

VI. EVALUATION OF THE PROJECT

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The power supply conditions of the Kathmandu valley has been much improved by completion of the first phase of the first stage program of the Project and the commissioning of the Kulekhani No.1 power station. The power generating capacity much increased and the power distribution system in the valley was much improved.

By implementation of the second phase of the first stage program, the remaining works of the first phase, the following benefits will accrue:-

- 1) The construction of 11 kV lines, rearrangement of the 11 kV distribution system, addition of new interconnection, upgrading of 3.3 kV system, etc. will much improve the supply conditions by the increase of the power supply capacity to meet increasing demand, decreasing the chance of shut-down, voltage drop and loss of the distribution system.
- 2) During the first phase work, extension of the distribution system was limited to the western part of the valley and about 10,000 households were newly supplied with electricity as shown on Appendix VIII. Under the second phase, the remaining parts of the rural areas of the valley, mainly the eastern parts, is planned to be electrified by construction of 11 kV and low tension lines, and installation of 3.6 MVA transformers. Thus, about 11,000 households will be newly electrified.
- 3) The reinforcement of the 11 kV distribution lines will improve the supply stability. As a result, new power supply to industrial consumers in Balaju and Patan industrial areas, and other bulk power consumers such as hotels, hospitals, etc. is expected. For such consumers, power will be supplied at 11 kV, by stepdown transformers installed by the consumers. These demand is estimated to be 2,300 kW in 1984/85.

- 4) The total capacity of the distribution transformers in the Kathmandu valley in 1980 was 42.6 MVA including transformers on the 3.3 kV system. Under the first phase implementation, a total of 25.9 MVA of distribution transformers were installed, but some of which were replacement of 3.3 kV transformers. Thus, the net increase of the transformer capacity was about 20 MVA.

By the addition of 27 MVA of transformers under the second phase program, the transformer capacity will increase by about 24 MVA after taking into account the replacement of 3.3 kV transformers due to the upgrading of the distribution voltage.

Thus, the total capacity of distribution transformers will be increased to about 87 MVA, the target capacity of the first stage of the project. This means the transformer capacity become two times of that in 1980 and will be enough for distributing the generated power including that of the Kulekhani No.1 power station.

The extension and rearrangement of the distribution network and the increase in the power supply capacity will result in supplying power to waiting consumers, electrification of the rural areas and improvement of supply conditions. Thus, the planned project will promote the electrification of the valley and the development of small and medium industries, and also contribute to the levelling up of the living standard of the inhabitants in the valley by utilization of electricity. It is also noted that the saving in fuel oil and fire woods for cooking and room heating by switching to electricity to be supplied by hydro-electric power plants is one of the important policies of HMG of Nepal.

VII. CONCLUSION AND PROPOSITION

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As described in the foregoing sections, necessity for implementing the second phase of the first stage of the Kathmandu Valley Transmission and Distribution Network Project is quite high. By implementing the planned Project, the power supply capacity of the distribution system will much increase and service conditions will be much improved. Thus, the Project will contribute to levelling up of living standard of the Kathmandu valley and promoting the industrial and commercial activities.

From the above reasons, the Project is considered to be significant and the grant-aid from the Government of Japan for implementation of the second phase of the first stage of the Kathmandu Valley Transmission and Distribution Network Project is considered to have sufficient relevance.

HMG of Nepal desires to complete the Project within the fiscal year of 1983/84. In order to meet this requirement, the time schedule is extremely tight as referred to Appendix X, the tentative time schedule referring to the actual performance of the first phase.

In order to achieve the proposed schedule, it is necessary to start the preparation of the tender documents immediately and call tender at the earliest possible time with possible shortest tendering period.

APPENDIX

APPENDIX ICOUNTERPARTS, TEAM MEMBERS AND SCHEDULE OF TEAM AT SITE(A) NEPALESE OFFICIALS and COUNTERPARTS

Ministry of Water Resources

Mr. P.P. Shah	Secretary
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Electricity Department

Mr. H.M. Shrestha	Chief Engineer
Mr. G.R. Bhatt	Ex. Project Manager of the First Phase
Mr. R.C.L. Pradhan	Chief of Electrical Design Division
Mr. M.P. Upadya	Divisional Engineer
Mr. B.S. Malla	Engineer
Mr. D. Gyawali	Engineer

Water Resource Commission

Dr. M.R. Tuladhar	Divisional Engineer
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Nepal Electricity Corporation

Mr. L.P. Dixit	General Manager
Mr. T.B. Pradhanaga	Manager, Transmission & Distribution
Mr. R.M. Sakya	Manager, Planning & Generation
Mr. M.J. Bhutia	Chief of Planning and Research Division
Mr. K.G. Shrestha	Chief of Transmission Distribution Maintenance Division

(B) TEAM MEMBER

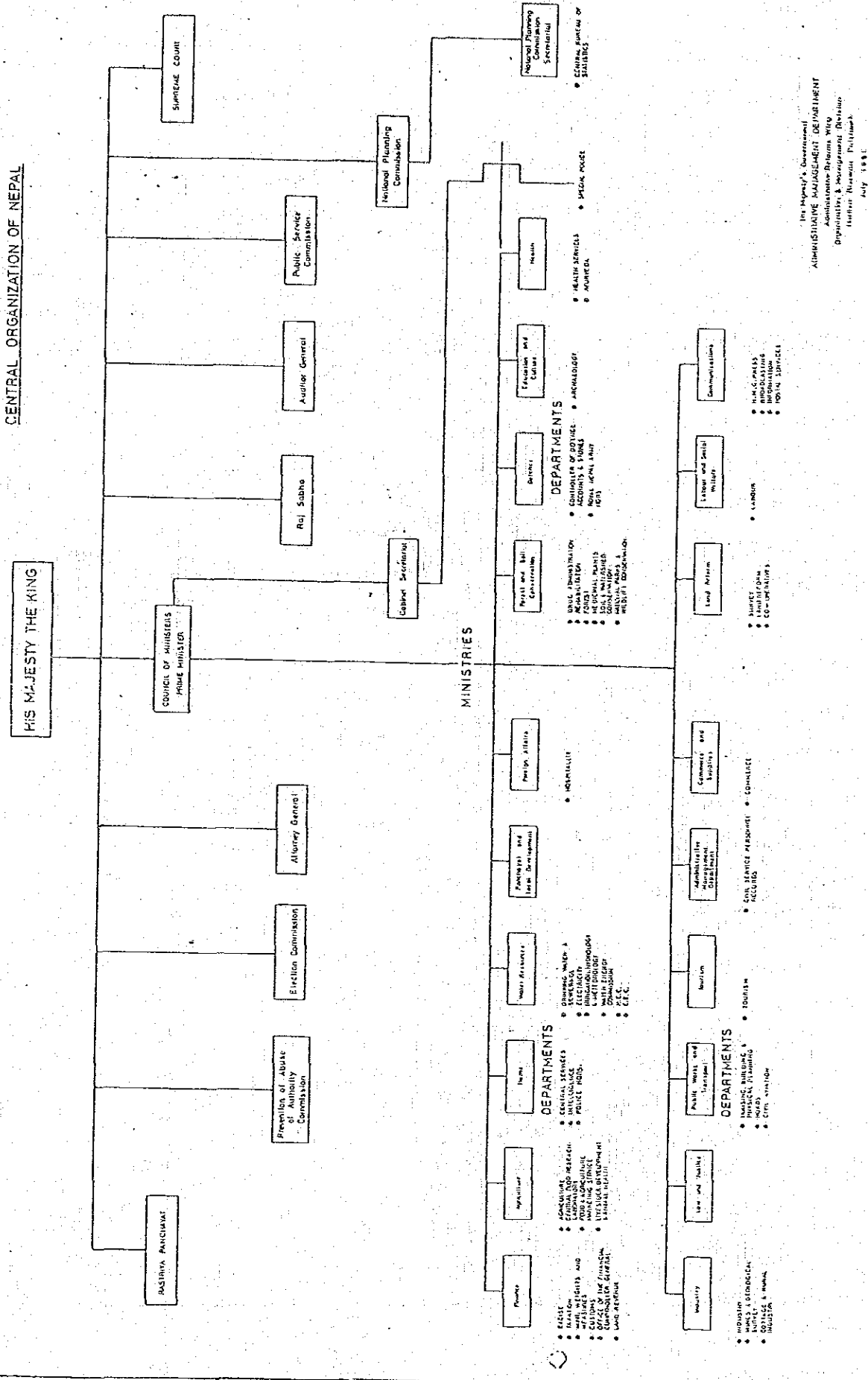
Mr. N. Shimomura	Team Leader
Mr. S. Suzuki	Team member
Mr. K. Kato	Team member
Mr. T. Arita	Team member
Mr. Y. Harada	Team member (Home work)

(C) SCHEDULE OF TEAM AT SITE

Date	Activities
19/Jun S	Trip from Narita to Bangkok
20/Jun Su	Trip from Bangkok to Kathmandu
21/Jun M	Courtesy call to Japanese Embassy, JICA office, Electricity Department, Nepal Electricity Cooperation and Finance Ministry
22/Jun T	Meeting with Nepalese officers and counter parts
23/Jun W	Discussion on distribution plan and investigation
24/Jun Th	Site investigation
25/Jun F	Site investigation
26/Jun S	Site investigation and discussion on distribution box of pole transformers
27/Jun Su	Site investigation
28/Jun M	Site investigation
29/Jun T	Site investigation and data collection
30/Jun W	Site investigation, preparation of drawings for distribution lines
1/Jul Th	Study of inland transportation condition and site investigation
2/Jul F	Discussion on meter, equipment and tools, site investigation
3/Jul S	Site investigation and arrangement of maps and drawings
4/Jul Su	Arrangement of maps and drawings
5/Jul M	Arrangement of maps and data, and cost calculation
6/Jul T	Discussion on scope of works and cost calculation
7/Jul W	Discussion on scope of works and cost calculation
8/Jul Th	Negotiation on the liability of HMG
9/Jul F	Reporting to Embassy of Japan about the result of the negotiation and explanation of the project condition
10/Jul S	Review of the design criteria
11/Jul Su	Review of the design criteria and courtesy call to Japanese Embassy, JICA Office, ED and NEC.
12/Jul M	Trip from Kathmandu to Bangkok
13/Jul T	Trip from Bangkok to Narita

APPENDIX - II

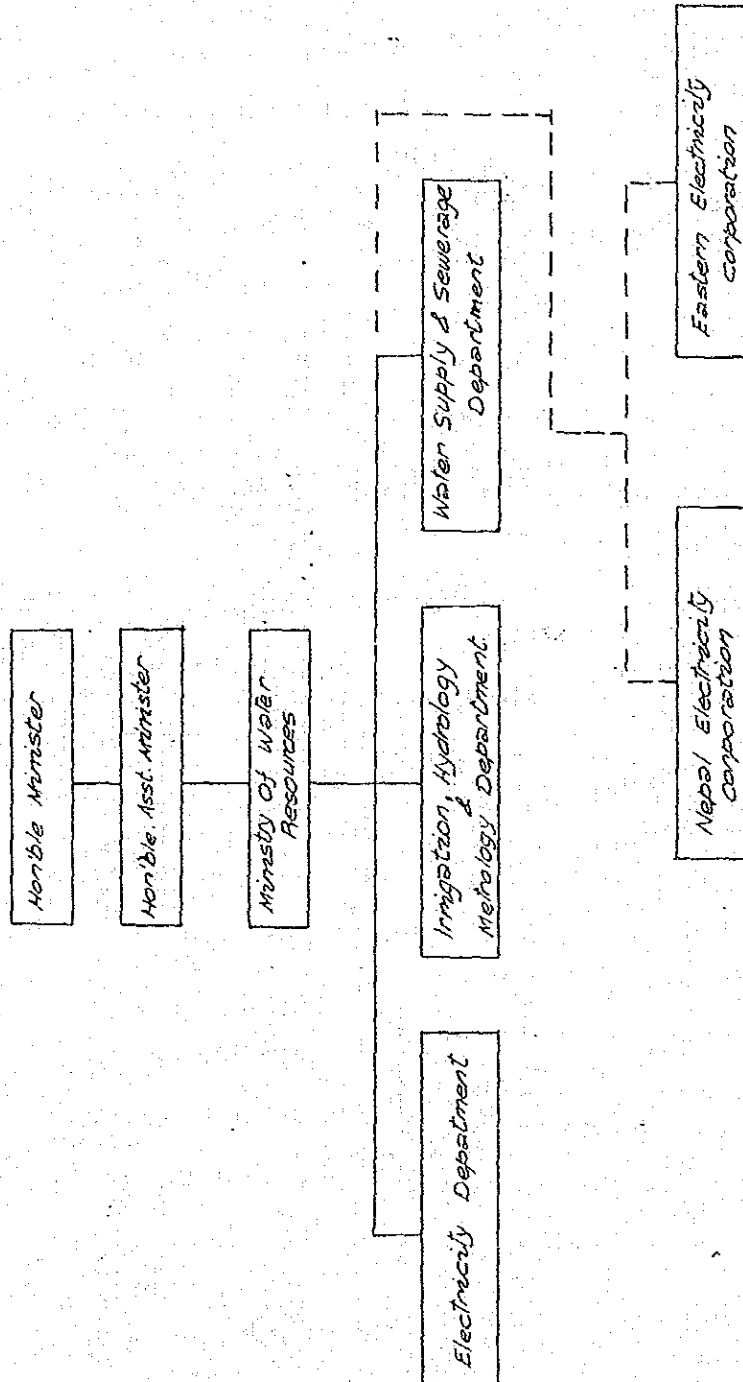
CENTRAL ORGANIZATION OF NEPAL



The Majesty's Government
ADMINISTRATIVE MANAGEMENT DEPARTMENT
 Administrative Debarth Wing
 Department of Management Division
 Institute National Publications
 July 1981

HIS MAJESTY'S GOVERNMENT OF NEPAL
MINISTRY OF WATER RESOURCES

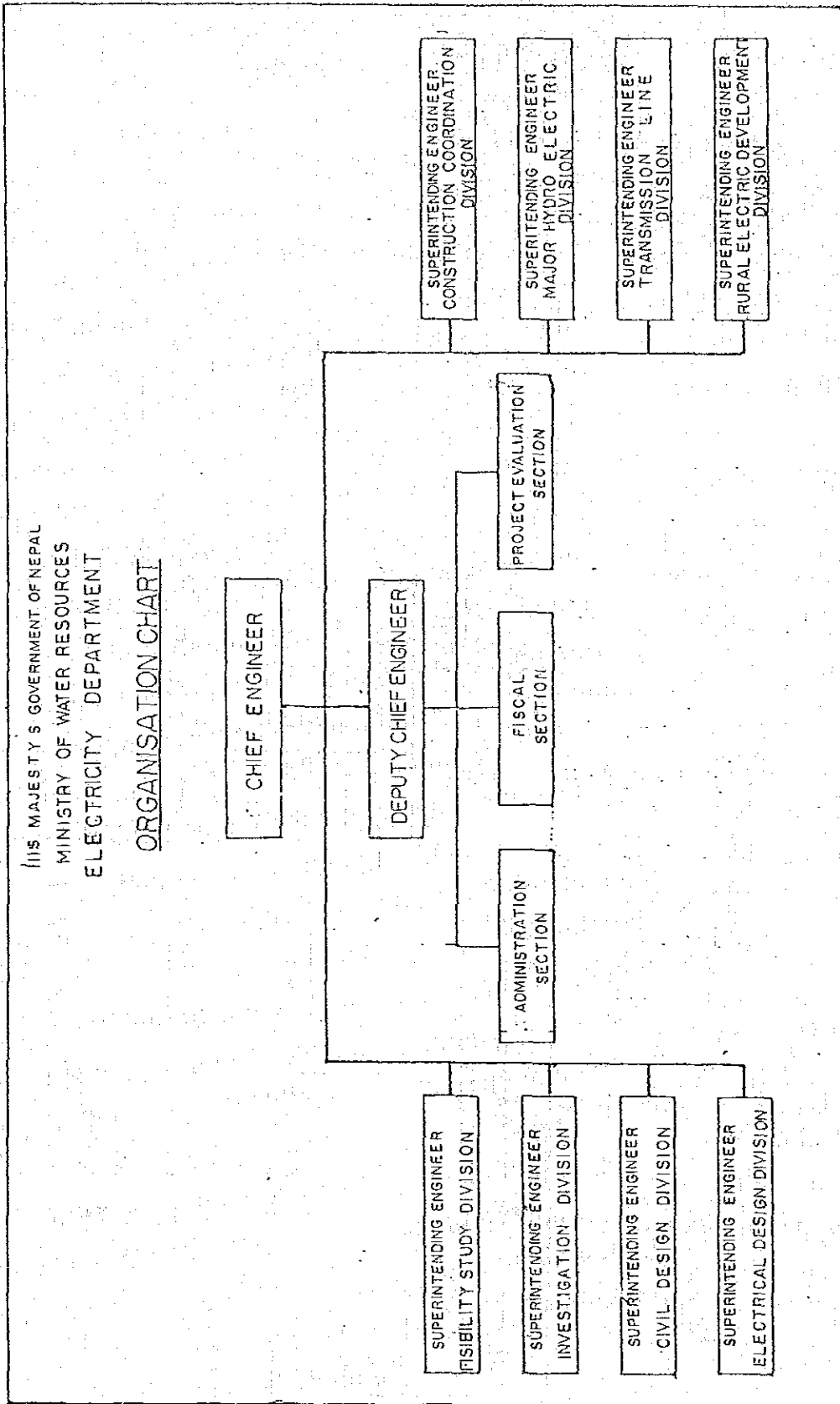
ORGANISATION - CHART



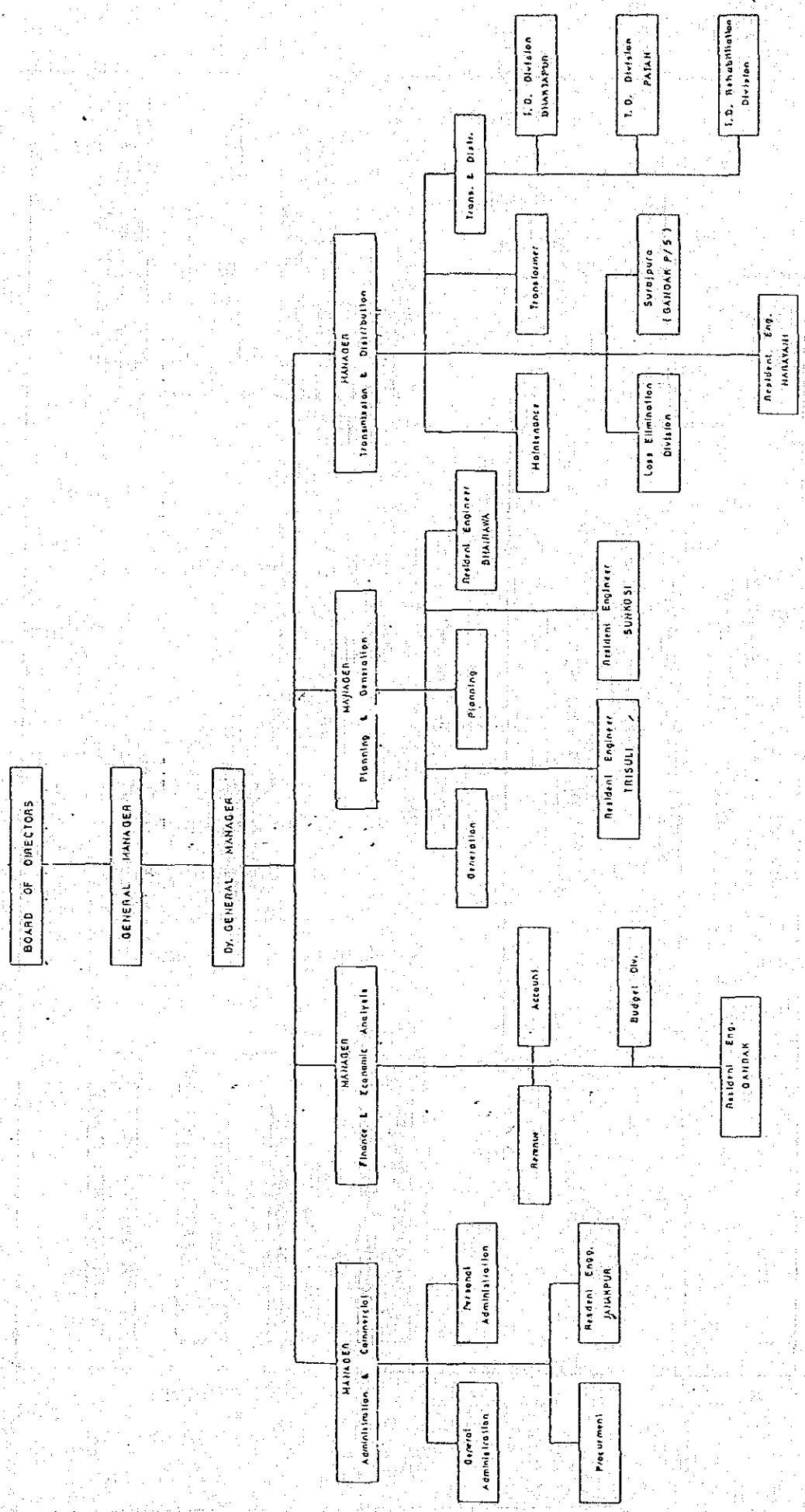
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His Majesty's Government of Nepal
Ministry of Water Resources
Electricity Department

ORGANISATION CHART



NEPAL ELECTRICITY CORPORATION



APPENDIX - 3CURRENT ELECTRICITY TARIFF RATES

The electricity tariff rates have been revised as given below. The revised tariff will be effective from the meter reading and billing from 1st Falgun 2036 in Bagmati, Narayani (except Guar in Rantahat District) 15 Jan., 1980 (Gandaki and Lumbini Zones).

<u>1. DOMESTIC CONSUMERS</u>	<u>Unit Rate</u>
A. a) 1 to 25 units	25 PAISA
b) 26 to 100 units	40 PAISA
c) 101 to 300 units	55 PAISA
d) Above 300 units	70 PAISA
 B. MINIMUM CHARGES	
a) 2.5 AMPS. to 15 AMPS	RS 6/25 per month and 25 units free
b) 16 AMPS. to 30 AMPS	RS 16/25 per month and 50 units free
c) 31 AMPS. to 60 AMPS	RS 36/25 per month and 100 units free
d) 61 AMPS. to 100 AMPS	RS 63/75 per month and 150 units free
e) Above 100 AMPS	RS 146/25 per month and 300 units free
 <u>2. INDUSTRIAL CONSUMERS</u>	
A. SMALL (upto 100 kW)	RS 12/- per installed kW per month and 36 PAISA per unit or RS 9/- per installed BHP per month
 B. MEDIUM AND LARGE	 RS 30/- per kW maximum demand per month and 30 PAISA per unit or 24/- per kVA maximum demand per month
 <u>3. COMMERCIAL CONSUMERS</u>	
ABOVE 50 kW	RS 30/- per kW maximum demand per month and 41 PAISA per unit or 22/50 per BHP per month or 24/- per kVA maximum demand per month

- | | | |
|----|--------------------------------|---|
| 4. | <u>STREET LIGHT</u> | |
| | A. METERED | 35 PAISA per unit |
| | B. UNMETERED | 14 PAISA per watt per month |
| 5. | <u>IRRIGATION AND DRINKING</u> | RS 25/- per kW per month. 25 PAISA |
| | WATER SUPPLY | per unit |
| 6. | <u>TRANSPORTATION</u> | RS 25/- per kW maximum demand per month |
| | | 30 PAISA per unit |
| | | or RS 18/75 per BHP per month |
| | | or RS 20/- per kVA maximum demand per |
| | | month |
| 7. | <u>TEMPORARY SUPPLY</u> | |
| | A. METERED | RS 1/- per unit per month |
| | B. UNMETERED | 45 PAISA per watt per month |
| 8. | <u>BULK SUPPLY TO INDIA</u> | 14 PAISA I.C. per unit |

The existing electricity tariff rates in Janakpur Zone and Rantahat District (Gaur Area) will remain unchanged.

APPENDIX - IV

App. IV

REVENUE AND EXPENDITURE OF NEC

(a) Gross Revenue (Classified) in Lac Rupees

	<u>1970</u> <u>/71</u>	<u>1971</u> <u>/72</u>	<u>1972</u> <u>/73</u>	<u>1973</u> <u>/74</u>	<u>1974</u> <u>/75</u>	<u>1975</u> <u>/76</u>	<u>1976</u> <u>/77</u>	<u>1977</u> <u>/78</u>	<u>1978</u> <u>/79</u>	<u>1979</u> <u>/80</u>
Domestic	49.63	63.38	75.37	98.51	110.83	134.55	310.09	238.10	266.84	299.25
Industrial	7.99	9.28	15.01	27.06	32.59	46.55	79.75	19.12	103.69	154.33
Commercial	10.00	11.55	13.84	15.97	20.89	27.76	44.91	52.41	71.07	113.83
Bulk Supply	6.52	6.60	12.38	7.68	8.99	11.56	11.91	11.80	52.52	11.98
Street Lights	0.99	0.97	1.93	1.34	1.45	1.56	2.72	3.42	4.24	9.15
Miscellaneous	2.04	3.06	4.56	8.50	18.38	10.19	11.40	13.77	35.81	42.52
Gross Revenue	87.17	96.98	122.09	159.06	187.12	232.19	360.78	410.62	494.22	631.06
Rebate	1.04	0.69	0.79	0.94	1.28	1.05	0.99	1.08	1.24	1.21
Net Revenue	86.13	96.29	121.30	158.12	186.10	231.10	359.79	409.54	492.98	629.85
Growth Rate (from previous year)	10.26%	11.79%	25.97%	30.35%	17.69%	24.20%	55.66%	13.83%	20.37%	27.76%

(b) Total Expenditure in Lac Rupees

<u>1970/71</u>	<u>1971/72</u>	<u>1972/73</u>	<u>1973/74</u>	<u>1974/75</u>	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>	<u>1978/79</u>	<u>1979/80</u>
81.38	87.70	106.20	149.00	258.87	322.33	251.35	393.81	558.12	458.98

APPENDIX -- V
WORKING ITEMS PROPOSED BY ED
FOR SECOND PHASE OF FIRST STAGE

1)	<u>New 11 kV lines</u>	<u>98.89 km</u>
	a) <u>Overhead line</u>	<u>86.46</u>
	City area	
	Kathmandu	8.86
	Patan	6.76
	Bhaktapur	3.80
	Rural area	67.04
	b) <u>Underground cables</u>	<u>12.43</u>
	City area	
	Kathmandu	6.76
	Patan	2.17
	Bhaktapur	2.5
	Rural area	1.0
2)	<u>Upgrading of Voltage and Conductor Size</u>	<u>27.5 km</u>
	a) <u>Overhead line</u>	<u>9.5</u>
	Kathmandu	6.50
	Patan	3.00
	b) <u>Underground line</u>	<u>18.0</u>
	Kathmandu	17.5 km
	Patan	0.5
3)	<u>Distribution transformers</u>	<u>46,100 kVA</u>
4)	<u>400/230 V Lines (New & Renewed)</u>	<u>206.46 km</u>
	a) <u>Overhead lines</u>	<u>201.46</u>
	City area	18.0
	Rural area	183.46
	b) <u>Underground cable</u>	<u>5</u>
	Cu 4C - 150 sq.mm	2
	Cu 4C - 78 sq.mm	3

5) Watt-hour meter and others

a) Watt-hour meter	34,700 Nos
b) 11 kV, sectionalizing switch (on load circuit breaker)	100 sets
c) 11 kV cutout switch with drop out fuse on primary side of pole transformers	1,500 Nos
d) Auto-reloser and sectionalizing switch	25 Nos
e) Machine and equipment for transformer workshop and laboratory	1 lot

6) Maintenance tools and others

a) Vehicles	
Working car (Diesel)	1 unit
Pick up car (")	3 "
b) Stringing tools	
Chain block	5 sets
Hand winch	10 "
Wire tensioner	20 Nos
Safety belts	100 sets
Earthing devices	15 sets
D.S. operating rods	15 "
Helmets	100 Nos
Snatch blocks	15 "
Wire cutters	5 "
Sling wires	140 Pos
Glass fibre ladders	200 Nos

7) New substation in city area in Kathmandu

K2 substation will be seriously overloaded in near future.
Some countermeasure was required.

Details of Distribution Lines in Rural Area

AREA	DISTANCE (km)	NO. OF CIRCUIT	CONDUCTOR	OTHERS
11 kV New Lines				
1.	Jhoukhel	1.57	1	ACSR 25 sq.mm
2.	Duwakot	2.89	1	- do -
3.	Gurdu	3.73	1	- do -
4.	Chhaling	0.53	1	- do -
5.	Bageswari	2.45	1	- do -
6.	Lamatar	5.50	1	- do -
7.	Phutunghour	1.75	1	- do -
8.	Dachhi	0.90	1	- do -
9.	Bimdunga	0.53	1	- do -
10.	Chovar	2.13	1	- do -
11.	Jharwarasi (North)	0.90	1	- do -
12.	Bisanku Narayan	0.98	1	- do -
13.	Indrayani	1.35	1	- do -
14.	Goldhunga	1.35	1	- do -
15.	Chunikhel	1.14	1	- do -
16.	Dadhikot	2.78	1	- do -
17.	Nagarkot	-	1	-
18.	Chapagaor	2.00	1	ACSR 25sq.mm
19.	Shipadol	3.35	1	- do -
20.	Jhor	12.30	1	- do -
21.	Dahachok	2.85	1	- do -
22.	Lapsephedi	3.38	1	- do -
23.	Sudal	4.95	1	- do -
24.	Tathali	3.53	1	- do -
25.	Jharwarasi (South)	3.20	1	- do -
Total:		67.04		

Details of Distribution Lines in Rural Area

AREA	DISTANCE (km)	NO. OF CIRCUIT	CONDUCTOR	OTHERS
400/230 V Low Tension Lines				
1.	Jhoukhel	11.01	1	ACSR 58sq.mm ACSR 25sq.mm
2.	Duwakot	12.23	1	- do -
3.	Gundu	13.77	1	- do -
4.	Chhaling	4.60	1	- do -
5.	Bageswari	11.63	1	- do -
6.	Lamatar	21.50	1	- do -
7.	Phutungchour	4.13	1	- do -
8.	Dachhi	4.45	1	- do -
9.	Bimdunga	6.65	1	- do -
10.	Chovar	5.03	1	- do -
11.	Jharwarasi (North)	1.40	1	- do -
12.	Bisanku Narayan	2.90	1	- do -
13.	Indrayani	3.85	1	- do -
14.	Goldhunga	3.90	1	- do -
15.	Chunikhel	1.15	1	- do -
16.	Dadhikot	8.83	1	- do -
17.	Nagarkot	7.15	1	- do -
18.	Chapagaor	6.98	1	- do -
19.	Shipadol	7.20	1	- do -
20.	Jhor	12.00	1	- do -
21.	Dahachok	5.00	1	- do -
22.	Lapsephedi	3.00	1	- do -
23.	Sudal	14.60	1	- do -
24.	Tathali	6.00	1	- do -
25.	Jharwarasi	4.50		
Total:		183.46		

APPENDIX - VIWORKING ITEMS OF SECOND PHASE OF FIRST STAGE

1)	<u>New 11 kV Line</u>	<u>70.81</u> km
	a) <u>Overhead line</u>	<u>58.18</u>
	City area	(24.50)
	Kathmandu	8.75
	Patan	4.25
	Bhakatapur	0.50
	Interconnection	11.00
	Rural area	(33.68)
	b) <u>Underground cable</u>	<u>12.63</u>
	City area	(11.63)
	Kathmandu	6.76
	Patan	2.17
	Bhakatapur	2.50
	Interconnection	0.20
	Rural area	(1.00)
2)	<u>Upgrading of Voltage</u>	<u>11.70</u> km
	a) <u>Overhead line</u>	<u>3.20</u>
	Kathmandu	3.04
	Patan	0.16
	b) <u>Underground cables</u>	<u>8.50</u>
	Kathmandu	4.83
	Patan	3.67
3)	<u>Distribution Transformers</u>	<u>27,075</u> kVA
	3 ϕ 11/0.4 kV, 250 kVA	35 units
	100 kVA	152 units
	50 kVA	39 units
	25 kVA	47 units
	(Total)	273 units

4) <u>400/230 V Lines (New & Renewing)</u>	<u>144.53 km</u>
a) <u>Overhead lines</u>	<u>139.53</u>
City area	18.00
Rural area	121.84
b) <u>Underground cable</u>	<u>(5.00)</u>
Cu 4C x 150 sq.mm	2.00
Cu 4C x 38 sq.mm	3.00
5) <u>Watt Hour Meter and Others</u>	<u>1 lot</u>
a) <u>Watt hour meter</u>	<u>9,650 Nos.</u>
3 ϕ - 4W, 400V/230 V, 15 Amp.	100
- ditto - 30 Amp.	50
1 ϕ - 2W, 230V, 10/60 Amp.	1,500
- ditto - 5/30 Amp.	4,000
- ditto - 5/15 Amp.	4,000
b) <u>11 kV sectionalizing switches</u>	<u>50 Nos.</u>
c) <u>11 kV cutout switch, 1ϕ</u>	<u>600 Nos.</u>
6) <u>Maintenance Tools</u>	<u>1 lot</u>
Chain block	5 sets
Hand winch	10 sets
Wire tensioner	20 Nos.
Earthing device	15 sets
Operating rod for cutout switch	15 Nos.
Helmet	100 Nos.
Safety belts	100 Nos.
Snatch block	15 sets
Wire cutter	5 sets
Sling wire	140 pcs.

7) <u>Thapathali Switching Station</u>	<u>1 lot</u>
a) <u>Panel</u>	<u>9 sets</u>
Incoming	2
Feeder	6
Station service	1
Battery charger and battery	1
b) <u>Underground cable</u>	<u>6.00</u>
Cu 3C x 200 sq.mm	5.00
Al 3C x 200 sq.mm	1.00
c) <u>Cable terminals and materials</u>	<u>1 lot</u>

Details of Overhead Lines & Underground Cables

WORK ITEM	LENGTH (km)	No. of CIRCUIT	CONDUCTOR & CABLE	Remark
1) New 11 kV Lines				
a) <u>Overhead lines</u>	<u>58.18</u>			
i) <u>City area</u>	<u>24.50</u>			
(Kathmandu)	(8.75)			
Kalirkasthan	1.48	1	ACSR 95 sq.mm	
Battisputali East	0.37	1	ACSR 25 sq.mm	
Kurmagon	0.18	1	- ditto -	
Mir Bhawar	0.25	1	- ditto -	
Koteswar	0.30	1	- ditto -	
Bimsengole-2	0.17	1	- ditto -	
Maitidewi-2	0.28	1	ACSR 95 sq.mm	
Kumarigole	0.40	1	ACSR 25 sq.mm	
Nayabazar	0.04	1	- ditto -	
Chetrapati	0.18	1	- ditto -	
Tahachal	0.24	1	- ditto -	
Kal car	0.30	1	- ditto -	
Min of Forests	0.25	1	- ditto -	
Babar Mahal	0.24	1	- ditto -	
Bareswar	0.25	1	- ditto -	
Min Bhawar	0.30	1	- ditto -	
Chable	0.25	1	- ditto -	
Hadigon	0.30	1	- ditto -	
Garridhara	0.28	1	- ditto -	
Dall	0.30	1	- ditto -	
Kimdol	0.30	1	- ditto -	
Tahachal-2	0.24	1	- ditto -	
- ditto -3	0.25	1	- ditto -	
Siuchatar	0.26	1	- ditto -	
Sunargoan	0.17	1	- ditto -	
Ghneswar-Bhandarkhel	1.17	1	ACSR 95 sq.mm	

WORK ITEM	LENGTH (km)	No. of CIRCUIT	CONDUCTOR & CABLE	Remark
(Patan)	(4.25)			
Kandevatesthan	0.56	1	ACSR 95 sq.mm	
Pulchok	0.14	1	ACSR 25 sq.mm	
Purnachandi	0.31	1	- ditto -	
Balkumari	0.38	1	- ditto -	
Tikhidewar	0.25	1	- ditto -	
Nyankhel	0.25	1	- ditto -	
Sanepa Dhunga Khani	0.77	1	- ditto -	
Gusingal	0.20	1	- ditto -	
Tadamlo	0.24	1	- ditto -	
Inar	0.30	1	- ditto -	
Sanchal	0.25	1	- ditto -	
Bakhundol	0.30	1	- ditto -	
Jhamsikhel	0.30	1	- ditto -	
(Bhaktapur)	(0.50)			
Bolachhe	0.20	1	ACSR 25 sq.mm	
Nasumana	0.30	1	- ditto -	
(Interconnection)	(11.00)			
Bhaktapur	3.30	1	ACSR 95 sq.mm	
Cable Gokarna	3.80	1	- ditto -	
Patan Radio Nepal	3.90	1	- ditto -	
ii) <u>Rural Area</u>	<u>33.68</u>			
Jhoukhel	1.57	1	ACSR 25 sq.mm	
Duwakot	2.89	1	- ditto -	
Gundu	3.73	1	- ditto -	
Chhaling	0.53	1	- ditto -	
Bageswari	2.45	1	- ditto -	
Lamatar	5.50	1	- ditto -	
Phutung Chour	1.75	1	- ditto -	

WORK ITEM	LENGTH (km)	No. of CIRCUIT	CONDUCTOR & CABLE	Remark
Dachhi	0.90	1	ACSR 25 sq.mm	
Bindunga	0.53	1	- ditto -	
Chovar	2.13	1	- ditto -	
Jharwarasi	4.10	1	- ditto -	
Bisank Narayan	0.98	1	- ditto -	
Indrayani	1.35	1	- ditto -	
Goldhunga	1.35	1	- ditto -	
Churikhel	1.14	1	- ditto -	
Dadhikot	2.78	1	- ditto -	

WORK ITEM	LENGTH (km)	No. of CIRCUIT	CONDUCTOR & CABLE	Remark
b) <u>Underground cable</u>	<u>12.63</u>			
i) <u>City area</u>	<u>11.63</u>			
(Kathmandu)	(6.76)			
K ₂ City hall	0.43	1	CVTAZV AL 3C x 200 sq.mm	
Thamel	0.56	1	- ditto -	
Kalinkasthan	0.15	1	CVTAZV AL 3C x 100 sq.mm	
Kalimati	0.14	1	- ditto -	
Matull tole	0.20	1	- ditto -	
Tripureswar	0.19	1	- ditto -	
Lagon tole	0.33	1	- ditto -	
Sarki goan	0.15	1	- ditto -	
Baneswar	0.39	1	- ditto -	
Kalikasthan	0.24	1	- ditto -	
Bhimsengole-1	0.37	1	- ditto -	
Bagh Bazar	0.17	1	- ditto -	
Dilli Bazar	0.24	1	- ditto -	
Maitidewi-1	0.40	1	- ditto -	
Maitidewi-2	0.32	1	CVTAZV AL 3C x 200 sq.mm	
Gathe Kulo	0.29	1	CVTAZV AL 3C x 100 sq.mm	
Mali gaon	0.34	1	- ditto -	
Lajimpot-1	0.40	1	- ditto -	
Lajimpot-2	0.31	1	- ditto -	
Battis Putali	0.25	1	- ditto -	
Bagh Bazar-2	0.47	1	- ditto -	
Dilli Bazar-3	0.22	1	- ditto -	
Naya Bazar	0.20	1	- ditto -	
(Patan)	(2.17)			
Pulchok	1.90	1	CVTAZV AL 3C x 200 sq.mm	
Dhobighat	0.10	1	CVTAZV AL 3C x 100 sq.mm	
Sanepa Dhunga Khani	0.17	1	- ditto -	

WORK ITEM	LENGTH (km)	No. of CIRCUIT	CONDUCTOR & CABLE	Remark
(Bhaktapur)	(2.50)			
Lachma tole	0.20	1	CVTAZV AL 3C x 100 sq.mm	
Chahwasa tole	0.20	1	- ditto -	
Pati Bihrr	0.20	1	- ditto -	
Maru tole	0.20	1	- ditto -	
Chhor tole	0.20	1	- ditto -	
Taumadhi	0.20	1	- ditto -	
Thalachhe	0.20	1	- ditto -	
Golmadhi	0.20	1	- ditto -	
Datatre	0.20	1	- ditto -	
Chochhe	0.20	1	- ditto -	
Bholachhe	0.20	1	- ditto -	
Muldhoka	0.20	1	- ditto -	
B.I.D	0.10	1	- ditto -	
(Interconnection)	(0.2)	1	CVTAZV AL 3C x 200 sq.mm	
ii) <u>Rural area</u>	<u>1.00</u>			
Ring line crossing	1.00	1	CVTAZV AL 3C x 100 sq.mm	

WORK ITEM	LENGTH (km)	NO. OF CIRCUIT	CONDUCTOR & CABLE	REMARKS
2) <u>Upgrading of Voltage and Conductors</u>				<u>11.68</u>
a) <u>Overhead line</u>	<u>3.20</u>			
(Kathmandu)	(3.04)			
New road	0.22	1	ACSR 95 sq.mm	
Chetrapati	1.11	1	- ditto -	
Sobhabhagwati	0.55	1	- ditto -	
Bijeswari	0.49	1	- ditto -	
Kankiswari	0.18	1	- ditto -	
Naya Bazar	0.49	1	- ditto -	
(Patan)	(0.16)			
Thaphity	0.16	1	ACSR 95 sq.mm	
b) <u>Underground cable</u>	<u>8.50</u>			
(Kathmandu)	(4.83)			
New road	0.59	1	CVTAZV 3C x 200 sq.mm	
Jyatha	1.59	1	- ditto -	
Chetrapati	0.43	1	- ditto -	
Sobhabhagwati	0.16	1	- ditto -	
Kaneswari	0.90	1	- ditto -	
Bhinsenthan	0.39	1	- ditto -	
New road	0.35	1	CVTAZV 3C x 100 sq.mm	
Jyatha	0.42		- ditto -	
(Patan)	(3.67)			
Naudon tole - Patan Gate	2.02		CVTAZV 3C x 200 sq.mm	
Thaphity	0.13		CVTAZV 3C x 100 sq.mm	
Ekhachhen	0.46		- ditto -	
Dalachhe Ebi	0.48		- ditto -	
Luksi	0.30		- ditto -	
Dhobighat	0.28		- ditto -	

WORK ITEM	LENGTH (km)	NO. OF CIRCUIT	CONDUCTOR & CABLE	REMARKS
3) <u>400/230 V Lines (New & Renewing)</u>				<u>144.5 km</u>
a) <u>Overhead lines</u>	<u>139.53</u>			
City area	(18.00)	1	ACSR 58 sq.mm	
Rural area	(121.53)			
Jhaukhel	11.01	1	ACSR 25 sq.mm	
Duwakot	12.23	1	- ditto -	
Gundu	13.77	1	- ditto -	
Chhaling	4.60	1	- ditto -	
Bageswari	11.63	1	- ditto -	
Lamatar	21.50	1	- ditto -	
Phutung chour	4.13	1	- ditto -	
Dachhi	4.45	1	- ditto -	
Bindunga	6.65	1	- ditto -	
Chovar	5.03	1	- ditto -	
Jharwarasi	5.90	1	- ditto -	
Bisanku Narayan	2.90	1	- ditto -	
Indrayani	3.85	1	- ditto -	
Goldhunga	3.90	1	- ditto -	
Chunikkel	1.15	1	- ditto -	
Dadhikot	8.83	1	- ditto -	
b) <u>Underground cable</u>	<u>5</u>			
City area	2	1	VVWAZV, Cu 4C x 150 sq.mm	
"	3	1	VVWAZV, Cu 4C x 38 sq.mm	

These cables are requested by HMG, but the locations are not clear.

APPENDIX - VII
CLIMATE IN KATHMANDU

(1) PRECIPITATION (1961 - 75)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Precipitation	18	21	33	54	83	270	383	338	160	62	07	02	1,431

(in Millimeters)

(2) TEMPERATURE (1961 - 75)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Extreme
Mean Maximum	18.6	20.8	24.8	28.2	29.5	28.9	27.7	27.7	27.4	26.6	23.1	20.0	36.6 (May)
Mean Minimum	1.5	3.1	6.6	10.4	14.1	17.8	18.8	18.6	17.1	12.4	6.5	2.2	-3.3 (Dec)

(in Degree Celsius)

Source: Central Bureau of Statistics, Statistical Pocket Book, Nepal, 1982.
(Department of Irrigation, Hydrology and Meteorology)

APPENDIX - VIIINUMBER OF HOUSEHOLDS IN RURAL AREA
TO BE ELECTRIFIED UNDER THE PROJECT

(based on 1981 census)

<u>Name of Panchayat</u>	<u>Number of Households</u>		
	<u>Total*</u>	<u>First Phase</u>	<u>Second Phase</u>
Pharping Soukhel	1,052	351	
Satikhel	509	509	
Sitapaila	1,101	1,101	
Gothatar	800	800	
Dhapasi Basundhara	764	382	
Indrayani	1,048	698	350
Mahankal	823	823	
Alapoth & Bhadrabas	645	273	
Chovar	832	421	411
Syuchatar	664	664	
Mane Maiju	948	473	
Goldhunga	748	561	187
Ramkot	1,126	751	375
Purano Naikap	902	451	
Jharuwasari	845	309	536
Dhapakhel	740	740	
Bisankhu Narayan	1,099	780	419
Jhoukhel	794		794
Duwakot	813		813
Gundu	816		816
Chhaling	1,188		1,188
Bageswari	691		691
Lamatar	1,005		1,005
Phutungchour	636		636
Dachhi	879		879
Chunikhel	823		823
Dadhikot	849		849
Total:	23,140	10,087	10,772

* Number of households is estimated from population divided by 5.5 of average number of persons per household.

APPENDIX - IXINLAND TRANSPORTATION CONDITION

All equipment and materials will be unloaded at Calcutta port in India.

From Calcutta to Kathmandu, there are two ways for the transportation. One is railway transportation, but the rail way has two different gauges. One part of between Calcutta and Muzaffarpur is wide gauge and from Muzaffarpur to Birganj is narrow gauge. Accordingly, all cargos will be transshipped at Muzaffarpur station from wide gauge trains to narrow ones. And the transportation condition is not so good and the arriving date is usually uncertain after the shipment. Under such situation it will be better to transport all cargoes by truck than by train. The cargos will be possible to reach at site after unloading at Calcutta port within one month.

The road conditions in Nepal from Birganj to Kathmandu have been much improved. There are two roads between these towns. One, marked B, is shorter road of existing Mahendra high way through the Daman Pass, and the other, marked A, is branched at Hetauda and then reached to Kathmandu through Bharatpur. The route length of A is nearly 3 time of B. But required time by A route will be one hour longer the B route. By this A route more heavy and voluminous cargo will be possible to be transported.

The route map of these main road is shown on the attached map.

ROUTE MAP OF MAIN ROAD
(BIRGANJ — KATHMANDU)

