1. 調査団員･氏名

(1) 第一次現地調査

氏 名	担当業務	現 職
林　俊行	総括	独立行政法人　国際協力機構 国際協力専門員
齊藤　学	計画管理	独立行政法人　国際協力機構 産業開発・公共政策部 資源・エネルギーグループ　資源・エネルギー第二課
工藤　義行	業務主任／送配電計画	（有）エクシディア
酒村　建治	変電設備	西日本技術開発（株）
大橋　圭一郎	系統解析／保護制御	西日本技術開発（株）
宇留野　厚人	送配電設備	八千代エンジニヤリング（株）
黒羽子　強平	施工計画／積算	八千代エンジニヤリング（株）
堀米　康男	施設設計／積算 1	（有）堀米設計
小松　大記	施設設計／積算 2	八千代エンジニヤリング（株）
樺沢　麻美	環境社会配慮	ビコーズインスチチュート株式会社
中島　朋哉	変電設備補助	西日本技術開発（株）

(2) 第二次現地調査

氏　名	担当業務	現　職
林　俊行	総括	独立行政法人　国際協力機構 国際協力専門員
齊藤　学	計画管理	独立行政法人　国際協力機構 産業開発・公共政策部 資源・エネルギーグループ　資源・エネルギー第二課
工藤　義行	業務主任／送配電計画	（有）エクシディア
酒村　建治	変電設備	西日本技術開発（株）
黒羽子　強平	施工設計／積算	八千代エンジニヤリング（株）

2. 調査日程

表 1　現地調査日程（第一次現地調査）

No.	月日	曜日	調査内容 JICA団員	コンサルタント団員 業務主任グループ	変電グループ	送配電グループ	環境社会配慮	宿泊地	調査概要
1	3月7日	土	• 移動{成田22:20ードーハ4:35 by QR-807}、{福岡21:05ー仁川22:35 by KE-782}					機中泊	コンポーネントに係る協議・合意
2	3月8日	日	• 移動{仁川0:05ードーハ4:15 by QR-859}、{ドーハ8:05ーキガリ14:30 by QR-1387}					キガリ	
3	3月9日	月	• 10:00JICAルワンダ事務所表敬訪問及び本調査行程、内容の説明・協議 • 14:00インフラ省（MoI）、ルワンダエネルギーグループ（REG）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					キガリ	
4	3月10日	火	• サイト調査（ガソギ変電所、ンデラ変電所送電線のコネクションポイント等）					キガリ	
5	3月11日	水	• M/D(案)の提出協議 • 無償資金協力スキーム、「ル」国負担事項、全体工程等の説明 • 他ドナーの動向調査（AfDB、ベルギー大使館、EU） • JICA齊藤氏移動{成田22:20ードーハ4:35 by QR-807}		• ギコンド変電所訪問及び質問表聞き取り調査 • 測量・ボーリングに係る現地業者との協議			キガリ	
6	3月12日	木	• M/D(案)の協議 • 他ドナーの動向 • JICA 齊藤氏移動{ドーハ8:05 ーキガリ14:30 by QR-1387}		• REG訪問・協議 • サイト調査（調査対象送電線の環境現況調査） • 測量・ボーリングに係る現地業者との協議 • 資機材市場調査			キガリ	
7	3月13日	金	• M/D(案)の協議 • 他ドナーの動向 • M/D（案）の修正（if any）		• REG訪問・協議 • 既存施設仕様確認 • 資機材市場調査			キガリ	
8	3月14日	土	• 団内協議、資料整理					JICA：機中泊 キガリ	
9	3月15日	日	• 団内協議、資料整理					キガリ	概略設計
10	3月16日	月	• M/D(案)の協議		• サイト調査（ンデラ変電所、ガソギ変電所及び他変電所等） • 110kV送電線ルート調査（ンデラ変電所 - ガソギ変電所：約6km）			キガリ	
11	3月17日	火	• JICA齊藤氏移動{キガリ15:00{ドーハ23:15 by QR-1388}	• サイト調査（ンデラ変電所、ガソギ変電所及び他変電所等） • 110kV送電線ルート調査（ンデラ変電所 - ガソギ変電所：約6km）				キガリ	
12	3月18日	水	• JICA齊藤氏移動{ドーハ1:45動成田17:55 by QR-806}	• サイト調査（ンデラ変電所、ガソギ変電所及び他変電所等） • 110kV送電線ルート調査（ンデラ変電所 - ガソギ変電所：約6km）				キガリ	
13	3月19日	木	• M/D(案)の協議	• サイト調査（ンデラ変電所、ガソギ変電所及び他変電所等） • 110kV送電線ルート調査（ンデラ変電所 - ガソギ変電所：約6km）				キガリ	
14	3月20日	金	• MoI及びREGとM/Dの署名 • JICA林氏移動{キガリ15:00ードーハ23:15 by QR-1388}	• サイト調査（ンデラ変電所、ガソギ変電所及び他変電所等） • 110kV送電線ルート調査（ンデラ変電所 - ガソギ変電所：約6km）				キガリ	
15	3月21日	土	• JICA林氏移動{ドーハ1:45ー成田17:55 by QR-806}	• 団内協議、資料整理 • 樺沢氏移動{成田22:20ードーハ4:35 by QR-807}				キガリ	
16	3月22日	日		• 団内協議、資料整理 • 樺沢氏移動{ドーハ8:05ーキガリ14:30 by QR-1387}				キガリ	
17	3月23日	月		• サイト調査（ンデラ変電所、ガソギ変電所及び他変電所等） • 110kV送電線ルート調査（ンデラ変電所 - ガソギ変電所：約6km） • 環境社会配慮に係る制度・組織の調査、関連機関面談				キガリ	概略設計
18	3月24日	火		• サイト調査（ンデラ変電所、ガソギ変電所及び他変電所等） • 110kV送電線ルート調査（ンデラ変電所 - ガソギ変電所：約6km） • 環境社会配慮に係る制度・組織の調査、関連機関面談 • 測量・ボーリングに係る現地業者との契約				キガリ	

No.	月日	曜日	調査内容					宿泊地	調査概要
			JICA団員	コンサルタント団員					
				業務主任グループ	変電グループ	送配電グループ	環境社会配慮		
19	3月25日	水		• 国家開発計画、社会経済状況に係る情報収集 • インフラ省訪問、電力セクター構造改革に係る調査 • 電力需給状況調査(インフラ省) • 収支状況、電気料金に係る調査協議 • 環境社会配慮に係る制度・組織の調査、関連機関面談				キガリ	
20	3月26日	木		• フィールドレポート及び現地調査結果概要の作成 • 団内協議、資料整理 • 環境社会配慮に係る制度・組織の調査、関連機関面談				キガリ	
21	3月27日	金		• フィールドレポート及び現地調査結果概要の作成 • 補足資料・データの収集 • 資機材市場調査、通関手続き調査 • 港湾、輸送ルート調査 • 環境社会配慮に係る制度・組織の調査、関連機関面談				キガリ	
22	3月28日	土		• サイト調査(補足調査)				キガリ	
23	3月29日	日		• フィールドレポート及び現地調査結果概要の作成 • 団内協議、資料整理				キガリ	概略設計に係る協議・合意
24	3月30日	月		• REGへフィールドレポートの説明・協議 • 補足資料・データの収集 • 測量・試掘・ボーリング報告書精査・受領 • 市場調査(現地施工業者等) • 環境社会配慮に係る制度・組織の調査、関連機関面談 • 大橋氏及び中島氏移動{キガリ15:00中ドーハ23:15 by QR-1388}				キガリ	
25	3月31日	火		• REGへフィールドレポートの提出・説明・協議 • 環境社会配慮との契約 • 大橋氏及び中島氏移動{ドーハ1:30び仁川16:00 by QR-858}{仁川18:35 福岡19:55 by KE-781}				キガリ	
26	4月1日	水		• REGへフィールドレポートの説明・協議 • 環境社会配慮に係る制度・組織の調査、関連機関面談				キガリ	
27	4月2日	木		• JICAルワンダ事務所へ第一次現地調査結果報告 • 環境社会配慮に係る制度・組織の調査、関連機関面談 • その他3月7日出発組移動{キガリ15:00動ドーハ23:15 by QR-1388}				キガリ	
28	4月3日	金		• 環境社会配慮に係る制度・組織の調査、関連機関面談 • その他3月7日出発組移動{ドーハ1:45－成田17:55 by QR-806}、{ドーハ1:30一仁川16:00 by QR-858}{仁川18:35－福岡19:55 by KE-781}				キガリ	
29	4月4日	土		• 資料整理				キガリ	環境再委託先のフォローアップ等
30	4月5日	日		• 資料整理				キガリ	
31	4月6日	月		• 環境再委託先のフォローアップ等				キガリ	
32	4月7日	火		• 環境再委託先のフォローアップ等				キガリ	
33	4月8日	水		• 環境再委託先のフォローアップ等				キガリ	
34	4月9日	木		• 環境再委託先のフォローアップ等				キガリ	
35	4月10日	金		• 環境再委託先のフォローアップ等				キガリ	
36	4月11日	土		• 資料整理				キガリ	
37	4月12日	日		• 資料整理				キガリ	
38	4月13日	月		• 環境再委託先のフォローアップ等				キガリ	
39	4月14日	火		• 環境再委託先のフォローアップ等				キガリ	
40	4月15日	水		• 環境再委託先のフォローアップ等				キガリ	
41	4月16日	木		• 樺沢氏移動{キガリ15:00ードーハ23:15 by QR-1388}				キガリ	
42	4月17日	金		• 樺沢氏移動{ドーハ1:45－成田17:55 by QR-806}				-	

表２　現地調査日程（第二次現地調査）

No.	月日	曜日	調査内容 JICA団員	調査内容 コンサルタント団員	宿泊地	調査概要
1	11月7日	土	• 移動{成田22:20ードーハ4:35 by QR-807}		機中泊	準備調査報告書に係る協議・合意
2	11月8日	日	• 移動{ドーハ8:05ーキガリ14:30 by QR-1387}		キガリ	
3	11月9日	月	• JICAルワンダ事務所表敬訪問及び在ルワンダ日本国大使館（EoJ）協力準備調査報告書（案）資料の内容説明 • インフラ省（MoI）、ルワンダエネルギーグループ（REG）表敬訪問及び協力準備調査報告書（案）資料の提出・説明・協議 • 環境管理庁（REMA）及びMoIに環境影響評価に係る許認可状況の確認		キガリ	
4	11月10日	火	• MoI、REGへ協力準備調査報告書（案）の提出・説明・協議 • 機材仕様書（案）の説明・協議		キガリ	
5	11月11日	水	• MoI、REGへ協力準備調査報告書（案）の提出・説明・協議 • 機材仕様書（案）の説明・協議		キガリ	
6	11月12日	木	• MoI、REGへ協議議事録M/D（案）の説明・協議 • 協議議事録M/Dの署名		キガリ	
7	11月13日	金	• JICAルワンダ事務所への報告 • 移動{キガリ15:00ードーハ23:15 by QR-1388}		機中泊	
8	11月14日	土	• 移動{ドーハ1:45ー成田17:55 by QR-806}		-	

【略　語】（アルファベット順）

EoJ　：Embassy of Japan
JICA　：Japan International Cooperation Agency
MoI　：Ministry of Infrastructure
REMA　：Rwanda Environment Management Agency
REG　：Rwanda Energy Group

3. 関係者(面会者)リスト

インフラ省
Ministry of Infrastructure (MoI)

Mr. Christian Rwakunda	Permanent Secretary
Mr. Robert Nyamrumba	Energy Division Manager
Mr. Peace Kaliisa	Donor Coordinator
Mr. Jerome Nsengyarenje	Senior Engineer

電力開発公社
Electrical Development Corporation Limited

Mr. Kamangi Emmanuel	Managing Director
Eng. Ngizwenayo Dieudonne	Director of Energy Planning and Design
Mr. Philbert Kabanda	Environmental Safeguard Specialist
Mr. Richard Sangabo	Social Safeguard Specialist

電力運用公社
Electrical Utility Corporation Limited

Eng. William Bihoyiki	Ag. Head of Electricity Transmission Unit
Eng. Lavvy Vincent Mpava	Ag. Director of Electrical Utility
Mr. Butera Laurent	Transmission Engineer
Mr. Simon Ndiramiye	Transmission Engineer
Mr. Kagunge Fredric	Transmission Engineer

環境管理局
Rwanda Environmental Management Authority

Mr. Remy Norbert Duhuze	Director of Environmental Regulation and Pollution Control

ルワンダ開発委員会
Rwanda Development Board

Mr. Gashugi Innocent	Senior Environmental Engineer/Investment Implementation Division

JICA ルワンダ務所
JICA Rwanda Office

守屋 貴裕	所長
室谷 龍太郎	次長
野坂 直広	企画調査員（経済基盤整備）
Mr. Plaude Nkunzwenimana	所員

Minutes of Discussions
of
The Preparatory Survey
on
The Project for Improvement of Substations and Distribution Network Phase 2

In response to the request from the Government of the Republic of Rwanda (hereinafter referred to as "GoR"), the Japan International Cooperation Agency (hereinafter referred to as "JICA"), in consultation with the Government of Japan (hereinafter referred to as "GoJ"), decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") on The Project for Improvement of Substations and Distribution Network Phase 2 (hereinafter referred to as "the Project").

JICA sent to Rwanda the Preparatory Survey Team (hereinafter referred to as "the Team"), headed by Mr. Toshiyuki HAYASHI, Senior Advisor of JICA. The Team is scheduled to stay in Rwanda from 8th March to 16th April 2015.

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

Kigali, Rwanda 20th March, 2015

Mr. Toshiyuki HAYASHI
Team Leader
JICA Senior Advisor,
Japan International Cooperation Agency

Mr. Christian Rwakunda
Permanent Secretary
Ministry of Infrastructure

Mr. Emmanuel Kamanzi
Managing Director
Energy Development Corporation Limited
Rwanda Energy Group

Ms. Odette Mbabazi
Managing Director
Energy Utility Corporation Limited
Rwanda Energy Group

ATTACHMENT

1 Objective of the Project

The objective of the Project is to reinforce power transmission and distribution networks in Kigali.

2 Project Site

The Project sites are located in Kigali as shown in Annex-1.

3 Responsible and Implementing Organizations

The responsible organization is Ministry of Infrastructure (MININFRA).

The implementing organization is Energy Development Corporation Ltd. (EDCL) in collaboration with Energy Utility Corporation Ltd. (EUCL).

The organization structures of MININFRA, EDCL and EUCL are shown in Annex-2, Annex-3 and Annex-4 respectively.

4 Components Requested by the Rwanda side

The main components requested by GoR to GoJ have been confirmed in the Minutes of Discussions signed on 29th August 2014 as attached in Annex-5. During the initial discussion of the Survey, the Rwanda side proposed the revised components for the Project. After a series of discussions, the Rwanda side and the Team have agreed on the main components for the Survey as follows:

(A) Ndera Substation

a. Two sets of 20 MVA 110/15 kV transformers
b. One set of 110 kV switchgear
c. One set of 15kV switchgear
d. One set of control and supervisory facilities

(B) Transmission Line

a. Two circuits of 110 kV transmission lines from the existing line between Birembo and Gasogi substations to Ndera Substation

(C) Distribution Line

a. Two circuits of 15 kV distribution lines from Ndera Substation to existing line between Birembo and Free Zone Phase 1 substations
b. One circuit of 15 kV distribution line from existing Gasogi Substation to Kabuga substation (Ring Main Unit)

(D) Modification of existing Gasogi Substation

a. One set of 15 kV switchgear panel for outgoing feeder to Kabuga

(E) Ring Main Unit

a. Two sets of Ring Main Unit at Kabuga and Murindi.

Based on the result of the Survey, JICA will assess the appropriateness and priority of the above components from the viewpoint of necessity and relevance as Japan's Grant Aid scheme, and will report the findings to the GoJ. The scope of the Project will be confirmed after consultation with the GoJ.

5 Land Preparation for Ndera Substation

During the discussion, the Rwanda side confirmed a heavy fuel oil (HFO) diesel power station will be constructed in the lower side of Ndera Substation. The Rwanda side and the Team have agreed that the land for the substation and the power station will be prepared simultaneously and the earth walls of the prepared land will be properly treated by concrete facing. The Team has confirmed that the necessary land area to construct the substation will be investigated and informed to the Rwanda side during the Survey. The Rwanda side has confirmed that the land preparation will be completed before the start of the civil work for the substation foundation.

6 Japan's Grant Aid Scheme

6.1 Japan's Grant Aid Scheme

The Rwanda side has understood Japan's Grant Aid Scheme explained by the Team as described in Annex-6 and Annex-7.

6.2 Major Undertakings by the Rwanda side

The Rwanda side will take the necessary measures as described in Annex-8 for smooth implementation of the Project.

7 Schedule of the Preparatory Survey

The Team will continue the Survey in Rwanda until 16th April 2015 and report the result to the Government of Japan. Based on the result of the Survey, JICA will prepare the Draft Final Report in English and send a mission around September 2015 to explain and agree on the contents of the Draft Final Report.

8 Environmental and Social Considerations

8.1 The Rwanda side has agreed to conduct the required environmental and social considerations, and obtain approval on environmental clearance as well as other relevant permits/licenses required for the implementation of the Project.

8.2 The Rwanda side has 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 Rwanda, and was requested to prepare Environmental Checklist and Monitoring Form which are designated by JICA Guidelines for an outline design.

8.3 The Rwanda side has agreed to make necessary arrangements with relevant governmental organizations in order to secure funding for and execution of the above environmental matters in a timely manner as required for smooth execution of the Project.

8.4 The Rwanda side shall secure a necessary budget for environmental assessment and undertake it, and obtain the Environmental Certificate approved by Rwanda Development Board by the end of December 2015.

8.5 Presently, it is expected that the Project may cause a small-scale involuntary resettlement. The Rwanda side has understood that the Team will assist EDCL in identifying project affected people and developing an "Abbreviated Resettlement Action Plan (ARAP)". EDCL shall be responsible for the implementing the ARAP including the payment of compensation by the end of December 2015.

8.6 EDCL shall obtain land use permits and complete land acquisition necessary for the Project by the end of December 2015.

8.7 EDCL shall obtain necessary permits from Municipality by the end of December 2015 to construct new distribution lines within the road reserve.

8.8 Based on the JICA Guidelines, EDCL shall identify stakeholders related to this project and carry out stakeholder consultations during the course of Environmental Impact Assessment study.

8.9 Since an assessment process has not been done yet for this project, the Rwanda side has understood the abbreviated Resettlement Plan (ARAP) might need to be amended based on the results of Environmental Impact Assessment study.

8.10 The Rwanda side has agreed that the compensation will be based on the full replacement cost as much as possible in accordance with the JICA Guidelines.

8.11 The Rwanda side has agreed that the compensation will be based on the full replacement cost as much as possible.

8.12 The Rwanda side has understood that if the Project triggered a large scale involuntary resettlement, the Project will be categorized as Category A instead of B according to the JICA Guidelines. In this case an EIA is required according to the JICA Guidelines, regardless of the requirement by laws and regulations in Rwanda.

9 Other Relevant Issues

9.1 Status of the Survey

The Team explained that the purpose of the Survey is to collect necessary information for evaluating the relevance, appropriateness and urgency of the Project and for analyzing power system in Kigali, and also to identify the issues to be cleared for implementation of the Project. The Rwanda side has agreed to share all necessary information and data with the Team.

9.2 Coordination among relevant Development Partners and agencies

The Team requested the Rwanda side to ensure coordination among relevant development partners and agencies for smooth implementation of the Project and the Rwanda side has agreed to it.

9.3 Counterpart Personnel

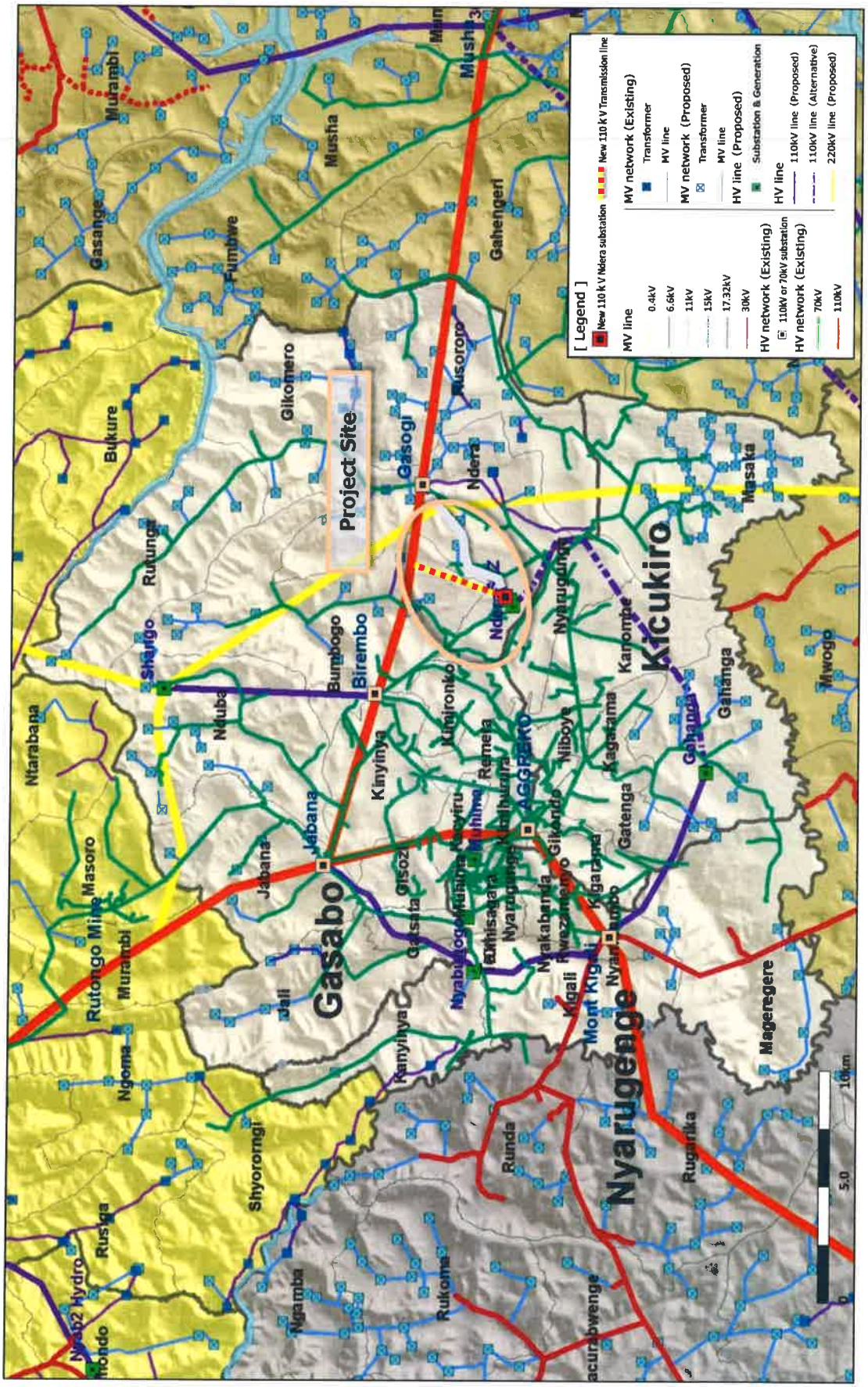
The Team requested the Rwanda side that necessary number of counterpart personnel shall be assigned to the Team and necessary arrangements with related organizations be made during the Survey in Rwanda. The Rwanda side has agreed to it.

(End)

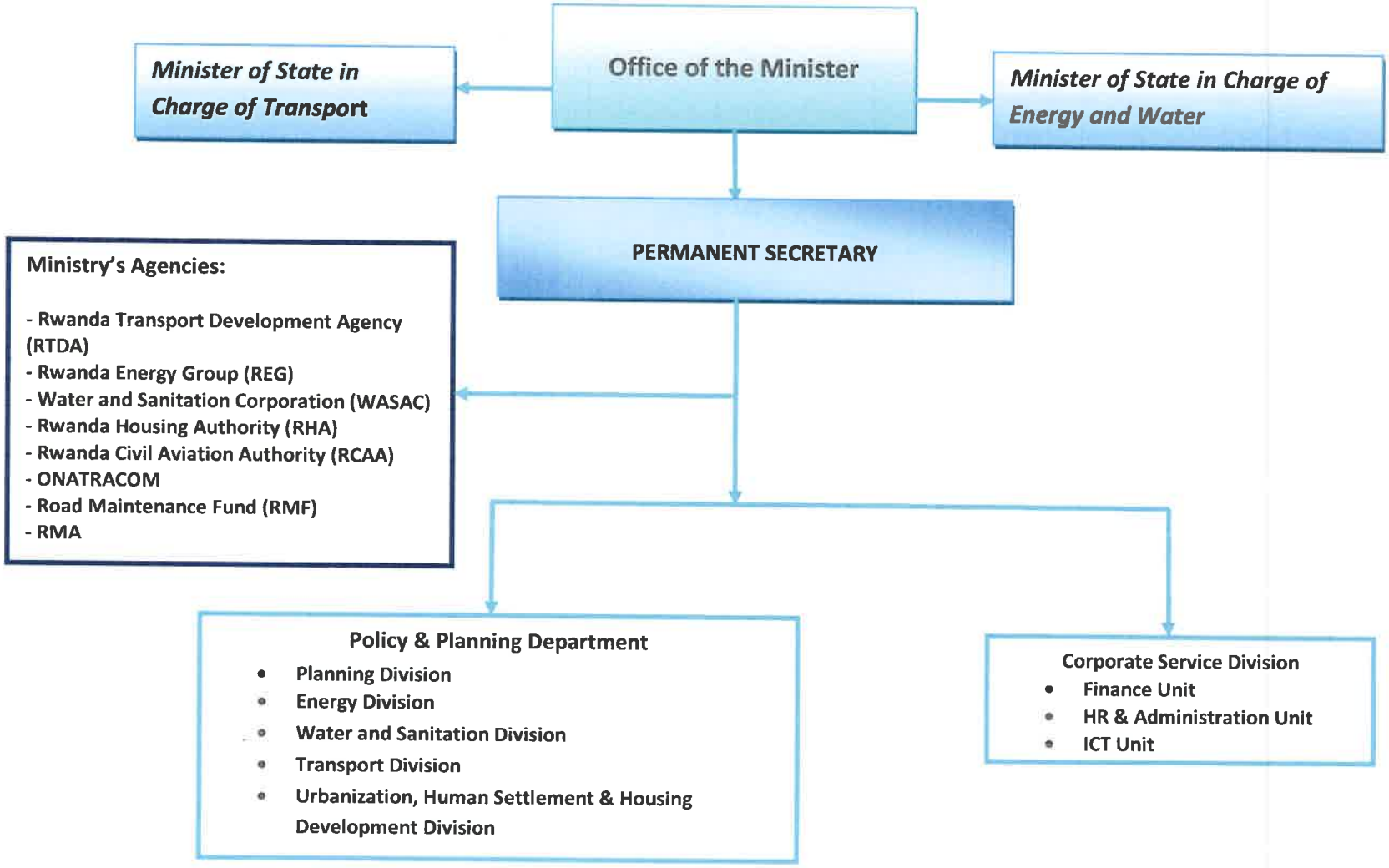
<List of Annexes>

Annex-1. Location of the Project Sites
Annex-2. Organization Structure of Ministry of Infrastructure (MININFRA)
Annex-3. Overall Structure of Rwanda Energy Group and Organization Structure of Energy Development Corporation Ltd. (EDCL)
Annex-4. Organization Structure of Energy Utility Corporation Ltd. (EUCL)
Annex-5. Minutes of Discussions signed on 29th August 2014
Annex-6. Japan's Grant Aid
Annex-7. Flow Chart of Japan's Grant Aid Procedures
Annex-8. Major Undertakings to be taken by Each Government
Annex-9. Tentative schedule of the Project

Location of the Project Sites



Organization Structure of Ministry of Infrastructure (MININFRA)

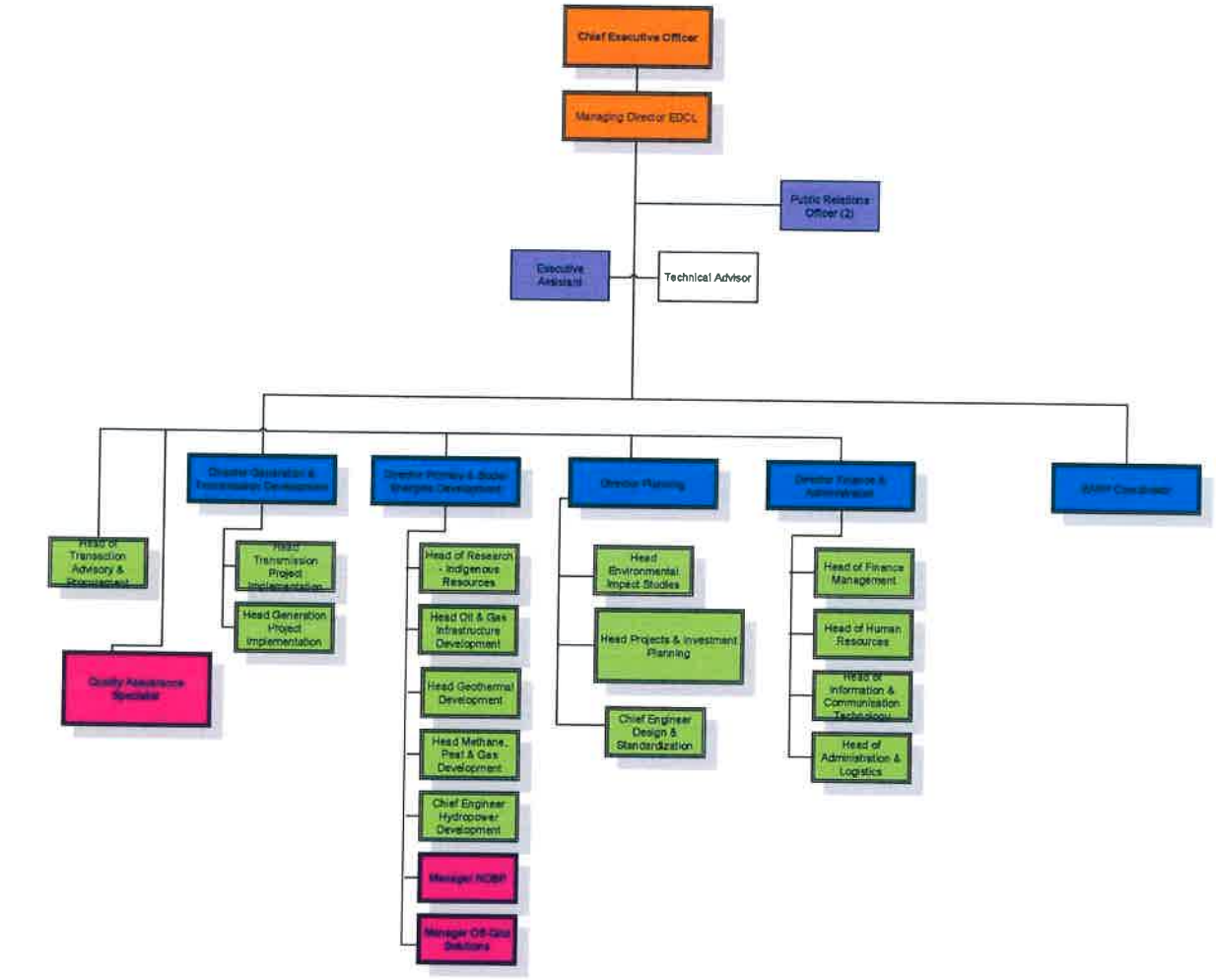


A4-6

Overall Structure of Rwanda Energy Group Ltd.

Organization Structure of Energy Development Corporation ltd.

EDCL Organisation Structure (November 2014) – ***High Level***



KEY

- MD
- Directors
- Senior Manager / Head of Units
- Manager
- Officer
- Support Staff
- Technicians

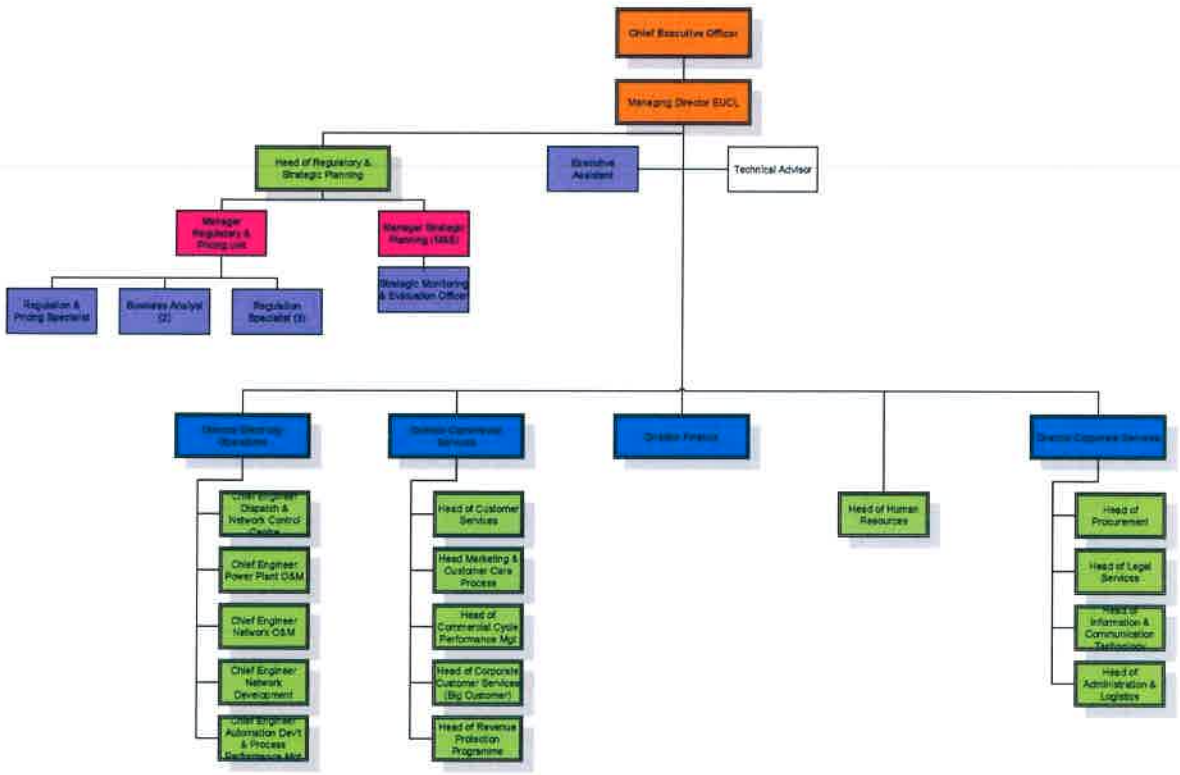
Summary

MD - 1	Manager - 1	Technicians - Nil
Senior Manager / Head of Units - 1	Officer - 3	Support Staff - Nil

Total Staff - 6

Organization Structure of Energy Utility Corporation ltd.

EUCL Organisation Structure (November 2014) – ***MD***



KEY

CEO / MD	Senior Manager / Head of Units	Officer
Directors	Manager	Support Staff

Summary

MD - 1	Senior Manager / Head of Units - 1	Officer - 8
Directors - Nil	Manager - 2	Support Staff - Nil

Total Staff - 12

Annex - 5

Minutes of Discussions on the Project for Improvement of Substations and Distribution Network Phase 2 in the Republic of Rwanda

In response to the request from the Government of the Republic of Rwanda (hereinafter referred to as "Rwanda"), 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 Improvement of Substations and Distribution Network Phase 2 (hereinafter referred to as "the Project").

Before conducting the Survey, JICA held discussions about the framework and appropriate components of the Project with the officials of Rwandan authorities concerned (hereinafter referred to as "the Rwandan side"). As a result of the discussions, both sides have confirmed the main items described in the sheets attached hereto.

Kigali, Rwanda
August 29th, 2014

Mr. HAYASHI Toshiyuki
JICA Senior Advisor
Japan International Cooperation Agency

Mr. RWAKUNDA Christian
Permanent Secretary
Ministry of Infrastructure

Mr. MUGIRANEZA Jean Bosco
Chief Executive Officer
Rwanda Energy Group Ltd.

RWANDA ENERGY GROUP LIMITED
CHIEF EXECUTIVE OFFICER

Mrs. MBABAZI Odette
Managing Director
Energy Utility Corporation Ltd.

ATTACHMENT

1. Objective of the Project

The objective of the Project is to reinforce transmission and distribution networks in Kigali.

2. Project Site

The Project sites based on the request from the Rwandan side are located in Kigali as shown in Annex-1.

3. Responsible and Implementing Organizations

(1) The responsible organization is Ministry of Infrastructure (MININFRA).
(2) The implementing organization is Rwanda Energy Group Co. Ltd. (REG) with its subsidiary company the Energy Utility Corporation Ltd. (EUCL).

4. Items Requested by Rwandan side

As a result of the discussions, requested components have been agreed as follows:

- Construction of Ndera primary substation including two sets of 25 MVA transformers (110/15 kV) and 110 kV in-coming transmission line from Gasogi substation to Ndera substation with two ring main units at Murindi and Kicukiro to complete the interconnection of 15 kV between Ndera and Gikondo substations.

JICA will assess the appropriateness and the priority of the requested components from the viewpoint of necessity and relevance as Japan's Grant Aid scheme, and will report the findings to the Government of Japan. The scope of the Project for the further analysis will be confirmed after consultation with the Government of Japan.

5. Japan's Grant Aid Scheme

(1) The Rwandan side has understood Japan's Grant Aid Scheme explained by JICA as described in Annex-2.
(2) The Rwandan side will take the necessary measures, as described in Annex-3, for smooth implementation of the Project.

6. The Preparatory Survey

Based on this Minutes of Discussions, JICA will send the Preparatory Survey Team for Basic Design to Rwanda subject to the approval of the Government of Japan.

7. Other Relevant Issues

(1) Coordination among relevant donors and agencies

JICA requested Rwandan side to ensure coordination among relevant development partners and agencies for smooth implementation of the Project.

(2) Environmental and Social Considerations

a) JICA requested Rwandan side to ensure access to the project site and undertake expropriation if necessary in order to secure the sites.
b) JICA requested Rwandan side to conduct the required environmental studies, and

obtain approval on environmental clearance for implementation of the Project.

c) Rwandan side agreed to comply with JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "JICA Guidelines") as well as Rwandan laws and regulations.

d) The Rwandan 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.

(3) Counterpart Personnel

The JICA requested Rwandan side that necessary number of counterpart personnel shall be assigned to the preparatory survey team and necessary arrangements with related organizations shall be made in Rwanda. Rwandan side agreed the request.

(4) Operation and maintenance (O&M) of the facilities

As it is quite important that the implementing organization secures proper O&M of the facilities that may be provided under the Japanese Grant Aid Scheme, JICA requested Rwandan side to take the maximum efforts for proper maintenance.

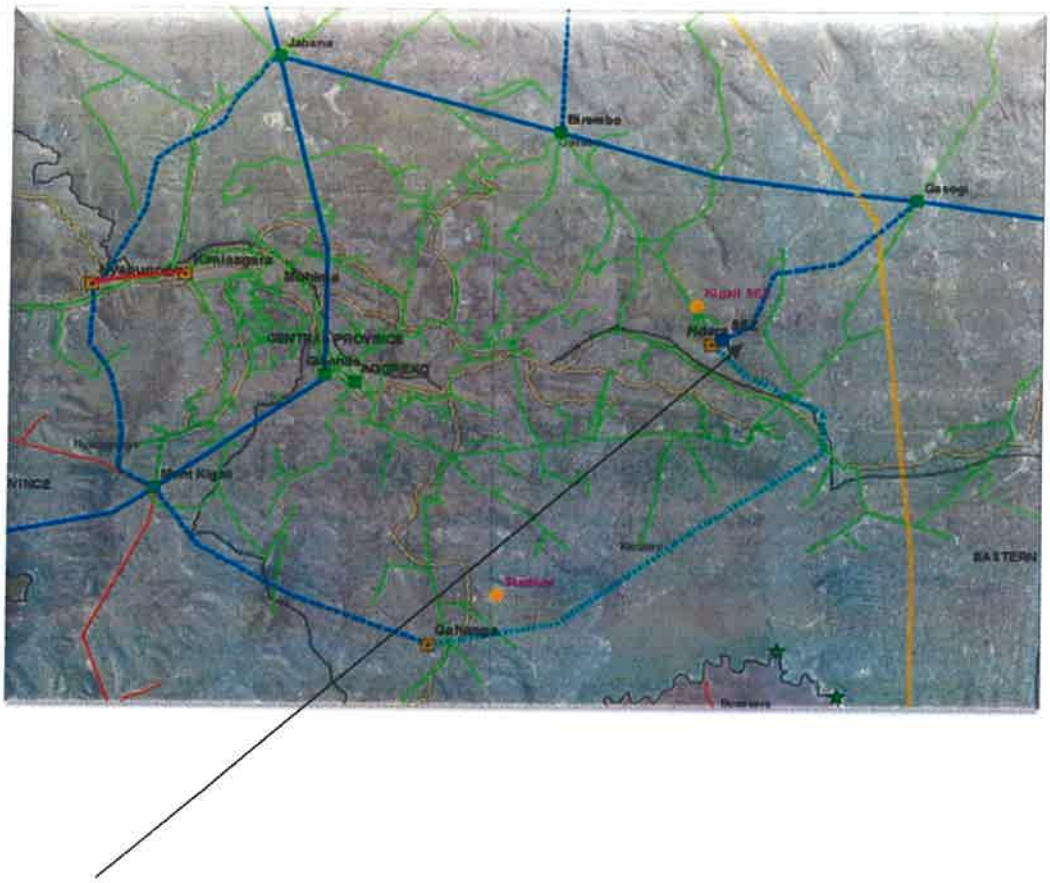
(End)

<List of Annex>

Annex-1	Location of the Requested Project Site
Annex-2	Japan's Grant Aid
Annex-3	Major Undertakings to be taken by Each Government

Annex - 1

LOCATION OF THE REQUESTED PROJECT SITES



Project Site: Ndera, Gasogi and the area between Ndera and Gasogi

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 (Official Development Assistance) operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on the law and the decision of the Government of Japan (hereinafter referred to as "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 to a recipient country 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

The Japanese Grant Aid is conducted as follows-

- Preparatory Survey (hereinafter referred to as "the Survey")
  - The Survey conducted by JICA
- Appraisal &Approval
  - Appraisal by The GOJ and JICA, and Approval by the Japanese Cabinet
- Determination of 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 Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey 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 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 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 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 considering the guidelines of the Japan's Grant Aid scheme.

JICA 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 Survey, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed, JICA recommends the GOJ to appraise the implementation 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 plead 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

The consultant firm(s) used for the Survey will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A, in order to maintain technical consistency.

(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 secure 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-3.

(6) "Proper Use"

The Government of 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) "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 in 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 to the Bank.

(10) Social and Environmental Considerations

A recipient country must ensure the social and environmental considerations for the Project and must follow the environmental regulation of the recipient country and JICA socio-environmental guideline.

(End)

Annex-3

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 (including Access road)		●
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		●
	b. The gas supply system within the site	●	
	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 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 consideration in the implementation of the Project.		●

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 the law and the decision of the Government of Japan (hereinafter referred to as "the GOJ"), JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

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- Estimation of costs of the Project.

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JICA 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.

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

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(2) Selection of Consultants

The consultant firm(s) used for the Survey will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A, in order to maintain technical consistency.

(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 secure 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-5.

(6) "Proper Use"

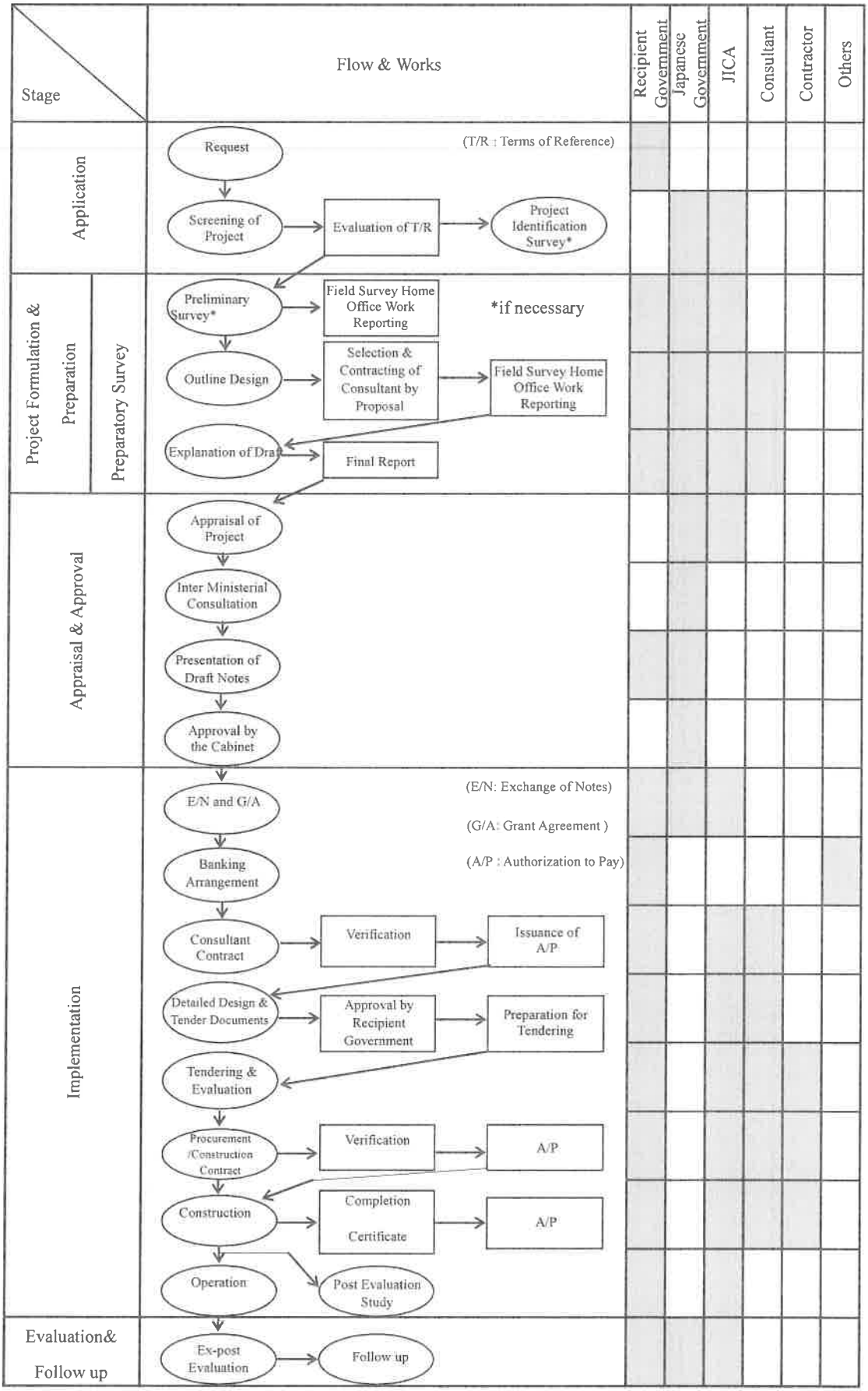
The Government of the recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by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

(7) "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)

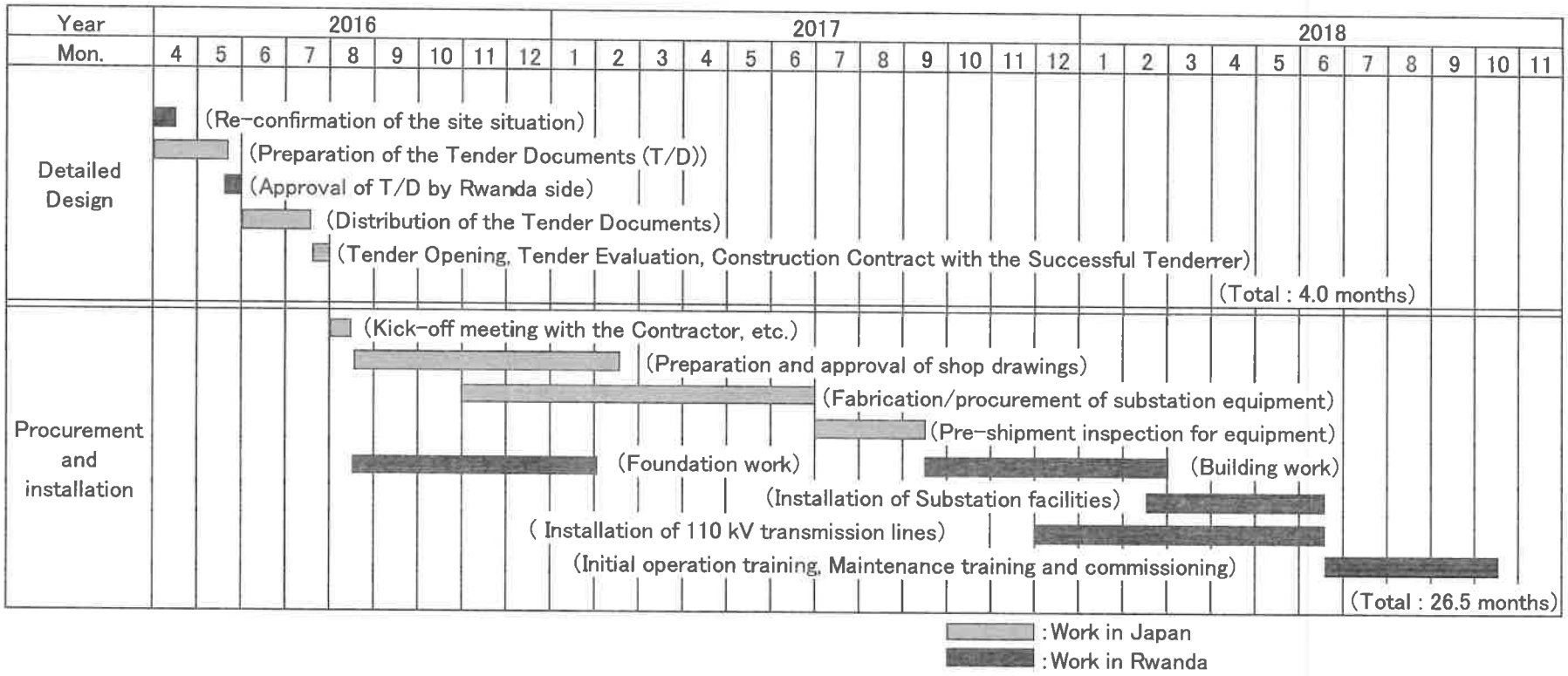
Flow Chart of Japan's Grant Aid Procedures



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 (including Access road)		●
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		●
	b. The gas supply system within the site	●	
	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 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 consideration in the implementation of the Project.		●

Tentative schedule of the Project



Minutes of Discussions
of
The Preparatory Survey
on
The Project for Improvement of Substations
and Distribution Network Phase 2
(Explanation on Draft Preparatory Survey Report)

On the basis of the discussions and field survey in the Republic of Rwanda from 8th March to 16th April 2015, and the subsequent technical examination of the results in Japan, the Japan International Cooperation Agency (hereinafter referred to as "JICA") prepared a draft Preparatory Survey Report on the Project for Improvement of Substations and Distribution Network Phase 2 (hereinafter referred to as "the Draft Report").

In order to explain the Draft Report and to consult with the concerned officials of the Government of Rwanda on its contents, JICA sent to Rwanda the Preparatory Survey Team for the explanation of the Draft Report (hereinafter referred to as "the Team"), headed by Mr. Toshiyuki HAYASHI, JICA Senior Advisor, and is scheduled to stay in the country from 8th to 13th November, 2015.

As the result of the discussions, both sides confirmed the main items described in the attached sheets.

Kigali, November 12th, 2015

Mr. Toshiyuki HAYASHI
Team Leader
JICA Senior Advisor,
Japan International Cooperation Agency

Mr. Christian RWAKUNDA
Permanent Secretary
Ministry of Infrastructure

Mr. Emmanuel KAMANZI
Managing Director
Energy Development Corporation Limited
Rwanda Energy Group

Ms. Odette MBABAZI
Managing Director
Energy Utility Corporation Limited
Rwanda Energy Group

ATTACHMENT

1 Objective of the Project

The objective of the Project is to improve stability and efficiency of power supply through strengthening substations, transmission lines and distribution lines, thereby contributing to economic growth of Rwanda.

2 Title of the Preparatory Survey

Both sides have confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Improvement of Substations and Distribution Network Phase 2".

3 Project Site

Both sides have confirmed that the sites of the Project are in Kigali City, and are shown in Annex 1.

4 Line Organization and Executing Agency

Both sides have confirmed the Line Organization and Executing Agency as follows:

4.1 The Line Organization is the Ministry of Infrastructure (hereinafter referred to as "MININFRA"), which would be the organization to supervise the Executing Agency.

4.2 The Executing Agency is Energy Development Corporation Limited (hereinafter referred to as "EDCL") in collaboration with Energy Utility Corporation Limited (hereinafter referred to as "EUCL"). The Executing Agency shall coordinate with all the relevant agencies, and ensure that the necessary undertakings are taken by the relevant agencies properly and on time for the smooth implementation of the Project. The organization charts of MININFRA, EDCL and EUCL are shown in Annex 2.

5 Contents of the Draft Report

After the explanation of the contents of the Draft Report by the Team, MININFRA, EDCL and EUCL (hereinafter referred to as " Rwanda side") have agreed in principle to its contents.

6 Cost Estimation (exclusive taxes)

Both sides have confirmed that the Project cost estimation described in the Draft Report was provisional and would be examined further by the Government of Japan for its final approval. Present cost estimation is shown in Annex 3.

7 Confidentiality of the Cost Estimation and Specifications

Both sides have confirmed that the Project cost estimation and technical specifications in the Draft Report should never be duplicated or disclosed to any third parties until all the contracts of the Project are concluded.

8 Japanese Grant Scheme

Rwanda side understands the Japanese Grant Scheme and its procedures as described in Annex 4 (Japanese Grant), Annex 5 (Flow Chart of Japanese Grant Procedures) and Annex 6 (Financial Flow of Japanese Grant), and the necessary measures to be taken by the Government of Rwanda.

9 Project Implementation Schedule

The Team explained to Rwanda side that the expected implementation schedule is as attached in Annex 7. The project completion is planned in 2018.

10 Expected outcomes and Indicators

Both sides have agreed that the key indicators for expected outcomes are as follows. Rwanda side has responsibility to monitor the progress of the indicators and achieve the target in year 2021.

10.1 Quantitative Description

Outcome Indicator	Base line in January 2015	Target in 2021	
		Without the Project	With the Project
Annual electric energy at sending end of Ndera substation (GWh)	N.A	N.A	65
Load factor of transformer in Gikondo Substation (%)	59	63 – 90	53 - 76
Power loss of transmission system in Kigali network (kW)	467	3,937	3,225

10.2 Narative Description

Power demand in Kigali area in base line period in January 2015 was 57 MW. The demand forecast at low case is 111 MW and high case is 158 MW in 2021 according to the "Final Report of the Project for Preparation of Electricity Development Plan for Sustainable Geothermal Energy Development in Rwanda March 2015 (Master Plan)." This project will enable EUCL to meet the demand increase in 2021 forecasted in the Master Plan; thus, increase the revenue from electricity sales for EUCL. As demand increases almost three times more than the base line period, power loss also increases as it is shown in Quantitative Description above. However, because of this project, power loss will be reduced by 712 kW.

11 Major Undertakings to be taken by Recipient Government

Both sides have confirmed that the Major Undertakings to be taken by Recipient Government are described in Annex 8. Rwanda side has assured to take the necessary measures and coordination including allocation of the necessary budget which is preconditions of the implementation of the Project. It has been further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage. Contents of Annex 3 (Project Cost Estimation) will be updated as the Detailed Design progresses, and will finally be attached to the signed Grant Agreement.

12 Monitoring during the Implementation

The Project will be monitored every month by the executing agency by using the Project Monitoring Report (PMR) attached in Annex 9.

13 Ex-Post Evaluation

JICA will conduct ex-post evaluation three (3) years after the project completion with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, Sustainability) of the Project. The result of the evaluation will be publicized. Rwanda side will be required to provide necessary support for the evaluation.

14 Schedule of the Study

JICA will compile the Final Report of the Preparatory Survey in accordance with the confirmed items and send it to Rwanda side around March 2016.

15 Environmental and Social Consideration

15.1 Environmental Guidelines and Environmental Category

The JICA mission explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as 'the Guidelines') is applicable for the Project. The Project is categorized as B because the Project is neither located in a sensitive area, nor has its sensitive characteristics, further nor falls into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

15.2 Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as Annex 10. Both sides have confirmed that in case of major modification of the content of the Environmental Checklist, EDCL shall submit the modified version to JICA in a timely manner.

15.3 Environmental Issues

15.3.1 Environmental Impact Assessment (EIA)

Both sides have confirmed that the EIA report was approved by Rwanda Development Board in August 2015. Rwanda side has agreed on JICA's disclosure of provided EIA report on its website.

15.3.2 Environmental Management Plan and Environmental Monitoring Plan

Both sides have confirmed Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) of the Project are shown as Annex 11. Both sides have agreed that environmental mitigation measures and monitoring shall be conducted based on the EMP and EMoP, which may be updated during the detailed design stage.

15.4 Social Environment

15.4.1 Land Acquisition and Resettlement

Both sides have confirmed that the14,539.2m^2 of land would be acquired, 59 Households / 191 people would be affected, and 3 Households / 19 people would be relocated due to the implementation of the Project. Such land acquisition and resettlement shall be implemented based on the (Abbreviated) Resettlement Action Plan (RAP) prepared in line with JICA Guidelines, and the RAP was authorized by Rwanda side in August 2015.

15.5 Environmental and Social Monitoring

15.5.1 Environmental Monitoring

Both sides have agreed that EDCL will submit the results of environmental monitoring to JICA by using the monitoring form attached as Annex 11.

15.5.2 Social Monitoring

Both sides have confirmed that EDCL will implement social monitoring about land acquisition and resettlement proposed in the RAP. Rwanda side and the JICA mission have agreed that EDCL will submit results of social monitoring to JICA by using the monitoring form attached as Annex 12.

15.5.3 Information Disclosure of Monitoring Results

Both sides confirmed that Rwanda side will disclose results of environmental and social monitoring to local stakeholders in their field offices.

Rwanda side has agreed that JICA will disclose the results of the environmental and social monitoring submitted by EDCL using the monitoring forms attached in Annex 11 and Annex 12 on its website.

16 Other Relevant Issues

16.1 Project Owner and Supervision

Both sides have confirmed that EDCL is the project owner and responsible for the construction supervision. Both sides have also confirmed that EDCL and EUCL will utilize this project for the capacity development of their engineers, so that they would be able to increase their practical experience for future projects.

16.2 Operation and Maintenance of the Facilities

The Team explained the importance of operation and maintenance of the facilities constructed by the Project considering that proper asset management impacts greatly on life-span of the facilities and its maintenance cost. EUCL shall secure enough staff and budgets necessary for appropriate operation and maintenance of the facilities.

16.3 Cooperation among Relevant Organizations

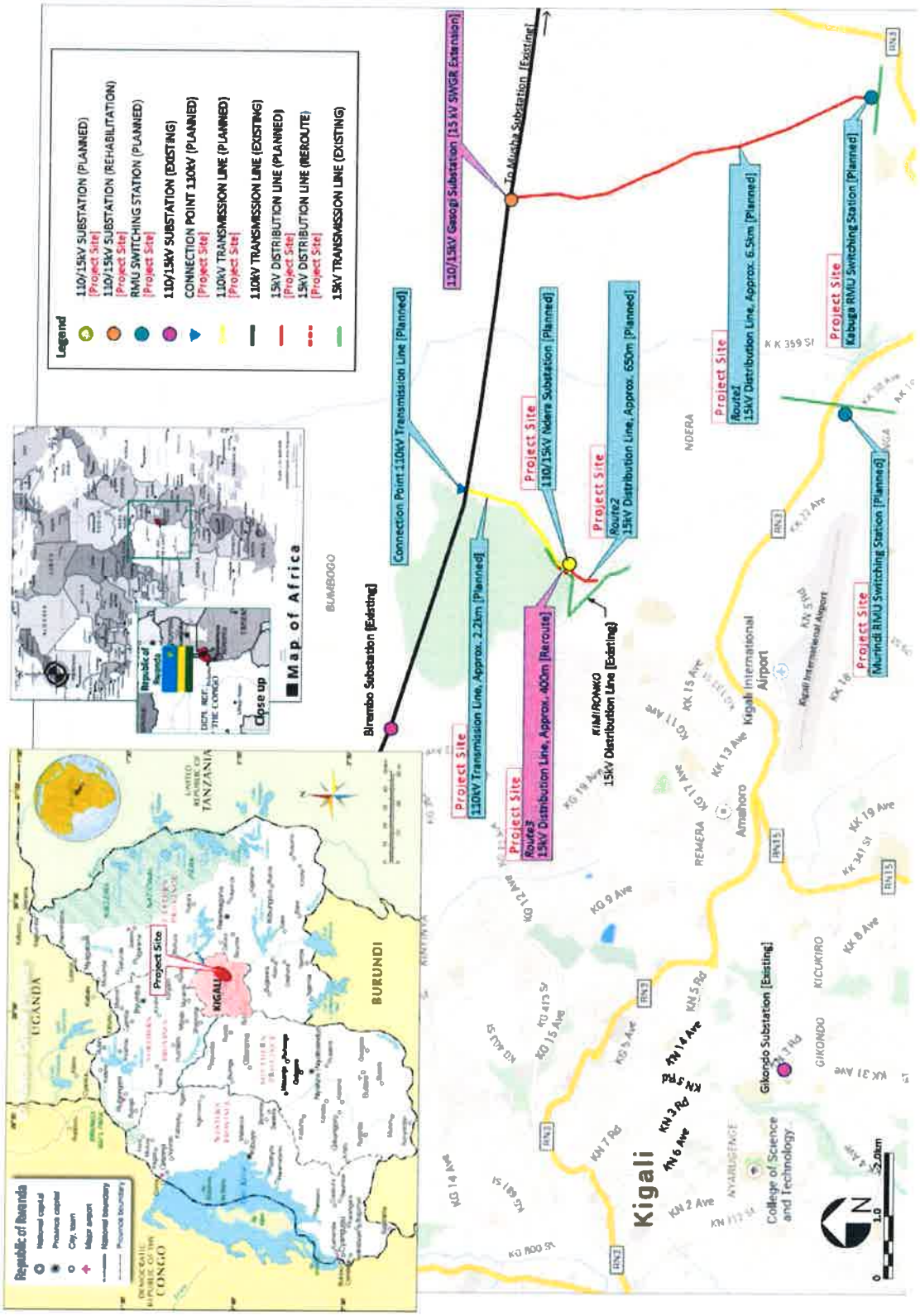
The Team requested Rwanda side to ensure coordination among relevant development partners and agencies for the smooth implementation of the Project. The Rwanda side has agreed to it.

16.4 Disclosure of Information

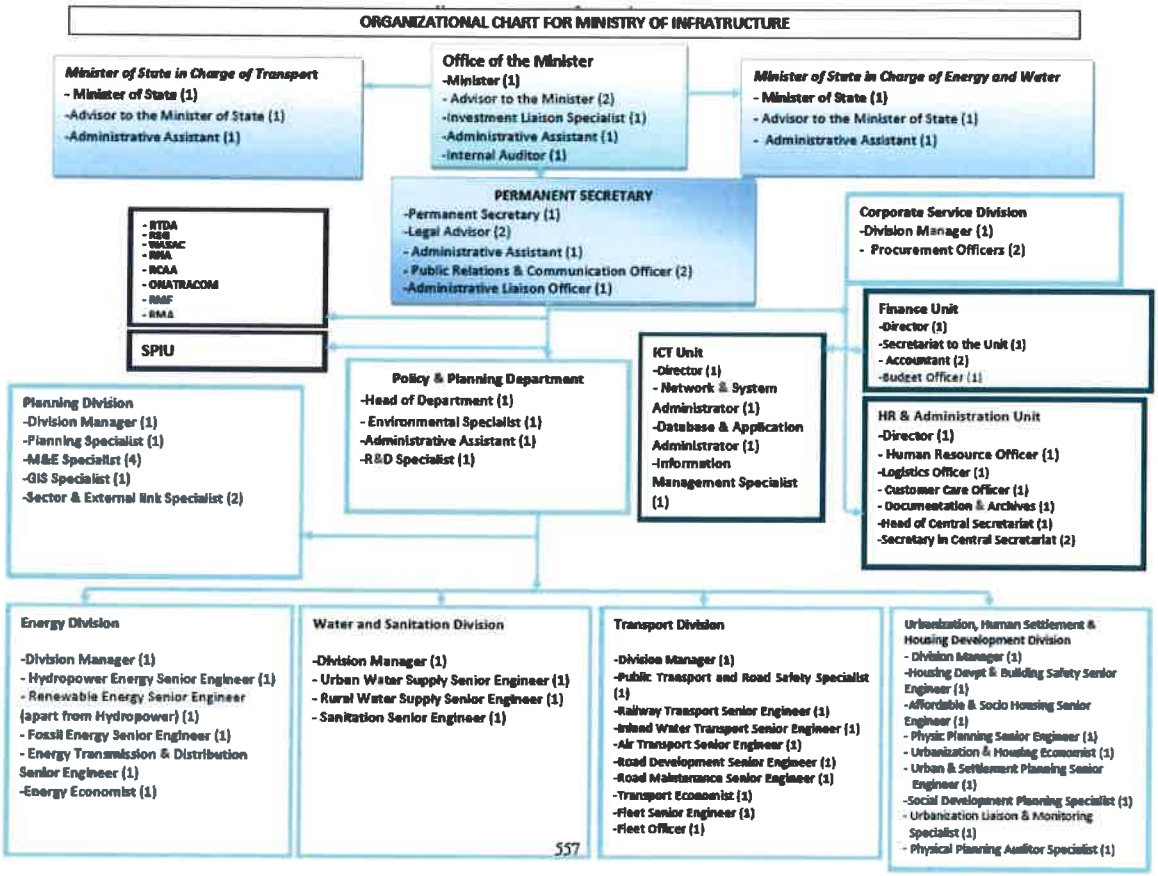
Both sides have confirmed that the study results excluding the Project cost will be disclosed to the public after completion of the Preparatory Survey. All the study results including the project cost will be disclosed to the public after all the contracts for the Project are concluded.

Annex 1

Project Site

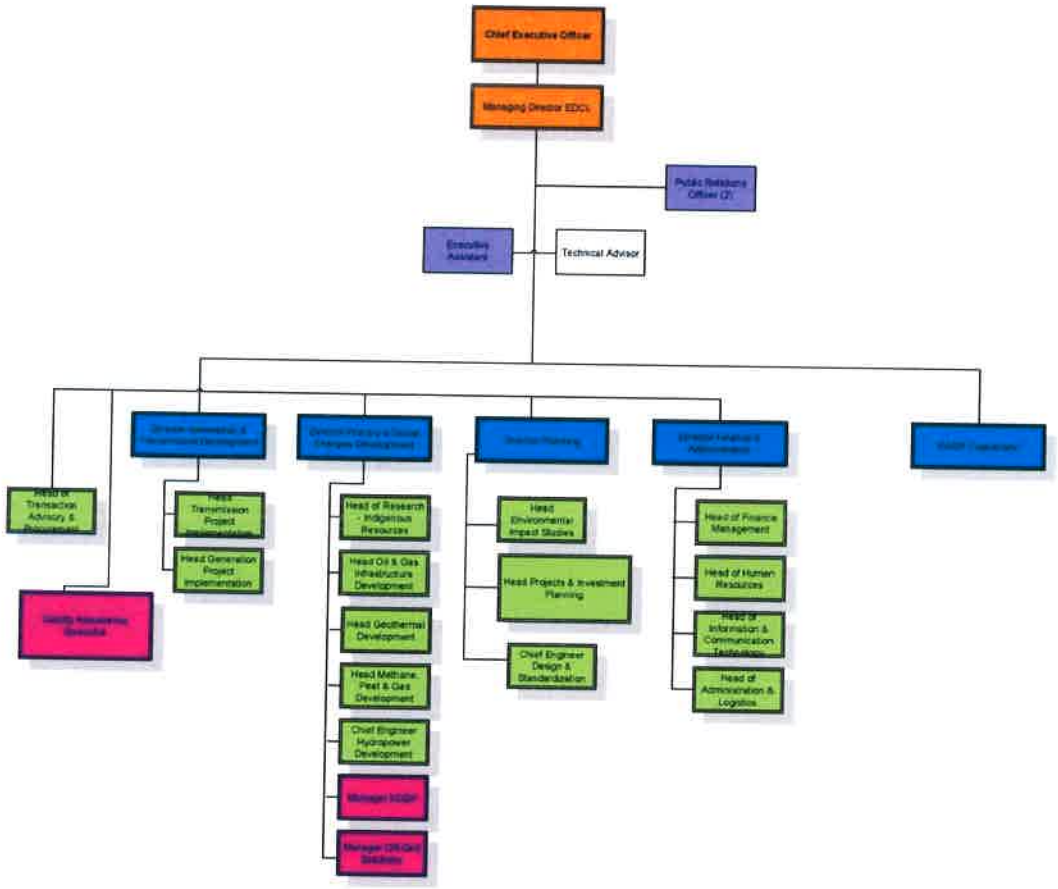


Organization Chart of MININFRA



Organization Chart of EDCL

EDCL Organisation Structure (November 2014) – ***High Level***



KEY

- MD
- Directors
- Senior Manager / Head of Units
- Manager
- Officer
- Support Staff
- Technicians

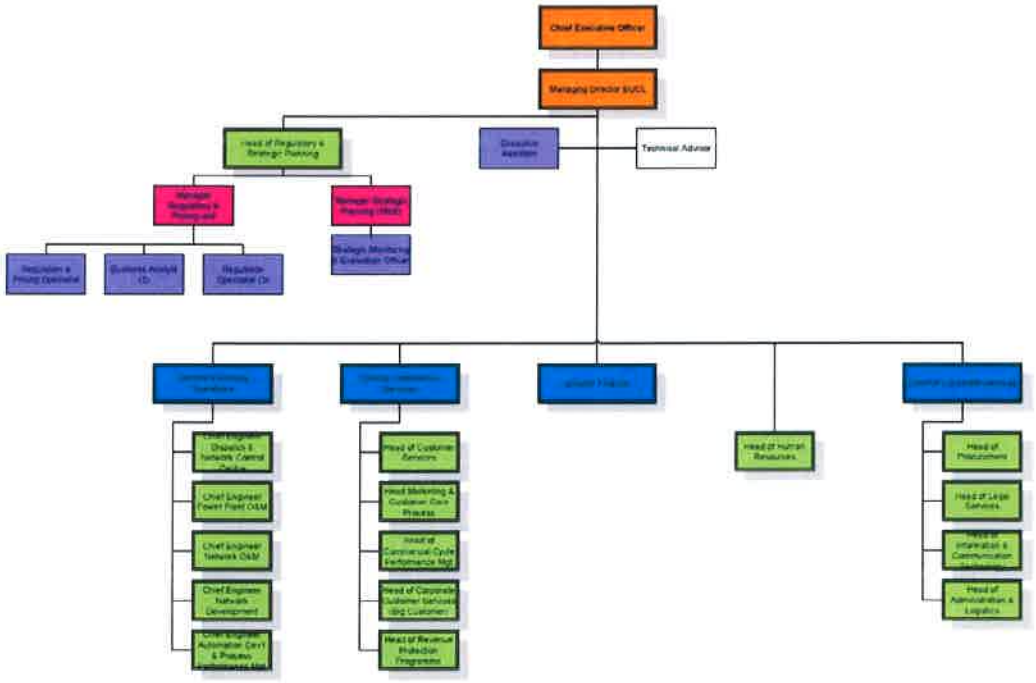
Summary

MD - 1	Manager - 1	Technicians - Nil
Senior Manager / Head of Units - 1	Officer - 3	Support Staff - Nil

Total Staff - 6

Organization Chart of EUCL

EUCL Organisation Structure (November 2014) – *MD*



KEY

CEO / MD
Directors
Senior Manager / Head of Units
Manager
Officer
Support Staff

Summary

MD - 1	Senior Manager / Head of Units - 1	Officer - 6
Directors - Nil	Manager - 2	Support Staff - Nil

Total Staff - 12

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This page is closed due to the confidentiality.

Japanese Grant

The Japanese Grant (hereinafter referred to as the "Grant") 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 is not supplied through the donation of materials as such.

Based on a JICA law which was entered into effect on October 1, 2008 and the decision of the GOJ, JICA has become the executing agency of the Japanese Grant for Projects for construction of facilities, purchase of equipment, etc.

1 Grant Procedures

The Grant is supplied through following procedures:

1.1 Preparatory Survey

The Survey conducted by JICA

1.2 Appraisal &Approval

Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet

1.3 Authority for Determining Implementation

The Notes exchanged between the GOJ and a recipient country

1.4 Grant Agreement (hereinafter referred to as "the G/A")

Agreement concluded between JICA and a recipient country

1.5 Implementation

Implementation of the Project on the basis of the G/A

2 Preparatory Survey

2.1 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:

a. 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.
b. Evaluation of the appropriateness of the Project to be implemented under the Grant Scheme from a technical, financial, social and economic point of view.
c. Confirmation of items agreed between both parties concerning the basic concept of the Project.
d. Preparation of an outline design of the Project.
e. 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 project. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant 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.

2.2 Selection of Consultants

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

2.3 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 Japanese Grant Scheme

3.1 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 signed 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, in accordance with the E/N, to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

3.2 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.

3.3 Eligible source country

Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. The Grant may be used for the purchase of the products or services of a third country, if necessary, taking into account the quality, competitiveness and economic rationality of products and services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals", in principle.

3.4 Necessity of "Verification"

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

3.5 Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Project, the recipient country is required to undertake such necessary measures. The Japanese Government requests the Government of the recipient country to exempt all customs duties, internal taxes and other fiscal levies such as VAT, commercial tax, income tax, corporate tax, resident tax, fuel tax, but not limited, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract, since the Grant fund comes from the Japanese taxpayers.

3.6 "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, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant.

3.7 "Export and Re-export"

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

3.8 Banking Arrangements (B/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"), in principle. JICA will execute the Grant 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.

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.

3.9 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.

3.10 Environmental and Social Considerations

The Government of the recipient country must carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the recipient country and JICA Guidelines for Environmental and Social Consideration (April, 2010) .

3.11 Monitoring

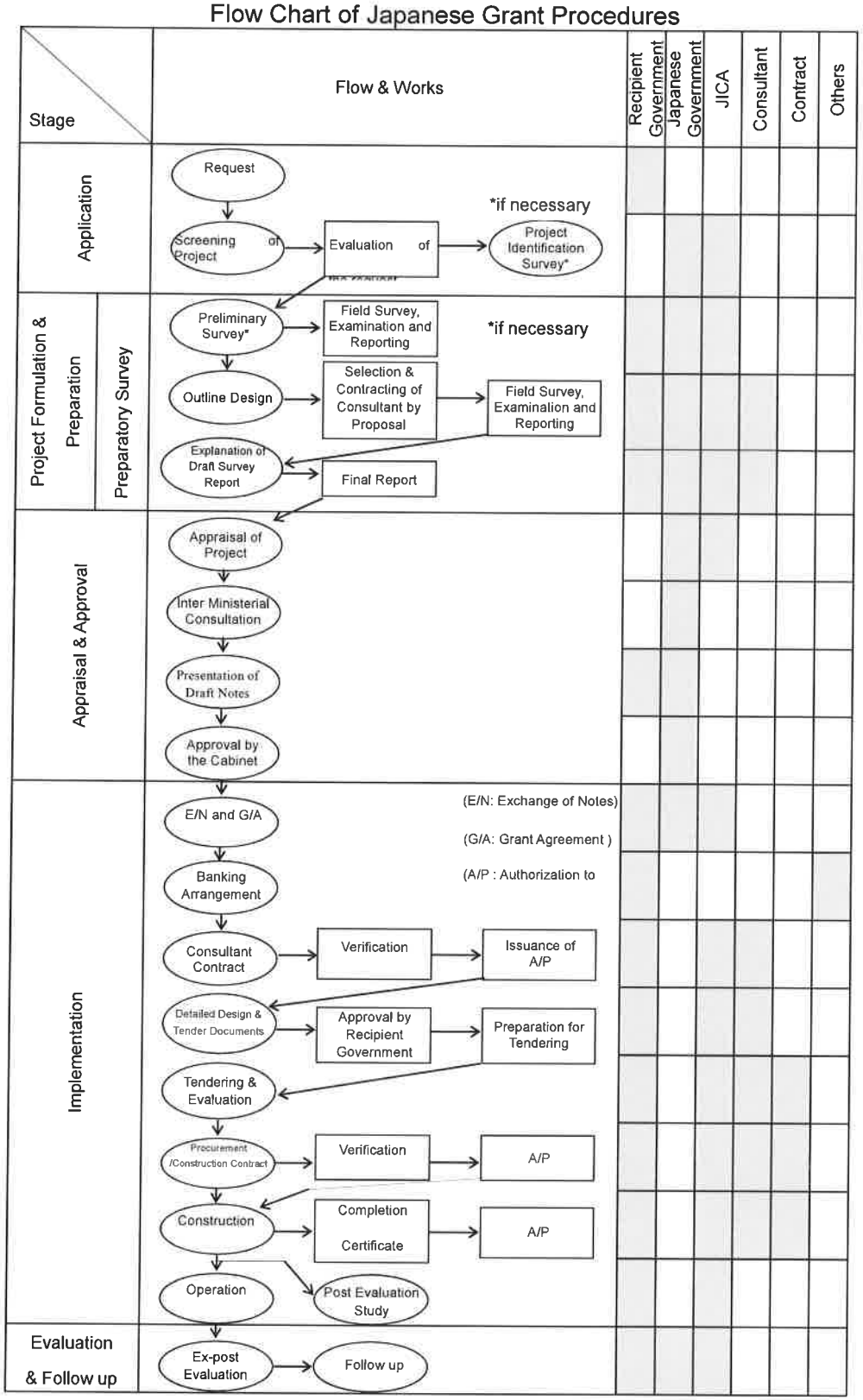
The Government of the recipient country must take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and must regularly report to JICA about its status by using the Project Monitoring Report (PMR).

3.12 Safety Measures

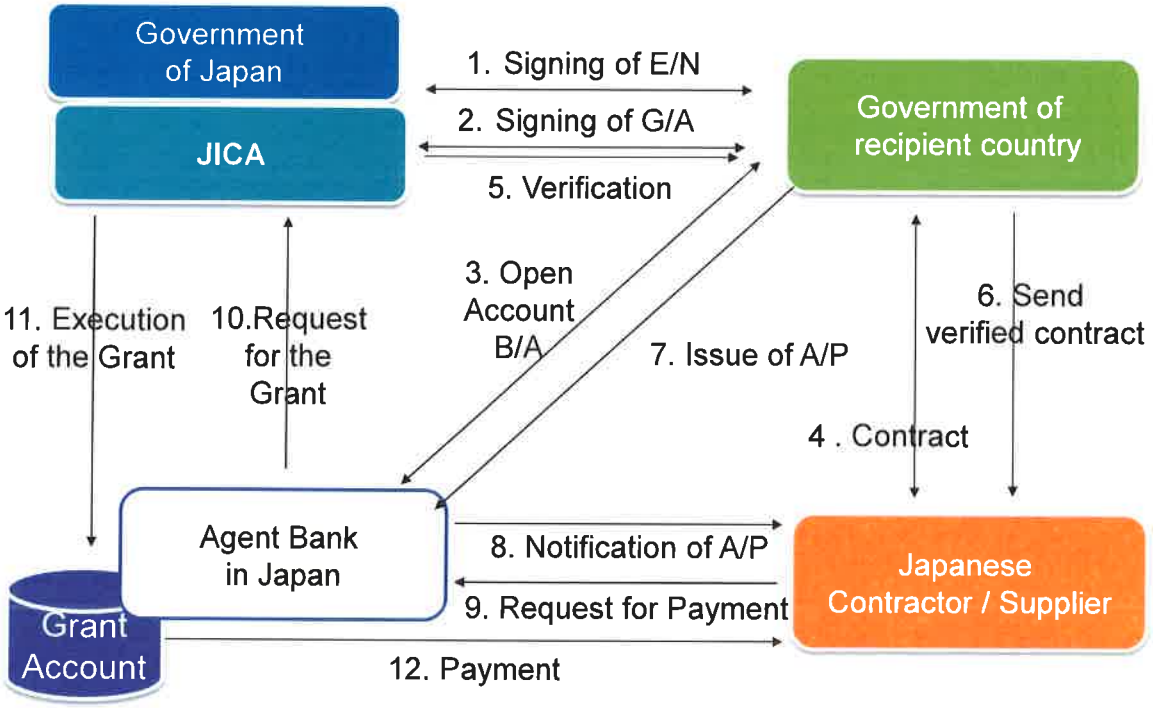
The Government of the recipient country must ensure that the safety is highly observed during the implementation of the Project.

Annex 5

Flow Chart of Japanese Grant Procedures

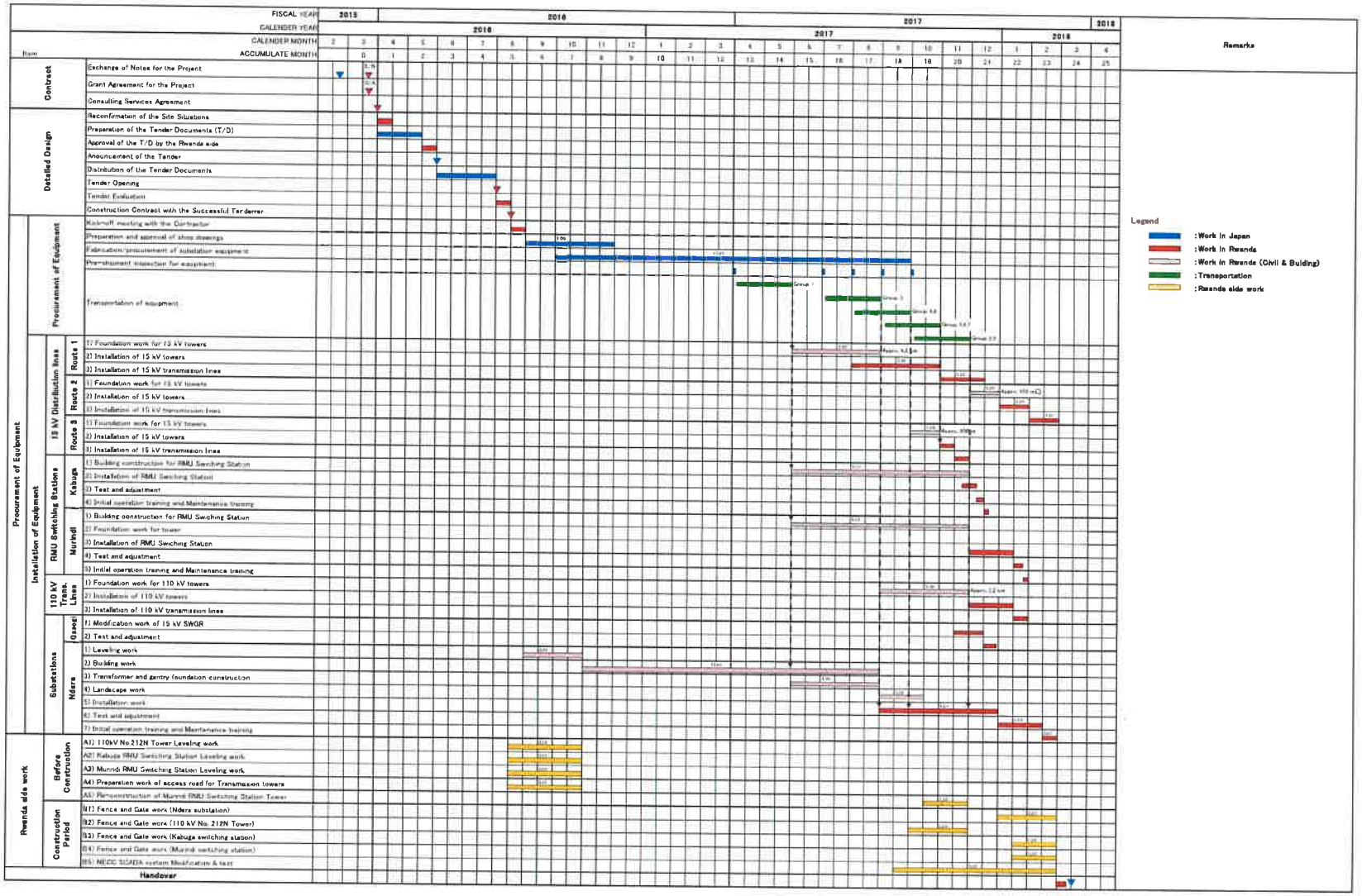


Financial Flow of Japanese Grant



Annex 7

Project Implementation Schedule



Annex 8

Major Undertakings to be taken by Recipient Government

1. Before the Tender

No	Items	Deadline	In charge	Cost (million USD)	Ref.
1	To open Bank Account (Banking Arrangement: B/A)	within 1 month after G/A	MINECOFIN	-	
2	To implement RAP	Before December 2015	EDCL	0.2	
3	To secure the following lands (1) For Ndera Substation (2) For Murindi RMU Switching Station (3) For Kabuga RMU Switching Station (4) For 110kV Transmission Line (2.2km) (5) For 110kV Connection Area (50mx50m) (6) For 15kV Distribution Line –Route 1 (6.5km) (7) For 15kV Distribution Line – Route 2 (650m) (8) For 15kV Distribution Line – Route 3 (400m) (9) For access road for constructing transmission and distribution lines	before notice of the tender document (T/D)	REG/ EDCL	1.0	
4	To obtain permission from related authorities such as road, water, air-port, etc., for construction of 110kV transmission and 15kV distribution lines	before notice of T/D	REG/ EDCL	-	
5	To clear, level and reclaim for Murindi RMU switching station	before notice of T/D	REG/ EDCL	-	

2. During the Project Implementation

No	Items	Deadline	In charge	Cost	Ref.
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A				
	1) Advising commission of A/P	every payment	EDCL	-	
	2) Payment commission for A/P	during the Project	EDCL	-	
2	To ensure prompt unloading and customs clearance of the products at the port of disembarkation in recipient country and assist internal transportation of the products (1) Tax exemption and customs clearance of the products at the port of disembarkation	during the Project	EDCL	-	
3	To accord Japanese nationals whose services may be requires in connection with the supply of the products and services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work	during the Project	EDCL	-	
4	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 to be exempted	during the Project	EDCL	-	
5	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment	during the Project	EDCL	-	

No	Items	Deadline	In charge	Cost	Ref.
6	To construct for the project sites the following facilities (1) Gate and fences for Ndera S/S, Murindi & Kabuga RMU stations and 110kV connection area (2) The road outside the site, if necessary (3) Guard house, if necessary	during the Project	EDCL/ EUCL	-	
7	To prepare following incidental work for the New substation and RMU stations (1) Electricity: the distribution power line to the site (2) Water: the city water distribution main to the site	during the Project	EDCL/ EUCL	-	
8	To prepare measures necessary to obtain the following permits: - Permits for installation work - Permits to access to restricted areas	during the Project	EDCL	-	
9	To Secure temporary storage yard for materials and equipment	during the Project	EDCL	0.04	
10	To Secure access roads, wayleaves and usage permissions for construction of 110kV transmission and 15kV distribution lines	during the Project	EDCL	-	
11	To transfer existing underground cables and pipes, and obtain acquisition of related permits (electricity, telephone, water, sewerage, etc.)	during the Project	EDCL/ EUCL	-	
12	To obtain acquisition of permits for trans-road work	during the Project	EDCL	-	
13	To provide the places to dispose of surplus soil and waste water	during the Project	EDCL	-	
14	To dismantle the existing towers for 15 kV distribution nearby Ndera substation and existing 110kV T/L tower No. 212	during the Project	EDCL/ EUCL	0.003	
15	To expand the 15kV switchgear room and cable trench in existing Gasogi substation	during the Project	EDCL/ EUCL	-	
16	To modify communication facility at existing Gasogi substation for new optical fibre cables from Kabuga RMU switching station	during the Project	EDCL/ EUCL	-	
17	To extend and connect optical fibre cable to Murindi RMU switching station from existing SCADA network for new entry	during the Project	EDCL/ EUCL	0.27	
18	To modify SCADA system and Optical Network Management System in NECC (in Gikondo S/S) to accommodate the three new stations	during the Project	EDCL/ EUCL	0.55	
19	To procure and install LV power cable from distribution panel in each RMU switching stations to surrounding consumers	during the Project	EDCL/ EUCL	-	
20	To Secure the safety of persons concerned with the works under the Rwanda side at the project sites	during the Project	EDCL/ EUCL	-	
21	To do temporary dead-line work during the work (Response to and compensation for users of electricity in relation to outages inevitable for the work)	during the Project	EDCL/ EUCL	-	
22	Announcement of outage plans to users of electricity during the work	during the Project	EDCL/ EUCL	-	
23	To clear and level for 110kV connection area	during the Project	EDCL/ EUCL	-	
24	To monitor and supervise the implementation of Environmental Management Plan (EMP) and mitigation measures prepared through the environmental assessment and monitor environmental and social impacts caused by the	during the Project	EDCL	-	

No	Items	Deadline	In charge	Cost	Ref.
	Project with an adaptive management approach				
25	To provide general furniture for three new stations	Upon the completion of the facilities	EUCL	-	

3. After the Project

No	Items	Deadline	In charge	Cost	Ref.
1	To monitor environmental and social impacts during the operation with an adaptive management approach	After completion of the construction	EUCL	-	

*; The cost estimates are provisional. This is subject to the approval of the Government of Japan.

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX

20XX, Month

Organization Information

Authority (Signer of the G/A)	_____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Executing Agency	_____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Line Agency	_____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____

Outline of Grant Agreement:

Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____
Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:

1: Project Description

1-1 Project Objective

1-2 Necessity and Priority of the Project

- Consistency with development policy, sector plan, national/regional development plans and demand of target group and the recipient country.

1-3 Effectiveness and the indicators

- Effectiveness by the project

Quantitative Effect (Operation and Effect indicators)		
Indicators	Original (Yr)	Target (Yr)
Qualitative Effect		

2: Project Implementation

2-1 Project Scope

Table 2-1-1a: Comparison of Original and Actual Location

Location	**Original:** *(M/D)* **Attachment(s):Map**	**Actual:** *(PMR)* **Attachment(s):Map**

Table 2-1-1b: Comparison of Original and Actual Scope

Items	Original	Actual
(M/D) 'Soft component' shall be included in 'Items'.	*(M/D)*	*(PMR)* Please state not only th e most updated schedul e but also other past re visions chronologically. All change of design shal l be recorded regardless of its degree.

2-1-2 Reason(s) for the modification if there have been any.

(PMR)

2-2 Implementation Schedule
2-2-1 Implementation Schedule

Table 2-2-1: Comparison of Original and Actual Schedule

Items	Original		Actual
	DOD	G/A	
【M/D】 'Soft component' shall be stated in the column of 'Items'. Project Completion Date*	*(M/D)*		*(PMR)* As of (Date of Revision) Please state not only the most updated schedule but also other past revisions chronologically.

*Project Completion was defined as _____ at the time of G/A.

2-2-2 Reasons for any changes of the schedule, and their effects on the project.

2-3 Undertakings by each Government
2-3-1 Major Undertakings
See Attachment 2.

2-3-2 Activities
See Attachment 3.

2-3-3 Report on RD
See Attachment 4.

2-4 Project Cost
2-4-1 Project Cost

Table 2-4-1a Comparison of Original and Actual Cost by the Government of Japan
(Confidential until the Tender)

Items			Cost (Million Yen)	
	Original	Actual	Original	Actual
Construction Facilities (or Equipment)	'Soft component' shall be included in 'Items'.			Please state not only the most updated schedule but also other past revisions chronologically.
Consulting Services	- Detailed design -Procurement Management -Construction Supervision			
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

Table 2-4-1b Comparison of Original and Actual Cost by the Government of XX

Items			Cost (Million USD)	
	Original	Actual	Original	Actual
				Please state not only the most updated schedule but also other past revisions chronologically.
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = (local currency)

2-4-2 Reason(s) for the wide gap between the original and actual, if there have been any, the remedies you have taken, and their results.

(PMR)

2-5 Organizations for Implementation

2-5-1 Executing Agency:

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original: *(M/D)*

Actual, if changed: *(PMR)*

2-6 Environmental and Social Impacts

- The results of environmental monitoring as attached in Attachment 5 in accordance with Schedule 4 of the Grant Agreement.
- The results of social monitoring as attached in Attachment 5 in accordance with Schedule 4 of the Grant Agreement.
- Information on the disclosed results of environmental and social monitoring to local stakeholders, whenever applicable.

3: Operation and Maintenance (O&M)

3-1 O&M and Management

- Organization chart of O&M
- Operational and maintenance system (structure and the number ,qualification and skill of staff or other conditions necessary to maintain the outputs and benefits of the project soundly, such as manuals, facilities and equipment for maintenance, and spare part stocks etc)

Original: *(M/D)*
Actual: *(PMR)*

3-2 O&M Cost and Budget

- The actual annual O&M cost for the duration of the project up to today, as well as the annual O&M budget.

Original: *(M/D)*

4: Precautions (Risk Management)

- Risks and issues, if any, which may affect the project implementation, outcome, sustainability and planned countermeasures to be adapted are below.

Original Issues and Countermeasure(s): *(M/D)*	
Potential Project Risks	Assessment
1.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:

	Mitigation Measures:
	Action during the Implementation:
	Contingency Plan (if applicable):
2.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action during the Implementation:
	Contingency Plan (if applicable):
3.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action during the Implementation:
	Contingency Plan (if applicable):
Actual issues and Countermeasure(s)	
(PMR)	

5: Evaluation at Project Completion and Monitoring Plan

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and

assurance of sustainability.

5-3 Monitoring Plan for the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

1. Project Location Map
2. Undertakings to be taken by each Government
3. Monthly Report
4. Report on RD
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (Final Report Only)

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C−D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2015	2nd ●month, 2015	3rd ●month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

-
-
-

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) Y (b) (c) (d)	(a)-(c) The EIA report has been already approved on 25 Aug. 2015. Conditions are general issues concerning the construction works and they are already addressed in the EIA report with mitigation measures and monitoring plan. (d) No additional approval is required.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a)Y (b) Y	(a)Stakeholder meetings are held at least twice at Sector level during EIA/ARAP study. PAPs who could not attend the meetings were contacted individually. For absent PAPs, EDCL continues to attempt to contact with them. (b)Main comments raised during meetings are concerning compensation for loss and employment opportunities during construction, and they are addressed in ARAP.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Alternative plans, including no-project option are examined. Different routes for transmission lines and distribution lines, and locations of the Ndera substation and two RMUs were examined. There is no major difference in terms of impacts on natural environment among alternatives; however, the present project is most preferable in terms of lower impacts on social and economic aspects.
2 Pollution Control	(1) Water Quality	(a) Is there any possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? If the water quality degradation is anticipated, are adequate measures considered?	(a) N	(a) There are no rivers or water areas around the project sites.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a)N	(a) The Project site is within Kigali City and there is no protected area nearby. The Project will not affect the protected area.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species	(a)N (b)N (c) N (d)N (e)N (f)N	(a) There is no forested area near the project site. (b) There is no protected habitat of endangered species. (c) No significant ecological impact is anticipated.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Are adequate measures taken to prevent disruption of migration routes and habitat fragmentation of wildlife and livestock? (e) Is there any possibility that the project will cause the negative impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystem due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered? (f) In cases where the project site is located in undeveloped areas, is there any possibility that the new development will result in extensive loss of natural environments?		(d) No significant impacts are expected on habitat fragmentation and migration routes. (e) There is no such possibility as there is no important ecosystem near the project site. The project will not introduce non-native invasive species or pests. (f)The project site is within Kigali city, which is already developed.
3 Natural Environment	(3) Topography and Geology	(a) Is there any soft ground on the route of power transmission and distribution lines that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? (b) Is there any possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	(a)N (b)Y (c)Y	(a)The study confirmed that there was hard soil at 2m below the surface. For the structure bases, the top soft soil will be removed and the hard soil will be directly used as bases. .(b)-(c)The site for Ndera Substation requires land preparation, by cutting soil from the north side and filling to the south side of the land. The slope is gentle and will not cause landslides. To avoid soil runoff, the rain gutter will be created the top and bottom of the slope. There will be no soil waste to cause soil run off.
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Are the compensations going to be paid prior to the resettlement? (e) Are the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people,	(a) Y (b) Y (c) Y (d) Y (e) Y (f) Y (g) Y (h) Y (i) Y (j) Y	(a) A small scale resettlement (59PAHs with 191PAPs) due to the loss of land, structures, crops and trees is triggered. Only 3 households need to relocate. To minimize the impact, the project site selection avoids areas with many houses and the smaller bases for towers are selected. (b) Stakeholder meetings as well as individual consultations were held to explain project brief and locations, calculation method for compensations/restoration measure (priority employment of PAPs) in local language and they will be continued during implementation. (c)Census survey and inventory of assets to be lost is conducted on all PAPs. The resettlement plan is including

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		including women, children, the elderly, and people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?		compensation with full replacement costs, restoration of livelihoods and living standards by temporary employment considering the suspension of agricultural activities during the construction. (d) The compensation will be paid prior to the resettlement. It is also stipulated in the laws of Rwanda. (e) An Abbreviated Resettlement Action Plan was prepared in accordance with JICA Guidelines and World Bank safeguard policies. (f) The PAHs of this project does not include the households headed by the vulnerable groups. Female household heads are simply the owners of assets and they are not widows or single mothers. For the employment during construction, female PAPs will be provided with equal opportunities. (g) As of now, there are 4 absent PAPs who lives away and have not been contacted and 8 PAPs who have not reached consensus. Efforts will be continuously made to contact or build consensus before implementation of resettlement. Failing, the process will be carried out in accordance with the law of Rwanda. However the grievance redress mechanism will remain in case these PAPs have complaints. (h) The organizational framework was established and EDCL will play the major role for implementation. EDCL has experience in implementing other RAPs and is responsible for securing the fund. (i) Monitoring is carried out monthly. The plan is included in ARAP. (j) The Grievance redress mechanism is established based on locally practiced conflict resolution method at community level and legal practice.
	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? (b) Is there a possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary?	(a) Y (b) Y (c)Y (d)Y	(a) A small scale resettlement is triggered. An ARAP was prepared and any loss will be compensated at full replacement cost (b) Since all labors will be employed locally within Kigali, no immigration of workers is expected. (c) There is no radio interference anticipated due to the low voltage and distance. (d)The compensation will be given in accordance with ARAP and the

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(c) Is there any possibility that installation of structures, such as power line towers will cause radio interference? If any significant radio interference is anticipated, are adequate measures considered? (d) Are the compensations for transmission wires given in accordance with the domestic law?		domestic law.
4 Social Environment	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a)N	(a)There is no such possibility as there is no heritage site.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a)N	(a)The project will not affect the landscape. The area around the project site is already developed.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a)N/A (b)N/A	(a)There are no ethnic minorities and indigenous people affected by the project. (b)There are no ethnic minorities and indigenous people affected by the project.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) N (b) Y (c)Y (d)Y	(a) -(d)The project proponent observes all laws and ordinances associated with working conditions of the country. EDCL has the document called "Environmental and Social Requirements for Tender" and the contractor is required to observe safety and hazard management as well as health and well-being of workers and local communities described in the document.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a)Y (b)Y (c)Y	(a) EDCL's "Environmental and Social Requirements for Tender" covers requirements to reduce impacts during construction. (b) The project site is within Kigali City hence construction activities are not going to affect the natural environment. (c)Construction activities may disturb the traffic around the site. EDCL requires the contractor to control traffic with collaboration with local police and

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
				mitigation measures will be included in Environmental Management Plan.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a)Y (b)Y (c)Y (d)Y	(a)-(d) For the items with impacts, EDCL (planning and construction phases) and EUCL (operation phase) will be monitoring. Monitoring plan and responsible organizations are included in the EIA report. RDB notified the frequency of monitoring report.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Road checklist should also be checked (e.g., projects including installation of electric transmission lines and/or electric distribution facilities).	(a)N/A	(a)There is no additional Environmental Items that may be affected.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed, (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a)N/A	(a)The impacts of this Project are limited to its immediate vicinity and most of them are related to construction activities. There is no such impact to trans boundary or global issues.

Environmental Management Plan/Environmental Monitoring Plan

Environmental Management Plan

No.	Item	Impact	Mitigation Measures	Implementation/Responsible Body	Cost (USD)
	Planning Phase				
1	Involuntary Resettlement	Loss of assets, income and livelihood due to resettlement (including temporary ones)	• In accordance with JICA guidelines and WB OP4.12, An Abbreviated Resettlement Action Plan(ARAP) will be prepared based on the consensus with project affected people, compensation at full replacement cost and support and will be implemented.	EDCL Relevant Sectors	251, 878USD
	Construction Phase				
1	Economic activities, living and livelihood	Impacts on living and livelihood due to resettlement (including temporary ones)	• Same as above • PAPs will have priority for the project related employment opportunities.	Same as above	N/A
2	Land Use and Utilization of local resources	Limited access to agricultural land due to land acquisition.	• Presentation of a clear construction work schedule and smooth implementation • Sharing and coordinating a work plan with residents and communities	Contractor	N/A
3	Existing social infrastructure and services	Impacts on traffic during construction works Power Cut during construction works	• By announcing construction plans to nearby residents and collaborating with local police, enforcement of traffic safety and mitigation of traffic congestion • Preparation of power cut plan and sharing the plan with affected communities	EDCL Contractor	N/A
4	Occupational health hazards	Health and safety of construction workers	• EUCL will confirm environmental and social safety management plan proposed by contractor at tendering. Based on this plan, the contractor will carry out safety and management tasks and avoid and mitigate risks of accidents. • Based on laboring laws, the contractor must provide protective gear to workers, ensure them to wear them and provide safe working environment. • Construction site (especially the storage site) will be fenced, lighted and guarded by security guards to prevent intruders and theft	EDCL Contractor	Include in construction costs
5	Air Pollution	Air pollution by heavy machineries during leveling and construction works	• Minimize number of deliveries through timely scheduling. • Only contract automobiles with vehicle inspection certification, which are expected to have less exhaust emissions.	Contractor	N/A

No.	Item	Impact	Mitigation Measures	Implementation/Responsible Body	Cost (USD)
6	Soil Pollution	Spillage of insulating oil from transformer	• Insulating oil as well as transformers will be set in the metal box. To prevent spillage, oil dike will be set under the transformers and filled with stone chips. • Protection of exposed ground with vegetation and rain drainage, etc.to prevent run-off	Contractor	Include in construction costs
7	Waste	Dismantling of the existing tower under the responsibility of the implementing agency Waste during construction	• EUCL will recycle any materials saved from dismantling the existing towers and unrecyclable materials will be properly hand over to waste Management Company. • Regular disposal of solid waste to Nduba damp site or have a contract with a RURA registered waste disposal company to dispose it of	Contractor	included in construction costs
8	Noise/Vibration	Noise during leveling and construction	• Controlling operation time to reduce impact by noise as much as possible. Use of proper automobile with inspection certificate	Contractor	N/A
9	Odor	Odors from waste and toilets	• Regular disposal of solid waste to Nduba damp site or have a contract with a RURA registered waste disposal company to dispose it off. • Mobile toilets installed on site with a person in-charge of ensuring proper hygiene of these toilets	Contractor	included in construction costs
10	Accidents	Accidents involving workers and residents	• Same as for occupational health hazards • When wiring or removing power lines, fall prevention net will be used.	Contractor	included in construction costs
11	Protected Plant	Cutting 2 trees of a protected species	• Vegetation clearance should be limited within ROW. • Plantation of the species removed.	EDCL	3USD/ suppling
	Operation Phase				
1	Soil pollution	Spillage of insulating oil from transformers	• Insulating oil as well as transformers will be set in the metal box. To prevent spillage, oil dike will be set under the transformers and filled with stone chips.	EUCL	included in construction costs
2	Electrocution	Electrocution caused by contacting with wire or tower	• Based on IEC Standards, proper insulator set is connected to each voltage. • Tower will be equipped with metals to prevent climbing and signboard indicating high voltage. Residents nearby will be informed about prevention of electrocution. • Ground wires with enough capacity will be set. • EUCL operatives will check house wiring carefully	EUCL Contractor	included in construction costs

No.	Item	Impact	Mitigation Measures	Implementation/Responsible Body	Cost (USD)
3	Fire	Fire risks caused by broken insulators	• Ground wires with enough capacity will be set.	EUCL Contractor	included in construction costs

Monitoring Plan

No		Item	Methods	Frequency	Responsible body
	Planning Phase				
1	Involuntary Resettlement/Land acquisition	Compensation payment to bank accounts of PAPs	Counting the number of payment transaction to PAPs	Monthly until completion of land acquisition	EDCL
	Construction Phase				
1	Land Use and Utilization of local resources	Work schedule and progress	Work schedule	Monthly during construction	Contractor/ EDCL
2	Existing social infrastructure and services	Rewiring of the existing line Power cut	Confirming work plan Confirming a power cut plan	During rewiring works During construction	Contractor/ EDCL
3	Occupational health hazards	Workers with protective gear Reports on accidents	Site inspection Confirming the reports	Daily during construction	Contractor/ EDCL
4	Security at construction sites	Security guards Fence Lighting at night	Site inspection	Daily during construction	Contractor
5	Protected Plant	Adherence to ROW Plantation of protected specie	Checking on no vegetation clearance outside of ROW. Confirming the number of trees planted and growth.	Monthly	Contractor/ EDCL
6	Air pollution	Inspection certification of vehicle and heavy machineries	Site inspection	Daily during construction phase	Contractor/Sector Infrastructure Department
7	Soil Pollution	PAHs, BTEX,	Soil sampling at the Ndera substation (GC/MS methods)	3 times, before, during and after construction	Contractor
8	Waste	Waste management	Site inspection	Daily during construction phase	EDCL/Sector Infrastructure Department
9	Noise/vibration	Inspection certification of vehicle and heavy machineries	Site inspection	Daily during construction phase	Contractor/Sector Infrastructure Department
10	Odor	Waste management	Site inspection	Daily during construction phase	Contractor/Sector Infrastructure

					Department
11	Temporary Toilets	Management of temporary toilets	Site inspection	Daily during construction phase	EDCL/Contractor
	Operation Phase				
1	Electrocution	Climbing prevention measure at towers	Site inspection	At commission and regular maintenance	EUCL/Sector Infrastructure Department
2	Soil Pollution	PAHs , BTEX	Soil sampling at the Ndera substation (GC/MS methods)	Annually	EUCL
3	Fire risks	Fire prevention measures	Site inspection	At commission and regular maintenance	EUCL/Sector Infrastructure Department

Annex 12

Environmental and Social Monitoring Form

Below are drafts of monitoring forms based on the EMP and for resettlement and land acquisition.

Environmental Management

Construction Phase

	Monitoring Item	Parameters to be monitored	Monitoring result and reports made during this period	Measures to be taken	Frequency
1	Land use & Utilization of local resources	Construction Duration			Before construction commencement and quarterly during construction phase
2	Existing social infrastructure and services	Existing line re-routed			During construction of Route 3
3	Occupation health hazards	Workers with protective gear Records of accidents			Monthly
4	Security in the project area	Hoarding fence, light and security guards			Throughout the construction phase
5	Protected flora species	• ROW width dimensions • Number of Umuco trees offset in tree nursery			Throughout the construction phase
6	Air pollution	Automobiles with inspection certificates			Throughout the construction phase
7	Soil degradation/pollution	Soil parameters; PAHs, BTEX,			Before construction, mid-term of construction and end of construction
8	Solid Waste	Solid waste on site			Throughout the construction phase
9	Noise/Vibration	Automobiles with inspection certificates			Throughout the construction phase
10	Odor	Solid waste on site			Throughout the construction phase
11	Poor sanitation	Clean mobile toilets on site			Throughout the construction phase

Operation Phase

	Monitoring Item	Parameters to be monitored	Monitoring result/reports made during this period	Measures to be taken	Frequency
1	Human electrocution	Towers with proposed mitigation precautionary measures installed			At commissioning of the construction completion
2	Soil degradation/pollution	Soil parameters; PAHs and BTEX			Annually
3	Fire risk	Towers with proposed mitigation precautionary measures installed			At construction completion. Also inspection throughout operation as part of Operation and Maintenance.

Resettlement and Land Acquisition

Monitoring on land acquisition and resettlement will be conducted monthly by EDCL.

Activities	Expected Date Completion	Responsible Organization.
Approval of ARAP		EDCL
Processing Compensation Fund	31 Oct 2015	EDCL/ MINECOFIN

Progress of Compensation Payment and Land Acquisition

Components	Planned Total	Unit	Monthly Progress			Progress in %		Expected Date Completion	Responsible Organization.
			Sept 2015	Oct 2015	Nov 2015	Till the last month	Up to the month		
Compensation Payment									
Ndera Substation area	20	HH						30 Nov 2015	EDCL/ MINECOFIN
15kV DL Gasogi-Kabuga	38	HH						30 Nov 2015	EDCL/ MINECOFIN
Murindi RMU	1	HH						30 Nov 2015	EDCL/ MINECOFIN
Total	59	HH						30 Nov 2015	EDCL/ MINECOFIN
Land Acquisition									
Ndera Substation area	11,462.48	m^2						30 Nov 2015	EDCL/Sector Leader
15kV DL Gasogi-Kabuga	2105.72	m^2						30 Nov 2015	EDCL/Sector Leader
Murindi RMU	971	m^2						30 Nov 2015	EDCL/Sector Leader
Total	14,539.2	m^2						30 Nov 2015	EDCL/Sector Leader

Note: The figures in this table include the PAPs without consensus and absent

Progress of Consensus with PAPs absent and without consensus

Type of PAPs	Number	Unit	Monthly Progress							Expected Date Completion	Responsible Organization.
			Sept 2015	Oct 2015	Nov 2015	Dec 2015	Jan 2016	Feb 2016	Mar 2016		
Absent	4	HH									EDCL
Without Consensus	8	HH									EDCL
Total	12	HH									EDCL

Remarks on Progress with PAPs absent and without consensus

No.	Name of PAP	Status/Progress in this month	Action Plan for the next month
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

番号	名 称	形態 文書・ビデオ・ 地図・写真等	ｵﾘｼﾞﾅﾙ・ｺﾋﾟｰ	発 行 機 関	発 行 元
1	Energy Sector Strategic Plan 2012/13 – 2017/18	データ	コピー	Ministry of Infrastructure	Oct. 2014
2	Review of Grid Strengthening Projects For 2014 - 2018	データ	コピー	World Bank	Feb. 2014
3	ルワンダ国首都圏及び主要都市配電施設整備計画準備調査（その 2）協力準備調査報告書	データ	コピー	JICA	Jan. 2011
4	ルワンダ国 持続的な地熱エネルギー開発推進のための電力開発計画策定支援プロジェクト（第 2 年次）インテリムレポート	データ	コピー	JICA	Oct. 2014
5	ルワンダ国 持続的な地熱エネルギー開発推進のための電力開発計画策定支援プロジェクト（第 2 年次）ドラフトファイナルレポート 2	データ	コピー	JICA	Mar. 2015
6	EWSA Annual Report and Financial Statement 2011	データ	コピー	EWASA	2012
7	JICA Project Phase II Overview General Project Map	図面	コピー	Rwanda Energy Group (REG)	Mar. 2015
8	JICA Project Phase II Industrial Zone Substation Layout	図面	コピー	Rwanda Energy Group (REG)	Mar. 2015
9	JICA Project Phase II Gasogi Substation General Layout	図面	コピー	Rwanda Energy Group (REG)	Mar. 2015
10	JICA Project Phase II Single Line Diagram 110/15kV Network	図面	コピー	Rwanda Energy Group (REG)	Mar. 2015
11	JICA Project Phase II Single Line Diagram 15kV Industrial Zone	図面	コピー	Rwanda Energy Group (REG)	Mar. 2015
12	Protection and SCADA System Layout Free Zone Substation	図面	コピー	Rwanda Energy Group (REG)	Mar. 2015
13	Development Partner Project Matrix Energy Sector	文書	コピー	JICA	Jan. 2015

番号	名 称	形態 文書・ビデオ・ 地図・写真等	ｵﾘｼﾞﾅﾙ・ｺﾋﾟｰ	発 行 機 関	発 行 元
14	キガリ周辺変電所運転記録（2015年1月） （Gikondo, Gasogi, Birembo, Jabana, Mont Kigali, Musha, Kabarongo, Rwinkwavu）	文書	コピー	Rwanda Energy Group (REG)	Mar. 2015
15	Gikondo (NCC) SCADA System RTU560 System Description R9	文書	コピー	ABB	2008
16	Gikondo (NCC) SCADA System RTU560 Function Description R9	文書	コピー	ABB	2008
17	Gikondo (NCC) SCADA System RTUs Technical Specification	文書	コピー	ABB	2008
18	Vacuum Circuit Breaker VD4X Manual	文書	コピー	ABB	2012
19	Rwanda Grid Code	データ	コピー	Rwanda Utilities Regulatory Authority (RURA)	Aug. 2013

6. 概略設計図

変電設備・開閉設備

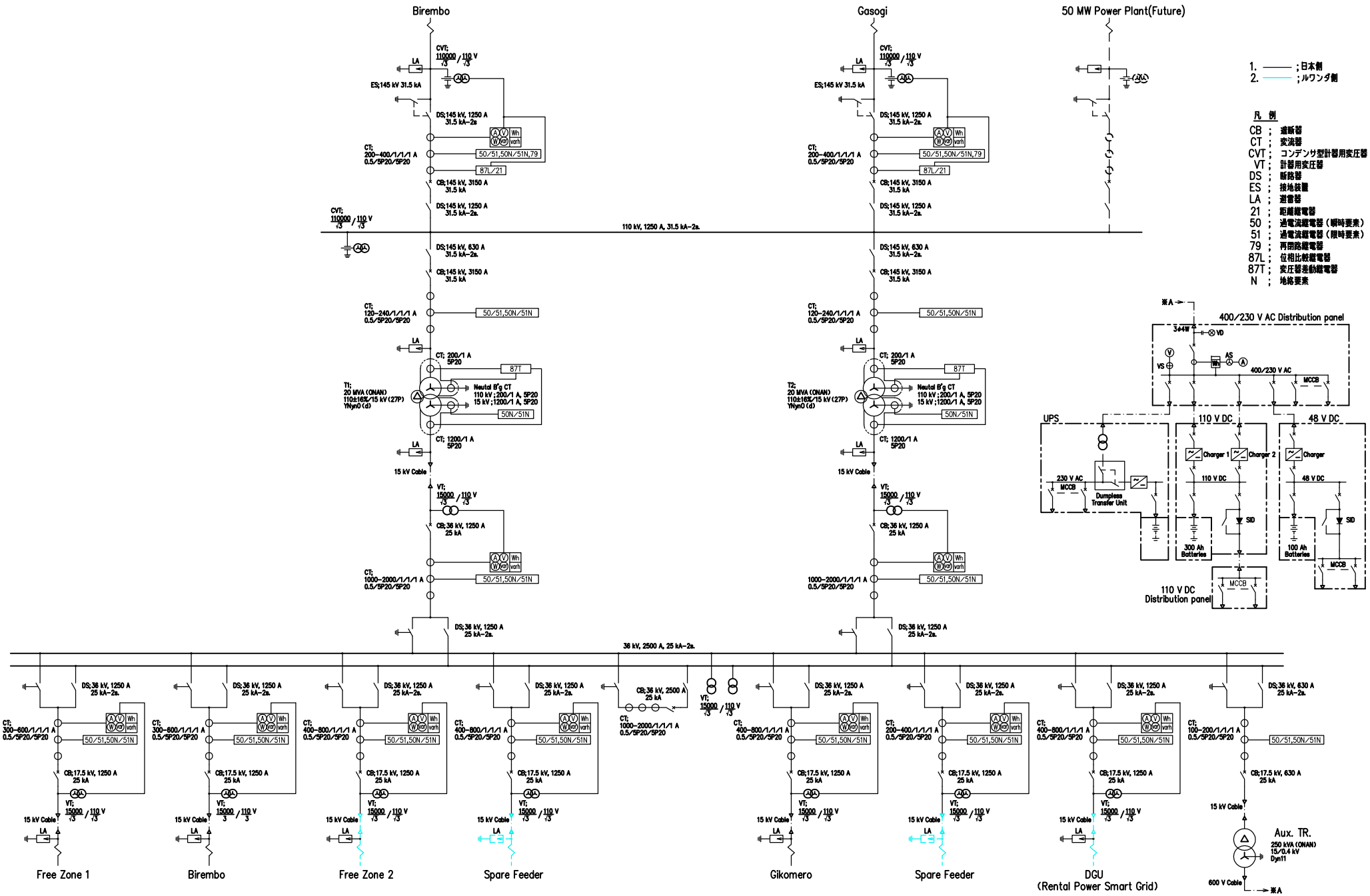
図面番号	図面名称
SS-01	ンデラ変電所　単線結線図
SS-02	カブガリングメインユニット開閉所　単線結線図
SS-03	ムリンディリングメインユニット開閉所　単線結線図
SS-04-1	ンデラ変電所　制御・保護構成図
SS-04-2	開閉所　制御・保護構成図
SS-04-3	ガソギ変電所及びカブガ開閉所　通信関連図
SS-05	ガソギ変電所　単線結線図
SS-06-1	ンデラ変電所　110 kV 開閉装置　配置図（平面図）
SS-06-2	ンデラ変電所　110 kV 開閉装置　配置図（側面図）
SS-07	ンデラ変電所　15 kV 開閉装置＆制御・保護盤　配置図（制御棟 1 階）
SS-08	ムリンディリングメインユニット開閉所　配置図
SS-09	カブガリングメインユニット開閉所　配置図
SS-11	ンデラ変電所　ケーブルトレイ配置図（制御棟地下ケーブル室）

建築設備

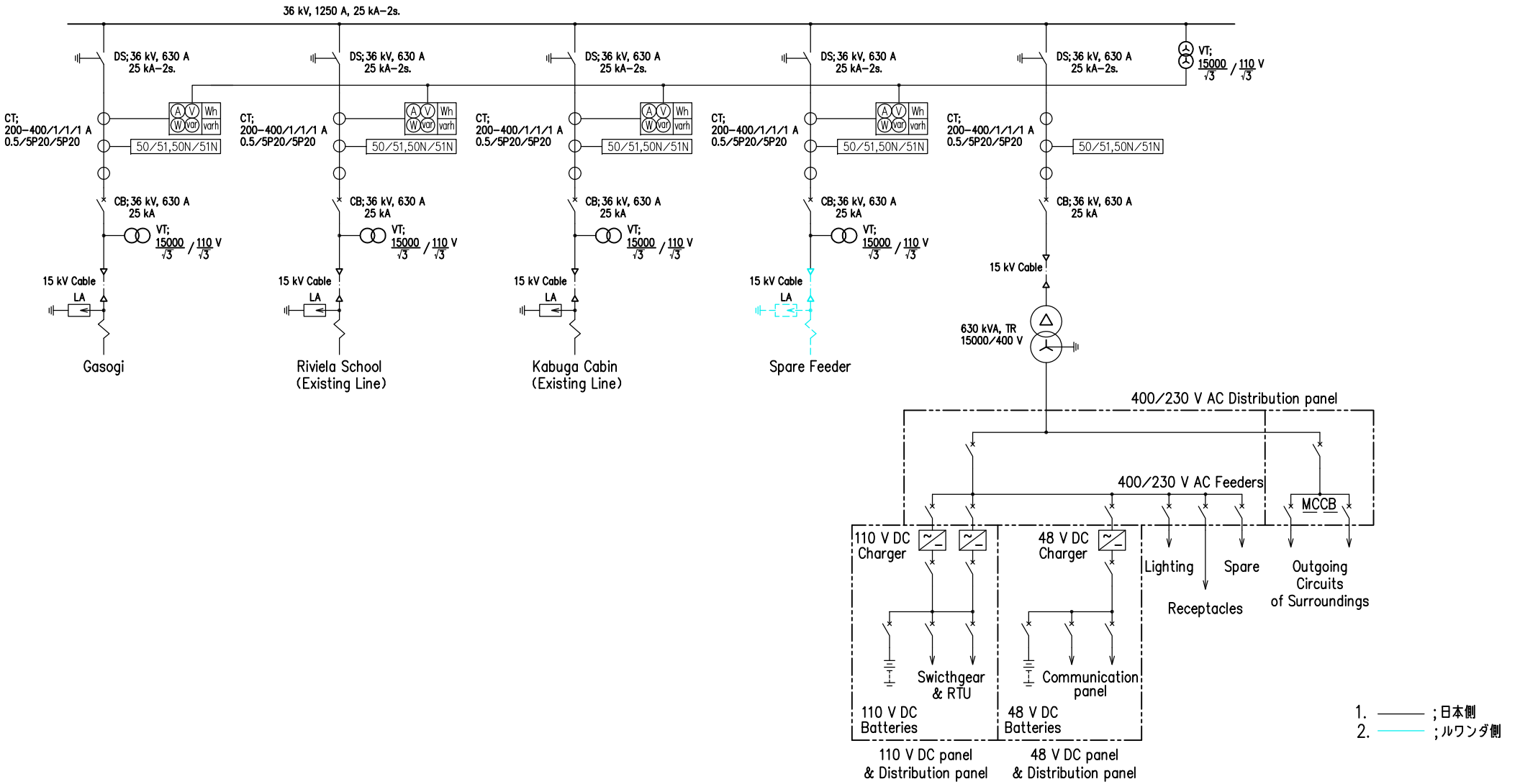
図面番号	図面名称
A-01	ンデラ変電所　配置図
A-02	ンデラ変電所　仕上表
A-03	ンデラ変電所　地階平面図
A-04	ンデラ変電所　１階平面図
A-05	ンデラ変電所　屋根伏図１
A-06	ンデラ変電所　屋根伏図２
A-07	ンデラ変電所　立面図１
A-08	ンデラ変電所　立面図２
A-09	ンデラ変電所　断面図１
A-10	ンデラ変電所　断面図２
A-11	カブガ開閉所　配置図
A-12	ムリンディ開閉所　配置図
A-13	開閉所　仕上表
A-14	開閉所　１階平面図・屋根伏図・ピット図
A-15	開閉所　立面図
A-16	開閉所　断面図

送配電設備

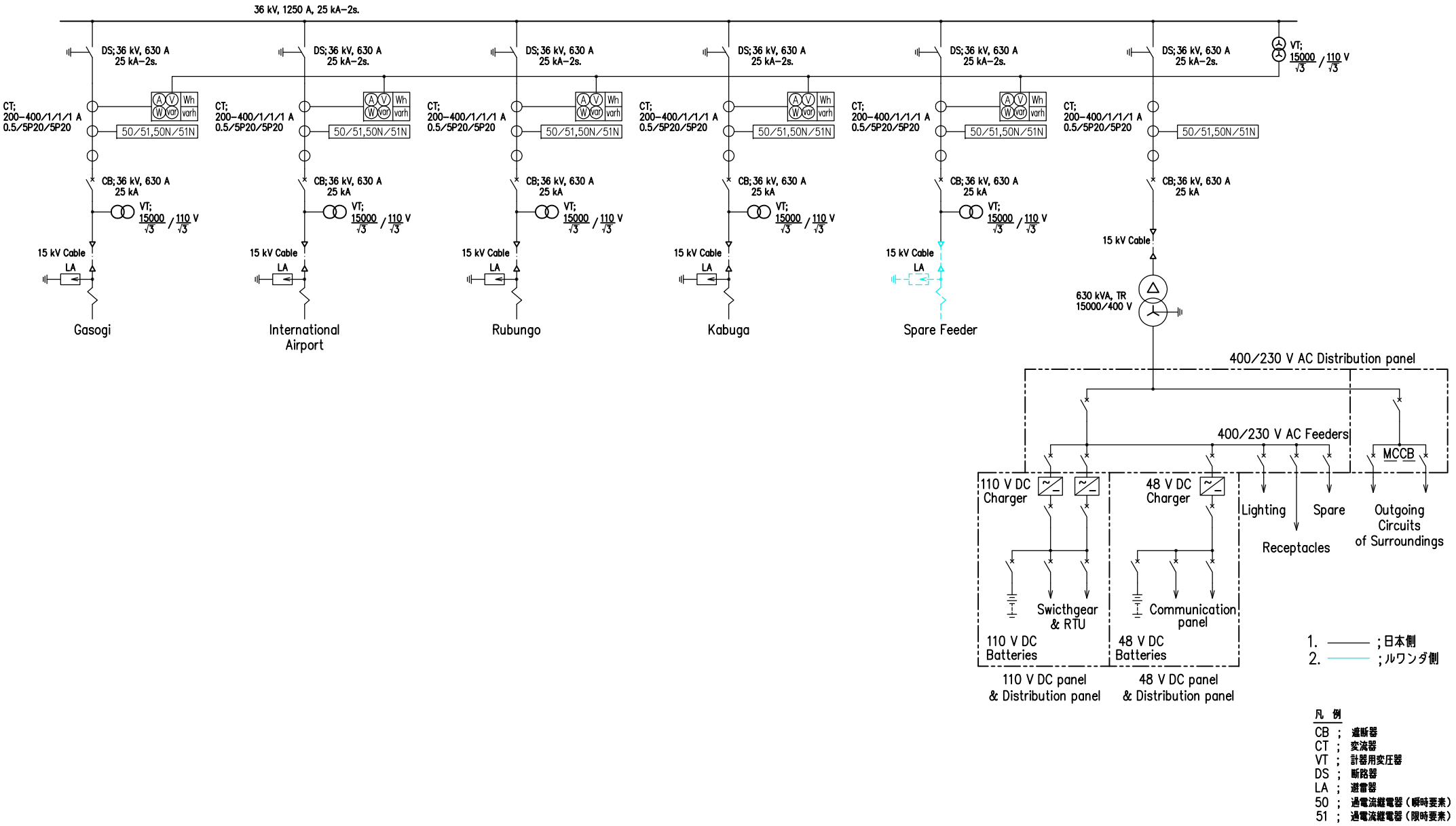
図面番号	図面名称
GG-01	送配電線サイトマップ（全体）
GG-02	110/15kV 送配電系統図（計画範囲））
GG-11	110kV 送電線ルート（新 212 号鉄塔⇔ンデラ変電所：約 2.2km）
GG-12	110kV 送電線分岐点配置図（Scale: 1/500）
GG-13	110kV 送電線分岐図（断面図）
GG-14	110kV 送電線分岐点用ガントリー図
GG-21	15kV 配電線ルート（ルート 1：ガソギ変電所 - カブガ開閉所）
GG-22	カブガ開閉所位置図
GG-31	15kV 配電線ルート（ルート 2：ンデラ変電所 - ﾋﾞﾚﾝﾎﾞ/ﾌﾘｰｿﾞｰﾝ 1）
GG-32	15kV 配電用ケーブルルート（ルート 2、新接鉄塔及び既設鉄塔間）
GG-41	15kV 配電線ルート（ルート 3：ルブンゴ⇔ゴシャ：ルート変更）
GG-51	ムリンディ開閉所位置図
LP-01	110kV 送電線縦断図（1/2）（既設鉄塔 212 号－ンデラ変電所間）
LP-02	110kV 送電線縦断図（2/2）（既設鉄塔 212 号－ンデラ変電所間）
LP-11	15kV 配電線ルート 1 縦断図（1/4）（ルート 1：ガソギ変電所－カブガ変電所間）
LP-12	15kV 配電線ルート 1 縦断図（2/4）（ルート 1：ガソギ変電所－カブガ変電所間）
LP-13	15kV 配電線ルート 1 縦断図（3/4）（ルート 1：ガソギ変電所－カブガ変電所間）
LP-14	15kV 配電線ルート 1 縦断図（4/4）（ルート 1：ガソギ変電所－カブガ変電所間）
LP-21	15kV 配電線ルート 2 縦断図（1/1）（ルート 2：ンデラ変電所－ﾋﾞﾚﾝﾎﾞ/ﾌﾘｰｿﾞｰﾝ 1 間）
LP-31	15kV 配電線ルート 3 縦断図（1/1）（ルート 3：ルブンゴ－ギシャカ，ルート変更）
TL-S1	110kV 送電線鉄塔姿図　タイプ：110-A2
TL-S2	110kV 送電線鉄塔姿図　タイプ：110-B2
TL-S3	110kV 送電線鉄塔姿図　タイプ：110-C2
TL-S4	110kV 送電線鉄塔姿図　タイプ：110-D2
TL-S5	110kV 送電線鉄塔姿図　タイプ：110-E1
TL-S6	110kV 送電線鉄塔　基礎図（1/2）
TL-S7	110kV 送電線鉄塔　基礎図（2/2）
DL-S1	15kV 配電線鉄塔姿図 タイプ：15-TA1
DL-S2	15kV 配電線鉄塔姿図 タイプ：15-TB1
DL-S3	15kV 配電線鉄塔姿図 タイプ：15-TD1
DL-S4	15kV 配電線鉄塔姿図 タイプ：15-TB2
DL-S5	15kV 配電線鉄塔姿図 タイプ：15-TD2
DL-S6	15kV 配電線鋼管柱姿図 タイプ：15-PA1
DL-S7	15kV 配電鉄塔　基礎図 (1/2)
DL-S8	15kV 配電鉄塔　基礎図 (2/2)



DWG No. SS-01 ンデラ変電所　単線結線図

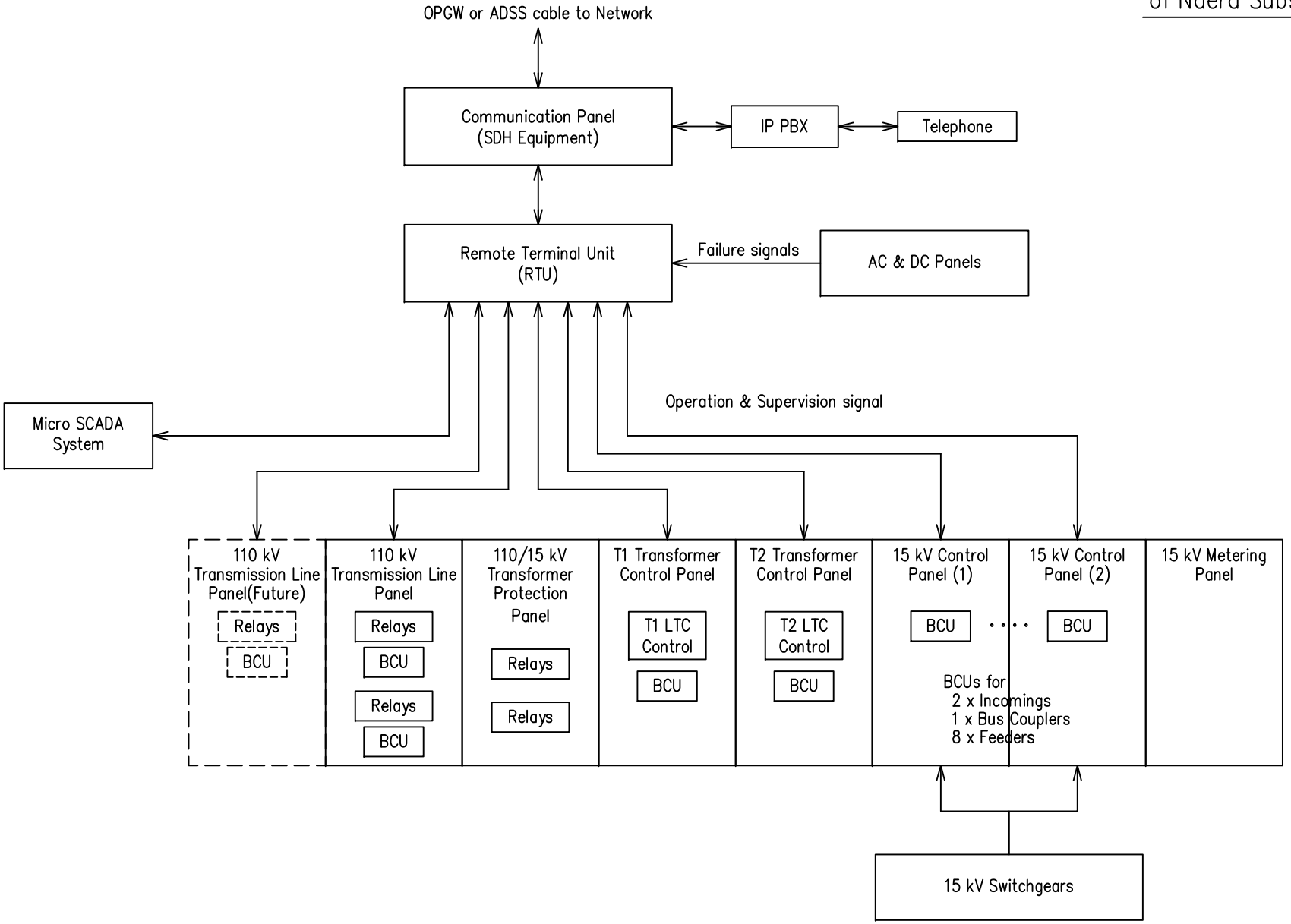


DWG No. SS-02 カブガ開閉所　単線結線図



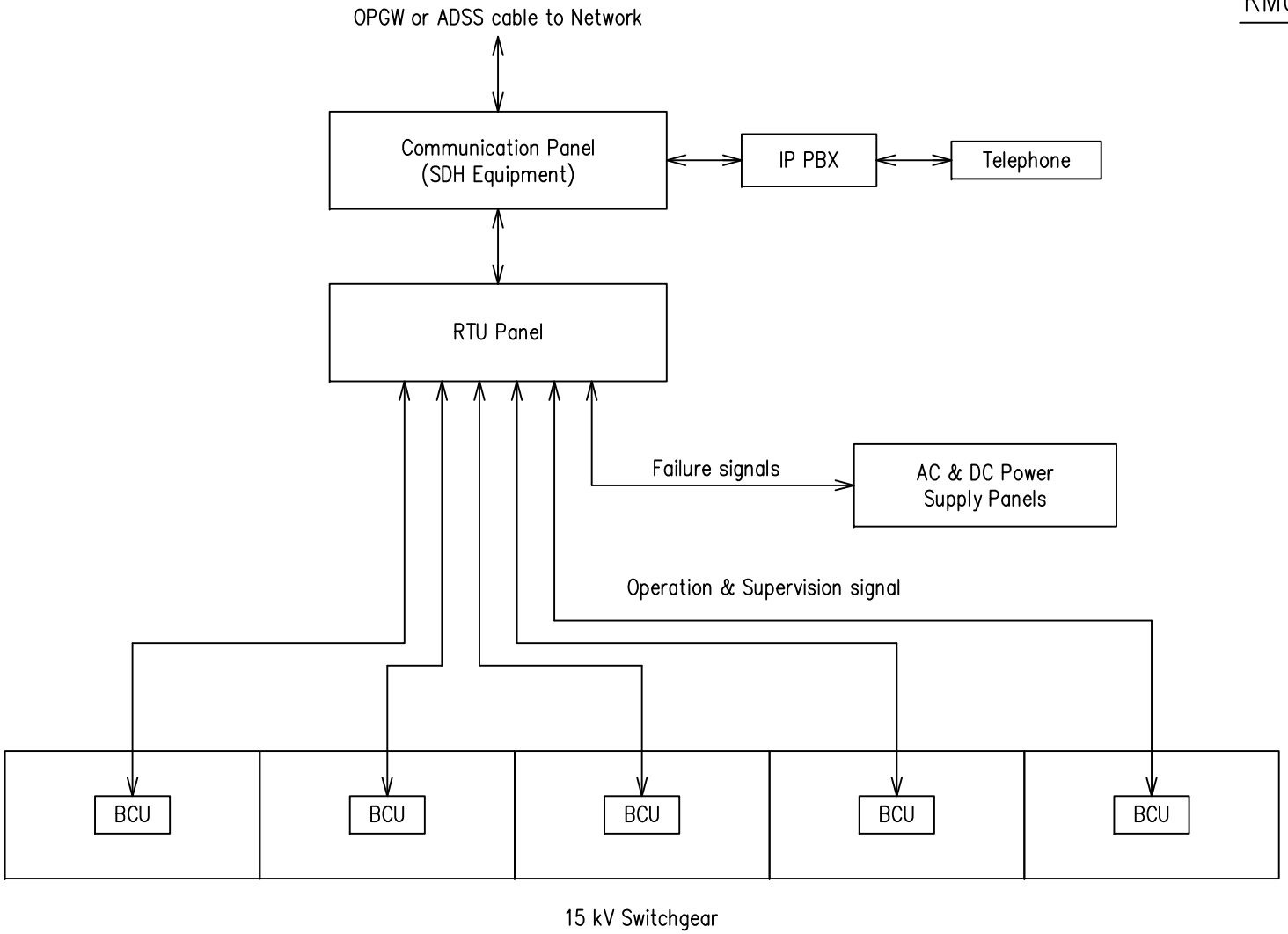
DWG No. SS-03 ムリンディ開閉所　単線結線図

Control System Diagram of Ndera Substation

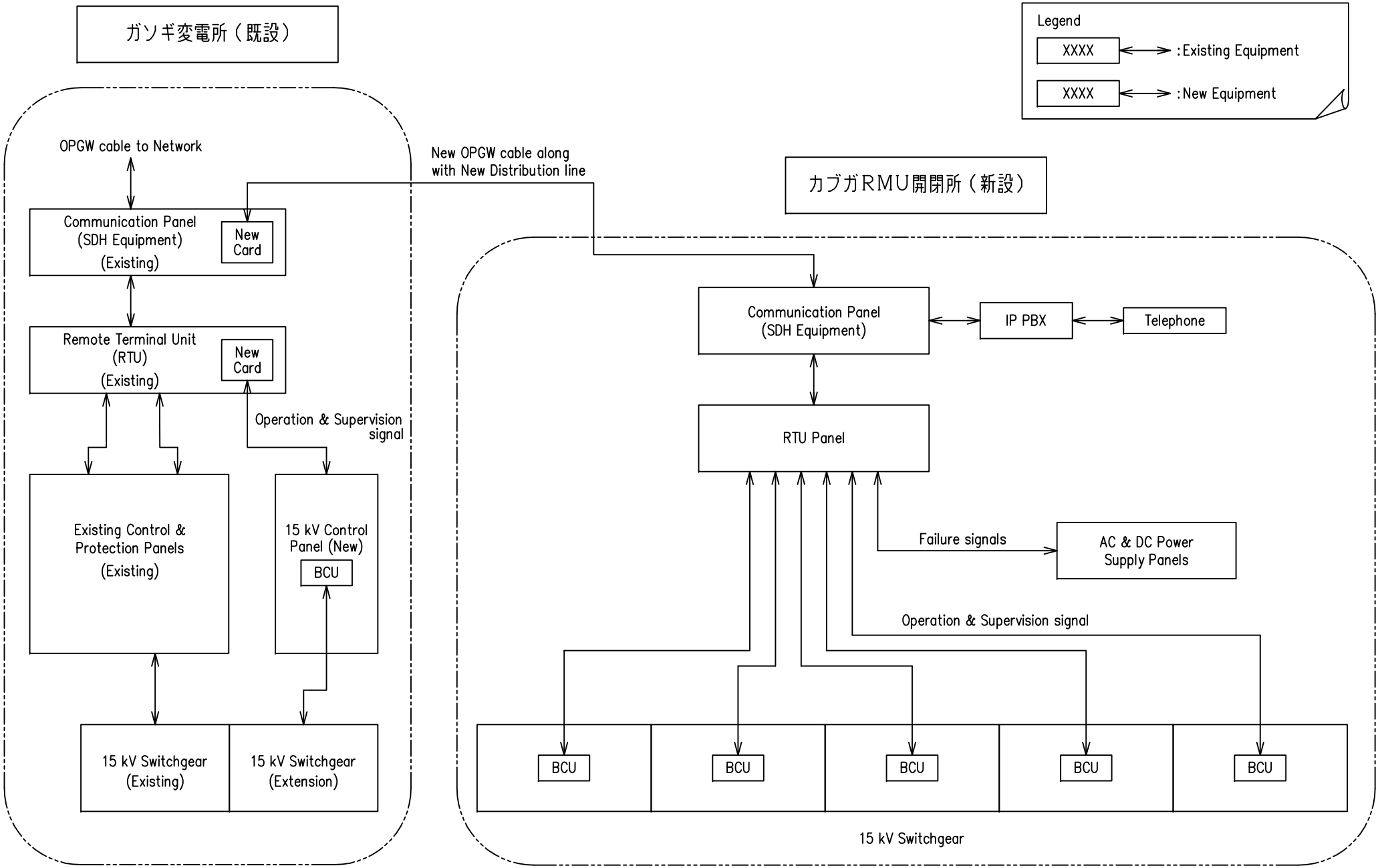


DWG No. SS-04-1 デラ変電所　制御・保護構成図

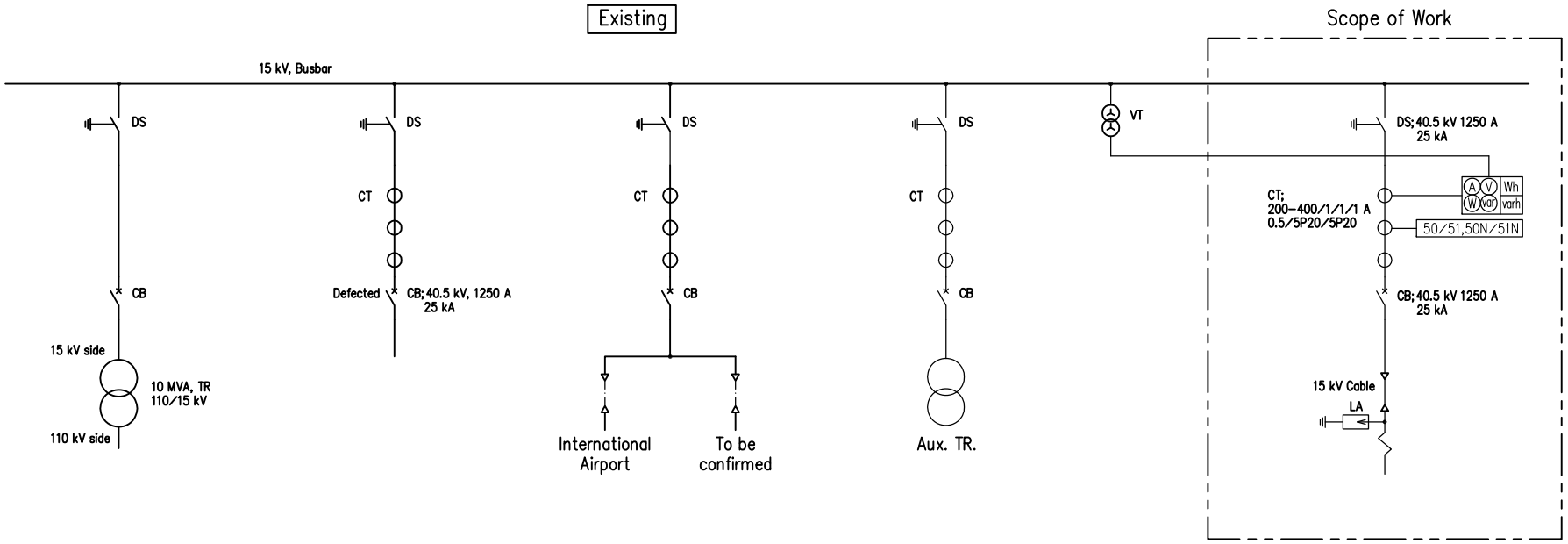
Control System Diagram of RMU Switching Stations



DWG No. SS-04-2 開閉所　制御・保護構成図



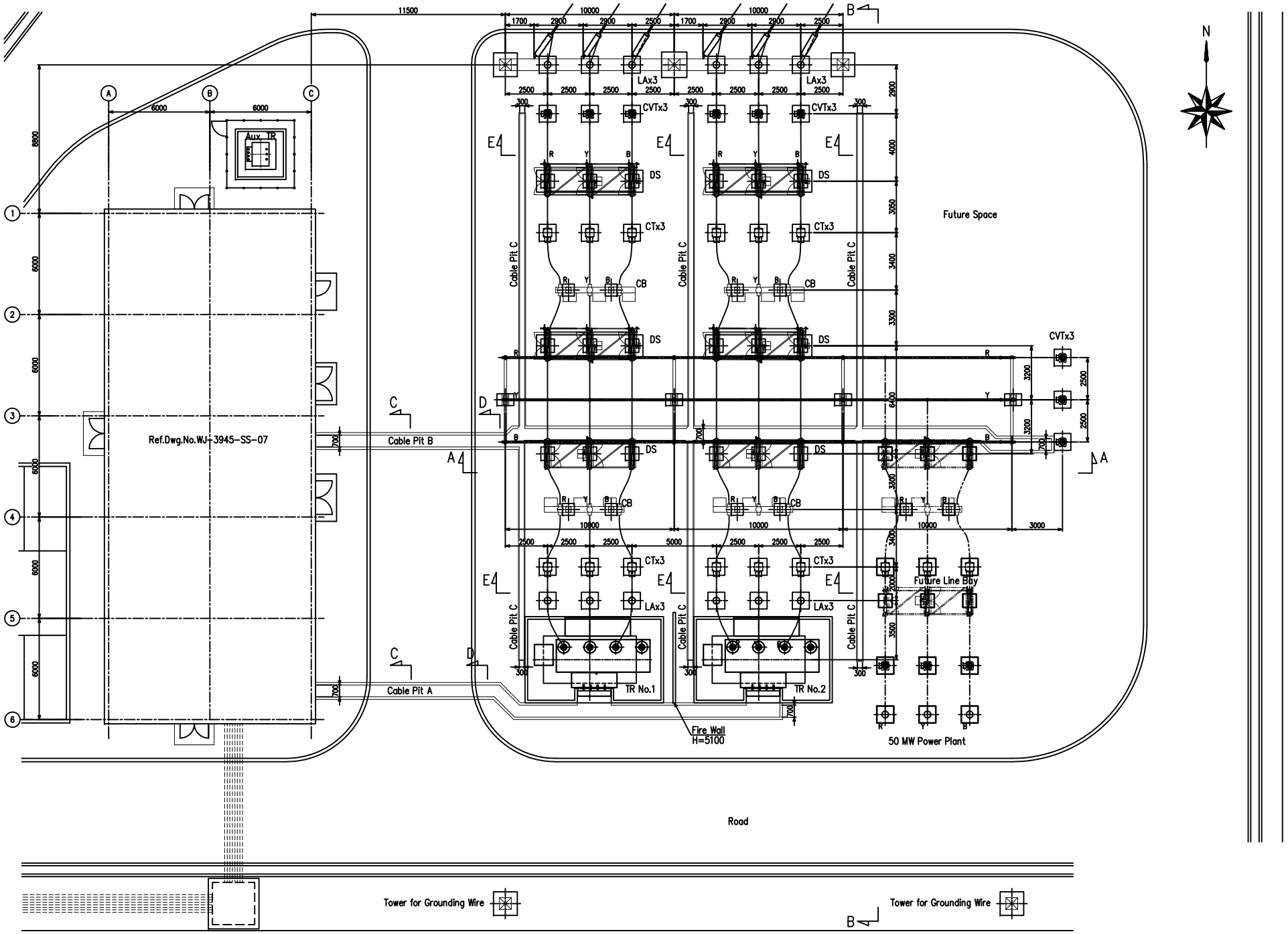
DWG No. SS-04-3 ガソギ変電所及びカブガ開閉所　通信関連図



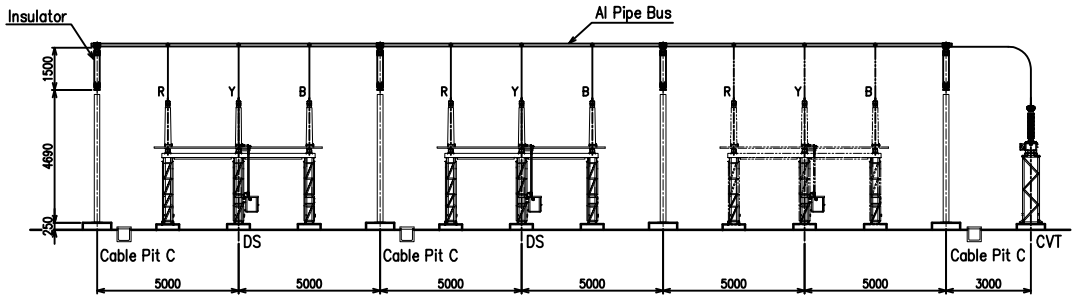
凡 例

CB ； 遮断器
CT ； 変流器
VT ； 計器用変圧器
DS ； 断路器
LA ； 避雷器
50 ； 過電流継電器（瞬時要素）
51 ； 過電流継電器（限時要素）

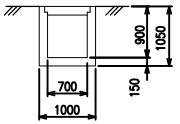
DWG No. SS-05 ガソギ変電所　単線結線図



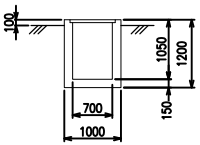
DWG No. SS-06-1 ンデラ変電所 110 kV 開閉装置　配置図（平面図）



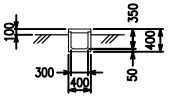
Section A–A
(S=1/100)



Section C~
(S=1/50)



Section D~
(S=1/50)



Section E~
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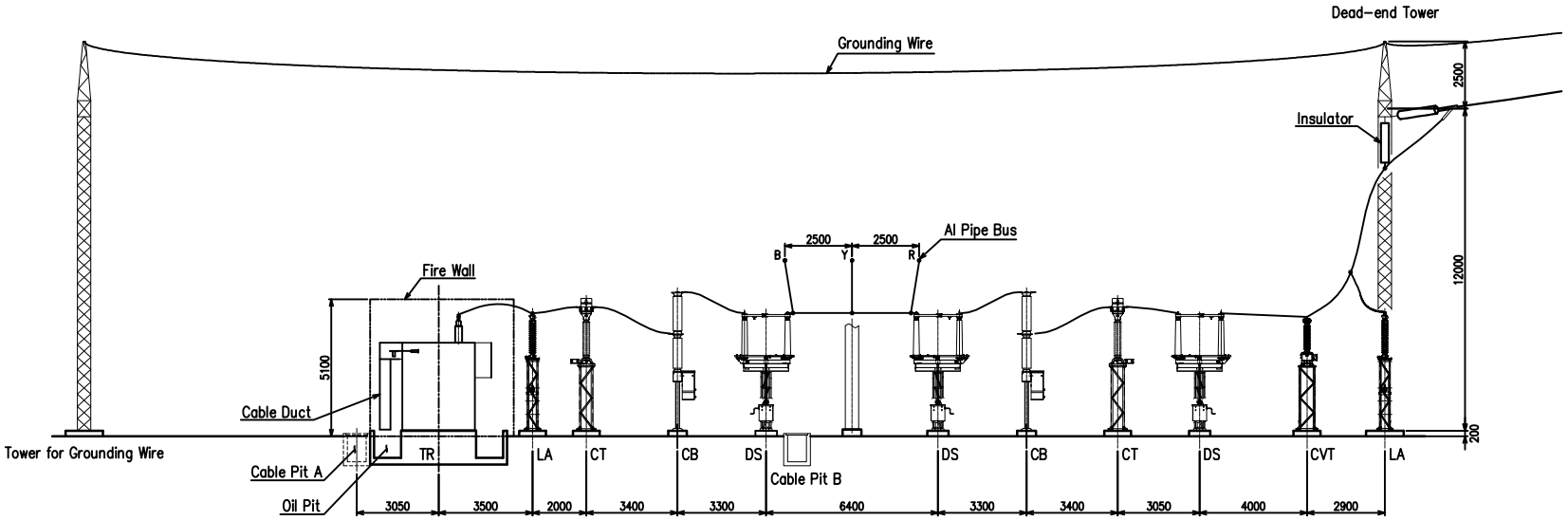
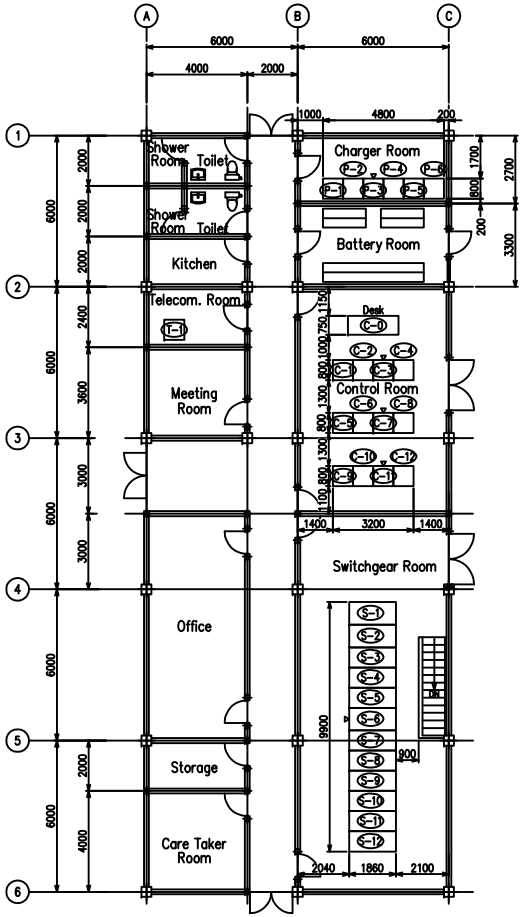


Section B–B
(S=1/100)

DWG No. SS-06-2 ンデラ変電所 110 kV 開閉装置　配置図(側面図)



Charger Room

No.	Panel Name
P-1	AC Distribution panel
P-2	Uninterruptible Power Supply panel
P-3	110 V DC Charger panel
P-4	110 V DC Distribution panel
P-5	48 V DC Charger panel
P-6	48 V DC Distribution panel

Control Room

No.	Panel Name
C-0	Micro SCADA on the Desk
C-1	15 kV Control panel (2)
C-2	15 kV Control panel (1)
C-3	T2 Transformer Control panel
C-4	T1 Transformer Control panel
C-5	Future Space
C-6	110/15 kV Transfofmer Protection panel
C-7	110 kV Transmission Line panel
C-8	110 kV Transmission Line panel (Future)
C-9	Future Space
C-10	Remote Terminal Unit
C-11	Future Space
C-12	Future Space

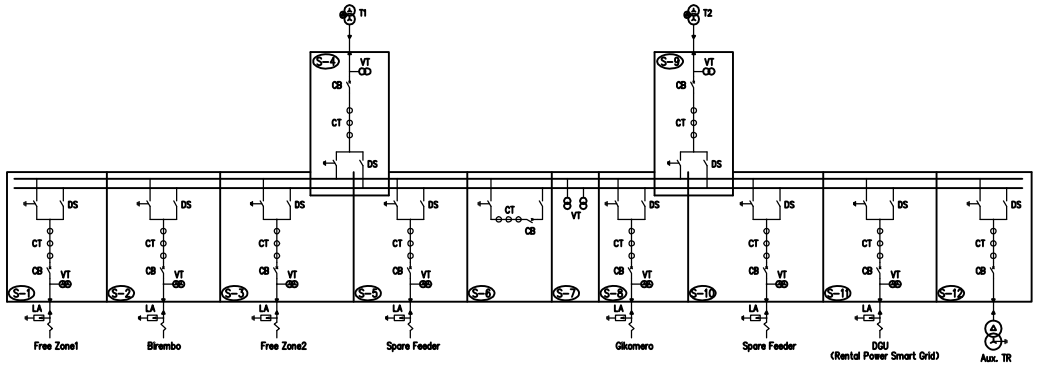
Switchgear Room

No.	Panel Name
S-1	Free Zone 1
S-2	Birembo
S-3	Free Zone 2
S-4	20 MVA Transformer T1
S-5	Spare Feeder
S-6	Bus Coupler
S-7	Busbar VT
S-8	Gikomero
S-9	20 MVA Transformer T2
S-10	Spare Feeder
S-11	DGU (Rental Power Smart Grid)
S-12	Auxiliary Transformer

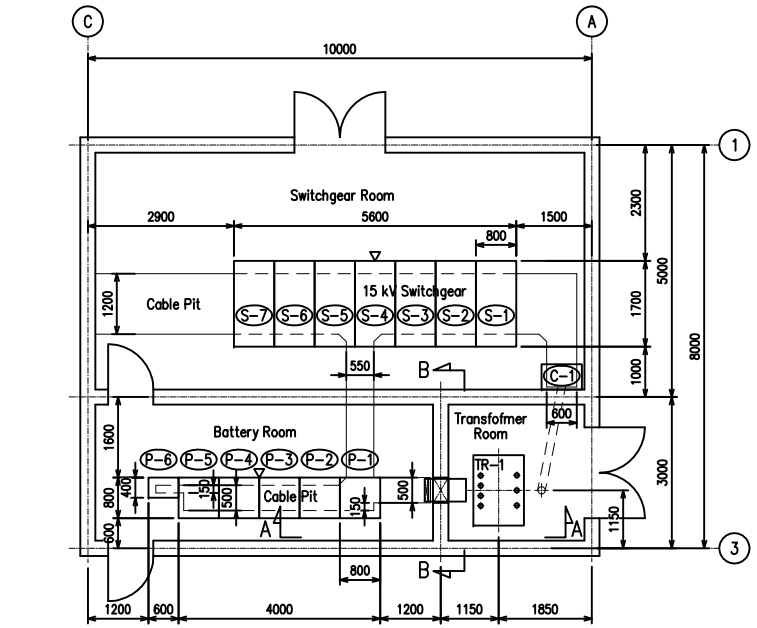
Telecommunication Room

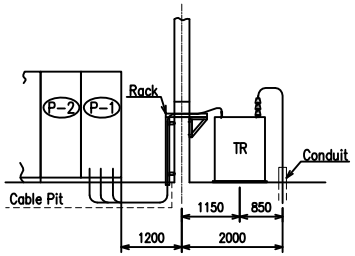
No.	Panel Name
T-1	Multiplexer

Single Line Diagram of 15 kV Switchgear

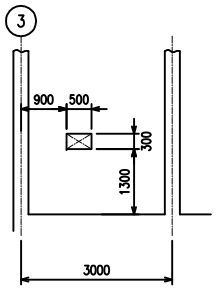


DWG No. SS-07 ンデラ変電所　15 kV 開閉装置 & 制御・保護盤　配置図（制御棟1階）





Section A-A



Section B-B

Battery Room

No.	Panel Name
P-1	AC Distribution panel (1)
P-2	AC Distribution panel (2)
P-3	110 V DC Charger panel
P-4	110 V DC Distribution panel
P-5	48 V DC Charger & Distribution panel
P-6	Multiplexer

Switchgear Room

No.	Panel Name
C-1	Remote Terminal Unit

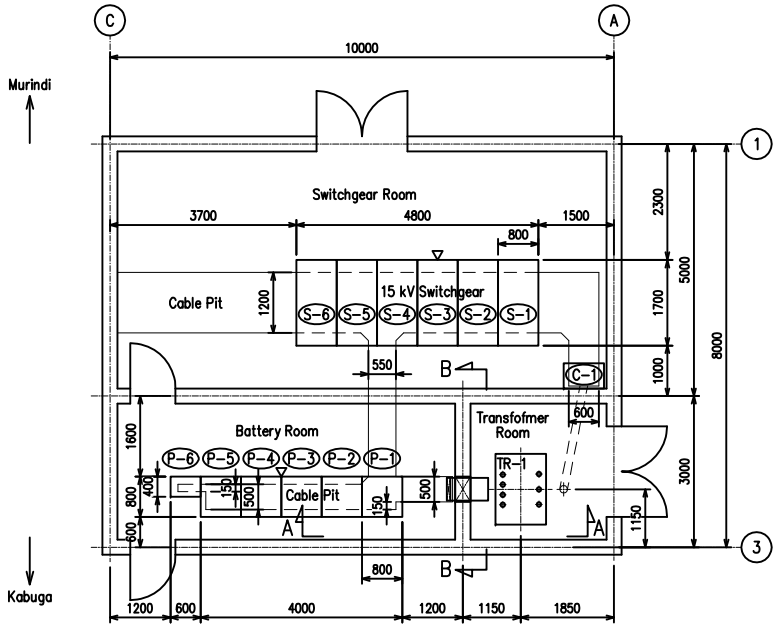
Switchgear Room

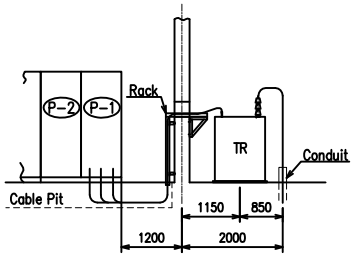
S-1	Gasogi
S-2	International Airport
S-3	Rubungo
S-4	Kabuga
S-5	Spare Feeder
S-6	630 kVA Transformer
S-7	Busbar VT

Transformer Room

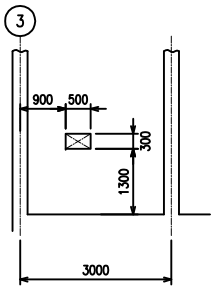
No.	Panel Name
TR-1	630 kVA Transformer

DWG No. SS-08 ムリンディ開閉所　配置図





Section A-A



Section B-B

Battery Room

No.	Panel Name
P-1	AC Distribution panel (1)
P-2	AC Distribution panel (2)
P-3	110 V DC Charger panel
P-4	110 V DC Distribution panel
P-5	48 V DC Charger & Distribution panel
P-6	Multiplexer

Switchgear Room

No.	Panel Name
C-1	Remote Terminal Unit

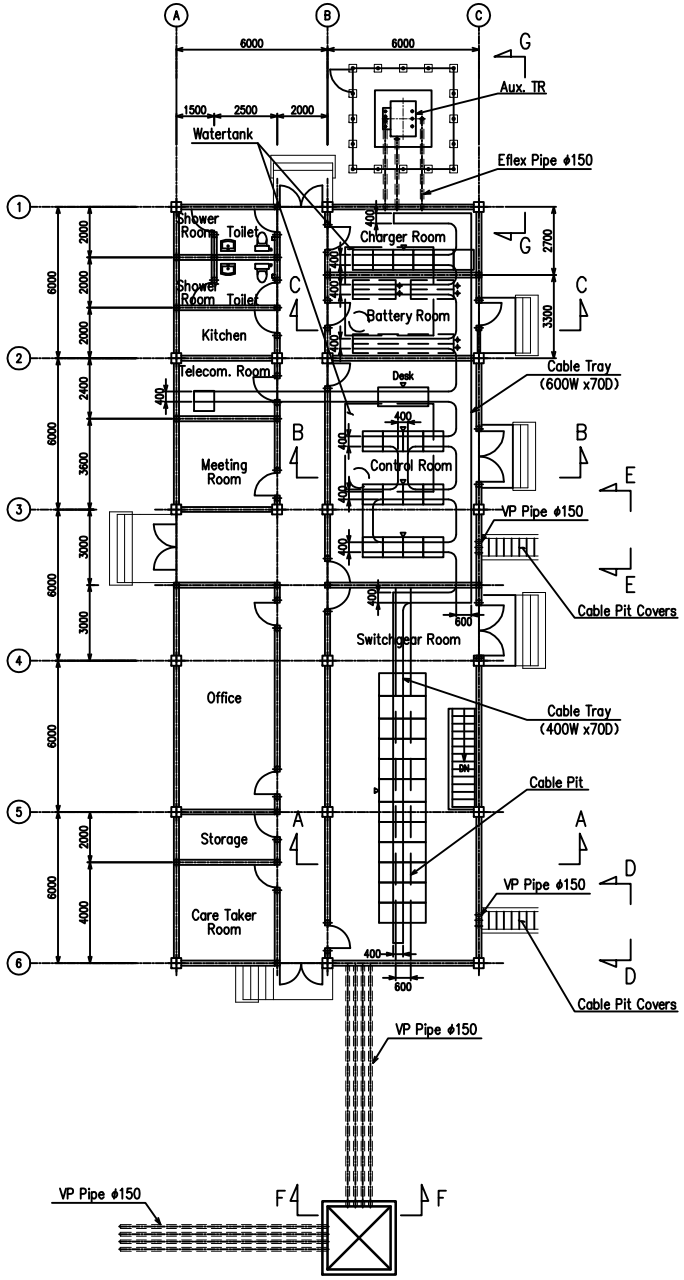
Switchgear Room

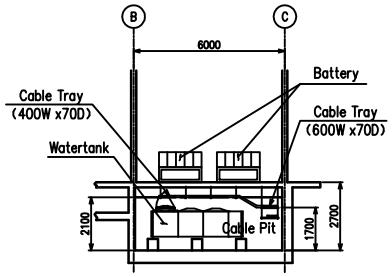
S-1	S-1 Gasogi
S-2	S-2 Riviela School
S-3	S-3 Kabuga Cabin
S-4	S-4 Spare Feeder
S-5	S-5 630 kVA Transformer
S-6	S-6 Busbar VT

Transformer Room

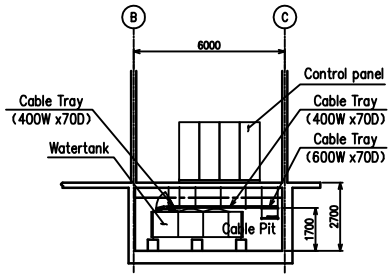
No.	Panel Name
TR-1	630 kVA Transformer

DWG No. SS-09 カブガ開閉所　配置図

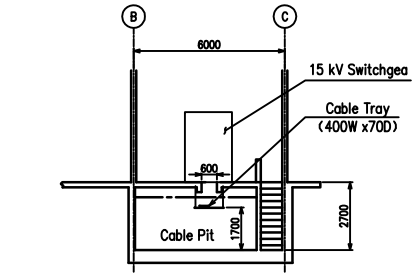




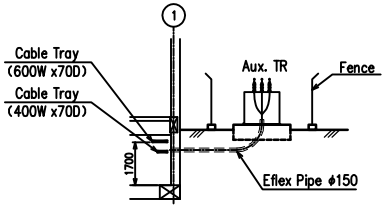
Section C–C



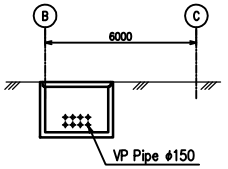
Section B–B



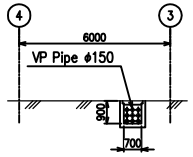
Section A–A



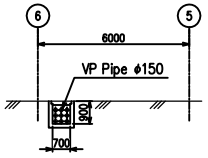
Section G–G



Section F–F



Section E–E

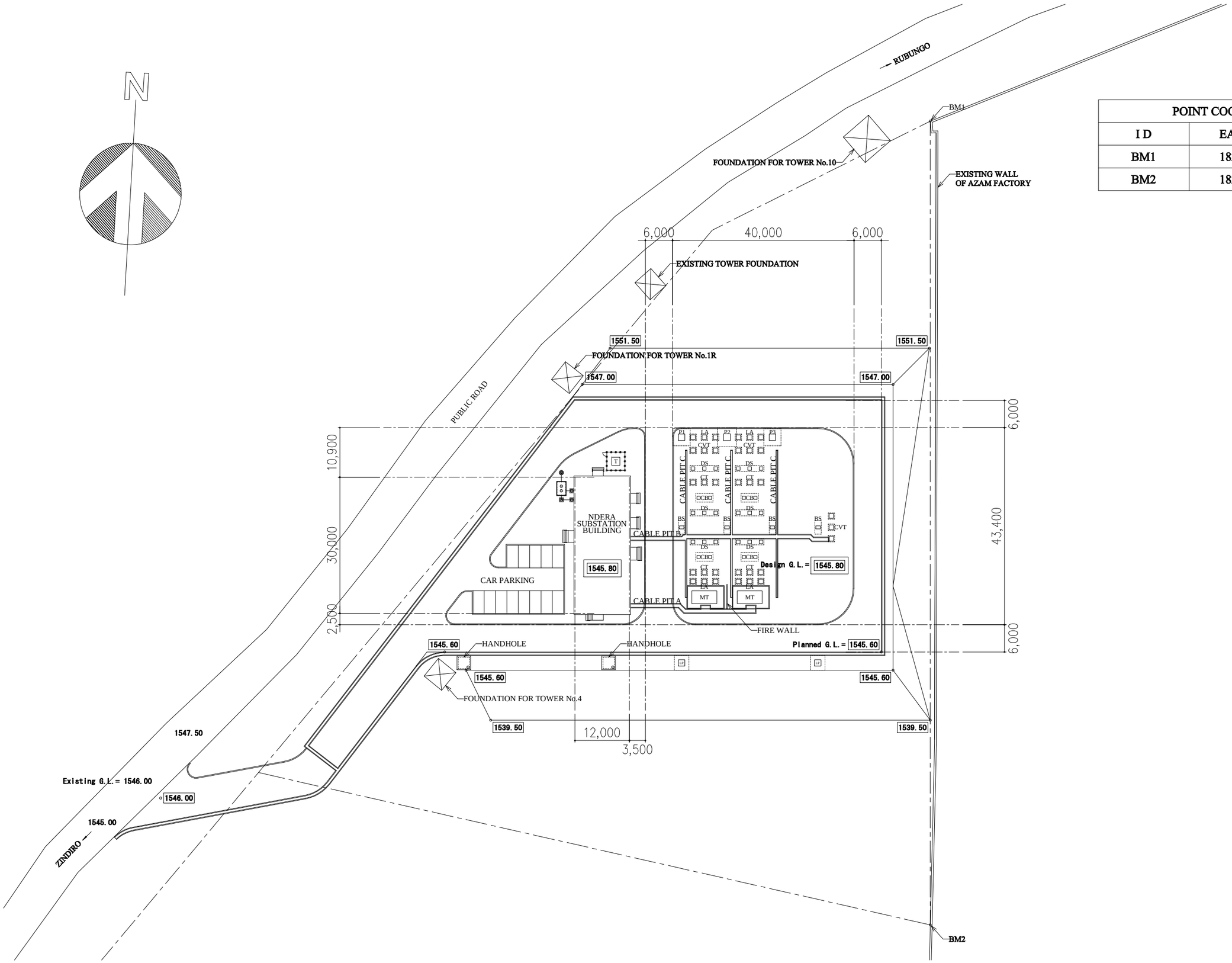


Section D–D

DWG No. SS-11 ンデラ変電所　ケーブルトレイ配置図（制御棟地下ケーブル室）

N

POINT COORDINATES		
I D	EAST	NORTH
BM1	182949.67	9786332.31
BM2	182959.89	9786155.62



DWG No. A-01: ンデラ変電所　配置図

GENERAL

BUILDING AREA	427.50 m2
TOTAL FLOOR AREA	602.19 m2
STRUCTURE	REINFORCED CONCRETE

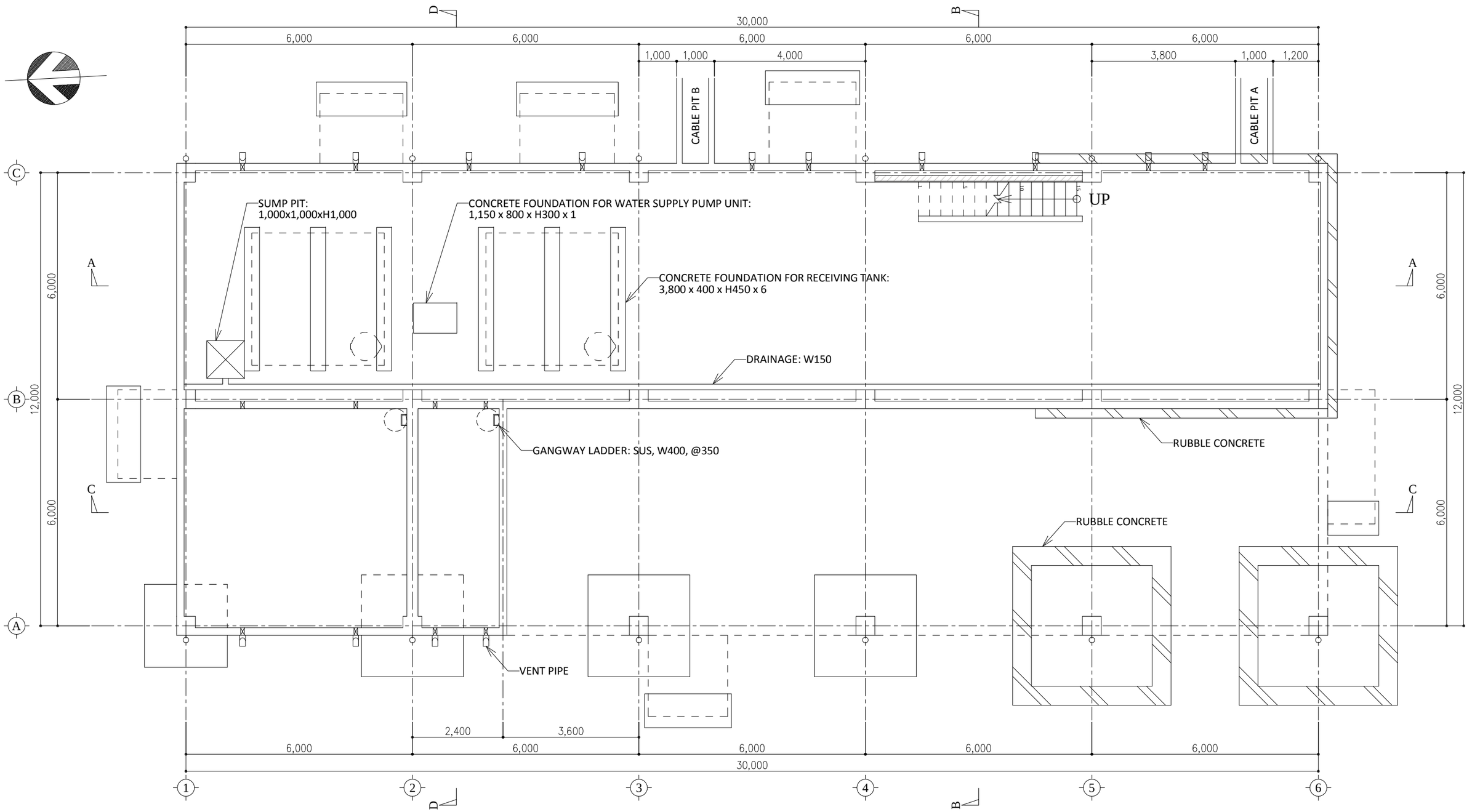
EXTERIOR FINISHING SCHEDULE

LOCATION	SPECIFICATION
COLUMN	FINISH (A.E.P) ON REINFORCED CONCRETE WITH MORTAR STEEL TROWEL 30mm THK
BEAM	PAINT FINISH (A.E.P) ON REINFORCED CONCRETE WITH MORTAR STEEL TROWEL 30mm THK
WALL	PAINT FINISH (A.E.P) ON 150mm THK CONCRETE BLOCK WITH MORTAR STEEL TROWEL 30mm THK
ROOF	CONCRETE STEEL TROWEL ON COVER CONCRETE WITH WELDED WIRE MESH THERMAL INSULATION: EXTRUDED POLYETHYLENE FORM 50mm THK ASPHALT MEMBRANE WATER PROOFING OR EQUIVALENT COATS OF HOT BITUMEN ON REINFORCED CONCRETE SLAB
FLOOR	CERAMIC TILE (300x300mm, NON SLIP) ON REINFORCED CONCRETE

INTERIOR FINISHING SCHEDULE (NDERA SUBSTATION BUILDING)

ROOM NAME	FLOOR	BASEBOARD	WALL	CEILING	REMARKS
BF Basement	NON-SLIP PAINTING FINISH ON CONCRETE		EXPOSED CONCRETE (WITH REPAIR)	EXPOSED CONCRETE (WITH REPAIR)	
BF Pit	CONCRETE STEEL TROWEL		DITTO	DITTO	
GF Switchgear Room	PORCELAIN TILE 300 X 300 ON MORTAR STEEL TROWEL	PAINT FINISH(A.E.P) MORTAR FINISH H=100	PAINT FINISH(A.E.P) MORTAR STEEL TROWEL 20mm THK ON 150mm THK CONCRETE BLOCK	PAINT FINISH (A.E.P) EXPOSED CONCRETE (WITH REPAIR)	FIRE EXTINGUISHER 1 SET, NAME PLATE
GF Control Room	DITTO	DITTO	DITTO	DITTO	AIR CONDITIONING, NAME PLATE FIRE EXTINGUISHER 1 SET
GF Battery Room	DITTO	DITTO	DITTO	DITTO	FIRE EXTINGUISHER 1 SET, NAME PLATE
GF Charger Room	DITTO	DITTO	DITTO	DITTO	AIR CONDITIONING, NAME PLATE FIRE EXTINGUISHER 1 SET WASH BASE, MIRROR, WATER FAUCET
GF Telecom Room	DITTO	DITTO	DITTO	MAKEUP PLASTER BOARD 9.5mm THK LIGHT IRON SUSPENDED FRAME	AIR CONDITIONING, NAME PLATE FIRE EXTINGUISHER 1 SET
GF Office	DITTO	DITTO	DITTO	DITTO	NAME PLATE
GF Meeting	DITTO	DITTO	DITTO	DITTO	NAME PLATE
GF Care Taker Room	DITTO	DITTO	DITTO	DITTO	NAME PLATE
GF Kitchen	DITTO	DITTO	DITTO	DITTO	EXHAUST FAN WITH HOOD, NAME PLATE FIRE EXTINGUISHER 1 SET SINK 1 SET, NAME PLATE
GF Toilet, Shower Room	DITTO		PORCELAIN TILE 100 X 100 ON MORTAR STEEL TROWEL ON 150, 100mm THK CONCRETE BLOCK	DITTO	EXHAUST FAN WITH HOOD, NAME PLATE TOILET PAPER HOLDER, WASH BASE MIRROR, WATER FAUCET
GF Storage	DITTO	PAINT FINISH(A.E.P) MORTAR FINISH H=100	PAINT FINISH(A.E.P) MORTAR STEEL TROWEL 20mm THK ON 150mm THK CONCRETE BLOCK	EXPOSED CONCRETE (WITH REPAIR)	NAME PLATE
GF Corridor	DITTO	DITTO	DITTO	MAKEUP PLASTER BOARD 9.5mm THK LIGHT IRON SUSPENDED FRAME	FIRE EXTINGUISHER 2 SETS

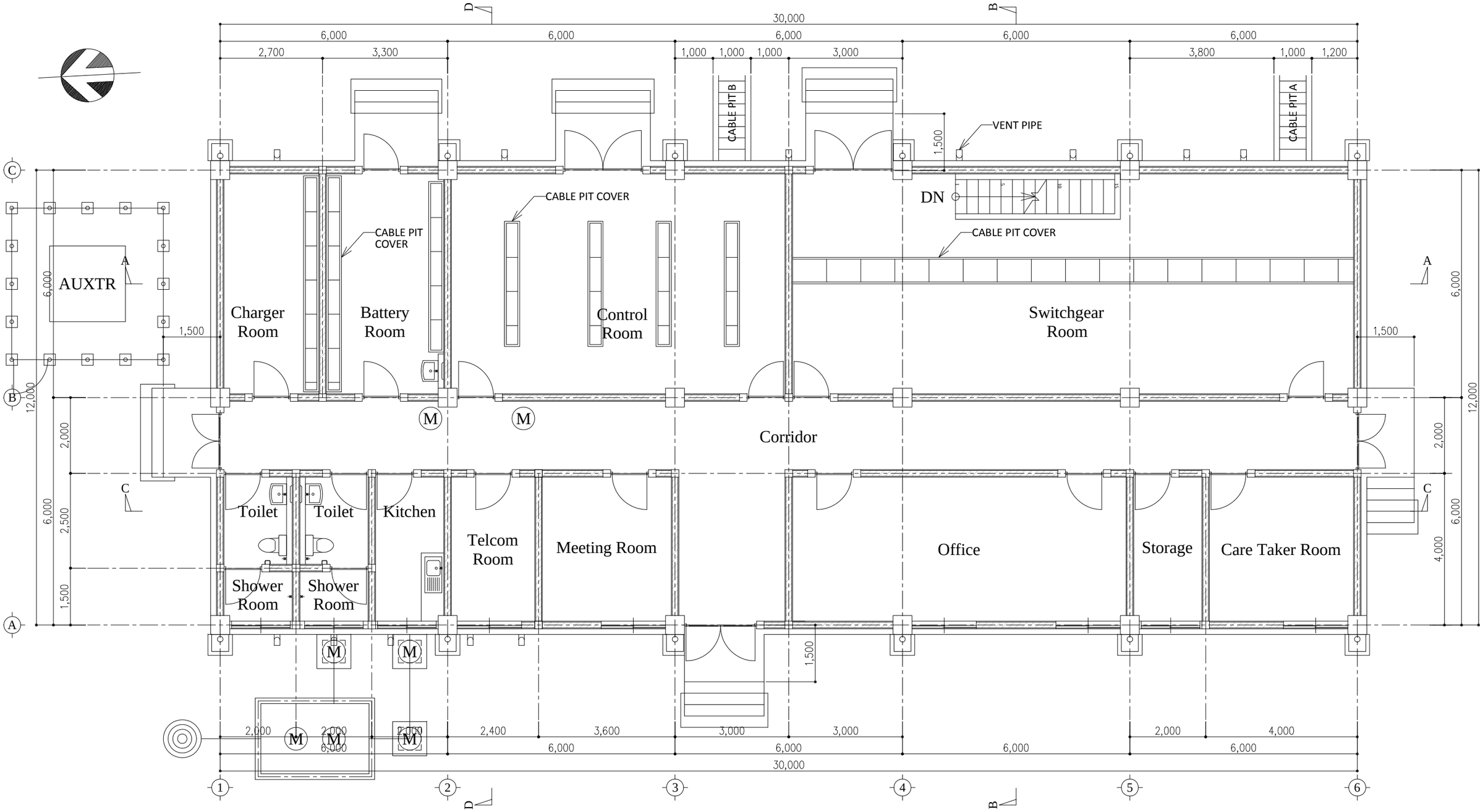
DWG No. A-02: ンデラ変電所　仕上表



GENERAL NOTES

1) CONCRETE BLOCK t=150

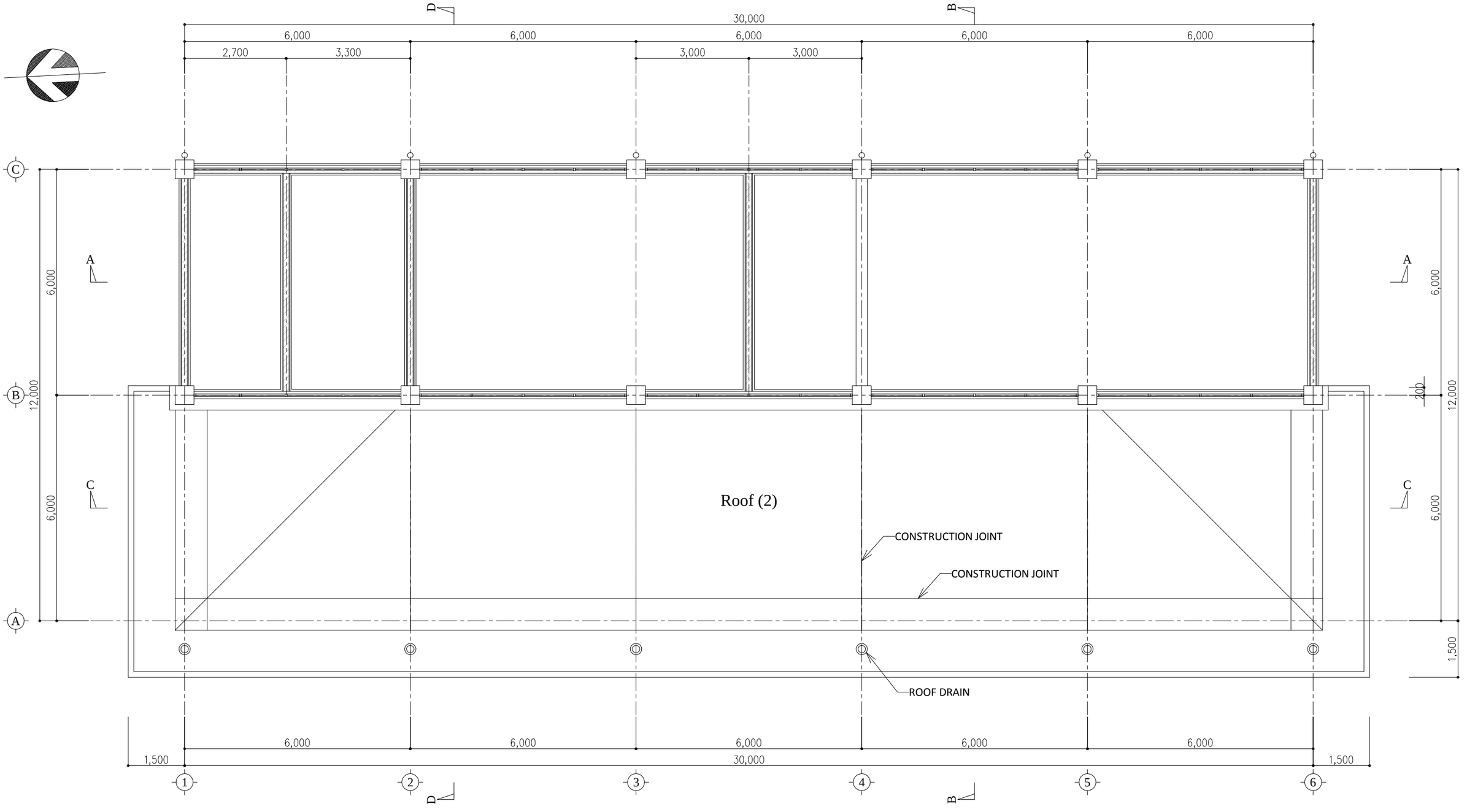
DWG No. A-03: ンデラ変電所　地階平面図



GENERAL NOTES

1) CONCRETE BLOCK t=150
2) (M) MANHOLE

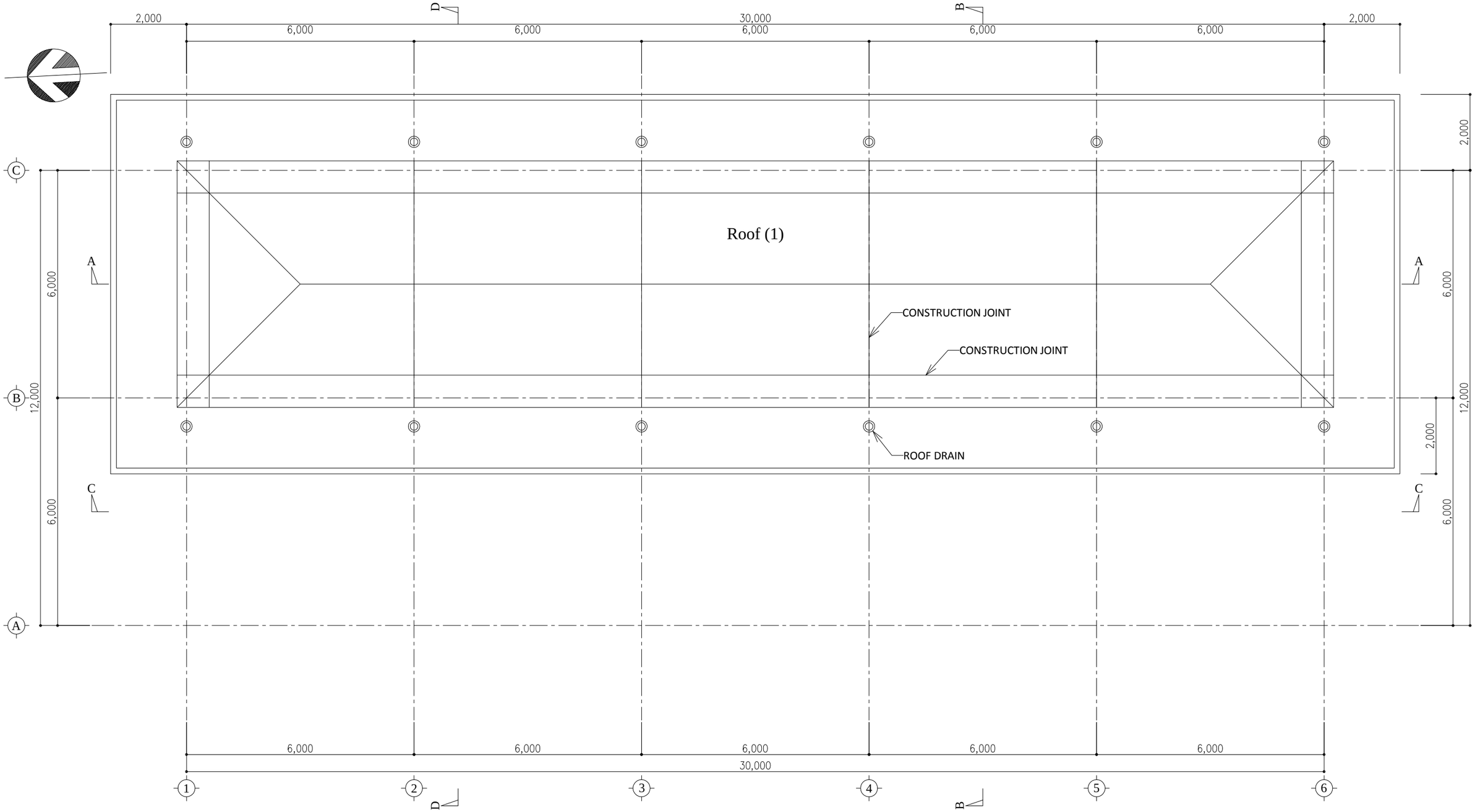
DWG No. A-04: ンデラ変電所　1階平面図



GENERAL NOTES

1) CONCRETE BLOCK t=150

DWG No. A-05: ンデラ変電所　屋根伏図1

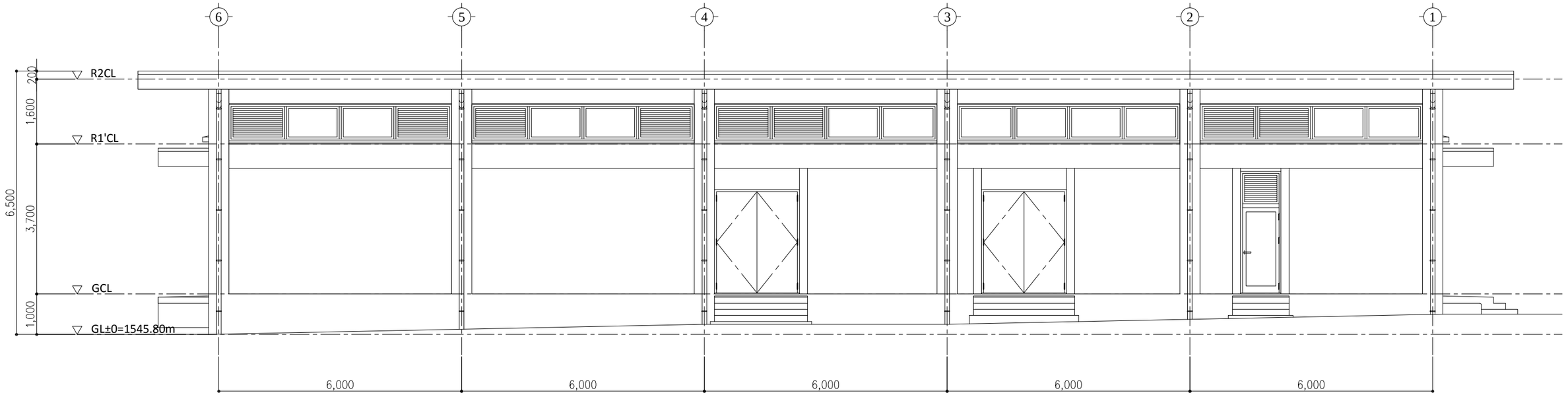


GENERAL NOTES

1) CONCRETE BLOCK t=150

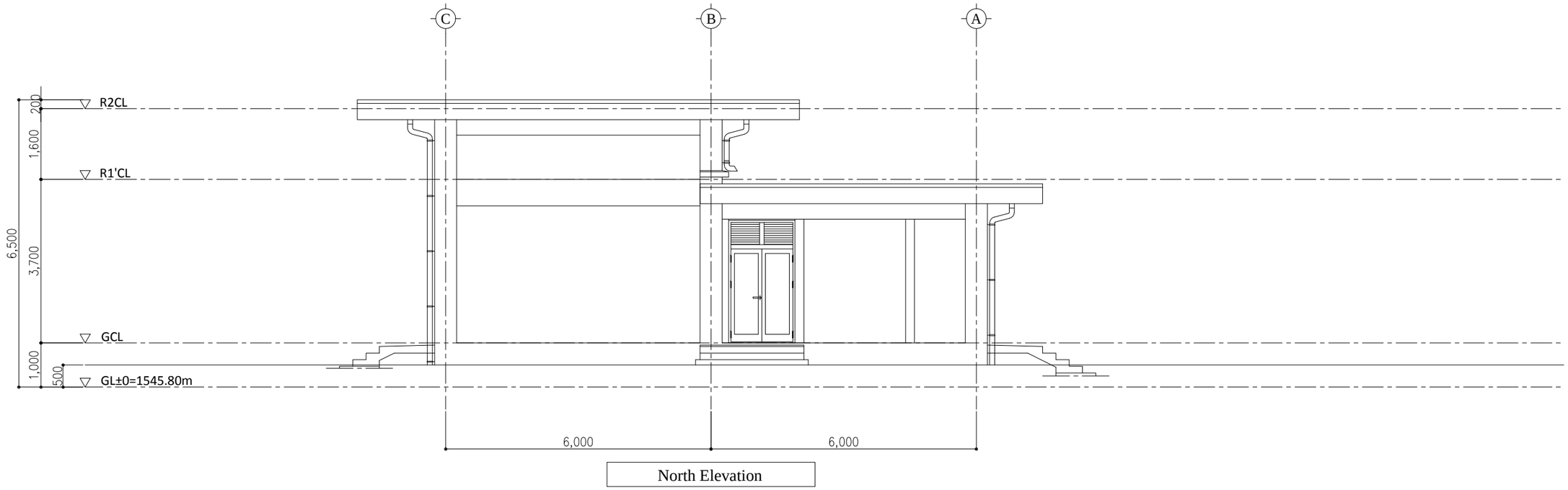
DWG No. A-06: ンデラ変電所　屋根伏図2

West Elevation

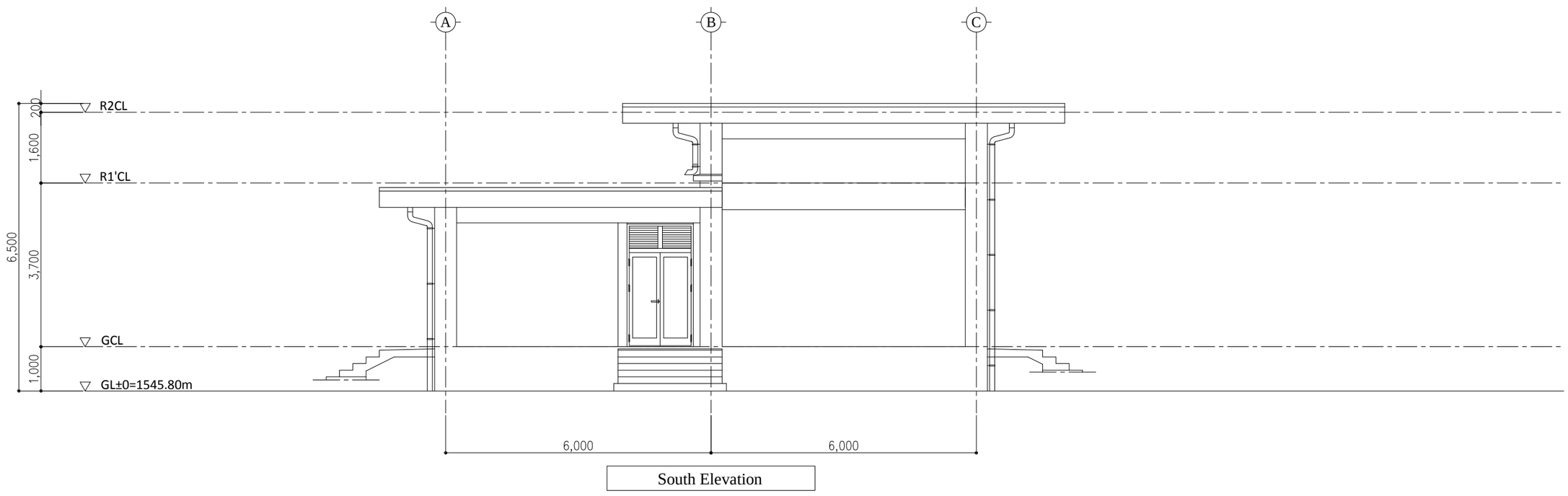


East Elevation

DWG No. A-07: ンデラ変電所　立面図1

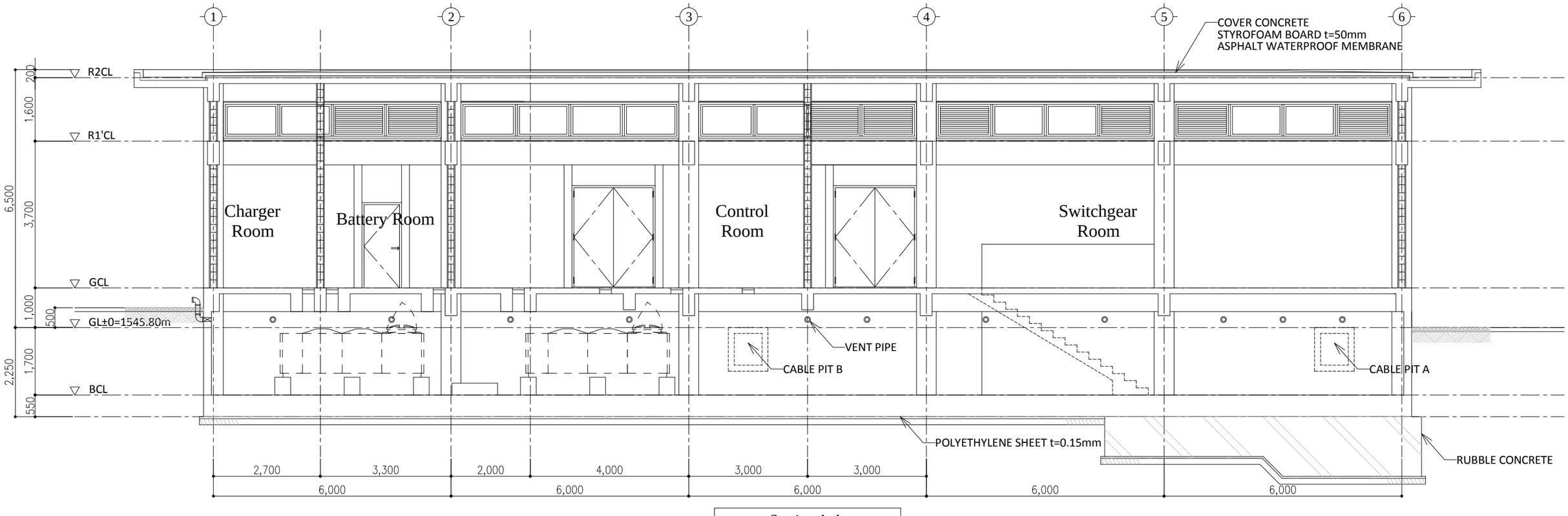


North Elevation

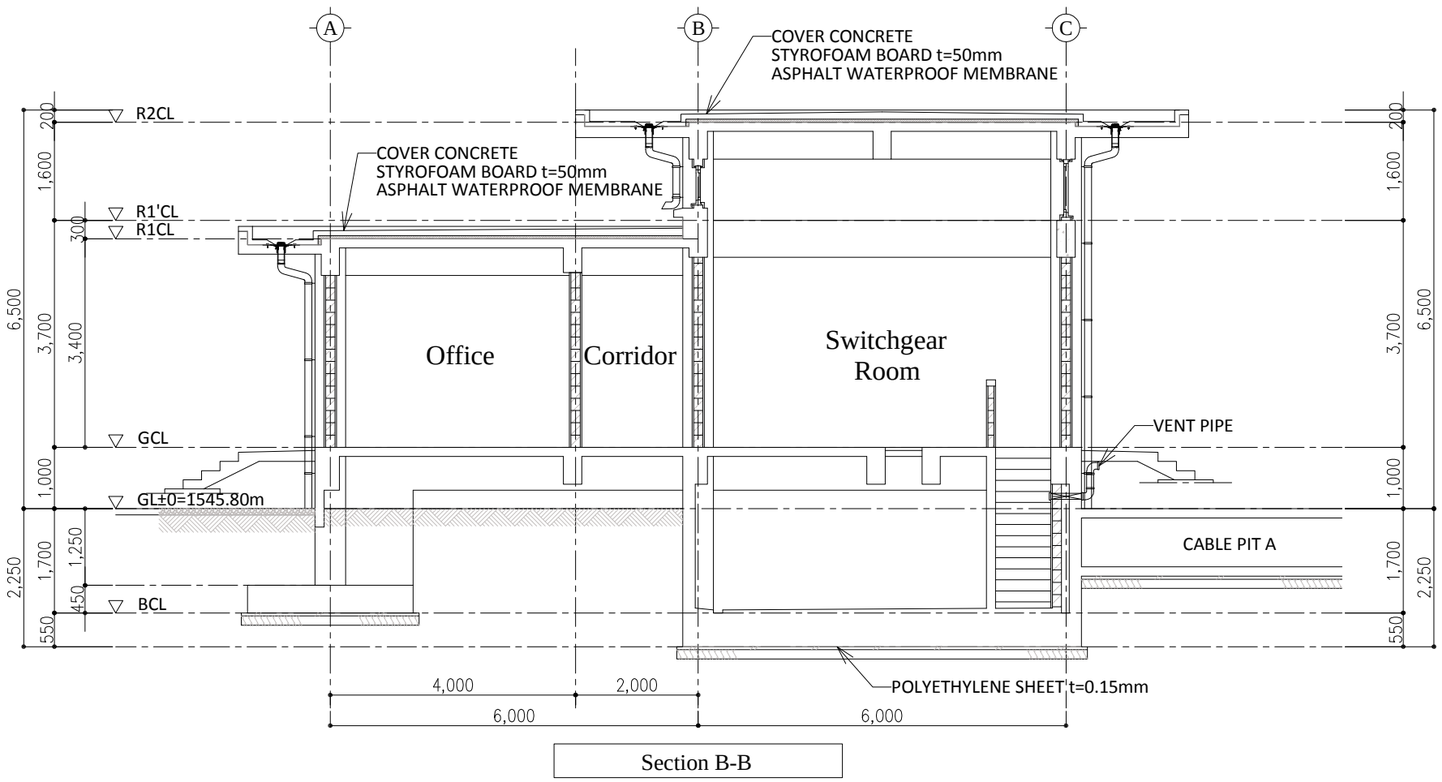


South Elevation

DWG No. A-08: ンデラ変電所　立面図2



Section A-A

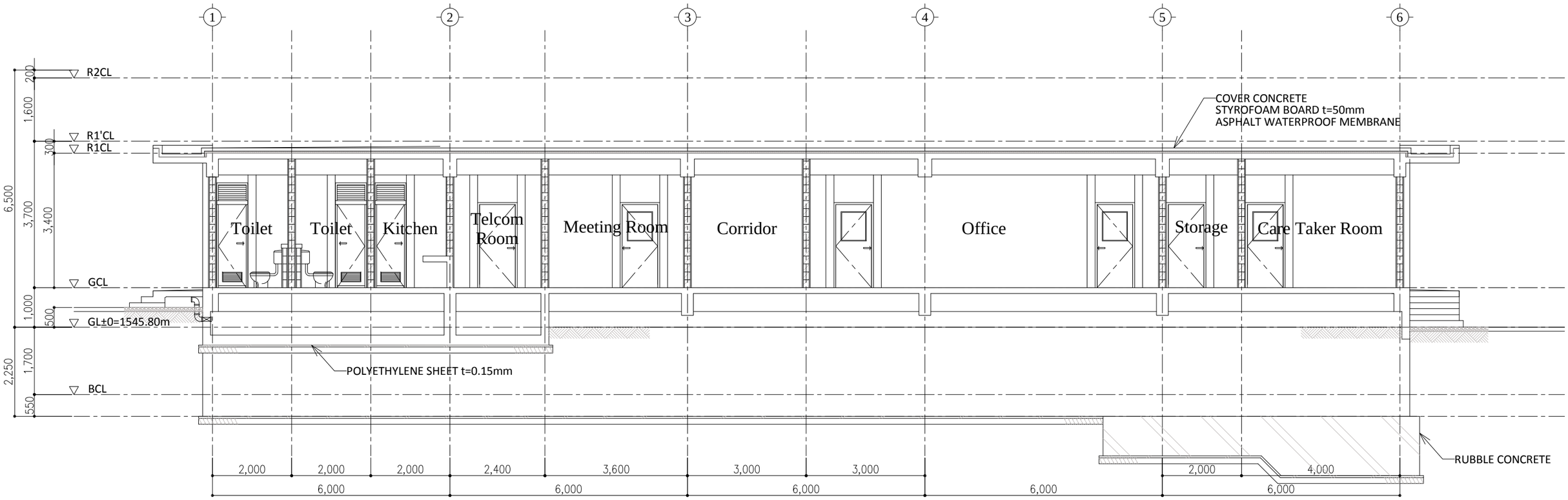


Section B-B

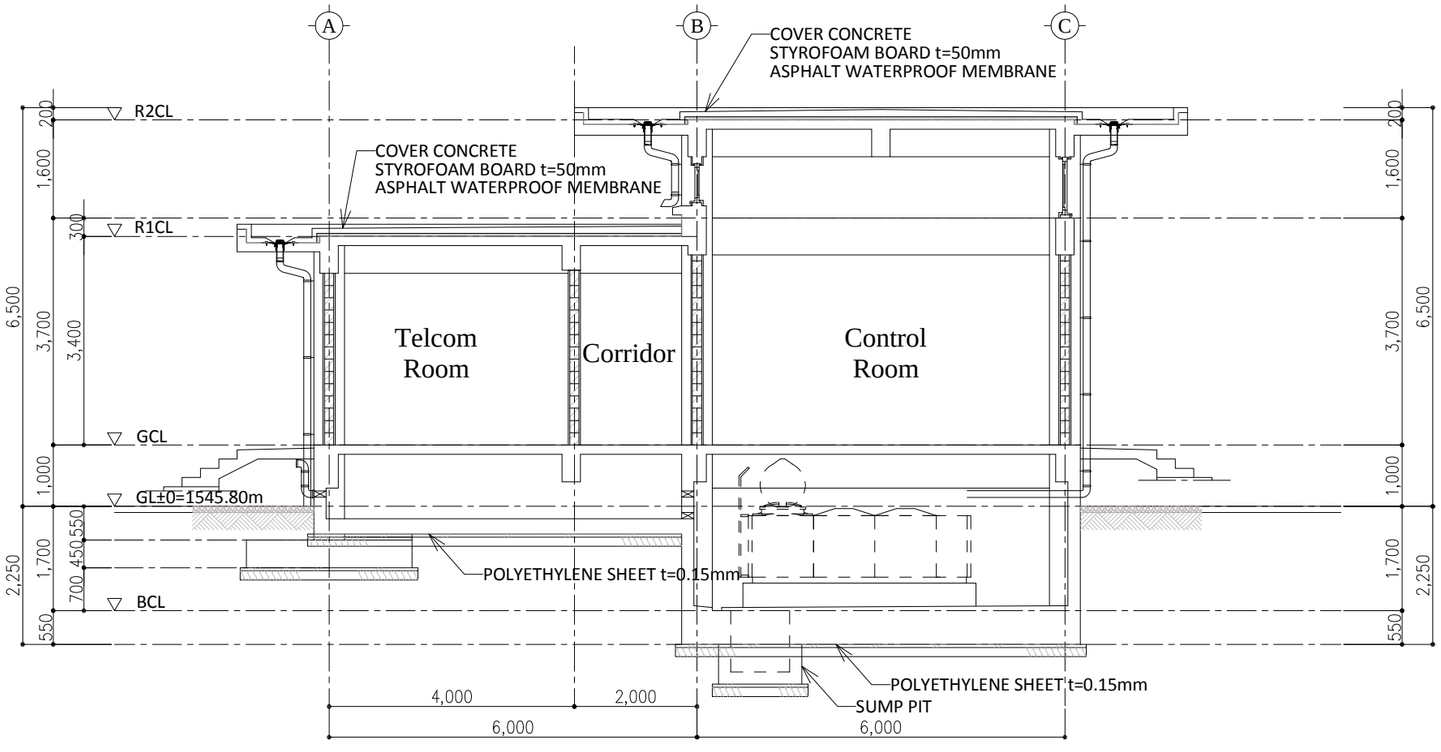
GENERAL NOTES

1) CONCRETE BLOCK t=150

DWG No. A-09: ンデラ変電所　断面図1



Section C-C

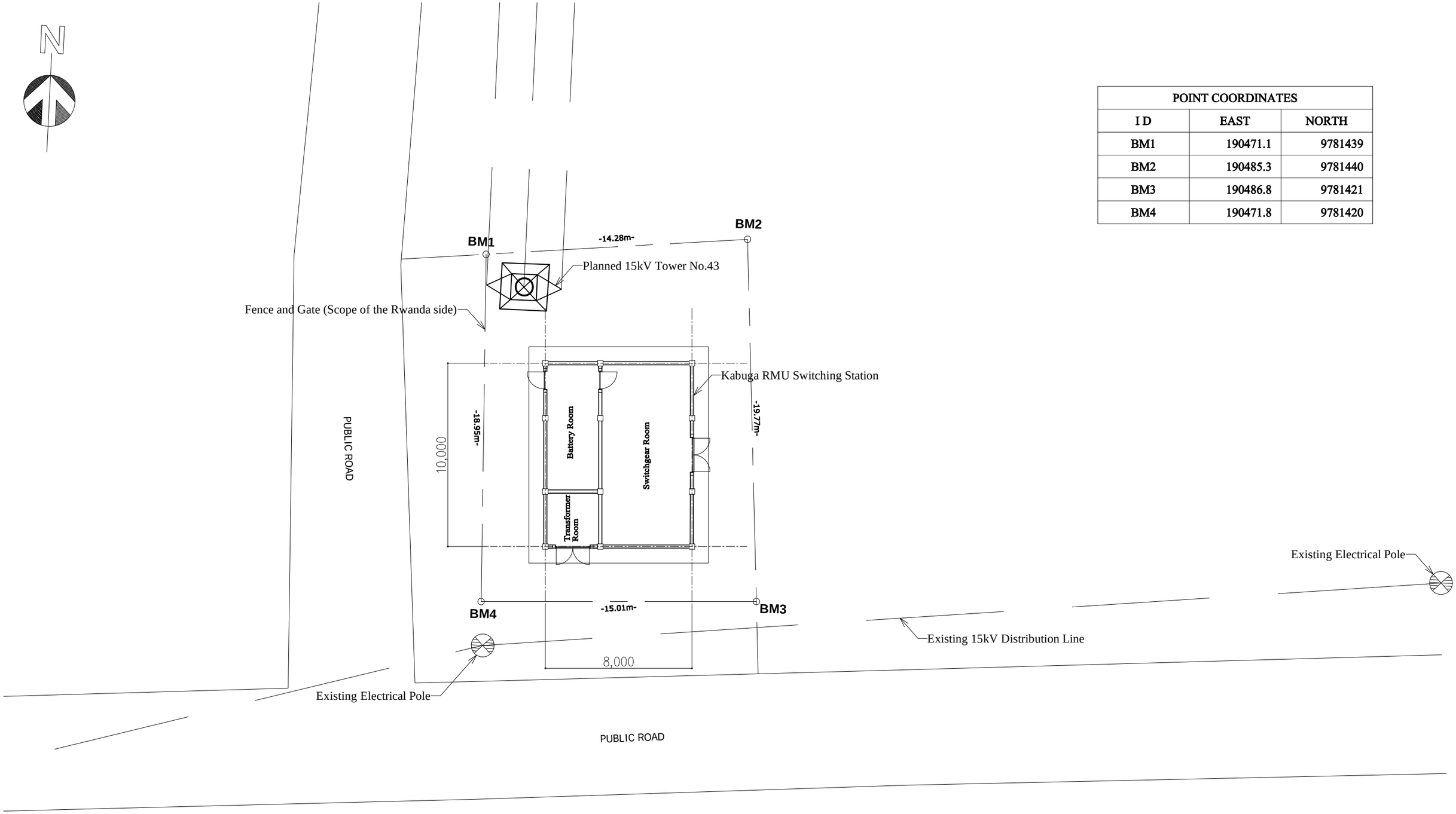


Section D-D

GENERAL NOTES

1) CONCRETE BLOCK t=150

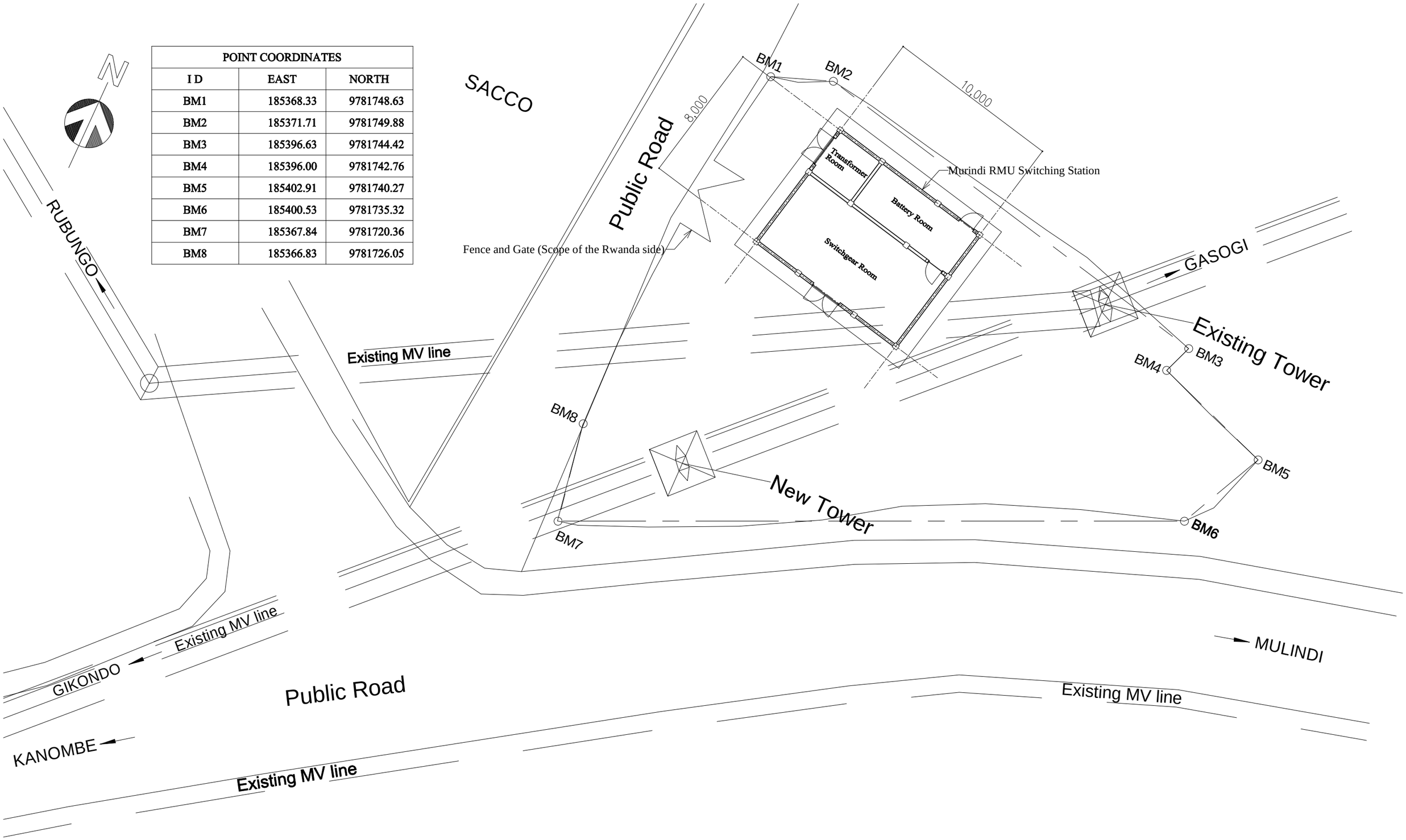
DWG No. A-10: ンデラ変電所　断面図2



POINT COORDINATES		
I D	EAST	NORTH
BM1	190471.1	9781439
BM2	190485.3	9781440
BM3	190486.8	9781421
BM4	190471.8	9781420

DWG No. A-11: カブカ開閉所　配置図

POINT COORDINATES		
I D	EAST	NORTH
BM1	185368.33	9781748.63
BM2	185371.71	9781749.88
BM3	185396.63	9781744.42
BM4	185396.00	9781742.76
BM5	185402.91	9781740.27
BM6	185400.53	9781735.32
BM7	185367.84	9781720.36
BM8	185366.83	9781726.05



DWG No. A-12: ムリンディ開閉所　配置図

GENERAL

BUILDING AREA	80.00 m2
TOTAL FLOOR AREA	80.00 m2
STRUCTURE	REINFORCED CONCRETE

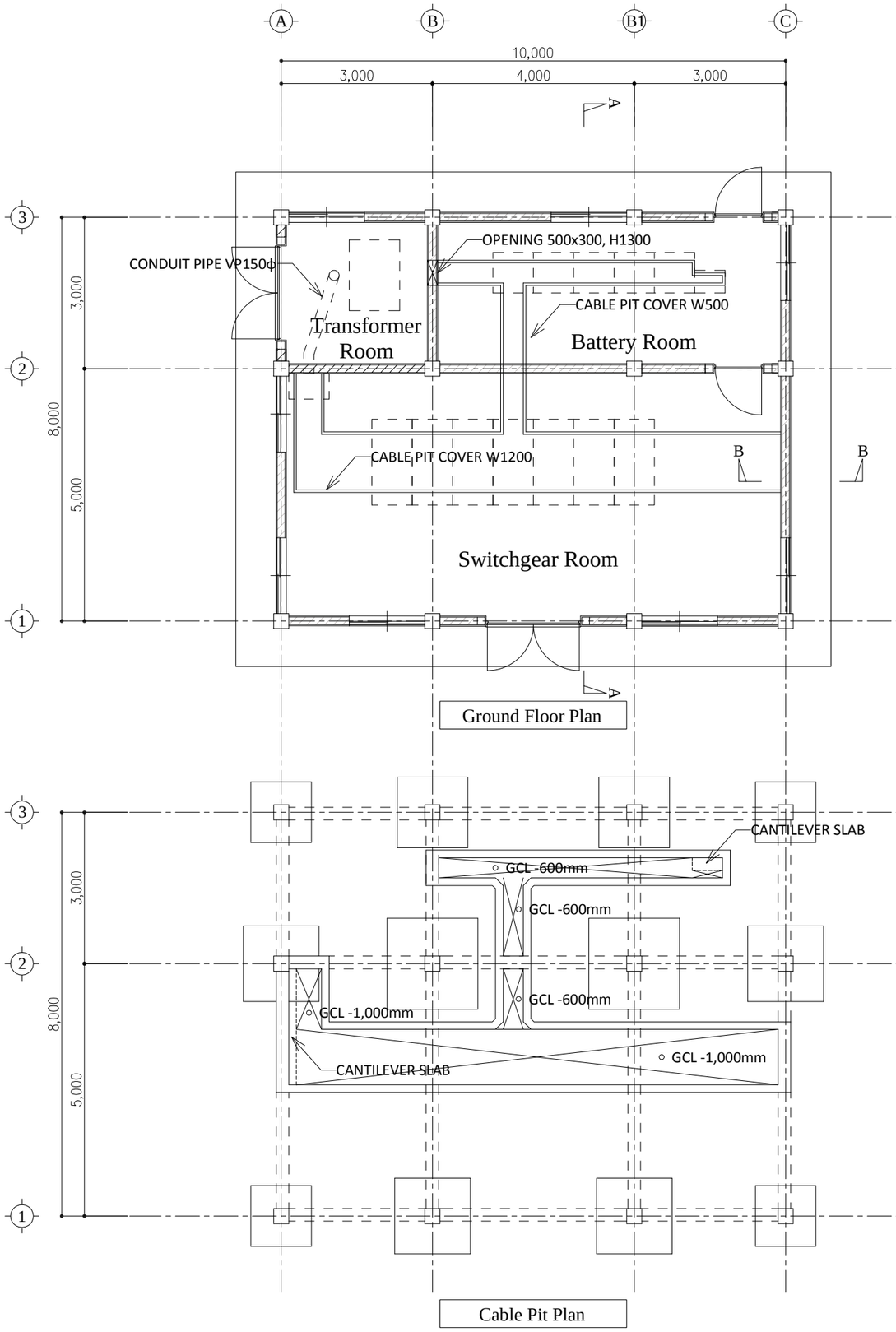
EXTERIOR FINISHING SCHEDULE

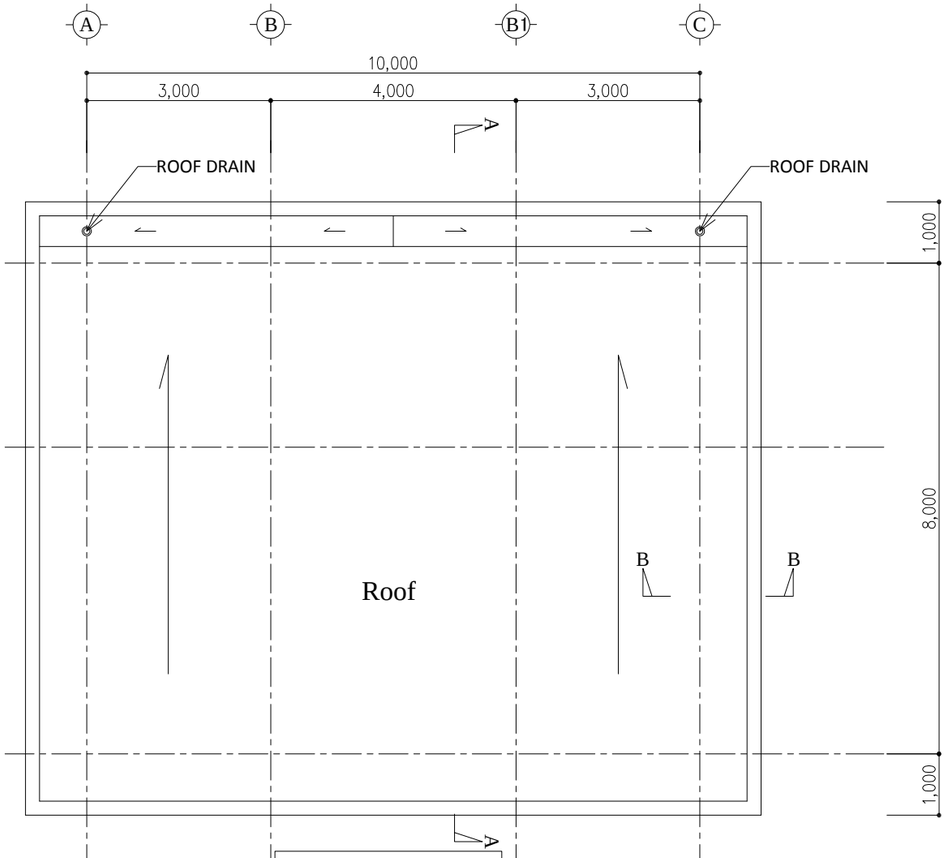
LOCATION	SPECIFICATION
COLUMN	FINISH (A.E.P) ON REINFORCED CONCRETE WITH MORTAR STEEL TROWEL 30mm THK
BEAM	PAINT FINISH (A.E.P) ON REINFORCED CONCRETE WITH MORTAR STEEL TROWEL 30mm THK
WALL	PAINT FINISH (A.E.P) ON 150mm THK CONCRETE BLOCK WITH MORTAR STEEL TROWEL 30mm THK
ROOF	CONCRETE STEEL TROWEL ON COVER CONCRETE WITH WELDED WIRE MESH THERMAL INSULATION: EXTRUDED POLYETHYLENE FORM 50mm THK ASPHALT MEMBRANE WATER PROOFING OR EQUIVALENT COATS OF HOT BITUMEN ON REINFORCED CONCRETE SLAB
FLOOR	CERAMIC TILE (300x300mm, NON SLIP) ON REINFORCED CONCRETE
PLINTH PROTECTION	CERAMIC TILE (300x300mm, NON SLIP) ON REINFORCED CONCRETE

INTERIOR FINISHING SCHEDULE (KABUGA, MURINDI SWITCHING STATION)

ROOM NAME	FLOOR	BASEBOARD	WALL	CEILING	REMARKS
Switchgear Room	PORCELAIN TILE 300 X 300 ON MORTAR STEEL TROWEL	PAINT FINISH(A.E.P) MORTAR FINISH H=100	PAINT FINISH(A.E.P) MORTAR STEEL TROWEL 20mm THK ON 150mm THK CONCRETE BLOCK	PAINT FINISH (A.E.P) EXPOSED CONCRETE (WITH REPAIR)	EXHAUST FAN WITH HOOD, NAME PLATE FIRE EXTINGUISHER 1 SET NAME PLATE
Battery Room	DITTO	DITTO	DITTO	DITTO	EXHAUST FAN WITH HOOD, NAME PLATE FIRE EXTINGUISHER 1 SET NAME PLATE
Transformer Room	NON-SLIP PAINTING FINISH ON CONCRETE	DITTO	DITTO	DITTO	EXHAUST FAN WITH HOOD, NAME PLATE FIRE EXTINGUISHER 1 SET NAME PLATE
					AIR CONDITIONING, NAME PLATE FIRE EXTINGUISHER 1 SET

DWG No. A-13: 開閉所　仕上表

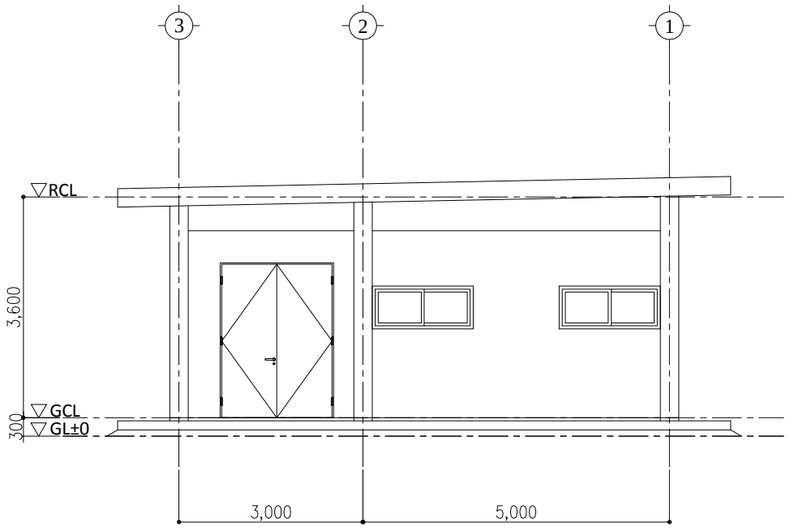




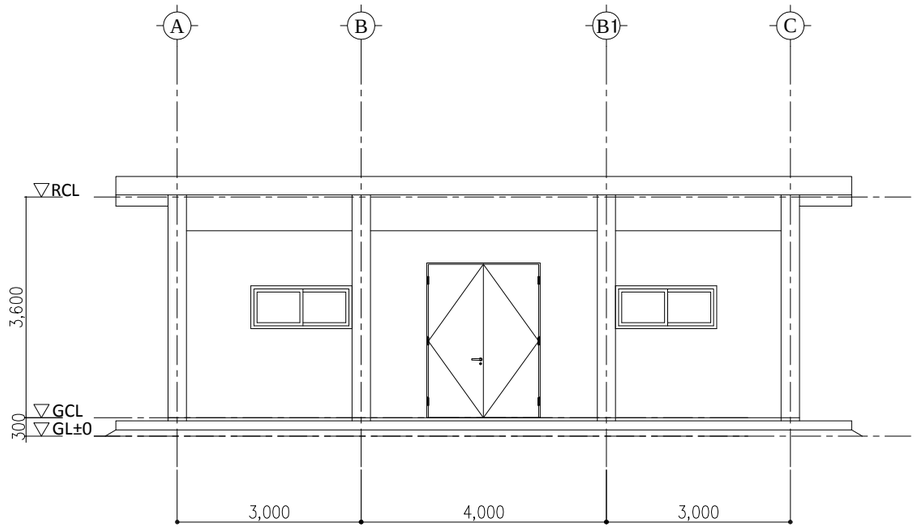
GENERAL NOTES

1) CONCRETE BLOCK t=150

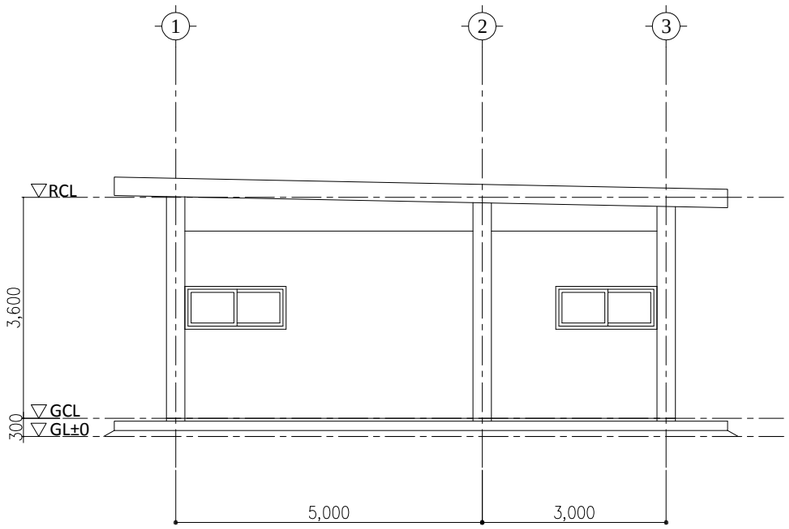
DWG No. A-14: 開閉所　1階平面図・屋根伏図・ピット図



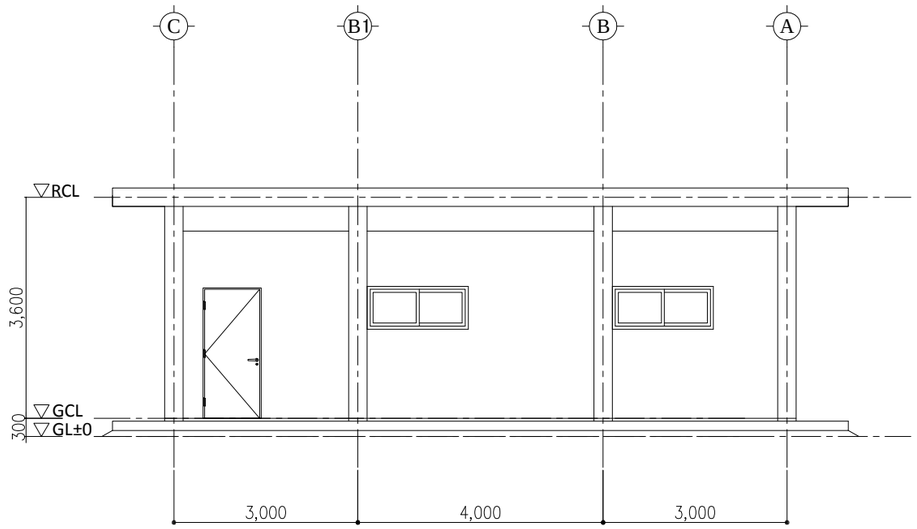
Elevation 1



Elevation 2

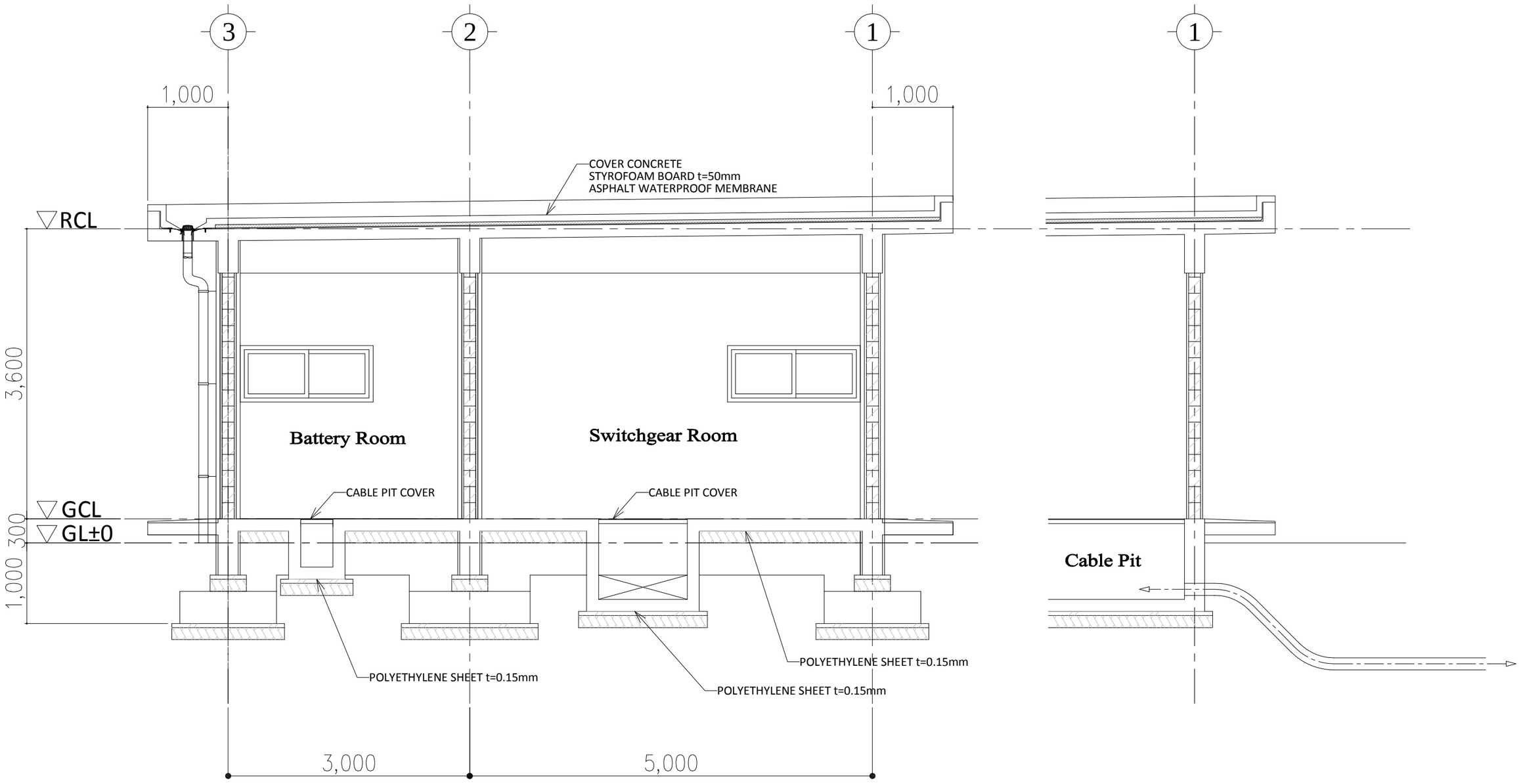


Elevation 3



Elevation 4

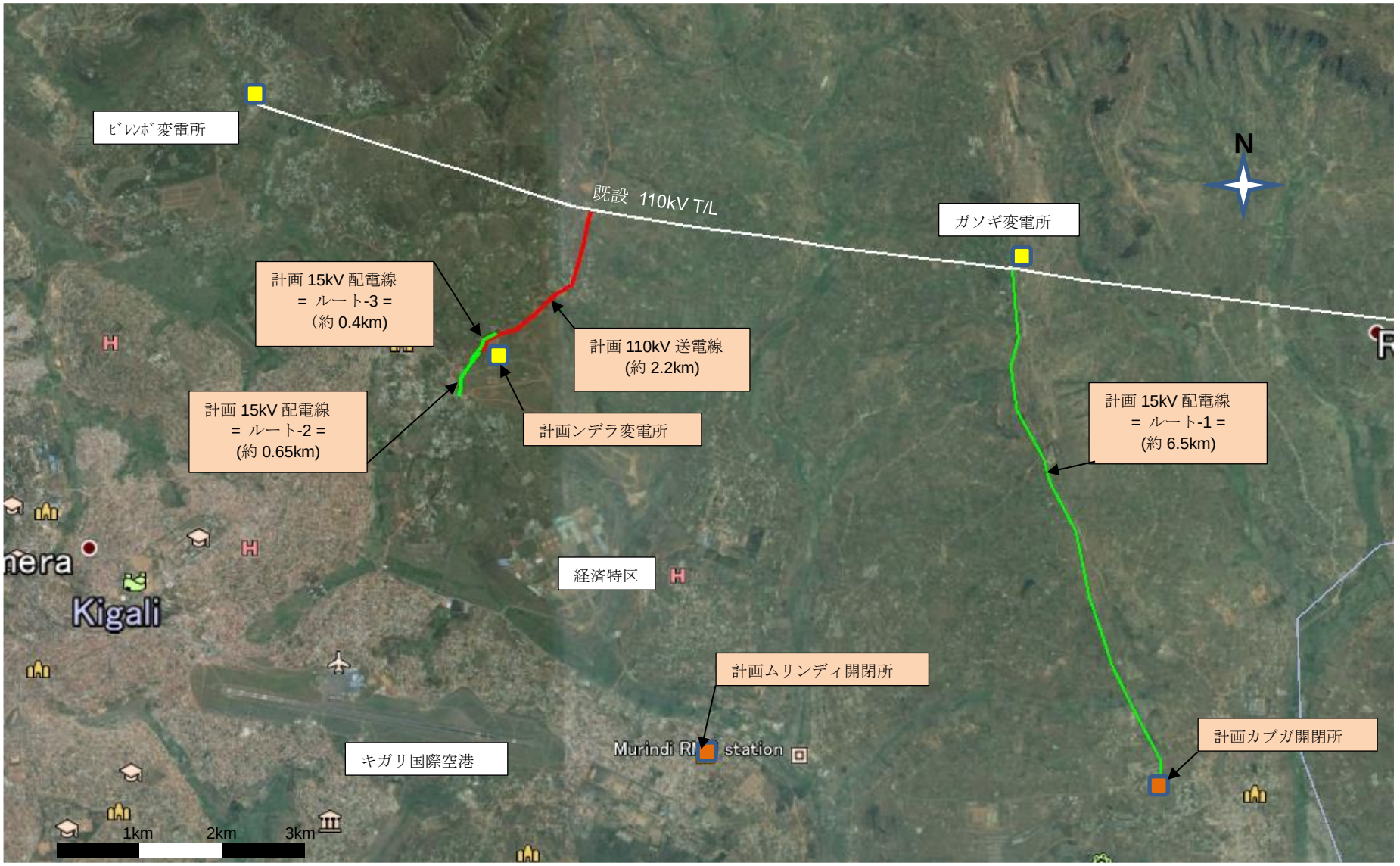
DWG No. A-15: 開閉所　立面図



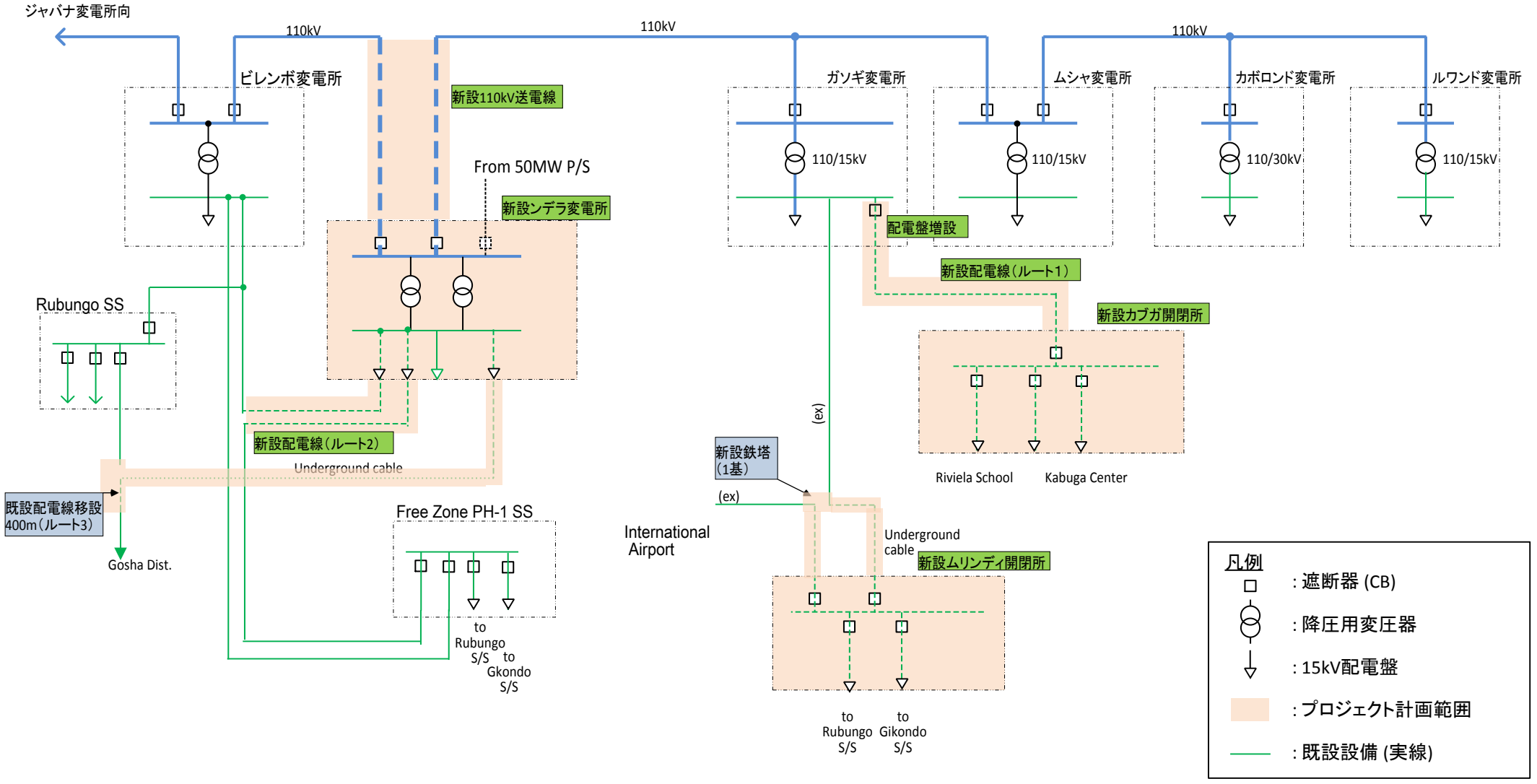
Section A-A

Section B-B

DWG No. A-16: 開閉所　断面図

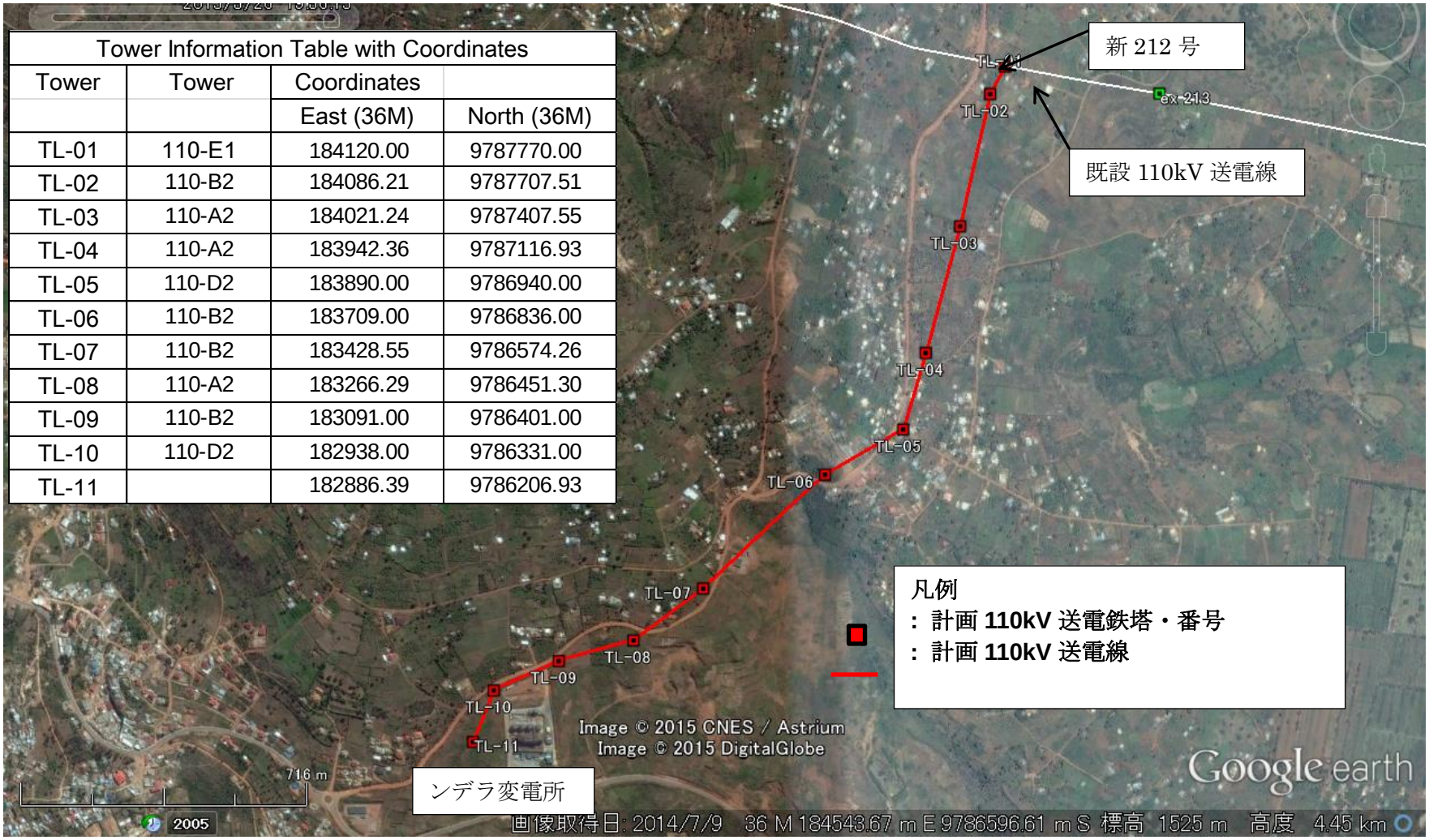


DWG No. GG-01: 送配電線サイトマップ（全体）



19th March 2015

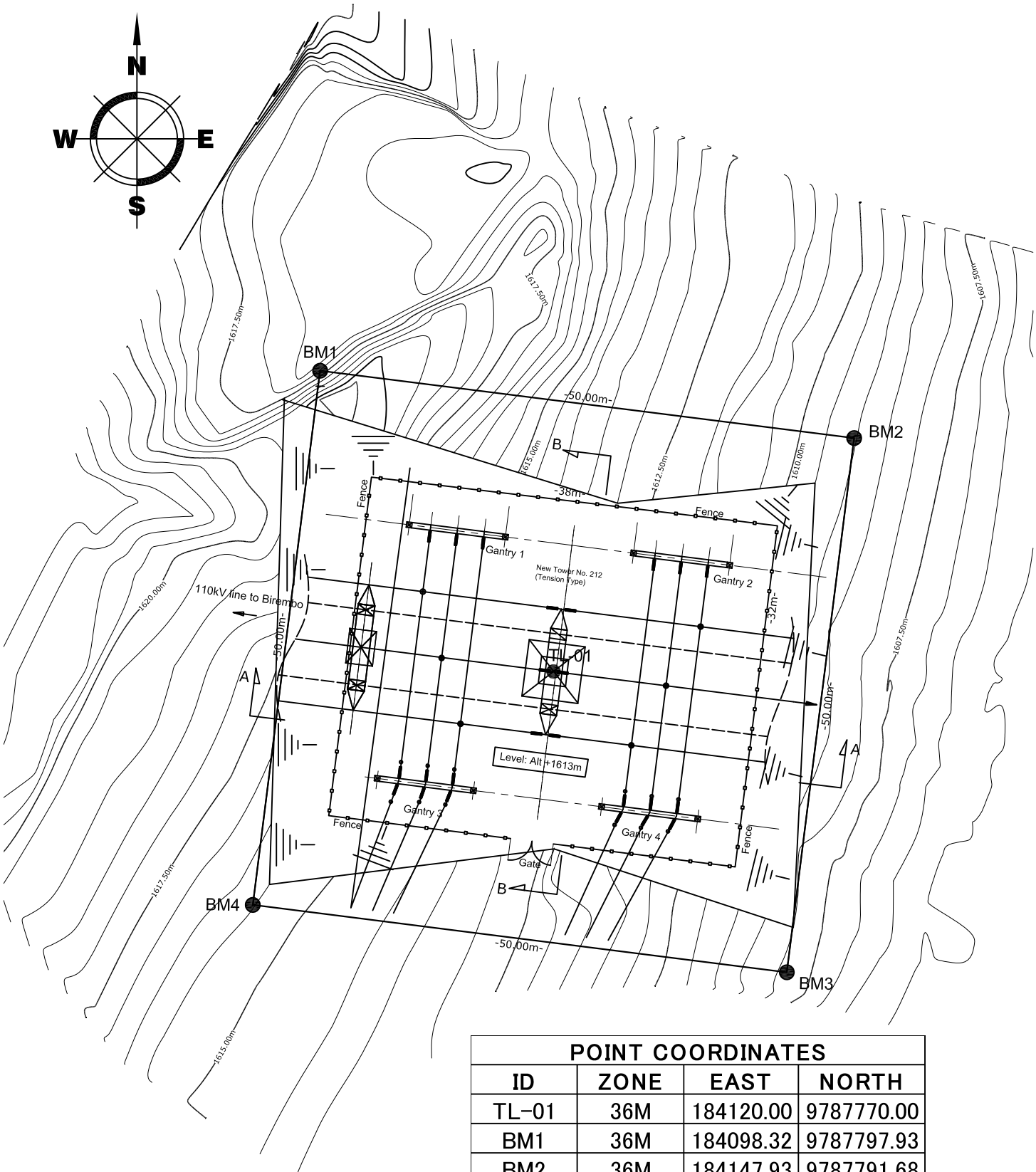
DWG No. GG-02: 110/15kV送配電系統図（計画範囲）



Tower Information Table with Coordinates

Tower	Tower	Coordinates	
		East (36M)	North (36M)
TL-01	110-E1	184120.00	9787770.00
TL-02	110-B2	184086.21	9787707.51
TL-03	110-A2	184021.24	9787407.55
TL-04	110-A2	183942.36	9787116.93
TL-05	110-D2	183890.00	9786940.00
TL-06	110-B2	183709.00	9786836.00
TL-07	110-B2	183428.55	9786574.26
TL-08	110-A2	183266.29	9786451.30
TL-09	110-B2	183091.00	9786401.00
TL-10	110-D2	182938.00	9786331.00
TL-11		182886.39	9786206.93

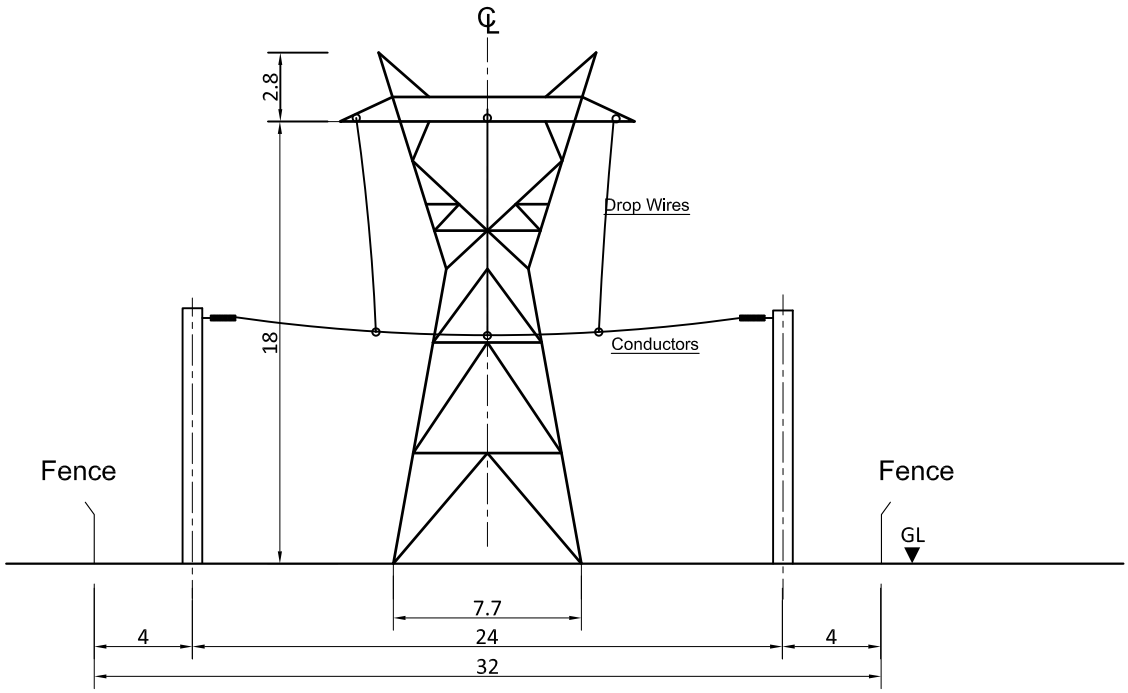
DWG No. GG-11: 110kV 送電線ルート（新 212 号鉄塔—ンデラ変電所：約 2.2km）



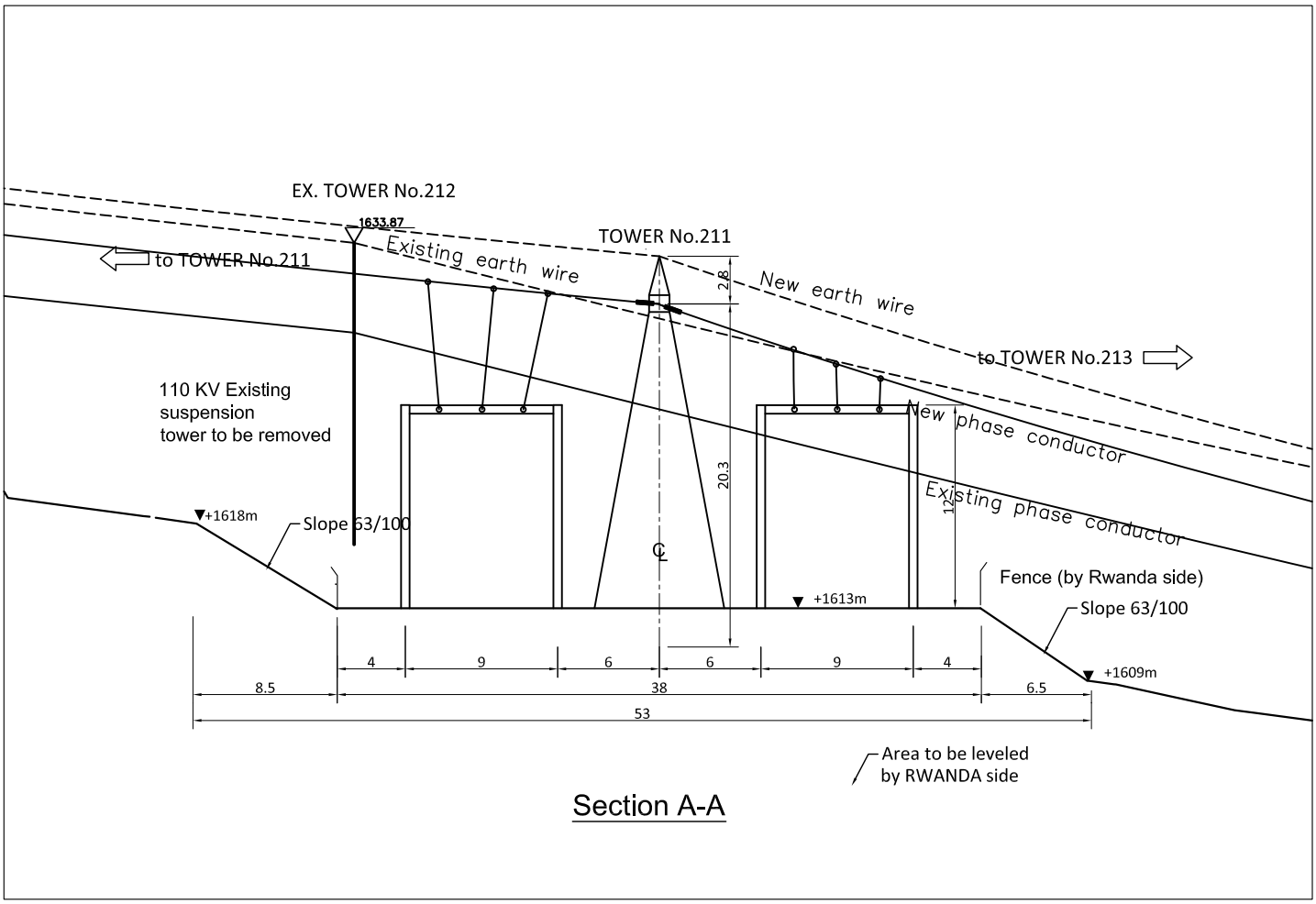
POINT COORDINATES			
ID	ZONE	EAST	NORTH
TL-01	36M	184120.00	9787770.00
BM1	36M	184098.32	9787797.93
BM2	36M	184147.93	9787791.68
BM3	36M	184141.67	9787742.07
BM4	36M	184092.07	9787748.32

Remarks:
1. Gate and Fence shall be installed by Rwandan side.
2. Site Leveling work shall be done by Rwandan side.

DWG No. GG-12: 110kV送電線分岐点配置図 （Scale: 1/500)



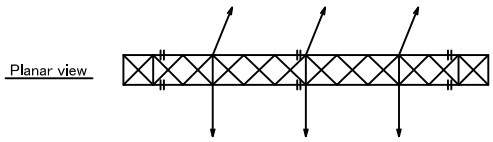
Section B-B

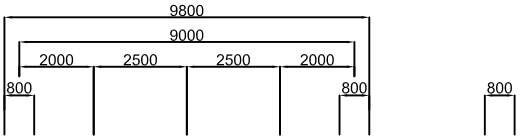


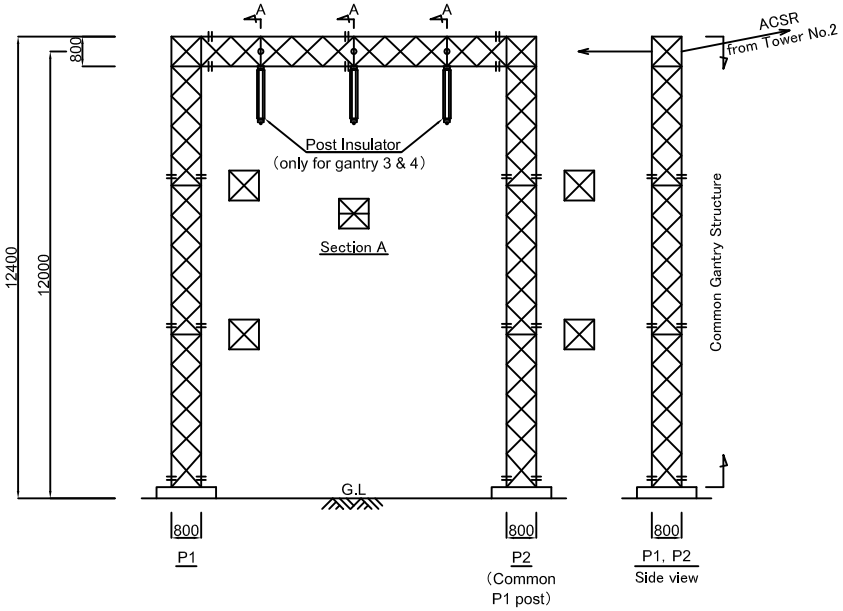
Section A-A

DWG No. GG-13: 110kV送電線分岐図（断面図）

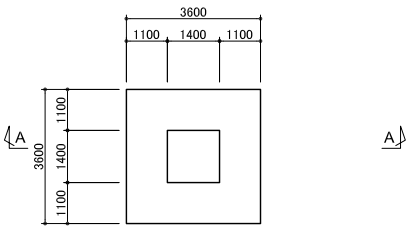
DESIGN CONDITION TABLE				
DESCRIPTION		UNIT	DESIGN VALUE	
VOLTAGE		kV	110	
CIRCUIT		cct	1	
TYPE TOWER		—	GANTRY	
WIND LOAD SPAN		m	40	
WEIGHT LOAD SPAN		m	40	
LINE ANGLE		Degree	0-22	
VERTICAL ANGLE		tan α	-0.2	
CONDUCTOR	CODE	—	ACSR 240/40 (DIN)	
	NUMBERS	—	(ONE) 1	
	DIAMETER	mm	21.8	
	UNIT MASS	kg/m	0.989	
	UNIT TENSION	N/wire	Gantry side 4,900 (500 kgf/wire)	
			To tower side 6,860 (700 kgf/wire)	
GROUND WIRE	CODE	—	OPGW 97/48	
	NUMBERS	—	(ONE) 1	
	DIAMETER	mm	16.0	
	UNIT MASS	kg/m	0.604	
	UNIT TENSION	N/wire	2,940 (300 kgf/wire)	
INSULATOR	KIND	—	250mm Suspension Type	Cylindrical Post Insulator
		Numbers	9 × 1 (SIngle Tension)	C6 - 650 - A
	WEIGHT	kg/set	180	70
	WIND	N/set	488 (49.8 kgf/set)	203 (20.7 kgf/set)
WIND PRESS.	TOWER	Pa	1,214 (123.8 kgf/m²)	
	CONDUCTOR	Pa	552 (56.3 kgf/m²)	
	GROUND WIRE	Pa	552 (56.3 kgf/m²)	



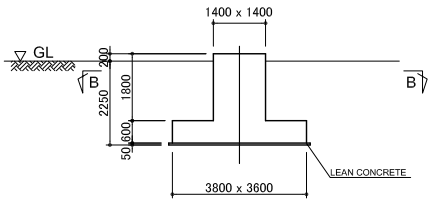




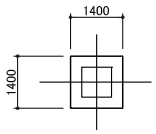
P1, 2 n=8
(COMMON GANTRY 1 ~ GANTRY 4)



PLAN



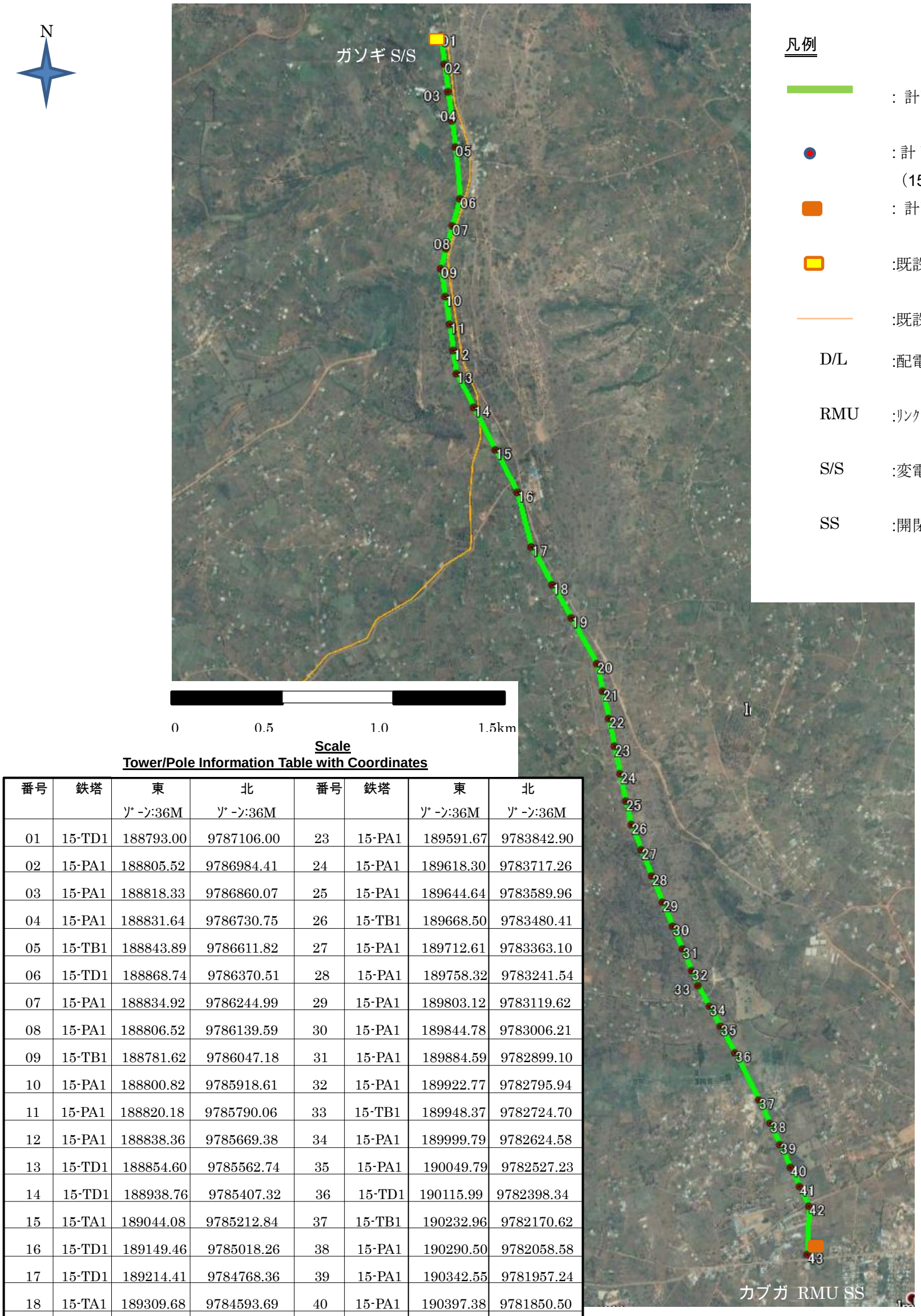
SECTION A - A



SECTION B - B

FOUNDATION PLAN FOR GANTRY STRUCTURE

DWG No. GG-14: 110kV送電線分岐点用ガントリー図



凡例

: 計画 15kV 配電線

: 計 画　鉄 塔 / 鋼 管 柱
（15kV 配電線番号付）

: 計画開閉所（RMU）

:既設変電所

:既設 15kV 配電線

D/L :配電線

RMU :ﾘﾝｸﾞﾒｲﾝﾕﾆｯﾄ

S/S :変電所

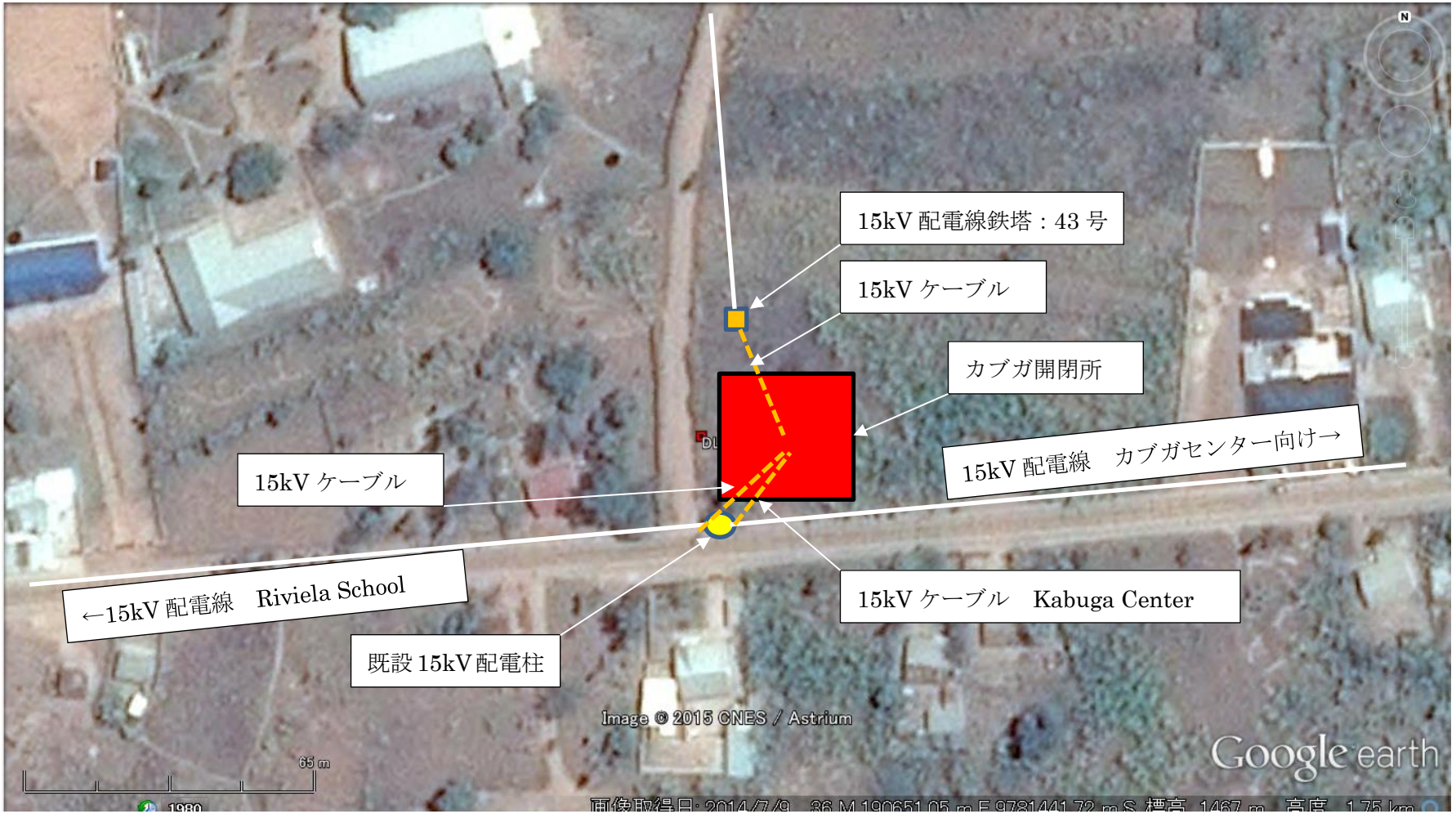
SS :開閉所

Scale

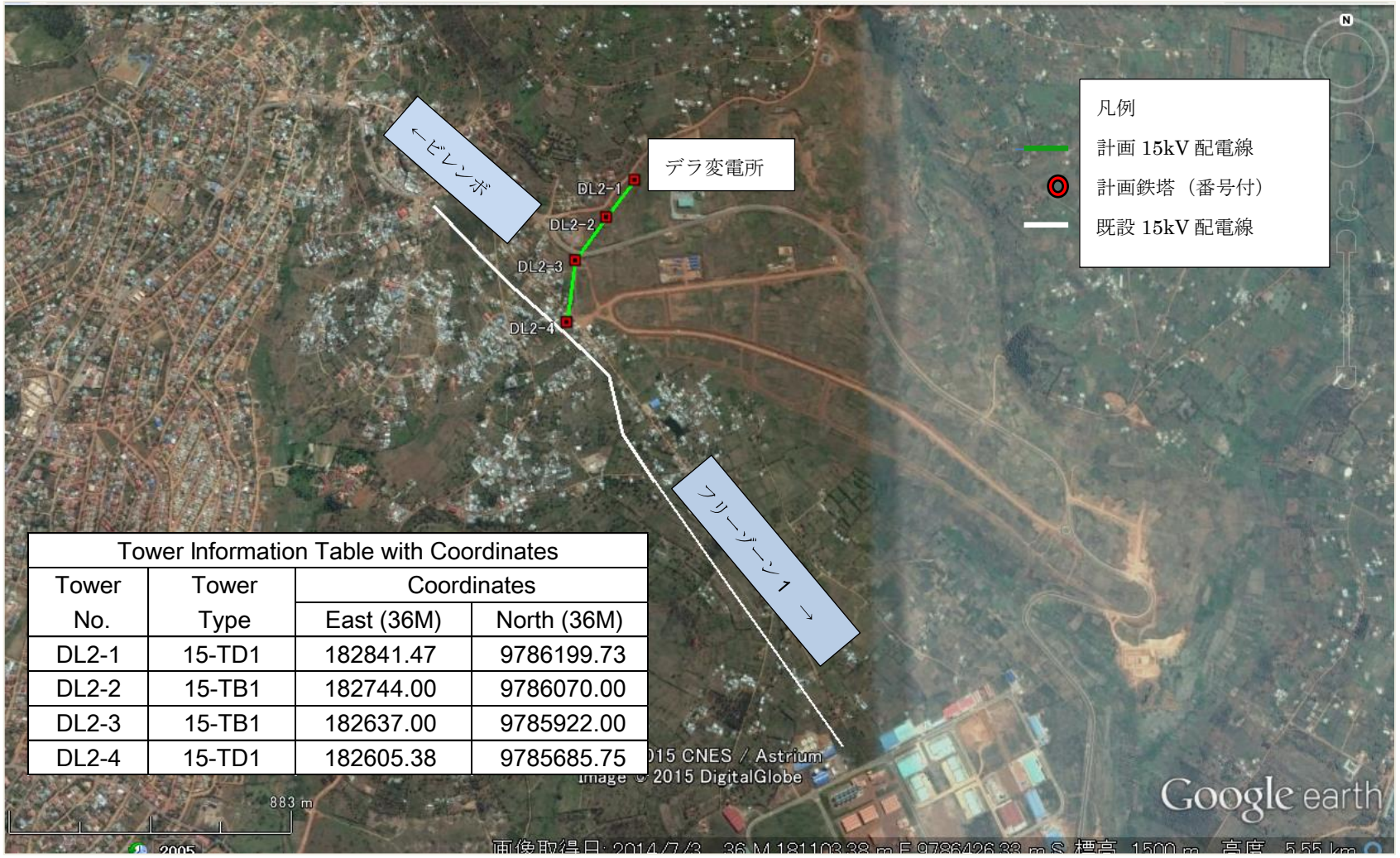
Tower/Pole Information Table with Coordinates

番号	鉄塔	東 ｿﾞｰﾝ:36M	北 ｿﾞｰﾝ:36M	番号	鉄塔	東 ｿﾞｰﾝ:36M	北 ｿﾞｰﾝ:36M
01	15-TD1	188793.00	9787106.00	23	15-PA1	189591.67	9783842.90
02	15-PA1	188805.52	9786984.41	24	15-PA1	189618.30	9783717.26
03	15-PA1	188818.33	9786860.07	25	15-PA1	189644.64	9783589.96
04	15-PA1	188831.64	9786730.75	26	15-TB1	189668.50	9783480.41
05	15-TB1	188843.89	9786611.82	27	15-PA1	189712.61	9783363.10
06	15-TD1	188868.74	9786370.51	28	15-PA1	189758.32	9783241.54
07	15-PA1	188834.92	9786244.99	29	15-PA1	189803.12	9783119.62
08	15-PA1	188806.52	9786139.59	30	15-PA1	189844.78	9783006.21
09	15-TB1	188781.62	9786047.18	31	15-PA1	189884.59	9782899.10
10	15-PA1	188800.82	9785918.61	32	15-PA1	189922.77	9782795.94
11	15-PA1	188820.18	9785790.06	33	15-TB1	189948.37	9782724.70
12	15-PA1	188838.36	9785669.38	34	15-PA1	189999.79	9782624.58
13	15-TD1	188854.60	9785562.74	35	15-PA1	190049.79	9782527.23
14	15-TD1	188938.76	9785407.32	36	15-TD1	190115.99	9782398.34
15	15-TA1	189044.08	9785212.84	37	15-TB1	190232.96	9782170.62
16	15-TD1	189149.46	9785018.26	38	15-PA1	190290.50	9782058.58
17	15-TD1	189214.41	9784768.36	39	15-PA1	190342.55	9781957.24
18	15-TA1	189309.68	9784593.69	40	15-PA1	190397.38	9781850.50
19	15-TA1	189394.47	9784438.23	41	15-PA1	190443.64	9781760.42
20	15-TD1	189510.64	9784225.24	42	15-TD1	190490.69	9781663.83
21	15-PA1	189537.77	9784097.22	43	15-TD1	190485.25	9781439.01
22	15-TD1	189564.72	9783970.08				

DWG No. GG-21: 15KV 配電線ルート（ルート 1 : ガソギ変電所-カブガ開閉所)



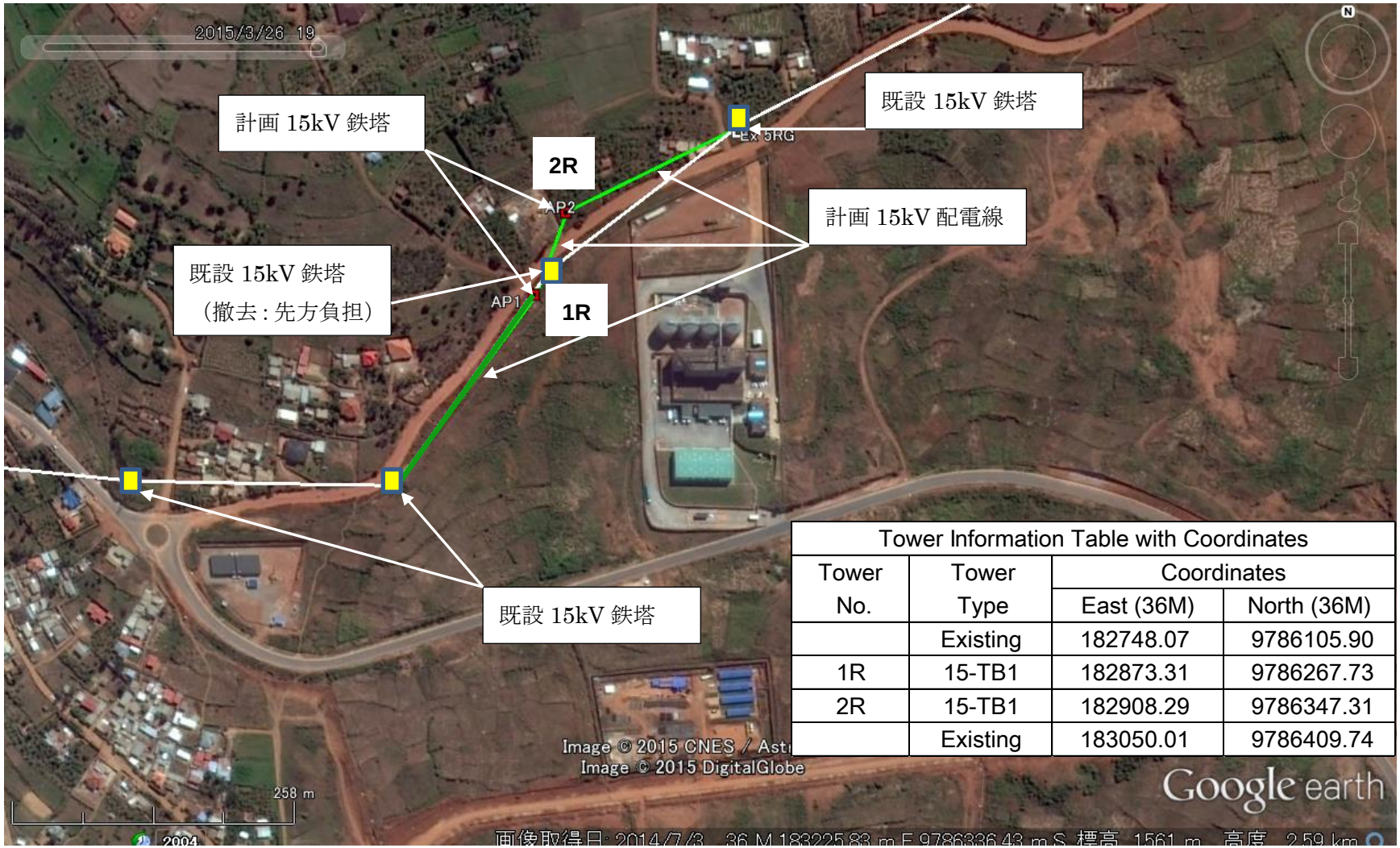
DWG No. GG-22: カブガ開閉所位置図



Tower Information Table with Coordinates			
Tower No.	Tower Type	Coordinates	
		East (36M)	North (36M)
DL2-1	15-TD1	182841.47	9786199.73
DL2-2	15-TB1	182744.00	9786070.00
DL2-3	15-TB1	182637.00	9785922.00
DL2-4	15-TD1	182605.38	9785685.75

GG-31: 15kV 配電線ルート（ルート-2: デラ変電所 – ビレンボ / フリーゾーン１ ）

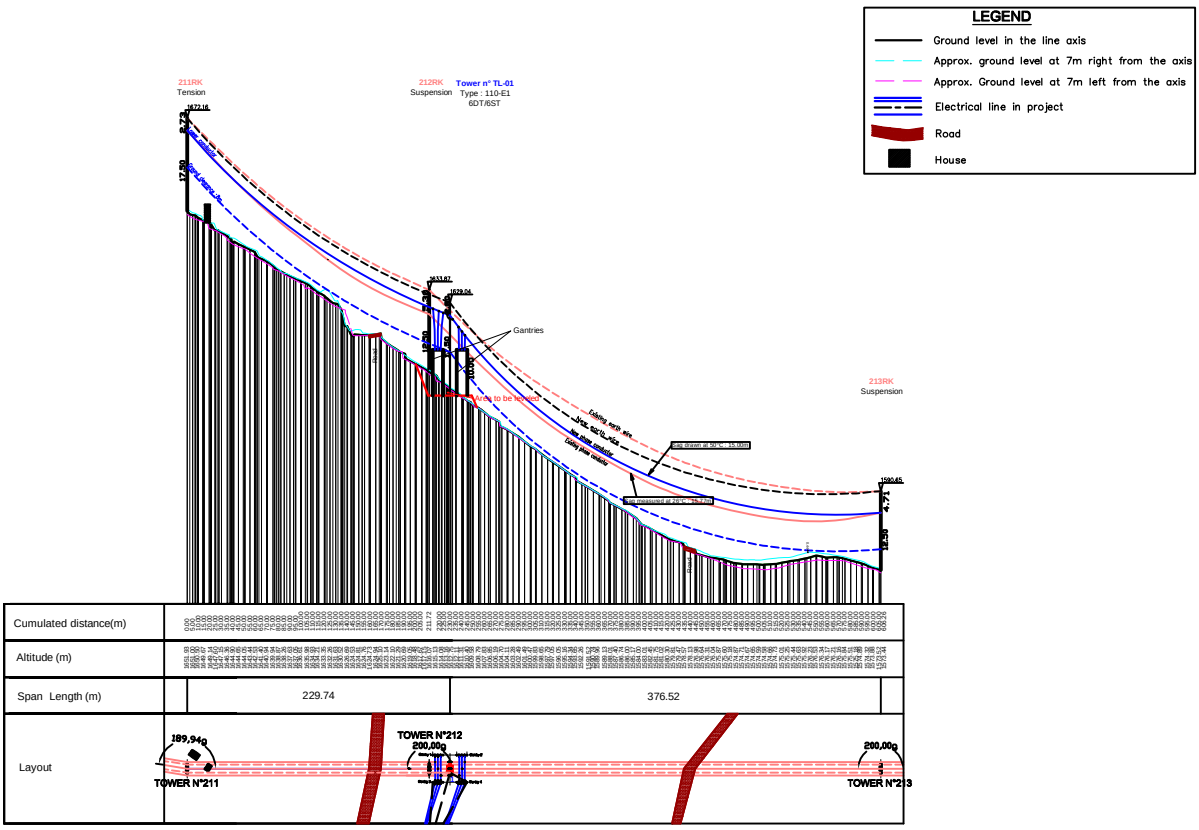
DWG No. GG-32:　15kV 配電用ケーブルルート（ルート２、新接鉄塔及び既設鉄塔間)



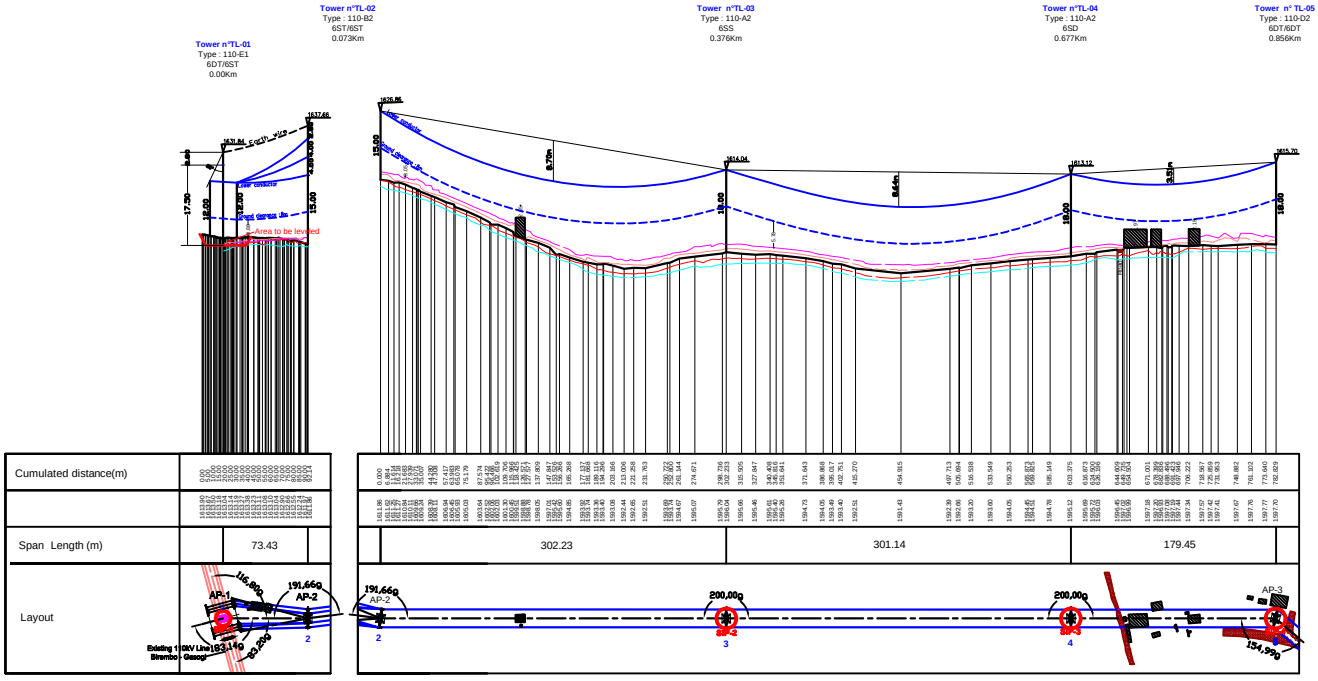
Tower Information Table with Coordinates			
Tower No.	Tower Type	Coordinates	
		East (36M)	North (36M)
	Existing	182748.07	9786105.90
1R	15-TB1	182873.31	9786267.73
2R	15-TB1	182908.29	9786347.31
	Existing	183050.01	9786409.74

DWG No. GG-41: 15kV 配電線ルート　（ルート 3: ルブンゴ⇔ゴシャ：　ルート変更）

DWG No. GG-51: ムリンディ開閉所位置図

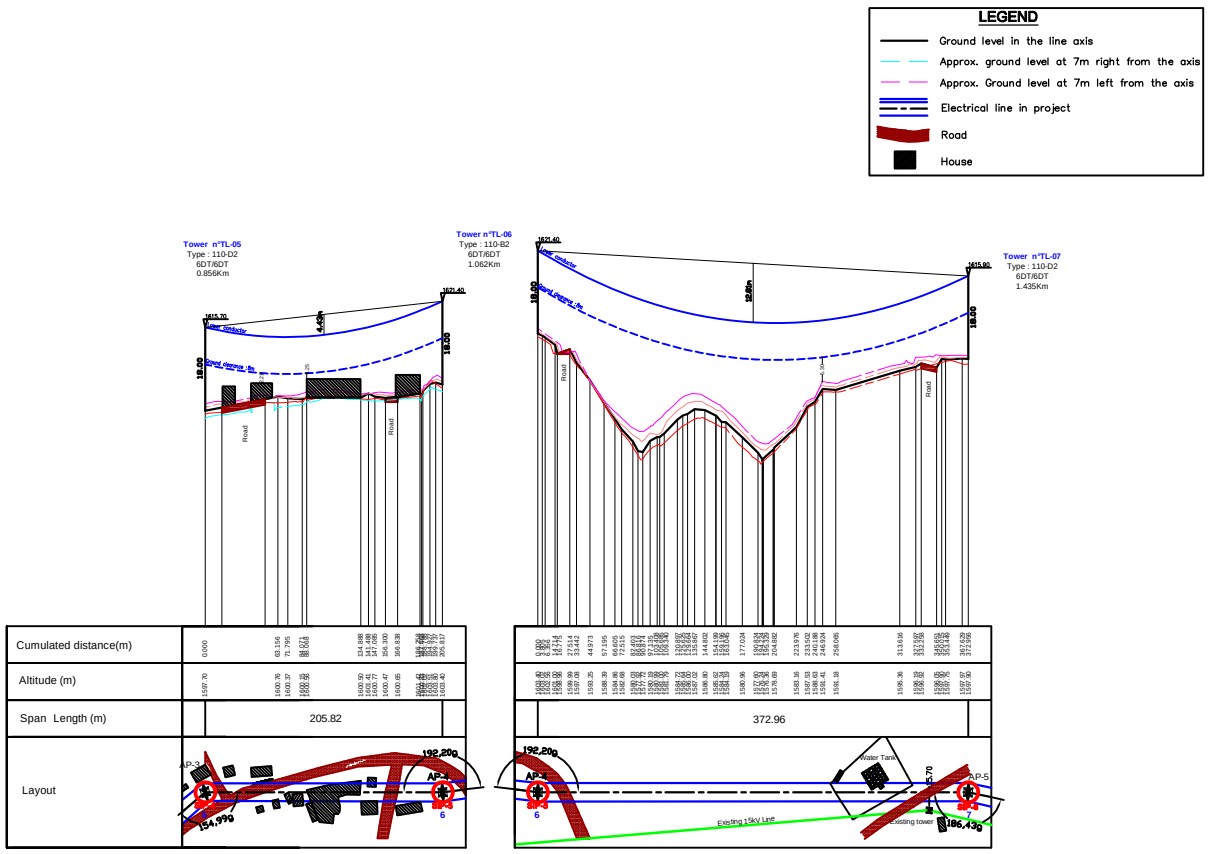


Existing Tower No. 211 to 213

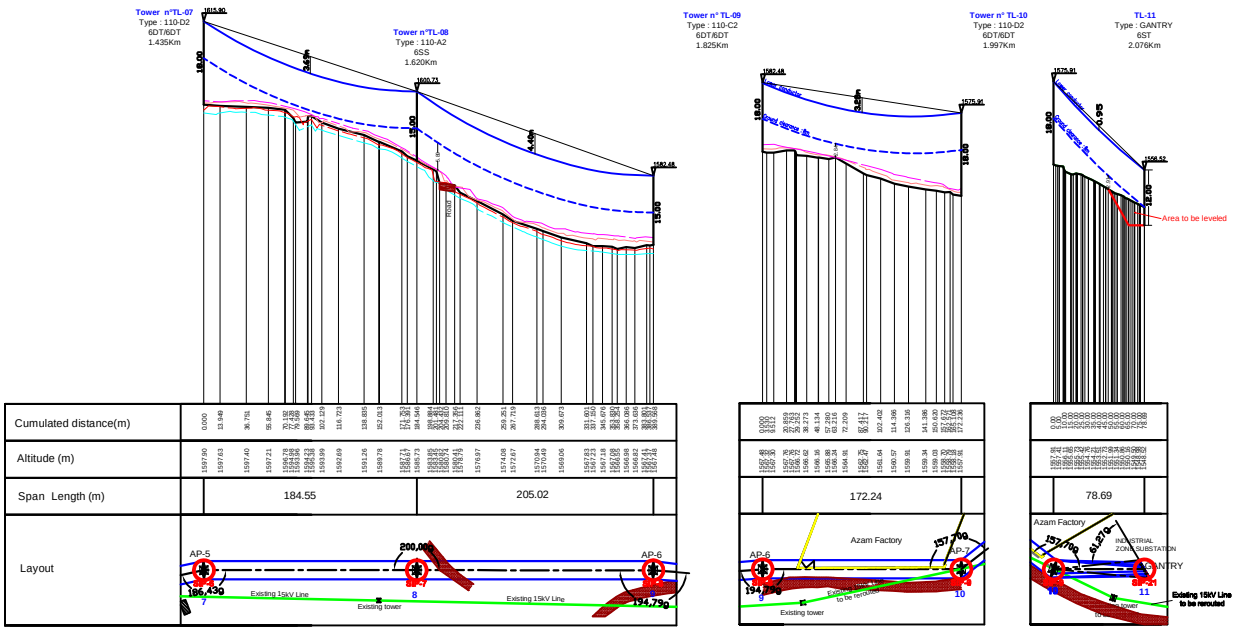


Tower No. 1 to 5

DWG No. LP-01: 110kV送電線縦断図 (1 / 2)
(既設鉄塔212号ーンデラ変電所間)

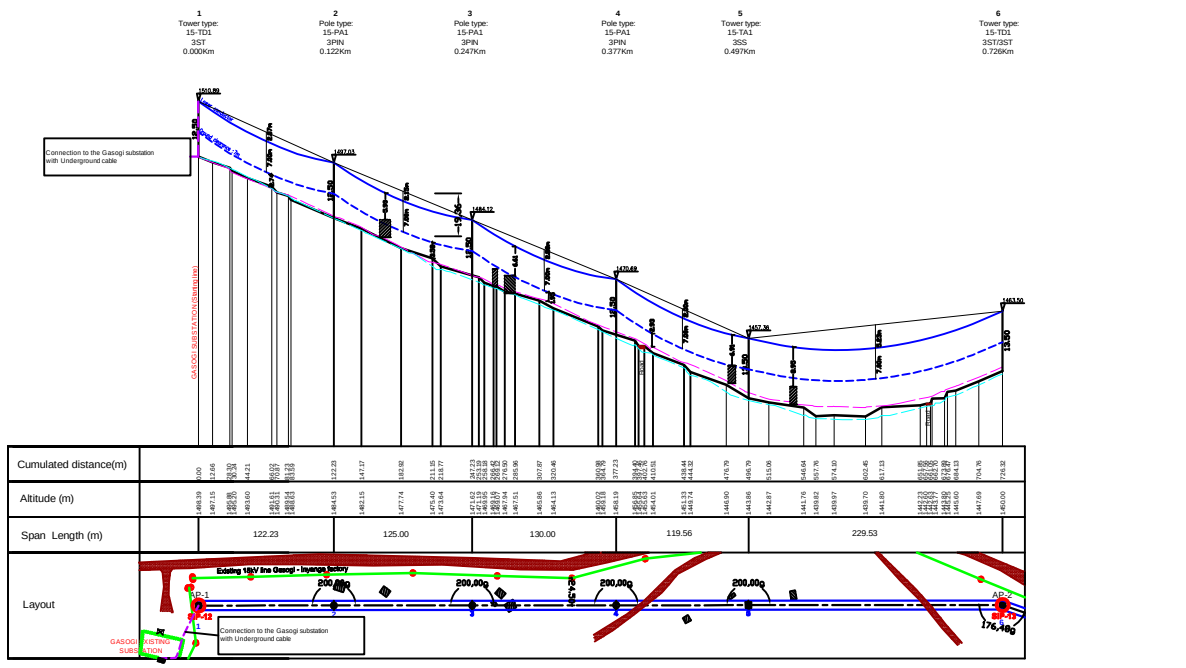


Tower No. 5 to 7

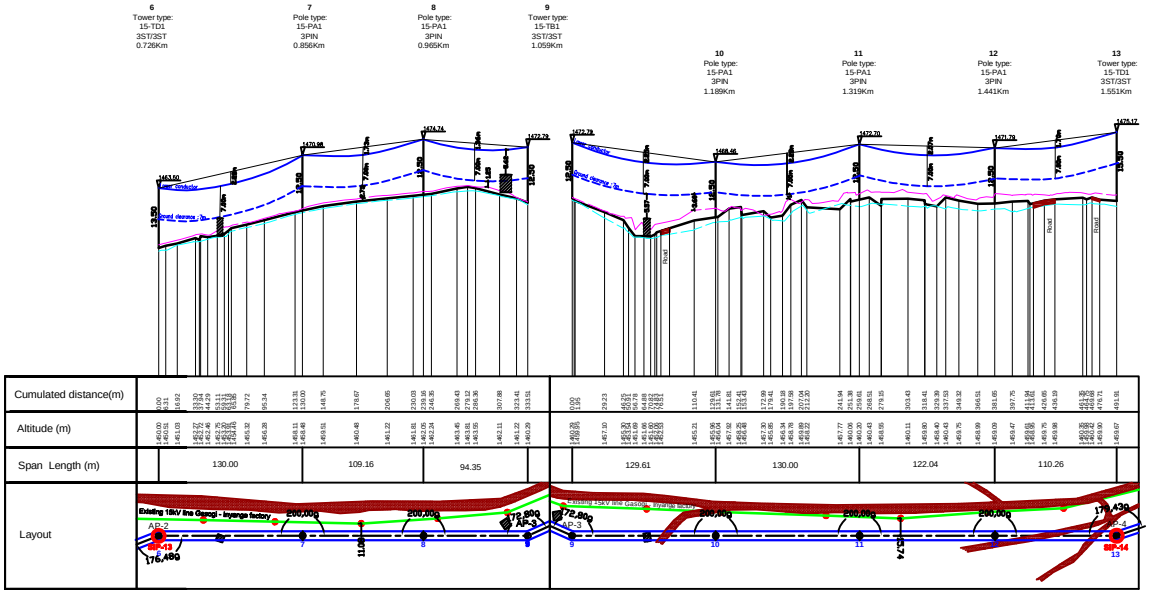


Tower No. 7 to 11

DWG No. LP-02: 110kV送電線縦断図 (2 / 2)
(既設鉄塔212号とンデラ変電所間)

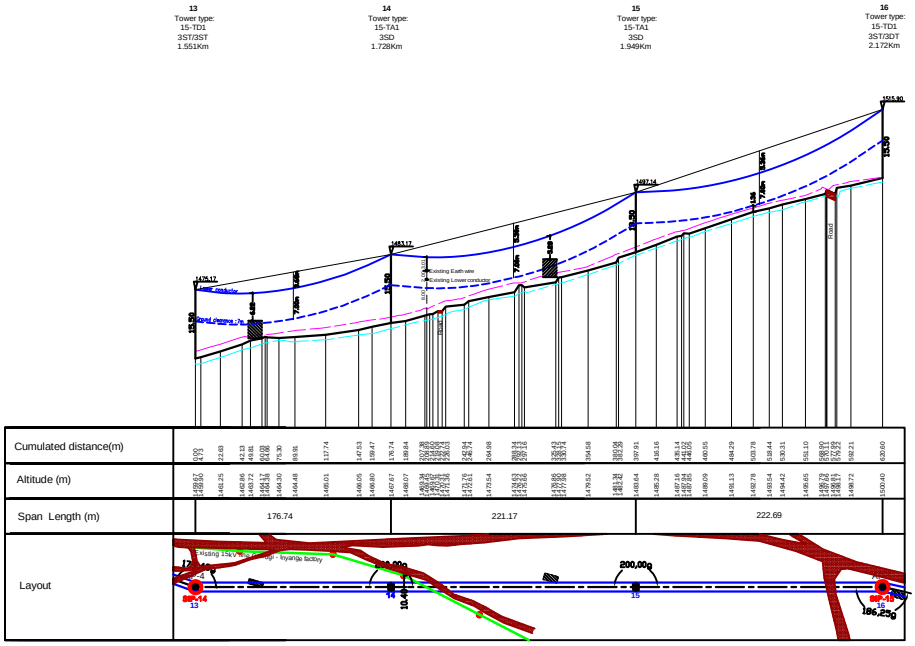


Tower / Pole No. 1 to 6

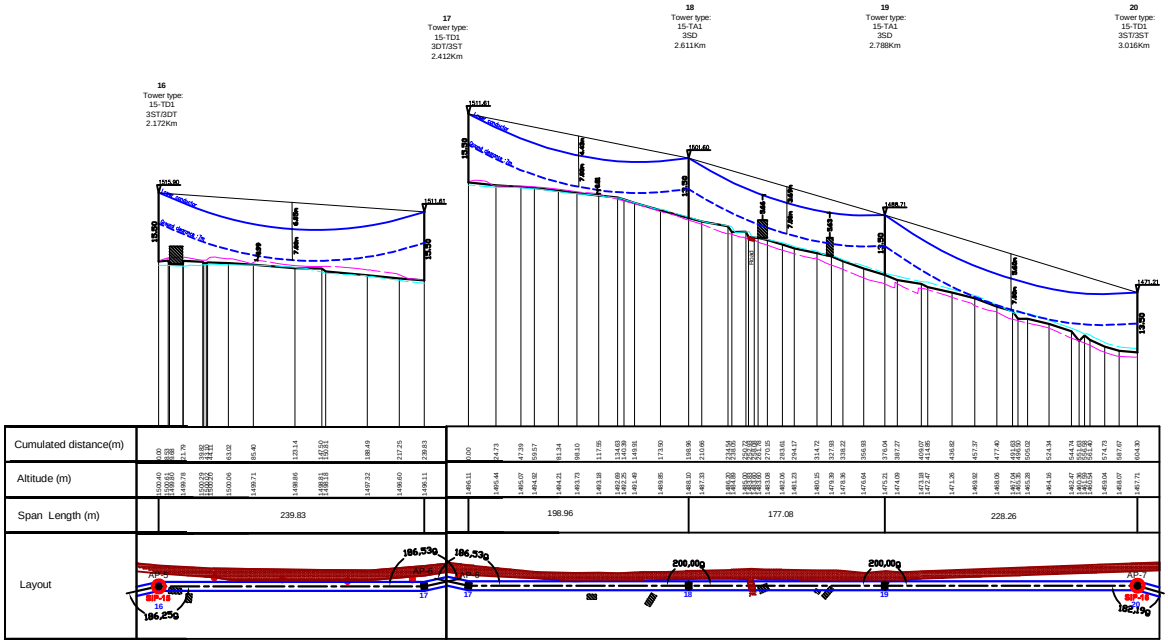


Tower / Pole No. 6 to 13

DWG No. LP-11: 15kV配電線ルート1縦断図 (1 / 4)
(ルート1: ガソギ変電所ーカブガ開閉所間)

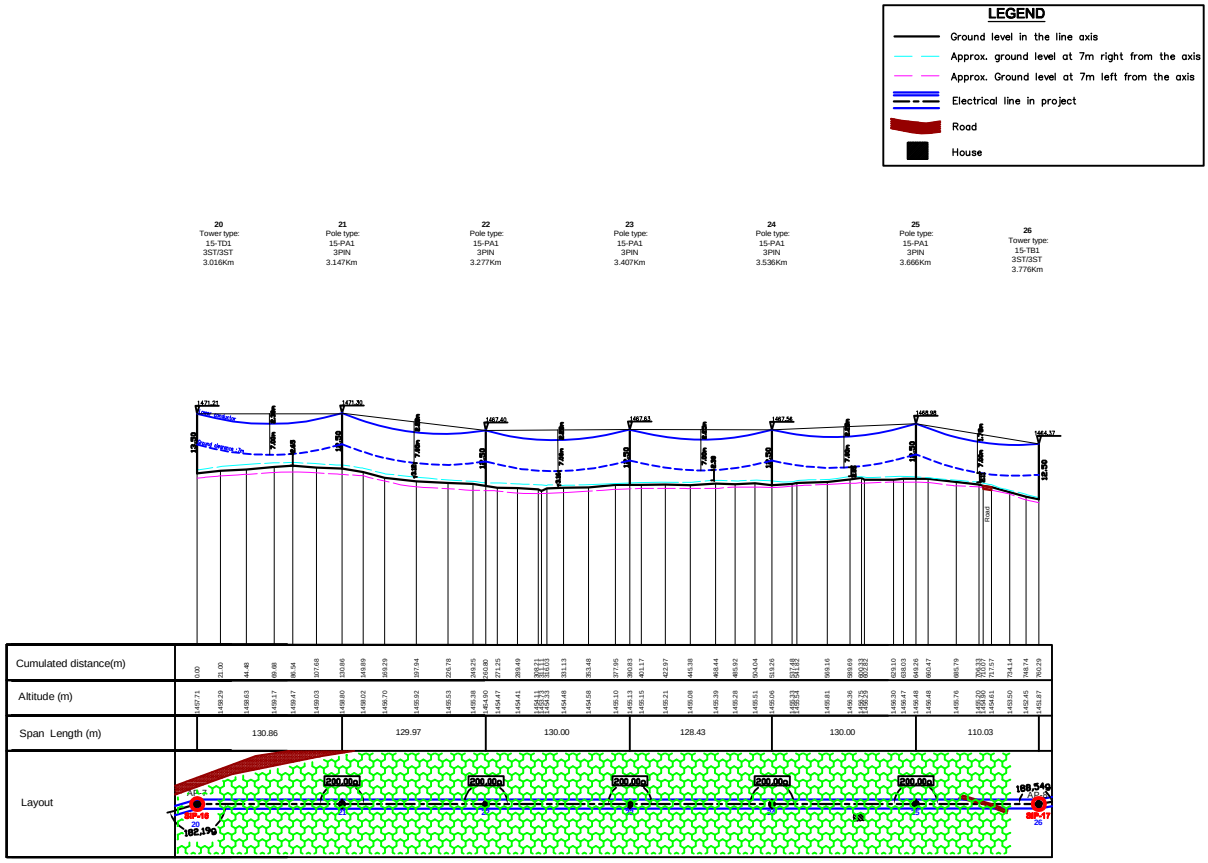


Tower / Pole No. 13 to 16

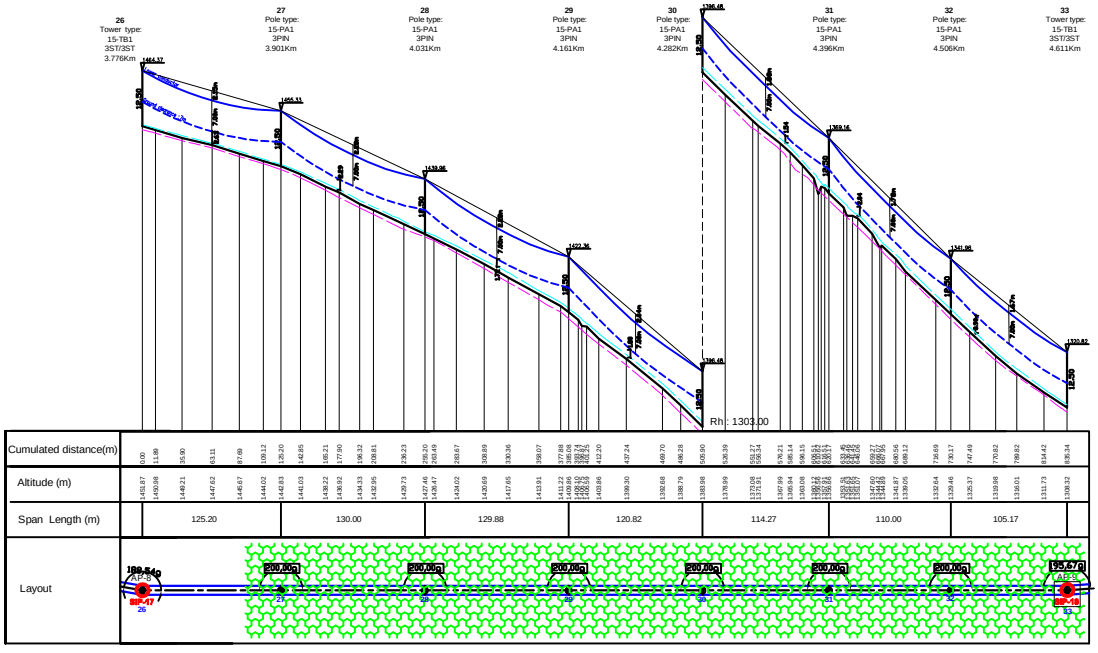


Tower / Pole No. 16 to 20

DWG No. LP-12: 15kV配電線ルート1縦断図 (2 / 4)
(ルート1: ガソギ変電所ーカブガ開閉所間)

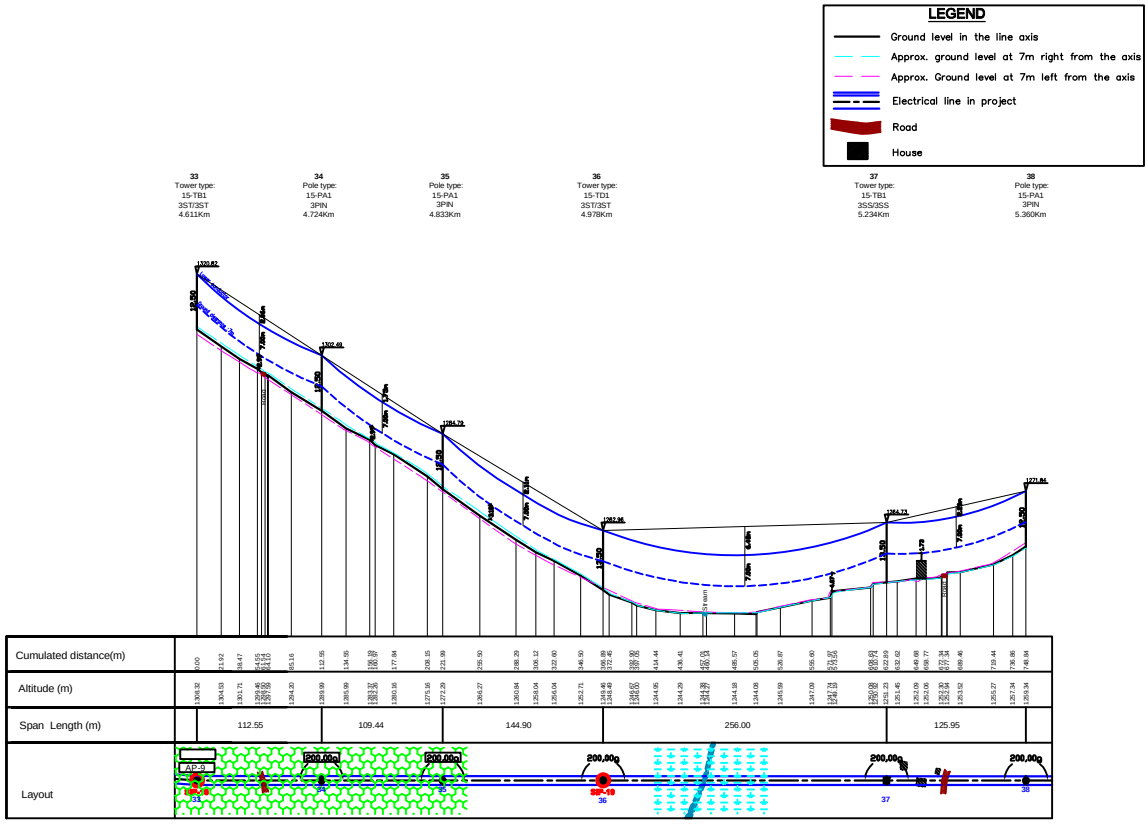


Tower / Pole No. 20 to 26

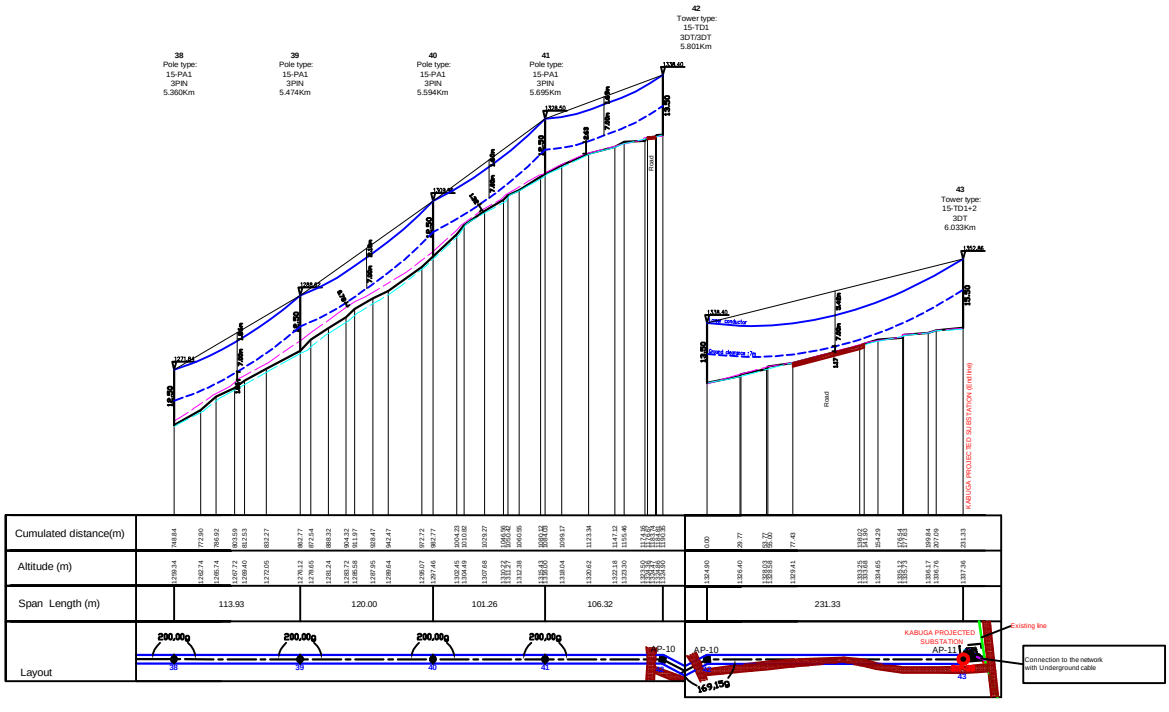


Tower / Pole No. 26 to 33

DWG No. LP-13: 15kV配電線ルート1縦断図 (3 / 4)
(ルート1: ガソギ変電所ーカブガ開閉所間)

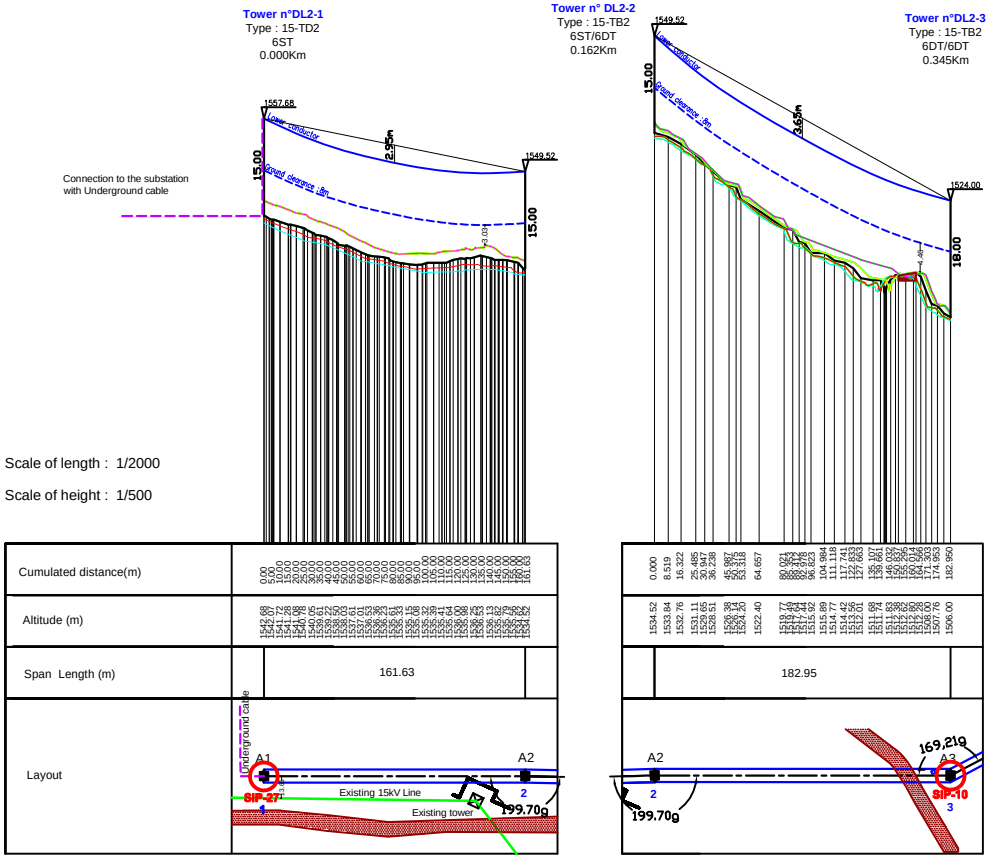


Tower / Pole No. 33 to 38

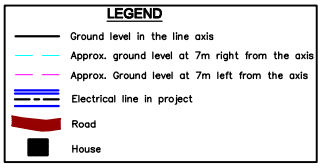


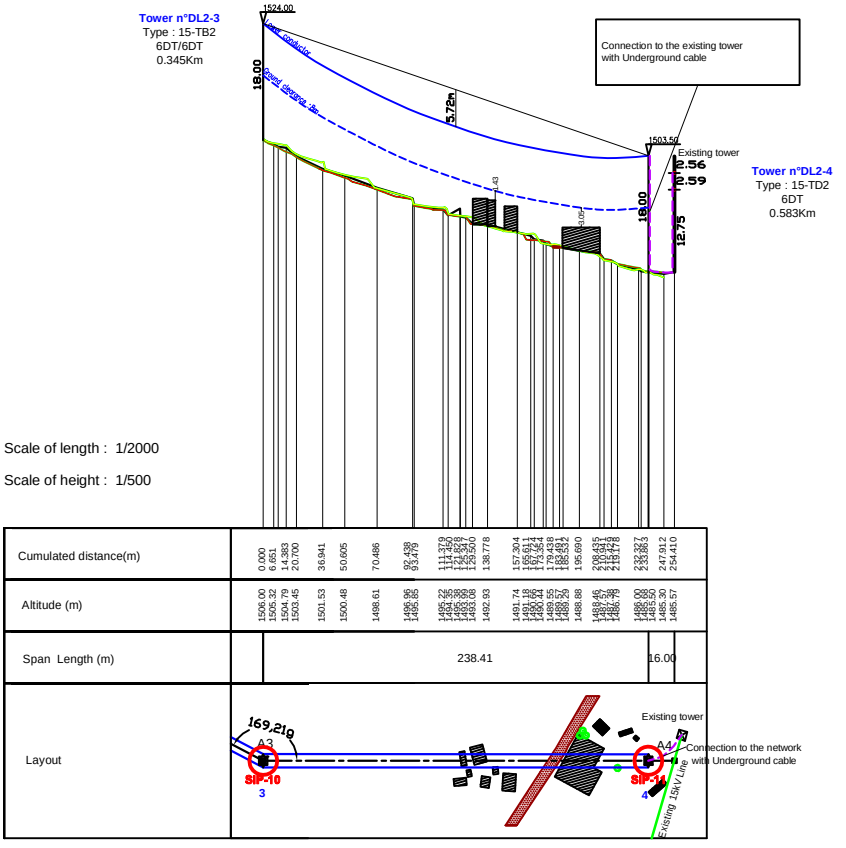
Tower / Pole No. 38 to 43

DWG No. LP-14: 15kV配電線ルート1縦断図 (4 / 4)
(ルート1: ガソギ変電所ーカブガ開閉所間)

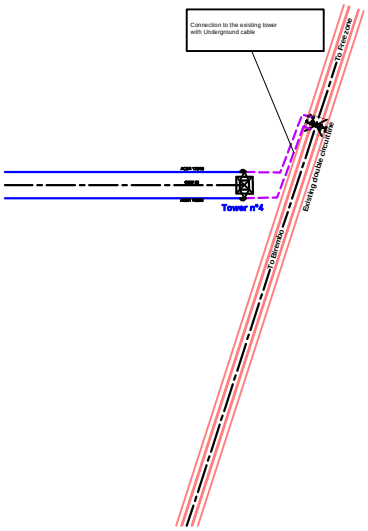


Tower No. 1 to 3



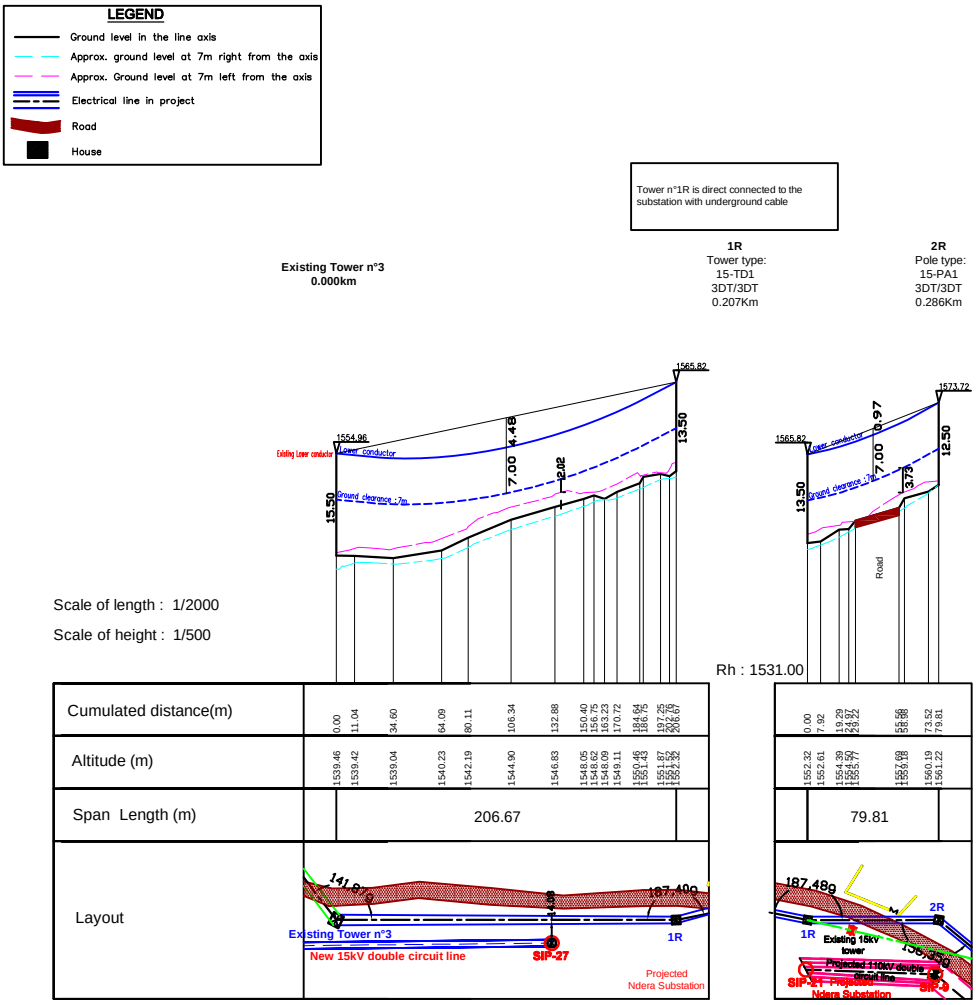


Tower No. 3 to 4

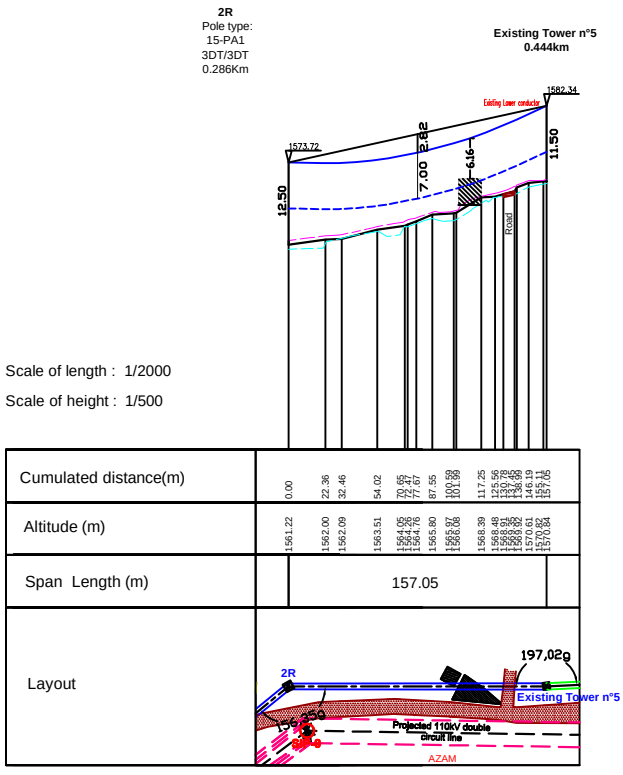


Cable Route from Tower 4 to Existing Tower

DWG No. LP-21: 15kV配電線ルート2縦断図 (1 / 1)
(ルート2: ンデラ変電所ービレンボ/フリーゾーン1間)



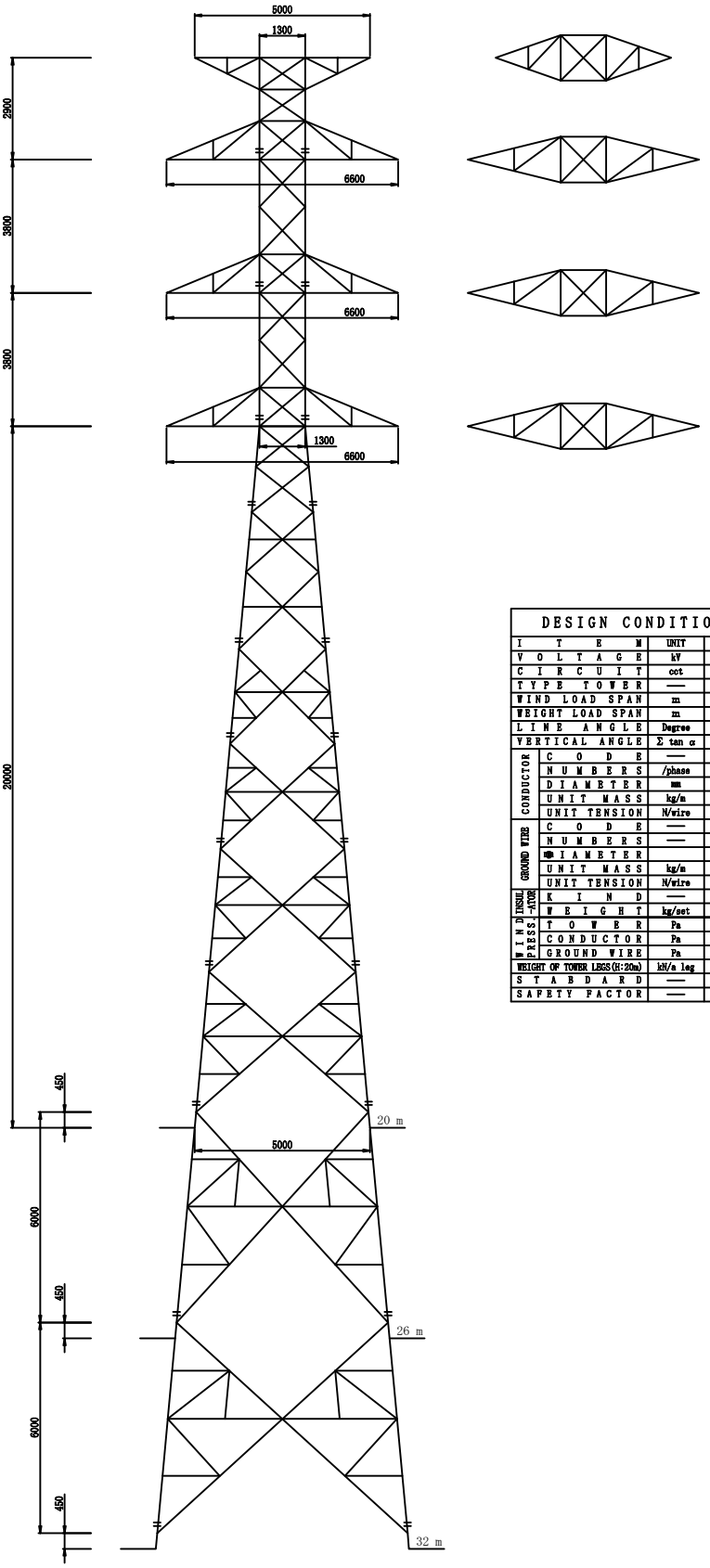
Existing Tower to Tower No. 2R



Tower No. 2R to Existing Tower

DWG No. LP-31: 15kV配電線ルート3縦断図 (1 / 1)

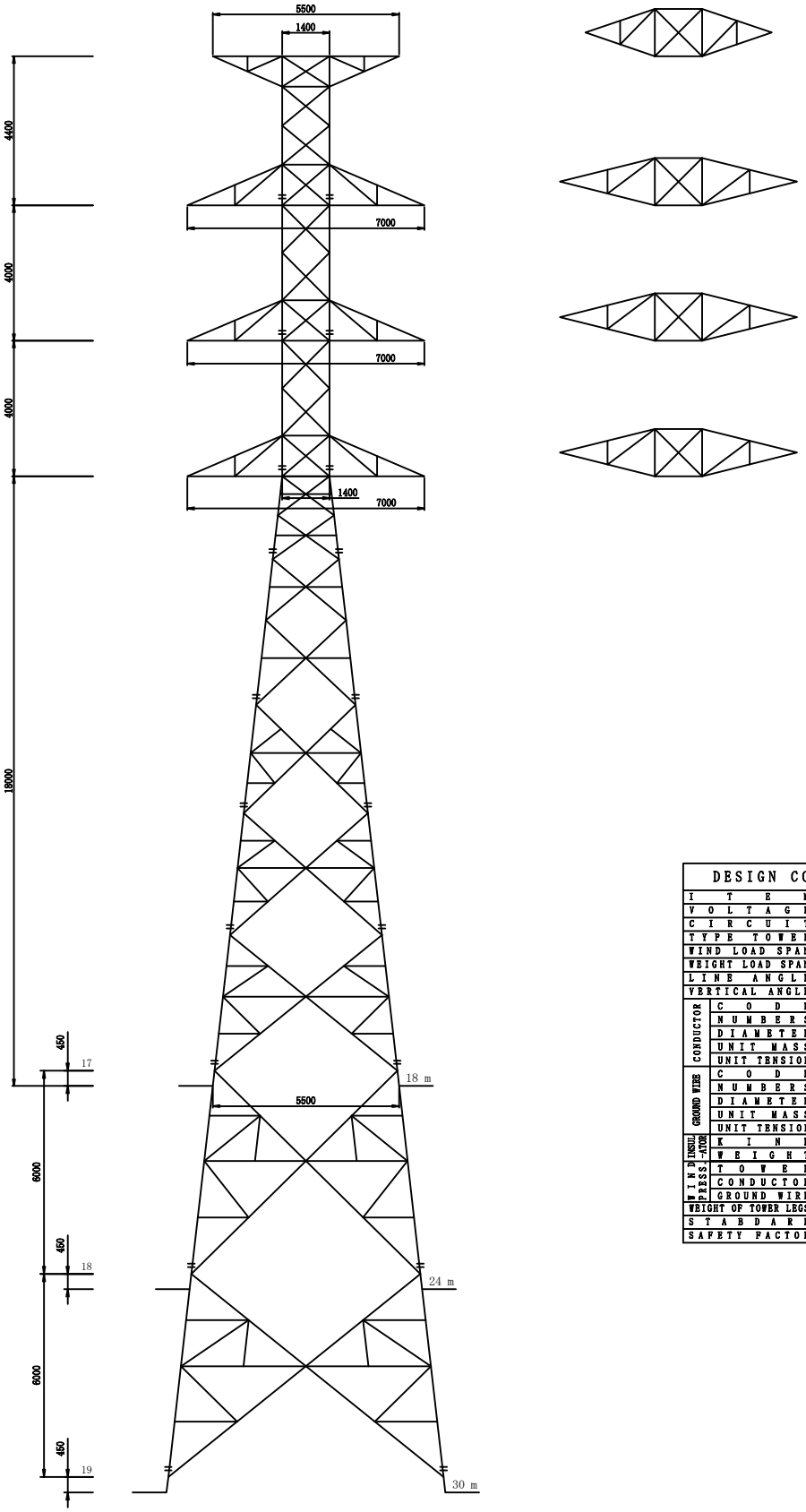
(ルート3: ルブンゴーギシャカ, ルート変更)



DESIGN CONDITION TABLE			
ITEM		UNIT	DESIGN
VOLTAGE		kV	110
CIRCUIT		cct	2
TYPE TOWER		—	110-A2
WIND LOAD SPAN		m	350
WEIGHT LOAD SPAN		m	450
LINE ANGLE		Degree	3
VERTICAL ANGLE		Σ tan α	0.15
CONDUCTOR	CODE	—	ACSR 240/40
	NUMBERS	/phase	1
	DIAMETER	mm	21.8
	UNIT MASS	kg/m	0.969
	UNIT TENSION	N/wire	26,478
GROUND WIRE	CODE	—	OPGW 97mm2
	NUMBERS	—	1
	DIAMETER		16
	UNIT MASS	kg/m	0.604
	UNIT TENSION	N/wire	20594
INSUL-ATOR	KIND	—	250mm x 2sets Suspension
	WEIGHT	kg/set	120
WIND PRESS.	TOWER	Pa	1599
	CONDUCTOR	Pa	552
	GROUND WIRE	Pa	552
WEIGHT OF TOWER LEGS(H:20m)		kN/a leg	10.7
STABDARD		—	JEC 127
SAFETY FACTOR		—	Body: 1.0,Arm: 1.2

Scale: 1/200

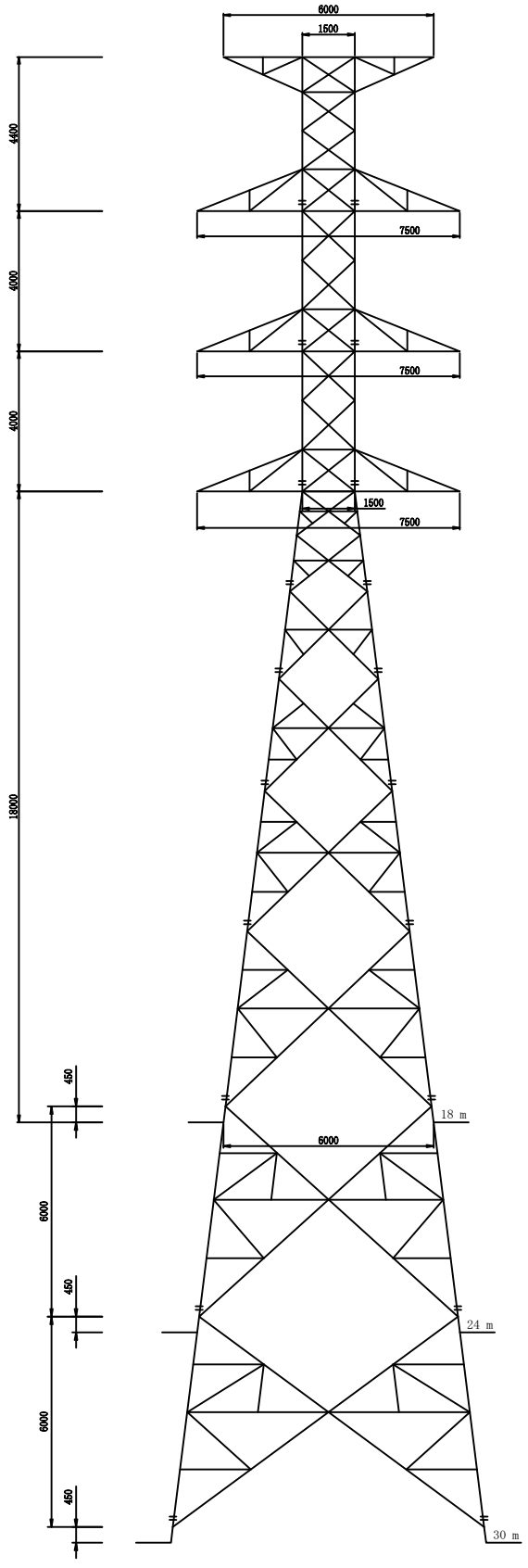
DWG No. TL-S1: 110kV送電線鉄塔姿図 タイプ110-A2



DESIGN CONDITION TABLE			
ITEM		UNIT	DESIGN
VOLTAGE		kV	110
CIRCUIT		cct	2
TYPE TOWER		—	110-B2
WIND LOAD SPAN		m	350
WEIGHT LOAD SPAN		m	450
LINE ANGLE		Degree	15
VERTICAL ANGLE		Σ tan α	0.15
CONDUCTOR	CODE	—	ACSR 240/40
	NUMBERS	/phase	1
	DIAMETER	mm	21.8
	UNIT MASS	kg/m	0.989
	UNIT TENSION	N/wire	26,478
GROUND WIRE	CODE	—	OPGW 97mm2
	NUMBERS	—	1
	DIAMETER	mm	16
	UNIT MASS	kg/m	0.604
	UNIT TENSION	N/wire	20694
INSULATOR	KIND	—	250mm x 2sets Suspension
	WEIGHT	kg/set	360
WIND PRESS.	TOWER	Pa	1599
	CONDUCTOR	Pa	552
	GROUND WIRE	Pa	552
WEIGHT OF TOWER LEGS		kN/a leg	10.7
STANDARD		—	JEC 127
SAFETY FACTOR		—	Body: 1.0, Arm: 1.2

Scale: 1/200

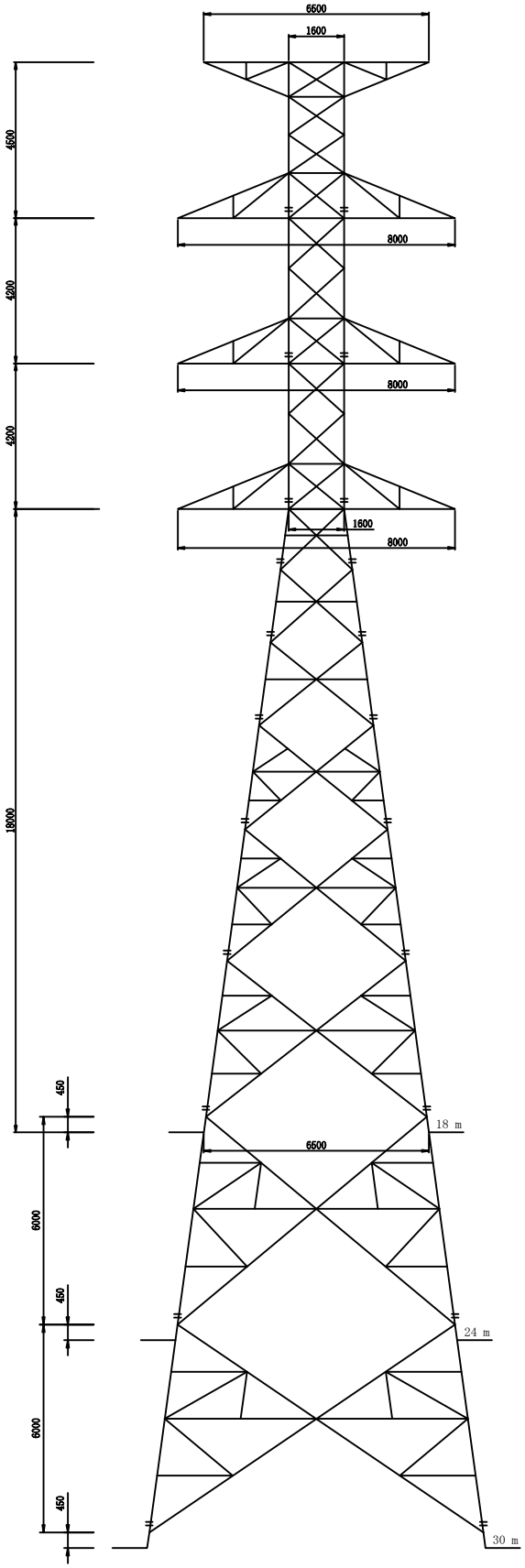
DWG No. TL-S2: 110kV送電線鉄塔姿図 タイプ110-B2

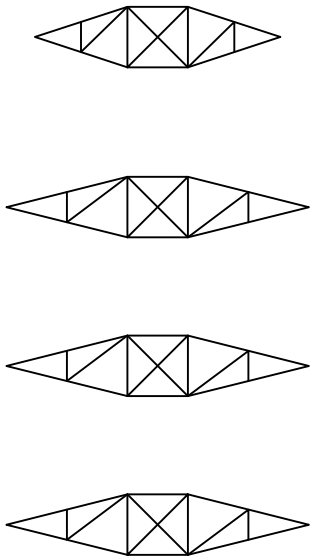


DESIGN CONDITION TABLE			
ITEM		UNIT	DESIGN
VOLTAGE		kV	110
CIRCUIT		cct	2
TYPE TOWER		—	110-C2
WIND LOAD SPAN		m	350
WEIGHT LOAD SPAN		m	450
LINE ANGLE		Degree	30
VERTICAL ANGLE		Σ tan α	0.15
CONDUCTOR	CODE	—	ACSR 240/40
	NUMBERS	/phase	1
	DIAMETER	mm	21.8
	UNIT MASS	kg/m	0.989
	UNIT TENSION	N/wire	26,478
GROUND WIRE	CODE	—	OPGW 97mm2
	NUMBERS	—	1
	DIAMETER	mm	16
	UNIT MASS	kg/m	0.604
	UNIT TENSION	N/wire	20694
INSUL. ASSEMBLY	KIND	—	250mm x 2sets Suspension
	WEIGHT	kg/set	360
DESIGN PRESS. FOR	TOWER	Pa	1599
	CONDUCTOR	Pa	552
	GROUND WIRE	Pa	552
WEIGHT OF TOWER LEGS		kN/a leg	10.7
STABDARD		—	JEC 127
SAFETY FACTOR		—	Body: 1.0, Arm: 1.2

Scale: 1/200

DWG No. TL-S3: 110kV送電線鉄塔姿図 タイプ110-C2

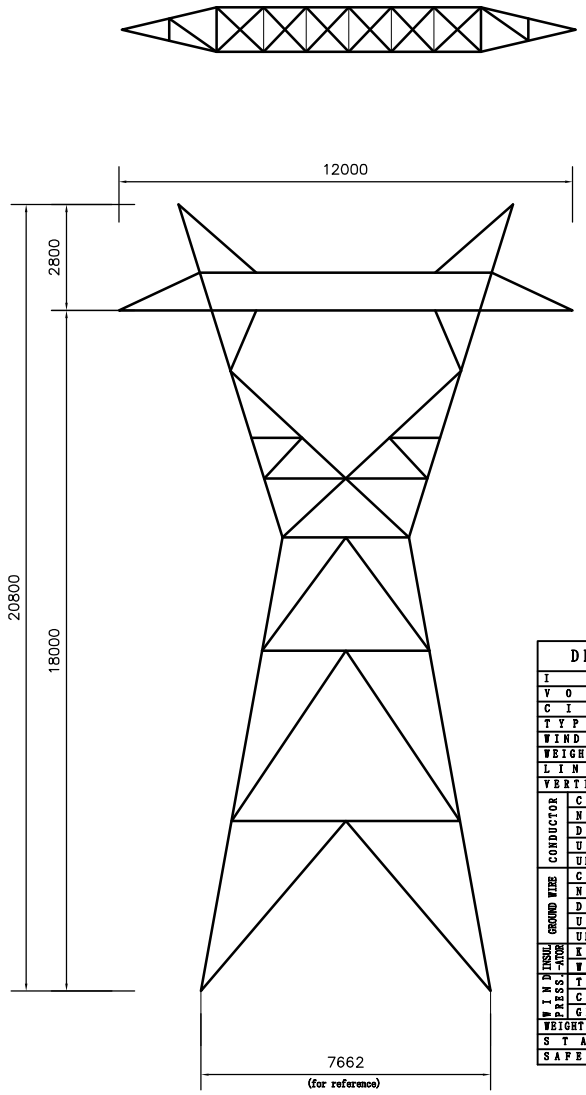




DESIGN CONDITION TABLE				
ITEM		UNIT	DESIGN	DESIGN
VOLTAGE		kV	110	110
CIRCUIT		cct	2	2
TYPE TOWER		——	110-D2	110-D2
WIND LOAD SPAN		m	50	300
WEIGHT LOAD SPAN		m	50	400
LINE ANGLE		Degree	30	0
VERTICAL ANGLE		Σ tan α	0.15	0.15
CONDUCTOR	CODE	——	ACSR 240/40	ACSR 240/40
	NUMBERS	/phase	1	1
	DIAMETER	mm	21.8	21.8
	UNIT MASS	kg/m	0.989	0.989
	UNIT TENSION	N/wire	9807	26478
GROUND WIRE	CODE	——	OPGW 97mm2	OPGW 97mm2
	NUMBERS	——	1	1
	DIAMETER	mm	16	16
	UNIT MASS	kg/m	0.604	0.604
	UNIT TENSION	N/wire	6875	20594
INSUL-ATOR	KIND	——	250mm x 2sets Suspension	250mm x 2sets Suspension
	WEIGHT	kg/set	360	360
WIND PRESS.	TOWER	Pa	1599	1599
	CONDUCTOR	Pa	552	552
	GROUND WIRE	Pa	552	552
WEIGHT OF TOWER LEGS		kN/a leg	——	27.3
STABDARD		——	JEC 127	JEC 127
SAFETY FACTOR		——	Body: 1.0, Arm: 1.2	Body: 1.0, Arm: 1.2

Scale: 1/200

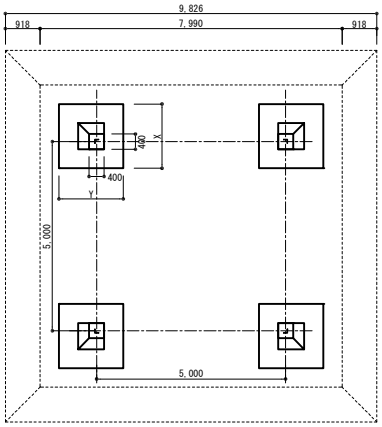
DWG No. TL-S4: 110kV送電線鉄塔姿図 タイプ110-D2



DESIGN CONDITION TABLE			
ITEM		UNIT	DESIGN
VOLTAGE		kV	110
CIRCUIT		cct	1
TYPE TOWER		——	110-E1
WIND LOAD SPAN		m	see line profile drawing
WEIGHT LOAD SPAN		m	see line profile drawing
LINE ANGLE		Degree	3
VERTICAL ANGLE		Σ tan α	0.15
CONDUCTOR	CODE	——	ACSR 240/40
	NUMBERS	/phase	1
	DIAMETER	mm	21.8
	UNIT MASS	kg/m	0.989
	UNIT TENSION	N/wire	26,478
GROUND WIRE	CODE	——	OPGW 97mm2
	NUMBERS	——	1
	DIAMETER	mm	16
	UNIT MASS	kg/m	0.604
	UNIT TENSION	N/wire	20694
INSUL-ATOR	KIND	——	250mm x 2sets Suspension
	WEIGHT	kg/set	360
WIND PRESS.	TOWER	Pa	1599
	CONDUCTOR	Pa	552
	GROUND WIRE	Pa	552
WEIGHT OF TOWER LEGS		kN/a leg	——
STABDARD		——	JEC 127 or equivalent
SAFETY FACTOR		——	Body: 1.0, Arm: 1.2

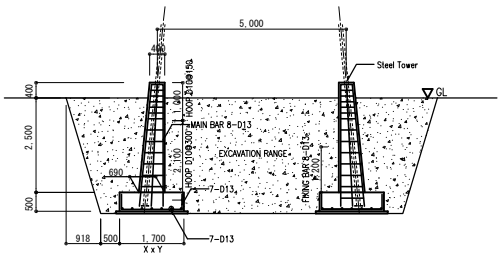
Scale: 1/200

DWG No. TL-S5: 110kV Tower Skeleton, Type: 110-E1



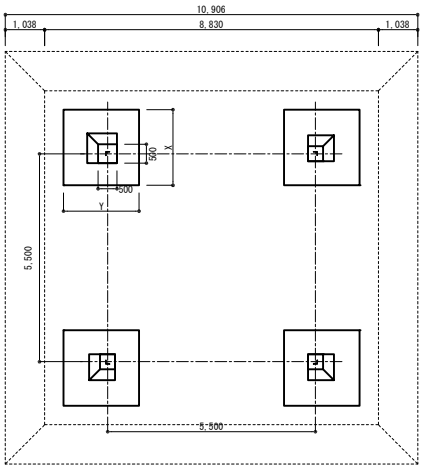
PLAN

Land Size to be secured: 10m x 10m



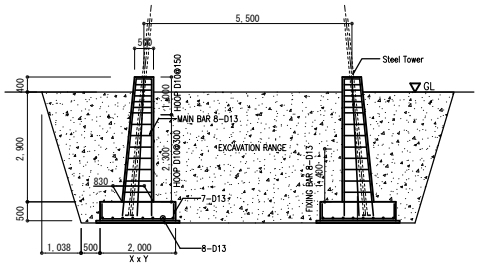
SECTION

FOUNDATION PLAN FOR TOWER TYPE: 110-A2 (SCALE 1/200)



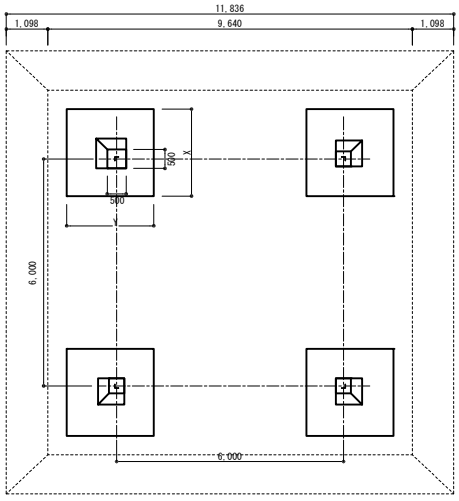
PLAN

Land Size to be secured: 11m x 11m



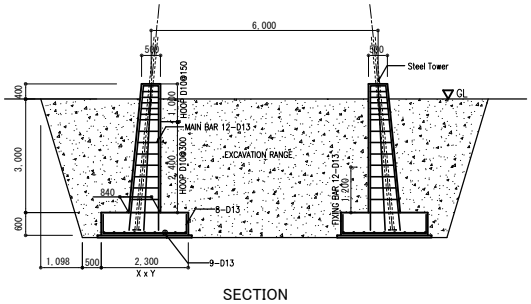
SECTION

FOUNDATION PLAN FOR TOWER TYPE: 110-B2 (SCALE 1/200)



PLAN

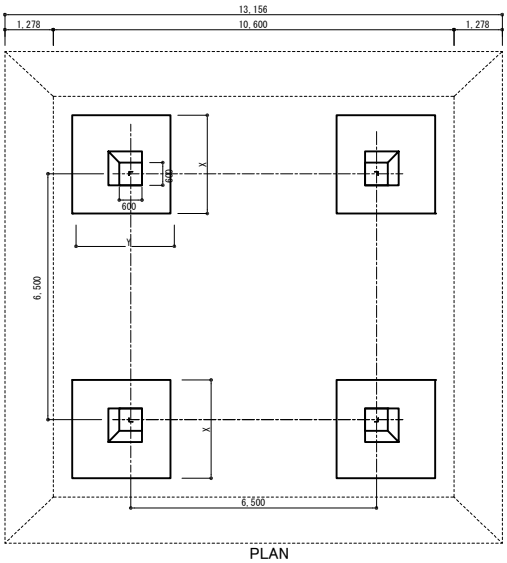
Land Size to be secured: 12m x 12m



SECTION

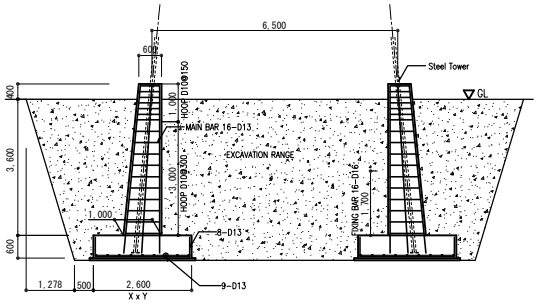
FOUNDATION PLAN FOR TOWER TYPE: 110-C2 (SCALE 1/200)

DWG No. TL-S6: 110kV送電鉄塔 基礎図(1/2)



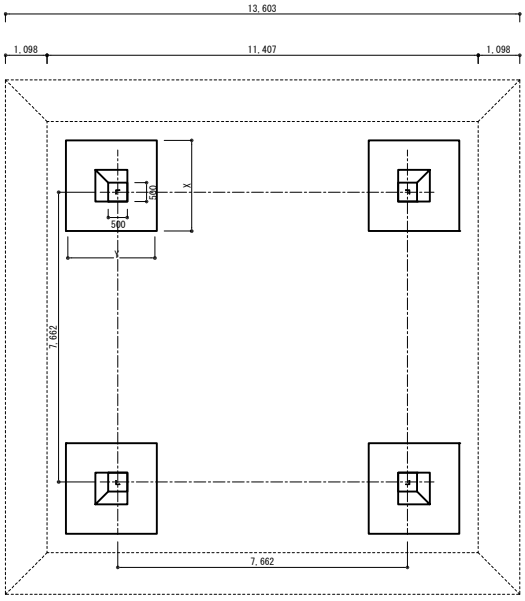
PLAN

Land Size to be secured: 14m x 14m



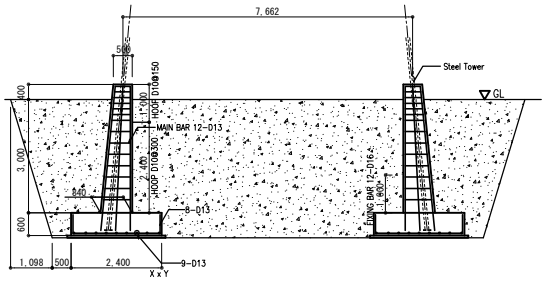
SECTION

FOUNDATION PLAN FOR TOWER TYPE: 110-D2 (SCALE 1/200)



PLAN

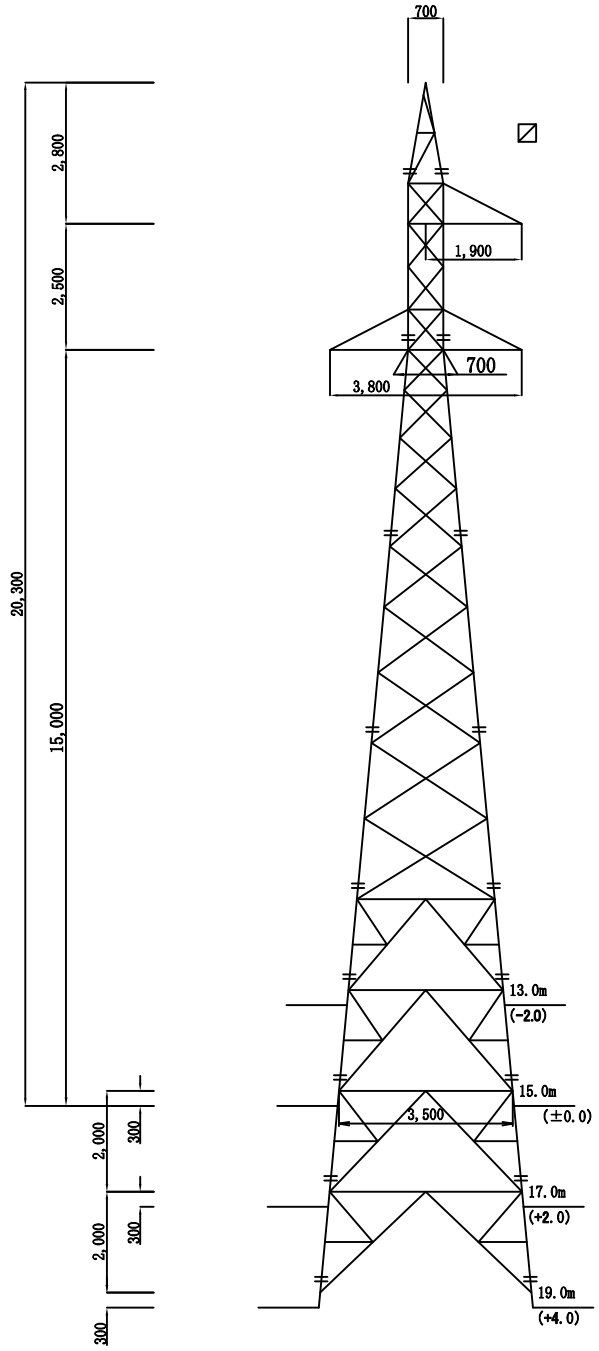
Land Size to be secured: 14m x 14m



SECTION

FOUNDATION PLAN FOR TOWER TYPE: 110-E1 (SCALE 1/200)

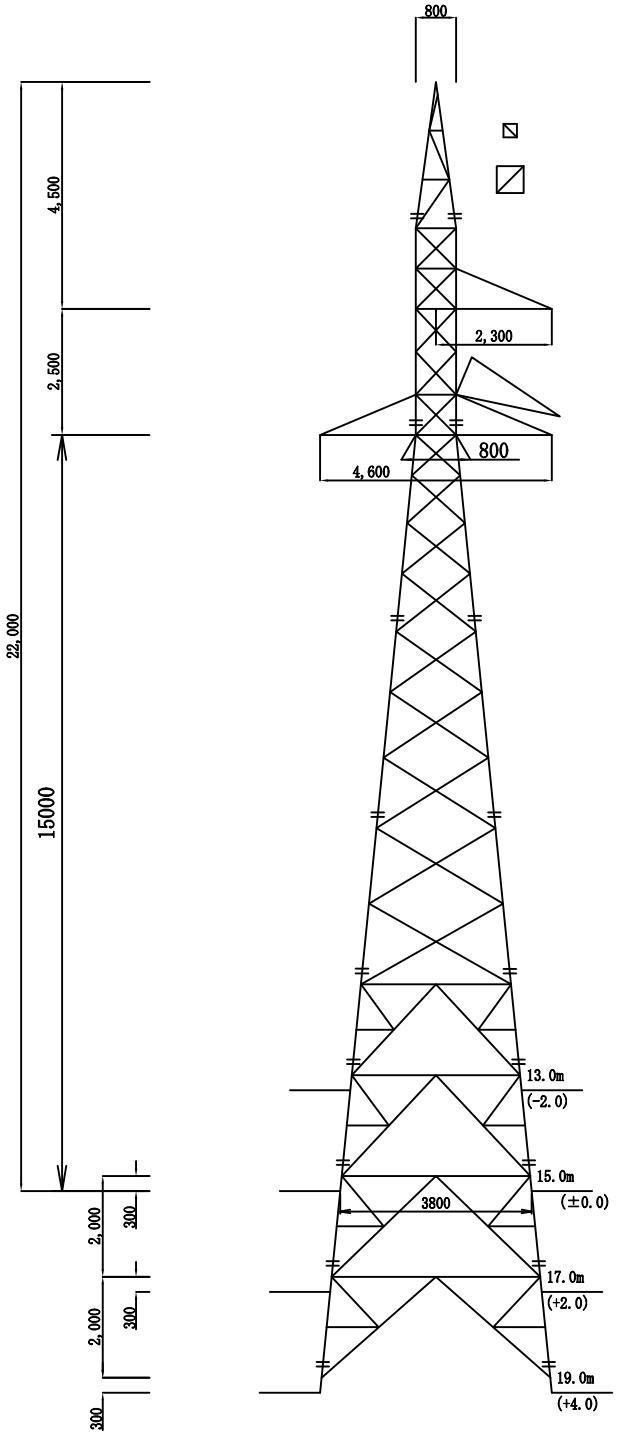
DWG No. TL-S7: 110kV送電鉄塔 基礎図(2/2)



DESIGN CONDITION TABLE			
ITEM		UNIT	DESIGN
VOLTAGE		kV	15(30)
CIRCUIT		cct	1
TYPE TOWER		——	15-TA1
WIND LOAD SPAN		m	250
WEIGHT LOAD SPAN		m	350
LINE ANGLE		Degree	3
VERTICAL ANGLE		Σ tan α	0.15
CONDUCTOR	CODE	——	ACSR 120/20
	NUMBERS	/phase	1
	DIAMETER	mm	15.5
	UNIT MASS	kg/m	0.496
	UNIT TENSION	N/wire	15,690
GROUND WIRE	CODE	——	OPGW ACS46mm2-3.9
	NUMBERS	——	1
	DIAMETER	mm	9.6
	UNIT MASS	kg/m	0.352
	UNIT TENSION	N/wire	11,770
INSUL-ATOR	KIND	——	250mm x 2sets Suspension
	WEIGHT	kg/set	120
WIND PRESS.	TOWER	Pa	1599
	CONDUCTOR	Pa	552
	GROUND WIRE	Pa	552
WEIGHT OF TOWER LEGS		kN/a leg	6.38
STABDARD		——	JEC 127
SAFETY FACTOR		——	Body: 1.0, Arm: 1.2

Scale: 1/150

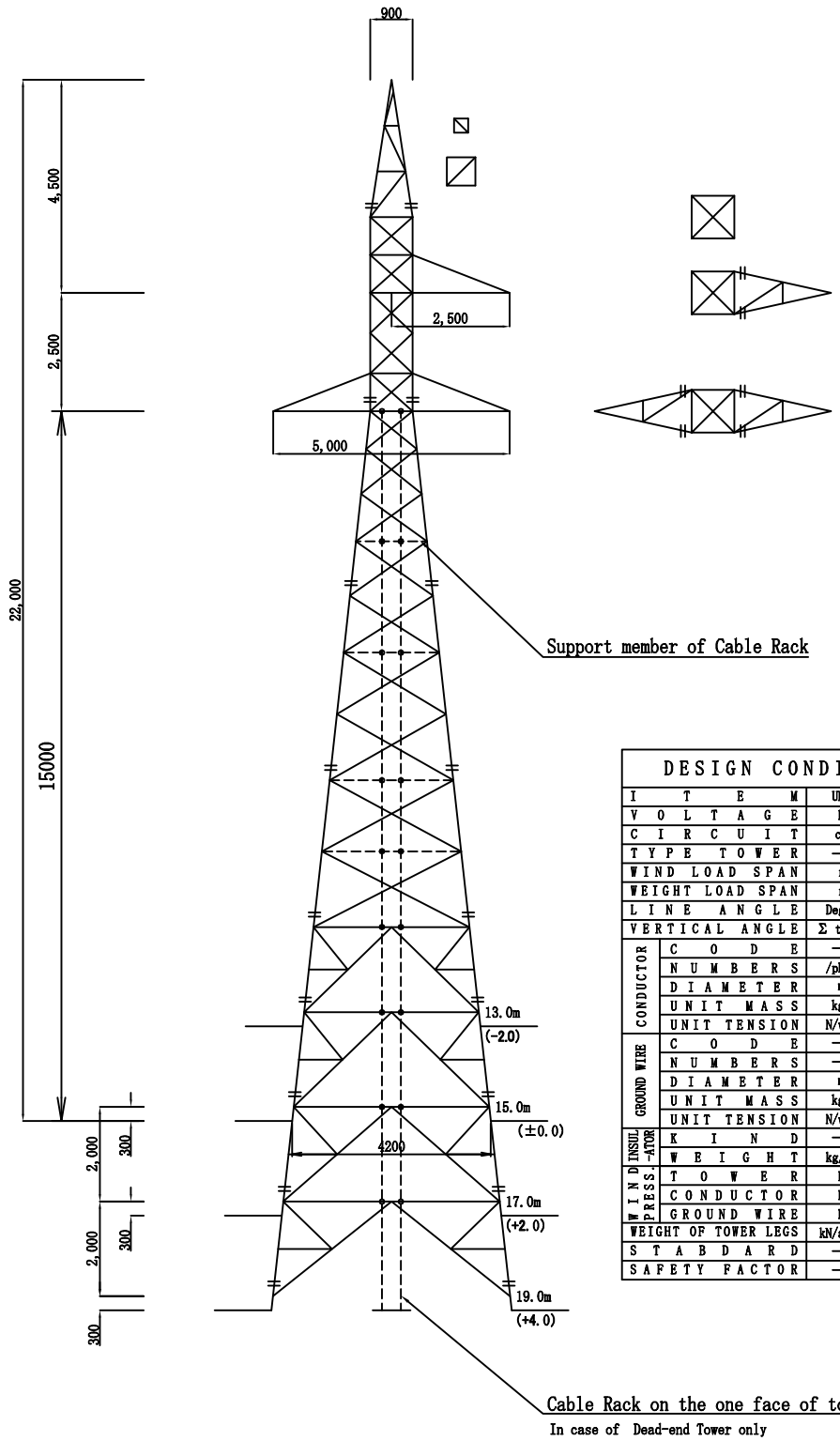
DWG No. DL-S1: 15kV配電線鉄塔姿図 タイプ15-TA1



DESIGN CONDITION TABLE			
ITEM		UNIT	DESIGN
VOLTAGE		kV	15(30)
CIRCUIT		cct	1
TYPE TOWER		—	15-TB1
WIND LOAD SPAN		m	250
WEIGHT LOAD SPAN		m	350
LINE ANGLE		Degree	30
VERTICAL ANGLE		Σ tan α	0.15
CONDUCTOR	CODE	—	ACSR 120/20
	NUMBERS	/phase	1
	DIAMETER	mm	15.5
	UNIT MASS	kg/m	0.496
	UNIT TENSION	N/wire	15,690
GROUND WIRE	CODE	—	OPGW ACS46mm2-3.9
	NUMBERS	—	1
	DIAMETER	mm	9.6
	UNIT MASS	kg/m	0.352
	UNIT TENSION	N/wire	11,770
INSUL-ATOR	KIND	—	250mm x 2sets Suspension
	WEIGHT	kg/set	210
WIND PRESS.	TOWER	Pa	1599
	CONDUCTOR	Pa	552
	GROUND WIRE	Pa	552
WEIGHT OF TOWER LEGS		kN/a leg	8.28
STABDARD		—	JEC 127
SAFETY FACTOR		—	Body: 1.0, Arm: 1.2

Scale: 1/150

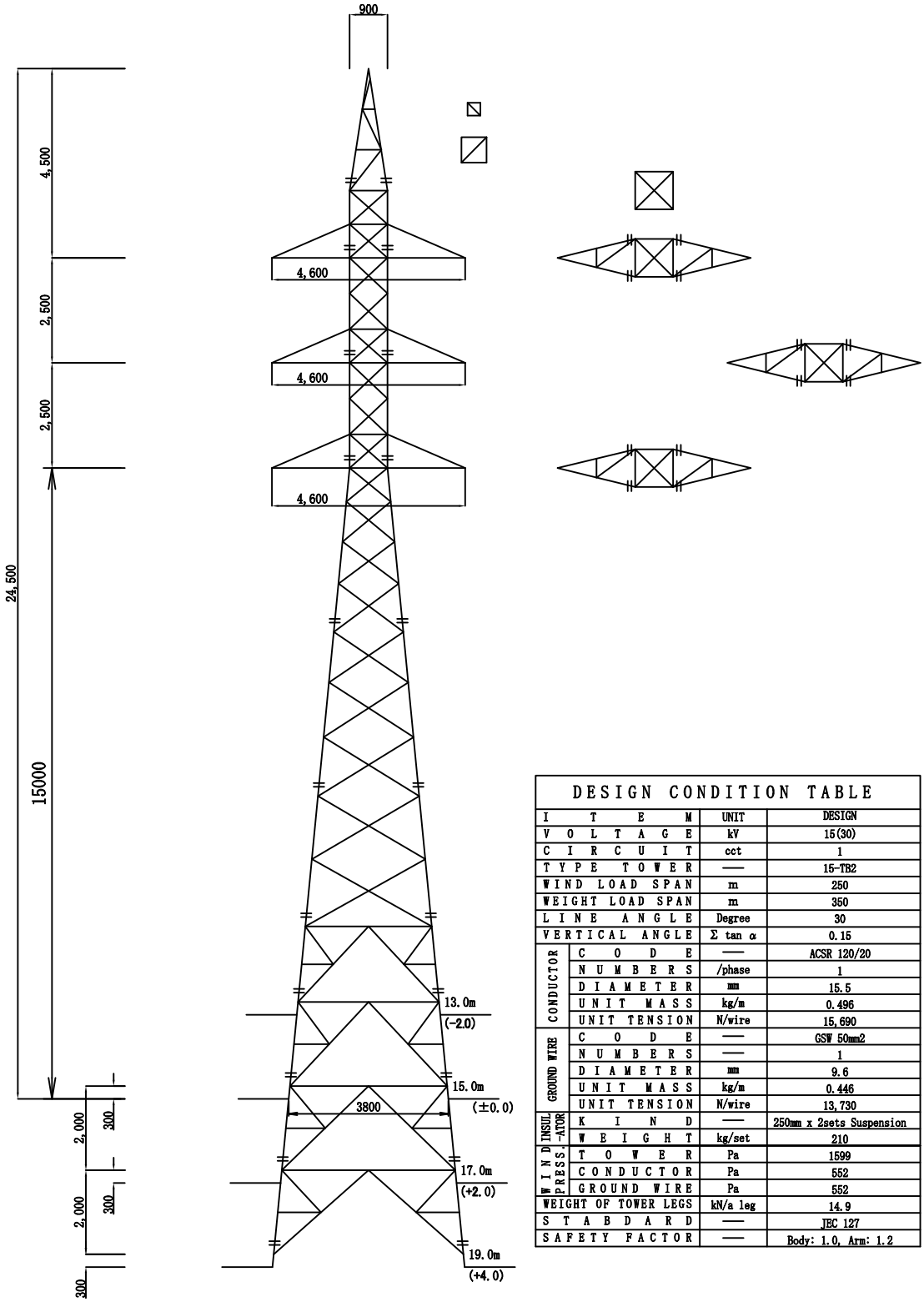
DWG No. DL-S2: 15kV配電線鉄塔姿図 タイプ15-TB1



DESIGN CONDITION TABLE			
ITEM		UNIT	DESIGN
VOLTAGE		kV	15(30)
CIRCUIT		cct	1
TYPE TOWER		—	15-TD1
WIND LOAD SPAN		m	Dead End: 125, Angle: 250
WEIGHT LOAD SPAN		m	Dead End: 175, Angle: 50
LINE ANGLE		Degree	50
VERTICAL ANGLE		Σ tan α	0.15
CONDUCTOR	CODE	—	ACSR 120/20
	NUMBERS	/phase	1
	DIAMETER	mm	15.5
	UNIT MASS	kg/m	0.496
	UNIT TENSION	N/wire	15,690
GROUND WIRE	CODE	—	OPGW ACS46mm2-3.9
	NUMBERS	—	1
	DIAMETER	mm	9.6
	UNIT MASS	kg/m	0.352
	UNIT TENSION	N/wire	11,770
INSUL-ATOR	KIND	—	250mm x 2sets Suspension
	WEIGHT	kg/set	210
WIND PRESS.	TOWER	Pa	1599
	CONDUCTOR	Pa	552
	GROUND WIRE	Pa	552
WEIGHT OF TOWER LEGS		kN/a leg	8.28
STABDARD		—	JEC 127
SAFETY FACTOR		—	Body: 1.0, Arm: 1.2

Scale: 1/150

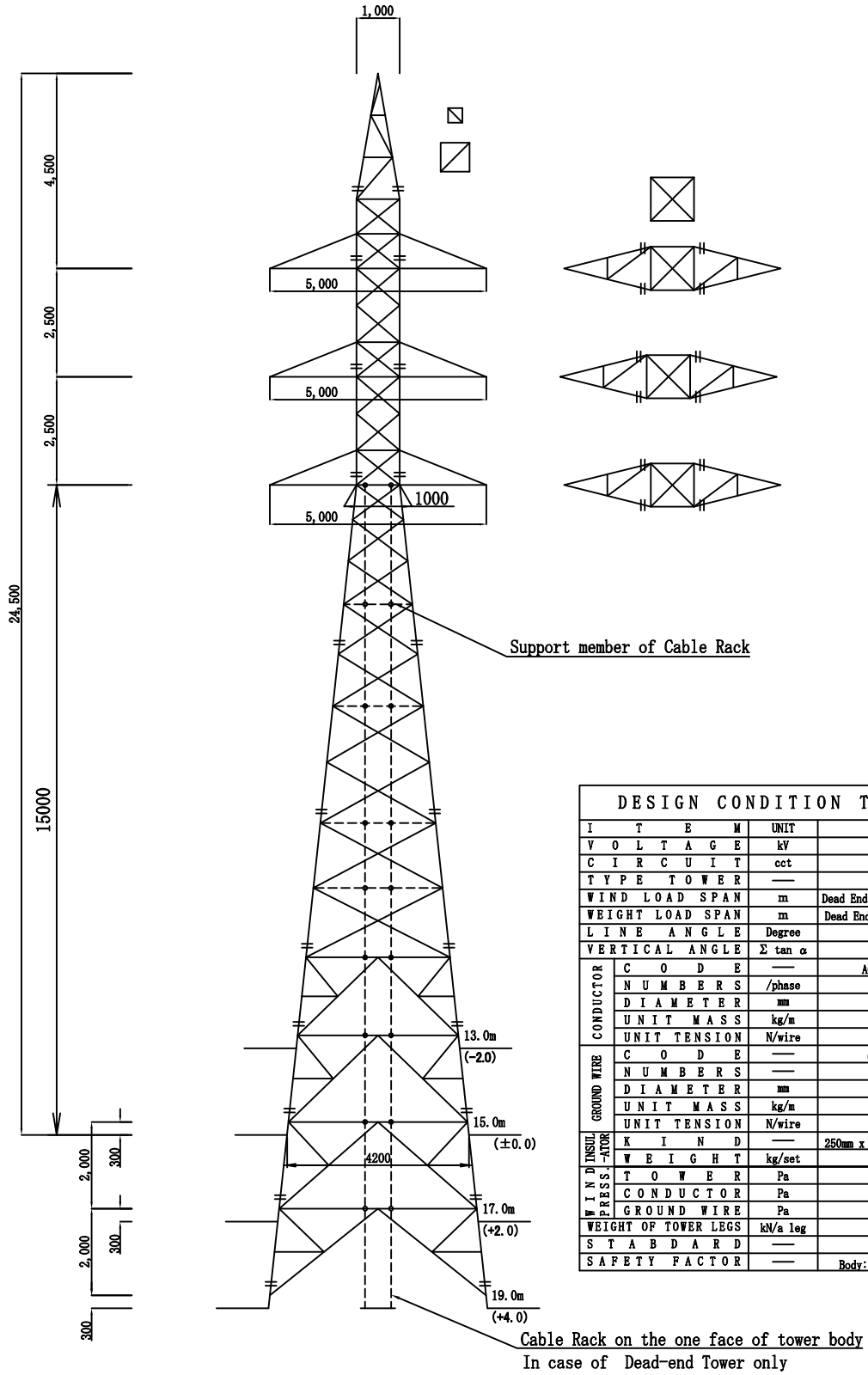
DWG No. DL-S3: 15kV配電線鉄塔姿図 タイプ15-TD1



DESIGN CONDITION TABLE			
ITEM		UNIT	DESIGN
VOLTAGE		kV	15(30)
CIRCUIT		cct	1
TYPE TOWER		—	15-TB2
WIND LOAD SPAN		m	250
WEIGHT LOAD SPAN		m	350
LINE ANGLE		Degree	30
VERTICAL ANGLE		Σ tan α	0.15
CONDUCTOR	CODE	—	ACSR 120/20
	NUMBERS	/phase	1
	DIAMETER	mm	15.5
	UNIT MASS	kg/m	0.496
	UNIT TENSION	N/wire	15,690
GROUND WIRE	CODE	—	GSW 50mm2
	NUMBERS	—	1
	DIAMETER	mm	9.6
	UNIT MASS	kg/m	0.446
	UNIT TENSION	N/wire	13,730
INSUL-ATOR	KIND	—	250mm x 2sets Suspension
	WEIGHT	kg/set	210
WIND PRESS.	TOWER	Pa	1599
	CONDUCTOR	Pa	552
	GROUND WIRE	Pa	552
WEIGHT OF TOWER LEGS		kN/a leg	14.9
STABDARD		—	JEC 127
SAFETY FACTOR		—	Body: 1.0, Arm: 1.2

Scale: 1/150

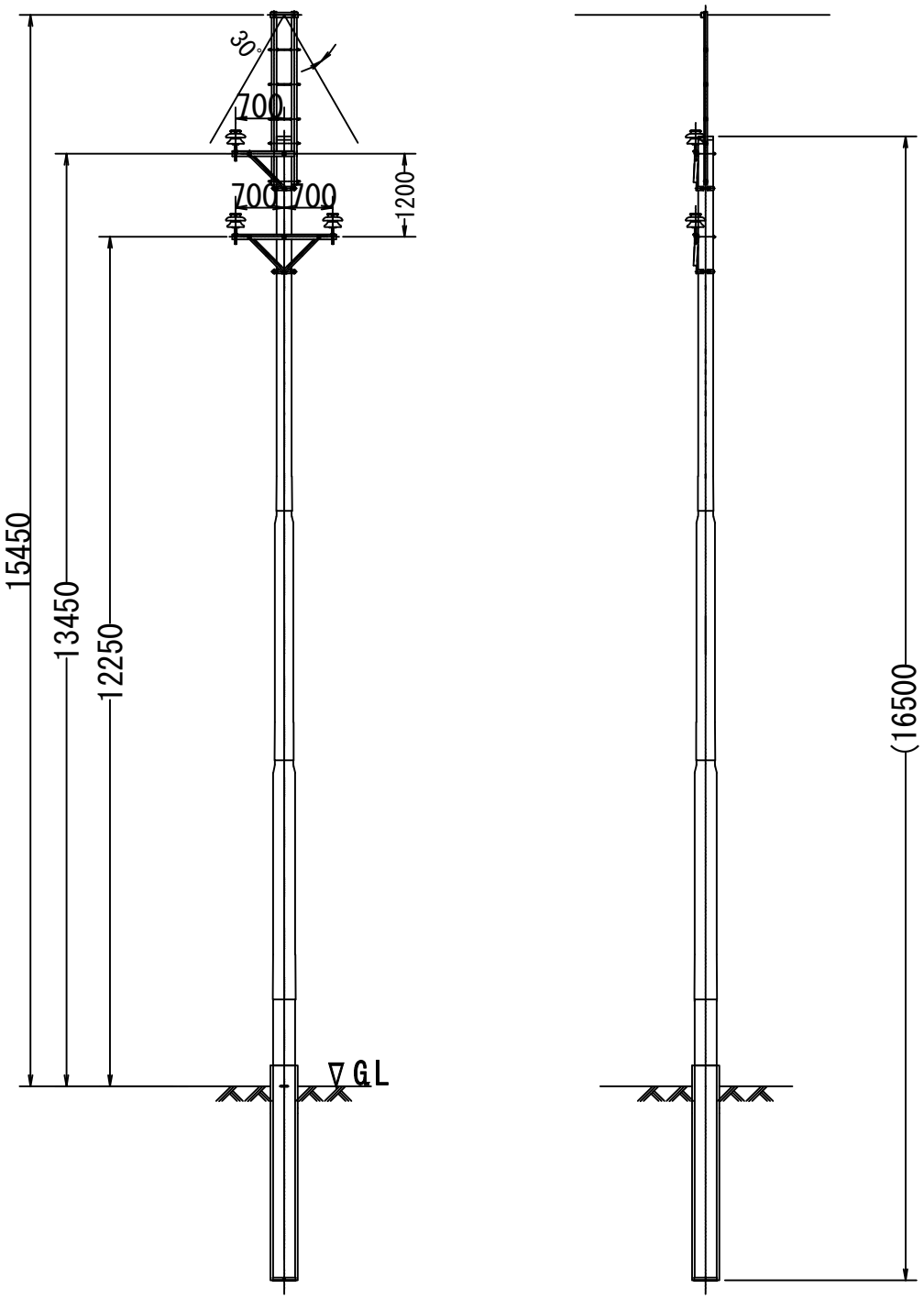
DWG No. DL-S4: 15kV配電線鉄塔姿図 タイプ15-TB2



DESIGN CONDITION TABLE			
ITEM		UNIT	DESIGN
VOLTAGE		kV	15(30)
CIRCUIT		cct	2
TYPE TOWER		—	15-TD2
WIND LOAD SPAN		m	Dead End: 125, Angle: 250
WEIGHT LOAD SPAN		m	Dead End: 175, Angle: 50
LINE ANGLE		Degree	50
VERTICAL ANGLE		Σ tan α	0.15
CONDUCTOR	CODE	—	ACSR 120/20
	NUMBERS	/phase	1
	DIAMETER	mm	15.5
	UNIT MASS	kg/m	0.496
	UNIT TENSION	N/wire	15,690
GROUND WIRE	CODE	—	GSW 55mm2
	NUMBERS	—	1
	DIAMETER	mm	9.6
	UNIT MASS	kg/m	0.446
	UNIT TENSION	N/wire	13,730
INSUL-ATOR	KIND	—	250mm x 2sets Suspension
	WEIGHT	kg/set	210
WIND PRESS.	TOWER	Pa	1599
	CONDUCTOR	Pa	552
	GROUND WIRE	Pa	552
WEIGHT OF TOWER LEGS		kN/a leg	14.7
STABDARD		—	IEC 127
SAFETY FACTOR		—	Body: 1.0, Arm: 1.2

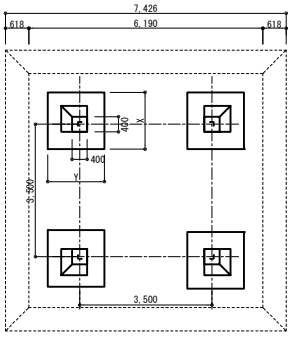
Scale: 1/150

DWG No. DL-S5: 15kV配電線鉄塔姿図 タイプ15-TD2



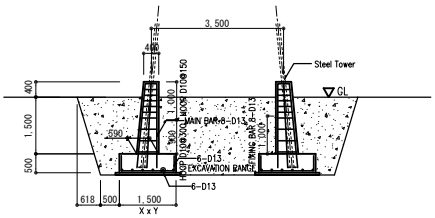
Scale: 1/100

DWG No. DL-S6: 15kV配電線鋼管柱姿図 タイプ15-PA1



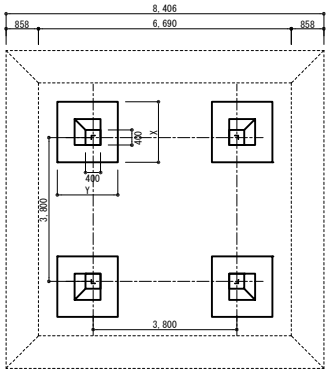
PLAN

Land Size to be secured: 8m x 8m



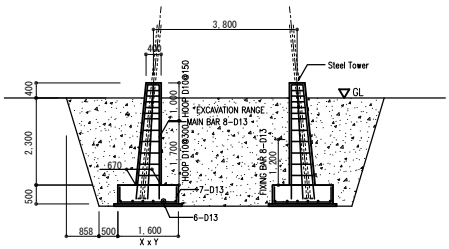
SECTION

FOUNDATION PLAN FOR TOWER TYPE: 15-TA1 (SCALE 1/200)



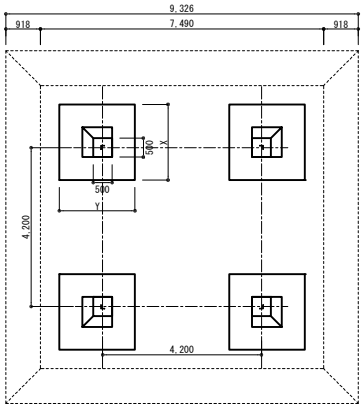
PLAN

Land Size to be secured: 9m x 9m



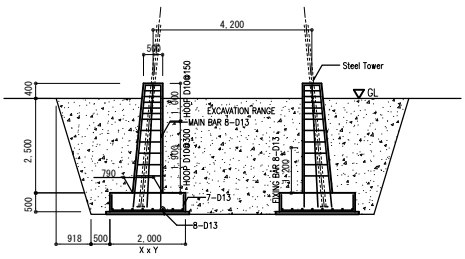
SECTION

FOUNDATION PLAN FOR TOWER TYPE: 15-TB1 (SCALE 1/200)



PLAN

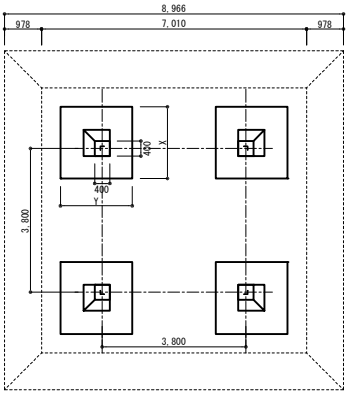
Land Size to be secured: 10m x 10m



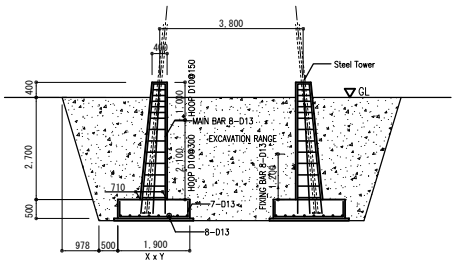
SECTION

FOUNDATION PLAN FOR TOWER TYPE: 15-TD1 (SCALE 1/200)

DWG No. DL-S7: 15kV配電鉄塔 基礎図(1/2)

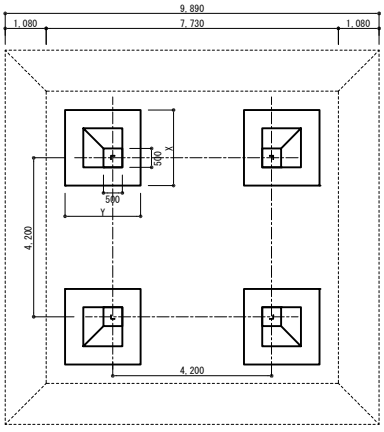


Land Size to be secured: 9m x 9m

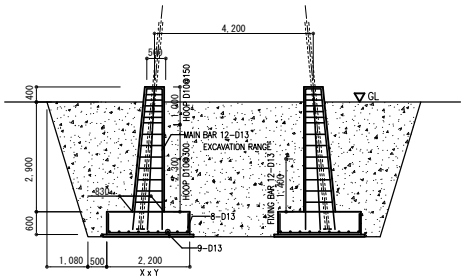


PLAN SECTION

FOUNDATION PLAN FOR TOWER TYPE: 15-TB2 (SCALE 1/200)



Land Size to be secured: 10m x 10m



PLAN SECTION

FOUNDATION PLAN FOR TOWER TYPE: 15-TD2 (SCALE 1/200)

DWG No. DL-S8: 15kV配電鉄塔 基礎図(2/2)