FIG. 4.10 LOAD OF BHAKTAPUR S/S

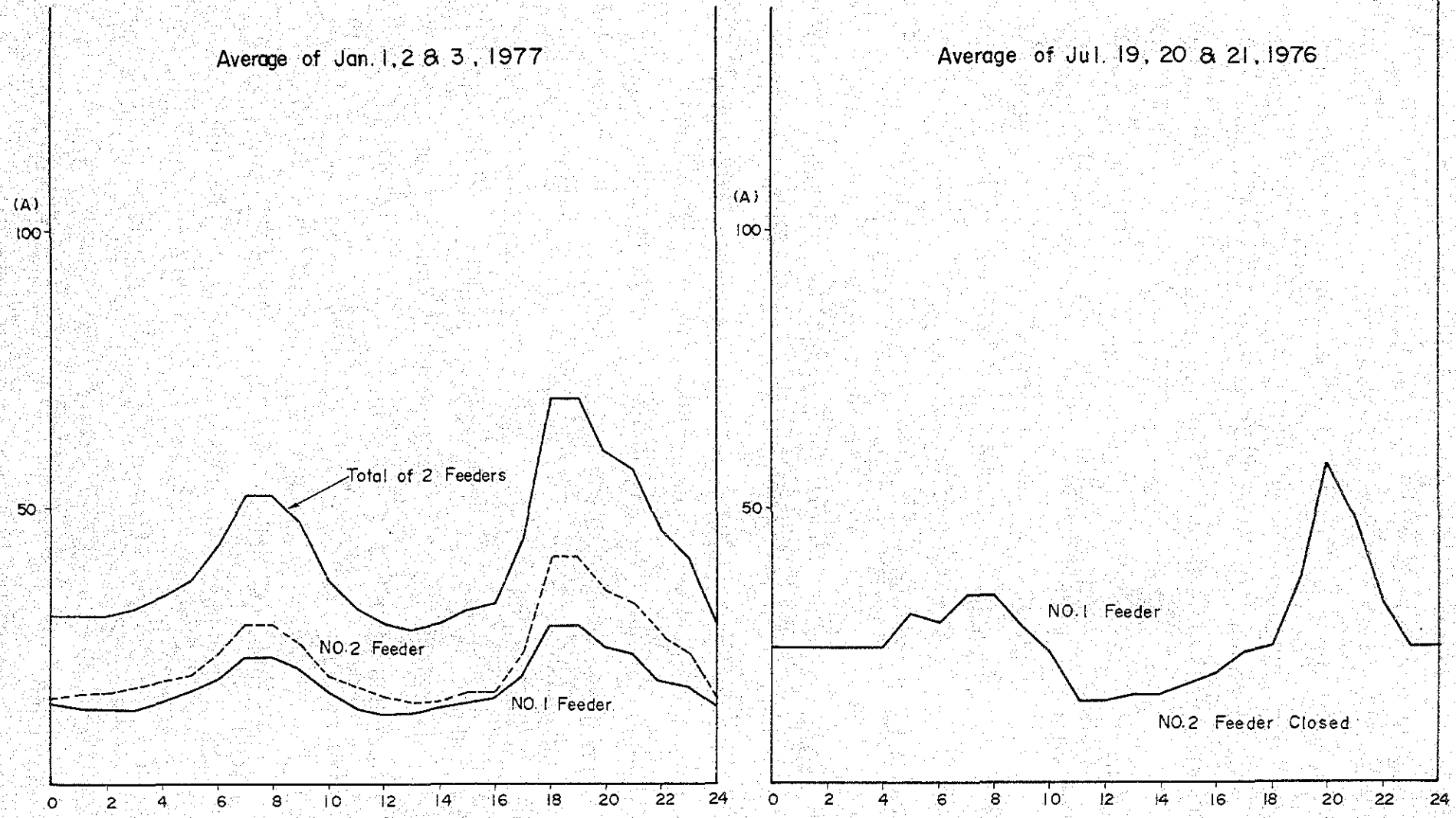


FIG. 4.11 LOAD OF PATAN S/S

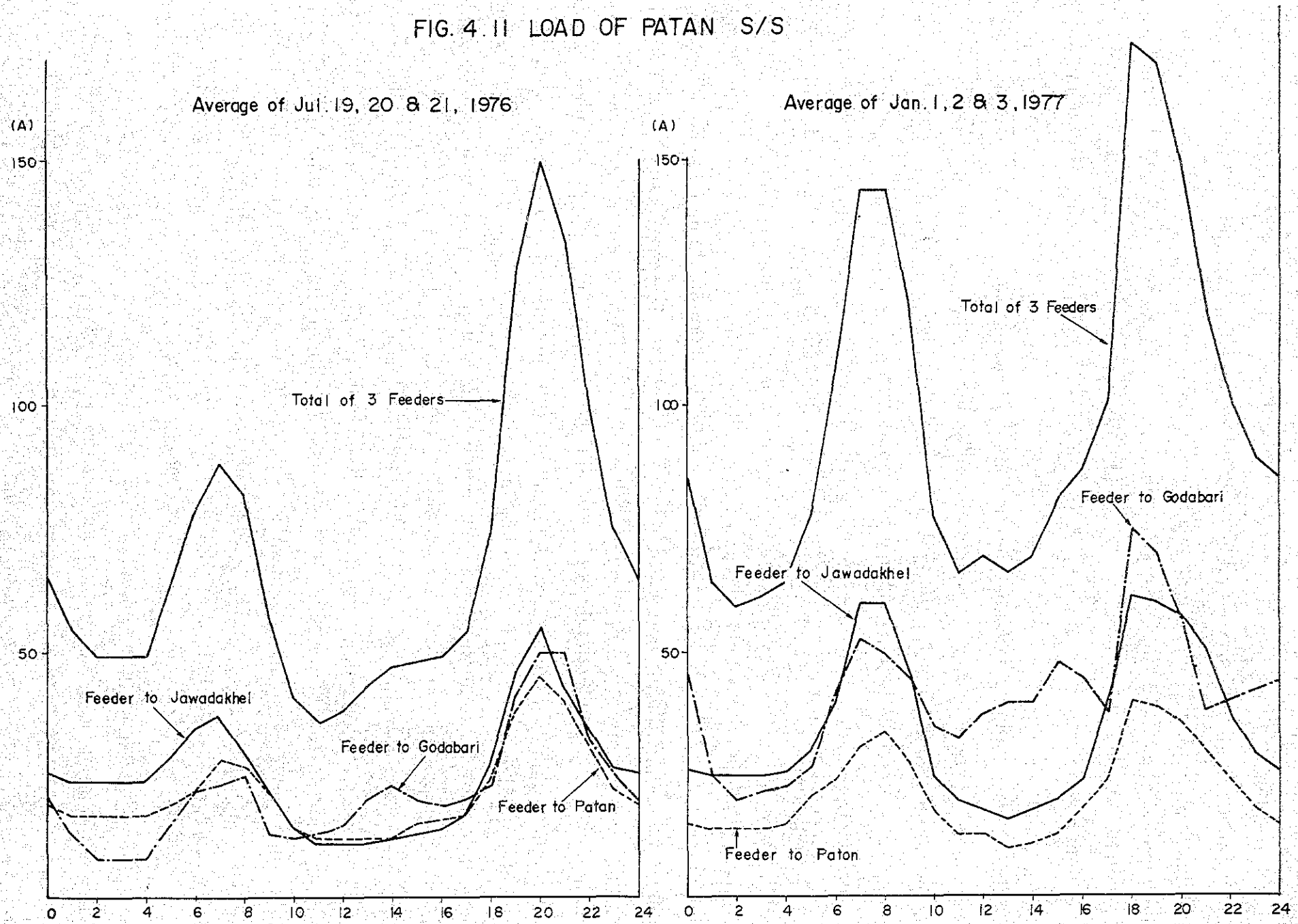


FIG. 4.12 LOAD OF TEKU S/S

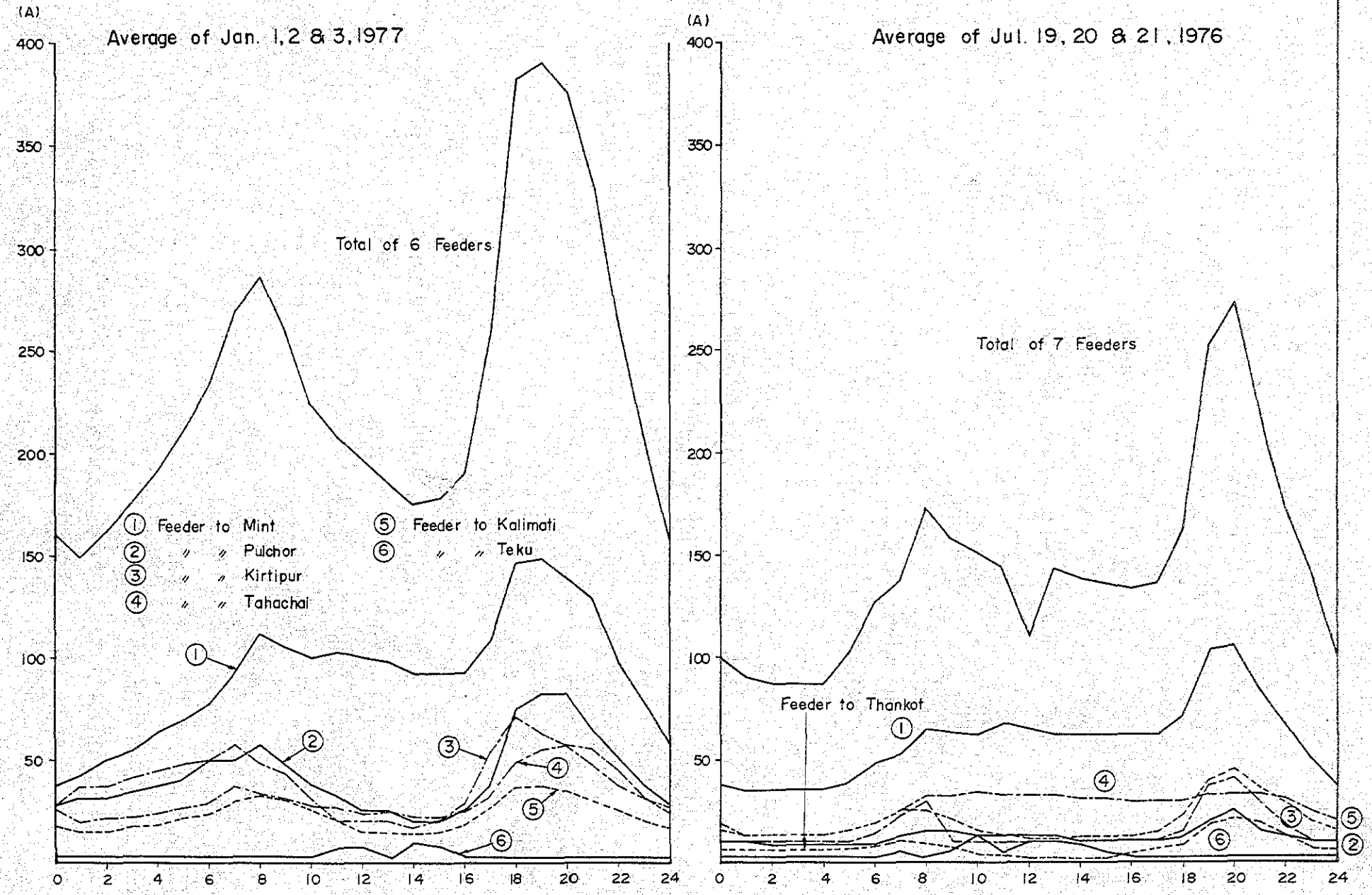


FIG. 4.13 LOAD OF K2 S/S

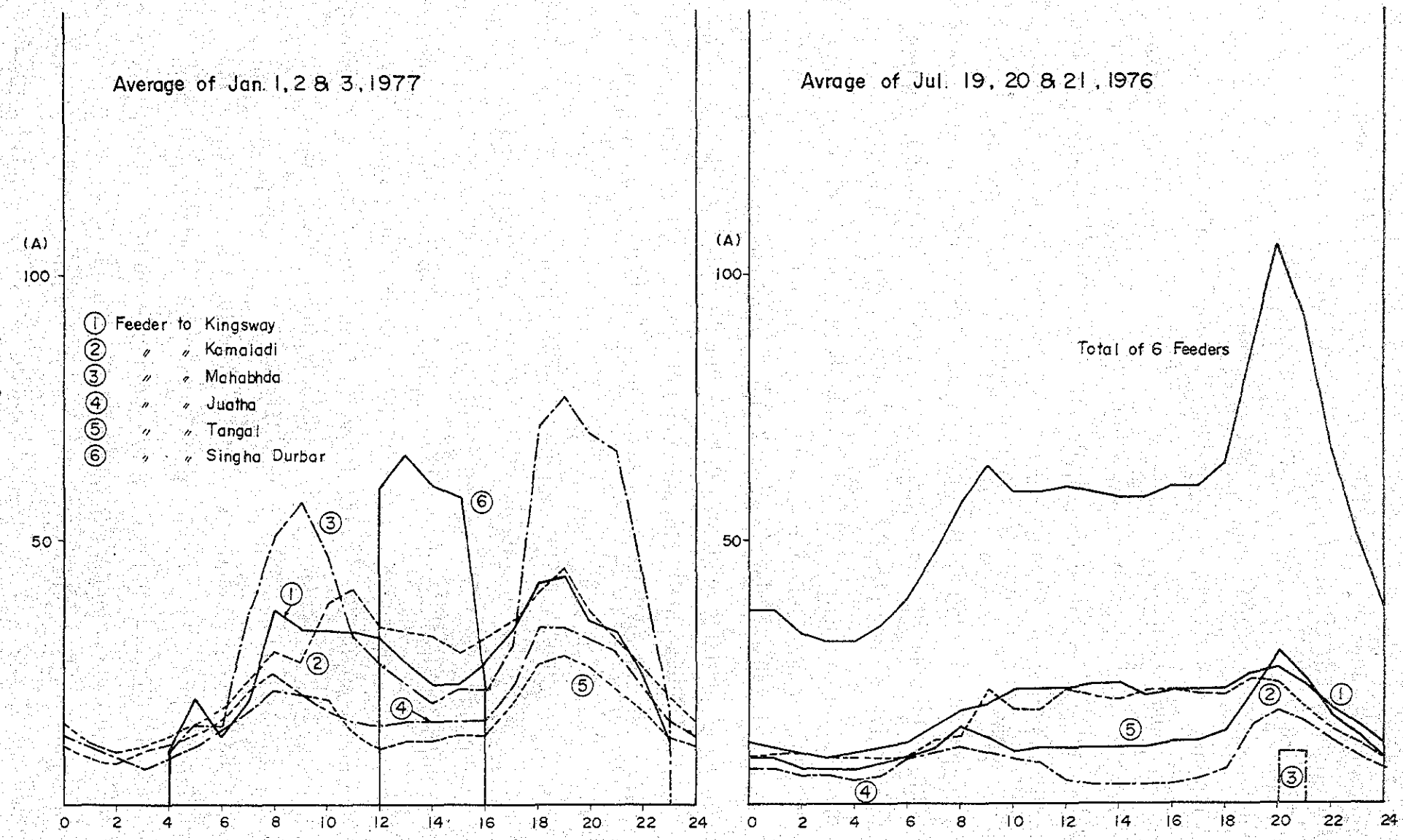


FIG. 4.14 LOAD OF THIMI S/S

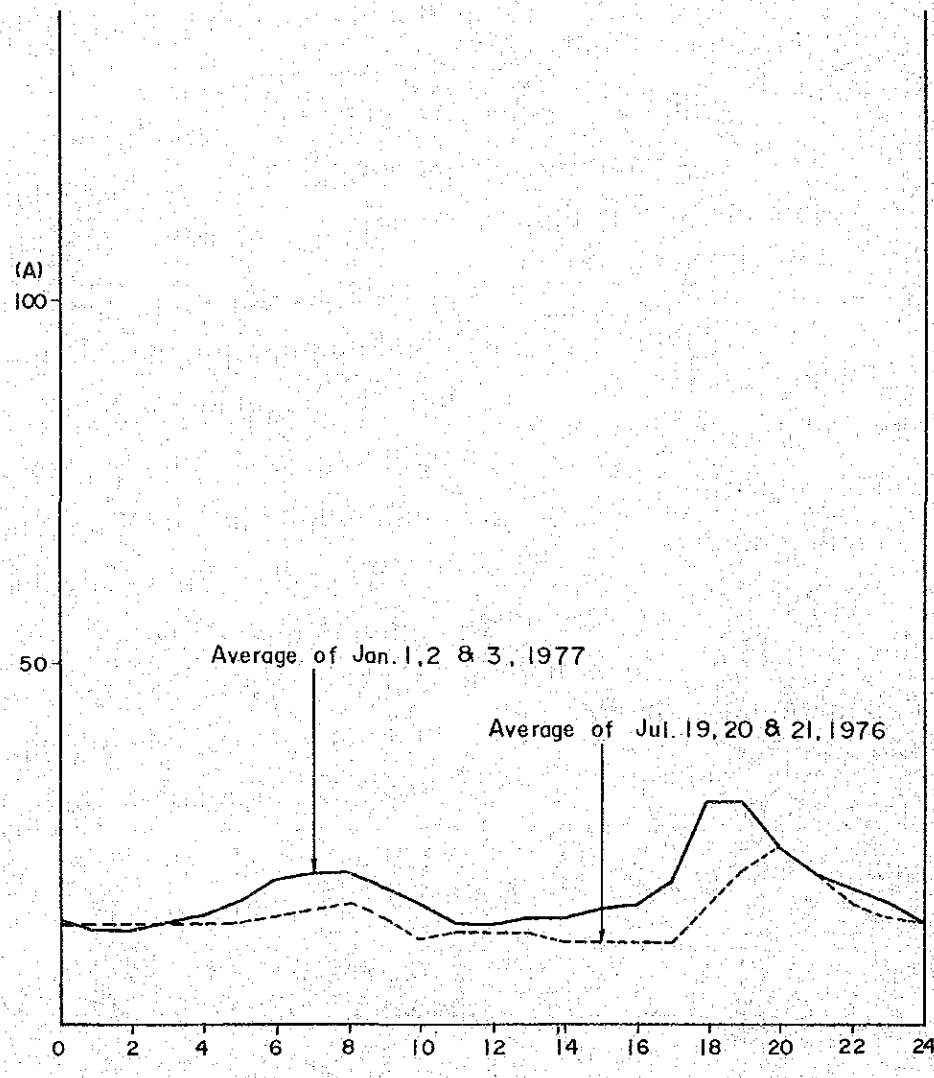


FIG. 4.15 RELATION BETWEEN NO. OF TOURISTS AND ENERGY CONSUMPTION OF COMMERCIAL CATEGORY

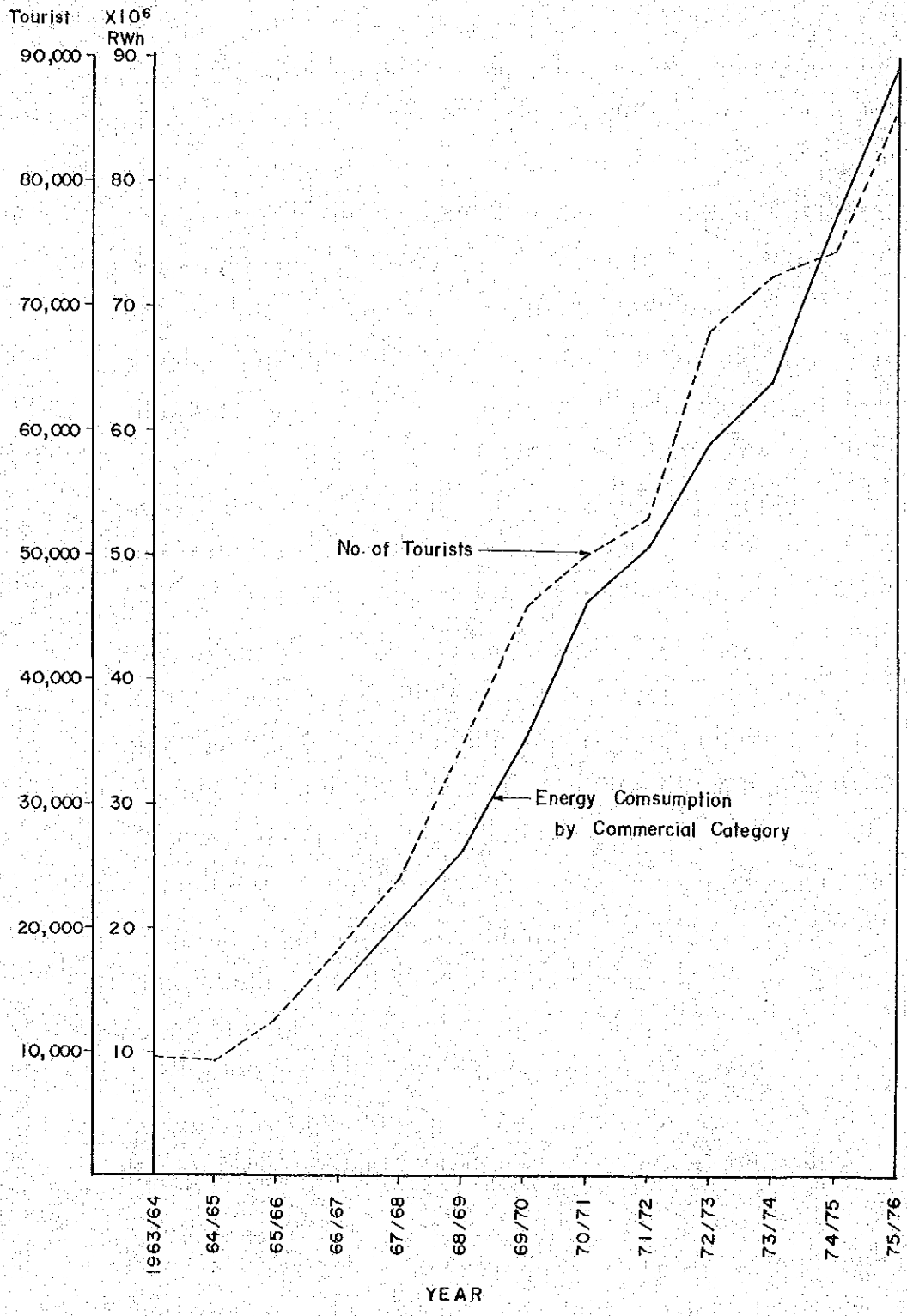


FIG. 4.16 DEMAND FORECAST OF KATHMANDU VALLEY

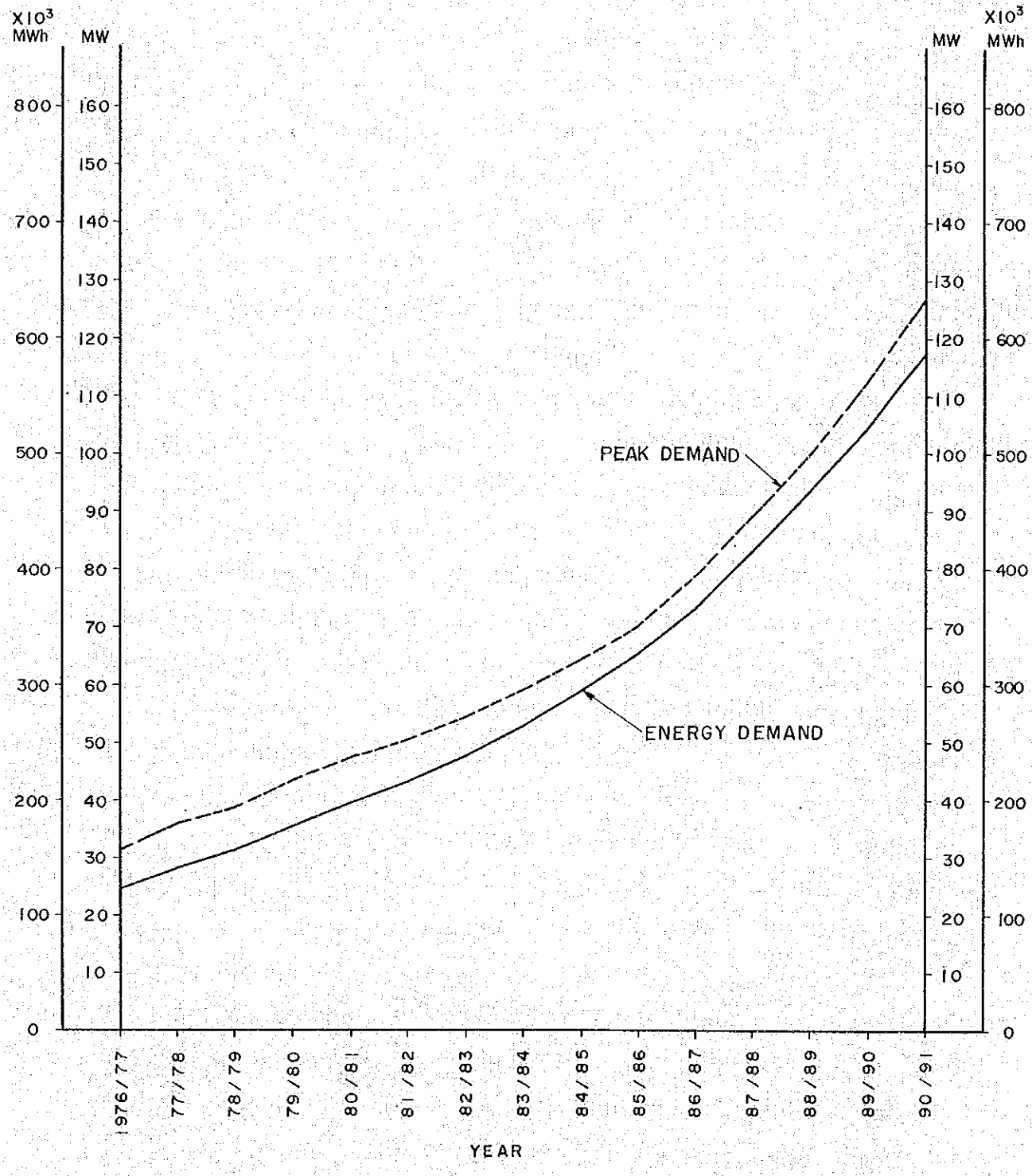


FIG. 4.17 PEAK DEMAND DISTRIBUTION OF EACH SUBSTATION IN THE KULEKHANI VALLEY

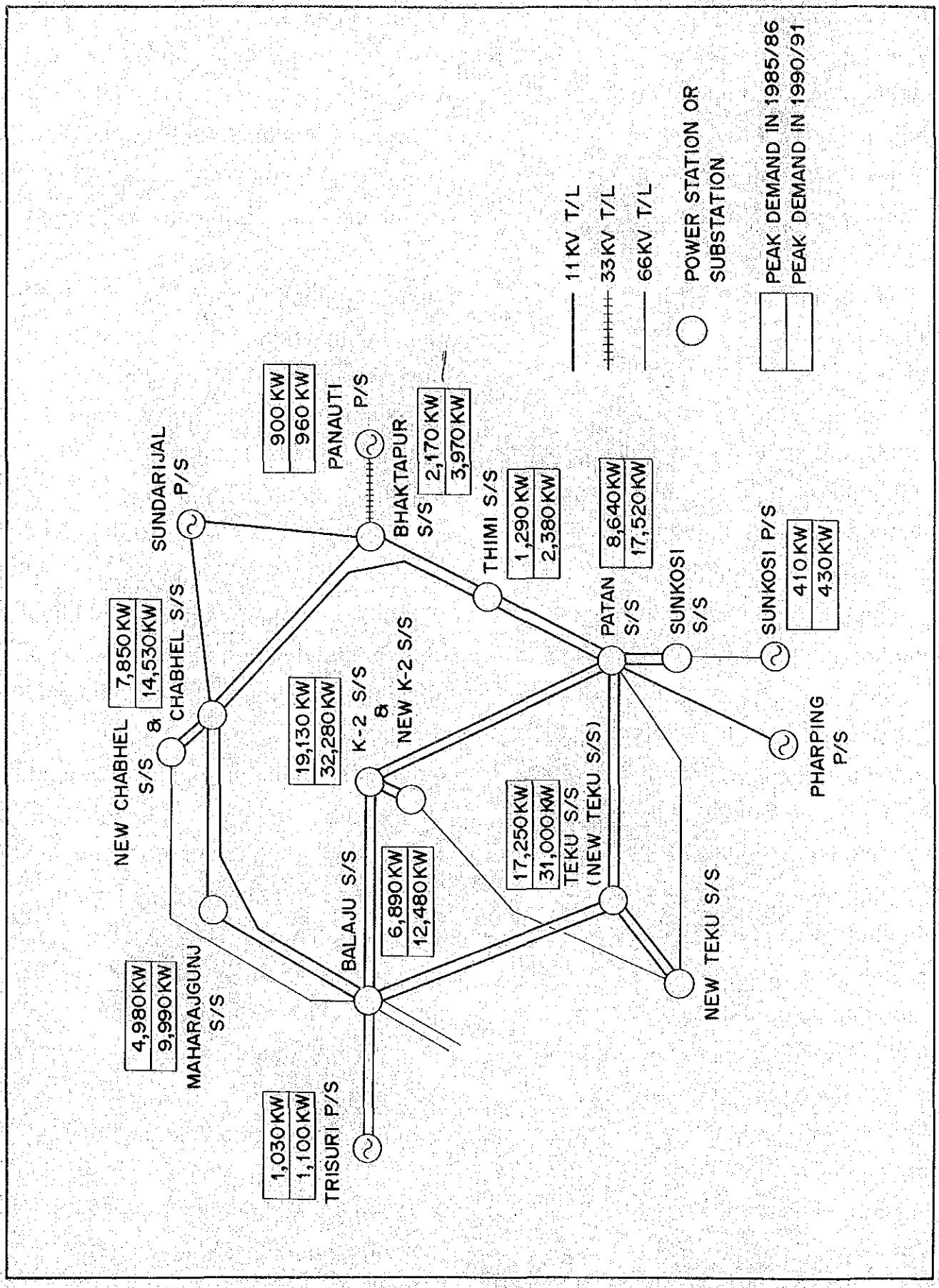
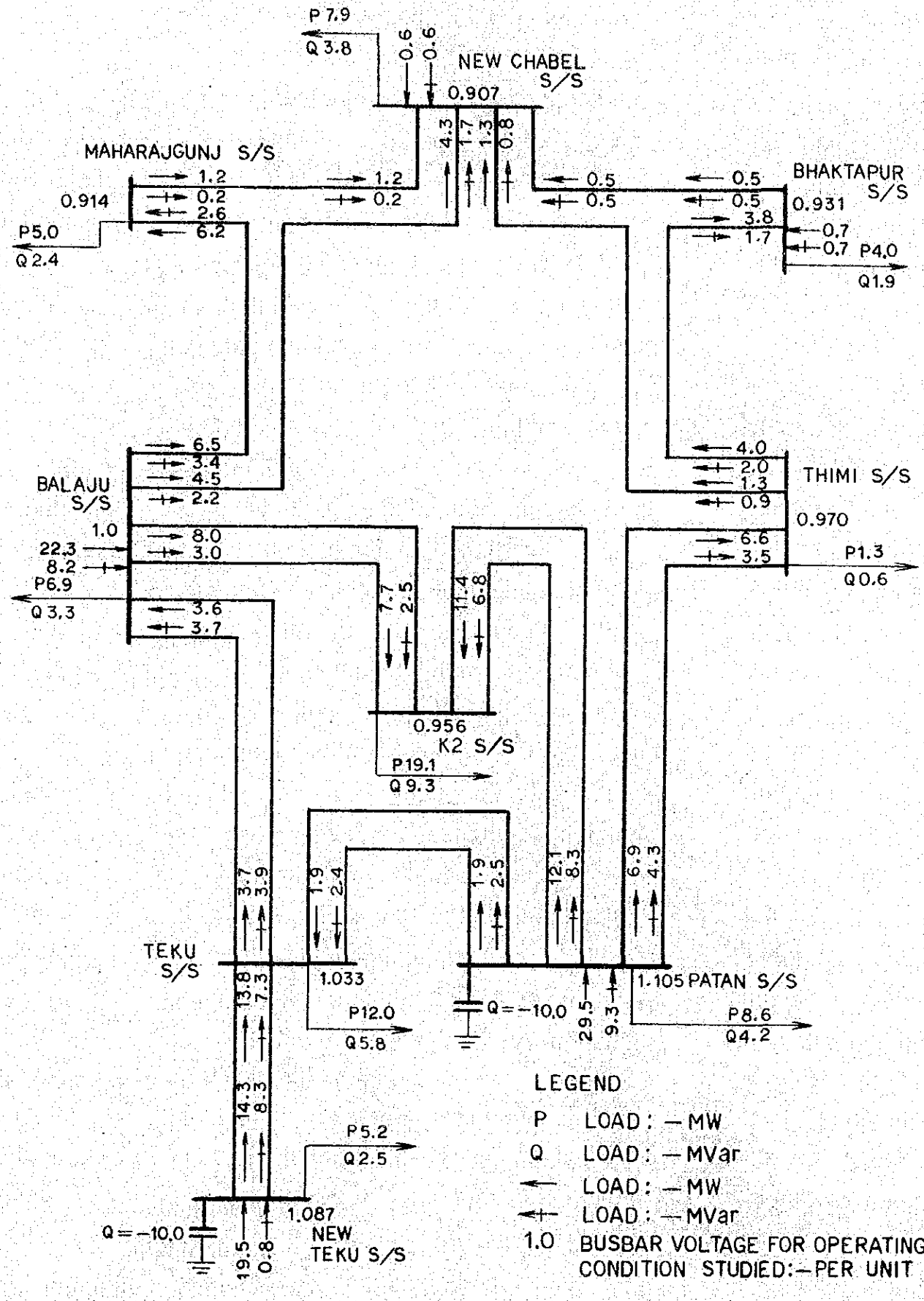
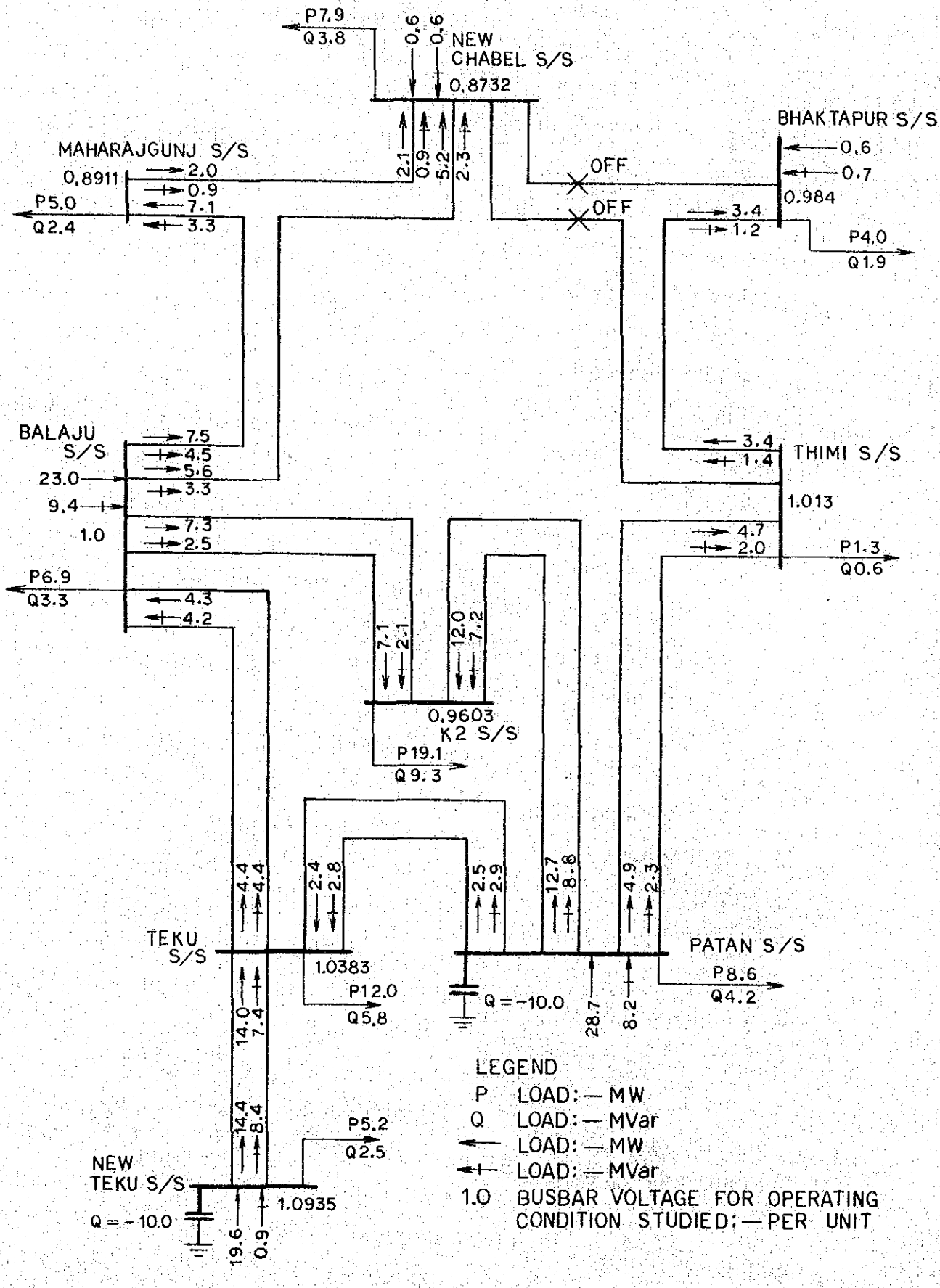


FIG 4.18 LOAD FLOW ON 11kV RING LINE

(1) NORMAL STATUS IN 1985/86



(2) ALTERNATIVE STATUS IN 1985/86



SECTION 5

DISTRIBUTION SYSTEM EXTENSION PLAN

SECTION 5

DISTRIBUTION SYSTEM EXTENSION PLAN

5.1 General

As mentioned in Clause 4.1, the growth of power consumption in the Kathmandu valley has been suppressed recently due to insufficiency of the power system capacity; the power generating facilities and as well as the distribution system.

In order to meet the growing demand in the CNPS, the following power stations are under construction and planned to be implemented as mentioned hereunder:

Gandaki power station, 15 MW	1978/79
Kulekhani No.1 power station, 60 MW	1980/81
Devigat power station, 14.4 MW	1981/82

Under the Kulekhani Hydroelectric project, the New Teku substation is planned to be constructed and the existing Patan substation will be extended for supply of the Kulekhani No.1 power to Kathmandu city. The power transmission system in the CNPS and the Kathmandu valley is shown in Dwg. Nos.KD-2 and KD-3.

Further to the above power stations, the Kulekhani No.2 power station with installed capacity of 33 MW is also under planning with target completion of 1985/86.

However, these power generating projects do not involve any extension plan of the distribution system.

The power supply capacity of the existing distribution system is not sufficient even for the present demand. The existing distribution transformers of 43,000 kVA in total in the Kathmandu valley are not enough to distribute full power of the existing power stations. Therefore, there is no allowance to receive any additional power.

Under such circumstances, it is required to implement a distribution system reinforcement project, covering the improvement of the existing distribution system and construction of the new distribution facilities, in order to distribute the added power to the consumers in the Kathmandu valley.

The extension plan of the distribution system is planned in this report in two stages; the first stage to be implemented by the end of 1982 to deliver the power to be generated at the Kulekhani No.1 power station and to meet the demand up to 1985/86, and the second stage to be implemented by 1985/86 to deliver the power of the Kulekhani No.2 power station and to meet the power demand up to 1990/91. The planned development project comprises the following:

The First Stage (to be completed by the end of 1982)

a) Transmission line

11 kV line between Teku and New Teku substations ..... 3 km

b) Distribution system

New 11 kV lines	125 km
Renewed 11 kV lines	60 km
Distribution transformers	72,000 kVA
New 400/230 V lines	90 km
Renewed 400/230 V lines	90 km
Watthour meters and others	1 lot
Tools and miscellaneous materials	1 lot

The Second Stage (to be completed by the end of 1985)

a) Transmission lines

New 66 kV lines ..... 13 km

- between New Teku and New K2 substations, ... approx. 5 km
- between Balaju and New Chabel substations, ... approx. 8 km

b) Improvement of load dispatching system

c) Substations

New substations 2

- New K2 substation, 2x18MVA (including existing 1x18 MVA to be removed from the Patan S/S)
- New Chabel substation, 18 MVA

Extension of substations 2

- New Teku substation (Extension of feeders)
- Balaju substation (Extension of feeders)

d) Distribution system

New 11 kV lines	150 km
Renewed 11 kV lines	70 km
Distribution transformers	83,000 kVA
New 400/230 V lines	110 km
Renewed 400/230 V lines	110 km
Watthour meters and others	1 lot
Tools and miscellaneous materials	1 lot

The proposed schematic transmission system diagrams are shown in Fig. 5.1 for the system after completion of the Kulekhani No.1 power station (1st stage) and in Fig. 5.2 for the system after completion of the Kulekhani No.2 power station (2nd stage). The proposed distribution systems connected to eight substations are illustrated in Fig. 5.3 through Fig. 5.9.

Descriptions for the development plans mentioned above are given in the following clauses.

5.2. Transmission System Development Plan

The new substations, New K2 substation and New Chabel substation, are planned to meet the growing demand in the center of Kathmandu city. The 66 kV outgoing facilities will be installed at New Teku substation for the extension of 66 kV line to New K2 substation and at Balaju substation for extension to the New Chabel substation.

In addition to the above two 11 kV tie lines are planned to be constructed between Teku and New Teku substations and between K2 and New K2 substations.

A new load dispatching center is planned at New Teku substation for load dispatching of the CNPS in the Kathmandu valley and the power system up to Hetauda.

5.2.1 Transmission Lines

Particulars of the planned 66 kV and 11 kV transmission lines are mentioned hereunder:

(a) 66 kV transmission lines

Both transmission lines between New Teku and New K2 substations and between Balaju and New Chabel substations consist of the overhead portion and the underground portion.

The former consists of the overhead line of approximately 3 km including Bagmati river crossing and the underground cable line of approximately 2 km in the thickly housed area of Kathmandu city. The latter consists of the overhead line of approximately 8 km including the underground portion of approximately 100 meters for crossing under the existing 66 kV transmission line.

Particulars of the lines are common for both lines and as given hereunder:

Major particulars of the overhead transmission line are as follows:

Nominal voltage:	66 kV
Number of circuit	1
Conductors:	ACSR 160 mm^2
Earthwire:	Galvanized steel wire 38 mm^2
Conductor arrangement:	Triangle formation
Supports:	One circuit, galvanized latticed steel structure
Neutral ground system:	Solid grounding system

Major particulars of the underground cable line are as follows:

Nominal voltage:	66 kV
Conductors:	Cu 150 mm^2
Type:	Single core, triplex, cross-linked polyethylene insulated, polyvinyl chloride sheathed, corrugated steel armored, PVC oversheathed cable

(b) 11 kV transmission lines

The 11 kV tie lines are of overhead construction and their particulars are common and as given hereunder:

Nominal voltage:	11 kV
Number of circuits	2
Conductors:	Hard aluminium stranded 240 mm^2
Earthwire:	Galvanized steel wire 38 mm^2
Supports:	Steel poles in H construction

5.2.2 Substations

Particulars of the substations planned to be newly constructed and to be extended are as mentioned hereunder:

(a) New K2 substation

New K2 substation with installed capacity of 2 x 18 MVA including existing 1 x 8 MVA to be removed from Patan Substation proposed near K2 switching-substation for the reinforcement of K2 substation. It is planned that the power is supplied from New Teku substation by the 66 kV transmission line for power distribution to the center of Kathmandu city. The single line diagram and the layout are shown in Dwg. Nos. KD-8 and KD-9. Six single-phase step down transformers from 66 kV to 11 kV (6,000 kVA each with an on-load tap changer) and 66 kV switchgear are to be installed in the outdoor switchyard. 11 kV switchgear consisting of four circuits for distribution feeders, two circuits for connection with K2 substation, one for spare in future and one station service circuit will be installed in the control house.

(b) New Chabhel substation

New Chabhel substation with installed capacity of 18 MVA is proposed near Chabhel switching-substation for the reinforcement of Chabhel and Maharajgunj substations. It is planned that the power is supplied from Balaju substation by the 66 kV transmission line for power distribution to the loads of Chabhel and Maharajgunj. The single line diagram and the layout are shown in Dwg. Nos. KD-10 and KD-11. Three single-phase step down transformer from 66 kV to 11 kV (6,000 kVA each with an on-load tap changer) and 66 kV switchgear will be installed in the outdoor switchyard. 11 kV switchgear consisting of two circuits for distribution feeders, two circuits for connection with Chabhel substation, one for spare in future and one station service circuit will be installed in the control house.

(c) Extension of New Teku substation

To supply power to New K2 substation, one set of 66 kV outgoing facilities consisting of a circuit breaker, one set of current transformers and two sets of disconnecting switches will be

installed at New Teku substation. The single line diagram and the layout are shown in Dwg. Nos. KD-4 and KD-5.

(d) Extension of Balaju subatation

To supply the power to New Chabhel substation, one set of 66 kV outgoing facilities consisting of a circuit breaker, one set of current transformers and three sets of disconnecting switches will be installed at Balaju substation.

The single line diagram and the layout are shown in Dwg. Nos. KD-6 and KD-7.

5.2.3 Load Dispatching System

It is proposed to set up a load dispatching center in New Teku substation for load dispatching of the power system in the Kathmandu valley and the CNPS up to Hetauda.

The communication system for the load dispatching system will be established as follows:-

(a) Existing power line carrier (PLC) telephone systems including under-construction

- A system: between Trisuli P.S. and Balaju S.S., and between Kulekhani P.S. and Hetauda S.S. manufactured by Brown Boveri (India)
- B system: between Sunkosi P.S. and Patan S.S.
- C system: between New Teku S.S. and Balaju S.S., between New Teku S.S. and Patan S.S., and between New Teku S.S. and Kulekhani No.1 P.S. manufactured by Ohi (Japan)

(b) Newly installed communication systems on the 66 kV line

- between New Teku S.S. and New K2 S.S.
- between New Teku S.S. and New Chabhel S.S. via Balaju S.S.

(c) Communication cable lines will be installed or improved for establishing the communication circuits between the above 66 kV substations and 11 kV substations on the 11 kV ring lines. The power line carrier telephone systems are illustrated in Dwg. No. KD-12.

5.3 Distribution System Extension Plan

New construction of the distribution system and improvement of the existing system are planned in order to deliver the generated power of the Kulekhani No.1 power station and to meet the increasing power demand. The reinforcement plan for each divided area is explained hereunder.

(a) Kathmandu (K-2) substation area

According to the demand forecast, the peak load in the Kathmandu service area will reach 32.3 MW in 1990/1991 and the energy consumption will be 149.9 GWh.

The proposed plan of the distribution system in this area is illustrated in Fig. 5.3.

The existing overhead lines extended to the center of Kathmandu city will be placed underground.

The lines to Mint, Indrachok, Pyaphal and Tengal extended from the existing feeders will be shifted to the new feeders. Mahendra feeder, Jayath feeder, Tangal feeder and Kamaladi feeder will be shifted to the New K-2 substation.

The existing 3.3 kV lines will be converted to 11 kV lines by changing insulators and cross arms. The distribution transformers of 42,000 kVA in total capacity including the transformers for the system converted from 3.3 kV to 11 kV will be added and installed on the existing and new lines.

All existing lines will be reinforced, improved and extended, and new branch lines will be extended to supply the power to the new service area.

(b) Teku substation area

According to the demand forecast, the peak load in the Teku service area will be 31.0 MW in 1990/1991 and the energy consumption 143.9 GWh.

The proposed plan of the distribution system in this area is illustrated in Fig. 5.4.

The lines extended to Thankot and Teku from the existing substation will be shifted to New Teku substation. Two new feeders will be extended from the New Teku substation to supply power to the new service area and connected to the Karimati and Tahalchal feeders of the existing Teku substation.

The existing 3.3 kV Karimati feeder and the 3.3 kV line on the Mint feeder are converted to 11 kV lines. The distribution transformers of 36,000 kVA in total capacity including the transformers for the system to be converted from 3.3 kV to 11 kV will be added and installed on the existing and new lines.

All existing lines will be reinforced, improved and extended, and new branch lines will be extended to supply the power to the new service area.

(c) Balaju substation area

According to the demand forecast, the peak demand in the Balaju service area will reach 12.5 MW in 1990/1991 and the energy consumption will be 57.9 GWh.

The proposed plan of the distribution system in this area is illustrated on Fig. 5.5.

All existing 3.3 kV lines will be converted to 11 kV lines. The 3.3 kV line being fed from the step down transformer at Nayabazar will be connected to the new feeder at the Balaju substation.

The distribution transformers of 17,000 kVA in total capacity, including the transformers for the system to be converted from 3.3 kV to 11 kV, will be added and installed on the existing and new lines.

All existing lines will be reinforced, improved and extended and new branch lines will be extended to supply the power to the new service area.

(d) Maharajgunj substation area

According to the demand forecast, the peak demand in the Mharajgunj

service area will reach 10.0 MW in 1990/1991 and the energy consumption will be 46.4 GWh.

The proposed plan of the distribution system in this area is illustrated in Fig. 5.6.

The distribution transformers of 13,000 kVA in total capacity will be added and installed on the existing and new lines.

The Baluwater, Mahabir and Bansbari lines will be connected to the new feeders, and some existing lines will be reinforced and improved. New branch lines will be extended to supply the power to the new service area.

(e) Chabhel substation area

According to the demand forecast, the peak load in the Chabhel service area will reach 14.5 MW in 1990/1991 and the energy consumption will be 67.5 GWh.

The proposed plan of the distribution system in this area is illustrated in Fig. 5.7.

The existing 3.3 kV lines on the Chabel feeder and Padam feeder will be converted to 11 kV lines and shifted to the new feeders fed from the New Chabel substation. The distribution transformers of 17,000 kVA in total capacity, including transformers for the system to be converted from 3.3 kV to 11 kV, will be added and installed on the existing and new lines.

The existing lines will be reinforced, improved or extended, and new branch lines will be extended to supply the power to the new service area.

(f) Bhaktapur and Thimi substation areas

According to the demand forecast, the peak load in these areas will reach 6.4 MW in 1990/1991 and the energy consumptions will be 29.5 GWh.

The proposed plan of the distribution system in this area is illustrated in Fig. 5.8.

The existing 11 kV line at the Bhaktapur substation will be shifted to the new feeder.

The distribution transformers of 8,000 kVA in total capacity will be added and installed on the existing and new lines.

The existing lines will be reinforced, improved and extended, and new branch lines will be extended to supply the power to the new service area.

(g) Patan substation area

According to the demand forecast, the peak load in the Patan service area will reach 17.5 MW in 1990/1991 and the energy consumption will be 81.3 GWh.

The proposed plans of the extension and improvement of the distribution system in this area is illustrated in Fig. 5.9.

The lines being extended to Chapagaon from the existing Godawari feeder will be separated and shifted to new feeders and another new feeder will also be extended to the Patan Industrial District.

The 3.3 kV Patan feeder and the 3.3 kV line on the Jawalakhel feeder will be converted to 11 kV line. The distribution transformers of 22,000 kVA in the total capacity, including the transformers for the system to be converted from 3.3 kV to 11 kV, will be added and installed on the existing and new lines.

All existing lines will be reinforced, improved and extended, and new branch lines will be extended to supply the power to the new revice area.

5.4 Materials and Equipment for Distribution System

(a) Conductors

In general, hard drawn insulated aluminium conductors are employed for overhead distribution lines and cross-linked polyethlene insulated and PVC sheathed (CV) power cables are employed for underground distribution lines.

The following miscellaneous conductors are also used:-

(1) Cables for the primary sides of transformers

(2) Insulated jumper wires for jumpers of primary lines

(3) 600 V outdoor weather proof (OW) wires and polyvinyl chloride insulated cables for service wires

Primary conductors are strung generally in horizontal layout on the poles and secondary conductors are in vertical layout.

(b) Supports and Cross Arms

Poles to be employed are non-galvanized painted steel tubes and will consist of two portions to be jointed at site by ordinary welding.

Crossarms will be made of galvanized steel channel and fixed to the poles with steel bands.

Steel bands will be made of galvanized steel and will be secured by tightening bolts and nuts with spring washers.

Tubular poles will be designed so as to prevent vibration or excessive deflection in service and will be classified as follows:-

Type A: Support at straight line section and light angle point up to 5 degrees, provided with pin type insulators but without stay assemblies.

Type B: Support at angle point up to 15 degrees, provided with pin type insulators and reinforced with stay assemblies.

Type C: Support at heavy angle point up to 90 degrees, provided with strain type insulators and reinforced with stay assemblies.

Type D: Terminal support at dead end, reinforced with stay assemblies.

Type T: Support for a pole-mounted transformer equipped with cutout fuses and lightning arresters.

Type S: Support for a section switch equipped with lightning arrestors.

(c) Insulators

For 11 kV lines, pin type insulators will be employed at straight and light angle supports, and strain type insulators at heavy angle and dead end supports.

Spool insulators will be employed for low tension lines.

(d) Transformers

The secondary sides of the transformers will be rated at 400/230 V for 3-phase units and 230 V for single-phase units. The transformers will be provided at their primary side with taps of plus 10 and 5 % and minus 5 and 10 % based on 10.5 kV, i.e., taps of 11.5 - 11 - 10.5 - 10 - 9.5 kV.

The rated voltages at secondary side are 420/241 V for 400/230 V operation to cover the voltage drop on the low tension lines.

The transformers are of oil immersed, outdoor use, and pole-mounted type for the capacity up to 30 kVA, and ground installation type for the capacity of 50 kVA and over.

Capacity of transformers to be procured are given below:-

Single-phase	5, 10, 20, 30 kVA
Three-phase	30, 50, 100, 150, 200, 500 kVA

(e) Automatic Section Switches and Others

1 - Automatic section switches

Automatic section switches for elimination and detection of faulty section will be installed on the distribution lines.

2 - Manually operated section switches

Manually operated section switches will be installed at the branching points of the lines and other locations as necessary.

3 - Cutout switches

Transformers will be provided with cutout fuse switches on the primary side and cutout switches on the secondary side.

4 - Lightning arrestors

Dry valve type lightning arrestors will be installed on the lines at transformer locations, the primary side of section switches and the jointing points of overhead and underground lines.

(f) Watthour Meters

Watthour meters for power trading are of the outdoor wall-mounted type and so designed as to be used under 230 V for single-phase two-wire systems and 400 V for three-phase four-wire systems.

As for 11 kV receiving customers, watthour meters with metering outfits will be provided.

(g) Miscellaneous Materials, and Erection and Maintenance Tools

The following miscellaneous materials and equipment will be purchased for the Project.

(1) Stay wires with accessories

(2) Binding wires

(3) Connectors and sleeves

(4) Galvanized bolts and nuts for arms and others

(5) Watthour meter testing board

(6) Vehicles

(7) Tools for erection and maintenance

5.5 Construction Schedule

As mentioned in the previous clauses, the implementation program of the distribution network systems is recommended to be scheduled in two stages, the first stage and second stage, as shown in Figure 5.8 - Construction Time Schedule.

On the condition that the financial arrangement for the first stage is made by the end of May 1979, the tender for procuring the materials and equipment can be called by the end of September 1979. The site erection work will be commenced at the beginning of October 1980 and completed at the end of March 1983.

The distribution line work for the second stage will be started with two years interval; the tender will be called at the end of September 1981 and the site erection work will be commenced at the beginning of April 1983 and completed by the end of 1985.

The tender for the transmission and substation system for the second stage development will be called in November 1981. The site erection work will be started in February, 1984 for the transmission line, in June 1984 for the substation equipment and the whole work will be completed by the end of March, 1985.

5.6 Cost Estimate

Construction cost for the project is estimated as shown in detail in Table 5.1 and summarized below:

(Unit: US$1,000)

	First Stage			Second State		
	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total
T/L System	183	10	193	928	107	1,035
Substations	-	-	-	2,242	457	2,699
D/L System	7,622	965	8,587	8,906	1,115	10,021
Contingency	390	49	439	600	84	684
Engineering	1,310	164	1,474	1,389	193	1,582
Total	9,505	1,188	10,693	14,065	1,956	16,021
Escalation	1,137	176	1,313	3,382	519	3,901
Grand Total	10,642	1,364	12,006	17,447	2,475	19,922

Remarks:
1. Conversion rate is assumed as US$1.00 = ¥210 = Rs. 12.55
2. The prices are based on the levels in August 1978
3. The price escalation is estimated assuming an annual escalation of 5 %.

The construction cost is estimated at US$12,006,000 for the first stage, US$19,992,000 for the second stage and US$31,928,000 for the whole of the project.

The foreign currency portion covers all necessary cost for procurement of equipment, materials, tools, vehicles and engineering services not including the cost for procuring locally available materials.

The local currency portion covers such materials to be procured locally as cement, steel bars, building materials and other miscellaneous materials, and local expenditures for consultants, but does not include the overhead and general expenses including staff salaries of ED or NEC, nor taxes and other indirect costs.

Based on the time schedule mentioned in Clause 5.6 and the estimated payment term that 100 % payment be made on shipment for procurement of materials and progressively for the erection work, the disbursement of the cost is scheduled as follows.-

Disbursement Schedule

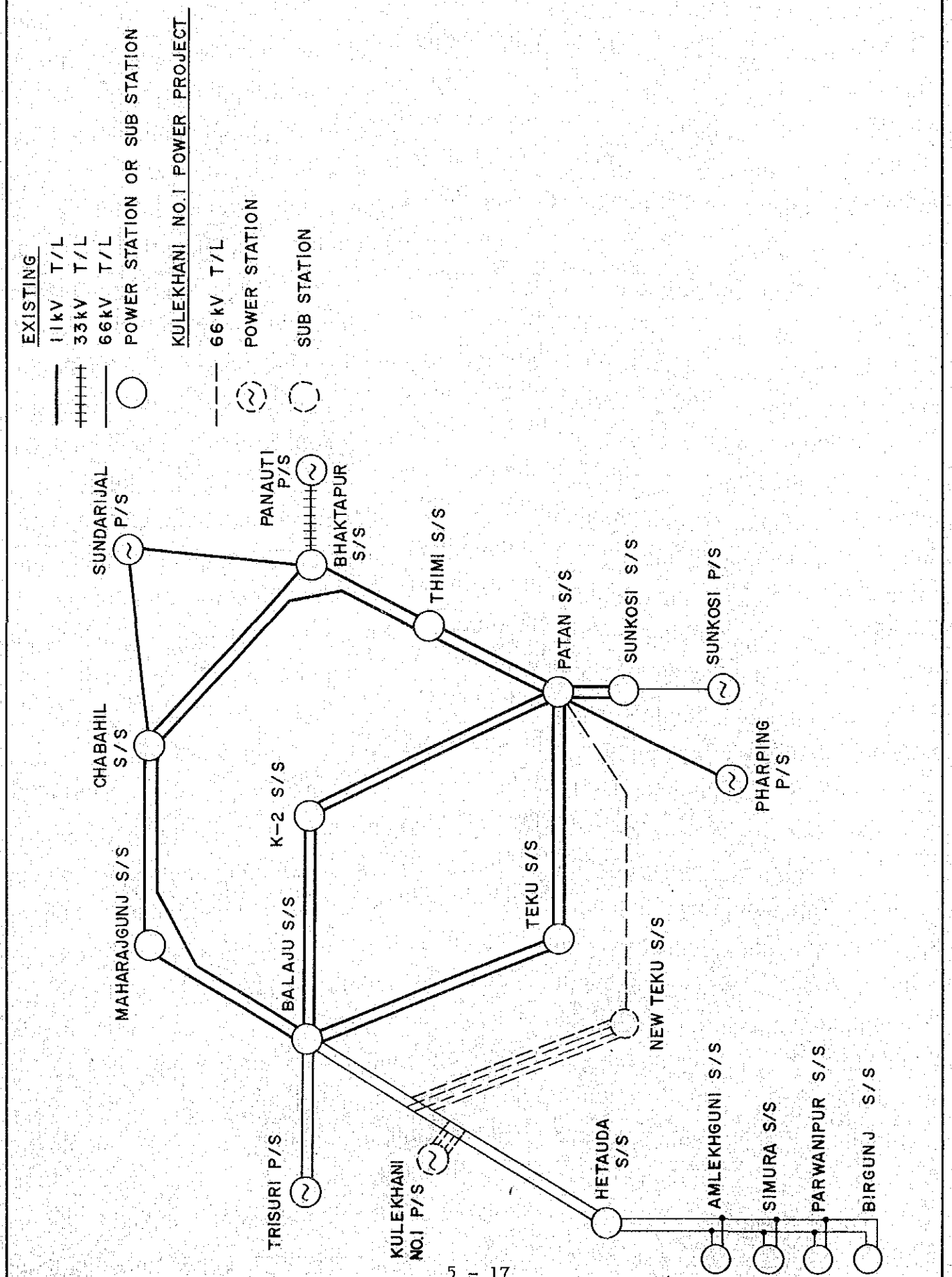
(Unit: US$1,000)

	First Stage			Second Stage			
	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total	Grand Total
1979/80	999	63	1,062				1,062
1980/81	6,288	459	6,747				6,747
1981/82	2,199	482	2,681	1,629	113	1,742	4,423
1982/83	1,156	360	1,516	8,549	833	9,382	10,898
1983/84				5,383	875	6,258	6,258
1984/85				1,886	654	2,540	2,540
Total	10,642	1,364	12,006	17,447	2,475	19,922	31,928

Table - 5.1 COST ESTIMATE

	First Stage Q'ty	First Stage Q'ty	First Stage Foreign Currency	First Stage Local Currency	First Stage Total	Second State Q'ty	Second State Foreign Currency	Second State Local Currency	Second State Total	Total
1) Transmission System										
66 kV T/L	13 km	-	-	-	-	13 km	928	107	1,035	
11 kV Connecting Line	3 km	3 km	183	10	193	-	-	-	-	
Sub-total			183	10	193		928	107	1,035	1,228
2) Substations										
Extension of New Teku S/S		-	-	-	-		117	23	140	
Extension of Balaju S/S		-	-	-	-		143	32	175	
New K-2 S/S	18 MVA	-	-	-	-	18 MVA	768	154	922	
New Chabel S/S	18 MVA	-	-	-	-	18 MVA	672	134	806	
Communication system		-	-	-	-		542	114	656	
Sub-total							2,242	457	2,699	2,699
3) Distribution System										
New 11 kV line	275 km	125 km	1,523	115	1,638	150 km	1,828	137	1,965	
Renewed 11 kV line	130 km	60 km	289	23	312	70 km	337	26	363	
Transformers	155,000 kVA	72,000 kVA	3,121	566	3,687	83,000 kVA	3,598	653	4,251	
New 400/230 V line	200 km	90 km	650	29	679	110 km	794	36	830	
Renewed 400/230 V line	200 km	90 km	433	17	450	110 km	530	20	550	
Watthour meters & others	1 lot		1,159	215	1,374		1,312	243	1,555	
Tools & miscellaneous materials	1 lot		447	-	447		507	-	507	
Sub-total			7,622	965	8,587		8,906	1,115	10,021	18,608
Total of Item 1, 2 and 3			7,805	975	8,780		12,076	1,679	13,755	22,535
4) Contingency			390	49	439		600	84	684	1,123
5) Engineering			1,310	164	1,474		1,389	193	1,582	3,056
Total			9,505	1,188	10,693		14,065	1,956	16,021	26,714
6) Escalation			1,137	176	1,313		3,382	519	3,901	5,214
Grand Total			10,642	1,364	12,006		17,447	2,475	19,922	31,928

FIG.5-1 TRANSMISSION SYSTEM OF KULEKHANI NO.1 POWER PROJECT



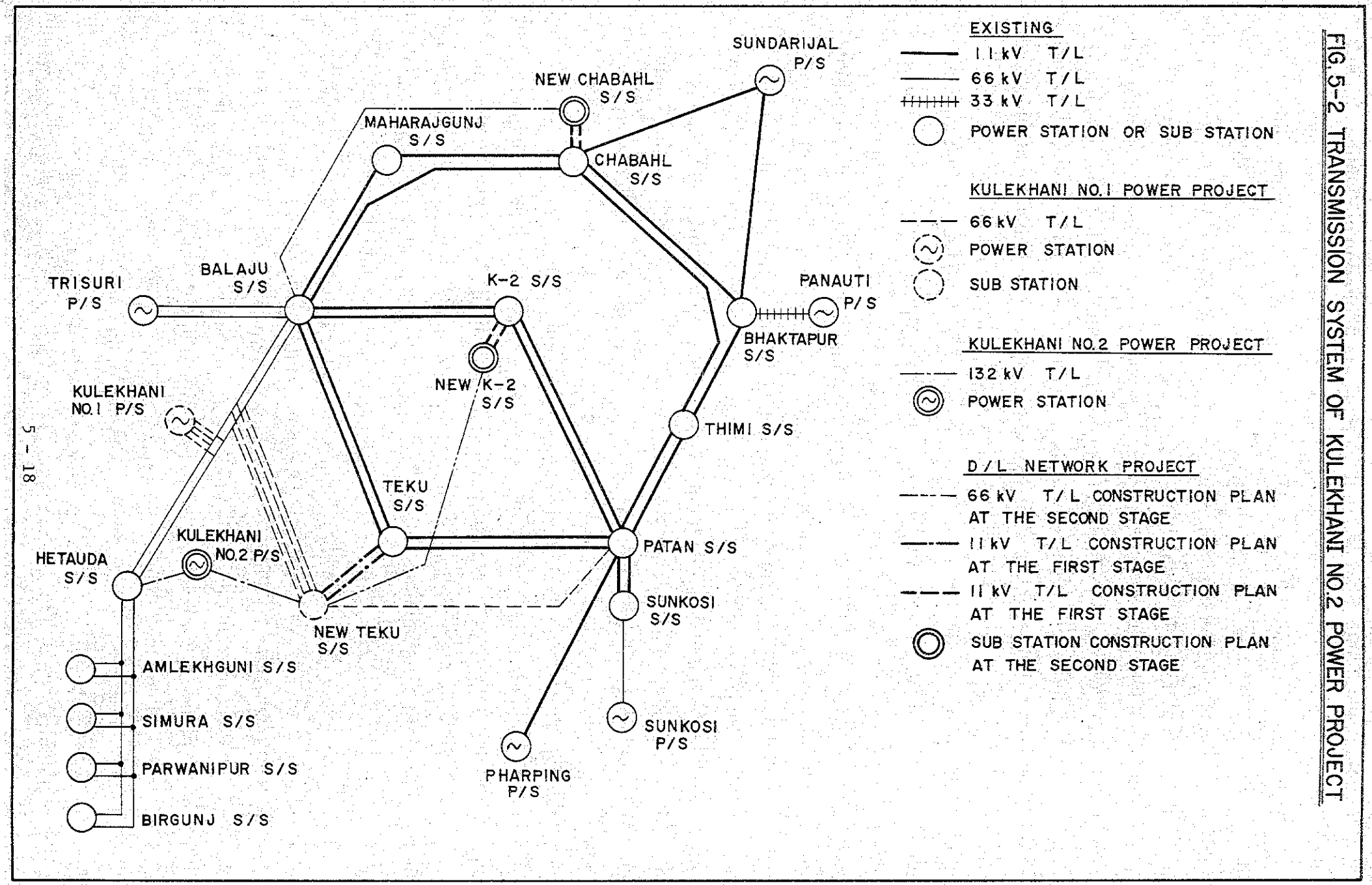


FIG. 5-2 TRANSMISSION SYSTEM OF KULEKHANI NO.2 POWER PROJECT

FIG. 5-3 PROPOSED PLAN OF D/L SYSTEM OF KATHMANDU S/S

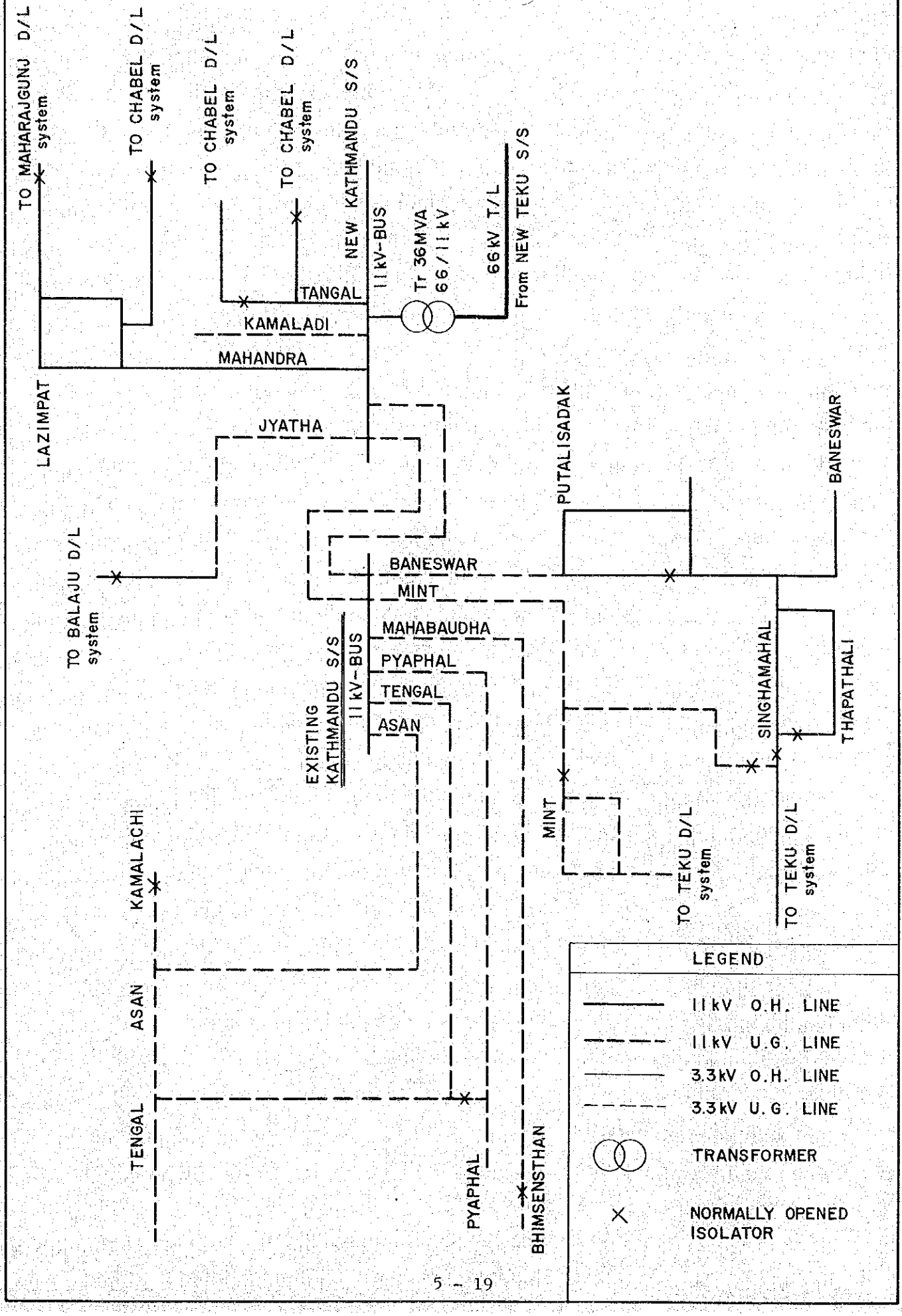


FIG. 5-4 PROPOSED PLAN OF D/L SYSTEM OF TEKU S/S

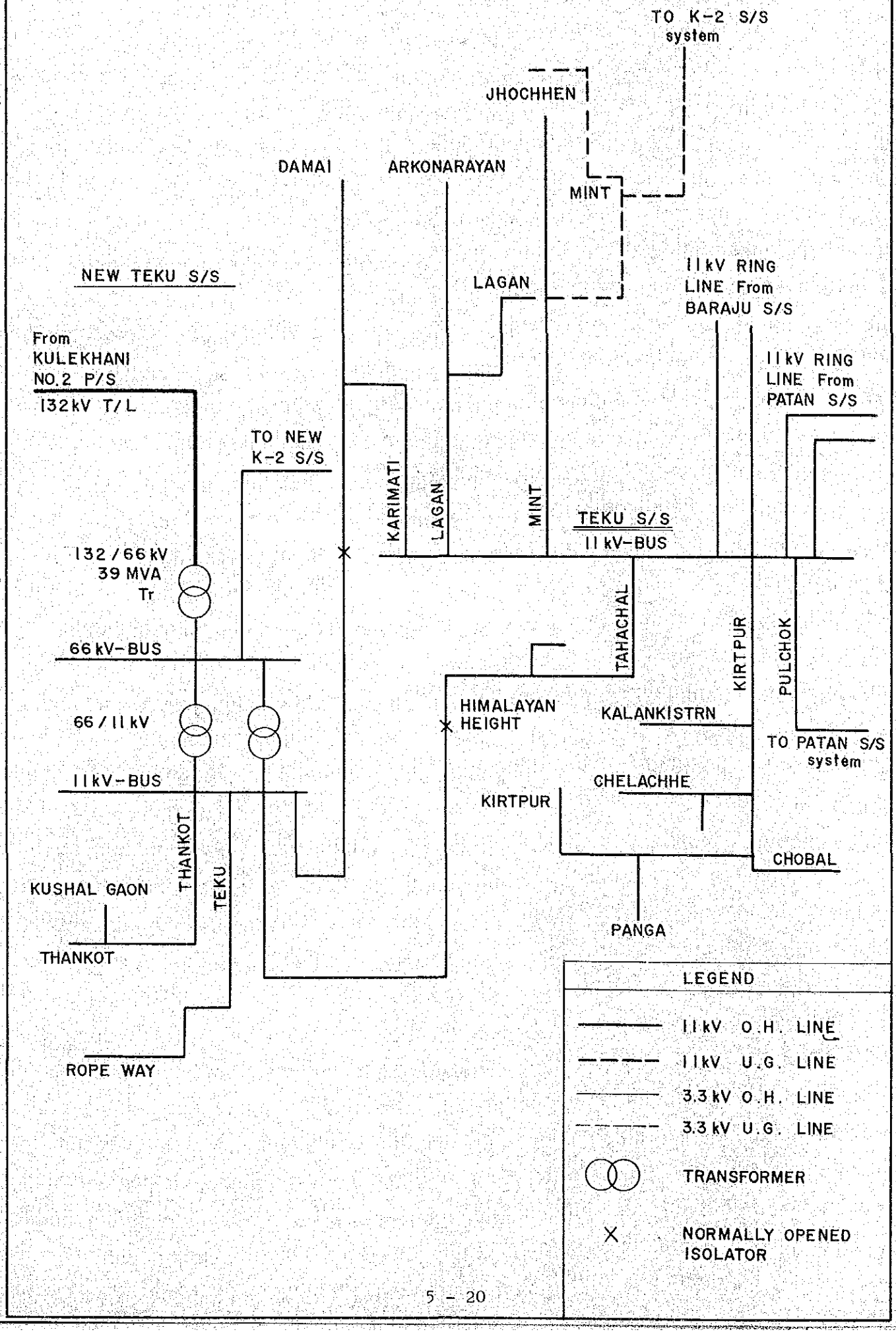


FIG. 5-5 PROPOSED PLAN D/L SYSTEM OF BALAJU S/S

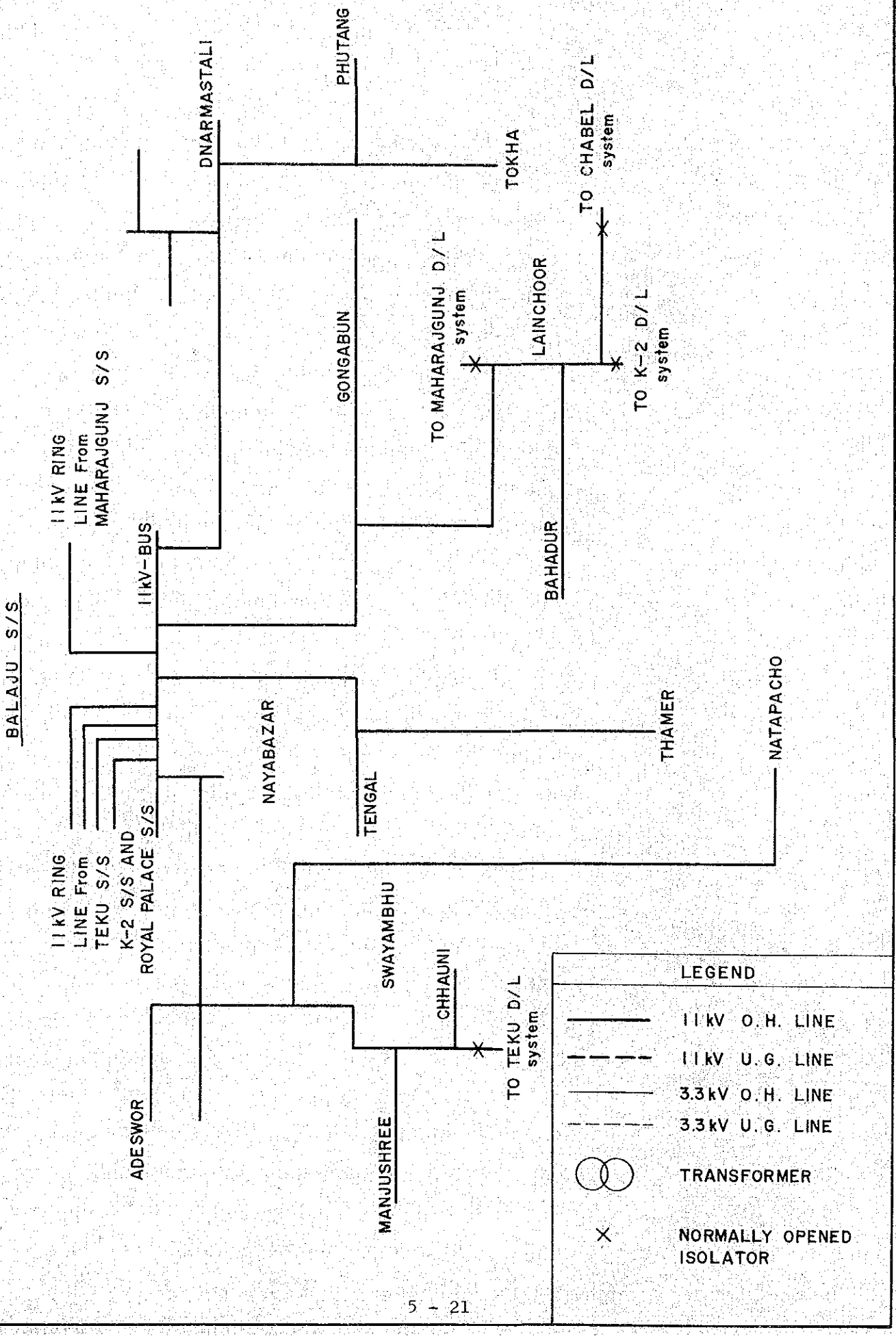


FIG. 5-6 PROPOSED PLAN OF D/L SYSTEM OF MAHARAJGUNJ S/S

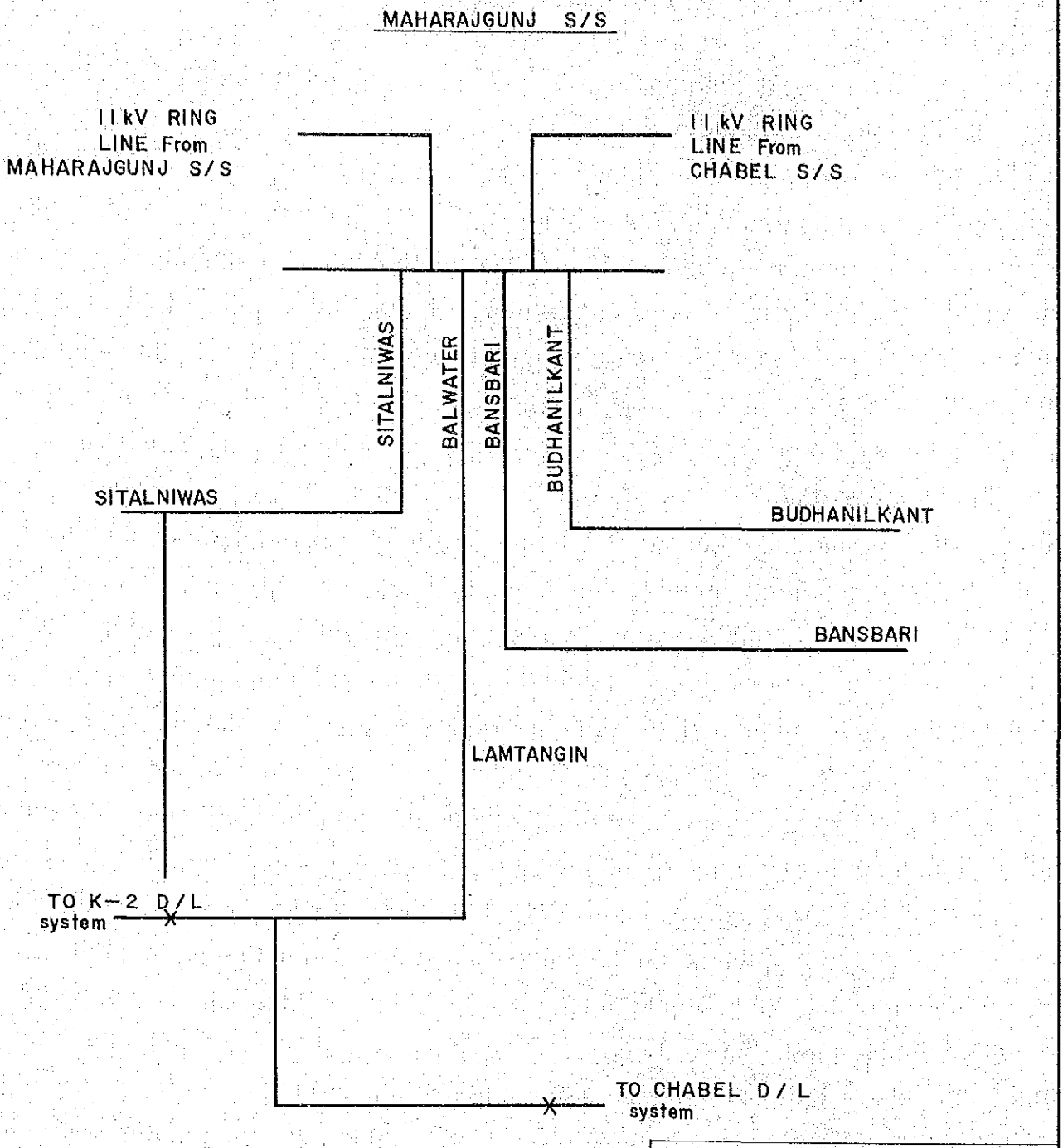


FIG. 5-7 PROPOSED D/L SYSTEM OF CHABEL S/S

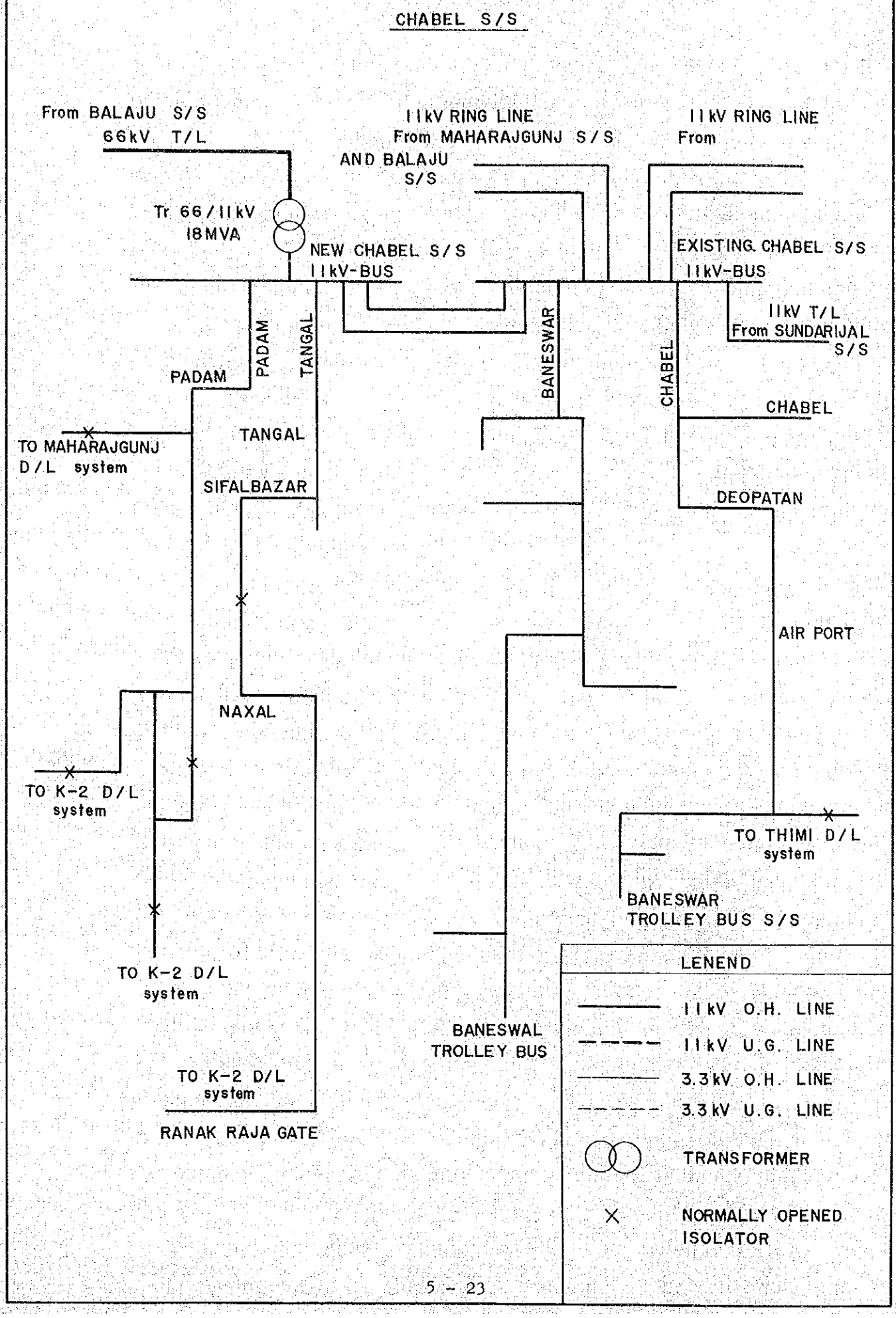


FIG. 5-8 PROPOSED PLAN OF D/L SYSTEM OF BHAKTAPUR S/S AND THIMI S/S

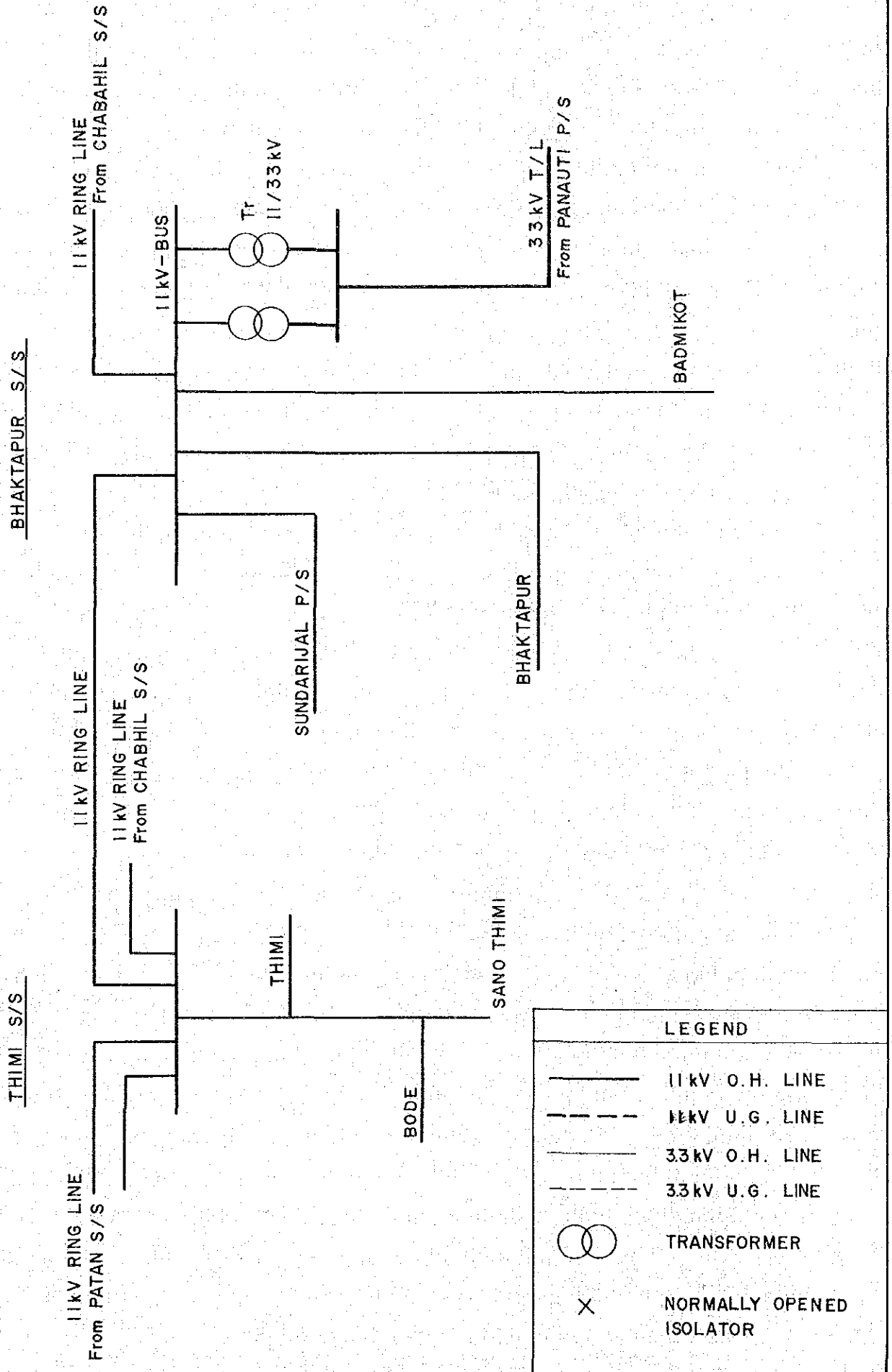


FIG. 5-9 PROPOSED PLAN OF D/L SYSTEM OF PATAN S/S

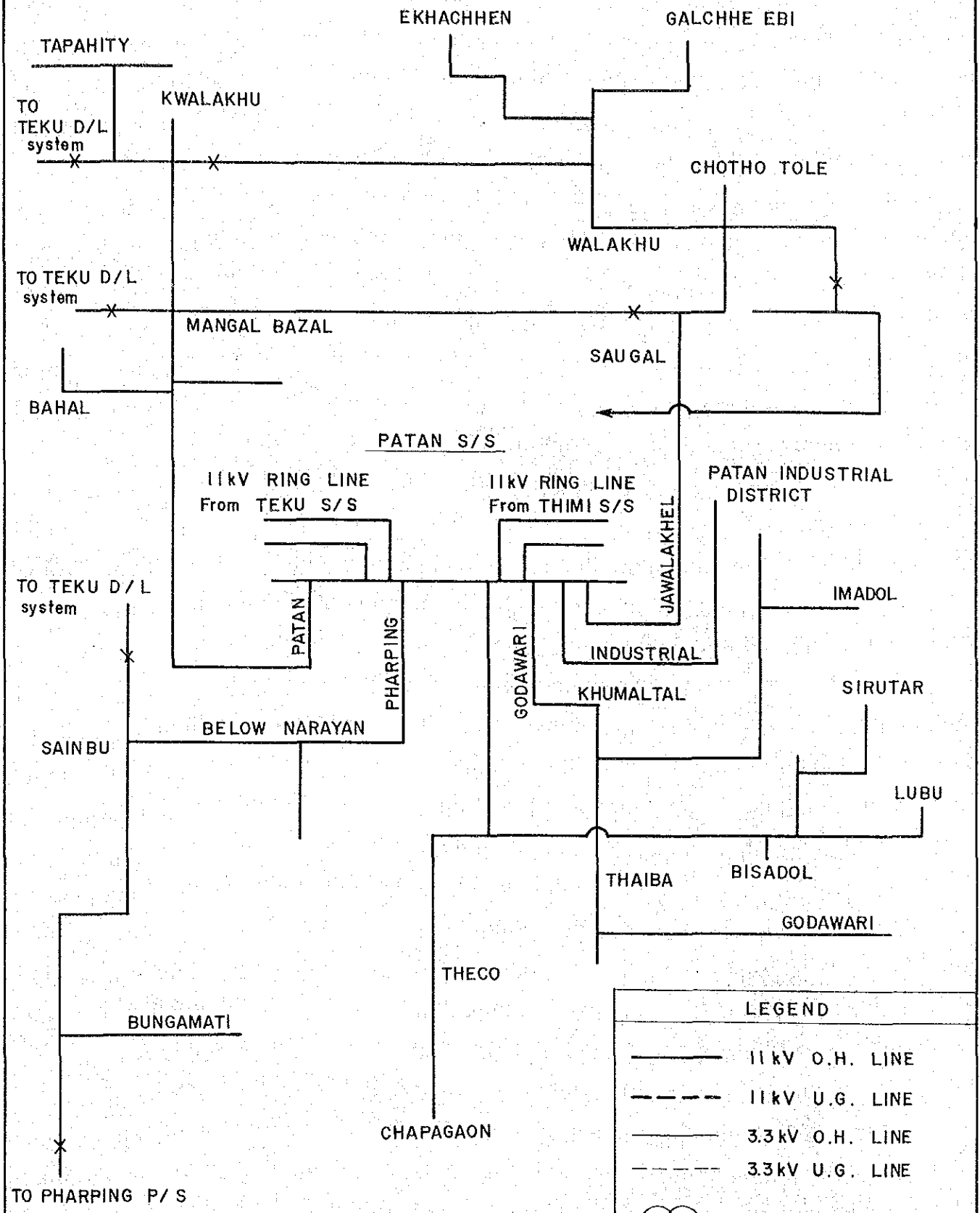


FIG. 5-10 CONSTRUCTION TIME SCHEDULE