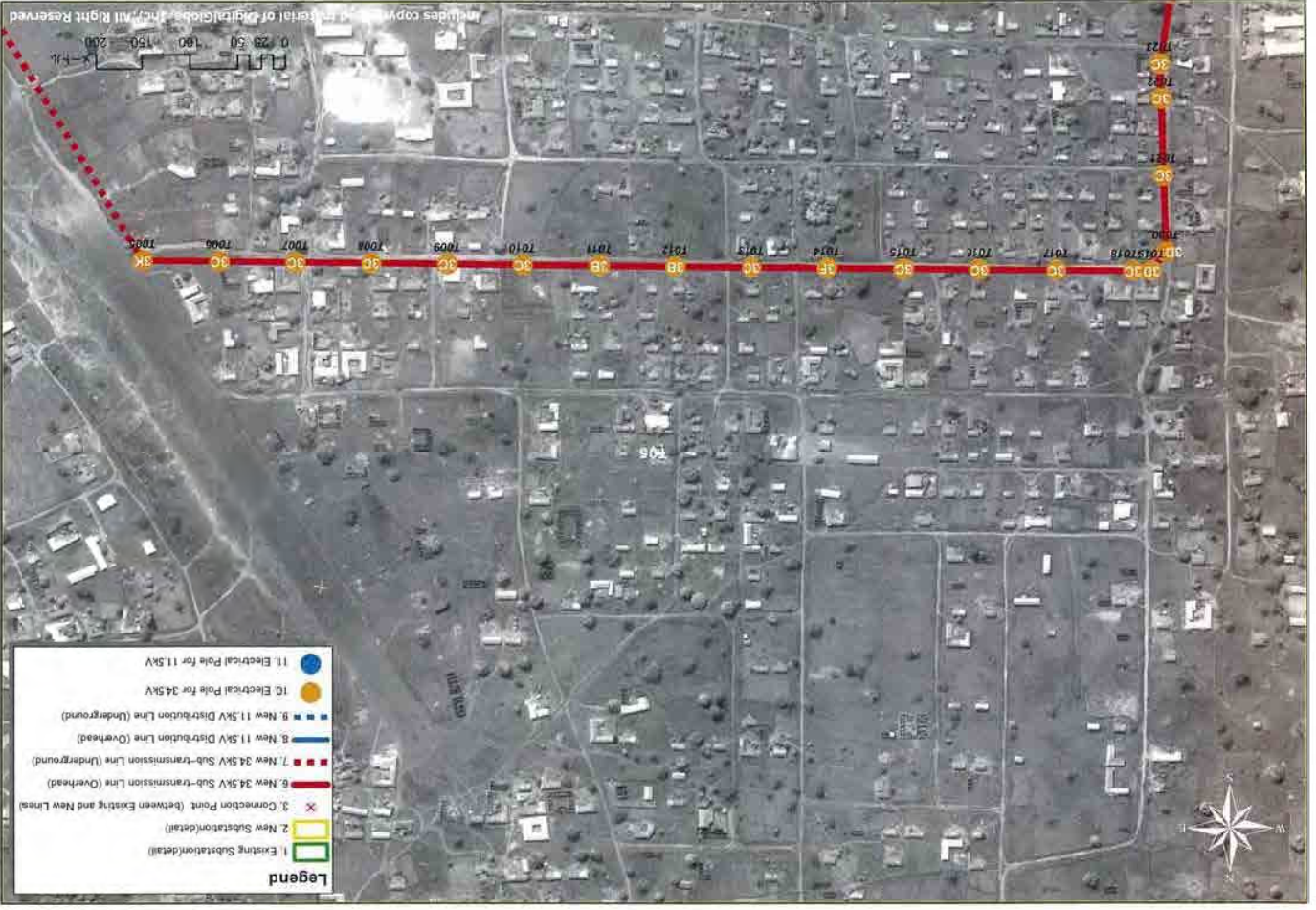
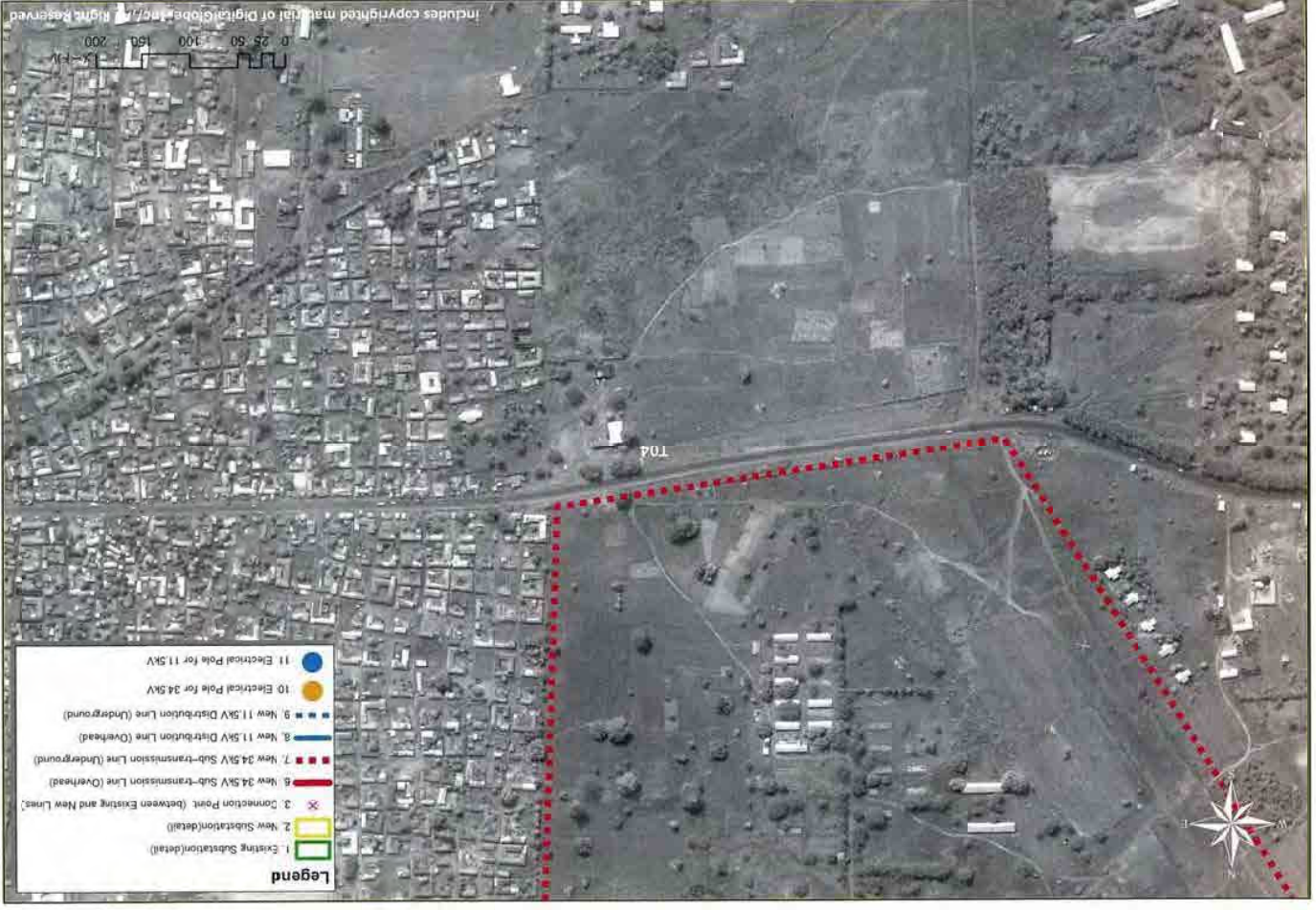


Route Map of Tamale Distribution System

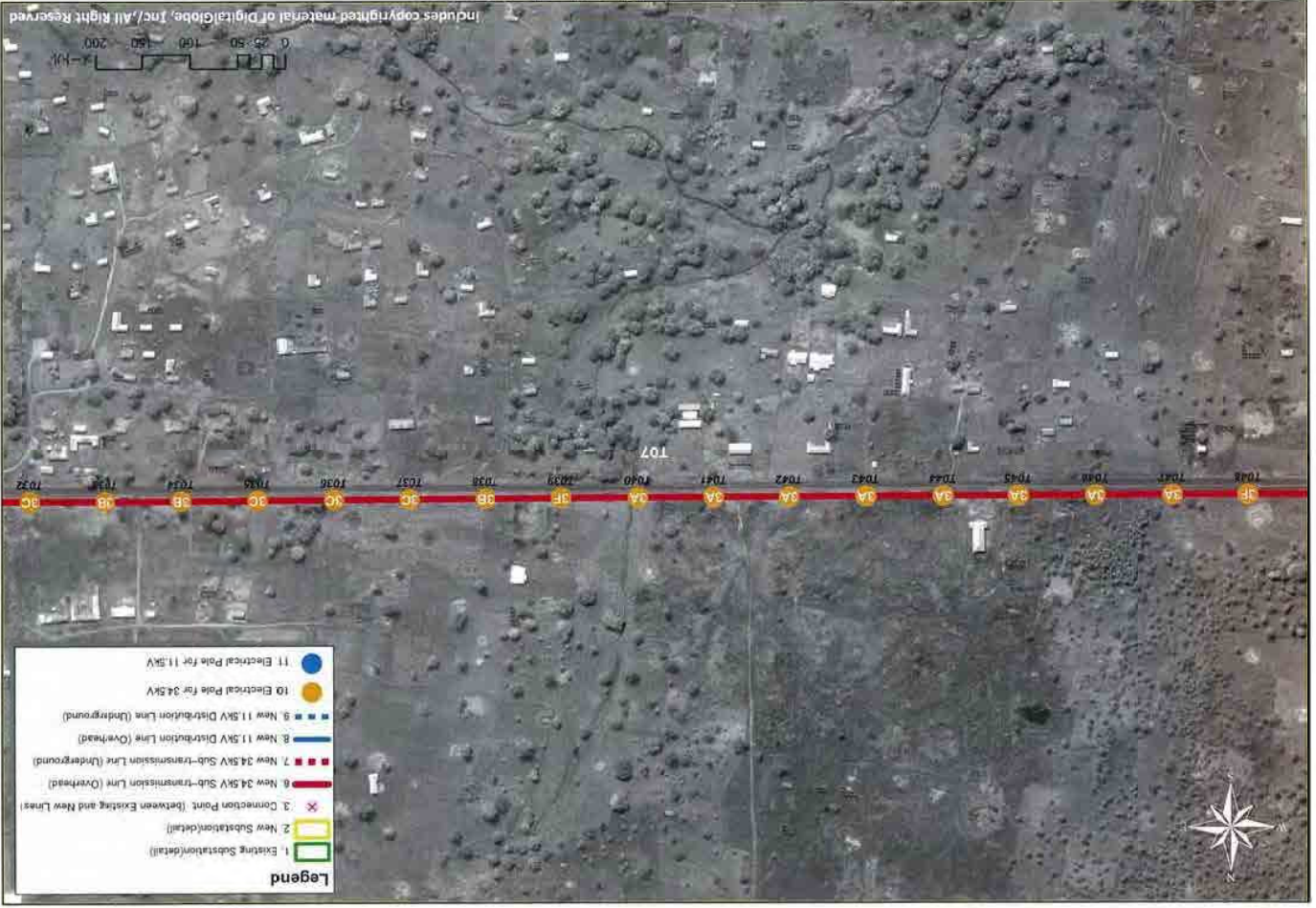


Route Map of Tamale Distribution System





### Route Map of Tamale Distribution System



51

### Route Map of Tamale Distribution System



50



Route Map of Tamale Distribution System

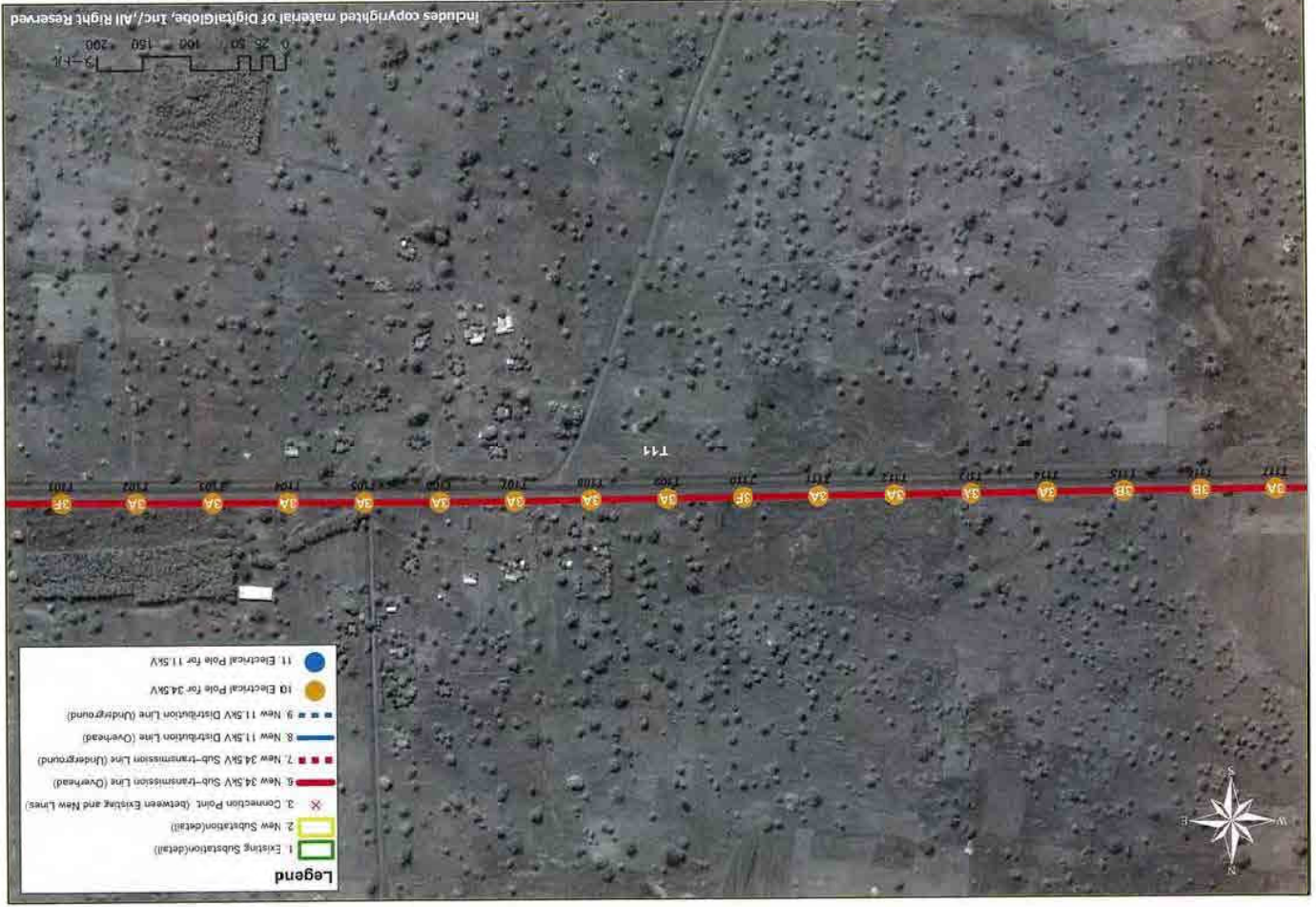


Route Map of Tamale Distribution System

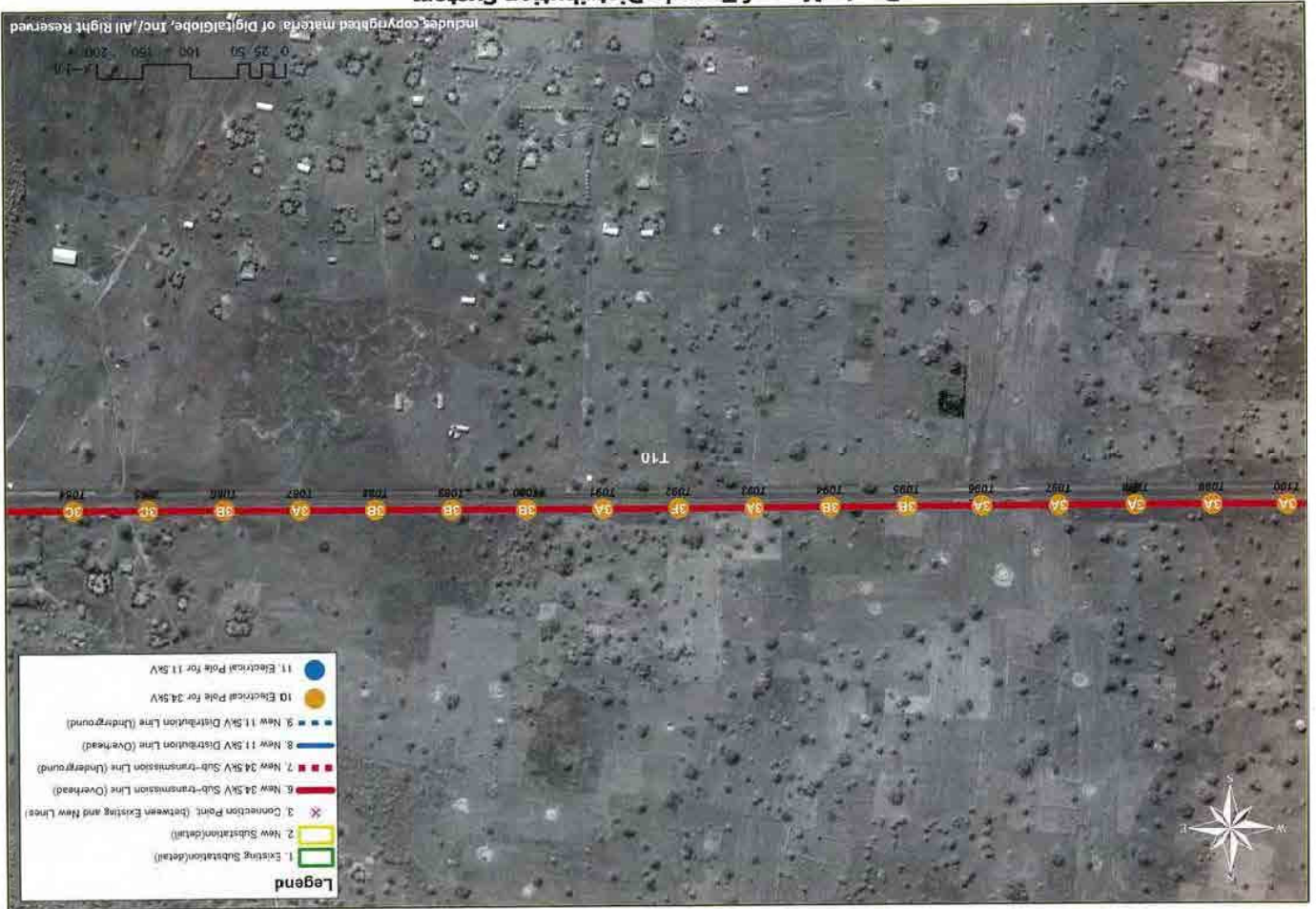




### Route Map of Tamale Distribution System



### Route Map of Tamale Distribution System



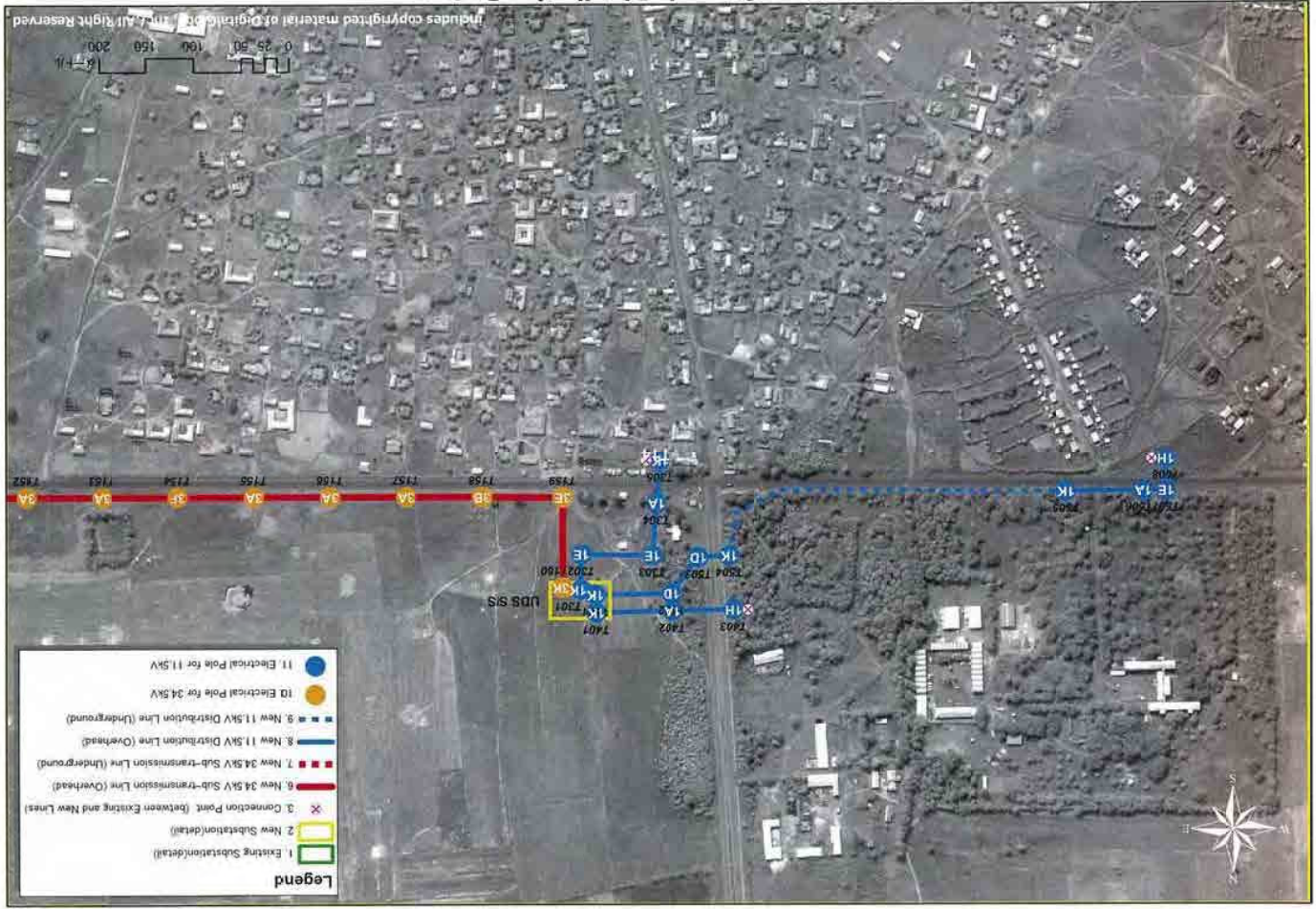


Route Map of Tamale Distribution System



Route Map of Tamale Distribution System





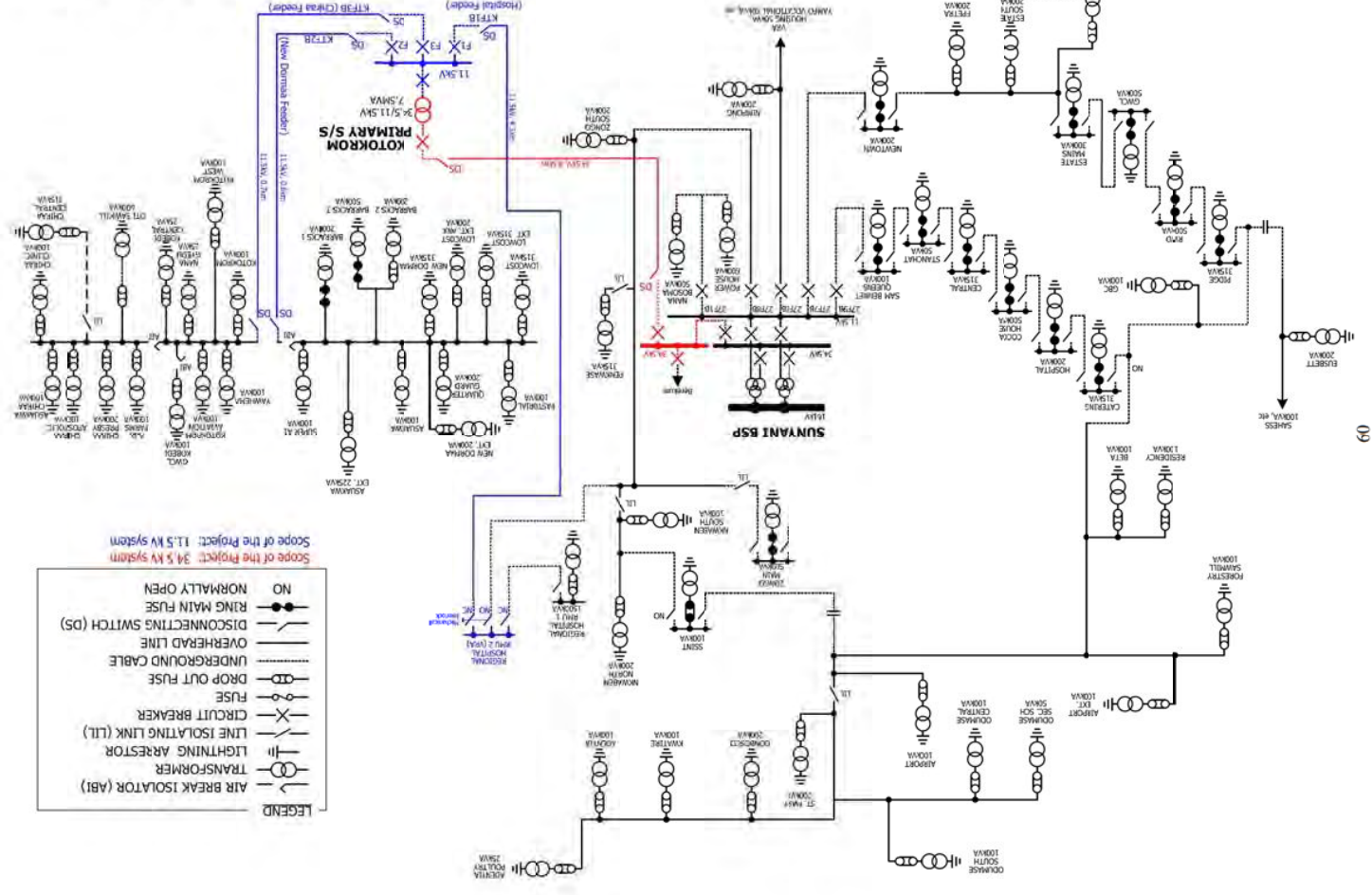
## DRAWINGS

### PART 2 Improvement of Sunyani Distribution System in Brong-Ahafo Region

#### 1. 34.5/11.5 kV Network Diagram



GE-S01: Sunyani 34.5/11.5kV Network Diagram



**LEGEND**

- AIR BREAK ISOLATOR (ABI)
- TRANSFORMER
- LIGHTNING ARRESTOR
- LINE ISOLATING LINK (LIL)
- CIRCUIT BREAKER
- FUSE
- DROP OUT FUSE
- UNDERGROUND CABLE
- OVERHEAD LINE
- DISCONNECTING SWITCH (DS)
- RING MAIN FUSE
- NORMALLY OPEN

Scope of the Project: 34.5 kV system  
 Scope of the Project: 11.5 kV system

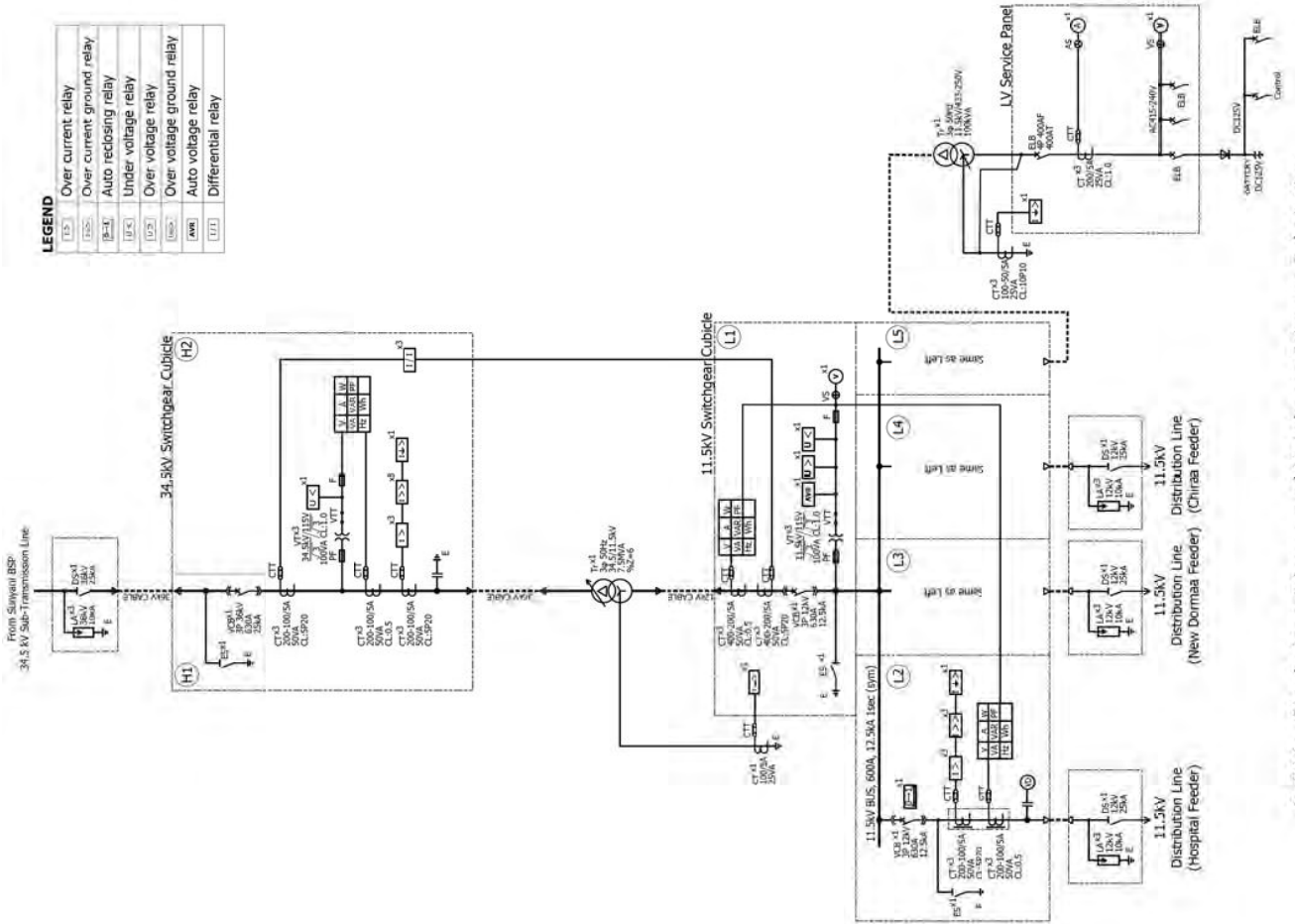
# DRAWINGS

## PART 2 Improvement of Sunyani Distribution System in Brong-Ahafo Region

### 2. Single Line Diagram

**LEGEND**

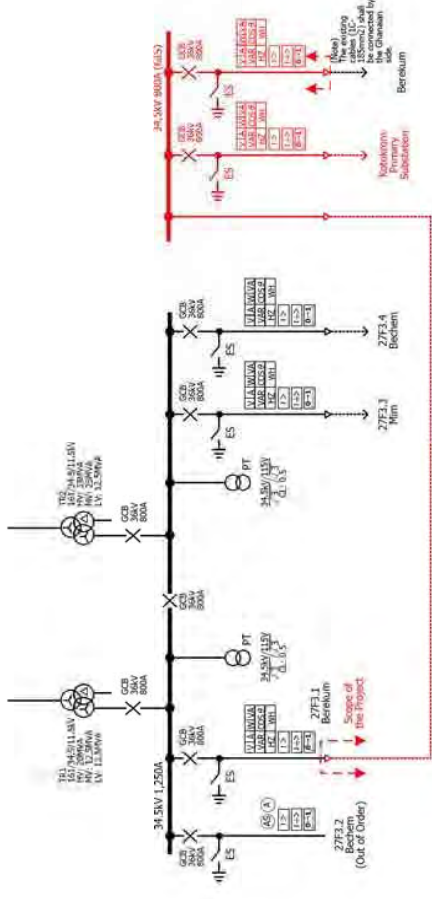
1.2.3	Over current relay
1.2.5	Over current ground relay
8-2.1	Auto reclosing relay
1.2.4	Under voltage relay
1.2.5	Over voltage relay
1.2.6	Over voltage ground relay
1.2.7	Auto voltage relay
1.2.8	Differential relay



E-S01: Single Line Diagram of Kotokrom Primary Substation

**LEGEND**

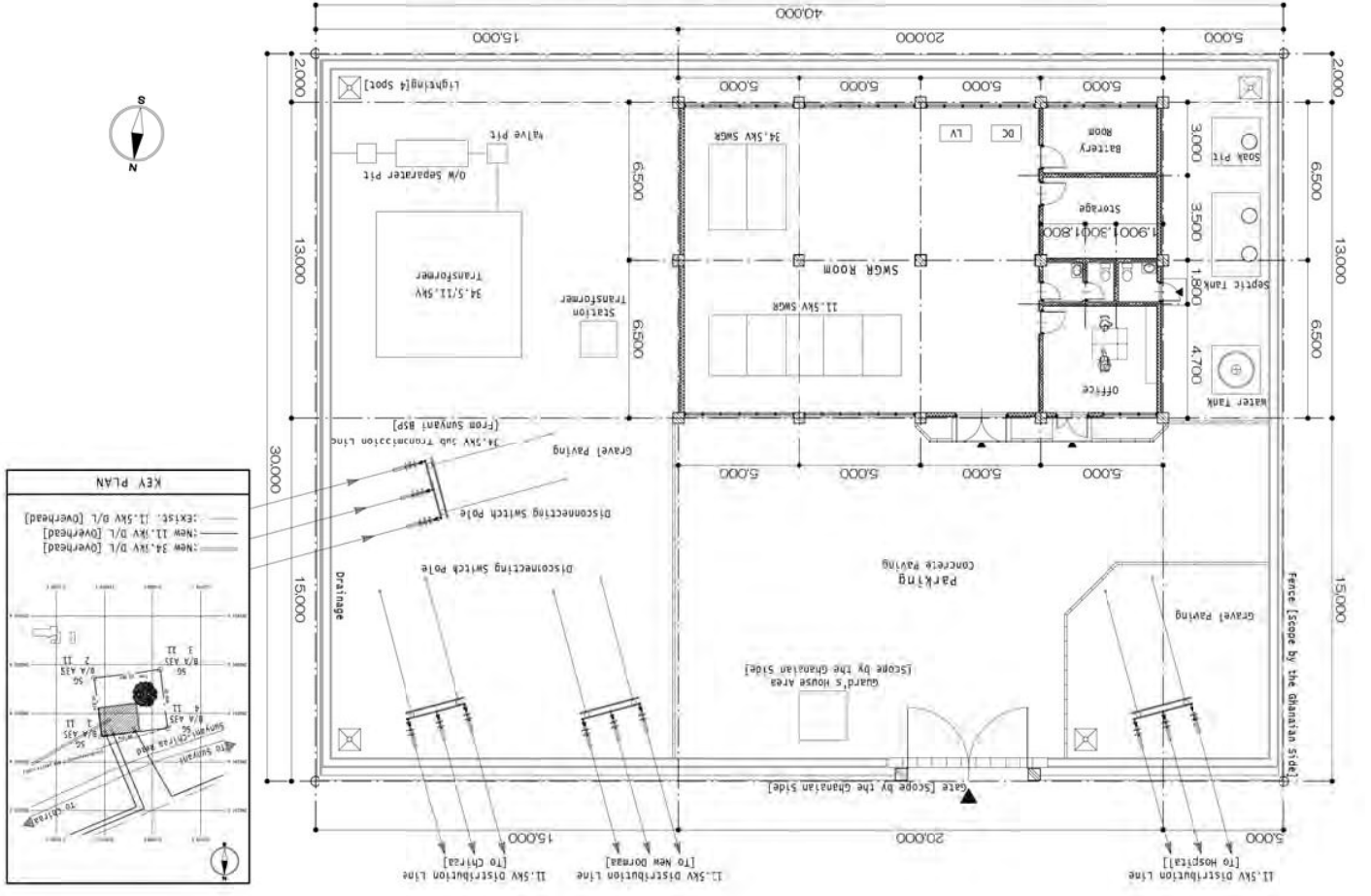
1.2.2	Over current relay
1.2.5	Over current ground relay
9-2.1	Auto reclosing relay



E-S02: Single Line Diagram of Sunyani BSP (Extension of 34.5 kV Feeder)



GENERAL LAYOUT OF KOTOKROM PRIMARY SUBSTATION 1/200



S9

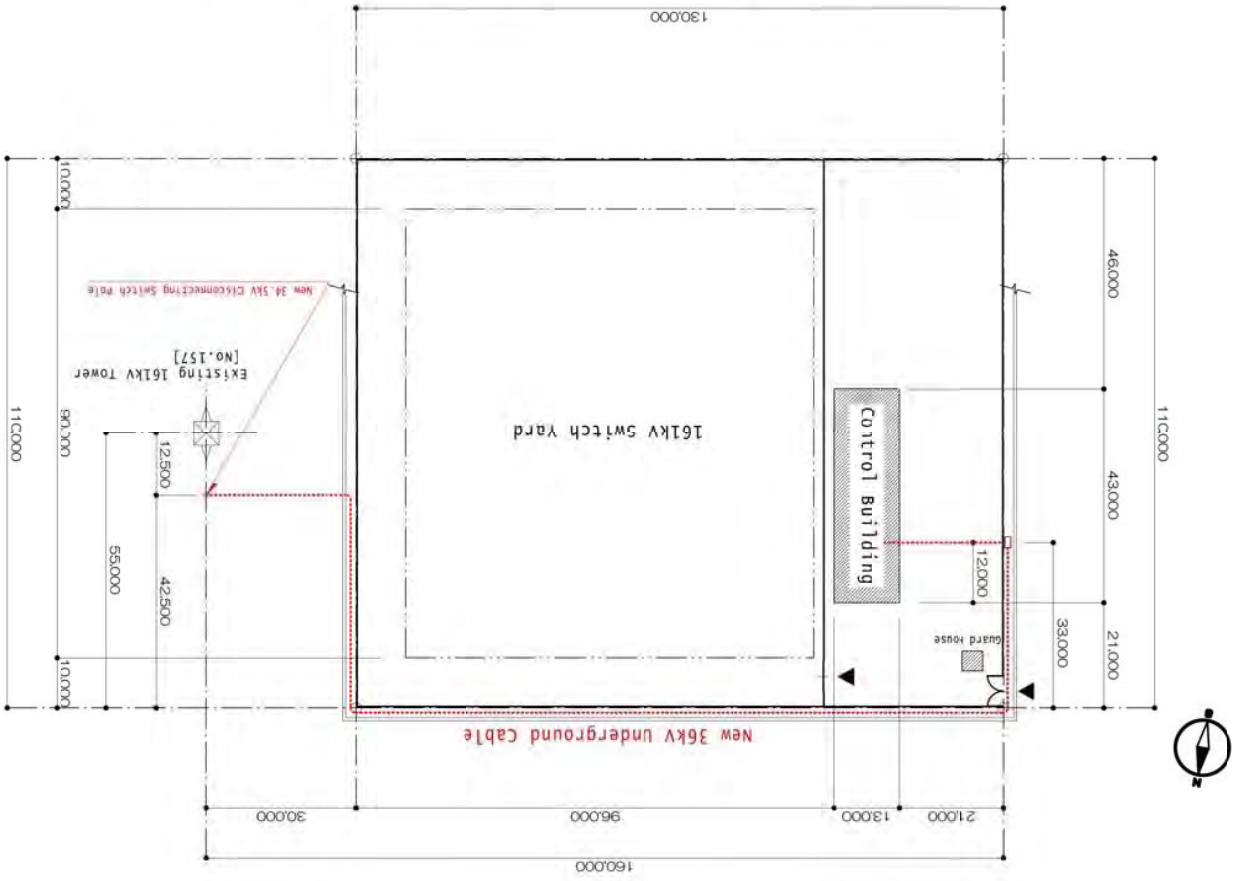
**DRAWINGS**

**PART 2 Improvement of Sunyani Distribution System in Brong-Ahafo Region**

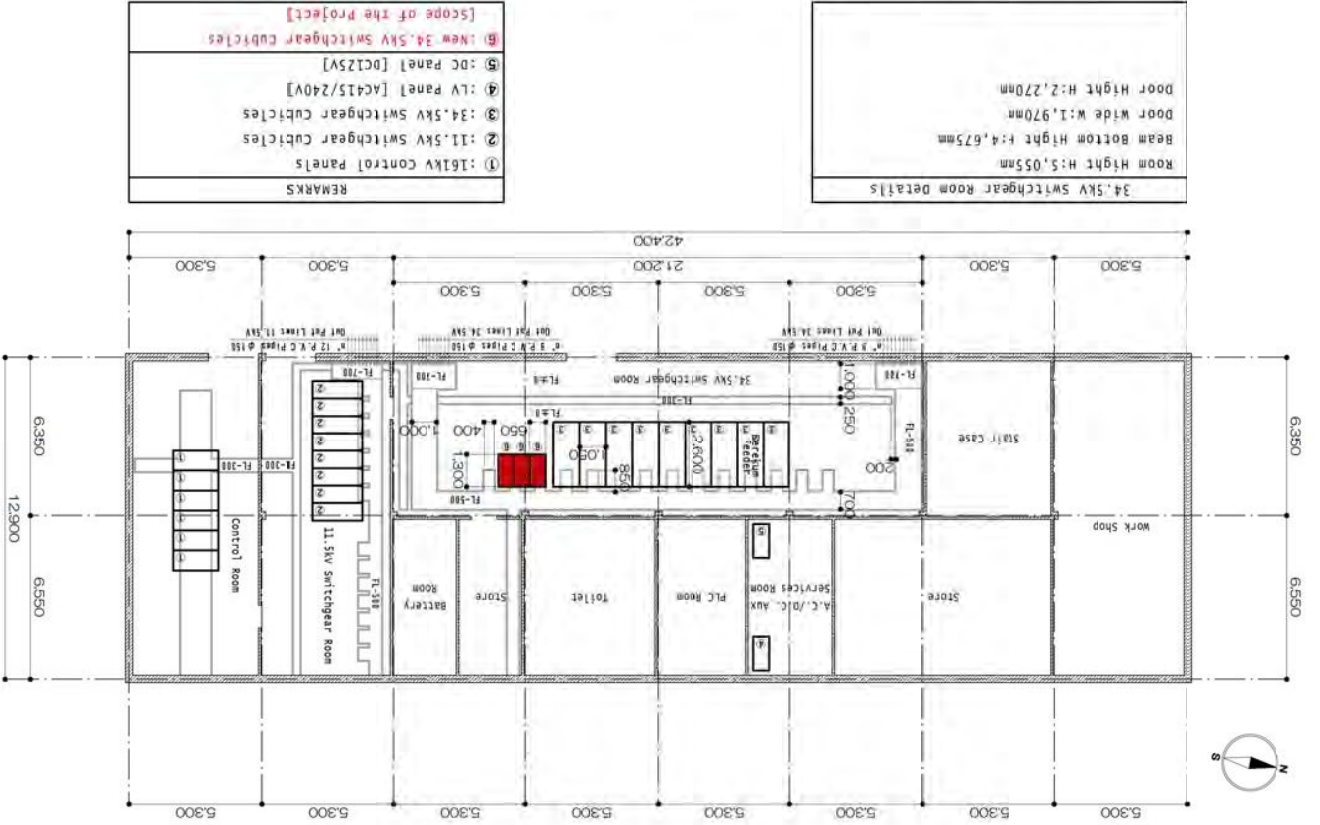
**3. General Layout**



CABLE ROUTE OF SUNYANI BULK SUPPLY POINT 1/1000



LAYOUT OF SUNYANI BULK SUPPLY POINT CONTROL BUILDING 1/200



REMARKS

- ①: 161kv control Panels
- ②: 11.5kv switchgear cubicles
- ③: 34.5kv switchgear cubicles
- ④: LV panel [AC415/240V]
- ⑤: DC panel [DC125V]
- ⑥: New 34.5kv switchgear cubicles

[scope of the project]

34.5KV SWITCHGEAR ROOM DETAILS

- Room Height H: 5.055m
- Beam Bottom Height F: 4.675m
- Door Wide W: 1.970m
- Door Height H: 2.270m

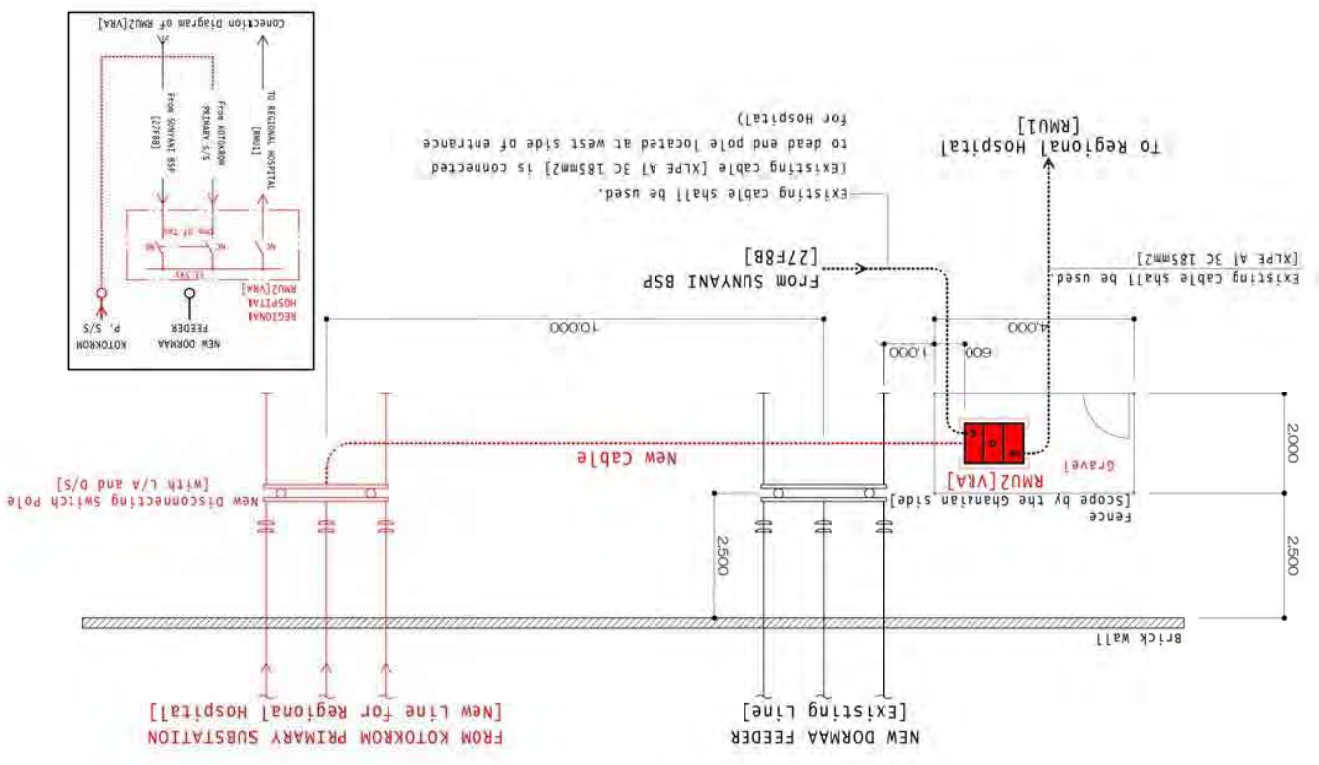


**DRAWINGS**

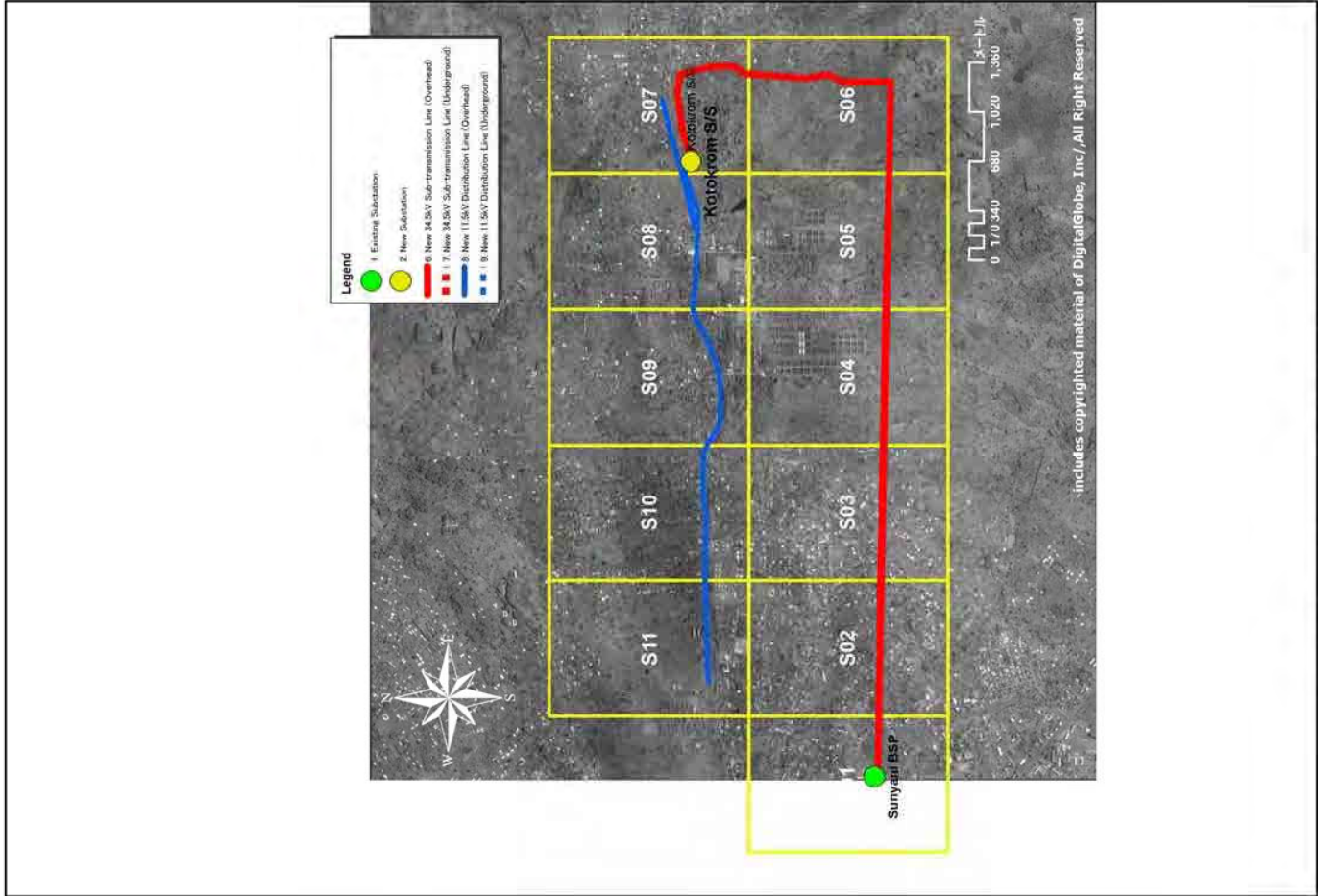
**PART 2 Improvement of Sunyani Distribution System  
in Brong-Ahafo Region**

**4. Route Map of Distribution System**

**LOCATION OF RMU2 [VRA] SUNYANI REGIONAL HOSPITAL**







Route Map of Sunyani Distribution System

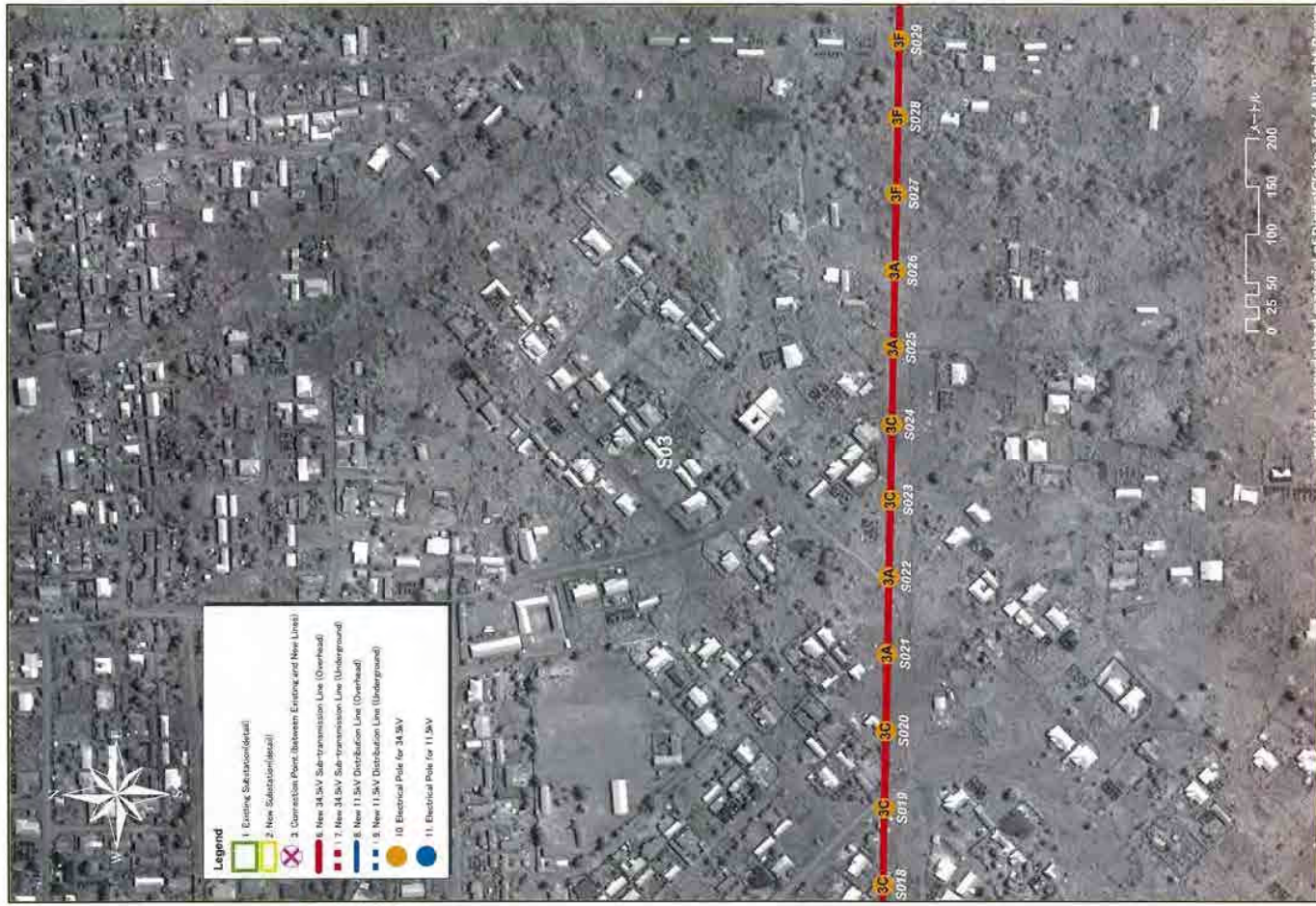


Route Map of Sunyani Distribution System



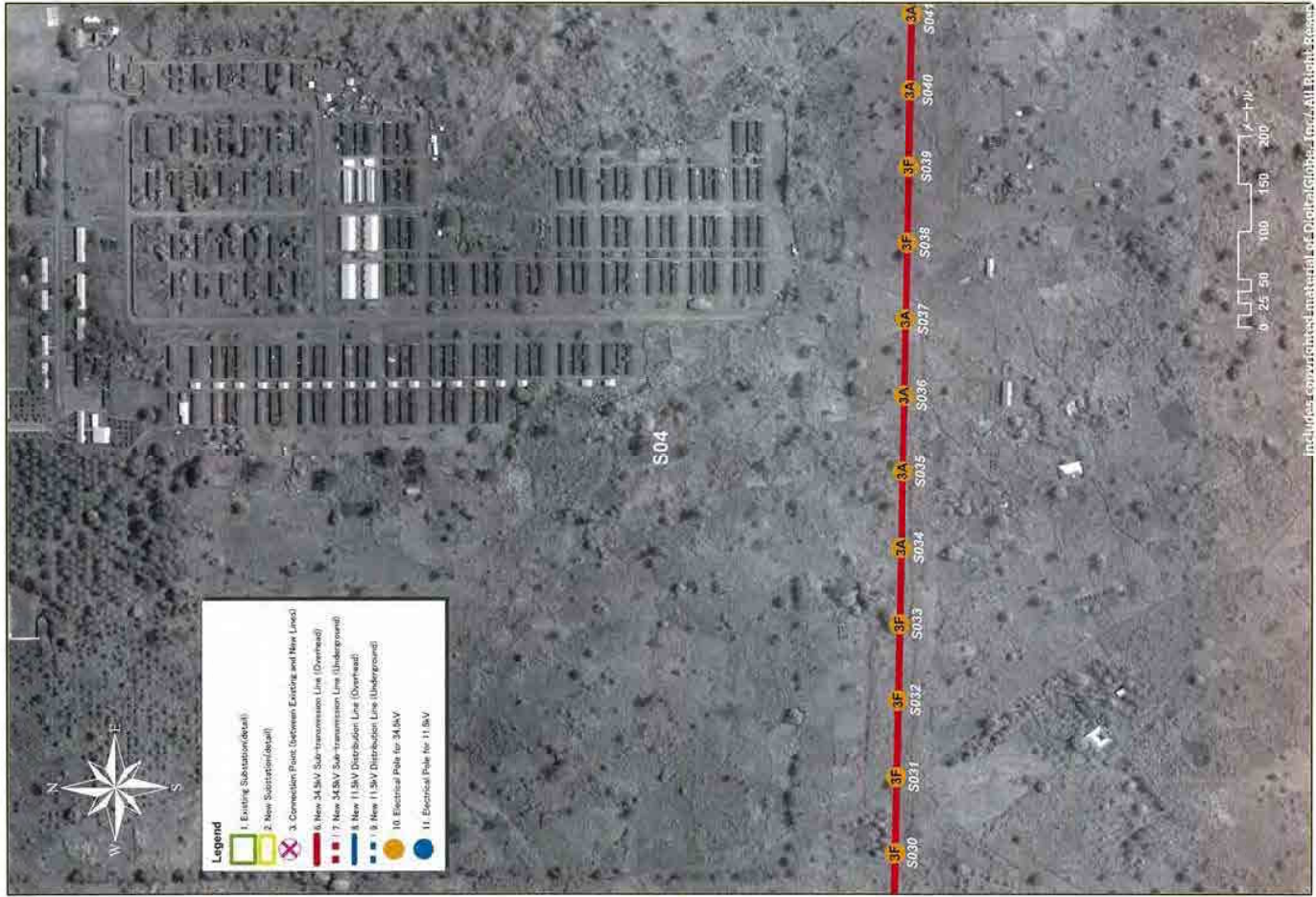


Route Map of Sunyani Distribution System



Route Map of Sunyani Distribution System



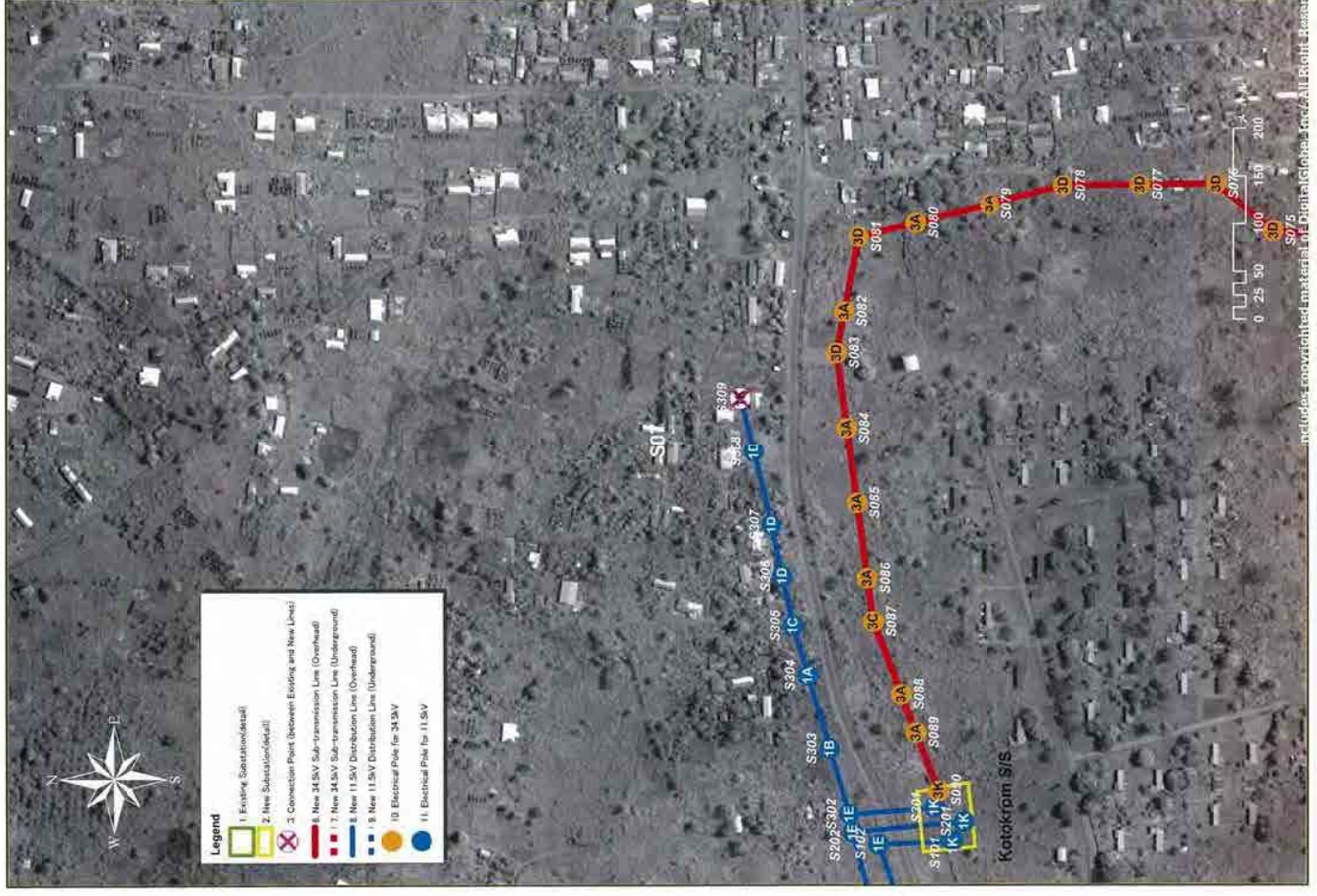


Route Map of Sunyani Distribution System

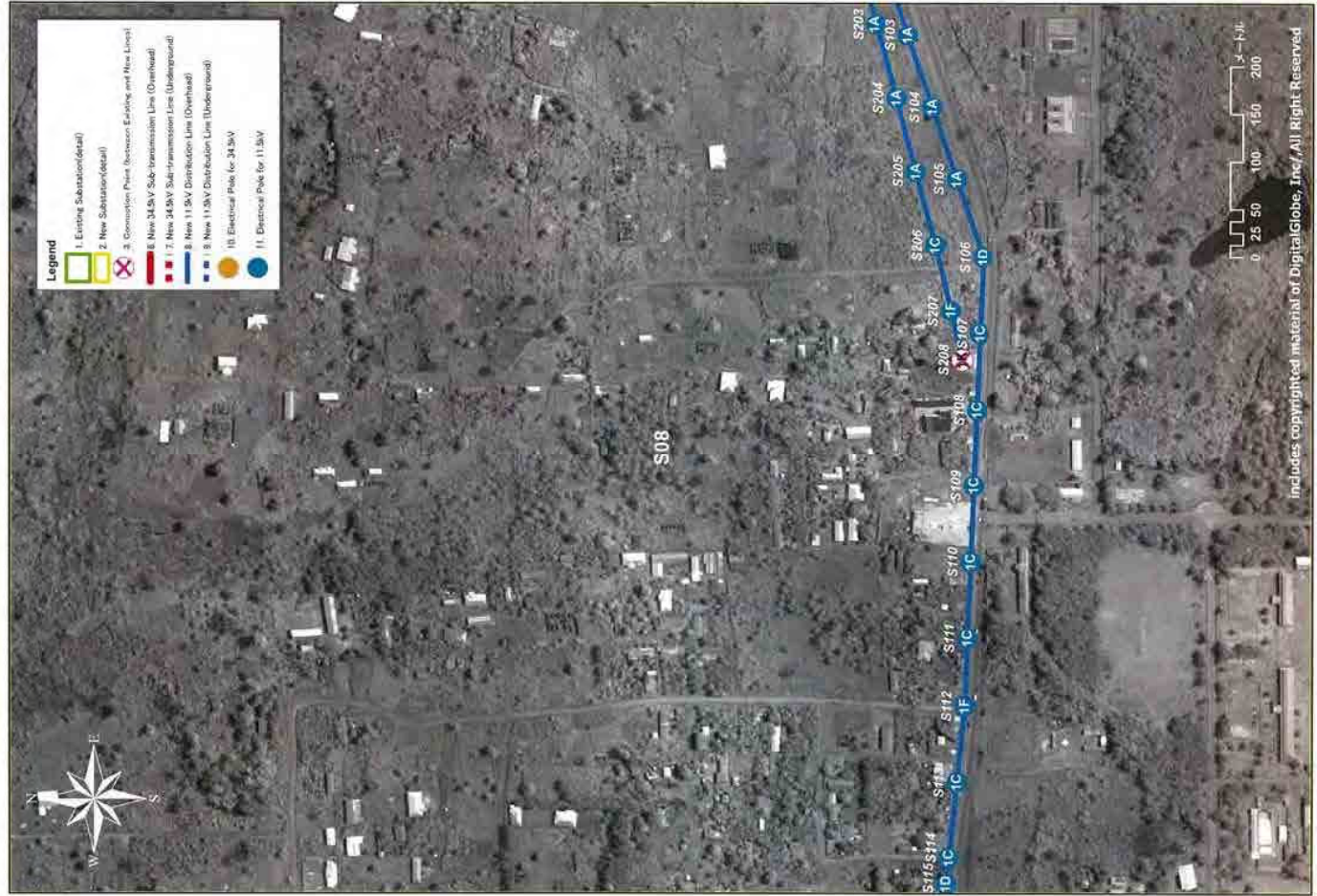


Route Map of Sunyani Distribution System



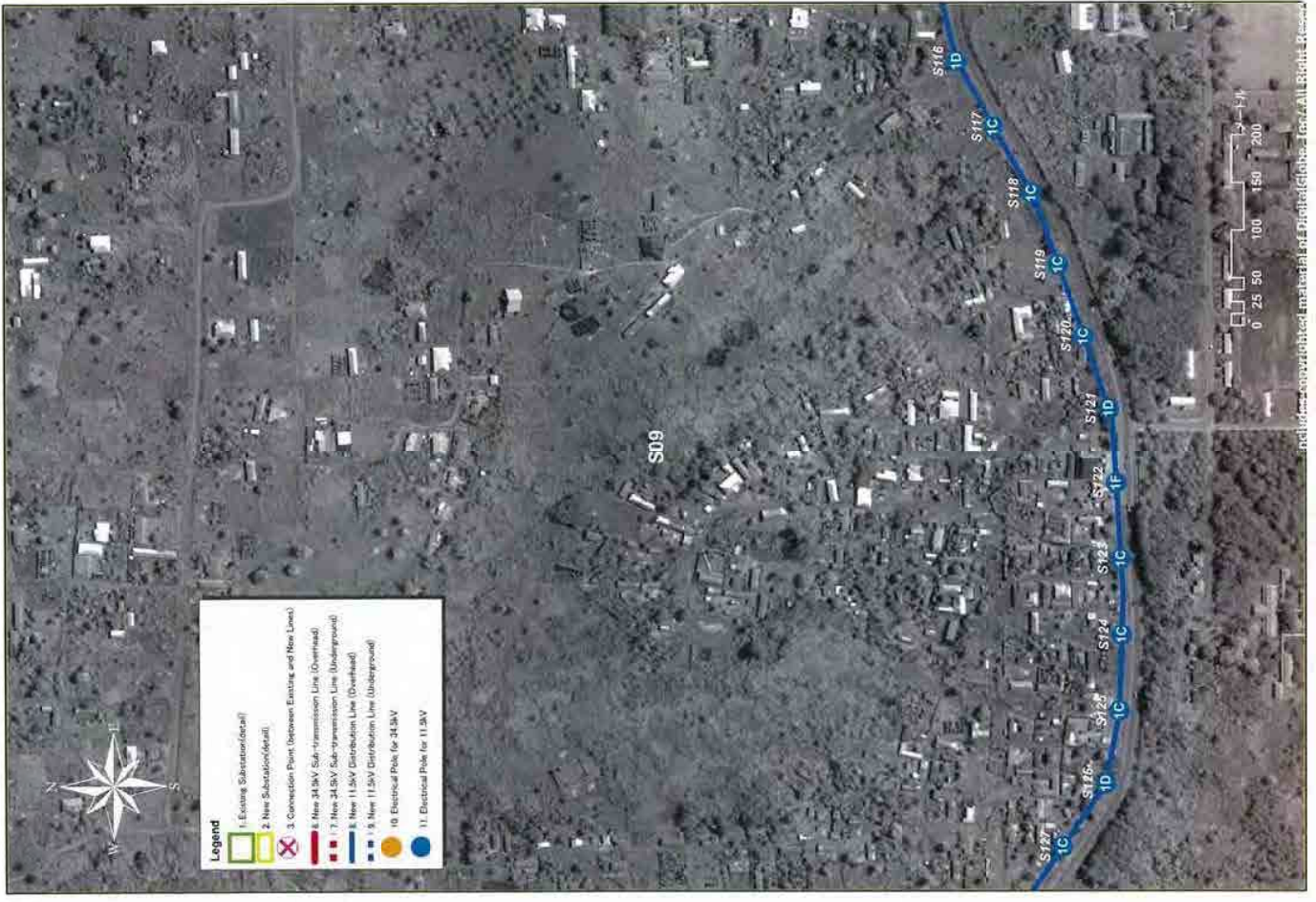






Route Map of Sunyani Distribution System

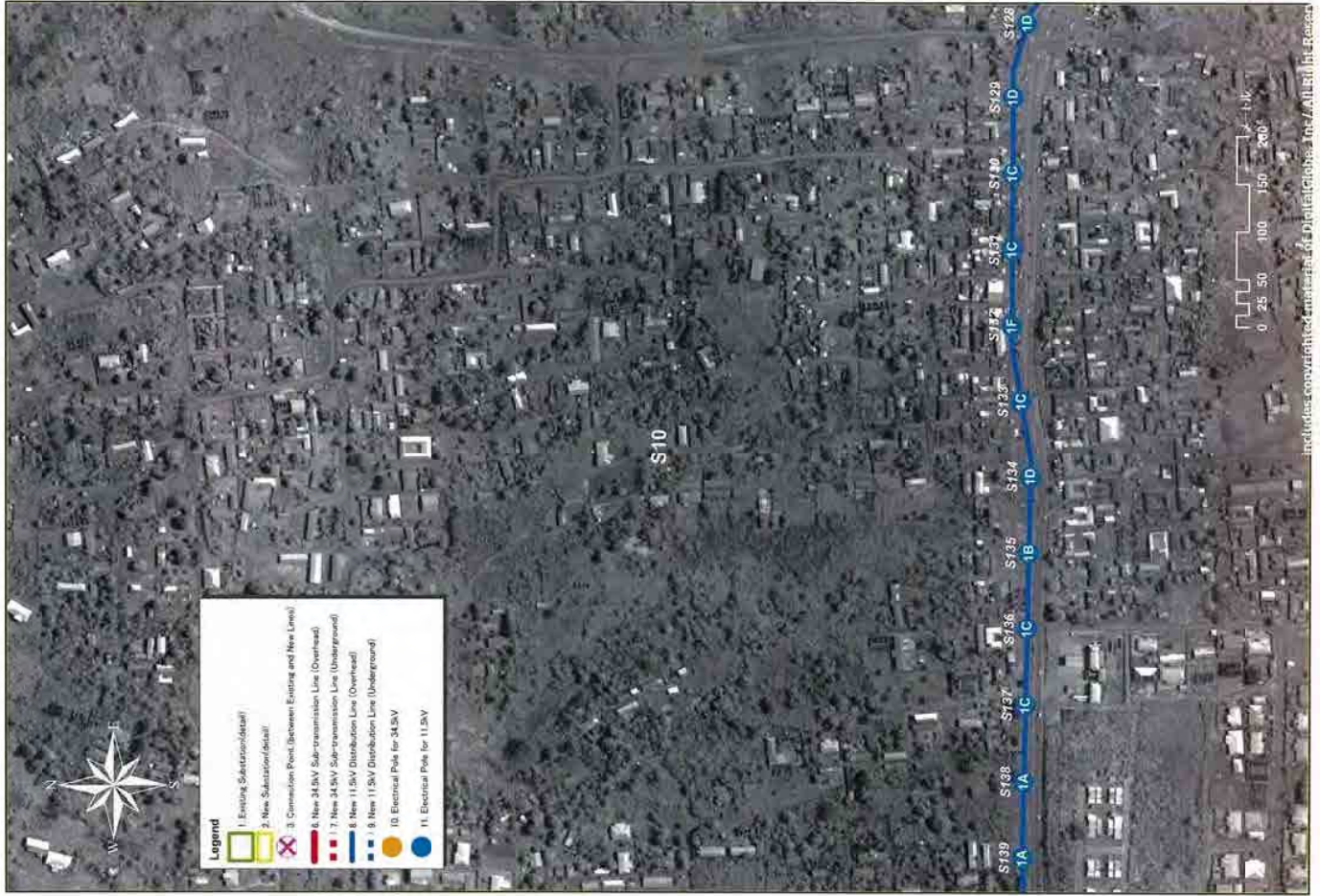
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Route Map of Sunyani Distribution System

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Route Map of Sunyani Distribution System

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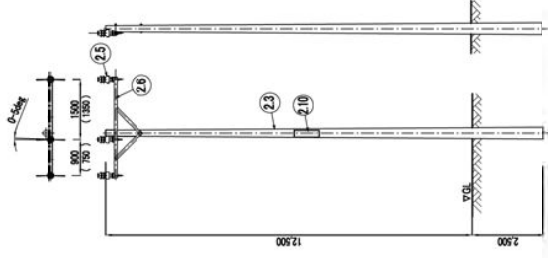


Route Map of Sunyani Distribution System

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# DRAWINGS

## PART 3 Pole Assembly Drawing for Distribution Line



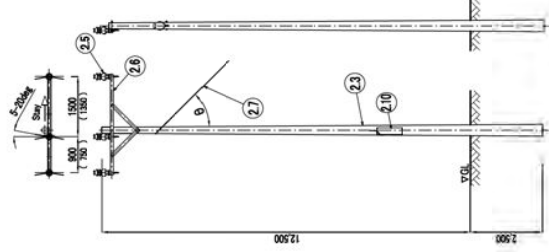
Values in ( ) are for 11.5kV

P/NO	DESCRIPTION	QTY
1.1	Distribution Transformer (DT)	0
1.2	Auto Recloser	0
1.3	Load Isolator	0
1.4	Circuit Switch with Fuse	0
1.5	Lightning Arrestor	0
1.6	Main Distribution Board(MDB)	0
2.1	Conductor (m)	0
2.2	Connector	0
2.3	Steel Pole (15m)	1
2.4	Strain Insulator Set	0
2.5	Pin Insulator set	3
2.6	Grossarm set	1
2.7	Stay Wire Set	0
2.8	Earth Wire Set	0
2.9	LV Cabling Materials	0
2.10	Plate set	1

Remarks : Pole Type "1A" is for 11.5kV and then type 3A is for 34.5kV.

Dwg.No.TPA-A

11.5/34.5kV 引渡し柱 (0度~5度) [型番 1A/3A]  
11.5/34.5kV Intermediate Pole (Line Angle 0-5deg.) [Type 1A/3A]



Values in ( ) are for 11.5kV

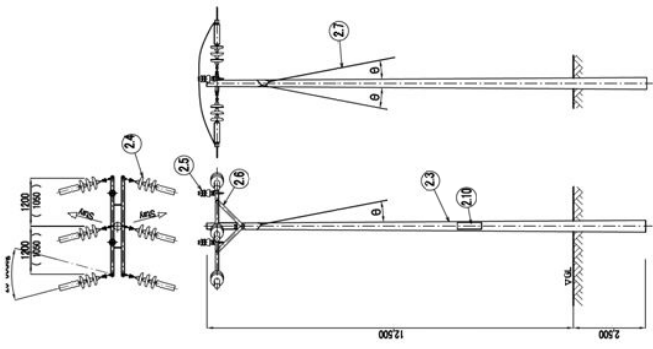
P/NO	DESCRIPTION	QTY
1.1	Distribution Transformer (DT)	0
1.2	Auto Recloser	0
1.3	Load Isolator	0
1.4	Circuit Switch with Fuse	0
1.5	Lightning Arrestor	0
1.6	Main Distribution Board(MDB)	0
2.1	Conductor (m)	0
2.2	Connector	0
2.3	Steel Pole (15m)	1
2.4	Strain Insulator Set	0
2.5	Pin Insulator set	3
2.6	Grossarm set	1
2.7	Stay Wire Set	1
2.8	Earth Wire Set	0
2.9	LV Cabling Materials	0
2.10	Plate set	1

Preferable Stay Angle : 30° ≤ B ≤ 45°

Dwg.No.TPA-B

11.5/34.5kV 軽荷役柱 (5度~20度) [型番 1B/3B]  
11.5/34.5kV Light Pole (Line Angle 5-20deg.) [Type 1B/3B]





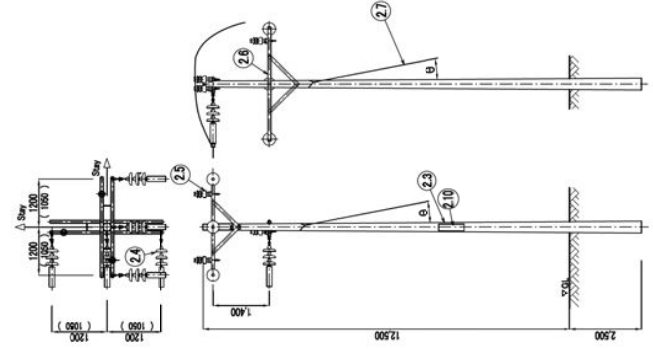
Values in ( ) are for 11.5kV

Dwg.No.TPA-C

11.5/34.5kV 中角支柱(20度~60度)型番 1C/3C  
11.5/34.5kV Medium Angle Pole (Line Angle 20-60deg.)Type 1C/3C

Preferable Stay Angle :  $30^\circ \leq \theta \leq 45^\circ$

P/NO	DESCRIPTION	QTY
1.1	Distribution Transformer (DT)	0
1.2	Auto Recloser	0
1.3	Load Isolator	0
1.4	Circuit Switch with Fuse	0
1.5	Lightning Arrester	0
1.6	Main Distribution Board(MDB)	0
2.1	Conductor (m)	0
2.2	Connector	0
2.3	Steel Pole (15m)	1
2.4	Stram Insulator Set	6
2.5	Pin Insulator set	2
2.6	Crossarm set	2
2.7	Stay Wire Set	2
2.8	Earth Wire Set	0
2.9	LV Cabling Materials	0
2.10	Plate set	1



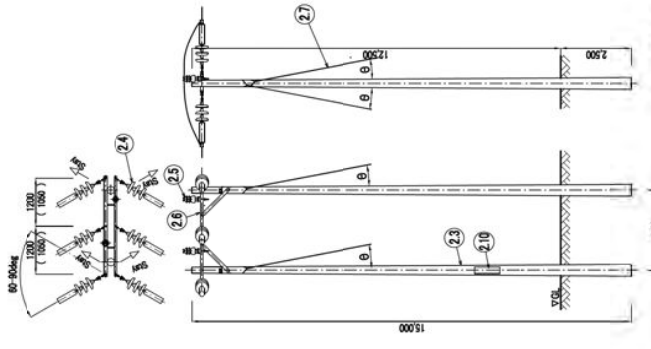
Values in ( ) are for 11.5kV

Dwg.No.TPA-E

11.5/34.5kV 直交柱(90度)型番 1E/3E  
11.5/34.5kV Cross Pole (Line Angle 90deg.)Type 1E/3E

Preferable Stay Angle :  $30^\circ \leq \theta \leq 45^\circ$

P/NO	DESCRIPTION	QTY
1.1	Distribution Transformer (DT)	0
1.2	Auto Recloser	0
1.3	Load Isolator	0
1.4	Circuit Switch with Fuse	0
1.5	Lightning Arrester	0
1.6	Main Distribution Board(MDB)	0
2.1	Conductor (m)	0
2.2	Connector	0
2.3	Steel Pole (15m)	1
2.4	Stram Insulator Set	6
2.5	Pin Insulator set	3
2.6	Crossarm set	4
2.7	Stay Wire Set	2
2.8	Earth Wire Set	0
2.9	LV Cabling Materials	0
2.10	Plate set	1



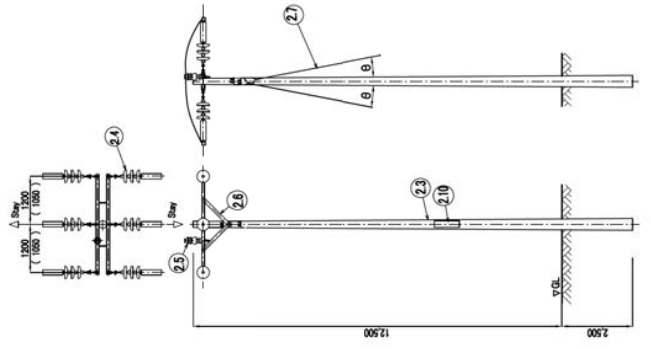
Values in ( ) are for 11.5kV

Dwg.No.TPA-D

11.5/34.5kV 強角支柱(60度~90度未満)型番 1D/3D  
11.5/34.5kV Heavy Angle Pole (Line Angle 60-90deg.)Type 1D/3D

Preferable Stay Angle :  $30^\circ \leq \theta \leq 45^\circ$

P/NO	DESCRIPTION	QTY
1.1	Distribution Transformer (DT)	0
1.2	Auto Recloser	0
1.3	Load Isolator	0
1.4	Circuit Switch with Fuse	0
1.5	Lightning Arrester	0
1.6	Main Distribution Board(MDB)	0
2.1	Conductor (m)	0
2.2	Connector	0
2.3	Steel Pole (15m)	2
2.4	Stram Insulator Set	6
2.5	Pin Insulator set	2
2.6	Crossarm set	2
2.7	Stay Wire Set	4
2.8	Earth Wire Set	0
2.9	LV Cabling Materials	0
2.10	Plate set	1



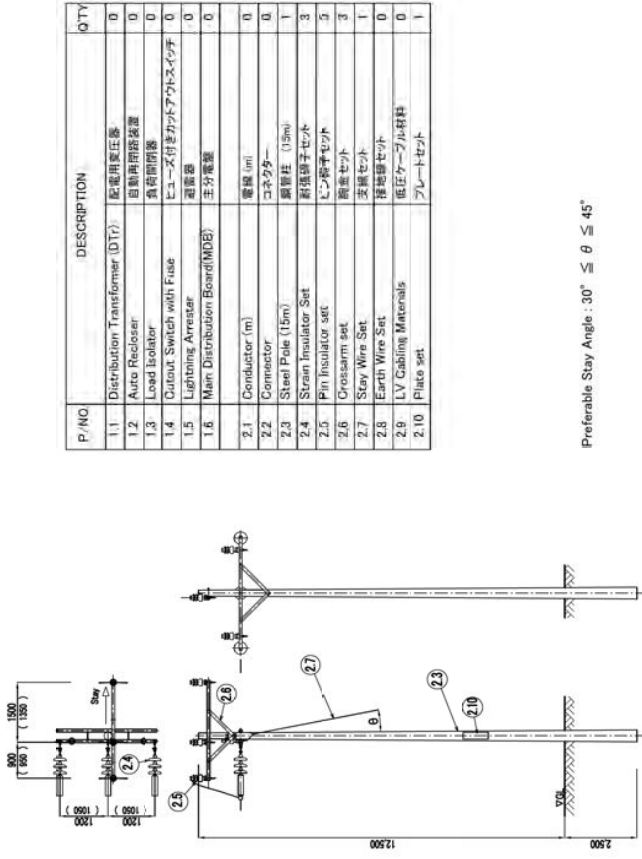
Values in ( ) are for 11.5kV

Dwg.No.TPA-F

11.5/34.5kV 面引留め柱型番 1F/3F  
11.5/34.5kV Section Pole Type 1F/3F

Preferable Stay Angle :  $30^\circ \leq \theta \leq 45^\circ$

P/NO	DESCRIPTION	QTY
1.1	Distribution Transformer (DT)	0
1.2	Auto Recloser	0
1.3	Load Isolator	0
1.4	Circuit Switch with Fuse	0
1.5	Lightning Arrester	0
1.6	Main Distribution Board(MDB)	0
2.1	Conductor (m)	0
2.2	Connector	0
2.3	Steel Pole (15m)	1
2.4	Stram Insulator Set	6
2.5	Pin Insulator set	1
2.6	Crossarm set	2
2.7	Stay Wire Set	2
2.8	Earth Wire Set	0
2.9	LV Cabling Materials	0
2.10	Plate set	1



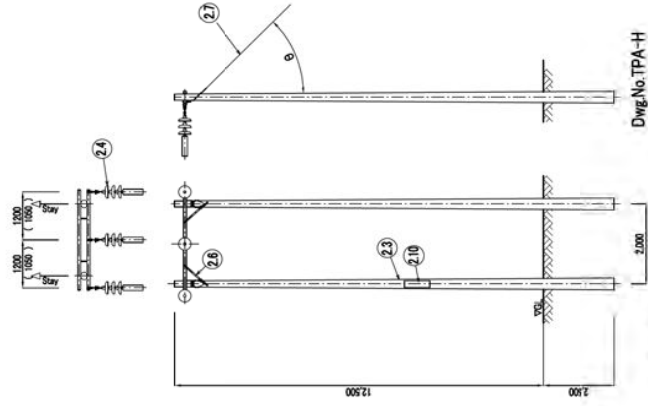
Dwg.No.TPA-G

Values in ( ) are for 11.5kV

Preferable Stay Angle :  $30^\circ \leq \theta \leq 45^\circ$

11.5/34.5kV 分岐柱[型番 1G/3G]  
11.5/34.5kV T-off Pole[Type 1G/3G]

P/NO	DESCRIPTION	QTY
1.1	Distribution Transformer (DT)	0
1.2	Auto Recloser	0
1.3	Load Isolator	0
1.4	Outcut Switch with Fuse	0
1.5	Lightning Arrester	0
1.6	Main Distribution Board(MDB)	0
2.1	Conductor (m)	0
2.2	Connector	0
2.3	Steel Pole (15m)	1
2.4	Stream Insulator Set	3
2.5	Pin Insulator set	5
2.6	Crossarm set	3
2.7	Stay Wire Set	1
2.8	Earth Wire Set	0
2.9	LV Cabling Materials	0
2.10	Plate set	1



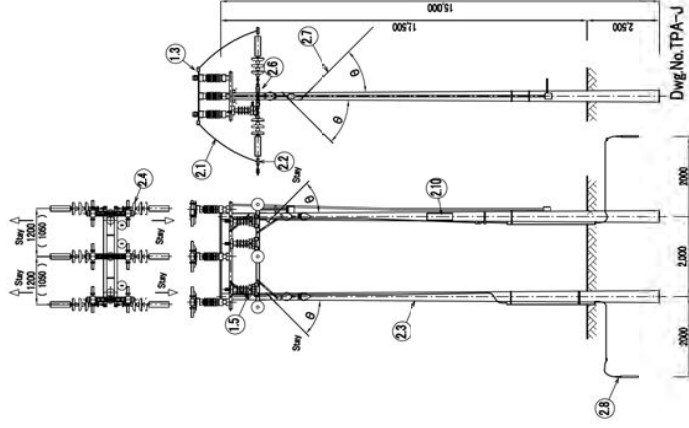
Dwg.No.TPA-H

Values in ( ) are for 11.5kV

Preferable Stay Angle :  $30^\circ \leq \theta \leq 45^\circ$

11.5/34.5kV 終端柱[型番 1H/3H]  
11.5/34.5kV Terminal Pole[Type 1H/3H]

P/NO	DESCRIPTION	QTY
1.1	Distribution Transformer (DT)	0
1.2	Auto Recloser	0
1.3	Load Isolator	0
1.4	Outcut Switch with Fuse	0
1.5	Lightning Arrester	0
1.6	Main Distribution Board(MDB)	0
2.1	Conductor (m)	0
2.2	Connector	0
2.3	Steel Pole (15m)	2
2.4	Stream Insulator Set	3
2.5	Pin Insulator set	0
2.6	Crossarm set	2
2.7	Stay Wire Set	2
2.8	Earth Wire Set	0
2.9	LV Cabling Materials	0
2.10	Plate set	1



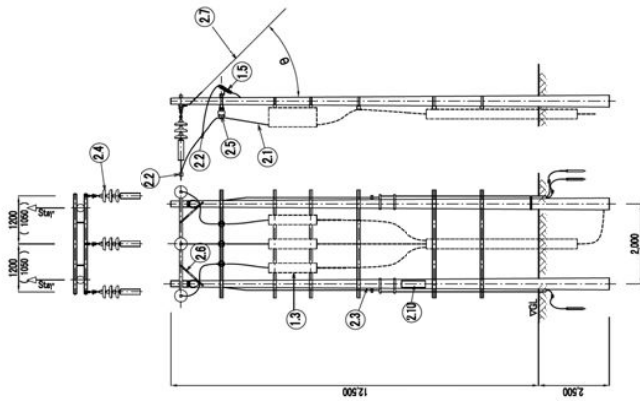
Dwg.No.TPA-J

Values in ( ) are for 11.5kV

11.5/34.5kV 断路器柱(水平型)[型番 1J/3J]  
11.5/34.5kV Disconnecting Switch Pole (Horizontal Type)[Type 1J/3J]

P/NO	DESCRIPTION	QTY
1.1	Distribution Transformer (DT)	0
1.2	Auto Recloser	0
1.3	Disconnecting Switch with Operating Device	1
1.4	Outcut Switch with Fuse	0
1.5	Lightning Arrester	1
1.6	Main Distribution Board(MDB)	0
2.1	Conductor (m)	30
2.2	Connector	3
2.3	Steel Pole (15m)	2
2.4	Stream Insulator Set	6
2.5	Pin Insulator set	0
2.6	Crossarm set	2
2.7	Stay Wire Set	4
2.8	Earth Wire Set	3
2.9	LV Cabling Materials	0
2.10	Plate set	1



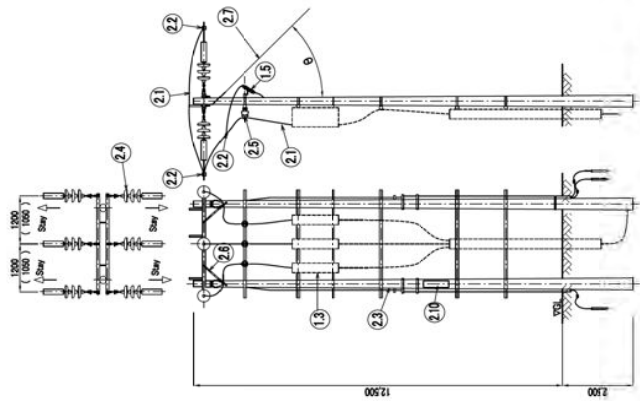


Dwg.No.TPA-K

11.5/34.5kV 断路器(垂直引留型) [型番 1K/3K]  
11.5/34.5kV Disconnecting Switch Pole(Vertical Dead End Type) [Type 1K/3K]

Values in ( ) are for 11.5kV

Preferable Stay Angle :  $30^\circ \leq \theta \leq 45^\circ$



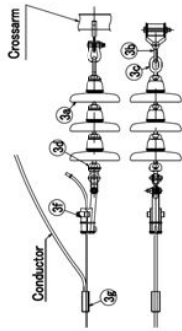
Dwg.No.TPA-M

11.5/34.5kV 断路器(垂直引留型) [型番 1M/3M]  
11.5/34.5kV Disconnecting Switch Pole(Vertical Section Type) [Type 1M/3M]

Values in ( ) are for 11.5kV

Preferable Stay Angle :  $30^\circ \leq \theta \leq 45^\circ$

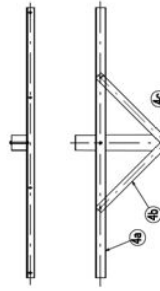
P/NO	DESCRIPTION	QTY
1.1	Distribution Transformer (DT)	0
1.2	Auto Recloser	0
1.3	Disconnecting Switch	1
1.4	Circuit Switch with Fuse	0
1.5	Lightning Arrester	1
1.6	Main Distribution Board(MDB)	0
2.1	Conductor (m)	30
2.2	Connector	6
2.3	Steel Pole (15m)	2
2.4	Strain Insulator Set	3
2.5	Pin Insulator set	3
2.6	Crossarm set	2
2.7	Stay Wire Set	2
2.8	Earth Wire Set	3
2.9	LV Cabling Materials	0
2.10	Plate set	1



Strain Insulator Set

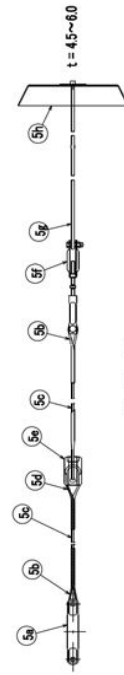
No.	Description	QTY per set
3a	Disc Insulator	3(2)
3b	Anchor Shackle	1
3c	Ball Eye	1
3d	Socket Eye	1
3f	Dead End Clamp	1
3g	Compression Connector	1

Values in ( ) are for 11.5kV



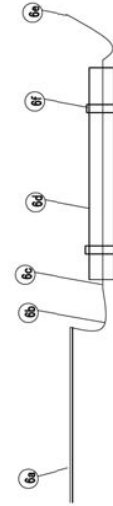
Crossarm Set

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



Stay Wire Set

No.	Description	QTY per set	Description	QTY per set
5a	Stay Band	1	34.5kV(11.5kV)Stay Insulator	1
5b	Dead End Grip for Thimble	2	Turnbuckle	1
5c	Stay Wire	1	Stay Rod	1
5d	Dead End Grip for Insulator	2	Stay Anchor	1



Earthing Wire Set

No.	Description	QTY per set	Description	QTY per set
6a	Grounding Rod	2	Terminal Lug	1
6b	Earthing Terminal	1	Band	1
6c	IV Wire (35sqmm)	12m		
6d	PVC (1inch)	23m		

Dwg.No.TPA-Z

構成部品組付図  
Material Composition of Assembly Parts