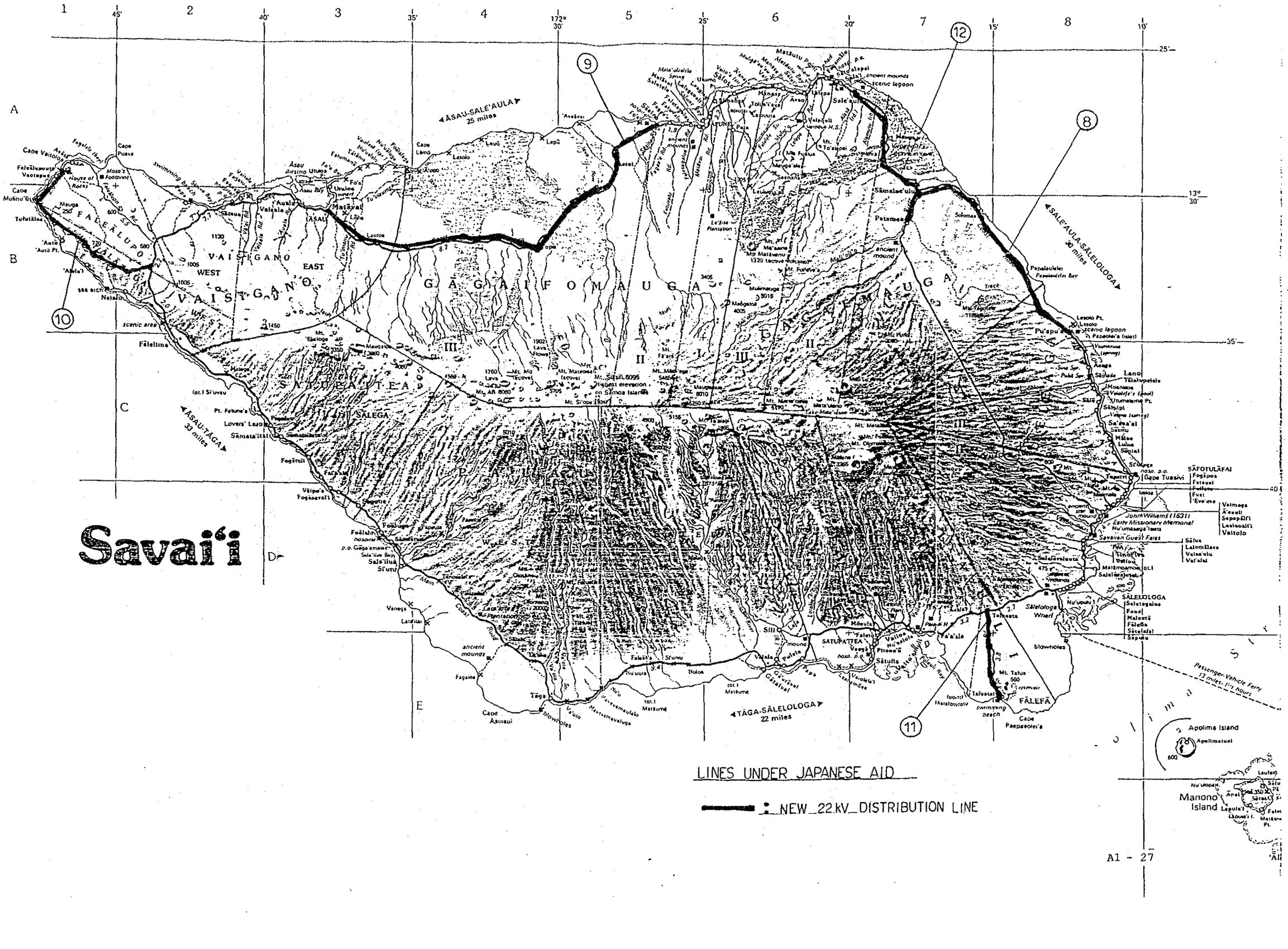
Savai'i


ÄSAU-SALE'AULA
25 miles
SALE'AULA-SÄLELOLOGA
20 miles
ÄSAUTÄGA
33 miles
TÄGA-SÄLELOLOGA
22 miles
FALEALUPO
V-AI-SEGAMO EAST
V-AI-SEGAMO WEST
GAGAIFOMAUGA
SALEGA
SATUPAITEA
SÄLELOLOGA
FÄLEFÄ
SÄFOTULÄFAI
Apolima Island
Manono Island
Passenger-Vehicle Ferry
13 miles-1½ hours
LINES UNDER JAPANESE AID
NEW 22 kV DISTRIBUTION LINE

'Upolu

LINES UNDER AFULILO PROJECT

NOTE

: NEW 22 kV LINE

: NEW 66 kV LINE (OPERATED IN 22 kV)

: UPGRADING TO 33 kV LINE

: POWER STATION

調査報告書
及び
相手側コメント

FIELD SURVEY REPORT
ON
RURAL ELECTRIFICATION PROJECT
IN WESTERN SAMOA

It is intended to confirm the following results of the site survey and study made by the Basic Design Study Team of JICA on the Rural Electrification Project.

1. Scope of Project

During site survey of the proposed Project areas with EPC Engineers, it has been found that the following distribution lines in Upolu and Savaii islands will be undertaken by the Japanese Grant Aid, the length of the lines are provisional length which will be finalized referring to the 1/20,000 maps during basic design study:

a. Upolu Island	22 kV Lines	HV/LV Lines	LV Lines	Priority
Tanugamanono - Siumu	16 km	9 km	3 km	1
Lotofaga - Amaile	7 km	15 km	21 km	2
Saluafata - Sauniatu	3 km	4 km	7 km	5
Siusega - Tanumalala	13 km	6 km	9 km	3
Aleisa Road - Saleimoa	4 km	3 km	3 km	6
Nuu - Faleula	0 km	3 km	2 km	4
Lepale - Fasitoouta	4 km	3 km	3 km	7
Satuimalufilufi - Satapuala	5 km	8 km	7 km	8
Total Upolu Island	52 km	51 km	55 km	

b. Savaii Island	22 kV Lines	HV/LV Lines	LV Lines	Priority
Puapua - Samalaeulu	10 km	7 km	1 km	11
Sasina - Matavai	16 km	10 km	1 km	12
Tafutafoe	5 km	2 km	1 km	9
Tafuaufa - Tafuatai	3 km	12 km	4 km	10
Total Savaii	34 km	31 km	7 km	

c. Total Length of Lines	22 kV Lines	HV/LV Lines	LV Lines
	86 km	82 km	62 km
22 kV Lines'	1[illegible] km		
LV lines	1[illegible] km		

The Project may be undertaken into two phases. the selection of the lines in the each phase will be made referring to the priority mentioned above. the lines have prior numbers will be included in the first phase, the remaining lines will be in the second phase.

2. The following materials, equipment and erection tools for the Project will be provided under the Japanese Grant Aid.

Distribution line poles, crossarms and fittings
Conductors, joints, preformed grips and fittings
Insulators, clamps and fittings
Distribution transformers and accessories
Switches lightning arresters and accessories
Construction equipment (Drilling machine)
Pickup trucks
Construction tools
Miscellaneous materials and equipment

It is noted that the Watt-Hour Meters and the step up transformer to be installed at Puapua will be studied during the basic design.

3. The Terms of Reference of the Consultant are as mentioned below;

Home Works

- Detailed design of the distribution system
- Preparation of the bid document for procurement of the Plant
- Administrative works for bidding, evaluation and contract
- Checking of drawings for approval and comment on it
- Pre-shipment inspection and issuing inspection certificates

Field Works

- Pre-shipment inspection and issuing inspection certificates, when required
- Preparation of construction drawings such as route maps, pole and insulator configuration
- Preparation of implementation schedule
- Supervising construction works
- Assist to EPC for the commissioning test of the completed lines

- Providing monthly progress reports
- Provision of foremen for additional working gangs. if required

4. The Government of Western Samoa will provide the followings:
   - To assist provision of site accommodation for the consultant at Apia and Lanomanu in Upolu, Salelologa and Vaisala
   - To secure right of way and clearing of the line routes
   - To provide a personnel of Public Relation to solved trouble with local peoples
   - To provide stock yards for the imported materials for the Project and to secure those materials in stores
   - To unload all materials arrived at Western Samoa and clear it from the custom security
   - To transport the materials from the port of Apia to construction sites via depots including transport to Savaii island
   - To construct all distribution lines
   - To provide all erection forces for the construction works
   - To nominate a person in charge to control construction gangs for implementation of the Project
   - To provide all local fund including custom duties and taxes for the imported materials if required and the banking charges for the banking arrangement required under the Japanese Grant Aid
   - Others not covered by Japanese Grant Aid

5 Technical Confirmation

a. 66 kV design of poles

Taking into account of the future reinforcement of the power system in Upolu island, the poles from Tanugamanono to Lotofaga via Siumu are requested to have sufficient height to add a 66 kV line at the top of the poles. Therefore, the lines from Siumu to Lotofaga and Lotofaga to Afulilo power station, which are scheduled to be undertaken by EPC and EEC respectively, are also designed to have such sufficient pole height.

b Design concept

The design of the distribution lines shall basically be made in accordance with [CORD OF PRACTICE FOR OVERHEAD LINE CONSTRUCTION] established by Electricity Supply Association of Australia: No. C(b) 1, 1974 superseding 1962

The main design criterion are as mentioned below:

Maximum ambient temperature			34 deg. C (M/Record)
Average (Every day) temperature of conductor			
Minimum temperature of conductor:			15deg. C (M/Record)
Maximum Conductor Temperature for Max. sag			
Every day stress:		18 % at 15deg. in still air	(Cord C(b) 1)
Recorded Max.Wind velocity:		82 Knot (41 m/sec)	(M/Record)
Wind loads	On conductors	500 Pa	(Cord C(b) 1)
	On Poles	750 Pa	(Cord C(b) 1)
Safety factor	Conductors	18 % at 15deg. in still air	(Cord C(b) 1)
		50 % at 15deg. C with wind	(Cord C(b) 1)
	Poles	Wooden poles:	
		Concrete poles:	
		Steel poles:	
		Steel structures	
Ground clearance	a. Over road:	6.7 m	(Cord C(b) 1)
	b. Over other road.	6.7 m	(Cord C(b) 1)
	c. Over field not negotiable by vehicles:	5.5m	(Cord C(b) 1)
	Clearance for rural area may be 0.6 m less than above c.		
Spacing	Between phase conductor: (Cord C(b) 1)		
	$S = 0.0076$ m/kV + $0.37 \times (S)^{1/2}$ where S=dip in m		
	Between phase and neutral		
	Other structures and building: (Cord C(b) 1)		
	Vertical over floor	5.5 m	
	Vertical over roof	4.6 m	
	in any direction from walls	3.0 m	
	In any direction from structure	3.0 m	

Equipment basic insulation level (BIL for Tulila Project)

22 kV 125 kV

c. Distribution Line Materials

Conductors	High voltage		AAC FLY
			AAC WASP
	Line from Tanugamanono to Siumu		AAC WASP
	Other lines		AAC FLY
	Low voltage	Phase conductor	PVC Covered AAC FLY
		Neutral wire	AAC Bare FLY
	Applied Standard		BS-215
Insulators	High voltage	22 kV	Pin type insulator
			Strain. Ball socket type suspension discs
	Low voltage	400V	Pin
	Color of Insulators and Bushing		
	Applied Standard		

Poles: Poles will be specified in acordance with AS 2209 and NSW Overhead Line Construction and Maintenance Regulations 1962 as follows:

Length	Stress Group	Treatment	Top Load
9 m (LV)	A (F=100 MPa)	Full length	6 kN
		Preservative	8 kN
		Treated	
12.5 m (22kV)	A (F=100 MPa)	Full length	6 kN
		Preservative	8 kN
		Treated	12 kN
14 m (66/22kV)	A (F=100 MPa)	Full length	8 kN
		Preservative	12 kN
		Treated	

Applied Standard: AS-061, 0117-1970, 2209-1979

d. Distribution transformers are installed on the basis of the following conditions

i Each village shown on the attached map is provided at least one distribution transformer

ii Single phase transformers 15 kVA and 25 kVA are basically provided in rural area

iii Three phase transformers will be installed at the village where demand is expected to be more than 50 kVA.

iv The demand in each village is estimated on the basis of population and demand per capita (about 30 to 40 W per Capita) obtained from the past record for keeping the same life level as the habitants in electrified area. The list of transformers estimated in accordance with the above conditions is attached for reference.

e The section switches will basically be provided at the following points

i Branch points of the 22 kV lines

ii Every 2 km but it's interval will be decided taking into account location of villages on line routes.

f. Selection of Poles

The wooden poles will basically be used for the Project, however, concrete poles and steel poles are also studied for the economical comparison. If concrete or steel poles is economical, these will be selected for the supports of the Project.

g. Step up transformer 6.6/22 kV at Savaii Island

The voltage of the existing line from Salelologa power station in Savaii island toward Puapua is 6.6 kV, the voltage of the line from Puapua to North coast to be constructed under the Project will be designed with 22 kV. Therefore, a step up transformer from 6.6 kV to 22 kV will be required to be installed at Puapua.

EPC has a plan to,up grade the existing 6.6 kV line into 22 kV which has been discussed in the Committee of Rural Electrification Programme and mentioned on the Report issued on May, 1988. The step up transformer will be required till the existing 6.6 kV line is up graded, the capacity of the transformer, therefore, is estimated for covering the demand of villages at North coast up to Aopo, but less than the capacity of the existing step up transformer installed at the Salelologa power station

h. Feeder from Tanugamanono power station

The existing outgoing feeders at the Tanugamanono power station are four (4) 6.6 kV feeders and three (3) 22 kV feeders, one 6.6 kV feeder named Alaoa feeder out of four will be up graded to 22 kV feeder when the line from Tanugamanono to Siumu is completed

EPC intends to provide a new outdoor switchyard out side the power station at his own cost taking into account of the expansion of 22 kV feeders and 66 kV feeders for the 66 kV transmission system in future. The out door switchyard shall have to be completed by the commencement of the 22 kV line for Siumu under the Project

No equipment and materials for the 22 kV feeder for the outdoor switchyard at the power station, therefore, is required to be provided under the Japanese Grant Aid Project.

i. Provisional Pole Arrangement

The provisional pole arrangement for the 22/LV distribution lines to be constructed under the Project are attached herewith for reference.

6 Capability of EPC erection gangs

a. Work progress undertaken by EPC erection gang

The erection gangs (two gangs) of EPC have completed the line from Leulumoega to Siumu about 35 km in length for five months with two gangs, the work progress is, therefore, calculated to be 3.5 km/month/gang.

The stringing work for low voltage single phase line is being carried out at the South coast, the progress is calculated to be 3.5 km/day (stringing work is being carried out in night time, since no traffic on the road).

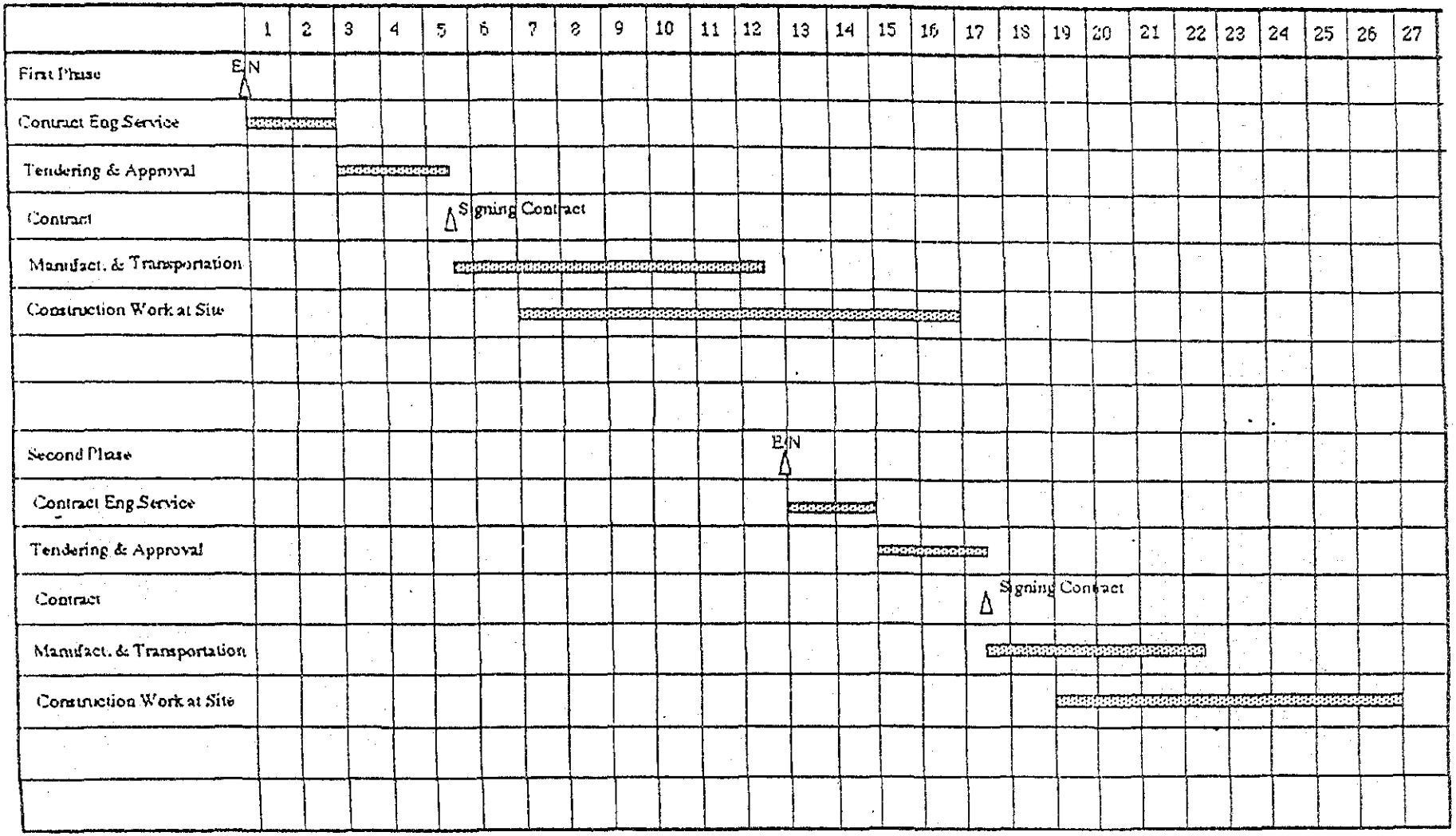
b. EPC organization for the Project

All construction works of the distribution lines under Japanese Grant Aid will be undertaken by EPC's own construction gangs. A person in charge to control the construction gangs is required to be nominated by EPC for the proper implementation of the Project.

7. Tentative Implementation Schedule

Referring to the Item 17 Reference in page 14 in [Japan's Grant Aid Program] the Tentative Implementation Schedule for the Project is estimated to be as shown on the attached Schedule provided that all construction gangs under EPC are placed for the Project.

TENTATIVE IMPLEMENTATION SCHEDULE ON RURAL ELECTRIFICATION IN PROJECT IN WESTERN SAMOA



Population and Transformer Capacity for Villages to be Electrified

Districts	Villages	Population in 1986	Population in 1990	Demand (kW) 30W/Cap	40W/Cap	50W/Cap	Tr Capa (kVA)	15 kVA	25 kVA	50 kVA	100 kVA
UPOLUISLAND											
VAIMAUGA WEST	**Moataa**	1,363	1,447	43	58	72		0	0	0	0
	Vaivase-Tai	1,344	1,426	43	57	71		0	0	0	0
	Vaivase-Uta	542	575	17	23	29		0	0	0	0
	Magiagi-Tai	1,419	1,506	45	60	75		0	0	0	0
	Magiagi-Uta	56	59	2	2	3		0	0	0	0
	Toomatagi	286	304	9	12	15		0	0	0	0
	Tanoalei'a	719	763	23	31	38		0	0	0	0
	Faatoialemanu	965	1,024	31	41	51		0	0	0	0
	Vaiala-Tai	481	511	15	20	26		0	0	0	0
	Vaiala-Uta	236	250	8	10	13		0	0	0	0
	Vinifou	131	139	4	6	7		0	0	0	0
	Vaipuna	391	415	12	17	21		0	0	0	0
	Levili	203	215	6	9	11		0	0	0	0
	Matautu-Uta	511	542	16	22	27		0	0	0	0
	Matautu-Tai	872	926	28	37	46		0	0	0	0
	Leone	581	617	18	25	31		0	0	0	0
	Vaisigano	432	459	14	18	23		0	0	0	0
	Niue	233	247	7	10	12		0	0	0	0
	Maluafou	120	127	4	5	6		0	0	0	0
	Malifa	258	274	8	11	14		0	0	0	0
	Lelata	196	208	6	8	10		0	0	0	0
	Leifiifi	239	254	8	10	13		0	0	0	0
	Motootua	1,131	1,200	36	48	60		0	0	0	0
	Leufisas	255	271	8	11	14		0	0	0	0
	Tanugamanon	654	694	21	28	35		0	0	0	0
	Papauta	504	535	16	21	27		0	0	0	0
	Vailima	790	838	25	34	42		0	0	0	0
	Avele	371	394	12	16	20		0	0	0	0

Districts	Villages	Population in 1986	Population in 1990		Demand (kW)		Tr. Capa	15	25	50	100
				30W/Cap	40W/Cap	50W/Cap	(kVA)	kVA	kVA	kVA	kVA
	Letava	264	280	8	11	14	15	1	0	0	0
	Vaoala	503	534	16	21	27	50	0	0	1	0
	Tiapapata	112	119	4	5	6	15	1	0	0	0
	Afiamalu East	74	79	2	3	4	15	1	0	0	0
	Afiamalu West	40	42	1	2	2	15	1	0	0	0
	Apia	358	380	11	15	19		0	0	0	0
	Tauese	236	250	8	10	13		0	0	0	0
	Tufuiopa	370	393	12	16	20		0	0	0	0
	Lalovaca	815	865	26	35	43		0	0	0	0
	Palisi	671	712	21	28	36	50	0	0	1	0
	Matafele	53	56	2	2	3	15	1	0	0	0
	Mulivai	66	70	2	3	4	15	1	0	0	0
	Tuloto	541	574	17	23	29		0	0	0	0
	Togafuafua	389	413	12	17	21		0	0	0	0
	Taufusi	716	760	23	30	38		0	0	0	0
	Alamagoto	611	648	19	26	32		0	0	0	0
	Vaimea	426	452	14	18	23		0	0	0	0
	Fugalei	868	921	28	37	46		0	0	0	0
	Saleufi	516	548	16	22	27		0	0	0	0
	Savalalo	396	420	13	17	21	25	0	1	0	0
	Gogi	314	333	10	13	17	25	0	1	0	0
	Mulinuu	194	206	6	8	10	15	1	0	0	0
	Aai-o-Fiti	282	299	9	12	15	15	1	0	0	0
	Sub-Total	24,098	25,577					8	2	2	0

Districts	Villages	Population in 1986	Population in 1990	30W/Cap	Demand (kW) 40W/Cap	50W/Cap	Tr Capa (kVA)	15 kVA	25 kVA	50 kVA	100 kVA
SIUMU	Maninoa	320	340	10	14	17	25	0	1	0	0
	Siumu	561	595	18	24	30	50	0	0	1	0
	Siumu-Uta	590	626	19	25	31	50	0	0	1	0
	Saaga	407	432	13	17	22	25	0	1	0	0
	Sub-Total	1,878	1,993					0	2		
FALEALILI	Togitogiga	45	48	1	2	2	15	1	0	0	0
	Iliili	77	82	2	3	4	15	1	0	0	0
	Saleilua	549	583	17	23	29	50	0	0	1	0
	Poutasi	462	490	15	20	25	25	0	1	0	0
	Vaovai	638	677	20	27	34	50	0	0	1	0
	Hatautu	296	314	9	13	16	25	0	1	0	0
	Tafatafa	275	292	9	12	15	15	1	0	0	0
	Malaemalu	239	254	8	10	13	15	1	0	0	0
	Satalo	302	321	10	13	16	25	0	1	0	0
	Piu	74	79	2	3	4	15	1	0	0	0
	Sapunaoa	387	411	12	16	21	25	0	1	0	0
	Salwsatele	368	391	12	16	20	25	0	1	0	0
	Siuniu	116	123	4	5	6	15	1	0	0	0
	Salani	631	670	20	27	33	50	0	0	1	0
	Utulaelae	171	181	5	7	9	15	1	0	0	0
	Sapee	131	139	4	6	7	15	1	0	0	0
	Sub-Total	4,761	5,053					8	5	3	0
LOTOFAGA	Matatufu	475	504	15	20	25	25	0	1	0	0
	Lotofaga	916	972	29	39	49	50	0	0	1	0
	Vavau	387	411	12	16	21	25	0	1	0	0
	Sub-Total	1,778	1,887					0	2	1	0

Districts	Villages	Population in 1986	Population in 1990	Demand (kW) 30W/Cap	40W/Cap	50W/Cap	Tr. Capa (kVA)	25 kVA	35 kVA	50 kVA	100 kVA
LEPA	Aufaga	511	542	16	22	27	50	0	0	1	0
	Vaigalu	124	132	4	5	7	15	1	0	0	0
	Lepa	318	338	10	14	17	25	0	1	0	0
	Siupapa	198	210	6	8	11	15	1	0	0	0
	Saleapaga	304	323	10	13	16	25	0	1	0	0
	Sub-Total	1,455	1,544					2	2	1	0
ALEIPATA	Satitea	481	511	15	20	26	50	0	0	1	0
	Malaela	123	131	4	5	7	15	1	0	0	0
	Lepue	258	274	8	11	14	15	1	0	0	0
	Mutiatele	252	267	8	11	13	15	1	0	0	0
	Saleaaumua	572	607	18	24	30	50	0	0	1	0
	Utufaalalafa	90	96	3	4	5	15	1	0	0	0
	Samusu	517	549	16	22	27	50	0	0	1	0
	Amaile	260	276	8	11	14	15	1	0	0	0
	Tiavea	584	620	19	25	31	50	0	0	1	0
	Lalomanu	748	794	24	32	40	50	0	0	1	0
	Vailoa	376	399	12	16	20	25	0	1	0	0
	Ulutogia	201	213	6	9	11	15	1	0	0	0
	Sub-Total	4,462						6	1	5	0
ANOAMAA EAST	**Saletele**	198	210	6	8	11		0	0	0	0
	Sauano	221	235	7	9	12	15	1	0	0	0
	Falevao	423	449	13	18	22	25	0	1	0	0
	Lalemauga	327	347	10	14	17		0	0	0	0
	Manunu	177	188	6	8	9	15	1	0	0	0
	Sauniatu	133	141	4	6	7	15	1	0	0	0
	Lufilufi	896	951	29	38	48		0	0	0	0
	Falefa	1,356	1,439	43	58	72		0	0	0	0
	Sub-Total	3,731	3,960					3	1	0	0

Districts	Villages	Population in 1986	Population in 1990	Demand (kW) 30W/Cap	40W/Cap	50W/Cap	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA	100 kVA
FALEATA EAST	**Sinamoga**	1,119	1,188	36	48	59		0	0	0	0
	Moamoa	1,007	1,069	32	43	53		0	0	0	0
	Vaimoso	1,290	1,369	41	55	68		0	0	0	0
	Pesaga	254	270	8	11	13		0	0	0	0
	Lotopa	1,802	1,913	57	77	96		0	0	0	0
	Alafua	884	938	28	38	47		0	0	0	0
	Tuaefu	54	57	2	2	3	15	1	0	0	0
	Tuanaimato East	325	345	10	14	17	25	0	1	0	0
	Seesee	234	248	7	10	12	25	0	1	0	0
	Lepea	670	711	21	28	36	50	0	0	1	0
	Vaitoloa	459	487	15	19	24		0	0	0	0
	Sub-Total	8,098	8,595					1	2	1	0
FALEATA WEST	Tulaele	292	310	9	12	15	15	1	0	0	0
	Talimatau	781	829	25	33	41		0	0	0	0
	Vailoa	1,153	1,224	37	49	61		0	0	0	0
	Vaiusu	1,371	1,455	44	58	73		0	0	0	0
	Vigaga	724	768	23	31	38		0	0	0	0
	Elisefou	217	230	7	9	12		0	0	0	0
	Vaitele	391	415	12	17	21		0	0	0	0
	Saina	198	210	6	8	11		0	0	0	0
	Toamua	582	618	19	25	31		0	0	0	0
	Safune	221	235	7	9	12		0	0	0	0
	Puipaa	623	661	20	26	33		0	0	0	0
	Falelauniu	53	56	2	2	3	15	1	0	0	0
	Leaupuni	169	179	5	7	9	15	1	0	0	0
	Tapatapae	117	124	4	5	6	15	1	0	0	0
	Tanumapua	374	397	12	16	20	25	0	1	0	0
	Tafaigata	278	295	9	12	15	15	1	0	0	0
	Siusega	729	774	23	31	39		0	0	0	0
	Tuanaimato West	248	263	8	11	13	15	1	0	0	0
	Sub-Total	8,521	9,044					6	1	0	0

Districts	Villages	Population in 1986	Population in 1990	30W/Cap	Demand (kW) 40W/Cap	50W/Cap	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA	100 kVA
SAGAGA USOGA	**Malie**	1,572	1,668	50	67	83		0	0	0	0
	Afega	1,708	1,813	54	73	91		0	0	0	0
	Tuanai	1,102	1,170	35	47	58		0	0	0	0
	Sub-Total	4,382	4,651					0	0	0	0
GAGAEMAUGA I	**Leauvaa**	2,244	2,382	71	95	119		0	0	0	0
SAGAGA FALEFA	**Faleula**	1,631	1,731	52	69	87		0	0	0	0
	Alamutu	224	238	7	10	12		0	0	0	0
	Levi	885	939	28	38	47		0	0	0	0
	Lotosoa	572	607	18	24	30		0	0	0	0
	Salepeua'e	624	662	20	26	33		0	0	0	0
	Nonoa	434	461	14	18	23		0	0	0	0
	Malua	297	315	9	13	16		0	0	0	0
	Utualii	478	507	15	20	25		0	0	0	0
	Tufulele	703	746	22	30	37		0	0	0	0
	Aleisa East	344	365	11	15	18	25	0	1	0	0
	Aleisa West	610	647	19	26	32	50	0	0	1	0
	Aele	326	346	10	14	17	25	0	1	0	0
	Nuu	257	273	8	11	14	15	1	0	0	0
	Sub-Total	7,385	7,838					1	2	1	0
ALOFI I	**Falcasiu**	2,894	3,072	92	123	154		0	0	0	0
	Fasitoo-Uta	1,837	1,950	58	78	97		0	0	0	0
	Lepale	43	46	1	2	2	15	1	0	0	0
	Sub-Total	4,774	5,067					1	0	0	0
ALOFI II	Nofoalii	1,716	1,821	55	73	91	50	0	0	2	0
	Leulumoega	1,200	1,274	38	51	64	50	0	0	2	0
	Sub-Total	3,095	93					0	0	4	0

Districts	Villages	Population in 1986	Population in 1990	Demand (kW) 30W/Cap	40W/Cap	50W/Cap	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA	100 kVA
ALOFI III	**Fasitootai**	1,254	1,331	40	53	67		0	0	0	0
	Vailuutai	738	783	23	31	39		0	0	0	0
	Falcatiu	474	503	15	20	25		0	0	0	0
	Faleele	26	28	1	1	1	15	1	0	0	0
	Satapuala	1,296	1,376	41	55	69		0	0	0	0
	Afia	163	173	5	7	9	15	1	0	0	0
	Vaipapa	126	134	4	5	7	15	1	0	0	0
	Satuimaluifilu	543	576	17	23	29		0	0	0	0
	Afolau	65	69	2	3	3	15	1	0	0	0
	Sina	150	159	5	6	8	15	1	0	0	0
	Sub-Total	4,835	5,132					5	0	0	0

Districts	Villages	Population in 1986	Population in 1990	Demand (kW) 30W/Cap	40W/Cap	50W/Cap	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA	100 kVA
TOTAL TRANSFORMERS IN UPOLU ISLAND								41	20	15	0

Population and Transformer Capacity for Villages to be Electrified in Savaii Island

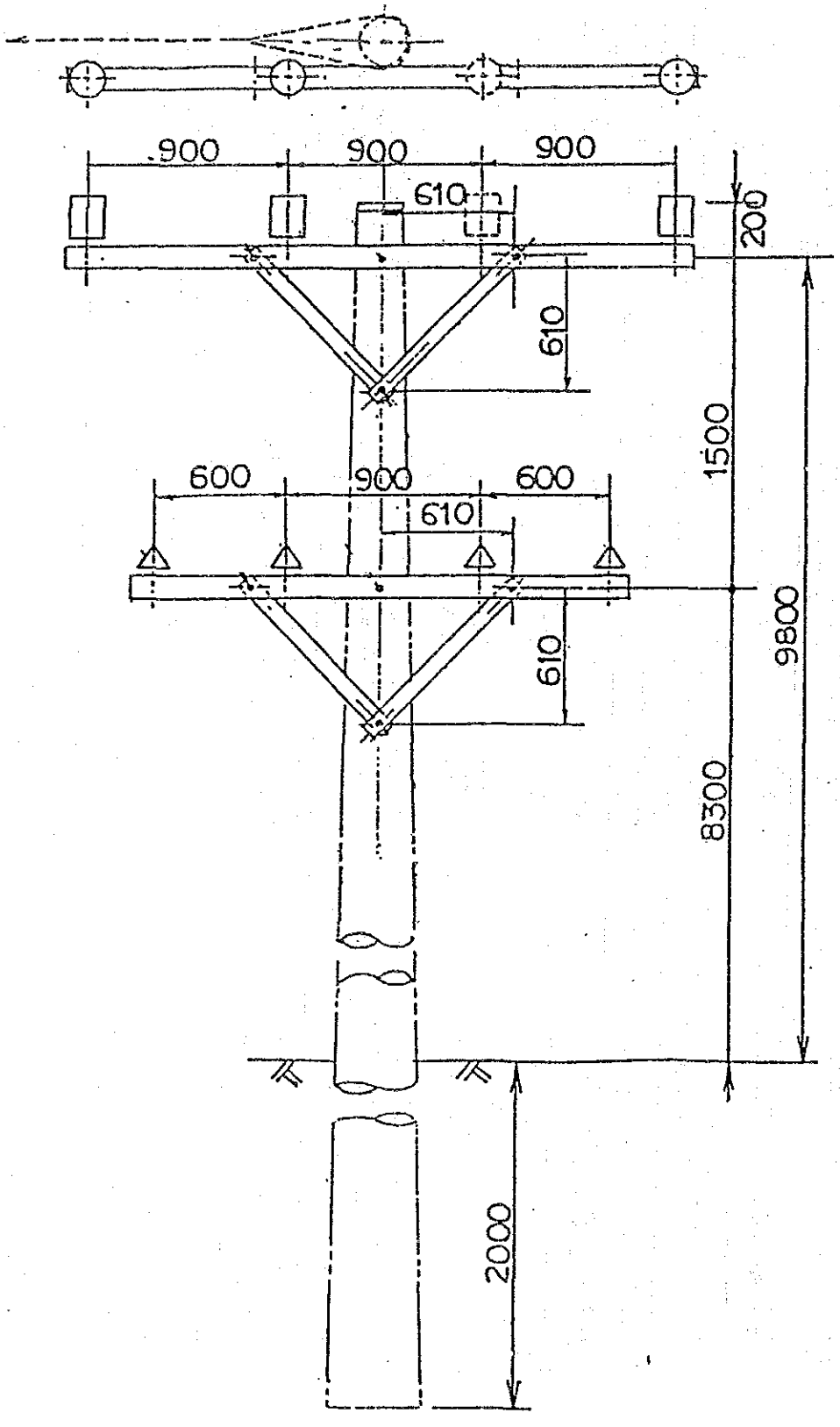
Districts	Villages	Population in 1986	Population in 1990	30W/Cap	Demand (kW) 40W/Cap	50W/Cap	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA	100 kVA
SAVAII ISLAND											
FAASDALELEAGA IV	**Lano**	695	738	22	30	37		0	0	0	0
	Asaga	243	258	8	10	13		0	0	0	0
	Puapua	519	551	17	22	28		0	0	0	0
	Sub-Total	1,457	1,546					0	0	0	0
GAGAEMAUGA I	Patamea	605	642	19	26	32	50	0	0	1	0
	Samalaeulu	828	879	26	35	44	50	0	0	1	0
	Mauga	157	167	5	7	8	15	1	0	0	0
	Sub-Total	1,590	1,688					1	0	2	
GAGAIFOMAUGA III	Fagaee	248	263	8	11	13	15	1	0	0	0
	Sasina	614	652	20	26	33	50	0	0	1	0
	Letui	273	290	9	12	14	15	1	0	0	0
	Aopo	389	413	12	17	21	25	0	1	0	0
	Sub-Total	1,524	1,618					2	1	1	0
VAISIGANO EAST	**Utulea**	41	44	1	2	2		0	0	0	0
	Matavai	1,571	1,667	50	67	83		0	0	0	0
	Auala	679	721	22	29	36		0	0	0	0
	Vaisala	652	692	21	28	35		0	0	0	0
	Sub-Total	2,943	3,124					0	0	0	0
FALEALUPO	Falealupo-Uta	718	762	23	30	38	50	0	0	1	0
	Vaetupua	386	410	12	16	20	25	0	1	0	0
	Avata	170	180	5	7	9	15	1	0	0	0
	Sub-Total	1,274	1,352					1	1	1	0

Districts	Villages	Population in 1986	Population in 1990	30W/Cap	Demand (kW) 40W/Cap	50W/Cap	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA	100 kVA
ALATAUA WEST	Tufutafoe	354	376	11	15	19	25	0	1	0	0
	Neiafu-Tai	506	537	16	21	27	50	0	0	1	0
	Neiafu-Uta	603	640	19	26	32	50	0	0	1	0
	Falelima	555	589	18	24	29	50	0	0	1	0
	Sub-Total	2,018						0	1	3	0
PALAULI FALEFA	**Gataivai**	1,006	1,068	32	43	53		0	0	0	0
	Gautavai	285	302	9	12	15		0	0	0	0
	Vaiala	291	309	9	12	15		0	0	0	
	Sili	870	923	28	37	46		0	0	0	0
	Puleia	281	298	9	12	15		0	0	0	0
	Papa	235	249	7	10	12		0	0	0	0
	Tafua-Tai	357	379	11	15	19	25	0	1	0	0
	Tafua-Uta	185	196	6	8	10		0	0	0	0
	Sub-Total	3,510	3,725					0	1	0	0

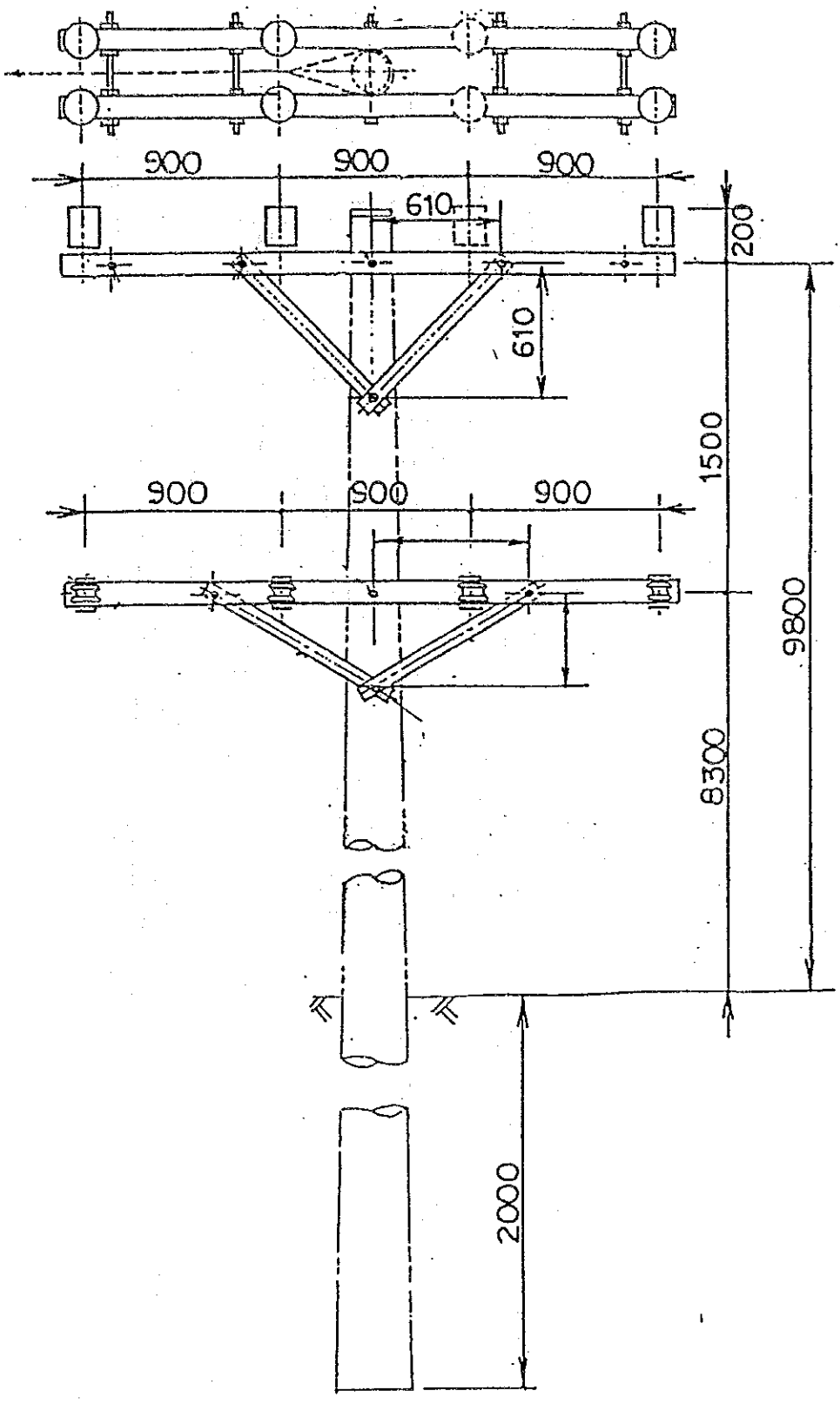
Districts	Villages	Population in 1986	Population in 1990	30W/Cap	Demand (kW) 40W/Cap	50W/Cap	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA	100 kVA
TOTAL TRANSFORMERS IN ~~UPOLU~~ ISLAND								4	4	5	0
TOTAL TRANSFORMERS IN UPOLU ISLAND								41	20	18	0
GROUND TOTAL								45	24	23	0

2,425 kVA

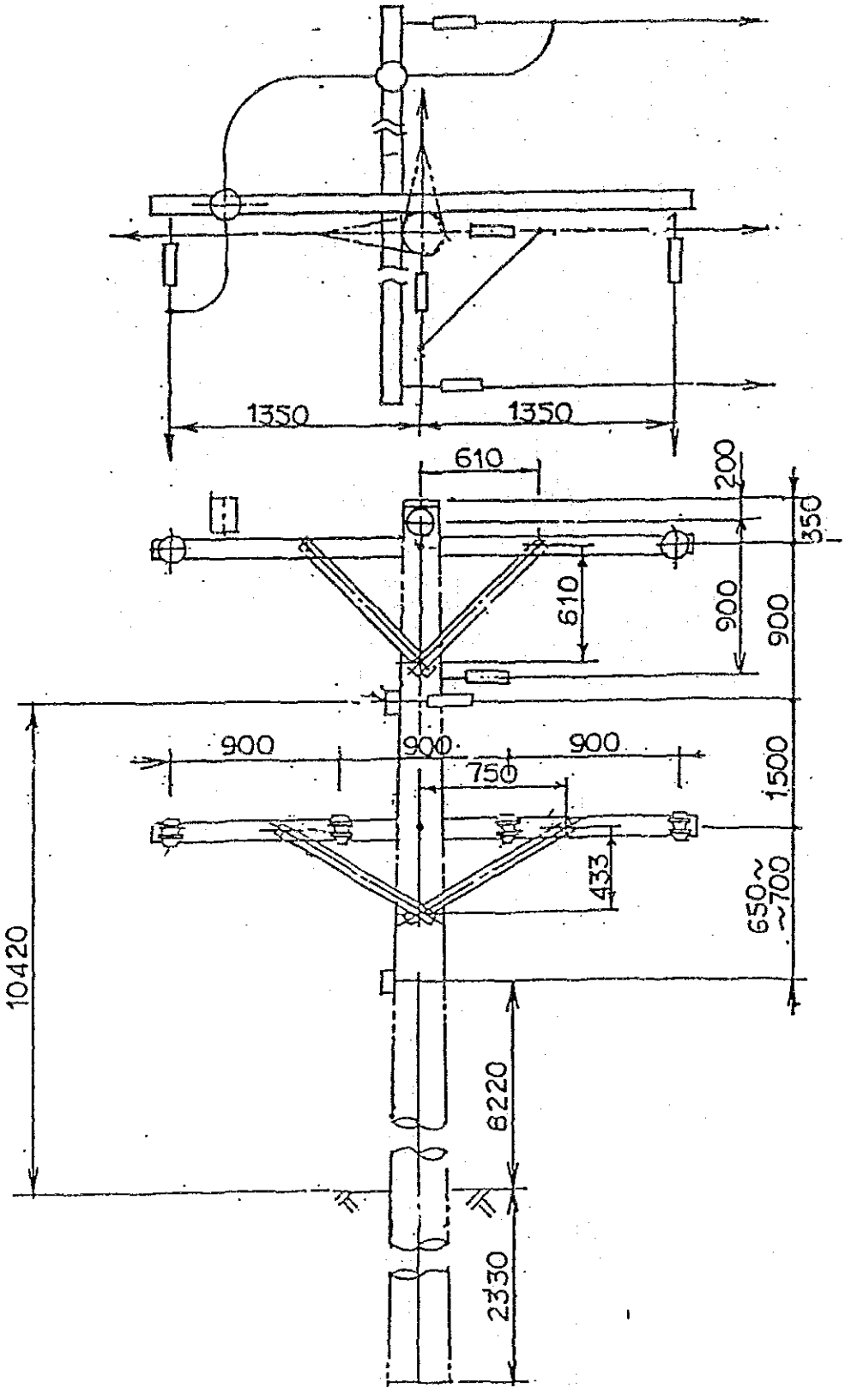
1. STRAIGHT LINE POLES



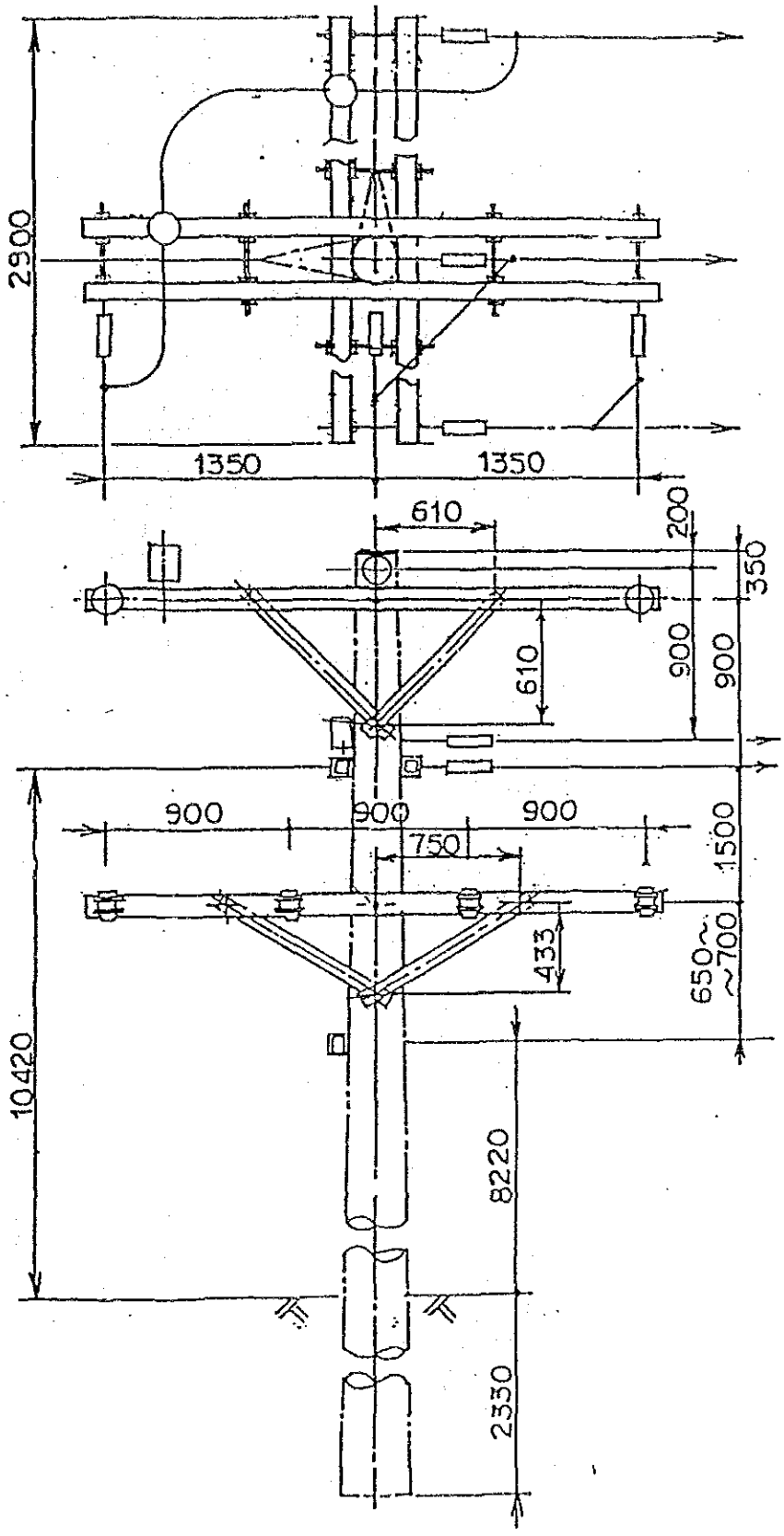
2. LIGHT ANGLE POLE (DOUBLE PIN)



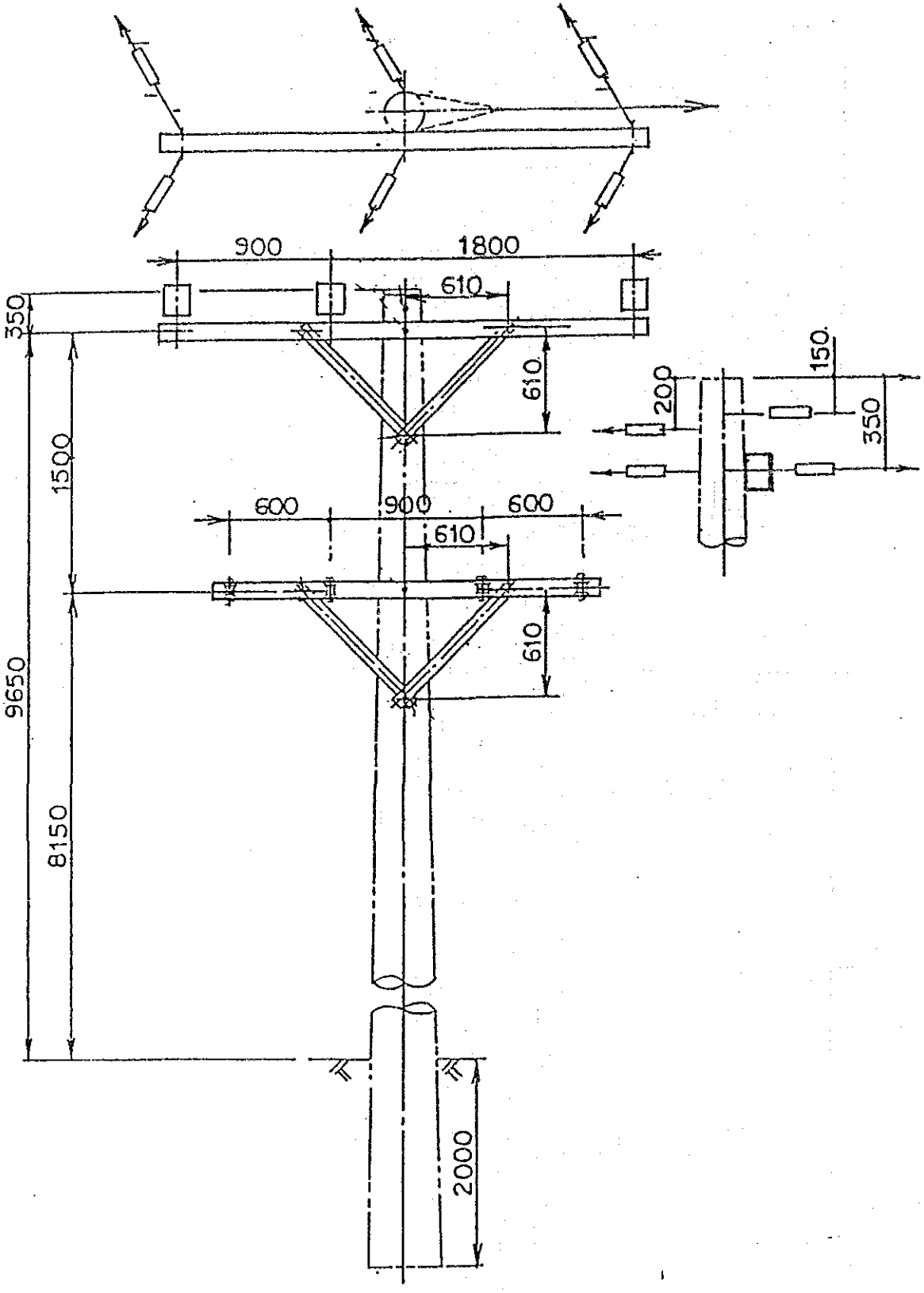
3. ANGLE LINE POLE (SINGLE ARM)



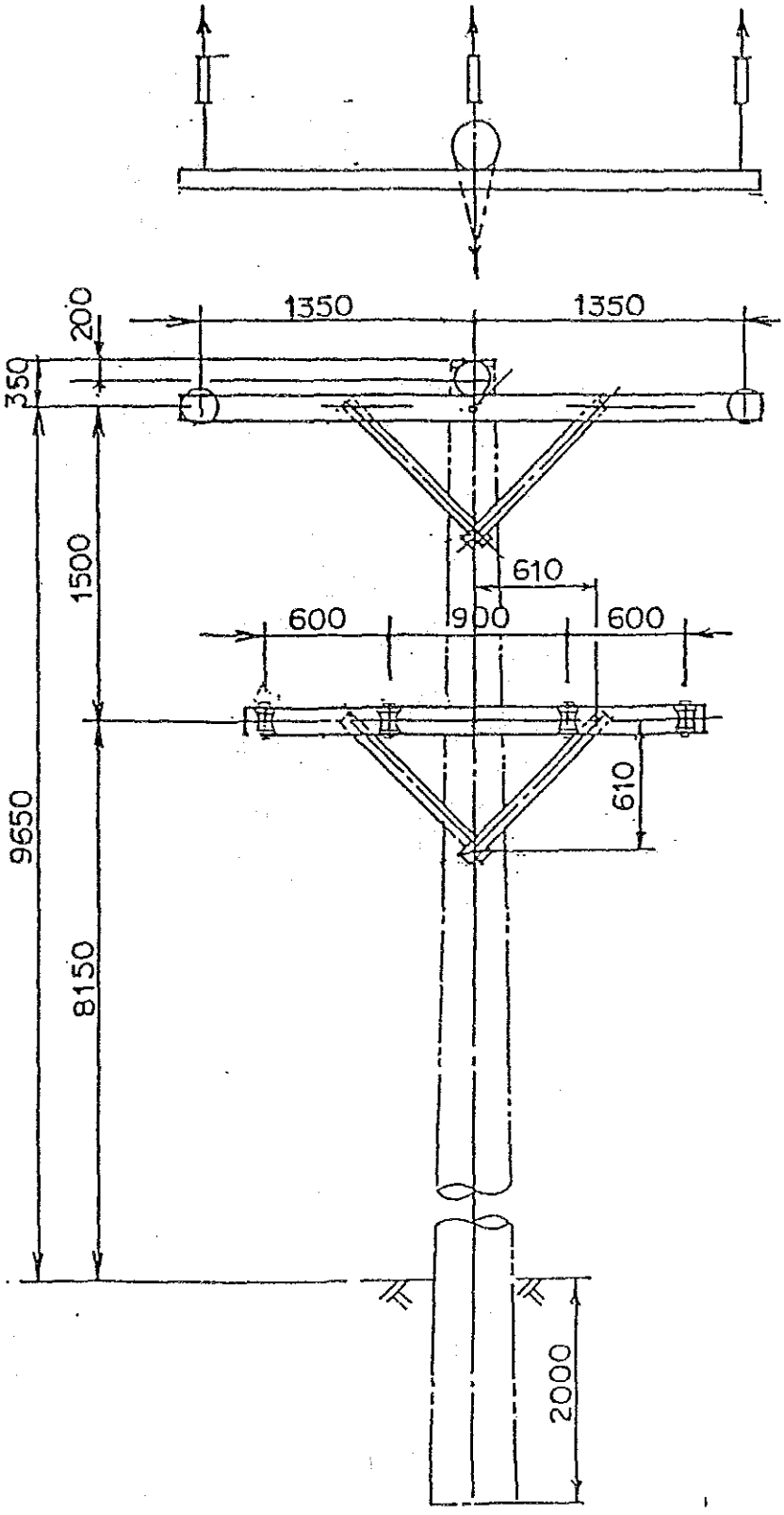
4. ANGLE LINE POLE (DOUBLE ARM)



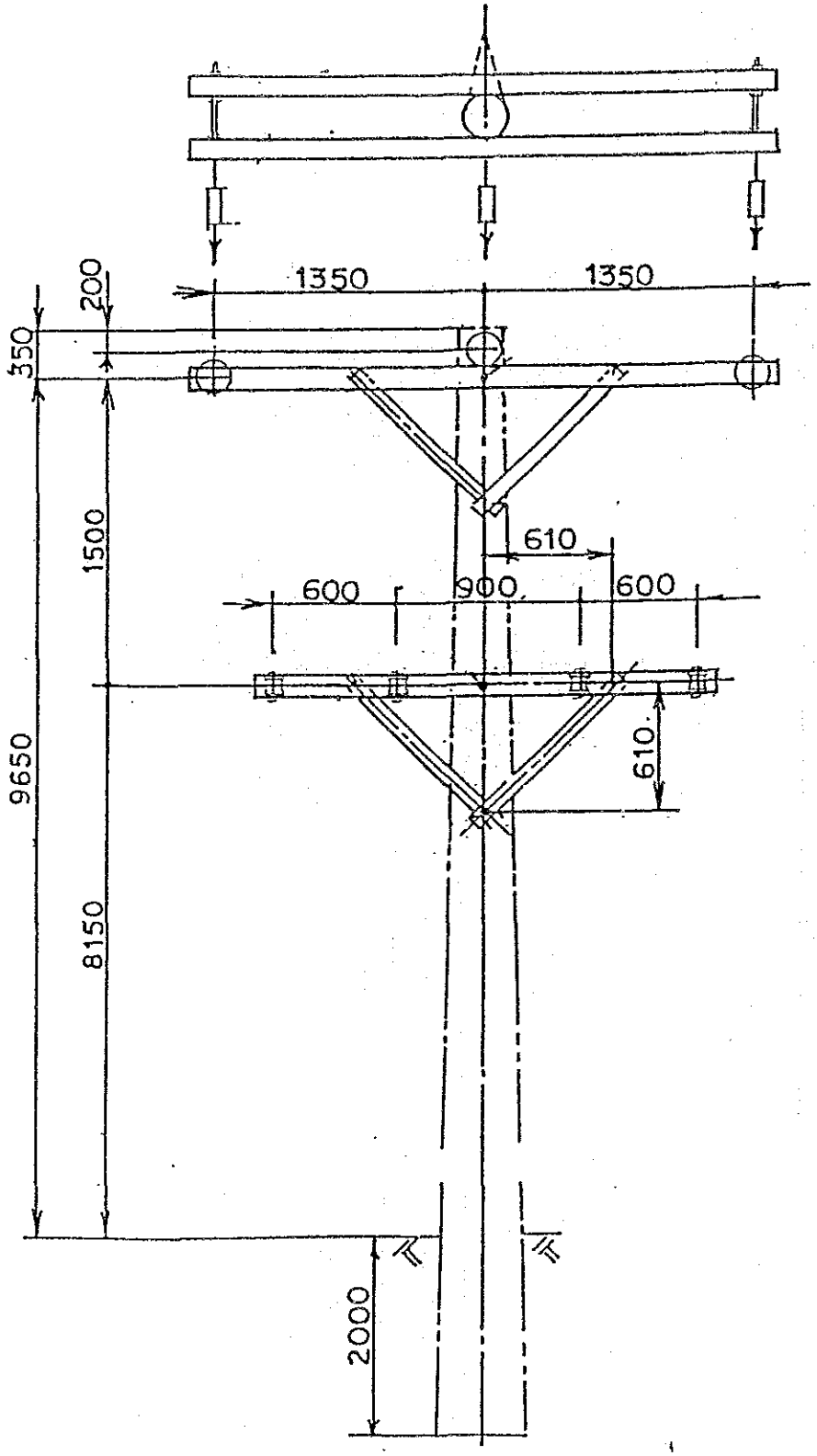
5. ANGLE LINE POLES STRAIN (SINGLE ARM)



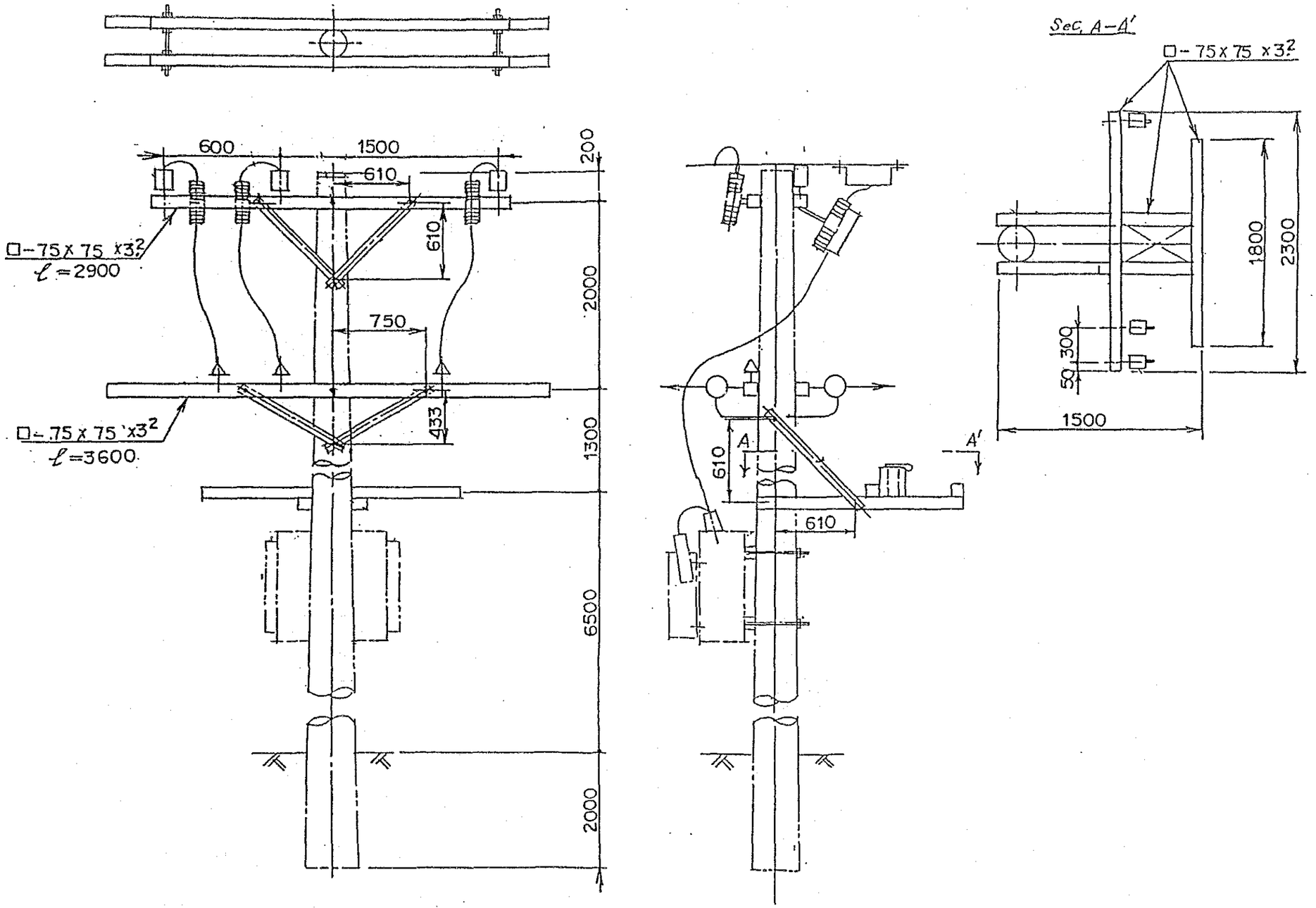
6. TERMINAL POLE (SINGLE ARM)



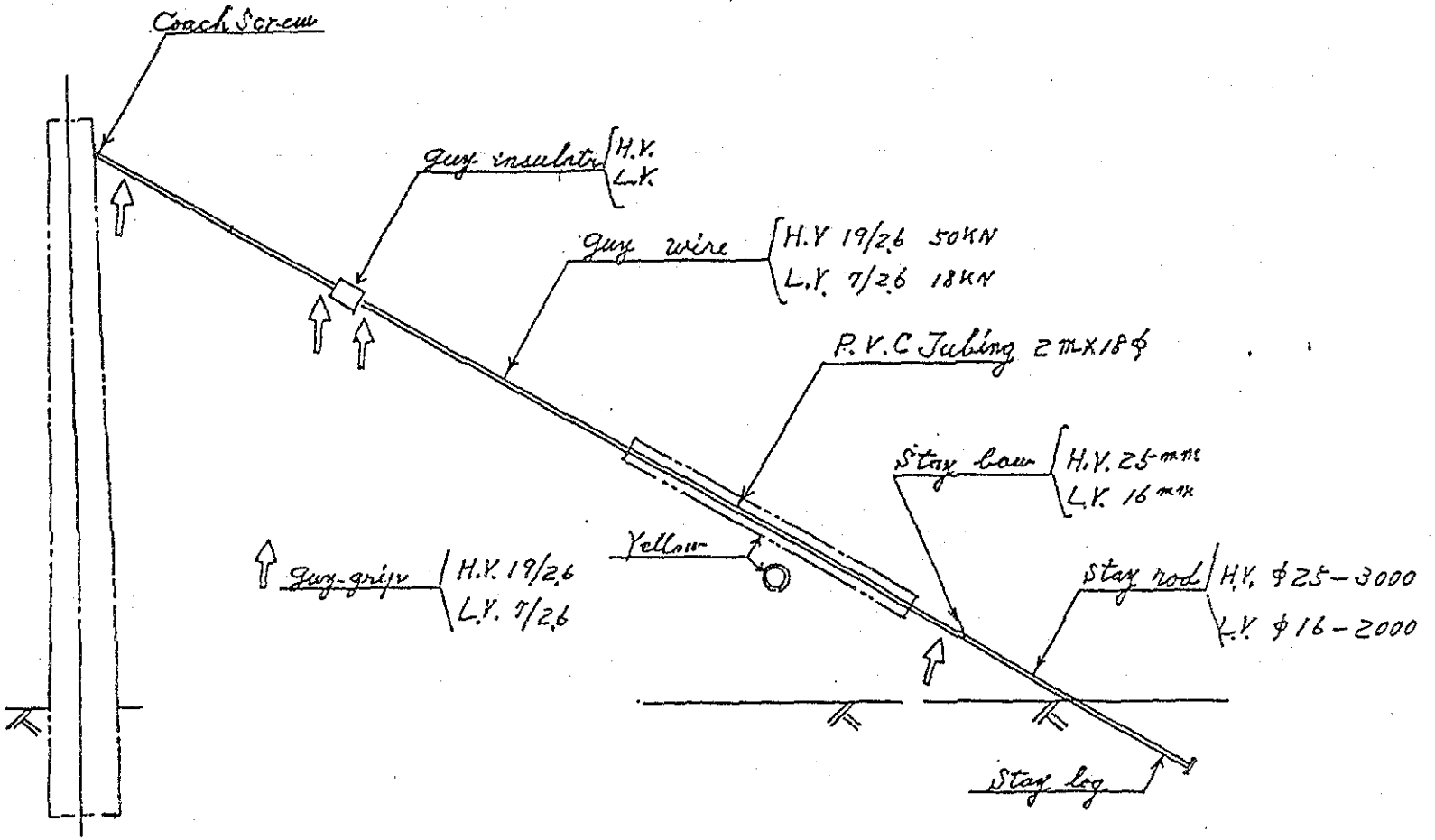
7. TERMINAL POLE (DOUBLE ARM)



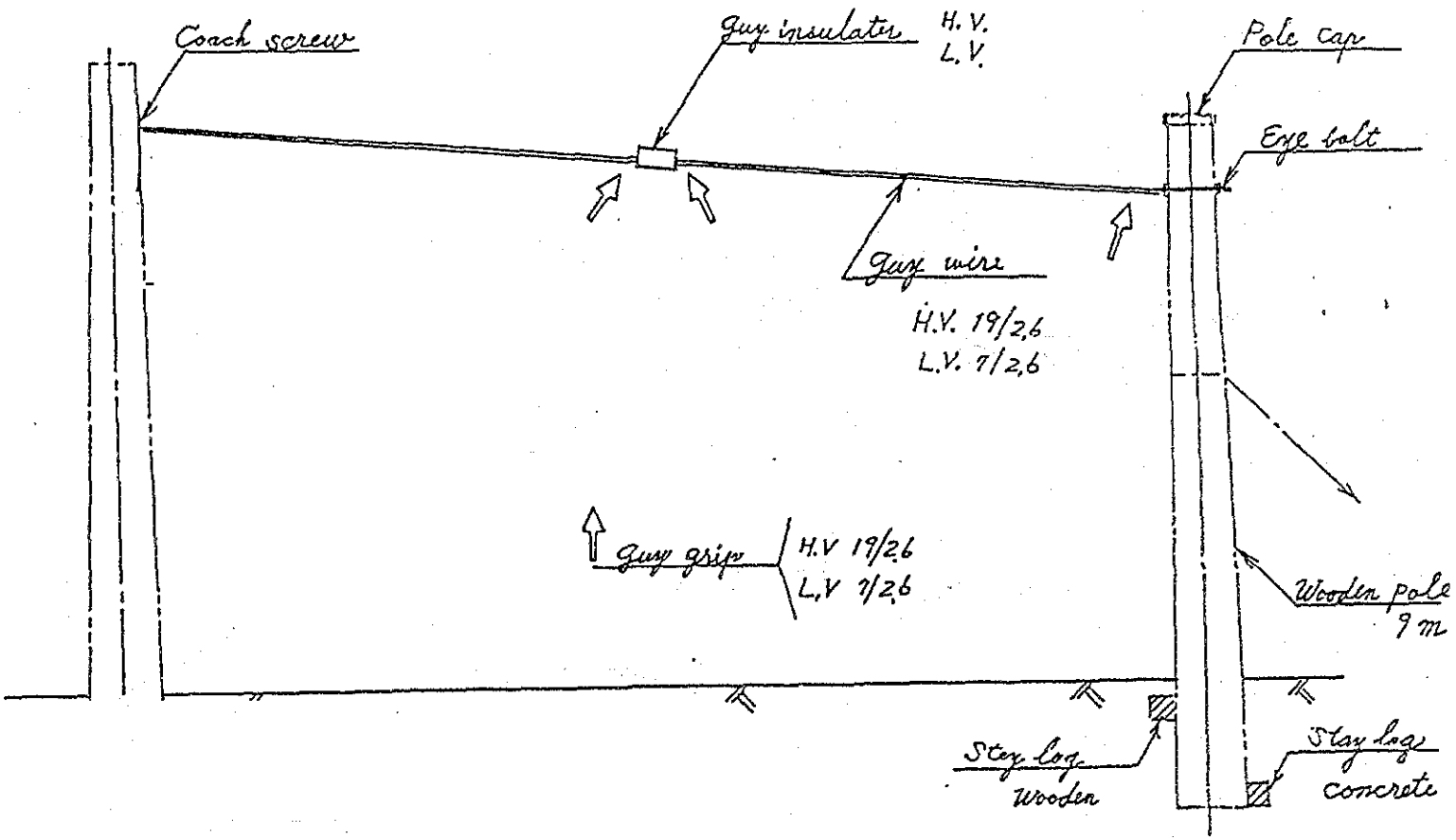
8. TRANSFORMER POLE



9. STAY ASSEMBLY



10. FLYING STAY ASSEMBLY



ELECTRIC POWER CORPORATION

COMMENTS ON "FIELD SURVEY REPORT ON
RURAL ELECTRIFICATION PROJECT IN WESTERN SAMOA"

1. Item 1(b) - Page 1:

It was anticipated that the reticulation of the Island of Savaii would be carried simultaneously with that of Upolu Island. The priorities allocated indicate that Savaii will be last to be reticulated.

It was expected there would be separate priorities - 1 to 4 allocated to Savaii replacing priorities 9 to 11 in the report.

2. Item 2 - Page 2:

Under the item "Construction Equipment (Drilling Machine)", it makes no mention of a crane truck for erection of poles. Is it intended that a crane will be sent out to perform the erection? It will be needed.

3. Item 2 - Page 2:

No mention is made of stay wire, stay wire bows, and anchoring equipment.

4. Item 4 - Page 3:

"To construct all distribution lines" should read: To "erect" all distribution lines.

5. Item 4 - Page 3:

To provide all erection forces for the construction works is too sweeping in the light of "Field Works" in Item 3. Suggest rewording to:

> "To provide the erection gang of labourers and linemen (with the exception of additional foremen under Item 3 above).

6. Item 5(b) - Page 4:

Average everyday temperature of conductor. Allow $30^{o}C$.

7. Item 5(b) - Page 4:

Maximum Temperature of Conductor (for maximum sag). Allow for $50^{o}C$.

.../2

8. Safety Factors: Item 5b - Page 4:

Wooden Poles:	4 (or preferably purchase poles with a strength rating (eg, 4, 6 or 8 kN) set by the Standard Specification AS 2209)
Concrete Poles) Steel Poles)	2 based on actual test results to establish crippling load
Steel Structures:	2 (if based on actual crippling load tests)
	4 (if based on design calculations only) and the design includes long members with compressive loads. These safety factors based on yield point

9. Item 5(b) - Page 4:

Ground Clearances - Please use the following clearances:

(a) 66 kV and 22 kV (EHV) 6.7m at any place

(b) 400/230 Volts Distribution lines 5.5m across or along roads, and any other place used by vehicles

(c) 400/230V Service Lines (last span to house):

- 5.5m across any part of a road
- 3.5m across any private property where vehicles will be used
- 2.7m at point of connection

10. Item 5(b) - Page 4:

The formula for spacing is confusing:

$S = 0.0076m/kV + 0.37(S)^{\frac{1}{2}}$ where
S = dip in m

Suggest the formula be rewritten.

Spacing $S = 0.0076m/kV + 0.37(d)^{\frac{1}{2}}$ where
S = Spacing in metres
d = dip or sag in metres

11. Item 5(c) - Page 5:

Colour preferred for insulators and bushings is Munsell grey, sometimes also known as "Sky glaze".

12. Item 5(d) - Page 6:

Suggest reword:

"Three phase transformers will be installed at villages where demand exceeds the largest size single phase transformer (25 kVA).

13. Item 5(h) - Page 7:

It is not necessary to have the 22kV outdoor switch yard completed before the commencement of the 22kV line from Tanugamanono to Siumu. It will be possible to connect the Siumu line to one of the 22kV lines at the gate of Tanugamanono - (preferably the West Coast Feeder) by a short 22kV cable link.

Otherwise it is accepted that the Japanese Aid does not include the outdoor switching yard.

14. Item 6(b) - Page 7:

It is suggested this be reworded more in line with the spirit of Items 3 and 4 as follows:

> **EPC Organization for the Project:**
>
> EPC will arrange a competent engineer to implement the project and a public relations officer to negotiate land use for the proper implementation of the project before commencement of construction in Samoa.
>
> EPC will, provide the erection work force so that the work can be implemented promptly, in accordance with the following tentative implementation schedule and in accordance with clauses 3 and 4 of this report".

It is considered that the original wording is too broad, and is, as a result, in conflict with the wording of the other clauses relating to staffing the project.

In all other respects the report is considered adequate.

Regarding the skeleton diagram for Poles etc.

Please refer 66kV line - Pages 1 and 2:

It is considered 2.000m bolt hole spacing for the 66kV arm to 22kV arm is excessive.

In view of a gain in height of about 400mm due to the difference in height of the 66kV post (about 600mm height) to that of a 22kV pin insulator (about 250mm) there is no reason why the spacing should not be 1.5m.

This will also make the 66kV wires within reach for a man standing on the 22kV arm.

The distances between arms above the LV arm is so great as to need "step bolts" for a worker to climb within reach of the wires - suggest these be shown at about 300 to 350mm spacing.

Eric J Hussey
GENERAL MANAGER

8 November 1989

COMMENTS ON FIELD SURVEY REPORT ON RURAL ELECTRIFICATION PROJECT IN WESTERN SAMOA

1. SCOPE OF PROJECT

(a) Upolu Island

This looks all right in that priority is given to the Tanugamanono - Siumu major link which by the time of the construction in 1990 will be very much needed to reinforce the voltage as the 22kV distribution around Leulumoega through Lefaga to Safata and Falealili, from the Control Station in Apia will have covered about 50 miles (80km).

The priority rating 1 to 5 for areas covered is all right too. I have swapped Aleisa Road - Saleimoa to rating 8 with Satuimalufilufi - Satapuala to 10 and Lepale - Fasitoo-uta to 9.

(b) Savaii Island

This part of the Project may be done simultaneously with Upolu at an independent priority rating from that of Upolu with the preferred ratings as followed:

Tufutafoe	- Falealupotai	- 6
Tafuauta	- Tafuatai	- 7
Puapua	- Samalaeulu	- 11
Sasina	- Matavai	- 12

2. Equipment and materials stated under this clause should include light trucks, heavy trucks of 6 tons type, compressure complete hammer dynamites (if required in place of a Koken-Down-the-hole drill type).

The vehicle and equipment essentials are given on a separate sheet attached. Crossarms if wooden and line construction hardware should also where required be standard to ones (or equivalent) used currently by EPC.

It is worth noting also that the 6.6kV/22kV step up transformer to be installed at Puapua will be temporary until conversion of the existing Salelologa - Puapua 6.6kV to 22kV at a later stage.

3. Home Works and Field Works are all right except that shipment of materials takes about three (3) months from placement of order to be supplied if procured from New Zealand or Australia.

4. Please note that materials are duty free into Apia. At present status the engineers in Charge is Toluono assisted by A. Tiotio.

5. (a) The pole design is the same as in our Construction manual submitted to you.

(b) Design Concept adopted is as in our construction manual submitted, based on the Australian Code of Practice for Overhead Line Construction by the Electricity Supply Association of Australia No. C (b) 1, 1974. All other design factors are all right except we use following safety factors for poles:

Wooden Poles	x 4
Concrete Poles	x 2
Steel Poles	x 2

Ground Clearance for LV (415/240 volts) is 5.5m.

(c) LINE MATERIALS

AAC FLY is hard drawn 7/3.4mm stranded conductors.

AAC WASP is also hard drawn 7/4.39mm stranded conductors.

Colour of Insulators and Bushings: Light Grey

(d) Distribution transformers sizes in the rural sector are determined mainly by the size of villages in population.

(f) Wood poles preferred for standardisation and local construction gangs experience with handling.

(g) A sawmill on this link have asked for a 100kVA substation with probable extension to 200kVA in two years.

(h) This clause is agreeable as it is.

(i) Provisional Pole Arrangement is ok except for the 14m poles where we have allowed 1.8m spacing between 66kV and 22kV although 1.5m space may be entertained for ease of maintenance.

6. Transformer erecting is still in progress between Lefaga and Siumu but had it not been for vehicle and machine break downs (old ones as no new ones assigned to this project) the whole section Leulumoega to Siumu would have finished by now.

T.F. Toluono.

T.F. Toluono
DEPUTY GENERAL MANAGER-ENGINEERING

LINE TOOLS AND MACHINERY FOR THE RURAL ELECTRIFICATION PROJECT UNDER JAPANESE AID

Cable Hoist or Puller (3-4 Tons)	36
Compression Tools 12 Tons	10
Wire Grip 1659-40 Klien for 7/3.4 PVC	36
Wire Grip 1628-58 Klien for 19/2.6 steel guy	12
Cable Cutter for Hull	12
Ring Anger Bits 22mm	24
Ring Anger Bits 20mm	24
Ring Anger Bits 18 mm	24
Digging Crawbars 2m	24
Digging spades with 2m galv. handles	30
Digging shovels with 2m galv. handles	30

Heavy Trucks 6 Ton Flat Deck or Dyna	3
Hiab Cranes 7 Ton with Pole Trailers	3
Air Compressor (complete with hammers) (Rig Crawler type)	2
Toyota Landcruiser S.W.B.	1

添付資料 - 2

西サモア概況

1．国名	THE STATE OF WESTERN SAMOA (SAMOA I SISFO)
2．位置	南緯13－14度　　西経171－173度 日付変更線のすぐ東側、日本との時差20時間
3．面積	2,934 sq.km （ｳﾎﾞﾙ島：1,122sq.km, ｻﾊﾞｲ島：1,714 sq。km、その他：98 sq.km）
4．人口	約160,000 （ｳﾎﾞﾙ島：117,800人, ｻﾊﾞｲ島：41,200人、その他：1,000人）
5．首都	アピア、人口　約35,000人
6．歴史	1722年　　オランダ人探検家の来訪 1830年　　キリスト教宣教師ジョン・ウイリアムスの上陸 1900年　　ドイツ領となる 第一次大戦以降　　国連委任統治領としてニュージランド領となる 第二時大戦以降　　ニュージランド統治領となる 1962年　　南太平洋の最初の独立を達成
7．言語	サモア語及び英語、教育程度は非常に高い
8．地勢	全て火山島、現在は休火山だが、最後の噴火は、1911年である。
9．気候	典型的な熱帯海洋性気候、平均気温26－27度、 年間降雨量2,800－3,000mm, 乾季：4月－10月　雨期：11月－3月
10．政治形態	立憲君主制、首相は国会で選出、首相は国会議員の中から8名の大臣を指名し内閣を組織する。
11．通貨	通貨単位はタラ（Tala＝WS$）現在の交換レートは1タラ約60円
12．財政	歳入の大部分が、先進国や国際機関よりの借款、贈与に支えられている。1988年度の国家予算は、WS$7,000,000（約42億円相当） 国民一人当たりGNPは、US$660（1987年度）と推定される。
13．産業	西サモアは農業国で、主な産物は、コプラ、ココア、バナナ、タロイモ、果物は、パパイア、マンゴー、アボガドなどが豊富である。林業は、製材所が二箇所有り国内需要のほとんどを自給している。 西サモア周辺の海域は、カツオ、マグロの好漁場だが西サモアではまだ本格的な漁業は、行なわれていない。 観光産業には、特質すべき物があり、政府も観光客誘致に力を入れている。西サモアを訪れる人の数は、年間約３万人で、アメリカン・サモア、ニュージーランド、オーストラリア、アメリカ、西ドイツ、の順だが日本人は、まだ300人足らずで商用が多く観光目的は少ない。

14. 貿易	年間輸出総額	WS$25,000,000（約15億円）
	年間輸入総額	WS$92,000,000（約55億円）
	輸出品目	コプラ、ココア、タロイモ等農産物
	輸入品目	機械、金属、食品、繊維、車輌、石油、ガソリン等
	相手国	ニュージーランド、オーストラリア、日本、アメリカ

15. 賃金　労働賃金は安く、国家公務員の平均収入は、約36,000円/月

国会議員の歳費は、　総理大臣　約1,920,000円/年
大臣　　約1,500,000円/年
一般議員　約　660,000円/年

添付資料 - 3

'Upolu

	路線ルート	優先順位	期分
1	Tanugamanono-Siumu	1	I
2	Saleapaga-Lefaga	12	II
3	Saluafata-Sauniatu	9	II
4	Amaile-Afulilo	11	II
5	Aleisa-Saleimoa	7	I
6	Nuu-Faleula	7	I
7	Lepale-Fasitoouta	7	I
8	Satuimalufilufi-Satapuala	13	II

Savai'i

	路線ルート	優先順位	期分
9	Puapua-Samalaeulu	8	II
10	Sasina-Matavai	10	II
11	Tafutafoe	4	I
12	Tafuauta-Tafuatai	5	I
13	Patamea-Saleaula	6	I

最高気温

出典：EPC

年度	1月	2月	3月	4月	5月	6月	7月	8月	9月	10月	11月	12月
1941	31.9	31.8	31.3	31.7	31.1	31.6	29.8	30.8	31.0	30.8	32.4	32.4
1942	32.8	32.7	31.6	30.9	31.8	31.1	29.9	30.1	30.9	30.2	30.4	30.5
1943	30.8	30.9	31.2	31.2	30.3	30.2	30.1	30.1	30.2	30.9	32.1	31.0
1944	32.3	30.5	31.0	31.7	30.8	30.3	30.7	30.2	30.3	30.1	30.5	31.2
1945	31.2	31.0	31.0	32.0	30.7	30.9	29.9	30.1	30.0	31.0	31.2	31.2
1946	31.7	31.4	32.1	32.2	32.1	31.2	31.0	30.7	31.5	31.8	31.9	31.9
1947	31.9	32.7	32.8	32.6	32.4	31.6	31.6	31.5	31.4	31.4	31.4	31.1
1948	33.8	31.6	32.2	31.8	32.0	31.8	30.8	30.8	30.7	31.9	31.7	31.1
1949	31.6	31.9	32.2	31.8	31.6	30.9	31.6	30.4	31.3	30.8	31.8	31.0
1950	31.9	31.1	31.6	31.8	31.6	30.3	29.9	30.3	31.1	31.4	31.4	31.3
1951	31.0	31.9	31.3	32.3	31.6	31.1	30.8	31.2	30.9	30.7	31.6	32.2
1952	33.3	32.3	32.3	31.4	31.7	31.3	30.6	30.6	31.0	31.3	31.5	32.4
1953	31.8	32.1	32.8	32.2	32.7	31.2	30.4	30.6	31.6	31.7	32.3	32.2
1954	31.6	32.4	30.7	31.2	31.6	30.9	31.1	31.2	30.6	31.1	31.2	31.1
1955	31.3	31.2	31.0	31.6	31.1	30.6	30.3	29.8	29.9	30.2	31.1	30.4
1956	31.1	30.1	31.0	31.8	31.1	30.8	29.9	30.3	30.6	31.0	31.4	31.7
1957	31.1	31.7	31.8	31.4	31.7	31.2	30.2	31.6	30.8	31.1	31.7	31.1
1958	32.2	32.1	32.8	32.3	32.0	30.7	31.6	31.3	30.7	31.3	31.7	32.2
1959	32.0	32.7	31.8	31.9	32.0	31.8	31.3	30.6	31.4	31.1	31.6	31.6
1960	31.7	31.8	31.7	30.4	32.2	30.9	30.2	30.7	30.8	31.3	31.6	31.3
1961	31.6	31.6	31.8	31.7	31.2	30.4	30.3	30.3	30.5	30.4	30.7	31.2
1962	31.1	31.7	31.9	31.7	31.0	31.1	30.6	30.0	30.5	30.0	31.1	31.4
1963	31.1	31.7	31.2	31.4	31.9	31.6	30.6	31.1	31.1	31.6	31.4	31.7
1964	32.2	32.8	32.2	31.9	30.9	30.7	30.1	30.2	30.5	30.7	30.6	30.3
1965	32.1	30.9	32.3	31.2	31.2	30.5	30.7	30.6	30.8	30.7	31.7	31.9
1966	31.9	31.7	32.8	31.6	31.3	31.0	30.4	30.6	30.4	31.2	31.7	31.5
1967	31.1	31.1	31.6	30.6	30.7	31.0	30.7	29.6	30.6	30.6	30.8	31.2
1968	32.8	31.6	31.9	31.0	30.6	30.7	29.6	30.1	30.0	31.1	31.5	31.7
1969	32.3	32.3	31.7	31.3	30.8	31.6	30.6	30.6	30.6	31.7	31.9	31.7
1970	32.4	32.2	31.6	31.7	32.2	30.8	30.7	30.7	31.2	30.6	30.8	30.6
1971	31.4	31.7	30.5	30.7	30.6	30.7	30.3	29.8	29.9	30.3	32.0	31.5
1972	30.8	31.3	31.5	31.3	31.6	31.1	30.4	30.2	30.2	31.3	31.2	31.2
1973	31.4	31.6	32.0	31.6	31.9	31.2	30.6	30.0	30.8	30.3	30.4	30.5
1974	32.0	31.0	30.6	31.0	30.5	30.1	30.5	30.1	30.4	30.6	30.7	30.7
1975	33.4	30.8	31.3	30.8	30.9	30.1	30.5	30.1	30.4	30.6	30.7	30.7
1976	30.2	31.0	31.7	31.2	30.8	30.9	30.1	31.2	30.4	31.5	31.6	31.4
1977	31.3	31.8	31.9	32.2	31.9	31.3	30.6	30.2	30.6	31.4	31.6	32.4
1978	30.9	33.4	32.1	31.8	31.9	31.0	31.2	31.5	31.4	31.6	31.5	32.0
1979	32.0	32.0	31.8	32.0	32.3	31.9	31.2	32.1	31.4	32.0	31.4	32.2
1980	32.0	32.1	32.0	33.2	31.1	31.6	30.9	30.8	31.0	31.2	32.6	32.8
1981	32.2	32.8	32.1	-	-	-	31.3	31.0	31.3	31.2	32.0	32.0
1982	31.6	31.4	32.8	32.6	32.6	32.2	31.4	30.9	31.8	32.8	31.5	32.4
1983	32.5	33.6	33.0	32.8	32.4	32.1	31.3	30.4	31.2	32.0	32.2	32.4
1984	31.6	32.0	32.3	32.1	32.1	31.9	30.6	30.6	31.0	32.4	32.0	31.5
1985	33.0	31.5	32.9	32.5	32.0	31.5	30.7	31.2	-	-	-	-
最高気温	33.8	33.6	33.0	33.2	32.7	32.2	31.6	32.1	31.8	32.8	32.6	32.8

最高気温　　33.8 度　　(記録：1948年　1月)

最低温度

出典：EPC

年度	1月	2月	3月	4月	5月	6月	7月	8月	9月	10月	11月	12月
1941	21.6	23.1	22.0	22.9	22.0	21.5	20.1	21.6	21.7	19.8	22.2	21.6
1942	22.8	23.9	23.8	21.6	21.8	21.7	20.1	22.0	20.2	21.6	21.2	21.8
1943	22.7	23.0	22.6	23.9	22.7	20.9	20.9	20.0	21.3	21.9	22.5	22.9
1944	22.5	22.7	23.0	22.0	22.0	22.8	20.1	21.0	22.6	20.1	22.2	21.8
1945	21.5	22.9	22.5	22.9	21.8	21.8	22.8	20.0	21.8	22.8	21.8	23.0
1946	22.9	22.8	22.8	22.2	22.6	21.7	19.7	20.8	20.9	20.8	22.9	20.7
1947	22.4	22.9	21.9	22.7	20.8	21.8	21.3	19.5	21.0	20.1	22.6	22.1
1948	21.7	22.9	22.3	22.4	22.7	20.8	19.7	19.7	20.6	21.9	21.3	21.7
1949	21.6	22.7	22.0	22.2	21.7	20.0	18.8	20.6	22.0	20.7	21.9	22.7
1950	22.2	21.9	21.9	21.8	21.7	20.9	20.5	20.8	19.7	20.9	21.3	21.4
1951	22.9	21.9	22.8	23.8	21.1	21.6	17.9	19.4	19.7	19.8	21.1	20.8
1952	22.7	22.6	22.2	20.7	20.6	20.8	20.9	20.0	19.7	20.6	21.7	22.7
1953	22.0	22.6	23.8	22.3	21.1	20.7	19.9	19.8	18.7	21.7	21.9	20.6
1954	21.7	22.3	21.6	21.1	21.1	21.8	19.0	21.6	21.1	21.7	21.6	22.0
1955	21.7	21.7	21.1	21.3	21.5	21.7	21.6	20.3	20.1	21.6	21.0	21.6
1956	20.6	21.6	21.7	21.9	21.0	19.5	19.9	20.6	19.8	20.5	20.8	21.4
1957	21.7	21.8	21.6	22.6	20.5	19.6	19.7	18.7	20.0	20.0	20.7	20.8
1958	21.7	21.8	22.7	23.4	21.6	20.9	17.7	18.9	19.6	20.3	21.9	21.5
1959	21.9	22.9	22.6	22.9	21.9	20.6	19.6	21.0	19.9	22.2	21.9	22.9
1960	21.9	22.6	22.8	23.6	22.1	20.9	19.9	20.7	19.6	20.6	21.5	22.8
1961	22.2	22.1	21.7	21.9	22.7	20.3	19.7	20.8	21.7	20.7	22.7	21.7
1962	22.2	23.6	22.8	22.2	22.0	19.6	20.6	20.6	21.7	20.6	21.7	21.7
1963	21.9	22.8	22.2	21.6	21.7	19.9	20.6	21.9	20.8	21.8	21.2	21.7
1964	21.1	22.8	22.7	22.1	20.4	20.3	19.6	19.4	20.9	21.3	20.6	21.7
1965	21.7	19.4	21.6	22.3	21.8	19.7	18.6	20.0	21.6	21.9	20.1	21.0
1966	22.9	21.6	22.2	21.1	22.3	21.6	20.8	18.6	19.9	21.7	21.7	19.9
1967	20.6	21.2	21.9	21.7	21.1	20.5	20.0	18.3	21.1	20.6	20.8	20.8
1968	21.9	22.3	22.7	19.5	21.0	20.7	21.6	19.4	19.4	21.7	20.8	21.7
1969	22.3	22.8	22.5	22.8	21.0	20.9	20.0	20.8	19.8	22.1	22.8	21.7
1970	21.7	21.1	22.7	22.1	21.5	22.8	19.6	20.4	18.1	21.2	21.6	21.5
1971	21.1	22.0	22.4	22.0	21.6	20.4	19.7	19.6	19.2	21.6	20.8	22.2
1972	21.9	21.9	21.6	22.4	20.8	21.6	20.2	20.3	21.9	20.5	21.6	23.0
1973	21.0	22.6	23.6	22.8	22.1	20.8	20.5	20.4	20.2	20.9	21.4	22.1
1974	22.1	21.1	21.6	21.3	19.6	19.6	19.1	21.4	20.0	20.4	19.3	21.6
1975	21.4	21.6	22.5	22.4	21.1	20.3	20.4	20.3	20.6	21.0	21.4	22.0
1976	20.4	21.5	22.0	22.5	21.6	20.9	20.2	19.8	18.7	21.4	21.8	20.7
1977	20.2	22.4	21.2	21.1	19.5	18.9	19.3	18.9	19.1	21.6	21.7	21.3
1978	22.6	21.4	21.5	22.2	21.6	20.7	19.2	20.7	19.2	21.5	19.2	22.0
1979	21.9	21.9	22.4	21.4	21.2	22.1	24.0	18.1	20.5	21.2	21.5	20.9
1980	21.5	23.2	22.7	21.5	20.5	19.1	21.2	21.9	21.9	21.9	18.5	19.0
1981	19.6	18.1	19.5	-	-	-	17.5	14.7	17.5	20.5	20.1	20.5
1982	23.0	21.4	22.4	23.0	22.0	20.9	20.2	20.4	20.4	20.1	21.4	21.0
1983	21.7	23.5	22.6	20.8	21.7	20.2	20.1	18.5	21.0	22.0	21.1	22.6
1984	20.9	22.5	23.1	22.7	20.8	20.3	19.0	20.4	20.5	20.3	21.8	22.4
1985	21.9	22.9	22.3	21.9	22.1	21.5	20.5	21.3	-	-	-	-
最低温度	19.6	18.1	19.5	19.5	19.5	18.9	17.5	14.7	17.5	19.8	18.5	19.0

最低温度:　　14.7 度　　(記録：1981年8月)

風速（突風）

出典：EPC

年度	1月	2月	3月	4月	5月	6月	7月	8月	9月	10月	11月	12月
1941	25	39	55	35	33	30	34	30	35	38	50	33
1942	30	38	36	39	28	43	44	41	41	38	29	33
1943	32	26	41	31	28	20	35	36	38	36	28	33
1944	42	33	35	32	32	29	36	38	42	37	28	29
1945	34	36	40	38	29	37	31	32	41	41	33	30
1946	33	38	26	26	29	38	31	39	32	33	30	46
1947	36	26	36	42	36	36	42	39	45	38	27	36
1948	42	42	42	36	35	41	41	36	37	39	32	49
1949	25	39	41	29	44	38	37	41	39	37	37	37
1950	44	41	38	35	32	43	28	34	35	34	31	44
1951	30	41	32	29	30	36	33	29	38	42	36	29
1952	38	37	36	34	34	43	35	31	43	47	27	39
1953	29	35	29	36	38	33	45	29	29	37	42	25
1954	36	42	39	36	43	34	44	37	41	44	35	34
1955	32	46	33	32	39	35	35	45	51	41	35	42
1956	39	38	33	35	30	39	39	33	37	34	29	34
1957	34	65	31	33	28	42	35	34	30	34	34	47
1958	44	31	44	29	48	33	32	36	32	37	33	27
1959	37	42	37	32	33	33	37	32	38	41	34	39
1960	52	34	39	34	36	38	39	35	34	32	33	38
1961	34	43	53	32	35	45	34	29	41	45	31	28
1962	41	37	38	29	43	35	29	47	42	35	31	46
1963	31	34	42	39	31	39	29	34	31	31	33	33
1964	37	34	40	44	33	39	33	37	37	39	33	28
1965	33	33	31	35	36	44	41	33	36	36	28	30
1966	82	35	33	36	34	43	32	33	41	30	33	35
1967	52	37	35	38	35	36	41	52	36	38	36	42
1968	40	78	34	42	28	37	39	28	32	40	31	31
1969	43	43	39	35	39	28	34	32	33	32	34	36
1970	51	47	41	33	32	38	39	36	35	34	28	30
1971	32	28	38	41	34	44	31	33	39	38	35	41
1972	40	32	30	36	29	36	32	38	38	37	36	51
1973	47	37	30	36	36	38	33	36	34	39	38	33
1974	41	37	45	34	42	41	37	28	39	34	35	44
1975	52	36	38	38	34	38	43	37	38	33	38	40
1976	36	42	39	-	-	-	-	-	28	34	30	40
1977	42	32	34	41	33	37	37	31	40	-	-	43
1978	41	30	35	23	35	31	34	30	37	35	38	43
1979	42	35	32	40	30	39	36	32	35	40	34	37
1980	33	44	42	32	27	41	32	36	36	35	26	32
1981	37	46	45	-	-	-	-	32	33	45	35	30
1982	-	49	-	25	38	33	31	-	29	28	38	22
1983	23	-	28	32	32	43	36	34	36	30	26	35
1984	29	36	33	31	33	38	34	38	31	33	28	38
1985	32	29	35	35	43	33	36	32	-	-	-	-
最大風速	82	78	55	44	48	45	45	52	51	47	50	51
m/sec	42	40	28	23	25	23	23	27	26	24	26	26

最高風速（突風）：98ノット(約42m/秒)

1ノット=1853M/時=0.:0.5147 m/sec

年間雷発生日数

出典：EPC

	1月	2月	3月	4月	5月	6月	7月	8月	9月	10月	11月	12月	計
1941	5	5	5	3	2	1	0	1	1	3	2	6	34
1942	7	9	20	10	4	2	1	3	5	4	6	9	80
1943	4	7	6	5	9	0	1	0	2	3	17	13	67
1944	6	5	6	5	4	2	0	1	1	1	0	3	34
1945	5	0	2	2	3	4	1	8	1	4	7	3	40
1946	7	2	13	7	6	1	0	0	0	7	19	14	76
1947	13	10	14	12	8	9	5	2	8	6	8	11	106
1948	7	6	10	9	9	2	1	1	1	6	5	11	68
1949	10	11	3	9	14	3	4	3	5	14	6	9	91
1950	8	13	2	10	14	5	4	2	1	11	15	12	97
1951	6	12	3	15	11	8	0	0	0	8	9	11	83
1952	1	15	9	6	5	3	0	3	2	8	4	12	68
1953	7	7	8	16	7	2	2	0	0	6	5	4	64
1954	8	8	3	11	9	9	2	4	3	17	14	7	95
1955	10	9	4	3	3	2	0	5	3	14	19	19	91
1956	9	5	9	7	1	5	0	0	0	4	3	8	51
1957	5	2	7	9	5	3	3	0	0	0	4	3	41
1958	2	4	13	9	3	0	1	1	3	2	3	4	45
1959	2	2	8	8	8	1	2	3	3	6	6	6	55
1960	1	3	2	6	5	1	0	0	3	3	7	11	42
1961	11	12	5	5	2	6	0	1	1	7	8	7	65
1962	8	3	9	13	11	6	2	8	0	8	6	7	81
1963	10	13	11	12	5	2	3	0	1	6	4	4	71
1964	6	6	9	15	8	13	1	2	5	5	4	6	80
1965	4	4	5	10	10	5	2	0	0	5	3	7	55
1966	8	4	10	9	12	6	3	5	4	5	13	13	92
1967	8	11	9	7	3	4	5	2	1	5	11	5	71
1968	6	8	9	8	10	1	2	1	0	8	4	10	67
1969	6	8	16	6	5	1	4	2	3	11	10	13	85
1970	14	4	7	2	5	4	1	3	3	6	13	3	65
1971	9	7	4	7	7	2	0	0	2	3	12	8	61
1972	5	10	11	11	1	1	1	0	0	6	3	3	52
1973	5	3	5	10	5	3	2	7	6	8	6	5	65
1974	5	3	9	5	10	3	0	0	3	7	7	7	59
1975	4	11	14	6	13	2	6	2	0	5	2	4	69
1976	1	6	7	7	5	2	0	0	0	3	10	8	49
1977	11	7	6	6	4	2	2	0	0	0	4	5	47
1978	12	8	2	3	1	3	3	1	1	2	1	5	42
1979	3	10	4	6	3	0	0	0	4	1	2	3	36
1980	6	5	5	3	3	5	0	0	0	5	0	0	32
1981	11	0	0	-	-	-	1	2	2	0	11	9	36
1982	2	4	3	6	2	0	0	0	1	3	0	2	23
1983	1	0	3	1	0	0	0	0	0	5	3	5	18
1984	4	1	2	3	3	5	0	0	1	0	2	8	29
1985	3	1	3	10	3	1	2	2	-	-	-	-	25

年間最大雷発生日数：106　(1947年)
平均雷発生日数：60

西サモア発電設備

出典：EPC

摘　要	定格出力 (kW)	稼働出力 (kW)	設置場所	完成時期	注
ウポル島					
ディーゼル発電設備					
タヌガマノノNO.4	1,670	0	タヌガマノノ	1966	予備品不足
タヌガマノノNO.5	1,670	1,336	タヌガマノノ	1966	
タヌガマノノNO.6	1,456	1,165	タヌガマノノ	1973	
タヌガマノノNO.7	1,800	0	タヌガマノノ	1979	予備品不足
タヌガマノノNO.8	1,800	1,440	タヌガマノノ	1979	
タヌガマノノNO.9	2,250	1,800	タヌガマノノ	1984	
タヌガマノノNO.10	1,000	0	タヌガマノノ	1986	予備品不足
タヌガマノノNO.11	1,000	0	タヌガマノノ	1986	予備品不足
タヌガマノノ(リース)	1,125	720	タヌガマノノ	1990	
タヌガマノノ(リース)	1,500	960	タヌガマノノ	1990	
タヌガマノノ(リース)	1,375	880	タヌガマノノ	1990	
サテフォア	160	128			
ディーゼル発電合計	16,806	8,429			稼働定格出力:10,536 kW
水力発電設備					
フルアソルNO.2	370	0	フルアソル	1985	水不足
アラオア	1,000	800	アラオア	1982	
ファレオラフィ	1,600	0	アラソア	1982	1989年サイクロンによる被害
サマソニ	950	1,520	サマソニ	1982	定格950 kW 2units
サウニアツ	1,750	1,408	ラロマウガ	1985	定格1750 kW 2units
水力発電合計	5,670	3,728			
ウポル島発電設備合計	22,476	12,157			
サバイ島					
サレロロガ発電設備					
サレロロガNO.1	100	0	サレロロガ	1978	予備品不足
サレロロガNO.2	300	0	サレロロガ	1978	予備品不足
サレロロガNO.3	412	0	サレロロガ	1978	予備品不足
サレロロガNO.4	480	0	サレロロガ	1985	予備品不足
サレロロガNO.5	60	0	サレロロガ	1982	予備品不足
サレロロガNO.6	60	48	サレロロガ	1982	
サレロロガNO.7	150	120	サレロロガ	1986	
サレロロガ（リース）	560	448			
バイボウリNo.1	200	160			
バイボウリNo.2	136	109			
サバイ島発電設備合計	2,458	885			稼働定格出力:1,106 kW
アサウ民間発電設備					
アサウ	1,500	500	アサウ	1894	500 kWをEPCが買電
サバイ発電設備合計	3,958	1,385			

注
1. ディーゼル発電機の低減出力は、発電機の老化と冷却設備不備によるものである。
2. サマソニ水力発電所は、ペンストックの損失が大きく最大出力が出せない。
3. 0.85発電機出力は、力率を0.85としたものである。

西サモア配電設備

出典：EPC

摘要	1981 (km)	1982 (km)	1983 (km)	1984 (km)	1985 (km)	1986 (km)	1987 (km)
ウポル配電系統							
架空配電線							
6.6 kV 配電線	69	99	74	73	73	73	73
22 kV 配電線	97	115	151	158	174	177	182
低圧配電線	217	320	335	350	370	396	419
合計	383	534	560	581	617	646	674
地中配電線							
6.6 kV 地中配電線	1.45	1.45	1.45	1.5	1.5	1.5	1.5
22 kV 地中配電線	0.85	3	3	3	3.08	3.33	3.33
合計	2.30	4.45	4.45	4.50	4.58	4.83	4.83
ウポル配電系統合計							
6.6 kV 配電線	70	100	75	75	75	75	75
22 kV 配電線	98	118	154	161	177	180	185
低圧配電線	217	320	335	350	370	396	419
合計	385	538	564	586	622	651	679
サレロロガ配電系統							
6.6 kV 配電線	23	23	23	23	23	23	23
22 kV 配電線					13	21	21
低圧配電線	30	45	45	53	63	72	72
合計	23	23	23	23	36	44	44
アサウ配電系統							
2.2 kV 配電線		10	15				
22 kV 配電線				28	40	44	72
低圧配電線		12	27	27	32	40	78.4
合計	0	22	42	55	72	84	150
サバイ配電系統合計							
2.2 kV 配電線	0	10	15	0	0	0	0
6.6 kV 配電線	23	23	23	23	23	23	23
22 kV 配電線	0	0	0	28	53	65	93
低圧配電線	30	57	72	80	95	112	150
合計	53	90	110	131	171	200	266

ウポル配電系統負荷率

出典:EPC

タヌガマノノ・西海岸フィーダー (一般、一部産業負荷 Feb. 20, 1989 月曜)													
時間	0:00	2:00	4:00	6:00	8:00	10:00	12:00	14:00	16:00	18:00	20:00	22:00	
負荷	75	730	780	1,050	1,200	1,220	1,230	1,220	1,100	1,460	1,760	1,300	
電力量	150	1,460	1,560	2,100	2,400	2,440	2,460	2,440	2,200	2,920	3,520	2,600	26,250
ピーク負荷	1,900												
ピーク電力量													45,600
負荷率													0.58

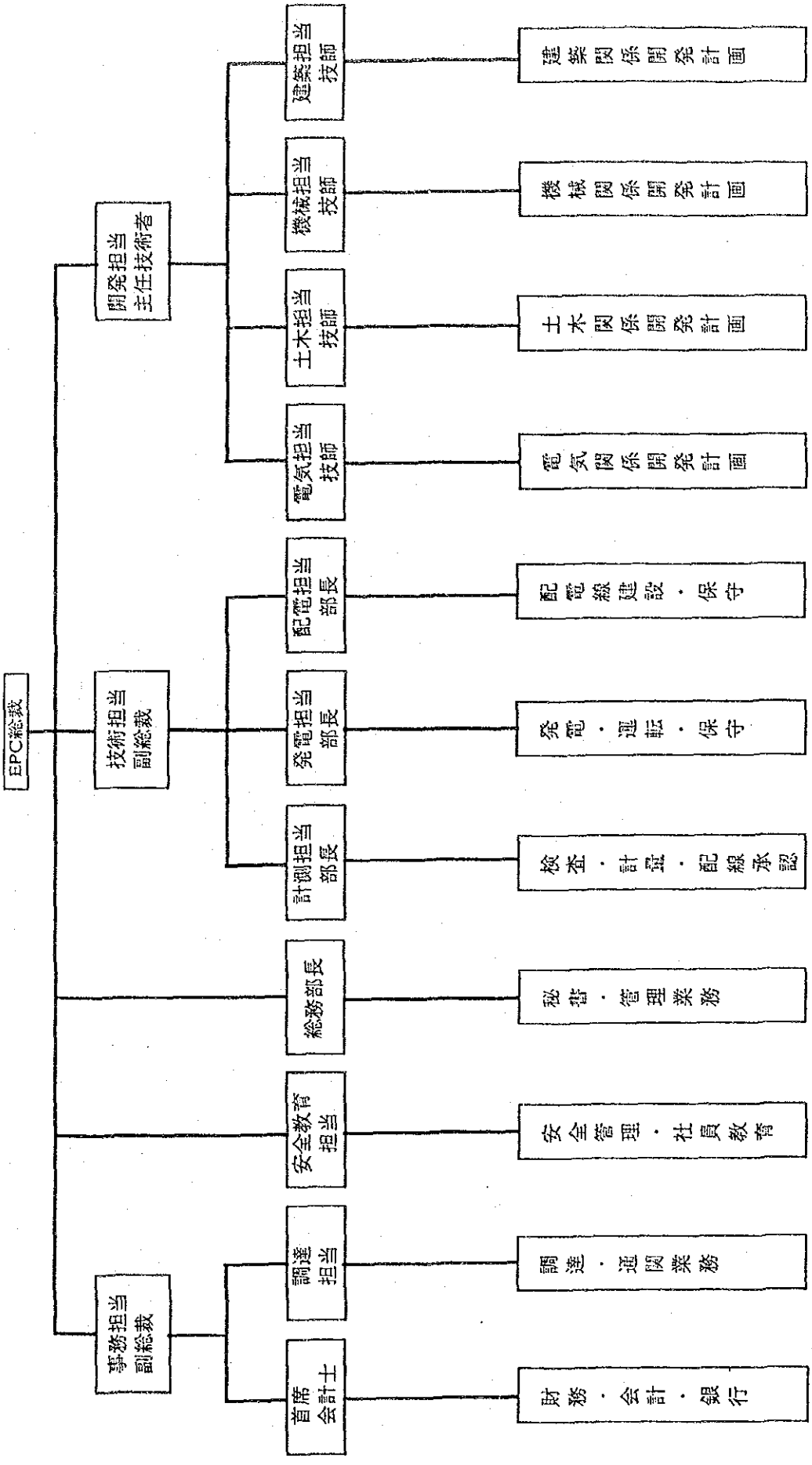
タヌガマノノ・バイテレフィーダー (商業負荷 Mar. 3, 1989)													
時間	0:00	2:00	4:00	6:00	8:00	10:00	12:00	14:00	16:00	18:00	20:00	22:00	
負荷	890	800	840	1,150	2,050	2,040	240	2,150	1,750	1,350	1,300	1,000	
電力量	1,780	1,600	1,680	2,300	4,100	4,080	480	4,300	3,500	2,700	2,600	2,000	31,120
ピーク負荷	2,150												
ピーク電力量													51,600
負荷率													0.60

タヌガマノノ・病院フィーダー (商業負荷 Feb. 28, 1989 Mon)													
時間	0:00	2:00	4:00	6:00	8:00	10:00	12:00	14:00	16:00	18:00	20:00	22:00	
負荷	550	540	540	630	930	1,000	950	990	850	850	800	650	
電力量	1,100	1,080	1,080	1,260	1,860	2,000	1,900	1,980	1,700	1,700	1,600	1,300	18,560
ピーク負荷	1,100												
ピーク電力量													26,400
負荷率													0.70

タヌガマノノ・アラオアフィーダー (一般需要 Mar. 2, 1989)													
時間	0:00	2:00	4:00	6:00	8:00	10:00	12:00	14:00	16:00	18:00	20:00	22:00	
負荷	90	87	87	102	100	90	98	98	100	120	155	120	
電力量	180	174	174	204	200	180	196	196	200	240	310	240	2,494
ピーク負荷	164												
ピーク電力量													3,936
負荷率													0.63

タヌガマノノ・ロトバフィーダー (一般需要 Mar. 8, 1989)													
時間	0:00	2:00	4:00	6:00	8:00	10:00	12:00	14:00	16:00	18:00	20:00	22:00	
負荷	90	65	63	105	98	97	100	110	140	180	130	90	
電力量	180	130	126	210	196	194	200	220	280	360	260	180	2,536
ピーク負荷	206												
ピーク電力量													4,944
負荷率													0.51

添付資料 - 4


EPC総裁
技術担当副総裁
事務担当副総裁
開発担当主任技術者
建築担当技師
機械担当技師
土木担当技師
電気担当技師
建築関係開発計画
機械関係開発計画
土木関係開発計画
電気関係開発計画
配電担当部長
発電担当部長
計測担当部長
配電線建設・保守
発電・運転・保守
検査・計量・配線承認
総務部長
安全教育担当
調達担当
首席会計士
秘書・管理業務
安全管理・社員教育
調達・通関業務
財務・会計・銀行

EPC 組織図

添付資料 - 5

発電電力量

出典:EPC

ウポル電力系統

年度	単位	1981	1982	1983	1984	1985	1986	1987
発電電力量	(GWH)	29.790	30.279	31.104	32.952	34.764	35.950	38.254
消費電力量	(GWH)	24.455	24.478	25.426	27.595	27.712	30.037	32.078
その他	(GWH)	0.336	0.269	0.243	0.253	0.620	0.721	0.642
損失電力量	(GWH)	4.999	5.532	5.435	5.104	5.432	5.191	5.534
損失率	%	16.8	18.3	17.5	15.5	15.6	14.4	14.5

サバイ電力系統

サレロロガ系統

年度	単位	1981	1982	1983	1984	1985	1986	1987
発電電力量	(GWH)	0.801	0.898	0.883	0.853	1.017	1.308	1.460
消費電力量	(GWH)	0.748	0.717	0.679	0.660	0.818	1.108	1.144
その他	(GWH)	0.009	0.010	0.010	0.018	0.014	0.019	0.044
損失電力量	(GWH)	0.043	0.171	0.194	0.175	0.185	0.181	0.271
損失率	%	5.5	19.1	22.0	20.5	18.2	13.8	18.6

アサウ系統

年度	単位	1981	1982	1983	1984	1985	1986	1987
発電電力量	(GWH)	0	0	0	0	0	0.557	0.512
消費電力量	(GWH)	0	0	0	0	0	0.342	0.411
その他	(GWH)	0	0	0	0	0	0.000	0.000
損失電力量	(GWH)	0	0	0	0	0	0.214	0.101
損失率	%	0	0	0	0	0	38.4	19.7

サモア全系統合計

年度	単位	1981	1982	1983	1984	1985	1986	1987
発電電力量	(GWH)	30.591	31.177	31.987	33.805	35.781	37.815	40.226
消費電力量	(GWH)	25.203	25.195	26.105	28.255	28.53	31.487	33.633
その他	(GWH)	0.345	0.279	0.253	0.271	0.634	0.74	0.686
損失電力量	(GWH)	5.042	5.703	5.629	5.279	5.617	5.586	5.906
損失率	%	16.48	18.29	17.60	15.62	15.70	14.77	14.70

販売電力量

出典:EPC

ウボル電力系統

年度	単位	1981	1982	1983	1984	1985	1986	1987	1988
一般需要	(GWH)	9,259	6,514	7,051	7,340	7,404	8,291	8,912	9,986
産業需要	(GWH)	1,626	2,921	3,376	3,887	3,727	3,650	3,798	4,037
商業需要	(GWH)	5,399	11,782	10,098	12,278	12,289	12,688	13,455	15,015
ホテル需要	(GWH)	1,723	1,554	1,395	1,675	1,684	1,701	1,707	1,788
宗教需要	(GWH)	-	574	1,006	1,545	2,032	2,188	2,298	2,416
学校需要	(GWH)	-	948	1,279	1,313	1,298	1,290	1,398	1,627
街路燈	(GWH)	176	185	222	228	263	250	281	261
合計		18,183	24,478	24,427	28,266	28,697	30,058	31,849	35,130
比率			34.6	-0.2	15.7	1.5	4.7	6.0	10.3

サバイ電力系統

サレロロガ系統

年度	単位	1981	1982	1983	1984	1985	1986	1987	1988
一般需要	(GWH)	284	292	253	288	367	489	595	743
産業需要	(GWH)	0	0	0	0	0	0	0	0
商業需要	(GWH)	214	382	367	349	389	484	512	513
ホテル需要	(GWH)	10	8	12	12	10	7	11	9
宗教需要	(GWH)	0	12	22	23	27	38	42	64
学校需要	(GWH)	0	8	10	8	11	17	24	25
街路燈	(GWH)	13	14	15	15	15	15	12	14
合計		521	716	679	695	819	1,050	1,196	1,368
比率			37.4	-5.2	2.4	17.8	28.2	13.9	14.4

アサウ系統

年度	単位	1981	1982	1983	1984	1985	1986	1987	1988
一般需要	(GWH)	0	31	41	41	91	121	168	289
産業需要	(GWH)	0	0	1	0	0	0	0	0
商業需要	(GWH)	0	16	90	88	135	154	160	194
ホテル需要	(GWH)	0	1	0	13	31	25	51	45
宗教需要	(GWH)	0	3	2	3	9	7	11	20
学校需要	(GWH)	0	0	0	0	0	0	1	0
街路燈	(GWH)	0	0	0	0	0	0	0	0
合計		0	51	134	145	266	307	391	548
比率				163.5	7.9	83.4	15.4	27.3	40.3

需要家数

出典;EPC

ウボル電力系統

年度	単位	1,981	1982	1983	1984	1985	1986	1987	1988
一般需要家	(Nos)	6,319	6,243	6,508	6,869	7,061	7,506	7,708	7,870
産業需要家	(Nos)	88	79	82	67	64	68	58	56
需要家	(Nos)	719	718	761	673	655	707	674	632
ホテル需要家	(Nos)	4	4	5	11	11	12	11	10
政府需要公共需要		202	0	0	0	0	0	0	0
宗教需要家	(Nos)	0	207	230	227	233	233	233	232
学校需要家	(Nos)	0	109	116	93	88	93	96	98
合計	(Nos)	7,332	7,360	7,702	7,940	8,112	8,619	8,780	8,898

サバイ電力系統

サレロロガ系統

年度	単位	1,981	1982	1983	1984	1985	1986	1987	1988
一般需要家	(Nos)	702	684	661	688	978	1,154	1,282	1,419
産業需要家	(Nos)	0	0	0	0	0	0	0	0
需要家	(Nos)	25	41	40	45	52	57	62	67
ホテル需要家	(Nos)	1	1	1	2	2	2	2	2
政府需要公共需要		17	0	0	0	0	0	0	0
宗教需要家	(Nos)	0	25	28	31	41	53	64	66
学校需要家	(Nos)	0	2	2	4	5	8	10	10
合計	(Nos)	745	753	732	770	1,078	1,274	1,420	1,564

アサウ系統

年度	単位	1,981	1982	1983	1984	1985	1986	1987	1988
一般需要家	(Nos)	0	55	93	135	224	286	494	738
産業需要家	(Nos)	0	0	1	0	0	0	0	0
需要家	(Nos)	0	2	16	17	24	36	28	31
ホテル需要家	(Nos)	0	1	1	2	2	2	2	2
政府需要公共需要		0	0	0	0	0	0	0	0
宗教需要家	(Nos)	0	1	5	7	11	13	21	31
学校需要家	(Nos)	0	0	0	0	0	1	1	3
合計	(Nos)	0	59	116	161	261	338	546	805

サモア全系統

年度	単位	1,981	1982	1983	1984	1985	1986	1987	1988
一般需要家	(Nos)	7,021	6,982	7,262	7,692	8,263	8,946	9,484	10,027
産業需要家	(Nos)	88	79	83	67	64	68	58	56
需要家	(Nos)	744	761	817	735	731	800	764	730
ホテル需要家	(Nos)	5	6	7	15	15	16	15	14
政府需要公共需要		219	0	0	0	0	0	0	0
宗教需要家	(Nos)	0	233	263	265	285	299	318	329
学校需要家	(Nos)	0	111	118	97	93	102	107	111
合計	(Nos)	8,077	8,172	8,550	8,871	9,451	10,231	10,746	11,267

添付資料5-4「西サモア・ウポル島電力需要想定」

1992年2月

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
一般需要																									
人口	(1986年度国勢調査を基準とする)					112,478	113,603	114,739	115,886	117,045	118,216	119,398	120,592	121,798	123,016	124,246	125,488	126,743	128,010	129,291	130,583	131,889	133,208	134,540	135,886
電化率(%)						75	75	75	75	75	75	75	88.8	92	93	93	94	94	95	95	95	95	95	95	95
電化地域人口						84,359	85,202	86,054	86,915	87,784	88,662	89,548	107,085	112,054	114,404	115,548	117,959	119,138	121,610	122,826	124,054	125,295	126,548	127,813	129,091
需要家数	6,319	6,243	6,508	6,869	7,061	7,506	7,708	7,870	7,901	7,980	8,060	8,141	9,735	10,187	10,400	10,504	10,724	10,831	11,055	11,166	11,278	11,390	11,504	11,619	11,736
需要家当たり家族数						11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
需要電力量(MWh)	9,259	6,514	7,051	7,340	7,404	8,291	8,912	9,986	10,114	7,650	8,113	8,604	11,317	13,027	13,965	14,810	15,875	16,835	18,044	19,135	20,293	21,521	22,823	24,204	25,668
需要家当たり消費電力(kWh)	1,465	1,043	1,083	1,069	1,049	1,105	1,156	1,269	1,280	959	1,007	1,057	1,163	1,279	1,343	1,410	1,480	1,554	1,632	1,714	1,799	1,889	1,984	2,083	2,187
需要家年間当たり増加率	-	0.712	1.038	0.986	0.981	1.053	1.047	1.097	1.009	0.749	1.050	1.050	1.100	1.100	1.050	1.050	1.050	1.050	1.050	1.050	1.050	1.050	1.050	1.050	1.050
年間需要増加率		0.704	1.082	1.041	1.009	1.120	1.075	1.121	1.013	0.756	1.061	1.061	1.315	1.151	1.072	1.061	1.072	1.061	1.072	1.061	1.061	1.061	1.060	1.061	1.061
産業需要																									
需要電力量(MWh)	1,626	2,921	3,376	3,887	3,727	3,650	3,798	4,037	4,037	4,502	4,801	5,121	5,462	5,823	6,213	6,627	7,068	7,538	8,040	8,575	9,146	9,755	10,404	11,096	11,835
需要家数	88	79	82	67	64	68	58	56	56	56	57	57	58	58	59	59	60	61	61	62	62	63	64	64	65
需要家の年間当たり増加率	-	0.898	1.038	0.817	0.955	1.063	0.853	0.966	1.000	1.000	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010
需要家当たり消費電力(kWh)	18,477	36,975	41,171	58,015	58,234	53,676	65,483	72,089	76,126	80,389	84,891	89,645	94,665	99,966	105,565	111,476	117,719	124,311	131,273	138,624	146,387	154,584	163,241	172,383	182,036
需要家当たり年間需要増加率	-	2.001	1.113	1.409	1.004	0.922	1.220	1.101	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056
商業需要																									
需要電力量(MWh)	5,399	11,782	10,098	12,278	12,289	12,688	13,455	15,015	15,526	16,053	16,599	17,164	17,747	18,351	18,974	19,620	20,287	20,976	21,690	22,427	23,190	23,978	24,793	25,636	26,508
需要家数	713	718	761	673	655	707	707	707	707	707	707	707	707	707	707	707	707	707	707	707	707	707	707	707	707
需要家の年間当たり増加率	-	1.007	1.060	0.884	0.973	1.079	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
需要家当たり消費電力(kWh)	7,572	16,409	13,269	18,244	18,762	17,946	19,031	21,238	21,960	22,706	23,478	24,277	25,102	25,955	26,838	27,750	28,694	29,670	30,678	31,721	32,800	33,915	35,068	36,261	37,493
需要家当たり年間需要増加率	-	2.167	0.809	1.375	1.028	0.957	1.060	1.116	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034
ホテル需要																									
需要電力量(MWh)	1,723	1,554	1,395	1,675	1,684	1,701	1,707	1,788	1,824	1,860	1,897	1,935	1,974	2,014	2,054	2,095	2,137	2,180	2,223	2,268	2,313	2,359	2,406	2,455	2,504
需要家数	4	4	5	11	11	12	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
需要家当たり消費電力(kWh)	430,750	388,500	279,000	152,273	153,091	141,750	155,182	178,800	182,376	186,024	189,744	193,539	197,410	201,358	205,385	209,493	213,683	217,956	222,315	226,762	231,297	235,923	240,641	245,454	250,363
需要家当たり年間需要増加率	-	0.902	0.718	0.546	1.005	0.926	1.095	1.152	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020
官政需要																									
需要電力量(MWh)		574	1006	1545	2032	2188	2,298	2,416	2,699	3,015	3,368	3,762	4,202	4,694	5,244	5,857	6,543	7,309	8,165	9,120	10,188	11,381	12,713	14,201	15,863
需要家数	-	207	230	227	233	233	235	238	240	242	245	247	250	252	255	257	260	263	265	268	271	273	276	279	281
需要家の年間当たり増加率	-	-	1.111	0.987	1.026	1.000	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010
需要家当たり消費電力(kWh)	-	2,773	4,374	6,806	8,721	9,391	9,765	10,165	11,242	12,434	13,752	15,210	16,822	18,605	20,577	22,758	25,171	27,839	30,790	34,053	37,663	41,655	46,071	50,954	56,355
需要家当たり年間需要増加率	-	-	1.577	1.556	1.281	1.077	1.040	1.041	1.106	1.106	1.106	1.106	1.106	1.106	1.106	1.106	1.106	1.106	1.106	1.106	1.106	1.106	1.106	1.106	1.106
学校需要																									
需要電力量(MWh)		948	1,279	1,313	1,298	1,290	1,398	1,627	1,691	1,813	1,914	2,021	2,133	2,252	2,378	2,510	2,650	2,797	2,953	3,117	3,291	3,474	3,668	3,872	4,088
需要家数	-	109	116	93	88	98	99	100	102	104	106	108	110	112	114	116	118	121	123	125	128	130	133	135	138
需要家の年間当たり増加率	-	-	1.064	0.802	0.946	1.114	1.010	1.010	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019
需要家当たり消費電力(kWh)	-	8,697	11,026	14,118	14,750	13,163	14,124	16,275	16,861	17,468	18,097	18,748	19,423	20,122	20,847	21,597	22,375	23,180	24,015	24,879	25,775	26,703	27,664	28,660	29,692
需要家当たり年間需要増加率	-	-	1.268	1.280	1.045	0.892	1.073	1.152	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036
道路照明需要																									
需要電力量(MWh)	176	185	222	228	263	250	281	261	270	279	289	298	308	319	330	341	353	365	377	390	403	417	431	446	461
年間需要増加率	-	1.051	1.200	1.027	1.154	0.951	1.124	0.929	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034
総消費電力量(MWh)	18,183	24,478	24,427	28,266	28,697	30,058	31,849	35,130	36,161	35,172	36,981	38,905	43,145	46,482	49,157	51,860	54,911	58,000	61,491	65,033	68,824	72,884	77,238	81,909	86,926
系統損失(MWh)	4,999	5,532	5,435	5,104	5,432	5,191	5,534	5,499	5,750	5,557	5,806	6,069	6,687	7,158	7,521	7,883	8,292	8,700	9,162	9,625	10,117	10,714	11,354	12,041	12,778
損失率(%)	27.49	22.60	22.25	18.06	18.93	17.27	17.38	15.65	15.90	15.80	15.70	15.60	15.50	15.40	15.30	15.20	15.10	15.00	14.90	14.80	14.70	14.70	14.70	14.70	14.70
系統総電力量(MWh)	23,182	30,010	29,862	33,370	34,129	35,249	37,383	40,629	41,910	40,730	42,787	44,974	49,832	53,640	56,679	59,742	63,203	66,700	70,653	74,658	78,941	83,598	88,592	93,950	99,704
負荷率	0.55	0.55	0.56	0.56	0.56	0.57	0.57	0.57	0.57	0.58	0.58	0.58	0.58	0.58	0.59	0.59	0.59	0.59	0.59	0.60	0.60	0.60	0.60	0.60	0.60
ピーク電力(kW)	4,812	6,229	6,087	6,802	6,957	7,059	7,487	8,137	8,393	8,016	8,421	8,852	9,808	10,557	10,966	11,559	12,229	12,905	13,670	14,204	15,019	15,905	16,855	17,875	18,970
年間電力増加率	-	1.295	0.995	1.117	1.023	1.033	1.061	1.087	1.032	0.972	1.051	1.051	1.108	1.076	1.057	1.054	1.058	1.055	1.059	1.057	1.057	1.059	1.060	1.060	1.061

注：1 1981年から1988年までは消費電力量、1988年以降は想定需要である。
2 1988年以降の電力需要は、1983年から1988年までの需要増加率で増加するものとして想定した。
3 一般需要は、人口増加と電化率より需要想定を行った。

添付資料5-5「西サモア・サバイ島電力需要想定」

1992年2月

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
一般需要																									
人口	[1986年度国勢調査を基準とする]					44,930	45,379	45,833	46,291	46,754	47,222	47,694	48,171	48,653	49,139	49,631	50,127	50,628	51,135	51,646	52,162	52,684	53,211	53,743	54,280
電化率(%)						70	70	70	*70*	*70*	*70*	*70*	*78.9*	*90*	*91*	*91*	*92*	*92*	*92*	*92*	*92*	*92*	*92*	*92*	*92*
電化地域人口						31,451	31,766	32,083	32,404	32,728	33,055	33,386	38,007	43,787	44,717	45,164	46,117	46,578	47,044	47,514	47,989	48,469	48,954	49,443	49,938
需要家数	702	739	754	823	1,202	1,440	1,776	2,157	1,800	1,818	1,836	1,855	2,111	2,433	2,484	2,509	2,562	2,588	2,614	2,640	2,666	2,693	2,720	2,747	2,774
需要家当たり家族数						22	18	18	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*
需要電力量(MWh)	284	323	294	329	458	610	763	832	860	427	453	480	618	805	863	915	981	1,040	1,103	1,170	1,241	1,316	1,395	1,480	1,569
需要家当たり消費電力(kWh)	405	437	390	400	381	424	430	386	478	235	247	259	293	331	347	365	383	402	422	443	465	489	513	539	566
需要家年間当たり増加率	-	1.080	0.892	1.025	0.953	1.112	1.014	0.898	1.238	0.492	1.050	1.050	1.130	1.130	1.050	1.050	1.050	1.050	1.050	1.050	1.050	1.050	1.050	1.050	1.050
年間需要増加率		1.137	0.910	1.119	1.392	1.332	1.251	1.090	1.033	0.497	1.061	1.061	1.286	1.302	1.072	1.060	1.072	1.061	1.061	1.061	1.060	1.061	1.061	1.060	1.061
基礎需要																									
需要電力量(MWh)	0	0	0	0	0	0	0	0	0	0	26	32	40	50	61	76	94	116	143	177	219	270	334	413	510
需要家数	0	0	0	0	0	0	0	0	0	0	2	2	3	3	4	5	6	7	9	10	12	15	18	21	26
需要家の年間当たり増加率	-	-	-	-	-	-	-	-	-	-	-	*1.200*	*1.200*	*1.200*	*1.200*	*1.200*	*1.200*	*1.200*	*1.200*	*1.200*	*1.200*	*1.200*	*1.200*	*1.200*	*1.200*
需要家当たり消費電力(kWh)	-	-	-	-	-	-	-	-	-	-	13,140	13,534	13,940	14,358	14,789	15,233	15,690	16,161	16,645	17,145	17,659	18,189	18,734	19,297	19,875
需要家当たり年間需要増加率	-	-	-	-	-	-	-	-	-	-	-	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*
商業需要																									
需要電力量(MWh)	214	398	457	437	524	638	672	707	735	765	796	828	861	896	932	970	1,009	1,050	1,092	1,136	1,182	1,229	1,279	1,330	1,384
需要家数	25	43	56	62	76	93	90	98	99	100	101	102	103	104	105	106	107	108	109	110	112	113	114	115	116
需要家の年間当たり増加率	-	1.720	1.302	1.107	1.226	1.224	0.968	1.089	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*
需要家当たり消費電力(kWh)	-	9,256	8,161	7,048	6,895	6,860	7,467	7,214	7,431	7,654	7,883	8,120	8,363	8,614	8,873	9,139	9,413	9,695	9,986	10,286	10,594	10,912	11,240	11,577	11,924
需要家当たり年間需要増加率	-	-	0.882	0.864	0.978	0.995	1.088	0.966	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*
ホテル需要																									
需要電力量(MWh)	-	9	13	25	41	32	62	54	55	145	166	172	179	186	211	220	229	238	247	279	290	301	313	326	339
需要家数	-	2	2	4	4	4	4	4	*10*	*10*	*11*	*11*	*11*	*11*	*12*	*12*	*12*	*12*	*12*	*13*	*13*	*13*	*13*	*13*	*13*
需要家当たり消費電力(kWh)	-	4,536	6,271	6,218	10,284	8,048	15,451	13,385	13,921	14,477	15,057	15,659	16,285	16,937	17,614	18,319	19,051	19,813	20,606	21,430	22,287	23,179	24,106	25,070	26,073
需要家当たり年間需要増加率	-	-	1.382	0.992	1.654	0.783	1.920	0.866	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*	*1.040*
公共需要																									
需要電力量(MWh)		16	24	111	36	36	52	84	93	103	115	128	142	158	175	195	216	240	267	296	329	366	407	452	502
需要家数	-	26	33	38	52	66	85	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	113	114	115
需要家の年間当たり増加率	-	-	1.269	1.152	1.368	1.269	1.288	1.141	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*	*1.010*
需要家当たり消費電力(kWh)	-	604	731	2,910	686	539	614	864	951	1,046	1,150	1,265	1,392	1,531	1,684	1,853	2,038	2,242	2,466	2,712	2,984	3,282	3,610	3,971	4,368
需要家当たり年間需要増加率	-	-	1.212	3.979	0.236	0.786	1.138	1.408	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*	*1.100*
学校需要																									
需要電力量(MWh)		8	10	8	11	17	24	25	26	27	29	30	31	32	33	35	36	38	39	41	42	44	46	48	50
需要家数	-	109	116	93	88	98	99	100	101	102	103	104	105	106	107	108	109	110	112	113	114	115	116	117	118
需要家の年間当たり増加率	-	-	1.064	0.802	0.946	1.114	1.010	1.010	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*	*1.020*
需要家当たり消費電力(kWh)	-	77	84	84	122	168	244	254	261	269	277	285	294	303	312	321	331	341	351	362	372	384	395	407	419
需要家当たり年間需要増加率	-	-	1.088	0.999	1.453	1.384	1.450	1.038	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*	*1.030*
道路照明需要																									
需要電力量(MWh)	-	14	15	15	15	15	12	14	12	12	13	13	14	14	15	15	16	16	17	17	18	19	19	20	21
年間需要増加率	-	-	1.051	0.967	0.993	1.025	0.796	1.195	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*	*1.035*
総消費電力量(MWh)	-	769	813	924	1,084	1,347	1,585	1,716	1,781	1,480	1,597	1,684	1,885	2,141	2,291	2,425	2,580	2,737	2,908	3,116	3,321	3,545	3,793	4,068	4,375
系統損失(MWh)	-	171	194	175	185	395	372	400	410	296	319	320	349	385	401	412	439	452	480	499	531	567	607	651	700
損失率(%)	-	22.25	23.87	18.94	17.06	29.32	23.47	23.31	*23.00*	*20.00*	*20.00*	*19.00*	*18.50*	*18.00*	*17.50*	*17.00*	*17.00*	*16.50*	*16.50*	*16.00*	*16.00*	*16.00*	*16.00*	*16.00*	*16.00*
系統総電力量(MWh)	-	940	1,007	1,099	1,269	1,742	1,957	2,116	2,191	1,776	1,917	2,004	2,234	2,526	2,692	2,837	3,019	3,189	3,388	3,615	3,852	4,113	4,400	4,719	5,075
負荷率	-	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.45	0.46	0.46	0.46	0.46	0.46	0.46
ピーク電力(kW)	-	306	328	358	414	568	638	690	714	548	576	587	638	703	732	753	783	809	860	897	956	1,021	1,092	1,171	1,259
年間電力増加率	-	-	1.071	1.092	1.155	1.373	1.123	1.081	1.035	0.811	1.079	1.045	1.115	1.131	1.066	1.054	1.064	1.056	1.062	1.067	1.066	1.068	1.070	1.072	1.075

注：1　1981年から1988年までは消費電力量、1988年以降は想定需要である。
　　2　1988年以降の電力需要は、1986年から1988年までの需要増加率で増加するものとして想定した。
　　3　一般需要は、人口増加と電化率より需要想定を行った。

添付資料 5-6 ウポル島電化地域需要想定

Distribution Lines	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
No.1 Line												
Tanugamanono-Siumu	Tanugamanono	654	782	71	2,083	148,135	0.40	42	50	0	2	0
	Papauta	504	603	55	2,083	114,159	0.40	33	50	0	2	0
	Pr. School		0	1	28,660	28,660	0.30	11	15	1	0	0
	Vailima	790	945	86	2,083	178,940	0.40	51	25	0	2	0
	Avele	371	444	40	2,083	84,034	0.40	24	25	0	1	0
	Church		0	1	50,954	50,954	0.60	10	15	1	0	0
	Letava	264	316	29	2,083	59,798	0.40	17	25	0	1	0
	Vaoala	503	602	55	2,083	113,933	0.40	33	50	0	0	1
	Tiapapata	112	134	12	2,083	25,369	0.40	7	15	1	0	0
	Afiamalu East	74	89	8	2,083	16,762	0.40	5	15	1	0	0
	Trans/Station		0	1	172,383	172,383	0.60	33	50	0	0	1
	Afiamalu West	40	48	4	2,083	9,060	0.40	3	15	1	0	0
	Branch line									0	0	0
	FM Trans/Station		0	1	2,083	2,083	0.40	0.59	15	1	0	0
	Maninoa	320	383	35	2,083	72,482	0.40	21	25	0	1	0
	Siumu	561	671	61	2,083	127,070	0.40	36	50	0	0	1
	Shops		0	8	36,261	290,088	0.40	83	25	0	1	0
	Schools		0	2	28,660	57,320	0.60	11	15	1	0	0
	Churches		0	6	50,954	305,724	0.60	58	25	0	1	0
	Siumu-Uta	590	706	64	2,083	133,639	0.40	38	50	0	0	1
	Saaga	407	487	44	2,083	92,188	0.40	26	50	0	0	1
	Hotel		0	2	245,454	490,908	0.60	93	25	0	1	0
	Sub-Total	5,190	6,208	584		2,082,782	0.45	528		7	12	5

Distribution Lines	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load(kW)	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
No.2 Line												
Saleapaga - Lefaga	Satitea	481	575	52	2,083	108,950	0.40	31	50	0	0	1
	Malaela	123	147	13	2,083	27,860	0.40	8	15	1	0	0
	Lepue	258	309	28	2,083	58,439	0.40	17	25	0	1	0
	Mutiatele	252	301	27	2,083	57,080	0.40	16	25	0	1	0
	Lalomanu	748	895	81	2,083	169,427	0.40	48	50	0	0	1
	Vailoa	376	450	41	2,083	85,167	0.40	24	25	0	1	0
	Ulutogia	201	240	22	2,083	45,528	0.40	13	15	1	0	0
	Shops		0	5	36,261	181,305	0.50	41	50	0	0	1
	Schools		0	3	28,660	85,980	0.60	16	25	0	1	0
	Church		0	6	50,954	305,724	0.60	58	25	0	2	0
	Sub-Total	2,439	2,917	279		1,125,459	0.45	286		2	6	3

Distribution Lines	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
No.3 Line												
Saluafata - Sauniatu	Sauano	221	264	24	2,083	50,058	0.40	14	15	1	0	0
	Falevao	423	506	46	2,083	95,812	0.40	27	50	0	0	1
	Manunu	177	212	19	2,083	40,092	0.40	11	15	1	0	0
	Sauniatu	133	159	14	2,083	30,125	0.40	9	15	1	0	0
	Shops		0	4	36,261	145,044	0.50	33	50	0	0	1
	Schools		0	2	28,660	57,320	0.60	11	15	1	0	0
	Church		0	2	50,954	101,908	0.60	19	25	0	1	0
	Sub-Total	954	1,141	112		520,360	0.45	132		4	1	2

Distribution Lines	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
No.4 Line												
Amaile - Aflilo	Amaile - Aflilo	150	179	16	2,083	33,976	0.40	10	15	1	0	0
	Shops		0	1	36,261	36,261	0.40	10	15	1	0	0
	Schools		0	1	28,660	28,660	0.40	8	15	1	0	0
	Church		0	1	50,954	50,954	0.40	15	15	1	0	0
	Sub-Total	150	179	19		149,851	0.40	43		4	0	0

Distribution Lines	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
No.5 Line												
Aleisa - Saleimoa	Salepeua'e	208	249	23	2,083	47,113	0.40	13	15	1	0	0
	Nonoa	143	171	16	2,083	32,390	0.40	9	15	1	0	0
	Sub-Total	351	420	38		79,504	0.40	23		2	0	0

Distribution Lines	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
No.6 Line												
Nuu - Faleula	Aele	326	390	35	2,083	73,841	0.40	21	25	0	1	0
	Nuu	257	307	28	2,083	58,212	0.40	17	25	0	1	0
	Church		0	1	50,954	50,954	0.60	10	15	1	0	0
	Sub-Total	583	697	64		183,007	0.45	46		1	2	0

Distribution Lines	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
No.7 Line												
Lepal - Fasitoouta	Lepale	43	51	5	2,083	9,740	0.40	3	15	1	0	0
	Church		0	2	50,954	101,908	0.60	19	25	0	1	0
	Sub-Total	43	51	7		111,648	0.45	28		1	1	0

Distribution Lines	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	E.Demand in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
No.8 Line												
Satuimalufilufi - Satapuala	Afia	163	195	18	2,083	36,921	0.40	11	15	1	0	0
	Vaipapa	126	151	14	2,083	28,540	0.40	8	15	1	0	0
	Faleele	26	31	3	2,083	5,889	0.40	2	15	1	0	0
	Afolau	65	78	7	2,083	14,723	0.40	4	15	1	0	0
	Sina	150	179	16	2,083	33,976	0.40	10	15	1	0	0
	Church		0	1	50,954	50,954	0.60	10	15	1	0	0
	Sub-Total	530	634	59		171,003	0.40	49		6	0	0

Transformers in Upolu	10,240	12,249	1,163		4,423,614	0.45	1,122		27	22	10

添付資料 5-7 サバイ島電化地域需要想定

Districts	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
Line No.9												
Puapia - Samalaeulu	Lane	695	831	46	539	24,893	0.20	14	15	1	0	0
	Asaga	243	291	16	539	8,704	0.20	5	15	1	0	0
	Puapua	519	621	34	539	18,590	0.20	11	15	1	0	0
	Patamea	605	724	40	539	21,670	0.20	12	15	1	0	0
	Samalaeulu	828	990	55	539	29,657	0.20	17	15	1	0	0
	Mauga	157	188	10	539	5,623	0.20	3	15	1	0	0
	Shops	0	0	2	11,577	23,154	0.40	7	15	1	0	0
	Schools	0	0	2	407	814	0.20	0	15	1	0	0
	Churches	0	0	3	3,971	11,913	0.40	3	15	1	0	0
	Sub-Total	3,047	3,645	209		145,018	0.35	47		9	0	0

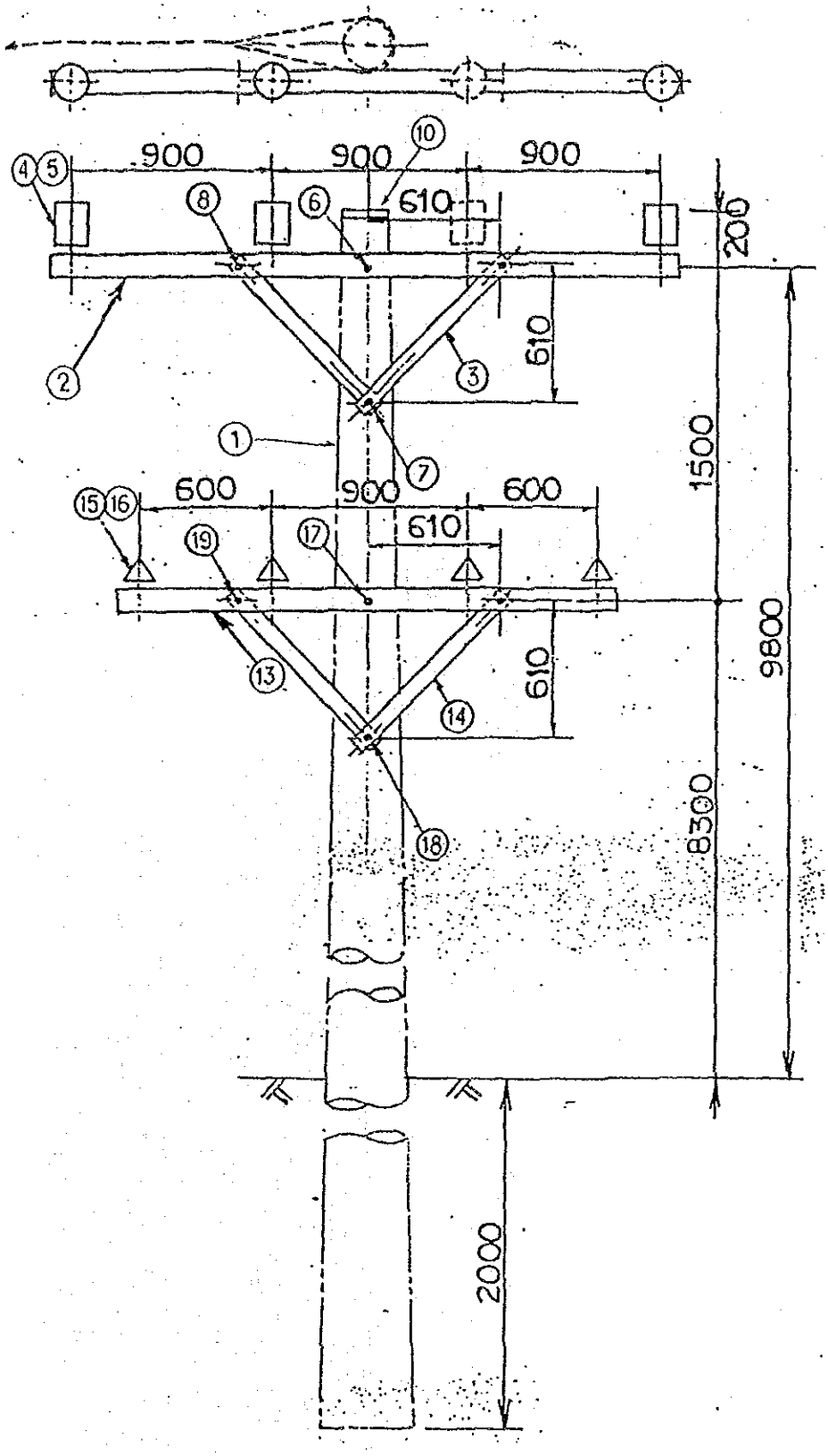
Districts	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
Line No.10												
Sasina - Matavai	Fagaee	248	297	16	539	8,883	0.20	5	15	1	0	0
	Sasina	614	734	41	539	21,992	0.20	13	15	1	0	0
	Letui	273	327	18	539	9,778	0.20	6	15	1	0	0
	Aopo	389	465	26	539	13,933	0.20	8	15	1	0	0
	Shops	0	0	6	11,577	69,462	0.20	40	15	1	1	0
	Schools	0	0	4	407	1,628	0.20	1	15	1	0	0
	Churches	0	0	4	3,971	15,884	0.20	9	15	1	0	0
	Sub-Total	1,524	1,823	115		141,561	0.20	81		7	1	0

Districts	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
Line No.11												
Taftafoe	Falealupo-Uta	718	859	48	539	25,717	0.20	15	15	1	0	0
	Vaetupua	386	462	26	539	13,826	0.20	8	15	1	0	0
	Avata	170	203	11	539	6,089	0.20	3	15	1	0	0
	Tufutafoe	354	423	24	539	12,680	0.20	7	15	1	0	0
	Neiafu-Tai	506	605	34	539	18,124	0.20	10	15	1	0	0
	Neiafu-Uta	603	721	40	539	21,598	0.20	12	15	1	0	0
	Falelima	555	664	37	539	19,879	0.20	11	15	1	0	0
	Shops	0	0	2	11,577	23,154	0.20	13	15	1	0	0
	Schools	0	0	3	407	1,221	0.20	1	15	1	0	0
	Churches	0	0	4	3,971	15,884	0.20	9	15	1	0	0
	Sub-Total	3,292	3,938	228		158,172	0.30	60		10	0	0

Districts	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
Line No.12												
Tafuautaa - Tafuatai	Tafua-Tai	357	427	24	539	12,787	0.20	7	15	1	0	0
	Tafua-Uta	185	221	12	539	6,626	0.20	4	15	1	0	0
	Shops	0	0	1	11,577	11,577	0.20	7	15	1	0	0
	Schools	0	0	1	407	407	0.20	0	15	1	0	0
	Churches	0	0	1	3,971		0.20	0	15	1	0	0
	Sub-Total	542	648	39		31,397	0.20	18		5	0	0

Districts	Villages or Big Consumers	Population in 1986	Population in 2004	Nos. of Consumer	Unit/MWh in 2004	Total MWh	Load Factor	Peak Load	Tr. Capa (kVA)	15 kVA	25 kVA	50 kVA
Line No.13												
Patamea - Salcaula	Patamea	605	724	40	539	21,670	0.20	12	15	1	0	0
	Samalaeulu	828	990	55	539	29,657	0.20	17	15	1	0	0
	Mauga	157	188	10	539	5,623	0.20	3	15	1	0	0
	Salcaula	634	758	42	539	22,709	0.20	13	15	1	0	0
	Shops	0	0	4	11,577	46,308	0.20	26	15	1	0	0
	Schools	0	0	3	407	1,221	0.20	1	15	1	0	0
	Churches	0	0	3	3,971	11,913	0.20	7	15	1	0	0
	Sub-Total	2,224	2,660	158		139,101	0.20	79	105	7	0	0
Transformers in Savai		10,629	12,714	749		615,249	0.30	234		38	1	0

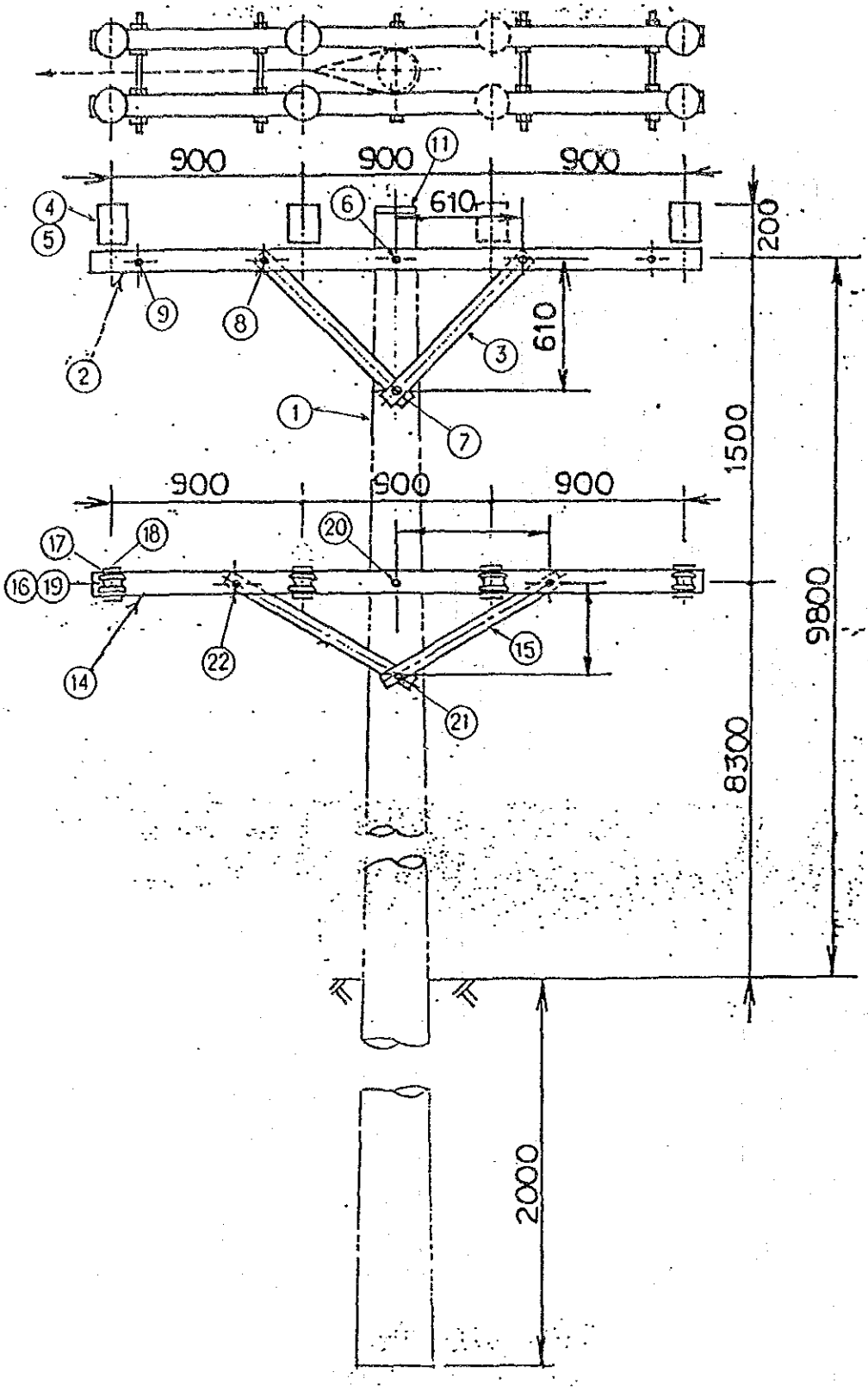
1. STRAIGHT LINE POLES



1. STRAIGHT LINE POLES

	DESCRIPTION	SPEC.	Q'TY
	(FOR 22KV LINE)		
1	POLES	12M	1
2	STEEL CROSSARM	75x75x3.2x2900	1
3	ARM BRACE	863x40x6	2
4	22KV PIN INSULATORS		3
5	22KV INSULATOR PIN		3
6	BOLT FOR ARM/POLE WITH 1-CURVED WASHER	M16x340	1
7	BOLT FOR BRACE/POLE WITH 1-CURVED WASHER	M16x280	1
8	BOLT FOR ARM/BRACE	M16x120	2
9	COACH SCREW	12x100	2
10	ALUMI POLE CAP		1
11	STEP BOLT	16x260	2
12	PREFORMED TOP TIE		3
	(FOR L.V.LINE)		
13	STEEL CROSSARM	75x75x3.2x2300	1
14	ARM BRACE	863x40x6	2
15	L/V PIN INSULATOR		4
16	L/V INSULATOR PIN		4
17	BOLT FOR ARM/POLE WITH 1-CURVED WASHER	M16x360	1
18	BOLT FOR BRACE/POLE WITH 1-CURVED WASHER	M16x300	1
19	BOLT FOR ARM/BRACE	M16x120	2
20	AL. BIND WIRE	3.2mm INSULATED	12M
21	POLES	9M	1

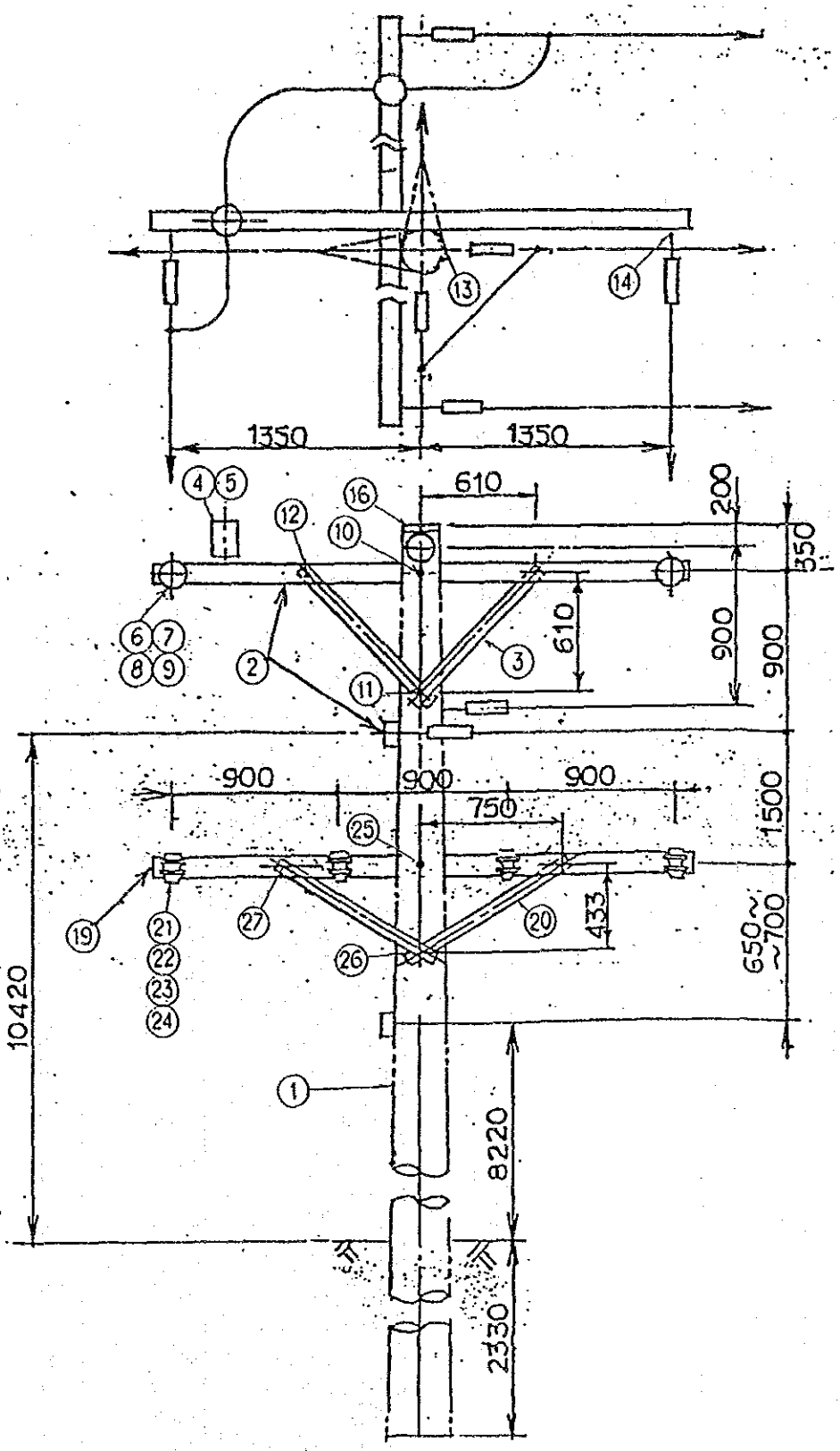
2. LIGHT ANGLE POLE (DOUBLE PIN)



2. LIGHT ANGLE POLE (DOUBLE PIN)

	DESCRIPTION	SPEC.	Q'TY
	(FOR 22KV LINE)		
1	POLES	12M	1
2	STEEL CROSSARM	75x75x3.2x2900	2
3	ARM BRACE	863x40x6	4
4	22KV PIN INSULATORS		6
5	22KV INSULATOR PIN		6
6	BOLT FOR ARM/POLE	M16x420	1
7	BOLT FOR BRACE/POLE	M16x300	1
8	BOLT FOR ARM/BRACE	M16x120	4
9	DOUBLE ARMING BOLT WITH 4-NUT, 4-SQ. WASHER	M16x440	2
10	COACH SCREW	12x100	2
11	ALUMI POLE CAP		1
12	STEP BOLT	16x260	2
13	PREFORMED TOP TIE	FOR DOUBLE PIN	3
	(FOR L.V.LINE)		
14	STEEL CROSSARM	75x75x3.2x2900	1
15	ARM BRACE	863x40x6	2
16	SHACKLE INSULATOR		8
17	SHACKLE STRAP	PAIR	8
18	SHACKLE STRAP BOLT	M16x150	4
19	SHACKLE BOLT	M16x120	8
20	BOLT FOR ARM/POLE WITH 1-CURVED WASHER	M16x360	1
21	BOLT FOR BRACE/POLE WITH 1-CURVED WASHER	M16x300	1
22	BOLT FOR ARM/BRACE	M16x120	2
23	AL. BIND WIRE	3.2mm INSULATED	24M
24	POLES	9M	1

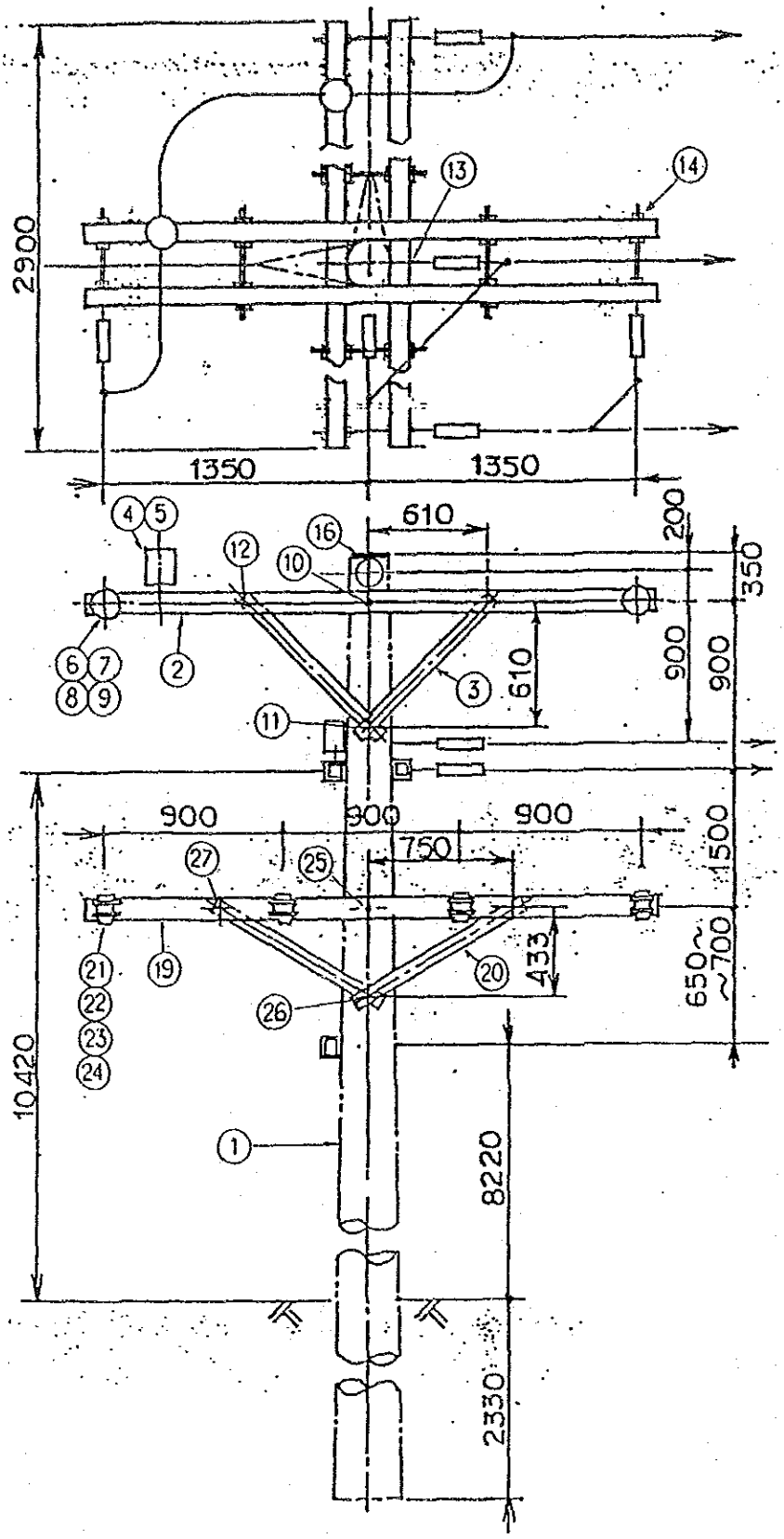
3. ANGLE LINE POLE (SINGLE ARM)



3. ANGLE LINE POLE (SINGLE ARM)

	DESCRIPTION	SPEC.	Q'TY
	(FOR 22KV LINE)		
1	POLES	14M	1
2	STEEL CROSSARM	75x75x3.2x2900	2
3	ARM BRACE	863x40x6	4
4	22KV PIN INSULATORS		2
5	22KV INSULATOR PIN		2
6	22KV DISC INSULATOR		12
7	BALL HOOK		6
8	SOCKET THIMBLE		6
9	PREFORMED DEADEND GRIP		6
10	BOLT FOR ARM/POLE WITH 1-CURVED WASHER	M16x340	2
11	BOLT FOR BRACE/POLE WITH 1-CURVED WASHER	M16x280	2
12	BOLT FOR ARM/BRACE	M16x120	4
13	EYE BOLT WITH 1-CURVED WASHER	M20x300	2
14	EYE BOLT WITH 1-SQUARE WASHER	M20x120	4
15	COACH SCREW	12x100	2
16	ALUMI POLE CAP		1
17	STEP BOLT	16x260	2
18	PREFORMED TOP TIE		2
	(FOR L.V.LINE)		
19	STEEL CROSSARM	75x75x3.2x2900	2
20	ARM BRACE	863x40x6	4
21	SHACKLE INSULATOR		8
22	SHACKLE STRAP	PAIR	8
23	SHACKLE STRAP BOLT	M16x150	8
24	SHACKLE BOLT	M16x120	8
25	BOLT FOR ARM/POLE WITH 1-CURVED WASHER	M16x360	2
26	BOLT FOR BRACE/POLE WITH 1-CURVED WASHER	M16x300	2
27	BOLT FOR ARM/BRACE	M16x120	4
28	AL. BIND WIRE	3.2mm INSULATED	24M
29	POLES	9M	1

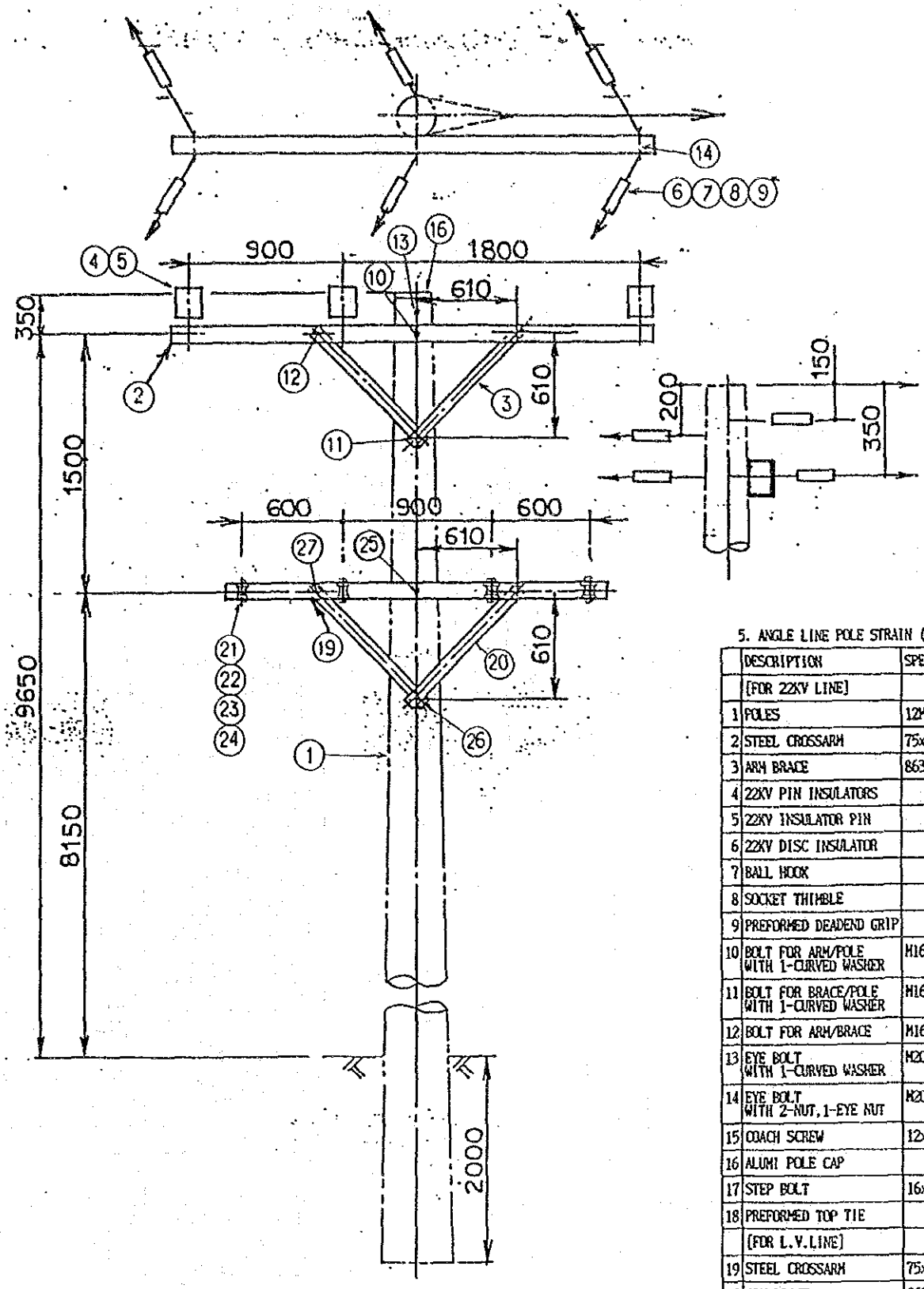
4. ANGLE LINE POLE (DOUBLE ARM)



4. ANGLE LINE POLE (DOUBLE ARM)

	DESCRIPTION	SPEC.	Q'TY
	(FOR 22KV LINE)		
1	POLES	14M	1
2	STEEL CROSSARM	75x75x3.2x2900	4
3	ARM BRACE	863x40x6	8
4	22KV PIN INSULATORS		2
5	22KV INSULATOR PIN		2
6	22KV DISC INSULATOR		12
7	BALL HOOK		6
8	SOCKET THIMBLE		6
9	PREFORMED DEADEND GRIP		6
10	BOLT FOR ARM/POLE	M16x420	2
11	BOLT FOR BRACE/POLE	M16x300	2
12	BOLT FOR ARM/BRACE	M16x120	8
13	EYE BOLT WITH 1-CURVED WASHER	M20x300	2
14	DOUBLE ARMING EYE BOLT WITH 4-NUT, 4-SQ. WASHER	M20x440	4
15	COACH SCREW	12x100	4
16	ALUMI POLE CAP		1
17	STEP BOLT	16x260	4
18	PREFORMED TOP TIE		2
	(FOR L.V.LINE)		
19	STEEL CROSSARM	75x75x3.2x2900	2
20	ARM BRACE	863x40x6	4
21	SHACKLE INSULATOR		8
22	SHACKLE STRAP	PAIR	8
23	SHACKLE STRAP BOLT	M16x150	8
24	SHACKLE BOLT	M16x120	8
25	BOLT FOR ARM/POLE WITH 1-CURVED WASHER	M16x360	2
26	BOLT FOR BRACE/POLE WITH 1-CURVED WASHER	M16x300	2
27	BOLT FOR ARM/BRACE	M16x120	4
28	AL. BIND WIRE	3.2mm INSULATED	24M
* 29	POLES	9M	1

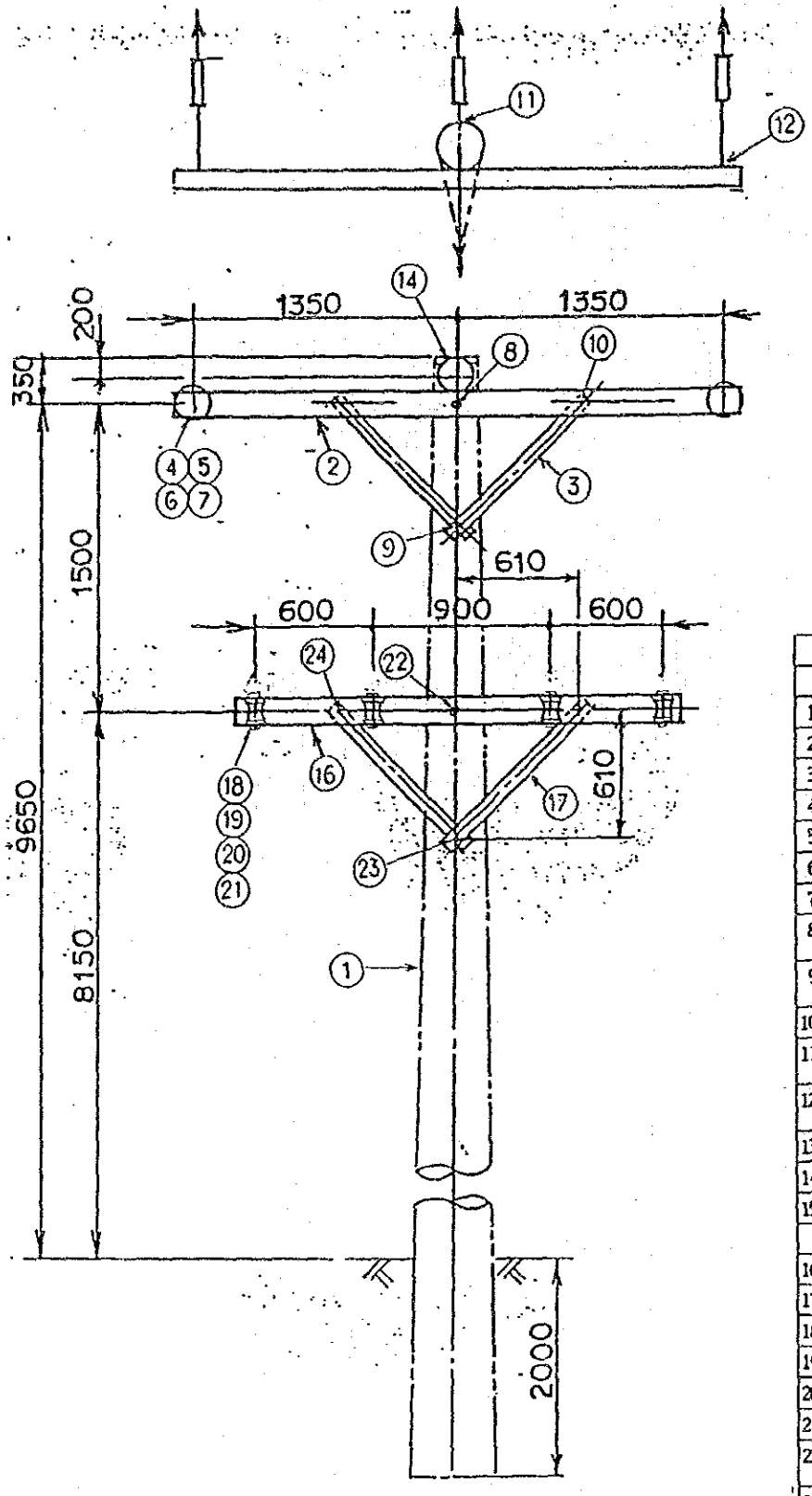
5. ANGLE LINE POLES STRAIN (SINGLE ARM)



5. ANGLE LINE POLE STRAIN (SINGLE ARM)

	DESCRIPTION	SPEC.	Q'TY
	(FOR 22KV LINE)		
1	POLES	12M	1
2	STEEL CROSSARM	75x75x3.2x2900	1
3	ARM BRACE	863x40x6	2
4	22KV PIN INSULATORS		3
5	22KV INSULATOR PIN		3
6	22KV DISC INSULATOR		12
7	BALL HOOK		6
8	SOCKET THIMBLE		6
9	PREFORMED DEADEND GRIP		6
10	BOLT FOR ARM/POLE WITH 1-CURVED WASHER	M16x340	1
11	BOLT FOR BRACE/POLE WITH 1-CURVED WASHER	M16x280	1
12	BOLT FOR ARM/BRACE	M16x120	2
13	EYE BOLT WITH 1-CURVED WASHER	M20x300	2
14	EYE BOLT WITH 2-NUT, 1-EYE NUT	M20x140	2
15	COACH SCREW	12x100	2
16	ALUMI POLE CAP		1
17	STEP BOLT	16x260	2
18	PREFORMED TOP TIE		3
	(FOR L.V.LINE)		
19	STEEL CROSSARM	75x75x3.2x2500	1
20	ARM BRACE	863x40x6	2
21	SHACKLE INSULATOR		8
22	SHACKLE STRAP	PAIR	8
23	SHACKLE STRAP BOLT	M16x150	4
24	SHACKLE BOLT	M16x120	8
25	BOLT FOR ARM/POLE WITH 1-CURVED WASHER	M16x360	1
26	BOLT FOR BRACE/POLE WITH 1-CURVED WASHER	M16x300	1
27	BOLT FOR ARM/BRACE	M16x120	2
28	AL. BIND WIRE	3.2mm INSULATED	24M
29	POLES	9M	1

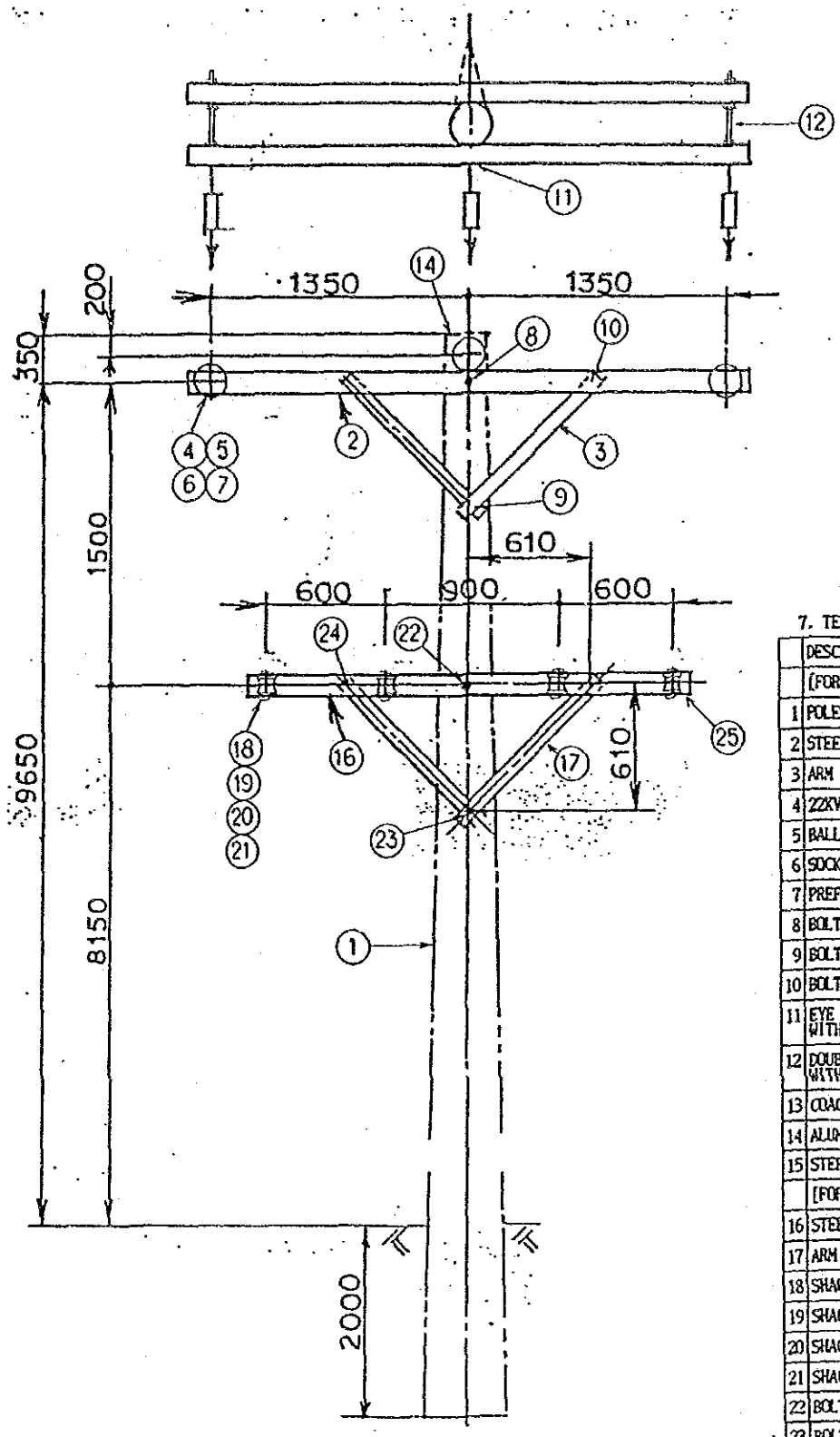
6. TERMINAL POLE (SINGLE ARM)



6. TERMINAL POLE (SINGLE ARM)

	DESCRIPTION	SPEC.	Q'TY
	[FOR 22KV LINE]		
1	POLES	12M	1
2	STEEL CROSSARM	75x75x3.2x2900	1
3	ARM BRACE	863x40x6	2
4	22KV DISC INSULATOR		6
5	BALL HOOK		3
6	SOCKET THIMBLE		3
7	PREFORMED DEADEND GRIP		3
8	BOLT FOR ARM/POLE WITH 1-CURVED WASHER	M16x340	1
9	BOLT FOR BRACE/POLE WITH 1-CURVED WASHER	M16x280	1
10	BOLT FOR ARM/BRACE	M16x120	2
11	EYE BOLT WITH 1-CURVED WASHER	M20x300	1
12	EYE BOLT WITH 2-NUT, 1-SQ. WASHER	M20x140	2
13	COACH SCREW	12x100	2
14	ALUMI POLE CAP		1
15	STEP BOLT	16x260	2
	[FOR L.V.LINE]		
16	STEEL CROSSARM	75x75x3.2x2300	1
17	ARM BRACE	863x40x6	2
18	SHACKLE INSULATOR		4
19	SHACKLE STRAP	PAIR	4
20	SHACKLE STRAP BOLT	M16x150	4
21	SHACKLE BOLT	M16x120	4
22	BOLT FOR ARM/POLE WITH 1-CURVED WASHER	M16x360	1
23	BOLT FOR BRACE/POLE WITH 1-CURVED WASHER	M16x300	1
24	BOLT FOR ARM/BRACE	M16x120	2
25	AL. BIND WIRE	3.2mm INSULATED	12M
26	POLES	9M	1

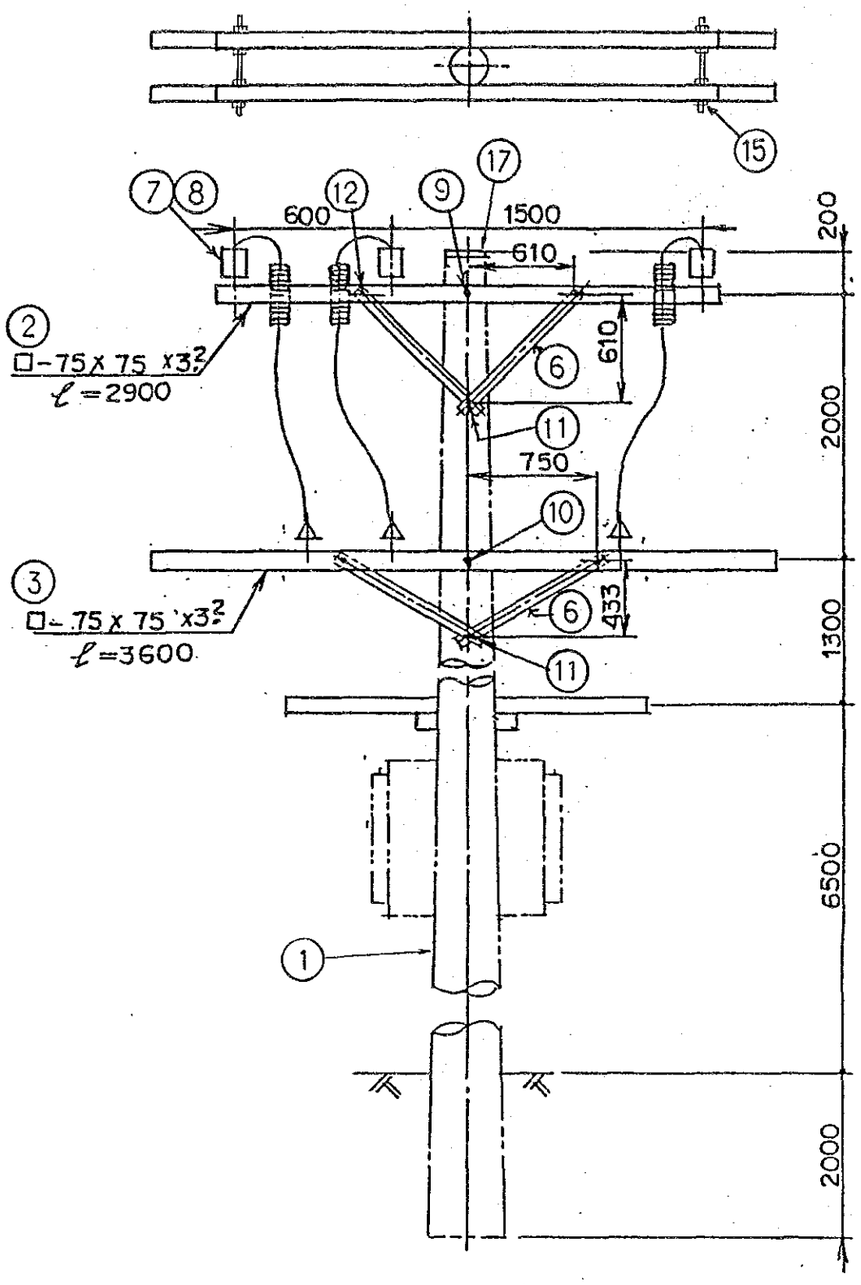
7. TERMINAL POLE (DOUBLE ARM)

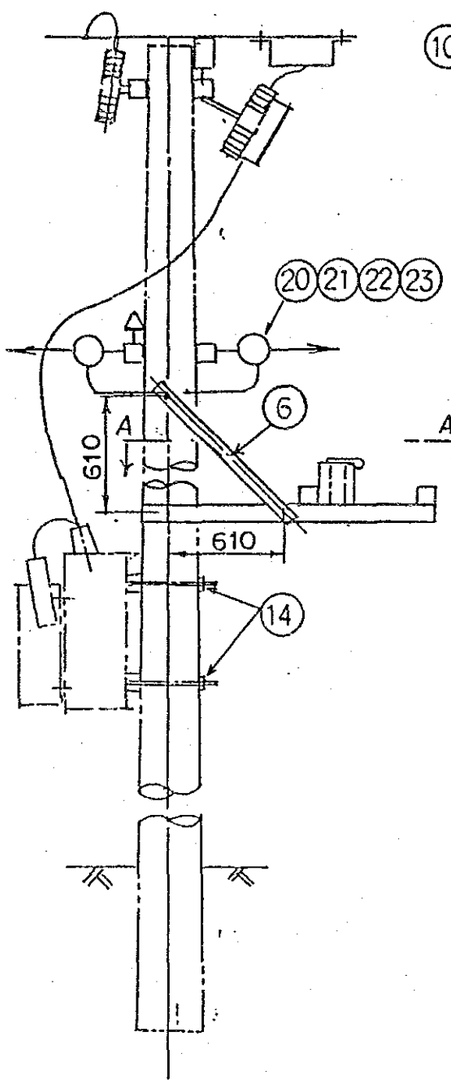


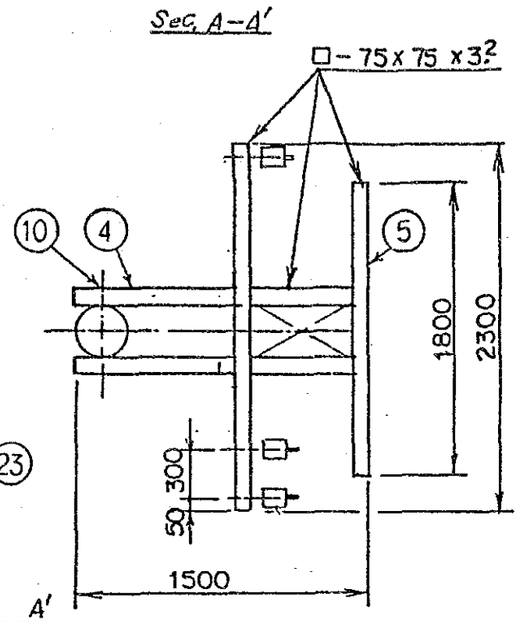
7. TERMINAL POLE (DOUBLE ARM)

	DESCRIPTION	SPEC.	Q'TY
	(FOR 22KV LINE)		
1	POLES	12M	1
2	STEEL CROSSARM	75x75x3.2x2900	2
3	ARM BRACE	863x40x6	4
4	22KV DISC INSULATOR		6
5	BALL HOOK		3
6	SOCKET THIMBLE		3
7	PREFORMED DEADEND GRIP		3
8	BOLT FOR ARM/POLE	M16x420	1
9	BOLT FOR BRACE/POLE	M16x300	1
10	BOLT FOR ARM/BRACE	M16x120	4
11	EYE BOLT WITH 1-CURVED WASHER	M20x300	1
12	DOUBLE ARMING EYE BOLT WITH 4-NUT, 4-SQ.WASHER	M20x440	2
13	COACH SCREW	12x100	2
14	ALUMI POLE CAP		1
15	STEP BOLT	16x260	2
	(FOR L.V.LINE)		
16	STEEL CROSSARM	75x75x3.2x2300	2
17	ARM BRACE	863x40x6	4
18	SHACKLE INSULATOR		4
19	SHACKLE STRAP	PAIR	4
20	SHACKLE STRAP BOLT	M16x150	4
21	SHACKLE BOLT	M16x120	4
22	BOLT FOR ARM/POLE	M16x440	1
23	BOLT FOR BRACE/POLE	M16x330	1
24	BOLT FOR ARM/BRACE	M16x120	4
25	DOUBLE ARMING BOLT WITH 4-NUT, 4-SQ.WASHER	M16x460	2
26	AL. BIND WIRE	3.2mm INSULATED	12M
27	POLES	9M	1

8. TRANSFORMER POLE



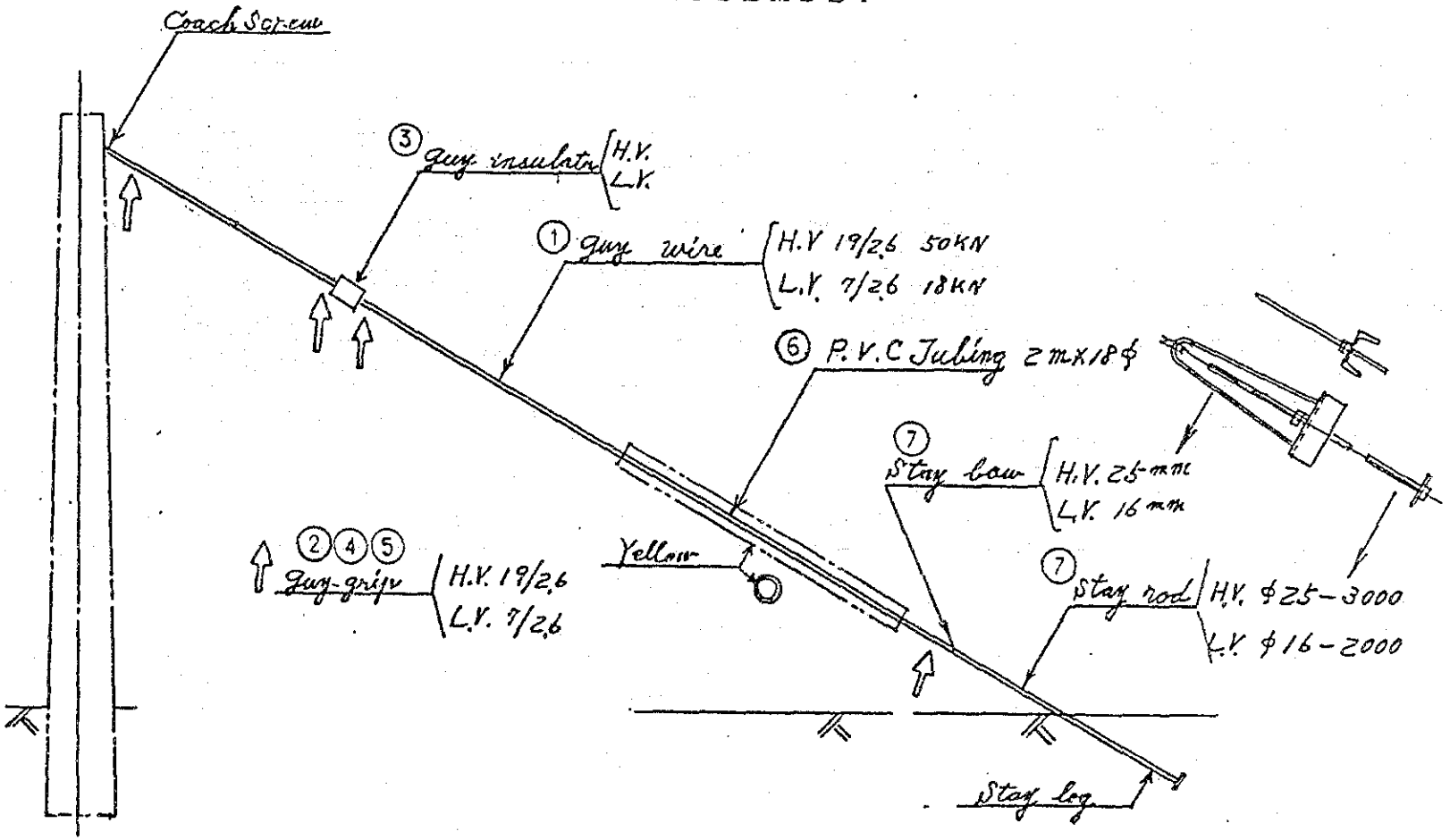




8. TRANSFORMER POLE

	DESCRIPTION	SPEC.	Q'TY
	(FOR 22KV LINE)		
1	POLES	12M	1
2	STEEL CROSSARM	75x75x3.2x2900	2
3	STEEL CROSSARM	75x75x3.2x3600	2
4	STEEL CROSSARM	75x75x3.2x1500	2
5	STEEL CROSSARM	75x75x3.2x1800	2
6	ARM BRACE	863x40x6	10
7	22KV PIN INSULATOR		6
8	22KV INSULATOR PIN		6
9	BOLT FOR ARM/POLE	M16x420	1
10	BOLT FOR ARM/POLE	M16x440	2
11	BOLT FOR BRACE/POLE	M16x320	3
12	BOLT FOR ARM/BRACE	M16x120	10
13	BOLT FOR ARM/ARM	M16x200	4
14	TRANSFORMER BRACKET WITH 2-THROUGH BOLT, 2-CURVED WASHER		1
15	DOUBLE ARMING BOLT WITH 4-NUT, 4-SQ.WASHER	M16x440	4
16	COACH SCREW	12x100	2
17	ALUMI POLE CAP		1
18	STEP BOLT	16x260	2
19	PREFORMED TOP TIE		3
	(FOR L.V.LINE)		
20	SHACKLE INSULATOR		8
21	SHACKLE STRAP	PAIR	8
22	SHACKLE STRAP BOLT	M16x150	8
23	SHACKLE BOLT	M16x120	8
24	AL. BIND WIRE	3.2mm INSULATED	24M
25	EARTHING WIRE COVER		2

9. STAY ASSEMBLY



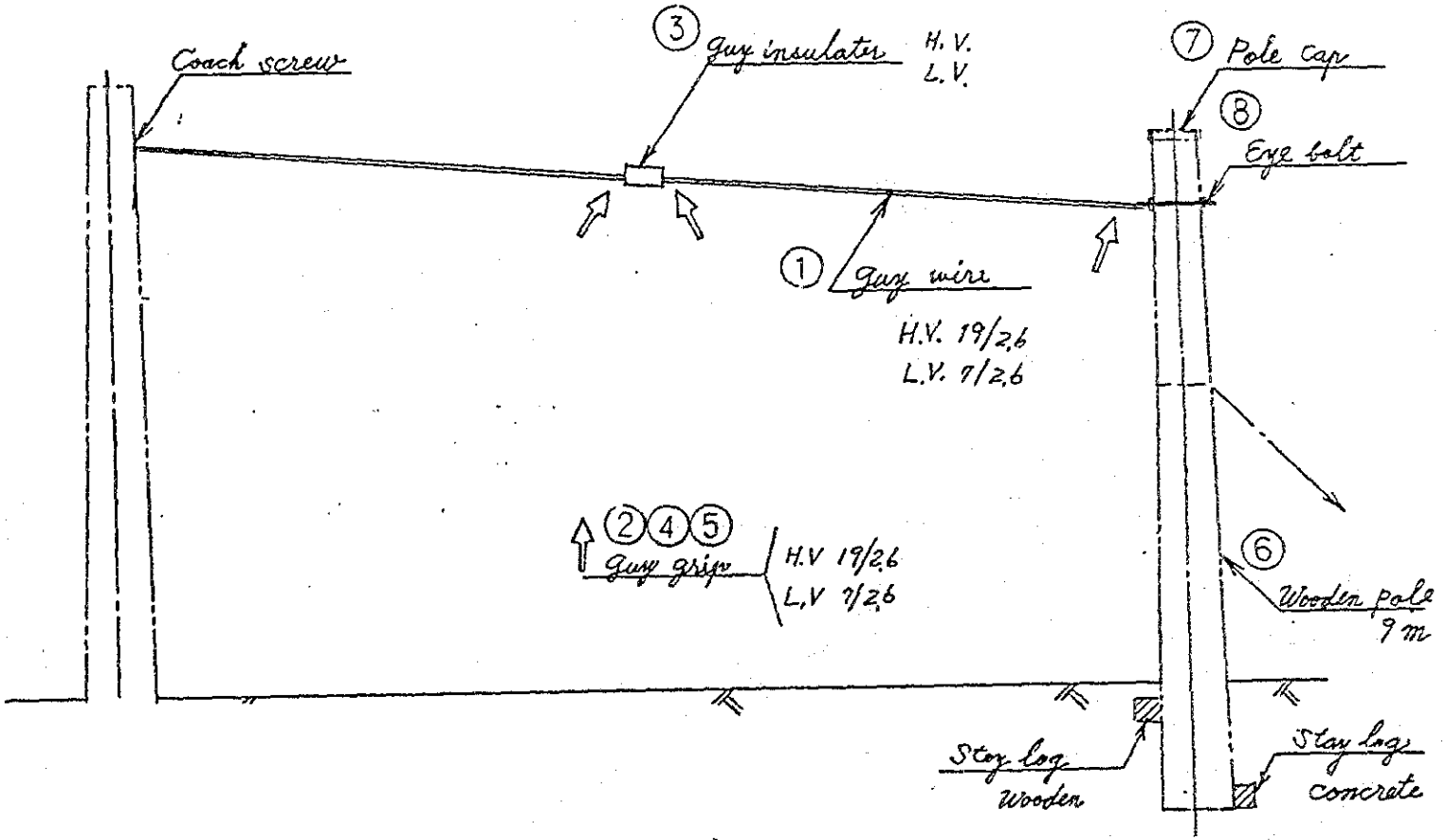
9-1. STAY ASSEMBLY(22KV)

	DESCRIPTION	SPEC.	Q'TY
	[FOR 22KV LINE]		
1	GUY WIRE	19/2.6	20M
2	GUY GRIP FOR WOOD POLE	FOR 19/2.6	1
3	GUY INSULATOR		1
4	GUY GRIP FOR INSULATOR	FOR 19/2.6	2
5	GUY GRIP FOR THIMBLE	FOR 19/2.6	1
6	PVC TUBE(YELLOW)	18x2500mm	1
7	STAY ROD,BOW TYPE	25x3000mm	1

9-2.STAY ASSEMBLY(L.V)

	DESCRIPTION	SPEC.	Q'TY
	(FOR L.V LINE]		
1	GUY WIRE	7/2.6	20M
2	GUY GRIP FOR WOOD POLE	FOR 7/2.6	1
3	GUY INSULATOR		1
4	GUY GRIP FOR INSULATOR	FOR 7/2.6	2
5	GUY GRIP FOR THIMBLE	FOR 7/2.6	1
6	PVC TUBE(YELLOW)	18x2500mm	1
7	STAY ROD,BOW TYPE	16x2200mm	1

0. FLYING STAY ASSEMBLY



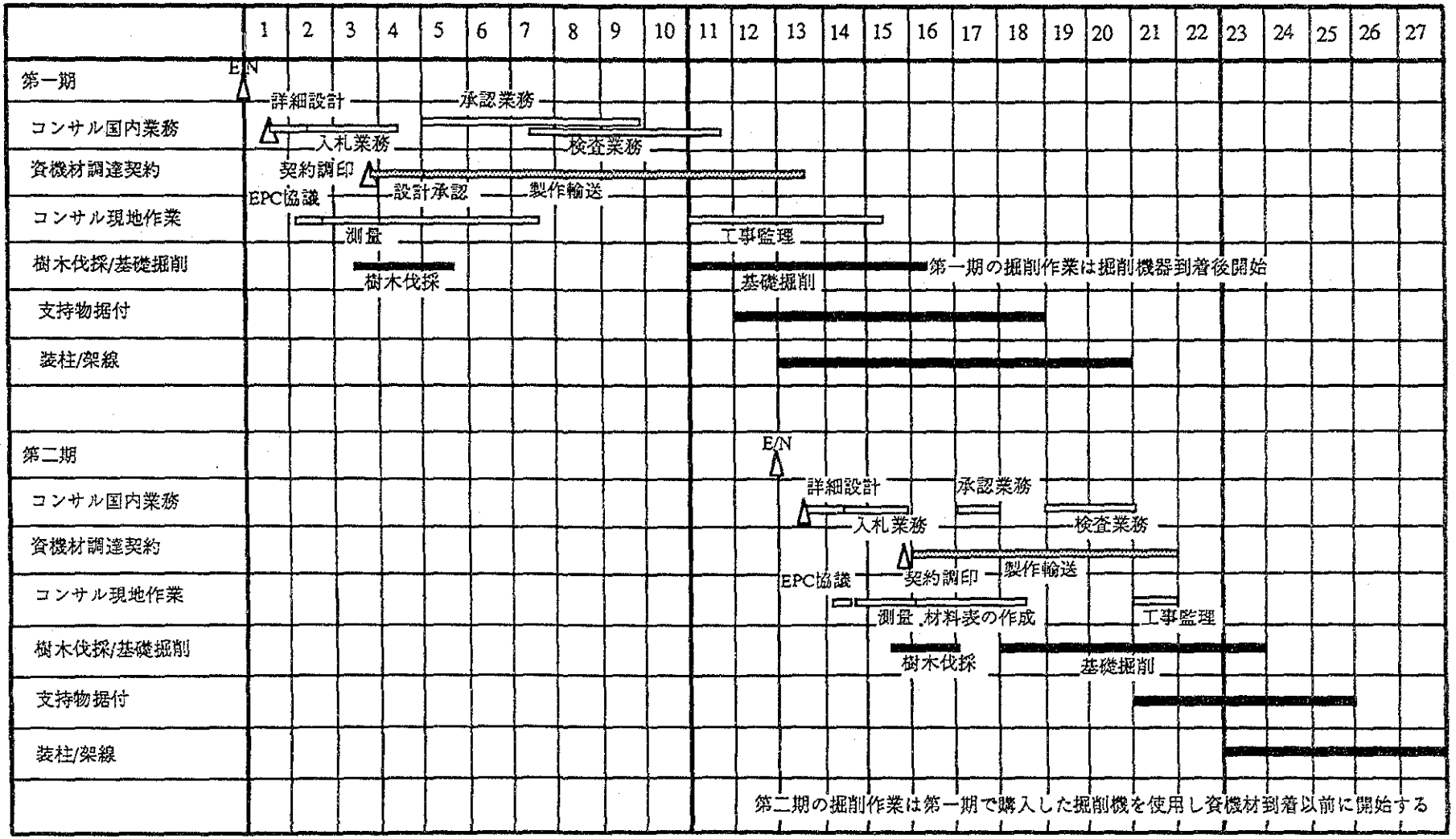
10-1. FLYING STAY ASSEMBLY(22KV)

	DESCRIPTION	SPEC.	Q'TY
	(FOR 22KV LINE)		
1	GUY WIRE	19/2.6	20M
2	GUY GRIP FOR WOOD POLE	FOR 19/2.6	1
3	GUY INSULATOR		1
4	GUY GRIP FOR INSULATOR	FOR 19/2.6	2
5	GUY GRIP FOR THIMBLE	FOR 19/2.6	1
6	POLES	9M	1
7	ALUMI POLE CAP		1
8	EYE BOLT WITH 1-CURVED WASHER,1-OPEN THIMBLE	M20x300	1

10-2.FLYING STAY ASSEMBLY(L.V)

	DESCRIPTION	SPEC.	Q'TY
	(FOR L.V LINE)		
1	GUY WIRE	7/2.6	20M
2	GUY GRIP FOR WOOD POLE	FOR 7/2.6	1
3	GUY INSULATOR		1
4	GUY GRIP FOR INSULATOR	FOR 7/2.6	2
5	GUY GRIP FOR THIMBLE	FOR 7/2.6	1
6	POLES	9M	1
7	ALUMI POLE CAP		1
8	EYE BOLT WITH 1-CURVED WASHER,1-OPEN THIMBLE	M20x300	1

添付資料 5-9 西サモア地方電化計画建設工程表



注: コンサルタント　納入業者　EPC