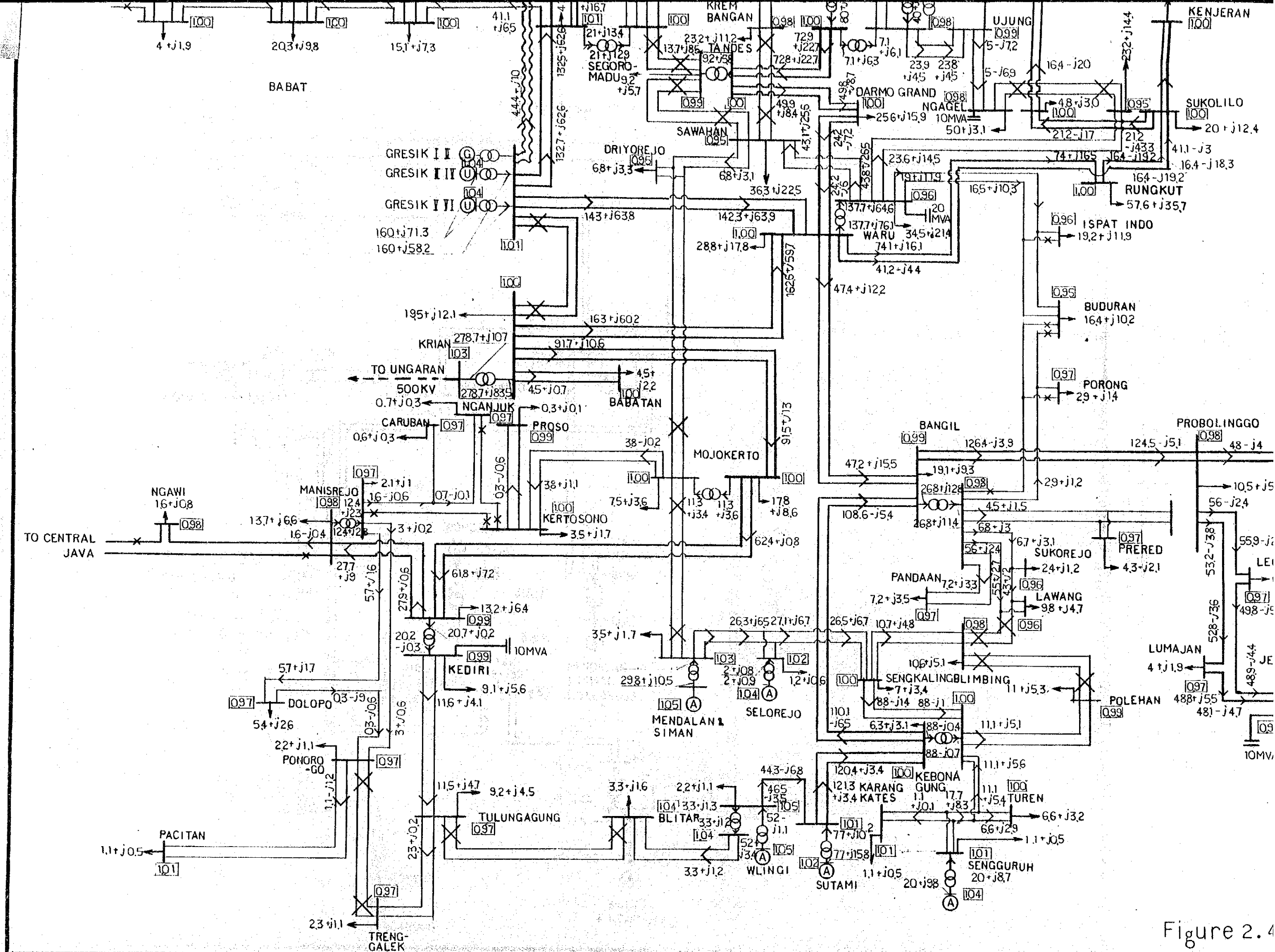


Figure 2.4

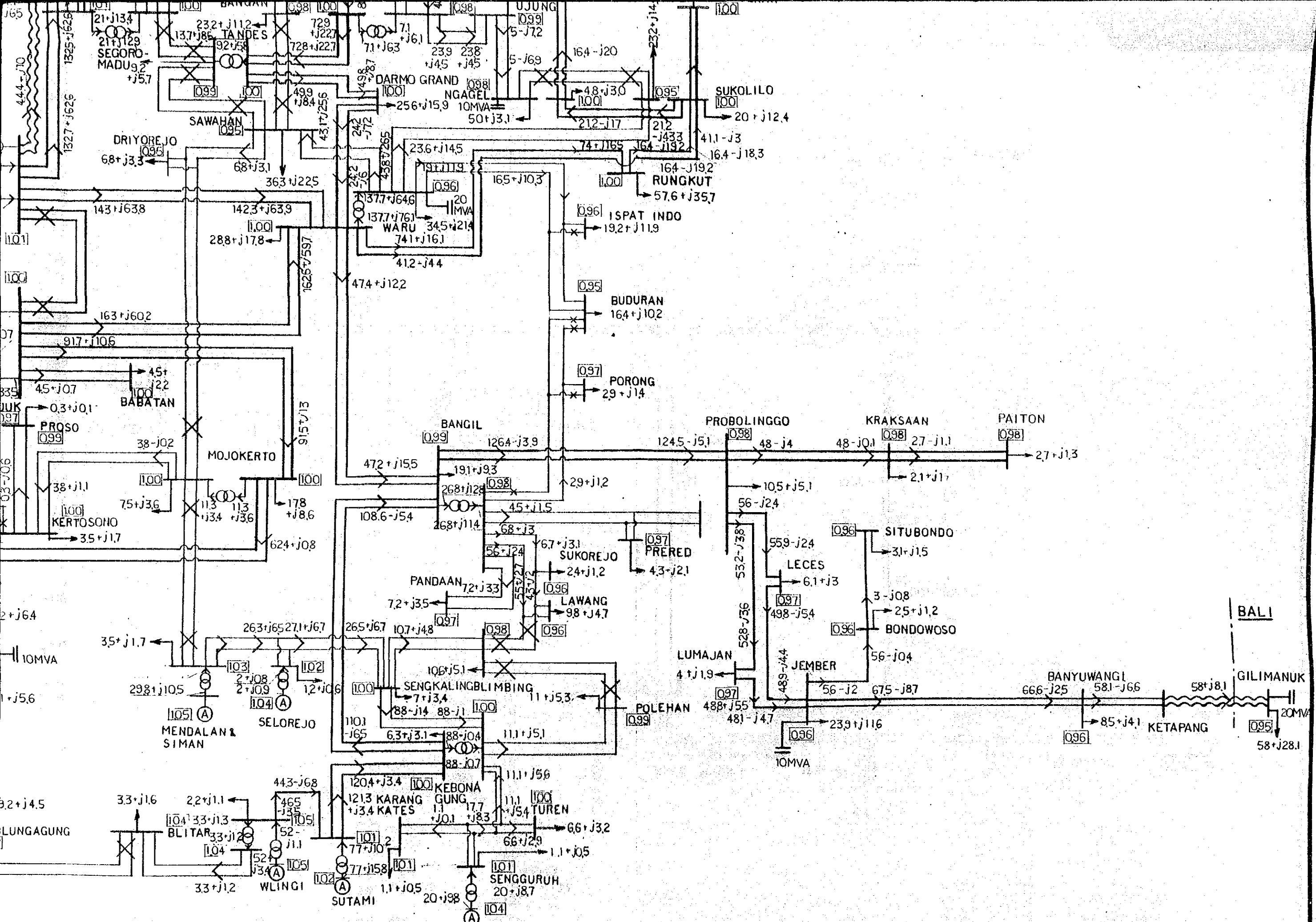
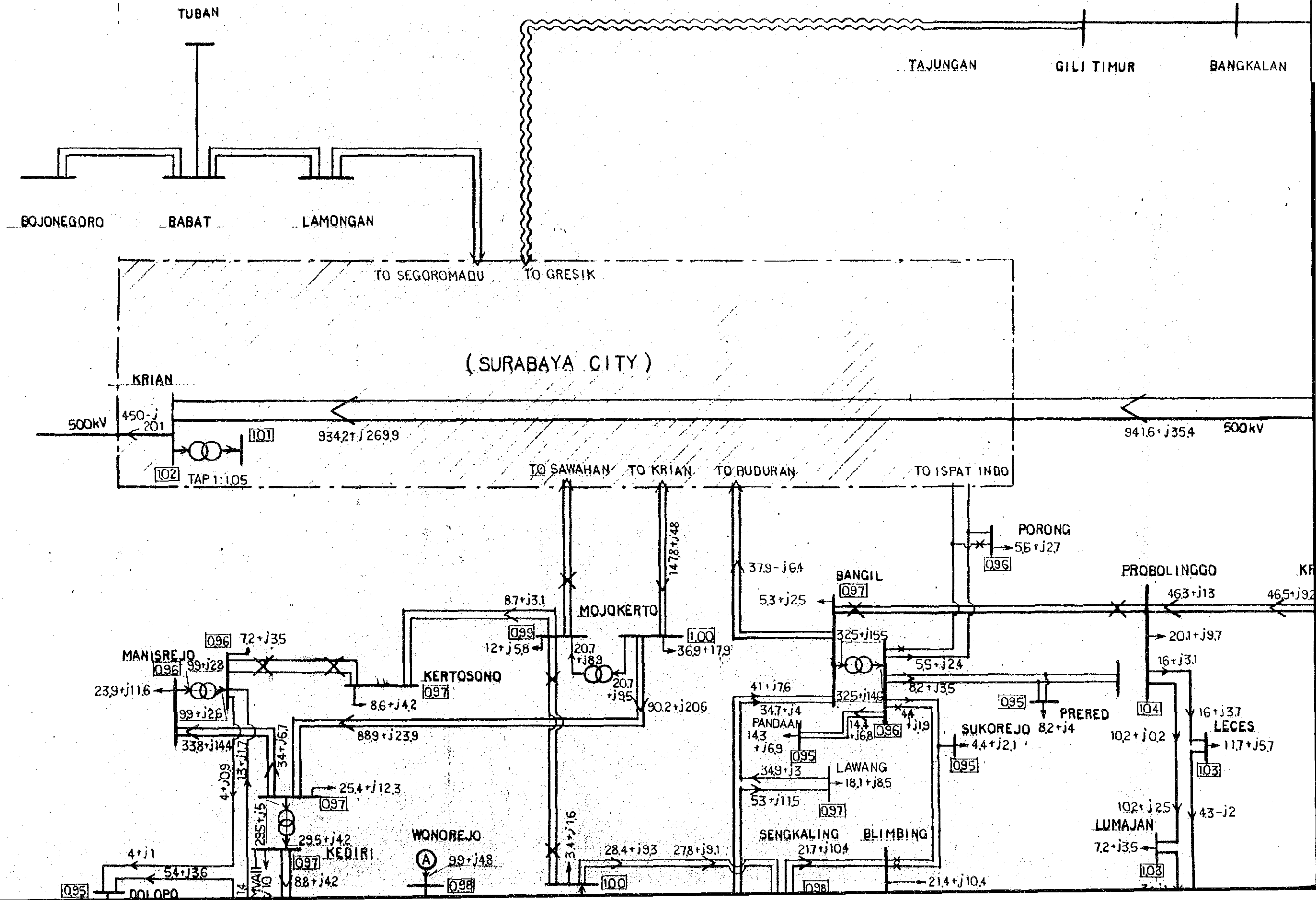
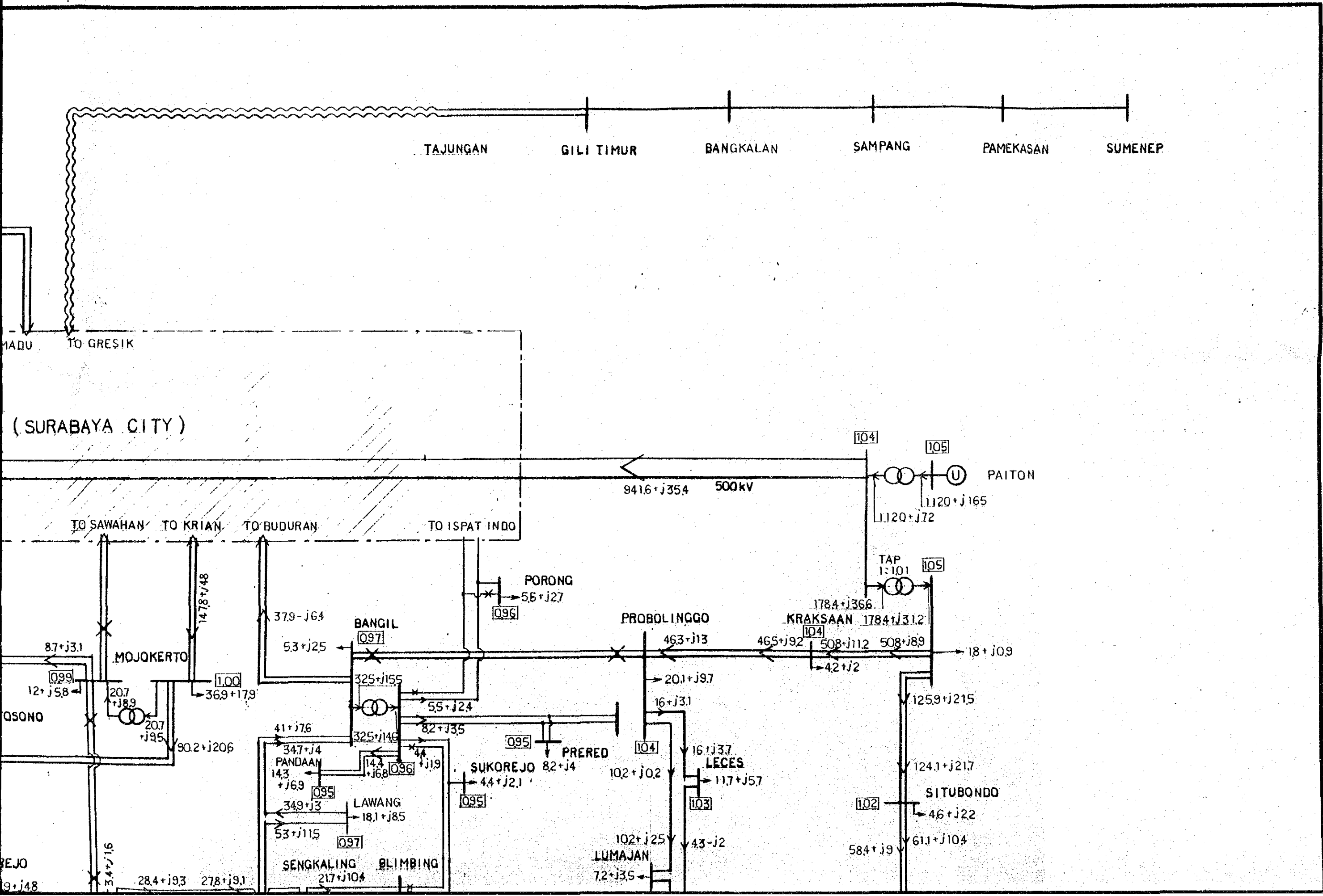


Figure 2.4-2 (1) Load Flow at Peak in Mar. 1989





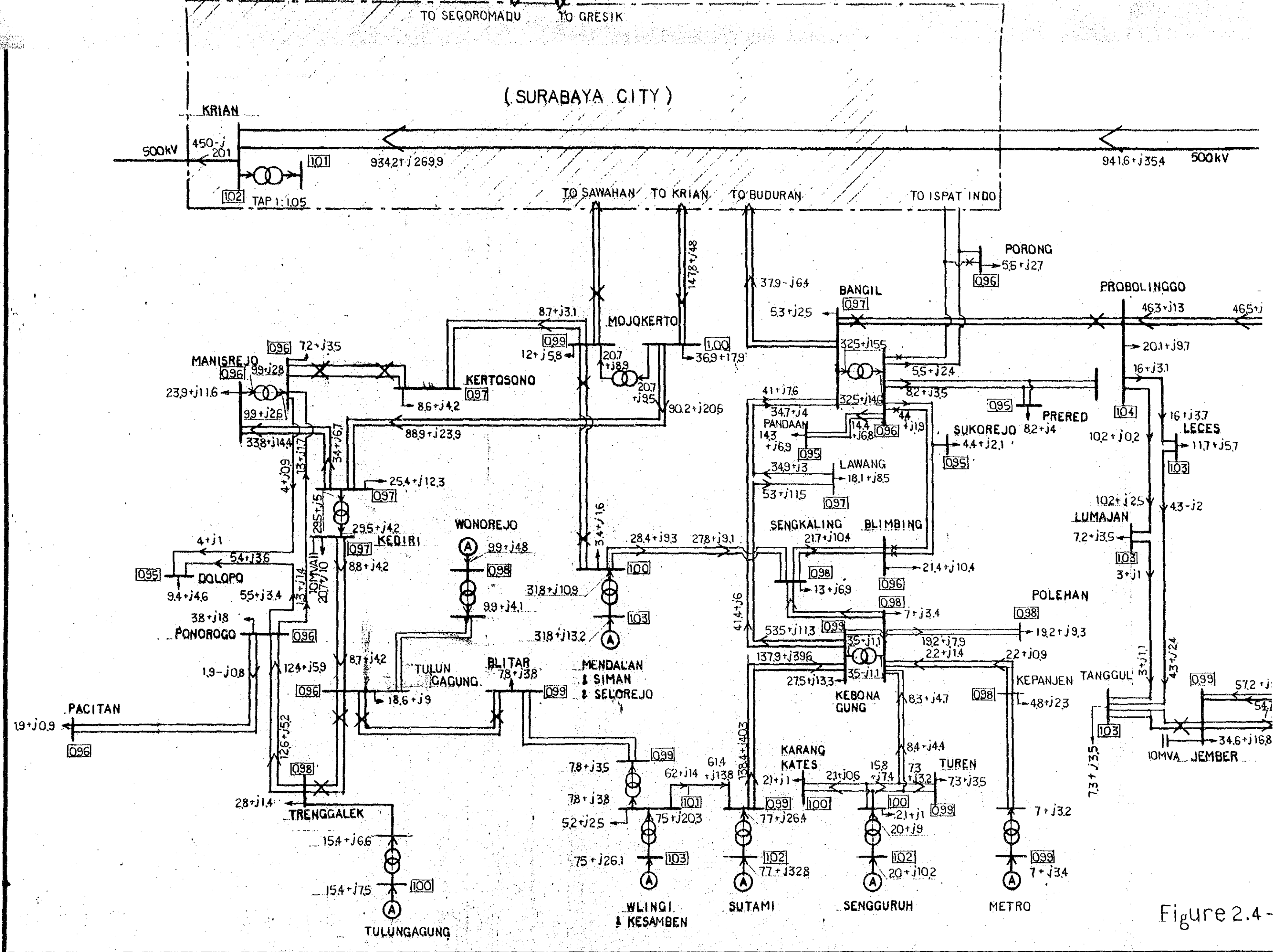


Figure 2.4-

(SURABAYA CITY)

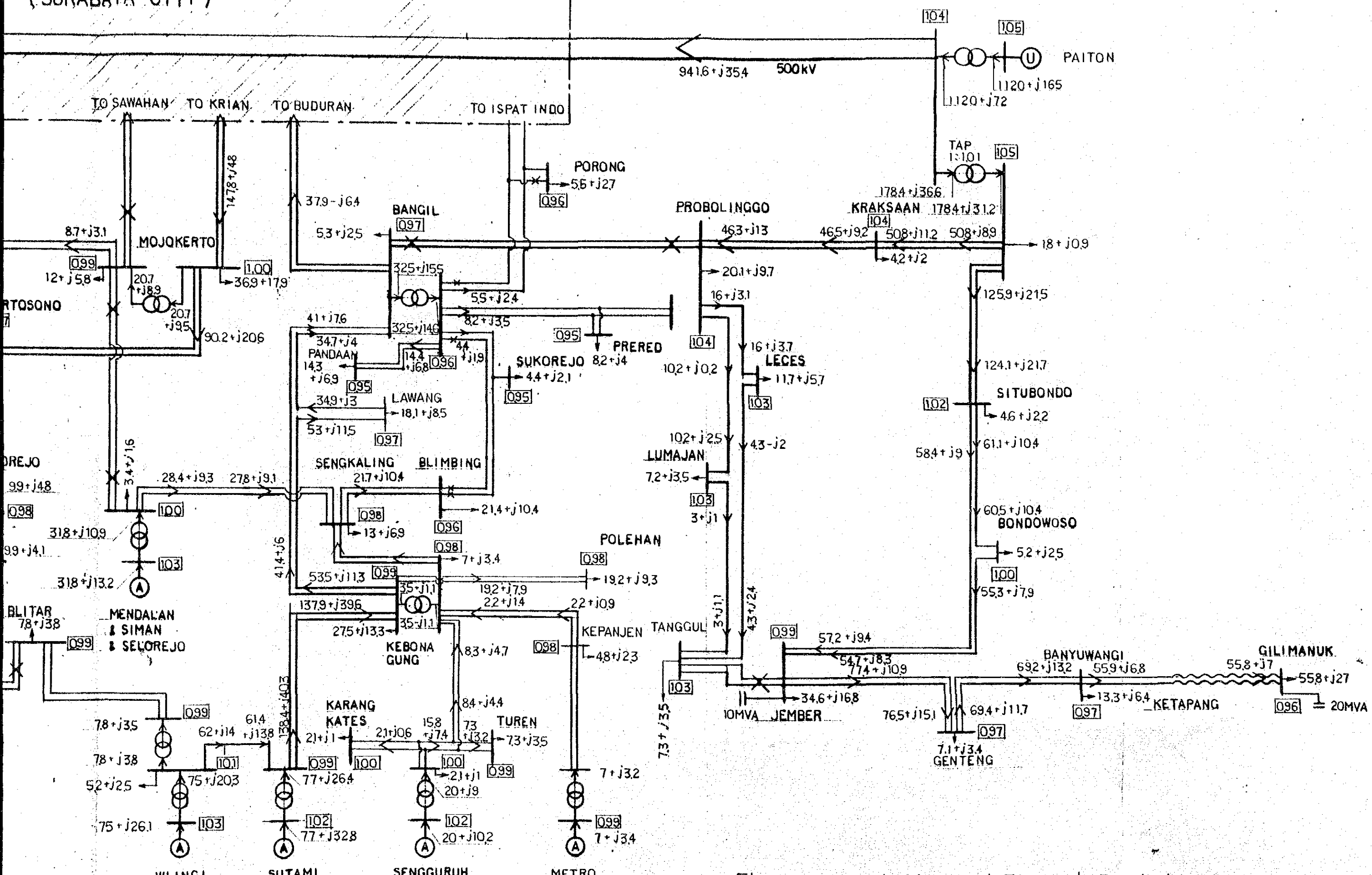


Figure 2.4-2 (2-1) Load Flow at Peak in Mar. 1994 (EXC. SURABAYA CITY)

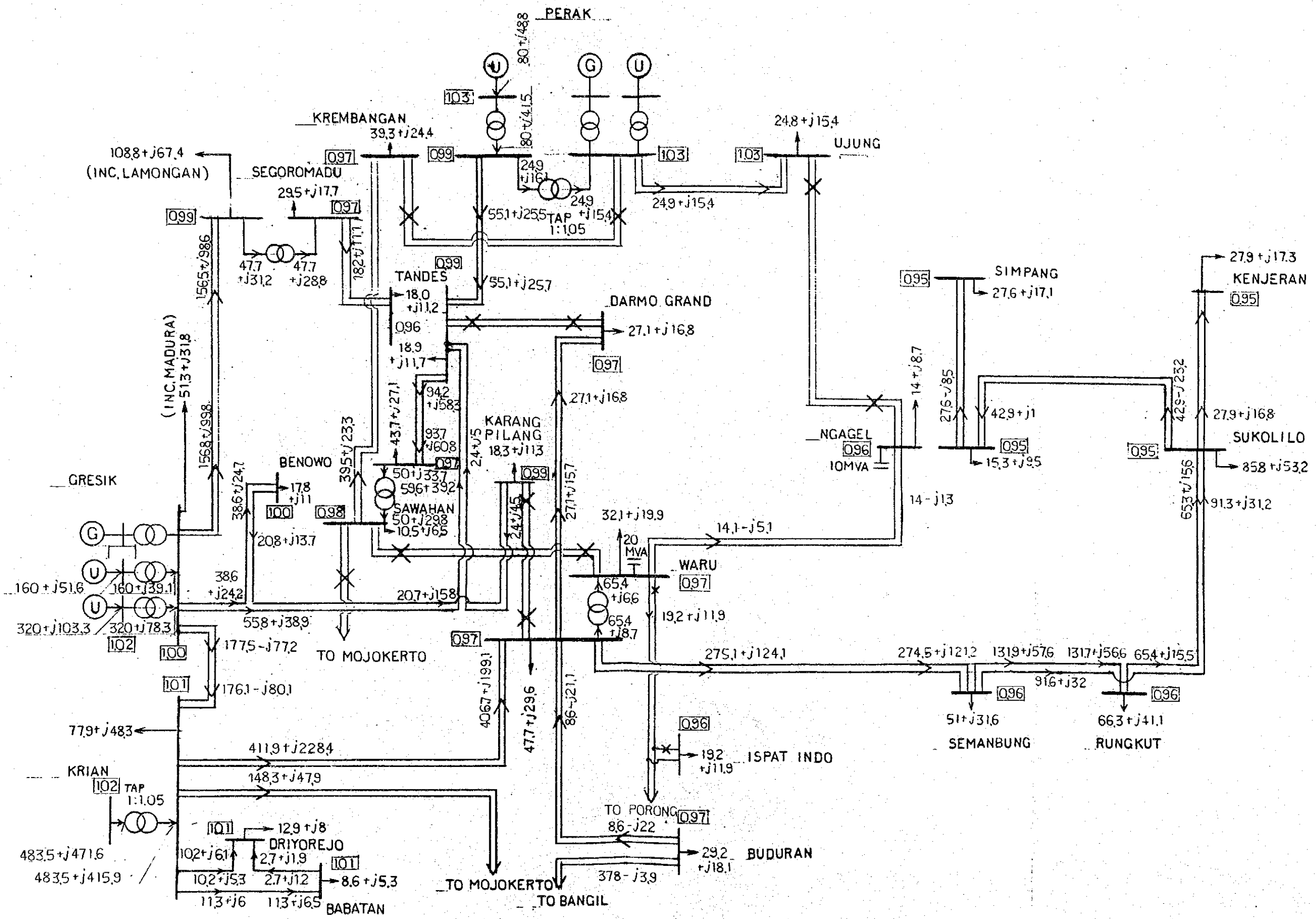
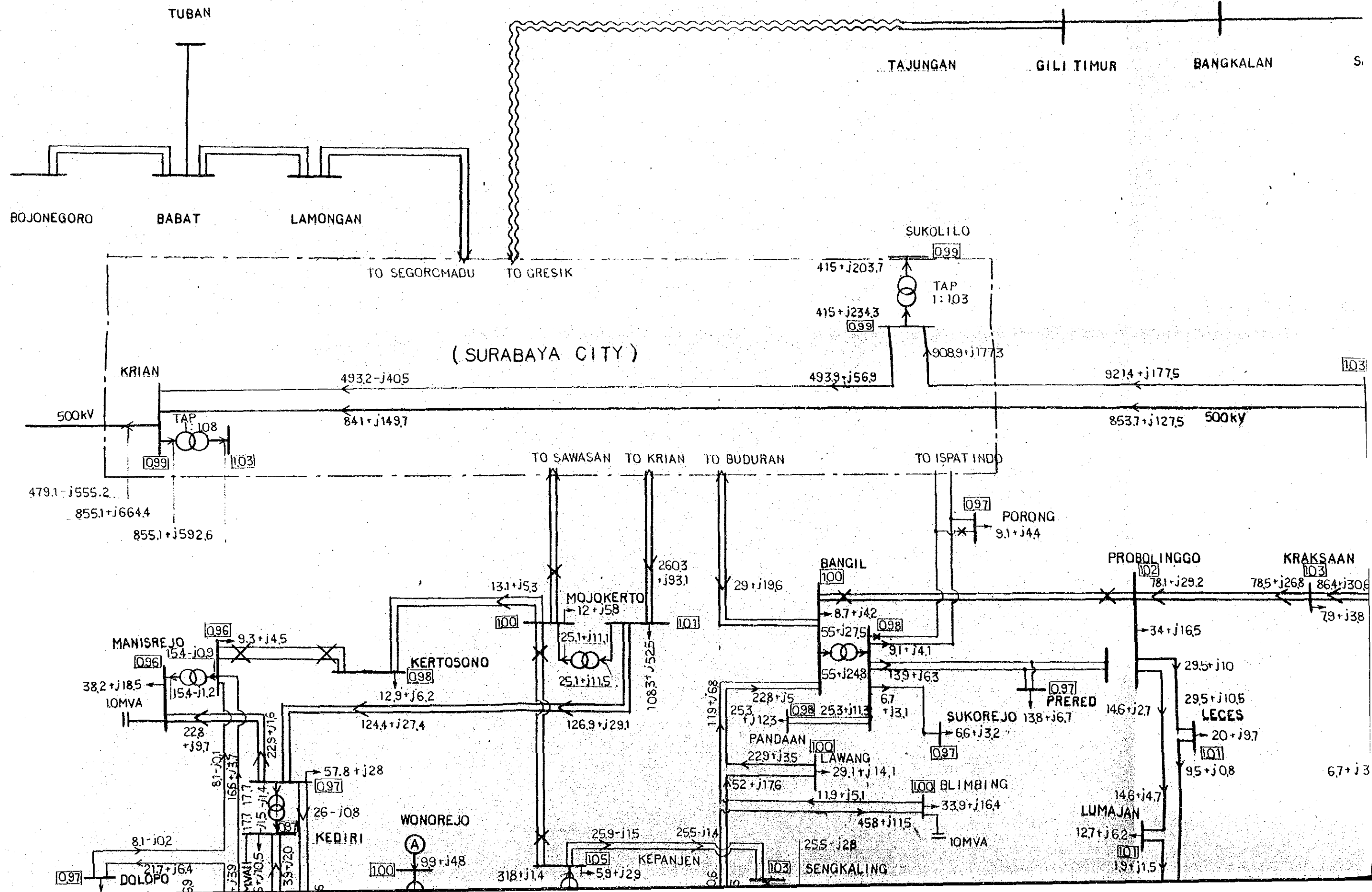
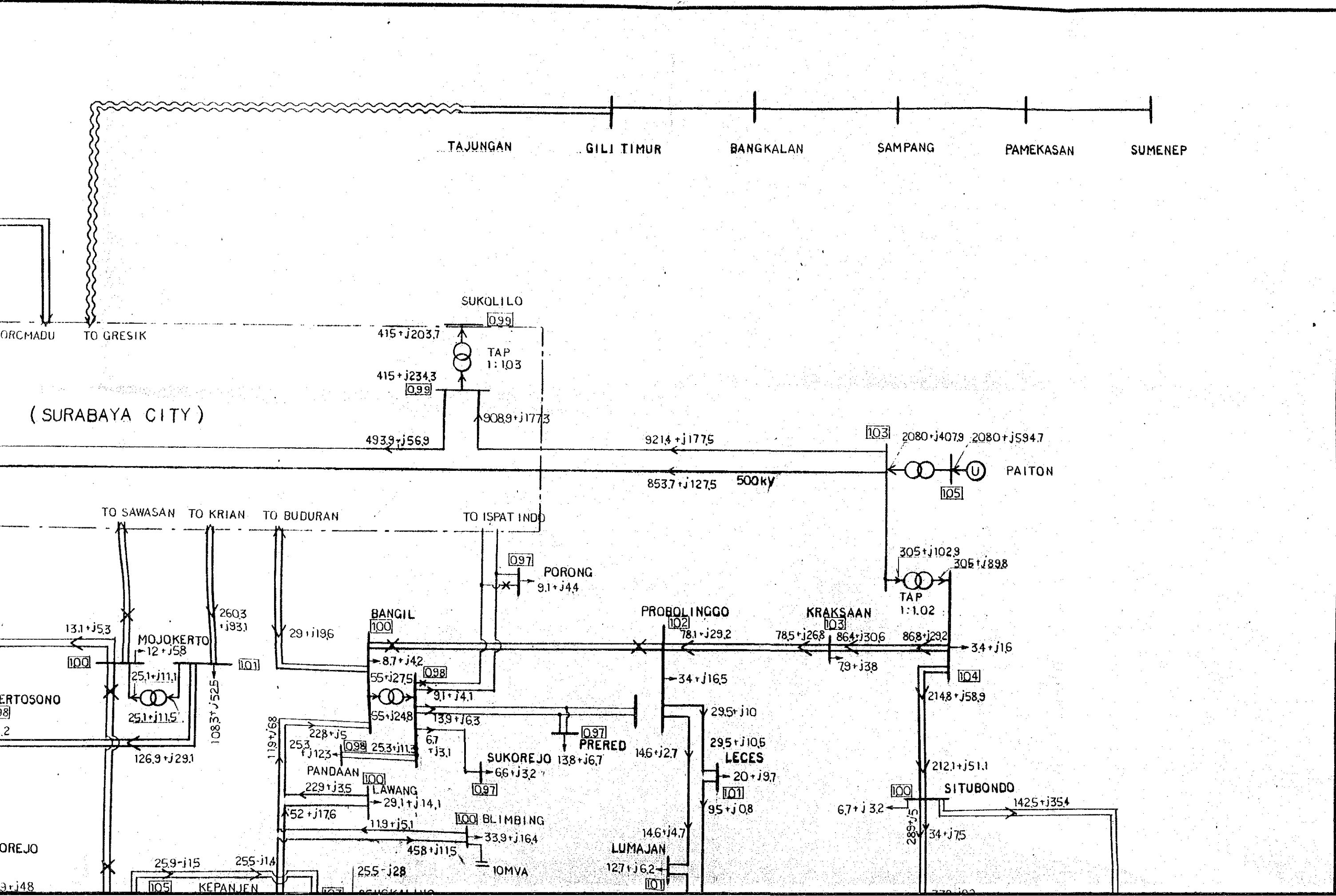


Figure 2.4-2 (2-2) Load Flow at Peak in Mar. 1994 (SURABAYA CITY)





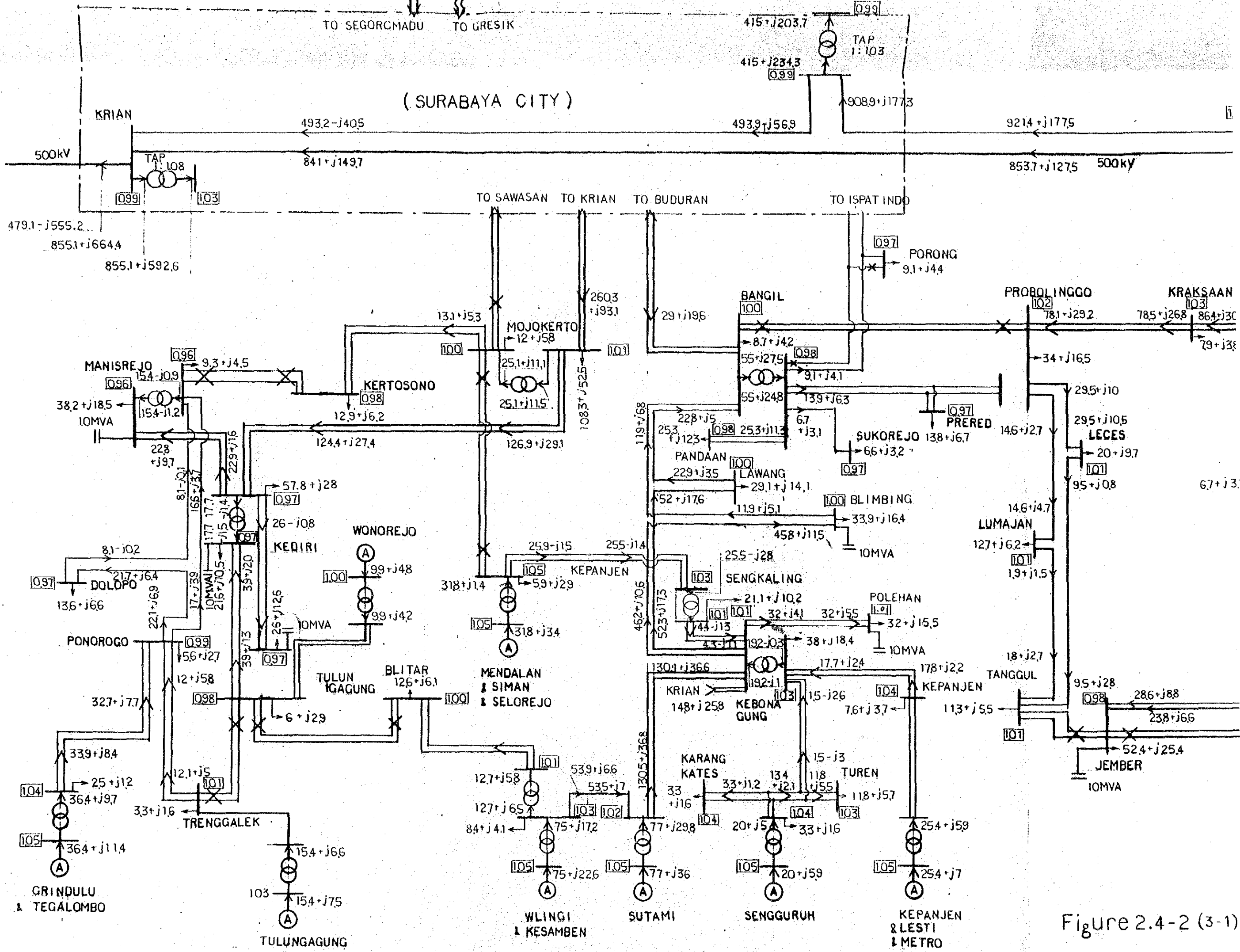
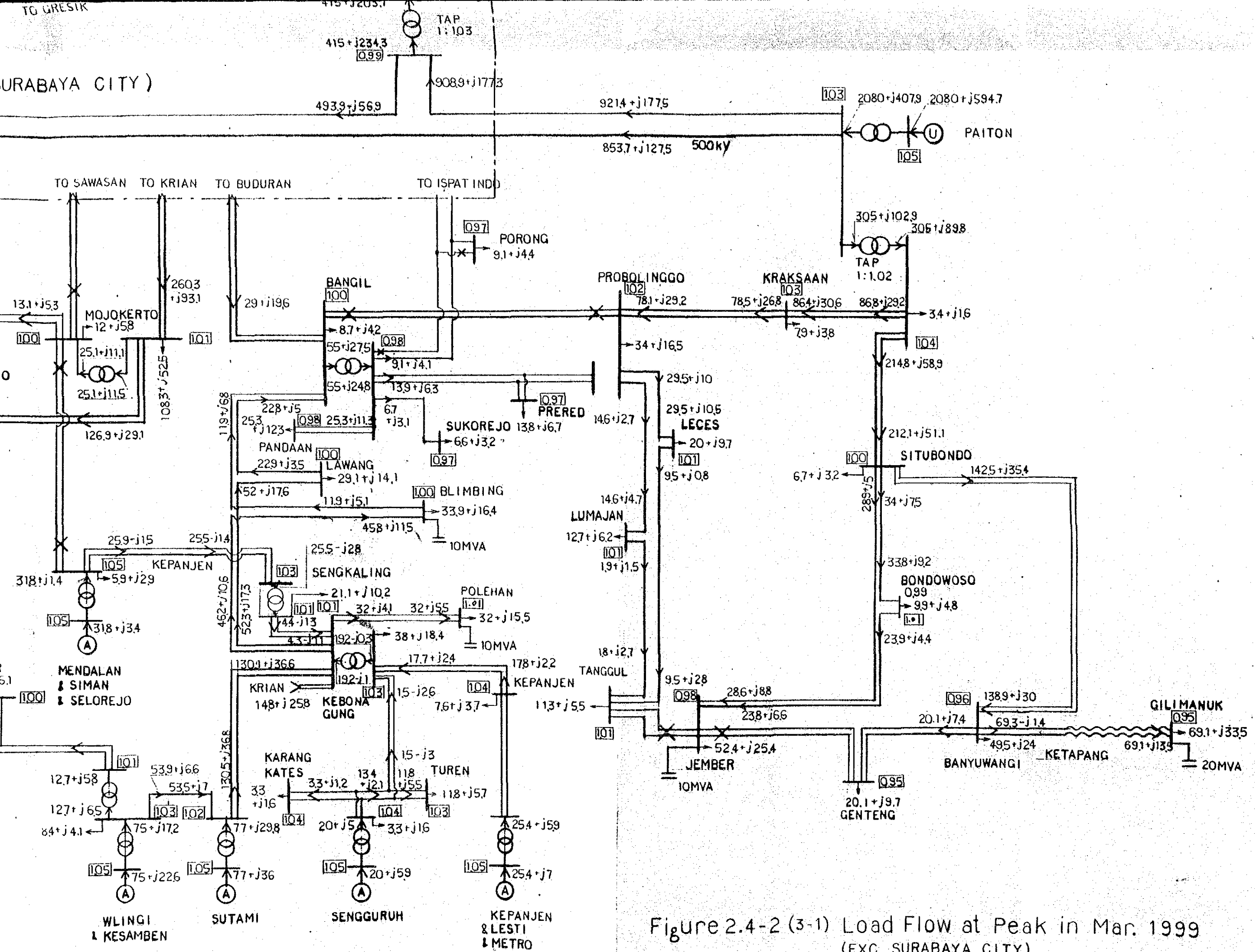
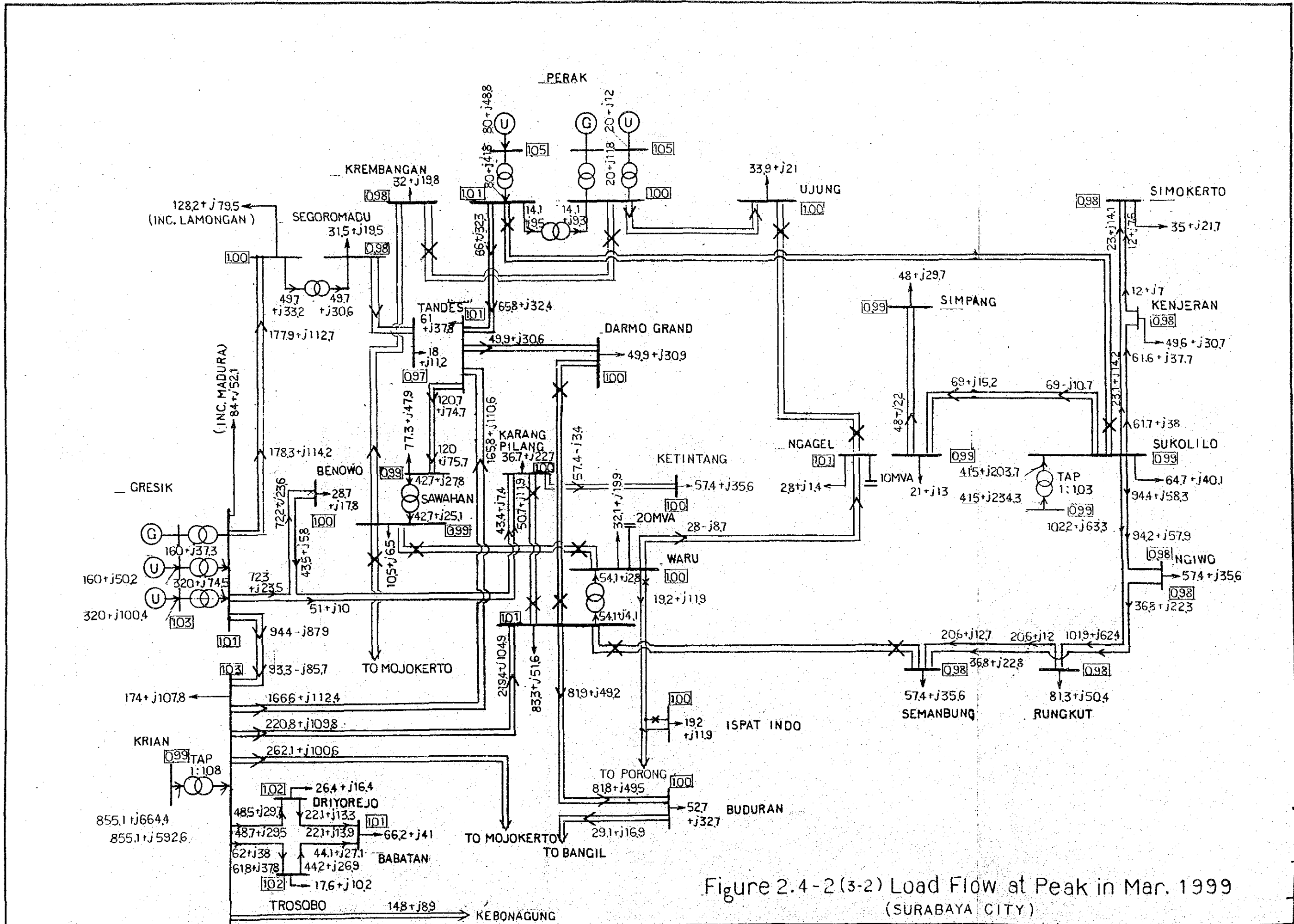
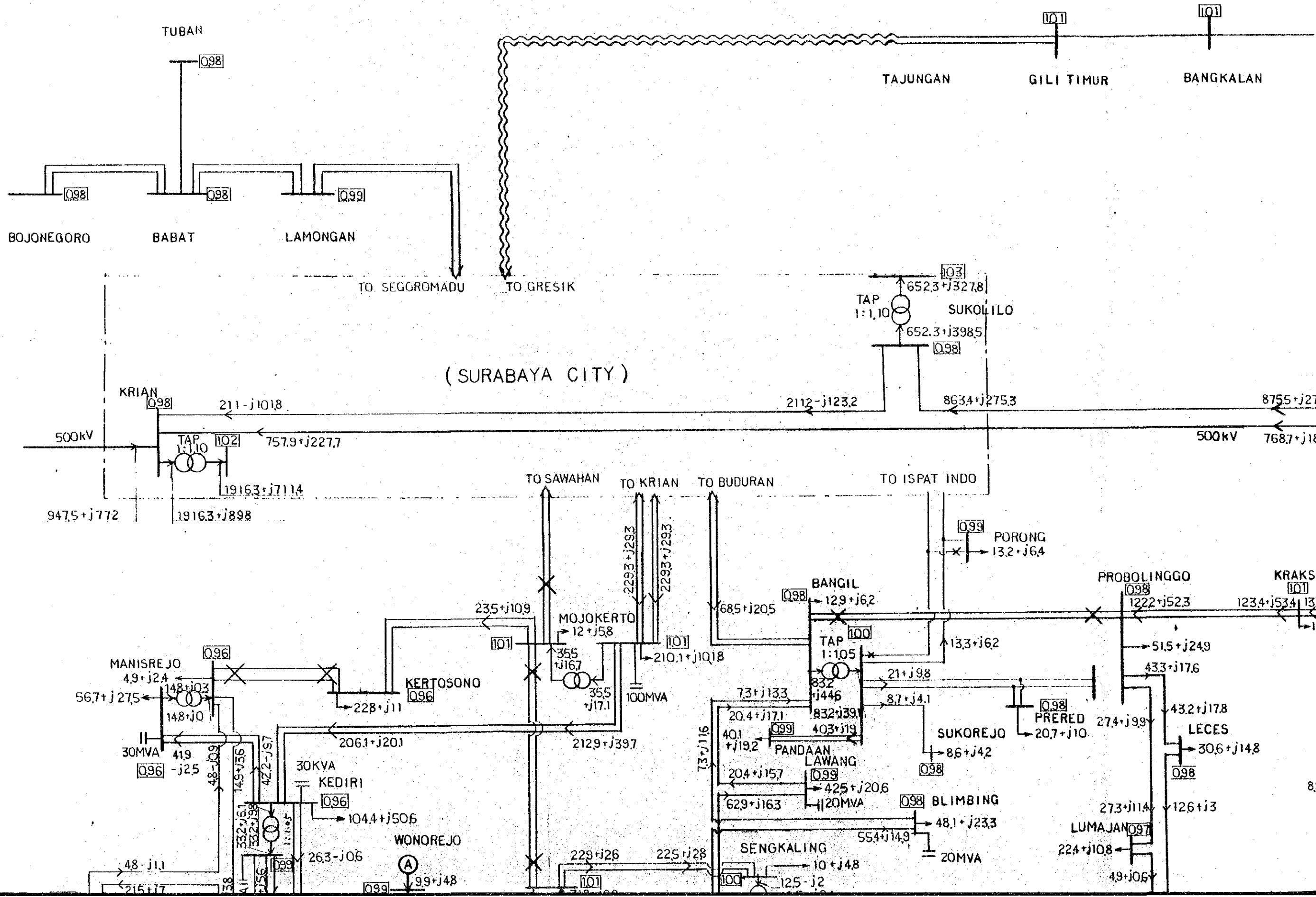
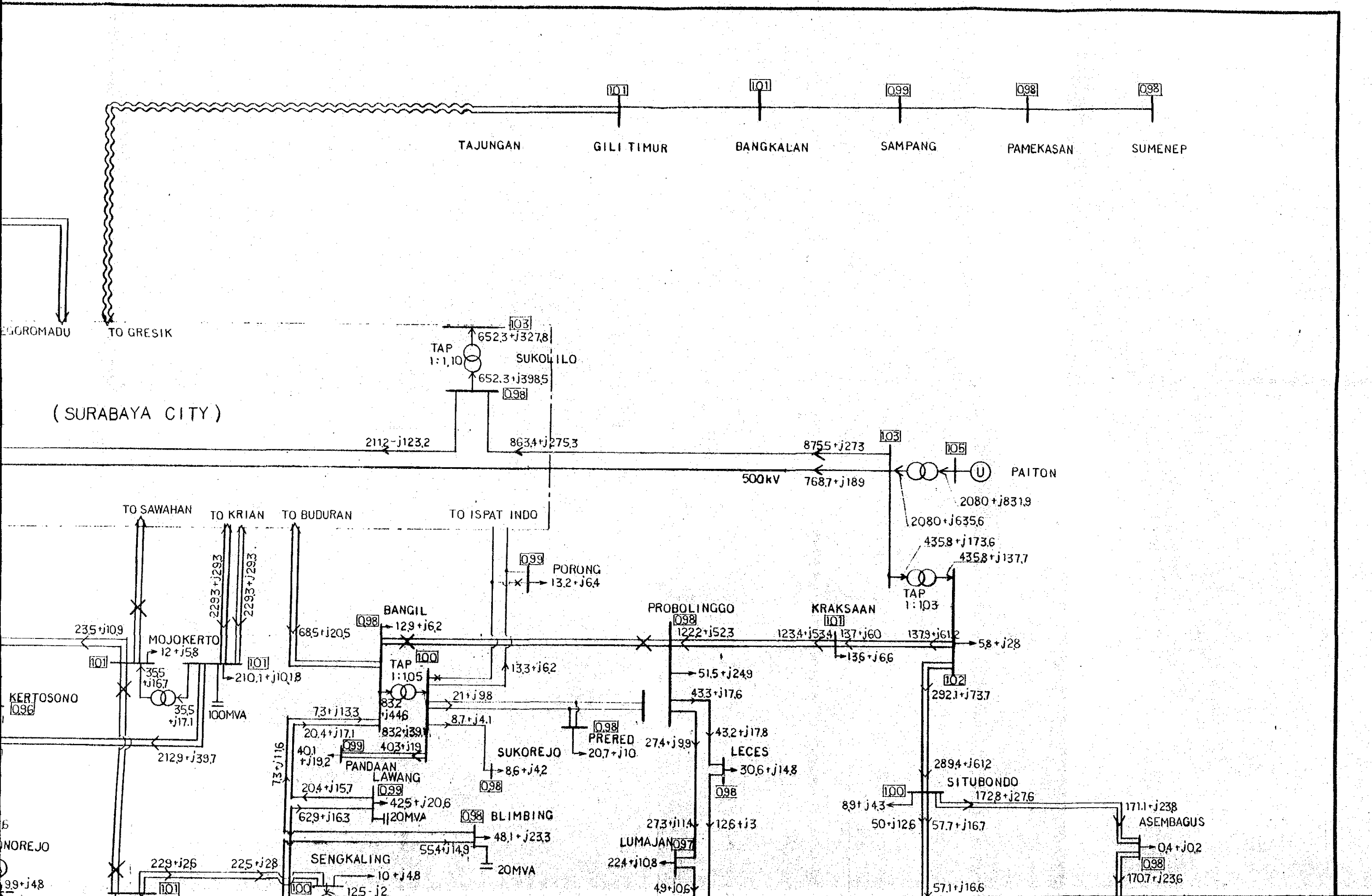


Figure 2.4-2 (3-1)









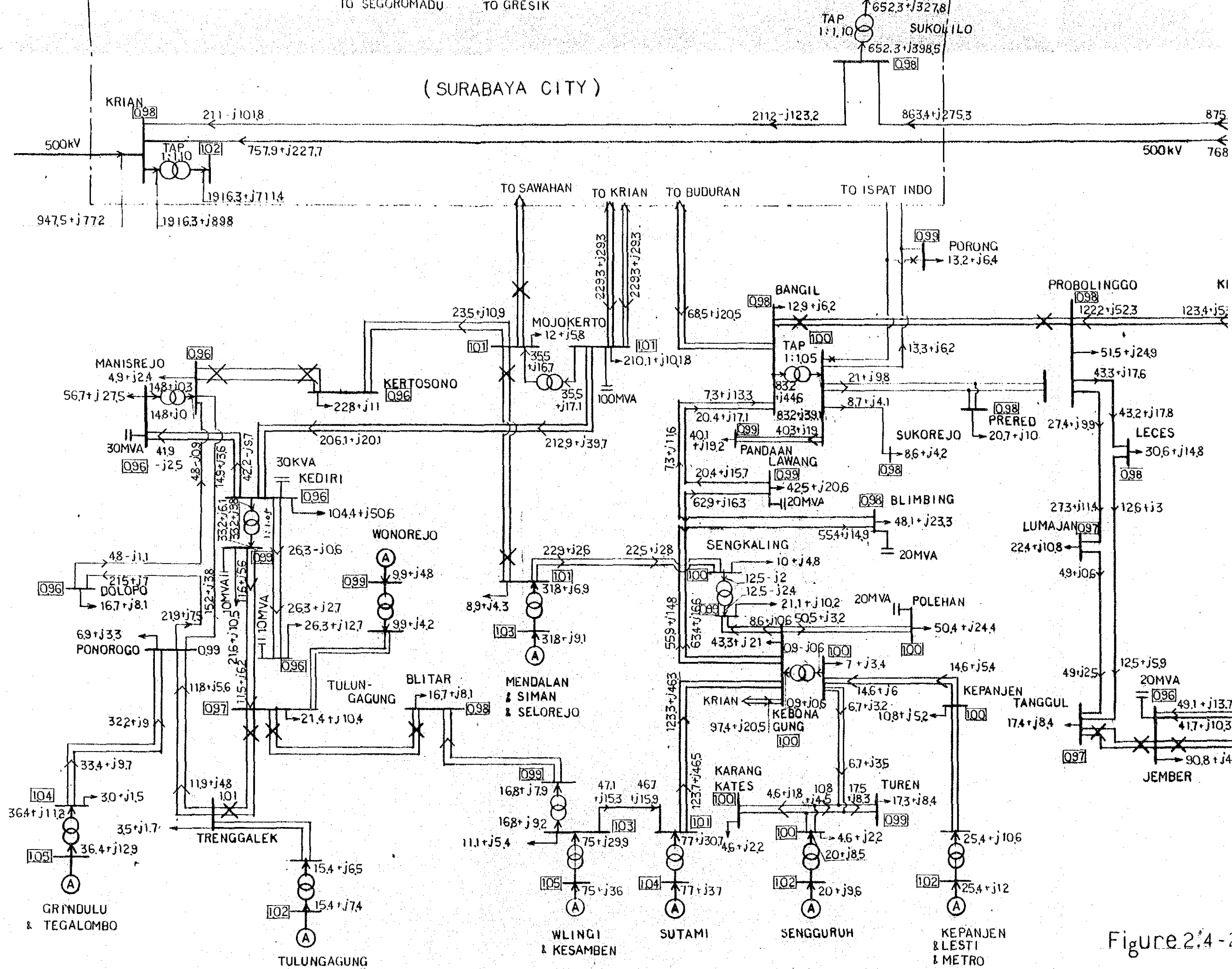


Figure 2.4-2

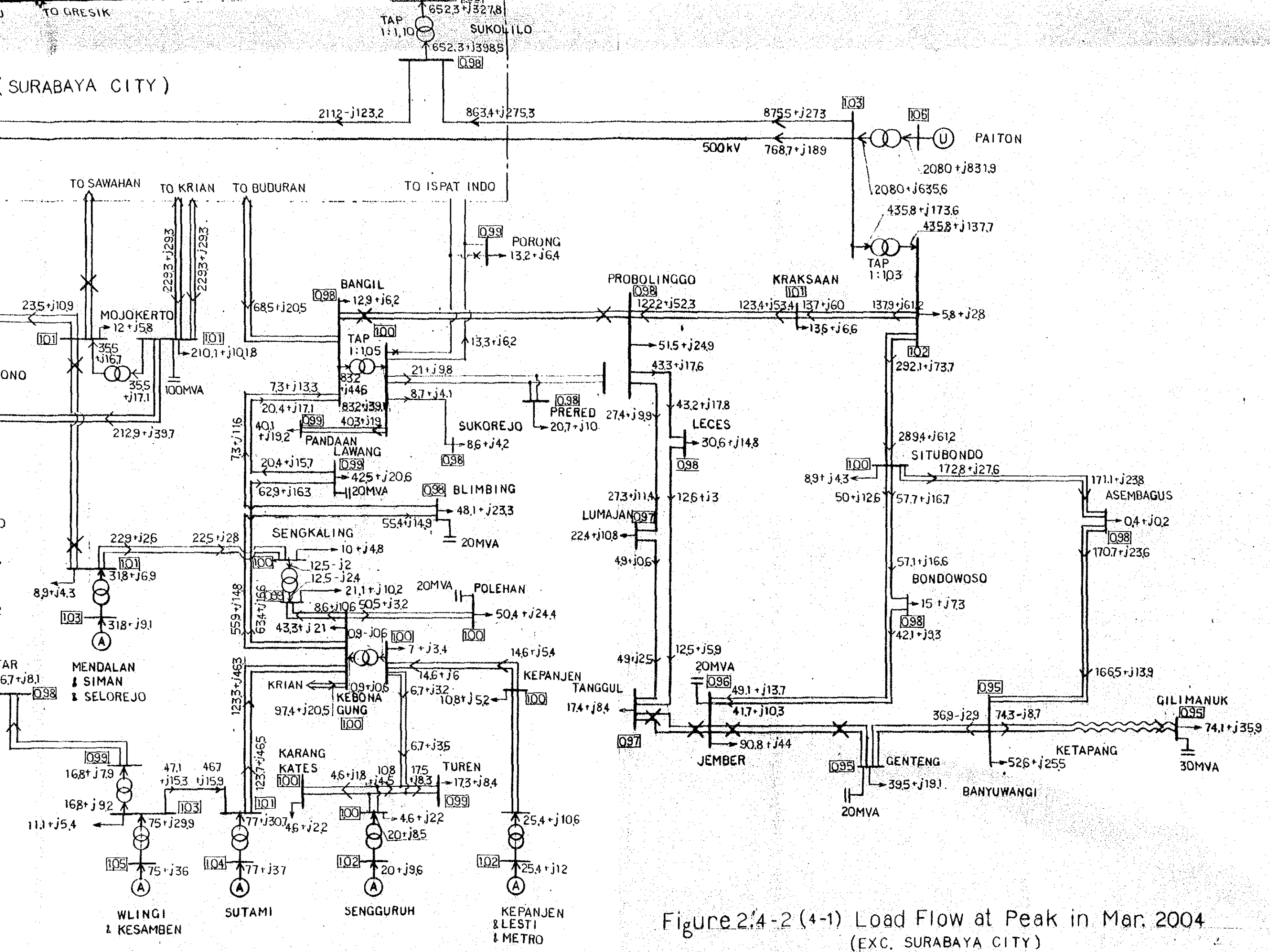


Figure 2.4-2 (4-1) Load Flow at Peak in Mar. 2004
(EXC. SURABAYA CITY)

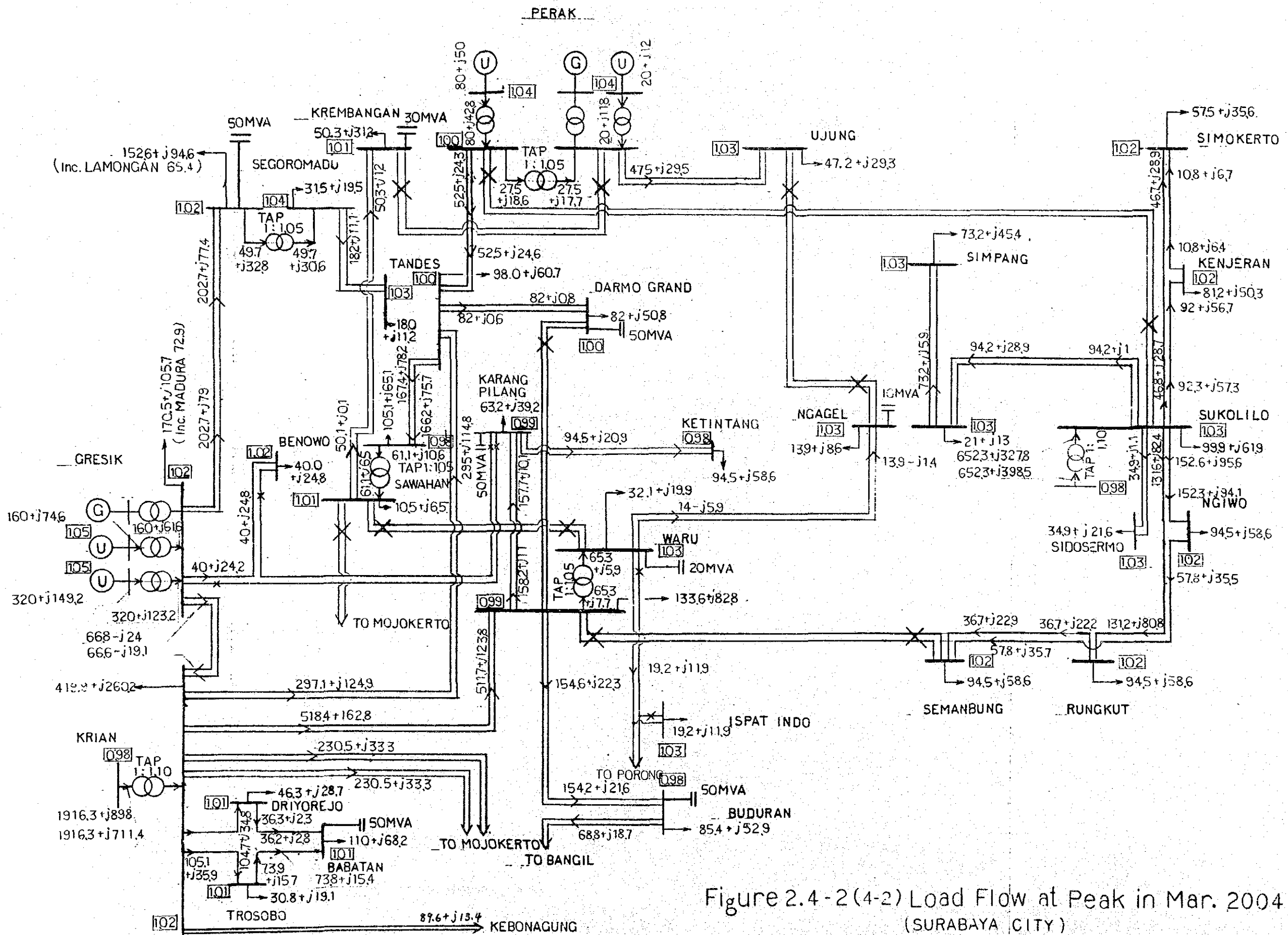


Figure 2.4-2(4-2) Load Flow at Peak in Mar. 2004 (SURABAYA CITY)