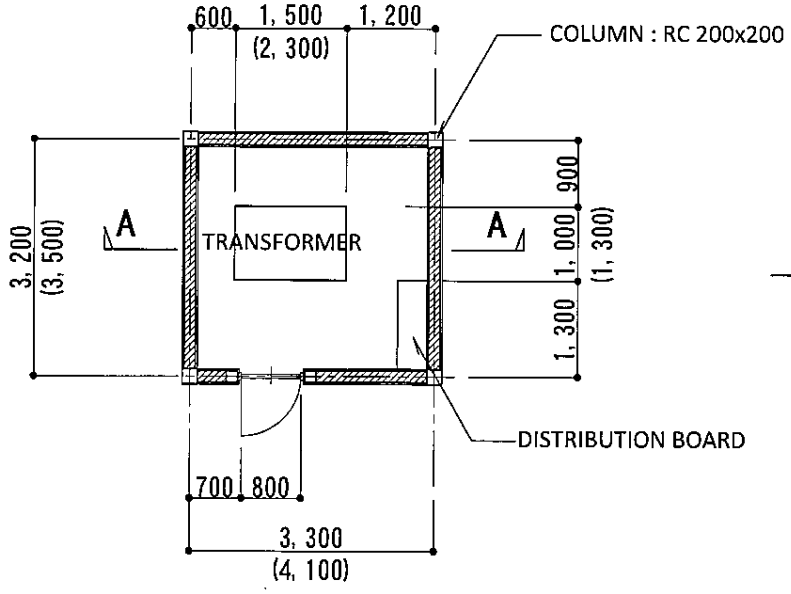
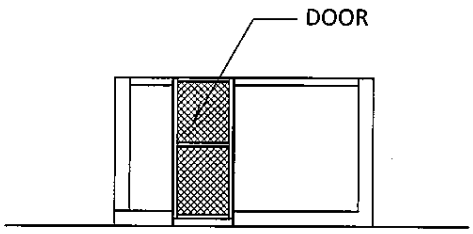
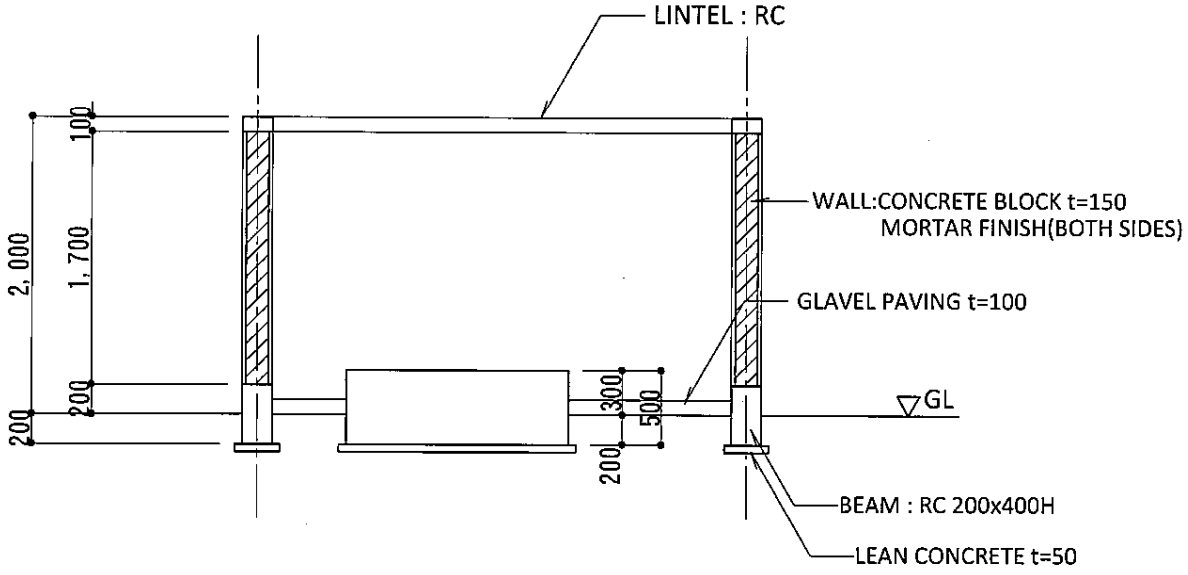


PLAN S=1/100



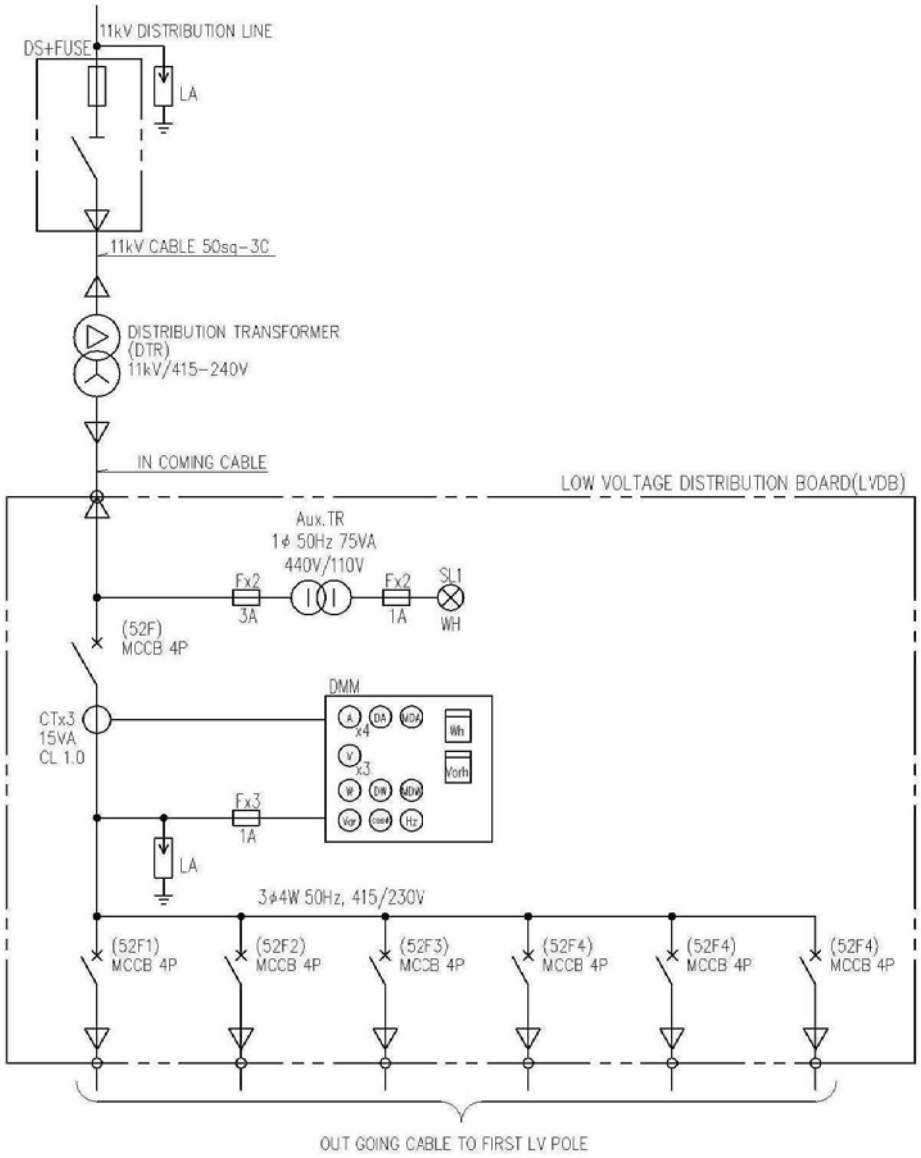
FRONT ELEVATION S=1/100

*1 : Marked with ( ) shows Transformer capacity more than 400kVA including 400kVA
Quantity 100 ~ 315kVA : 12plans
Quantity 400 ~ 500kVA : 2plans



A-A SECTION S=1/50

DL-C1 Foundation Plan of Secondary Substation



Abbreviations

Description	Capacity of DTR (kVA)					
	100	200	315	400	500	800
In Coming Cable	120sq-1Cx4	120sq-1Cx4	240sq-1Cx3+120sq-1C	240sq-1Cx6+120sq-1C	240sq-1Cx6+120sq-1C	240sq-1Cx9+120sq-1C
CT	200/5A	400/5A	600/5A	600/5A	800/5A	1200/5A
52F	200A	400A	600A	600A	800A	1200A
52F1	100A	150A	225A	225A	225A	225A
52F2	100A	100A	150A	225A	225A	225A
52F3	75A	100A	100A	150A	225A	225A
52F4	75A	75A	100A	100A	100A	225A
52F5	---	---	(100A)*1	---	---	150A
52F6	---	---	(100A)*1	---	---	100A

* MCCB for F1 to F6 shall be adjustable type.

Out Going Cable

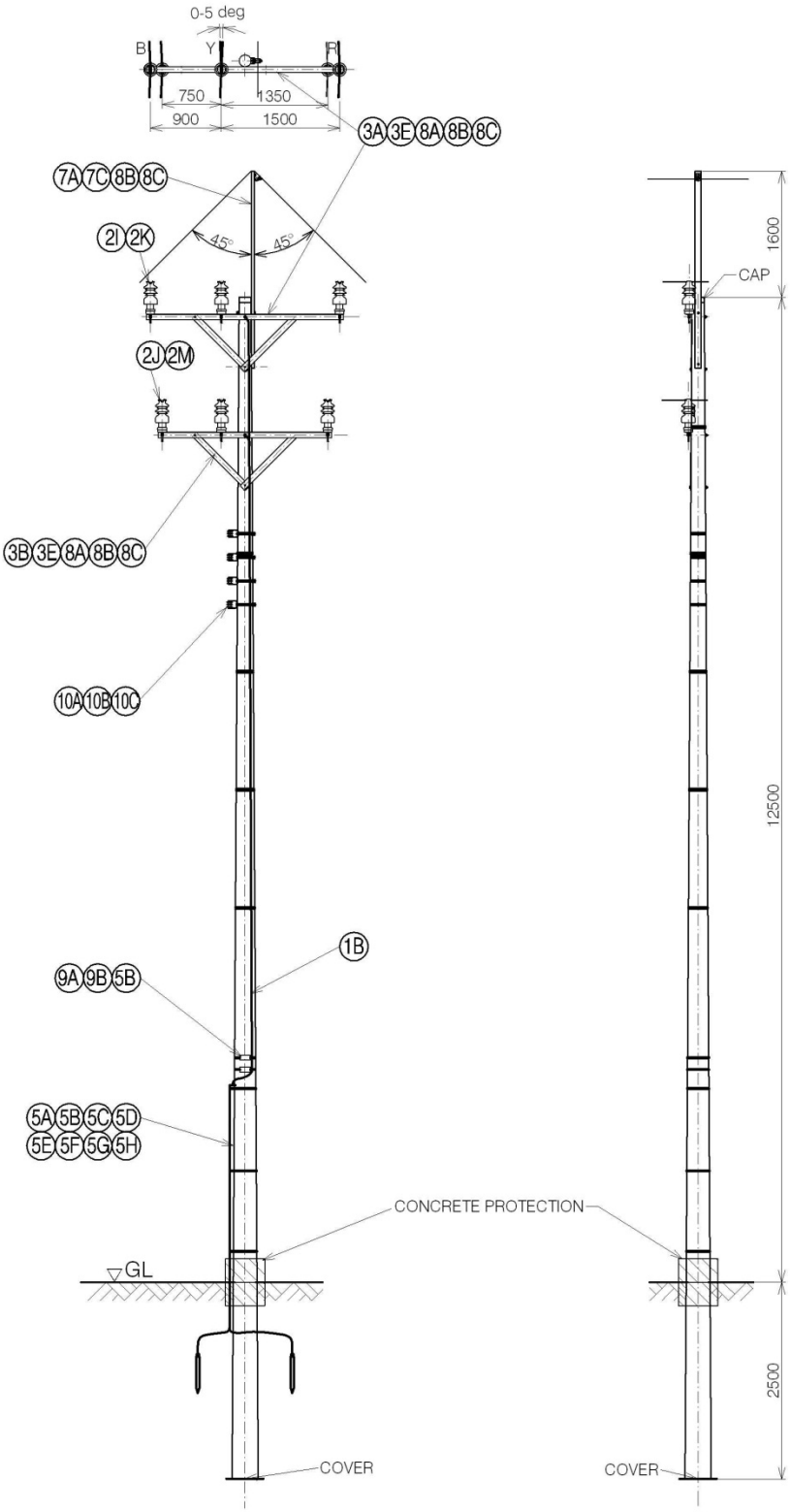
Description	Capacity of MCCB			
MCCB	75AF	100AF	150AF	225AF
Cable	50sqmm 4C		95sqmm 4C	

NOTES: LV Cables with accessory from LVDB to LV Trunk Line shall be supplied by Japanese side and installed by Sierra Leonean Side.

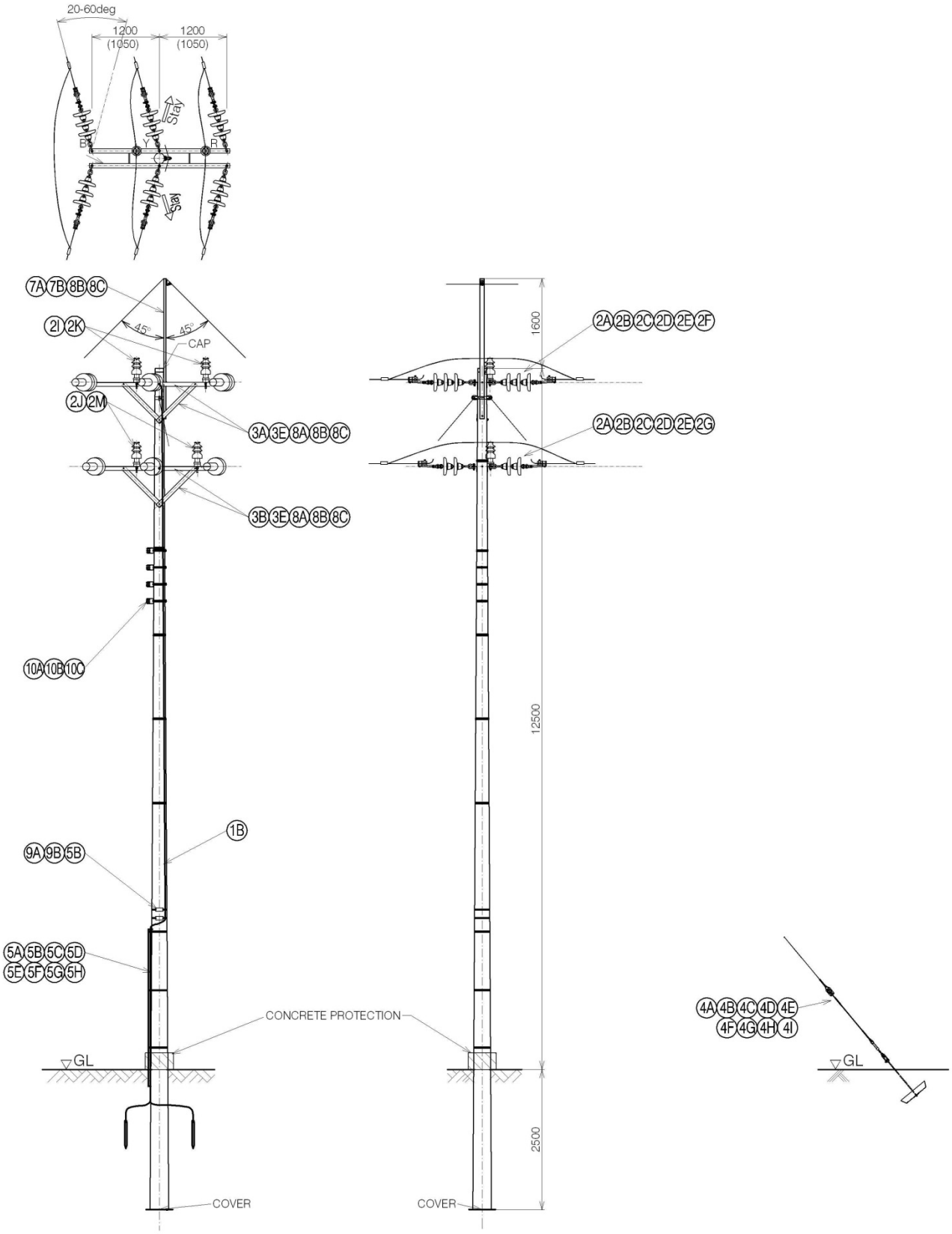
DMM: Disital Maltimeter

Marked with (*1) shows only MMCET Secondary Substation

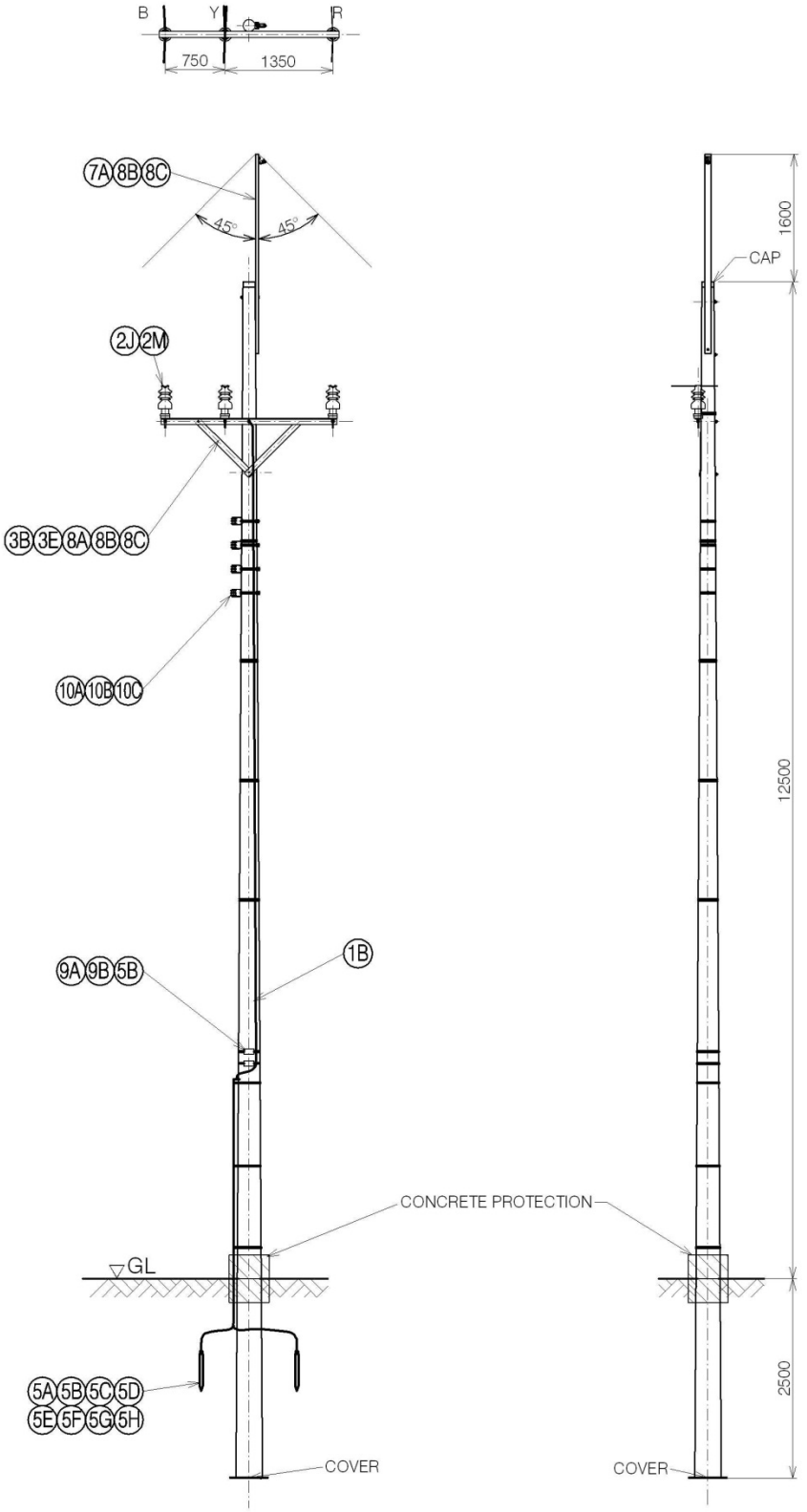
DL-E1 Single Line Diagram of Secondary Substation



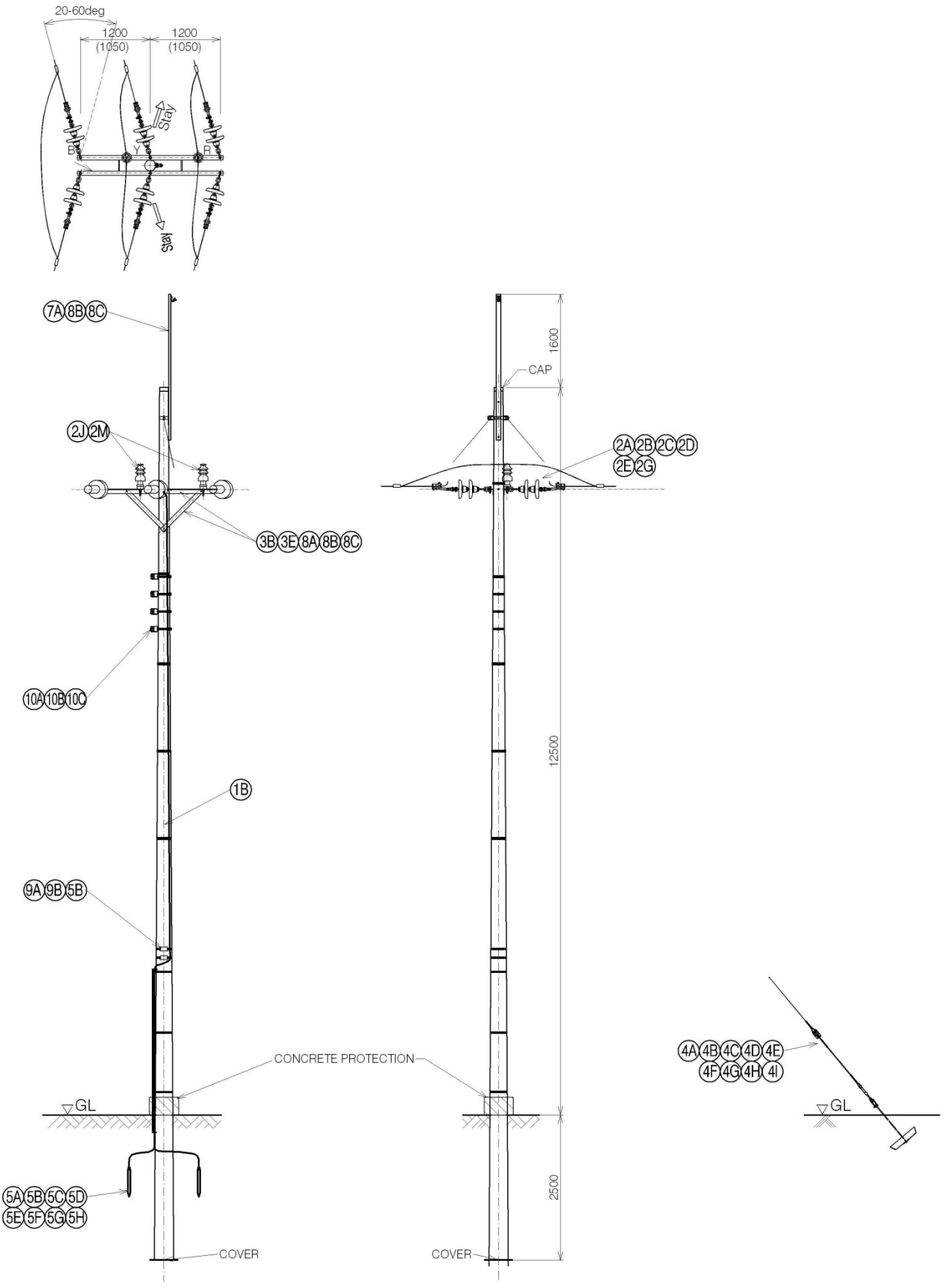
DL-GA1 Pole Type for 11/33kV Distribution (CA Type: Combined Intermediate)



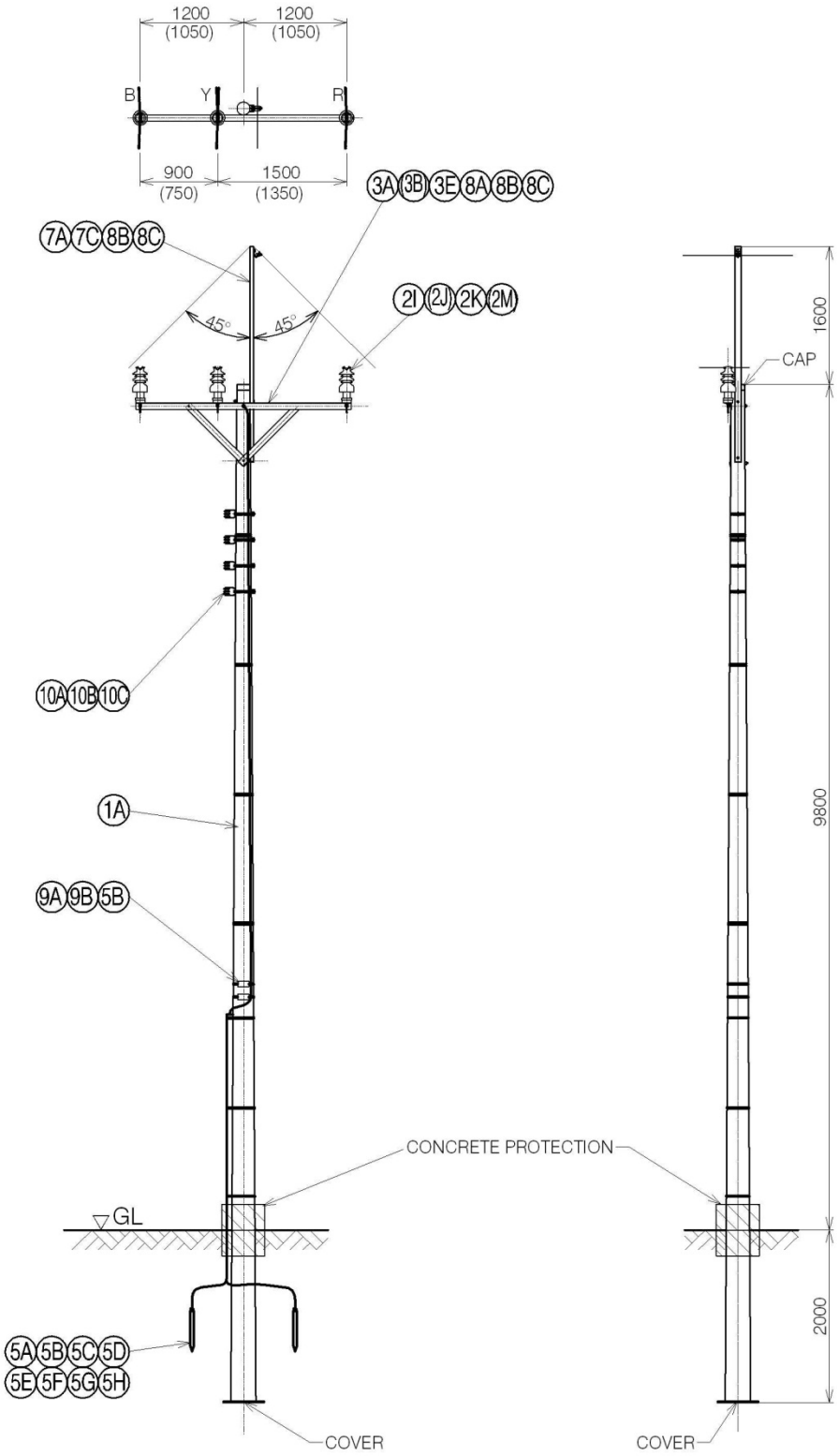
DL-GA3 Pole Type for 11/33kV Distribution (CC Type: Combined Middle Angle)



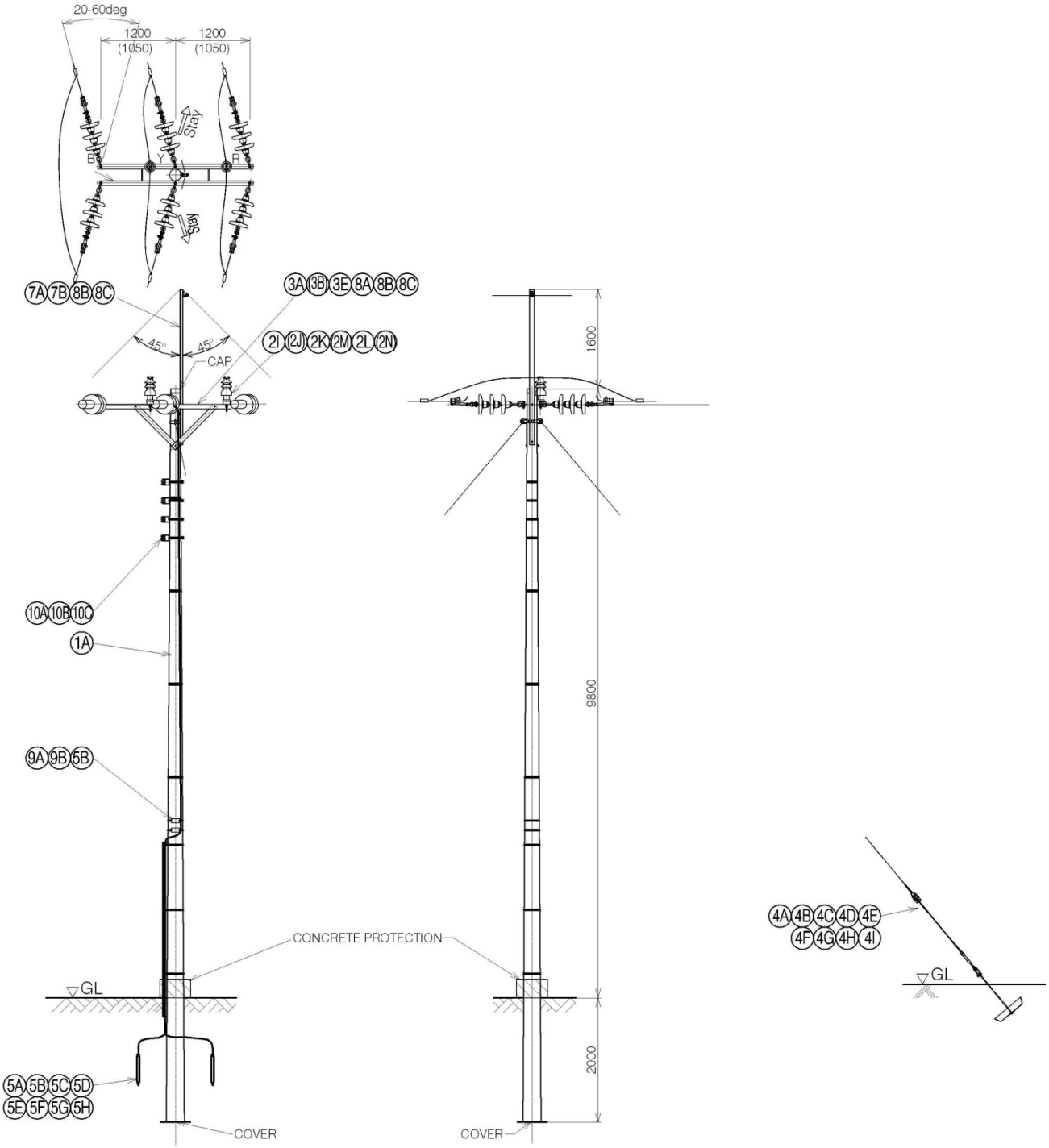
DL-GA10 Pole Type for 11kV Distribution (SA Type: Combined Intermediate)



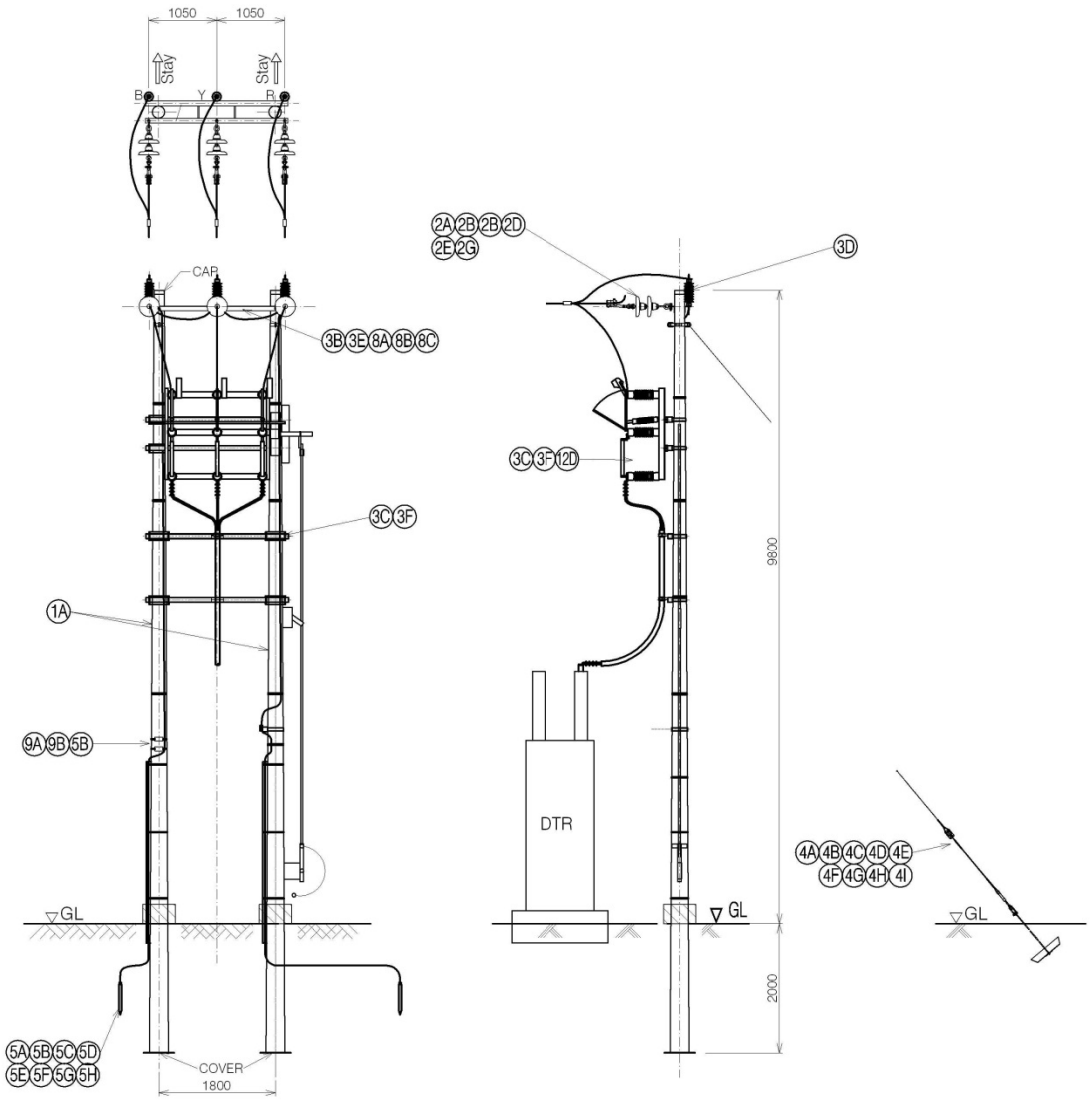
DL-GA12 Pole Type for 11kV Distribution (SC Type: Combined Middle Angle)



DL-GA20 Pole Type for 11/33kV Distribution (1A/3A Type: Intermediate)



DL-GA22　Pole Type for 11/33kV Distribution (1C/3C Type: Middle Angle)



DL-GA29　Pole Type for 11kV Distribution (1L Type: Transformer with line end)

DL-30 : Part List on Each Pole Type for 11/33kV Distribution Line / 各ポールタイプ 資機材数量表

Classi-fication	Part No.		Description	詳細	unit	Pole Type: OGW / 33kV / 11kV / LV									OGW / ― / 11kV / LV							11kV / 11kV / LV			OGW / 33kV					11kV / LV								合計
						CA	CB	CC	CD	CE	CF	CG	CH	CJ	SA	SB	SC	SD	SE	SH	SK	DG	DC	DH	3A	3B	3C	3D	3E	3F	3G	1A	1B	1C	1D	1E	1F	1G	1J	1K	1L	
Pole	1	A	Steel pole 12m with Base Plate,Cap	鋼管柱 12m(底板、キャップ付)	pc	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	2	1	–	2	1	1	1	2	1	–	2	1	1	2	207
		B	Steel pole 15m with Base Plate,Cap	鋼管柱 15m(底板、キャップ付)	pc	1	1	1	2	1	1	2	1	1	1	1	1	2	1	1	2	2	2	1	–	–	–	–	–	1	–	–	–	–	–	–	1	–	–	–	–	268
Insulator and Accessory	2	A	Suspension Insulator	懸垂がいし	pc	–	–	30	30	30	30	15	6	6	–	–	12	12	12	6	12	12	24	6	–	–	18	18	18	18	9	–	–	12	12	12	12	9	–	12	6	1,284
		B	Anchor Shackle	アンカーシャックル	pc	–	–	12	12	12	12	6	3	3	–	–	6	6	6	3	6	6	12	3	–	–	6	6	6	6	3	–	–	6	6	6	6	3	–	6	3	579
		C	Ball Eye	ボールアイ	pc	–	–	12	12	12	12	6	3	3	–	–	6	6	6	3	6	6	12	3	–	–	6	6	6	6	3	–	–	6	6	6	6	3	–	6	3	579
		D	Socket Eye	ソケットアイ	pc	–	–	12	12	12	12	6	3	3	–	–	6	6	6	3	6	6	12	3	–	–	6	6	6	6	3	–	–	6	6	6	6	3	–	6	3	579
		E	Twist Strap	ねじりストラップ	pc	–	–	12	12	12	12	6	3	3	–	–	6	6	6	3	6	6	12	3	–	–	6	6	6	6	3	–	–	6	6	6	6	3	–	6	3	579
		F	Dead End Clamp for 33kV(ACSR 240)	引留クランプ 33kV用(ACSR 240)	pc	–	–	6	6	6	6	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6	6	6	6	3	–	–	–	–	–	–	3	–	–	–	126
		G	Dead End Clamp for 11kV(AAAC 120)	引留クランプ 11kV用(AAAC 120)	pc	–	–	6	6	6	6	3	3	3	–	–	6	6	6	3	6	6	12	3	–	–	–	–	–	–	–	–	–	6	6	6	6	–	–	6	3	453
		H	Dead end Clamp Adaptor	引留クランプアダプター	pc	–	–	12	12	12	12	6	3	3	–	–	6	6	6	3	6	6	12	3	–	–	6	6	6	6	3	–	–	6	6	6	6	3	–	6	3	579
		I	33kV Pin Insulator	33kV ピンがいし	pc	3	3	2	2	1	2	6	3	3	–	–	–	–	–	–	–	–	–	–	3	3	2	2	1	2	–	–	–	–	–	–	–	–	–	–	271
		J	11kV Pin Insulator	11kV ピンがいし	pc	3	3	2	2	1	2	–	3	3	3	3	2	2	1	3	–	6	4	7	–	–	–	–	–	–	–	3	3	2	2	1	2	–	3	–	–	1,013
		K	Preformed Top Tie for ACSR240	頂部タイ ACSR240mm2用	pc	3	–	2	2	1	2	6	3	3	–	–	–	–	–	–	–	–	–	–	3	–	2	2	1	2	–	–	–	–	–	–	–	–	–	–	235
		L	Preformed Side Tie for ACSR240	側部タイ ACSR240mm2用	pc	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	36
		M	Preformed Top Tie for AAAC120	頂部タイ AAAC120mm2用	pc	3	–	2	2	1	2	–	3	3	3	–	2	2	1	3	–	6	4	7	–	–	–	–	–	–	–	3	–	2	2	1	2	–	3	–	–	839
		N	Preformed Side Tie for AAAC120	側部タイ AAAC120mm2用	pc	–	3	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	174
Fitting Materials	Crossarm 3	A	Crossarm for Insulator (for 33kV)	腕金 100x75x7x2500 (33kV)	pc	1	1	2	2	2	4	2	1	1	–	–	–	–	–	–	–	–	–	–	1	1	2	2	2	4	2	–	–	–	–	–	–	–	–	–	129
		B	Crossarm for Insulator (for 11kV)	腕金 100x75x7x2200 (11kV)	pc	1	1	2	2	2	4	3	3	2	1	1	2	2	2	3	2	5	4	4	–	–	–	–	–	–	–	1	1	2	2	2	4	2	2	2	2	504
		C	Crossarm for DS & PAS	腕金 75x75x3.2x2200 (DS & PAS用)	pc	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–	2	–	–	–	–	–	2	–	1	2	43
		D	Crossarm for 33kV Cable Support	腕金 75x75x3.2x2200 (ケーブル保護パイプ用)	pc	–	–	–	–	–	–	10	–	–	–	–	–	–	–	1	10	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	4	–	–	2	60
		E	Crossarm Brace	アームタイ(平鋼型)	pc	4	4	8	8	8	8	–	4	2	2	2	4	4	4	4	4	–	8	8	2	2	4	4	4	8	–	2	2	4	4	4	8	–	6	6	–	1,134
		F	Single Crossarm Brace less Band	アームタイレスバンド(片抱)	pc		–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	12	–	–	–	–	–	–	12	2	–	8	154
		G	W-Crossarm Brace less Band	アームタイレスバンド(両抱)	pc		–	–	–	–	–	14	–	–	–	–	–	–	–	–	14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	28
	Stay Wire 4	A	Stay Band with thimble	支線バンド D=14cm リング付	pc	–	1	2	4	2	2	2	2	–	–	1	2	4	2	1	4	2	2	1	–	1	2	4	2	2	2	–	1	2	4	2	2	2	–	2	2	277
		B	Dead End Grip for Thimble	巻付グリップシンブル用45mm2用	pc	–	2	4	8	4	4	4	4	–	–	2	4	8	4	2	8	4	4	2	–	2	4	8	4	4	4	–	2	4	8	4	4	4	–	4	4	554
		C	Stay Wire	亜鉛めっき鋼より線45mm2	m	–	20	40	80	40	40	40	40	–	–	20	40	80	40	20	80	40	40	20	–	15	30	60	30	30	30	–	15	30	60	30	30	30	–	30	30	4,905
		D	Dead End Grip for Insulator	巻付グリップがいし用45mm2用	pc	–	2	4	8	4	4	4	4	–	–	2	4	8	4	2	8	4	4	2	–	2	4	8	4	4	4	–	2	4	8	4	4	4	–	4	4	554
		E	Stay Insulator 33kV	支線用がいし 33kV用	pc	–	1	2	4	2	2	2	2	–	–	1	2	4	2	1	4	2	2	1	–	1	2	4	2	2	2	–	1	2	4	2	2	2	–	2	2	277
		F	Turnbuckle	ターンバックル	pc	–	1	2	4	2	2	2	2	–	–	1	2	4	2	1	4	2	2	1	–	1	2	4	2	2	2	–	1	2	4	2	2	2	–	2	2	277
		G	Stay Rod	支線棒	pc	–	1	2	4	2	2	2	2	–	–	1	2	4	2	1	4	2	2	1	–	1	2	4	2	2	2	–	1	2	4	2	2	2	–	2	2	277
		H	Stay Plate	支線プレート	pc	–	1	2	4	2	2	2	2	–	–	1	2	4	2	1	4	2	2	1	–	1	2	4	2	2	2	–	1	2	4	2	2	2	–	2	2	277
		I	Vine Stopper	つる巻きストッパー	pc	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	15
	Earthing 5	A	PVC Protection Pipe (L=4.0m)	接地線保護用PVCパイプ	pc	2	2	2	2	2	2	3	2	3	2	2	2	2	2	2	3	2	2	1	2	2	2	2	2	2	3	1	1	1	1	1	1	2	2	2	2	794
		B	Stainless Band (L=1200mm)	ステンレスバンド	pc	8	8	8	8	8	8	12	8	12	8	8	8	8	8	8	12	8	8	4	8	8	8	8	8	8	12	4	4	4	4	4	4	8	8	8	8	3,176
		C	Ring Saddle for Stainless Band	ステンレスバンド用サドル (PVC)	pc	6	6	6	6	6	6	9	6	9	6	6	6	6	6	6	9	6	6	3	6	6	6	6	6	6	9	3	3	3	3	3	3	6	6	6	6	2,382
		D	Ground Rod	連結式接地棒 16x1500	pc	4	4	4	4	4	4	6	4	6	4	4	4	4	4	4	6	4	4	2	4	4	4	4	4	4	6	2	2	2	2	2	2	4	4	4	4	1,588
		E	Lead Wire Terminal	リード端子	pc	4	4	4	4	4	4	6	4	6	4	4	4	4	4	4	6	4	4	2	4	4	4	4	4	4	6	2	2	2	2	2	2	4	4	4	4	1,588
		F	Compression Connector(Cu22/Cu22)	圧縮コネクタ Cu22/Cu22	pc	2	2	2	2	2	2	3	2	3	2	2	2	2	2	2	3	2	2	1	2	2	2	2	2	2	3	1	1	1	1	1	1	2	2	2	2	794
		G	Compression Terminal(Cu22, M18type)	圧着端子	pc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	467
		H	IV 22sq.mm	600Vﾋﾞﾆｰﾙ絶縁電線 IV22sq.mm	m	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	15	15	15	15	15	20	14	15	15	15	15	15	20	30	30	30	30	8,299
		I	Compression Terminal(Cu22/Cu100)	圧着コネクタ	pc	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	2	1	1	–	1	1	1	1	1	1	2	–	–	–	–	–	–	–	–	–	–	327
		J	IV 100sq.mm	600Vﾋﾞﾆｰﾙ絶縁電線 IV100sq.mm	m	20	20	20	20	20	20	40	20	40	20	20	20	20	20	20	40	20	20	–	15	15	15	15	15	20	30	–	–	–	–	–	–	15	15	15	15	6,545
	HV Cable 6	A	Compression Terminal	圧縮端子 185mm2	pc	–	–	–	–	–	–	6	–	–	–	–	–	–	–	–	–	6	–	–	–	–	–	–	–	3	–	–	–	–	–	–	3	3	–	–	27
		B	Protection Pipe(L=4.0m)	ケーブル保護パイプ	pc	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	1	–	–	9
		C	Pipe Saddle	パイプサドル 100mm	pc	–	–	–	–	–	–	8	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–	–	–	3	–	–	–	–	–	–	3	3	–	–	31
		D	Bolt & Nut for Bracket M10x100	ボルトナットM10x100	set	–	–	–	–	–	–	8	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–	–	–	3	–	–	–	–	–	–	3	3	–	–	31
	OGW 7	A	Support Arm	架空地線用延長ロッド	pc	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	–	–	–	1	1	1	1	1	1	2	–	–	–	–	–	–	–	–	1	1	335
		B	Dead end Clump	地線引留めクランプ	pc	–	–	2	2	2	2	4	2	2	–	–	–	–	–	–	–	–	–	–	–	–	2	2	2	2	4	–	–	–	–	–	–	–	–	–	–	60
		C	Strain Clump	地線引き通しクランプ	pc	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	1	1	–	–	–	–	–	–	–	161
	Miscellaneous 8	A	Bolt & Nut M16x50(Brace/Crossarm)	ボルトナットM16x50	set	4	4	8	8	8	16	–	8	12	2	2	4	4	4	6	4	–	8	8	2	2	4	4	4	8	–	2	2	4	4	4	8	–	6	6	–	1,206
		B	Bolt & Nut M16x220(Pole/Cross arm・Brace)	ボルトナットM16x220	set	6	6	6	12	6	10	10	8	8	4	4	4	8	4	6	10	6	8	6	4	4	4	8	4	6	6	2	2	2	8	4	6	6	4	4	2	1,730
		C	Square Washer	角座金	pc	20	20	20	20	20	32	16	28	28	12	12	16	24	16	24	28	12	32	28	12	12	16	24	16	28	12	8	8	12	16	12	24	4	16	20	4	5,696
		D	Bolt & Nut M16x100	ボルトナットM16x100	set		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		A	ODA mark	ODAマーク	pc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	446
		B	Danger Plate	危険表示札	pc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	446
		C	Ivy Guard	つた巻き防止用(森林保護地区用15組のみ)	pc	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	15
	LV mate 10	A	Insulator	碍子	pc	4	4	4	4	4	4	–	4	4	4	4	4	4	4	4	4	–	4	4	–	–	–	–	–	–	–	4	4	4	4	4	4	–	4	4	4	1,520
		B	Arm set	腕金セット	set	4	4	4	4	4	4	–	4	4	4	4	4	4	4	4	4	–	4	4	–	–	–	–	–	–	–	4	4	4	4	4	4	–	4	4	4	1,520
		C	Bolt & Nut	ボルトおよびナット	pc	4	4	4	4	4	4	–	4	4	4	4	4	4	4	4	4	–	4	4	–	–	–	–	–	–	–	4	4	4	4	4	4	–	4	4	4	1,520
Equipment	11	A	33kV Lightning Arrester 5kA	33kV 避雷器 5kA (取付金具付)	pc	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		B	33kV Lightning Arrester 10kA	33kV 避雷器 10kA (取付金具付)	pc	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	6
		C	11kV Lightning Arrester 5kA	11kV 避雷器 5kA (取付金具付)	pc	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	15
		D	11kV Lightning Arrester 10kA	11kV 避雷器 10kA (取付金具付)	pc	–	–	–	–	–	3	–	–	3	–	–	–	–	–	–	–	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	3	75
		E	PG Clamp(ACSR120/120)	締付コネクタ ACSR120/120	pc	–	–	6	6	6	6	6	6	6	–	–	6	6	6	6	9	12	12	6	–	–	–	–	–	–	–	–	–	6	6	6	6	6	6	9	6	603
		F	PG Clamp(ACSR240/240)	締付コネクタ ACSR240/240	pc	–		6	6	6	6	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6	6	6	6	6	–	–	–	–	–	–	–	–	–	–	132
	12	A	11kV Line Switch	11kV 開閉器 (PAS)	set	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	5
		B	11kV Disconnecting Switch	11kV 断路器	set	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
		C	33kV Disconnecting Switch	33kV 断路器	set	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	–	–	–	2
		D	11kV Disconnecting Swicth with fuse	11kV 断路器＋ヒューズ(3相)	set	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	22
		E	11kV cable (Drop wire, 50mm2 x 1c)	11kV cable (Drop wire, 50mm2 x 1c)	m	–	–	–	–	–	–	–	–	15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	15	270
		F	Surge Counter	サージカウンター (取付金具付)	個	–	–		–			2	–																	1	–	–	–	–	–	–	–	–	–	–	5

LV-G1 Planned Rehabilitation Map in Low Voltage Trunk Line (1/8)

LV-G2 Planned Rehabilitation Map in Low Voltage Trunk Line (2/8)

LV-G3 Planned Rehabilitation Map in Low Voltage Trunk Line (3/8)

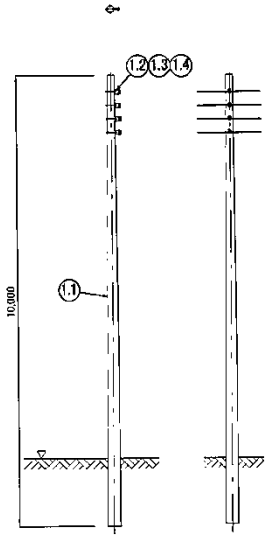
LV-G4 Planned Rehabilitation Map in Low Voltage Trunk Line (4/8)

LV-G5 Planned Rehabilitation Map in Low Voltage Trunk Line (5/8)

LV-G6 Planned Rehabilitation Map in Low Voltage Trunk Line (6/8)

LV-G7 Planned Rehabilitation Map in Low Voltage Trunk Line (7/8)

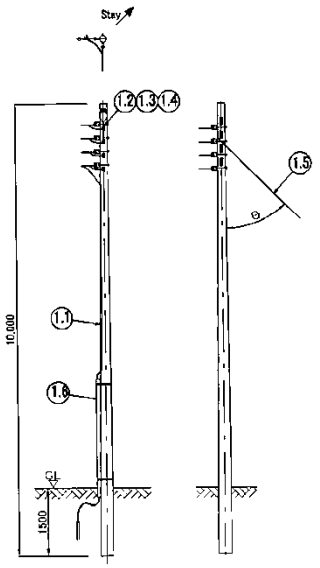
LV-G8 Planned Rehabilitation Map in Low Voltage Trunk Line (8/8)



Material List

P/NO.	DESCRIPTION		Q'TY
1.1	Steel Pole	鋼管柱	1
1.2	LV Shackle Insulator	低圧碍子(AAC用)	4
1.3	Bracket set	低圧碍子取付金具(AAC用)	4
1.4	But, Nut & washer set	ボルト・ナット	4
1.5	Stay & Wire set	支線セット	0
1.6	LV Neutral Earthing Assembly	低圧中性点接地線セット	0
1.7	Clamp for Intermediate (For ABC)	引き通し用クランプ(ABC用)	0
1.8	Tension Clamp (for ABC)	耐張クランプ(ABC用)	0

Dwg.No.DL-LA　　低圧引通し柱[型番LA]
LV Intermediate Pole[Type LA]



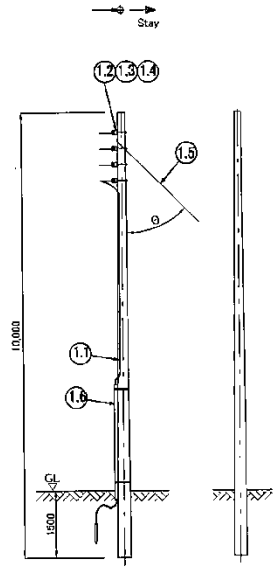
Material List

P/NO.	DESCRIPTION		Q'TY
1.1	Steel Pole	鋼管柱	1
1.2	LV Shackle Insulator	低圧碍子(AAC用)	8
1.3	Bracket set	低圧碍子取付金具(AAC用)	8
1.4	But, Nut & washer set	ボルト・ナット	8
1.5	Stay & Wire set	支線セット	1
1.6	LV Neutral Earthing Assembly	低圧中性点接地線セット	1
1.7	Clamp for Intermediate (For ABC)	引き通し用クランプ(ABC用)	0
1.8	Tension Clamp (for ABC)	耐張クランプ(ABC用)	0

Preferable Stay Angle : $30° \leqq \theta \leqq 45°$

Dwg.No.DL-LB　　低圧直角柱[型番LB]
LV Angle Pole[Type LB]

LV-GA1　Pole Type for Low Voltage Distribution (Type LA & LB)



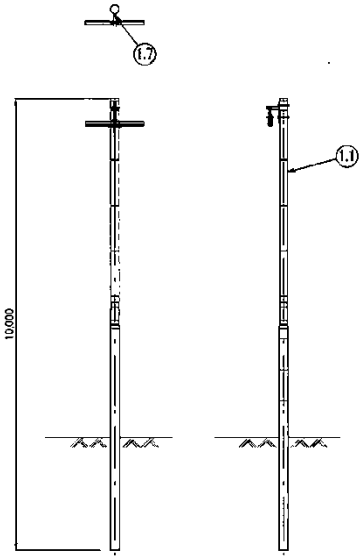
Material List

P/NO.	DESCRIPTION		Q'TY
1.1	Steel Pole	鋼管柱	1
1.2	LV Shackle Insulator	低圧碍子(AAC用)	4
1.3	Bracket set	低圧碍子取付金具(AAC用)	4
1.4	But, Nut & washer set	ボルト・ナット	4
1.5	Stay & Wire set	支線セット	1
1.6	LV Neutral Earthing Assembly	低圧中性点接地線セット	1
1.7	Clamp for Intermediate (For ABC)	引き通し用クランプ(ABC用)	0
1.8	Tension Clamp (for ABC)	耐張クランプ(ABC用)	0

Preferable Stay Angle : $30° \leqq \theta \leq 45°$

Dwg.No.DL-LC　　低圧終端柱D[型番LC]
LV Terminal Pole[Type LC]

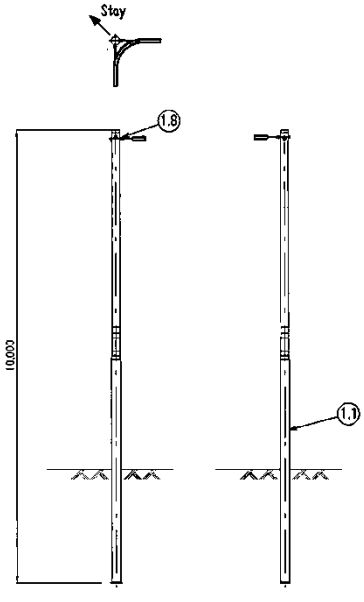
LV-GA2　Pole Type for Low Voltage Distribution (Type LC: Heavy Angle)



Material List

P/NO.	DESCRIPTION		QTY
1.1	Steel Pole	鋼管柱	1
1.2	LV Shackle Insulator	低圧碍子(AAC用)	0
1.3	Bracket set	低圧碍子取付金具(AAC用)	0
1.4	But, Nut & washer set	ボルト・ナット	0
1.5	Stay & Wire set	支線セット	0
1.6	LV Neutral Earthing Assembly	低圧中性点接地線セット	0
1.7	Clamp for Intermediate (For ABC)	引き通し用クランプ(ABC用)	1
1.8	Tension Clamp (for ABC)	耐張クランプ(ABC用)	0

Dwg.No.DL-LD　　低圧引通し (ABC)柱[型番LD]
LV Intermediate Pole (ABC) [Type LD]



Material List

P/NO.	DESCRIPTION		QTY
1.1	Steel Pole	鋼管柱	1
1.2	LV Shackle Insulator	低圧碍子(AAC用)	0
1.3	Bracket set	低圧碍子取付金具(AAC用)	0
1.4	But, Nut & washer set	ボルト・ナット	0
1.5	Stay & Wire set	支線セット	1
1.6	LV Neutral Earthing Assembly	低圧中性点接地線セット	0
1.7	Clamp for Intermediate (For ABC)	引き通し用クランプ(ABC用)	0
1.8	Tension Clamp (for ABC)	耐張クランプ(ABC用)	1

Dwg.No.DL-LE　　低圧直角柱 (ABC)[型番LE]
LV Angle Pole (ABC)[Type LE]

LV-GA3　Pole Type for Low Voltage Distribution (Type LD & LE)

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

The Project will be implemented based on Japan's Grant Aid scheme. According to this, the Project will receive approval by the Government of Japan, the Exchange of Notes (E/N) will be signed by both countries' governments, and the Grant Agreement (G/A) will be concluded by JICA (Japan International Cooperation Agency) and the Government of Sierra Leone before the Project progresses to the implementation stage. The following paragraphs describe the basic items and points requiring particular consideration in the event where the Project is implemented.

(1) Project Implementing Agency

The supervising government agency on the Sierra Leone side is the Ministry of Energy and Water Resources (MEWR). Following the completion of installation works in the Project, the National Power Authority (NPA), under the jurisdiction of the MEWR, will be responsible for the operation and maintenance of equipment. Therefore, it will be necessary for the MEWR and NPA to liaise and communicate closely with the Japanese consultant and contractor and to appoint staff in charge of the Project in order to smoothly implement the Project.

The appointed Project staff member will need to fully explain and secure understanding for the contents of the Project to employees of the Transmission and Distribution Section, Engineering Department, NPA and residents of the Project area with a view to eliciting cooperation for Project implementation.

(2) Consultant

In order to implement the equipment and materials procurement and installation works and facilities construction works, the Japanese Consultant will conclude a Consulting Services Contract with the Government of Sierra Leone and conduct the detailed design and site supervision work for the Project. Moreover, the Consultant will prepare the tender documents and act for the Project implementing agency the NPA in conducting the tendering work.

(3) Contractor

In accordance with Japan's Grant Aid scheme, the Japanese contractor that has been selected by the Sierra Leone side in general open tender will implement the equipment and materials procurement and installation works and facilities construction works of the Project.

Following completion of the Project, since it will be necessary to continue supplying spare parts and conducting after-sales service to resolve breakdowns and so on, it will be necessary to conduct thorough liaison and coordination after the handover of equipment and materials.

(4) Need for Dispatch of Engineers

Since the substation and distribution facility works in the Project will entail repairing works of charged existing distribution lines, it will be necessary to coordinate with the NPA in order to implement the installation works with a view to minimizing power interruption times and giving consideration to the safety of residents. Moreover, since the works will also conduct densely populated residential areas and busy national roads, it will be essential to dispatch Japanese engineers and technicians who can conduct consistent management and guidance on schedule, quality, progress and safety throughout the works.

Concerning the civil engineering and foundation works too, since Sierra Leone does not possess many technicians endowed with adequate technology and experience concerning large-scale construction works, it will be necessary to dispatch Japanese engineers to manage quality and the works schedule. Moreover, wide-ranging knowledge and expert skills concerning equipment functions and composition will be required when conducting the substation and distribution installation works. Therefore, it will be necessary to dispatch experts from the equipment manufacturers during both the installation and test operation/adjustment of the Project equipment.

2-2-4-2 Implementation Conditions

(1) Implementation Conditions and Technology Transfer in Sierra Leone

In Sierra Leone, although it is possible to secure workers (laborers) for construction works, there are not many skilled workers and engineers who possess expert knowledge concerning schedule, quality and safety management, etc. Therefore, it will be necessary for the Japanese contractor to dispatch engineers from Japan or a third country as the need arises in Sierra Leone.

Furthermore, since the substation equipment installation works and transmission line construction works entail a high degree of difficulty and will need to be certainly implemented with the minimum required equipment and materials, and since highly skilled engineers will be needed to conduct adjustment and testing during and after equipment installation, it will be hard to find local personnel with these skills. Accordingly, when implementing the installation work, it is desirable that the Japanese contractor procures local laborers and works equipment and dispatches engineers from Japan or a third country.

Moreover, the Japanese engineers will conduct technology transfer through OJT for the Sierra Leone engineers during the installation period.

(2) Important Points in Execution Planning

① Looking at rainfall data for the Project area over the past 30 years, rain falls throughout the year and the minimum rainfall is 1.6 mm in January and the maximum is 800 mm in August. Therefore, when conducting excavation work for distribution line and terminal treating work

for high voltage cables, it will be necessary to compile the implementation schedule taking measures for rain, for example, compiling a rain protection and drainage plan.

② The substation installation works will be implemented simultaneously with the substation building works and electrical equipment works, etc. When making connections with existing distribution equipment, effort will be made to shorten the schedule and minimize the impacts of power interruptions on residents.

③ When implementing distribution line works, the implementation plan will be compiled with a view to minimizing power interruptions, road controls and other impacts on citizen lifestyles.

④ When excavating underground cables, it will be necessary to display ample care regarding existing sewage pipes and telephone lines and make sure that the works do not clash with works on other infrastructure.

⑤ In cases where it becomes necessary to cut down trees and so on, the scale of cutting will be checked with the NPA in advance and steps will be taken to obtain confirmation and understanding from government ministries and residents with a view to avoiding environmental destruction and problems with residents.

(3) Shortening of Power Interruption Times

When upgrading and extending existing distribution lines, steps will be taken to shorten power interruption times through conducting diversion distribution using temporary cables and increasing the number of work teams and so on.

(4) Utilization of Local Equipment and Materials

As aggregate, cement and reinforcing bars, etc. required for the civil engineering and building works in the Project can be procured in Sierra Leone, locally procurable equipment and materials will be utilized as much as possible for the distribution line works. However, temporary materials (iron scaffolding, supports), building finishing materials and building services equipment in Sierra Leone cannot meet the delivery and quality requirements for the scale of supply required in the Project; moreover, since imported materials are relied on in substation and distribution facilities, local products again cannot be used. Therefore, in the facilities construction works, all temporary materials, building finishing materials, building equipment materials and substation and distribution equipment and materials will be procured from Japan or third countries.

(5) Safety Measures

Freetown, the capital of Sierra Leone, is relatively safer than surrounding areas, however, the Project area still has risk of pickpockets, baggage thieves and fraudsters targeting tourists in addition to general theft and burglary. It will thus be necessary to display ample care for preventing theft of equipment and securing the safety of works personnel. It will also be

indispensible for the Sierra Leone side to take the necessary safety measures. Also, the Japanese side will need to take thorough safety measures around the accommodation facilities, site offices and equipment and materials stores, secure means of communication, confirm methods of response to emergency situations, and establish a liaison setup.

(6) Transportation of Equipment and Materials

As Sierra Leone is located in the northwest of Africa, it will be necessary to give consideration to the lead-time needed for transporting equipment and materials from Japan and ASEAN countries. Even at normal times, when traveling through the Suez Canal, it takes at least two months for goods to reach Sierra Leone from Japan and other Asian countries, however, now that waters around the Suez Canal are increasingly threatened by piracy, ships are electing to travel around the Cape of Good Hope, meaning that it can take upwards of three months traveling from Japan. Moreover, since Freetown Port isn't equipped with cranes and other landing equipment, further time is required for unloading equipment and materials. Accordingly, the contractor must take such factors into account when planning the transportation time in the construction schedule.

(7) Tax Exemption Measures

In order to receive exemptions of Sierra Leone taxes (including value added tax) on the Project equipment and materials, the contractor will need to request the NPA to implement the required procedure. In response, the NPA, working through the MEWR, will request the Ministry of Finance to issue a letter of tax exemption to the tax authorities (copies will also be issued to the MEWR and the contractor at the same time). When the Project equipment and materials arrive at the port or airport in Sierra Leone, the contractor will attach the said copy of the tax exemption letter to the shipping documents and present them to the customs office in order to obtain tax exemption. Ample care will be required to ensure that progress of the Project is not impacted by any delays in the tax exemption measures.

2-2-4-3 Scope of Works

Table 2-2-4.1 shows the detailed scope of works on the Japanese and Sierra Leone sides.

It is recommended that the distribution facility spare parts and maintenance power tools planned for procurement in the Project should be kept in the materials store of the newly constructed Goderich Primary Substation.

Table 2-2-4.1 Work Demarcation on the Japanese and Sierra Leone Sides

Item	Procurement		Installation		Remarks
	Japan	Sierra Leone	Japan	Sierra Leone	
A. Construction of 33/11 kV Goderich Substation (S/S)					
1. To secure and clear land for the S/S		O		O	Minimum 30 m x 50 m
2. To secure or construct access road for transportation to the S/S		O		O	Considering weight of trailers (maximum 40 t)
3. Construction of S/S gate and perimeter fence		O		O	See attached drawing
4. Construction of S/S building	O		O		See attached drawing
5. Furniture (desks, chairs, cabinets, lockers, etc.) and curtains		O		O	
6. Necessary S/S equipment and materials (transformers, circuit breakers, etc.)	O		O		See attached drawing
7. Spare parts and consumable parts for 1 year operation	O			O*1	*1 to store properly
8. Maintenance tools and testing equipment	O			O*1	*1 to store properly
9. Commissioning test	O		O		
10. On the Job Training (OJT) during installation & commissioning period	O*2		O*3	O*4	*2 Materials *3 Conduct *4 Enrolled
B. Installation of 33 kV Distribution Line from Wilberforce S/S to Goderich S/S					
1. Installation of 33 kV receiving panel and power receiving work at Wilberforce S/S (including station service power supply AC/DC)		O		O	NPA works assisted by WB
2. Installation of 33 kV Distribution Line from Wilberforce S/S to Goderich S/S	O		O		See attached drawing (including 33 kV switchgear works to Wilberforce S/S)
3. To cut and/or prune trees which may obstruct the installation of D/L		O		O	If necessary
4. Public notice/announcement of the works for distribution networks to people connected with the works, prior to the commencement of the works		O		O	
5. Commissioning test	O		O		
6. On the Job Training (OJT) during installation & commissioning period	O*5		O*6	O*7	*5Materials *6 Conduct *7 Enrolled
7. Spare parts and consumable parts for 1 year operation	O			O*1	*1 to store properly
C. Repair of 11 kV distribution lines					
1. Repair of the following three (3) 11 kV distribution lines and connections to Goderich S/S	O		O	O*8	See attached drawings *8 1.5 km in Goderish area to be borne by the Sierra Leone side
(1) From Goderich S/S to Juba area	O		O		See attached drawing
(2) From Goderich S/S to Goderich area	O		O	O	See attached drawing
(3) From Goderich S/S to Lakka-Sussex area	O		O		See attached drawing
2. To cut and/or prune trees which may obstruct the installation of D/L		O		O	If necessary
3. Coordination of necessary power outage work		O		O	
4. Disinstallation work of the existing poles, conductors, insulator, etc. and the transportation	O		O		

Item	Procurement		Installation		Remarks
	Japan	Sierra Leone	Japan	Sierra Leone	
5. Construction and repair of secondary S/S (11 kV-415/240 V) (including foundations, fences, gates)	O		O		See the drawing
6. Installation of pole switchgear to 11 kV distribution poles	O		O		See the drawing
7. Removal of existing equipment and foundations from secondary S/S to be repaired		O		O	
8. Repairing of fencing and gate for each existing substation and providing keys		O		O	If necessary
9. Public notice/announcement of the works for distribution networks to people connected with the works, prior to the commencement of the works		O		O	If necessary
10. Commissioning test	O		O		
11. On the Job Training (OJT) during installation & commissioning period	O*9		O*10	O*11	*9Materials *10 Conduct *11Enrolled
12. Spare parts and consumable parts for 1 year operation	O			O*1	*1 to store properly
D. Material supply of Low Voltage (L/V) distribution equipment and materials					
1. Supply of Low Voltage (L/V) distribution equipment and materials	O			O	Procurement: Japan, Installation: Sierra Leone
2. Commissioning test				O	
E. Others					
1. Procurement of maintenance vehicles and equipment (1 truck with crane, 1 truck with bucket, 3 rock crushers)	O			O*1	*1 to store and operate properly
2. Spare parts and consumable parts for 1 year operation of the above vehicles and equipment	O			O*1	*1 to store properly
3. To provide temporary land(s) for offices, storage and work yard(s) for equipment and materials for the Project		O	O		At least 2,500 m^2 is necessary, provided on free of charge basis by NPA
4. NPA office during the works		O		O	If necessary
5. Charges for Temporary Electrical, Water Supply and Telephone Services during construction	O		O		To be borne by the Japan side during the works period

Note: Marking with 'O' means responsible side for the Work/Procurement concerned.

2-2-4-4 Consultant Supervision

Based on Japan's Grant Aid scheme, the Consultant will organize a consistent project team to smoothly conduct the implementation design and construction supervision work according to the principles of the basic design. Since the Project covers a wide area and entails complex contents such as substation construction works, 33/11 kV distribution line works, distribution equipment installation works and procurement of low voltage distribution equipment, and these works will frequently interfere with existing substation and distribution equipment, it will be necessary to conduct supervision based on coordination with the NPA on the Project site. Therefore, the Consultant will permanently assign at least one engineer during the construction supervision stage in order to conduct general schedule control, quality control, performance control and safety control. Furthermore, another

expert will attend the installation, test operation, adjustment and commissioning tests, etc. of equipment in order to supervise these work components by the Contractor. Moreover, where necessary, the expert will attend product inspections at manufacturers' factories and pre-shipping inspections of equipment and materials manufactured in Japan and/or third country with a view to ensuring that no troubles occur following delivery of materials and equipment to Sierra Leone.

(1) Basic Concept of Consultant Supervision

The Consultant will supervise the progress to ensure that the works are completed on time, and it will supervise and guide the contractor in order to secure the quality, performance and delivery deadlines specified in the contract and make sure that the works are carried out safely.

The major points to bear in mind in the consultant supervision are described below.

1) Schedule control

The Consultant will compare progress with the implementation schedule decided in the contract every month or every week in order to adhere to the delivery deadline given in the contract. In cases where delays are predicted, the Consultant will warn the contractor, demand the submission and implementation of a plan of countermeasures and offer guidance to ensure that the works and delivery of equipment and materials are completed within the contract period. The comparison of the planned schedule and actual progress will be carried out according to the following items.

① Confirmation of works performance (manufacture of equipment and materials in plant and performance of civil engineering an building works on site)

② Confirmation of equipment and materials delivery (substation and distribution equipment and materials, and civil engineering and building works equipment and materials)

③ Confirmation of temporary installation works and construction machinery preparations

④ Confirmation of yield and actual numbers of engineers, skilled workers and laborers, etc.

2) Quality and performance control

Supervision will be carried out based on the following items to determine whether the manufactured, delivered and installed equipment and materials and constructed facilities satisfy the required quality and performance stated in the contract documents. In cases where doubts arise over quality and performance, the Consultant will immediately demand that the contractor make amendments, revisions or corrections.

① Checking of shop drawings and specifications of facilities and equipment

② Attendance of plant inspections of facilities and equipment and checking of plant inspection results

③ Checking of packing, transportation and on-site temporary storage methods

④ Checking of shop drawings and installation guidelines of facilities and equipment

⑤ Checking of trial operation, adjustment, test and inspection guidelines of facilities and equipment

⑥ Supervision of facilities and equipment site installation works and attendance of trial operations, adjustments, tests and inspections

⑦ Checking of facilities and equipment installation work drawings and shop drawings against site performance

3) Safety control

Discussions will be held and cooperation sought with representatives of the contractor and safety control will be exercised during the construction period in order to prevent industrial accidents and accidents affecting third parties. Important points to consider in safety control on the ground are as follows:

① Establishment of safety control regulations and appointment of manager

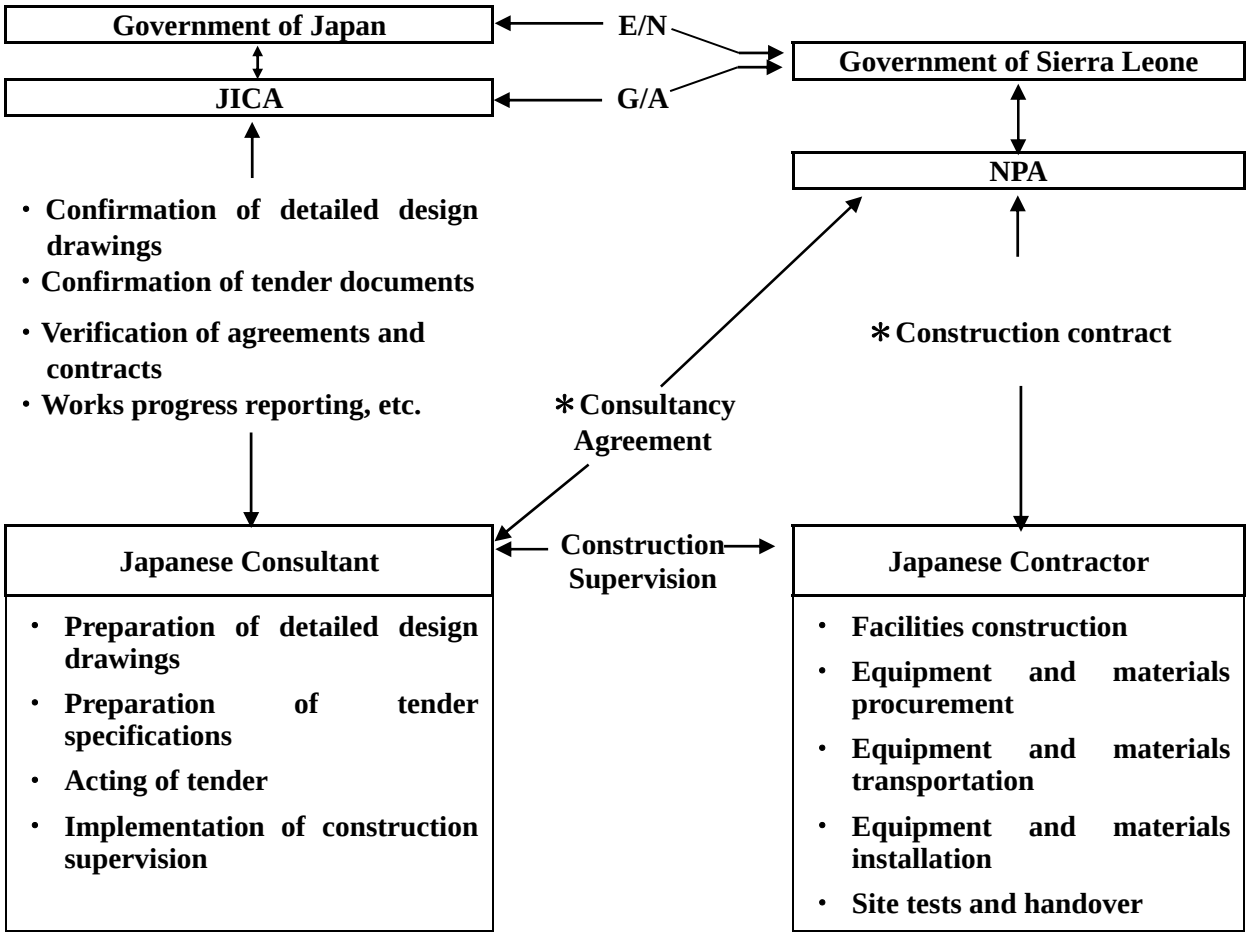
② Prevention of accidents through implementation of periodic inspections of construction machinery

③ Planning of the works vehicles and construction machinery operating routes and thorough enforcement of safe driving

④ Encouragement of laborers to utilize welfare measures and holidays

(2) Overall Relationships concerning Project Implementation

Figure 2-2-4.1 shows the mutual relationships between Project parties including the construction supervision.



＊Note: The Consultancy agreement and construction must be approved by JICA.

Figure 2-2-4.1 Project Implementation Relationships

(3) Works Supervisor

It is desirable that the contractor dispatch Japanese engineers who have experience of similar projects overseas to oversee local laborers when implementing the facilities construction and equipment installation works based on the contract.

The contractor will procure and supply the equipment and materials for the substation construction works and the 33 kV and 11 kV distribution line works, implement the civil engineering and building works, and procure equipment and materials for the low voltage distribution lines to be installed by the Sierra Leone side. Moreover, in order to implement these works, the contractor will employ a subcontractor or subcontractors in Sierra Leone. Since the contractor will need to thoroughly ensure that the subcontractor complies with the works schedule, quality, performance and safety measures prescribed in the contract, it will dispatch Japanese engineers who have experience of similar projects in overseas countries to provide guidance and advice on the ground (technicians and SV from the makers will also be dispatched as necessary).

Based on the scale and contents of substation equipment and distribution line works in the

Project, it is desirable that the contractor assign the engineers and technicians indicated in Table 2-2-4.2 to the works sites.

Table 2-2-4.2 Engineer Dispatch by the Contractor

Dispatched Engineer	Number	Work Contents	Dispatch Period
Site procurement control staff member (site manager)	1	Management of works overall, liaison and coordination with related agencies and acquisition of approval, OJT implementation, equipment and materials procurement management, customs clearance procedures	Entire works period
Procurement control staff member (administrative officer)	1	Labor management, accounting, receiving of equipment and materials through customs	Entire works period
Inspector 1	1	Confirmation of and checking against equipment (general) shop drawings	Drawings approval period
Inspector 2	1	Equipment (general) on-site inspections	Equipment test period
Procurement control assistant 1	2	Manager's assistant: Equipment and materials in general Adjustment of equipment (general) installation test and coordination with local subcontractors On-site inspections, OJT assistance	Entire works period
Procurement control assistant 2 (building)	1	Manager's assistant: Civil engineering and building On-site inspections, OJT assistance	Foundations and building works period
Procurement control assistant 3 (locally recruited)	1	Miscellaneous tasks	Entire works period

2-2-4-5 Quality Control Plan

The Consultant's construction supervisor will carry out supervision and checking based on the following items to ensure that the contractor secures the quality of Project equipment and materials and the execution and installation performance stipulated in the contract documents (technical specifications and implementation design drawings, etc.). In cases where doubts arise over quality and performance, the Consultant will immediately demand that the contractor make amendments, revisions or corrections.

① Checking of shop drawings and specifications of equipment and materials

② Witnessing of factory inspections of equipment and materials and checking of factory inspection results

③ Checking of packing, transportation and on-site temporary storage methods

④ Checking of working drawings of equipment and installation manuals

⑤ Checking of trial operation, adjustment, test and inspection guidelines of equipment and materials

⑥ Supervision of site installation works of equipment and materials and witnessing of trial operations, adjustments, tests and inspections

⑦ Checking of facilities shop drawings against work performance on site

2-2-4-6 Procurement Plan

The facilities construction equipment, substation and distribution equipment and materials to be procured and installed in the Project are hardly manufactured in Sierra Leone at all. Some materials (cement, stone, sand, etc.) and construction and installation equipment can be purchased on the Sierra Leone market, however, since deadlines and quality cannot be guaranteed for other items, it will be necessary for the contractor to procure from Japan or a third country.

In particular, many of the distribution and substation equipment and materials adopted by the NPA are made in Europe, and not only distribution panels and transformers but also cables, utility poles and insulators are imported. Therefore, since NPA employees are well-versed in the handling of these products, the Consultant recommends that products from Development Assistance Committee (DAC) countries be adopted in the Project. Also, since many Japanese 11 kV distribution and substation equipment products are manufactured in ASEAN countries, products should be procured from such countries.

In consideration of the above points, the suppliers of equipment and materials in the Project will be as indicated in Table 2-2-4.3.

Table 2-2-4.3 Country Origins of Equipment and Materials

Equipment and materials	Procurement Source		
	Sierra Leone	Japan	Third country
(Construction materials)			
① Sand, gravel	○		
② Cement	○		
③ Ready-mixed concrete	○		
④ Steel		○	○
⑤ Steel frame		○	○
⑥ Building equipment, finishing materials	○		○
(Construction machinery and vehicles for transportation)			
① General construction machinery	○		
② Low-floor trailer (for transporting main transformer)		○	○
(Substation and distribution line facility)			
① 33/11 kV Step down transformer		○	○
② 33 kV and 11 kV distribution panel		○	○
③ Station service facility (LV panel and transformer) and earthing transformer		○	○
④ 11/0.4 kV distribution transformer		○	○
⑤ Low voltage distribution panel (LVDB)		○	○
⑥ Electrical installation materials (11/33 kV overhead line/ underground line conductors, low voltage cable, conduit and accessories, etc.)		○	○
⑦ Distribution network maintenance spare parts and power tools		○	○

Note: Third countries will be DAC and ASEAN countries.

Moreover, when transporting products from Japan, durable packing methods capable of withstanding the long ocean passage, port landing and inland transportation to the Project site will be adopted.

2-2-4-7 Operational Guidance Plan

During the orks period, the contractor will carry out guidance on the initial equipment controls and operation and maintenance methods. Such guidance will basically be carried out by instructors from the manufacturer or works contractor, dispatched from Japan or third country, via site OJT according to the operation and maintenance manual.

It will also be necessary to dispatch engineers from Japan or third country in order to conduct technical guidance on testing and adjustment, etc. and manage the schedule regarding transfer of technology for adjustment and testing during and after installation of the substation equipment and 33/11 kV distribution line equipment. In order to advance the plan of guidance smoothly, the NPA will need to hold close communications and discussions with the Consultant and contractor and appoint a full-time engineer to take part in the OJT. The appointed engineer will need to convey technology to other employees who cannot participate in the Project and cooperate in enhancing the maintenance capability of the NPA.

2-2-4-8 Soft Component Plan

Since Sierra Leone has owned similar distribution and substation facilities to be installed under the Project and has operated and maintained, it is not necessary to plan soft component and assumed to obtain effectiveness carried out by Sierra Leone side.

2-2-4-9 Implementation Schedule

Following the granting of approval for Project implementation by the Government of Japan, the Exchange of Notes (E/N) and grant agreement (G/A) will be signed between the two countries and Project implementation will be commenced based on Japan's grant aid scheme.

Figure 2-2-4.2 shows the implementation schedule.

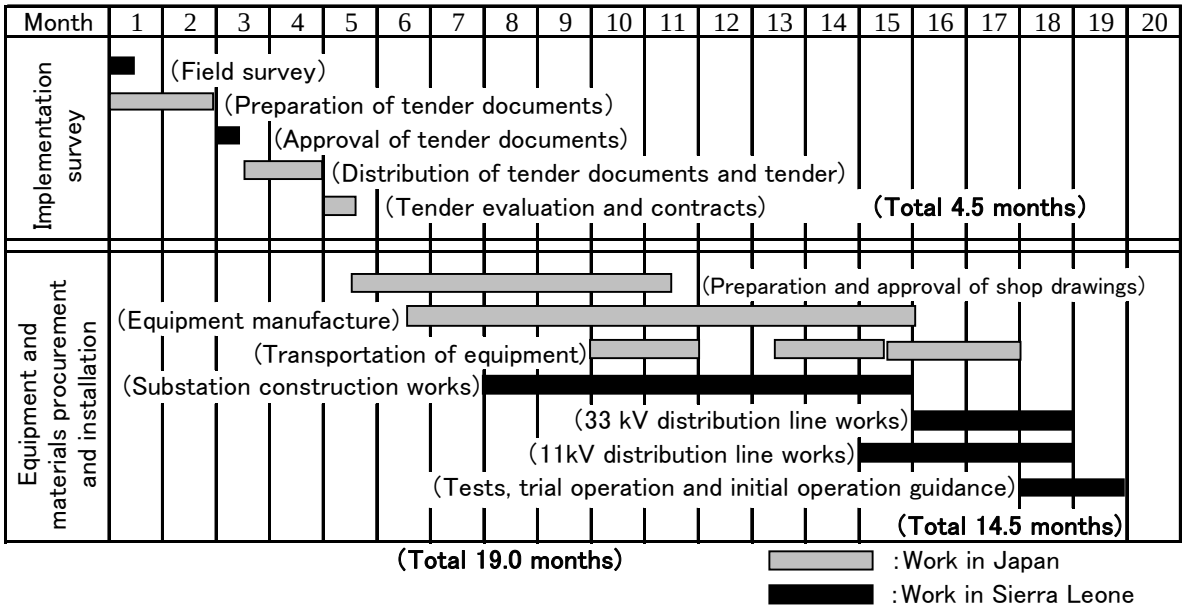


Figure 2-2-4.2 Project Implementation Schedule

2-3 Obligations of the Recipient Country

When it comes to implementing the Project, in addition to the scope of works on the Sierra Leone side indicated in 2-4-3.1 Work Demarcation, Procurement and Construction, items to be implemented or borne by the Sierra Leone side are as follows. It is assumed that there are no main problems to implement the Project since the Sierra Leone side has executed similar undertakings in Japan' grant aid Project (The Project for urgent Improvement of Electric Power Supply system in freetown) completed and handed over in 2007

Common Items

(1) To provide information and data necessary for the Project.

(2) To secure tax exemption and customs clearance and the speedy unloading of products for the Project at the port of unloading in Sierra Leone.

(3) To exempt taxes and tariffs and provide conveniences regarding products and services required for the Project and Japanese nationals dispatched therein.

(4) To exempt business taxes regarding products and services required for the Project, Japanese corporations and Japanese individuals

(5) To pay commission fees to the Japanese bank in relation to opening of a bank account for the Project

(6) To bear all items not covered under Japan's Grant Aid but necessary for implementing the Project

(7) To appoint specialist engineers and technicians for the transfer of Project operation and maintenance technology and to attend equipment and materials quality inspections on site

(8) To properly and effectively use and maintain the facilities constructed and equipment and materials procured under Japan's Grant Aid

(9) To implement environmental monitoring

Preparatory works

(10) To secure power outage when connecting the 33 kV distribution line to the existing 33 kV high voltage panel, etc. in Wilberforce Primary Substation

(11) To provide disposal sites for residual earth, wastewater and waste oil during the works

(12) To construct a fence and gate on the perimeter of Goderich Primary Substation

(13) To construct an access road and remove or relocate existing structures around Goderich Primary Substation

(14) To provide sites for a work office, equipment materials store yard and other temporary installations.

(15) To review and readjust the existing protective relay system

(16) To authorize and give notification of local power outages for the 11 kV distribution line works

Works to be borne by the Sierra Leone side

(17) To install 11 kV distribution line between Peninsular secondary substation and Goderich Village secondary substation and construct Goderich-2 secondary substation and Goderich village secondary substation.

(18) To improve and extend the low voltage distribution system in the Project target area using the equipment and materials provided by Japan

2-4 Project Operation Plan

2-4-1 Basic Concept

In order to improve the reliability of power supply to consumers in the Project target area and conduct stable operation of the supply utility, it is essential to conduct the appropriate operation and maintenance (O&M) of substation and distribution facilities and maintain the peripheral environment. Equipment maintenance is broadly divided into preventive maintenance and breakdown maintenance, and the maintenance conducted by the NPA is a haphazard form of breakdown maintenance called 'emergency breakdown maintenance.' Issues in breakdown maintenance are that: (1) great damage is imparted to equipment, causing large costs to be incurred for repair, and (2) equipment needs to be shut down for extended periods in order to conduct repairs.

Accordingly, it is desirable to implement appropriate preventive maintenance and regular maintenance geared to reducing breakdown rates in facilities and enhancing reliability, safety and efficiency.

Figure 2-4-1.1 shows the basic thinking regarding the maintenance of equipment and facilities.

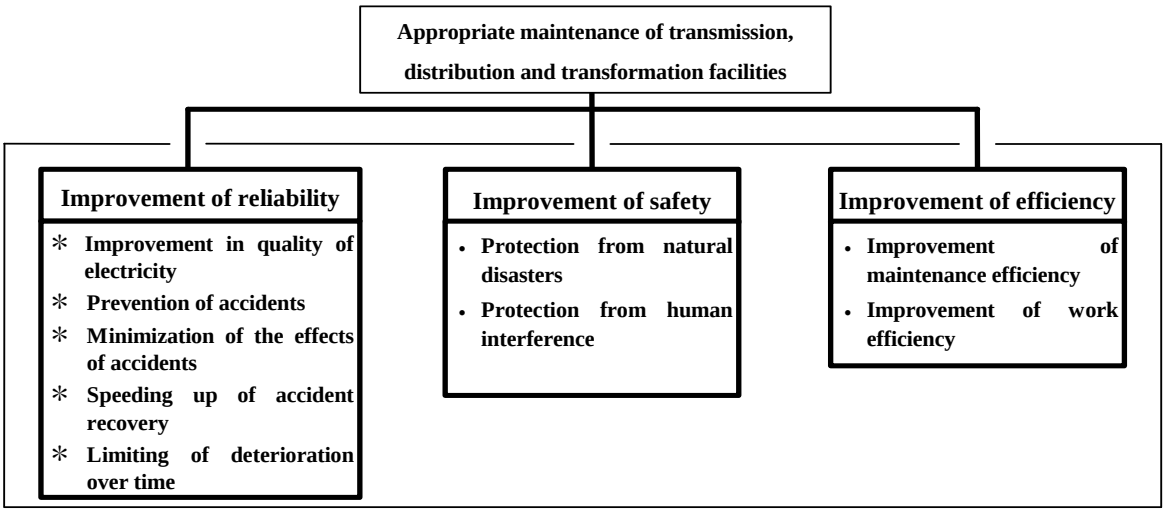


Figure 2-4-1.1 Basic Thinking on Maintenance of Transmission, Distribution and Substation Facilities

In the Project, bearing in mind the above points, it will be necessary for the Sierra Leone side to implement operation and maintenance following completion of the Project in accordance with the O&M technology that was transferred by the expert engineers dispatched by the Japanese contractor during the works and the operation and maintenance manual. Furthermore, it will be necessary to enhance the equipment operation and maintenance technology capacity of employees belonging to the NPA engineering department transmission and distribution section, via the Japanese technical cooperation project (Capacity Building Project for Maintenance of Power Supply Facilities) that is implemented in tandem with the Project.

2-4-2 Operation and Maintenance Setup

Following Project implementation, employees of the NPA engineering department transmission and distribution section (112 employees as of October 2010) will be responsible for operating and maintaining Goderich Substation and 11 kV and low voltage distribution systems in the target area, however, presently these facilities are under the jurisdiction of the headquarters transmission and distribution section (inside Falconbridge Substation), as is also the case regarding other areas. However, the current transmission and distribution section does not have any dedicated engineers or technicians for conducting the operation, maintenance and patrol inspection of the distribution network including newly constructed substations and secondary substations; moreover, since the said facilities are located far away from Falconbridge Substation (it takes roughly one to one and a half hours to Goderich Substation and two to two and a half hours to Sussex), it would be very difficult to rapidly respond to breakdowns and conduct patrol inspections of the distribution network. Therefore, it is recommended that the NPA permanently assigns at least one engineer (also serving as plant manager), two staff in charge of substation equipment and two staff in charge of distribution equipment to the operation and maintenance office of Goderich Substation.

2-4-3 Periodic Inspection Items

(1) Periodic Inspection of Substation Equipment

Table 2-4-3.1 shows the standard periodic inspection items for substation equipment to be procured and installed in the Project. As is shown in the table, equipment inspections are classified into the following three types:

1) Patrol inspections in which abnormal heating or noises, etc. are inspected everyday based on the five senses;

2) Ordinary inspections in which inspections are conducted on charged sections that cannot be inspected in routine patrols, for example, torque of equipment bolts, surface dirt on insulated objects, etc., and

3) Detailed inspections on functions of interlocking mechanisms between instruments and for maintaining precision of measuring instruments.

Ordinary inspections are normally conducted once every one or two years, while detailed inspections are conducted around once every four years. Moreover, it is desirable to replace parts such as fuses, meters and relays, etc. fitted inside circuit breaker panels and distribution panels, etc. when they are found to have deteriorated performance, deteriorated insulation performance, worn contacts or altered characteristics in ordinary inspections and detailed inspection.

Table 2-4-3.1 Periodic Inspection Items in Standard Substation Equipment

Inspection Item	Inspection Contents (Method)	Patrol Inspection	Ordinary Inspection	Detailed Inspection
Equipment exterior	Display conditions of switching indicators, switching display lamps	○	○	
	Abnormal noise and odor	○	○	
	Heating discoloration of terminals	○	○	
	Cracking, damage and staining of bushing and porcelain tubes	○	○	
	Rust on installation booths and frames, etc.	○	○	
	Abnormal temperature (thermometer)	○	○	
	Bushing terminals torque (mechanical check)	○	○	
Operating device and control panel	Display conditions on measuring instruments	○	○	○
	Indications on operation counters		○	○
	Condensation, rust and dirt inside operating boxes and panels		○	○
	Lubrication and cleaning conditions		○	○
	Wiring terminals torque	○	○	○
	Confirmation of switching display status		○	○
	Air and oil leaks		○	○
	Pressure check before and after operation (air pressure, etc.)		○	○
	Operation check of operation meters		○	○
	Rust, deformation and damage of springs (repair)	○	○	○
	Abnormality of pins at tightening parts		○	○
	Inspection (repair) of auxiliary switches and relays		○	○
	Inspection of DC control power source	○		
Measurement and testing	Measurement of insulation resistance		○	○
	Measurement of contact resistance			○
	Heater disconnections		○	○
	Operation test of relays		○	○

(2) Periodic Inspection of Distribution Lines

Maintenance of distribution lines including secondary substations is the most important service to consumers and entails discovering breakdown, damage and breakage areas through routine patrol inspections and implementing immediate recovery work when breakdowns occur. Moreover, when there is risk of short circuits, etc. being caused by contact of lines with trees and so on, it is necessary to take preventive measures such as cutting trees, etc. The major inspection items in routine patrols are as follows.

1) Contact between power line and trees, etc.

2) Damage to and inclination of insulators, damage to electric poles, cutting of power lines

3) Checking of the state of fences and locks for secondary substations and distribution equipment

4) Checking of the state of secondary substations (transformers and switchgear panels)

2-4-4 Spare Parts Purchasing Plan

(1) Budget Steps for Spare Parts and Maintenance Tools

The spare parts for substation equipment and distribution equipment comprise consumable parts that need to be replaced due to degradation and replacement parts that are urgently needed in the event of breakdowns, and it will be necessary for the Sierra Leone side to purchase parts upon investigating what is needed in the above-mentioned periodic inspections.

Therefore, it will be necessary for the Sierra Leone side to budget for the purchase of standard accessory parts up to one year ahead and the purchase of the necessary emergency replacement parts.

In the Project, it is planned to procure a one year supply of emergency replacement parts for use in cases of breakdown and failure and general maintenance parts for the warranty period.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) Costs to be borne by the Sierra Leone side

US$ 155 thousand (approximately 13.5 million yen)

The contents and costs to be borne by the Sierra Leone side are as follows:

Goderich Primary Substation ground leveling, fence and gate works:

US$ 46 thousand (approximately 4.0 million yen)

Installation of 11 kV distribution lines in Goderich district:

US$ 40 thousand (approximately 3.5 million yen)

Installation of low voltage distribution lines:

US$ 52 thousand (approximately 4.5 million yen)

Bank commission for banking arrangement:

US$ 17 thousand (approximately 1.5 million yen)

(2) Estimation criteria

Estimation point:	December 2010
Exchange rate:	1 US$＝86.61 yen (TTS mean value from June to November 2010) 1 Euro＝113.07 (TTS mean value from June to November 2010)
Works and procurement period:	The detailed design and equipment procurement and installation period is as shown in the implementation schedule.
Other points:	The Project will be implemented according to the Grant Aid Scheme of the Government of Japan.

2-5-2 Operation and Maintenance Costs

The NPA engineering department transmission and distribution section conducts maintenance on existing substations and distribution lines, and it will be responsible for operating and maintaining the upgraded and newly constructed substations and newly installed distribution lines in the Project.

At least five maintenance staff members will be needed in order to conduct maintenance of Goderich Primary Substation, which will be newly constructed, and the distribution lines, which will be repaired and extended in the Project. As the NPA engineering department transmission and distribution section has 112 staff members as of December 2010, it will be able to manage by reshuffling staff in the immediate future, however, in order to respond to emergency breakdowns and manage the safety and

welfare of maintenance personnel, it is recommended that seven or eight new maintenance staff be recruited as soon as possible. Furthermore, the NPA will need to employ additional personnel to maintain the 33 kV distribution lines currently being constructed under assistance from the World Bank.

Moreover, in order to soundly operate the substations to be upgraded and constructed in the Project, it will be necessary to always keep the spare parts for the NPA engineering department transmission and distribution section to budget for necessary parts (approximately 3.3 million yen/year). Since the section's budget for repair and maintenance in 2010 was 110 million yen, which means that the cost of maintaining substations upgraded and constructed in the Project is equivalent to roughly 3 percent of this, it should be possible for the section to afford the cost of maintaining the Project facilities.

CHAPTER 3 PROJECT EVALUATION

Chapter 3 Project Evaluation

3-1 Preconditions for Project Implementation

Permission to use the land for Goderich Substation was acquired in December 2010, and Project implementation is conditional on compensation being provided for the relocation of two illegally occupied houses and one abandoned house on the site and environmental authorization being secured. The Sierra Leone side is taking the necessary steps to realize these preconditions, and there are no major concerns.

3-2 Preconditions and External Conditions for Achieving the Overall Project Plan

In order to realize and sustain the effects of the Project, the issues that need to be tackled by the Sierra Leone side are as follows.

(1) It will be necessary to appropriately conduct routine maintenance to ensure that the power distribution and transformation equipment procured and installed in the Project is utilized to the full.

(2) It will be necessary to implement the planned training of personnel assigned to the newly constructed Goderich Substation and to take steps to ensure that operation of the substation is commenced smoothly.

(3) In order to ensure the rapid manifestation of the Project effects, it will be necessary to implement the works on the low voltage trunk line, for which the Japanese side will provide equipment, without delay, and complete the extension and connection of the line to hospitals, health centers, schools and other public and social welfare facilities within a year of Project completion.

(4) Technical guidance will be received from personnel of the technical cooperation project that is implemented in tandem with the Japanese project, and effort will be made to improve technology for operating and maintaining distribution lines.

(5) It will be necessary to secure the necessary budget for purchasing the necessary expendables and emergency spare parts necessary for conducting maintenance of the distribution and transformation facilities to be constructed in the Project.

3-3 External Conditions

In order to realize and sustain the effects of the Project, the external issues that need to be tackled by the Sierra Leone side are as follows.

(1) It will be necessary to complete construction of 33 kV distribution line to Wilberforce Substation, where the 33 kV distribution line branches, before the start of works by the Japanese side.

(2) It will be necessary to conduct management and coordination to ensure that the transmission and distribution line and generating facility improvement projects being planned by other donors are implemented without delay.

3-4 Project Evaluation

3-4-1 Relevance

Since the Project will contribute to the realization of Sierra Leone's poverty reduction strategy, development plans and energy policy and impart benefits to the general public, it is deemed to have high relevance as an aid undertaking.

(1) Benefiting population

As a result of Project implementation, approximately 61,600 residents living in the area from Goderich district (a part of Freetown) to York district will receive direct benefits in the form of stable 24-hour supply of electricity from the distribution grid (approximately 57,200 residents will benefit as a result of existing distribution line improvement and 4,400 as a result of distribution line extension). Meanwhile approximately 1,100,000 residents in the Freetown metropolitan area will receive indirect benefits.

(2) Urgency

The frequent power interruptions in Freetown metropolitan area are causing deterioration of the living environment and public safety, hindering the operation and public services of public and social welfare facilities such as schools, hospitals, health centers, and impeding the productivity of local industries. Therefore, there is an urgent need to remedy such issues through implementation of the Project.

(3) Contribution to stable operation of public and social welfare facilities

Freetown metropolitan area is currently experiencing frequent power interruptions and decline in power quality (voltage drop) due to the deterioration and inadequate capacity of transmission and distribution facilities. This unstable power supply is leading to a decline in medical care services in hospitals and health centers, for example, medical examinations need to be suspended and voltage drop causes medical instruments to stop operating and so on. Moreover, in teacher training colleges, problems arise in the storage of samples and implementation of experiments, while in elementary and secondary schools, lessons are interrupted and school operations are greatly disrupted.

Implementation of the Project will enable stable and high quality power supply to be provided to public and social welfare facilities such as the tuberculosis hospital, surgical hospitals, health centers and schools, etc. in the Project area and thereby make it possible to realize the stable operation and vitalization of facilities and improve medical care services.

(4) Operation and Maintenance Capacity

The NPA routinely conducts the operation and maintenance of 33/11 kV substations and 33/11 kV distribution lines and has experience in operating and maintaining these transmission, distribution and transformation facilities. Therefore, as the implementing agency, the NPA

possesses ample technical capacity to operate and maintain the 33/11 kV distribution equipment to be procured and installed in the Project, and there should be no major problems when it comes to implementing the Project. However, since the NPA does not possess all the equipment that is needed to conduct maintenance, it is scheduled to procure some maintenance equipment and tools in the Project.

Furthermore, JICA is implementing a technical cooperation undertaking, the Project for Capacity Development for Maintaining Power Supply Facilities over three years starting March 2011, and it is anticipated that this will generate a synergistic effect with the Project.

(5) Project Contributing to National Development Plans in Sierra Leone

In the Poverty Reduction Strategy Paper-II "Agenda for Change," which was announced on May 20, 2009, the Government of Sierra Leone specified construction, development and improvement in the four priority sectors of electric power, agriculture, roads and human resources development (education and health) as the primary objective of the state.

In particular concerning electric power, the Paper states the following: "It is imperative we transmit sound and reliable electricity to the country. For this purpose, we must enhance business management, discipline and technical standards in the energy sector, reinforce tariff collections and improve power generating capacity. Reliable supply of electricity is born out of connections of distribution lines to selected districts and expansion of the transmission and distribution grid. We will also embark on the development of new power sources and attraction of competitive private sector investment throughout the country."

Since the Project aims to reinforce, construct and repair power supply facilities, which are essential and necessary infrastructure for maintaining metropolitan functions and ensuring the stable operation of social and public facilities in Sierra Leone and improving the living standard of residents in Freetown and its expanding environs, it will contribute to achieving the superior objective indicated in Poverty Reduction Strategy Paper-II.

(6) Environmental and Social Impacts

Since the Project is intended to construct a substation and install power distribution facilities and it may entail some undesirable impacts on environment and society such as land acquisition and disturbance of forest resources, etc., the NPA will need to obtain environmental approval from the Environmental Protection Agency based on the Environmental Protection Agency Act.

Improvement and extension of transmission and distribution lines in the Project will mainly be conducted alongside existing roads where distribution lines are already installed. Some parts of the routes concerned are located in residential areas, however, as the lines are designed to have no impacts on residents, there will be no need for involuntary resettlement except for two illegally occupied houses on the premises of Goderich Substation.

As Project implementation will not entail any large-scale earthworks, there will be no runoff of

soil in line with it. Moreover, it will be necessary to cut down some trees when laying the distribution lines, however, as it is planned to minimize cutting through adopting insulated power lines, etc., it is anticipated that the impact on forest preservation will be small.

To sum up the above points, the Project will not impart any major impacts in terms of environment and society.

(7) Japan's Grant Aid Scheme

The main equipment for the Project will be procured in Japan, DAC countries and ASEAN countries, and the work is scheduled to finish within the E/N time limit. Therefore, since the Project contents and schedule are feasible and reasonable for implementation within the scope of the grant aid scheme, it should be possible to implement without any major difficulty.

3-4-2 Effectiveness

The following effects are anticipated as a result of Project implementation.

(1) Quantitative effects

Output Indicator	Current Value (2010)	Planned Value (2018)
Supply restriction time (hours/day, including failure interruptions)	12 hours/day	1 hour/day
Power quality (voltage drop %)	20% or more	Approx. 10%
Power (transmission and distribution) loss	30% or more	Approx. 20%

(2) Qualitative effects (Project overall)

Current Conditions and Problems	Project Measures (target works)	Project Effects and Improvements
In Western Area in Sierra Leone, power interruptions frequently occur due to deterioration of power transmission and distribution facilities, lack of maintenance and overload, and these are impeding the industrial development and vitalization of local areas.	Construct a new 33/11kV primary substation, improve and upgrade an 11/0.4kV secondary substation, construct new 33/11 kV distribution lines and supply equipment and materials for low voltage distribution lines.	Through the provision of stable and high quality power supply, it is anticipated the operation of local tourism facilities such as hotels and restaurants as well as the local block factories and fisheries, etc. will be vitalized, thereby enhancing local economic activities.
In Western Area in Sierra Leone, power interruptions frequently occur due to deterioration of power transmission and distribution facilities, lack of maintenance and overload, and these are impeding the operation and vitalization of public and social welfare facilities such as schools, hospitals and industries, etc.	Construct a new 33/11kV primary substation, improve and upgrade an 11/0.4kV secondary substation, construct new 33/11 kV distribution lines and supply equipment and materials for low voltage distribution lines.	Through the provision of stable and high quality power supply to surgical hospitals, tuberculosis isolation hospitals and health centers, contribution will be made to the stable operation and vitalization of such medical, educational and other public facilities and enhancement of medical care services.

Current Conditions and Problems	Project Measures (target works)	Project Effects and Improvements
In Western Area in Sierra Leone, power interruptions frequently occur due to deterioration of power transmission and distribution facilities, lack of maintenance and overload, and these are adversely affecting the living environment of local residents.	Construct a new 33/11kV primary substation, improve and upgrade 11/0.4kV secondary substations, construct new 33/11 kV distribution lines and supply equipment and materials for low voltage distribution lines.	Through the provision of stable and high quality power supply, the living environment of local residents (approximately 57,200 people) will be improved and it will become possible to supply power to areas that are currently not electrified (approximately 4,400 people live in such areas).

The beneficial effects of each Project component are indicated in the following table.

(3) Qualitative effects (according to component)

No	Component	Current problems and Anticipated Effects
1	Construction of 33 kV distribution line from Wilberforce Substation to Goderich Substation	Currently, the only power supply to the Project area is through the 11 kV distribution line from Lumley Secondary Substation after passing through Congo Cross Substation and Spur Secondary Substation, however, the transformation equipment and distribution line are overloaded and deteriorated and this is leading to the supply of unstable and poor quality power. In the Project, the existing Wilberforce Substation will be connected to the new Goderich Substation by a 33 kV distribution line, making it possible to provide stable and good quality power supply to the Project area.
2	Construction of Goderich Substation	Through constructing a 33 kV/11 kV substation on the site of the former broadcasting station in Goderich district (the Project target Area) and connecting this substation to secondary substations in each part of the Project area by 11 kV distribution lines, it will be possible to supply stable and good quality electricity to consumers.
3	Repair of 11 kV distribution lines and extension of distribution lines to non-electrified areas	Out of 18 secondary substations in the Project area, five have stopped operations while the 13 others are connected by 11 kV distribution lines and distribute power to consumers. However, at almost all these still operating substations, transformers and circuit breakers are not fully functioning due to deterioration, lack of maintenance and overload, while the circuit breakers are actually exposed and are in a highly dangerous state in some stations. In the Project, except for four secondary substations where the NPA is autonomously conducting improvements (including one where repair of the low voltage panel is needed), improvements will be conducted at 16 existing secondary substations and associated distribution lines, and four secondary substations will be constructed and distribution lines extended in non-electrified districts, thereby making it possible to provide stable and high quality power supply.
4	Procurement of equipment and materials for low voltage distribution lines and connection of public and social welfare facilities to distribution lines	Low voltage distribution lines in the Project area have been extended by patching from existing lines in line with the increased number of consumers in recent years. Accordingly, distribution lines have great voltage drops due to deterioration and lack of capacity, and this causes distribution losses. In the Project, equipment and materials will be supplied in order to repair and improve low voltage distribution trunk lines and make connections to public and social welfare facilities, and the Sierra Leone side will implement the installation works, thereby contributing to the supply of stable and good quality electricity.

(4) Concrete Examples of Beneficial Effects based on Rehabilitation and Extension of Distribution Lines to Public and Social Welfare Facilities

① Milton Margai College of Education and Technology

This college for training and imparting technology to teachers is equipped with 35 general classrooms and five practical learning areas and has 1,700 students. Its maximum electric power is approximately 250 kW and power is interrupted for approximately 12 hours per day. During power interruptions, a 37 kVA (approximately 30 kW) generator is operated, however, adverse impacts are exerted not only on lessons but also storage of samples, practical area activities and canteen services, etc. If a stable and good quality supply of electricity can be provided, it is planned to increase the number of students to 2,000 and it is anticipated that all university activities will be vitalized.

② Low cost area clinic

This clinic was constructed in 2009 under assistance from the United Nations Peace Building Fund, UNICEF and Japan. It currently has no permanently assigned doctors but nurses treat between 20~30 patients per day and conduct inspections, guidance and treatment for between 40~50 pregnant and parturient women every Thursday. However, the clinic still has no electricity supply. Moreover, although it is equipped with wash basins, toilets and septic tanks, etc., it has no plumbing facilities and staff have to carry water by bucket from a nearby well. It is urgently necessary to provide electricity and water supply in order to improve medical care services to the local community.

③ Emergency Surgical Hospital around Adonkia

This emergency surgical hospital is visited by around 30,000 patients every year and is composed of an outpatient room, surgical procedure room and numerous inpatient rooms. Its maximum electric power is approximately 110 kW and power is interrupted for approximately 12 hours per day. Moreover, the quality of power supplied by the NPA is poor (frequent voltage fluctuations) and this has adverse effects on equipment. Therefore, the hospital relies on a private generator for conducting surgical operations. It currently uses a 135 kW generator during power interruptions, but it plans to increase capacity to 200 kW x 2 sets in future. If the NPA power supply can be stabilized, the money currently that is being used on the generator fuel can be used to build additional hospital facilities.

④ Lakka Isolation Hospital

This hospital currently receives no power supply from the NPA but instead uses a 40 kW generator, although this is insufficient. The hospital has an outpatient room, two rooms for leprosy patients and twenty four rooms for tuberculosis patients, however, it constantly has trouble preserving medicines, food for patients and patients' samples for use in laboratory experiments. The top priority for the hospital today is to reduce its generator fuel requirement through obtaining power supply from the NPA. It currently receives fuel assistance from an NGO.

⑤ Clinic in Hamilton

This clinic was constructed under assistance from UNICEF and Japan. It receives no power supply from the NPA and has no generator either. It comprises one outpatient room, one consultation room and one delivery room, however, it can only treat around three patients a day. Since it is unable to store medicines, it relies on the neighboring Ogoofarm clinic. Power supply is eagerly awaited.

⑥ Health Center in Sussex

This health center comprises an outpatient room, consultation room, two delivery rooms, inpatient room and storeroom. It has no NPA power supply, however, it stores medicines in a refrigerator powered by photovoltaic energy (maximum electric power 3 kW). This health center is able to treat patients, however, it can only accept four inpatients per day. If power supply could be provided to the clinic, medical services to the local community would be greatly improved.

⑦ Mambo Primary School, Sulpon Primary School, Sussex Primary School

None of the schools has access to NPA power supply, and the maximum electric power is between 2~5 kW. The number of students is 100 at Mambo Primary School, 80 at Sulpon Primary School, and 140 at Sussex Primary School, and these figures are expected to rise by 30~40% over the next two years. Electricity is currently used for lighting, ventilation and storage of beverages, however, generators only operate for a few hours every day. If power supply can be provided, it is anticipated that the schools will be able to conduct nighttime lessons and extracurricular lessons and also host lessons using PCs provided with the help of NGOs.

⑧ Church and Mosque

The church and mosque have no power supply from the NPA and only operate generators with output of 2~5 kVA at prayer times (5 times a day in the mosque and 2 times a day in the church). Lighting accounts for almost the entire load and it is hoped that major reductions can be realized in fuel costs and maintenance costs when power supply by the NPA is introduced.

Judging from conditions at the main public and social welfare facilities in the target area described above, implementation of the Project can make a major contribution to vitalizing operation of hospitals and health centers, etc., improving the quality of medical care services, and vitalizing the operation of public facilities.

Appendices

Appendix 1 Member List of the Study Team

1. Member List of the Study Team

（1） First Field Survey

Name	Work Assignment	Position
Hiroto KAMIISHI	Team Leader	Advisor Electric Power Division Natural Resources and Energy Group Industrial Development and Public Policy Department, JICA
Takeshi TOMITANI	Study Planning	Electric Power Division Natural Resources and Energy Group Industrial Development and Public Policy Department, JICA
Sei KIMURA	Cooperation Planning	Country Officer Sierra Leone, Liberia West and Central Africa Division 1 Africa Department, JICA
Mitsuhisa NISHIKAWA	Chief Consultant / Power Development Planning / Substation Facilities Planning	Yachiyo Engineering Co., Ltd.
Takayuki MIYAMOTO	Transmission and Distribution Facilities Planning	Yachiyo Engineering Co., Ltd.
Koji ODA	Civil Structure / Installation Planning	Yachiyo Engineering Co., Ltd.
Hiromi MATSUBARA	Environmental and Social Considerations	Yachiyo Engineering Co., Ltd.
Makoto ABE	Assistant Chief Consultant / Construction and Procurement Planning / Cost Estimation	Yachiyo Engineering Co., Ltd.
Atsuhito URUNO	Coordinator / Assistant Substation Facilities Planning	Yachiyo Engineering Co., Ltd.

（2） Second Field Survey (Explanation on Draft Final Report)

Name	Work Assignment	Position
Hiroto KAMIISHI	Team Leader	Advisor Electric Power Division Natural Resources and Energy Group Industrial Development and Public Policy Department, JICA
Takeshi TOMITANI	Study Planning	Electric Power Division Natural Resources and Energy Group Industrial Development and Public Policy Department, JICA
Mitsuhisa NISHIKAWA	Chief Consultant / Power Development Planning / Substation Facilities Planning	Yachiyo Engineering Co., Ltd.
Makoto ABE	Assistant Chief Consultant / Construction and Procurement Planning / Cost Estimation	Yachiyo Engineering Co., Ltd.

Appendix 2 Study Schedule

2. Study Schedule

（1） First Field Survey

No.	Date	Day of the week	Survey Contents		Stay at
			Official Members (JICA)	Consultant Members（Yachiyo Engineering Co.,Ltd.）	
			Mr. Kamiishi, Mr. Tomitani (14 ～ 25 Nov.), and Mr. Kimura (18 ～ 30 Nov.)	Mr. Nishikawa, Mr. Miyamoto, Mr. Oda, Ms. Matsubara, Mr. Abe and Mr. Uruno	
1	14 Nov	Sun.	• Mr. Kamiishi and Mr. Tomitani Trip from Tokyo (11:10) to London (14:25) by BA-006	• Trip from Tokyo (12:30) to Frankfurt (16:35) by JL-407	London/ Frankfurt
2	15 Nov.	Mon.	• Trip from London (14:20) to Accra (21:00) by BA-081	• Trip from Frankfurt (12:05) to Accra (17:40) by LH-566	Accra
3	16 Nov.	Tue.	• Trip from Accra (13:10) to Freetown (15:30) by KQ-510		Freetown
4	17 Nov.	Wed.	• Courtesy Call to JICA Field office and Explanation of Objectives/Contents/Schedule of the Field Survey, etc. • Courtesy Call to Ministry of Energy & Water Resources (MEWR) and Submission & Explanation of Inception Report, Field Survey Schedule, Questionnaires, etc. • Courtesy Call to National Power Authority (NPA) and Submission & Explanation of Inception Report, Field Survey Schedule, Questionnaires, etc. • Meeting with Local Consultant for Topographic Survey and Soil Investigation Works (Only Consultant Team)		Freetown
5	18 Nov.	Thu.	• Meeting & discussions with MEWR and NPA regarding Background, Contents, and Effects of the requested project and Undertaking of Sierra Leonean side during Survey period. • Field Survey of the Project sites (Distribution line route and Substation construction site) • Meeting with Local Consultant for Topographic Survey and Soil Investigation Works (Only Consultant Team) • Mr. Kimura: Trip from Tokyo (11:10) to London (14:25) by BA-006		Freetown/London
6	19 Nov.	Fri.	• Confirmation & discussions with NPA regarding Detailed/Technical Contents of the requested Project. • Submission /Explanation/Discussion of Draft Minutes of Discussions (M/D) to NPA. • Discussion of Draft Record of Discussions (R/D) for the technical cooperation to NPA. • Visiting of Local Constructors and Suppliers for Submission of Questionnaires related to Market survey/Cost estimation (Only Consultant Team) • Mr. Kimura: Trip from London (11:50) to Freetown (19:45) by BD-967		Freetown
7	20 Nov.	Sat.	• Field Survey of the Existing Power Station, Substations and Distribution lines (Kingtom P/S, Freetown Substation, Regent Substation, Falconbridge Substation, and Blackhall road Substation, etc.) • Visiting of Local Contractors and Suppliers related to Market survey/Cost estimation(Only Consultant team)		Freetown
8	21 Nov.	Sun.	• Internal meeting. • Sorting of Data collected and Market Survey in Freetown. • Collection of M/D and R/D (if necessary)		Freetown
9	22 Nov.	Mon.	• Confirmation of WB Project (Work schedule/progress, Technical Specifications, Construction cost, etc.) • Discussion with MEWR and NPA regarding M/D and R/D • Detailed Field Survey of the Project sites (Distribution line route and Substation construction site)-Consultant Team		Freetown
10	23 Nov.	Tue.	• Detailed Field Survey of the Project sites (Distribution line route and Substation construction site) -Consultant Team • Discussion with MEWR and NPA regarding M/D and R/D • Visit NPC (National Commission of Privatization) and confirmation of Electrical Sector reform Plan and its progress, etc.		Freetown
11	24 Nov.	Wed.	• Signing the M/D and R/D with MEWR and NPA • Report to JICA Sierra Leone Field Office regarding the Signing of M/D and R/D, etc.	• Detailed Field Survey of the Project sites (Distribution line route and Substation construction site) • Collecting information/Data regarding the National Development Plan, Socio Economic Data, Freetown Development Plan, etc. • Confirmation and collection of information related to the Current Laws of Environment and Social Considerations at Environment Protection Agency (EPA) / Ministry of Agriculture, Forestry and Food Security (MAFFS)	Freetown

No.	Date	Day of the week	Survey Contents		Stay at
			Official Members (JICA)	Consultant Members（Yachiyo Engineering Co.,Ltd.）	
			Mr. Kamiishi, Mr. Tomitani (14 ～ 25 Nov.), and Mr. Kimura (18 ～ 30 Nov.)	Mr. Nishikawa, Mr. Miyamoto, Mr. Oda, Ms. Matsubara, Mr. Abe and Mr. Uruno	
12	25 Nov.	Thu.	• Mr. Kamiishi and Mr. Tomitani Trip from Freetown (17:30) to Accra (19:50) by KQ-511 • Mr. Kimura: Being arranged	• Detailed Survey of the Project sites (Distribution line route and Substation construction site) • Confirmation of Present Demand Forecast based on M/P study. • Confirmation of Present Financial status and Electric tariff of NPA • Confirmation and collection of information related to the Current Laws of Environment and Social Considerations at Environment Protection Agency (EPA) / Ministry of Agriculture, Forestry and Food Security (MAFFS)	Freetown/Accra
13	26 Nov.	Fri.	• Mr. Kamiishi and Mr. Tomitani: Report & discussion at the Embassy of Japan and JICA Ghana Office • Trip from Accra (23:30) to London (06:25) by BA-078 • Mr. Kimura: Being arranged	• Detailed Survey of the Project sites (Distribution line route and Substation construction site) • Confirmation and collection of information related to the Current Laws of Environment and Social Considerations at Environment Protection Agency (EPA) / Ministry of Agriculture, Forestry and Food Security (MAFFS) • Collecting Data for Cost Estimation	Freetown/On board
14	27 Nov.	Sat.	• Mr. Kamiishi and Mr. Tomitani: Trip from London (12:35) to Narita (09:10+1) by BA-005 • Mr. Kimura: Being arranged	• Internal meeting. • Sorting of Data collected and Market Survey in Freetown.	Freetown/On board
15	28 Nov.	Sun.	• Mr. Kamiishi and Mr. Tomitani: arrive at Japan • Mr. Kimura: Being arranged	• Internal meeting. • Sorting of Data collected and Market Survey in Freetown.	Freetown
16	29 Nov.	Mon.	• Mr. Kimura: Being arranged	• Collecting information/Data regarding the National Development Plan, Socio Economic Data, Freetown Development Plan, etc. • Visiting of EU office to confirm their assistance to the electric Sector. • Confirmation and collection of information related to the Current Laws of Environment and Social Considerations at Environment Protection Agency (EPA) / Ministry of Agriculture, Forestry and Food Security (MAFFS) • Collecting Data for Cost Estimation from the Local Contractors/Suppliers	Freetown
17	30 Nov.	Tue.	• Mr. Kimura: Being arranged • Trip from Freetown (17:30) to Accra (19:50) by KQ-511	• Detailed Survey of the Project sites (Distribution line route and Substation construction site) • Confirmation and collection of information related to the Current Laws of Environment and Social Considerations at Environment Protection Agency (EPA) / Ministry of Agriculture, Forestry and Food Security (MAFFS) • Collecting Data for Cost Estimation from the Local Contractors/Suppliers	Freetown/Accra
18	1 Dec.	Wed.	• Mr. Kimura: Report & discussion at the Embassy of Japan and JICA Ghana Office • Trip from Accra (23:30) to London (06:25+1) by BA-078	• Detailed Survey of the Project sites (Distribution line route and Substation construction site) • Confirmation and collection of information related to the Current Laws of Environment and Social Considerations at Environment Protection Agency (EPA) / Ministry of Agriculture, Forestry and Food Security (MAFFS) • Collecting Data for Cost Estimation from the Local Contractors/Suppliers	Freetown/On board
19	2 Dec.	Thu.	• Mr. Kimura: Trip from London (12:35) to Narita (09:10+1) by BA-005	• Visiting of Sierra Leone Port Authority to confirm their import procedures and Port conditions. • Confirmation of the progress soil investigation and topographic survey • Collection of supplemental data and information	Freetown/On board
20	3 Dec.	Fri.	• Mr. Kimura: Arrive at Japan	• Confirmation of the progress soil investigation and topographic survey • Collection of supplemental data and information • Preparation of Field report	Freetown

No.	Date	Day of the week	Survey Contents		Stay at
			Official Members (JICA)	Consultant Members（Yachiyo Engineering Co.,Ltd.）	
			Mr. Kamiishi, Mr. Tomitani (14 ～ 25 Nov.), and Mr. Kimura (18 ～ 30 Nov.)	Mr. Nishikawa, Mr. Miyamoto, Mr. Oda, Ms. Matsubara, Mr. Abe and Mr. Uruno	
21	4 Dec.	Sat.		• Confirmation of the progress soil investigation and topographic survey • Collection of supplemental data and information • Preparation of Field report	Freetown
22	5 Dec.	Sun.		• Internal meeting. • Sorting of Data collected • Collection of supplemental data and information • Preparation of Field report	Freetown
23	6 Dec.	Mon.		• Collection of supplemental data and information • Submission/Explanation of Field report to NPA	Freetown
24	7 Dec.	Tue.		• Collection of supplemental data and information • Submission/Explanation of Field report to NPA • Collection of Field report (If any)	Freetown
25	8 Dec.	Wed.		• Obtaining the Acceptance for Field report from NPA • Courtesy Call to MEWR and NPA • Report to JICA Field Office	Freetown
26	9 Dec.	Thu.		• Trip from Freetown to Accra [17:30 – 19:50 by KQ-511]	Accra
27	10 Dec.	Fri.		• Report & Courtesy Call to the Embassy of Japan and JICA Ghana Office • Trip from Accra to London [23:30 – 06:25+1 by BA-0078]	On board
28	11 Dec.	Sat.		• Arrive at London from Accra on 06:25a.m. • Trip from London to Narita [19:00 – 16:05+1 by JL-402]	On board
29	12 Dec.	Sun.		• Arrive at Narita from London on 16:05 p.m. by JL-402	

[Remarks]

EOJ: Embassy of Japan	R/D: Record of Discussions
JICA: Japan International Cooperation Agency	MODEP: Ministry of Development and Economic Planning
NPA: National Power Authority	P/S: Power Station
MEWR: Ministry of Energy and Water Resources	S/S: Substation
NPC: National Commission of Privatization	MAFFS: Ministry of Agriculture, Forestry and Food Security
M/D: Minutes of Discussions	EPA: Environment Protection Agency

（2） Second Field Survey (Explanation on Draft Final Report)

No.	Date	Day of the week	Survey Contents		Stay at
			Official Members (JICA)	Consultant Members（Yachiyo Engineering Co.,Ltd.））	
			Mr.Kamiishi and Mr.Tomitani	Mr.Nishikawa and Mr.Abe	
1	15 May	Sun.		• Trip from Narita (12:15) to Frankfurt (17:20) by JL-407	Frankfurt
2	16 May	Mon.	• Trip from Narita (10:55) to London (15:05) by BA-006	• Trip from Frankfurt (12:30) to Accra (17:40) by LH-566	London/Accra
3	17 May	Tue	• Trip from London (14:00) to Freetown (20:55) by KQ-510	• Trip from Accra (13:10) to Freetown (15:30) by KQ-510	Freetown
4	18 May	Wed.	• 09:00; Courtesy Call to JICA Sierra Leone Field Office and Explanation of Draft Final Report, Field Survey Schedule, etc. • 10:00; Courtesy Call to National Power Authority (NPA) and Submission and Explanation of Draft Final Report, Field Survey Schedule, discussion on progress of procedure regarding Environmental and social considerations etc. • 14:00; Discussion with World Bank staff regarding the existing Wilberforce Substation through Audio Communication.		Freetown
5	19 May	Thu.	• 09:00; Meeting and discussions with NPA regarding Draft Final Report and Draft Minutes of Discussions. • 12:00; Courtesy Call to Ministry of Energy and Water Resources (MEWR) and Submission and Explanation of Draft Final Report, Field Survey Schedule, Draft Minutes of Discussions, etc. • Field Survey of the Existing Power Stations （Kingtom P/S, Blackhall road S/S）		Freetown
6	20 May	Fri.	• Meeting and discussions with NPA regarding Draft Final Report and Draft Minutes of Discussions. • Field Survey of the Wilberforce S/S, Goderich S/S, 33kV Distribution route and Secondary Substations (Mainly beneficial areas).		Freetown
7	21 May	Sat.	• Field Survey of the Secondary Substations (Mainly beneficial areas).		Freetown
8	22 May	Sun.	• Internal meeting. • Sorting of Data collected and Market Survey in Freetown. • Collection of M/D		Freetown
9	23 May	Mon.	• Meeting and discussions with NPA regarding Draft Minutes of Discussions..		Freetown
10	24 May	Tue.	• Signing the M/D with MEWR and NPA • Report to JICA Sierra Leone Field Office regarding the Signing of M/D and site survey, etc. • Trip from Freetown (17:30) to Accra (19:50) by KQ-511		Accra
11	25 May	Wed.	Preparation of Documents	• Trip from Accra (23:45) to London (06:25+1) by BA-078	Accra/ On board
12	26 May	Thu.	1000 EOJ (tentative) 1500 JICA Ghana Office Trip from Accra (22:45) to London (06:25+1) by BA078	• Trip from London (19:00) to Narita (16:05+1) by JL-402	On board
13	27 May	Fri.	Trip from London (13:25) to Narita (09:05+1) by BA005	• Arrive at Narita from London on 16:05 by JL-402	On board

Appendix 3 Member List of the Study Team

3. Member List of the Study Team

Name and Organization	Position
Ministry of Energy and Water Resources: MEWR	
Prof. Ogunlade R. Davidson	Minister
Ministry of Finance and Economic Development	
Mr. A. Jam Jalloh	Director of Planning, Ministry of Finance and Economic Development
Prf. Motoyoshi Suzuki	Executive Adviser (JICA Expert)
Ministry of Foreign Affairs and International Cooperation	
Mr. U. S. Dura	Director
National Commission for Privatization	
Mr. Abu Bangura	Chairman/Commissioner
National Power Authority (NPA)	
Dr. Zubairu Kaloko	General Manager
Mr. Denis John Scott Garvie	Deputy General Manager
Eng. Alex Mabuku Matale	Consultant/Commercial Director
Mr. John A. Kabia	System Planning Manager
Mr. Milton M. Gebbai	Senior Mechanical Engineer
Mr. Alex S. Jabba	T & D Department Ag. Manager
Mr. Francis V. Nyama	Electrical Engineer, Falcon Bridge
Mr. Edward Parkinson	Electrical Engineer, Falcon Bridge
Mr. Unisa Samura	Senior Electrical Engineer, Falcon Bridge

Mr. Foday I. Kamara	Electrical Superintendent
Mr. Yanson Taylor	Surveyor
Mr. Ken P Sondai	Safety Engineer

Forestry Division, Ministry of Agriculture, Forestry and Food Security

Mr. Sheku A Mansary	Acting Director of Forestry

Sierra Leone Roads Authority (SLRA)

Mr. Munda E Rogers	Director General
Mr. Sah Daniel Dugba	Director of Development
Ms. Memuna Kumba Jalloh	Road Assets Manager

Sierra Leone Broadcasting Corporation (SLBC)

Mr. Gbanabom Hallaoell	Director General

Ministry of Lands, Country Planning and the Environment

Mr. Augustine Kai Banya	Director of Country Planning
Dr. William L Farmer	Director of Surveys and Lands

Sierra Leone Environmental Protection Agency (SLEPA),
Ministry of Lands, Country Planning and the Environment)

Mr. Victor H O Sawyer	Deputy Director, Operations Policy Researching and Planning Department
Mr. Syl Riors Kamara	Deputy Director, Field Operations and Extension Department

Interserve Industrial Services Limited

Mr. Wilbert Mukori	Substation & HV Cable, Project Manager

JICA Sierra Leone Field Office

Mr. Masahiro Yoshikawa	Project Formulation Advisor
Mr. Joseph Cummings-Lewis	Programme Officer

JICA Ghana Office

Mr. Kunihiro Yamauchi	Chief Representative
Mr. Koichi Kito	Senior Representative
Ms. Maki Okusa	Project Formulation Advisor (Private & Infrastructure Sector)

Appendix 4 Minutes of Discussions

Minutes of Discussions
on the Preparatory Survey on the Project for
Urgent Improvement of Power Distribution System in Freetown
in the Republic of Sierra Leone

In response to the request from the Government of the Republic of Sierra Leone, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), in consultation with the Government of Japan, decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") on the Project for Urgent Improvement of Power Distribution System in Freetown (hereinafter referred to as "the Project").

JICA sent to the Republic of Sierra Leone the Preparatory Survey Team (hereinafter referred to as "the Team"), headed by Mr. Hiroto Kamiishi, Advisor for Electric Power Division, Natural Resources and Energy Group, Industrial Development Department, JICA. The Team is scheduled to stay in the country from November 16 to December 9, 2010.

The Team held discussions with the officials of concerned authorities in Sierra Leone (hereinafter referred to as "the Sierra Leonean side"). In the course of the discussions, both sides have confirmed the main items described in the sheets attached hereto.

Freetown, November 24th, 2010

Mr. Hiroto Kamiishi
Leader
Preparatory Survey Team
Japan International Cooperation Agency

Dr. Zubairu A. Kaloko,
General Manager,
National Power Authority

Prof. Ogunlade R. Davidson,
Minister,
Ministry of Energy and Water Resources

ATTACHMENT

1. Objective of the Project

The objective of the Project is to construct and rehabilitate the power distribution network in Goderich Area in Freetown

2. Project Site

The Project sites which are selected through the Survey and the analysis in Japan based on the request from the Sierra Leonean side are located in Goderich Area, Freetown as shown in Annex-1.

3. Responsible and Implementing Organization

(1) The responsible ministry is the Ministry of Energy and Water Resources (MEWR).
(2) The implementing organization is the National Power Authority (NPA).
(3) The Organization Structure of NPA is shown in Annex-2.

4. Result of Analysis on the Survey

Based on the request from the Sierra Leonean side and the discussion between the Team and the Sierra Leonean side, both sides confirmed the priority (A, the highest, to D, the lowest) for the following components of the Project.

(1) Construction of 33/11kV Goderich Substation (S/S)	A
(2) Installation of 33kV Distribution Line (D/L) from Wilberforce S/S to Goderich S/S	A
(3) Rehabilitation of 11kV D/L	B
(4) Material supply of Low Voltage (L/V) distribution equipment and materials	C

The Team explained that the requested 4 components are considered as candidate components to be implemented; however, the items of the components might be adjusted due to the budget frameworks of the Japanese side.

5. Japan's Grant Aid Scheme

(1) JICA confirmed that the Sierra Leonean side understood Japan's Grant Aid Scheme explained by the Team as described in Annex-3 and 4.
(2) The Sierra Leonean side will take the necessary measures, as described in Annex-5, for smooth implementation of the Project as prerequisites for the Japan's Grant Aid to be implemented.

6. Schedule of the Survey

The Team will continue the Survey in Sierra Leone until December 9, 2010.

7. Other Relevant Issues

(1) Status of the Survey

The Team explained that the purpose of the Survey is to collect information and data necessary for the outline design and cost estimation of the Project components which are confirmed through the Survey and the analysis in Japan.

(2) Submission of the Questionnaire

The Sierra Leonean side shall submit answers to the Questionnaire given by the Team before the end of November, 2010.

(3) Coordination among relevant donors and agencies

The Team requested the Sierra Leonean side to ensure coordination among relevant donors and agencies for smooth implementation of the Project. The Team explained to the Sierra Leonean side that the Project will face significant difficulties if the construction of 33kV D/L from Freetown S/S to Wilberforce S/S is not completed at least by the end of June, 2011. The Sierra Leonean side accepted to provide the Team with information regarding the construction schedule, commissioning date and specification of equipments of the above World Bank project.

(4) Environmental and Social Considerations

a) The Team requested the Sierra Leonean side to conduct the required environmental procedures, and obtain approval on environmental clearance for implementation of the Project.
b) The Sierra Leonean side agreed to comply with the JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "JICA Guidelines") as well as laws and regulations in Sierra Leone, and was requested to prepare Environmental Checklist and Monitoring Form which are designated by JICA Guidelines for an outline design.
c) The Sierra Leonean side agreed to make necessary arrangements with governmental organizations concerned in order to secure funding for and execution of the above environmental matters in a schedule as required for smooth execution of the Project.
d) The Sierra Leonean side agreed to complete necessary procedures by the end of April, 2011.

(5) Major Undertakings to be taken by the Sierra Leonean side

a) The Sierra Leonean side agreed to undertake the following particular items out of general undertakings described in Annex-5.
b) The Sierra Leonean side shall take necessary measures for obtaining the permissions as below in prior to the commencement of the implementation of the Project.
   - Permission(s) necessary to cut trees which may obstacle the installation and rehabilitation of D/L by the Project from relevant authorities.
   - Permission(s) necessary to install electric poles from land owner(s), in case electric pole(s) are to be installed in the private land(s).
   - Permission(s) necessary for enforcement of traffic controls during the installation and rehabilitation of 33/11 kV D/L from relevant authorities prior to the commencement of the Project.
c) The Sierra Leonean side shall secure enough budget and human resources for the following undertakings in accordance with the implementation of the Project
   - Securing ownership of the land for proposed 33kV, 11kV and LV D/L and Substation.
   - Securing access road for transportation of the equipment and materials to the proposed Goderich Substation and 33kV D/L including removal work of obstacles.
d) The Sierra Leonean side shall take necessary procedures in order to follow the tentative schedule (Annex 6) for implementation of the Project.

(6) Site for Goderich S/S

The Team conducted site reconnaissance of the proposed area for Goderich S/S and found that there could be a few options for the exact site. Both sides recognized that the exact site for the construction of the S/S needs to be decided in a timely manner in order to conduct detailed survey of the outline design and cost estimation of the Project during the Survey period. And both sides agreed to decide the site for the S/S by the end of November, 2010.

(7) Routes of the 33kV D/L

The Team conducted route reconnaissance of the proposed 33kV from Wilberforce S/S to Goderich S/S and found that there could be a few options for the exact route. Both sides

agreed that the route of the 33kV D/L shall be decided by the end of November, 2010 based on the Survey regarding feasibility of construction and maintenance, environmental and social considerations.

(8) 11kV and LV D/L

a) Both sides agreed that the Project provides equipments for 11kV and that the Sierra Leonean side conducts the construction of 11kV networks. The Sierra Leonean side, however, requested the Team to construct some parts of the installation of 11kV D/L such as the parts where 33kV lines and 11kV lines are to be installed in parallel.

b) The Sierra Leonean side also explained the importance and requested the Team to provide necessary materials and equipment for the construction of LV networks in order to better distribute the development fruit to beneficiaries.

c) The Team, confirming that the installation works of the LV D/L would be undertaken by the Sierra Leonean side, recognized the importance and agreed to consider the possibility of the provision and the construction of LV D/L, discussing with authorities concerned in Japan.

(9) The priority of areas for installation and rehabilitation of 11kV and LV D/L

The Team requested the Sierra Leonean side to clarify and explain the priority of areas for rehabilitation of 11kV D/L and supply of LV distribution equipment and materials to the Team during the Survey. The both sides agreed that the priorities are made by particularly considering beneficiaries of the Project including the public and welfare facilities such as schools, hospitals, clinics and water-supply facilities. The Sierra Leonean side agreed to clarify such beneficiaries of each area before the end of the Survey.

(10) Collaboration between the Grant Aid and the Technical Cooperation

The Team requested the Sierra Leonean side to conduct construction works for installation and rehabilitation of 11kV D/L during the implementation period of the technical cooperation titled "The Project for Capacity Development for Maintaining Power Supply Facilities," whose implementation was mutually recognized by the Sierra Leonean side and JICA in the Record of Discussions signed on November 18th, 2010. The technical cooperation will support the installation and maintenance of D/L installed by the Project.

(11) Presidential Election planned in 2012

The Team has mentioned the possibility that the political events in 2012 in the Republic of Sierra Leone would affect the schedule of the Project. The Sierra Leonean side, while pointing out that there would be little possibility of affecting the schedule, agreed that the schedule might be modifiable due to the proceedings of the political events in 2012. The Sierra Leonean side also proposed to provide the information regarding the matters and expressed that they would take every effort for the smooth implementation of the Project.

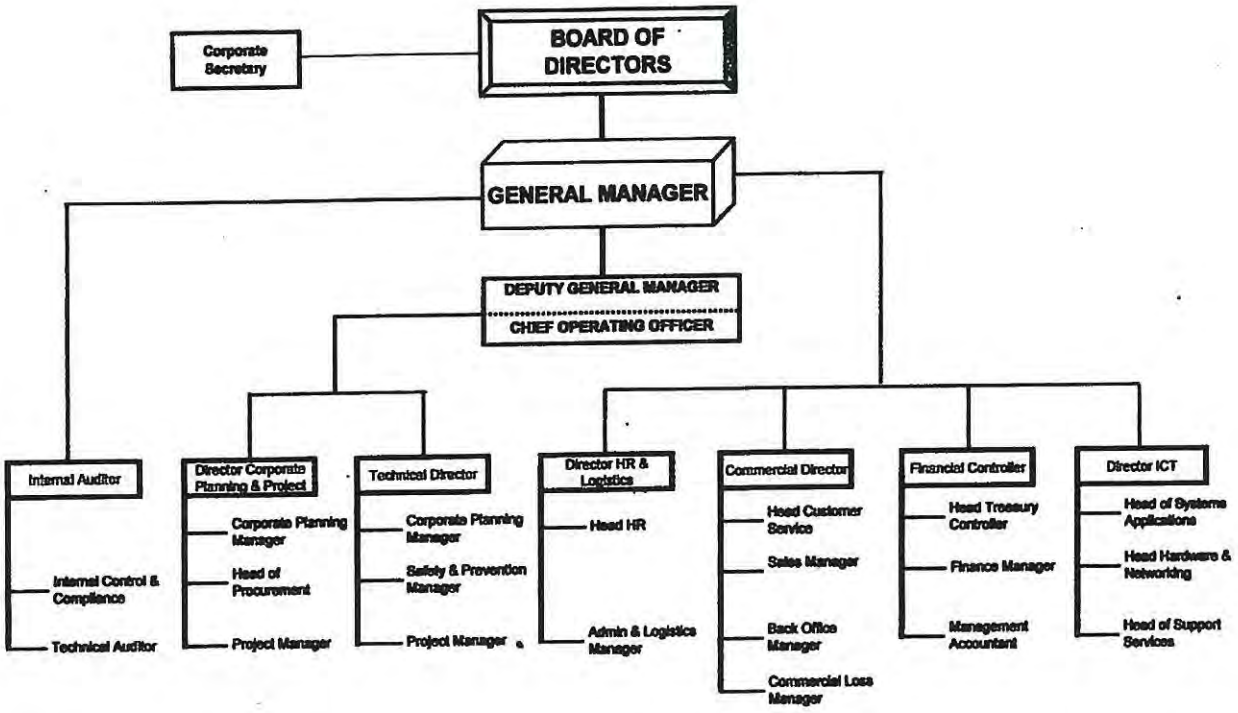
(End)

Annex-1	Project Sites
Annex-2	Organization Chart of NPA
Annex-3	Japan's Grant Aid
Annex-4	Flow Chart of Japan's Grant Aid Procedures
Annex-5	Major Undertakings to be taken by Each Government
Annex-6	Tentative Implementation Schedule

Annex-1 Project Sites

Tentative Planned 33kV Distribution Line and Coverage Area of LV Network

PROPOSED ORGANIZATIONAL CHART OF NATIONAL POWER AUTHORITY



Annex-2 Organization Chart of NPA

Annex-3

Japan's Grant Aid

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

- ·Preparatory Survey
  - The Survey conducted by JICA
- ·Appraisal &Approval
  - -Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- ·Authority for Determining Implementation
  - -The Notes exchanged between the GOJ and a recipient country
- ·Grant Agreement (hereinafter referred to as "the G/A")
  - -Agreement concluded between JICA and a recipient country
- ·Implementation
  - -Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of a basic design of the Project.

- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

(End)

Annex-4

Flow Chart of Japan's Grant Aid Procedures

Stage	Flow & Works	Recipient Government	Japanese Government	JICA	Consultant	Contract	Others
Application	Request						
	Screening of Project						
	Evaluation of T/R (T/R: Terms of Reference)						
	Project Identification Survey*						
Project Formulation & Preparation	*if necessary						
Preparatory Survey	Preliminary Survey*						
	Field Survey Home Office Work Reporting						
	Outline Design						
	Selection & Contracting of Consultant by Proposal						
	Field Survey Home Office Work Reporting						
	Explanation of Draft						
	Final Report						
Appraisal & Approval	Appraisal of Project						
	Inter Ministerial Consultation						
	Presentation of Draft Notes						
	Approval by the Cabinet						
Implementation	(E/N: Exchange of Notes) E/N and G/A						
	(G/A: Grant Agreement) Banking Arrangement						
	(A/P: Authorization to Pay) Consultant Contract						
	Verification						
	Issuance of A/P						
	Detailed Design & Tender Documents						
	Approval by Recipient Government						
	Preparation for Tendering						
	Tendering & Evaluation						
	Procurement /Construction Contract						
	Verification						
	A/P						
	Construction						
	Completion Certificate						
	A/P						
	Operation						
	Post Evaluation Study						
Evaluation& Follow up	Ex-post Evaluation						
	Follow up						

Annex-5

Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient side
1	to secure lots of land necessary for the implementation of the Project and to clear the sites;		●
2	To construct the following facilities		
	1) The building	●	
	2) The gates and fences in and around the site		●
	3) The parking lot	●	
	4) The road within the site	●	
	5) The road outside the site		●
3	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the sites		
	1)Electricity		
	a. The distributing power line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer	●	
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	●	
	3) Drainage		
	a. The city drainage main (for storm sewer and others to the site)		●
	b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site	●	
	4) Gas Supply		
	a. The city gas main to the site	n/a	n/a
	b. The gas supply system within the site	n/a	n/a
	5) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	6) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
4	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the Products from Japan and/or 3rd countries to the recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
6	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
7	To ensure that the Facilities and the products be maintained and used properly and effectively for the implementation of the Project		●
8	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
9	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
10	To give due environmental and social considerations in the implementation of the Project.		●

*1 B/A : Banking Arrangement, A/P : Authorization to pay)

Annex-6

Tentative Implementation Schedule

As of 27 October, 2010