KABARNET
132/33KV SUBSTATION
SITE PLAN AND GENERAL LAYOUTS

COVER

1

REFERENCE DRAWINGS

DRAWING NO.:	TITLE:

☐ APPROVED ☐ APPROVED WITH COMMENTS ☐ NOT APPROVED ☐ FOR INFORMATION

DATE:..... SIGNATURE/STAMP:..... PROJECT CONSULTANT

KETRACO Kenya Electricity Transmission Company Limited

KENYA ELECTRICITY TRANSMISSION COMPANY LTD

COLENCO Consulting Limited

COLENCO CONSULTING LIMITED

PROJECT:

KENYA TRANSMISSION NETWORK IMPROVEMENT PROJECT (KTRNIP).

PROJECT DRAWING NO.

	NAME:	DATE:
PREPARED:	NIL	
DRAWN:	T.J	15/05/2025
CHECKED:	V.JOSHI	15/05/2025
APPROVED:	S.DESHMUKH	15/05/2025

PROJECT NO:

KABARNET 132/33kV SUBSTATION

TITLE:

COVER

REVISIONS

NO.	NAME DATE

SCALE: 1:600 DWG NO. REV.:

DESIGNATION OF	TITLE	REVISION			
1	COVERING SHEET	0	A		
2	INDEX	0	A		
3	GENERAL NOTES &LEGEND 132kV	0	A		
4	GENERAL NOTES &LEGEND 33kV	0	A		
5	GENERAL LAYOUT (DEMOLITION)	0	A		
6	GENERAL LAYOUT (OVERALL)	0	A		
7	GENERAL LAYOUT (CURRENT SCOPE)	0	A		
8	SECTION DRAWINGS A&B	0	A		
9	SECTION DRAWING C&D	0	A		

LIST OF DRAWINGS

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COLENCO
innovation for sustainable future

COLENCO CONSULTING LIMITED

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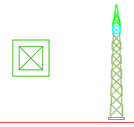
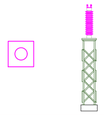
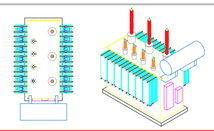
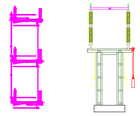
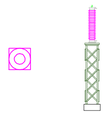
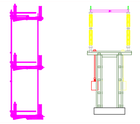
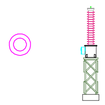
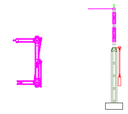
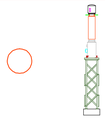
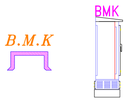
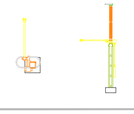
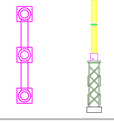
LEGEND

 GANTRY TOWER	 POST INSULATOR	 POWER TRANSFORMER 132/33kV	CABLE TRENCH
 DISCONNECTING SWITCH MOTOR OPERATED WITH TWO EARTH SWITCH MOTOR OPERATED	 LIGHTNING ARRESTER	STRING INSULATOR	ROAD
 DISCONNECTING SWITCH MOTOR OPERATED WITH ONE EARTH SWITCH MOTOR OPERATED	 CAPACITIVE VOLTAGE TRANSFORMER	EARTH MAT	STRANDED CONDUCTOR
 DISCONNECTING SWITCH MOTOR OPERATED	 CURRENT TRANSFORMER	 BAY MARSHALLING KIOSK	SHIELD WIRE
 EARTH SWITCH MOTOR OPERATED	 CIRCUIT BREAKER MOTOR OPERATED		CHAIN–LINK FENCE

MINIMUM AIR CLEARANCES

MINIMUM AIR CLEARANCES	132kV
RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE	650 KV
RATED SWITCHING IMPULSE WITHSTAND VOLTAGE (PHASE–EARTH)	–
RATED SWITCHING IMPULSE WITHSTAND VOLTAGE (PHASE–PHASE)	–
BASIC VALUE (NON–FLASHOVER DISTANCE, INCLUDING SAFETY–MARGIN)	1.52m +10%
MINIMUM CLEARANCE BETWEEN LOWEST LIVE PART AND GROUND (TOTAL SAFETY ZONE)	3.77m
CLEARANCE BETWEEN GROUND AND THE INSULATOR'S BASE	2.5m
VERTICAL CLEARANCE WORKING ZONE	3m
HORIZONTAL CLEARANCE WORKING ZONE	3.27m
CLEARANCE OF CONDUCTORS ABOVE THE MAIN ROADS	8.5m
PHASE SPACING OF RIGID BUSBAR (CENTER LINE TO CENTER LINE)	2.5m
PHASE SPACING OF OVERSPAN (CENTER LINE TO CENTER LINE)	3.5m
PHASE SPACING OF FLEXIBLE CONDUCTOR BETWEEN EQUIPMENT (CENTER LINE TO CENTER LINE)	3.5m
POWER FREQUENCY WITHSTAND VOLTAGE	275kV
VERTICAL CLEARANCE BETWEEN LIVE CONDUCTOR AND SHIELD	3m

ABBREVIATION

ABBR.	EQUIPMENT
CB	CIRCUIT BREAKER
CT	CURRENT TRANSFORMER
CVT	CAPACITIVE VOLTAGE TRANSFORMER
DS	DISCONNECTING SWITCH
DSE	DISCONNECTING SWITCH WITH EARTHING SWITCH
EM	EARTH MAT
ES	EARTH SWITCH
GA	GANTRY TOWER
LA	LIGHTNING ARRESTER
BMK	BAY MARSHALLING KIOSK
PI	POST INSULATOR
SC	SURGE COUNTER
SI	STRING INSULATOR
TW	TOWER

NOTE:

1– ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

2– 132kV SWITCHYARD LAYOUT PLAN & SECTION ARE TYPICAL REPRESENTATION & PRELIMINARY.

3– ALL CLEARANCES ARE AS PER IEC GUIDELINES.

4– LOCATION OF MARSHALLING BOX SHOWN IN DRAWING ARE TENTATIVE AND SHALL BE SUITABLY LOCATED CONSIDERING ACTUAL SITE CONDITION.

5– ALL THE EQUIPMENT & BUSES IN THE SOW WILL BE PROTECTED FROM LIGHTNING STRIKE BY MEANS OF SHIELD WIRE.

6– DISCONNECTOR SWITCH WILL HAVE MECHANICAL AND ELECTRICAL INTERLOCK WITH THE RELEVANT EARTH SWITCH.

– 7ELECTRICAL INTERLOCK WILL BE PROVIDED BETWEEN DISCONNECTORS & CIRCUIT BREAKER SUCH THAT DISCONNECTOR WILL BE OPEN AND CLOSED WHEN RESPECTIVE CIRCUIT BREAKER IS IN OFF POSITION.

8– THIS IS CONCEPTUAL DRAWING FOR TENDER PURPOSE. HOWEVER IT IS MANDATORY TO FOLLOW THE REQUIREMENT OF KETRACO STANDARD.

9– ALL CABLE TRENCHES' SIZES AND ROUTES ARE TENTATIVE AND SUBJECTED TO CABLE TRENCH LAYOUT & DETAIL DOCUMENT AND CLIENT/ CONSULTANT'S APPROVAL.

10– CONTRACTOR SHALL VISIT THE SITE AND REQUIRED MODIFICATIONS/ DEMOLITIONS ARE IN THE CONTRACTOR'S RESPONSIBILITY.

11– CONTRACTOR SHALL VISIT THE SITE TO ENSURE THAT SUFFICIENT SPACE IS AVAILABLE FOR EXISTING CABLE TRENCHES TO IMPLEMENT NEW CABLES

12– ALL CLEARANCES WILL BE FINALIZED AFTER APPROVAL OF INSULATION COORDINATION DOCUMENT IN EPC DETAIL DESIGN STAGE.

13– CONSIDERING THE SIGNIFICANT LEVEL DIFFERENCE BETWEEN THE EDGE/ FENCE TO BE DEMOLISHED AND THE COVERING THE NEW SCOPE, THE CONTRACTOR SHALL SELF–APPRAISE ON THIS ASPECT WHICH MAY INFLUENCE DESIGN DECISION ON BUSBAR EXTENSION, EARTHWORKS AND DRAINAGE WORKS.

14– THE CONTRACTOR SHOULD STUDY FOUNDATION DRAWINGS/ SITE CONDITION CAREFULLY BEFORE FIRMING UP ON THE FOUNDATION DESIGN CONSIDERING THE 200mm. THICK CONCRETE RAFT FOUNDATION OVER THE ENTIRE SUBSTATION SWITCHYARD.

15– WHEREVER THE CABLE TRENCH CROSSES THE ROAD, AN UNDER ROAD CONCRETE CABLE DUCT SHALL BE CONSIDERED IN GENERAL LAYOUT, TOGHETHER WITH PROVIDING THE ELABORATE DESIGN DURING EPC DETAIL DESIGN STAGE.

16– THE LIGHTNING PROTECTION IS INDICATIVE ONLY AND THE CONTRACTOR SHALL PROVIDE CALCULATIONS.

17– THE LIGHTNING AND POWER FREQUENCY WITHSTAND VOLTAGE WILL BE GUIDED BY AN INSULATION COORDINATION STUDY IN ACCORDANCE TO IEC.

GENERAL NOTES & LEGENDS OF 132KV EQUIPMENT

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APPROVED:	S.DESHMUKH	15/05/2025

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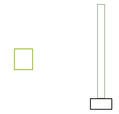
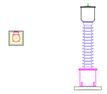
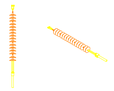
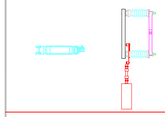
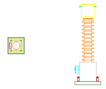
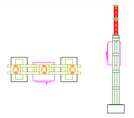
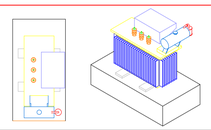
TITLE: GENERAL NOTES & LEGENDS OF 132KV EQUIPMENT

REVISIONS

NO.	NAME	DATE

SCALE: 1:600 DWG NO. REV.:

LEGEND

 GANTRY TOWER	 VOLTAGE TRANSFORMER	 STRING INSULATOR	ROAD
 DISCONNECTING SWITCH MOTOR OPERATED WITH ONE EARTH SWITCH MOTOR OPERATED	 CURRENT TRANSFORMER	BAY MARSHALLING KIOSK	STRANDED CONDUCTOR
DISCONNECTING SWITCH MOTOR OPERATED	 CIRCUIT BREAKER MOTOR OPERATED	CABLE TRENCH	SHIELD WIRE
POST INSULATOR	CUTOFF FUSE		CHAIN–LINK FENCE
LIGHTNING ARRESTER	 AUXILIARY TRANSFORMER		

MINIMUM AIR CLEARANCES

MINIMUM AIR CLEARANCES	33kV
RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE	170 KV
RATED SWITCHING IMPULSE WITHSTAND VOLTAGE (PHASE–EARTH)	–
RATED SWITCHING IMPULSE WITHSTAND VOLTAGE (PHASE–PHASE)	–
BASIC VALUE (NON–FLASHOVER DISTANCE, INCLUDING SAFETY–MARGIN)	0.32m +10%
MINIMUM CLEARANCE BETWEEN LOWEST LIVE PART AND GROUND (TOTAL SAFETY ZONE)	3m
CLEARANCE BETWEEN GROUND AND THE INSULATOR'S BASE	2.5m
VERTICAL CLEARANCE WORKING ZONE	3m
HORIZONTAL CLEARANCE WORKING ZONE	3m
CLEARANCE OF CONDUCTORS ABOVE THE MAIN ROADS	7.5m
PHASE SPACING OF RIGID BUSBAR (CENTER LINE TO CENTER LINE)	1m
PHASE SPACING OF OVERSPAN (CENTER LINE TO CENTER LINE)	1m
PHASE SPACING OF FLEXIBLE CONDUCTOR BETWEEN EQUIPMENT (CENTER LINE TO CENTER LINE)	1m
POWER FREQUENCY WITHSTAND VOLTAGE	70kV
VERTICAL CLEARANCE BETWEEN LIVE CONDUCTOR AND SHIELD	2m

ABBREVIATION

ABBR.	EQUIPMENT
CB	CIRCUIT BREAKER
CT	CURRENT TRANSFORMER
VT	VOLTAGE TRANSFORMER
DS	DISCONNECTING SWITCH
DSE	DISCONNECTING SWITCH WITH EARTHING SWITCH
EM	EARTH MAT
ES	EARTH SWITCH
GA	GANTRY TOWER
LA	LIGHTNING ARRESTER
BMK	BAY MARSHALLING KIOSK
PI	POST INSULATOR
SC	SURGE COUNTER
SI	STRING INSULATOR
TW	TOWER
MH	MANHOLE

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17– THE LIGHTNING AND POWER FREQUENCY WITHSTAND VOLTAGE WILL BE GUIDED BY AN INSULATION COORDINATION STUDY IN ACCORDANCE TO IEC.

18–EXISTING 100kVA AUXILIARY TRANSFORMER HAS TO BE DISASSEMBLED AND DELIVERED TO CLIENT. A NEW 250kVA AUXILIARY TRANSFORMER HAS TO BE REPLACED.

GENERAL NOTES & LEGENDS OF 33KV EQUIPMENT

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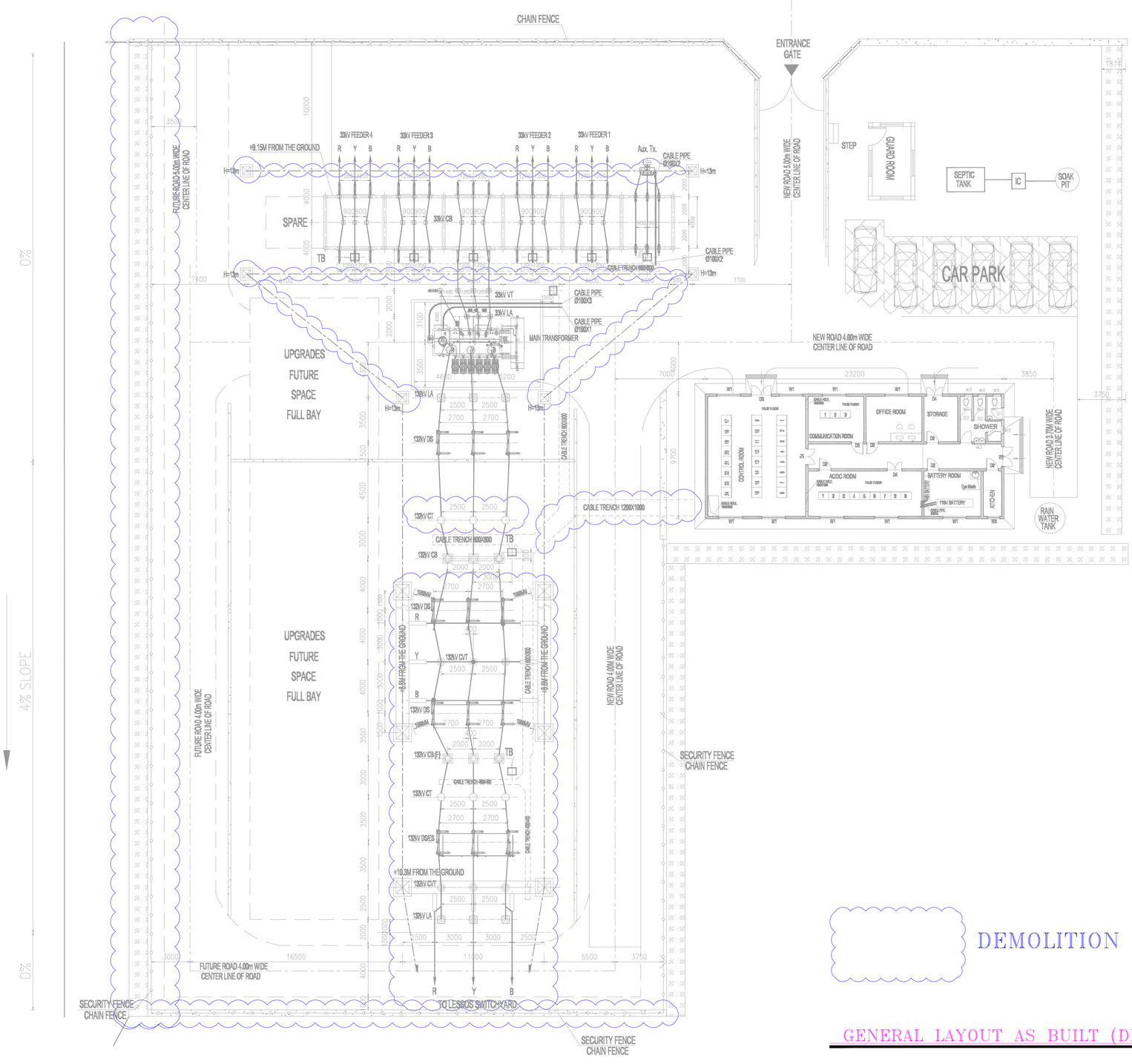

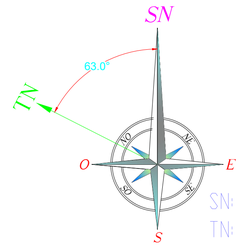

DEMOLITION

GENERAL LAYOUT AS BUILT (DEMOLITION)

REFERENCE DRAWINGS

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APPROVED | APPROVED WITH COMMENTS | NOT APPROVED | FOR INFORMATION

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COLENCO CONSULTING LIMITED

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DRAWN:	F.J	15/05/2025	TITLE:
CHECKED:	V.JOSHI	15/05/2025	GENERAL LAYOUT AS BUILT (DEMOLISION)
APPROVED:	S. DESHMUKH	15/05/2025	

REVISIONS		
NO.	NAME	DATE

SCALE: 1:600 DWG NO. KABARNET-DEMOLITION -002 REV.:

LEGEND

	EXISTING
	CURRENT SCOPE OF WORK
	FUTURE PLAN
	BAYS AND FEEDERS UNDER CURRENT SCOPE OF WORK

NOTES

1. THE DRAWING IS FOR BIDDING PURPOSE ONLY

2. LESSOS AND KABARNET HAS BEEN SWAPPED IN THE DRAWING AS IT SHOULD BE DURING THE CONNECTION AND TERMINATIONS.

REFERENCE DRAWINGS

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DATE:...................................... SIGNATURE/STAMP:...................................... PROJECT CONSULTANT

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KENYA ELECTRICITY TRANSMISSION COMPANY LTD

COLENCO — Innovation for sustainable future

COLENCO CONSULTING LIMITED

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APPROVED:	S. DESHMUKH	15/05/2025

KABARNET 132/33kV SUBSTATION

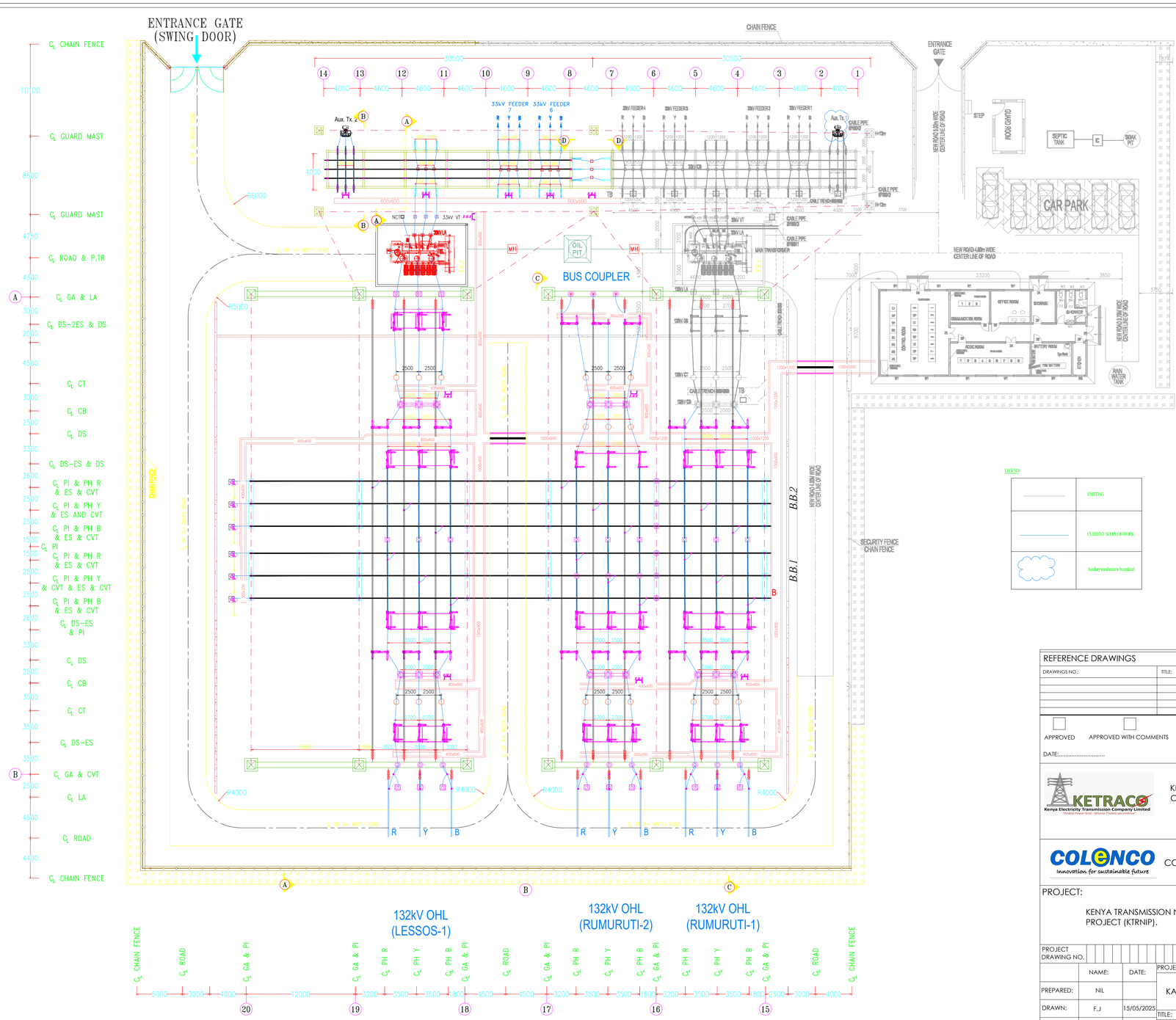
TITLE:

GENERAL LAYOUT (OVERALL)

REVISIONS

NO. NAME DATE

SCALE: 1:600 | DWG NO. KABARNET-OVERALL -002 | REV.:



NOTES

1. THE DRAWING IS FOR BIDDING PURPOSE ONLY

2. LESSOS AND KABARNET HAS BEEN SWAPPED IN THE DRAWING AS IT SHOULD BE DURING THE CONNECTION AND LINE TERMINATIONS.

GENERAL LAYOUT (SCOPE OF WORK)

REFERENCE DRAWINGS

DRAWINGS NO.:	TITLE:

☐ APPROVED ☐ APPROVED WITH COMMENTS ☐ NOT APPROVED ☐ FOR INFORMATION

DATE:..... SIGNATURE/STAMP:.....PROJECT CONSULTANT

KENYA ELECTRICITY TRANSMISSION COMPANY LTD

COLENCO CONSULTING LIMITED

PROJECT:

KENYA TRANSMISSION NETWORK IMPROVEMENT PROJECT (KTRNIP).

	NAME:	DATE:
PREPARED:	NIL	
DRAWN:	F.J	15/05/2025
CHECKED:	V.JOSHI	15/05/2025
APPROVED:	S. DESHMIKH	15/05/2025

PROJECT DRAWING NO.

PROJECT NO:

KABARNET 132/33kV SUBSTATION

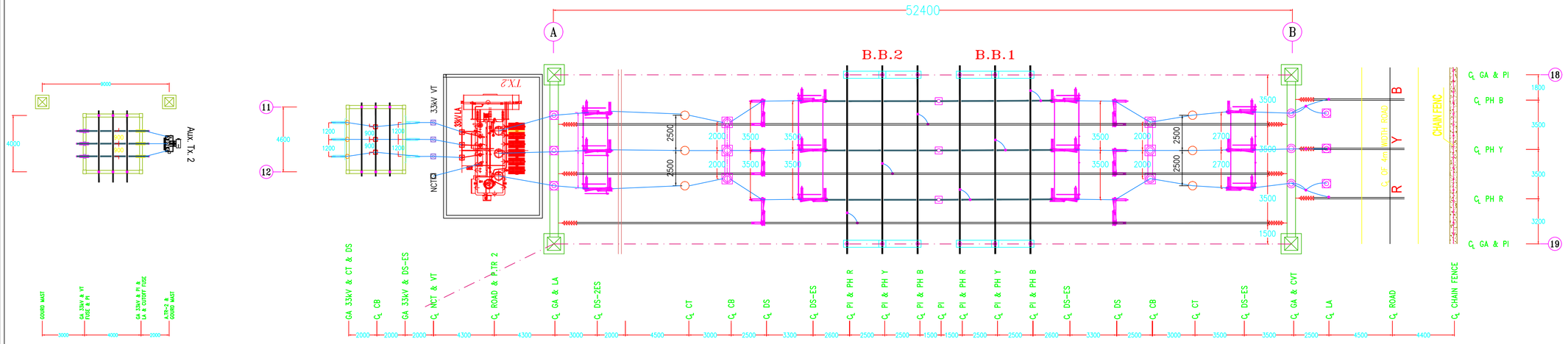
TITLE:

GENERAL LAYOUT (SCOPE OF WORK)

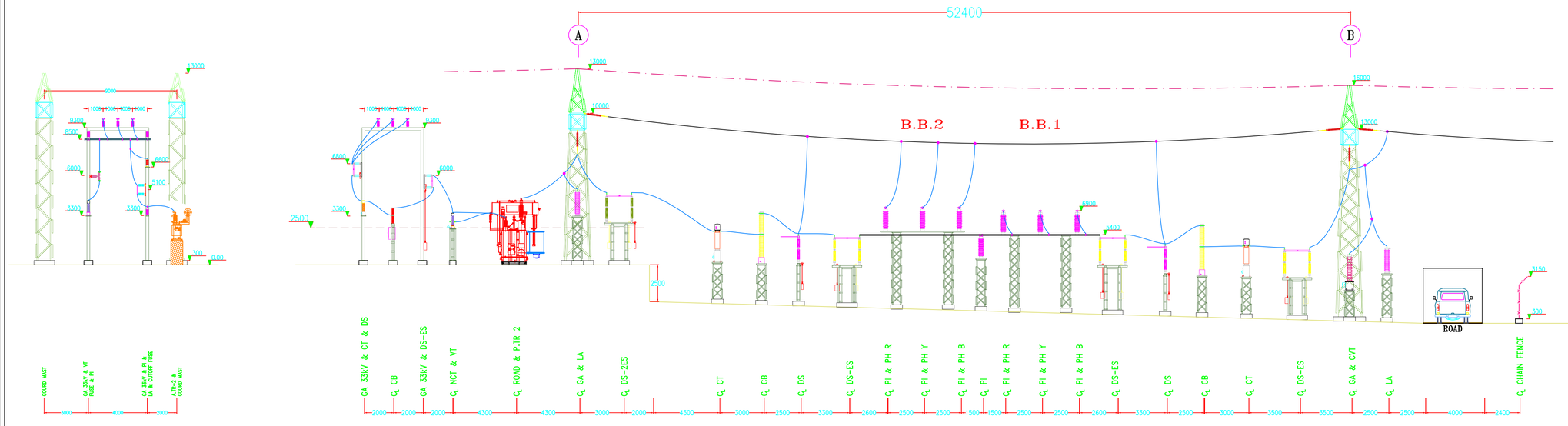
REVISIONS

NO.	NAME	DATE

SCALE: 1:600 DWG NO. KABARNET-LAYOUT-SW-002 REV.:



SECTION 'B–B'



SECTION 'A–A'

REFERENCE DRAWINGS	
DRAWINGS NO.:	TITLE:

☐ APPROVED ☐ APPROVED WITH COMMENTS ☐ NOT APPROVED ☐ FOR INFORMATION

DATE:..... SIGNATURE/STAMP:..... PROJECT CONSULTANT

KETRACO — Kenya Electricity Transmission Company Limited

KENYA ELECTRICITY TRANSMISSION COMPANY LTD

COLENCO — innovation for sustainable future

COLENCO CONSULTING LIMITED

PROJECT:

KENYA TRANSMISSION NETWORK IMPROVEMENT PROJECT (KTRNIP).

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	NAME:	DATE:
PREPARED:	NIL	
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CHECKED:	V.JOSHI	15/05/2025
APPROVED:	S.DESHMUKH	15/05/2025

PROJECT NO:

KABARNET 132/33kV SUBSTATION

TITLE:

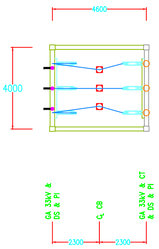
SECTION 'A–A' & 'B–B'

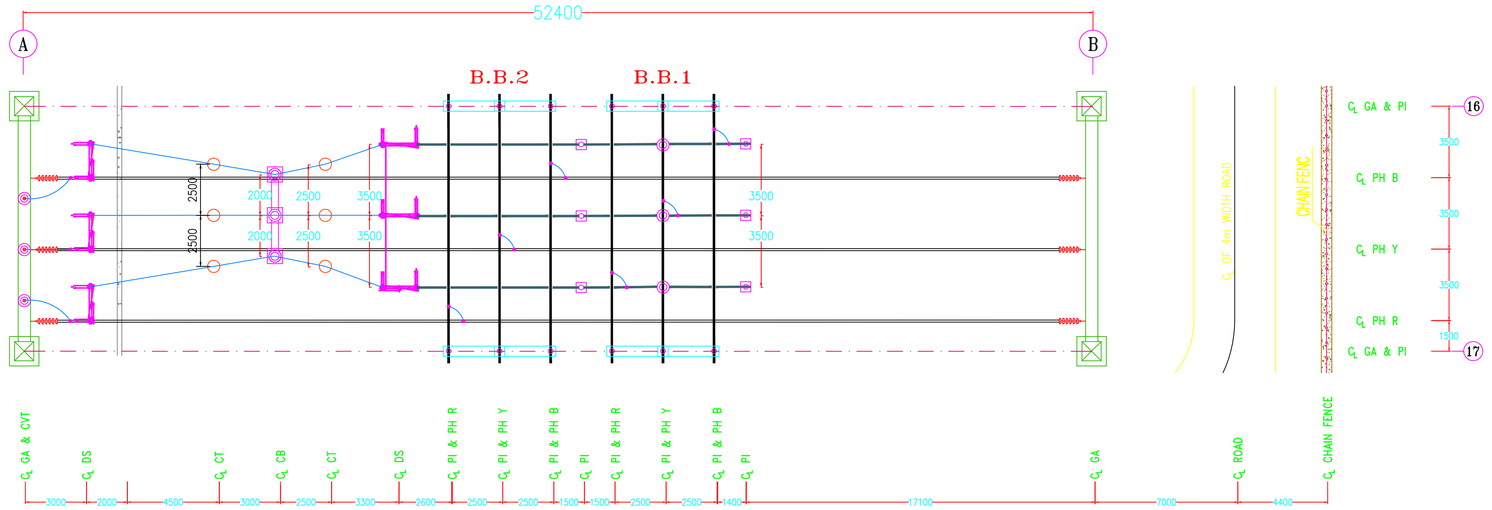
REVISIONS

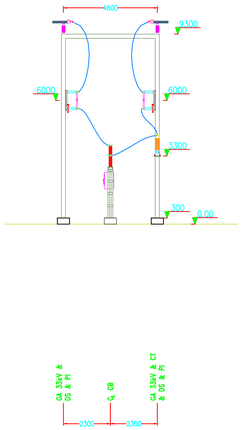
NO.	NAME	DATE

SCALE: 1:600 DWG NO. REV.:

1:150 A1







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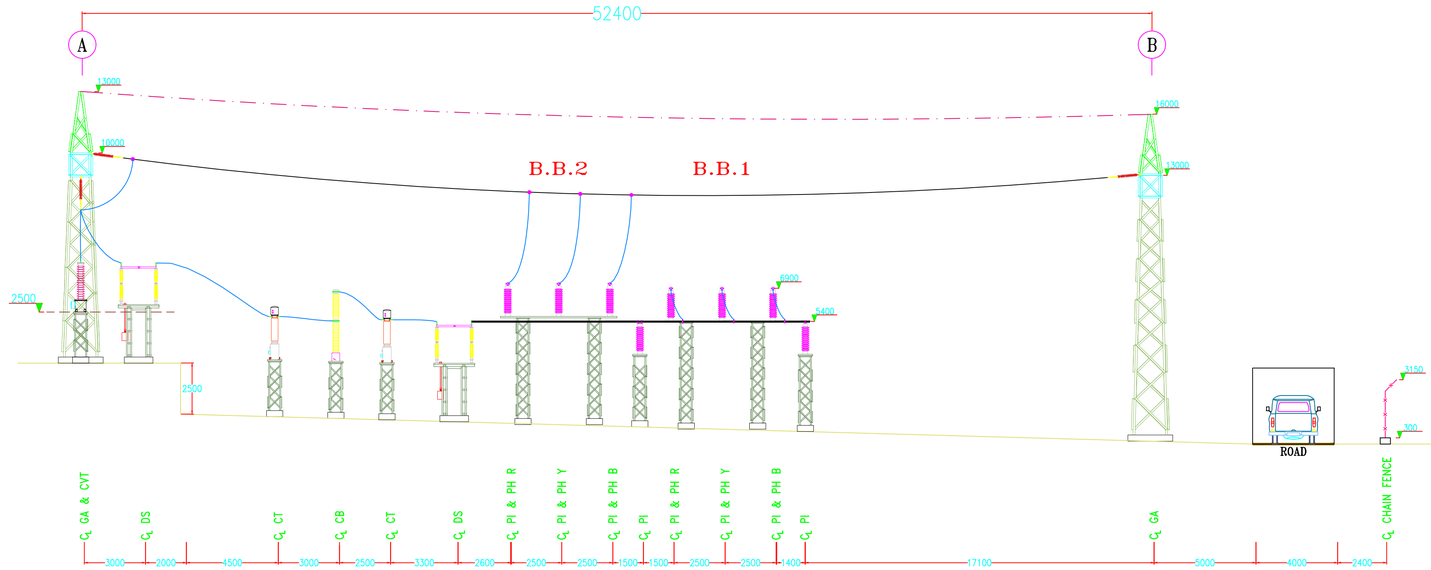

SECTION 'C-C'

SECTION 'C-C' & 'D-D'

1:150 A1 11

REFERENCE DRAWINGS

DRAWINGS NO.:	TITLE:

☐ APPROVED ☐ APPROVED WITH COMMENTS ☐ NOT APPROVED ☐ FOR INFORMATION

DATE:..... SIGNATURE/STAMP:..... PROJECT CONSULTANT

KETRACO Kenya Electricity Transmission Company Limited

KENYA ELECTRICITY TRANSMISSION COMPANY LTD

COLENCO innovation for sustainable future

COLENCO CONSULTING LIMITED

PROJECT:

KENYA TRANSMISSION NETWORK IMPROVEMENT PROJECT (KTRNIP).

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CHECKED:	V.JOSHI	15/05/2025
APPROVED:	S.DESHMUKH	15/05/2025

PROJECT NO:

KABARNET 132/33kV SUBSTATION

TITLE:

SECTION 'C-C' & 'D-D'

REVISIONS

NO.	NAME	DATE

SCALE: 1:600 DWG NO. REV.: