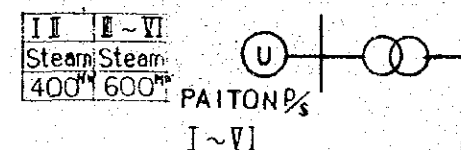
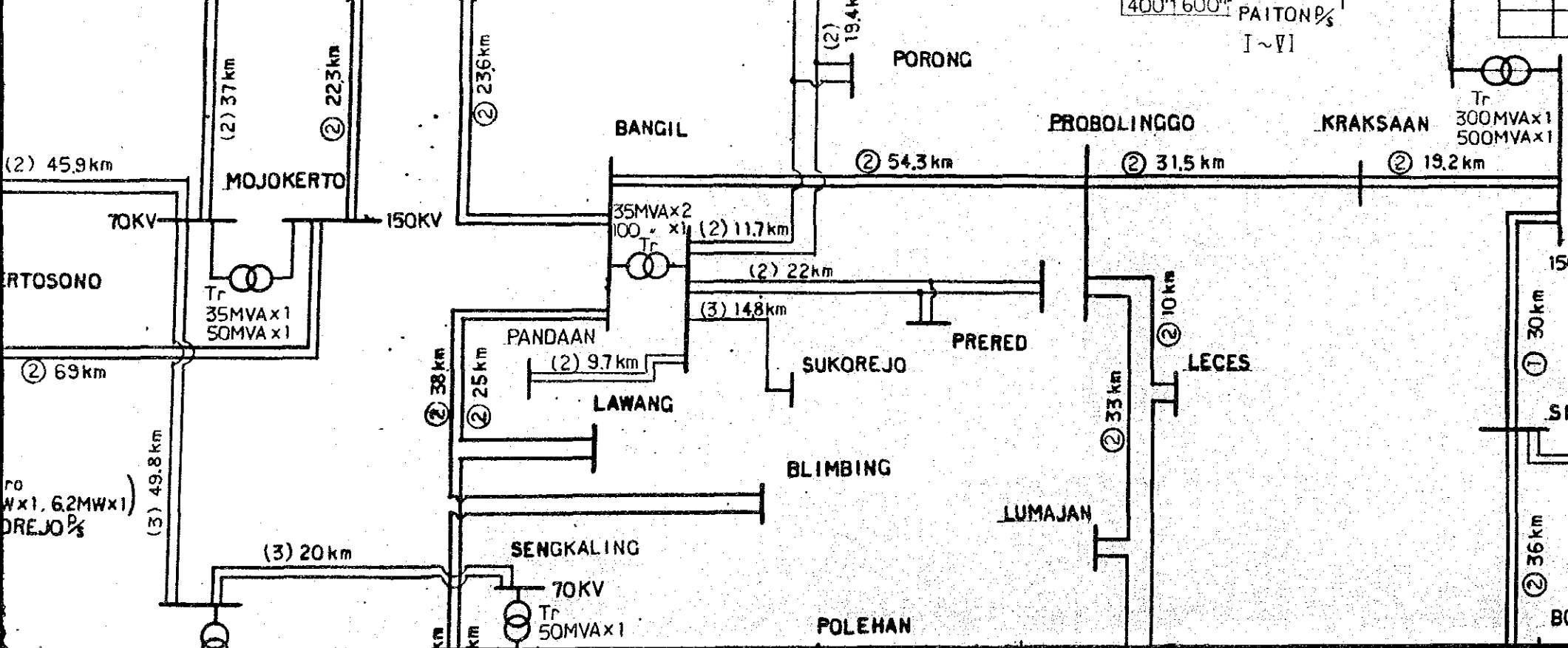
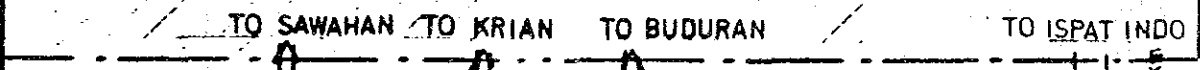
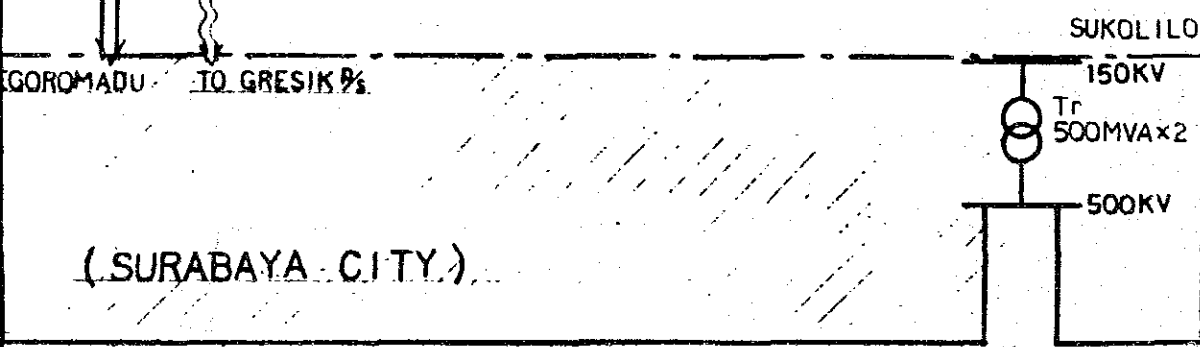


MENDARAN	SIMAN	SEROREJO
Hydro	Hydro	Hydro
5.6MW x 1	3.6MW x 3	4.8MW x 1
5.8MW x 1		

I I I ~ VI
 Steam Steam
 400^{psi} 600^{psi}
 PAITON
 I ~ VI



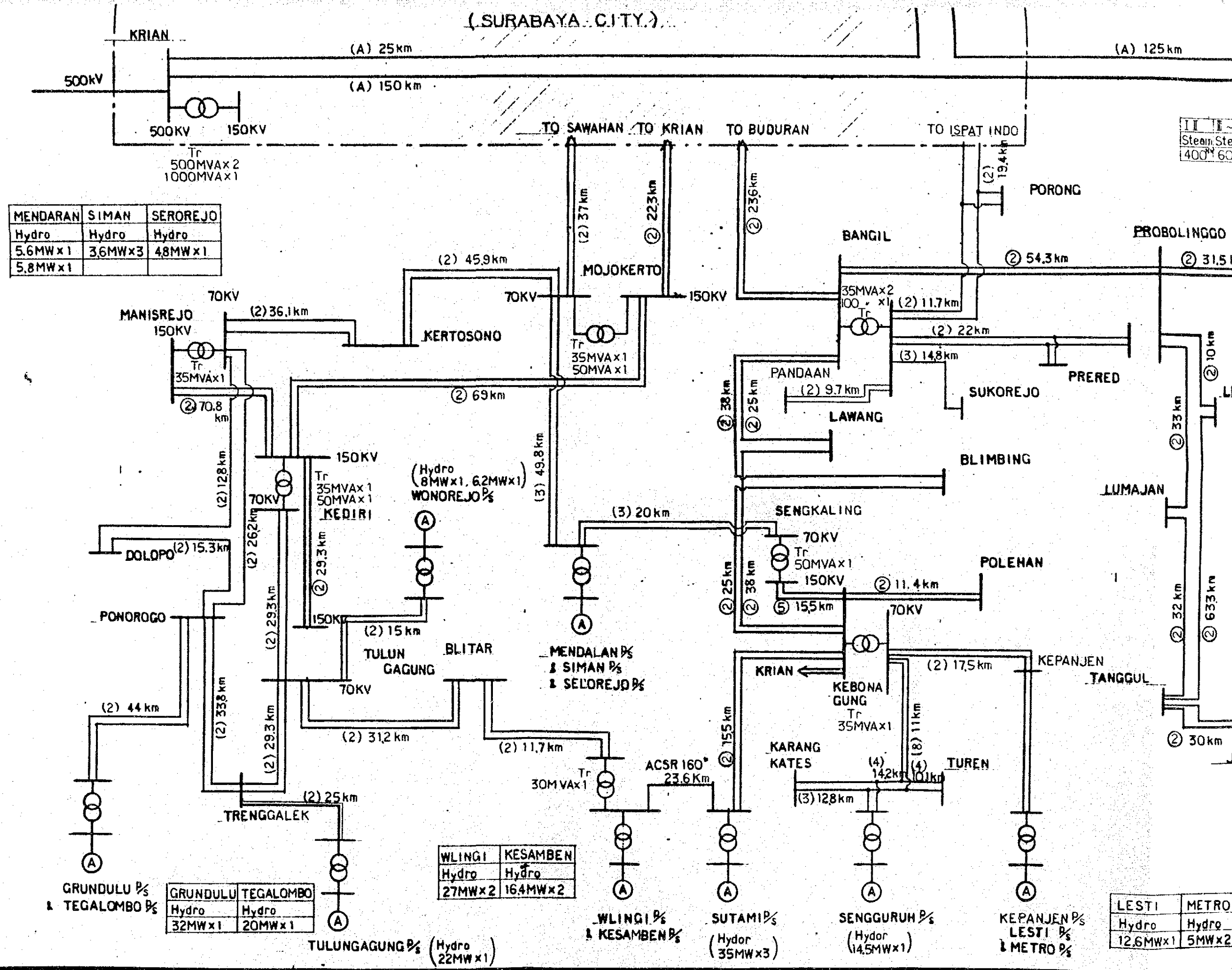
No.	CONDUCTOR	VOLTAGE
①	ACSR 330° TWIN	150KV
②	" 330°	"
③	" 240°	"
④	" DUCK (307°)	"
⑤	CABLE 2000°	"
⑥	" 300°	"
⑦	OF 240(4km) 330° (1.1km)	"
(1)	PIPER (152°)	70 KV
(2)	OSTRICH (152°)	"
(3)	PIGEON (85°)	"
(4)	Cu - 50	"
(5)	UGCL CVT325	"
(6)	OSTRICH UG325	" (4 + 1.5 ^m)
(7)	" Cu 50	" (4.3 + 7.1 ^m)
(8)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

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

Tr 6.2MW x 1
DREJO 1/2

78.2 km

(SURABAYA CITY)



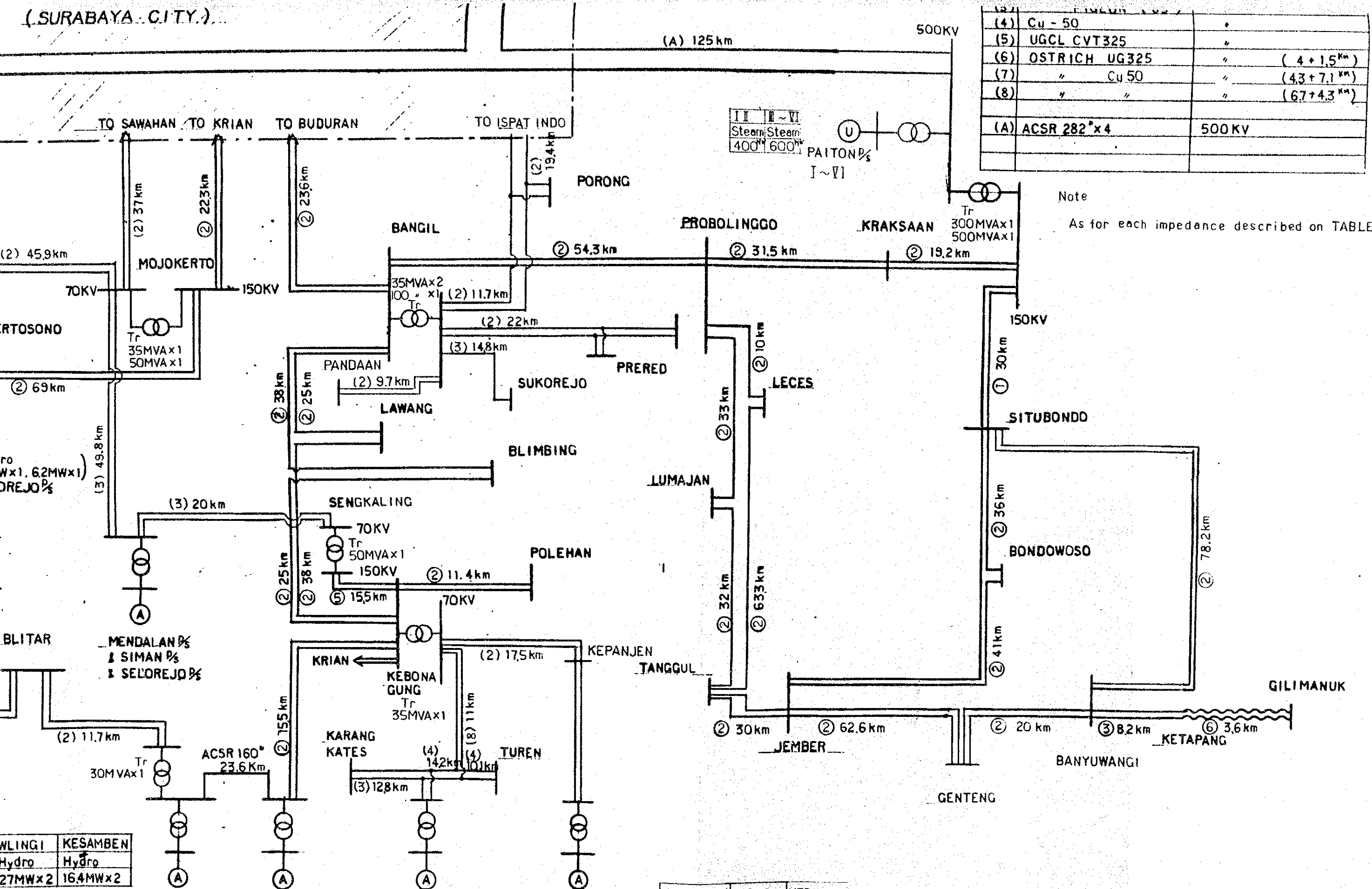
MENDARAN	SIMAN	SEROREJO
Hydro	Hydro	Hydro
5.6MW x 1	3.6MW x 3	4.8MW x 1
5.8MW x 1		

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

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

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

(SURABAYA CITY)



(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 ² x 4	500KV

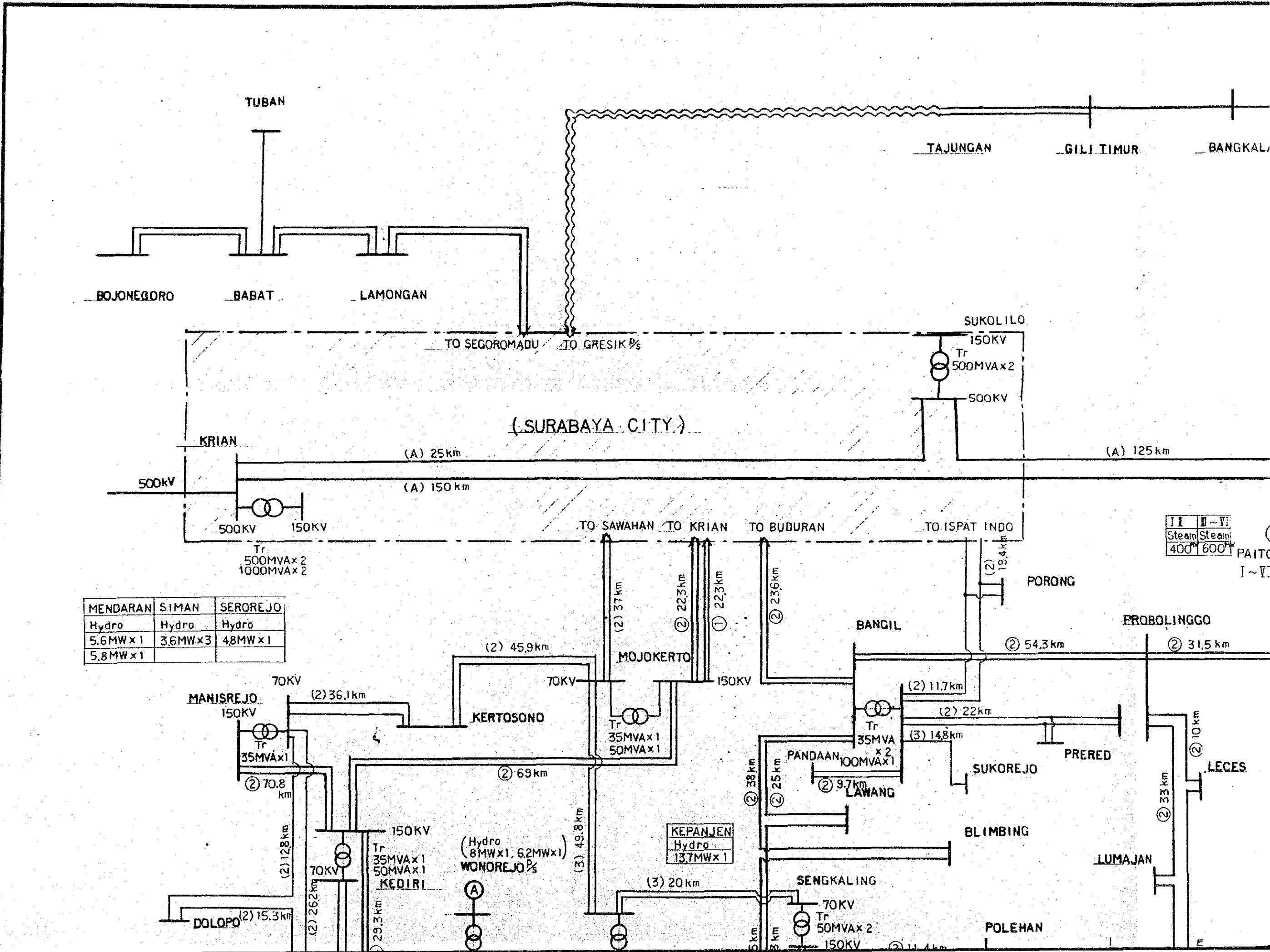
Note
As for each impedance described on TABLE 2.4-2~3

WLINGI	KESAMBEN
Hydro	Hydro
27MWx2	16.4MWx2

WLINGI² & KESAMBEN²
SUTAMI³ (Hydro 35MWx3)
SENGGURUH¹ (Hydro 14.5MWx1)
KEPANJEN² LESTI¹ & METRO²

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

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



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

I I ~ V
 Steam Steam
 400 600 PAITO
 I ~ V

(SURABAYA CITY)

(A) 25 km

(A) 150 km

(A) 125 km

(2) 45.9 km

(2) 37 km

(2) 22.3 km

(1) 22.3 km

(2) 23.6 km

(2) 54.3 km

(2) 31.5 km

(2) 36.1 km

(2) 69 km

(3) 49.8 km

(2) 11.7 km

(2) 22 km

(3) 14.8 km

(2) 70.8 km

(2) 12.8 km

(2) 15.3 km

(2) 29.3 km

(2) 38 km

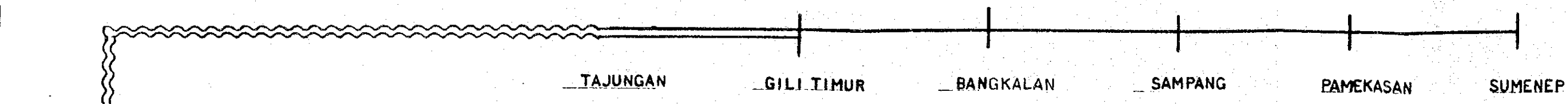
(2) 25 km

(2) 9.7 km

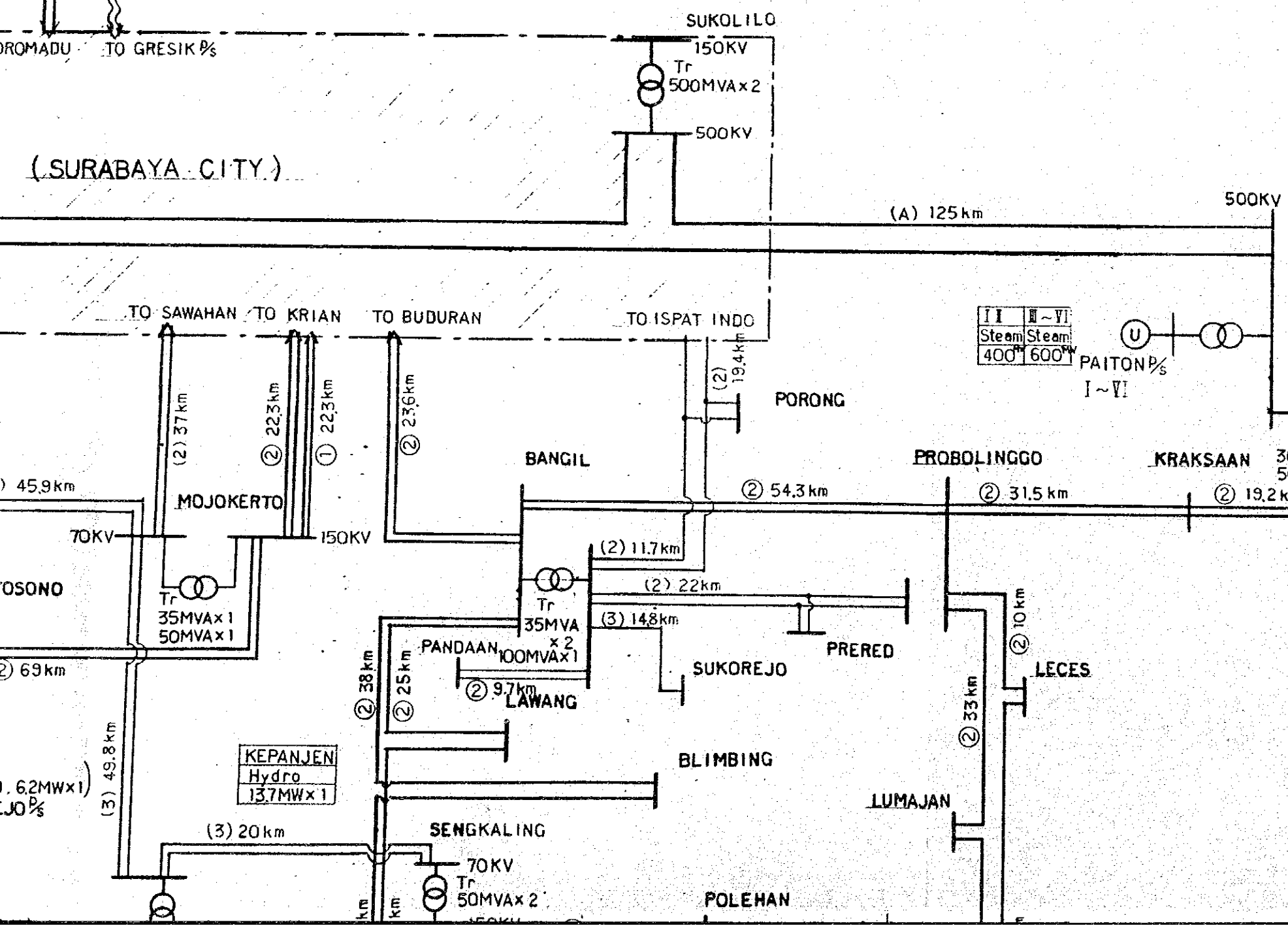
(2) 33 km

(2) 10 km

(2) 11.4 km

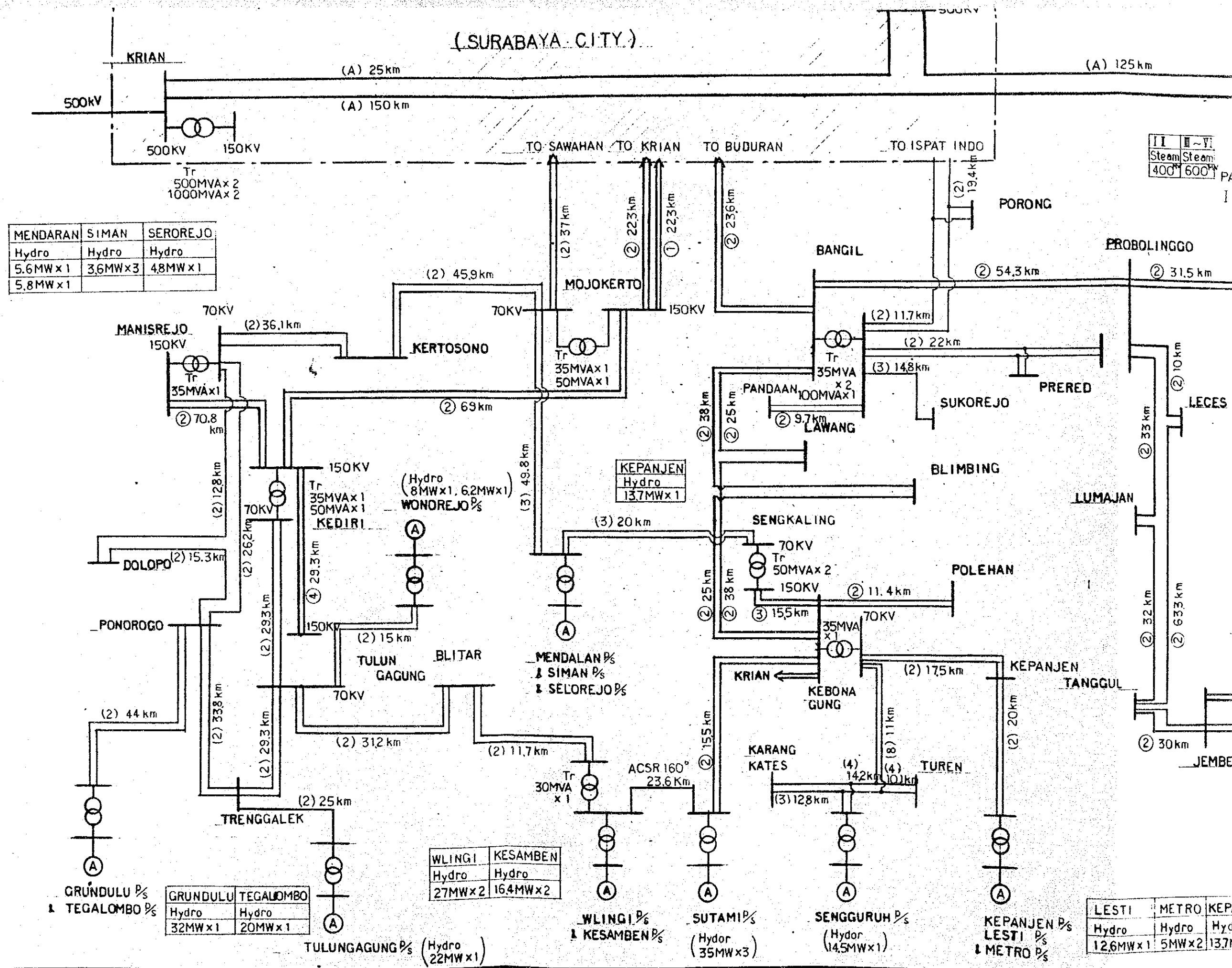


No.	CONDUCTOR	VOLTAGE
①	ACSR 330 ^o TWIN	150KV
②	" 330 ^o	"
③	" 240 ^o	"
④	" DUCK (307 ^o)	"
⑤	CABLE 2000 ^o	"
⑥	" 300 ^o	"
⑦	OF 240(4km) 330 ^o (1.1km)	"
(1)	PIPER (152 ^o)	70 KV
(2)	OSTRICH (152 ^o)	"
(3)	PIGEON (85 ^o)	"
(4)	Cu - 50	"
(5)	UGCL CVT325	"
(6)	OSTRICH UG325	" (4 + 1.5 ^{km})
(7)	" Cu 50	" (43 + 7.1 ^{km})
(8)	" "	" (67 + 4.3 ^{km})
(A)	ACSR 282 ^o x 4	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		

WONOREJO
Hydro
8MW x 1, 6.2MW x 1

KEPANJEN
Hydro
13.7MW x 1

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

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

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

(SURABAYA CITY)

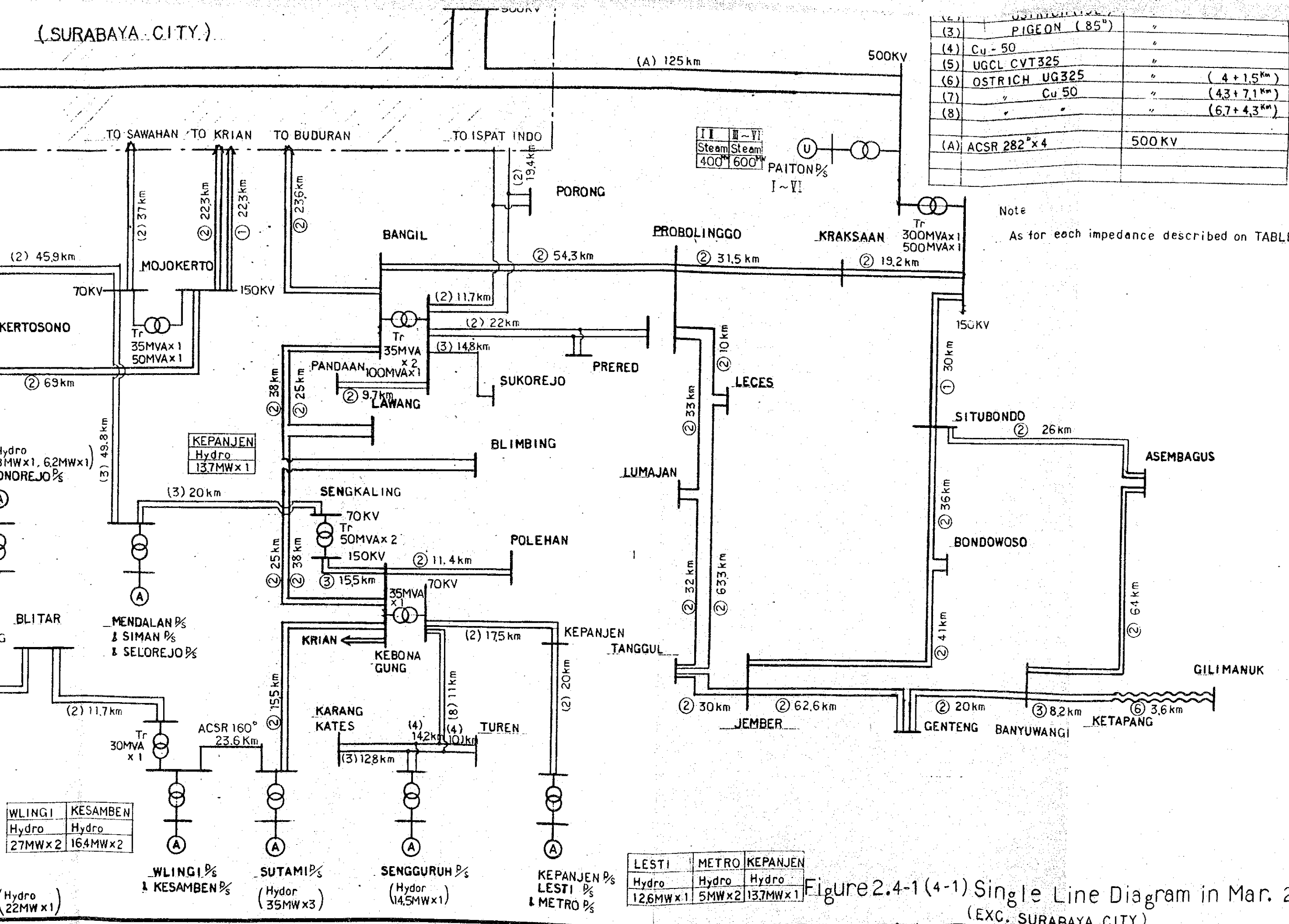
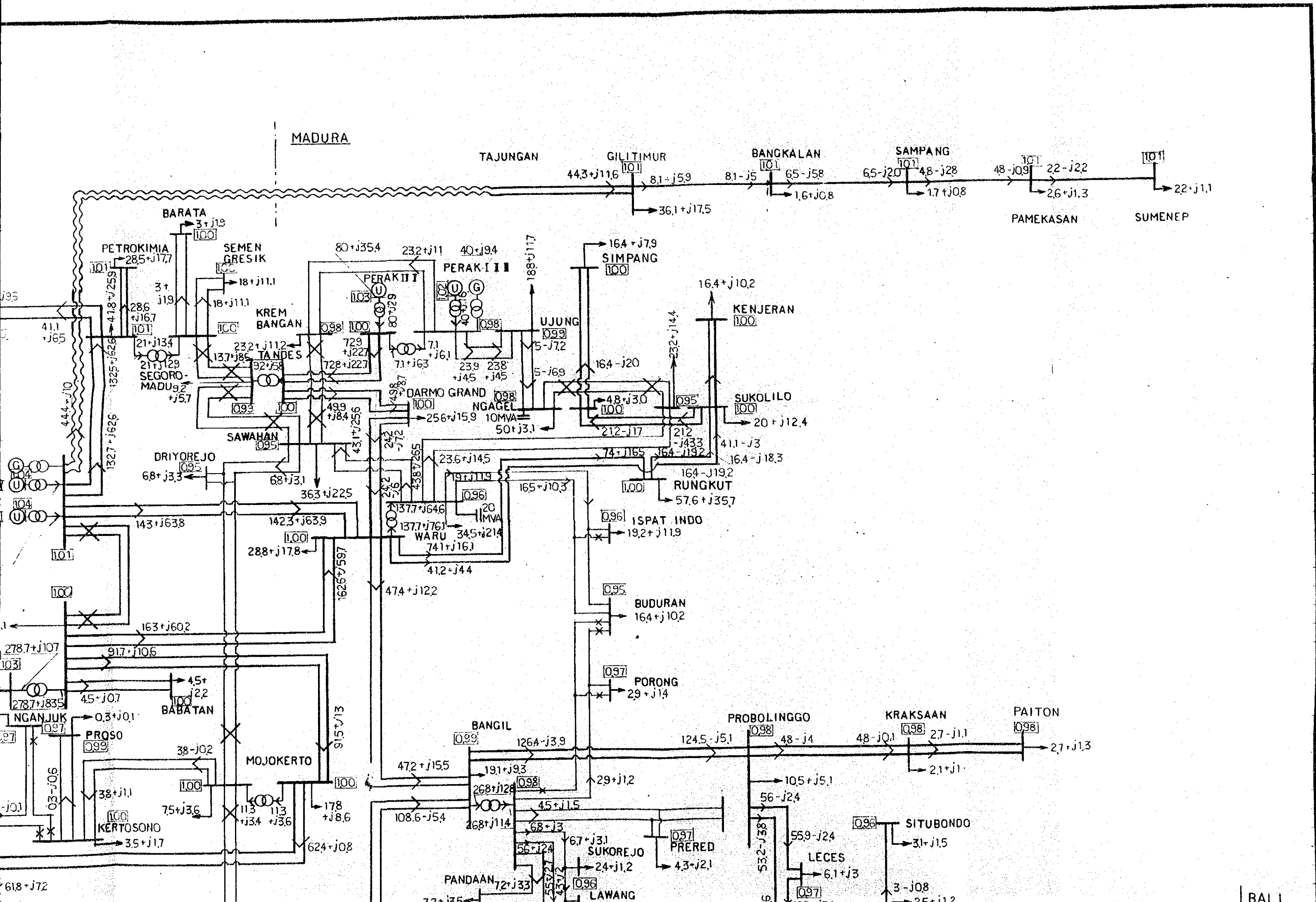


Figure 2.4-1 (4-1) Single Line Diagram in Mar. 2004 (EXC. SURABAYA CITY)



MADURA

TAJUNGAN

GILITIMUR

BANGKALAN

SAMPANG

PAMEKASAN

SUMENEP

BARATA

PETROKIMIA

SEMEN GRESIK

PERAK I

PERAK II

SIMPANG

KENJERAN

SUKOLILO

KREM BANGAN

TA NDES

DARMO GRAND

NGAGEL

DRIYOREJO

SAWAHAN

WARU

RUNGKUT

ISPAT INDO

BUDURAN

PORONG

MOJOKERTO

BANGIL

PROBOLINGGO

KRAKSAAN

PAITON

PROSO

BABATAN

KERTOSONO

PANDAAN

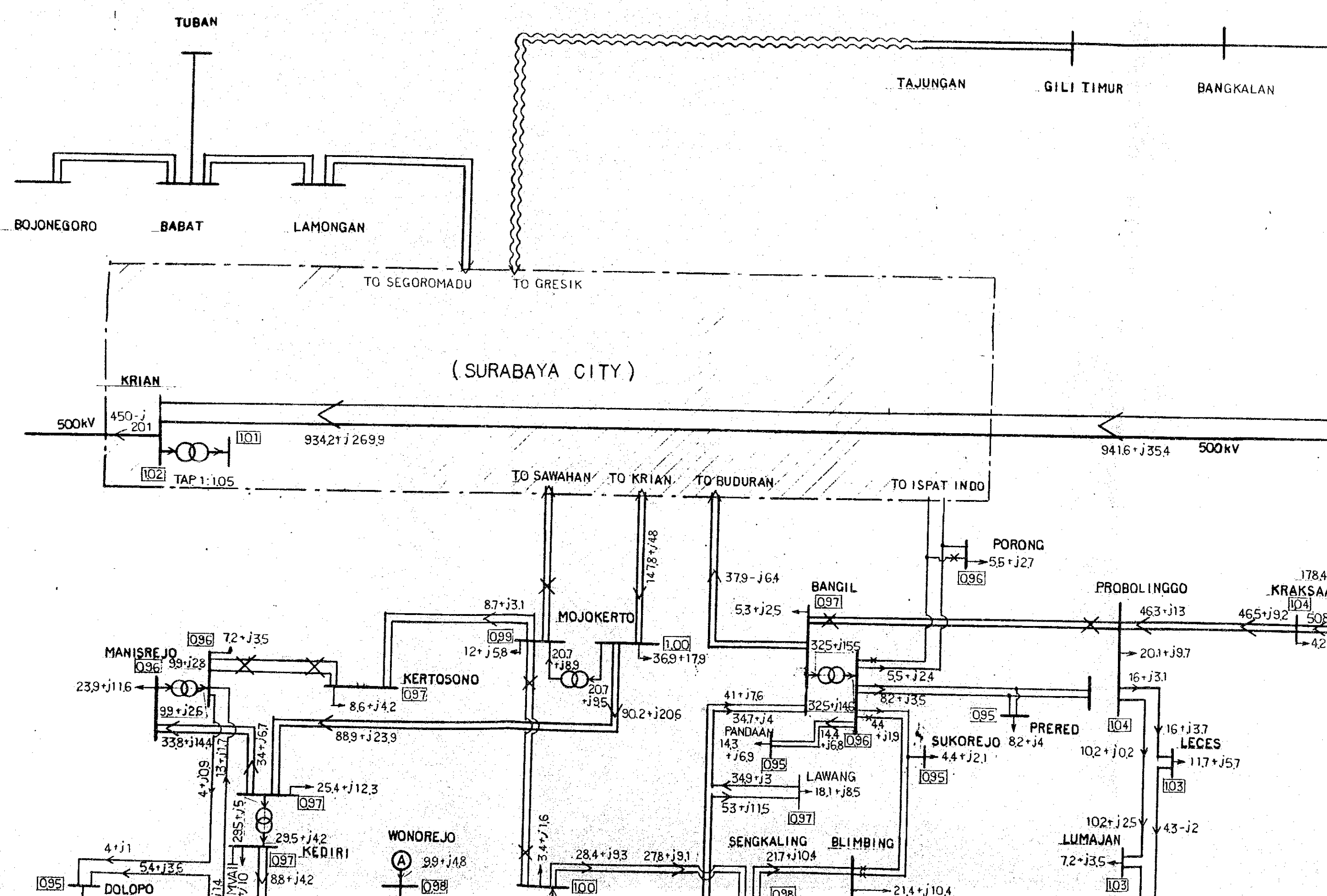
SUKOREJO

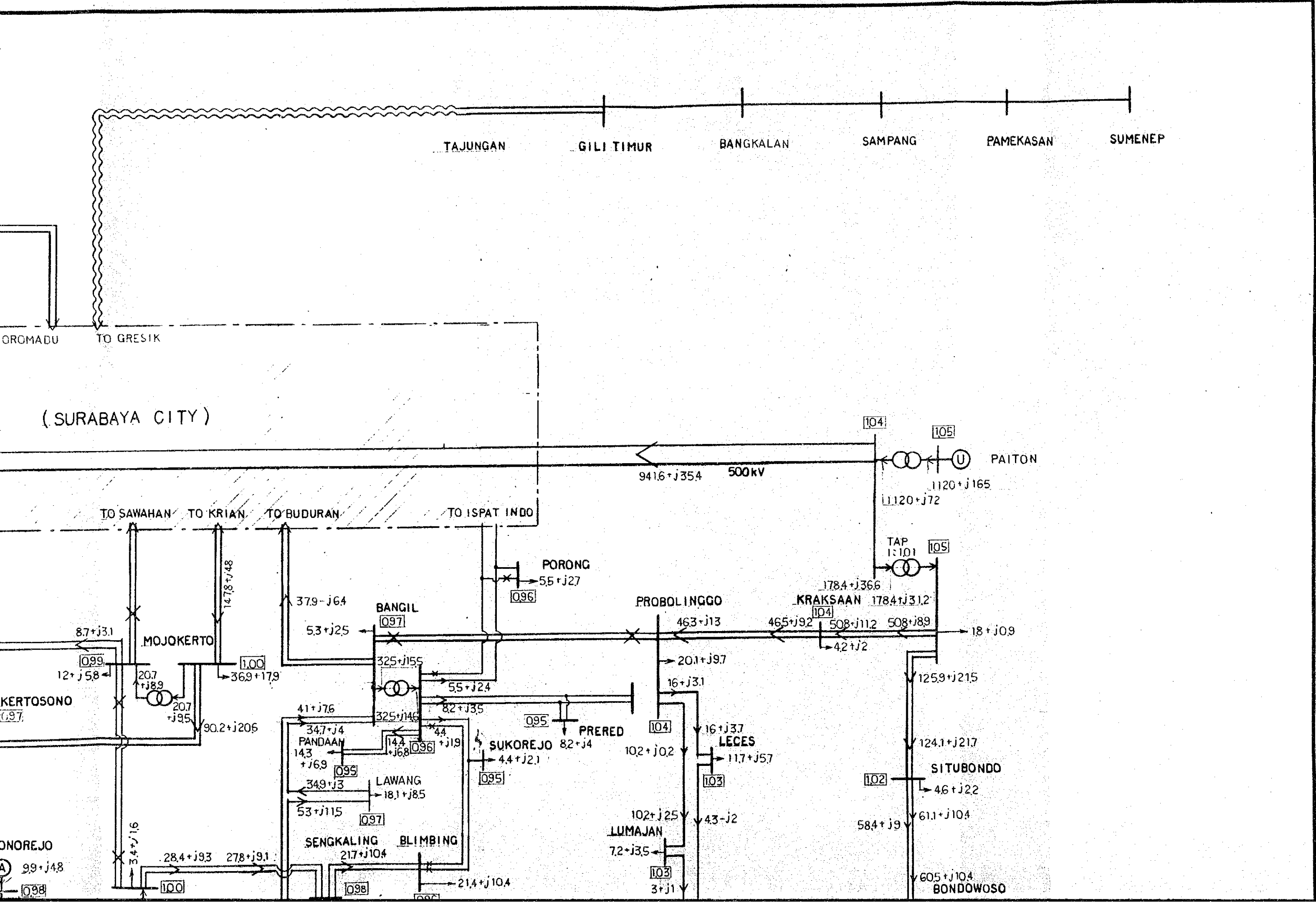
LAWANG

SITUBONDO

LECES

BALI





(SURABAYA CITY)

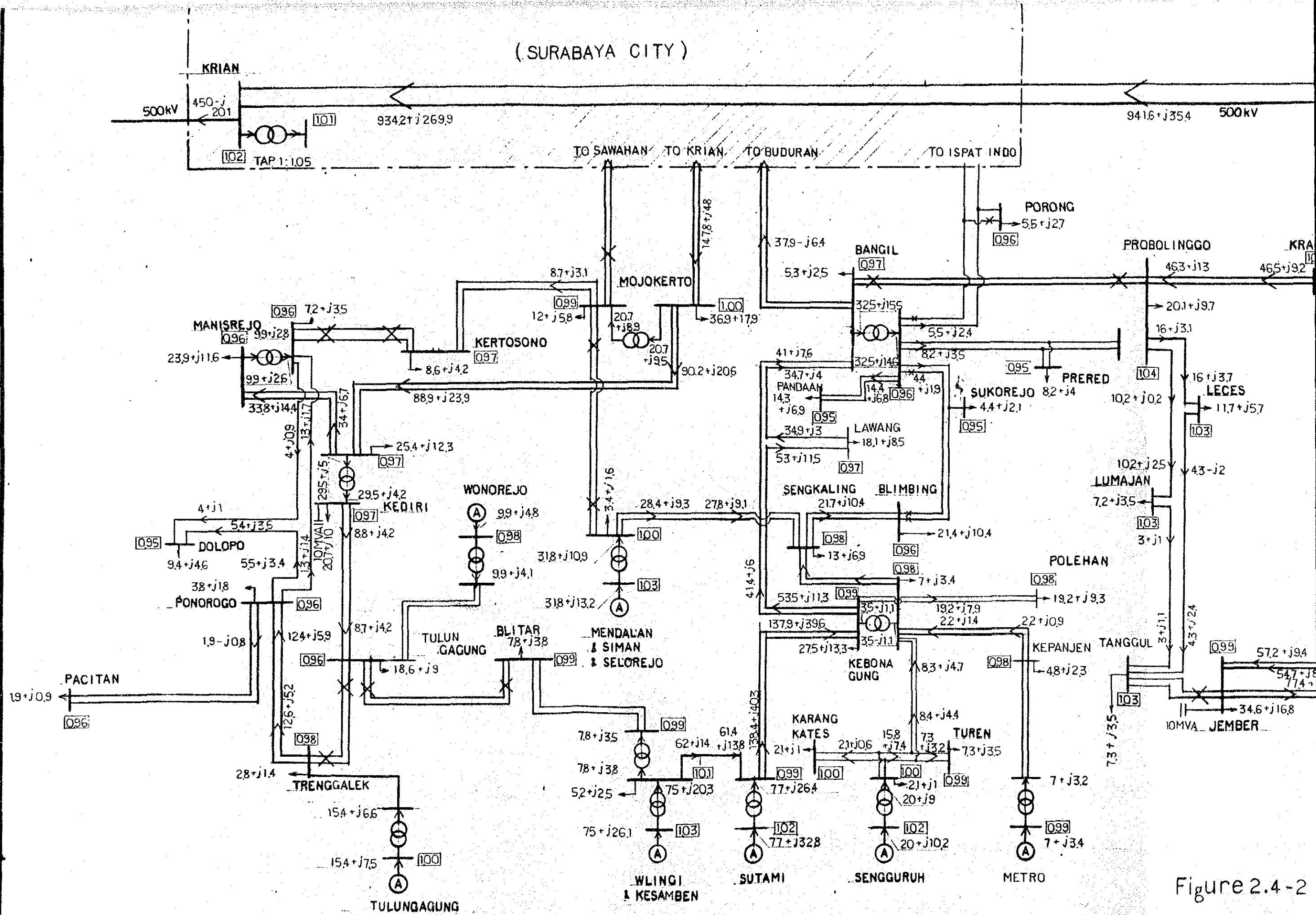


Figure 2.4-2

ABAYA CITY)

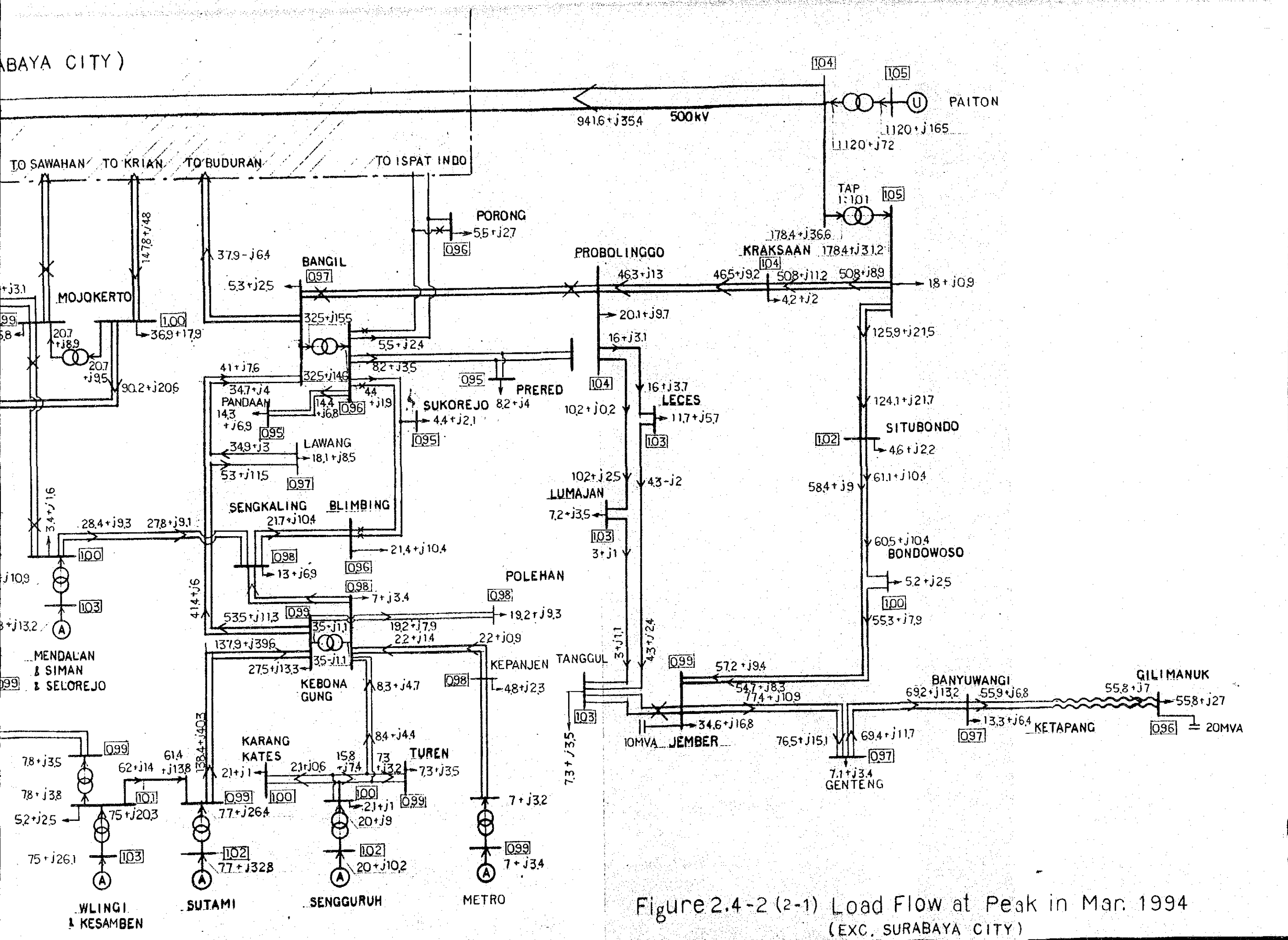


Figure 2.4-2 (2-1) Load Flow at Peak in Mar. 1994
(EXC. SURABAYA CITY)

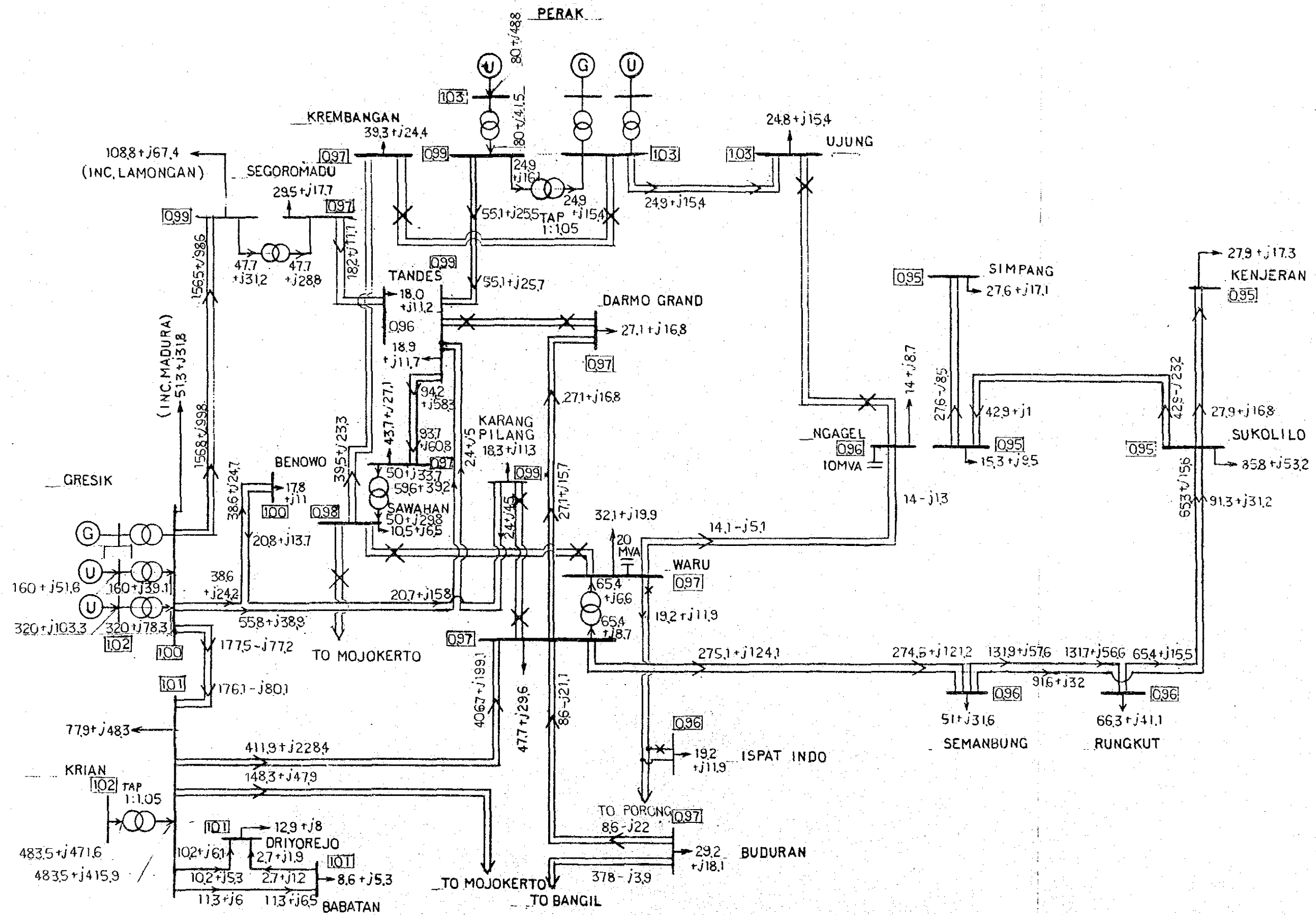
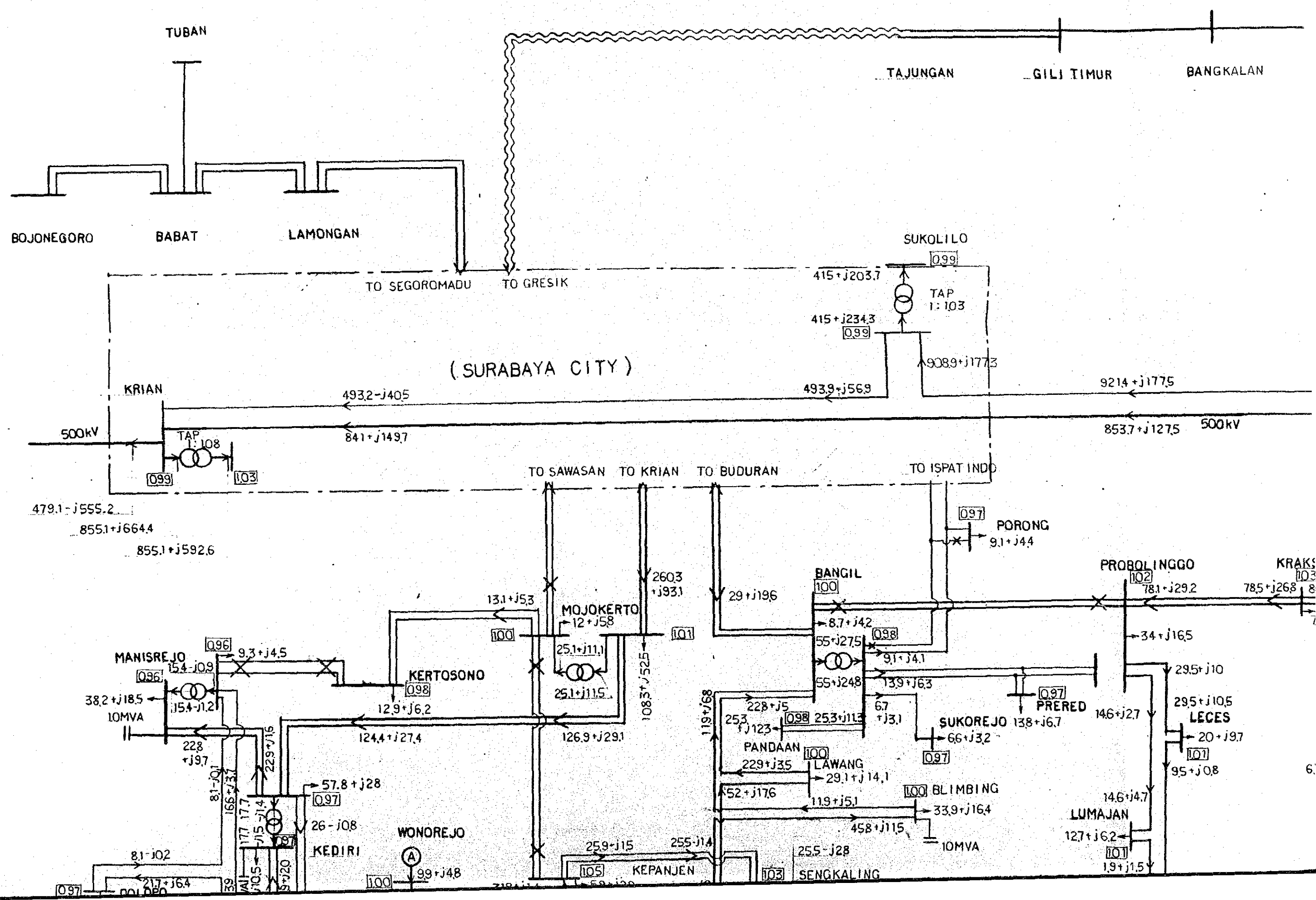
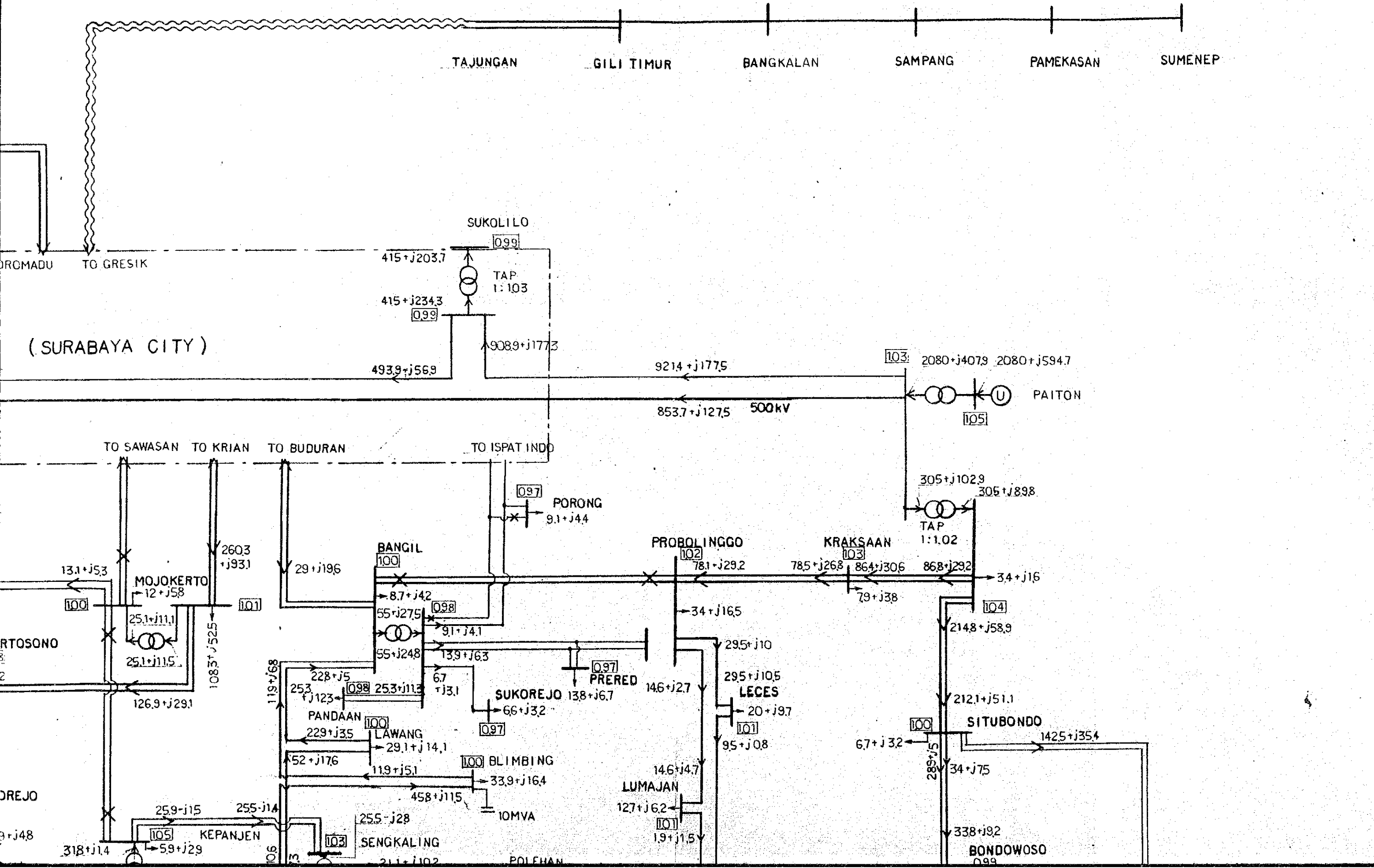


Figure 2.4-2 (2-2) Load Flow at Peak in Mar. 1994
(SURABAYA CITY)





TAJUNGAN

GILI TIMUR

BANGKALAN

SAMPANG

PAMEKASAN

SUMENEP

SUKOLILO

099

415+j203.7

TAP
1:103

415+j234.3

099

908.9+j177.3

493.9+j56.9

921.4+j177.5

103

2080+j407.9 2080+j594.7

853.7+j127.5 500kV

105

PAITON

TO SAWASAN

TO KRIAN

TO BUDURAN

TO ISPAT INDO

097

PORONG

9.1+j4.4

BANGIL

100

29+j19.6

PROBOLINGGO

102

78.1+j29.2

KRAKSAAN

103

78.5+j26.8

86.4+j30.6

86.8+j29.2

3.4+j1.6

305+j102.9

305+j89.8

TAP
1:1.02

13.1+j5.3

100

MOJOKERTO

12+j5.8

101

25.1+j11.1

25.1+j11.5

126.9+j29.1

108.5+j52.5

260.3+j93.1

29+j19.6

8.7+j4.2

55+j27.5

55+j24.8

25.3+j12.3

22.8+j5

22.9+j3.5

52+j17.6

11.9+j5.1

25.5-j2.8

119+j6.8

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

11.9+j5.1

45.8+j11.5

25.5-j2.8

11.9+j5.1

25.3+j11.3

22.9+j3.5

29.1+j14.1

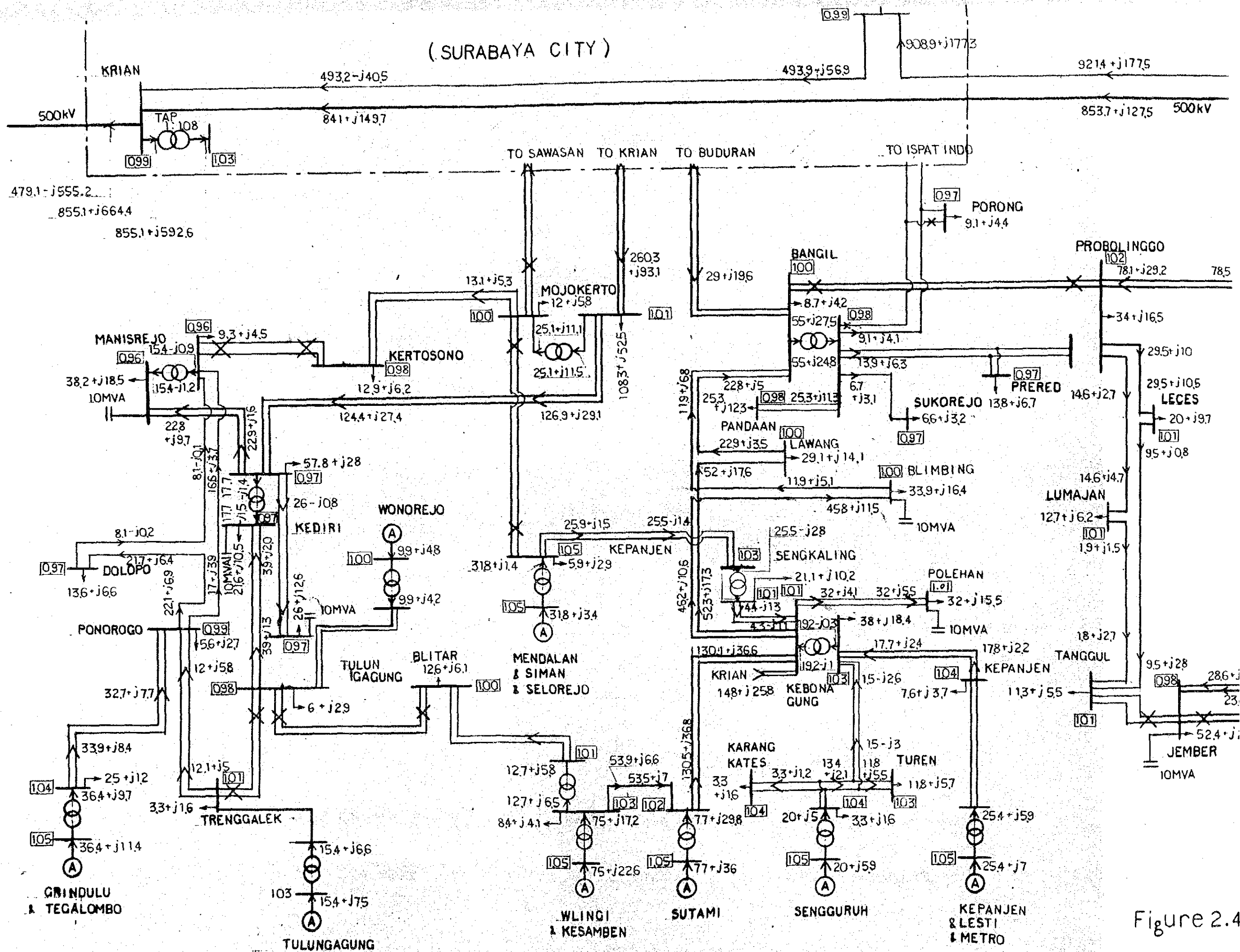


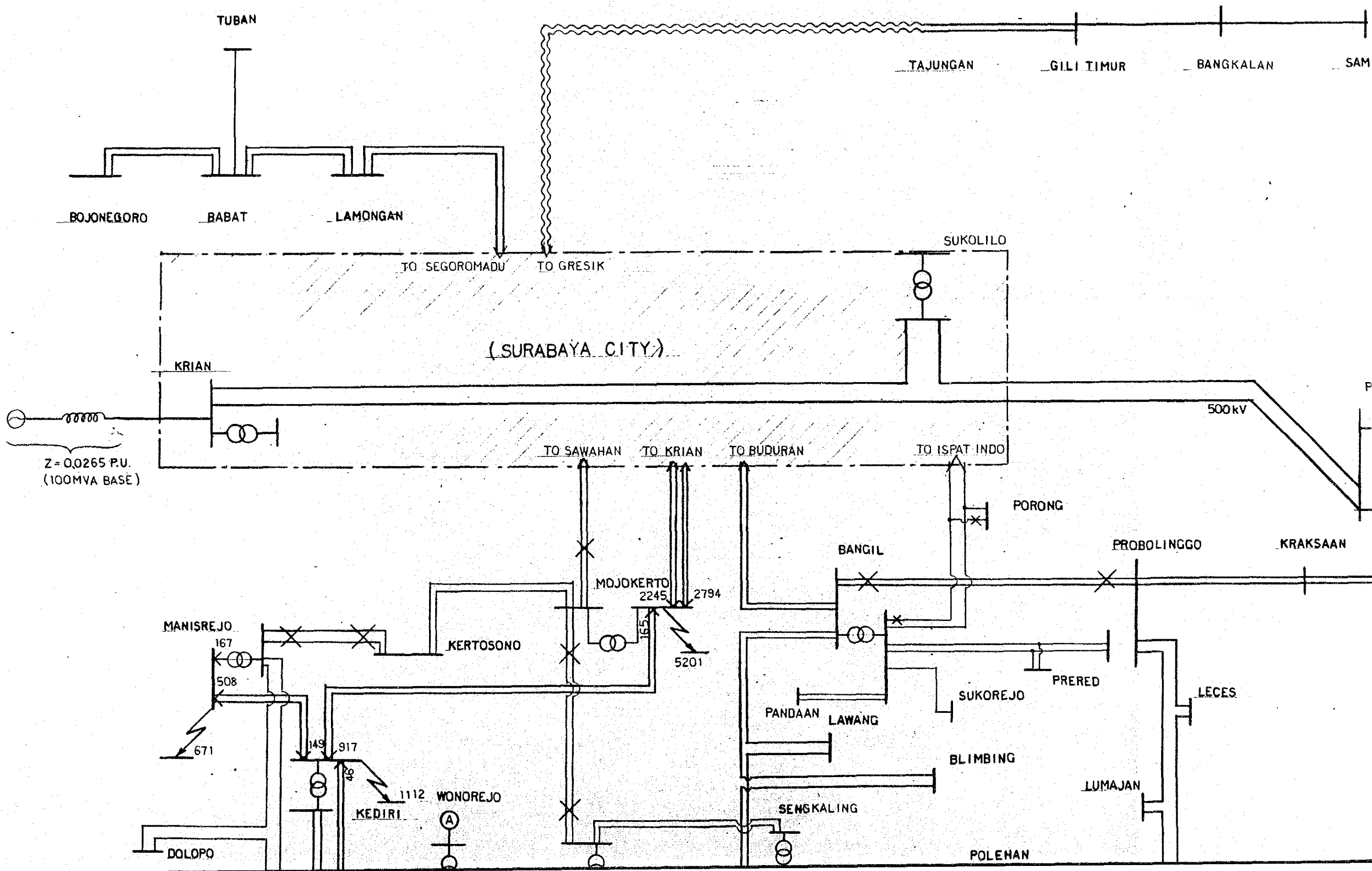
Figure 2.4

TABLE 2.4-5

Stationing of Capacitors

Unit(MVA)

SUBSTATION	Exsisting	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



TUBAN

TAJUNGAN

GILI TIMUR

BANGKALAN

SAM

BOJONEGORO

BABAT

LAMONGAN

SUKOLILO

TO SEGOROMADU

TO GRESIK

(SURABAYA CITY)

KRIAN

500kV

$Z = 0.0265 \text{ P.U.}$
(100MVA BASE)

TO SAWAHAN

TO KRIAN

TO BUDURAN

TO ISPAT INDO

PORONG

BANGIL

PROBOLINGGO

KRAKSAAN

MOJOKERTO

2245

2794

165

5201

MANISREJO

167

508

KERTOSONO

PANDAAN

LAWANG

BLIMBING

SUKOREJO

PRERED

LECES

LUMAJAN

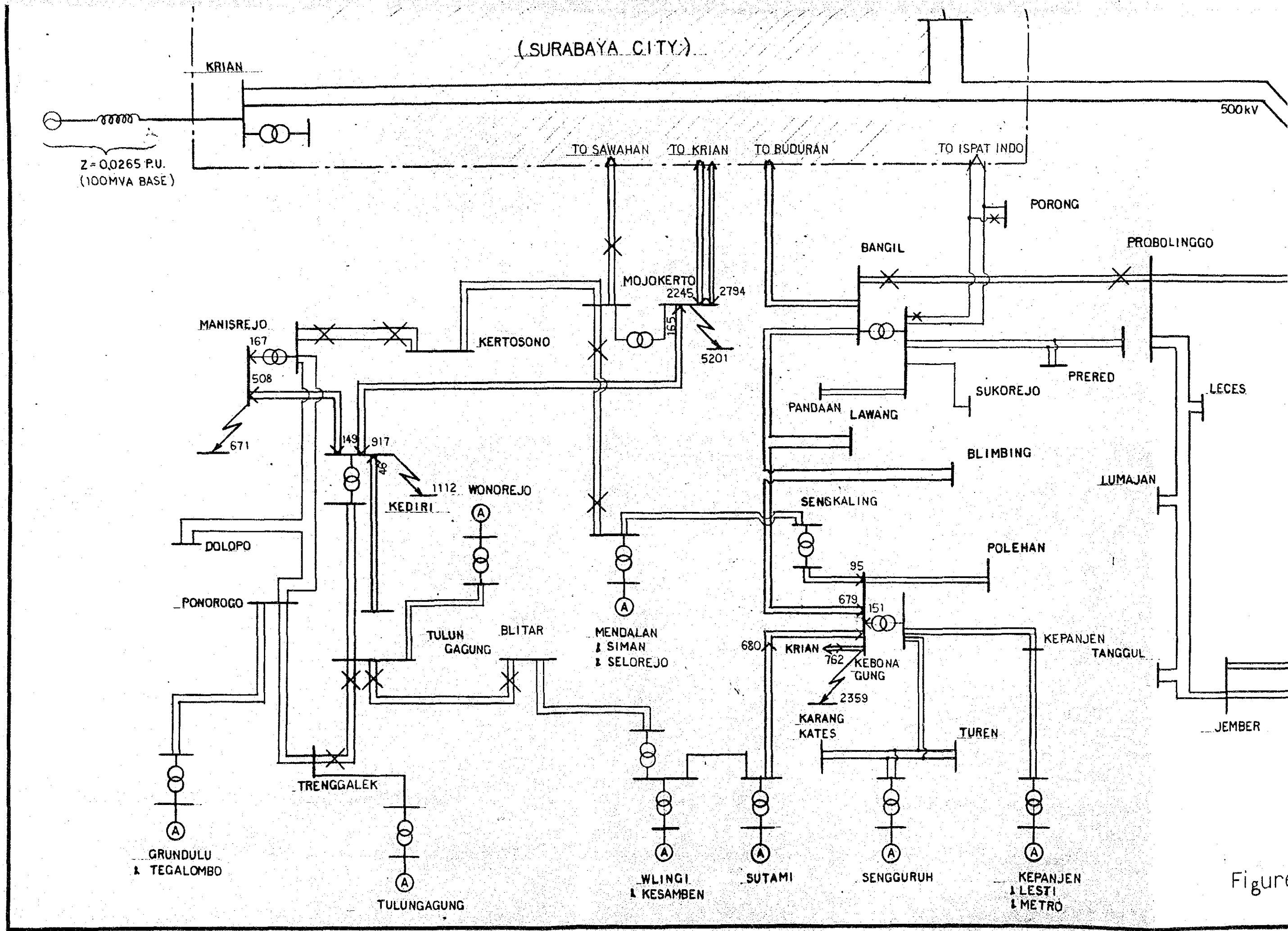
SENSKALING

POLEHAN

DOLOPO

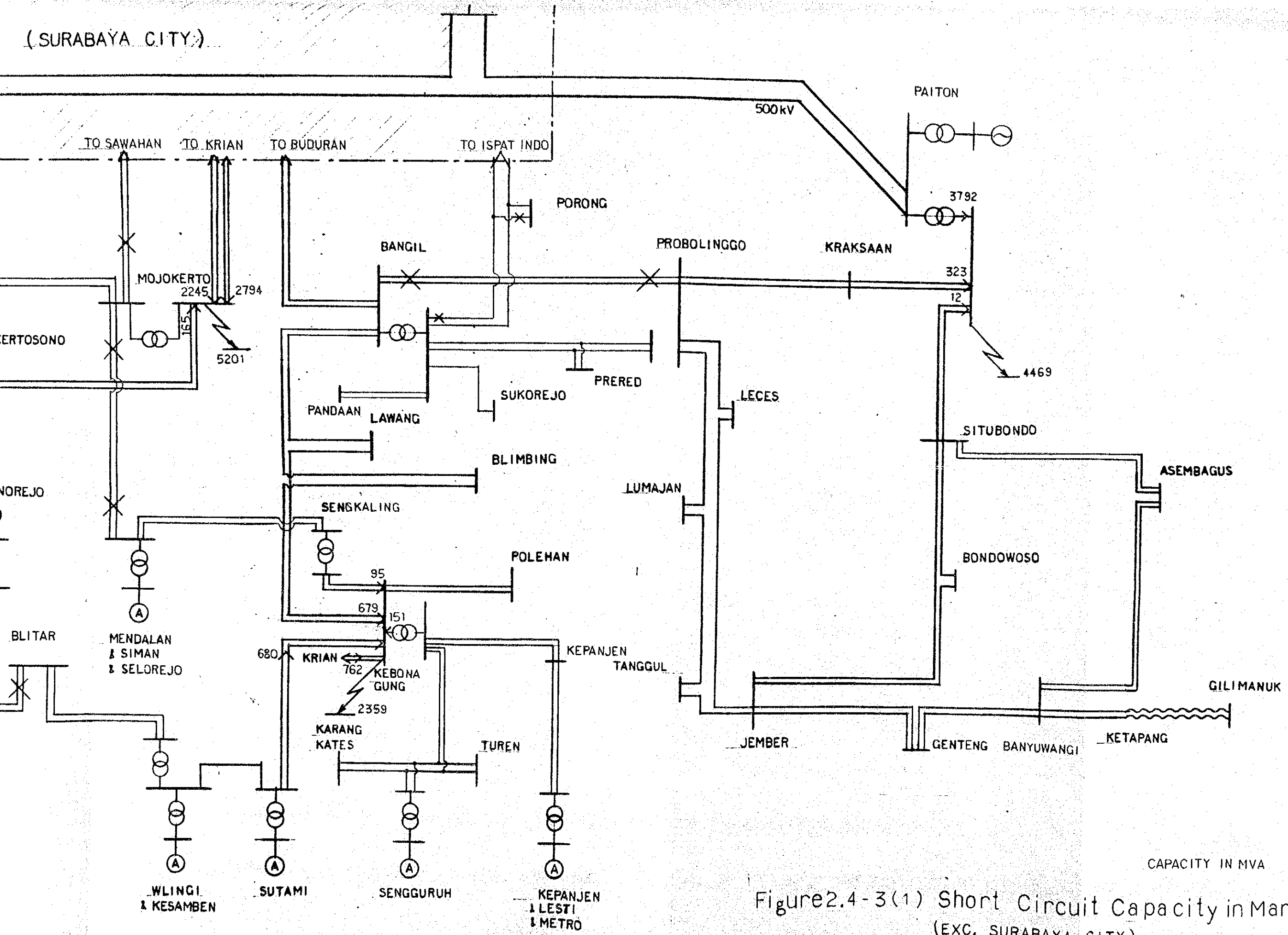
KEDIRI

WONOREJO



Figure

(SURABAYA CITY)



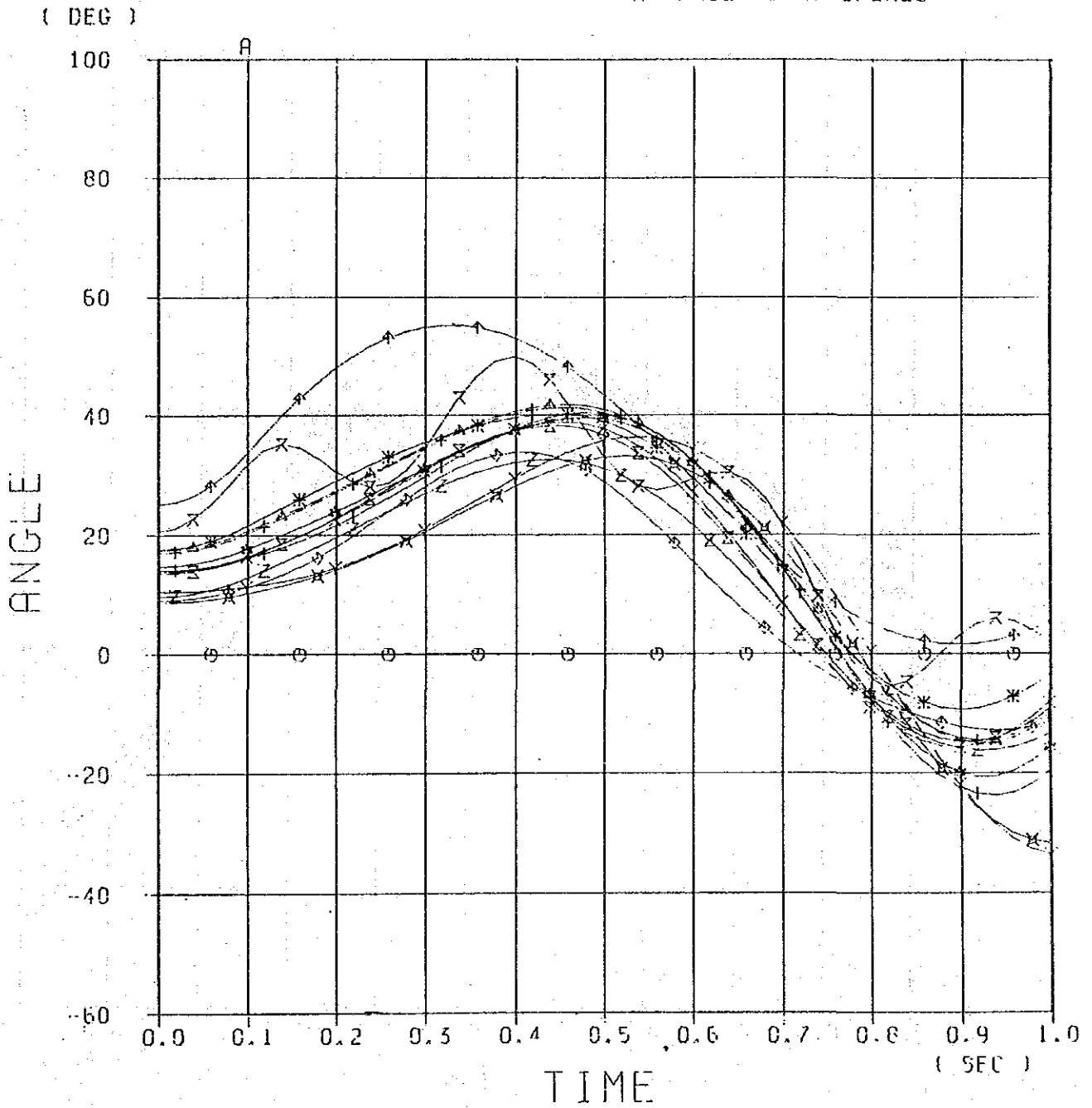
CAPACITY IN MVA

Figure 2.4-3(1) Short Circuit Capacity in Mar. 2004
(EXC. SURABAYA CITY)

FIGURE 2. 4-4(1-1) Transient Stability

FAULT LINE : PAITON
SUKOLILO

A: FAULT LINE OPENED

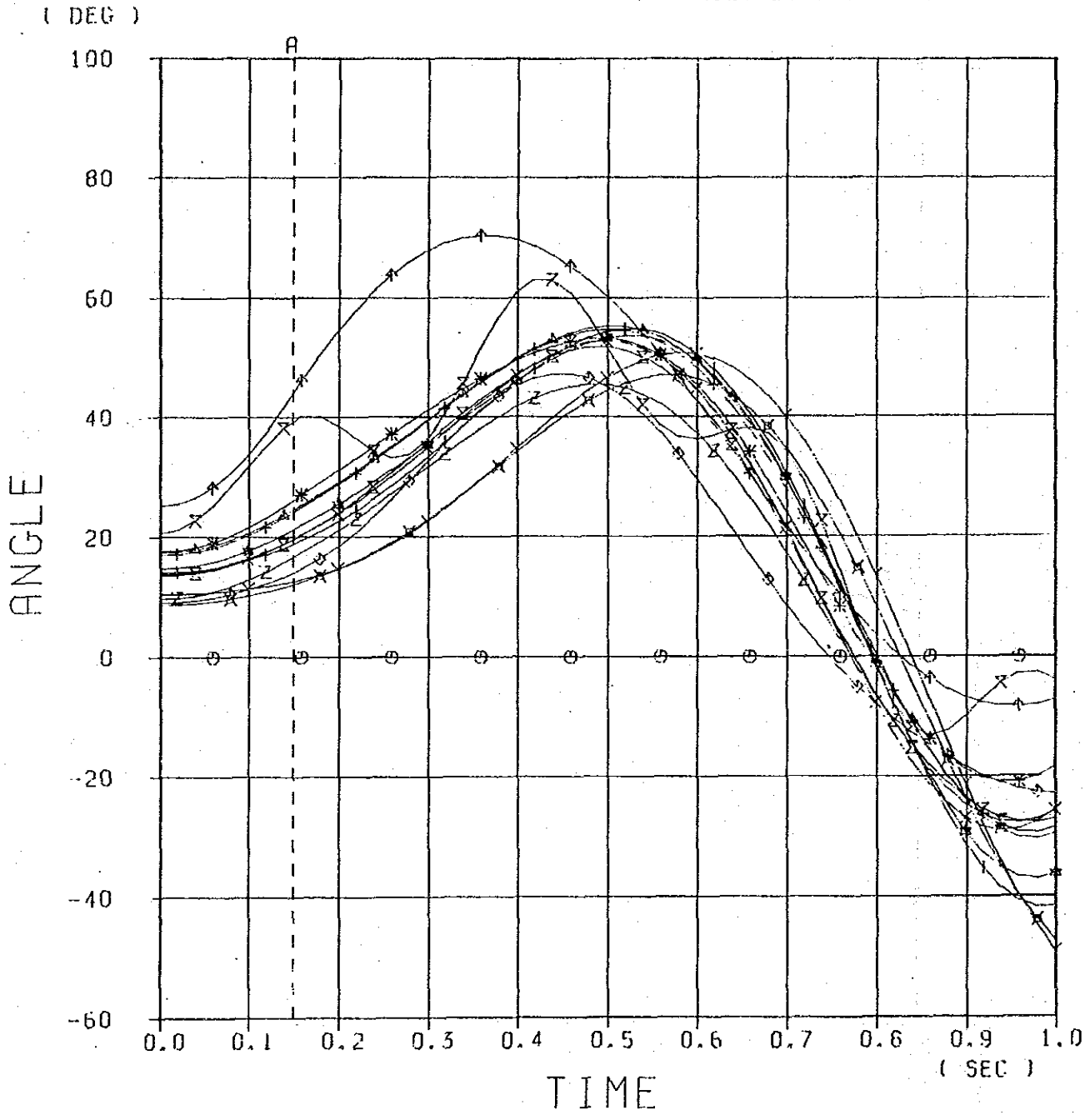


1	○	KRIAN	2	△	GRESIK 2
3	+	GRESIK 3	4	x	PERAK 3
5	◇	PERAK 1	6	†	PAITON
7	x	MENDALAN	8	z	WONOREJO
9	Y	GRINDULU	10	⋈	TULUNGAGUNG
11	*	WLINGI	12	z	SUTAMI
13		SENGCURUH	14	⊙	METRO

FIGURE 2. 4-4(1-2) Transient Stability

FAULT LINE : PAITON
SUKOLILO

A: FAULT LINE OPENED

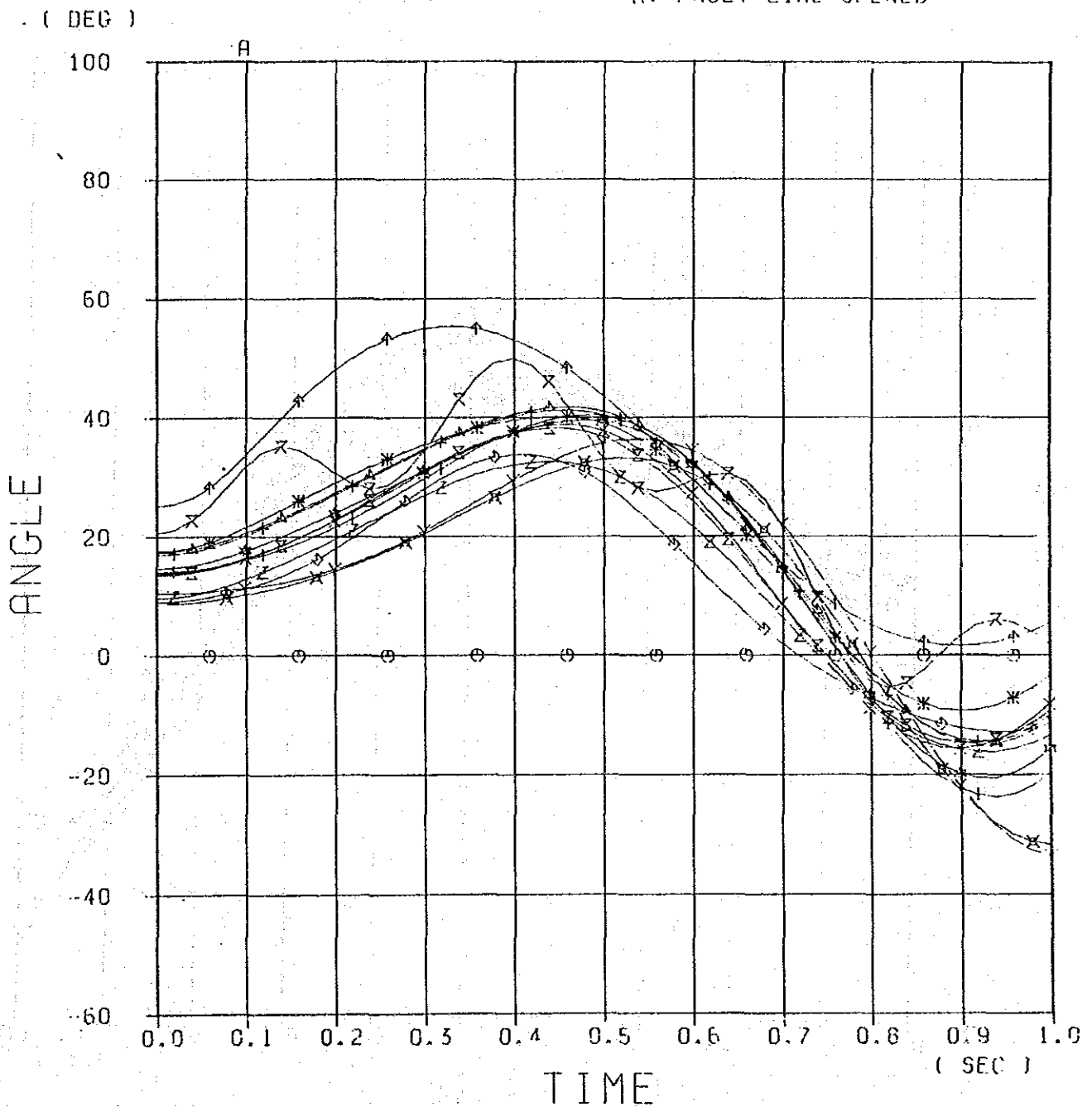


1	○	KRIAN	2	△	GRESIK 2
3	+	GRESIK 3	4	x	PERAK 3
5	◇	PERAK 1	6	†	PAITON
7	x	MENDALAN	8	z	WONOREJO
9	Y	GRINDULU	10	x	TULUNGAGUNG
11	*	WLINGI	12	z	SUTAMI
13	I	SENGGURUH	14	*	METRO

FIGURE 2.4-4(2-1) Transient Stability

FAULT LINE : PAITON
KRIAN

A: FAULT LINE OPENED

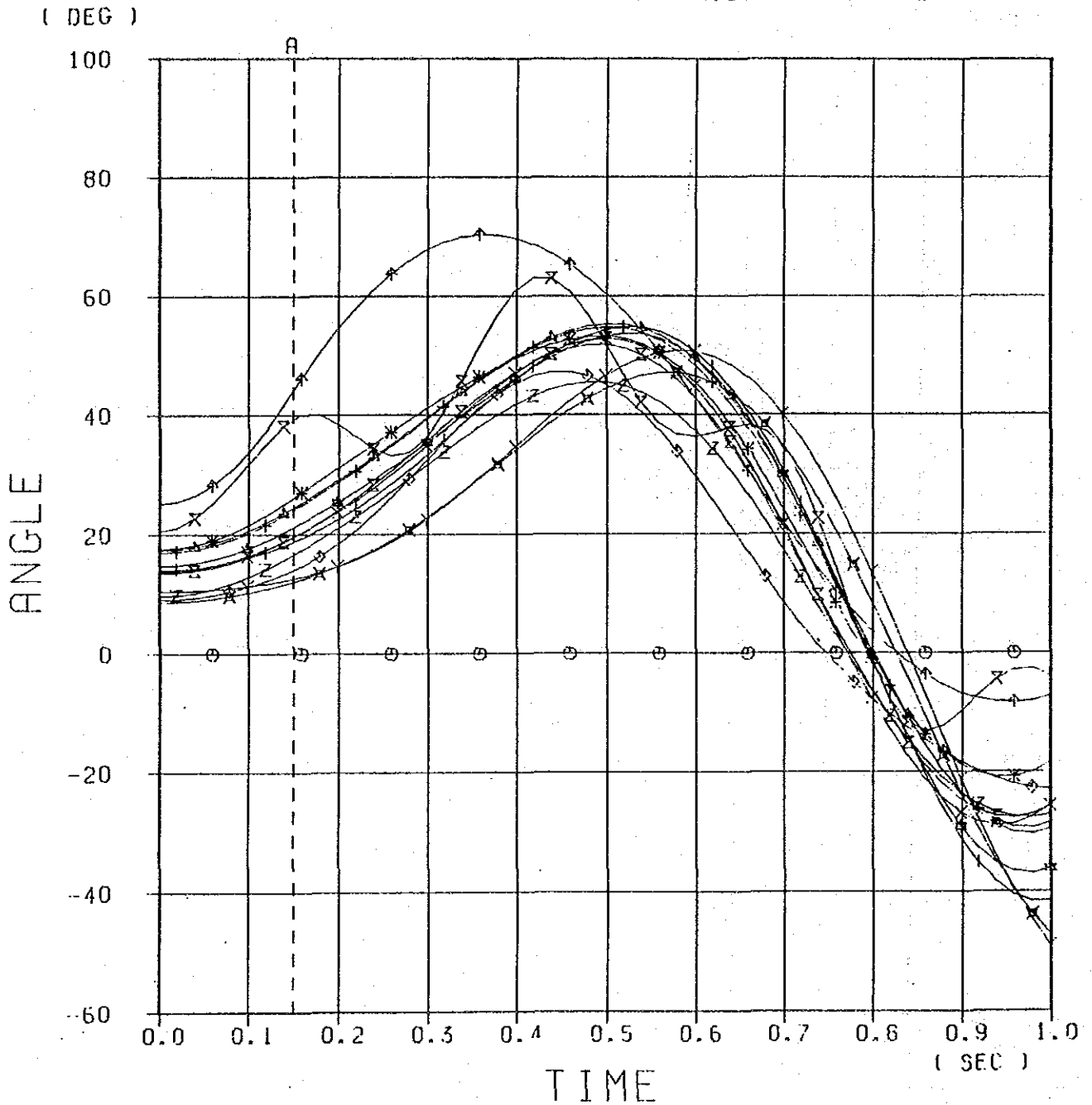


1	○	KRIAN	2	△	GRESIK 2
3	+	GRESIK 3	4	x	PERAK 3
5	◇	PERAK 1	6	↑	PAITON
7	z	MENDALAN	8	z	WONORE JO
9	y	GRINDULU	10	x	TULUNGAGUNG
11	*	WLINGI	12	z	GUTAMI
13		SENGCURUH	14	*	METRO

FIGURE 2.4-4(2-2) Transient Stability

FAULT LINE : PAITON
KRIAN

A: FAULT LINE OPENED

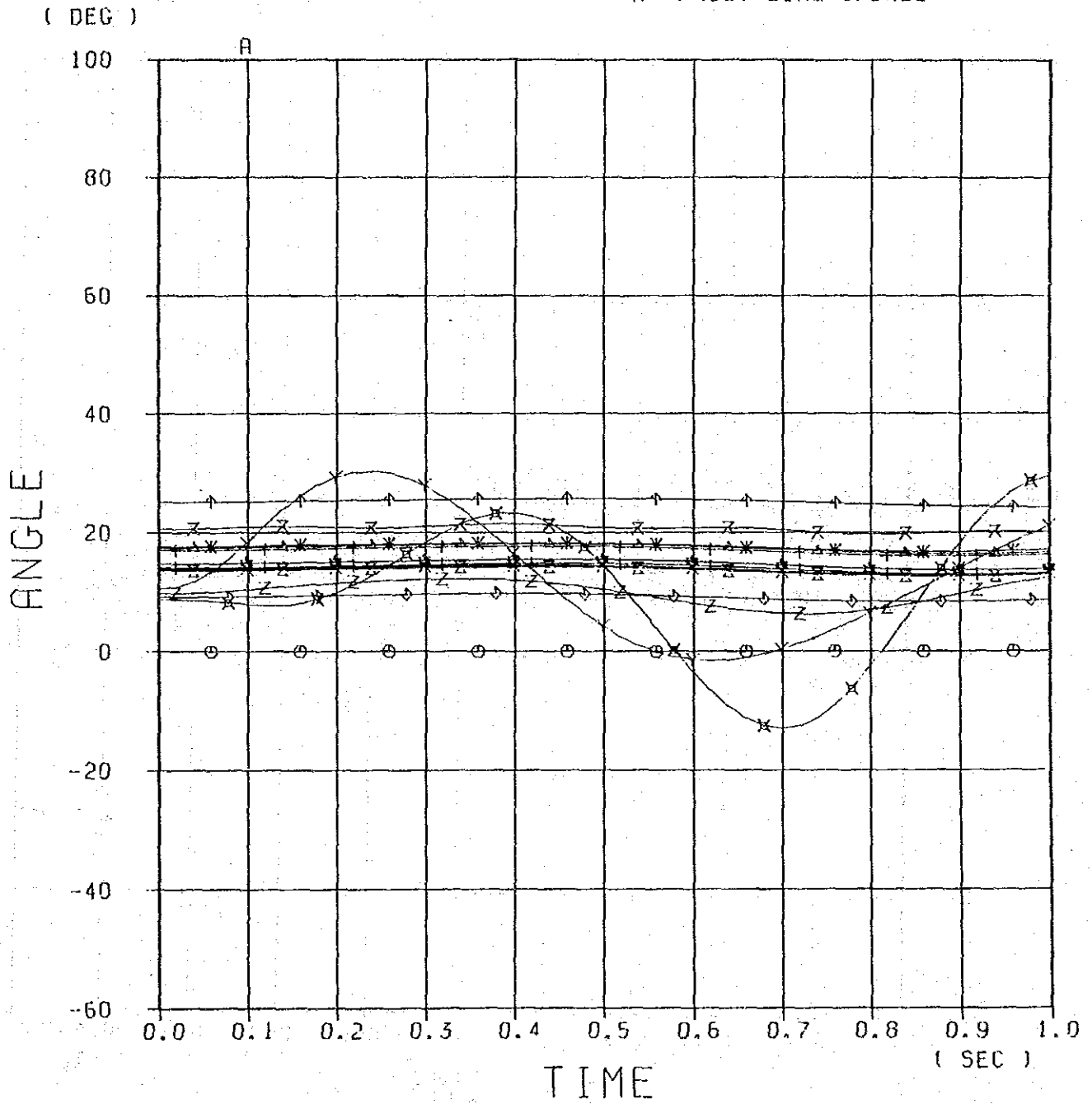


1	○	KRIAN	2	▲	GRESIK 2
3	+	GRESIK 3	4	x	PERAK 3
5	◇	PERAK 1	6	↑	PAITON
7	x	MENDALAN	8	z	WONOREJO
9	Y	GRINDULU	10	⊗	TULUNGAGUNG
11	*	WLINGI	12	Σ	SUTAMI
13		SENGGURUH	14	☆	METRO

FIGURE 2.4-4(3-1) Transient Stability

FAULT LINE : GRINDULU
PONDORO

A: FAULT LINE OPENED



- 1 ○
- 3 +
- 5 ◇
- 7 x
- 9 Y
- 11 *
- 13 I

- KRIAN
- GRESIK 3
- PERAK 1
- MENDALAN
- GRINDULU
- WLINGI
- SENGGARUH

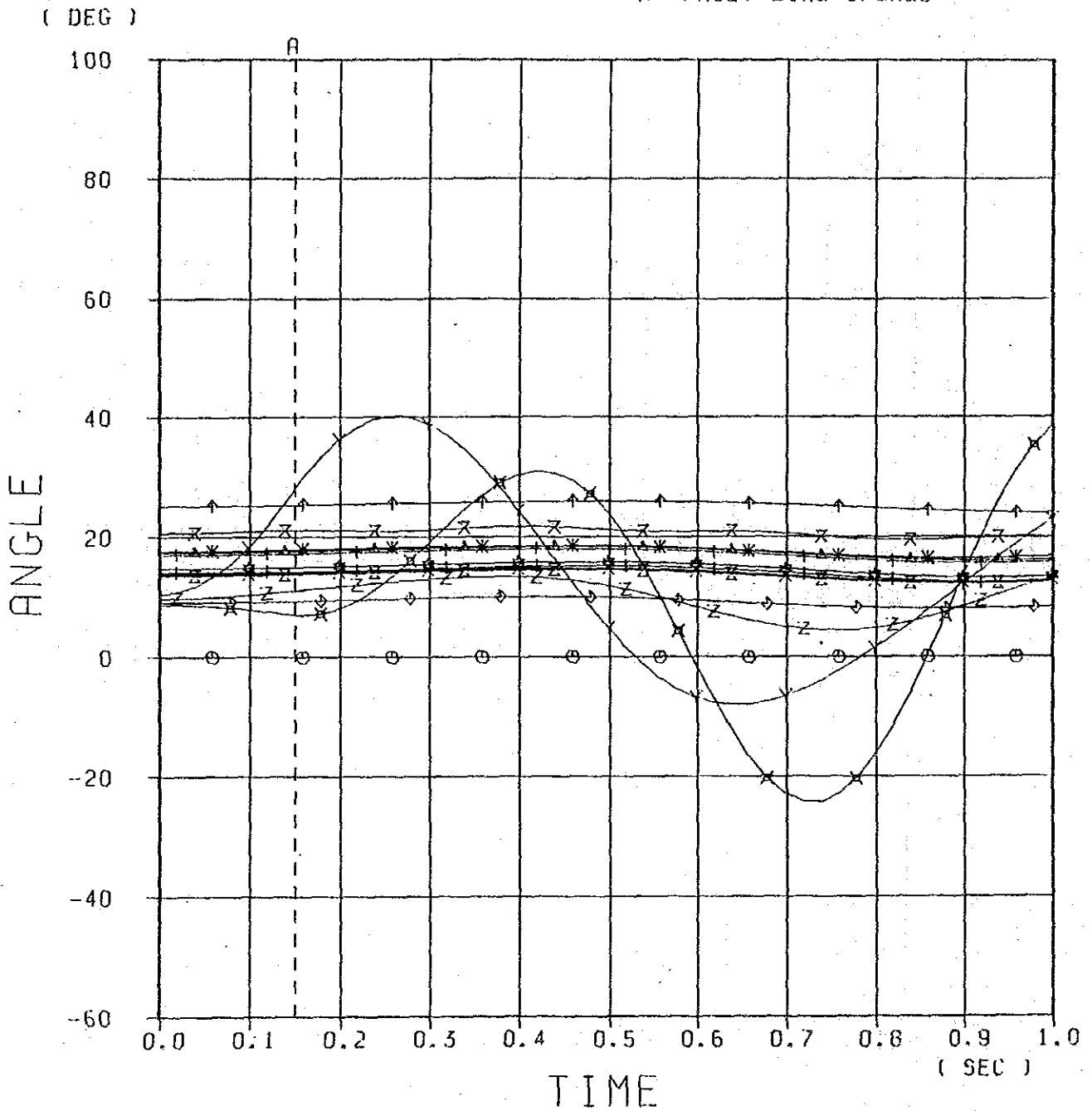
- 2 ▲
- 4 x
- 6 ↑
- 8 z
- 10 x
- 12 z
- 14 *

- GRESIK 2
- PERAK 3
- PAITON
- WONOREJO
- TULUNGAGUNG
- SUTAMI
- METRO

FIGURE 2.4-4(3-2) Transient Stability

FAULT LINE : GRINDULU
PONOROGO

A: FAULT LINE OPENED



1	○	KRIAN	2	△	GRESIK 2
3	+	GRESIK 3	4	x	PERAK 3
5	◇	PERAK 1	6	↑	PAITON
7	z	MENDALAN	8	z	WONOREJO
9	Y	GRINDULU	10	x	TULUNGAGUNG
11	*	WLINGI	12	Σ	SUTAMI
13	I	SENGGURUH	14	*	METRO