資料－１　調査団員・氏名

1. 調査団員氏名、所属

(1) 基本設計調査

氏 名	担当業務	現 職
村上 博	総括	独立行政法人 国際協力機構 ガーナ事務所 所長
杉田 樹彦	計画管理	独立行政法人 国際協力機構 無償資金協力部 業務第1グループ 運輸交通・電力チーム
瀬戸 寛仁	業務主任/電力計画/配電計画 I	八千代エンジニヤリング(株)
西川 光久	副業務主任/配電計画 II /運営維持管理 I	八千代エンジニヤリング(株)
宇留野 厚人	配電機材計画 I	八千代エンジニヤリング(株)
不二葦 教治	配電機材計画 II /運営維持管理 II/環境社会配慮	八千代エンジニヤリング(株)
小林 辰哉	調達計画/積算	八千代エンジニヤリング(株)

(2) 基本設計概要説明調査

氏 名	担当業務	現 職
村上 博	総括	独立行政法人 国際協力機構 ガーナ事務所 所長
瀬戸 寛仁	業務主任/電力計画/配電計画 I	八千代エンジニヤリング(株)
不二葦 教治	配電機材計画 II /運営維持管理 II/環境社会配慮	八千代エンジニヤリング(株)

資料－２　調査行程

2. 調査日程

(1) 基本設計調査

No	月日	曜日	調査内容			宿泊地
			官ベース	コンサルタント団員		
			JICA （杉田樹彦）	Aチーム: 中央州アッパー・デンチラ地域 （瀬戸寛仁、小林辰哉）	Bチーム: 東部州西アキム地域 （西川光久、宇留野厚人、不二葦教治）	
1	1月28日	土	• 移動［東京 10:15 → ロンドン 14:00 by JL403］	• 移動［東京 13:30 → フランクフルト 17:40 by JL407}		官:ロンドン コンサル:フランクフルト
2	1月29日	日	• 移動［ロンドン 14:00 → アクラ 20:55 by BA081］	• 移動［フランクフルト 11:10 → アクラ 18:25 by LH564］		アクラ
3	1月30日	月	• 在ガーナ日本国大使館（EOJ）及びJICAガーナ事務所表敬訪問及び調査内容・日程の説明・協議 • MOE、WB及びMOFEP表敬訪問及びインセプションレポート、本調査行程等提出・説明・協議			アクラ
4	1月31日	火	• 移動［アクラ → ヌサワン → アサマンケセ］ • 東部州西アキム地域調査 • 移動［アサマンケセ → シュム → クマシ］			クマシ
5	2月1日	水	• 移動［クマシ → オブアシ → ドゥンクワ］ • 中央州アッパー・デンチラ地域調査 • 移動［ドゥンクワ → オブアシ］ • 西川団員移動［東京 13:30 → フランクフルト17:40 by JL407］			オブアシ:A,Bチーム フランクフルト: （西川）
6	2月2日	木	• 移動［オブアシ → ドゥンクワ］ • 中央州アッパー・デンチラ地域調査 • 既設ドゥンクワ変電所調査 • 移動［ドゥンクワ → アクラ］ • 西川団員アクラ着［フランクフルト 11:10 → アクラ 18:25 by LH564］			アクラ
7	2月3日	金	• MOE及びECGとのプロジェクト内容及び技術事項に関する協議 • 宇留野団員移動［東京 13:30 → フランクフルト17:40 by JL407］			アクラ:A,Bチーム フランクフルト: （宇留野）
8	2月4日	土	• 団内協議 • 宇留野団員アクラ着［フランクフルト 11:10 → アクラ 18:25 by LH564］			アクラ
9	2月5日	日	• 協議議事録（M/D）案作成 • 団内協議、資料整理			アクラ
10	2月6日	月	• MOE、MOFEP、ECG及びEPAとM/Dの説明・協議 • EPAとの環境影響評価に係る協議			アクラ
11	2月7日	火	• M/Dの説明・協議 • 移動［アクラ 23:30 → ロンドン 06:35+1 by BA078］	• M/Dの説明・協議	• 同左	官:機内 コンサルタント:アクラ
12	2月8日	水	• 移動［ロンドン 21:00 → 東京 17:55+1 by JL-404］	• 移動［アクラ → クマシ］ • ECGアシャンティ州西事務所訪問・協議 • 移動［クマシ → オブアシ］	• 移動［アクラ → アサマンケセ］ • 東部州西アキム地域11kV配電ルート確認・踏査・測量 • 移動［アサマンケセ → アクラ］	官:機内 Aチーム:オブアシ Bチーム:アクラ
13	2月9日	木		• 移動［オブアシ → ドゥンクワ］ • 中央州アッパー・デンチラ地域11kV配電ルート確認・踏査・測量 • 移動［ドゥンクワ → ウィアウソ］ • ECG西部州ウィアウソ事業所訪問・協議 • 移動［ウィアウソ → アサウィンソ］ • 既設アサウィンソ変電所調査 • 中央州アッパー・デンチラ地域33kV配電ルート確認・踏査・測量 • 移動［アサウィンソ → ダウサソ → トゥンクワ → オブアシ］	• 移動［アクラ → アサマンケセ］ • 東部州西アキム地域11kV配電ルート確認・踏査・測量 • 移動［アサマンケセ → アクラ］	Aチーム:オブアシ Bチーム:アクラ
14	2月10日	金		• 移動［オブアシ → ドゥンクワ］ • 中央州アッパー・デンチラ地域33/11kV配電ルート確認・踏査・測量 • 移動［ドゥンクワ → オブアシ］	• 移動［アクラ → アサマンケセ］ • 東部州西アキム地域11kV配電ルート確認・踏査・測量 • 移動［アサマンケセ → アクラ］	Aチーム:オブアシ Bチーム:アクラ

No	月日	曜日	調 査 内 容			宿 泊 地
			官ベース	コンサルタント団員		
			JICA （杉田樹彦）	Aチーム: 中央州アッパー・デンチラ地域 （瀬戸寛仁、小林辰哉）	B チーム: 東部州西アキム地域 （西川光久、宇留野厚人、不二葦教治）	
15	2月11日	土		• 移動［オブアシ → アクラ］ • 団内協議、資料整理	• 移動［アクラ → アサマンケセ］ • 東部州西アキム地域11kV配電ルート確認・踏査・測量 • 移動［アサマンケセ → アクラ］	アクラ
16	2月12日	日		• 団内協議、資料整理		アクラ
17	2月13日	月		• M/D署名 • EOJへのM/D締結報告 • MOE/ECGからの情報収集 • 市場調査（現地施工業者等）	• 移動［アクラ → アサマンケセ］ • 東部州西アキム地域11kV配電ルート確認・踏査・測量 • 移動［アサマンケセ → アクラ］	アクラ
18	2月14日	火		• MOE/ECGからの情報収集 • 市場調査（電柱メーカー、電線メーカー、レンタカー、借上宿舎等）	• 移動［アクラ → アクワティア → ヌサワン］ • 東部州既設変電所調査 • 移動［ヌサワン → アクラ］	アクラ
19	2月15日	水		• MOE/ECGからの情報収集 • テマ港調査 • ECG訓練センター訪問 • ECG地方事務所運転維持管理状況調査 • フィールドレポートの作成		アクラ
20	2月16日	木		• MOE/ECGからの情報収集 • フィールドレポートの作成		アクラ
21	2月17日	金		• MOE及びECGへフィールドレポートの提出・説明協議		アクラ
22	2月18日	土		• 団内協議、資料整理		アクラ
23	2月19日	日		• 団内協議、資料整理 • 西川団員帰国[アクラ 20:05 → フランクフルト 05:35 +1 by LH-565]		アクラ 西川(機内)
24	2月20日	月		• MOE及びECGとフィールドレポートの協議 • 西川団員帰国［フランクフルト 20:20 → 東京 15:40+1 by JL-408］		アクラ 西川(機内)
25	2月21日	火		• 団内協議、資料整理及びフィールドレポートの修正作業		アクラ
26	2月22日	水		• MOE及びECGとフィールドレポートの協議 • VRA及び道路局訪問		アクラ
27	2月23日	木		• MOE及びECGからフィールドレポートの承認取得		アクラ
28	2月24日	金		• EOJ及びJICAへ調査報告 • 団員帰国［アクラ 20:05 → フランクフルト 05:35 +1 by LH-565］		機内
29	2月25日	土		• 団員帰国［フランクフルト 20:20 → 東京 15:40+1 by JL-408］		機内
30	2月26日	日		• 団員東京着		

(2) 基本設計概要説明調査

No	月日	曜日	調査内容 官ﾍﾞｰｽ JICAガーナ事務所（村上所長）	調査内容 ｺﾝｻﾙﾀﾝﾄ団員（瀬戸寛仁、不二葦教治）	宿泊地
1	5月31日	水		• 移動［東京 13:00 → ﾌﾗﾝｸﾌﾙﾄ 18:00 by JL407］	ﾌﾗﾝｸﾌﾙﾄ
2	6月1日	木		• 移動［ﾌﾗﾝｸﾌﾙﾄ 10:50 → ｱｸﾗ 17:00 by LH564］	ｱｸﾗ
3	6月2日	金	• 在ｶﾞｰﾅ日本国大使館（EOJ）及びJICAｶﾞｰﾅ事務所表敬訪問及び基本設計概要書の内容説明 • MOE、ECG表敬訪問及び基本設計概要書の提出・説明・協議 • 環境影響評価に係る許認可状況の確認（EPA、MOE）		ｱｸﾗ
4	6月3日	土	• 移動［ｱｸﾗ → ﾇｻﾜﾝ → ｱｻﾏﾝｹｾ］ • 東部州西ｱｷﾑ地域調査 • 移動［ｱｻﾏﾝｹｾ → ｵﾌﾞｱｼ］		ｵﾌﾞｱｼ
5	6月4日	日	• 移動［ｵﾌﾞｱｼ → ﾄﾞｳﾝｸﾜ］ • 中央州ｱｯﾊﾟｰ・ﾃﾞﾝﾁﾗ地域調査 • 移動［ﾄﾞｳﾝｸﾜ → ｱｸﾗ］		ｱｸﾗ
6	6月5日	月	• 基本設計概要書の説明・協議（MOE、ECG） • 機材仕様書（案）の説明・協議（MOE、ECG）		ｱｸﾗ
7	6月6日	火	• 基本設計概要書の説明・協議（MOE、ECG）		ｱｸﾗ
8	6月7日	水	• 協議議事録（M/D）案の説明・協議		ｱｸﾗ
9	6月8日	木	• 協議議事録（M/D）案の説明・協議 • 協議議事録（M/D）署名		ｱｸﾗ
10	6月9日	金	• EOJ及びJICAへ調査報告	• 団員帰国［ｱｸﾗ 19:00 → ﾌﾗﾝｸﾌﾙﾄ 05:30 +1 by LH565］	機内
11	6月10日	土		• 団員帰国［ﾌﾗﾝｸﾌﾙﾄ 21:05 → 東京 15:20+1 by JL408］	機内
12	6月11日	日		• 団員東京着	

【略語】

ECG: Electricity Company of Ghana
EOJ: Embassy of Japan
EPA: Environmental Protection Agency
EU: European Union
JICA: Japan International Cooperation Agency
MOE: Ministry of Energy
MOFEP: Ministry of Finance and Economy Planning
WB: World Bank

資料－３　相手国関係者リスト

3. 相手国関係者リスト

所属及び氏名	職位
エネルギー省 **Ministry of Energy (MOE)**	
Mr. Emmanuel Antwi-Darkwa	Director (Power)
Mr. Solomon Adjetey	Programme Officer, Rural Electrification
Mr. Chris Anaglo - Nawunegbloe	Associate Programme Officer
Mr. Aaron Asante-Addai	Environmental Consultant Environmental and Engineering Consultants (Consultant for MOE)
財務・経済計画省 **Ministry of Finance and Economic Planning (MOFEP)**	
Mr. Ernest Osei Prempeh	Acting Director External Resource Mobilization (Bilateral) Division
Mr. Samuel Abu-Bonsrah	Head of Japan Desk
Ms. Patrince Alsban	Assistant Economy Officer
Mr. Stephen Yesoah Frimpong	Assistant Economy Officer
環境保全局 **Environmental Protection Agency (EPA)**	
Mr. Ebenezer Appah-Sampong	Head of Environmental Assessment and Audit
東部州西アキム地区役場 **West Akim District Assembly in Eastern Region**	
Hon. Kwabena Sintim Aboagye	Chief Executive
Mr. Bruce K. Awu	District Works Engineer
中央州アッパー・デンチラ地区役場 **Upper Denkyira District in Central Region**	
Mr. Richard Anane Adabor	Chief Executive
ガーナ電力公社本社 **Electricity Company of Ghana (ECG) Head Office**	
Mr. Stephen Akuoko	Managing Director
Mr. C. S. Tetteh	Director of Finance
Mr. Julius Kwame Kpekpena	Divisional Manager (Maintenance)
Ing. Sam Adjidjonu	Divisional Manager (Rural Projects)
Mr. Charles Yakah	Project Engineer (Rural Electrification)
Mr. Victor Ocran	Project Engineer (Rural Electrification)
Mr. Osei Yaw Adofo	Engineer of Design Section

ガーナ電力公社 アシャンティ州西支店
ECG Ashanti West Regional Office

Mr. Ing. Kofi Afewu	Regional Director
Mr. Agyemang Daniel Jackson	Regional Commercial Manager
Mr. Ing. Peter Opoku	Regional Engineer
Mr. Nii Okine-Gem	Regional Draughtsman

ガーナ電力公社 東部州事業所
ECG Eastern Regional Office

Ing. Kofi Anane Kyeremeh	Regional Director
Dr. Kwabena Adomah	Regional Engineer
Mr. Godfred Awuku	Project Engineer

ガーナ電力公社 西アキム事業所
ECG West Akim District Office

Mr. Solomon Tsawe	West Akim District Manager
Mr. Obed Boniface Glover	West Akim District Engineer

ガーナ電力公社 ンサワム事業所
ECG Nsawam District Office

Mr. Harry Obeng Baffoe	Nsawam District Engineer

ガーナ電力公社 ドゥンクワ事業所
ECG Dunkwa District Office

Mr. Emmanuel Afari-Kwaku	Dunkwa District Manager

ガーナ電力公社 ウィアウソ事業所
ECG Wiawso District Office

Mr. Prince Buaku	Wiawso District Manager

ガーナ電力公社研修センター
ECG Training Centre

Mr. Christian K. Lorho	Technical Instructor

ガーナ高速道路公団
Ghana Highway Authority

Mr. S. Swanzy-Baffoe	Deputy Chief Executive (Development)

地方道路局
Department of Feeder Road

Mr. E. Nii Klemesu Ashong	Deputy Director (Development)

ボルタ河公社
Volta River Authority (VRA)

Mr. O. Sackey	Sales Section
Mr. E. D. Osafo	Engineering Department Kpong Generating Station

世界銀行ガーナ事務所
The World Bank Ghana Office

Mr. Subramaniam V. Iyer	Lead Financial Analyst, Task Team Leader National Energy Development Project
Mr. Mats Karlsson	Country Director Ghana, Liberia and Sierra Leone

在ガーナ日本国大使館
Embassy of Japan in Ghana

Mr. Yutaka Nakamura	Counselor, Deputy Head of Mission
Mr. Shinichi Tamamitsu	First Secretary
Mr. Takafumi Nakase	Special Assistant

JICA ガーナ事務所
JICA Ghana Office

Mr. Hiroshi Murakami	Resident Representative
Dr. Katsuya Kuge	Assistant Resident Representative
Ms. Rabi Ali-Abaari	Program Officer

資料－４　討議議事録（M/D）

4. 協議議事録(MD)

Minutes of Discussions
of the Basic Design Study
on the Project for Rural Electrification
in the Republic of Ghana

In response to the request from the Government of the Republic of Ghana (hereinafter referred to as "Ghana"), the Government of Japan decided to conduct a Basic Design Study on the Project for Rural Electrification (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Ghana the Basic Design Study Team (hereinafter referred to as "the Team"), headed by Mr. Hiroshi MURAKAMI, Resident Representative, JICA Ghana Office, and is scheduled to stay in the country from January 29 to February 24, 2006.

The Team held discussions with the concerned officials of the Government of Ghana and conduct field surveys at the study areas.

In the course of the discussions, both sides have confirmed the main items described in the attached sheets. The Team will proceed to further works and prepare the Draft Basic Design Report.

Accra, February 7, 2006

村上博

Mr. Hiroshi Murakami
Leader
Basic Design Study Team
Japan International Cooperation Agency

Mr. Emmanuel Antwi-Darkwa
Director of Power
Ministry of Energy
Republic of Ghana

Mr. Ernest Osei Prempeh
Acting Director
External Resource Mobilization (Bilateral) Division
Ministry of Finance and Economic Planning
Republic of Ghana

Mr. Stephen Akuoko
Managing Director
Electricity Company of Ghana
Republic of Ghana

ATTACHMENT

1. Objective

The objective of the Project is to realize rural electrification in and around West Akim District in Eastern Region and in and around Upper Denkyira District in Central Region by supplying and installing distribution network.

2. Project Site

The study areas are shown in Annex-1.
The study communities are listed in Annex-2.
The Project sites (project communities) will be confirmed within the study areas after the site survey.

3. Responsible and Implementing Organizations

(1) The Responsible and the Implementing organization is the Ministry of Energy (MOE).

(2) The Agency in charge of operation and maintenance of the distribution network to be provided under the Project is the Electricity Company of Ghana (ECG).

The organization charts of MOE and ECG are shown in Annex-3.

4. Components Requested by the Government of Ghana

After discussions with the Team, the following components were finally requested by the Ghanaian side;

(1) Supply and Installation of Distribution Lines in and around West Akim District in Eastern Region

- Supply and Installation of 33/11kV Distribution Lines including 33kV/LV and 11kV/LV Substations
- Supply of LV Trunk Distribution Line Materials except service drop wires and credit meters

(2) Supply and Installation of Distribution Lines in and around Upper Denkyira District in Central Region

- Supply and Installation of 33/11kV Distribution Lines including 33kV/LV and 11kV/LV Substations
- Supply of LV Trunk Distribution Line Materials except service drop wires and credit meters

The outline of the Project Component is shown in Annex-4.
JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

(1) The Ghanaian side understands the Japan's Grant Aid scheme and the necessary measures to be taken by the Government of Ghana explained by the Team as described in Annex-5 and Annex-6.

(2) The Ghanaian side promised to take necessary measures as described in Annex-7, for smooth implementation of the Project as a condition for the Japan's Grant Aid to be implemented.

6. Schedule of the Study

(1) The Team will proceed to further studies in Ghana until February 24, 2006.

(2) JICA will prepare the Draft Basic Design Report in English and dispatch a team to Ghana in order to explain its contents around the beginning of June 2006.

(3) When the contents of the Draft Basic Design Report are accepted in principle by the Government of Ghana, JICA will complete the final report in English around the end of July 2006 and send it to the Government of Ghana.

7. The JICA Guidelines for Environmental and Social Considerations

(1) The Team explained the outline of the JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "the JICA Guidelines").

(2) The Ghanaian side took the JICA Guidelines into consideration, and agreed to complete the necessary procedures, when deemed necessary.

(3) The both sides confirmed that there is no need of involuntary resettlement for the implementation of the Project.

(4) The Ghanaian side explained that they already obtained a basic agreement for implementation of the Project from the Environmental Protection Agency (hereinafter referred as "EPA") and had confirmed the concrete procedure in accordance with due process stipulated in the Environmental Assessment Regulations, 1999, Legislative Instrument 1652.

(5) MOE shall obtain the Environmental Permit for the Project from EPA by the end of March 2006.

8. Other Relevant Issues

(1) The Ghanaian side should submit answers in English to the Questionnaire, which the Team handed to the Ghanaian side, by February 10, 2006.

(2) The Ghanaian side should provide necessary number(s) of counterpart personnel to the Team during the field survey.

(3) The Ghanaian side shall make arrangements to allow the Team to bring back to Japan any necessary data, maps and materials related to the study, subject to approval by the relevant ministry, in order to prepare the reports.

(4) The Ghanaian side should arrange the budget allocation for undertakings shown in Annex-7, and others described in this Minutes of Discussion, including procurement of materials such as service drop wires, watt-hour meters, etc. in conformity with the Project construction schedule. MOE shall supply and install all materials needed for service drops as in Annex-4.

(5) The Ghanaian side explained to the Team that they secured the land necessary for construction of distribution network in the proposed project areas.

(6) The Ghanaian side requested the Team to carry out the counterpart training to the MOE / ECG staff in Japan on operation and maintenance techniques as technical cooperation by JICA. The Ghanaian side agreed to submit the official request regarding training with concrete contents of training through the Embassy of Japan by the end of June 2006.

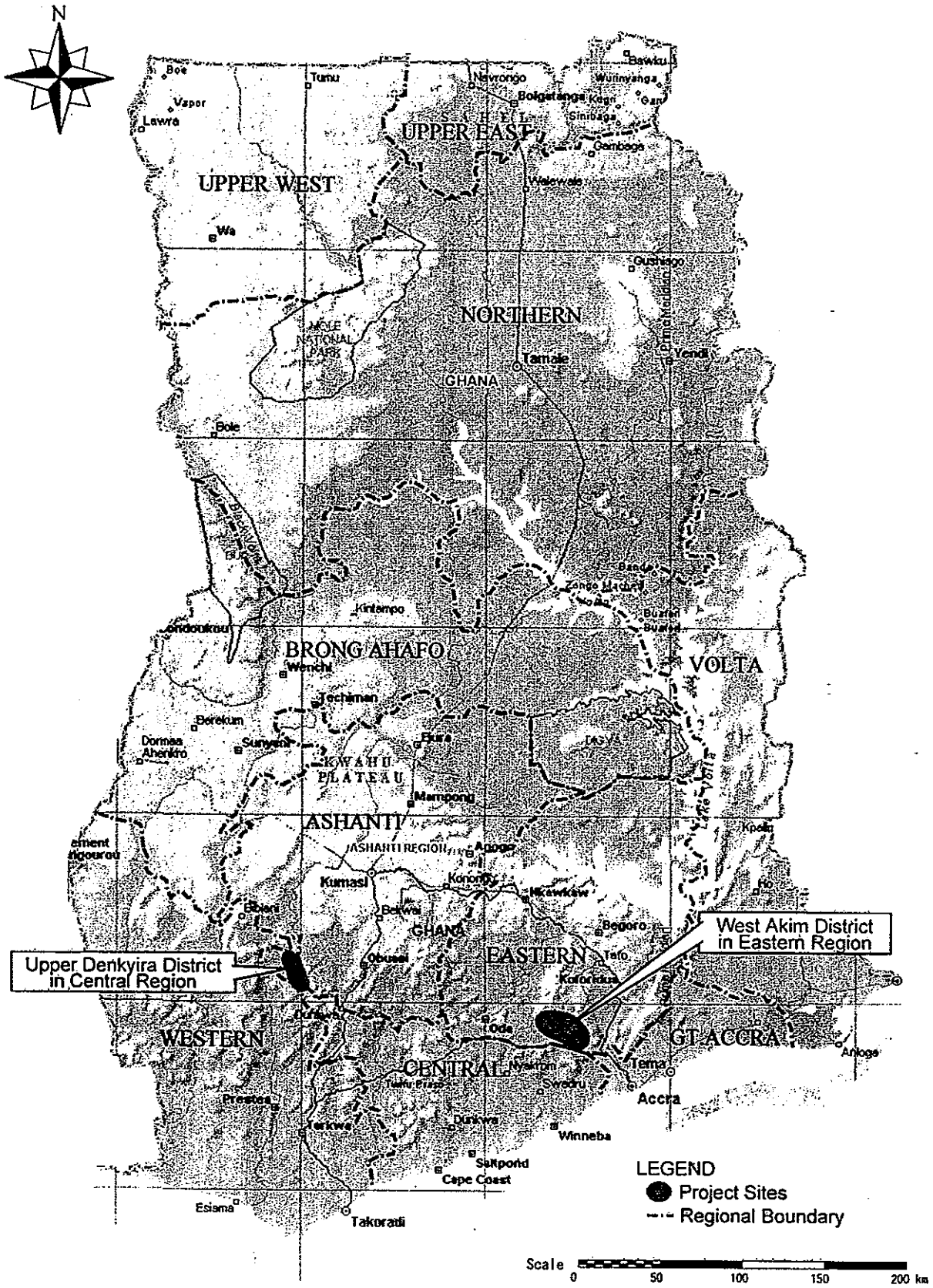
(7) The Ghanaian side explained the status of the organizations concerned and the ownership of the property provided under the Project as follows;

- MOE shall own the assets provided under the Project.
- ECG shall be in charge of operation and maintenance of the distribution network provided under the Project.
- The ownership of the properties provided under the Project belongs to MOE and shall not be transferred to private sector.

(8) Both sides agreed that the information obtained through a series of discussions and field survey are confidential and should not be disclosed to any outside party in order to secure the fair and competitive tender in case the Project will be implemented.

Annex-1: Project Site Map
Annex-2: Proposed Project Communities List
Annex-3: (1) Organization Chart of MOE
(2) Organization Chart of ECG
Annex-4: Outline of the Project Component
Annex-5: Japan's Grant Aid Scheme
Annex-6: Flow Chart of Japan's Grant Aid Procedures
Annex-7: Major Undertakings to be taken by Each Government

(End)



Project Site Map

5

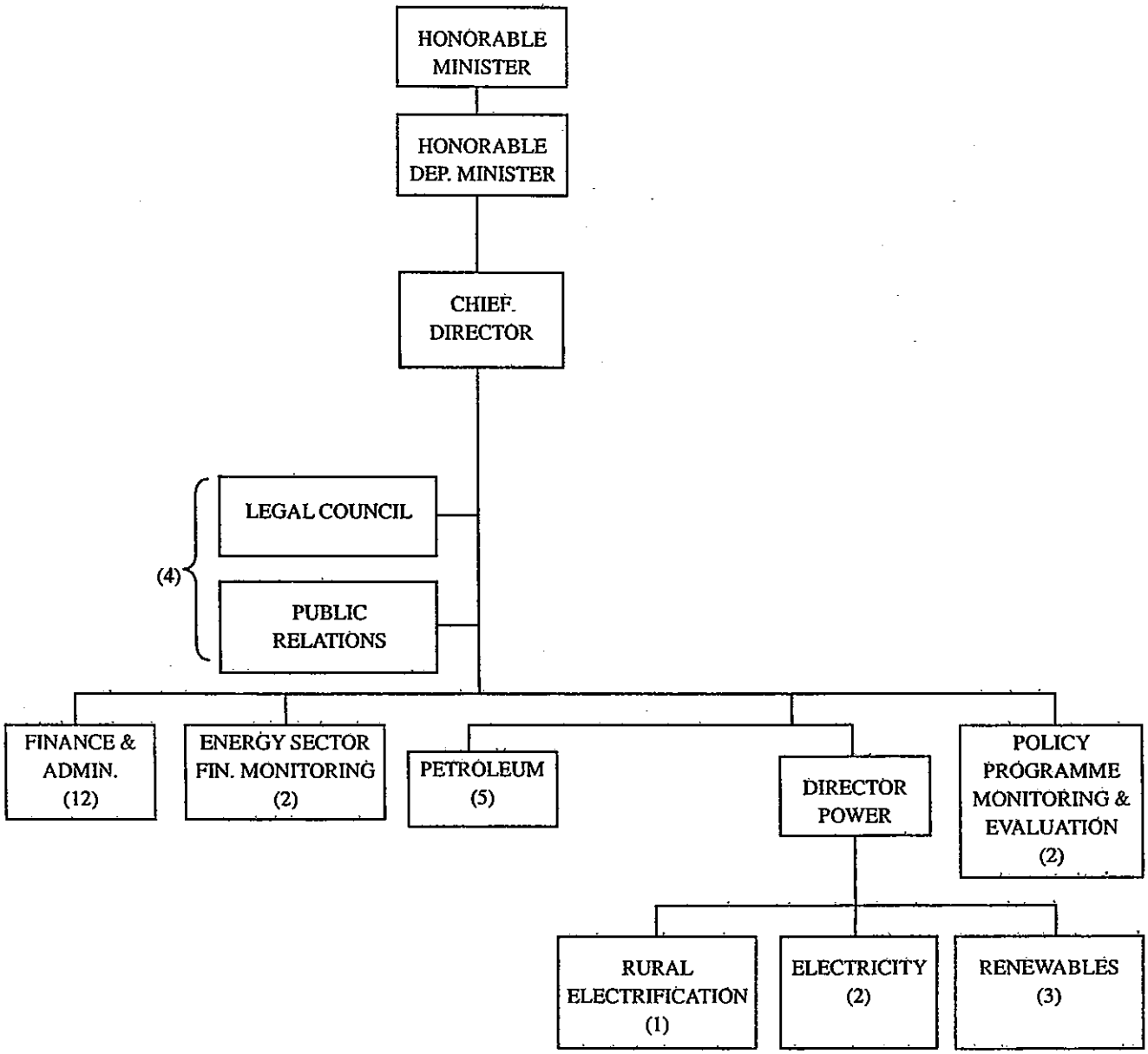
Proposed Project Communities List

West Akim District in Eastern Region

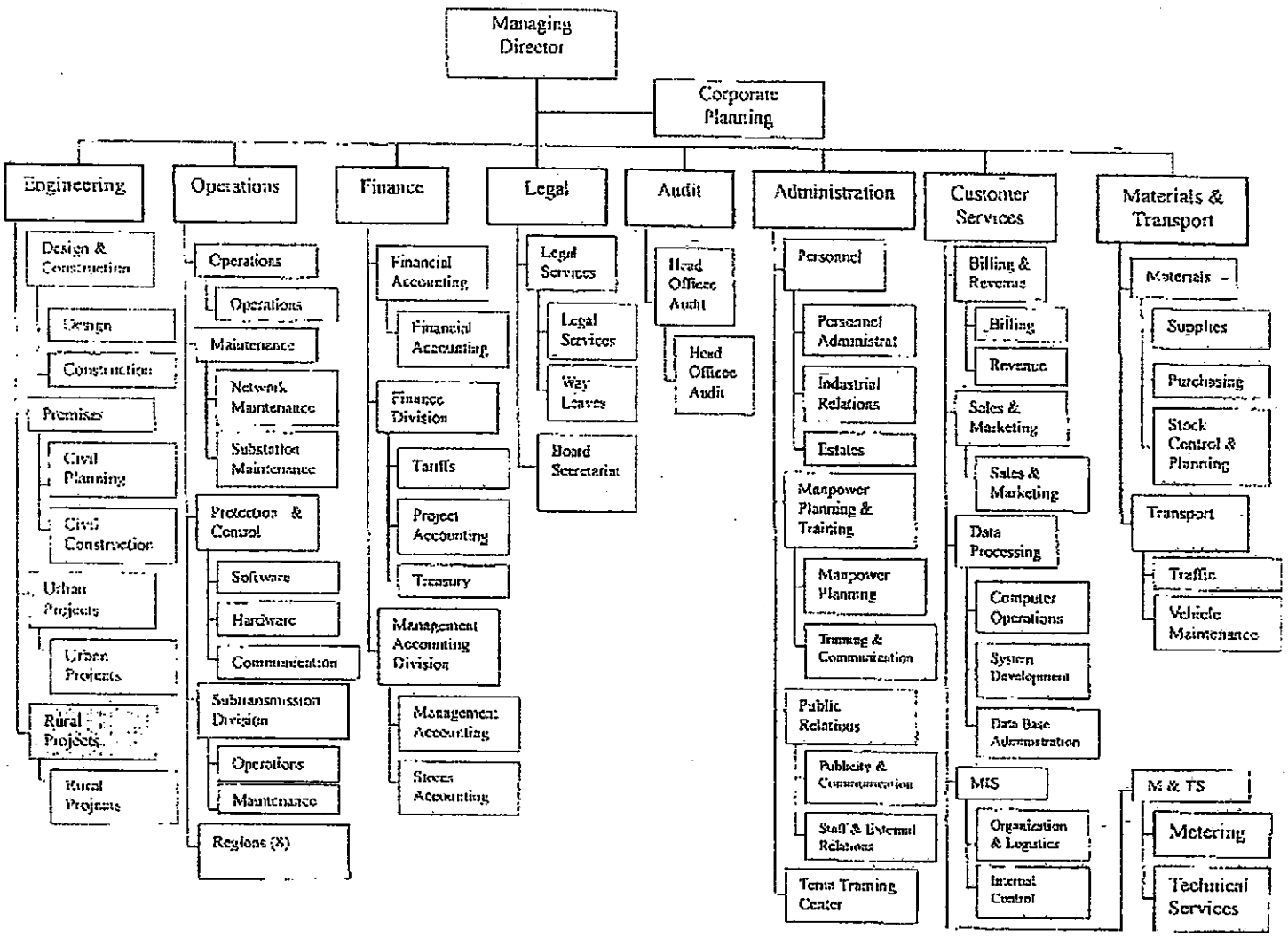
1. Krodua
2. Akim Breman
3. Kwabaa
4. Nyanoa
5. Obinyimda
6. Abankrom
7. Kumikrom
8. Esaaso
9. Danso
10. Nkurankan
11. Nyakoma
12. Anomakojo
13. Asuofori
14. Akanteng
15. Krobiso
16. Afranse
17. Ammarko
18. Brekumaso
19. Owuram
20. Pobi
21. Anum Apapam
22. Mfranor
23. Kuano
24. Sowatey
25. Sukutu
26. Bunsu
27. Abuchenso
28. Krofokrom
29. Odjade
30. Akwadum
31. Takorase
32. Atokrom
33. Kofikyere

Upper Denkyira District in Central Region

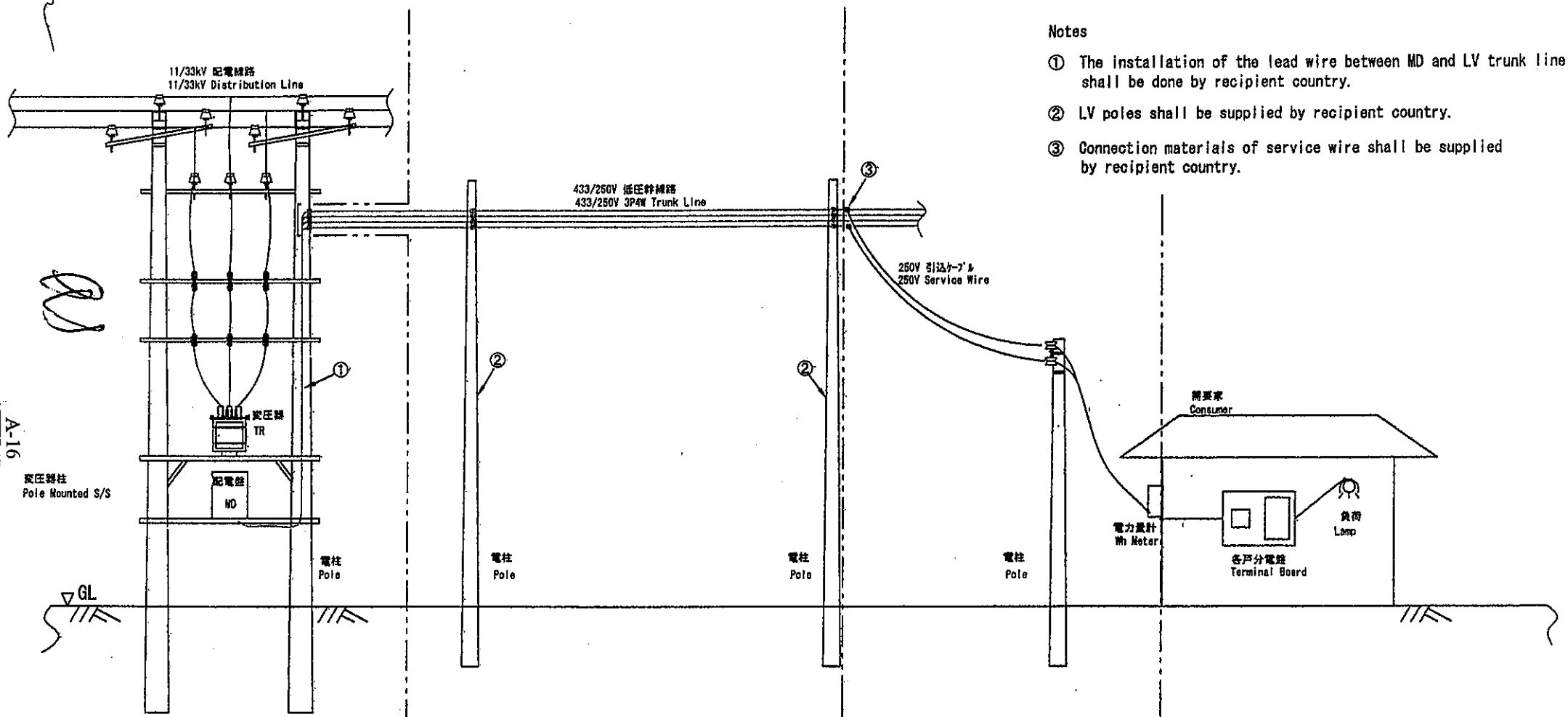
1. Dominase
2. Nyinawusu/Anhwiaso
3. Subin
4. Afiefiso
5. Ameyaw
6. Akwaboso
7. Asaaman
8. Esienkyen
9. Dawusaso
10. Brofoyedru
11. Bremang
12. Nkroful
13. Ampabame/Beseasi
14. Anurawra
15. Abrua



Organization Chart of MOE



Organization Chart of ECG



Notes

① The installation of the lead wire between MD and LV trunk line shall be done by recipient country.

② LV poles shall be supplied by recipient country.

③ Connection materials of service wire shall be supplied by recipient country.

From existing 11/33kV terminal pole
To Main Distribution Board (MD)

From lead wire connecting at MCCB in MD
To LV Trunk Line

From Service wire with connection materials
To watt-hour meter

From secondary of watt-hour meter
To load

日本国側調達・据付範囲 Japan side supply and installation	日本国側調達・相手国側据付範囲 Japan side supply / Recipient Country side installation	相手国側調達・据付範囲 Recipient Country side supply and installation	需要家負担範囲 Consumer side supply and installation

施工負担区分図
ANNEX-4: OUTLINE OF THE PROJECT COMPONENT

A-16

JAPAN'S GRANT AID SCHEME

The Grant Aid Scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles 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

Japan's Grant Aid Scheme is executed through the following procedures.

Application	(Request made by the recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal &Approval	(Appraisal by the Government of Japan and Approval by the Cabinet)
Determination of Implementation	(The Note exchanged between the Governments of Japan and recipient country)

Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study) using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Scheme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes (E/N) signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

(1) Contents of the study

The aim of the Basic Design Study (hereafter referred to as "the Study") conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.

- Confirmation of items agreed on by 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 are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure 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 in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consultant firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

(1) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

(2) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as national disaster, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

(3) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When the two Governments 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, consulting, constructing and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

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

(5) Undertakings required of 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 the following:

a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction,
b) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
c) To secure buildings prior to the procurement in case the installation of the equipment,
d) To ensure all the expenses and prompt excursion for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
e) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,
f) To accord Japanese nationals, whose services may be required in connection with the supply of the products and services under the Verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(6) "Proper Use"

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

(7) "Re-export"

The products purchased under the Grant Aid should not be 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 in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan 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.

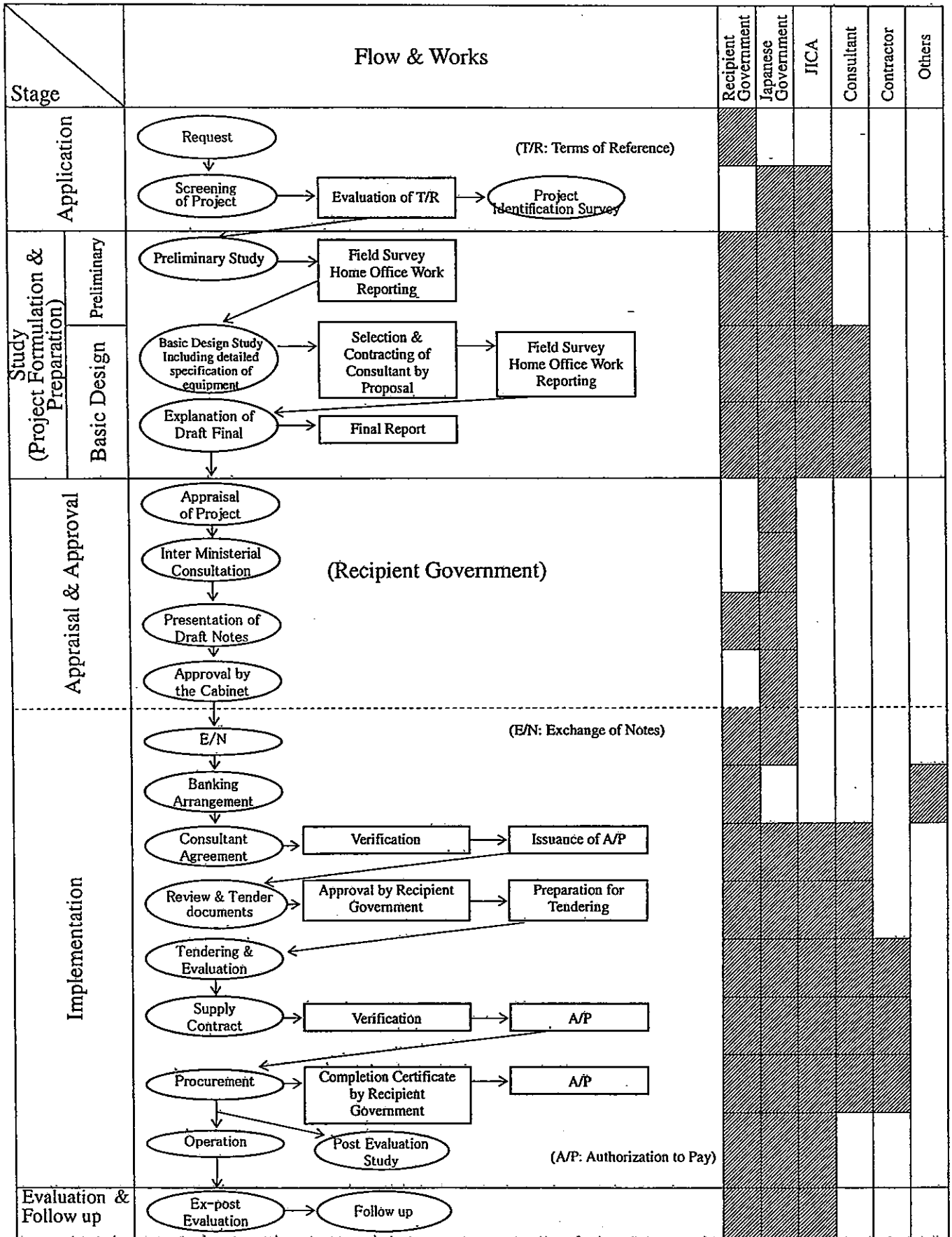
b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(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 to the Bank.

(End)

Flow Chart of Japan's Grant Aid Procedures



Note: This chart shows the procedures in case of the Basic Design Study will include preparation of detailed specification of equipment

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 land		●
2	To clear, level and reclaim the site when needed		●
3	To bear the following commissions to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
4	To ensure smooth unloading and customs clearance at the port of disembarkation in the recipient country		
	1) Marine (Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project sites		●
5	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.		●
6	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		●
7	To maintain and use properly and effectively the facilities constructed and the equipment provided under the Grant Aid		●
8	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the installation of the facilities as well as the transportation of the equipment		●

(B/A: Banking Arrangement, A/P: Authorization to Pay)

Minutes of Discussions
of the Basic Design Study
on the Project for Rural Electrification
in the Republic of Ghana
(Explanation on the Draft Report)

In January to February, 2006, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Project for Rural Electrification (hereinafter referred to as "the Project") to the Republic of Ghana (hereinafter referred to as "Ghana"). JICA prepared a draft report of the study based on the discussion, field survey and technical examination in Japan.

In order to explain and consult the Government of Ghana on the components of the draft report, JICA sent to Ghana the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is dispatched by the Grant Aid Management Department, JICA headquarters and is scheduled to stay in the country from June 2 to 9, 2006.

As a result of discussions between the Team and the Government of Ghana, both sides have confirmed the main items described in the attached sheets.

Accra, June 8, 2006

村上 博

Mr. Hiroshi Murakami
Leader
Basic Design Study Team
Japan International Cooperation Agency

Mr. Emmanuel Antwi-Darkwa
Director of Power
Ministry of Energy
Republic of Ghana

for

Mr. Ernest Osei Prempeh
Acting Director
External Resource Mobilization (Bilateral) Division
Ministry of Finance and Economic Planning
Republic of Ghana

Mr. Stephen Akuoko
Managing Director
Electricity Company of Ghana
Republic of Ghana

ATTACHMENT

1. Components of the Draft Report

The Ghanaian side agreed and accepted in principle the components of the Draft Report explained by the Team.

2. Japan's Grant Aid Scheme

The Ghanaian side reconfirmed the framework of the Japan's Grant Aid scheme and the implementation of necessary measures to be taken by the Ghanaian side as explained by the Team in February 2006 and described in the Annex-5 of the Minutes of Discussions signed by both sides on February 7, 2006.

3. Schedule of the Study

JICA will complete the Final Report by the end of July 2006 and send it to the Ghanaian side around August 2006.

4. Other Relevant Issues

(1) Both sides confirmed that the Ministry of Energy of Ghana already obtained the Environmental Permit for the Project from the Environmental Protection Agency, as shown in ANNEX-1, and that the content of the permission was acceptable.

(2) Both sides confirmed that the three villages (Abucheno, Anhwiaso, and Nyinawusu) have had their LV distribution plan prepared by Electricity Company of Ghana, and these villages should be included in the Project. Sukuntu should be excluded from the Project because the electrification there will not be sustainable due to its small population.

(3) Both sides re-confirmed that the Ghanaian side shall allocate necessary budget for the fiscal years of 2007 and 2008 for undertakings to be done in a timely manner, based on the provisional amount shown in page 39 and 40 of the Draft Report.

(4) Both sides confirmed that the Ghanaian side shall ensure the tax exemption including VAT according to the procurement schedule presented by the Team.

(5) Both sides confirmed major undertakings listed below are to be done by the Ghanaian side for the smooth implementation of the Project;

1) to clear bush, trees and obstacles along the 11/33kV distribution lines and LV distribution lines.
2) to install the LV trunk line equipment and materials supplied under the Grant Aid.
3) to procure and install wooden poles for LV distribution lines.
4) to procure and install service wiring to the consumers including energy meter.
5) to energize the 11 kV line between Mepom and Kwao-Baah by March 2007.
6) to energize the existing Nkwantanum switching station within year 2007.

(6) The Team explained that the Project would be divided into two phases as shown in the Draft Report. Both sides confirmed that the electrification in and around the West Akim District in Eastern Region would be done in the first phase, and the Upper Denkyira District in the Central Region in the second phase.

(7) Both sides agreed that this Draft Report handed to the Ghanaian side from the Team is confidential and should not be disclosed to any other parties in order to ensure the fair and competitive tender for the Project.

ANNEX - 1

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662465 / 667524
Fax: 233 (021) 662690

Email: support@epaghana.org

Environmental Protection Agency
P.O. Box M 326
Ministries Post Office
Accra, Ghana

Permit No: CE0013950106

ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL PERMIT

(ENVIRONMENTAL IMPACT ASSESSMENT)

This is to certify that

Authorisation has been given to **MINISTRY OF ENERGY**

to commence and pursue operations as per attached schedule

Date Issued: JUNE 2, 2006

.....
J. A. ALLOTEY
EXECUTIVE DIRECTOR

NB: This permit is only valid with the Seal of the Environmental Protection Agency.

SCHEDULE TO THE ENVIRONMENTAL PERMIT

1.0	CONTACT	:	THE DIRECTOR (POWER)
2.0	PROPONENT	:	MINISTRY OF ENERGY P. O. BOX T 40 STADIUM POST OFFICE ACCRA
3.0	REGISTRATION NO.	:	CE1395/01/06
4.0	PERMIT NO.	:	CE0013950106

5.1 PEA OF RURAL ELECTRIFICATION PROJECT FOR WEST AKIM DISTRICT

In pursuance of the Environmental Protection Agency Act 1994, (Act 490) {Sections 2(i) and 12(1)} and the Environmental Assessment Regulations, LI 1652 of 1999 and, on the basis of the published project Preliminary Environmental Report (March 2006), this Environmental Permit is issued authorizing **Ministry of Energy** to commence work on the proposed Rural Electrification Project for the West Akim District in the Eastern Region of Ghana.

6.0 CONDITIONS OF PERMIT

6.1 Commitment to Project Specification

Comply with all project specifications, mitigation, monitoring and other environmental management provisions as indicated in the project Preliminary Environmental Report (PER) The project involves the:

- The supply and installation of 11kV sub-transmission and distribution lines spanning a length of 102km and covering thirty-two (32) beneficiary communities.
- The supply of Low Voltage materials including service drop wires and credit meters.

6.2 Location

- The project area has been categorised into five (5) sections namely:
  - Adeiso-Danso section
  - Mepom-Esaaso section
  - Asuokaw-Kofi Kyere section
  - Odjade-Asamankese-Sowatey section
  - Anomakojo-Osenase-Kobriso section

6.3 Acquisition and Protection of Right of Way

- A detailed survey of all Project Affected Persons (PAPS) and properties should be compiled and valued and the appropriate compensation paid by the West Akim District Assembly for their losses.
- Buildings, land and crops should be duly compensated for in accordance with the provisions of the law at the appropriate values in line with Land Valuation Board procedures.

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6.4 **Traffic and Public Safety**

- Trucks and machinery being sent to the sites should display appropriate road safety signals (red flags and flashing amber lights).
- Deliveries should be made during daylight hours and speeds limited to prescribed safe levels (10-20km/h) especially within towns and settlements.
- Speed limits should be imposed on the sensitive sections of roads through settlements as well as the use of speed ramps at those locations.
- Where stringing is expected to cross power lines, telephone lines, public roads etc. due notification should be given to the appropriate authorities.

6.5 **Compliance with Factories, Offices and Shops Act.**

- Comply with the requirements of the Factories, Offices and Shops Act, 1970, Act 328) consult with the Factories Inspectorate Department in order to satisfy the requirements of the Act and the Department.

6.6 **Occupational Health and Public Safety Measures**

Occupational health and safety measures should include among others:

- Environmental awareness training programmes to sensitise workers on the need to follow laid down procedures and the handling of equipment/machinery etc.
- Provision of appropriate personal protective clothing/gear such as helmets, climbing belts, wellington boots, hand gloves etc. to workers.
- Provision of a well-stocked first aid kit with all items prescribed by the Factories, Shops & Offices Act 328 for minor injuries that might occur in the course of construction.
- All potentially hazardous machinery should undergo statutory examination by a certified engineer.

6.7 **Archaeology and Cultural Heritage**

- Project construction should be made in such a way as to avoid, as much as possible the destruction of any cultural properties.
- Where cultural properties (e.g. cemeteries) are affected by the project construction, the necessary performance of pacification rites should be undertaken under an agreement with the local communities.
- Procedures for managing chance finds from archaeological discoveries should be in line with procedures of the National Museum Degree 1969 (NLCD 387).

6.8 **Commencement and Completion Notice**

- Notify EPA on the completion of the construction project (i.e before the electrification project commences operations).

6.9 **Notification of Changes**

- Notify EPA of any major changes in the planned development of the project contrary to the information provided in the PER.

6.10 **Annual Environmental Report**

- Submit Annual Environmental Report of the project's operations in accordance with Regulation 25 of LI 1652. The first report should be submitted by June 2, 2007.

6.11 **Environmental Monitoring**

- The following parameters should be monitored:

  - Water quality of rivers and streams, where construction activities are carried out close to streams and rivers every month. During maintenance phase, monitoring should be carried out twice yearly. Parameters to be monitored include BOD, pH, Turbidity, TSS, Conductivity, Total Coliform.
  - Transportation effects
  - Occupational health & safety issues

- Transmission lines
- Accidents
- Waste management
- Compensation payment and persons affected by the project
- Cultural/archaeological finds
- Submission of maintenance reports every month during the construction phase and yearly during operations

6.12 Environmental Management Plan

- Submit within eighteen (18) months on commencement of operations, an Environmental Management Plan on the project in accordance with Regulation 24 of LI 1652.

6.13 Environmental Certificate

- An Environmental Certificate must be obtained within 24 months (before June 2, 2008) of satisfactory performance and compliance with relevant permit conditions, in accordance with Regulation 22 of LI 1652.

6.14 Other Permits

- Notwithstanding this permit, the project is further subject to other relevant regulations and permits pertaining to the sector and must be observed.

6.15 Validity Period

- The permit shall be valid for a period of 18 months effective from the date of issue of this permit
- Failure to commence operations within the 18 months shall render the permit invalid after the period

Failure to comply with or observe all the permit conditions above would render the Environmental Permit invalid.

EXECUTIVE DIRECTOR. ..... **June 2, 2006**
J. A. ALLOTEY **DATE ISSUED**

NOTIFICATION
The Hon. Minister, Ministry of Local Government, Rural Development & Environment, Accra
The Hon. Minister, Ministry of Energy, Accra
The Executive Secretary, Energy Commission, Accra
The District Chief Executive, West Akim District Assembly, Asamankese
The Director, EPA Eastern Region, Koforidua

Mydoc: Greater Accra

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This is to certify that

Authorisation has been given to MINISTRY OF ENERGY

to commence and pursue operations as per attached schedule

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EXECUTIVE DIRECTOR

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SCHEDULE TO THE ENVIRONMENTAL PERMIT

1.0	CONTACT	:	THE DIRECTOR (POWER)
2.0	PROPONENT	:	MINISTRY OF ENERGY P. O. BOX T 40 STADIUM POST OFFICE ACCRA
3.0	REGISTRATION NO.	:	CE1394/01/06
4.0	PERMIT NO.	:	CE0013940106

5.0 PEA OF RURAL ELECTRIFICATION PROJECT FOR UPPER DENKYIRA DISTRICT

In pursuance of the Environmental Protection Agency Act 1994, (Act 490) {Sections 2(i) and 12(1)} and the Environmental Assessment Regulations, LI 1652 of 1999 and, on the basis of the published project Preliminary Environmental Report (March 2006), this Environmental Permit is issued authorizing **Ministry of Energy** to commence work on the proposed Rural Electrification Project for the Upper Denkyira District in the Central Region of Ghana.

6.0 CONDITIONS OF PERMIT

6.1 Commitment to Project Specification

Comply with all project specifications, mitigation, monitoring and other environmental management provisions as indicated in the project Preliminary Environmental Report (PER) The project involves the:

- Design, delivery to site of equipment, erection, testing and commissioning of 33kV transmission and 11kV distribution lines spanning a length of 65km and covering sixteen (16) beneficiary communities.

6.2 Location

- The project area spans across sixteen (16) communities namely; Brofoyedru, Bremang, Dominase, Abora, Awiawa, Besease, Nkroful, Treposo, Esienkyem, Asaaman, Akwaboso, Afiefiso, Ameyaw, Subin, Anhwiaso and Nyinawusu in the Upper Denkyira District of the Central Region.

6.3 Acquisition and Protection of Right of Way

- A detailed survey of all Project Affected Persons (PAPS) and properties should be compiled and valued and the appropriate compensation paid by the Upper Denkyira District Assembly for their losses.
- Buildings, land and crops should be duly compensated for in accordance with the provisions of the law at the appropriate values in line with Land Valuation Board procedures.

6.4 Traffic and Public Safety

- Trucks and machinery being sent to the sites should display appropriate road safety signals (red flags and flashing amber lights).

- Deliveries should be made during daylight hours and speeds limited to prescribed safe levels (10-20km/h) especially within towns and settlements.
- Speed limits should be imposed on the sensitive sections of roads through settlements as well as the use of speed ramps at those locations.
- Where stringing is expected to cross power lines, telephone lines, public roads etc. due notification should be given to the appropriate authorities.

6.5 Compliance with Factories, Offices and Shops Act.

- Comply with the requirements of the Factories, Offices and Shops Act, 1970, Act 328) consult with the Factories Inspectorate Department in order to satisfy the requirements of the Act and the Department.

6.6 Occupational Health and Public Safety Measures

Occupational health and safety measures should include among others:

- Environmental awareness training programmes to sensitise workers on the need to follow laid down procedures and the handling of equipment/machinery etc.
- Provision of appropriate personal protective clothing/gear such as helmets, climbing belts, wellington boots, hand gloves etc. to workers.
- Provision of a well-stocked first aid kit with all items prescribed by the Factories, Shops & Offices Act 328 for minor injuries that might occur in the course of construction.
- All potentially hazardous machinery should undergo statutory examination by a certified engineer.

6.7 Archaeology and Cultural Heritage

- Project construction should be made in such a way as to avoid, as much as possible the destruction of any cultural properties.
- Where cultural properties (e.g. cemeteries) are affected by the project construction, the necessary performance of pacification rites should be undertaken under an agreement with the local communities.
- Procedures for managing chance finds from archaeological discoveries should be in line with procedures of the National Museum Degree 1969 (NLCD 387).

6.8 Commencement and Completion Notice

- Notify EPA on the completion of the construction project (i.e before the electrification project commences operations).

6.9 Notification of Changes

- Notify EPA of any major changes in the planned development of the project contrary to the information provided in the PER.

6.10 Annual Environmental Report

- Submit Annual Environmental Report of the project's operations in accordance with Regulation 25 of LI 1652. The first report should be submitted by June 2, 2007.

6.11 Environmental Monitoring

- A monitoring programme should be put in place to deal with the following:

  - Water quality of rivers and streams (where construction activities are carried out close to streams and rivers) every month. Parameters to be monitored include BOD, pH, Turbidity, TSS, Conductivity, Total Coliform.
  - Transportation effects
  - Occupational health & safety issues
  - Transmission lines
  - Accidents
  - Waste management
  - Compensation payment and persons affected by the project
  - Cultural/archaeological finds

- Submission of maintenance reports every month during the construction phase and yearly during operations

6.12 Environmental Management Plan

- Submit within eighteen (18) months on commencement of operations, an Environmental Management Plan on the project in accordance with Regulation 24 of LI 1652.

6.13 Environmental Certificate

- An Environmental Certificate must be obtained within 24 months (before June 2, 2008) of satisfactory performance and compliance with relevant permit conditions, in accordance with Regulation 22 of LI 1652.

6.14 Other Permits

- Notwithstanding this permit, the project is further subject to other relevant regulations and permits pertaining to the sector and must be observed.

6.15 Validity Period

- The permit shall be valid for a period of 18 months effective from the date of issue of this permit.
- Failure to commence operations within the 18 months shall render the permit invalid after the period.

Failure to comply with or observe all the permit conditions above would render the Environmental Permit invalid.

EXECUTIVE DIRECTOR ..... **J. A. ALLOTEY** **June 2, 2006** **DATE ISSUED**

NOTIFICATION

The Hon. Minister, Ministry of Local Government, Rural Development & Environment, Accra
The Hon. Minister, Ministry of Energy, Accra
The Executive Secretary, Energy Commission, Accra
The District Chief Executive, Upper Denkyira District Assembly, Dunkwa-On-Offin
The Ag. Director, EPA Central Region, Cape Coast
The Deputy Director, Built Environment Department, EPA, Accra

Mydoc: Greater Accra

資料－５　参考資料／入手資料リスト

5. 参考資料/入手資料リスト

調査名： ガーナ共和国 地方電化計画 基本設計調査

番号	名 称	形態 図書・ビデオ・地図 ・写真等	ｵﾘｼﾞﾅﾙ・ｺﾋﾟｰ	発 行 機 関	発行年
1	Progress Report on SHEP	図書	コピー	Ministry of Energy	2005
2	Feasibility Study Report Draft Final Report Volume 3E, SHEP IV	図書	コピー	Electricity Company of Ghana	2002
3	Monthly Progress Report (SHEP IV)	図書	コピー	Electricity Company of Ghana	2005
4	Business Plan (Accra West Region, Eastern Region, Ashanti West Region, Central Region and Western Region)	図書	コピー	Electricity Company of Ghana	2004
5	Operation Report & Engineering Report	資料	コピー	Electricity Company of Ghana	2005
6	Construction Procedures for Implementing Rural Electrification Project	図書	コピー	Electricity Company of Ghana	2004
7	36th Annual Report & Audited Account 2003	図書	コピー	Electricity Company of Ghana	2003
8	Safety Policy	図書	オリジナル	Electricity Company of Ghana	2005
9	42nd Annual Report and Accounts 2003	図書	オリジナル	Volta River Authority	2003
10	2000 Population & Housing Census Summary Report of Final Results	図書	オリジナル	Ghana Statistical Service	2002
11	2000 Population & Housing Census Special Report of Urban Localities	図書	オリジナル	Ghana Statistical Service	2002
12	Final Report (Distribution Planning & Technical Losses, Summary)	図書	コピー	Power Planning Associates Ltd	2000
13	Ghana Ports Handbook 2005-2006	図書	オリジナル	Ghana Ports and Harbors Authority	2006
14	Preliminary Environmental Assessment (PEA)-Rural Electrification Project in the West Akim District	図書	コピー	Ministry of Energy	2006
15	Preliminary Environmental Assessment (PEA)-Rural Electrification Project in the Upper Denkyira District	図書	コピー	Ministry of Energy	2006

資料－６　基本設計図

6. 基本設計図

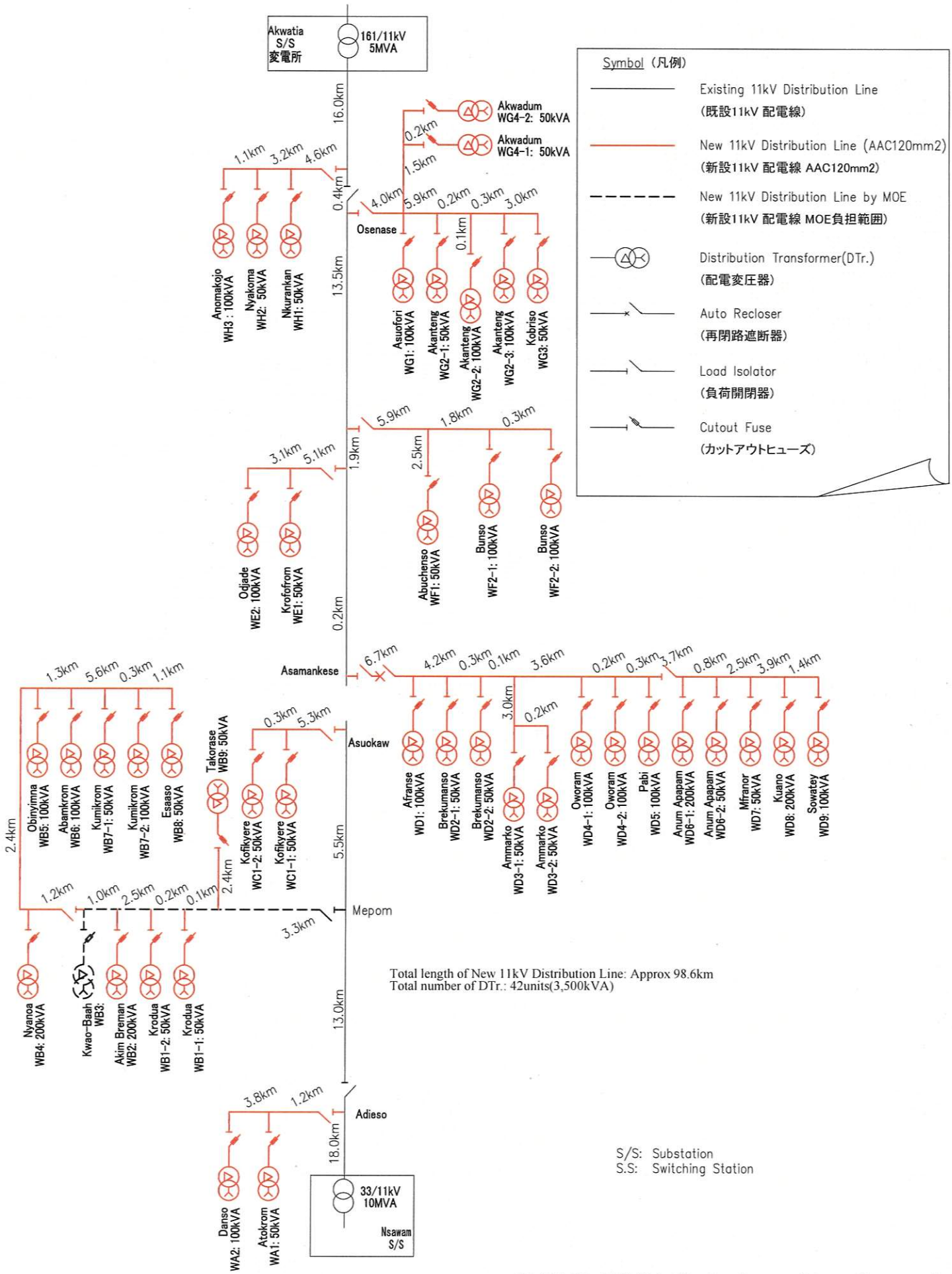
1. 33kV 及び 11kV 配電線ルート･系統図
   (1) DL-WA01 11kV 配電線ルート図[西アキム地区] (巻頭図)
   (2) DL-WA02 11kV 配電線系統図[西アキム地区]
   (3) DL-UD01 33kV 及び 11kV 配電線ルート図[アッパーデンチラ地区] (巻頭図)
   (4) DL-UD02 33kV 及び 11kV 配電線系統図[アッパーデンチラ地区]
   (5) G02 調達･施工区分図

2. 11/33kV 用標準装柱図
   (1) TPA-A 11/33kV 引通し柱(0 度～5 度)[型番 1A/3A]
   (2) TPA-B 11/33kV 軽角度柱(5 度～20 度)[型番 1B/3B]
   (3) TPA-C 11/33kV 中角度柱(20 度～60 度)[型番 1C/3C]
   (4) TPA-D 11/33kV 強角度柱(60 度～90 度未満)[型番 1D/3D]
   (5) TPA-E 11/33kV 直交柱(90 度)[型番 1E/3E]
   (6) TPA-F 11/33kV 両引留め柱[型番 1F/3F]
   (7) TPA-G 11/33kV 分岐柱[型番 1G/3G]
   (8) TPA-H 11/33kV 終端柱[型番 1H/3H]
   (9) TPA-J 11/33kV 負荷開閉器柱[型番 1J/3J]
   (10) TPA-K 11/33kV 引通し用変圧器柱[型番 1K/3K]
   (11) TPA-M 11/33kV 終端用 変圧器柱[型番 1M/3M]
   (12) TPA-N 11/33kV 自動再閉路柱[型番 1N/3N]
   (13) TPA-Z 構成部品組付図

3. 低圧用標準装柱図
   (1) TPA-LA 低圧引通し柱[型番 LA]
   (2) TPA-LB 低圧両引留柱[型番 LB]
   (3) TPA-LC 低圧分岐柱[型番 LC]
   (4) TPA-LD 低圧直角柱[型番 LD]
   (5) TPA-LE 低圧直交柱[型番 LE]
   (6) TPA-LF 低圧終端柱 D[型番 LF]

4. 単線結線図
   (1) SLD-1 配電変圧器柱単線図
   (2) SLD-2 自動再閉路装置単線図

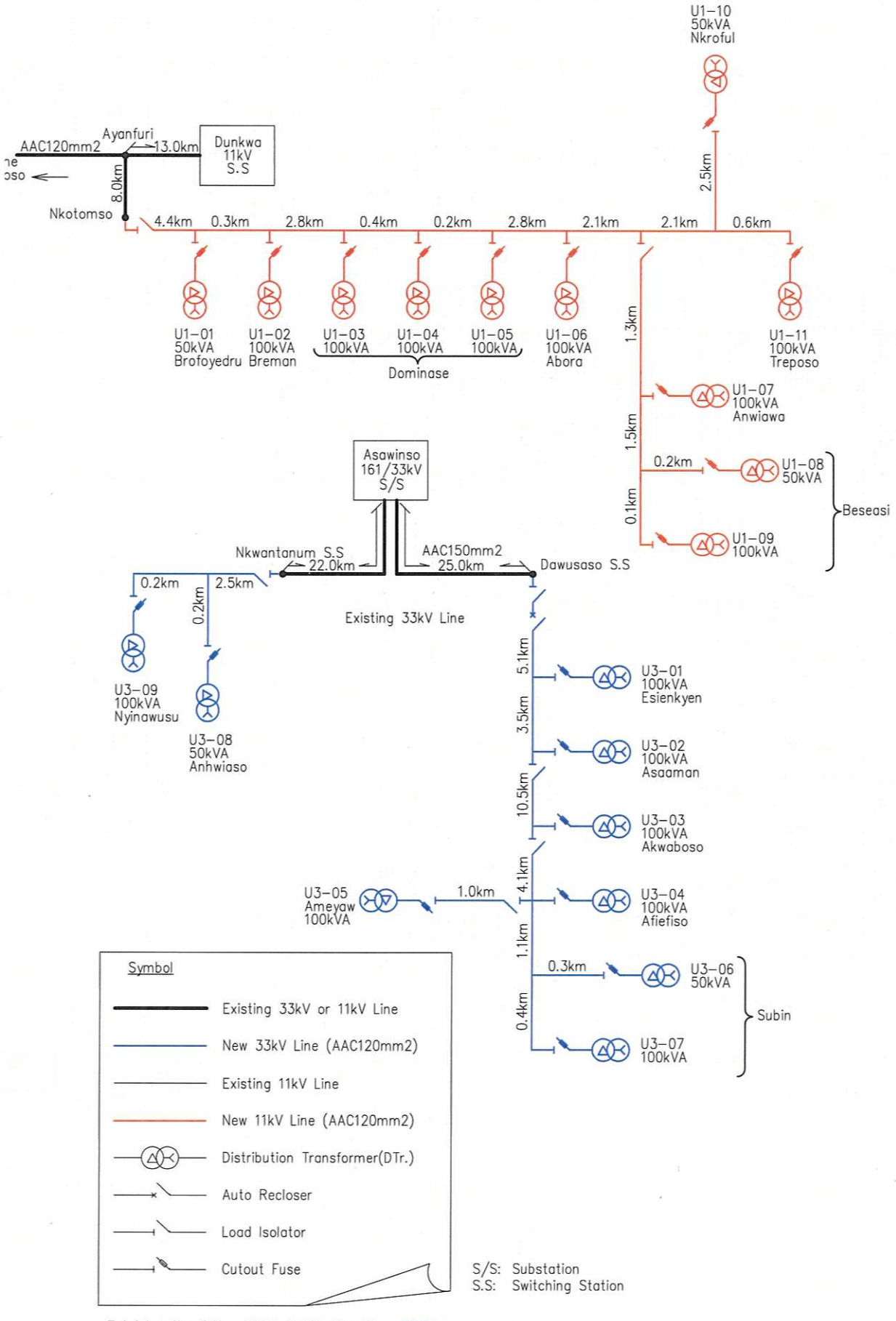
5. 既設配電線接続図
   (1) TPA-X 標準分岐接続用 資機材構成図
   (2) TPA-Y 標準延伸接続用 資機材構成図
   (3) UD-1 33kV ダウサソ開閉所接続用
   資機材構成図(アッパー･デンチラ地域)
   (4) UD-2 33kV ヌクワンタヌム開閉所接続用
   資機材構成図(アッパー･デンチラ地域)



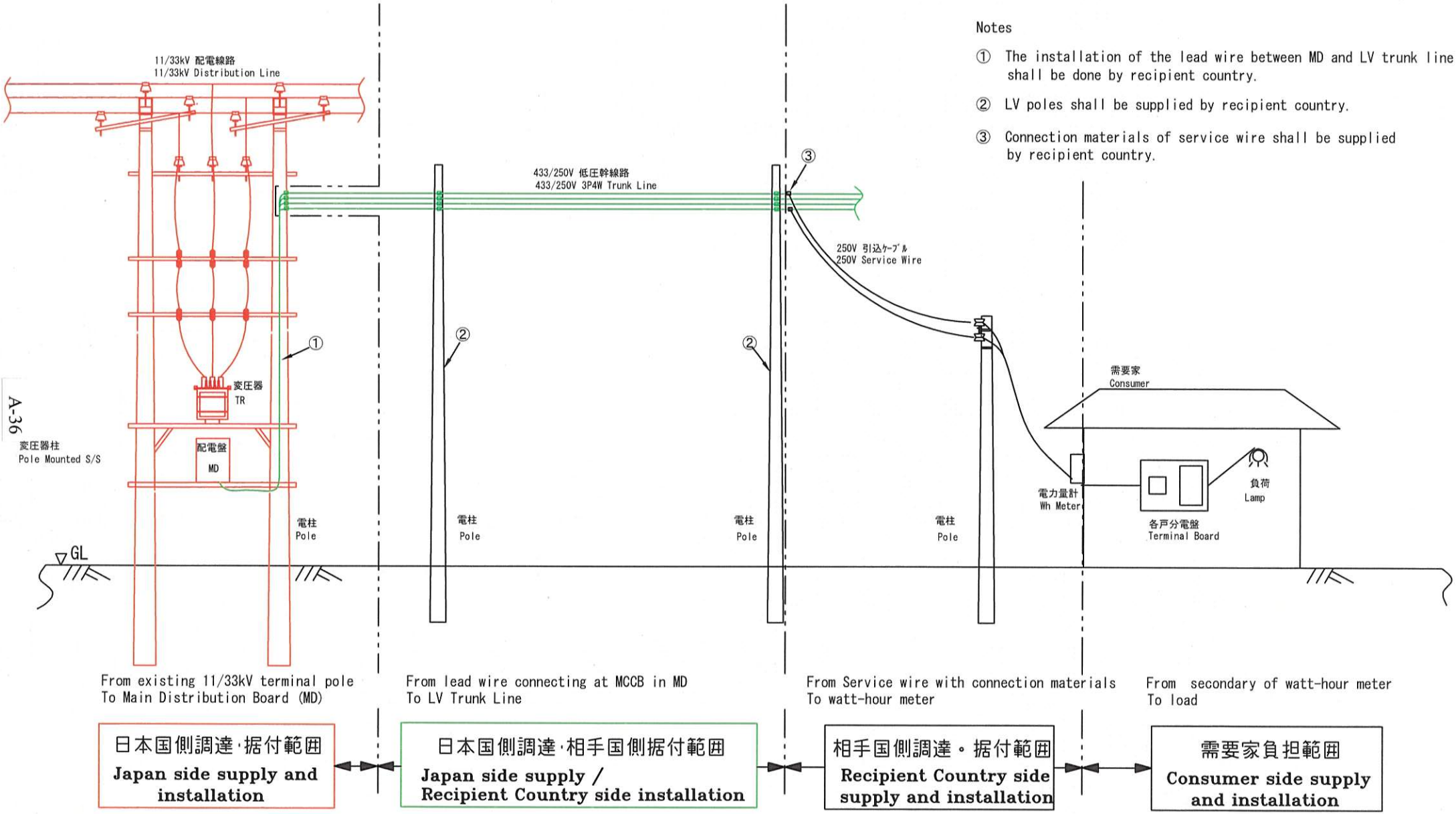
Total length of New 11kV Distribution Line: Approx 98.6km
Total number of DTr.: 42units(3,500kVA)

S/S: Substation
S.S: Switching Station

DL-WA02: 11kV Distribution System [West Akim Area]
11kV 配電系統図 [西アキム地区]



DL-UD02: 33kV and 11kV Distribution System [Upper Denkyira Area]
33kV 及び 11kV 配電系統図 [アッパーデンチラ地区]



Notes

① The installation of the lead wire between MD and LV trunk line shall be done by recipient country.

② LV poles shall be supplied by recipient country.

③ Connection materials of service wire shall be supplied by recipient country.

From existing 11/33kV terminal pole
To Main Distribution Board (MD)

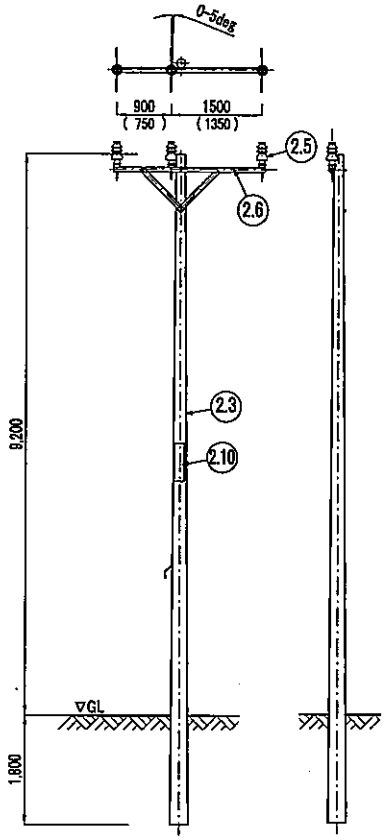
From lead wire connecting at MCCB in MD
To LV Trunk Line

From Service wire with connection materials
To watt-hour meter

From secondary of watt-hour meter
To load

日本国側調達･据付範囲 **Japan side supply and installation**	日本国側調達･相手国側据付範囲 **Japan side supply / Recipient Country side installation**	相手国側調達・据付範囲 **Recipient Country side supply and installation**	需要家負担範囲 **Consumer side supply and installation**

施工負担区分図
G-02 OUTLINE OF THE PROJECT COMPONENT

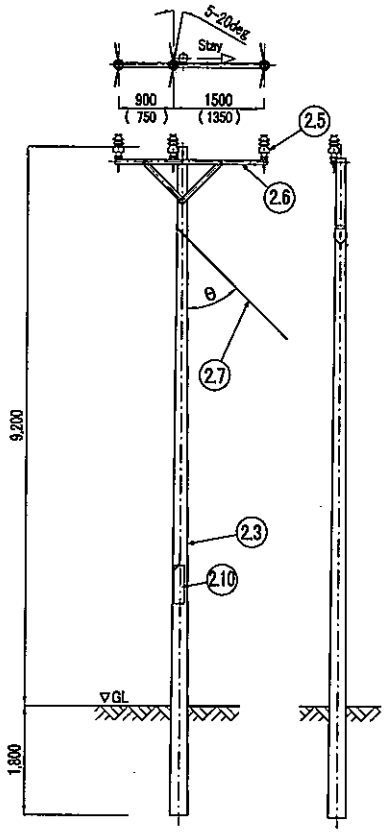


P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	0
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	0
1.5	Lightning Arrester	避雷器	0
1.6	Main Distribution Board(MDB)	主分電盤	0
2.1	Conductor (m)	電線 (m)	0
2.2	Connector	コネクター	0
2.3	Steel Pole (11m)	鋼管柱 (11m)	1
2.4	Strain Insulator Set	耐張碍子セット	0
2.5	Pin Insulator set	ピン碍子セット	3
2.6	Crossarm set	腕金セット	1
2.7	Stay Wire Set	支線セット	0
2.8	Earth Wire Set	接地線セット	0
2.9	LV Cabling Materials	低圧ケーブル材料	0
2.10	Plate set	プレートセット	1

Remarks : Pole Type "1A" is for 11kV and then type 3A is for 33kV.

Dwg.No.TPA-A

11/33kV 引通し柱(0度～5度)[型番1A/3A]
11/33kV Intermediate Pole (Line Angle 0-5deg.) [Type 1A/3A]

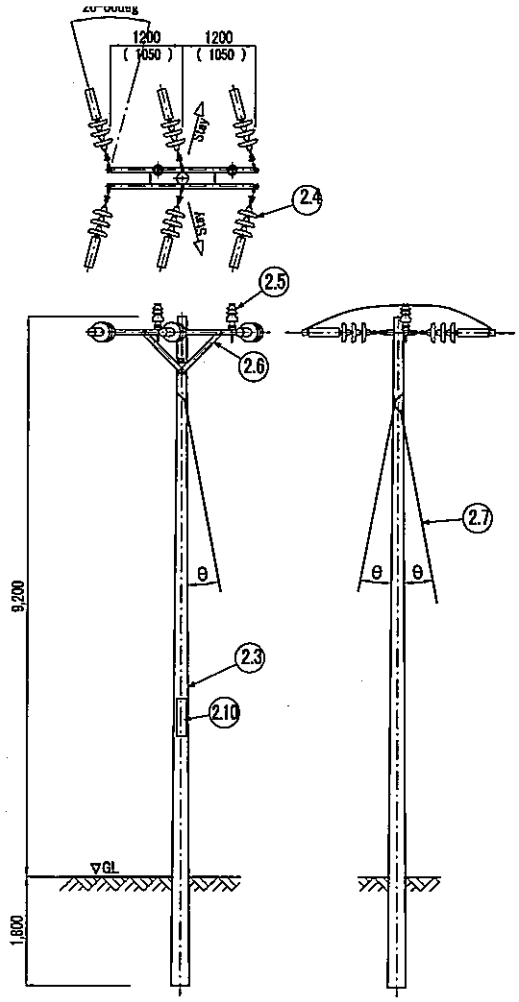


P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	0
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	0
1.5	Lightning Arrester	避雷器	0
1.6	Main Distribution Board(MDB)	主分電盤	0
2.1	Conductor (m)	電線 (m)	0
2.2	Connector	コネクター	0
2.3	Steel Pole (11m)	鋼管柱 (11m)	1
2.4	Strain Insulator Set	耐張碍子セット	0
2.5	Pin Insulator set	ピン碍子セット	3
2.6	Crossarm set	腕金セット	1
2.7	Stay Wire Set	支線セット	1
2.8	Earth Wire Set	接地線セット	0
2.9	LV Cabling Materials	低圧ケーブル材料	0
2.10	Plate set	プレートセット	1

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

Dwg.No.TPA-B

11/33kV 軽角度柱(5度～20度)[型番 1B/3B]
11/33kV Light Angle Pole (Line Angle 5-20deg.)[Type 1B/3B]

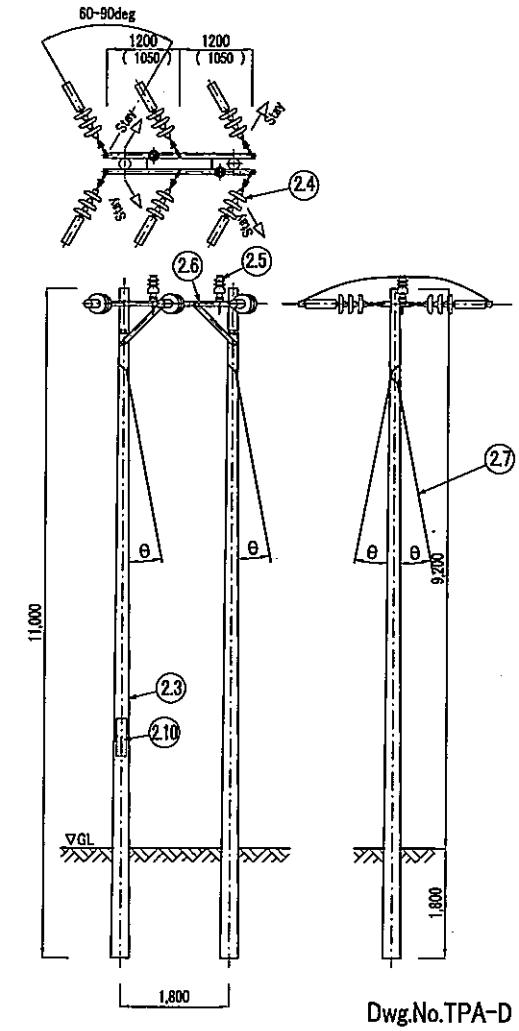


Dwg.No.TPA-C

P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	0
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	0
1.5	Lightning Arrester	避雷器	0
1.6	Main Distribution Board(MDB)	主分電盤	0
2.1	Conductor (m)	電線 (m)	0
2.2	Connector	コネクター	0
2.3	Steel Pole (11m)	鋼管柱 (11m)	1
2.4	Strain Insulator Set	耐張碍子セット	6
2.5	Pin Insulator set	ピン碍子セット	2
2.6	Crossarm set	腕金セット	2
2.7	Stay Wire Set	支線セット	2
2.8	Earth Wire Set	接地線セット	0
2.9	LV Cabling Materials	低圧ケーブル材料	0
2.10	Plate set	プレートセット	1

Preferable Stay Angle : 30° ≦ θ ≦ 45°

11/33kV 中角度柱(20度～60度)[型番 1C/3C]
11/33kV Medium Angle Pole (Line Angle 20-60deg.)[Type 1C/3C]

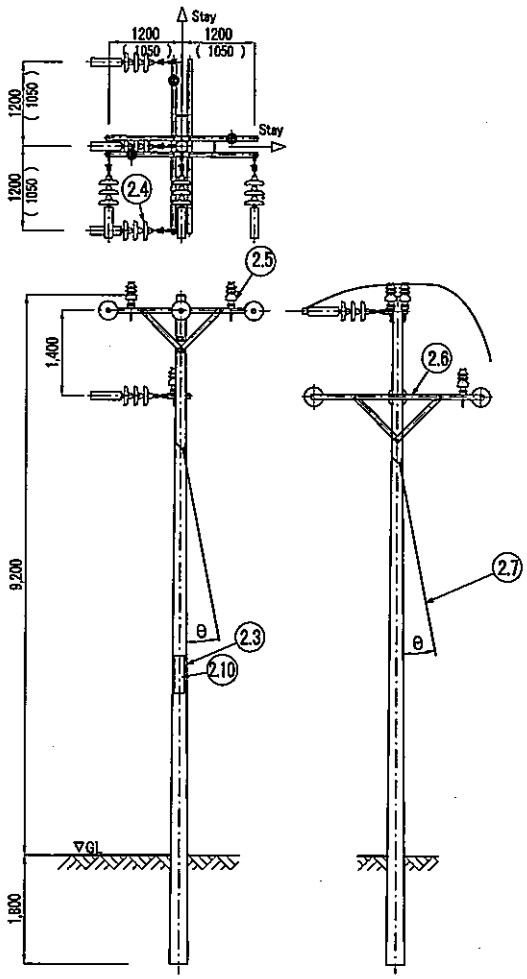


Dwg.No.TPA-D

P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	0
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	0
1.5	Lightning Arrester	避雷器	0
1.6	Main Distribution Board(MDB)	主分電盤	0
2.1	Conductor (m)	電線 (m)	0
2.2	Connector	コネクター	0
2.3	Steel Pole (11m)	鋼管柱 (11m)	2
2.4	Strain Insulator Set	耐張碍子セット	6
2.5	Pin Insulator set	ピン碍子セット	2
2.6	Crossarm set	腕金セット	2
2.7	Stay Wire Set	支線セット	4
2.8	Earth Wire Set	接地線セット	0
2.9	LV Cabling Materials	低圧ケーブル材料	0
2.10	Plate set	プレートセット	1

Preferable Stay Angle : 30° ≦ θ ≦ 45°

11/33kV 強角度柱(60度～90度未満)[型番 1D/3D]
11/33kV Heavy Angle Pole (Line Angle 60-90deg.)[Type 1D/3D]

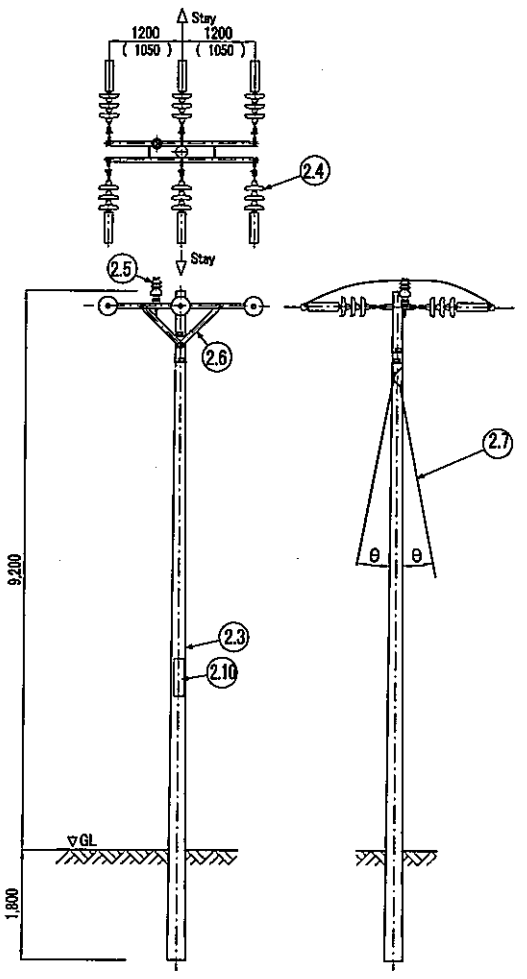


P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	0
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	0
1.5	Lightning Arrester	避雷器	0
1.6	Main Distribution Board(MDB)	主分電盤	0
2.1	Conductor (m)	電線 (m)	0
2.2	Connector	コネクター	0
2.3	Steel Pole (11m)	鋼管柱 (11m)	1
2.4	Strain Insulator Set	耐張碍子セット	6
2.5	Pin Insulator set	ピン碍子セット	3
2.6	Crossarm set	腕金セット	4
2.7	Stay Wire Set	支線セット	2
2.8	Earth Wire Set	接地線セット	0
2.9	LV Cabling Materials	低圧ケーブル材料	0
2.10	Plate set	プレートセット	1

Preferable Stay Angle : 30° ≦ θ ≦ 45°

Dwg.No.TPA-E

11/33kV 直交柱(90度)[型番 1E/3E]
11/33kV Cross Pole (Line Angle 90deg.)[Type 1E/3E]

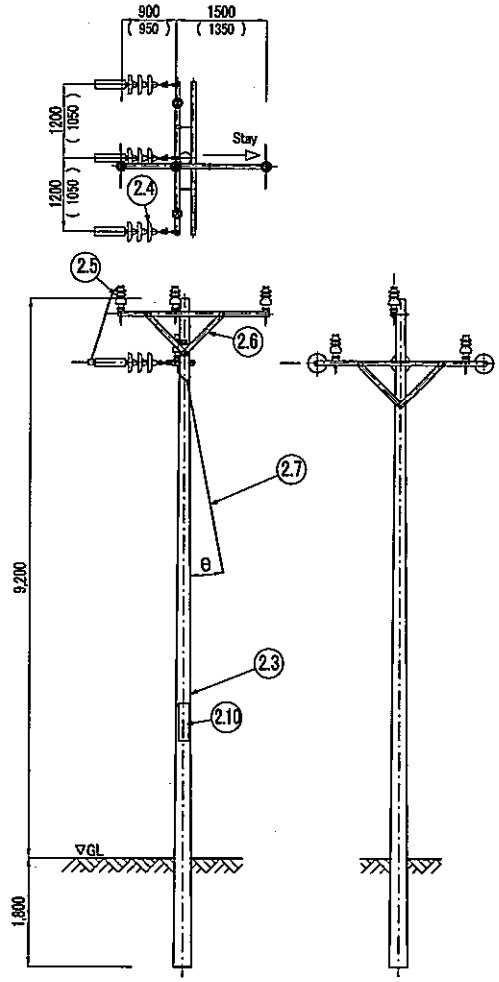


P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	0
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	0
1.5	Lightning Arrester	避雷器	0
1.6	Main Distribution Board(MDB)	主分電盤	0
2.1	Conductor (m)	電線 (m)	0
2.2	Connector	コネクター	0
2.3	Steel Pole (11m)	鋼管柱 (11m)	1
2.4	Strain Insulator Set	耐張碍子セット	6
2.5	Pin Insulator set	ピン碍子セット	1
2.6	Crossarm set	腕金セット	2
2.7	Stay Wire Set	支線セット	2
2.8	Earth Wire Set	接地線セット	0
2.9	LV Cabling Materials	低圧ケーブル材料	0
2.10	Plate set	プレートセット	1

Preferable Stay Angle : 30° ≦ θ ≦ 45°

Dwg.No.TPA-F

11/33kV 両引留め柱[型番 1F/3F]
11/33kV Section Pole[Type 1F/3F]

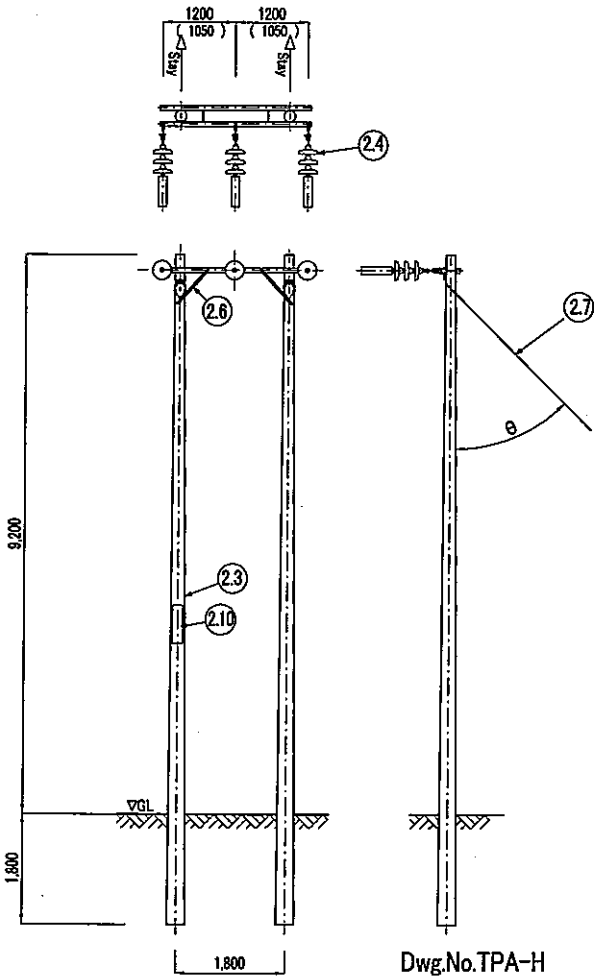


P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	0
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	0
1.5	Lightning Arrester	避雷器	0
1.6	Main Distribution Board(MDB)	主分電盤	0
2.1	Conductor (m)	電線 (m)	0
2.2	Connector	コネクター	0
2.3	Steel Pole (11m)	鋼管柱 (11m)	1
2.4	Strain Insulator Set	耐張碍子セット	3
2.5	Pin Insulator set	ピン碍子セット	5
2.6	Crossarm set	腕金セット	3
2.7	Stay Wire Set	支線セット	1
2.8	Earth Wire Set	接地線セット	0
2.9	LV Cabling Materials	低圧ケーブル材料	0
2.10	Plate set	プレートセット	1

Preferable Stay Angle : 30° ≦ θ ≦ 45°

Dwg.No.TPA-G

11/33kV 分岐柱[型番 1G/3G]
11/33kV T-off Pole[Type 1G/3G]

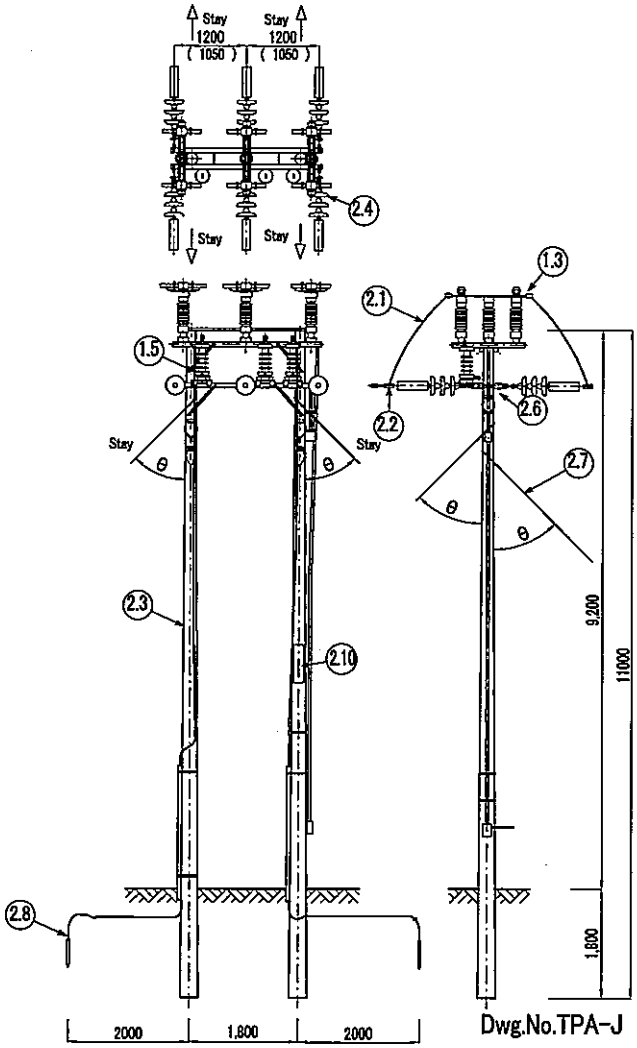


P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	0
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	0
1.5	Lightning Arrester	避雷器	0
1.6	Main Distribution Board(MDB)	主分電盤	0
2.1	Conductor (m)	電線 (m)	0
2.2	Connector	コネクター	0
2.3	Steel Pole (11m)	鋼管柱 (11m)	2
2.4	Strain Insulator Set	耐張碍子セット	3
2.5	Pin Insulator set	ピン碍子セット	0
2.6	Crossarm set	腕金セット	2
2.7	Stay Wire Set	支線セット	2
2.8	Earth Wire Set	接地線セット	0
2.9	LV Cabling Materials	低圧ケーブル材料	0
2.10	Plate set	プレートセット	1

Preferable Stay Angle : 30° ≦ θ ≦ 45°

Dwg.No.TPA-H

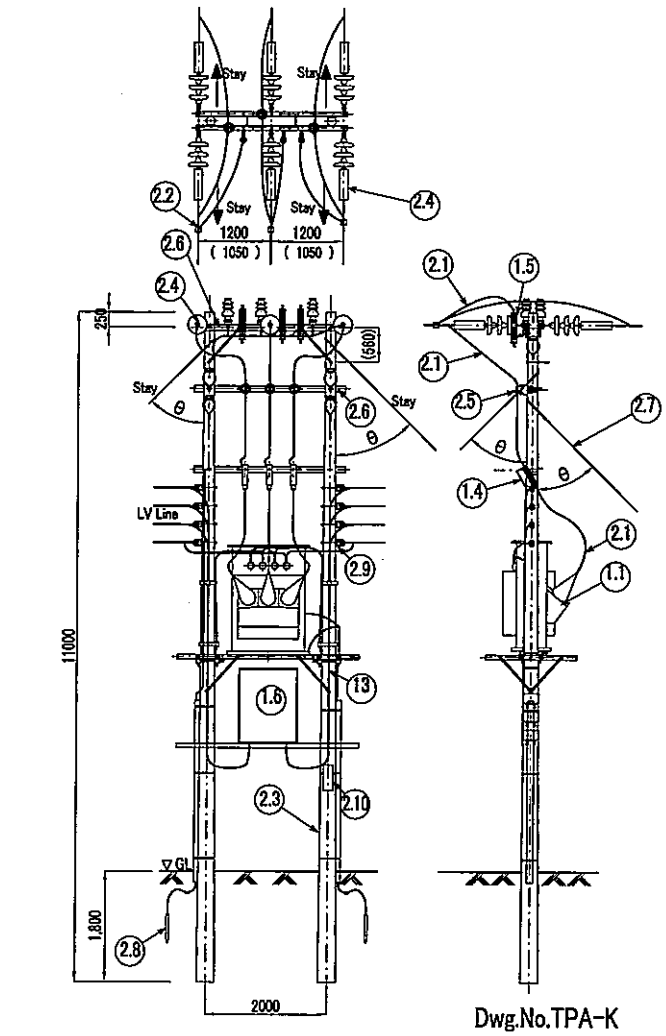
11/33kV 終端柱[型番 1H/3H]
11/33kV Terminal Pole[Type 1H/3H]



Dwg.No.TPA-J

P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	0
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	1
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	0
1.5	Lightning Arrester	避雷器	1
1.6	Main Distribution Board(MDB)	主分電盤	0
2.1	Conductor (m)	電線 (m)	30
2.2	Connector	コネクター	3
2.3	Steel Pole (11m)	鋼管柱 (11m)	2
2.4	Strain Insulator Set	耐張碍子セット	6
2.5	Pin Insulator set	ピン碍子セット	0
2.6	Crossarm set	腕金セット	2
2.7	Stay Wire Set	支線セット	4
2.8	Earth Wire Set	接地線セット	3
2.9	LV Cabling Materials	低圧ケーブル材料	0
2.10	Plate set	プレートセット	1

11/33kV負荷開閉器柱[型番 1J/3J]
11/33kV Load Isolator Pole[Type 1J/3J]

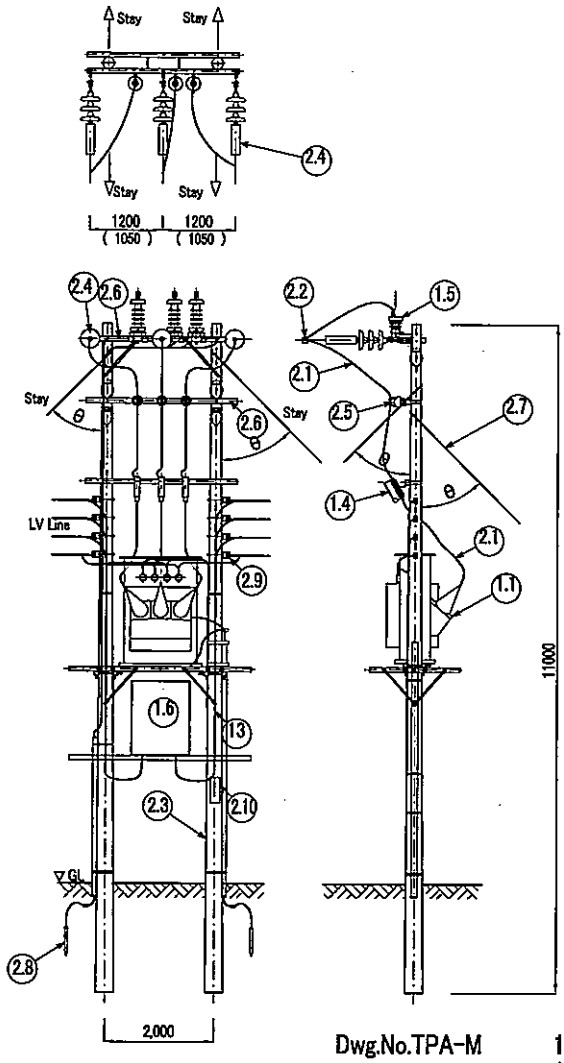


Dwg.No.TPA-K

P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	1
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	1
1.5	Lightning Arrester	避雷器	1
1.6	Main Distribution Board(MDB)	主分電盤	1
2.1	Conductor (m)	電線 (m)	50
2.2	Connector	コネクター	12
2.3	Steel Pole (11m)	鋼管柱 (11m)	2
2.4	Strain Insulator Set	耐張碍子セット	6
2.5	Pin Insulator set	ピン碍子セット	6
2.6	Crossarm set	腕金セット	3
2.7	Stay Wire Set	支線セット	4
2.8	Earth Wire Set	接地線セット	3
2.9	LV Cabling Materials	低圧ケーブル材料	1
2.10	Plate set	プレートセット	1

Preferable Stay Angle : 30° ≦ θ ≦ 45°

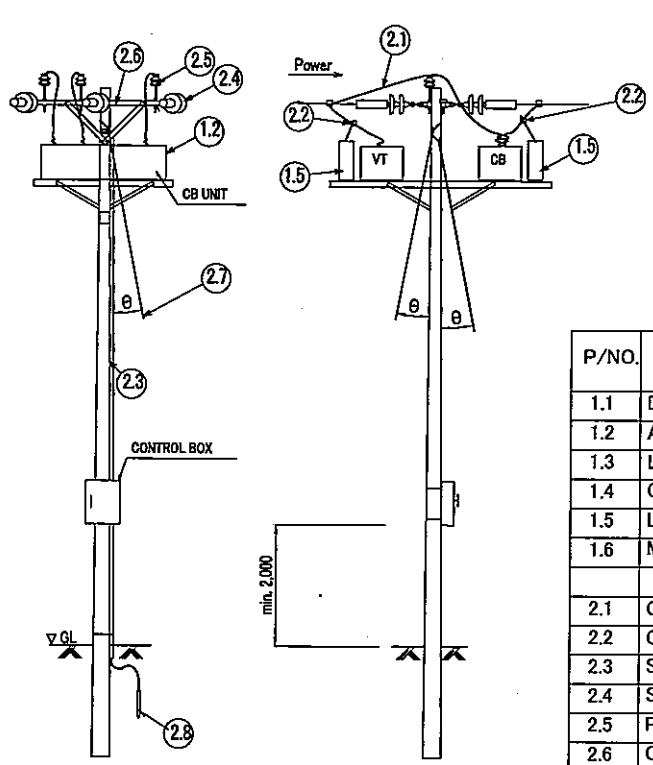
11/33kV 引通し用変圧器柱[型番 1K/3K]
11/33kV Intermediate Transformer Pole[Type 1K/3K]

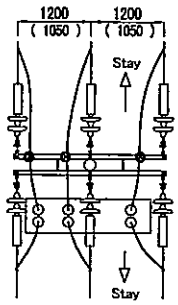


P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	1
1.2	Auto Recloser	自動再閉路装置	0
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	1
1.5	Lightning Arrester	避雷器	1
1.6	Main Distribution Board(MDB)	主分電盤	1
2.1	Conductor (m)	電線 (m)	50
2.2	Connector	コネクター	6
2.3	Steel Pole (11m)	鋼管柱 (11m)	2
2.4	Strain Insulator Set	耐張碍子セット	3
2.5	Pin Insulator set	ピン碍子セット	3
2.6	Crossarm set	腕金セット	3
2.7	Stay Wire Set	支線セット	4
2.8	Earth Wire Set	接地線セット	3
2.9	LV Cabling Materials	低圧ケーブル材料	1
2.10	Plate set	プレートセット	1

Preferable Stay Angle : 30° ≦ θ ≦ 45°

Dwg.No.TPA-M　11/33kV 終端用 変圧器柱[型番 1M/3M]
11/33kV Dead End Transformer Pole [Type 1M/3M]

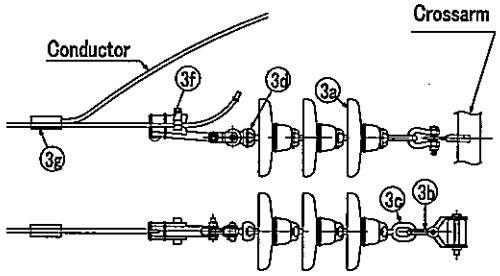




P/NO.	DESCRIPTION		Q'TY
1.1	Distribution Transformer (DTr)	配電用変圧器	0
1.2	Auto Recloser	自動再閉路装置	1
1.3	Load Isolator	負荷開閉器	0
1.4	Cutout Switch with Fuse	ヒューズ付きカットアウトスイッチ	0
1.5	Lightning Arrester	避雷器	2
1.6	Main Distribution Board(MDB)	主分電盤	0
2.1	Conductor (m)	電線 (m)	45
2.2	Connector	コネクター	8
2.3	Steel Pole (11m)	鋼管柱 (11m)	1
2.4	Strain Insulator Set	耐張碍子セット	6
2.5	Pin Insulator set	ピン碍子セット	3
2.6	Crossarm set	腕金セット	2
2.7	Stay Wire Set	支線セット	2
2.8	Earth Wire Set	接地線セット	3
2.9	LV Cabling Materials	低圧ケーブル材料	0
2.10	Plate set	プレートセット	1

Preferable Stay Angle : 30° ≦ θ ≦ 45°

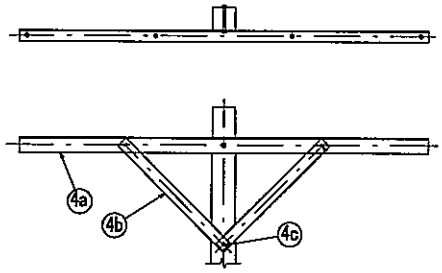
Dwg.No.TPA-N　11/33kV 自動再閉路柱[型番 1N/3N]
11/33kV Auto Recloser Pole[Type 1N/3N]



Strain Insulator Set

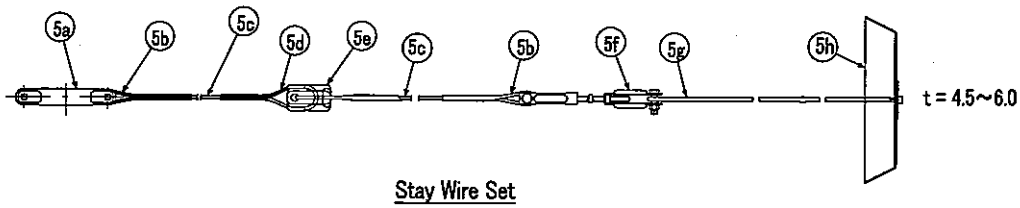
No.	Description	Q'TY per set
3a	Disc Insulator	3(2)
3b	Anchor Shackle	1
3c	Ball Eye	1
3d	Socket Eye	1
3f	Dead End Clamp	1
3g	Compression Connector	1

( ):for 11kV Line



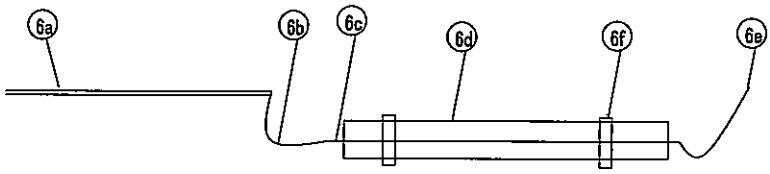
Crossarm Set

No.	Description	Q'TY per set
4a	Crossarm	1
4b	Crossarm Brace	2
4c	Bolt&Nut Set	4



Stay Wire Set

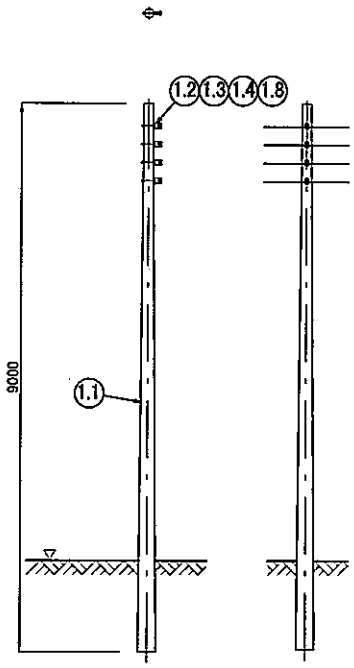
No.	Description	Q'TY per set	No.	Description	Q'TY per set
5a	Stay Band	1	5e	33kV(11kV)Stay Insulator	1
5b	Dead End Grip for Thimble	2	5f	Turnbuckle	1
5c	Stay Wire	1	5g	Stay Rod	1
5d	Dead End Grip for Insulator	2	5h	Stay Anchor	1



Earthing Wire Set

No.	Description	Q'TY per set	No.	Description	Q'TY per set
6a	Grounding Rod	2	6e	Terminal Lug	1
6b	Earthing Terminal	1	6f	Band	1
6c	IV Wire (35sqmm)	12m			
6d	PVC (1inch)	2.5m			

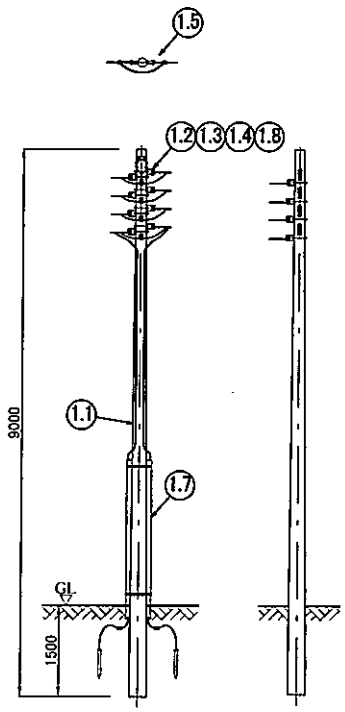
Dwg.No.TPA-Z　　構成部品組付図
Material Composition of Assembly Parts



Material List

P/NO.	DESCRIPTION		Q'TY
1.1	Wood Pole	木柱	1
1.2	Bracket set	装柱金物セット	4
1.3	LV Shackle Insulator	低圧シャックル碍子	4
1.4	But, Nut & washer set	ボルト、ナット及びワッシャーセット	4
1.5	Conductor Connector set	電線コネクターセット	0
1.6	Stay Wire Assembly	支線セット	0
1.7	LV Neutral Earthing Assembly	低圧中性点接地線セット	0
1.8	Binding Wire	バインド線	4

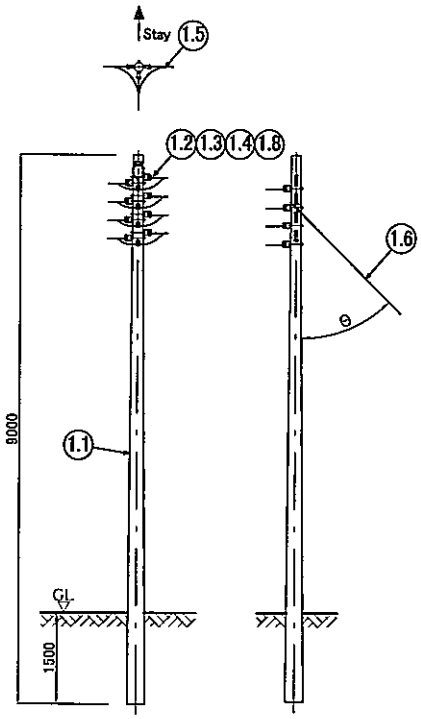
Dwg.No.TPA-LA　低圧引通し柱[型番LA]
LV Intermediate Pole[Type LA]



Material List

P/NO.	DESCRIPTION		Q'TY
1.1	Wood Pole	木柱	1
1.2	Bracket set	装柱金物セット	8
1.3	LV Shackle Insulator	低圧シャックル碍子	8
1.4	But, Nut & washer set	ボルト、ナット及びワッシャーセット	8
1.5	Conductor Connector set	電線コネクターセット	4
1.6	Stay Wire Assembly	支線セット	0
1.7	LV Neutral Earthing Assembly	低圧中性点接地線セット	2
1.8	Binding Wire	バインド線	8

Dwg.No.TPA-LB　低圧両引留柱[型番LB]
LV Section Pole[Type LB]

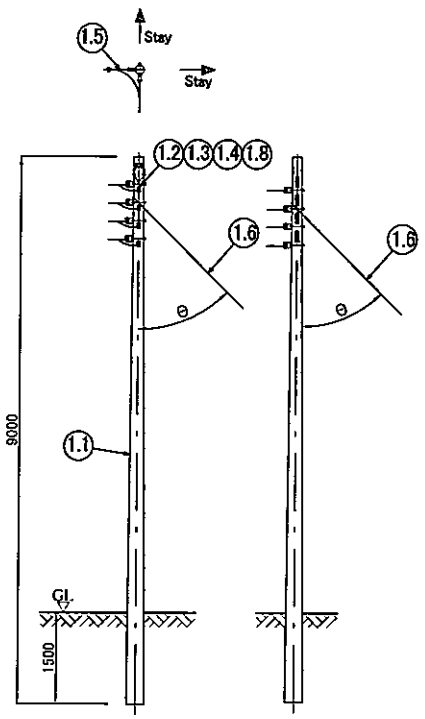


Material List

P/NO.	DESCRIPTION		Q'TY
1.1	Wood Pole	木柱	1
1.2	Bracket set	装柱金物セット	12
1.3	LV Shackle Insulator	低圧シャックル碍子	12
1.4	But, Nut & washer set	ボルト、ナット及びワッシャーセット	12
1.5	Conductor Connector set	電線コネクターセット	12
1.6	Stay Wire Assembly	支線セット	1
1.7	LV Neutral Earthing Assembly	低圧中性点接地線セット	0
1.8	Binding Wire	バインド線	8

Preferable Stay Angle : 30° ≦ θ ≦ 45°

Dwg.No.TPA-LC　低圧分岐柱[型番LC]
LV T-off Pole[Type LC]

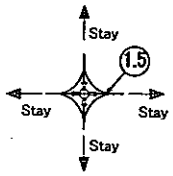


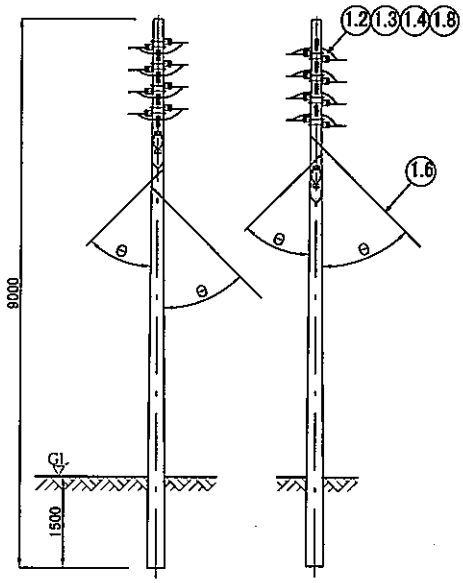
Material List

P/NO.	DESCRIPTION		Q'TY
1.1	Wood Pole	木柱	1
1.2	Bracket set	装柱金物セット	8
1.3	LV Shackle Insulator	低圧シャックル碍子	8
1.4	But, Nut & washer set	ボルト、ナット及びワッシャーセット	8
1.5	Conductor Connector set	電線コネクターセット	4
1.6	Stay Wire Assembly	支線セット	2
1.7	LV Neutral Earthing Assembly	低圧中性点接地線セット	0
1.8	Binding Wire	バインド線	8

Preferable Stay Angle : 30° ≦ θ ≦ 45°

Dwg.No.TPA-LD　低圧直角柱[型番LD]
LV Right Angle Pole[Type LD]



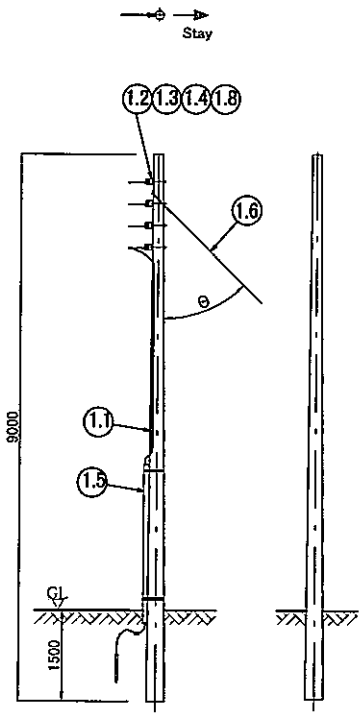


Material List

P/NO.	DESCRIPTION		Q'TY
1.1	Wood Pole	木柱	1
1.2	Bracket set	装柱金物セット	16
1.3	LV Shackle Insulator	低圧シャックル碍子	16
1.4	But, Nut & washer set	ボルト、ナット及びワッシャーセット	16
1.5	Conductor Connector set	電線コネクターセット	16
1.6	Stay Wire Assembly	支線セット	4
1.7	LV Neutral Earthing Assembly	低圧中性点接地線セット	0
1.8	Binding Wire	バインド線	16

Preferable Stay Angle : 30° ≦ θ ≦ 45°

Dwg.No.TPA-LE　低圧直交柱[型番LE]
LV Cross Pole[Type LE]

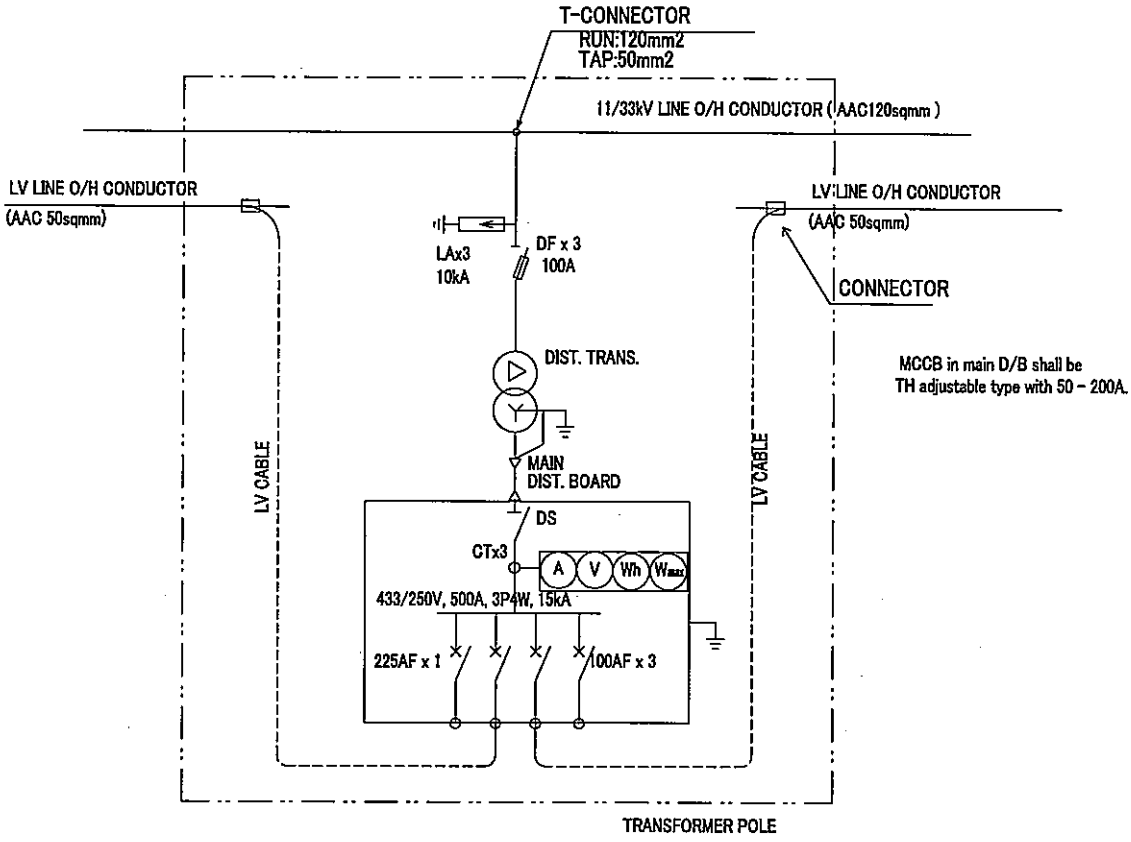


Material List

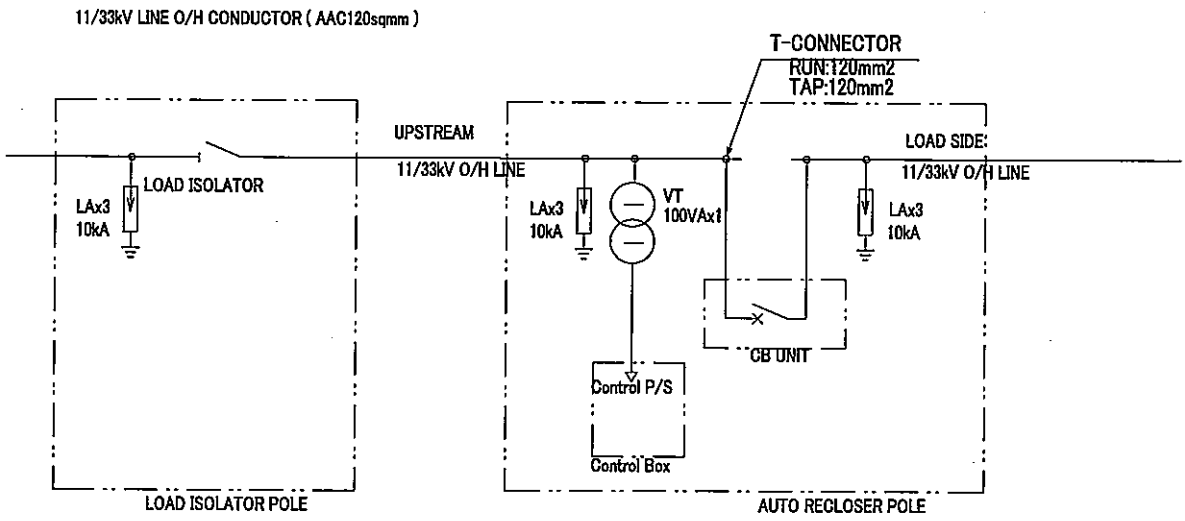
P/NO.	DESCRIPTION		Q'TY
1.1	Wood Pole	木柱	1
1.2	Bracket set	装柱金物セット	4
1.3	LV Shackle Insulator	低圧シャックル碍子	4
1.4	But, Nut & washer set	ボルト、ナット及びワッシャーセット	4
1.5	Conductor Connector set	電線コネクターセット	0
1.6	Stay Wire Assembly	支線セット	1
1.7	LV Neutral Earthing Assembly	低圧中性点接地線セット	1
1.8	Binding Wire	バインド線	4

Preferable Stay Angle : 30° ≦ θ ≦ 45°

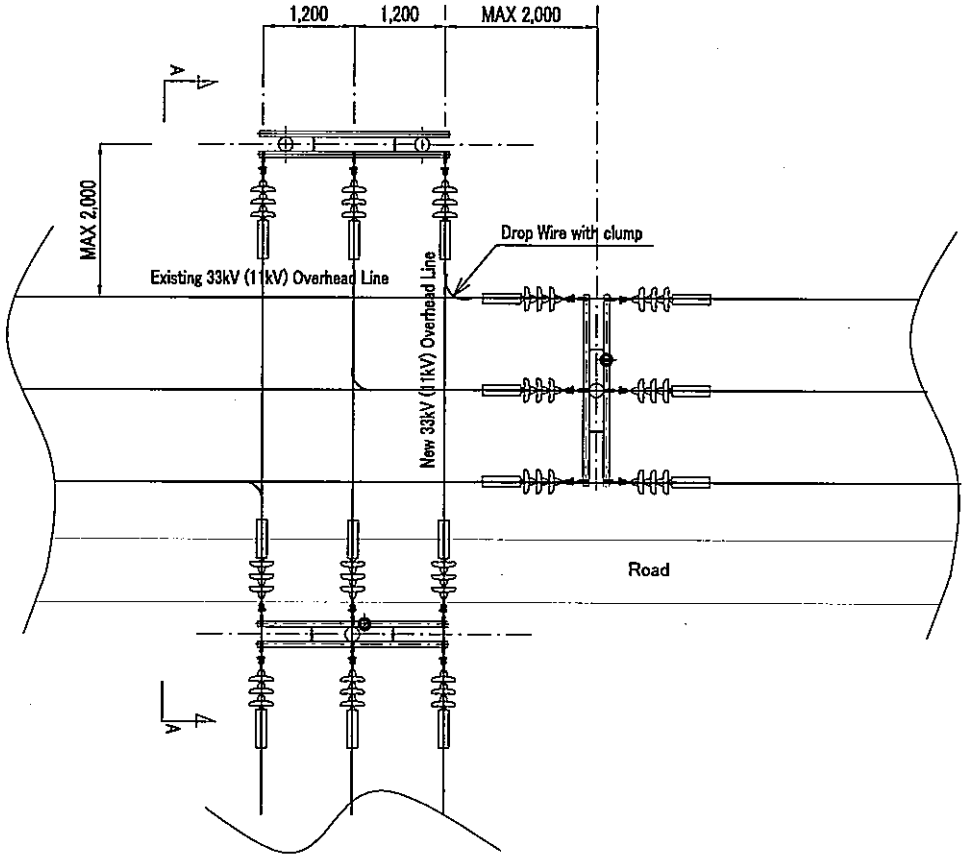
Dwg.No.TPA-LF　低圧終端柱D[型番LF]
LV Terminal Pole[Type LF]

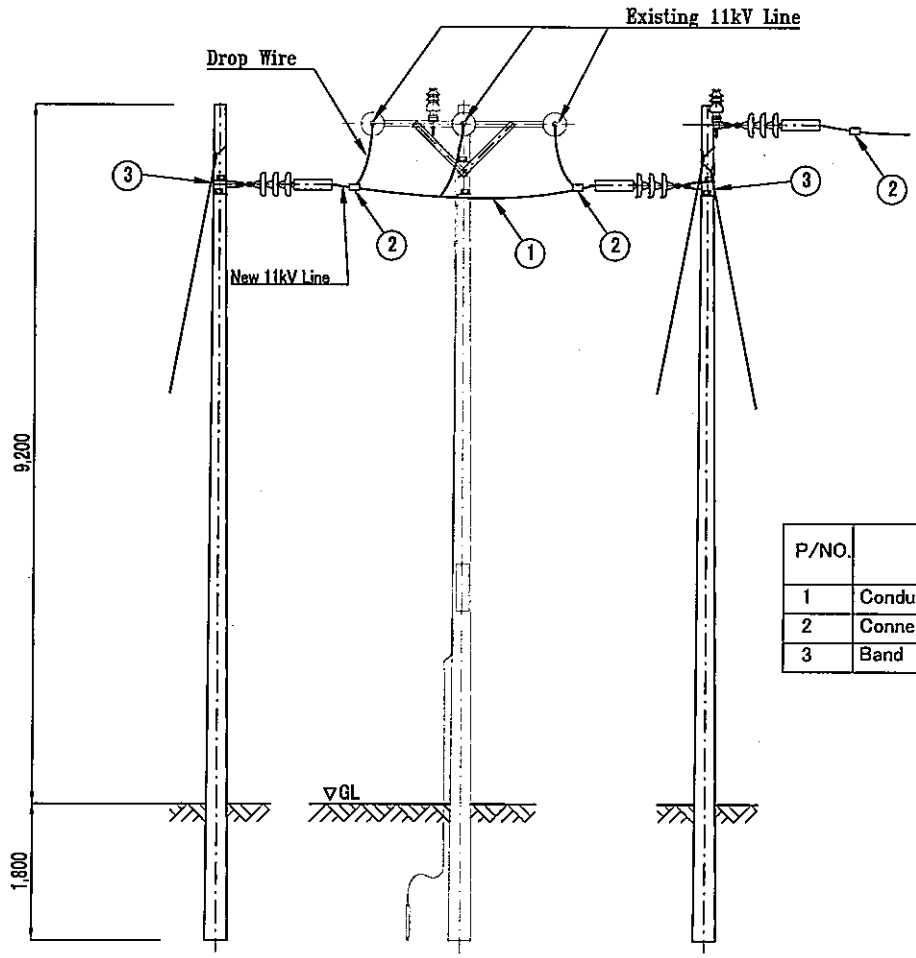


Dwg.No.SLD-1　　配電変圧器柱単線図
Single Line Diagram for Distribution Transformer System



Dwg.No.SLD-2　　自動再閉路装置単線図
Single Line Diagram for Auto Recloser System

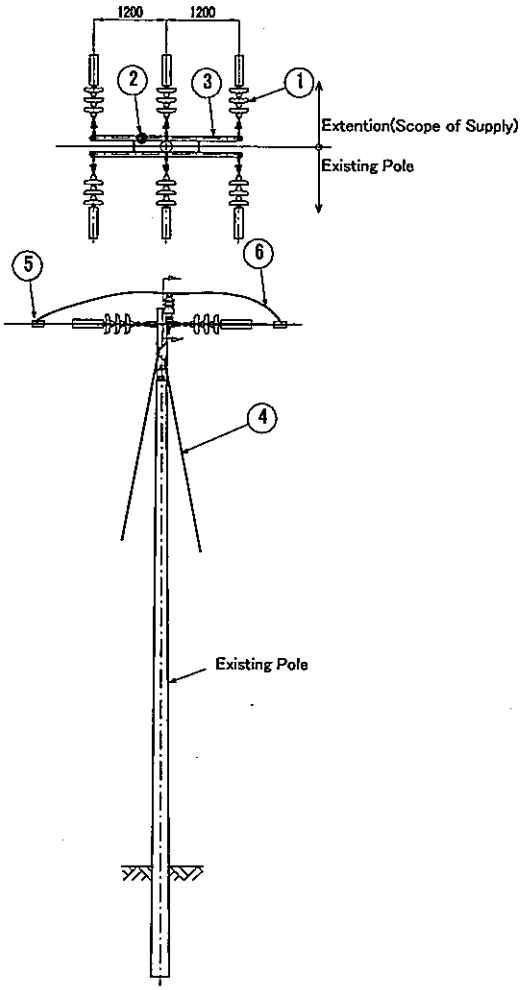




P/NO.	DESCRIPTION		Q'TY
1	Conductor	電線	10m
2	Connector	コネクター	6pcs
3	Band	バンド	2sets

Section A-A

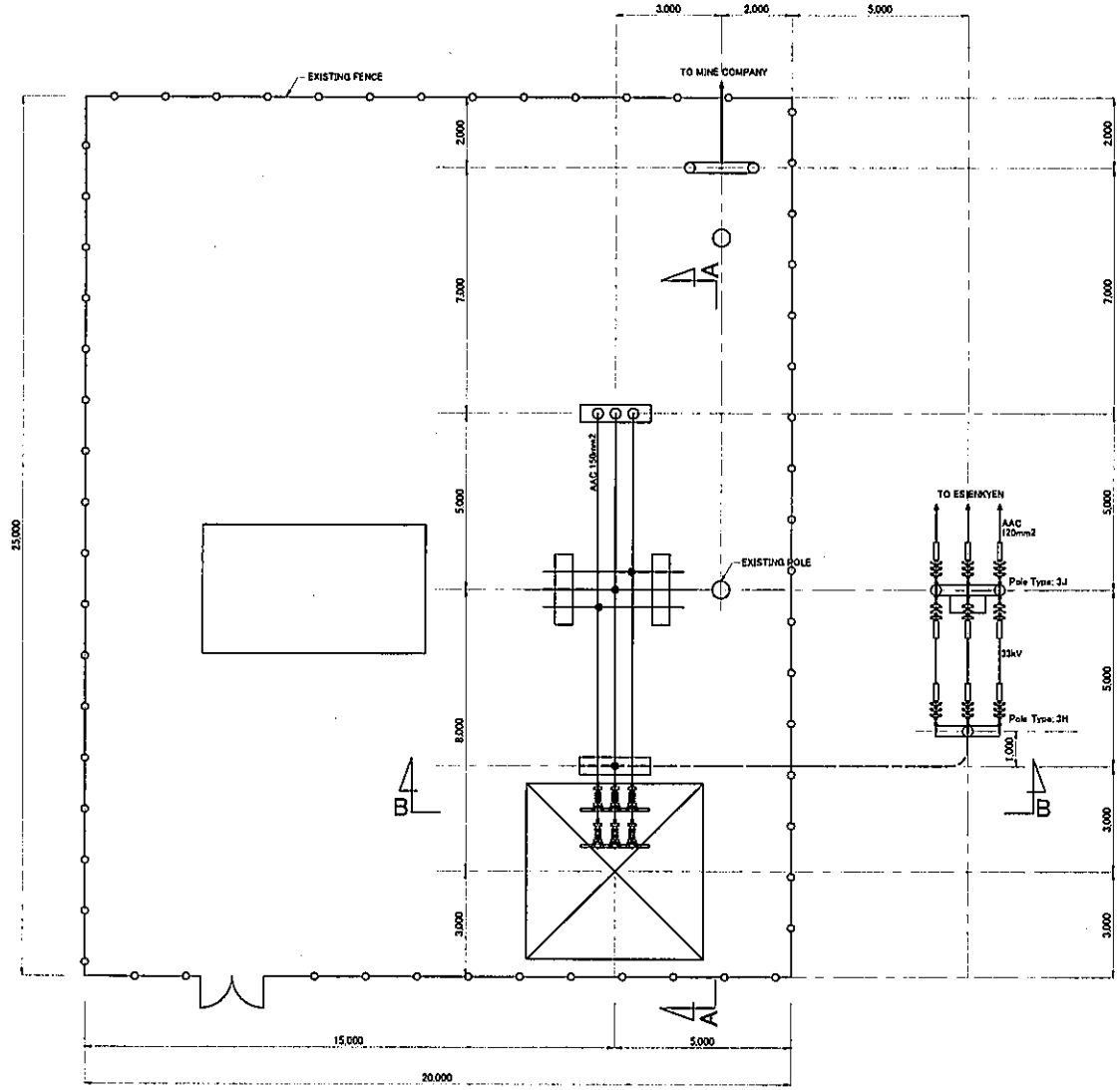
Dwg.No.TPA-X　　標準分岐接続用 資機材構成図
Typical Connection Plan to the Existing Line (Cross Type)



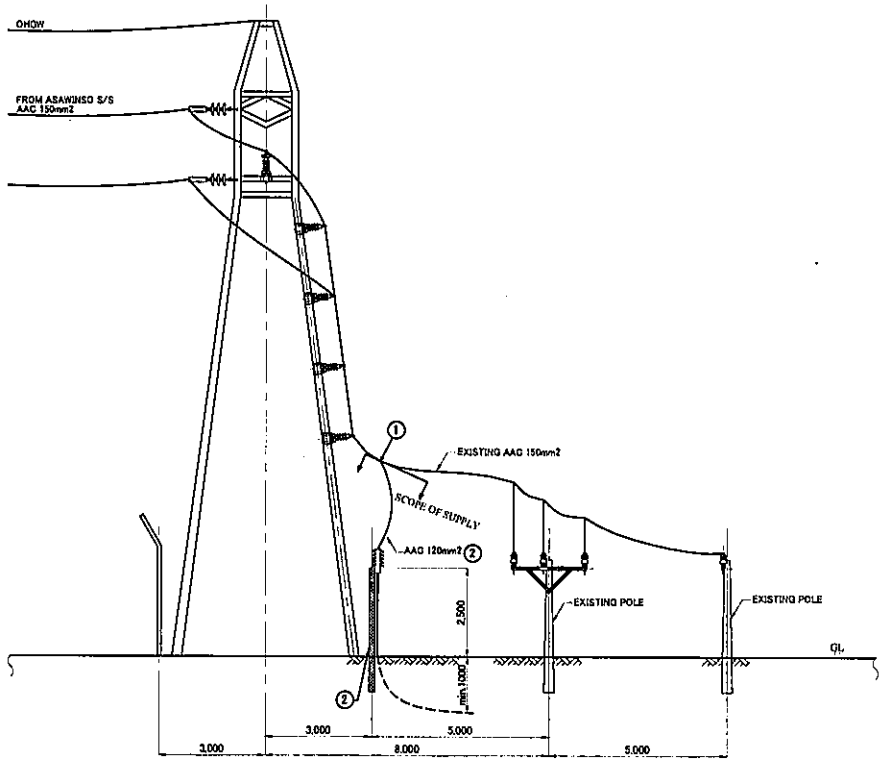
Additional Materials (追加資機材リスト)

PART.NO.	DESCRIPTION		Q'TY
1	Strain Insulator Set	耐張碍子セット	3
2	Pin Insulator Set	ピン碍子セット	1
3	Crossarm Set	腕金セット	1
4	Stay Wire Set	支線セット	1
5	Connector	コネクター	3pcs
6	Conductor	電線	10m

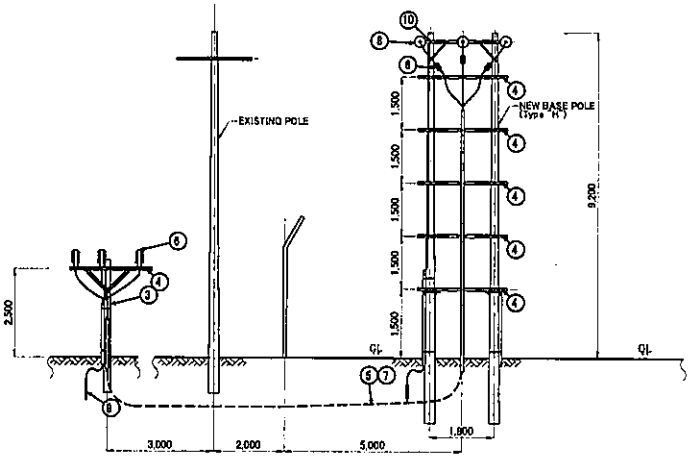
Dwg.No.TPA-Y　　標準延伸接続用 資機材構成図
Typical Connection Plan to the Existing Line (Extension Type)



PLAN VIEW



SECTION : A-A



SECTION : B-B

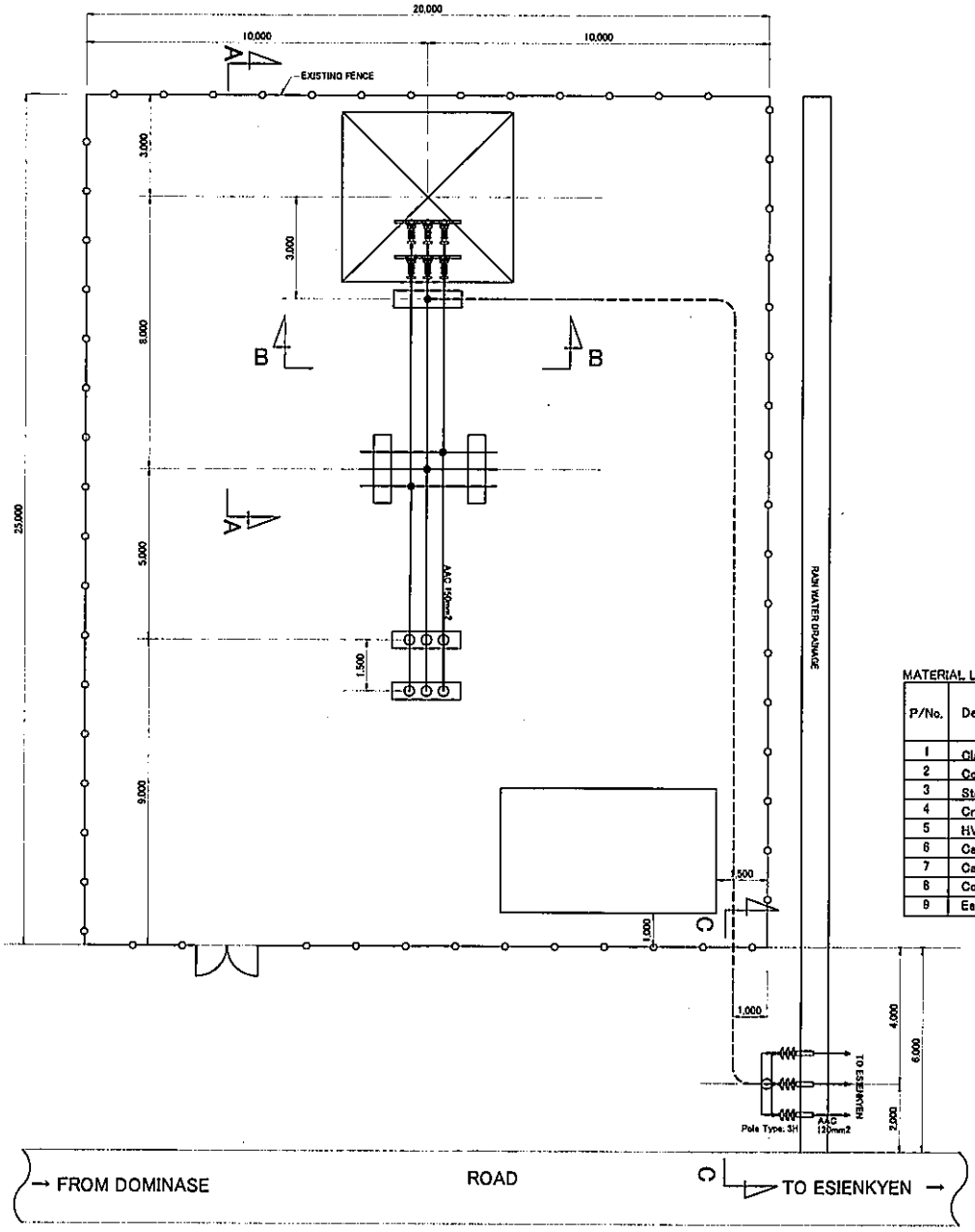
MATERIAL LIST

P/No.	Description	Unit	Q'ty per point
1	Clamp	pc	3
2	Conductor	m	10
3	Steel Pole	pc	2
4	Crossarm set	set	4
5	HV Cable	m	100
6	Cable Termination	set	6
7	Cable Conduit	m	20
8	Connector	pc	3
9	Earthing Set	set	1

REMARKS
1.T-CLAMP (RUN: 150, TAP: 120) SHALL BE SUPPLIED IN THIS PROJECT.
2.XLPE SHALL BE OF COPPER CONDUCTOR WITH WIRE ARMOR.

Title	DWG. No.
33kVダウサソ開閉所接続用 資機材構成図(アッパーデンチラ地域) 33kV Connection Plan at DAWUSASO Switching Station (UPPER DENKYIRA AREA)	UD-1

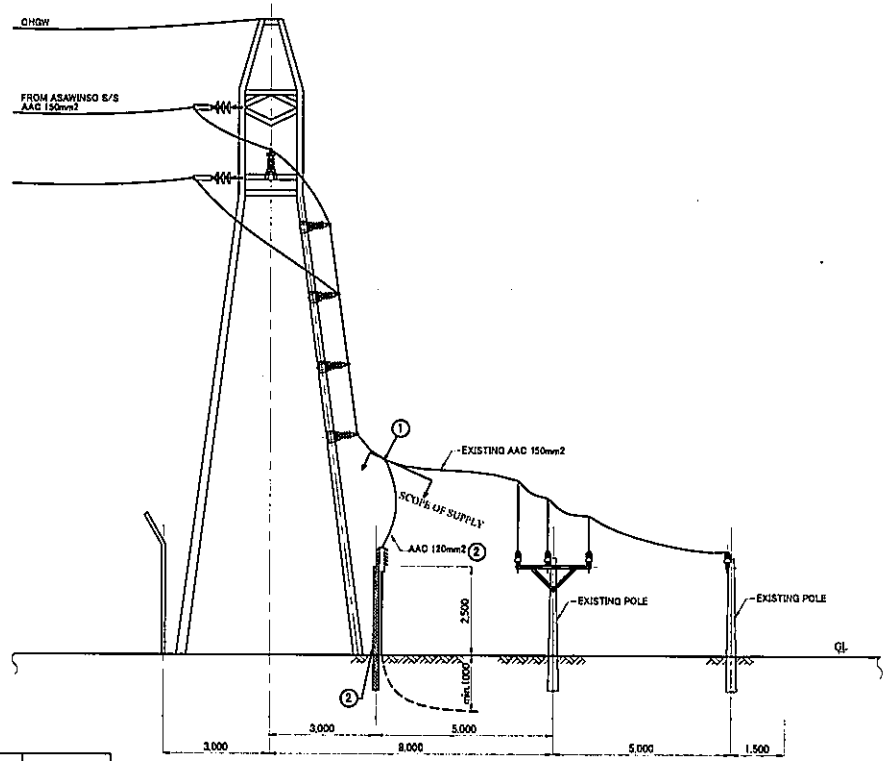
A-50



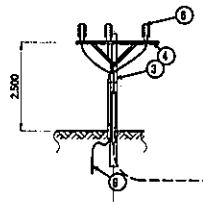
PLAN VIEW

MATERIAL LIST

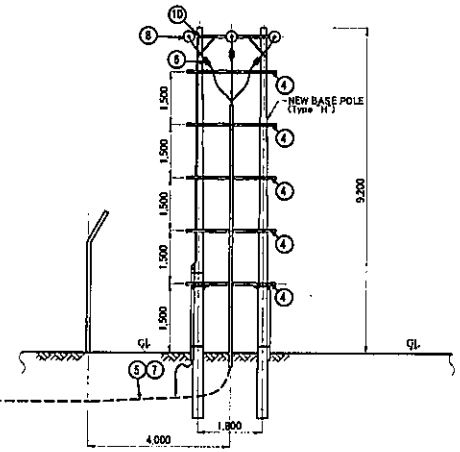
P/No.	Description	Unit	Q'ty per point
1	Clamp	pc	3
2	Conductor	m	10
3	Steel Pole	pc	2
4	Crossarm set	set	5
5	HV Cable	m	100
6	Cable Termination	set	6
7	Cable Conduit	m	10
8	Connector	pc	3
9	Earthing Set	set	1



SECTION : A-A



SECTION : B-B



SECTION : C-C

REMARKS
1.T-CLAMP (RUN: 150, TAP: 120) SHALL BE SUPPLIED IN THIS PROJECT.
2.XLPE SHALL BE OF COPPER CONDUCTOR WITH WIRE ARMOR.

Title	DWG. No.
33kVヌクワンタヌム開閉所接続用 資機材構成図(アッパーデンチラ地域) 33kV Connection Plan at NKWANTANUM Switching Station (UPPER DENKYIRA AREA)	UD-2

資料－７　電力需要予測

7. 電力需要予測

東部州西アキム地域 電力需要予測

(Unit: kW)

No.	Name of Community	Popula-tion	①	Public and Commercial Facilities ②	③	④	⑤	2005	2006 (+2.5%)	2007 (+2.5%)	2008 (+2.5%) ▽Commencement of Operation	2009 (+5%)	2010 (+5%)	2011 (+5%)	2012 (+5%)	2013 (+5%) Target-1 ▼	2014 (+5%)	2015 (+5%)	2016 (+5%)	2017 (+5%)	2018 (+5%) Target-2 ▼
									Population Growth			Power Demand Growth									
1	Asuofori	1,700	170	2		7		38	39	40	42	44	46	49	51	54	56	59	62	65	68
2	Akwadum	700	100	1	0	1	1	18	18	19	20	21	22	23	24	25	27	28	29	31	32
3	Akanteng	4,000	400			10	6	78	80	82	86	90	95	100	105	110	115	121	127	133	140
4	Kobriso	1,040	214	2			2	35	36	37	39	41	43	45	47	49	52	54	57	60	63
5	Afranse	4,000	400	3		6	2	73	75	77	81	85	89	93	98	103	108	113	119	125	131
6	Brekumanso	1,010	176	2	1	4	4	39	40	41	43	45	47	50	52	55	58	60	63	67	70
7	Ammarko	3,000	200	3	0	5	4	43	44	45	47	49	52	54	57	60	63	66	69	73	76
8	Oworam	7,000	700	3	1	5	8	122	125	128	135	141	148	156	164	172	180	189	199	209	219
9	Pabi	3,000	300	2	1	5	12	63	65	66	69	73	77	80	84	89	93	98	103	108	113
10	Anum Apapam	6,500	615	4	1	8	5	113	116	119	125	131	138	145	152	159	167	176	185	194	204
11	Mfranor	1,500	100	2	0	3	2	23	23	24	25	26	27	29	30	32	33	35	37	39	40
12	Kuano	3,800	449	3	0	6	5	82	84	86	90	95	100	105	110	115	121	127	133	140	147
13	Sowatey	1,135	190	1	0	2	2	34	34	35	37	39	41	43	45	47	50	52	55	57	60
14	Takorase	1,500	100	2	0	3	2	23	23	24	25	26	27	29	30	32	33	35	37	39	40
15	Krodua	4,000	400	4		8	2	77	79	81	85	89	94	98	103	108	114	120	125	132	138
16	Akim Breman	4,390	440	2		3	2	74	75	77	81	85	89	94	99	103	109	114	120	126	132
17	Nyanoa	1,450	347	3		6	2	65	67	68	72	75	79	83	87	92	96	101	106	111	117
18	Obinyimna	1,230	170	2		5	1	36	36	37	39	41	43	45	48	50	52	55	58	61	64
19	Abamkrom	2,042	270	4	1	5	2	56	57	58	61	64	68	71	74	78	82	86	90	95	100
20	Kumikrom	4,000	400	2		4	5	71	72	74	78	82	86	90	95	99	104	109	115	121	127
21	Esaaso	1,000	100	1		2	2	20	21	21	22	23	24	26	27	28	30	31	33	34	36
22	Nkurankan	690	110	1		4	3	25	26	26	28	29	30	32	34	35	37	39	41	43	45
23	Nyakoma	1,600	160	2		2	4	31	32	33	34	36	38	40	42	44	46	48	51	53	56
24	Anomakojo	1,400	210	2		2	2	38	38	39	41	43	46	48	50	53	55	58	61	64	67
25	Atokrom	1,200	100	1	0	2	2	20	21	21	22	23	24	26	27	28	30	31	33	34	36
26	Danso	1,647	350	2		2	3	59	60	62	65	68	72	75	79	83	87	92	96	101	106
27	Krofofrom	1,200	100	1	0	2	2	20	21	21	22	23	24	26	27	28	30	31	33	34	36
28	Odjade	2,750	280	2	0	4	3	52	53	54	57	60	63	66	69	73	76	80	84	88	93
29	Abuchenso	1,500	100	2	0	3	2	23	23	24	25	26	27	29	30	32	33	35	37	39	40
30	Bunso	4,000	400	3	0	6	5	75	76	78	82	86	91	95	100	105	110	116	121	127	134
31	Kofikyere	1,800	120	2	0	3	2	26	26	27	28	30	31	33	34	36	38	40	42	44	46
	Total	75,784	8,171	66	5	128	99	1,546	1,584	1,624	1,705	1,790	1,880	1,974	2,073	2,176	2,285	2,399	2,519	2,645	2,777

Remarks: [Target-1] means the target for the estimation of transformer capacity and Target-2 means the target for distribution line capacity.

(1) Maximum Demand per Customer（kW）

①:	**Residential (250Wx0.6=150)**	**0.15**
②:	**School**	**1.00**
③:	**Clinic**	**2.50**
④:	**Corn mill**	**1.50**
⑤:	**Others (Well, Shop, etc.)**	**0.50**

(2) Basic Parameters

1:	**Growth rate (%) of Maximum Power Demand**	**1.050**
2:	**Growth rate (%) of Residential Increase**	**1.025**

中央州アッパー・デンチラ地域　電力需要予測

(Unit: kW)

No.	Name of Community	Popula-tion	①	Public and Commercial Facilities				2005	2006 (+2.5%)	2007 (+2.5%)	2008 (+2.5%)	2009 (+5%)	2010 (+5%)	2011 (+5%)	2012 (+5%)	2013 (+5%) Target-1 ▼	2014 (+5%)	2015 (+5%)	2016 (+5%)	2017 (+5%)	2018 (+5%) Target-2 ▼
				②	③	④	⑤				▽Commencement of Operation										
									Residential Growth			Power Demand Growth									
1	Brofoyedru	1,000	200	1	0	1	2	34	34	35	36	38	40	42	44	46	48	51	53	56	59
2	Bremang	2,500	250	2	0	2	7	46	47	48	50	52	55	57	60	63	66	70	73	77	81
3	Dominase	6,000	1,200	5	2	6	20	209	214	220	225	236	248	261	274	287	302	317	333	349	367
4	Abora	1,500	350	1	0	1	8	59	60	62	64	67	70	74	77	81	85	89	94	99	103
5	Anwiawa	1,500	300	2	0	1	9	53	54	56	57	60	63	66	69	73	76	80	84	89	93
6	Beseasi	4,200	500	2	0	2	13	87	89	91	93	98	103	108	113	119	125	131	138	145	152
7	Nkroful	1,500	200	3	0	1	11	40	41	42	43	45	47	50	52	55	58	61	64	67	70
8	Treposo	1,800	250	1	0	1	6	43	44	45	46	49	51	54	56	59	62	65	68	72	75
9	Esienkyen	2,000	350	1	0	1	7	59	60	61	63	66	69	73	77	80	84	89	93	98	103
10	Asaaman	2,500	300	2	0	2	10	55	56	58	59	62	65	69	72	76	79	83	88	92	96
11	Akwaboso	2,500	450	2	0	3	7	78	79	81	83	88	92	97	101	107	112	117	123	129	136
12	Afiefisc	1,500	400	4	1	2	7	73	75	77	79	83	87	91	96	100	105	111	116	122	128
13	Ameyaw	2,500	400	3	0	2	9	71	72	74	76	80	84	88	92	97	102	107	112	118	124
14	Subin	2,000	340	2	1	3	8	64	66	67	69	72	76	80	84	88	92	97	102	107	112
15	Anhwiaso	800	80	3	0	2	10	23	24	24	25	26	27	29	30	32	33	35	37	38	40
16	Nyinawusu	1,800	300	0	0	1	8	51	52	53	54	57	60	63	66	69	73	77	80	84	89
	Total	35,600	5,870	34	4	31	142	1,042	1,068	1,095	1,122	1,178	1,237	1,299	1,364	1,432	1,504	1,579	1,658	1,741	1,828

Remarks: [Target-1] means the target for the estimation of transformer capacity and Target-2 means the target for distribution line capac

(1) Maximum Demand per Customer（kW）

①:	**Residential (250Wx0.6=150)**	**0.15**
②:	**School**	**1.00**
③:	**Clinic**	**2.50**
④:	**Corn mill**	**1.50**
⑤:	**Others (Well, Shop, etc.)**	**0.50**

(2) Basic Parameters

1:	**Growth rate (%) of Maximum Power Demand**	**1.050**
2:	**Growth rate (%) of Residential Increase**	**1.025**

資料－８　事業事前計画表

8. 事業事前計画表（基本設計時）

1. 案件名

ガーナ共和国　地方電化計画

2. 要請の背景（協力の必要性・位置付け）

ガーナ共和国（以下「ガ」国と称す）では、人口の約 7 割を占める地方部と都市部の経済格差が著しく、比較的貧しい地方農村地域から都市地域へ人口が流入し、都市のスラム化が進むなど、貧困問題は深刻な状況となっている。このため、「ガ」国は持続的経済成長、貧困削減及び民主的政策の推進を目指し、1995 年に長期開発指針である「VISION2020」を、2003 年にガーナ貧困削減戦略ペーパー（GPRS）を策定し、地方農村部住民の生活水準の向上、貧困削減に不可欠な事業として、地方電化事業を最優先課題と位置付けている。

「ガ」国は地方電化を推進するため、1989 年に全国電化計画（NES: National Electrification Scheme）を策定し、2020 年までに人口 500 人以上の全ての集落に対する電力供給を目標に掲げ、6 期に分けて計画を実施している。同計画の第 1 期（1991～1995 年）、第 2 期（1996～2000 年）では、世界銀行の主導により日本を含む各ドナーが協調し、郡都及び地方中核市町村の電化が実施され、全郡都（110 ヶ所）の電化が完了している。現在は、NES による地方中核市町村の電化と並行して、NES による電化が遅れている市町村からの要請に対応するために、エネルギー省は自立電化計画（SHEP: Self Help Electrification Project）を推進している。

電力セクターの財政状況については、設備投資に必要な資金を十分確保することが困難であるものの、近年は配電損失の低減、電気料金の値上げ、料金回収の強化等により、ガーナ電力公社の収支状況は改善されつつある。しかしながら全国平均電化率 43%（人口比率、2000 年人口統計）に対し、全人口の約 7 割が居住している地方部の電化率は今なお 20%程度に留まっており、地方未電化地域においては、医療、教育機関等の公共機関で電気が利用できていない。公共サービスの質を確保し、住民の生活環境を改善する上で地方電化は重要課題となっている。

本計画は、地方農村地域と都市部の経済格差の是正と貧困削減を目的とし、農産物の一大産地として電化の実施により経済発展が期待される中南部の 2 地域（東部州西アキム地域、中央州アッパー・デンチラ地域）の電化を NES の一環として実施するものである。

3. プロジェクト全体計画概要

(1) プロジェクト全体計画の目標（裨益対象の範囲及び規模）

「ガ」国の東部州西アキム地域及び中央州アッパー・デンチラ地域において、電化率が向上し、住民の生活環境の改善、経済活動の活性化が達成される。

《裨益対象の範囲及び規模》

約 11.1 万人（西アキム地域(31 ヶ村)約 7.6 万人、アッパー・デンチラ地域(16 ヶ村)約 3.6 万人）

(2) プロジェクト全体計画の成果

1) 東部州西アキム地域、中央州アッパー・デンチラ地域において、33/11kV 配電設備の調達・据付が行われる。

2) 東部州西アキム地域、中央州アッパー・デンチラ地域において、低圧基幹配電資材の調達・据付が行われる。

3) 東部州西アキム地域、中央州アッパー・デンチラ地域において、電力量計及び引込線の調達、需要家への接続が行われる。

(3) プロジェクト全体計画の主要活動

1) 33/11kV 配電設備の調達、据付を行う。

2) 低圧基幹配電資材の調達を行う。

3) 低圧基幹配電資材の据付を行う。

4) 電力量計及び引込線の調達、需要家への接続を行う。

5) 上記の配電設備を使用して電力供給を行う。

(4) 投入（インプット）

1) 日本側（＝本案件）：無償資金協力 10.79 億円

2) 相手国側

a) 配電線据付ルート上の樹木の伐採
b) 低圧基幹配電資材の据付
c) 電力量計の調達、需要家への接続
d) 運転・維持管理要員
e) 調達された設備の運転・維持管理

(5) 実施体制

1) 主管官庁： エネルギー省（MOE）

2) 実施機関（プロジェクト）： 同上

3) 実施機関（運転・維持管理）：ガーナ電力公社（ECG）

4. 無償資金協力案件の内容

(1) サイト

「ガ」国東部州西アキム地域（31 町村）、中央州アッパー・デンチラ地域（16 町村）

(2) 概要

電化対象地域における 33/11kV 配電設備の調達・据付並びに低圧基幹配電資材の調達

(3) 相手国側負担事項

配電線据付ルート上の樹木の伐採、低圧基幹配電資材の据付、電力量計の調達、需要家への接続、運転・維持管理要員の配置、調達された設備の運転・維持管理

(4) 概算事業費

14.23 億円（無償資金協力 10.79 億円、「ガ」国側負担 3.44 億円）

(5) 工期

詳細設計・入札期間を含め、第 1 期（西アキム地域）が約 15 ヶ月、第 2 期（アッパー・デンチラ地域）が約 14 ヶ月

(6) 貧困、ジェンダー、環境及び社会面の配慮

住民移転を伴わないよう、配電線ルート選定に配慮した。

5. 外部要因リスク

特になし

6. 過去の類似案件からの教訓の活用

特になし

７．プロジェクト全体計画の事後評価に係る提案

(1) プロジェクト全体計画の目標達成を示す成果指標

番号	項　目	単位	現状	計画後
1.	本計画対象地域の町村電化率 (1)東部州西ｱｷﾑ地域 (2)中央州ｱｯﾊﾟｰ･ﾃﾞﾝﾁﾗ地域	%	 6 7	 17 13
2.	本計画対象地域の世帯電化率 (1)東部州西ｱｷﾑ地域 (2)中央州ｱｯﾊﾟｰ･ﾃﾞﾝﾁﾗ地域	%	 15 22	 35 44

[備考]
町村電化率：当該地域の全町村数のうち、電化されている町村の割合
世帯電化率：当該地域の全世帯数のうち、電化されている世帯の割合

(2) その他の成果指標

特になし

(3) 評価のタイミング

2011 年以降（機材稼働開始 2 年経過後）