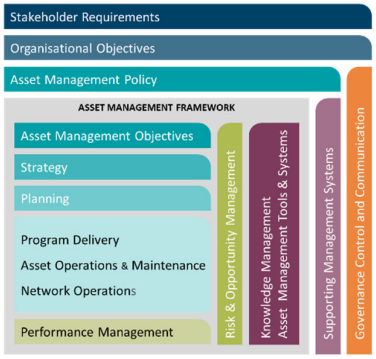
Western Power's Asset Management System



Distribution Substation Plant Manual Chapter 3 – Substation Installation, up to 22kV

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Document control

Endorsement & approvals

	Name	Position	Signature & Date
Author	Ken Tiong	Senior Distribution Design Engineer	Signature on file
Checked	Phil Capper	Principal Engineer	Signature on file
Endorsed	Lanka Thabrew	Engineering Team Leader	Signature on file
Approved	Mohsin Miyanji	Distribution Design & Standards Manager	Signature on file

Record of revisions

Revision No.	Date	Version	Revised by	Description
0	August 2019	EDM 0	Gareth Chadwick	Original
1	December 2019	EDM 1	Gareth Chadwick	Updated to include New PENDA
2	May 2023	EDM 2	Ken Tiong	Non-fire rated arrangements up to 1MVA updated to DSPM, Earthing SLD added for up to 2MVA layouts, Clearance Updates, Multiple notes and layout changes. Refer to individual drawings.
3	22/12/2025	Volt 1	Sam Liau	Changes made to DSM-3-07, DSM-3-08 DSM-3-09, DSM-3-10, DSM-3-17, DSM-3-18, DSM-3-19, DSM-3-20 & DSM-3-21

Key documents providing direction and influencing this document

Doc #	Title of document
EDM# 40304923	Asset Management System
EDM# 41965928	Safety in Design Guidelines
EDM# 50473207	DSPM Governance & Supporting Technical Documents Register

This document gives direction to and influences the following documents

Doc #	Title of document
Various DQM documents	Distribution Substation Design Projects

Stakeholders (people that were consulted when document was updated)

Business Unit / Function
Asset Management - Asset Performance
Asset Management – Safety Environment Quality and Training
Asset Management - Grid Transformation

Asset Operations – Network Operations
Asset Operations – Operational Services
Asset Operations – Customer Connection Services
Business and Customer Service – Customer Service

Notification list (people to be notified when document is updated)

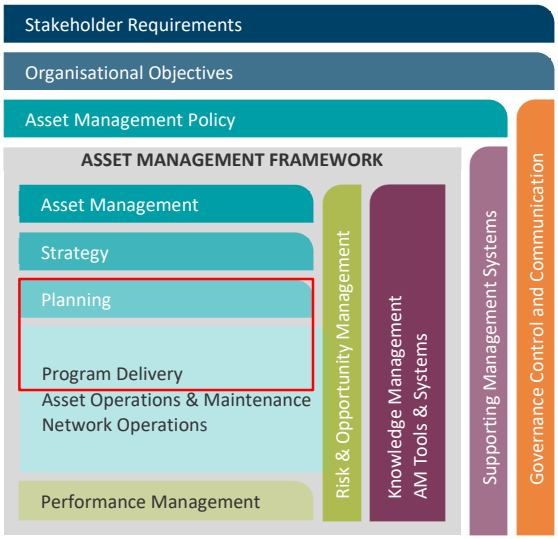
Business Unit / Function
Asset Management - Asset Performance
Asset Management – Safety Environment Quality and Training
Asset Management - Grid Transformation
Asset Operations – Network Operations
Asset Operations – Operational Services
Asset Operations – Customer Connection Services
Business and Customer Service – Customer Service

Document classification and hierarchy

A key requirement of the Western Power Asset Management Policy (AMP) is to develop and maintain an Asset Management System (AMS). This Distribution Substation Plant Manual is defined as a technical document within the AMS document classification and structure and sits within the planning and Program Delivery components of the AMS.

The AMS and the interrelationships between the collection of documents, tools and systems that are used for asset management are described in the AMS document Volt ID

ID-005-dc7f342fed83eb7f008777ff0463b876.



Contents

1. Introduction

This Chapter of the Distribution Substation Plant Manual (DSPM) contains substation plant related information and drawings showing the standard plant arrangements used within Western Power's distribution substations with Tyree and ETEL transformers. This Chapter is being updated progressively as the plant procurement process is being undertaken. As an interim measure this Chapter may contain Distribution Substation Manual (DSM) drawings where legacy plant is still being used and the drawing set has not been updated to demonstrate Western Power's compliance with AS5577.

2. Disclaimer

The information contained within these drawings shall not be used for anything other than their intended purpose (as stated within this Chapter). Other documents that refer to these drawings shall not change the intended purpose whether it is written or inferred.

This Chapter alone does not claim to demonstrate compliance with any Government Regulations or Industry Standards. These drawings are to be read in conjunction with the following Western Power documents:

i. Western Australian Service and Installation Requirements (WASIR)
ii. Underground Distribution Schemes Manual (UDSM)
iii. Distribution Customer Connection Requirements (DCCR)
iv. Distribution Design Catalogue (DDC)

The drawings within this Chapter are generic in nature and may not be suitable for all substation sites. It is the designer's responsibility to make sure that these drawings are suitable for the proposed substation site prior to use.

2.1 Compliance with this manual

The project design drawing shall include the layout design of the substation site and its proposed location on the lot. The standard designs in this chapter can be used as the basis for the project design.

Where a customer's site requires a non-standard substation arrangement (for example: where an alternative plant layout is required or where only an odd sized piece of land is available for a substation site), the drawings within this section can be made available to the customer. It is then the customer's responsibility, in conjunction with their architect and Civil / Structural Engineers and Western Power's Designer / Design Manager, to prepare an alternative design. This design must meet all Western Power's requirements and any relevant Australian Standards.

The non-standard substation or bespoke design must be submitted to Western Power for approval by Western Powers Designer or Design manager with an explanation of how the proposed substation design is safe, fit for purpose and will facilitate installation of "standardised Western Power distribution equipment". Where there is a non-standard layout of a substation building / room or site, the approval process should be undertaken prior to any construction work.

The non-standard drawings register for Distribution Construction Standards Handbook (DCSH) and Distribution Substation Manual (DSM / DSPM) is EDM# 34163616. Any non-standard design must be approved by a Team Leader and a Senior Engineer, and added to this register.

3. Information Provided on Drawings

The standard substation drawings are grouped into two main substation types (drawing sets), Non-Fire Rated substations (outdoor) and Fire Rated substations (indoor). These drawing sets will consist of the following:

3.1 Non - fire rated substations

Each Non-Fire Rated substation will typically have six standard drawing sheets.

1. Plant Single line diagram
2. Land requirements
3. Plant, equipment and substation layout
4. Clearances
5. Plant earthing single line diagram
6. Permissible screening arrangements
7. Oil containment (to be developed)

Some drawings may contain additional sheets where information needs to be communicated about the plant that may affect the installation. As previously mentioned, not all substations will have a complete drawing set until Western Power has finalised the plant procurement process. As an interim measure some substation drawings may still contain DSM drawings.

The following sections explain the purpose of, and the typical information that is contained within each drawing sheet.

3.1.1 Sheet 1 – Plant Single Line Diagram

The purpose of this drawing is to provide a diagrammatic representation of the electrical circuit of the substation equipment.

This drawing sheet shows the following information:

- Location of isolation switches and disconnectors. This includes the utilisation categories of the switches and their nominal ratings.
- Operational earthing points
- Electrical protection
- Voltage levels
- Transformer vector group
- Number of incoming and outgoing circuits

General Designer Notes:

1. Refer to the DCCR for HV feeder and customer connection arrangements.
2. The protection requirements and fuse chart are published within the Distribution Customer Connection Requirements (DCCR) manual and should be used to select the correct fuse size.

3.1.2 Sheet 2 - Land Requirements

The purpose of this drawing sheet is to show a diagrammatic representation of a piece of land that is to be provided by the landowner for the design and installation of the substation. This drawing should be used in conjunction with the relevant customer connection manual such as the Underground Distribution Schemes (UDSM) or Western Australian Service Installation and Requirements (WASIR).

This drawing sheet shows:

- Cable ducting requirements.
- The minimum size land area required for the substation.

The designer may need the land owner to provide additional land to facilitate the following items that are site specific and not shown on the standard substation drawings:

- Additional grading rings or an extension to the substation earthing system.
- Personnel access, egress, and equipment transport aisles
- Oil containment methods and collection bunds.
- Fire clearances and barriers
- Earth retaining systems
- Surface treatments and the methods used to retain them within the site
- Screening walls and doors
- Impact protection bollards

Designer Notes:

1. Where these non-standard items are required, they shall be included on the substation design drawing with dimensions to ensure Western Power's unrestricted access to this land is maintained in the future.
2. The designer is to ensure that the substation site is in a position that does not pose a safety risk and allows unrestricted access for Western Power personnel and operational vehicles.

3.1.3 Sheet 3 – Plant, Equipment and Substation Layout

The purpose of this drawing is to show what equipment is required within the substation and its physical arrangement on the site. All equipment shown is based on standard Western Power equipment contained in the Distribution Design Catalogue (DDC).

This sheet serves three purposes:

1. To enable the designer to build up an assembly list for the substation (for cost estimating and creating work orders).
2. To assist in defining construction information to other groups - for example, a marked-up copy can be issued to Kewdale Electrical Workshop for the construction of equipment such as an LV kiosk or automated ring main unit and another copy can be issued to field staff for site installation requirements.
3. To allow "standard substation equipment" to be procured by Western Power reducing the overall cost of a substation. In the event of future equipment failure, the "standard substation equipment" will facilitate like for like replacement where these standard drawings have been used for the design and construction of the original substation site.

This drawing sheet shows:

- The layout of distribution plant that can be used within the site such as transformers, ring main units and low voltage switchgear.
- When required, the arrangement of the LV switchgear.
- Power cables and connectors that shall be used to interconnect the distribution plant within the site.
- The dimensions from the edge of the site to the culvert and / or equipment base within the site.

Designer Notes:

1. All dimensions shown on drawings have been rounded up to the nearest 50mm. An equivalent building tolerance of ± 50mm should be permitted.

3.1.4 Sheet 4 - Clearances

The purpose of this drawing is to provide a diagrammatic representation of the clearances that have been provided within the substation site.

This drawings sheet shows:

- The clearances required around items of equipment to the edge of the substation site that allow the equipment to be operated.
- The clearances required around items of equipment to the edge of the substation site used as access and egress paths.
- The clearance from the equipment to the earth grading ring to be used by the designer for calculation of the touch voltages.
- Fire clearances from transformer tank or inside edge of the oil containment bund to combustible surfaces in accordance with WASIR Clause 14.4.3 (AS/NZS 2067 Table 6.1).
- Noise clearance zones in accordance with UDSM, Clause 5.3.18.

Designer Notes:

1. Where additional clearances are required that are not shown on the standard layout drawing, they shall be included on the substation design drawing and dimensioned to ensure clearances to substation equipment is maintained.
2. The designer is to complete a fire risk assessment as per AS/NZS 2067 Clause 6.7.4.4 to demonstrate how these clearances have been met or the fire risk has been mitigated. Refer DSPM Chapter 5 – Fire Clearances for additional guidance.

3.1.5 Sheet 5 – Plant Earthing Single Line Diagram

The purpose of this drawing is to provide a diagrammatic representation of the earthing circuit. The equipment used for earthing of distribution substations is shown on the compatible unit drawing for the plant within the Distribution Design Catalogue (DDC). The DDC provides details and quantities of the equipment used to make earth connections onto the plant and between pieces of plant within the substation site.

The standard earthing arrangement is based on a combined HV & LV system of earthing. Where an alternative earthing arrangement is used (e.g. separate HV & LV earthing system) the standard earthing arrangement can be modified and shown on the substation design drawings. The design drawings shall show the equipment used for the LV earthing system and its location in relation to the substation.

This drawing shows:

- Number of earth electrodes required within the site
- Number and types of earth bars (e.g. HV, LV)
- Neutral earthing connections
- Equipotential bonding connections (e.g. to exposed metal work on the plant)
- Grading ring connections
- Connection points for cable screens

Designer Notes:

1. The Earthing FAQ provides additional information on Western Power's network earthing requirements. This document will be replaced with Western Power's earthing guideline in the near future.

3.1.6 Sheet 6 - Permissible Screening Arrangements

The purpose of this drawing is to provide a diagrammatic representation of acceptable screening around the substation site. This sheet is intended to be issued to the customer to allow preparation of architectural drawings that are to be submitted back to Western Power's substation designer for approval.

This drawing shows:

- Where screening is permissible (i.e. outside the substation site).
- The required depth of the screening foundations to allow safe excavation within the substation site
- The additional land that is required (when screening is used) to ensure operational clearances shown on sheet 3 can be maintained.

Designer Notes:

1. Access and egress routes are required to be maintained when screening is used. The land area may need to be increased to facilitate screening so that operational clearances and access routes can be maintained.
2. Where screening is used the designer should include the architectural drawings into the substation design drawing. The landowner becomes the owner of any screening structure. Refer to DSPM Chapter 5.
3. This drawing should be read in conjunction with the Substation Installation Requirements within the UDSM Clause 6.2.8.25 or WASIR 14.5.4, and DSPM Chapter 5.
4. The customer becomes the owner of any screening structure.
5. All buildings shall meet the requirements of the Local Government and the National Construction Code (NCC)

3.2 Fire Rated Substations

Each fire rated substation will typically have six standard drawing sheets.

1. Plant single line diagram
2. Substation building requirements
3. Plant, equipment and substation layout
4. Clearances
5. Plant, earthing single line diagram
6. Switchgear fixing details

Some drawings may contain additional sheets where information needs to be communicated about the plant that may affect the installation.

The following sections explain the purpose of, and the typical information that is contained within each drawing sheet.

3.2.1 Sheet 1 – Plant Single Line Diagram

The purpose of this drawing is to provide a diagrammatic representation of the electrical circuit of the substation equipment.

This drawing sheet shows the following:

- Location of isolation switches and disconnectors. This includes the utilisation categories of the switches and their and nominal ratings.
- Operational earthing points
- Electrical protection
- Voltage levels
- Transformer vector group
- Number of incoming and outgoing circuits

General Designer Notes:

1. The customer connection arrangements and protection requirements / fuse chart are published within the Distribution Customer Connection Requirements Manual (DCCR).

3.2.2 Sheet 2 – Substation Building Requirements

The purpose of this drawing sheet is to show a diagrammatic representation of a substation building. This building is to be designed to be suitable for the installation of Western Power's standard substation equipment. This drawing should be read in conjunction with the relevant customer connection manual such as the Underground Distribution Schemes (UDSM) or Western Australian Service and Installation Requirements (WASIR). This sheet should be issued to the customer to allow preparation of architectural drawings that are to be submitted back to Western Power's substation designer for approval.

This drawing sheet shows:

- The size of the fire rated enclosure
- Cable ducting requirements (but no civil design details).
- Layout and size of cable trenches and trench covers
- Size and position of doors
- Layout of small light and power within the room
- Position of wall mounted air vents

Designer Notes:

1. The designer should include the architectural drawings onto the substation design drawing.
2. The designer is to ensure that the substation site is in a position that does not pose a safety risk and allows unrestricted access for Western Power personnel and operational vehicles.
3. All buildings shall meet the requirements of the Local Council and the National Construction Code (NCC)

3.2.3 Sheet 3 – Plant, Equipment and Substation Layout

The purpose of this drawing sheet is to show a diagrammatic representation of what equipment is required within the substation building and its physical layout. All equipment shown is based on standard Western Power equipment assemblies contained in the Distribution Design Catalogue (DDC).

This sheet also serves the following purposes:

1. To enable the designer to build up an assembly list in DQM for the substation (for cost estimating and creating work orders). A copy of this sheet can be retained on the design file for future reference.

2. To assist in defining construction information to other groups - for example, a marked-up copy can be issued to Kewdale Electrical Workshop for the construction of equipment such as an LV kiosk or automation of RMUs and another copy can be issued to field staff for site installation requirements.
3. To allow “standard substation equipment” to be procured by Western Power reducing the overall cost of a substation. In the event of future equipment failure, the “standard substation equipment” will facilitate like for like replacement where these standard drawings have been used for the design and construction of the original substation site.

This drawing sheet shows:

- The layout of distribution plant that can be used within the substation room such as transformers, ring main units and low voltage switchgear.
- When required, the arrangement of the LV switchgear.
- Power cables and connectors that should be used to interconnect the distribution plant within the room.
- The position of any other equipment within the substation room.

3.2.4 Sheet 4 - Operational and Earthing Clearances

The purpose of this drawing sheet is to provide a diagrammatic representation of the clearances that have been provided within the substation room.

This drawings sheet shows

- The clearances around items of equipment that allow the equipment to be operated.
- The clearances required around items of equipment to the walls of the substation room used as access and egress paths.

3.2.5 Sheet 5 – Plant Earthing Single Line Diagram

The purpose of this drawing is to provide a diagrammatic representation of the earthing circuit. The equipment used for earthing of distribution substations is shown on the compatible unit drawing for the plant within the Distribution Design Catalogue (DDC). It provides details and quantities of the equipment used to make earth connections onto the plant and between pieces of plant within the substation site.

The standard earthing arrangement is based on a combined HV & LV system of earthing. Where an alternative earthing arrangement is used (e.g. separate HV & LV earthing system) the standard earthing arrangement can be modified and shown on the substation design drawings. The design drawings shall show the equipment used for the LV earthing system and its location in relation to the substation.

This drawing shows:

- Number of earth electrodes required within the site
- Number and types of earth bars (e.g. HV, LV)
- Neutral earthing connections
- Equipotential bonding connections (e.g. to exposed metal work on the plant)
- Connection points for cable screens

Designer Notes:

1. The Earthing FAQ provides additional information on Western Power’s network earthing requirements. This document is to be replaced with Western Power’s earthing guideline in the near future.

3.2.6 Sheet 6 – Switchgear Fixing Details

The purpose of this drawing sheet is to provide a diagrammatic representation of the following:

- Where to position the switchgear over the trench.
- How to install the cantilever support brackets.
- How to install the cable trench covers

This sheet is intended for the installer of the ring main unit (HV switchgear).

4. Drawings - Substation Arrangements

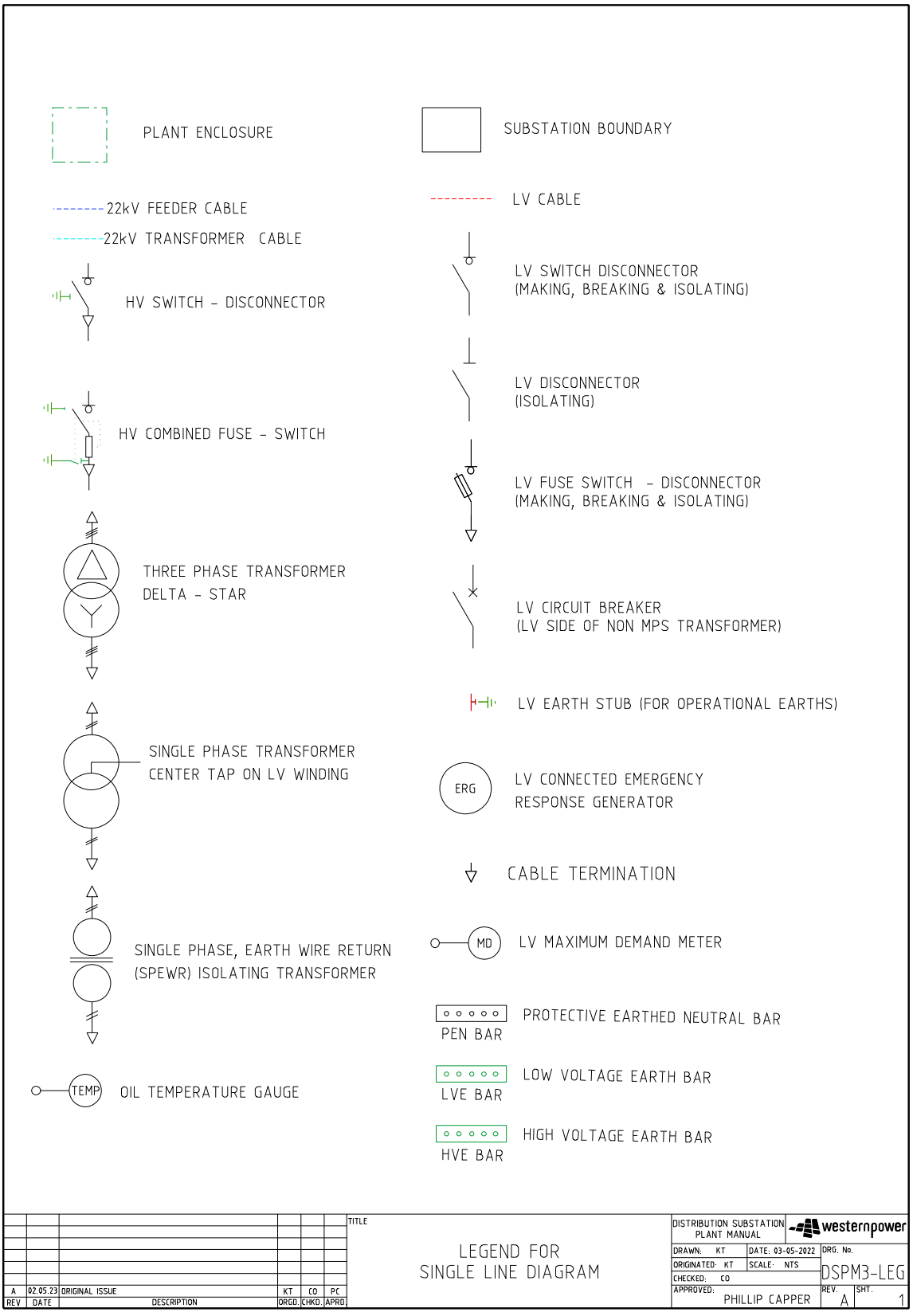
The following section contains the substation arrangement drawings for the following voltage levels:

a. 6.6kV three phase
b. 11kV three phase
c. 12.7kV single phase
d. 22kV three phase

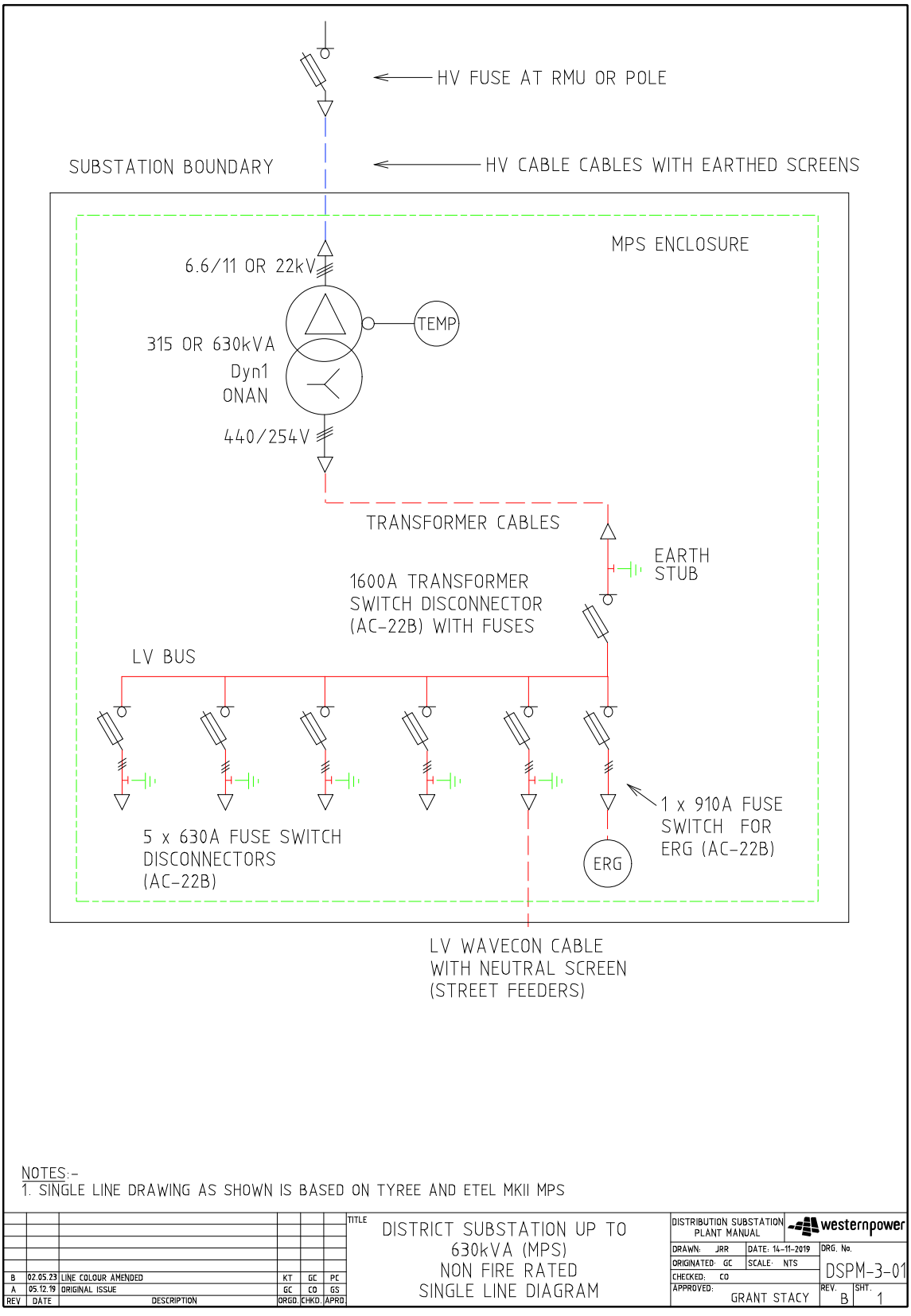
These drawings are grouped into the following types:

- District Substations, non-fire rated
- District Substations, fire rated
- Sole Use Substations, non-fire rated
- Sole Use Substations, fire rated
- Customer Owned Substations (HV metered sites)
- Single phase and three phase ground mounted rural substations (SPUD & THUD)
- Standalone HV switchgear
- Isolating Transformer

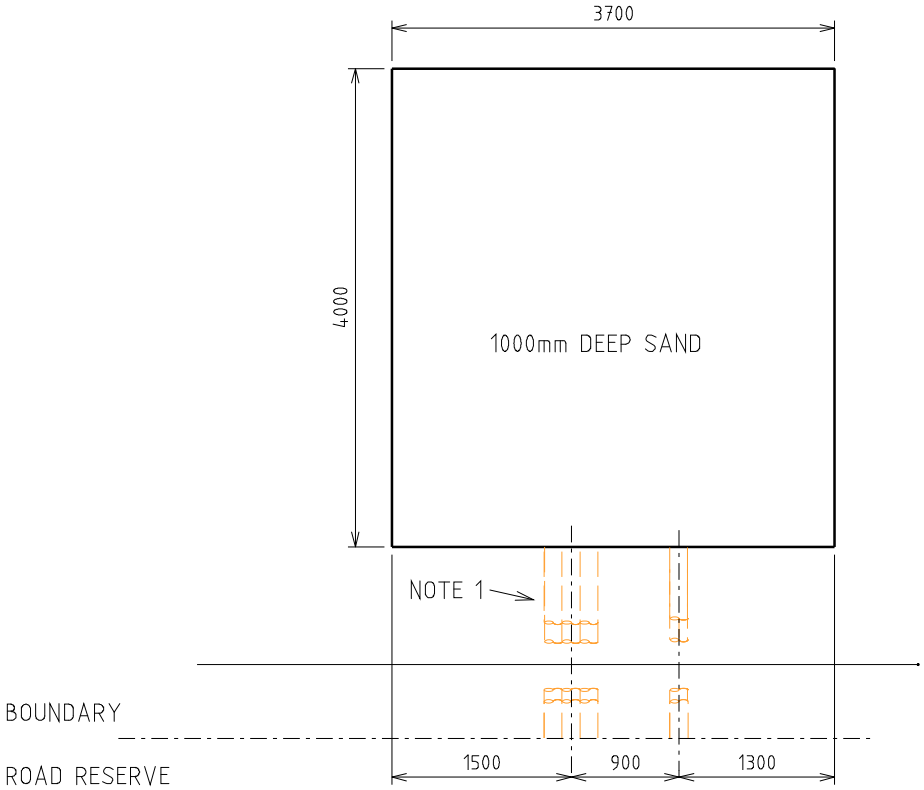
4.1 Drawing Legend

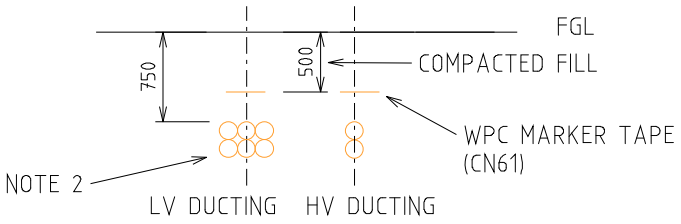


4.2 District Substations - Non-Fire Rated



4.2.1 DSPM-3-01 Up to 630kVA (MPS)





SECTION AA

NOTES:-
1. DUCTING REQUIRED IF LAND IS SET BACK FROM THE ROAD RESERVE BOUNDARY OR IF SCREENING IS REQUIRED.
2. 6x100 (LV) & 2x150 (HV) ID HEAVY DUTY DUCTS (CN56)

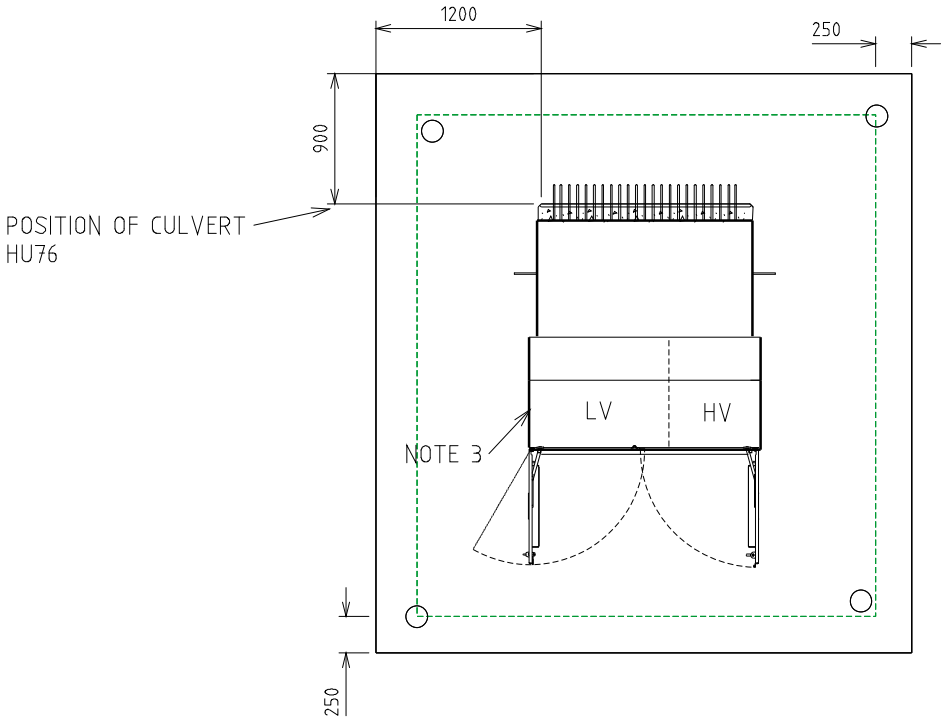
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	05.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: DISTRICT SUBSTATION UP TO 630kVA (MPS) NON FIRE RATED LAND REQUIREMENTS & CABLE DUCTS

DISTRIBUTION SUBSTATION PLANT MANUAL

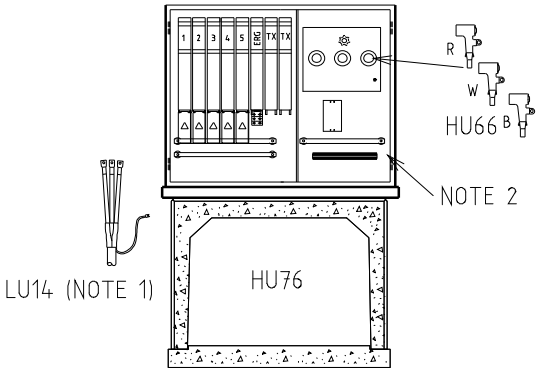
westernpower

DRAWN: JRR | DATE: 14-11-2019 | DRG. No. DSPM-3-01
ORIGINATED: GC | SCALE: NTS
CHECKED: CO
APPROVED: GRANT STACY
REV. B | SHT. 2



TRANSFORMER
MATERIALS (QTY)

CU	6/11kV	22kV
HU61/315		
HU61/630		
LU14		
HU66		
HU76		



BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416x1022x1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg

NOTES:-
1. 1 X LU14 NEEDED WITH EACH WAVECON STREET FEEDER.
2. INSTALL CABLE CLAMP ON EACH PHASE OF HV CABLE (FM0200).
3. REFER TO DSPM CHAPTER 4 FOR THE CORRECT POSITIONING OF THE MPS ONTO THE CULVERT.
4. MEASUREMENTS SHOW ARE ± 50mm, SAME CONSTRUCTION TOLERANCE APPLIES.
5. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APPRD.
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	05.02.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: DISTRICT SUBSTATION
UP TO 630kVA (MPS)
NON FIRE RATED
EQUIPMENT & SITE LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL
westernpower

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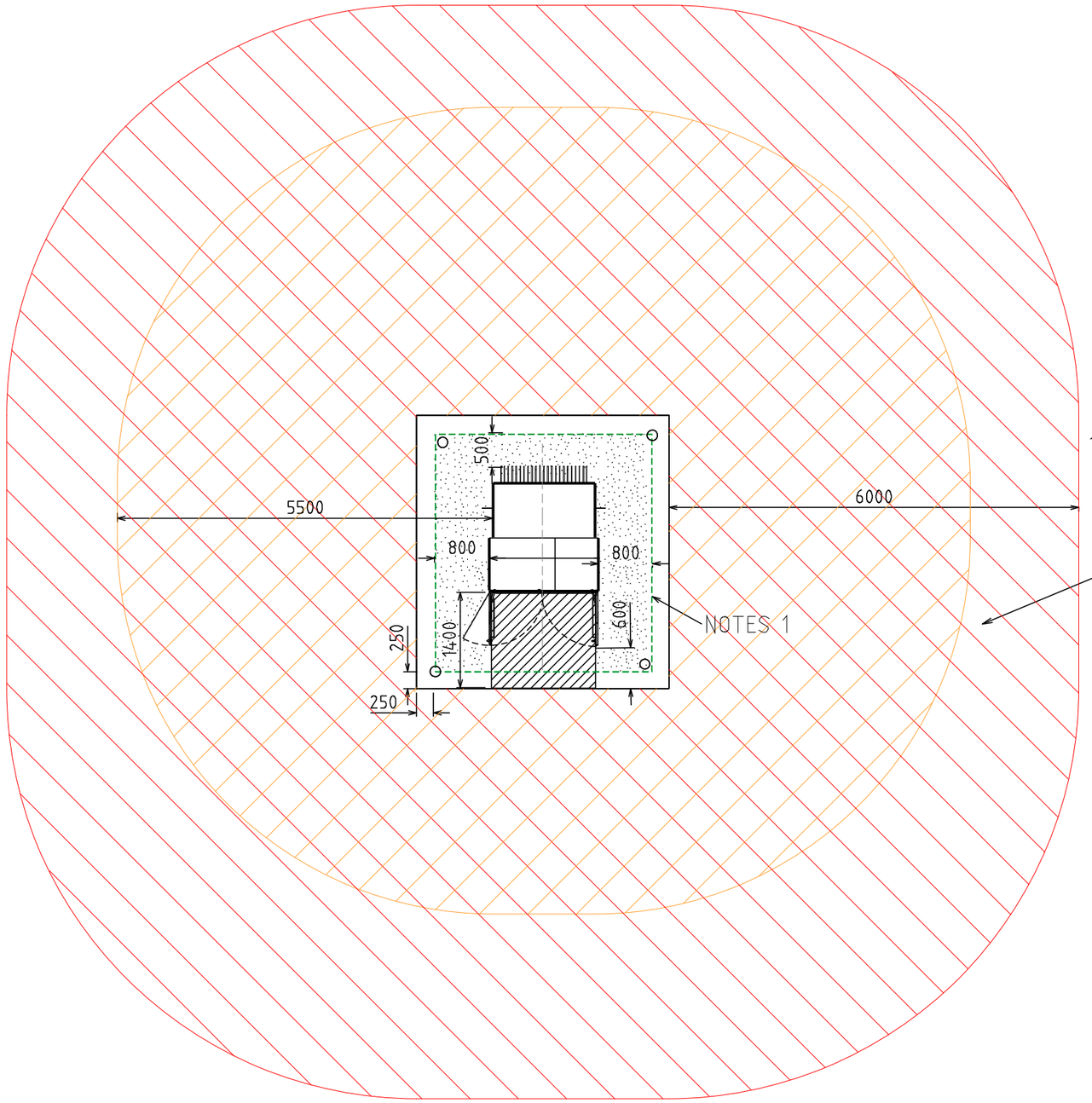
APPROVED: GRANT STACY		REV. B / SHT. 3



FIRE RISK ZONE

TRANSFORMER NOISE IMPACT ZONE

EARTHING (STEP AND TOUCH)

OPERATIONAL

NOTES:-
1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO TRANSFORMER. USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION DESIGN DRAWING.
5. FIRE RISK ZONE IS TO BE SHOWN FROM THE EDGE OF THE SUBSTATION SITE. OIL CONTAINMENT TO BE USED TO KEEP THE OIL WITHIN THE SITE. FIRE RISK ZONE MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER DSPM CHAPTER 5.
6. NOISE IMPACT ZONE IS BASED ON 630kVA TRANSFORMER AND IS MEASURED FROM THE EDGE OF THE TRANSFORMER TANK. NOISE IMPACT ZONE MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER TO "NOISE COMPLIANCE REQUIREMENTS FOR DISTRIBUTION TRANSFORMERS" GUIDELINE.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
B	02.05.23	FIRE RISK ZONE CONTOUR MODIFIED AND NOTES AMENDED	KT	GC	PC
A	06 12.19	ORIGINAL ISSUE	AK	AT	GS

TITLE

DISTRICT SUBSTATION UP TO 630kVA (MPS) NON-FIRE RATED CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

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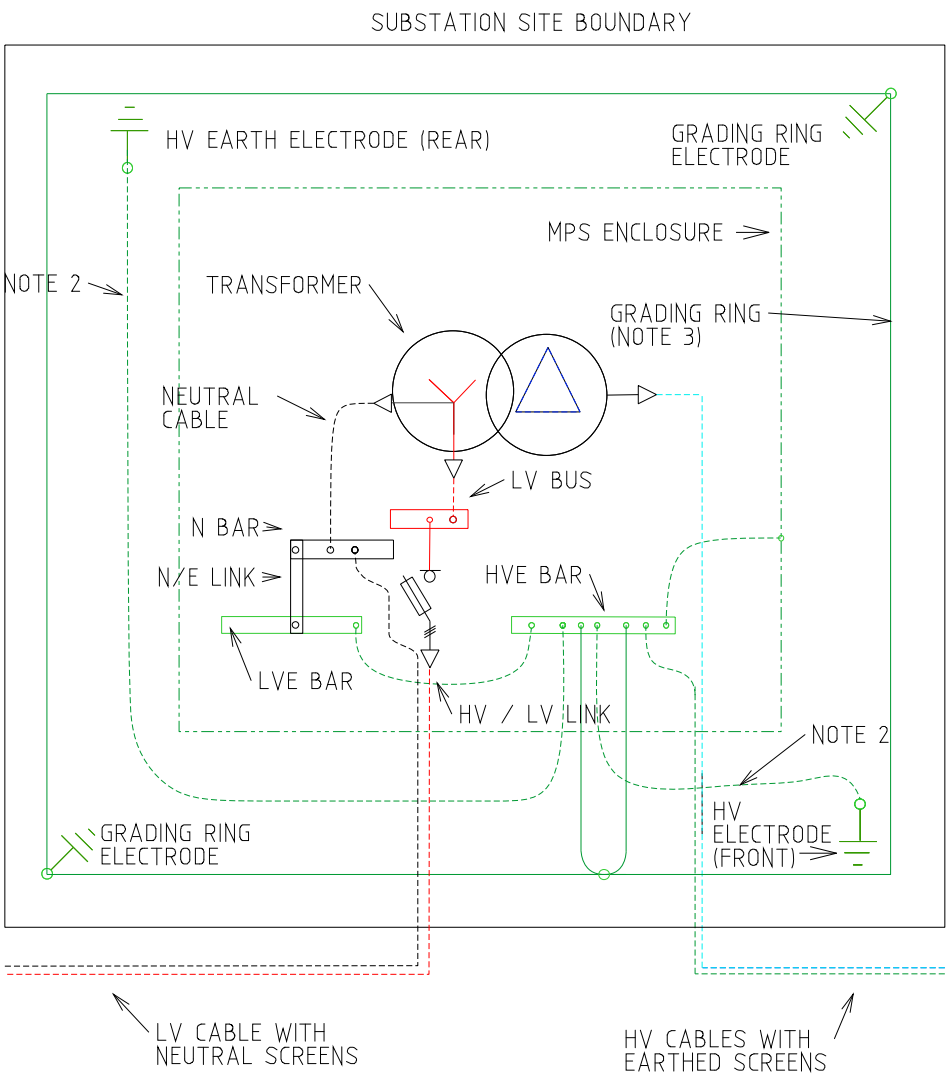
APPROVED: GRANT STACY		REV. B	SHT. 4



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS.
2. CONNECT 70mm^2 PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	06.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE

DISTRICT SUBSTATION UP TO 630kVA (MPS) NON FIRE RATED EARTHING SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

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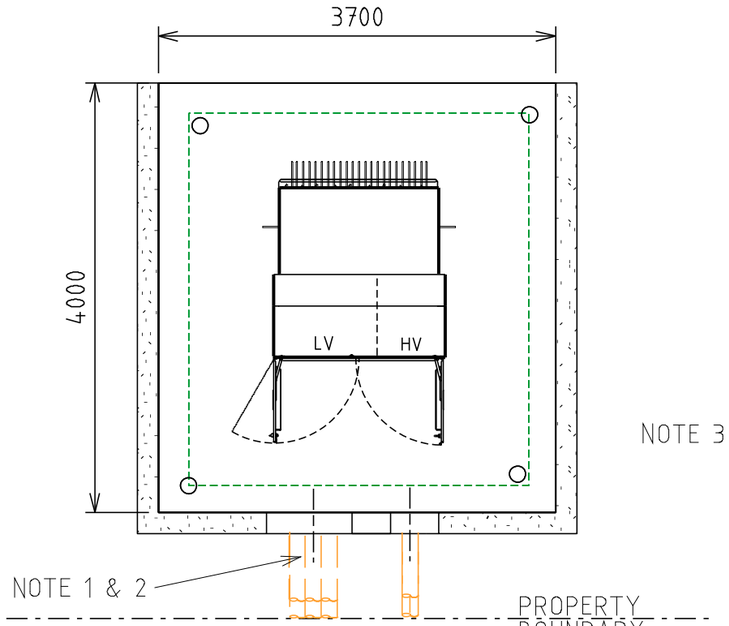
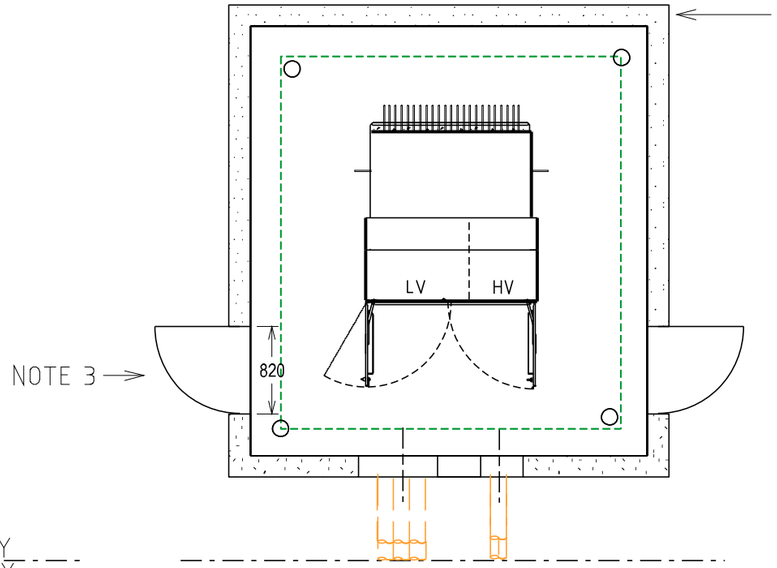
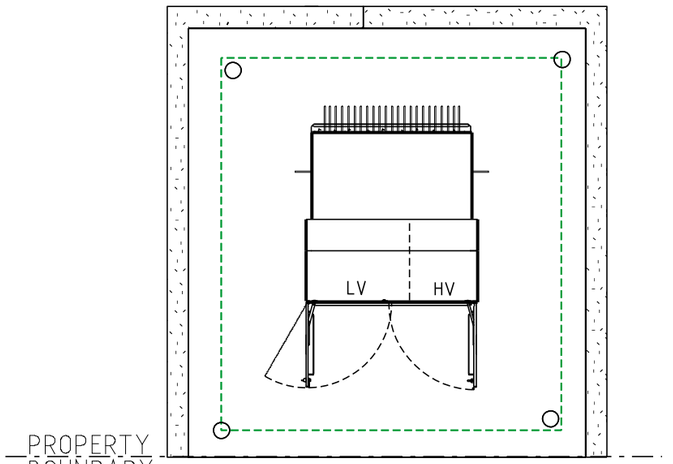


PARTIAL (FRONT) SCREENING



FULL SCREENING



PARTIAL (REAR) SCREENING

NOTES:-
1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTO SUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING WITHIN FIRE RISK ZONE (MASONARY, ETC.)
6. 2 HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER TO DSPM CHAPTER 5 (FIRE RISK).
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8m (HEIGHT OF TRANSFORMER + 300mm).
8. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV.	DATE	DESCRIPTION	DRGD.	CHKD.	APRD
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	06.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE

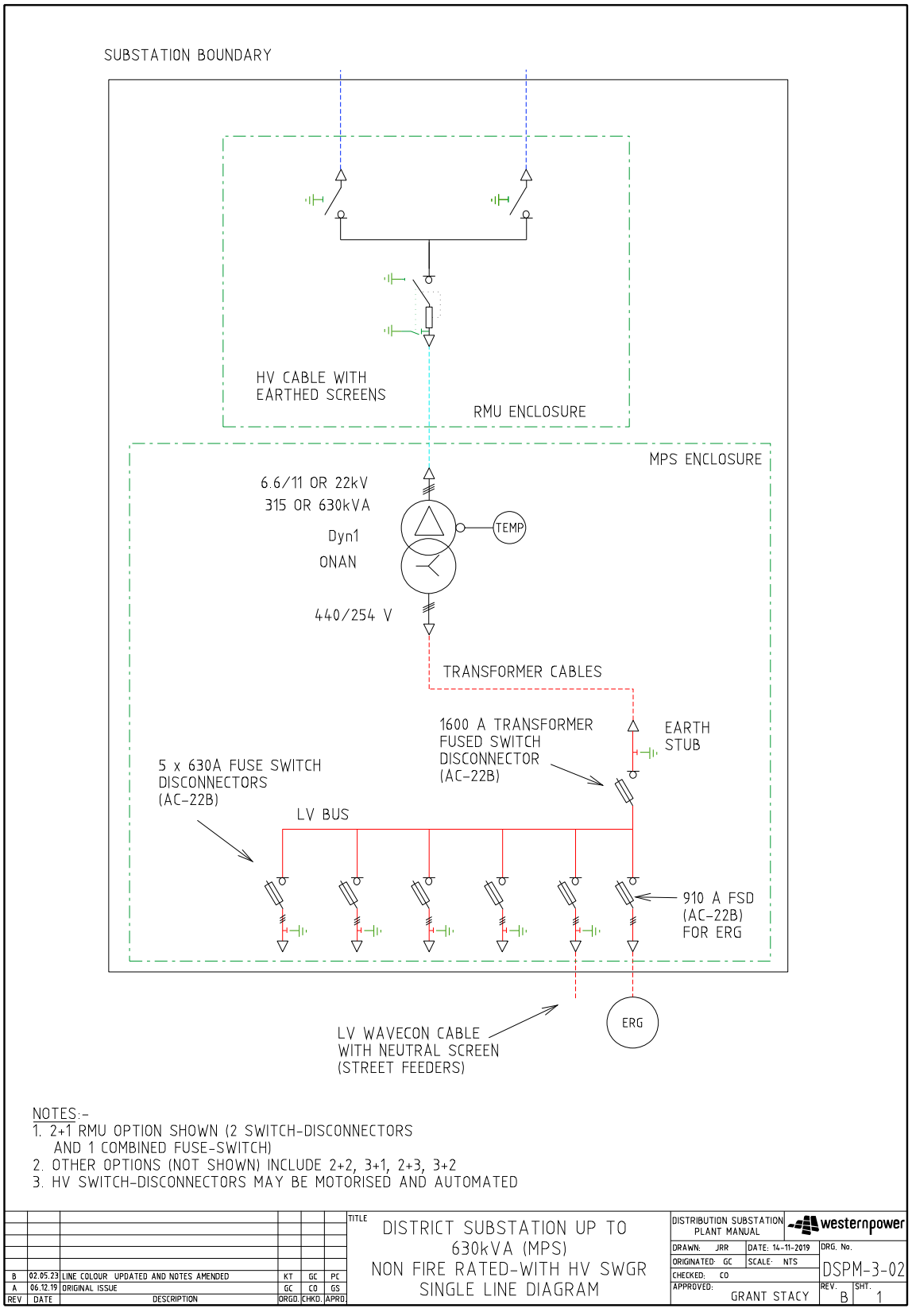
DISTRICT SUBSTATION
UP TO 630kVA (MPS)
NON FIRE RATED
PERMISSIBLE SCREENING ARRANGEMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: JRR	DATE 14-11-2019	DRG. No.	
ORIGINATED: GC	SCALE: NTS	DSPM-3-01	
CHECKED: CO			
APPROVED: GRANT STACY		REV. B	SHT. 6

4.2.2 DSPM-3-02 Up to 630kVA (MPS) with HV SWGR



NOTES:-
1. 2+1 RMU OPTION SHOWN (2 SWITCH-DISCONNECTORS AND 1 COMBINED FUSE-SWITCH)
2. OTHER OPTIONS (NOT SHOWN) INCLUDE 2+2, 3+1, 2+3, 3+2
3. HV SWITCH-DISCONNECTORS MAY BE MOTORISED AND AUTOMATED

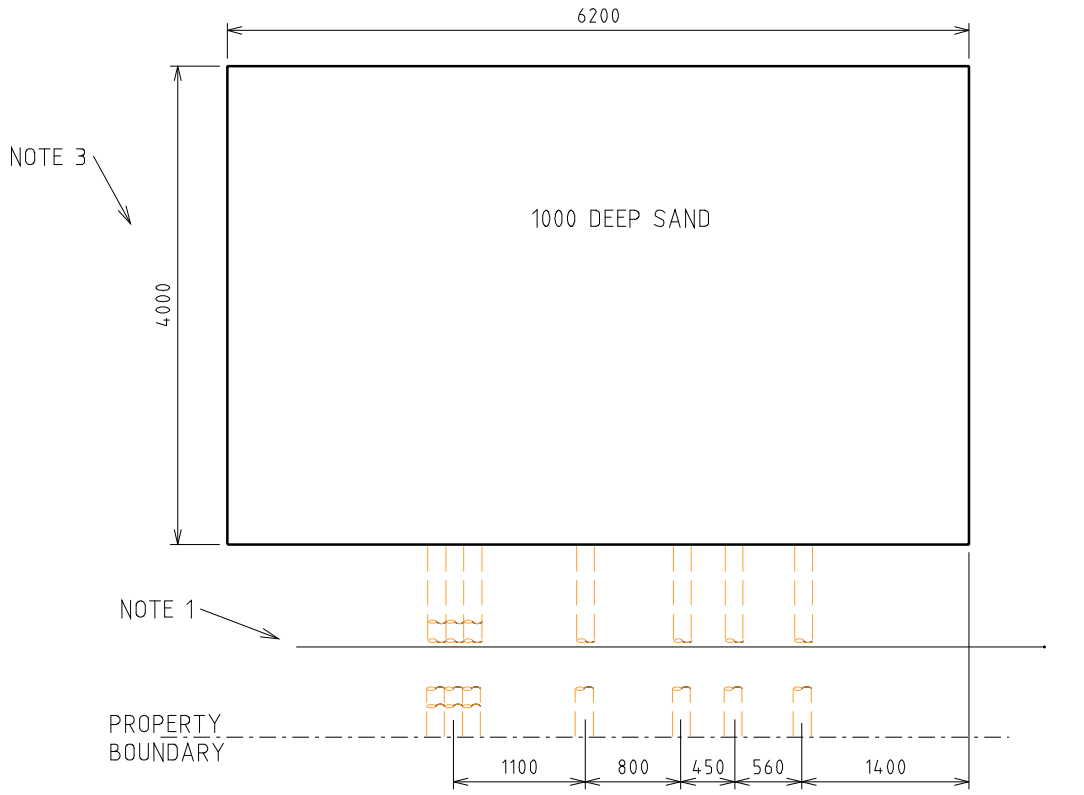
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	LINE COLOUR UPDATED AND NOTES AMENDED	KT	GC	PC
A	06.12.19	ORIGINAL ISSUE	GC	CO	GS

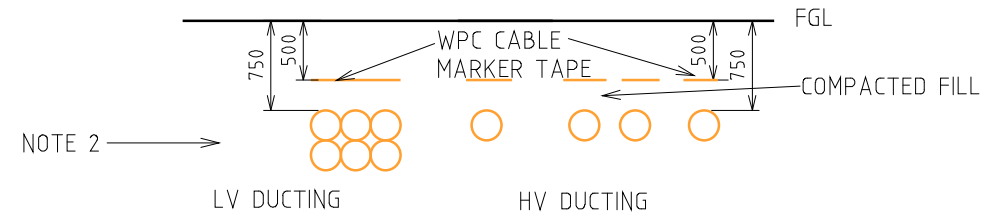
TITLE: DISTRICT SUBSTATION UP TO 630kVA (MPS) NON FIRE RATED-WITH HV SWGR SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: JRR | DATE: 14-11-2019 | DRG. No.
ORIGINATED: GC | SCALE: NTS | DSPM-3-02
CHECKED: CO
APPROVED: GRANT STACY | REV. B | SHT. 1





SECTION AA

NOTES:-
1. DUCTING REQUIRED IF LAND IS SET BACK FROM THE ROAD RESERVE BOUNDARY OR IF SCREENING IS REQUIRED.
2. 6x100 (LV) & 4x150 (HV) ID HEAVY DUTY DUCTS (CN56)
3. LAND AREA TO BE INCREASED IF SCREENING IS REQUIRED. SEE SHEET 6 FOR DETAILS

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	06.12.19	ORIGINAL ISSUE	GC	CO	GS

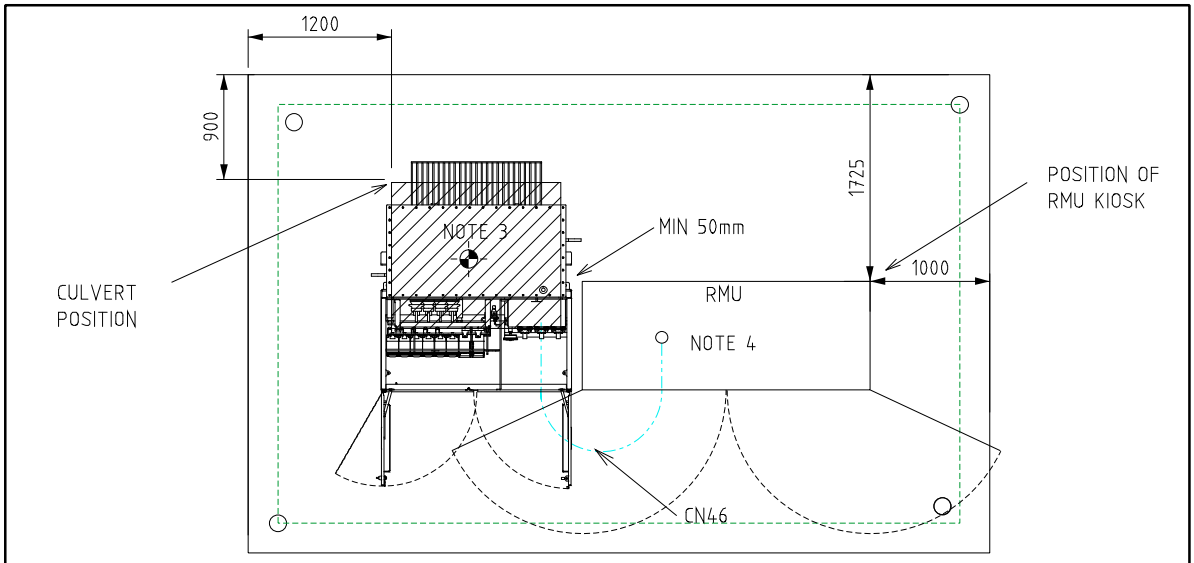
TITLE

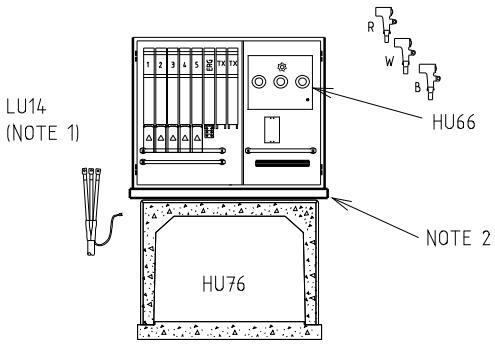
DISTRICT SUBSTATION
UP TO 630kVA (MPS)
NON FIRE RATED WITH HV SWGR
LAND REQUIREMENTS & DUCTS

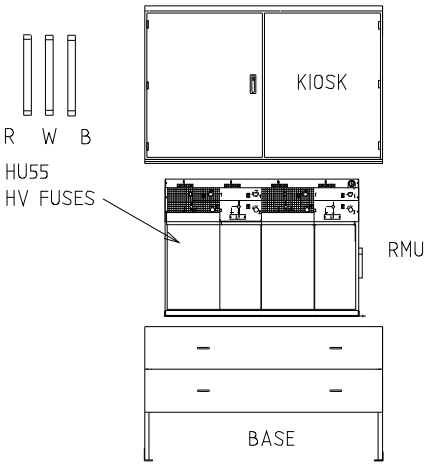
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: JRR	DATE: 14-11-2019	DRG. No.
ORIGINATED: GC	SCALE: NTS	DSPM-3-02
CHECKED: CO		
APPROVED: GRANT STACY		REV. B / SHT. 2







TRANSFORMER MATERIALS (QTY)

CU	6 /11 kV	22kV
HU61/315		
HU61/630		
LU14		
HU66		
HU76		

RMU MATERIALS (QTY)

HV FUSES	6kV	11kV	22kV
HU55 / 315			
HU55 / 630			
HU6			
HU7			
HU8			
HU80			
HU81			
CN46			
DA6			
DA10			

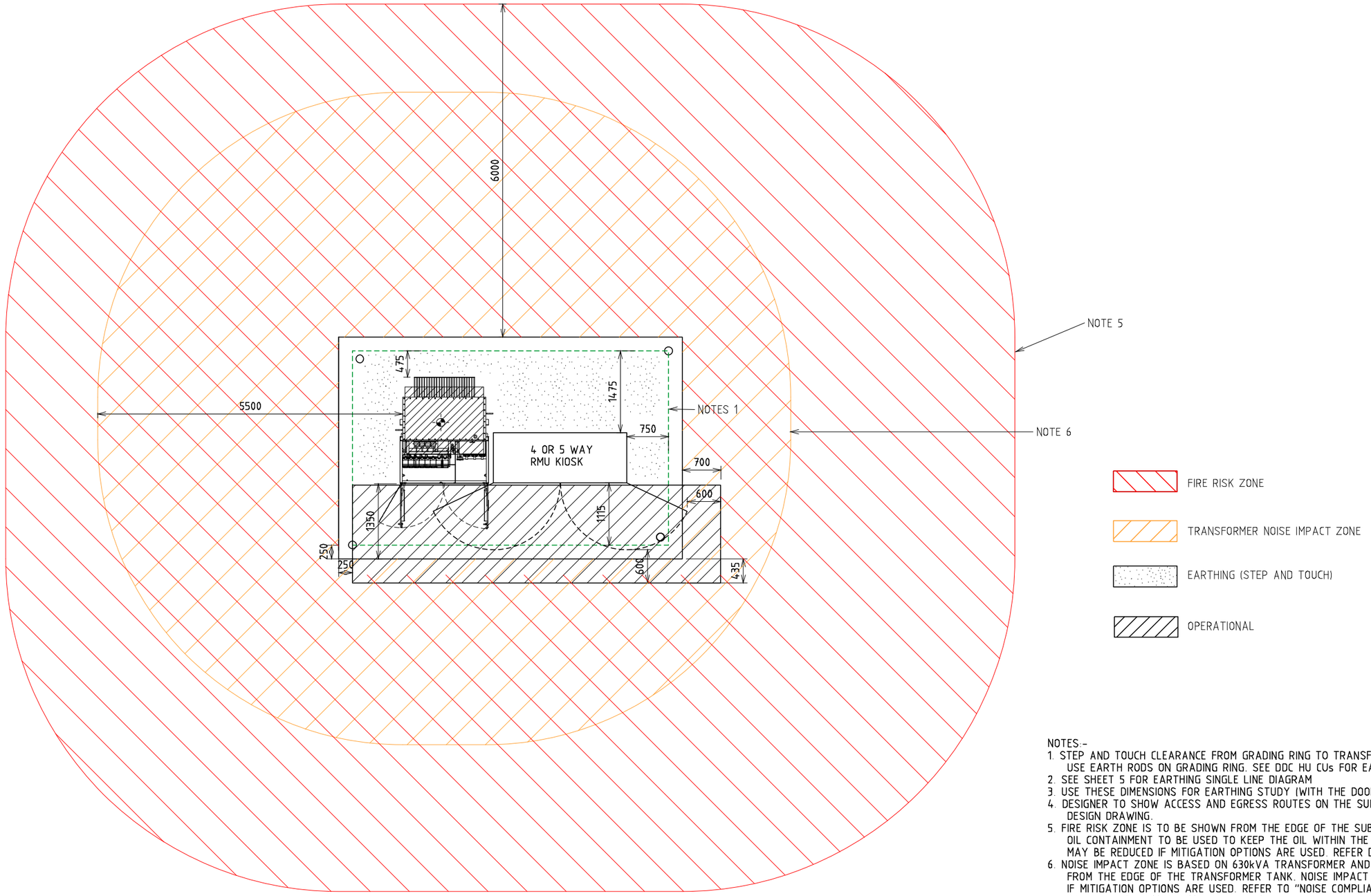
NOTES:-
1. 1 x LU14 NEEDED WITH EACH STREET FEED ONLY.
2. INSTALL CABLE CLAMP ON EACH PHASE OF HV CABLE (FM0200)
3. REFER DSPM CHAPTER 4 FOR THE CORRECT POSITIONING OF THE MPS ONTO THE CULVERT.
4. REFER TO DSPM CHAPTER 4 FOR THE CORRECT INSTALLATION OF THE RMU BASE.
5. MEASUREMENTS SHOWN ARE ± 50mm, SAME CONSTRUCTION TOLERANCE APPLIES.
6. RMU, KIOSK BASE AND CABLE TERMINATIONS SUPPLIED IN RMU CU.
7. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.
8. REFER TO DSPM CHAPTER 4 FOR AUTOMATION DETAILS.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AND MATERIAL LIST AMENDED	KT	GC	PC
A	06.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE
DISTRICT SUBSTATION
UP TO 630kVA (MPS)
NON FIRE RATED WITH HV SWGR
EQUIPMENT & SITE LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL
westernpower

DRAWN: JRR	DATE: 14-11-2019	DRG. No. DSPM-3-02
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. B SHT. 3



NOTES:-
1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO TRANSFORMER AND RMU. USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION DESIGN DRAWING.
5. FIRE RISK ZONE IS TO BE SHOWN FROM THE EDGE OF THE SUBSTATION SITE. OIL CONTAINMENT TO BE USED TO KEEP THE OIL WITHIN THE SITE. FIRE RISK ZONE MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER DSPM CHAPTER 5.
6. NOISE IMPACT ZONE IS BASED ON 630kVA TRANSFORMER AND IS MEASURED FROM THE EDGE OF THE TRANSFORMER TANK. NOISE IMPACT ZONE MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER TO "NOISE COMPLIANCE REQUIREMENTS FOR DISTRIBUTION TRANSFORMERS" GUIDELINE.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
B	02.05.23	FIRE RISK ZONE CONTOUR MODIFIED AND NOTES AMENDED	KT	GC	PC
A	06.12.19	ORIGINAL ISSUE	GC	CO	GS

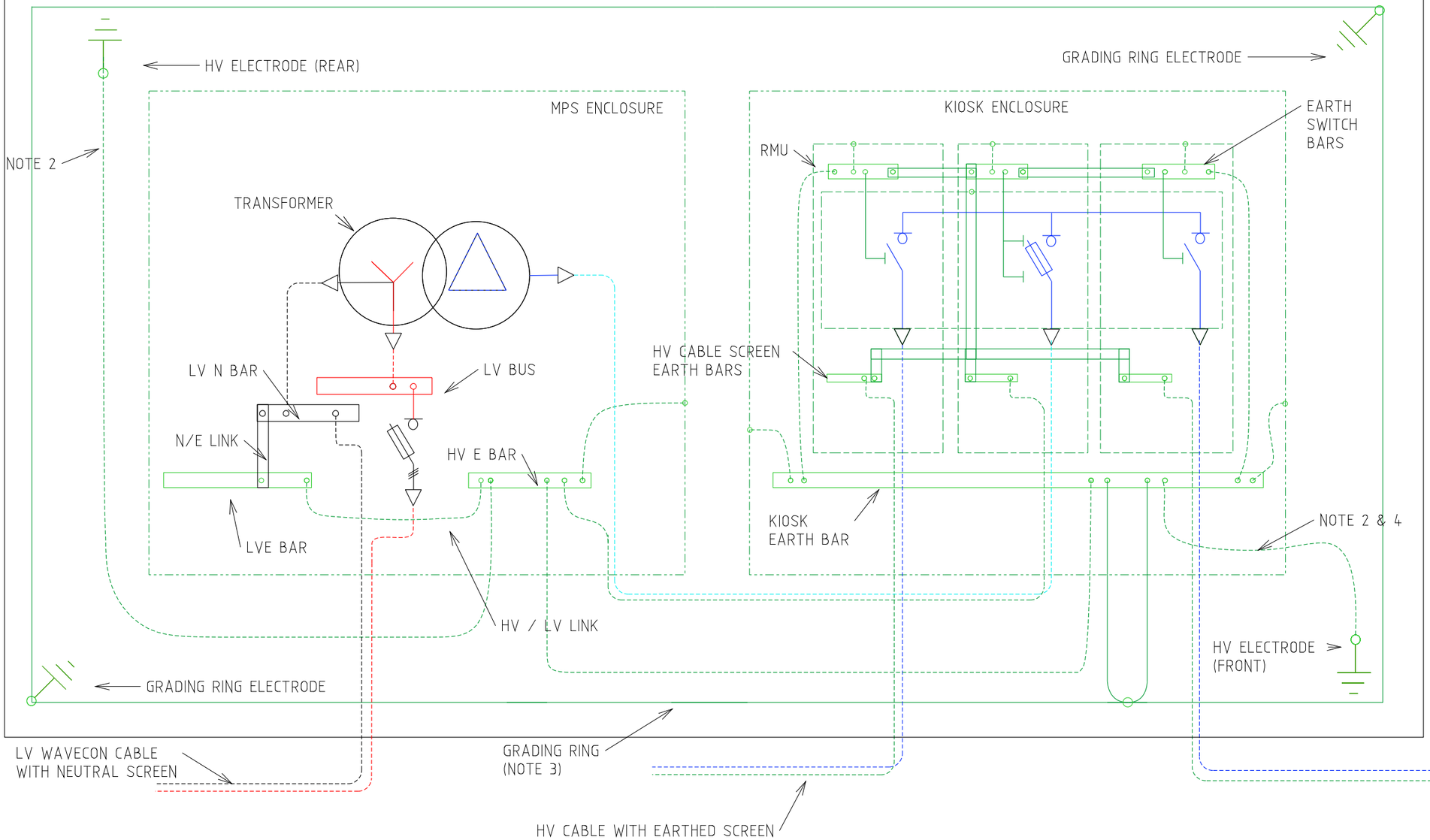
TITLE

DISTRICT SUBSTATION UP TO 630kVA (MPS) NON-FIRE RATED - WITH HV SWGR CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: JRR	DATE 14-11-2019	DRG. No.	DSPM-3-02
ORIGINATED: GC	SCALE: NTS		
CHECKED: CO			
APPROVED: GRANT STACY		REV. B	SHT. 4



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS.
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAS/FLAME TRAP, IN SOIL.
4. LOOP EARTH CABLES TO EARTH RODS INSIDE KIOSK FOR EASE OF TESTING.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	06.12.19	ORIGINAL ISSUE	GC	CO	GS

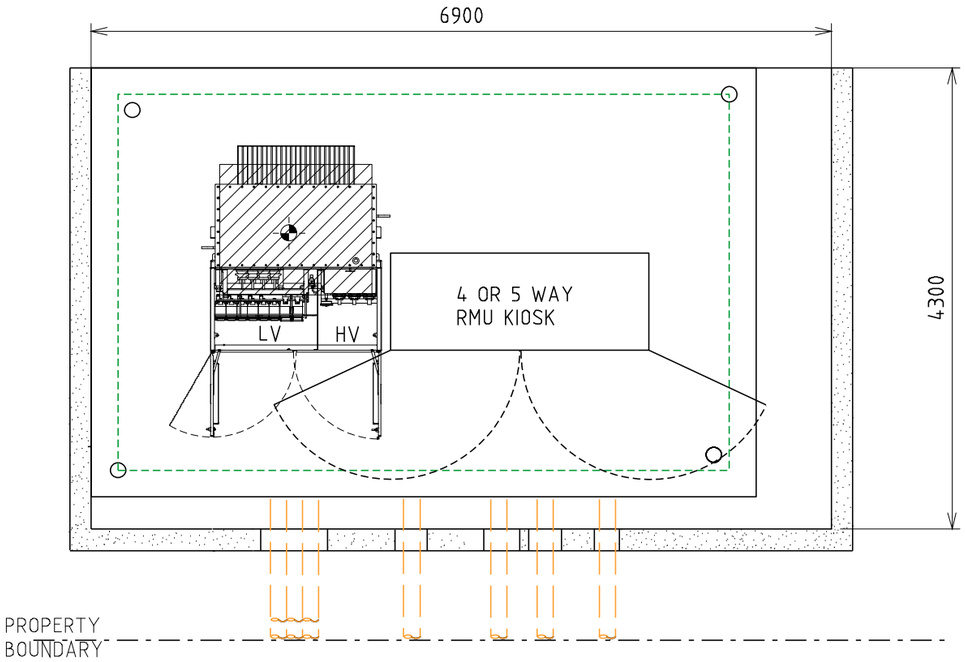
TITLE

DISTRICT SUBSTATION UP TO 630kVA (MPS) NON-FIRE RATED - WITH HV SWGR EARTHING SINGLE LINE DIAGRAM

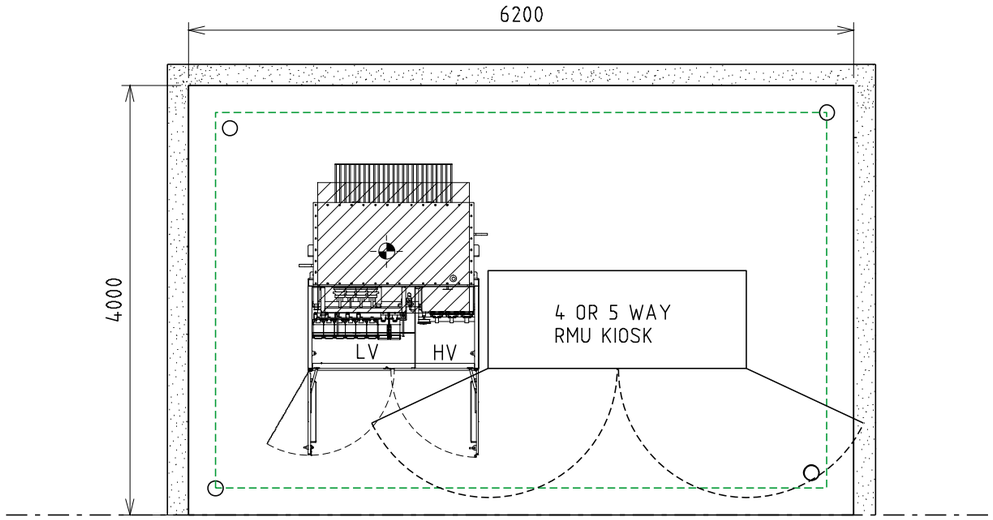
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

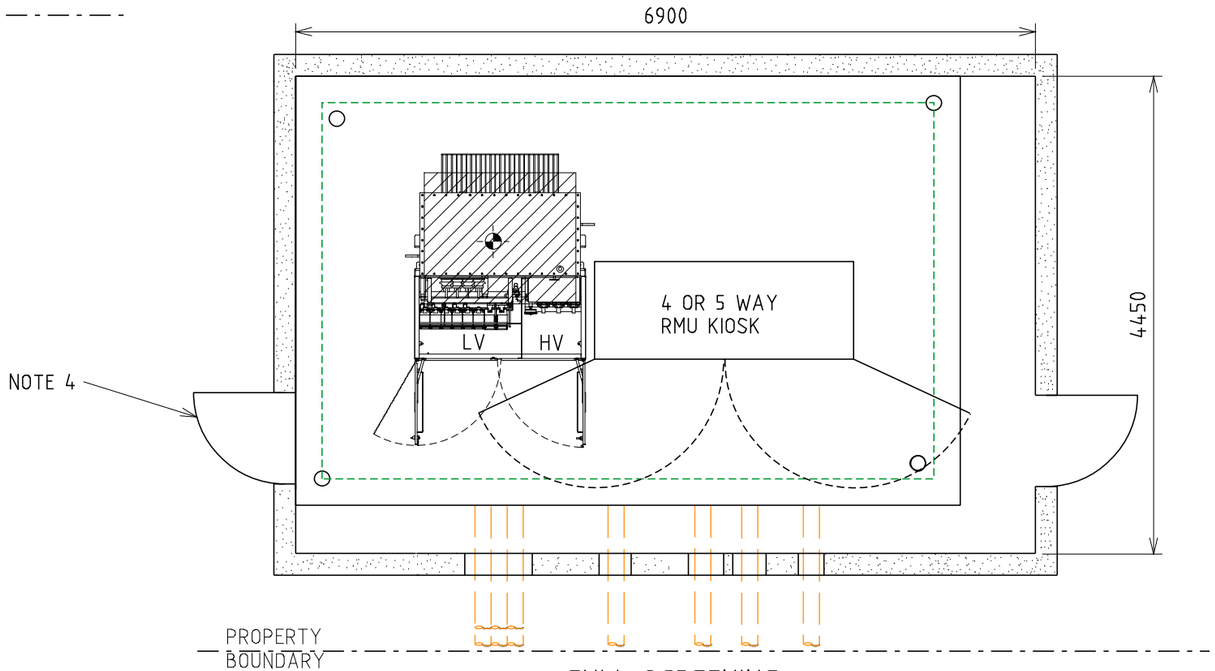
DRAWN: JRR	DATE: 14-11-2019	DRG. No.	
ORIGINATED: GC	SCALE: NTS	DSPM-3-02	
CHECKED: CO			
APPROVED: GRANT STACY		REV. B	SHT. 5



PARTIAL SCREENING (FRONT)



PARTIAL SCREENING (REAR)



FULL SCREENING

NOTES:-
1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTO SUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING WITHIN FIRE RISK ZONE (MASONARY, ETC.)
6. 2 HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER TO DSPM CHAPTER 5 (FIRE RISK).
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8m (HEIGHT OF TRANSFORMER + 300mm).
8. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	06.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE

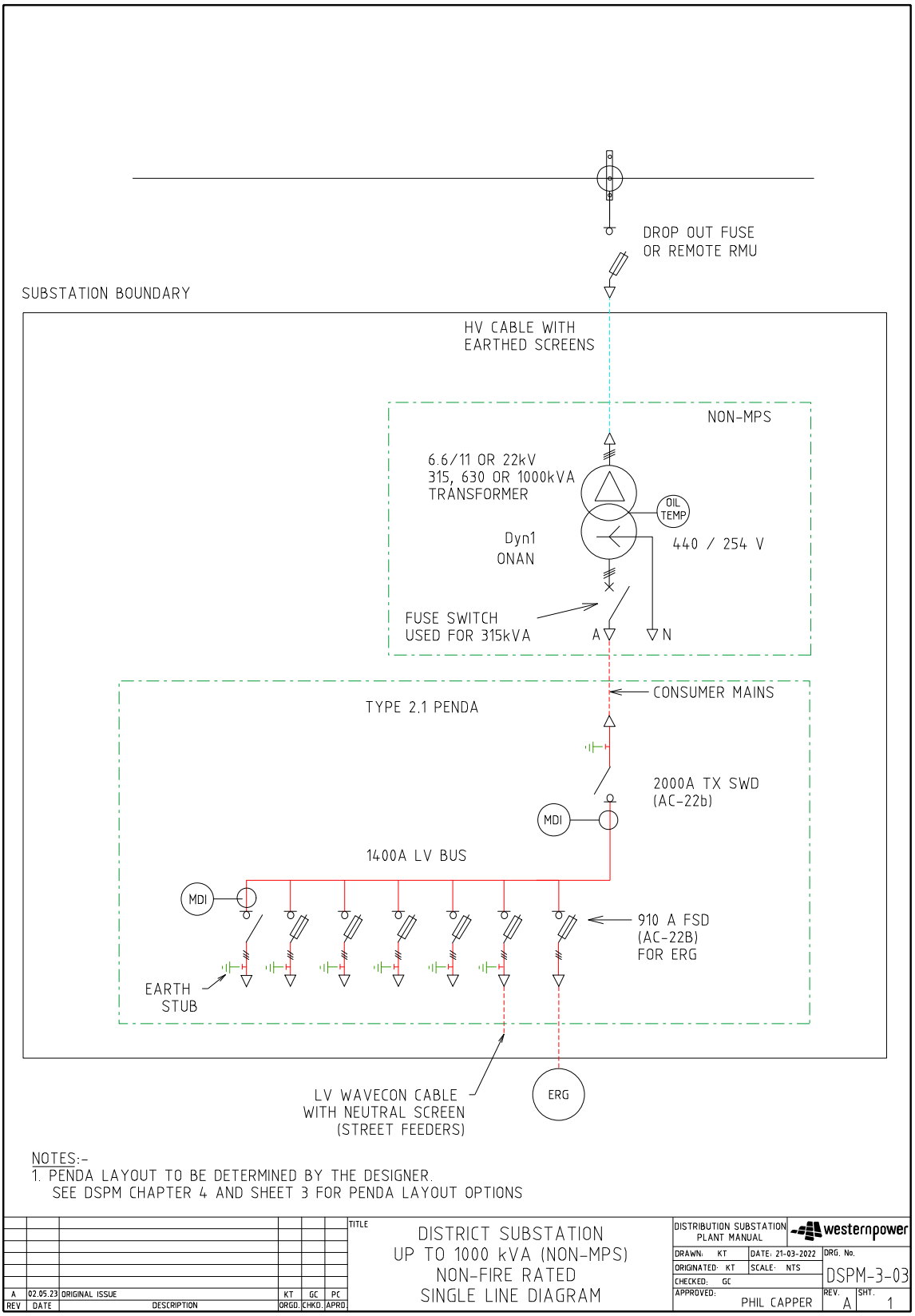
DISTRICT SUBSTATION
UP TO 630kVA (MPS)
NON FIRE RATED WITH HV SWGR
PERMISSIBLE SCREENING ARRANGEMENTS

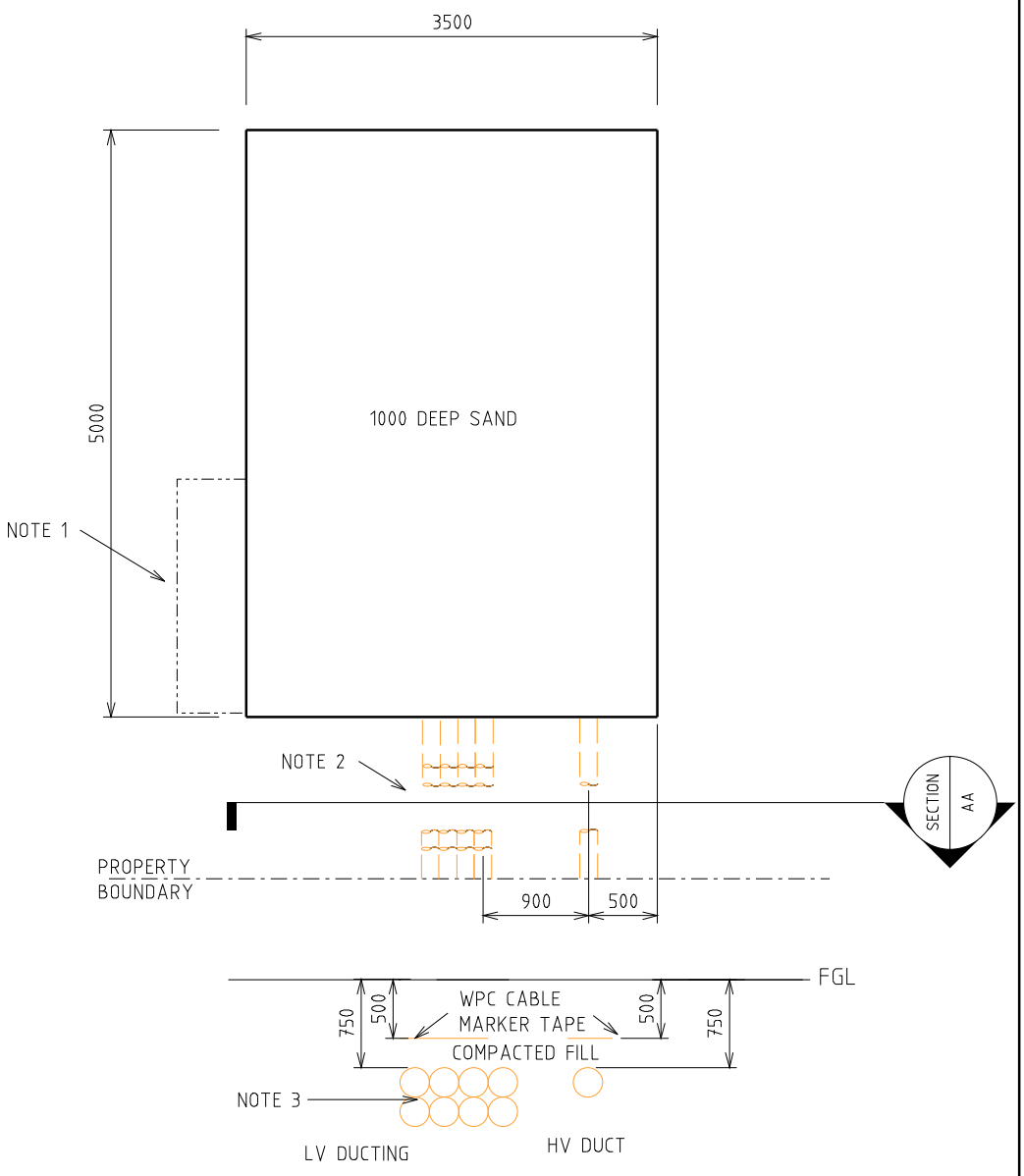
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: JRR	DATE 14-11-2019	DRG. No.	DSPM-3-02
ORIGINATED: GC	SCALE: NTS		
CHECKED: CO			
APPROVED: GRANT STACY		REV. B	SHT. 6

4.2.3 DSPM-3-03 Up to 1000kVA (Non-MPS)





SECTION AA

NOTES:-
1. SITE OF CUSTOMERS MAIN DISTRIBUTION BOARD (IF REQUIRED).
2. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
3. 8x100 (LV) & 1x150 (HV) ID HEAVY DUTY DUCT (CN56).

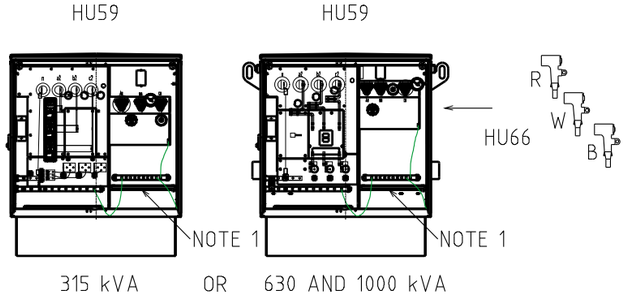
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: DISTRICT SUBSTATION UP TO 1000kVA (NON-MPS) NON FIRE RATED DUCTS & LAND REQUIREMENTS

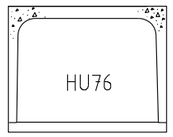
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

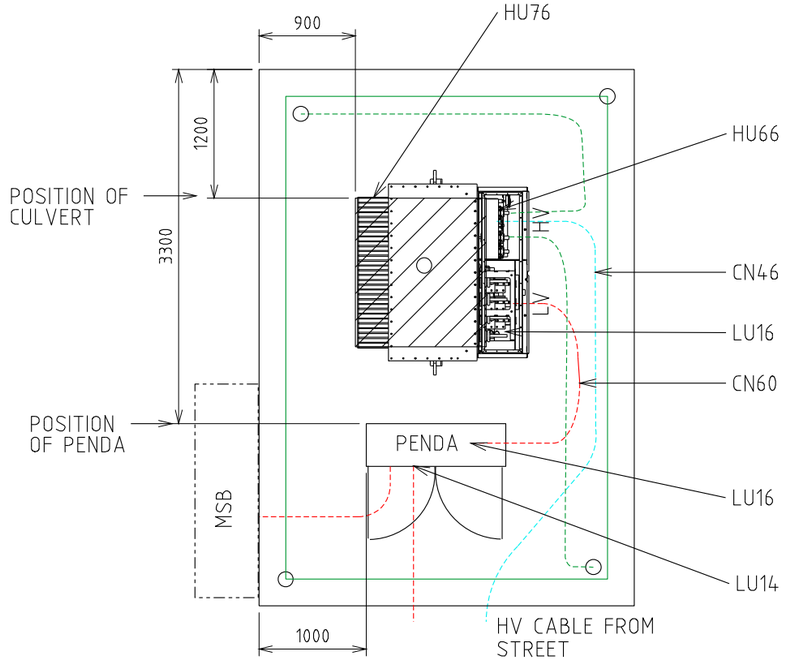
DRAWN: KT	DATE: 21-03-2022	DRG. No. DSPM-3-03
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 2



315, 630 & 1000 kVA



BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416 x 1022 x 1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg



TRANSFORMER MATERIALS (QTY)

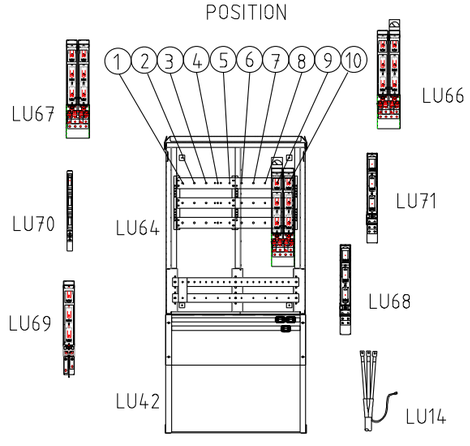
CU	440V	6/11kV	22kV
HU59/315			
HU59/630			
HU59/1000			
HU66			
CN60			
LU16			
HU76			

TYPE 2.1 PENDA LAYOUT

SWG	MAX FUSE	CU	1	2	3	4	5	6	7	8	9	10
TYPE 2.1 PENDA		LU64										
PENDA BASE		LU42										
160A FSD	1 X 63A DIN 00	LU70				L	L					
630 FSD	1 X 400A NH2	LU69	C/S	C/S	C/S	C/S	C/S	C/S	C/S			
910A FSD	1 X 630A NH3	LU68								E		
1260A FSD	2 X 400A NH2	LU67	C		C							
1000A SWD	LINKS SUPPLIED	LU71	C									
2000A SWD	LINKS SUPPLIED	LU66	C1								T1	
FSD CABLE TERM	FUSES SUPPLIED	LU14	S	S	S	L/S	S	S	S			
TX CABLE TERM	TX MCCB	LU16									T1	

T = TRANSFORMER L = LIGHTING CIRCUIT E = EMERGENCY RESPONSE GENERATOR
C = CUSTOMER S= STREET CIRCUIT

POSITION



NOTES:-
1. INSTALL CABLE CLAMP ON EACH PHASE OF HV CABLE (FM0200).
2. LU66 CAN BE USED FOR THE TRANSFORMER AND CUSTOMER.
3. EVERY INSTALLATION SHALL INCLUDE AN ERG CONNECTION LU68.
4. 2 x LU70 OR 1 x LU69 CAN BE USED IN POSITION 4.
5. 1 X LU14 NEEDED WITH EACH LU69 STREET FEEDER OR LU70 LIGHTING CIRCUIT.
6. 1 X LU16 NEEDED WITH EACH LU66_TX IN PENDA AND 1 X LU16 FOR LU59 (NON-MPS).
7. LU66_TX WILL DEFAULT TO POSITIONS 9 & 10 UNLESS POSITION 1 & 2 IS SPECIFIED BY THE DESIGNER.
8. STANDARD PENDA LAYOUT SHOWN. DESIGNER MAY DESIGN AN ALTERNATIVE PENDA LAYOUT.
9. NO GANGED FSD OR SWD PERMITTED SPANING POSITIONS 5 & 6 OR 6 & 7.
10. LU71 ONLY TO BE USED WHERE THERE IS UPSTREAM LV PROTECTION (I.E. MKII NON MPS).
11. NO GANGED FSD OR SWD PERMITTED SPANING POSITIONS 5 & 6 OR 6 & 7.
12. REFER DSPM CHAPTER 4 FOR THE CORRECT POSITIONING OF THE NON-MPS ONTO THE CULVERT.
13. MEASUREMENTS SHOWN ARE ± 50mm, SAME CONSTRUCTION TOLERANCE APPLIES.
14. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

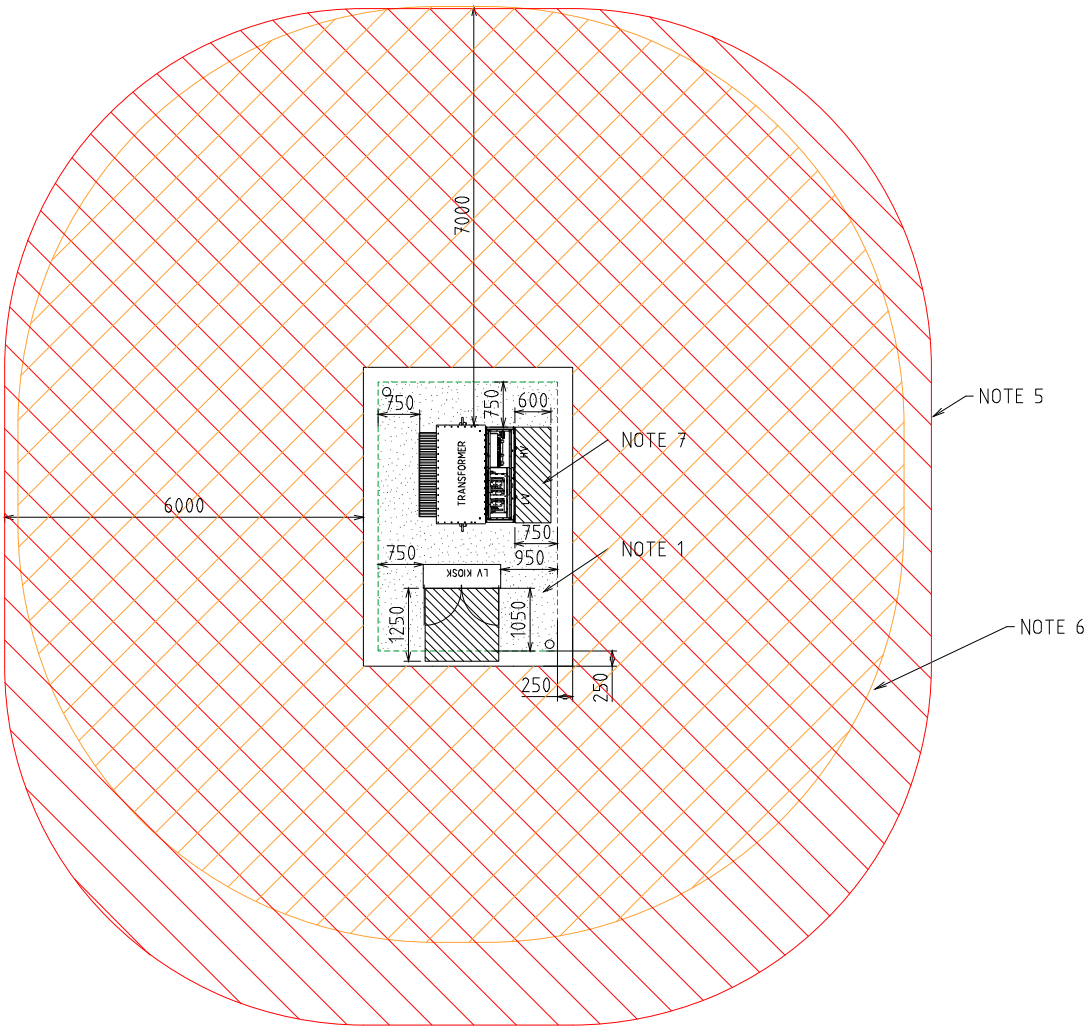
TITLE

DISTRICT SUBSTATION
UP TO 1000kVA (NON MPS)
NON FIRE RATED
EQUIPMENT & SITE LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 23-03-2022	DRG. No. DSPM-3-03
ORIGINATED: KT	SCALE: NTS	
CHECKED: PC		
APPROVED: PHIL CAPPER		REV. A / SHT. 3



FIRE RISK ZONE

EARTHING (STEP AND TOUCH)

TRANSFORMER NOISE IMPACT ZONE

OPERATIONAL

NOTES:-

1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO TRANSFORMER.
   USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION DESIGN DRAWING.
5. FIRE RISK ZONE IS TO BE SHOWN FROM THE EDGE OF THE SUBSTATION SITE.
   OIL CONTAINMENT TO BE USED TO KEEP THE OIL WITHIN THE SITE. FIRE RISK ZONE
   MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER DSPM CHAPTER 5.
6. NOISE IMPACT ZONE IS BASED ON 1000 kVA TRANSFORMER AND IS MEASURED FROM THE EDGE
   OF THE TRANSFORMER TANK. NOISE IMPACT ZONE MAY BE REDUCED IF MITIGATION OPTIONS
   ARE USED. REFER TO "NOISE COMPLIANCE REQUIREMENTS FOR DISTRIBUTION TRANSFORMERS" GUIDELINE.
7. OPERATIONAL CLEARANCE IN FRONT OF TRANSFORMER SHOWN WITH DOORS LIFTED OFF.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

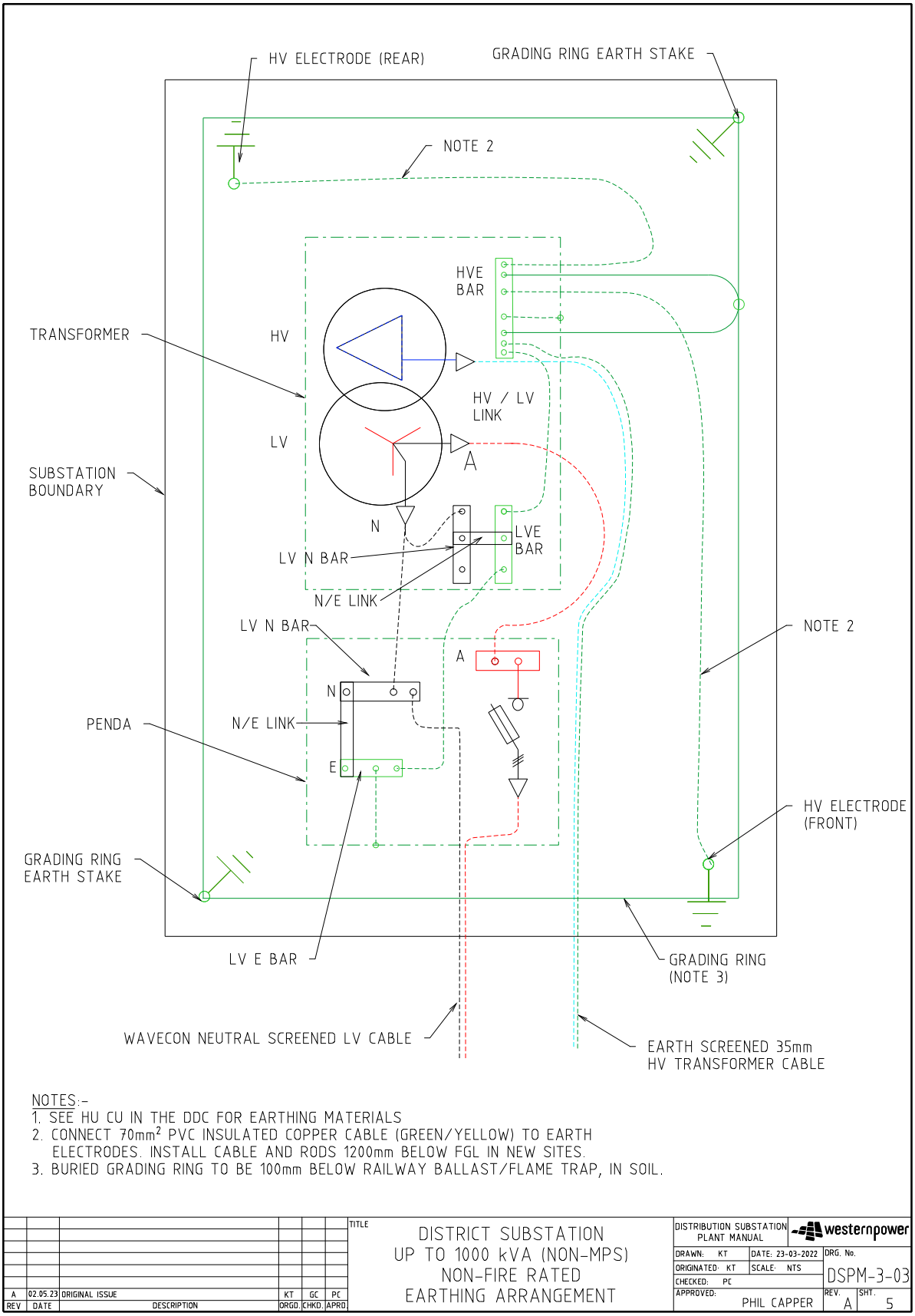
TITLE

DISTRICT SUBSTATION UP TO 1000kVA (NON MPS) NON FIRE RATED OPERATIONAL CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 23-03-2022	ORG. No. DSPM-3-03
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 4



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

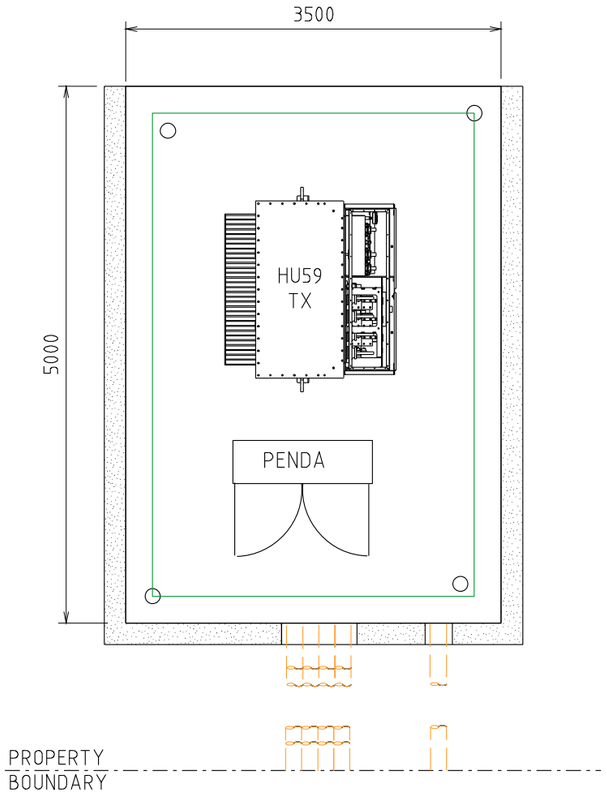
TITLE

DISTRICT SUBSTATION UP TO 1000 kVA (NON-MPS) NON-FIRE RATED EARTHING ARRANGEMENT

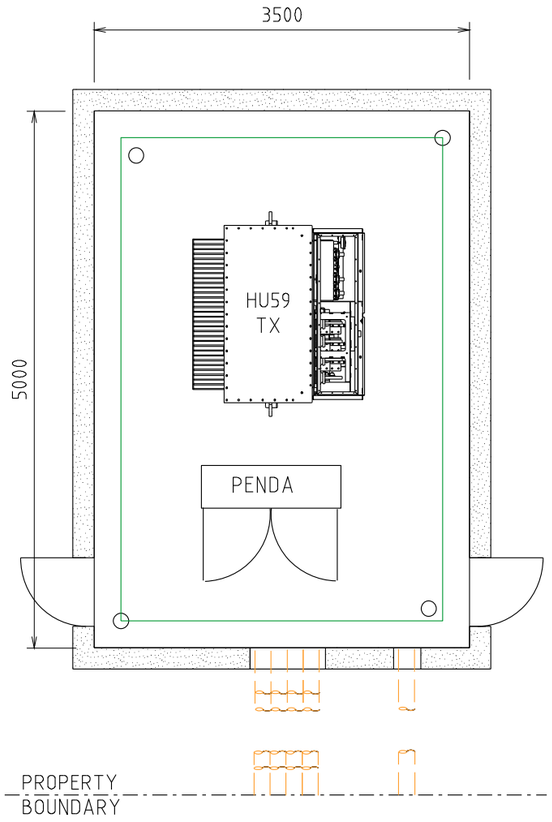
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

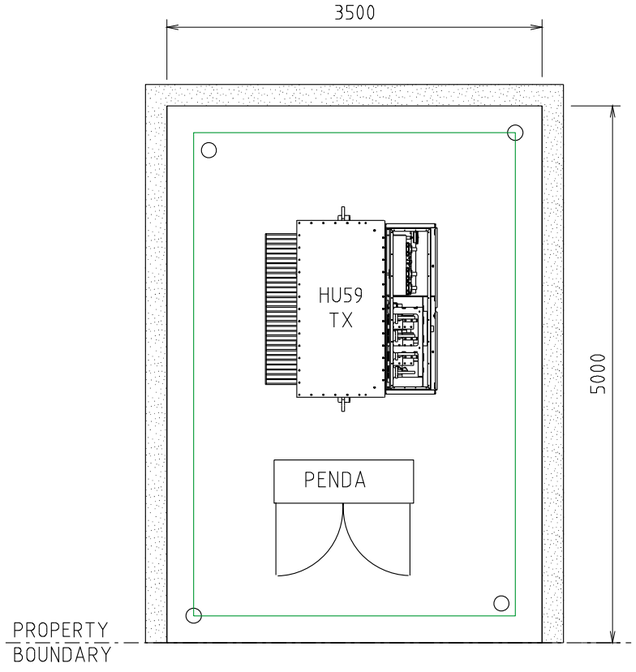
DRAWN: KT	DATE: 23-03-2022	DRG. No. DSPM-3-03
ORIGINATED: KT	SCALE: NTS	
CHECKED: PC		
APPROVED: PHIL CAPPER		REV. A SHT. 5



PARTIAL (FRONT) SCREENING



FULL SCREENING



PARTIAL (REAR) SCREENING

NOTES:-

1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTO SUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE.
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING (MASONARY, ETC.)
6. 2HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER DSPM CHAPTER 5 (FIRE RISK)
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8m (HEIGHT OF TRANSFORMER + 300mm).
8. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

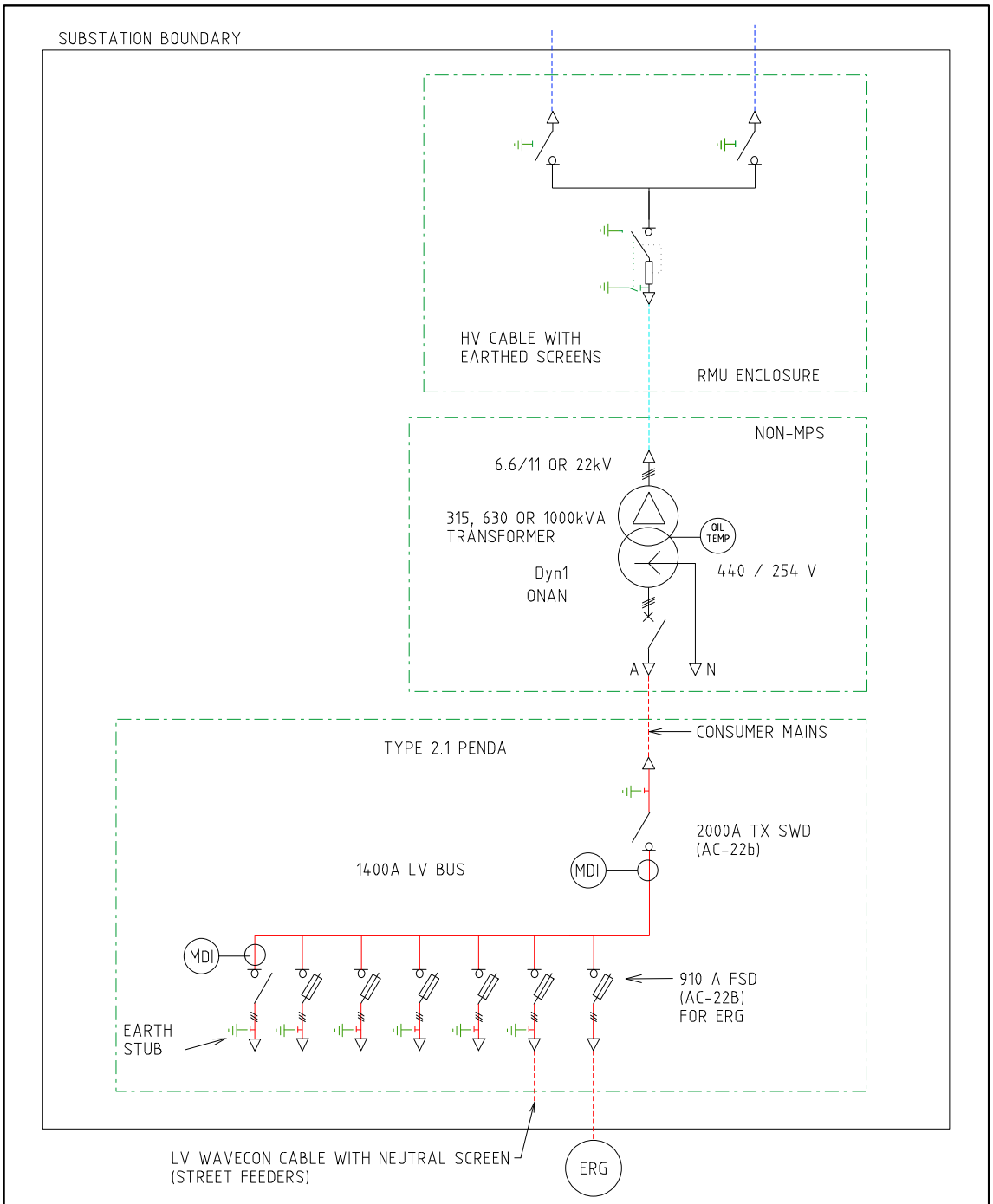
DISTRICT SUBSTATION UP TO 1000 kVA (NON-MPS) NON-FIRE RATED SCREENING ARRANGEMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 23-03-2022	DRG. No. DSPM-3-03
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 6

4.2.4 DSPM-3-04 Up to 1000kVA (Non-MPS) with HV SWGR



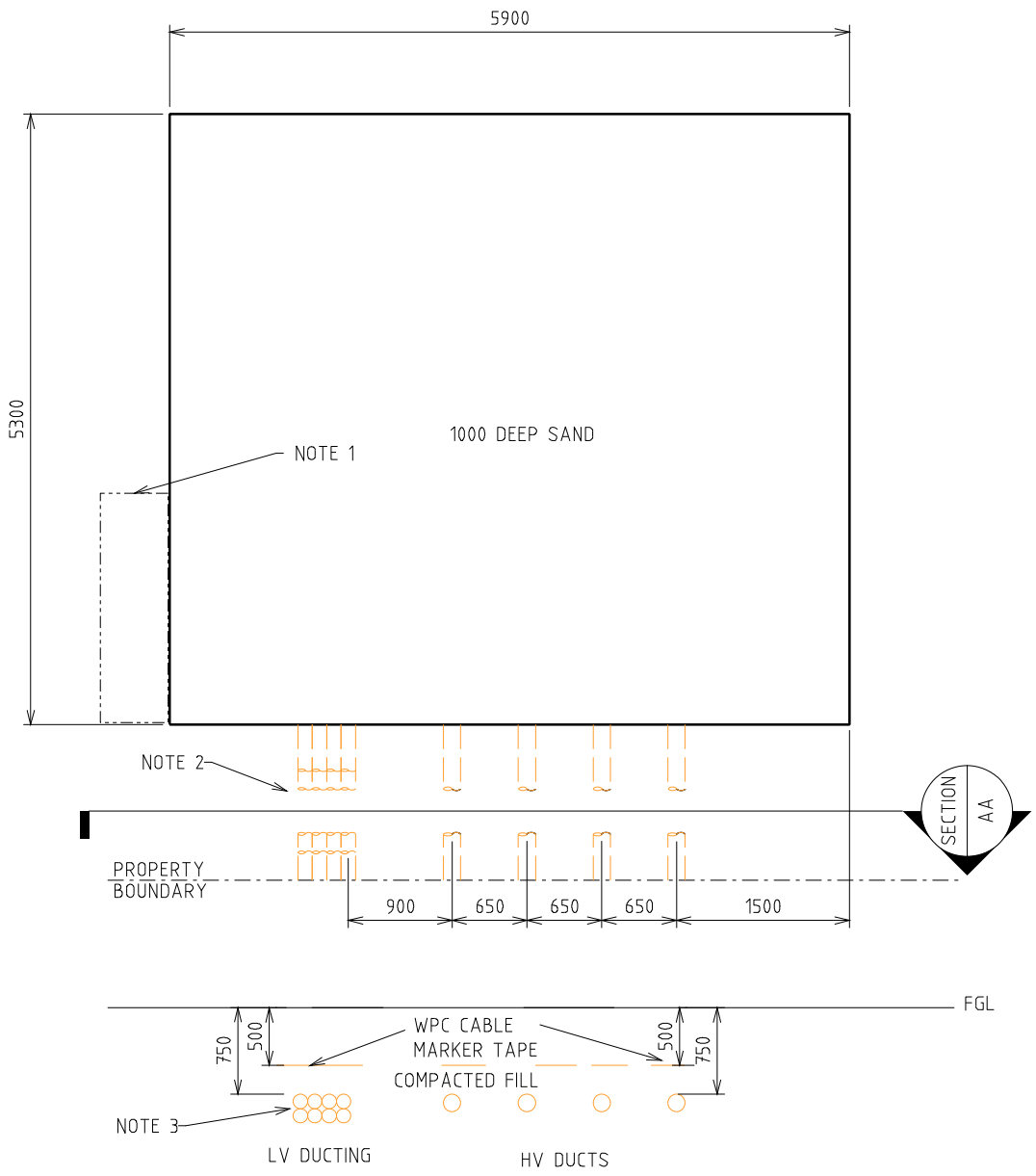
NOTES:-
1. 2+1 RMU OPTION SHOWN (2 SWITCH-DISCONNECTORS AND 1 COMBINED FUSE-SWITCH)
2. OTHER OPTIONS (NOT SHOWN) INCLUDE 3+0, 2+2 OR 3+1
3. HV SWITCH-DISCONNECTORS MAY BE MOTORISED AND AUTOMATED
4. PENDA LAYOUT TO BE DETERMINED BY THE DESIGNER, SEE SHEET 3 AND DSPM CHAPTER 4.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: DISTRICT SUBSTATION UP TO 1000 kVA (NON- MPS) NON-FIRE RATED - WITH HV SWGR SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL

DRAWN: KT	DATE: 28-03-2022	DRG. No. DSPM-3-04
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 1



SECTION AA

NOTES:-
1. SITE OF CUSTOMERS MAIN DISTRIBUTION BOARD (IF REQUIRED).
2. DUCTING REQUIRED IF LAND IS SET BACK FROM THE ROAD RESERVE BOUNDARY OR IF SCREENING IS REQUIRED.
3. 8x100 (LV) & 4x150 (HV) ID HEAVY DUTY DUCTS (CN56).
4. LAND AREA TO BE INCREASED IF SCREENING IS REQUIRED (SEE SHEET 6)

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: DISTRICT SUBSTATION UP TO 1000 kVA (NON-MPS) NON-FIRE RATED - WITH HV SWGR REQUIREMENTS AND DUCT INSTALLATION

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT | DATE: 28-03-2022

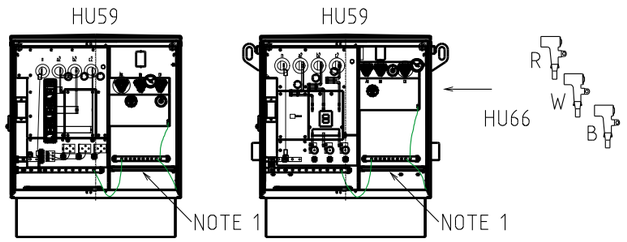
ORIGINATED: KT | SCALE: NTS

CHECKED: GC

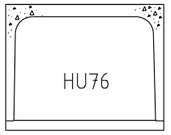
APPROVED: PHIL CAPPER

DRG. No. DSPM-3-04

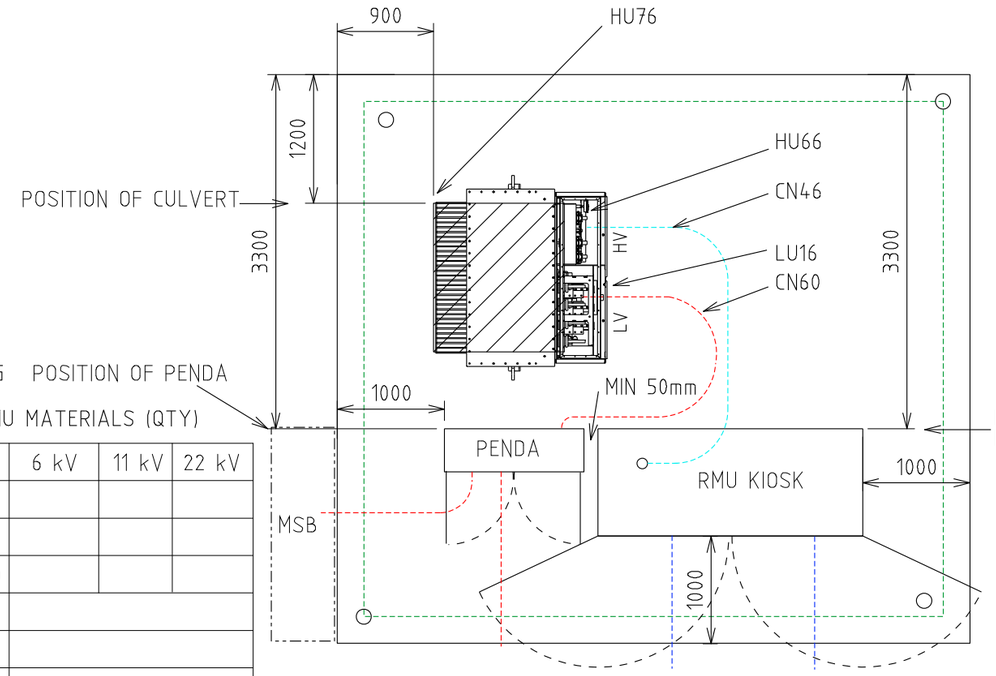
REV. A | SHT. 2

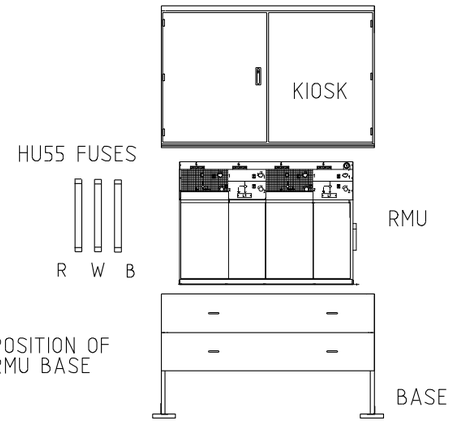


315, 630 & 1000 kVA



BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416 x 1022 x 1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg





TRANSFORMER MATERIALS (QTY)

CU	440V	6/11kV	22kV
HU59/315			
HU59/630			
HU59/1000			
HU66			
CN60			
LU16			
HU76			

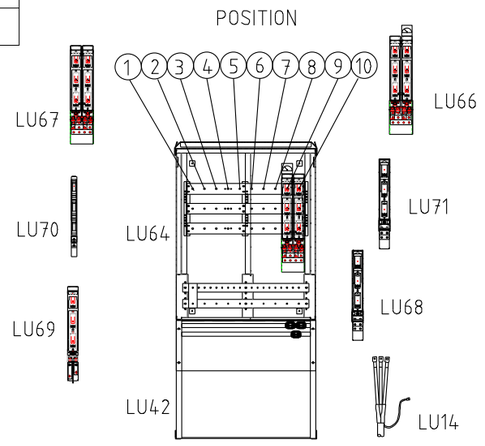
RMU MATERIALS (QTY)

CU	6 kV	11 kV	22 kV
HU55/315			
HU55/630			
HU55/1000			
HU6			
HU7			
HU8			
HU80			
HU81			
CN46			
DA6			
DA10			

TYPE 2.1 PENDA LAYOUT

SWG	MAX FUSE	CU	1	2	3	4	5	6	7	8	9	10
TYPE 2.1 PENDA		LU64										
PENDA BASE		LU42										
160A FSD	1 X 63A DIN 00	LU70				L	L					
630 FSD	1 X 400A NH2	LU69	C/S	C/S	C/S	C/S	C/S	C/S	C/S			
910A FSD	1 X 630A NH3	LU68								E		
1260A FSD	2 X 400A NH2	LU67	C			C						
1000A SWD	LINKS SUPPLIED	LU71	C									
2000A SWD	LINKS SUPPLIED	LU66	C1									T1
FSD CABLE TERM	FUSES SUPPLIED	LU14	S	S	S	L/S	S	S	S			
TX CABLE TERM	TX MCCB	LU16										T1

T = TRANSFORMER L = LIGHTING CIRCUIT E = EMERGENCY RESPONSE GENERATOR
C = CUSTOMER S= STREET CIRCUIT



NOTES:-
1. INSTALL CABLE CLAMP ON EACH PHASE OF HV CABLE (FM0200).
2. LU66 CAN BE USED FOR THE TRANSFORMER AND CUSTOMER.
3. EVERY INSTALLATION SHALL INCLUDE AN ERG CONNECTION LU68.
4. 2 x LU70 OR 1 x LU69 CAN BE USED IN POSITION 4.
5. 1 X LU14 NEEDED WITH EACH LU69 STREET FEEDER OR LU70 LIGHTING CIRCUIT.
6. 1 X LU16 NEEDED WITH EACH LU66_TX IN PENDA AND 1 X LU16 FOR LU59 (NON-MPS).
7. LU66_TX WILL DEFAULT TO POSITIONS 9 & 10 UNLESS POSITION 1 & 2 IS SPECIFIED BY THE DESIGNER.
8. STANDARD PENDA LAYOUT SHOWN. DESIGNER MAY DESIGN AN ALTERNATIVE PENDA LAYOUT.
9. NO GANGED FSD OR SWD PERMITTED SPANING POSITIONS 5 & 6 OR 6 & 7.
10. LU71 ONLY TO BE USED WHERE THERE IS UPSTREAM LV PROTECTION (I.E. MKII NON MPS).
11. NO GANGED FSD OR SWD PERMITTED SPANING POSITIONS 5 & 6 OR 6 & 7.
12. REFER DSPM CHAPTER 4 FOR THE CORRECT POSITIONING OF THE NON-MPS ONTO THE CULVERT.
13. REFER TO DSPM CHAPTER 4 FOR THE CORRECT INSTALLATION OF THE RMU BASE.
14. MEASUREMENTS SHOWN ARE ± 50mm, SAME CONSTRUCTION TOLERANCE APPLIES.
15. RMU, KIOSK BASE AND CABLE TERMINATIONS SUPPLIED IN RMU CU.
16. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.
17. REFER TO DSPM CHAPTER 4 FOR AUTOMATION DETAILS.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

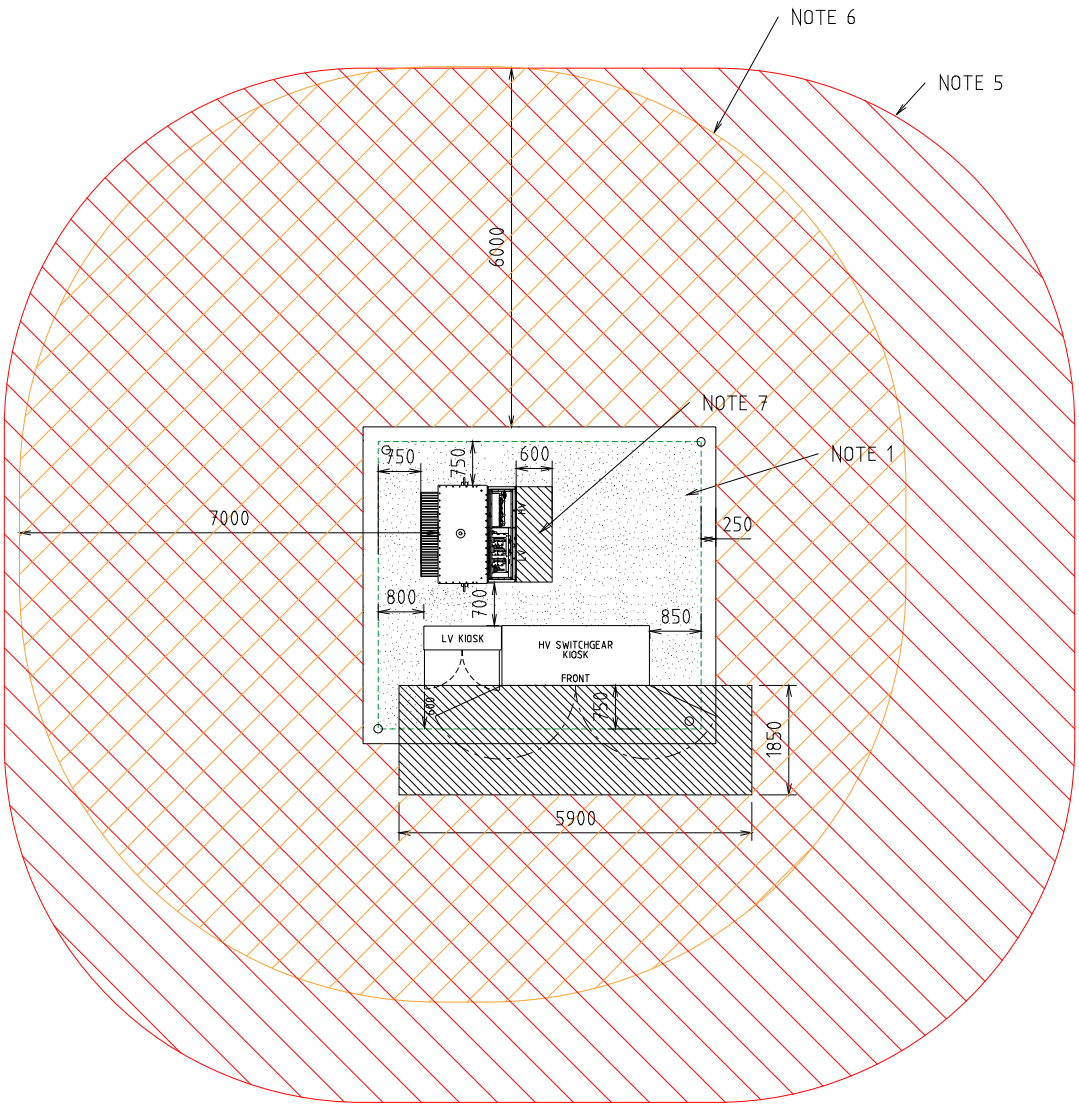
TITLE

DISTRICT SUBSTATION
UP TO 1000 kVA (NON-MPS)
NON-FIRE RATED - WITH HV SWGR
EQUIPMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 28-03-2022	DRG. No.	DSPM-3-04
ORIGINATED: KT	SCALE: NTS		
CHECKED: GC			
APPROVED: PHIL CAPPER		REV. A	SHT. 3



FIRE RISK ZONE

EARTHING (STEP AND TOUCH)

TRANSFORMER NOISE IMPACT ZONE

OPERATIONAL

NOTES:-

1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO TRANSFORMER AND RMU. USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM.
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION DESIGN DRAWING.
5. FIRE RISK ZONE IS TO BE SHOWN FROM THE EDGE OF THE SUBSTATION SITE. OIL CONTAINMENT TO BE USED TO KEEP THE OIL WITHIN THE SITE. FIRE RISK ZONE MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER DSPM CHAPTER 5.
6. NOISE IMPACT ZONE IS BASED ON 1000 kVA TRANSFORMER AND IS MEASURED FROM THE EDGE OF THE TRANSFORMER TANK. NOISE IMPACT ZONE MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER TO "NOISE COMPLIANCE REQUIREMENTS FOR DISTRIBUTION TRANSFORMERS" GUIDELINE.
7. OPERATIONAL CLEARANCE IN FRONT OF TRANSFORMER SHOWN WITH DOORS LIFTED OFF.

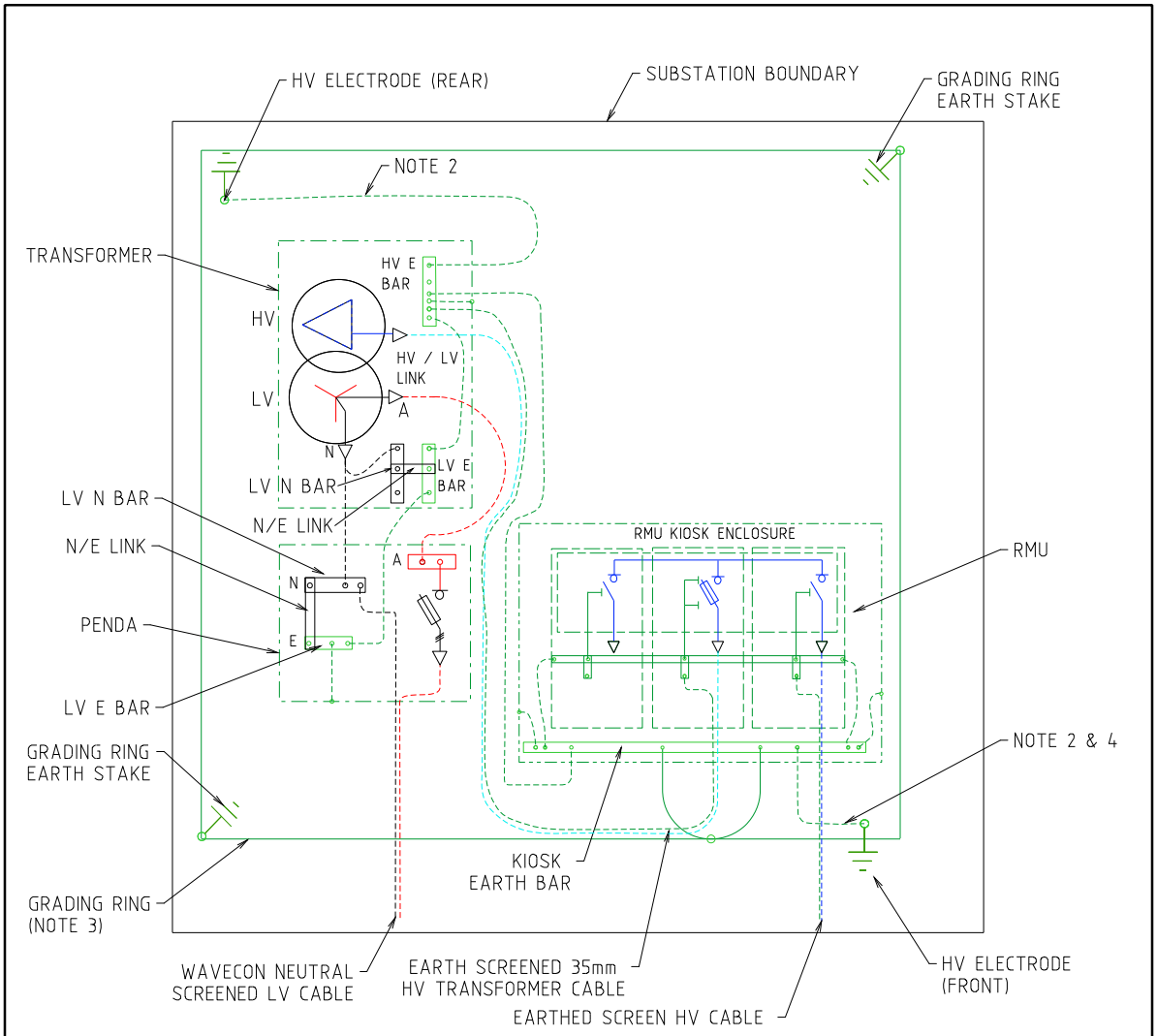
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: DISTRICT SUBSTATION UP TO 1000 kVA (NON-MPS) NON-FIRE RATED - WITH HV SWGR CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 29-03-2022	DRG. No. DSPM-3-04
ORIGINATED: KT	SCALE: NTS	
CHECKED: PC		
APPROVED: PHIL CAPPER		REV. A / SHT. 4



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS.
2. CONNECT 70mm^2 PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.
4. LOOP EARTH CABLES TO EARTH RODS INSIDE KIOSK FOR EASE OF TESTING.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

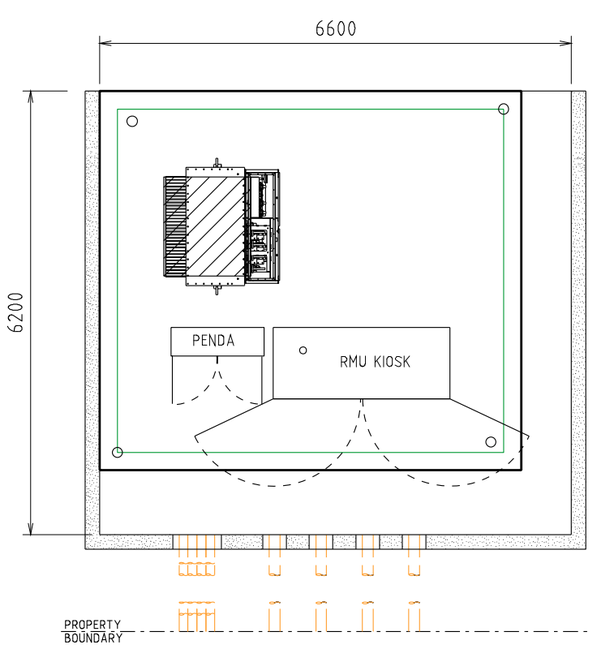
TITLE

DISTRICT SUBSTATION UP TO 1000 kVA NON- MPS NON-FIRE RATED - WITH HV SWGR EARTHING ARRANGEMENT

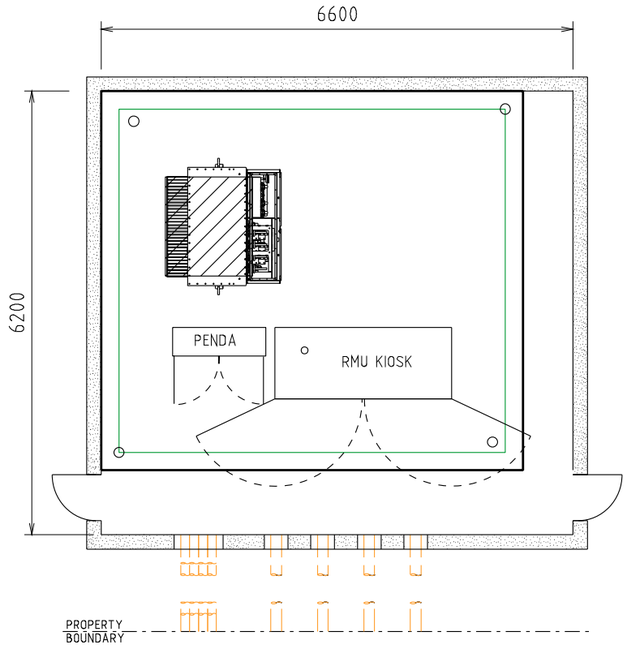
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

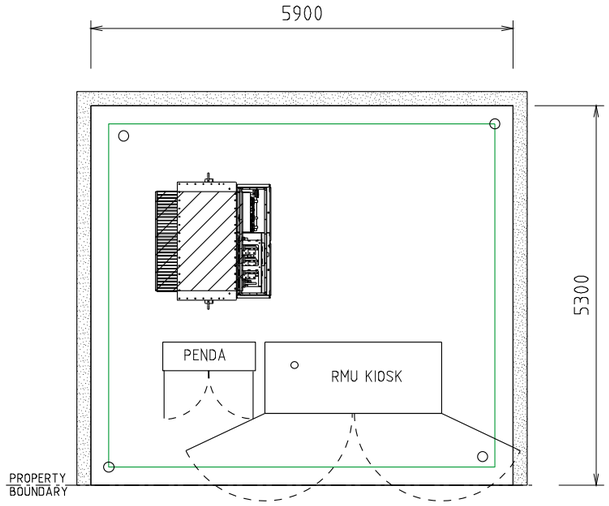
DRAWN: KT	DATE: 30-03-2022	DRG. No. DSPM-3-04
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 5



PARTIAL (FRONT) SCREENING



FULL SCREENING



PARTIAL (REAR) SCREENING

NOTES:-
1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTOSUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING (MASONARY, ETC.)
6. 2HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER DSPM CHAPTER 5 (FIRE RISK)
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8M (HEIGHT OF TRANSFORMER + 300mm).
8. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

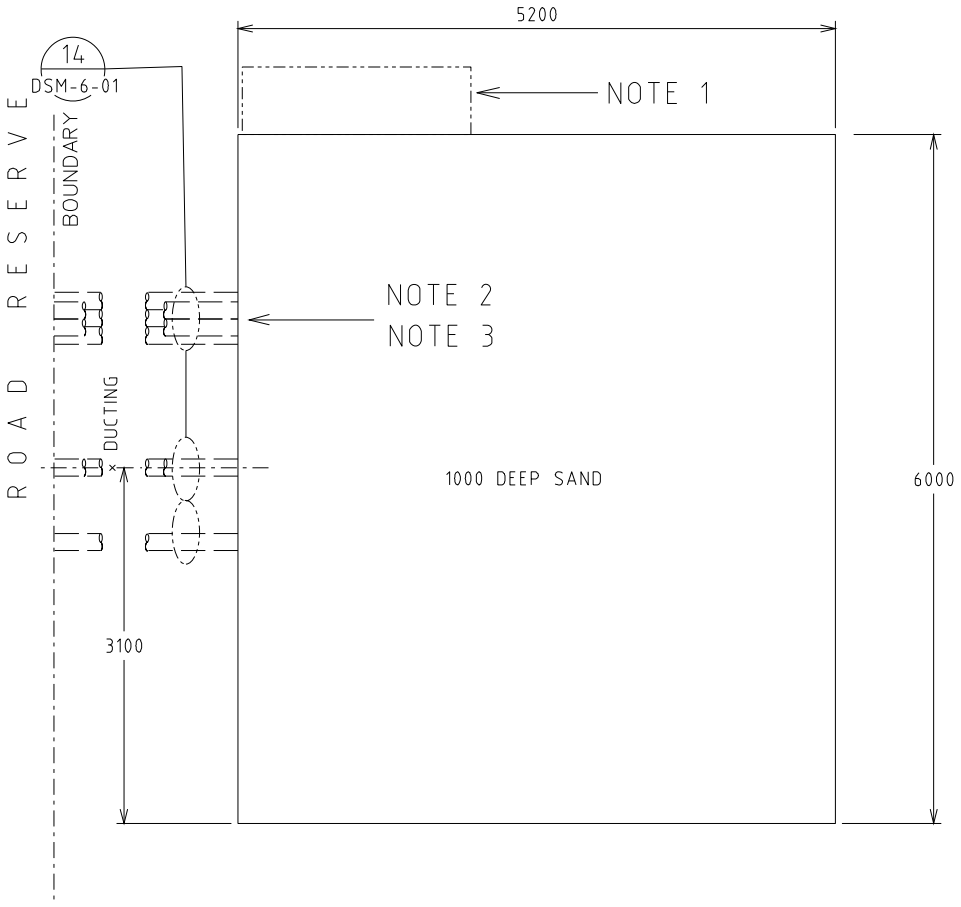
DISTRICT SUBSTATION
UP TO 1000 kVA NON- MPS
NON-FIRE RATED - WITH HV SWGR
SCREENING ARRANGEMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 30-03-2022	DRG. No. DSPM-3-04
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 6

4.2.5 DSM-3-05 Up to 2000kVA (Non-MPS)



NOTES:-
1. SITE OF CUSTOMERS MAIN DISTRIBUTION BOARD (IF REQUIRED).
2. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
3. 9 - 150 ID HEAVY DUTY DUCTING. SEE DSM SECTION 6 FOR DETAILS

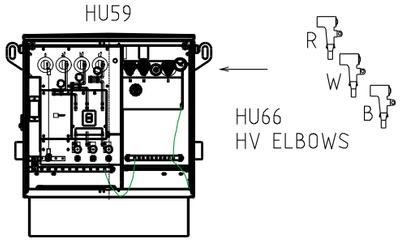
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	14.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: DISTRICT SUBSTATION UP TO 2000kVA (NON MPS) NON FIRE RATED-WITHOUT HV SWGR CIVIL & LAND REQUIREMENTS

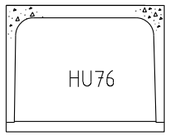
DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 12-11-2019	DRG. No. DSM-3-05
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. A SHT. 1



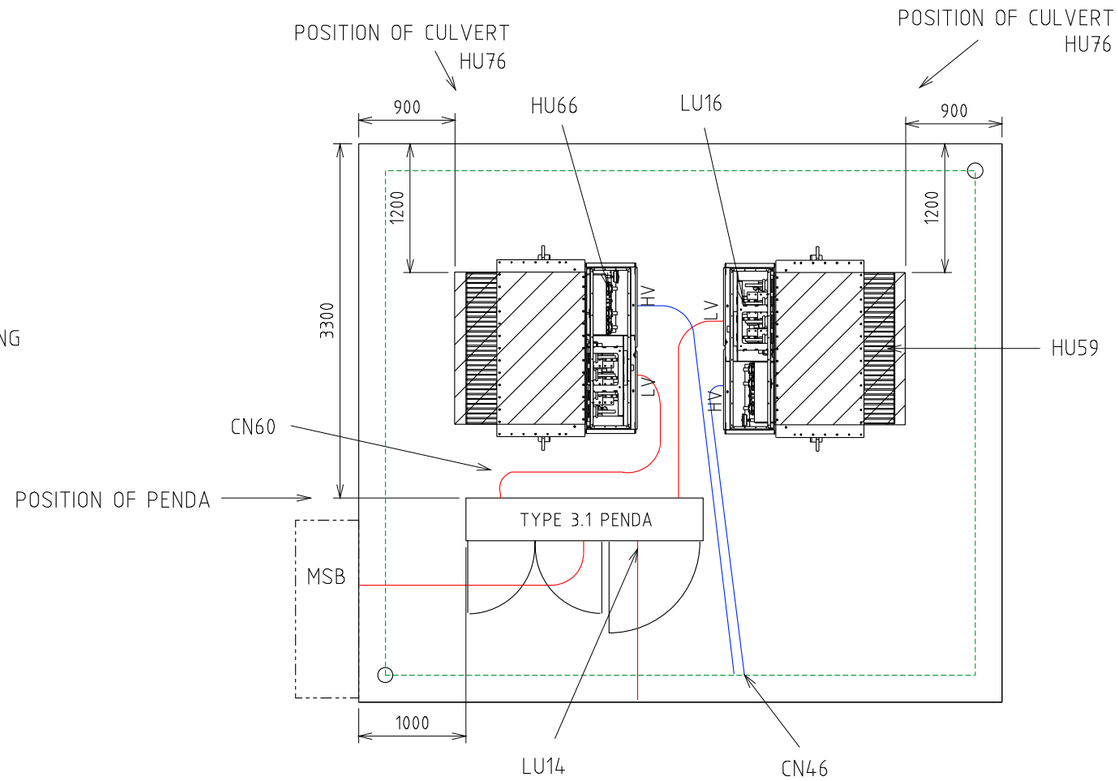
630 AND 1000 kVA



BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416 x 1022 x 1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg

TRANSFORMER MATERIALS (QTY)

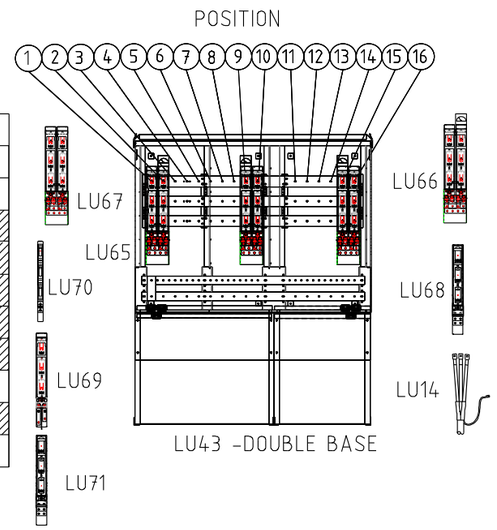
CU	440V	6/11kV	22kV
HU59/630		NOTE 11	NOTE 11
HU59/1000			
HU66			
CN60			
LU16			
HU76			



TYPE 3.1 PENDA LAYOUT AND MATERIALS QTY

SWG	MAX FUSE	CU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TYPE 3.1 PENDA		LU65																
PENDA BASE		LU43																
160A FSD	1 X 63A DIN 00	LU70				L	L											
630 FSD	1 X 400A NH2	LU69				C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S			
910A FSD	1 X 630A NH3	LU68			E											E		
1260A FSD	2 X 400A NH2	LU67				C			C		C		C					
1000A SWD	LINKS SUPPLIED	LU71	C															
2000A SWD	LINKS SUPPLIED	LU66	T2								C1						T1	
FSD CABLE TERM	FUSES SUPPLIED	LU14				L/S	S	S	S	S	S	S	S	S	S			
TX CABLE TERM	TX MCCB	LU16	T2														T1	

T = TRANSFORMER
C = CUSTOMER
L = LIGHTING CIRCUIT
S= STREET CIRCUIT
E = EMERGENCY RESPONSE GENERATOR



NOTES:-

1. LU66 CAN BE USED FOR THE TRANSFORMER AND CONTIGUOS CUSTOMER.
2. EVERY INSTALLATION SHALL INCLUDE AN ERG CONNECTION 2 x LU68.
3. 2 x LU70 OR 1 x LU69 CAN BE USED IN POSITION 4.
4. 1 x LU14 NEEDED WITH EACH LU69 STREET FEEDER OR LU70 LIGHTING CIRCUIT.
5. 1 x LU16 NEEDED WITH EACH LU66_TX IN PENDA AND 1 x LU16 FOR EACH LU59 (NON-MPS).
6. LARGE CUSTOMER CONNECTED VIA A 2000A SWITCH (LU66) MUST ALWAYS BE IN POSITIONS 7 & 8 OR 9 & 10.
7. STANDARD PENDA LAYOUT SHOWN. DESIGNER MAY DESIGN AN ALTERNATIVE PENDA LAYOUT.
8. NO GANGED FSD OR SWD PERMITTED SPANNING POSITIONS 5 & 6, 6 & 7 OR 10 & 11.
9. REFER DSPM CHAPTER 4 FOR THE CORRECT INSTALLATION OF THE PENDA BASE.
10. REFER DSPM CHAPTER 4 FOR THE CORRECT POSITIONING OF THE NON-MPS ONTO THE CULVERT.
11. DESIGNER TO REQUEST FOR 2 x ETEL TRANSFORMERS FOR DUAL 630kVA LAYOUT.
12. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

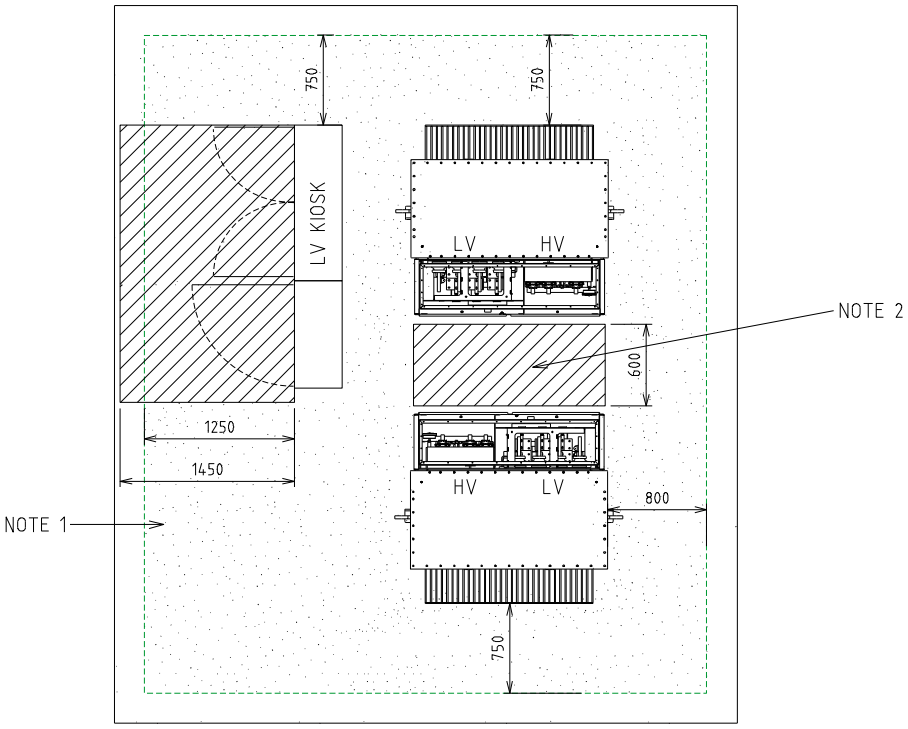
TITLE

DISTRICT SUBSTATION
UP TO 2000 kVA (NON- MPS)
NON FIRE RATED - WITHOUT HV SWGR
EQUIPMENT SELECTION & LAYOUT

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 12-11-2019	DRG. No. DSM-3-05
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY	REV. A	SHT. 2



MINIMUM CLEARANCE REQUIRED FOR EARTHING PURPOSES.
(STEP AND TOUCH POTENTIAL)

MINIMUM CLEARANCE REQUIRED FOR OPERATIONAL PURPOSES

NOTES:-
1. CLEARANCES TO BE USED FOR EARTHING STUDY / CALCULATION OF TOUCH VOLTAGES (WITH DOORS CLOSED)
2. OPERATIONAL CLEARANCES IN FRONT OF TRANSFORMERS SHOWN WITH DOORS LIFTED OFF

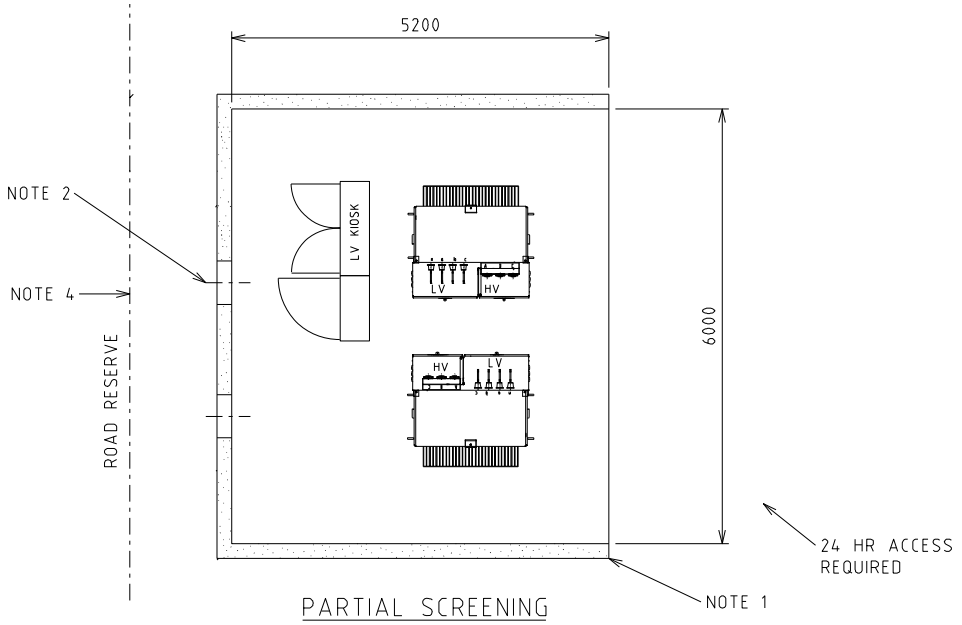
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: DISTRICT SUBSTATION UP TO 2000kVA (NON MPS) NON FIRE RATED-WITHOUT HV SWGR OPERATIONAL CLEARANCES

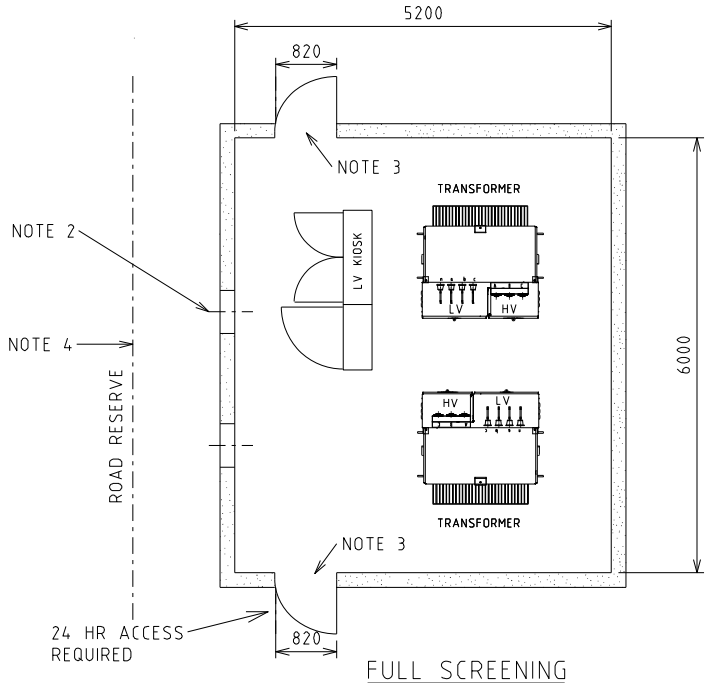
DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 12-11-2019	DRG. No. DSM-3-05
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. A / SHT. 3



PARTIAL SCREENING



FULL SCREENING

NOTES:-

1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW SAFE EXCAVATION 1200 DEEP. SCREENING NOT TO ENCROACH INTO SUBSTATION LAND REQUIREMENTS. SCREENING TYPES SHALL BE NON-COMBUSTIBLE, FENCING, MASONARY WALLS etc..
2. INDICATIVE OF DUCTING ONLY, FOR DETAILS REFER TO SECTION 6.
3. OPENINGS MUST BE A MINIMUM OF 820 WIDE. OPEN DOORS SHOULD NOT BLOCK EXIT WAY. DOORS ARE OPTIONAL.
4. VEHICLE ACCESS. CLEARANCES MUST BE MAINTAINED. AREA TO BE KEPT CLEAR TO ENSURE ACCESS. SITE SPECIFIC REQUIREMENTS TO BE DETERMINED BY DESIGNER.
5. SCREENING DESIGN TO BE APPROVED BY SUBSTATION DESIGNER PRIOR TO CONSTRUCTION. OPERATIONAL AND EARTHING CLEARANCES SHOWN ON SHEET 3 MUST BE MAINTAINED WITH SCREENING INSTALLED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	04.12.19	ORIGINAL ISSUE	GC	CO	GS

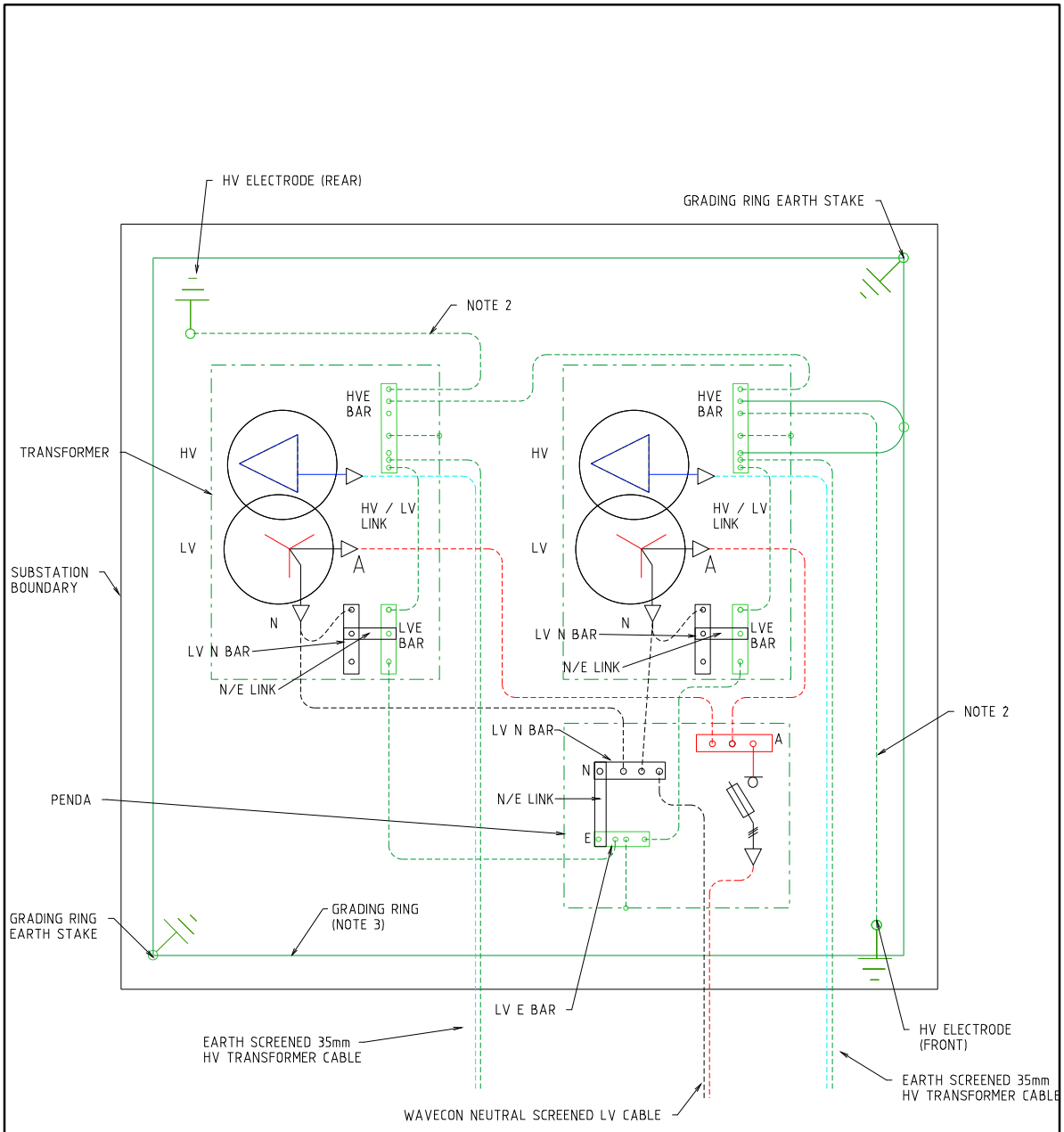
TITLE

DISTRICT SUBSTATION
UP TO 2000kVA (NON MPS)
NON FIRE RATED-WITHOUT HV SWGR
PERMISSABLE SCREENING ARRANGEMENTS

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 12-11-2019	DRG. No. DSM-3-05
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. A / SHT. 4



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

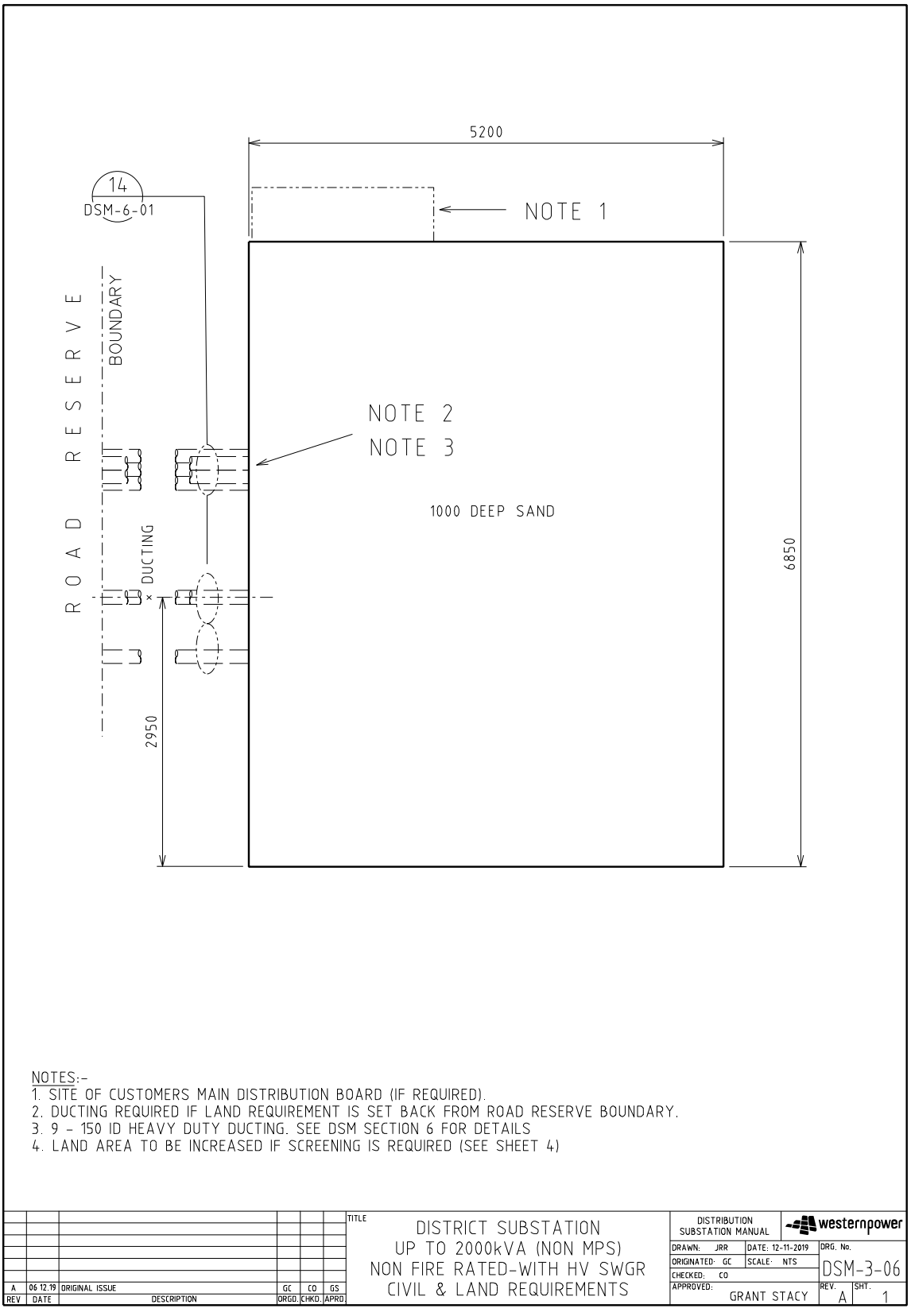
DISTRICT SUBSTATION UP TO 2000 kVA (NON-MPS) NON-FIRE RATED EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: KT	DATE: 22-08-2022	DRG. No. DSM-3-05
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 5

4.2.6 DSM-3-06 Up to 2000kVA (Non-MPS) with HV SWGR



NOTES:-
1. SITE OF CUSTOMERS MAIN DISTRIBUTION BOARD (IF REQUIRED).
2. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
3. 9 - 150 ID HEAVY DUTY DUCTING. SEE DSM SECTION 6 FOR DETAILS
4. LAND AREA TO BE INCREASED IF SCREENING IS REQUIRED (SEE SHEET 4)

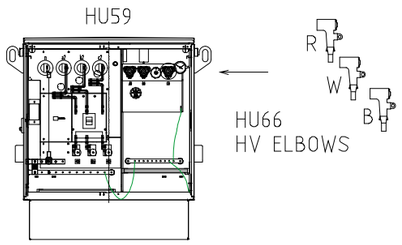
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	06.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: DISTRICT SUBSTATION UP TO 2000kVA (NON MPS) NON FIRE RATED-WITH HV SWGR CIVIL & LAND REQUIREMENTS

DISTRIBUTION SUBSTATION MANUAL

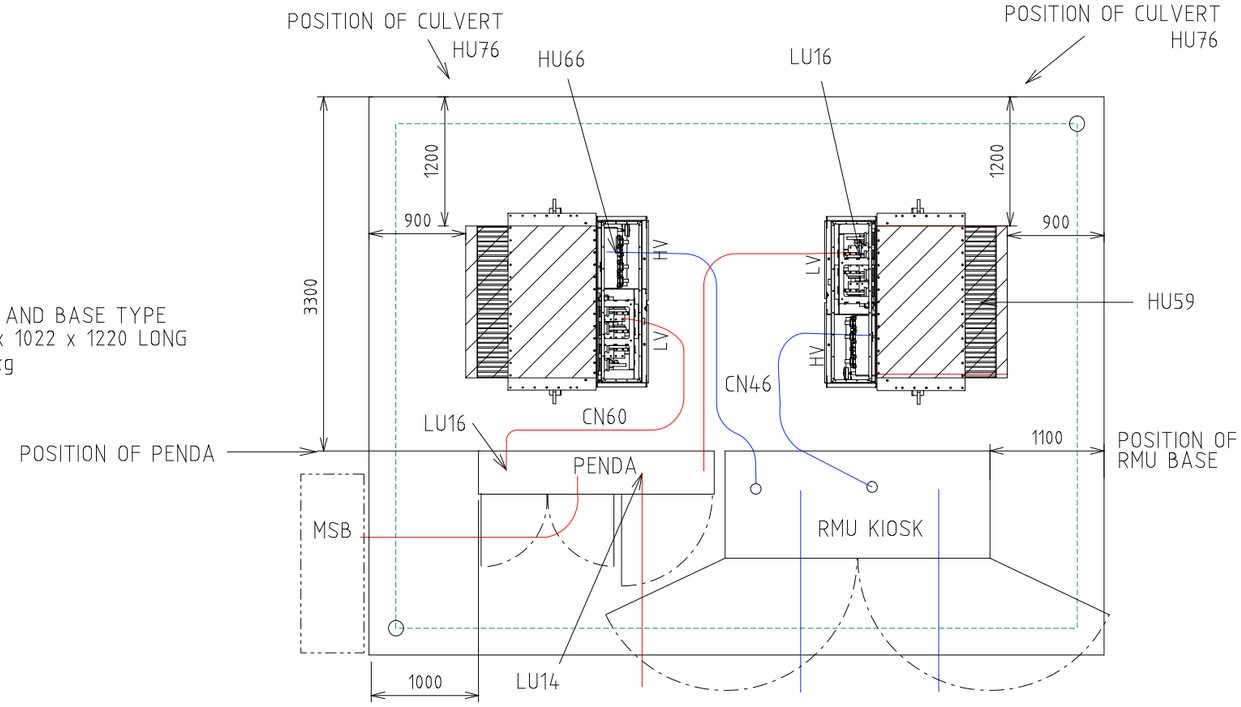
westernpower

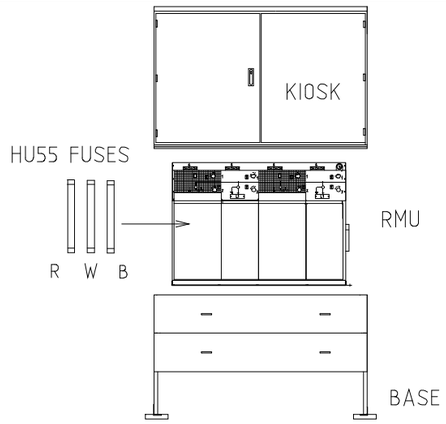
DRAWN: JRR	DATE: 12-11-2019	DRG. No. DSM-3-06
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. A SHT. 1



630 AND 1000 kVA

BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416 x 1022 x 1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg





RMU MATERIALS (QTY)

CU	6 kV	11 kV	22 kV
HU55/315			
HU55/630			
HU55/1000			
HU7			
HU80			
HU81			
CN46			
DA6			
DA10			

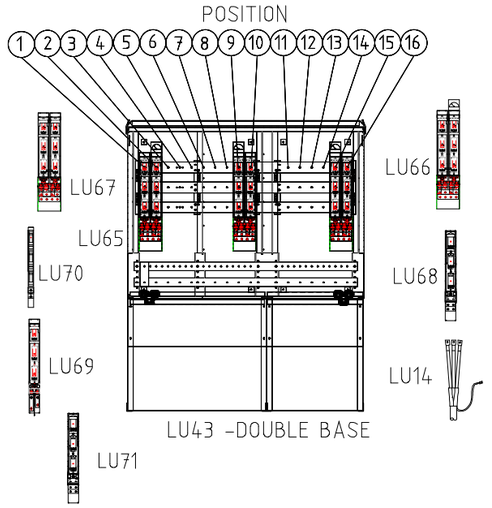
TRANSFORMER MATERIALS (QTY)

CU	440V	6/11kV	22kV
HU59/630		NOTE 13	NOTE 13
HU59/1000			
HU66			
CN60			
LU16			
HU76			

TYPE 3.1 PENDA LAYOUT AND MATERIALS QTY

SWG	MAX FUSE	CU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TYPE 3.1 PENDA		LU65																
PENDA BASE		LU43																
160A FSD	1 X 63A DIN 00	LU70				L	L											
630 FSD	1 X 400A NH2	LU69				C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S			
910A FSD	1 X 630A NH3	LU68			E											E		
1260A FSD	2 X 400A NH2	LU67				C			C		C		C					
1000A SWD	LINKS SUPPLIED	LU71	C															
2000A SWD	LINKS SUPPLIED	LU66	T2								C1						T1	
FSD CABLE TERM	FUSES SUPPLIED	LU14				L/S	S	S	S	S	S	S	S	S	S			
TX CABLE TERM	TX MCCB	LU16	T2														T1	

T = TRANSFORMER
C = CUSTOMER
L = LIGHTING CIRCUIT
S= STREET CIRCUIT
E = EMERGENCY RESPONSE GENERATOR



NOTES

1. LU66 CAN BE USED FOR THE TRANSFORMER AND CONTIGUOS CUSTOMER.
2. EVERY INSTALLATION SHALL INCLUDE AN ERG CONNECTION 2 x LU68.
3. 2 x LU70 OR 1 x LU69 CAN BE USED IN POSITION 4.
4. 1 x LU14 NEEDED WITH EACH LU69 STREET FEEDER OR LU70 LIGHTING CIRCUIT.
5. 1 x LU16 NEEDED WITH EACH LU66_TX IN PENDA AND 1 x LU16 FOR EACH LU59 (NON-MPS).
6. LARGE CUSTOMER CONNECTED VIA A 2000A SWITCH (LU66) MUST ALWAYS BE IN POSITIONS 7 & 8 OR 9 & 10.
7. STANDARD PENDA LAYOUT SHOWN. DESIGNER MAY DESIGN AN ALTERNATIVE PENDA LAYOUT.
8. NO GANGED FSD OR SWD PERMITTED SPANNING POSITIONS 5 & 6, 6 & 7 OR 10 & 11.
9. RMU, KIOSK, BASE AND HV CABLE TERMINATIONS SUPPLIED IN HV SWG CU.
10. REFER DSPM CHAPTER 4 FOR THE CORRECT INSTALLATION OF THE PENDA BASE.
11. REFER DSPM CHAPTER 4 FOR THE CORRECT POSITIONING OF THE NON-MPS ONTO THE CULVERT.
12. REFER TO DSPM CHAPTER 4 FOR CORRECT INSTALLATION OF THE RMU BASE.
13. DESIGNER TO REQUEST FOR 2 x ETEL TRANSFORMERS FOR DUAL 630kVA LAYOUT.
14. REFER TO DSPM CHAPTER 4 FOR AUTOMATION DETAILS.
15. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
B	02.05.23	NOTES AND MATERIAL LIST AMENDED	KT	GC	PC
A	10.12.19	ORIGINAL ISSUE	GC	CO	GS

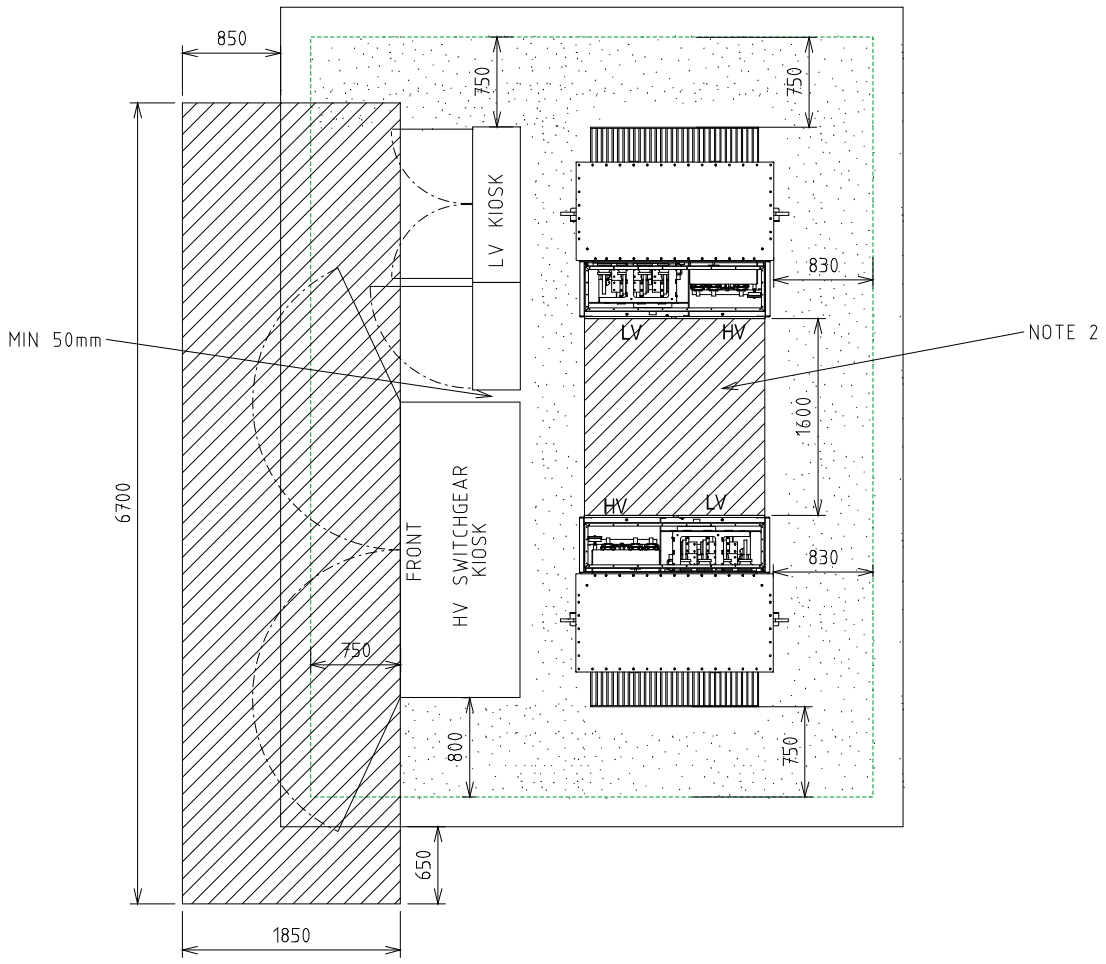
TITLE

DISTRICT SUBSTATION
UP TO 2000kVA (NON MPS)
NON FIRE RATED-WITH HV SWGR
EQUIPMENT & INSTALLATION DETAILS

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 12-11-2019	DRG. No.	
ORIGINATED: GC	SCALE: NTS	DSM-3-06	
CHECKED: CO			
APPROVED: GRANT STACY		REV. B	SHT. 2



MINIMUM CLEARANCE REQUIRED FOR EARTHING PURPOSES.
(STEP AND TOUCH POTENTIAL)

MINIMUM CLEARANCE REQUIRED FOR OPERATIONAL PURPOSES

NOTES:-
1. CLEARANCES TO BE USED FOR EARTHING STUDY / CALCULATION OF TOUCH VOLTAGES (WITH DOORS CLOSED)
2. OPERATIONAL CLEARANCES IN FRONT OF TRANSFORMERS SHOWN WITH DOORS LIFTED OFF

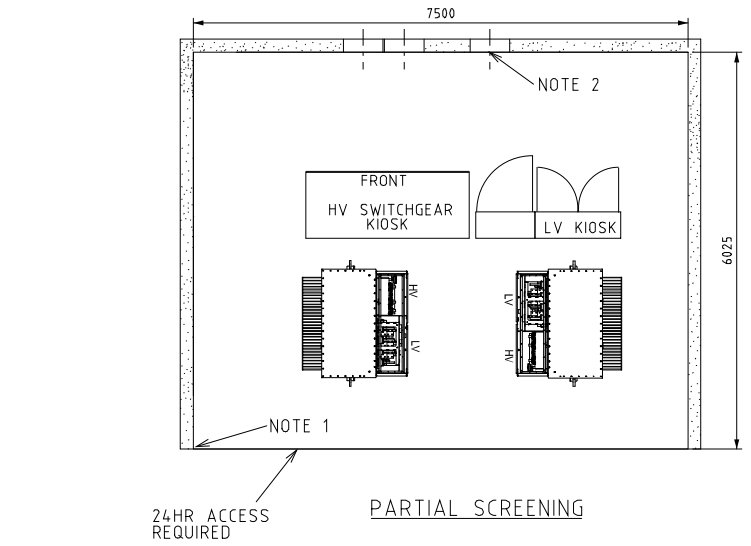
REV.	DATE	DESCRIPTION	DRGD.	CHKD.	APRD.
B	02.05.23	DIMENSIONS AND NOTES AMENDED	KT	GC	PC
A	04.06.19	ORIGINAL ISSUE	GC	CO	GS

TITLE
DISTRICT SUBSTATION
UP TO 2000kVA (NON MPS)
NON FIRE RATED-WITH HV SWGR
OPERATIONAL CLEARANCES

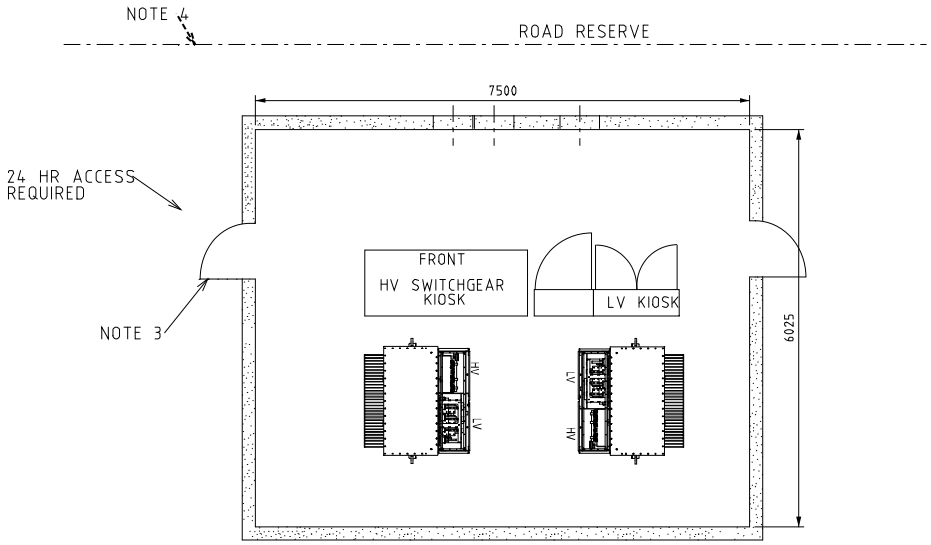
DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 13-11-2019	DRG. No.
ORIGINATED: GC	SCALE: NTS	DSM-3-06
CHECKED: CO		
APPROVED: GRANT STACY		REV. B SHT. 3



PARTIAL SCREENING



FULL SCREENING

NOTES:-

1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW SAFE EXCAVATION 1200 DEEP. SCREENING NOT TO ENCROACH INTO SUBSTATION LAND REQUIREMENTS. SCREENING TYPES SHALL BE NON-COMBUSTIBLE, FENCING, MASONARY WALLS etc...
2. INDICATIVE OF DUCTING ONLY, FOR DETAILS REFER TO SECTION 6.
3. OPENINGS MUST BE A MINIMUM OF 820 WIDE.
4. VEHICLE ACCESS. CLEARANCES MUST BE MAINTAINED. AREA TO BE KEPT CLEAR TO ENSURE ACCESS. SITE SPECIFIC REQUIREMENTS TO BE DETERMINED BY DESIGNER.
5. SCREENING DESIGN TO BE APPROVED BY SUBSTATION DESIGNER PRIOR TO CONSTRUCTION. OPERATIONAL AND EARTHING CLEARANCES SHOWN ON SHEET 3 MUST BE MAINTAINED WITH SCREENING INSTALLED

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	LAYOUT AMENDED	KT	GC	PC
A	04.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: DISTRICT SUBSTATION UP TO 2000kVA (NON MPS) NON FIRE RATED-WITH HV SWGR PERMISSABLE SCREENING ARRANGEMENTS

DISTRIBUTION SUBSTATION MANUAL

westernpower

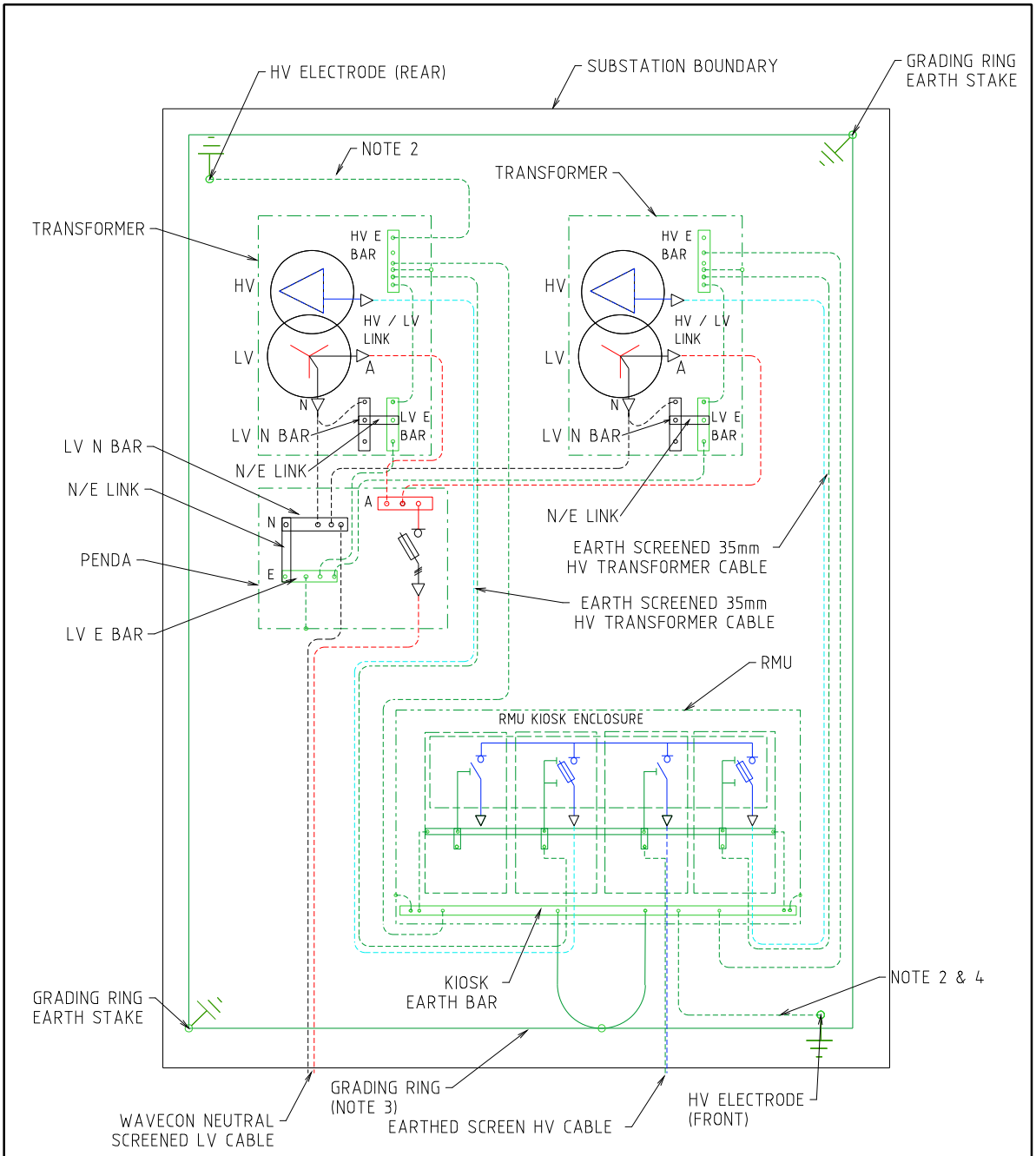
DRAWN: JRR | DATE: 13-11-2019 | DRG. No. DSM-3-06

ORIGINATED: GC | SCALE: NTS

CHECKED: CO

APPROVED: GRANT STACY

REV. B | SHT. 4



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS.
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.
4. LOOP EARTH CABLES TO EARTH RODS INSIDE KIOSK FOR EASE OF TESTING.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

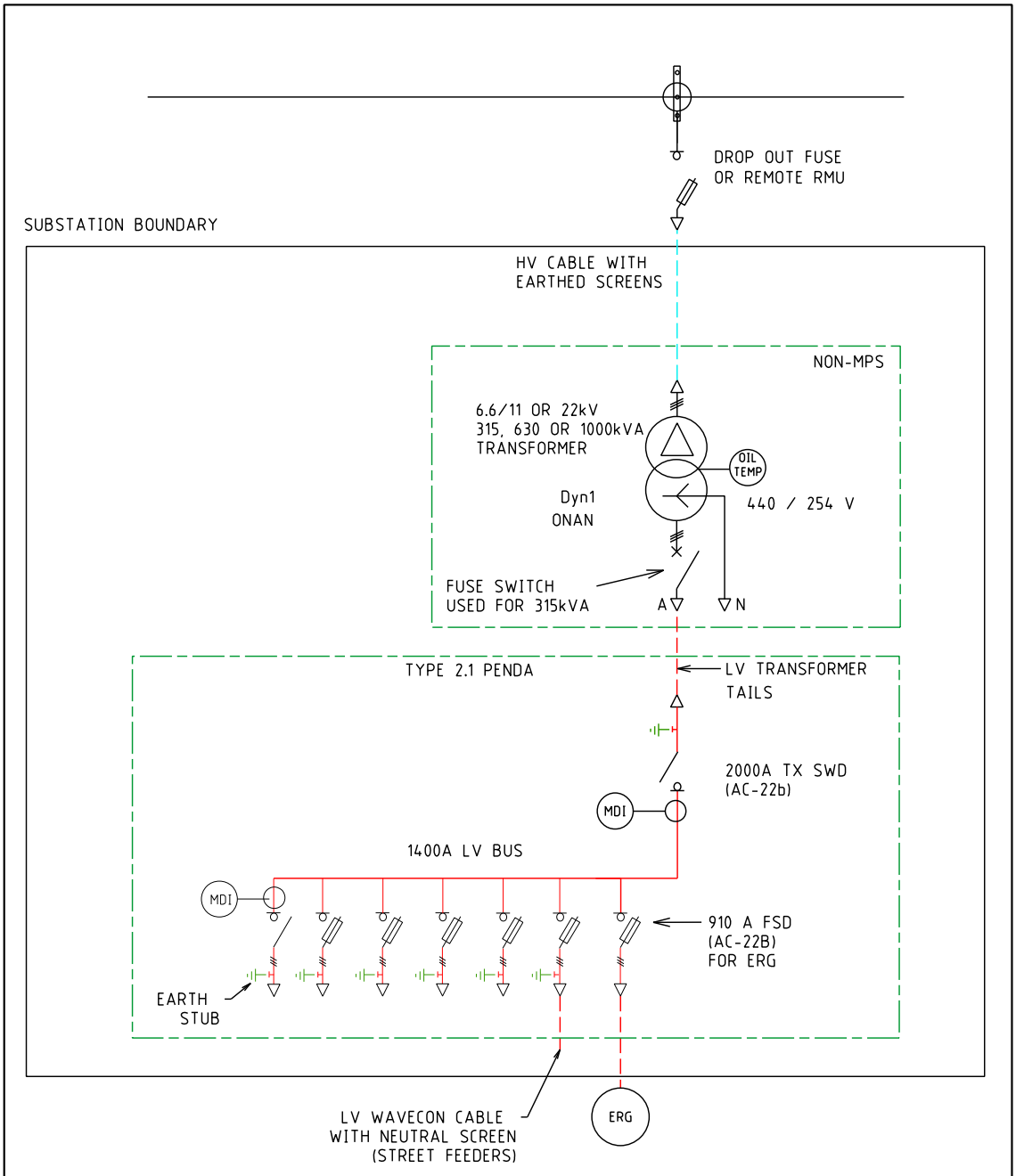
TITLE: DISTRICT SUBSTATION UP TO 2000 kVA NON- MPS NON-FIRE RATED - WITH HV SWGR EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION MANUAL — westernpower

DRAWN: KT	DATE: 24-08-2022	DRG. No. DSM-3-06
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 5

4.3 District Substations - Fire Rated

4.3.1 DSM-3-07 Up to 1000kVA (Non-MPS)

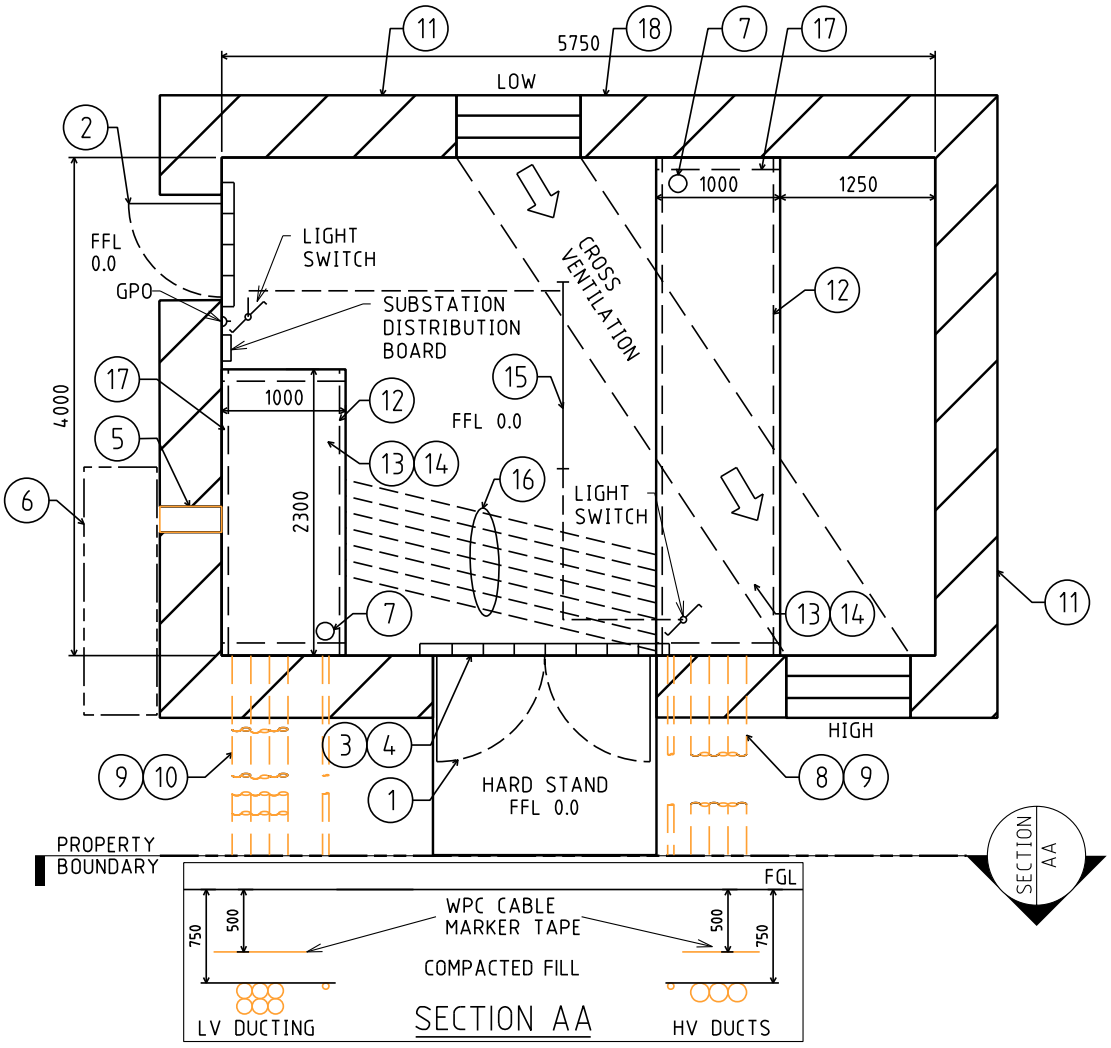


NOTES:-
1. PENDA LAYOUT TO BE DETERMINED BY THE DESIGNER.
SEE DSPM CHAPTER 4 AND SHEET 3 FOR PENDA LAYOUT OPTIONS

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE: DISTRICT SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITHOUT HV SWGR
SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL
westernpower
DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR
DRG. No. DSM-3-07
REV. C | SHT. 1/5



1	DOUBLE DOORS 2340x1720 CLEAR OPENING.
2	DOOR 2040x820 CLEAR OPENING.
3	75 HIGH BRICK BUND.
4	BUND LAID AFTER EQUIPMENT INSTALLED.
5	CUSTOMERS DUCT(S) AT FLOOR OF TRENCH.
6	CUSTOMERS MAIN DISTRIBUTION BOARD.
7	75 DIA PENETRATION THROUGH SLAB FOR EARTHING - TO BE SEALED WITH CN81.
8	3-150 & 1-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
9	750 COVER AT BOUNDARY.
10	6-150 & 1-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
11	600x800 WIDE FIRE DAMPERED VENT AT HIGH (TOP 200 MAX BELOW CEILING) & LOW (BOTTOM MAX 200 ABOVED FINISHED FLOOR LEVEL) LEVELS.
12	50mm WIDE x 38mm DEEP REBATE FOR TRENCH COVERS.
13	TRENCH COVER 35mm THICK x 26kg/m² FRP SLAB PANEL FRONT OF HV SWITCHGEAR ONLY. 38mm THICK x 18.2kg/m² MESH GRATING ELSEWHERE. REFER TO DSM-6-04 AND DSM-6-08.
14	1200 DEEP TRENCH WALLS & FLOOR OF TRENCH TO BE PAINTED WITH SILICONE GLAZE S50.
15	LED LIGHTS BATTEN FITTING (2 WAY SWITCH WITH NEON INDICATOR).
16	6-150 ID HEAVY DUCTS INSTALLED AT FLOOR OF TRENCH - TO BE SEALED WITH CN81.
17	COVER SUPPORTS - 100x75x6 UA (H.D.G.) FIXED TO WALL OF TRENCH.
18	WALLS, CEILING & DOORS TO BE 2HR FIRE RATED, CEILING HEIGHT TO BE MIN 2500mm.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

DISTRICT SUBSTATION
UP TO 1000 kVA (NON-MPS)
FIRE RATED - WITHOUT HV SWGR
REQUIREMENTS AND DUCT INSTALLATION

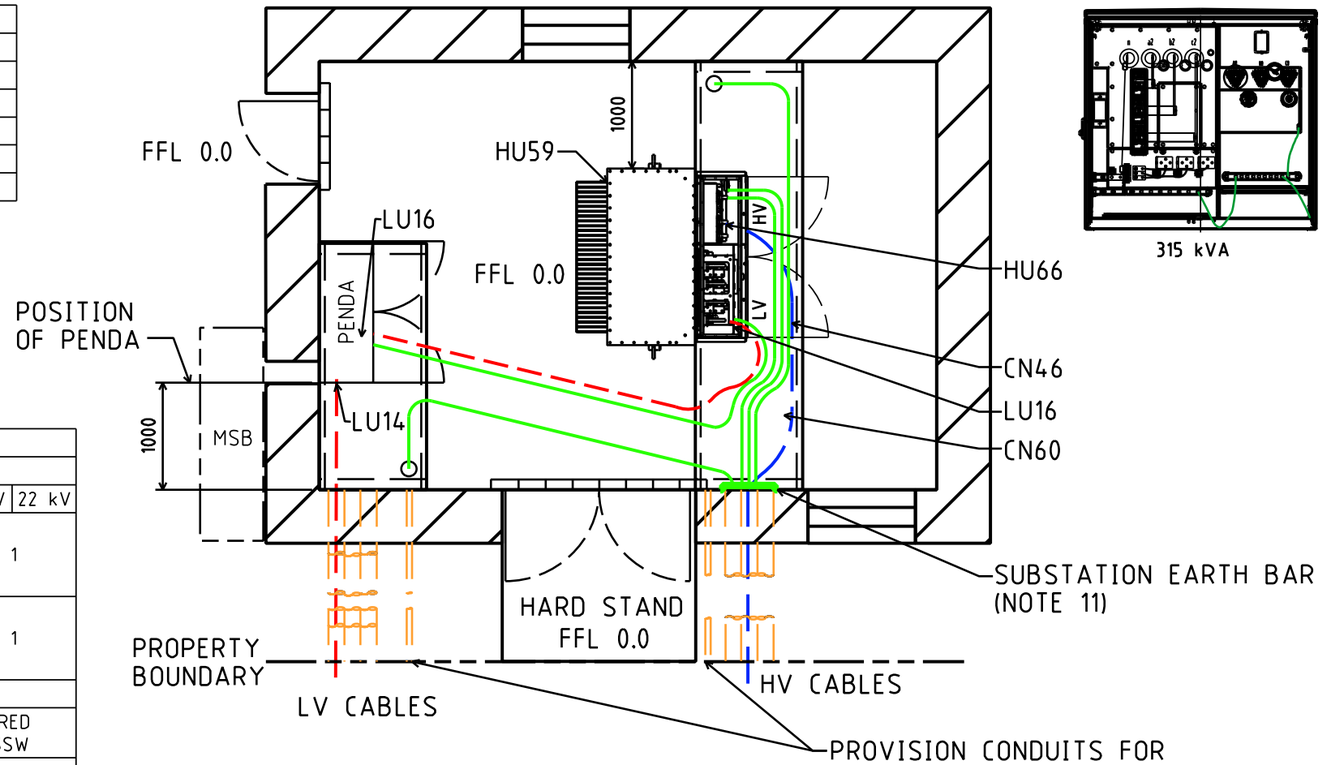
DISTRIBUTION SUBSTATION PLANT MANUAL

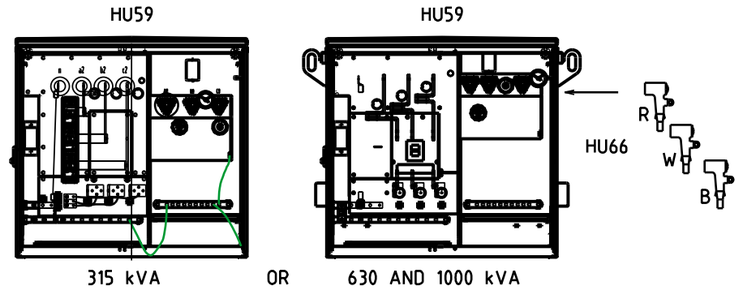
westernpower

DRAWN: SL	DATE: 17/12/2025	DRG. No. DSM-3-07
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 2/5

LV MATERIAL		
EQUIPEMENT	CU	QTY
PENDA	LU64_I	1
	LU66	1
	LU68	1
CABLE	CN60	56
	LU16	2

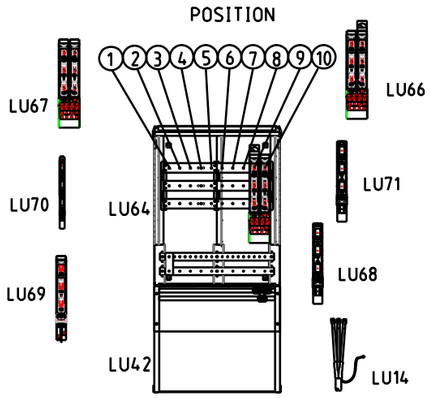
HV MATERIAL				
EQUIPEMENT	CU	QTY		
		6 kV	11 kV	22 kV
TRANSFORMER	HU55/315	SELECT 1		
	HU55/630			
	HU55/1000			
	HU59/315	SELECT 1		
	HU59/630			
	HU59/1000			
CABLE	HU66	1		
	CN46	AS REQUIRED FROM FSSW		
EARTHING	HU70_1	1		





TYPE 2.1 PENDA LAYOUT												
EQUIPEMENT	MAX FUSE	CU	1	2	3	4	5	6	7	8	9	10
TYPE 2.1 PENDA		LU64	1 REQUIRED									
PENDA BASE		LU42	1 REQUIRED									
160A FSD	1x 63A DIN 00	LU70				2xL						
630A FSD	1x 400A NH2	LU69	C/S	C/S	C/S	C/S	C/S	C/S	C/S			
910A FSD	1x 630A NH3	LU68								E		
1260A FSD	2x 400A NH2	LU67	C		C							
1000A FSD	LINKS	LU71	C									
2000A FSD	LINKS	LU66	C								TX	
FSD CABLE TERM		LU14	S	S	S	L/S	S	S	S			
TX CABLE TERM		LU16									TX	

TX = TRANSFORMER L = LIGHTING CIRCUIT E = EMERGENCY RESPONSE
C = CUSTOMER S= STREET CIRCUIT GENERATOR



NOTES:-
1. LU66 CAN BE USED FOR THE TRANSFORMER AND CUSTOMER.
2. EVERY INSTALLATION SHALL INCLUDE AN ERG CONNECTION LU68.
3. 2 x LU70 OR 1 x LU69 CAN BE USED IN POSITION 4.
4. 1 X LU14 NEEDED WITH EACH LU69 STREET FEEDER OR LU70 LIGHTING CIRCUIT.
5. 1 X LU16 NEEDED WITH EACH LU66_TX IN PENDA AND 1 X LU16 FOR LU59 (NON-MPS).
6. LU66_TX WILL DEFAULT TO POSITIONS 9 & 10 UNLESS POSITION 1 & 2 IS SPECIFIED BY THE DESIGNER.
7. STANDARD PENDA LAYOUT SHOWN. DESIGNER MAY DESIGN AN ALTERNATIVE PENDA LAYOUT.
8. NO GANGED FSD OR SWD PERMITTED SPANING POSITIONS 5 & 6 OR 6 & 7.
9. REFER TO DSPM CHAPTER 4 FOR THE CORRECT INSTALLATION OF THE PENDA.
10. CABLE TRENCH TO BE WATER/OIL TIGHT.
11. INDICATIVE LOCATION OF EARTH BAR SHOWN. EXACT LOCATION TO BE CONFIRMED IN DESIGN.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

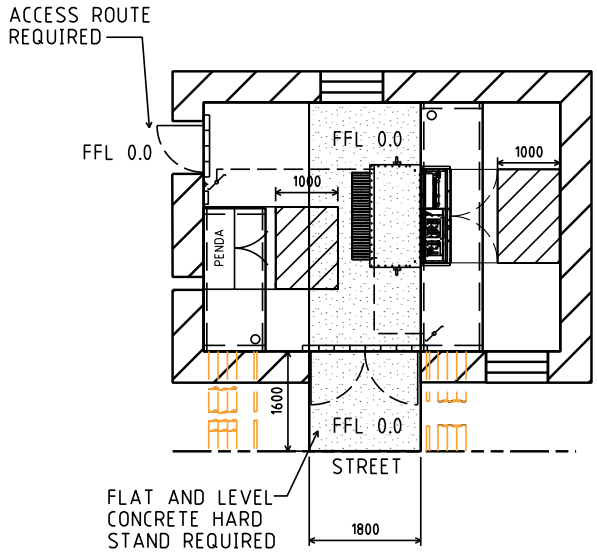
TITLE

DISTRICT SUBSTATION
UP TO 1000 kVA (NON- MPS)
NON-FIRE RATED - WITH HV SWGR
EQUIPMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	ORG. No. DSM-3-07
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 3/5



INSTALLATION AND MAINTENANCE CLEARANCE

OPERATIONAL CLEARANCE

NOTES:-
1. DESIGNER TO ENSURE SAFE ACCESS AND EGRESS ROUTES ARE PROVIDED.
2. WHERE THE SITE IS SET BACK FROM THE STREET, CRANE ACCESS IS REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

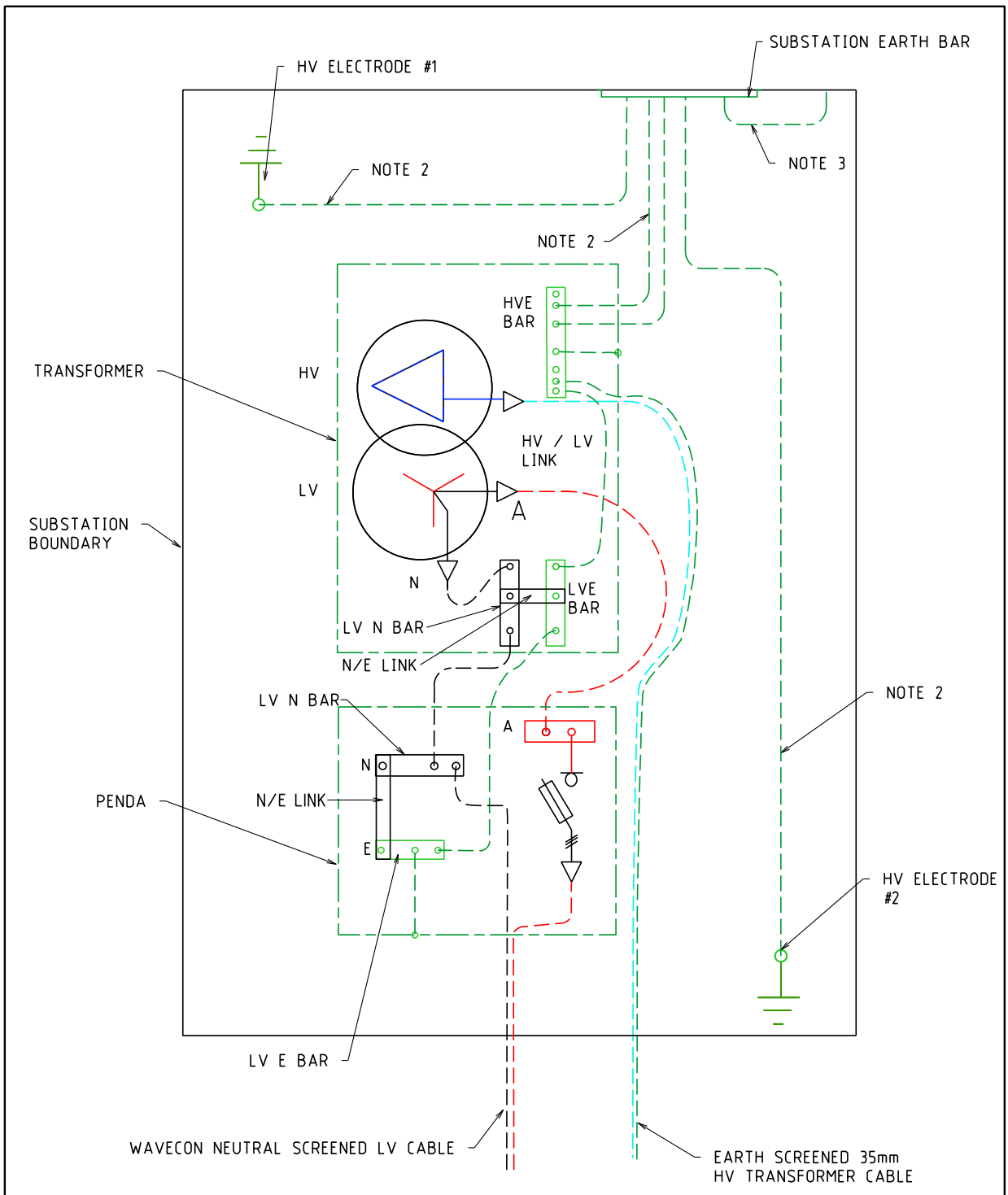
TITLE

DISTRICT SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITHOUT HV SWGR
CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	DRG. No. DSM-3-07
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 4/5



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES AS PER ITEM 7 ON SHEET 2 - TO BE SEALED WITH CN81.
3. BUILDING EARTH CABLE BOND IS TO BE PROVIDED BY THE CUSTOMER.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

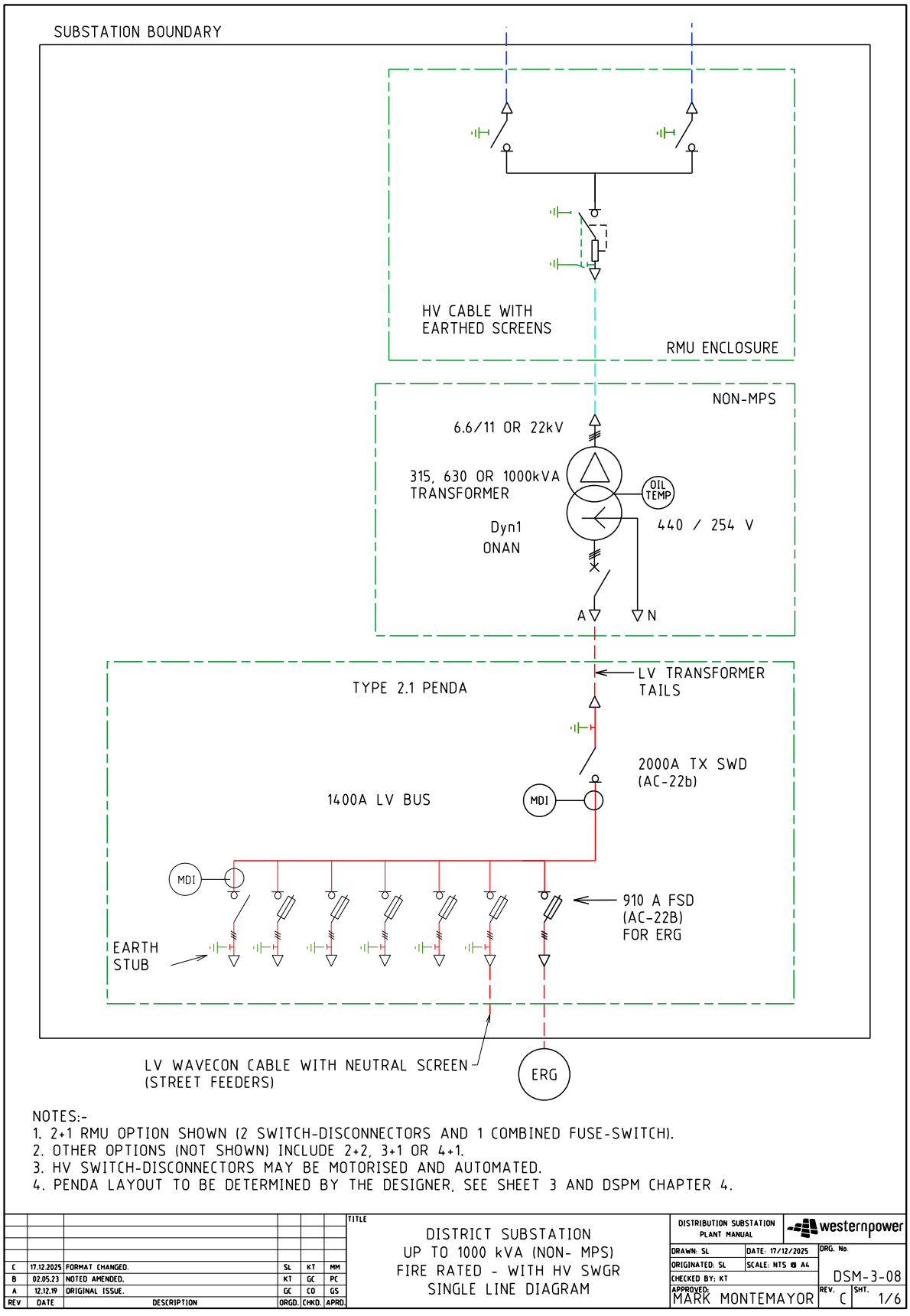
DISTRICT SUBSTATION
UP TO 1000 kVA (NON- MPS)
NON-FIRE RATED - WITH HV SWGR
EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	DRG. No. DSM-3-07
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 5/5

4.3.2 DSM-3-08 Up to 1000kVA (Non-MPS) with HV SWGR



NOTES:-
1. 2+1 RMU OPTION SHOWN (2 SWITCH-DISCONNECTORS AND 1 COMBINED FUSE-SWITCH).
2. OTHER OPTIONS (NOT SHOWN) INCLUDE 2+2, 3+1 OR 4+1.
3. HV SWITCH-DISCONNECTORS MAY BE MOTORISED AND AUTOMATED.
4. PENDA LAYOUT TO BE DETERMINED BY THE DESIGNER, SEE SHEET 3 AND DSPM CHAPTER 4.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

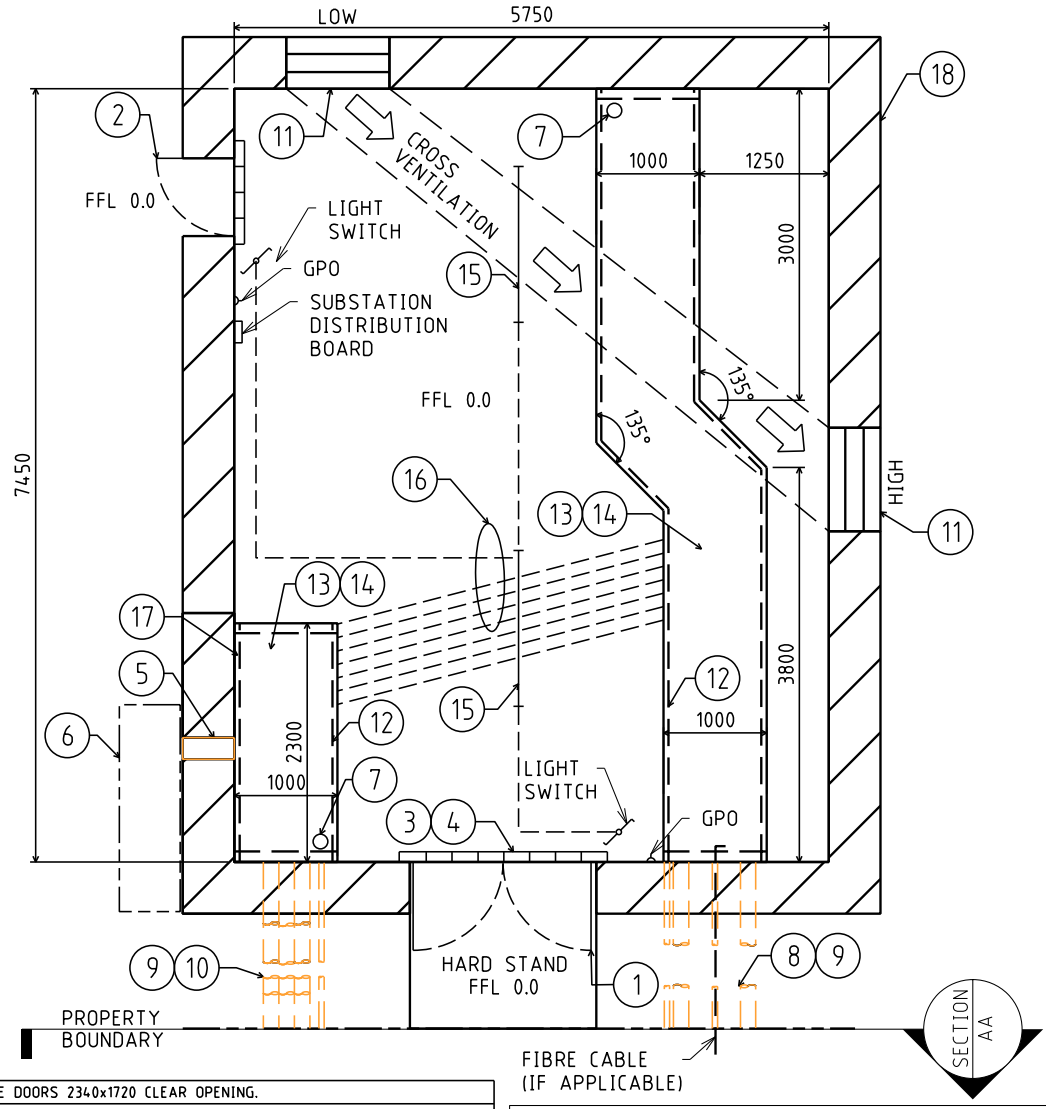
TITLE: DISTRICT SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL

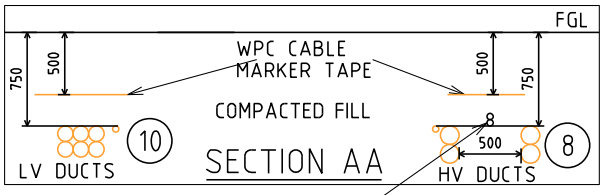
westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

DRG. No. DSM-3-08
REV. C | SHT. 1/6



1	DOUBLE DOORS 2340x1720 CLEAR OPENING.
2	DOOR 2040x820 CLEAR OPENING.
3	75 HIGH BRICK BUND.
4	BUND LAID AFTER EQUIPMENT INSTALLED.
5	CUSTOMERS DUCT(S) AT FLOOR OF TRENCH.
6	CUSTOMERS MAIN DISTRIBUTION BOARD.
7	75 DIA PENETRATION THROUGH SLAB FOR EARTHING - TO BE SEALED WITH CN81.
8	4-150 & 1-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
9	750 COVER AT BOUNDARY.
10	6-150 & 1-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
11	600x800 WIDE FIRE DAMPERED VENT AT HIGH (TOP 200 MAX BELOW CEILING) & LOW (BOTTOM MAX 200 ABOVED FINISHED FLOOR LEVEL) LEVELS.
12	50mm WIDE x 38mm DEEP REBATE FOR TRENCH COVERS.
13	TRENCH COVER 35mm THICK x 26kg/m2 FRP SLAB PANEL FRONT OF HV SWITCHGEAR ONLY. 38mm THICK x 18.2kg/m2 MESH GRATING ELSEWHERE.
14	1200 DEEP TRENCH WALLS & FLOOR OF TRENCH TO BE PAINTED WITH SILICONE GLAZE S50.
15	LED LIGHTS BATTEN FITTING (2 WAY SWITCH WITH NEON INDICATOR).
16	6-150 ID HEAVY DUCTS INSTALLED AT FLOOR OF TRENCH - TO BE SEALED WITH CN81.
17	COVER SUPPORTS - 100x75x6 UA (H.D.G.) FIXED TO WALL OF TRENCH.
18	WALLS, CEILING & DOORS TO BE 2HR FIRE RATED, CEILING HEIGHT TO BE MIN 2500mm.



REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

DISTRICT SUBSTATION
UP TO 1000 kVA (NON-MPS)
FIRE RATED - WITH HV SWGR
REQUIREMENTS AND DUCT INSTALLATION

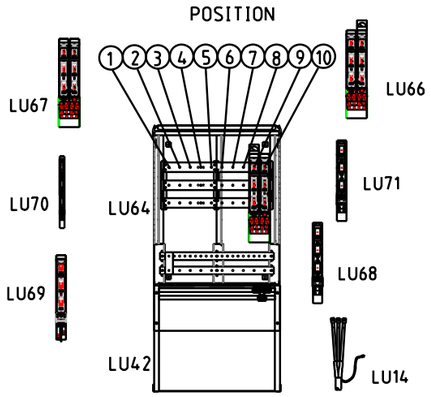
DISTRIBUTION SUBSTATION PLANT MANUAL

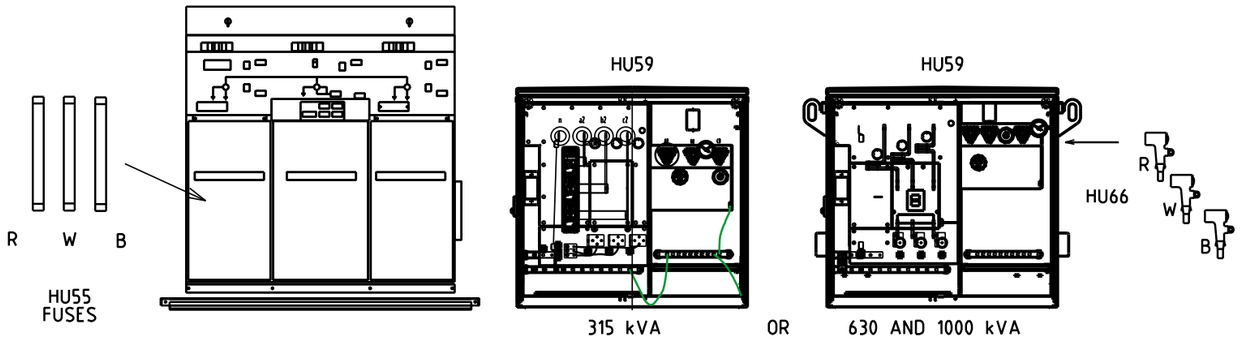
westernpower

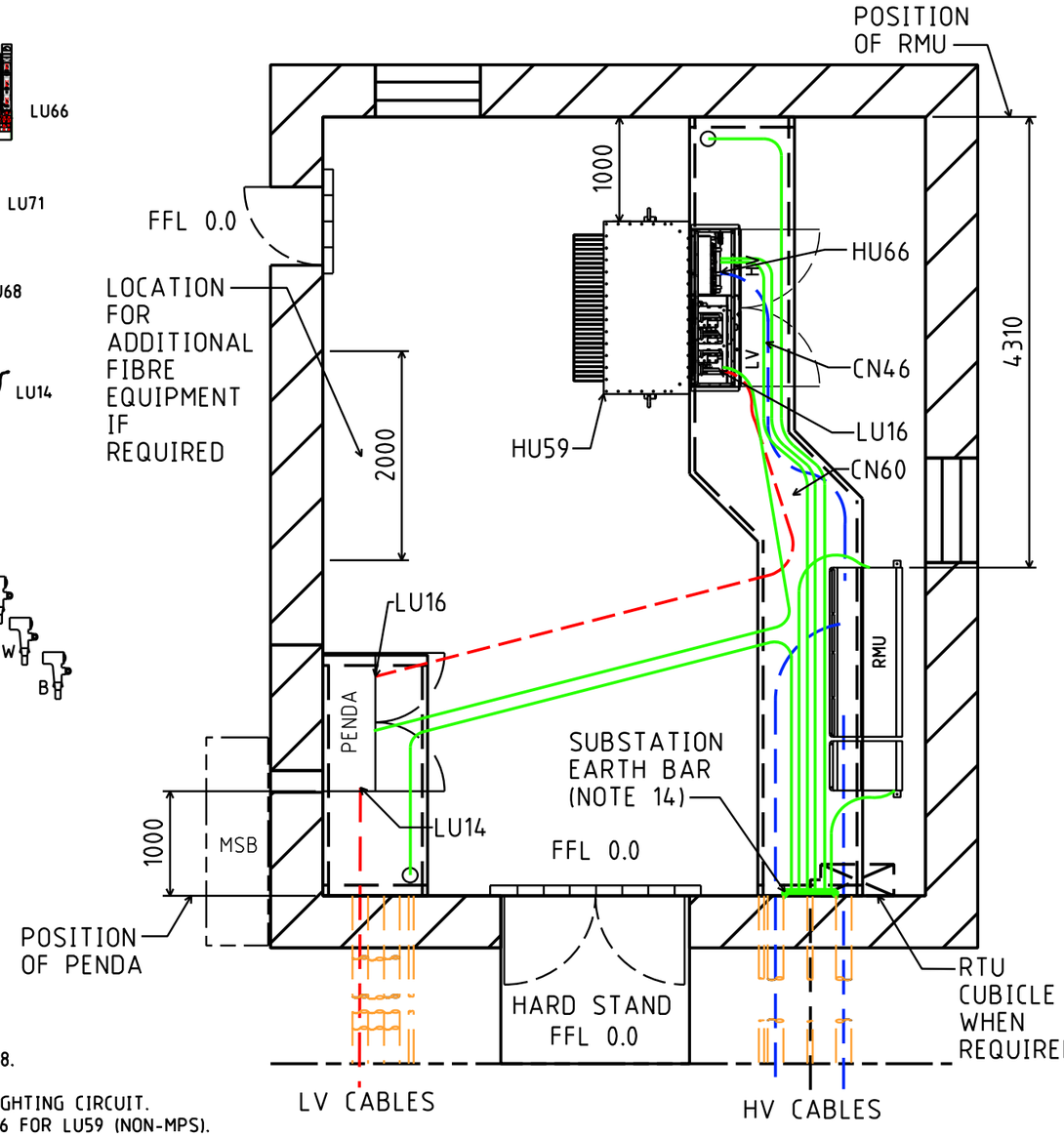
DRAWN: SL	DATE: 17/12/2025	DRG. No. DSM-3-08
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 2/6

TYPE 2.1 PENDA LAYOUT												
EQUIPEMENT	MAX FUSE	CU	1	2	3	4	5	6	7	8	9	10
TYPE 2.1 PENDA		LU64	1 REQUIRED									
PENDA BASE		LU42	1 REQUIRED									
160A FSD	1x 63A DIN 00	LU70				2xL						
630A FSD	1x 400A NH2	LU69	C/S	C/S	C/S	C/S	C/S	C/S	C/S			
910A FSD	1x 630A NH3	LU68								E		
1260A FSD	2x 400A NH2	LU67	C		C							
1000A FSD	LINKS	LU71	C									
2000A FSD	LINKS	LU66	C								TX	
FSD CABLE TERM		LU14	S	S	S	L/S	S	S	S			
TX CABLE TERM		LU16									TX	

TX = TRANSFORMER L = LIGHTING CIRCUIT E = EMERGENCY RESPONSE
C = CUSTOMER S= STREET CIRCUIT GENERATOR







HV MATERIAL				
EQUIPEMENT	CU	QTY		
		6 kV	11 kV	22 kV
TRANSFORMER	HU55/315	SELECT 1		
	HU55/630			
	HU55/1000			
	HU59/315	SELECT 1		
	HU59/630			
	HU59/1000			
RMU	HU22	SELECT 1		
	HU23			
	HU24			
	HU25_2S			
	HU25_3S			
EARTHING	HU70_2	1		
CABLE	HU66	1		
	CN46	7		
AUTOMATION	DA6_LVS	1		
	DA6_NG_SE	1 (OPTIONAL)		

LV MATERIAL		
EQUIPEMENT	CU	QTY
PENDA	LU64_I	1
	LU66	1
	LU68	1
CABLE	CN60	56
	LU16	2

NOTES:-
1. LU66 CAN BE USED FOR THE TRANSFORMER AND CUSTOMER.
2. EVERY INSTALLATION SHALL INCLUDE AN ERG CONNECTION LU68.
3. 2 x LU70 OR 1 x LU69 CAN BE USED IN POSITION 4.
4. 1 X LU14 NEEDED WITH EACH LU69 STREET FEEDER OR LU70 LIGHTING CIRCUIT.
5. 1 X LU16 NEEDED WITH EACH LU66_TX IN PENDA AND 1 X LU16 FOR LU59 (NON-MPS).
6. LU66_TX WILL DEFAULT TO POSITIONS 9 & 10 UNLESS POSITION 1 & 2 IS SPECIFIED BY THE DESIGNER.
7. STANDARD PENDA LAYOUT SHOWN. DESIGNER MAY DESIGN AN ALTERNATIVE PENDA LAYOUT.
8. NO GANGED FSD OR SWD PERMITTED SPANING POSITIONS 5 & 6 OR 6 & 7.
9. REFER TO DSPM CHAPTER 4 FOR THE CORRECT INSTALLATION OF THE PENDA.
10. RMU SUPPLIED WITH BASE AND HV CABLE TERMINATIONS.
11. REFER TO SHEET 6 FOR THE CORRECT INSTALLATION OF THE RMU.
12. REFER TO DSPM CHAPTER 4 FOR AUTOMATION DETAILS.
13. CABLE TRENCH TO BE WATER/OIL TIGHT.
14. INDICATIVE LOCATION OF EARTH BAR SHOWN. EXACT LOCATION TO BE CONFIRMED IN DESIGN.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

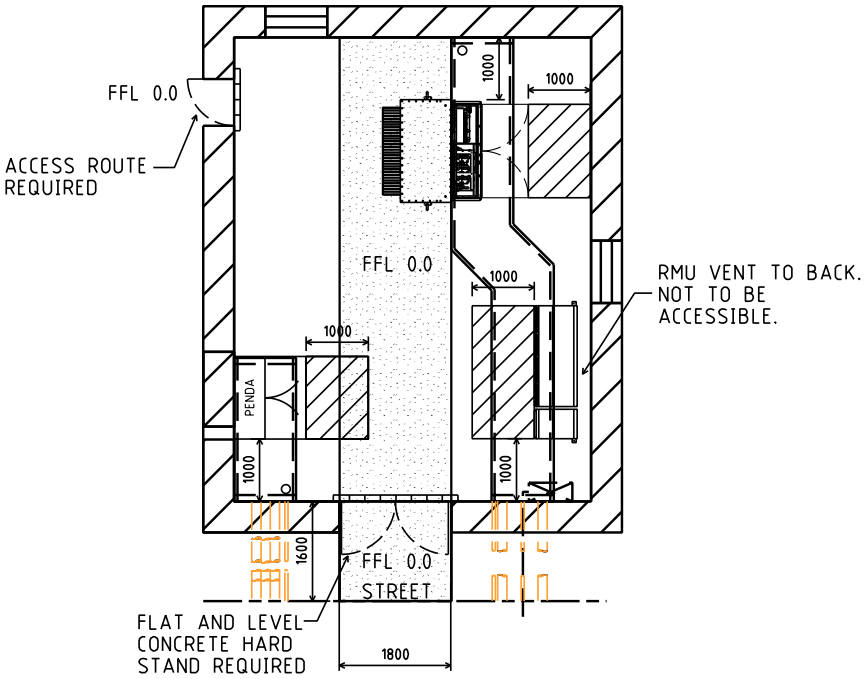
DISTRICT SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
EQUIPMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

DRG. No. DSM-3-08
REV. C | SHT. 3/6



INSTALLATION AND MAINTENANCE CLEARANCE

OPERATIONAL CLEARANCE

NOTES:-
1. DESIGNER TO ENSURE SAFE ACCESS AND EGRESS ROUTES ARE PROVIDED.
2. WHERE THE SITE IS SET BACK FROM THE STREET, CRANE ACCESS IS REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

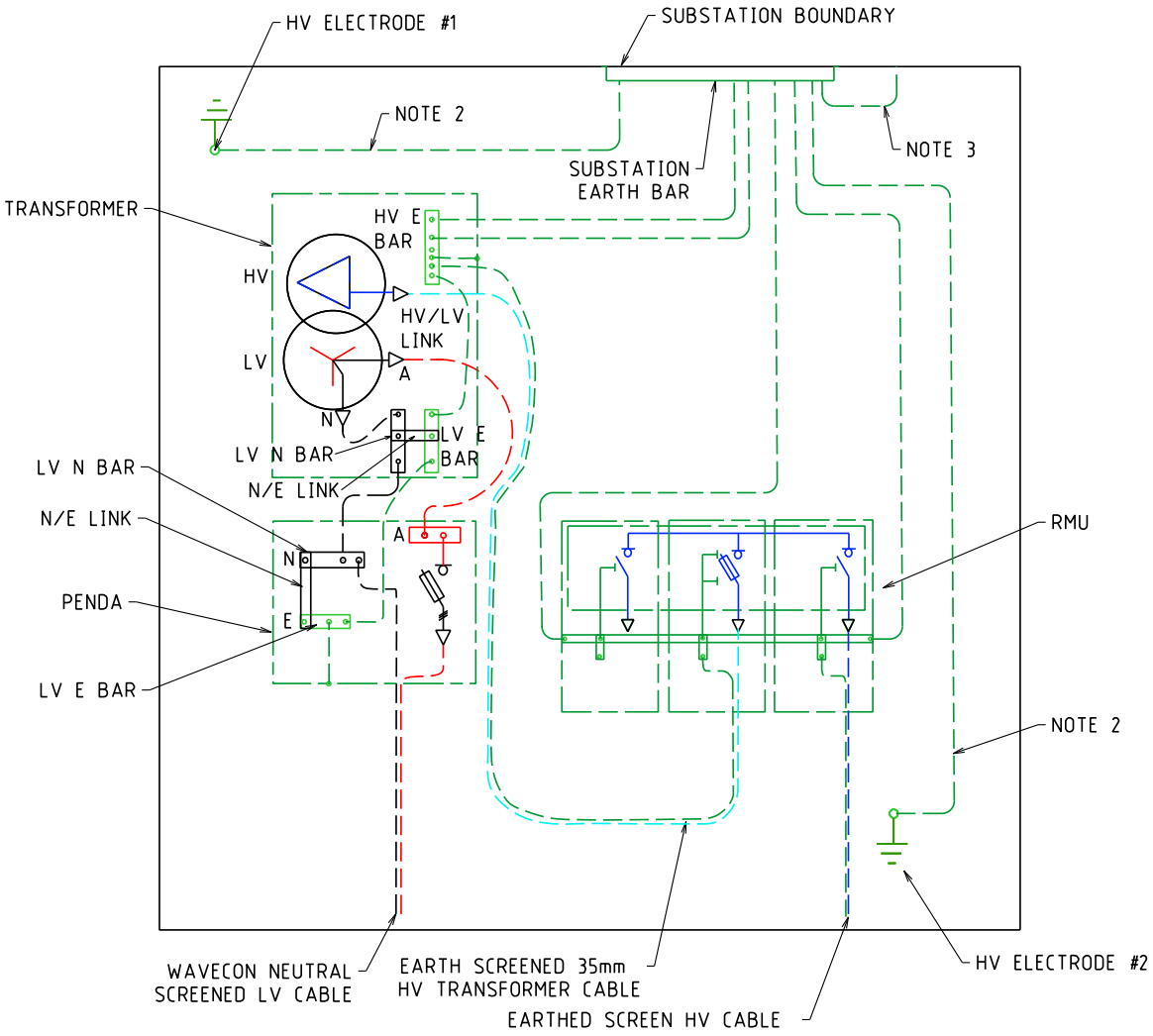
TITLE

DISTRICT SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	DRG. No. DSM-3-08
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 4/6



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES AS PER ITEM 7 ON SHEET 2 - TO BE SEALED WITH CN81.
3. BUILDING EARTH CABLE BOND IS TO BE PROVIDED BY THE CUSTOMER.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APPRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

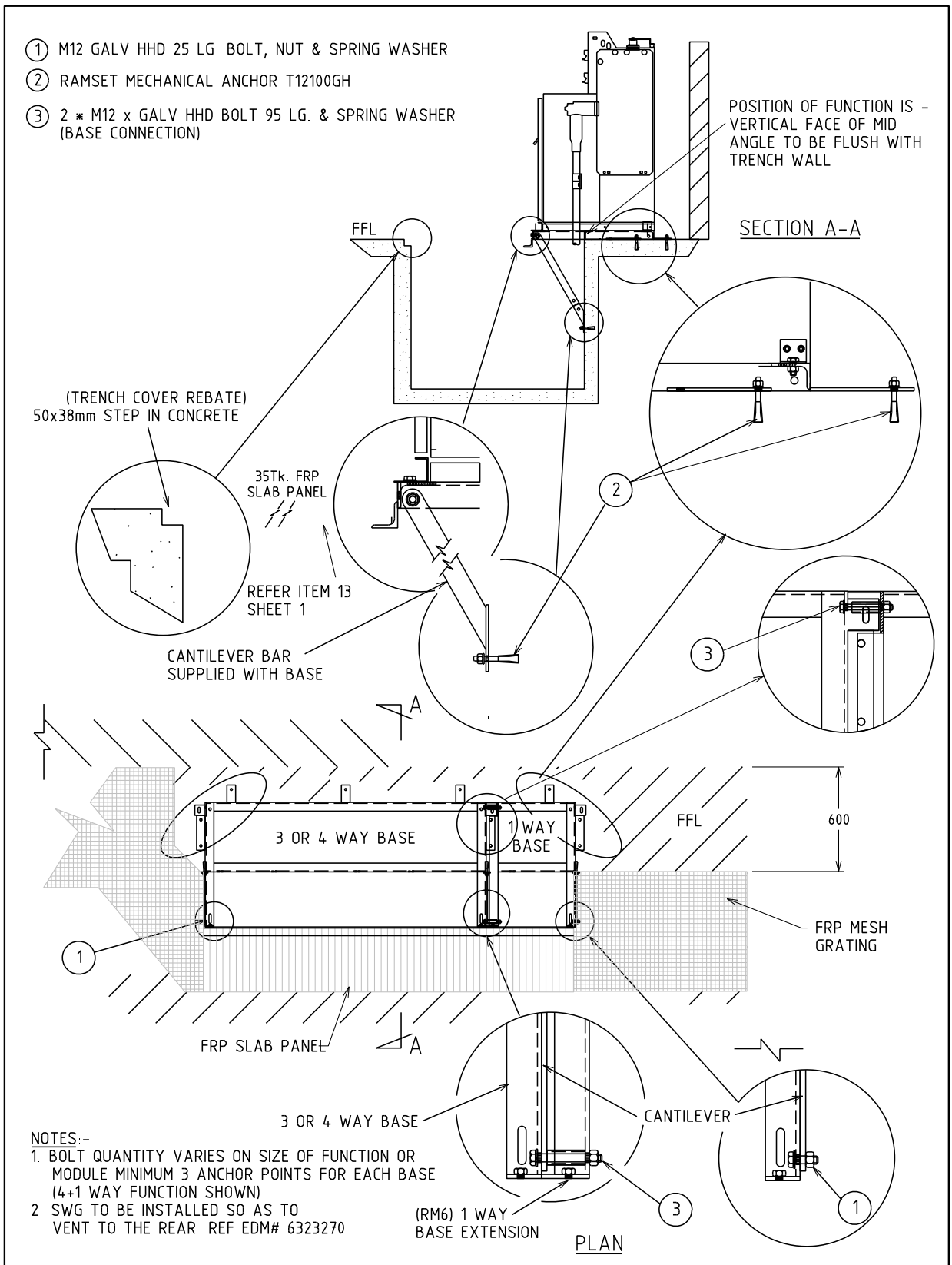
TITLE

DISTRICT SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	DRG. No.
ORIGINATED: SL	SCALE: NTS @ A4	DSM-3-08
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 5/6



NOTES:-
1. BOLT QUANTITY VARIES ON SIZE OF FUNCTION OR MODULE MINIMUM 3 ANCHOR POINTS FOR EACH BASE (4+1 WAY FUNCTION SHOWN)
2. SWG TO BE INSTALLED SO AS TO VENT TO THE REAR. REF EDM# 6323270

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

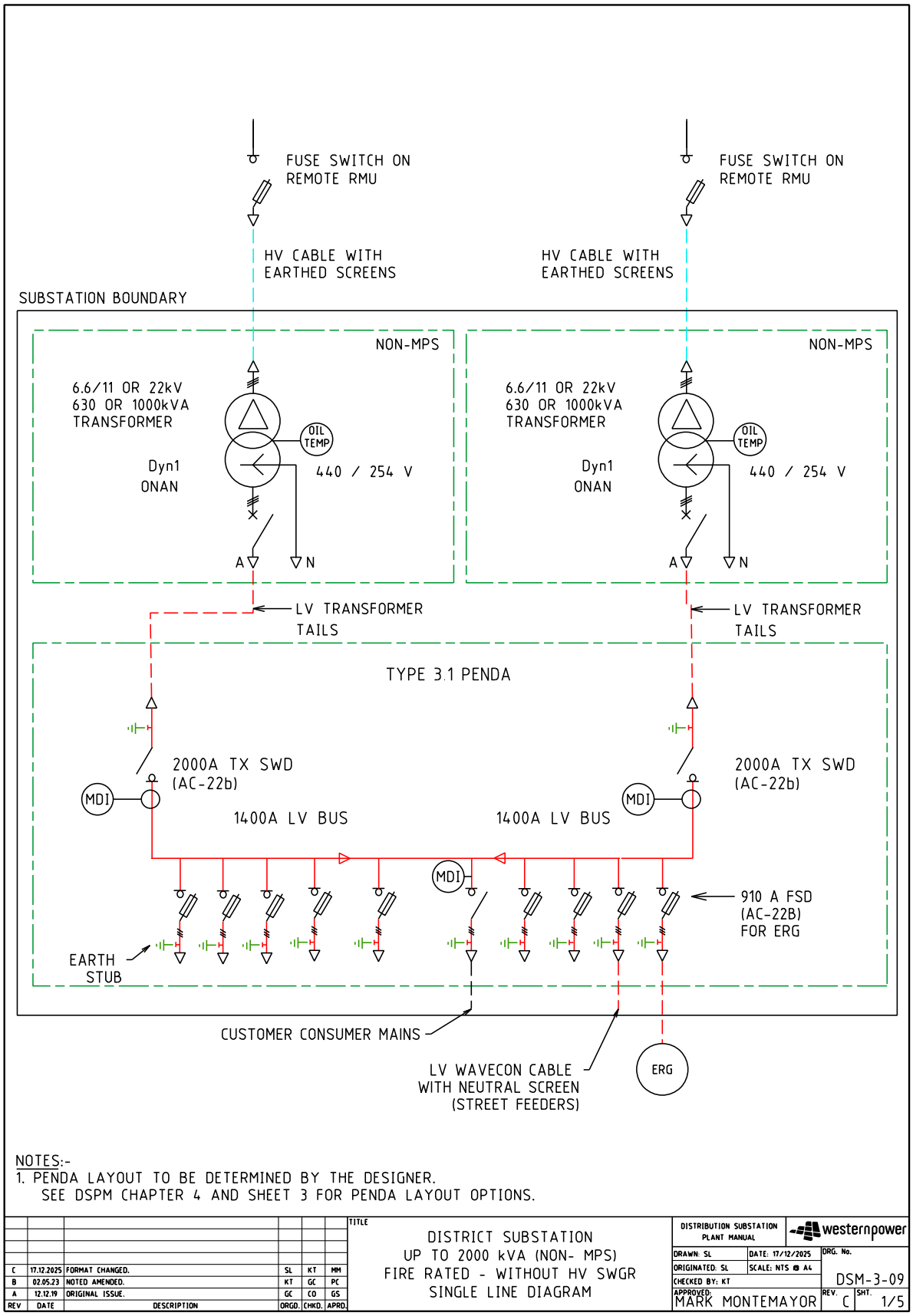
TITLE: SCHNEIDER SWITCHGEAR 3 & 4 WAY WITH 1 WAY EXTENSION FIXING DETAILS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	DRG. No. DSM-3-08
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 6/6

4.3.3 DSM-3-09 Up to 2000kVA (Non-MPS)



NOTES:-
1. PENDA LAYOUT TO BE DETERMINED BY THE DESIGNER.
   SEE DSPM CHAPTER 4 AND SHEET 3 FOR PENDA LAYOUT OPTIONS.

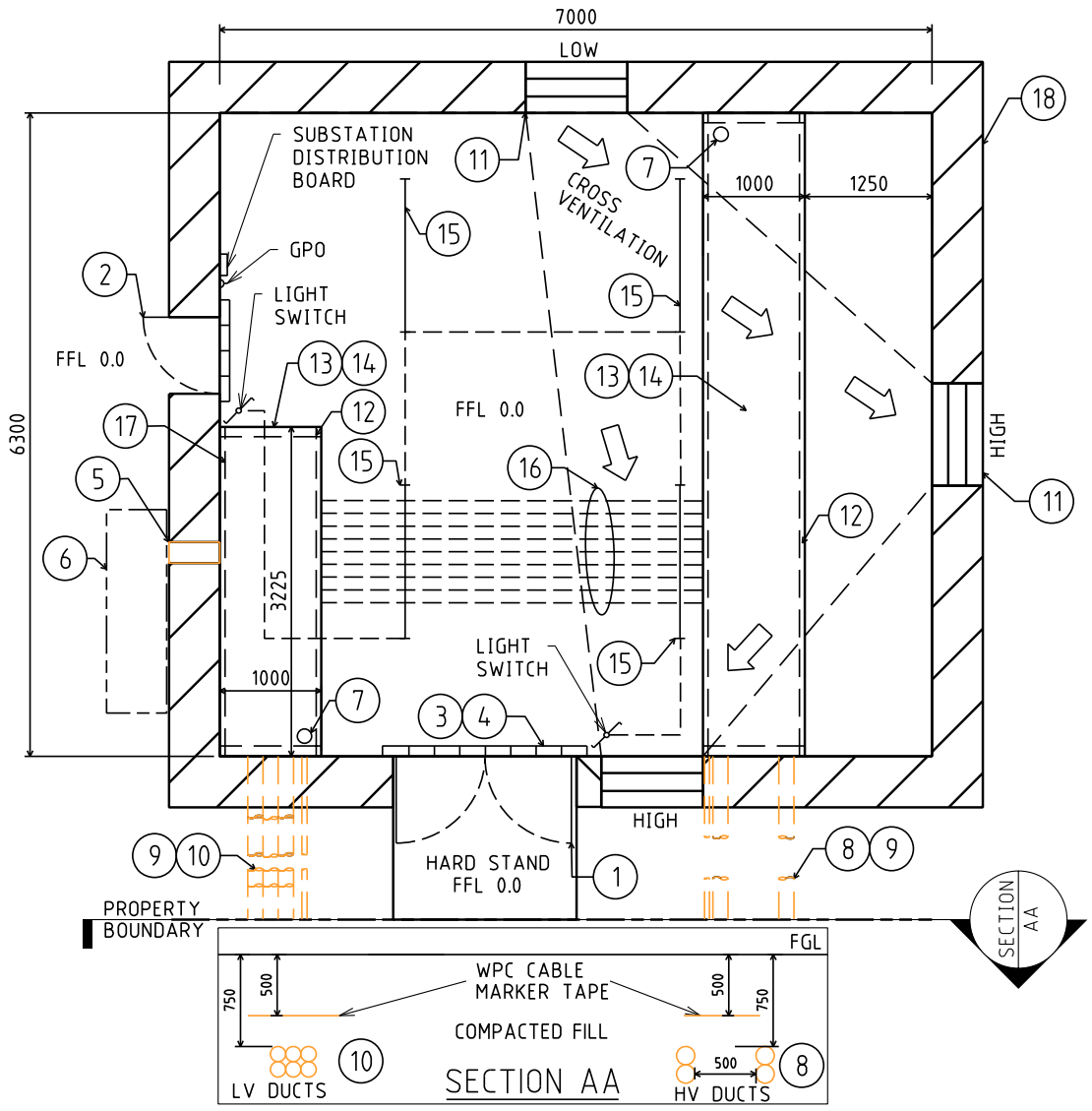
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE: DISTRICT SUBSTATION UP TO 2000 kVA (NON- MPS) FIRE RATED - WITHOUT HV SWGR SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025 | DRG. No. DSM-3-09
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR | REV. C | SHT. 1/5



1	DOUBLE DOORS 2340x1720 CLEAR OPENING.
2	DOOR 2040x820 CLEAR OPENING.
3	75 HIGH BRICK BUND.
4	BUND LAID AFTER EQUIPMENT INSTALLED.
5	CUSTOMERS DUCT(S) AT FLOOR OF TRENCH.
6	CUSTOMERS MAIN DISTRIBUTION BOARD.
7	75 DIA PENETRATION THROUGH SLAB FOR EARTHING - TO BE SEALED WITH CN81.
8	4-150 & 1-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
9	750 COVER AT BOUNDARY.
10	6-150 & 1-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
11	600x800 WIDE FIRE DAMPERED VENT AT HIGH (TOP 200 MAX BELOW CEILING) & LOW (BOTTOM MAX 200 ABOVED FINISHED FLOOR LEVEL) LEVELS.
12	50mm WIDE x 38mm DEEP REBATE FOR TRENCH COVERS.
13	TRENCH COVER 35mm THICK x 26kg/m2 FRP SLAB PANEL FRONT OF HV SWITCHGEAR ONLY. 38mm THICK x 18.2kg/m2 MESH GRATING ELSEWHERE.
14	1200 DEEP TRENCH WALLS & FLOOR OF TRENCH TO BE PAINTED WITH SILICONE GLAZE S50.
15	LED LIGHTS BATTEN FITTING (2 WAY SWITCH WITH NEON INDICATOR).
16	12-150 ID HEAVY DUCTS INSTALLED AT FLOOR OF TRENCH, STACKED 2 ON 2 - TO BE SEALED WITH CN81.
17	COVER SUPPORTS - 100x75x6 UA (H.D.G.) FIXED TO WALL OF TRENCH.
18	WALLS, CEILING & DOORS TO BE 2HR FIRE RATED, CEILING HEIGHT TO BE MIN 2500mm.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

DISTRICT SUBSTATION
UP TO 2000 kVA (NON-MPS)
FIRE RATED - WITHOUT HV SWGR
REQUIREMENTS AND DUCT INSTALLATION

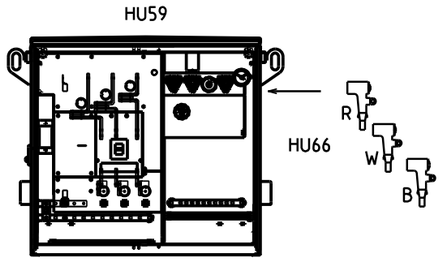
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

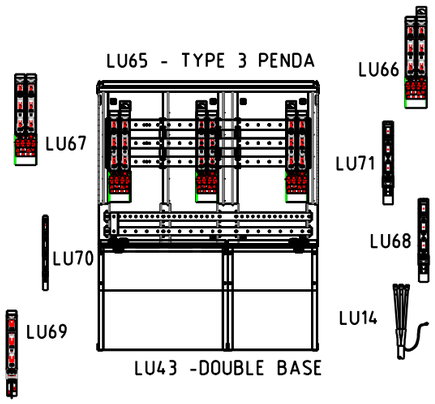
DRAWN: SL | DATE: 17/12/2025 | DRG. No. DSM-3-09
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR | REV. C | SHT. 2/5

TYPE 3.1 PENDA LAYOUT																		
EQUIPEMENT	MAX FUSE	CU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TYPE 3.1 PENDA		LU65																
PENDA BASE		LU42																
160A FSD	1x 63A DIN 00	LU70				L	L											
630A FSD	1x 400A NH2	LU69				C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S			
910A FSD	1x 630A NH3	LU68			E											E		
1260A FSD	2x 400A NH2	LU67				C			C		C		C					
1000A FSD	LINKS	LU71			C	C	C	C	C	C	C	C	C	C	C	C		
2000A FSD	LINKS	LU66	T2								C1						T1	
FSD CABLE TERM		LU14				L/S	S	S	S	S	S	S	S	S	S			
TX CABLE TERM		LU16	T2														T1	

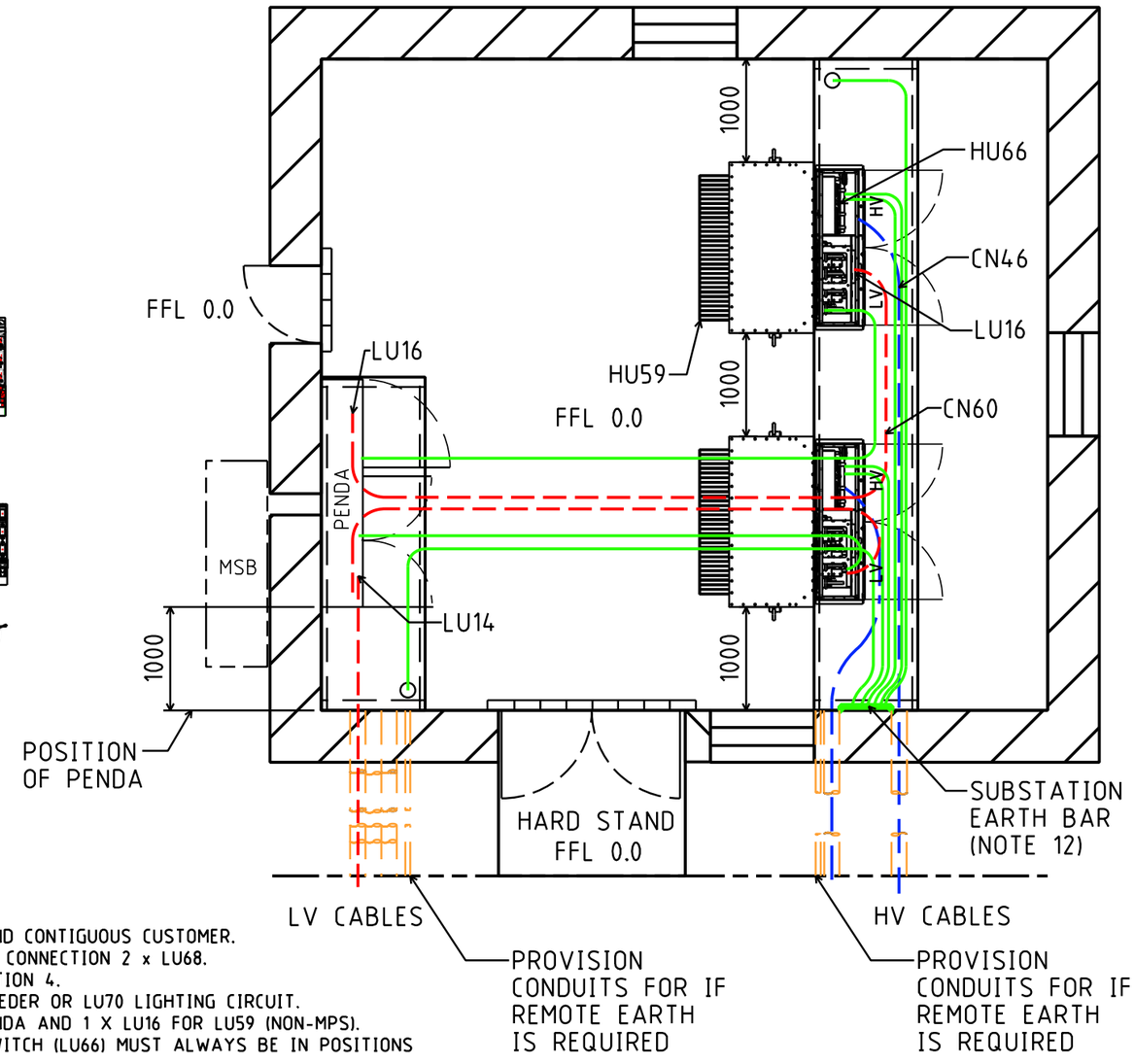
TX = TRANSFORMER L = LIGHTING CIRCUIT E = EMERGENCY RESPONSE
C = CUSTOMER S= STREET CIRCUIT GENERATOR



630 AND 1000 kVA



LU43 -DOUBLE BASE



LV MATERIAL		
EQUIPEMENT	CU	QTY
PENDA	LU65_0	1
	LU43	1
	LU66	2
	LU68	2
CABLE	CN60	112
	LU16	4

HV MATERIAL				
EQUIPEMENT	CU	QTY		
		6 kV	11 kV	22 kV
	HU55/630	SELECT 2 OF THE SAME TYPE		
	HU55/1000			
	HU59/630	SELECT 2 OF THE SAME TYPE		
	HU59/1000			
CABLE	HU66	1		
	CN46	AS REQUIRED FROM FSSW		
EARTHING	HU70_1	1		

NOTES:-
1. LU66 CAN BE USED FOR THE TRANSFORMER AND CONTIGUOUS CUSTOMER.
2. EVERY INSTALLATION SHALL INCLUDE AN ERG CONNECTION 2 x LU68.
3. 2 x LU70 OR 1 x LU69 CAN BE USED IN POSITION 4.
4. 1 X LU14 NEEDED WITH EACH LU69 STREET FEEDER OR LU70 LIGHTING CIRCUIT.
5. 1 X LU16 NEEDED WITH EACH LU66_TX IN PENDA AND 1 X LU16 FOR LU59 (NON-MPS).
6. LARGE CUSTOMER CONNECTED VIA A 2000A SWITCH (LU66) MUST ALWAYS BE IN POSITIONS 7 & 8 OR 9 & 10
7. STANDARD PENDA LAYOUT SHOWN. DESIGNER MAY DESIGN AN ALTERNATIVE PENDA LAYOUT.
8. NO GANGED FSD OR SWD PERMITTED SPANING POSITIONS 5 & 6, 6 & 7 OR 10 & 11.
9. REFER TO DSPM CHAPTER 4 FOR THE CORRECT INSTALLATION OF THE PENDA.
10. CABLE TRENCH TO BE WATER/OIL TIGHT.
11. DESIGNER TO REQUEST FOR 2 x ETEL TRANSFORMERS FOR DUAL 630kVA LAYOUT.
12. INDICATIVE LOCATION OF EARTH BAR SHOWN. EXACT LOCATION TO BE CONFIRMED IN DESIGN.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

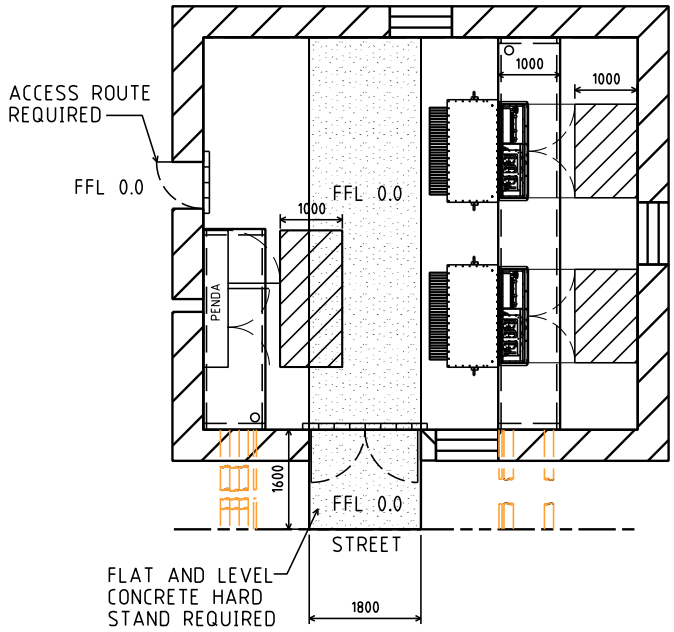
DISTRICT SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITHOUT HV SWGR
EQUIPEMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL DATE: 17/12/2025
ORIGINATED: SL SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

DRG. No. DSM-3-09
REV. C SHT. 3/5



INSTALLATION AND MAINTENANCE CLEARANCE

OPERATIONAL CLEARANCE

NOTES:-
1. DESIGNER TO ENSURE SAFE ACCESS AND EGRESS ROUTES ARE PROVIDED.
2. WHERE THE SITE IS SET BACK FROM THE STREET, CRANE ACCESS IS REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

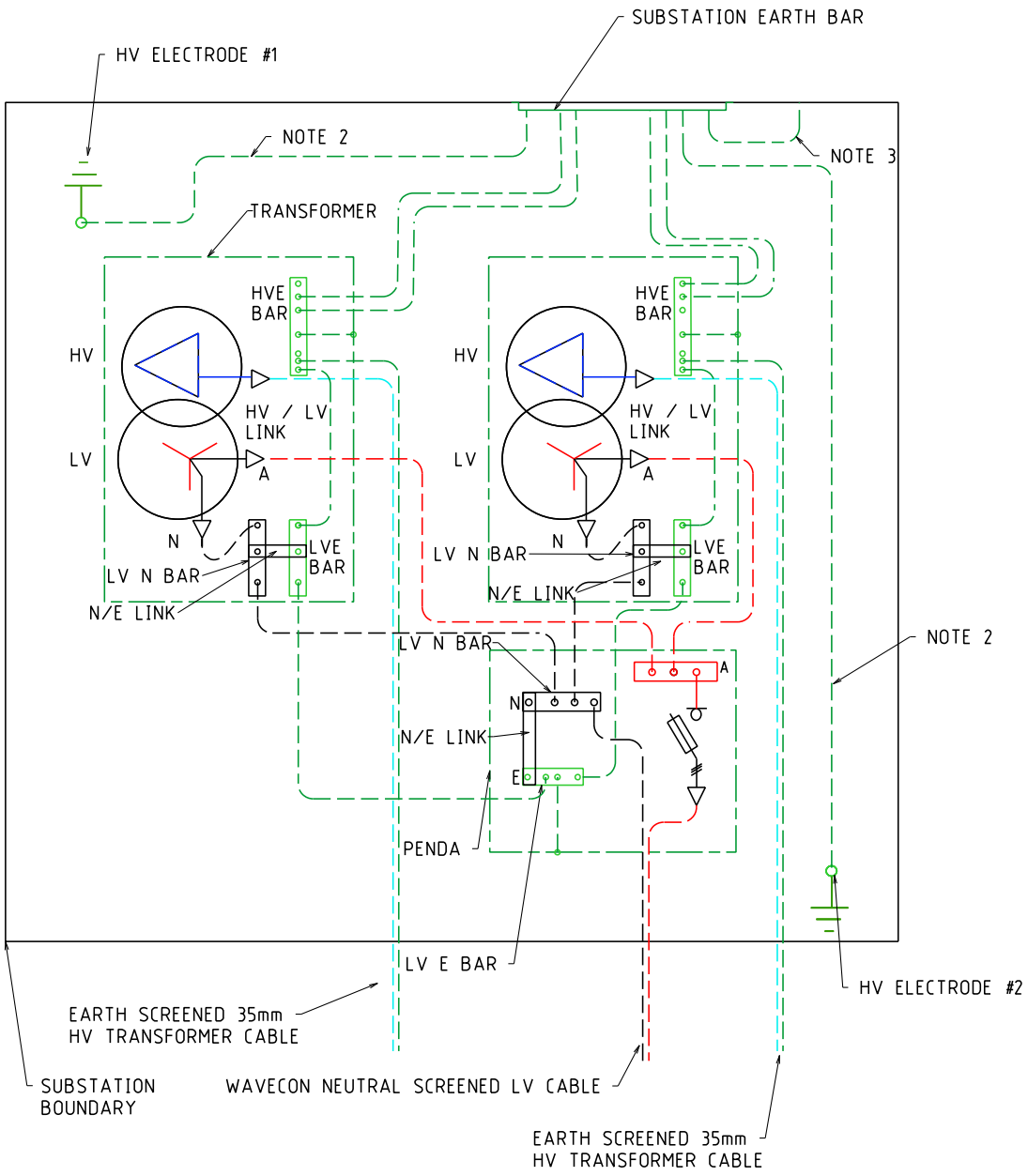
TITLE

DISTRICT SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITHOUT HV SWGR
CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	DRG. No. DSM-3-09
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 4/5



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES AS PER ITEM 7 ON SHEET 2 - TO BE SEALED WITH CN81.
3. BUILDING EARTH CABLE BOND IS TO BE PROVIDED BY THE CUSTOMER.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

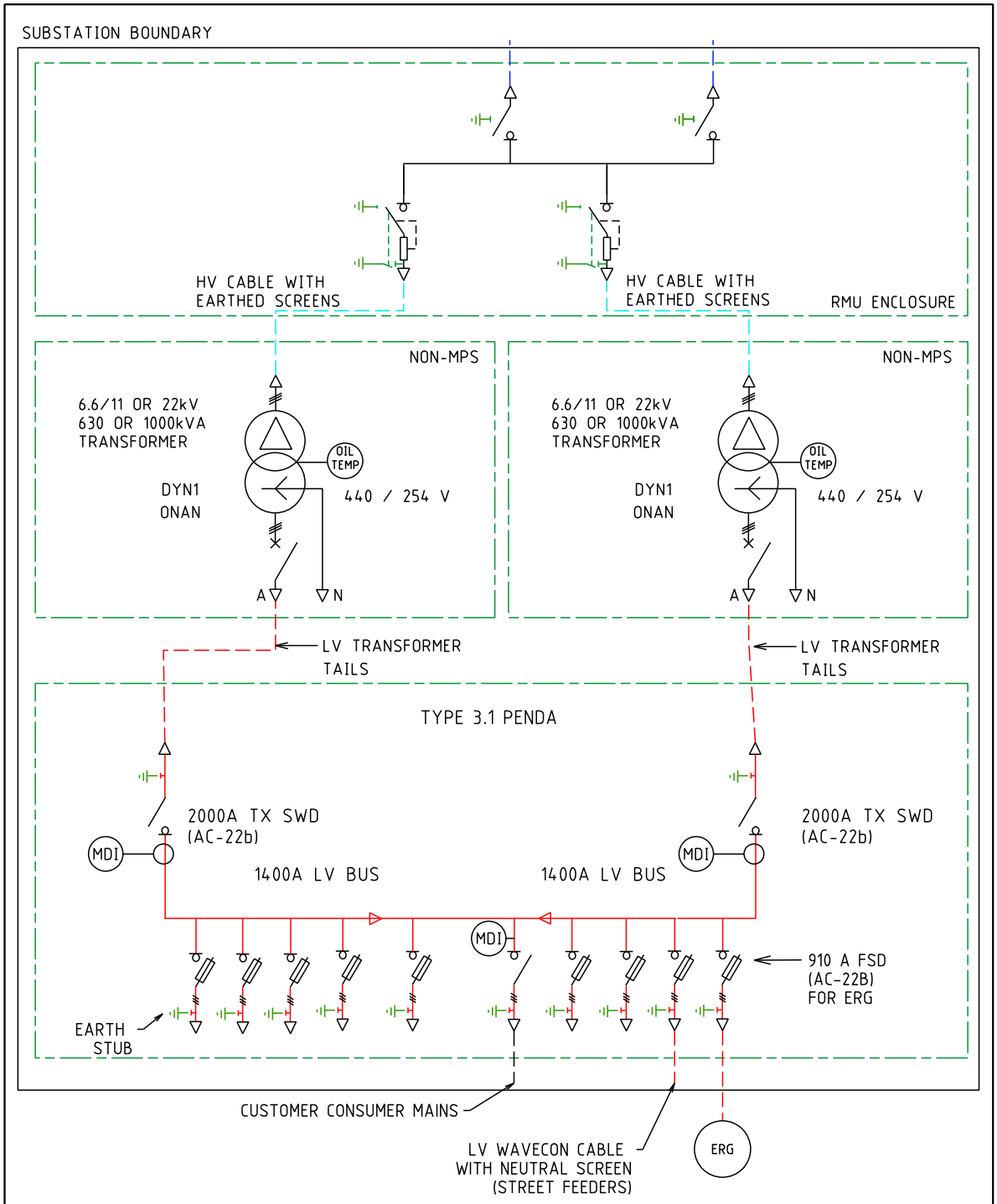
TITLE: DISTRICT SUBSTATION UP TO 2000 kVA (NON- MPS) FIRE RATED - WITHOUT HV SWGR EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	DRG. No. DSM-3-09
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 5/5

4.3.4 DSM-3-10 Up to 2000kVA (Non-MPS) with HV SWGR



NOTES:-
1. 2+2 RMU OPTION SHOWN (2 SWITCH-DISCONNECTORS AND 2 COMBINED FUSE-SWITCH).
2. OTHER OPTIONS (NOT SHOWN) INCLUDE 3+2 OR 2+3.
3. HV SWITCH-DISCONNECTORS MAY BE MOTORISED AND AUTOMATED.
4. PENDA LAYOUT TO BE DETERMINED BY THE DESIGNER, SEE SHEET 3 AND DSPM CHAPTER 4.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
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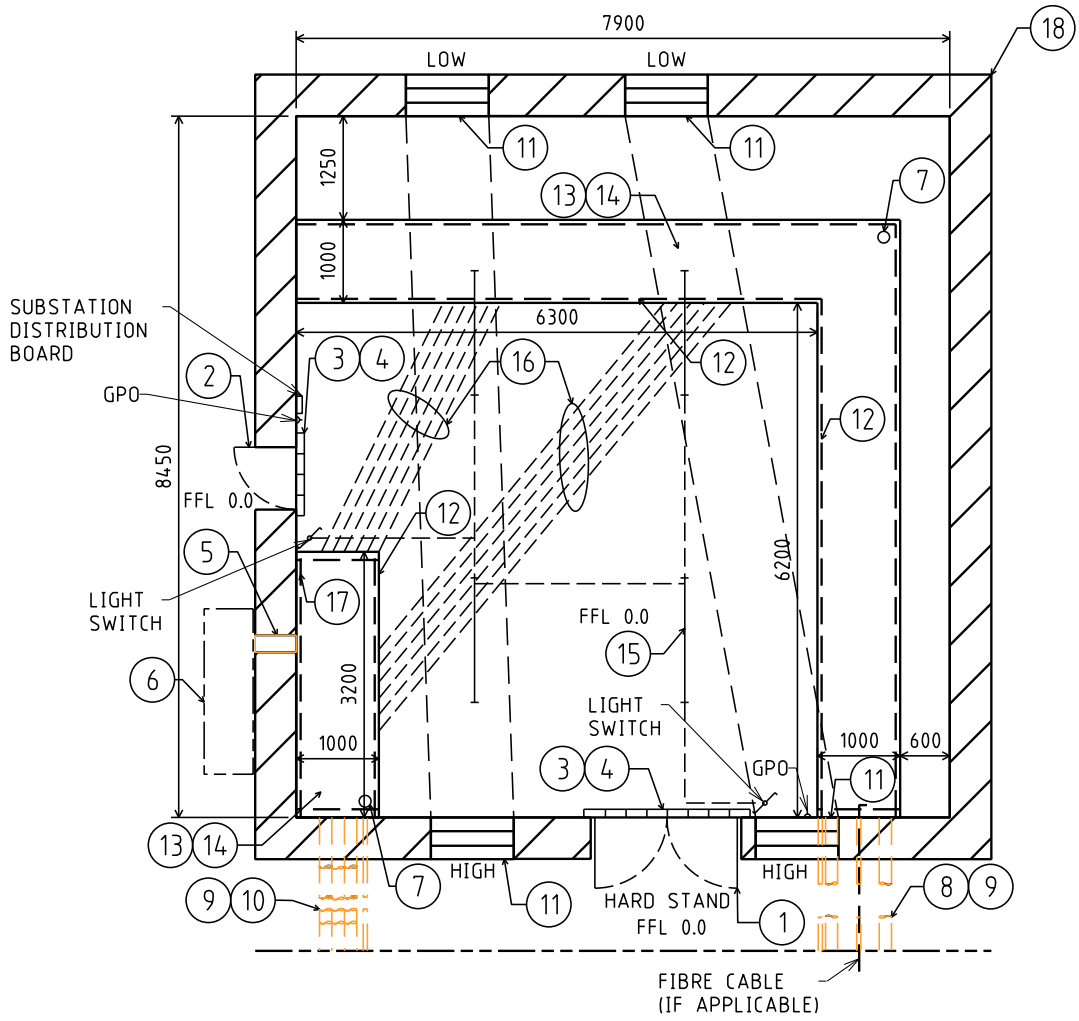
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE: DISTRICT SUBSTATION UP TO 2000 kVA (NON- MPS) FIRE RATED - WITH HV SWGR SINGLE LINE DIAGRAM

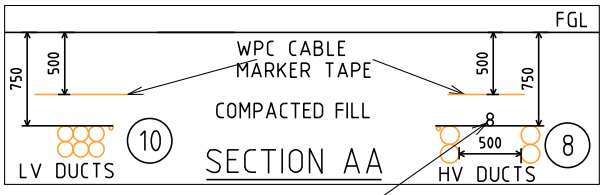
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025 | DRG. No. DSM-3-10
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR | REV. C | SHT. 1/6



1	DOUBLE DOORS 2340x1720 CLEAR OPENING.
2	DOOR 2040x820 CLEAR OPENING.
3	75 HIGH BRICK BUND.
4	BUND LAID AFTER EQUIPMENT INSTALLED.
5	CUSTOMERS DUCT(S) AT FLOOR OF TRENCH.
6	CUSTOMERS MAIN DISTRIBUTION BOARD.
7	75 DIA PENETRATION THROUGH SLAB FOR EARTHING - TO BE SEALED WITH CN81.
8	4-150 & 1-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
9	750 COVER AT BOUNDARY.
10	6-150 & 1-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
11	600x800 WIDE FIRE DAMPERED VENT AT HIGH (TOP 200 MAX BELOW CEILING) & LOW (BOTTOM MAX 200 ABOVED FINISHED FLOOR LEVEL) LEVELS.
12	50mm WIDE x 38mm DEEP REBATE FOR TRENCH COVERS.
13	TRENCH COVER 35mm THICK x 26kg/m2 FRP SLAB PANEL FRONT OF HV SWITCHGEAR ONLY. 38mm THICK x 18.2kg/m2 MESH GRATING ELSEWHERE.
14	1200 DEEP TRENCH WALLS & FLOOR OF TRENCH TO BE PAINTED WITH SILICONE GLAZE S50.
15	LED LIGHTS BATTEN FITTING (2 WAY SWITCH WITH NEON INDICATOR).
16	10-150 ID HEAVY DUCTS INSTALLED AT FLOOR OF TRENCH - TO BE SEALED WITH CN81.
17	COVER SUPPORTS - 100x75x6 UA (H.D.G.) FIXED TO WALL OF TRENCH.
18	WALLS, CEILING & DOORS TO BE 2HR FIRE RATED, CEILING HEIGHT TO BE MIN 2500mm.



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A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

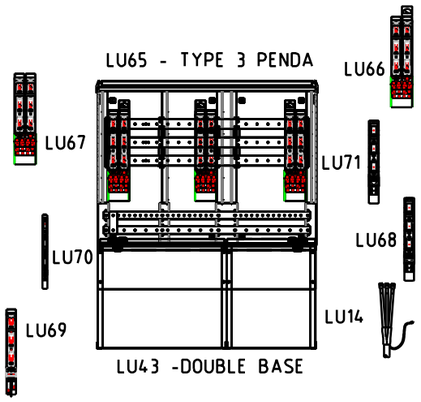
TITLE

DISTRICT SUBSTATION
UP TO 2000 kVA (NON-MPS)
FIRE RATED - WITH HV SWGR
REQUIREMENTS AND DUCT INSTALLATION

DISTRIBUTION SUBSTATION PLANT MANUAL

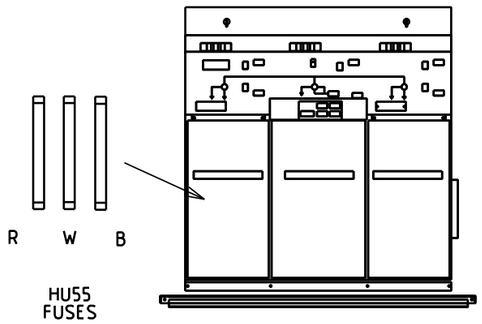
westernpower

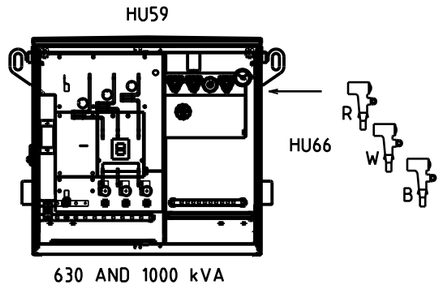
DRAWN: SL	DATE: 17/12/2025	DRG. No. DSM-3-10
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 2/6



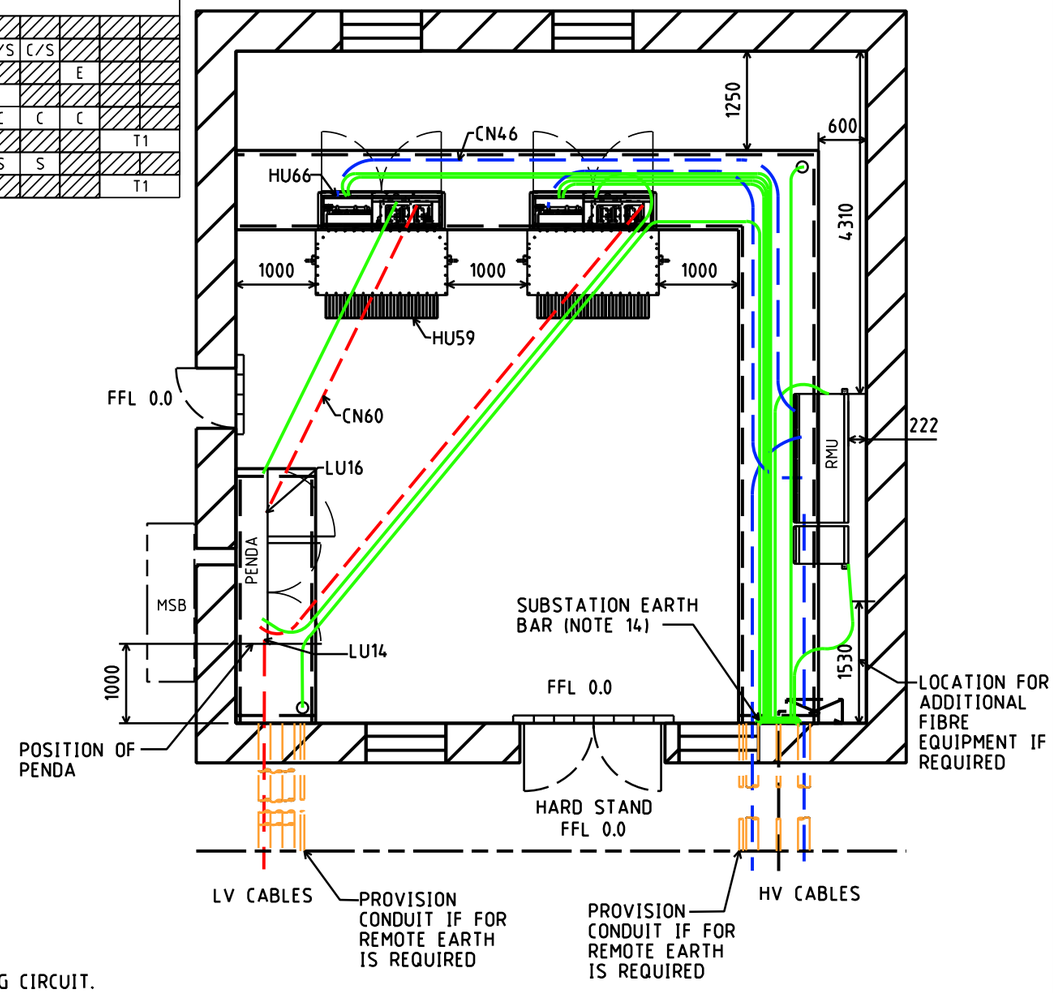
TYPE 3.1 PENDA LAYOUT																		
EQUIPEMENT	MAX FUSE	CU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TYPE 3.1 PENDA		LU65																
PENDA BASE		LU42																
160A FSD	1x 63A DIN 00	LU70				L	L											
630A FSD	1x 400A NH2	LU69				C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S			
910A FSD	1x 630A NH3	LU68			E											E		
1260A FSD	2x 400A NH2	LU67				C			C		C		C					
1000A FSD	LINKS	LU71			C	C	C	C	C	C	C	C	C	C	C	C		
2000A FSD	LINKS	LU66	T2								C1						T1	
FSD CABLE TERM		LU14				L/S	S	S	S	S	S	S	S	S	S			
TX CABLE TERM		LU16	T2														T1	

TX = TRANSFORMER L = LIGHTING CIRCUIT E = EMERGENCY RESPONSE
C = CUSTOMER S= STREET CIRCUIT GENERATOR





630 AND 1000 kVA



HV MATERIAL				
EQUIPEMENT	CU	QTY		
		6 kV	11 kV	22 kV
TRANSFORMER	HU55/630	SELECT 2 OF THE SAME TYPE		
	HU55/1000			
	HU59/630	SELECT 2 OF THE SAME TYPE		
	HU59/1000			
RMU	HU24	SELECT 1		
	HU25_2S			
	HU25_3S			
EARTHING	HU70_3	1		
CABLE	HU66	2		
	CN46	14		
AUTOMATION	DA6_LVS	1		
	DA6_NG_SE	1 (OPTIONAL)		

LV MATERIAL		
EQUIPEMENT	CU	QTY
PENDA	LU64_I	1
	LU66	1
	LU68	1
CABLE	CN60	56
	LU16	2

NOTES:-
1. LU66 CAN BE USED FOR THE TRANSFORMER AND CUSTOMER.
2. EVERY INSTALLATION SHALL INCLUDE AN ERG CONNECTION LU68.
3. 2 x LU70 OR 1 x LU69 CAN BE USED IN POSITION 4.
4. 1 X LU14 NEEDED WITH EACH LU69 STREET FEEDER OR LU70 LIGHTING CIRCUIT.
5. 1 X LU16 NEEDED WITH EACH LU66_TX IN PENDA AND 1 X LU16 FOR LU59 (NON-MPS).
6. LU66_TX WILL DEFAULT TO POSITIONS 9 & 10 UNLESS POSITION 1 & 2 IS SPECIFIED BY THE DESIGNER.
7. STANDARD PENDA LAYOUT SHOWN. DESIGNER MAY DESIGN AN ALTERNATIVE PENDA LAYOUT.
8. NO GANGED FSD OR SWD PERMITTED SPANING POSITIONS 5 & 6 OR 6 & 7.
9. REFER TO DSPM CHAPTER 4 FOR THE CORRECT INSTALLATION OF THE PENDA.
10. RMU SUPPLIED WITH BASE AND HV CABLE TERMINATIONS.
11. REFER TO SHEET 6 FOR THE CORRECT INSTALLATION OF THE RMU.
12. REFER TO DSPM CHAPTER 4 FOR AUTOMATION DETAILS.
13. CABLE TRENCH TO BE WATER/OIL TIGHT.
14. INDICATIVE LOCATION OF EARTH BAR SHOWN.
EXACT LOCATION TO BE CONFIRMED IN DESIGN.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
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B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

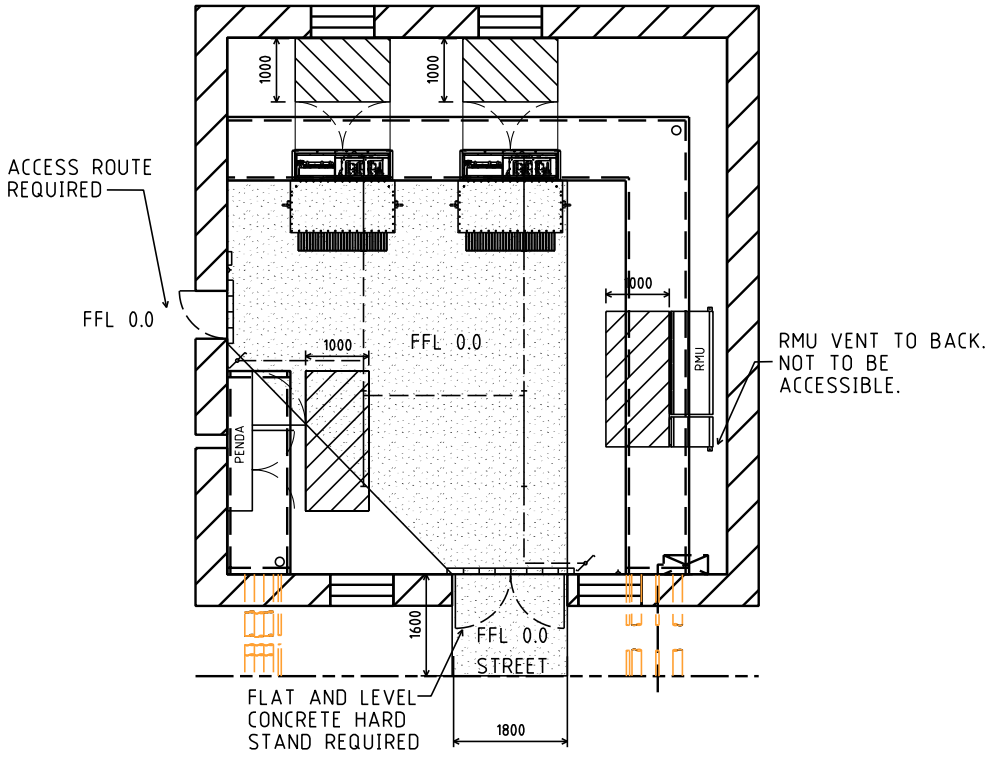
DISTRICT SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
EQUIPMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

DRG. No. DSM-3-10
REV. C | SHT. 3/6



INSTALLATION AND MAINTENANCE CLEARANCE

OPERATIONAL CLEARANCE

NOTES:-
1. DESIGNER TO ENSURE SAFE ACCESS AND EGRESS ROUTES ARE PROVIDED.
2. WHERE THE SITE IS SET BACK FROM THE STREET, CRANE ACCESS IS REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
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B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

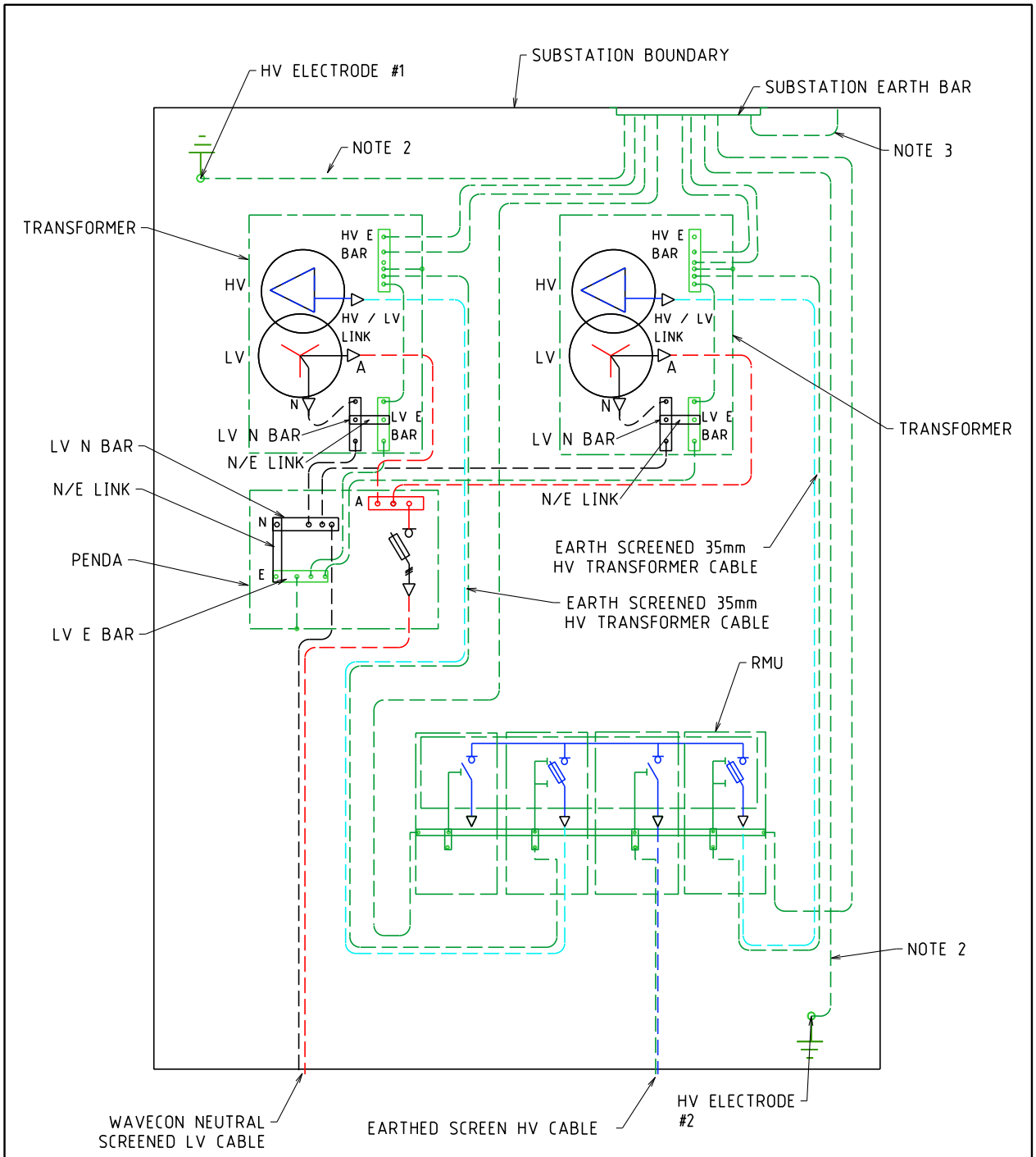
DISTRICT SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

DRG. No. DSM-3-10
REV. C
SHT. 4/6



NOTES:-

1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES AS PER ITEM 7 ON SHEET 2 - TO BE SEALED WITH CN81.
3. BUILDING EARTH CABLE BOND IS TO BE PROVIDED BY THE CUSTOMER.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
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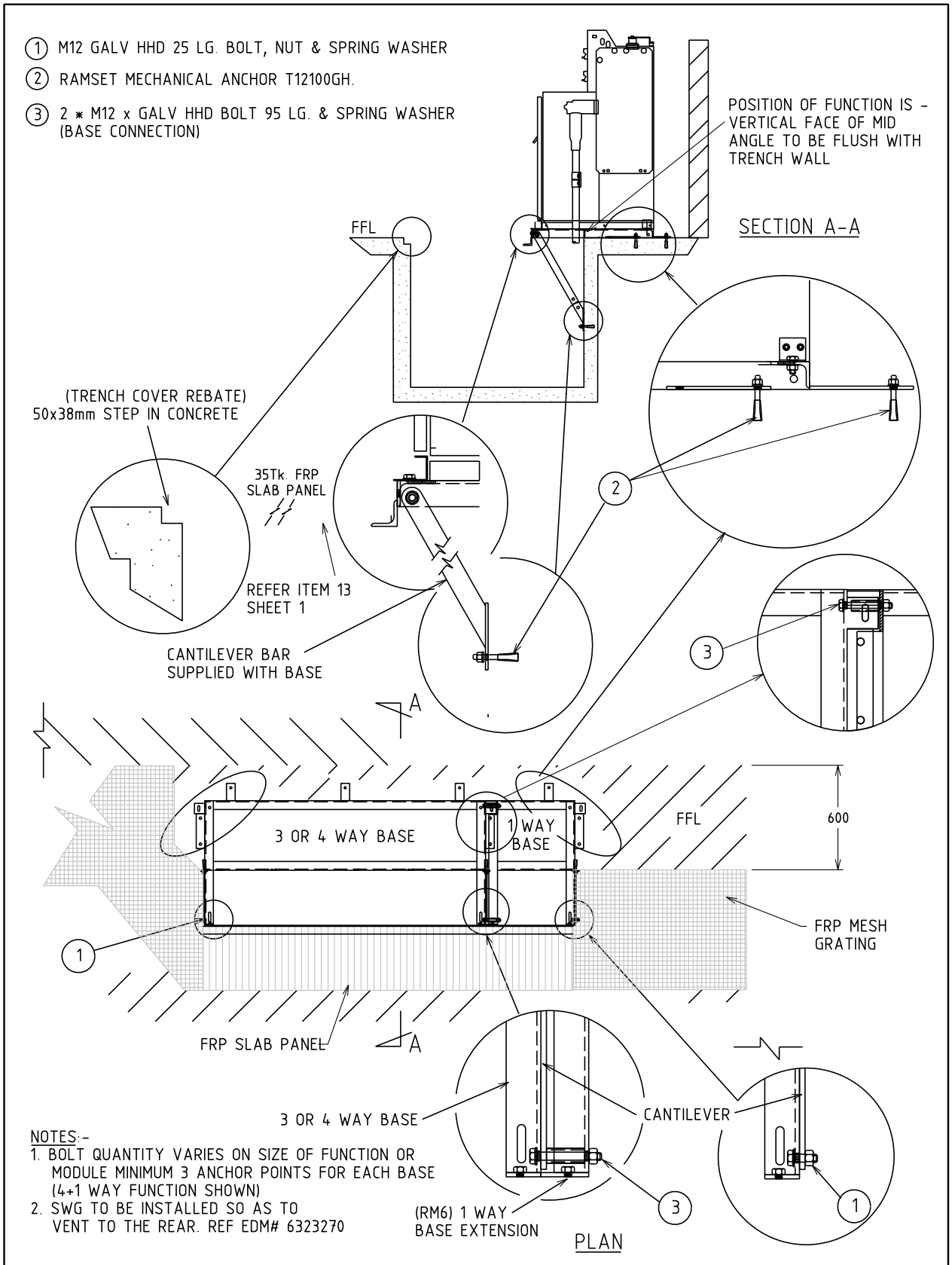
TITLE

DISTRICT SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	DRG. No.
ORIGINATED: SL	SCALE: NTS @ A4	DSM-3-10
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 5/6



NOTES:-
1. BOLT QUANTITY VARIES ON SIZE OF FUNCTION OR MODULE MINIMUM 3 ANCHOR POINTS FOR EACH BASE (4+1 WAY FUNCTION SHOWN)
2. SWG TO BE INSTALLED SO AS TO VENT TO THE REAR. REF EDM# 6323270

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE: SCHNEIDER SWITCHGEAR 3 & 4 WAY WITH 1 WAY EXTENSION FIXING DETAILS

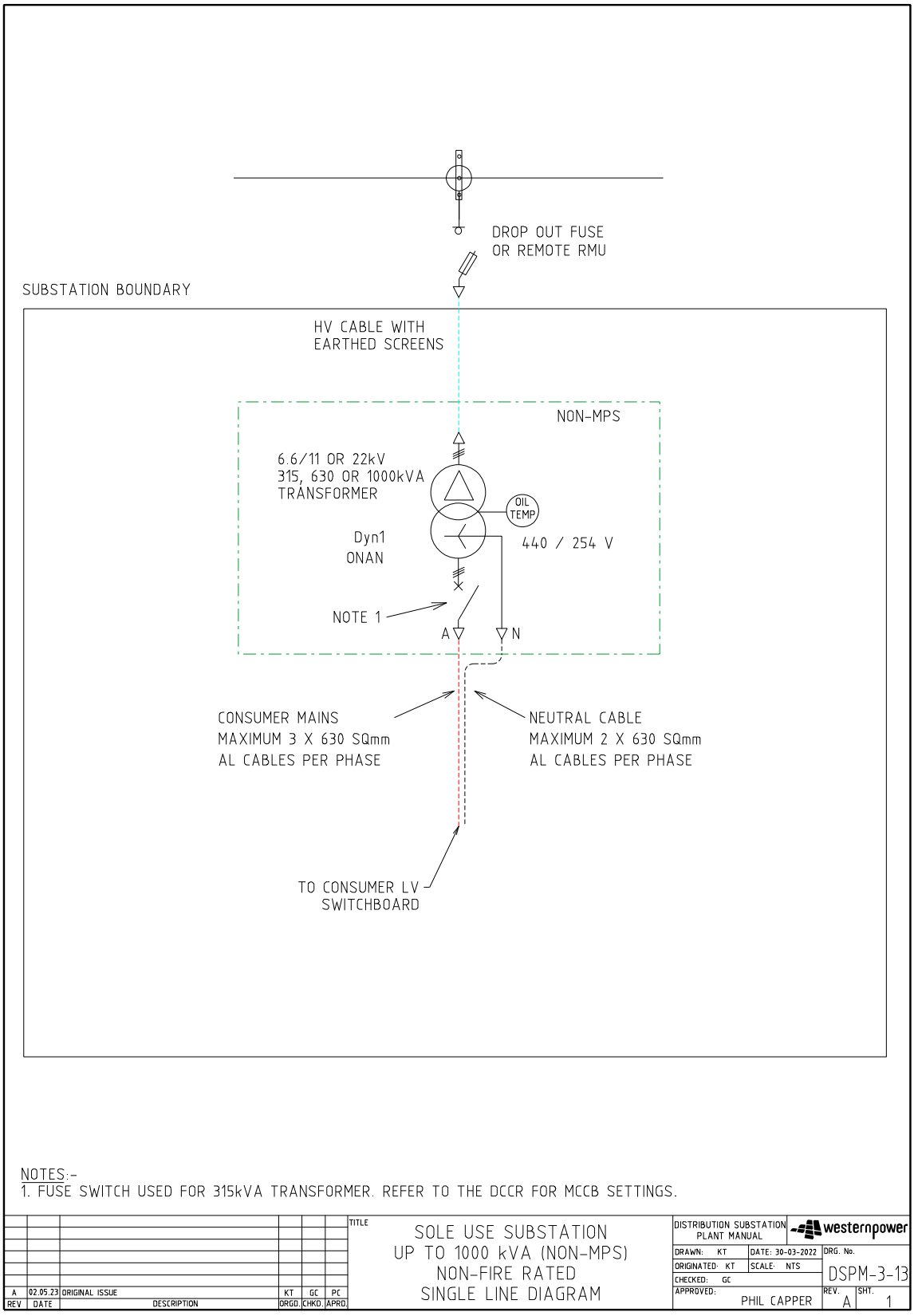
DISTRIBUTION SUBSTATION PLANT MANUAL

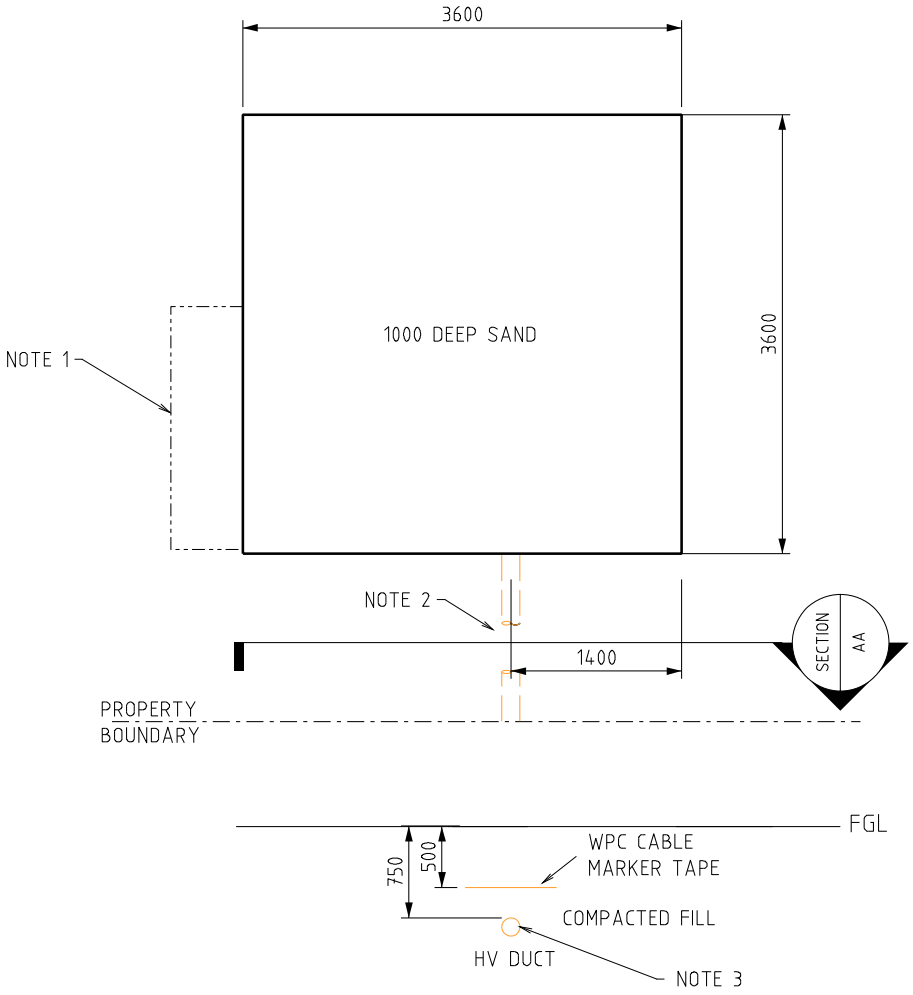
westernpower

DRAWN: SL	DATE: 17/12/2025	DRG. No. DSM-3-10
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 6/6

4.4 Sole Use Substations – Non-Fire Rated

4.4.1 DSPM-3-13 Up to 1000kVA (Non-MPS)





SECTION AA

NOTES:-
1. SITE OF CUSTOMERS MAIN DISTRIBUTION BOARD (IF REQUIRED).
2. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
3. 1x150 (HV) ID HEAVY DUTY DUCT (CN56).

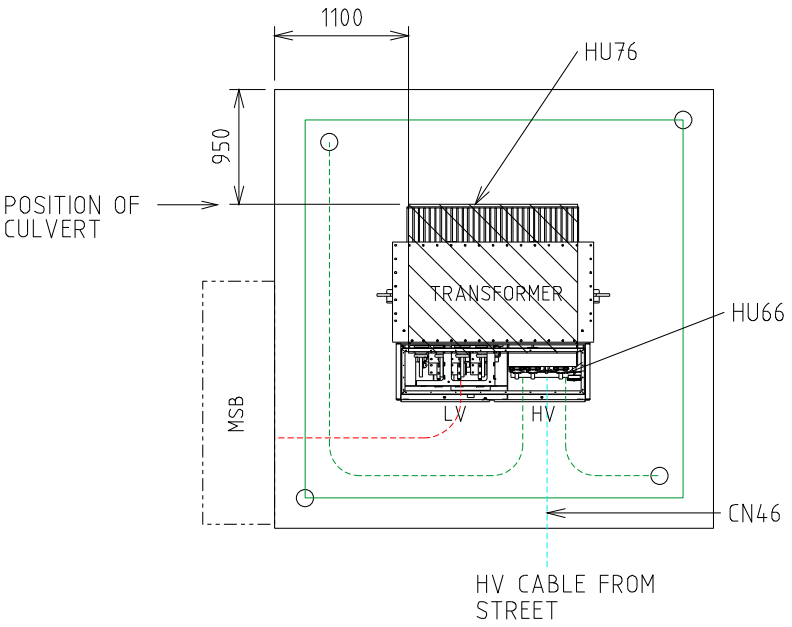
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

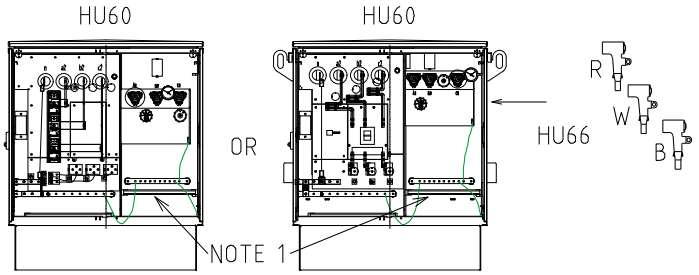
TITLE: SOLE-USE SUBSTATION UP TO 1000kVA (NON-MPS) NON FIRE RATED DUCTS & LAND REQUIREMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 31-03-2022	DRG. No. DSPM-3-13
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 2

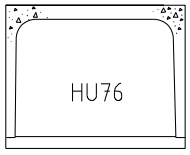




TRANSFORMER MATERIALS (QTY)

CU	440V	6/11kV	22kV
HU60/315			
HU60/630			
HU60/1000			
HU66			
HU68			
HU76			

315, 630 & 1000 kVA



BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416 x 1022 x 1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg

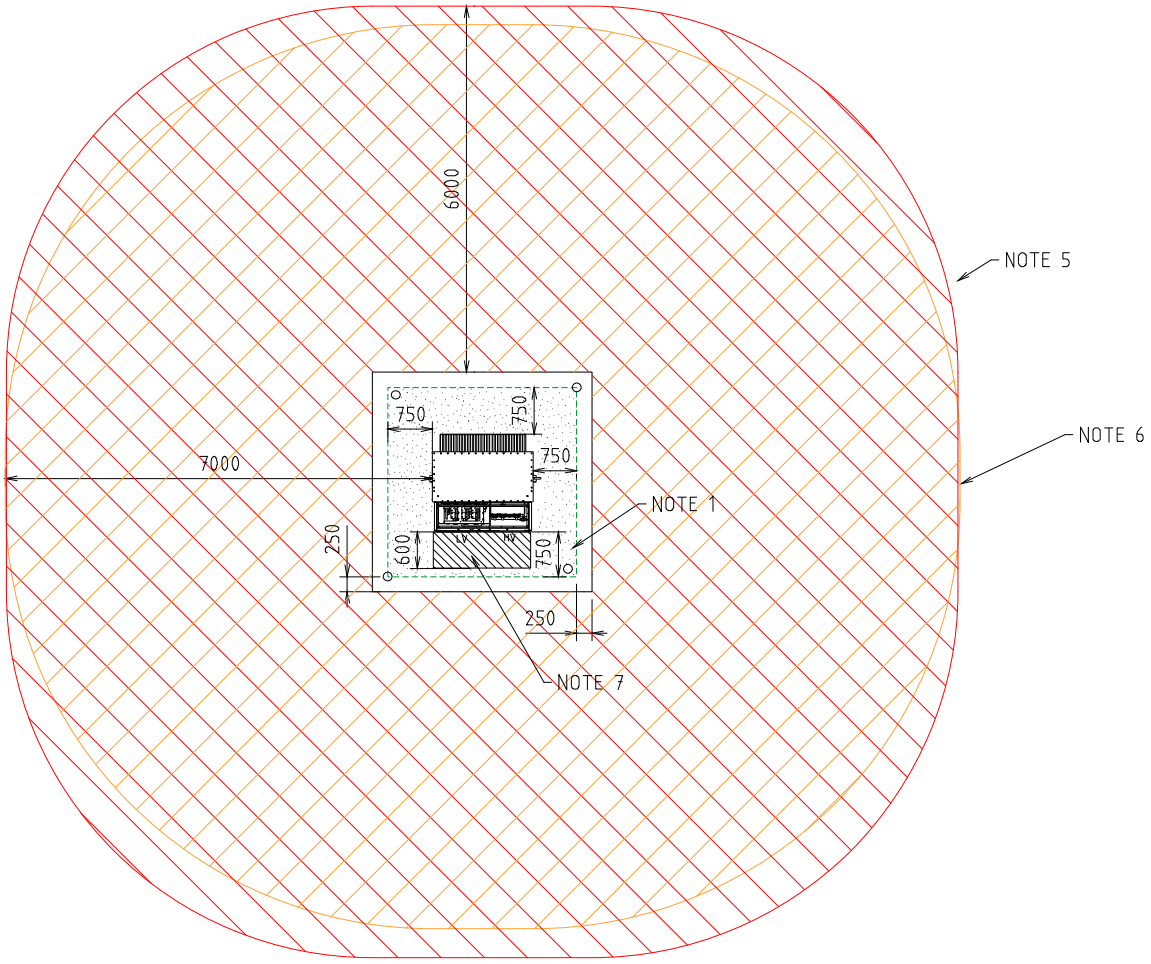
NOTES:-
1. INSTALL CABLE CLAMP ON EACH PHASE OF HV CABLE (FM0200)
2. REFER DSPM CHAPTER 4 FOR THE CORRECT POSITIONING OF THE NON-MPS ONTO THE CULVERT.
3. MEASUREMENTS SHOWN ARE ± 50mm, SAME CONSTRUCTION TOLERANCE APPLIES.
4. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: SOLE USE SUBSTATION UP TO 1000kVA (NON-MPS) NON FIRE RATED EQUIPMENT & SITE LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL | westernpower

DRAWN: KT | DATE: 31-03-2022 | DRG. No. DSPM-3-13
ORIGINATED: KT | SCALE: NTS
CHECKED: GC
APPROVED: PHIL CAPPER | REV. A | SHT. 3



FIRE RISK ZONE

EARTHING (STEP AND TOUCH)

TRANSFORMER NOISE IMPACT ZONE

OPERATIONAL

NOTES:-

1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO TRANSFORMER.
   USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION DESIGN DRAWING.
5. FIRE RISK ZONE IS TO BE SHOWN FROM THE EDGE OF THE SUBSTATION SITE.
   OIL CONTAINMENT TO BE USED TO KEEP THE OIL WITHIN THE SITE. FIRE RISK ZONE
   MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER DSPM CHAPTER 5.
6. NOISE IMPACT ZONE IS BASED ON 1000 kVA TRANSFORMER AND IS MEASURED FROM THE EDGE
   OF THE TRANSFORMER TANK. NOISE IMPACT ZONE MAY BE REDUCED IF MITIGATION OPTIONS
   ARE USED. REFER TO "NOISE COMPLIANCE REQUIREMENTS FOR DISTRIBUTION TRANSFORMERS" GUIDELINE.
7. OPERATIONAL CLEARANCE IN FRONT OF TRANSFORMER SHOWN WITH DOORS LIFTED OFF.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

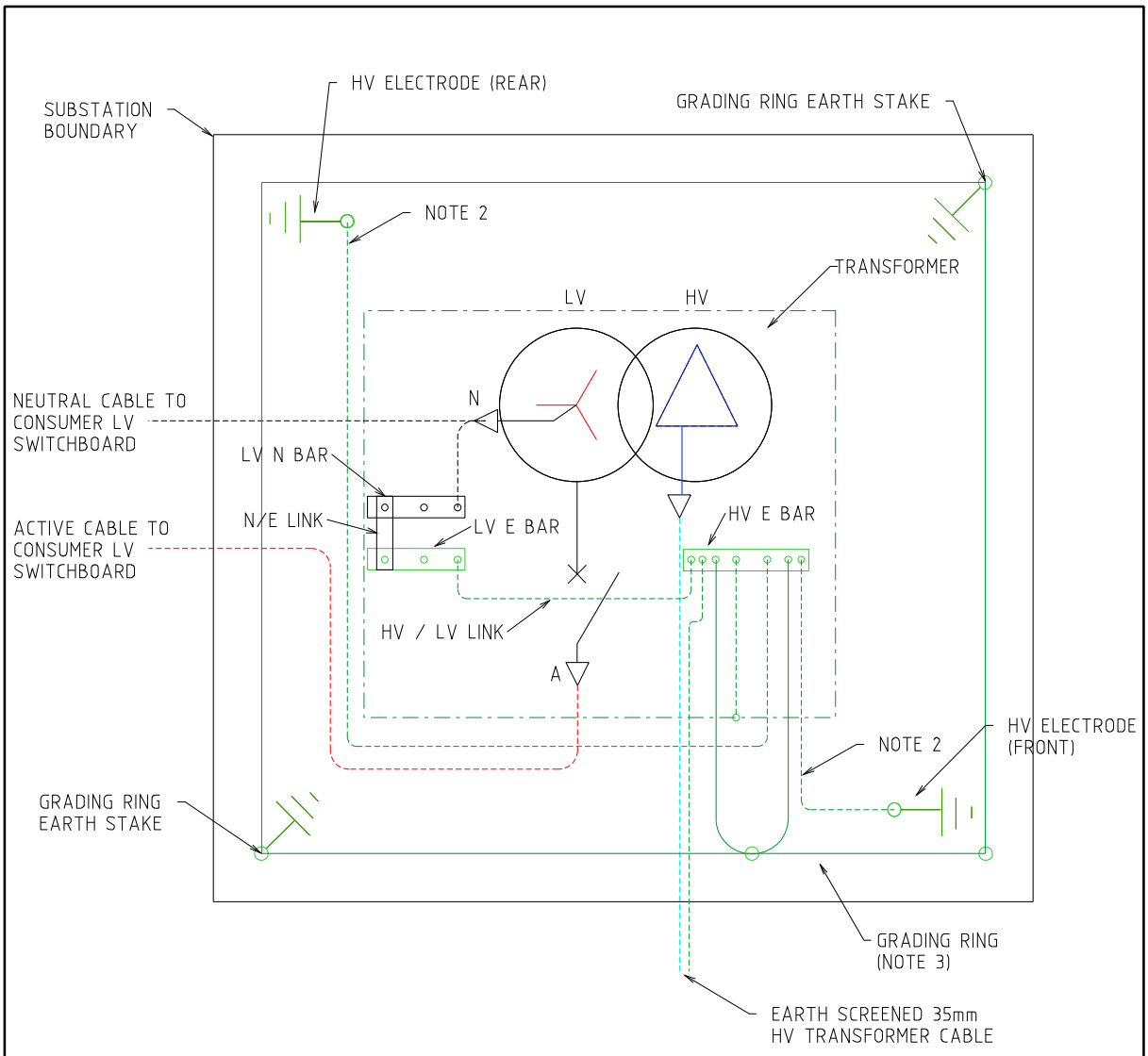
TITLE

SOLE-USE SUBSTATION UP TO 1000kVA (NON-MPS) NON FIRE RATED OPERATIONAL CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 31-03-2022	DRG. No. DSPM-3-13
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 4



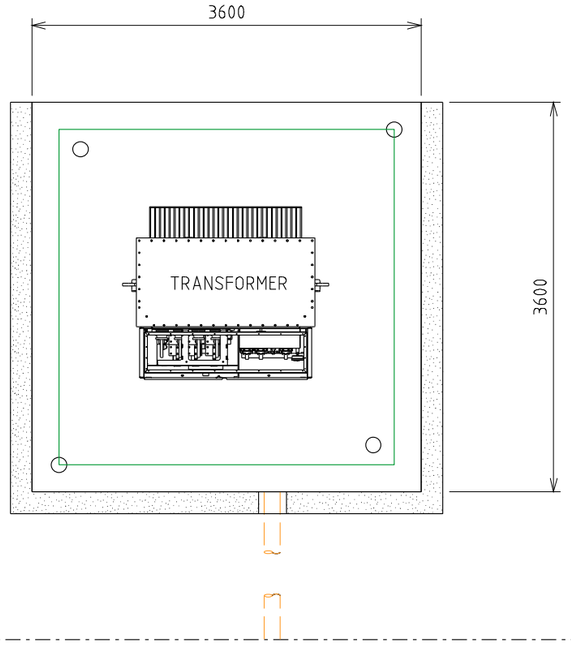
NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	KT

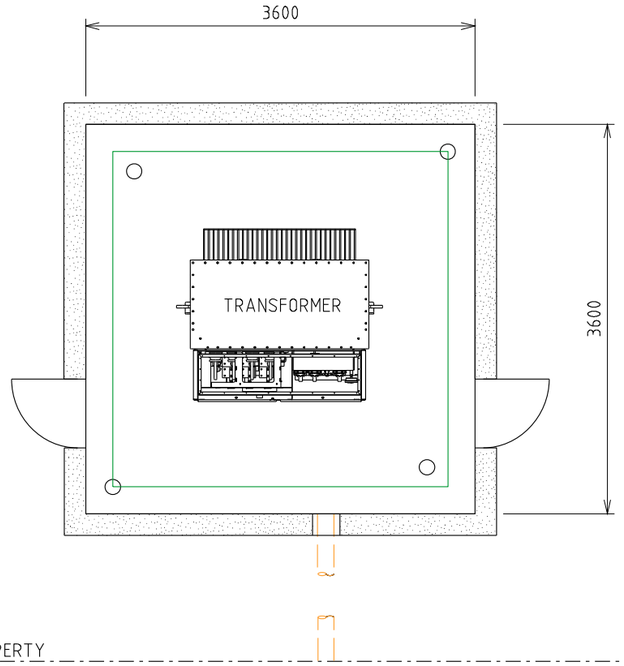
TITLE

SOLE-USE SUBSTATION UP TO 1000 kVA (NON-MPS) NON-FIRE RATED EARTHING ARRANGEMENT

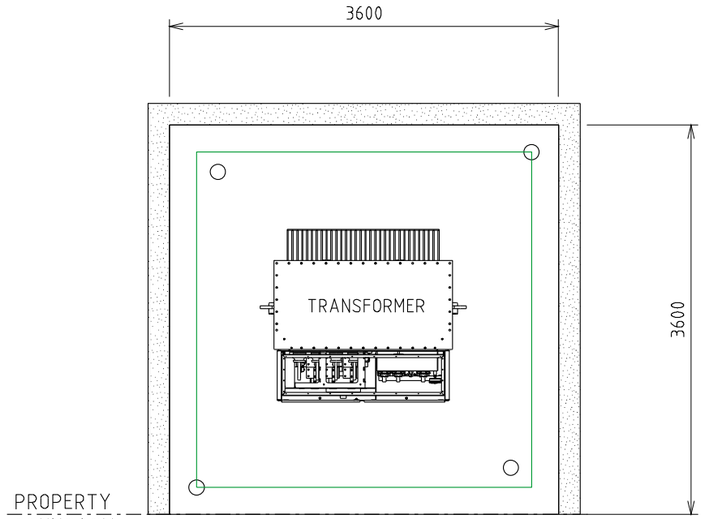
DISTRIBUTION SUBSTATION PLANT MANUAL		westernpower
DRAWN: KT	DATE: 30-03-2022	DRG. No. DSPM-3-13
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 5



PARTIAL (FRONT) SCREENING



FULL SCREENING



PARTIAL (REAR) SCREENING

NOTES:-

1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTO SUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE.
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING (MASONARY, ETC.)
6. 2HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER DSPM CHAPTER 5 (FIRE RISK)
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8m (HEIGHT OF TRANSFORMER + 300mm).
8. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

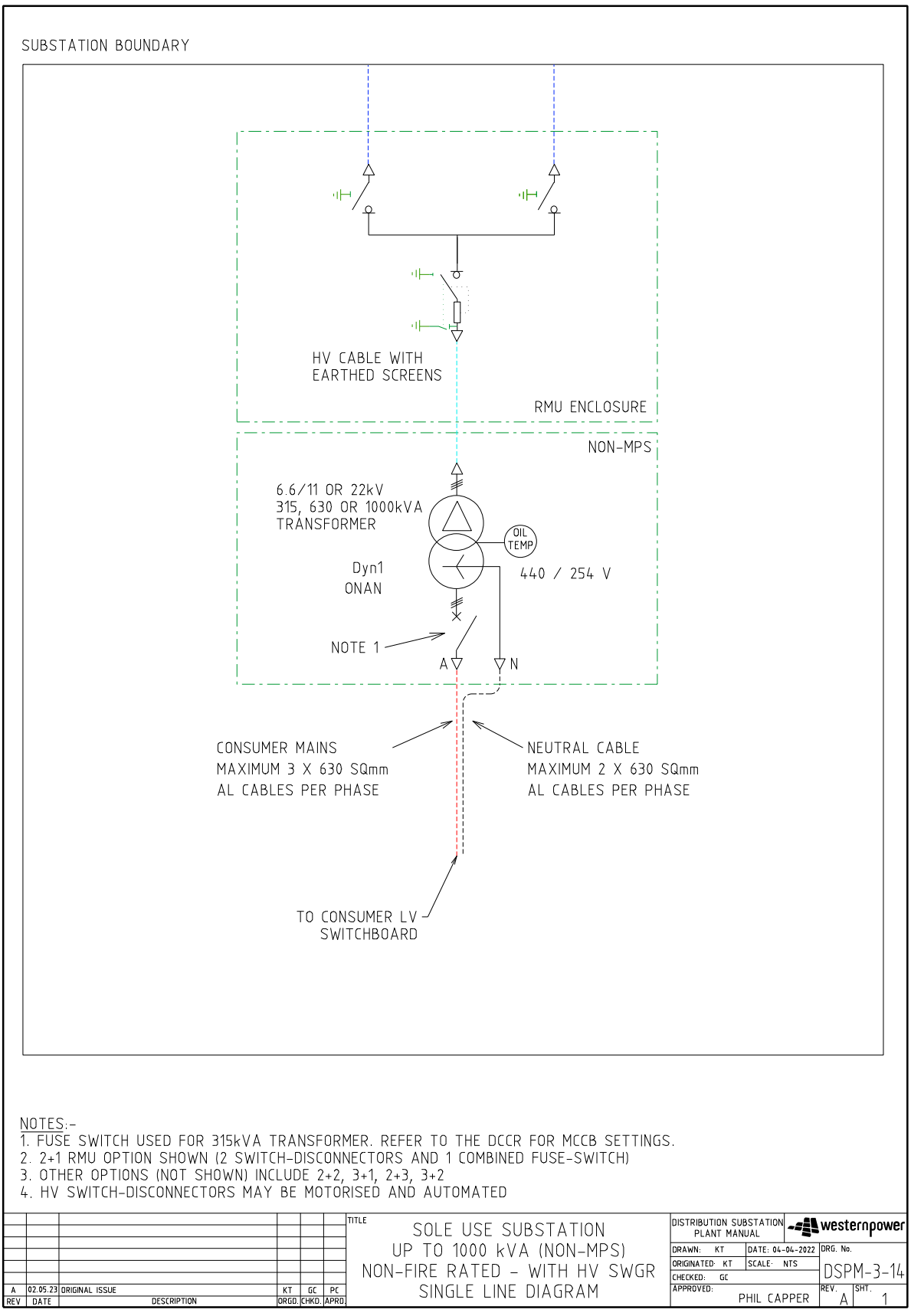
SOLE-USE SUBSTATION UP TO 1000 kVA (NON-MPS) NON-FIRE RATED SCREENING ARRANGEMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 31-03-2022	DRG. No. DSPM-3-13
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER	REV. A	SHT. 6

4.4.2 DSPM-3-14 Up to 1000kVA (Non-MPS) with HV SWGR



NOTES:-
1. FUSE SWITCH USED FOR 315kVA TRANSFORMER. REFER TO THE DCCR FOR MCCB SETTINGS.
2. 2+1 RMU OPTION SHOWN (2 SWITCH-DISCONNECTORS AND 1 COMBINED FUSE-SWITCH)
3. OTHER OPTIONS (NOT SHOWN) INCLUDE 2+2, 3+1, 2+3, 3+2
4. HV SWITCH-DISCONNECTORS MAY BE MOTORISED AND AUTOMATED

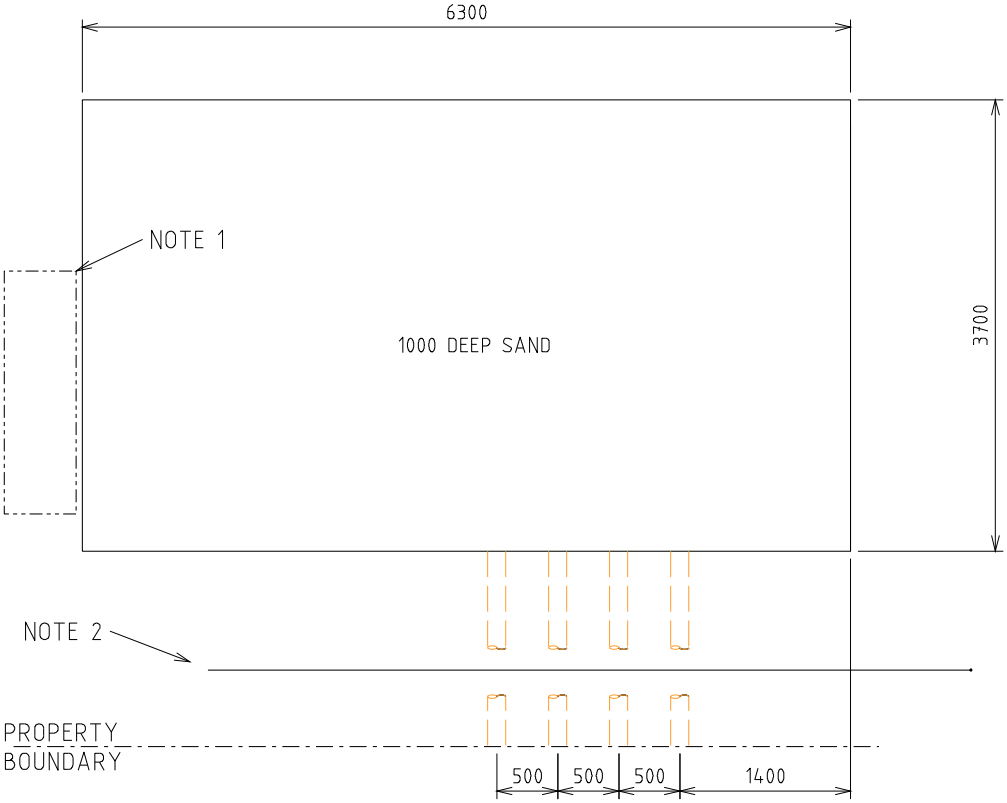
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

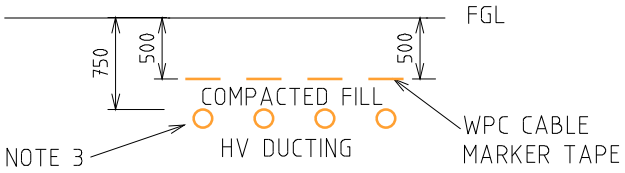
TITLE: SOLE USE SUBSTATION UP TO 1000 kVA (NON-MPS) NON-FIRE RATED - WITH HV SWGR SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 04-04-2022	DRG. No. DSPM-3-14
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 1





SECTION AA

NOTES:-
1. SITE OF CUSTOMERS MAIN DISTRIBUTION BOARD (IF REQUIRED).
2. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
3. 4x150 (HV) ID HEAVY DUTY DUCT (CN56).
4. LAND AREA TO BE INCREASED IF SCREENING IS REQUIRED. SEE SHEET 6 FOR DETAILS.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: SOLE-USE SUBSTATION UP TO 1000kVA (NON-MPS) NON FIRE RATED - WITH HV SWGR DUCTS & LAND REQUIREMENTS

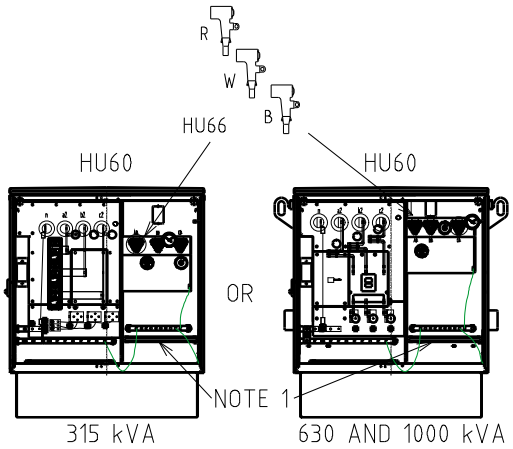
DISTRIBUTION SUBSTATION PLANT MANUAL

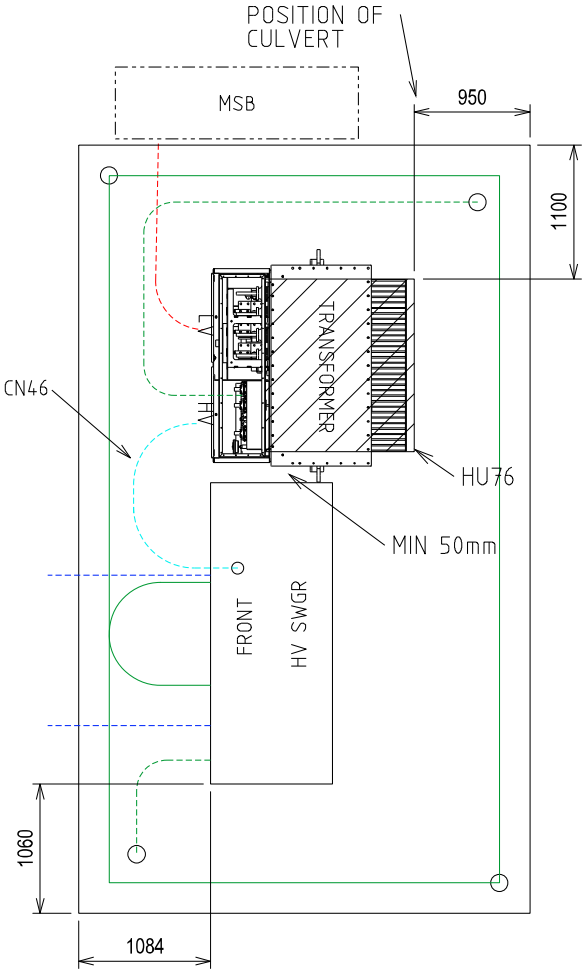
westernpower

DRAWN: KT	DATE: 04-04-2022	DRG. No. DSPM-3-14
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER	REV. A	SHT. 2

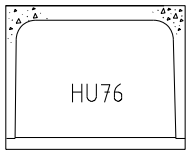
TRANSFORMER MATERIALS (QTY)

CU	440V	6/11kV	22kV
HU60/315			
HU60/630			
HU60/1000			
HU66			
HU68			
HU76			

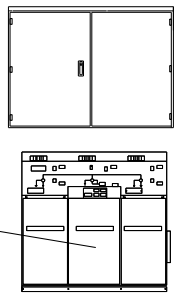




315, 630 & 1000 kVA



BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416 x 1022 x 1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg



RMU MATERIALS (QTY)

CU	6 kV	11 kV	22 kV
HU55/315			
HU55/630			
HU55/1000			
HU6			
HU7			
HU8			
HU80			
HU81			
CN46			
DA6			
DA10			

NOTES:-
1. INSTALL CABLE CLAMP ON EACH PHASE OF HV CABLE (FM0200)
2. REFER DSPM CHAPTER 4 FOR THE CORRECT POSITIONING OF THE NON-MPS ONTO THE CULVERT.
3. REFER TO DSPM CHAPTER 4 FOR THE CORRECT INSTALLATION OF THE RMU BASE.
4. MEASUREMENTS SHOWN ARE ± 50mm, SAME CONSTRUCTION TOLERANCE APPLIES.
5. RMU, KIOSK BASE AND CABLE TERMINATIONS SUPPLIED IN RMU CU.
6. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.
7. REFER TO DSPM CHAPTER 4 FOR AUTOMATION REQUIREMENTS.

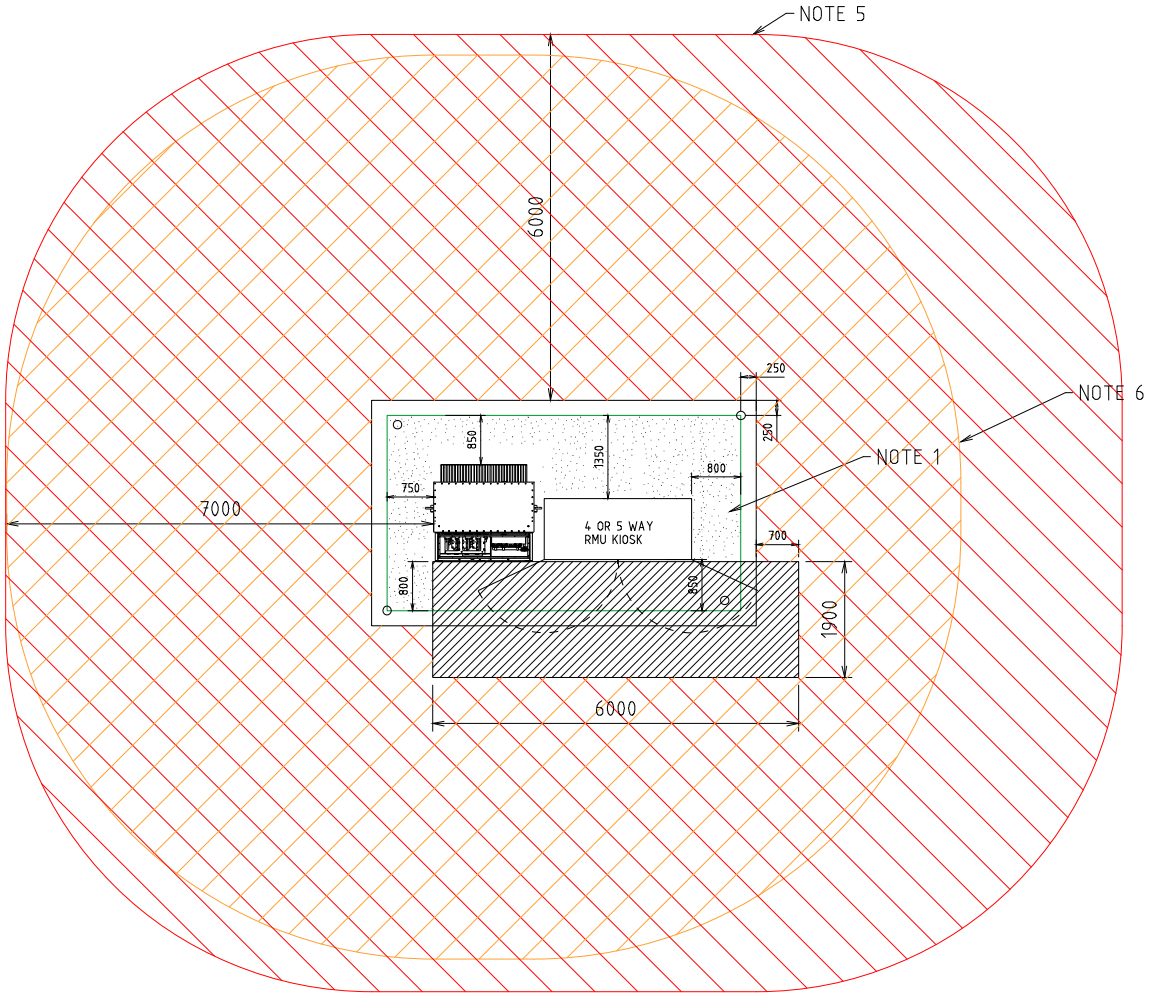
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: SOLE USE SUBSTATION UP TO 1000kVA (NON-MPS) NON FIRE RATED - WITH HV SWGR EQUIPMENT & SITE LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT | DATE: 04-04-2022 | DRG. No. DSPM-3-14
ORIGINATED: KT | SCALE: NTS
CHECKED: GC
APPROVED: PHIL CAPPER | REV. A | SHT. 3



FIRE RISK ZONE

EARTHING (STEP AND TOUCH)

TRANSFORMER NOISE IMPACT ZONE

OPERATIONAL

NOTES:-

1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO TRANSFORMER AND RMU. USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION DESIGN DRAWING.
5. FIRE RISK ZONE IS TO BE SHOWN FROM THE EDGE OF THE SUBSTATION SITE. OIL CONTAINMENT TO BE USED TO KEEP THE OIL WITHIN THE SITE. FIRE RISK ZONE MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER DSPM CHAPTER 5.
6. NOISE IMPACT ZONE IS BASED ON 1000 kVA TRANSFORMER AND IS MEASURED FROM THE EDGE OF THE TRANSFORMER TANK. NOISE IMPACT ZONE MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER TO "NOISE COMPLIANCE REQUIREMENTS FOR DISTRIBUTION TRANSFORMERS" GUIDELINE.

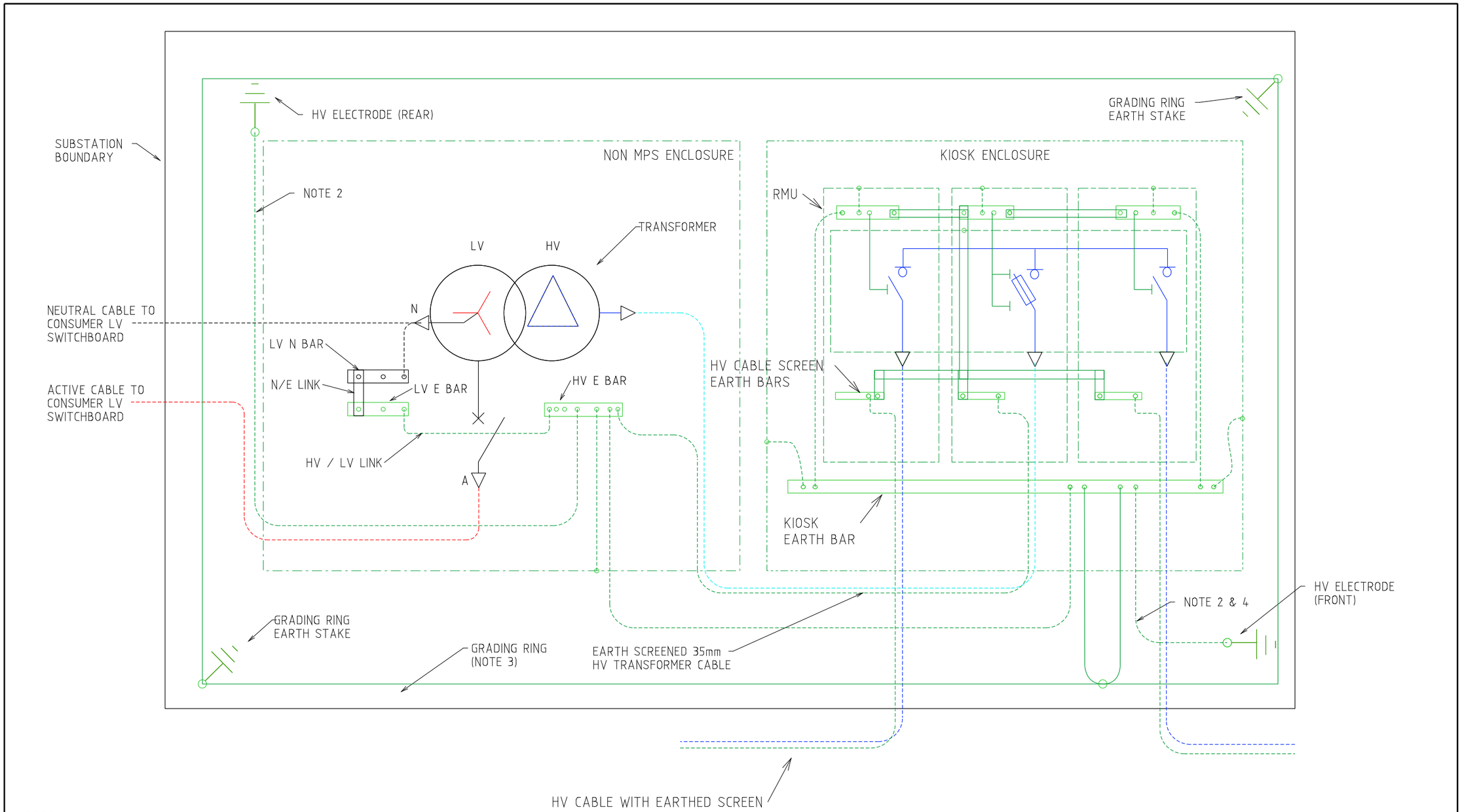
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: SOLE-USE SUBSTATION UP TO 1000kVA (NON-MPS) NON FIRE RATED - WITH HV SWGR OPERATIONAL CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 31-03-2022	DRG. No. DSPM-3-14
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER	REV. A	SHT. 4



NOTES:-

1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS.
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.
4. LOOP EARTH CABLES TO EARTH RODS INSIDE KIOSK FOR EASE OF TESTING.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

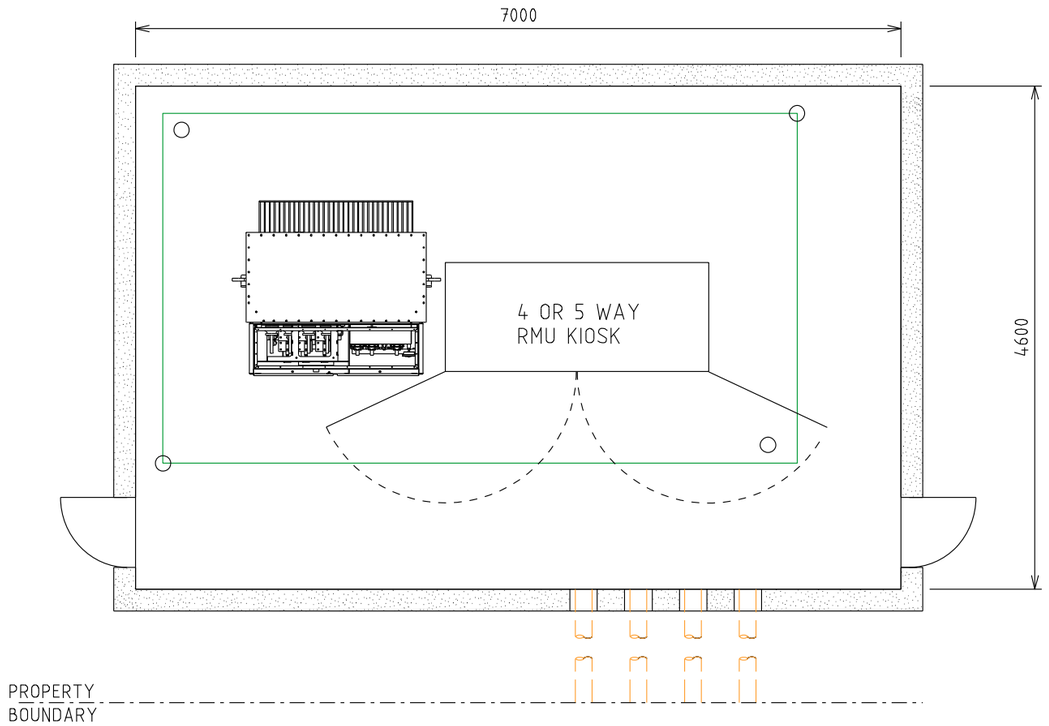
TITLE

SOLE-USE SUBSTATION
UP TO 1000 kVA (NON-MPS)
NON-FIRE RATED - WITH HV SWGR
EARTHING ARRANGEMENT

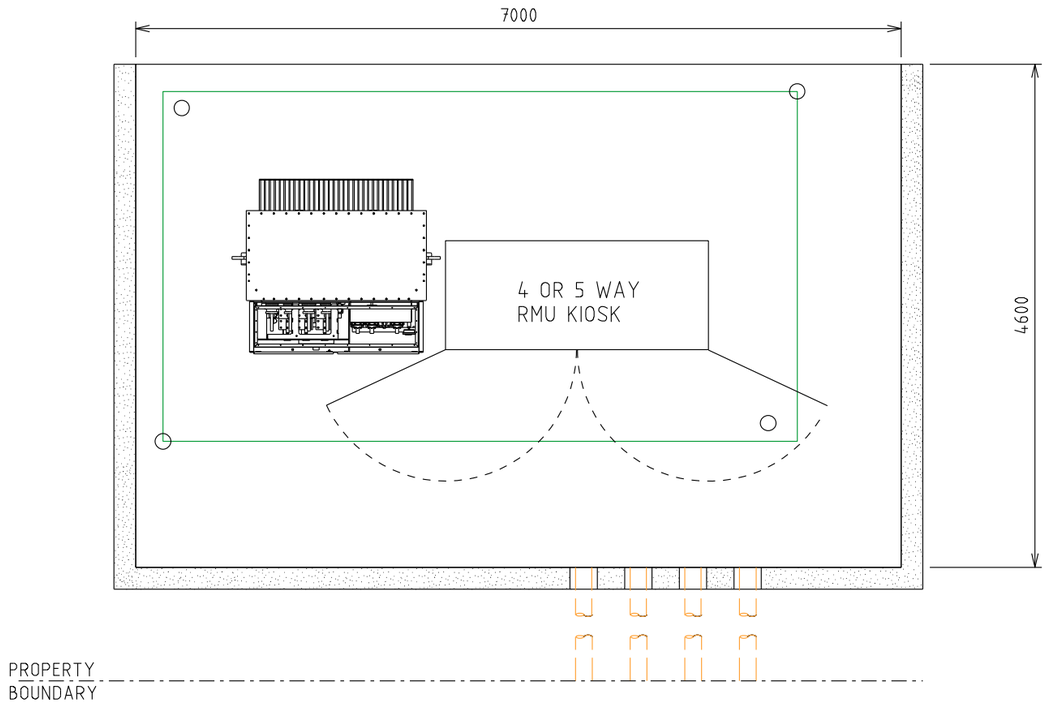
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

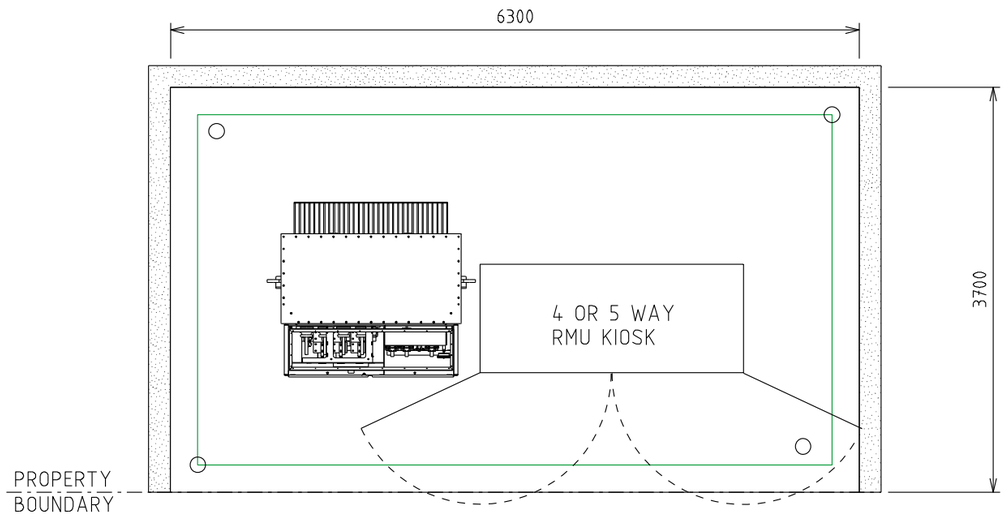
DRAWN: KT	DATE: 04-04-2022	DRG. No.	DSPM-3-14
ORIGINATED: KT	SCALE: NTS		
CHECKED: GC			
APPROVED: PHIL CAPPER		REV. A	SHT. 5



PARTIAL (FRONT) SCREENING



PARTIAL (FRONT) SCREENING



PARTIAL (REAR) SCREENING

NOTES:-

1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTO SUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE.
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING (MASONARY, ETC.)
6. 2HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER DSPM CHAPTER 5 (FIRE RISK)
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8m (HEIGHT OF TRANSFORMER + 300mm).
8. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

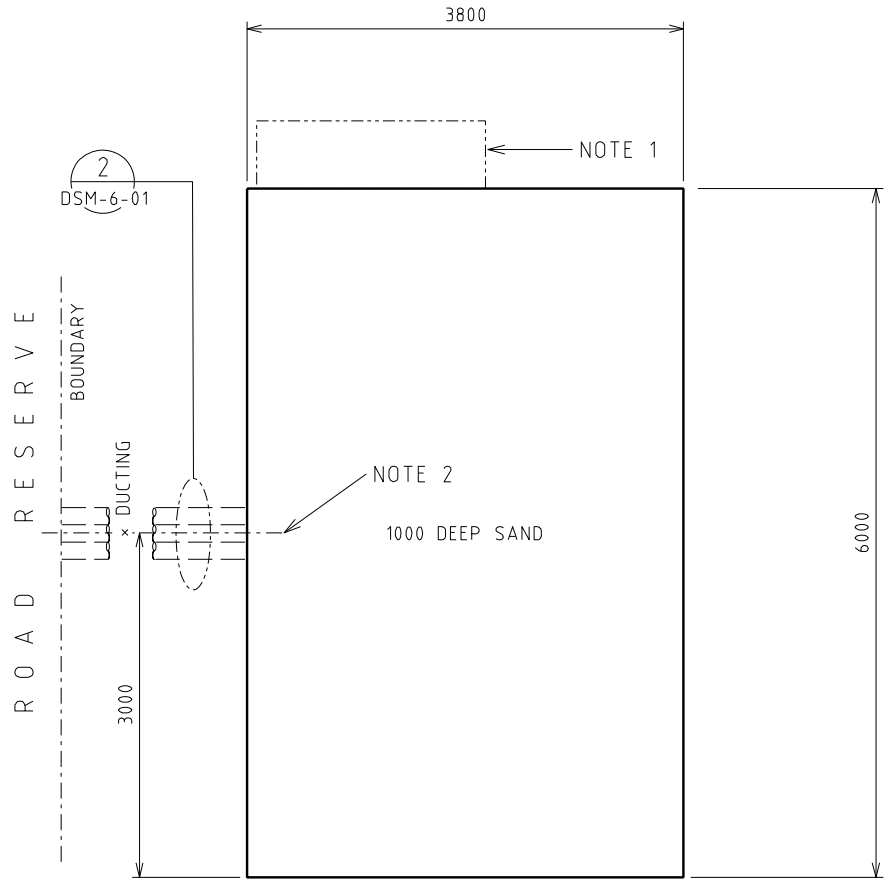
SOLE-USE SUBSTATION
UP TO 1000 kVA (NON-MPS)
NON-FIRE RATED - WITH HV SWGR
SCREENING ARRANGEMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 05-04-2022	DRG. No. DSPM-3-14
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER	REV. A	SHT. 6

4.4.3 DSM-3-15 Up to 2000kVA (Non-MPS)



NOTES:-
1. SITE OF CUSTOMERS MAIN DISTRIBUTION BOARD (IF REQUIRED).
2. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
3. 4 - 150 ID HEAVY DUTY DUCTING. SEE DSM SECTION 6 FOR DETAILS

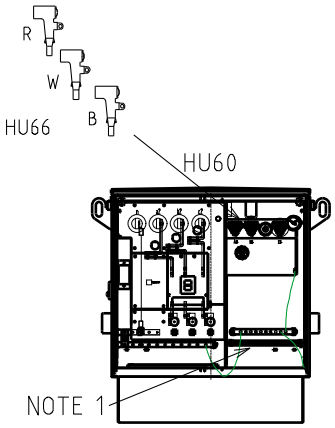
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE
SOLE USE SUBSTATION
UP TO 2000kVA (NON MPS)
NON FIRE RATED-WITHOUT HV SWGR
CIVIL & LAND REQUIREMENTS

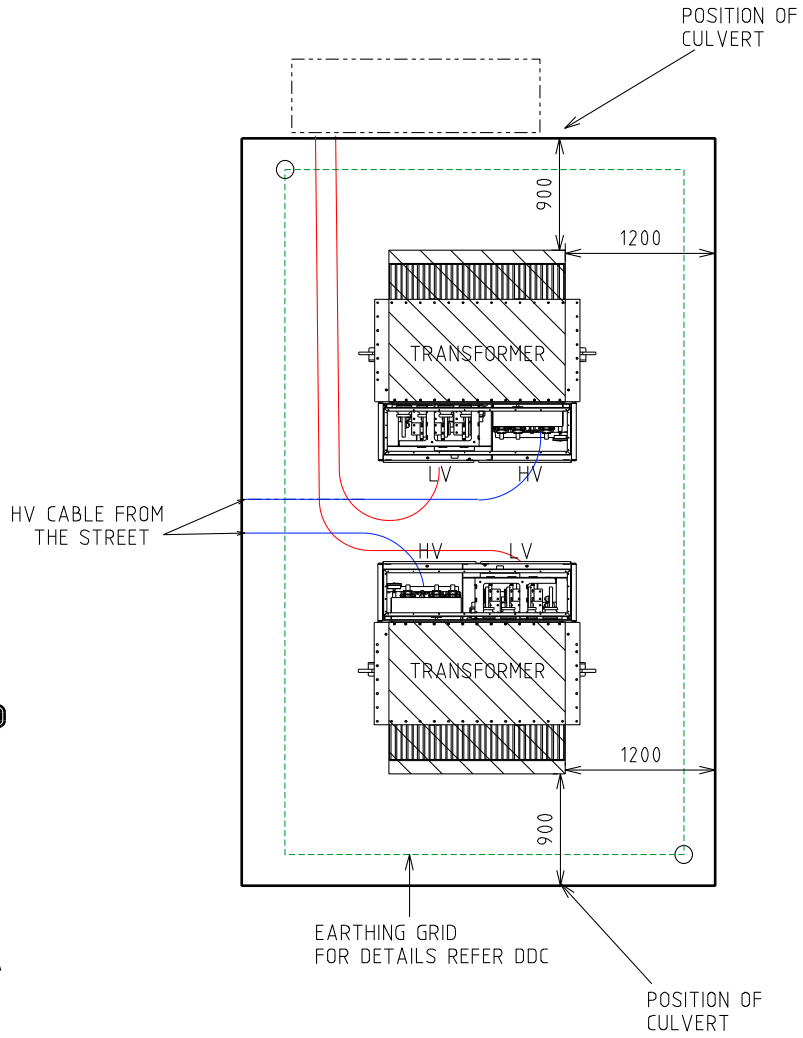
DISTRIBUTION SUBSTATION MANUAL
westernpower
DRAWN: JRR | DATE: 13-11-2019 | DRG. No.
ORIGINATED: GC | SCALE: NTS | DSM-3-15
CHECKED: CO
APPROVED: GRANT STACY | REV. B | SHT. 1

TRANSFORMER MATERIALS (QTY)

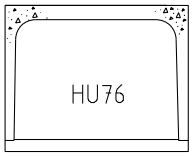
CU	6/11KV	22KV
HU60/630	NOTE 3	NOTE 3
HU60/1000		
HU66		
HU76		
LU16		



630 AND 1000 kVA



630 & 1000 kVA



BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416 x 1022 x 1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg

SEE DRAWING DSM-4-06 SHT 2 OF 2
FOR INSTALLATION DETAILS

NOTES:-
1. CABLE CLAMP REQUIRED FOR EACH PHASE OF THE HV AND LV CABLES (PROVIDED IN HU60 CU IN THE DDC)
2. SEE DDC FOR EARTHING MATERIALS
3. DESIGNER TO REQUEST FOR 2 x ETEL TRANSFORMERS FOR DUAL 630kVA LAYOUT.
4. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.

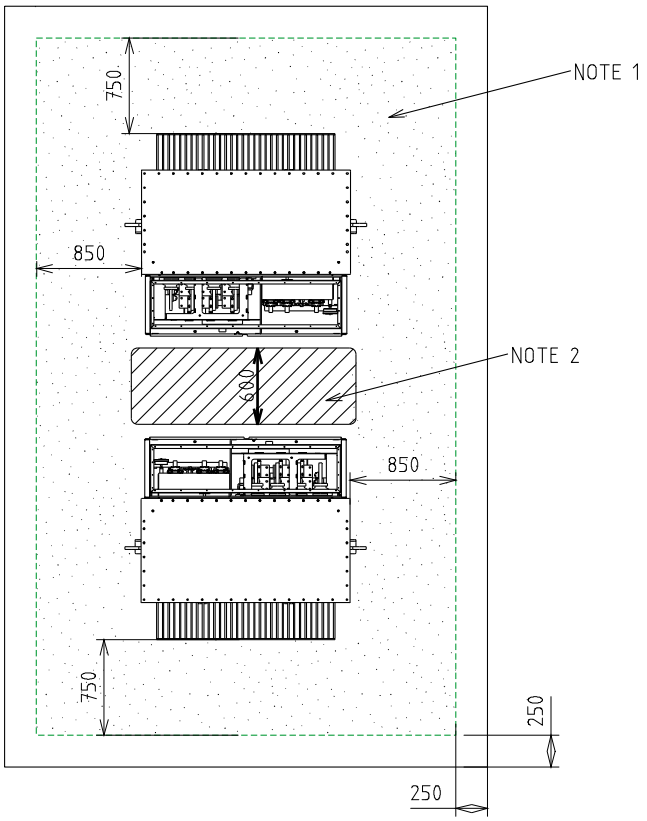
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AND MATERIAL LIST AMENDED	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: SOLE USE SUBSTATION
UP TO 2000kVA (NON MPS)
NON FIRE RATED-WITHOUT HV SWGR
EQUIPMENT & INSTALLATION DETAILS

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR | DATE: 13-11-2019 | DRG. No. DSM-3-15
ORIGINATED: GC | SCALE: NTS
CHECKED: CO
APPROVED: GRANT STACY | REV. B | SHT. 2



MINIMUM CLEARANCE REQUIRED FOR EARTHING PURPOSES
(STEP AND TOUCH POTENTIAL)

CLEARANCE REQUIRED FOR OPERATIONAL PURPOSES

NOTES:-
1. CLEARANCES TO BE USED FOR EARTHING STUDY / CALCULATION OF TOUCH VOLTAGES
2. OPERATIONAL CLEARANCES IN FRONT OF TRANSFORMERS SHOWN WITH DOORS LIFTED OFF

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE
SOLE USE SUBSTATION
UP TO 2000kVA (NON MPS)
NON FIRE RATED-WITHOUT HV SWGR
OPERATIONAL CLEARANCES

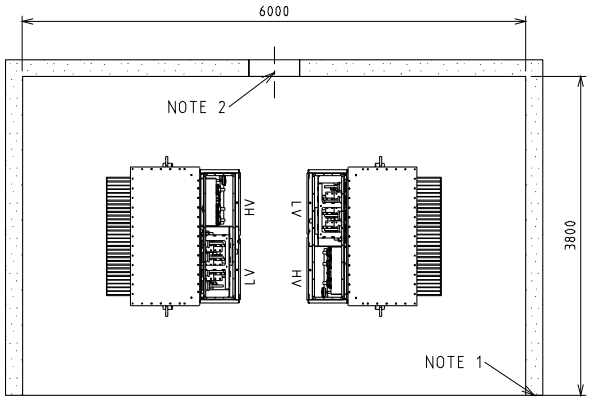
DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 13-11-2019	DRG. No. DSM-3-15
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. B / SHT. 3

ROAD RESERVE

24 HR ACCESS
REQUIRED

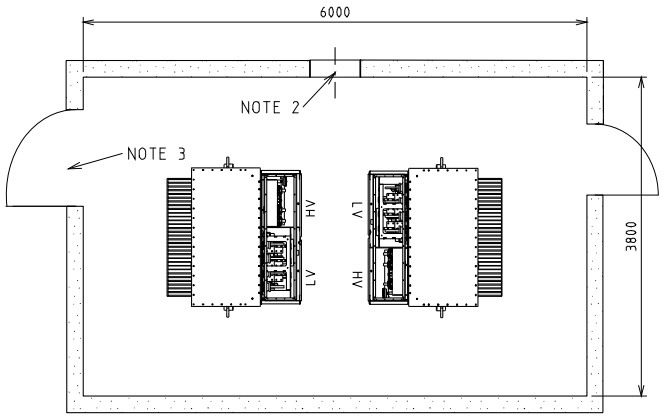


PARTIAL SCREENING

NOTE 4

ROAD RESERVE

24 HR ACCESS
REQUIRED



FULL SCREENING

NOTES:-
1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW SAFE EXCAVATION 1200 DEEP. SCREENING NOT TO ENCROACH INTO SUBSTATION LAND REQUIREMENTS. SCREENING TYPES SHALL BE NON-COMBUSTIBLE, FENCING, MASONARY WALLS etc...
2. INDICATIVE OF DUCTING ONLY, FOR DETAILS REFER TO SECTION 6.
3. OPENINGS MUST BE A MINIMUM OF 820 WIDE.
4. VEHICLE ACCESS. CLEARANCES MUST BE MAINTAINED. AREA TO BE KEPT CLEAR TO ENSURE ACCESS. SITE SPECIFIC REQUIREMENTS TO BE DETERMINED BY DESIGNER.
5. SCREENING DESIGN TO BE APPROVED BY SUBSTATION DESIGNER PRIOR TO CONSTRUCTION. OPERATIONAL AND EARTHING CLEARANCES SHOWN ON SHEET 3 MUST BE MAINTAINED WITH SCREENING INSTALLED

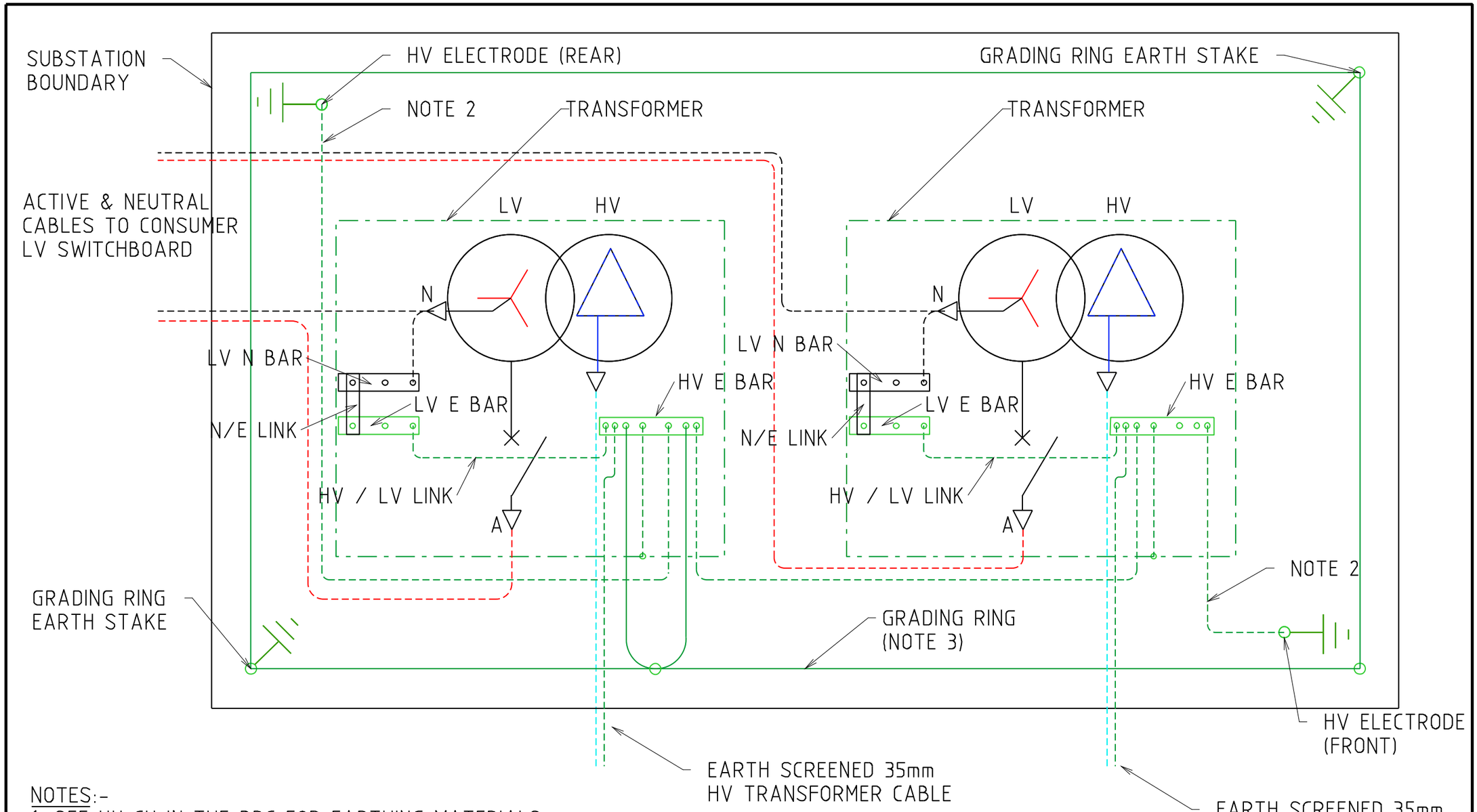
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	EQUIPMENT DRAWING UPDATED AND DIMENSIONS ADDED	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE
SOLE USE SUBSTATION
UP TO 2000kVA (NON MPS)
NON FIRE RATED-WITHOUT HV SWGR
PERMISSABLE SCREENING ARRANGEMENTS

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 13-11-2019	DRG. No. DSM-3-15
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. B SHT. 4



NOTES:-

1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.

REV	DATE	DESCRIPTION	ORGD	CHKD	APRD
A	02.05 23	ORIGINAL ISSUE	KT	GC	PC

TITLE

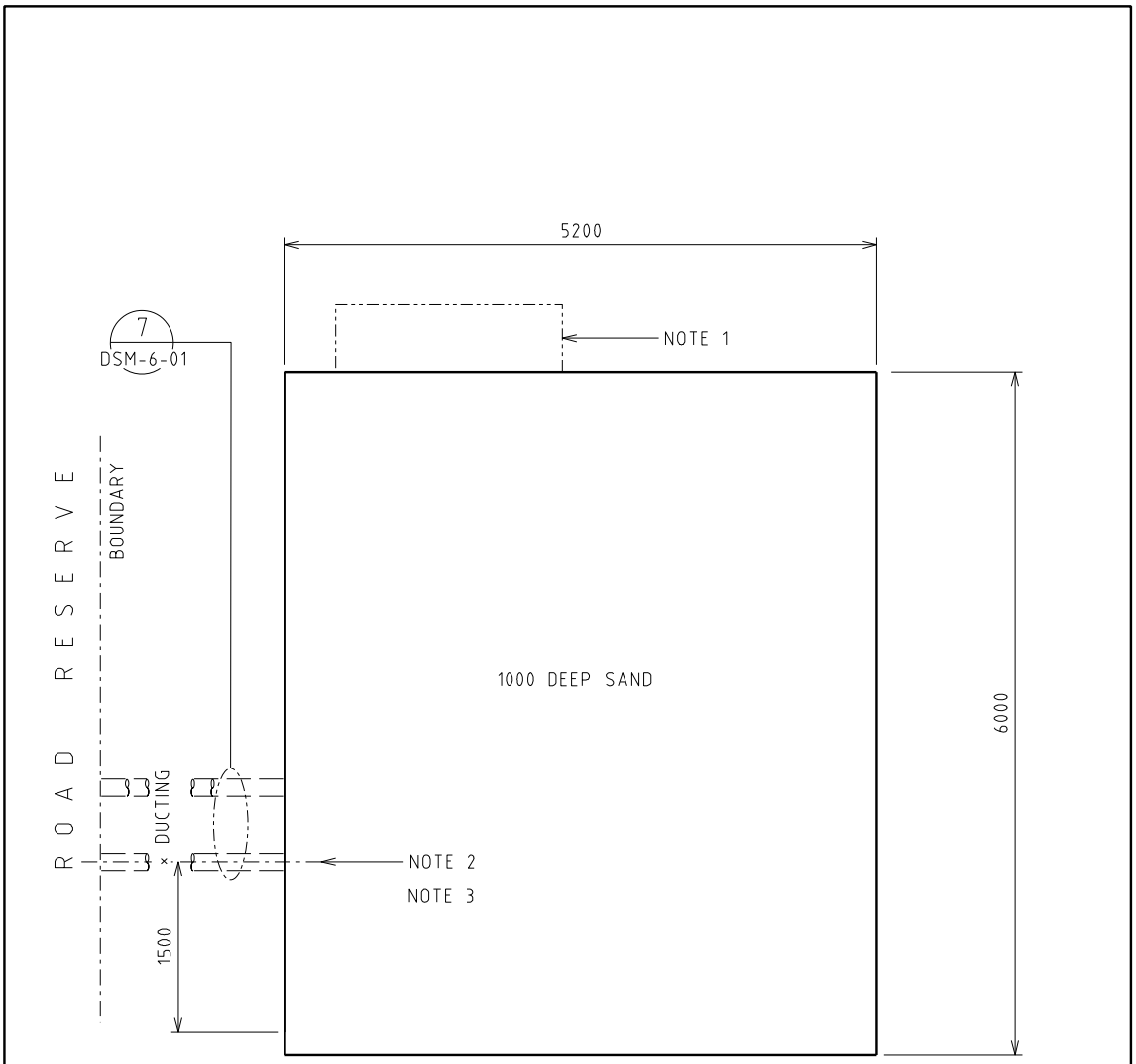
SOLE-USE SUBSTATION UP TO 2000 kVA (NON-MPS) NON-FIRE RATED EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: KT	DATE: 24-08-2022	DRG No. DSM-3-15
ORIGINATED KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 5

4.4.4 DSM-3-16 Up to 2000kVA (Non-MPS) with HV SWGR



NOTES:-
1.SITE OF CUSTOMERS MAIN DISTRIBUTION BOARD (IF REQUIRED).
2. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
3. 4 - 150 ID HEAVY DUTY DUCTING. SEE DSM SECTION 6 FOR DETAILS.
4. LAND AREA TO BE INCREASED IF SCREENING IS REQUIRED (SEE SHEET 4)

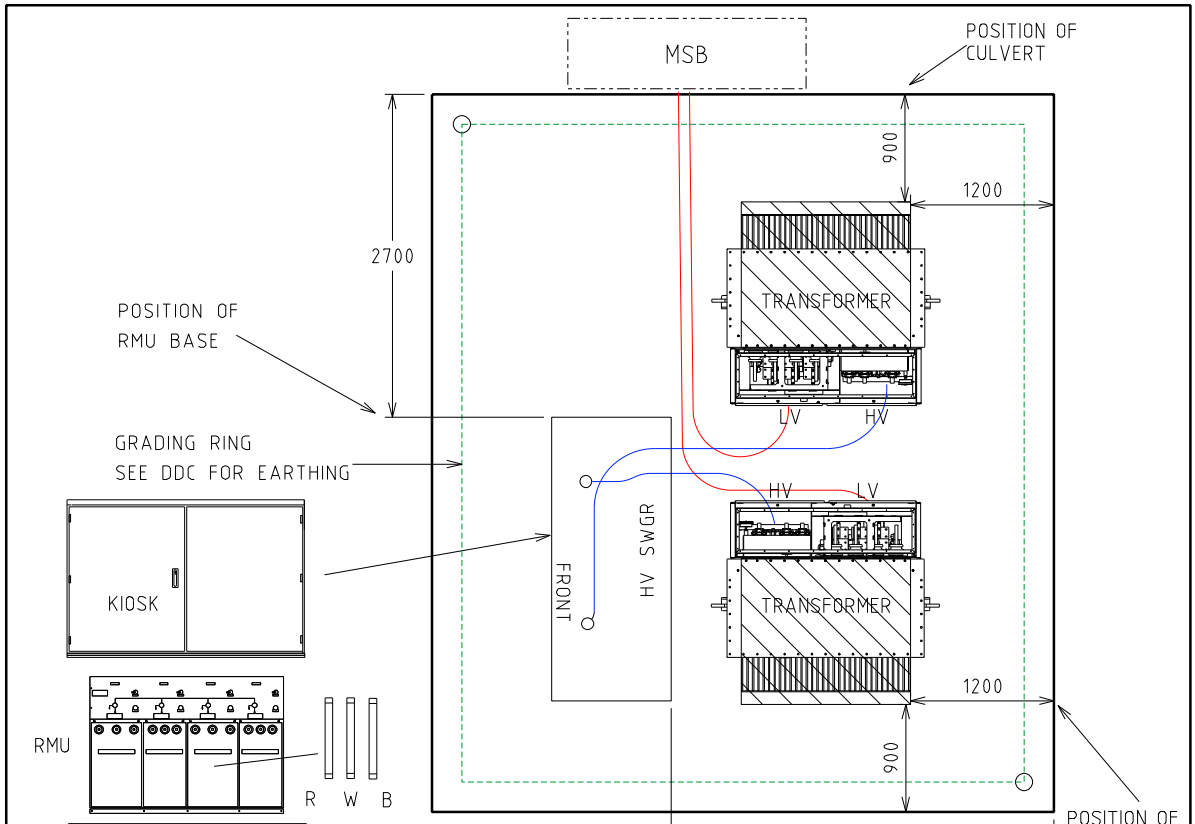
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

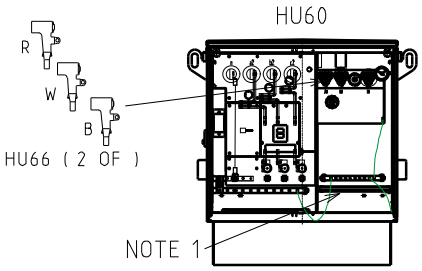
TITLE: SOLE USE SUBSTATION UP TO 2000kVA (NON MPS) NON FIRE RATED-WITH HV SWGR CIVIL & LAND REQUIREMENTS

DISTRIBUTION SUBSTATION MANUAL

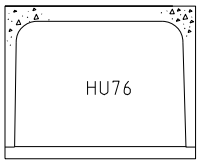
westernpower

DRAWN: JRR	DATE: 13-11-2019	DRG. No. DSM-3-16
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY	REV. A	SHT. 1





630 AND 1000 kVA



RMU MATERIALS (QTY)

CU	6KV	11KV	22KV
HU55/630			
HU55/1000			
HU7			
HU80			
HU81			
CN46			

TRANSFORMER MATERIALS (QTY)

CU	6/11KV	22KV
HU60/630	NOTE 4	NOTE 4
HU60/1000		
HU66		
HU76		
DA6		
DA10		

BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416 x 1022 x 1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg
SEE DRAWING DSPM-4-06 SHEETS 4 & 5
FOR INSTALLATION DETAILS

NOTES:-
1. CABLE CLAMP REQUIRED FOR EACH PHASE OF THE HV CABLE (PROVIDED IN HU61 CU IN THE DDC)
2. REFER CU IN DDC FOR EARTHING MATERIALS
3. REFER TO DSPM CHAPTER 4 FOR AUTOMATION REQUIREMENTS
4. DESIGNER TO REQUEST FOR 2 x ETEL TRANSFORMERS FOR DUAL 630kVA LAYOUT.
5. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.

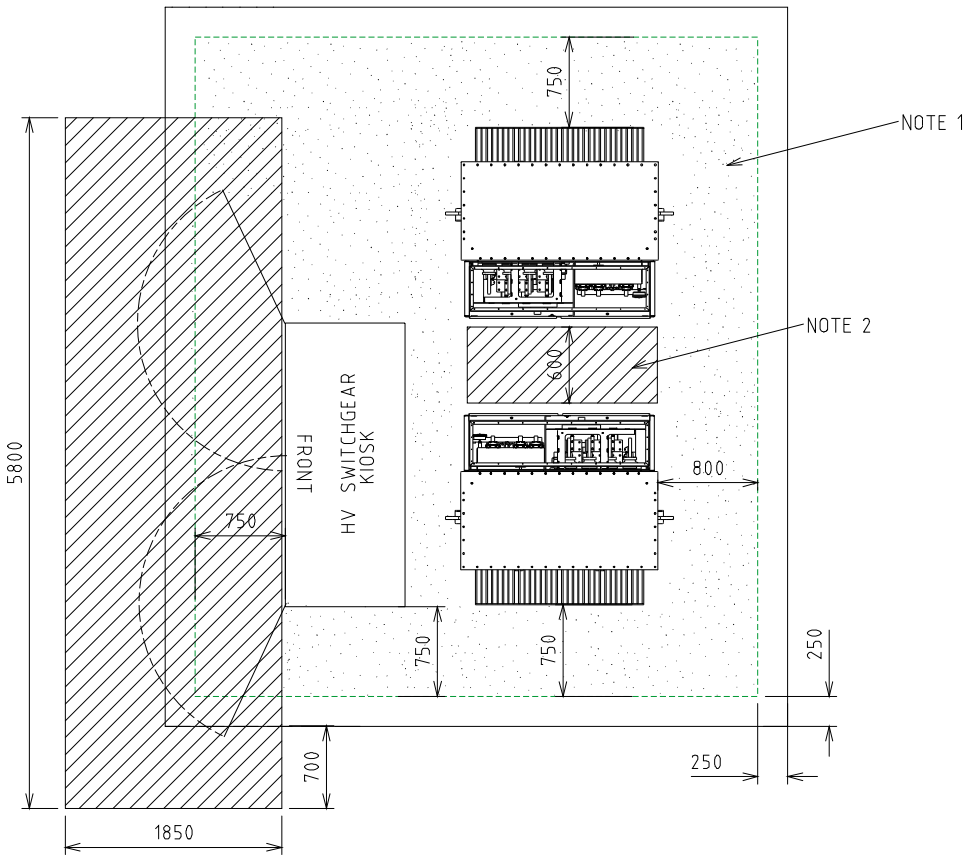
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AND MATERIAL LIST AMENDED	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: SOLE USE SUBSTATION UP TO 2000kVA (NON MPS) NON FIRE RATED-WITH HV SWGR EQUIPMENT & INSTALLATION DETAILS

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR | DATE: 13-11-2019 | DRG. No.
ORIGINATED: GC | SCALE: NTS | DSM-3-16
CHECKED: CO
APPROVED: GRANT STACY | REV. B | SHT. 2



MINIMUM CLEARANCE REQUIRED FOR EARTHING PURPOSES.
(STEP AND TOUCH POTENTIAL)

MINIMUM CLEARANCE REQUIRED FOR OPERATIONAL PURPOSES

NOTES:-
1. CLEARANCES TO BE USED FOR EARTHING STUDY / CALCULATION
   OF TOUCH VOLTAGES (WITH DOORS CLOSED)
2. OPERATIONAL CLEARANCES IN FRONT OF TRANSFORMERS SHOWN WITH DOORS LIFTED OFF

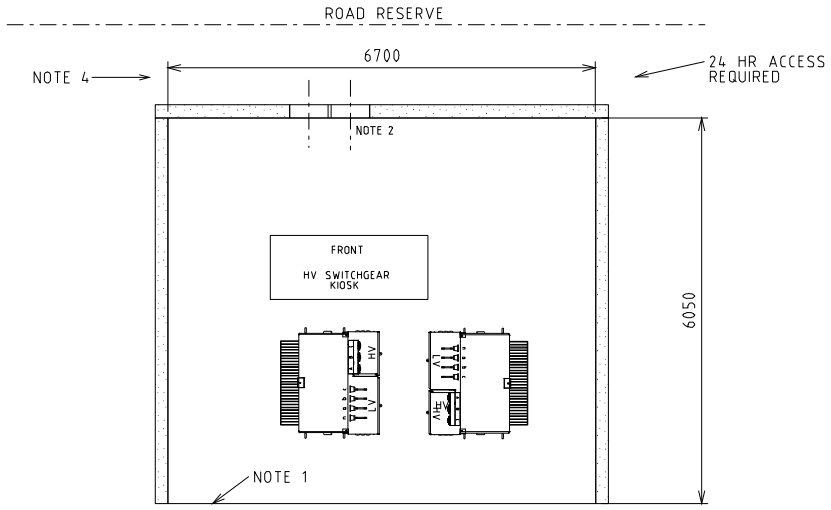
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE
SOLE USE SUBSTATION
UP TO 2000kVA (NON MPS)
NON FIRE RATED-WITH HV SWGR
OPERATIONAL CLEARANCES

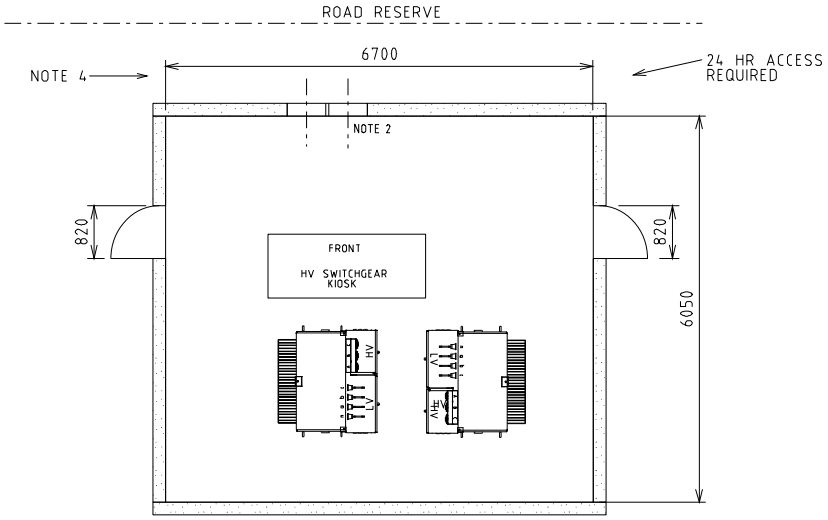
DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 13-11-2019	DRG. No. DSM-3-16
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. B SHT. 3



PARTIAL SCREENING



FULL SCREENING

NOTES:-
1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW SAFE EXCAVATION 1200 DEEP. SCREENING NOT TO ENCROACH INTO SUBSTATION LAND REQUIREMENTS. SCREENING TYPES SHALL BE NON-COMBUSTIBLE, FENCING, MASONARY WALLS etc...
2. INDICATIVE OF DUCTING ONLY, FOR DETAILS REFER TO SECTION 6.
3. OPENINGS MUST BE A MINIMUM OF 820 WIDE.
4. VEHICLE ACCESS. CLEARANCES MUST BE MAINTAINED. AREA TO BE KEPT CLEAR TO ENSURE ACCESS. SITE SPECIFIC REQUIREMENTS TO BE DETERMINED BY DESIGNER.
5. SCREENING DESIGN TO BE APPROVED BY SUBSTATION DESIGNER PRIOR TO CONSTRUCTION. OPERATIONAL AND EARTHING CLEARANCES SHOWN ON SHEET 3 MUST BE MAINTAINED WITH SCREENING INSTALLED

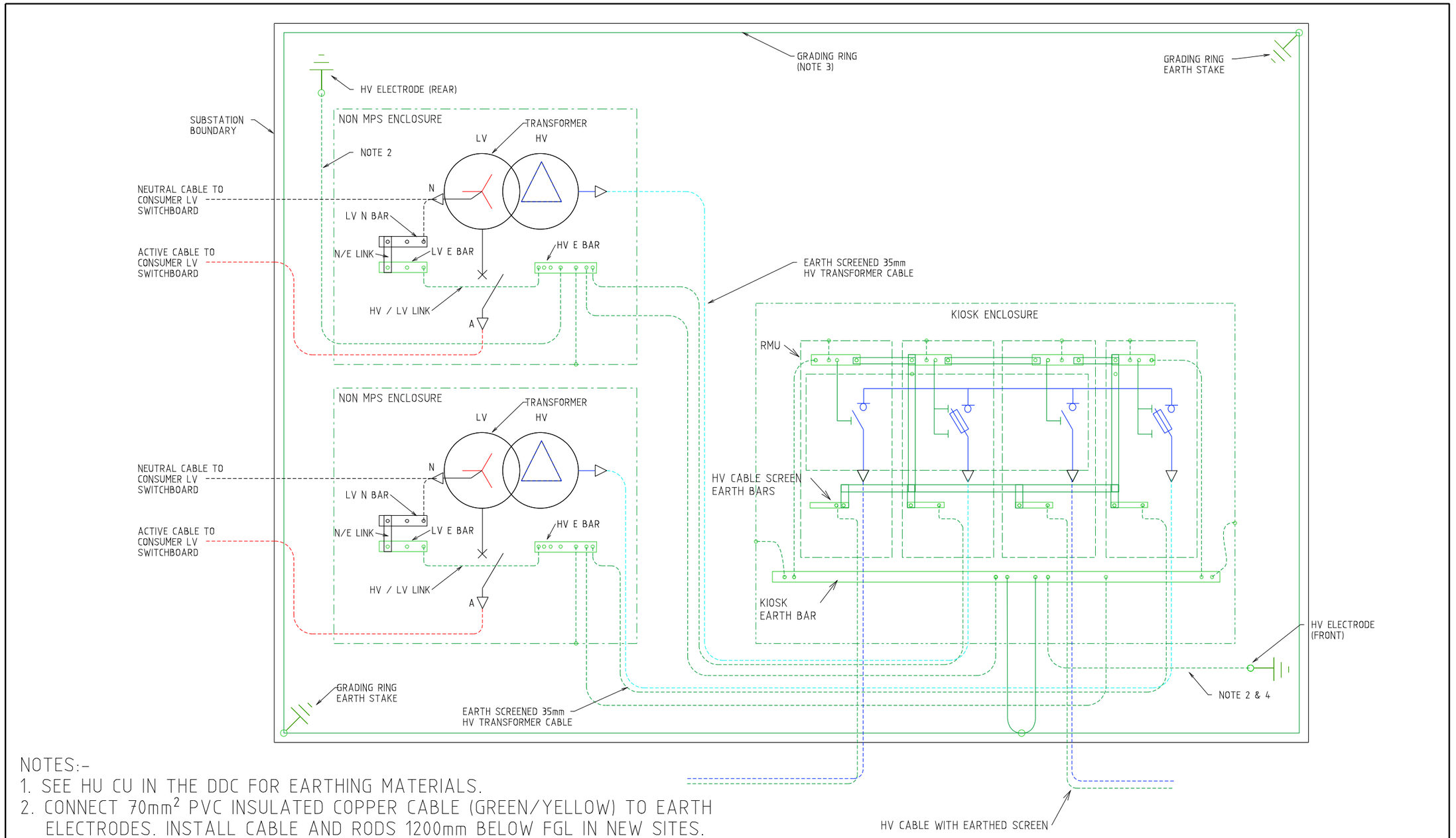
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
B	02.05.23	LAYOUT AMENDED AND DIMENSIONS ADDED	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: SOLE USE SUBSTATION UP TO 2000kVA (NON MPS) NON FIRE RATED-WITHOUT HV SWGR PERMISSABLE SCREENING ARRANGEMENTS

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 13-11-2019	DRG. No. DSM-3-16
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. B SHT. 4



NOTES:-

1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS.
2. CONNECT 70mm^2 PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.
4. LOOP EARTH CABLES TO EARTH RODS INSIDE KIOSK FOR EASE OF TESTING.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

SOLE-USE SUBSTATION UP TO 2000 kVA (NON-MPS) NON-FIRE RATED - WITH HV SWGR EARTHING ARRANGEMENT

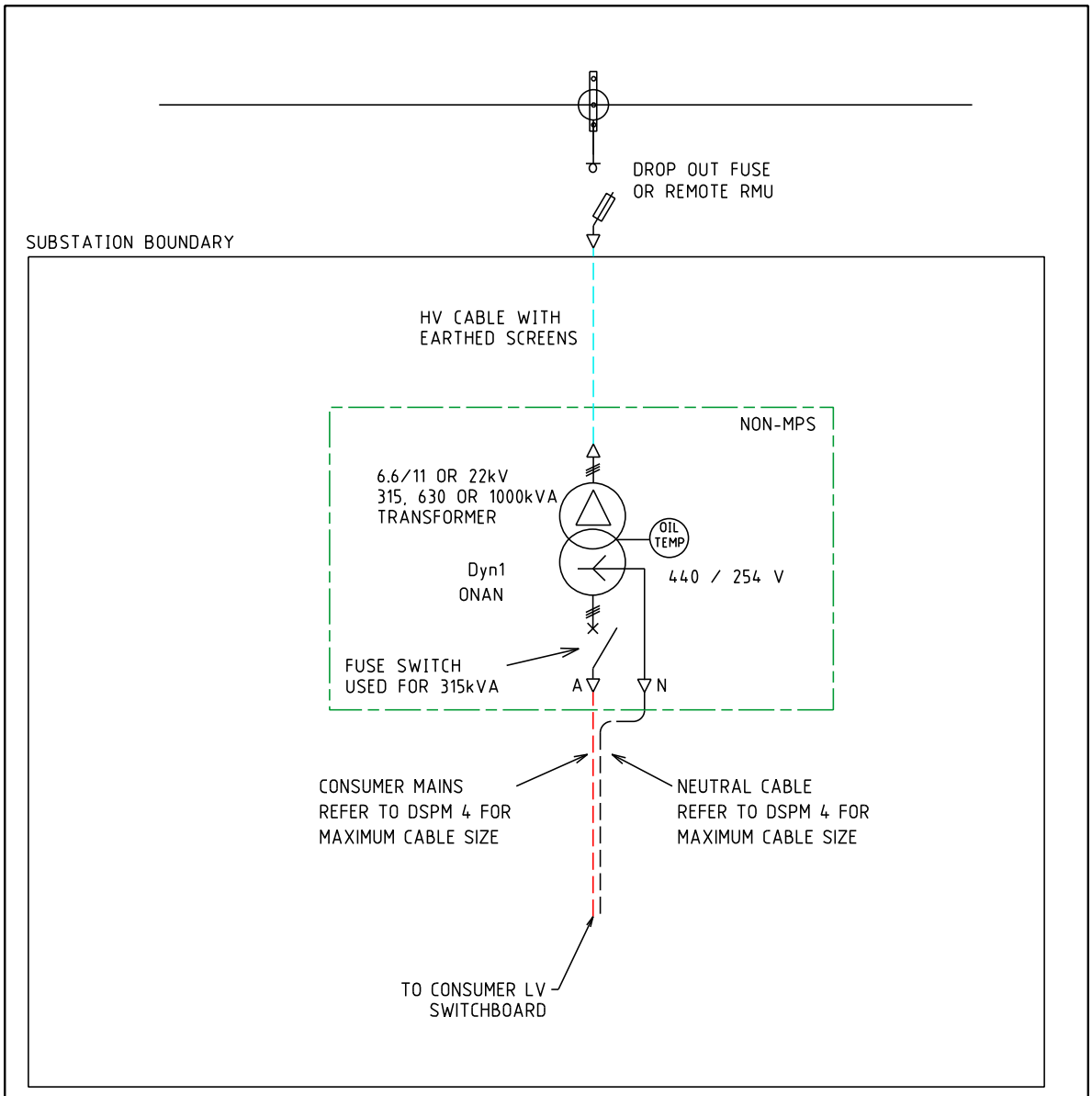
DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: KT	DATE: 24-08-2022	DRG. No. DSM-3-16
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 5

4.5 Sole Use Substations - Fire Rated

4.5.1 DSM-3-17 Up to 1000kVA (Non-MPS)



NOTES:-
1. FUSE SWITCH USED FOR 315kVA TRANSFORMER. REFER TO THE DCCR FOR MCCB SETTINGS.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

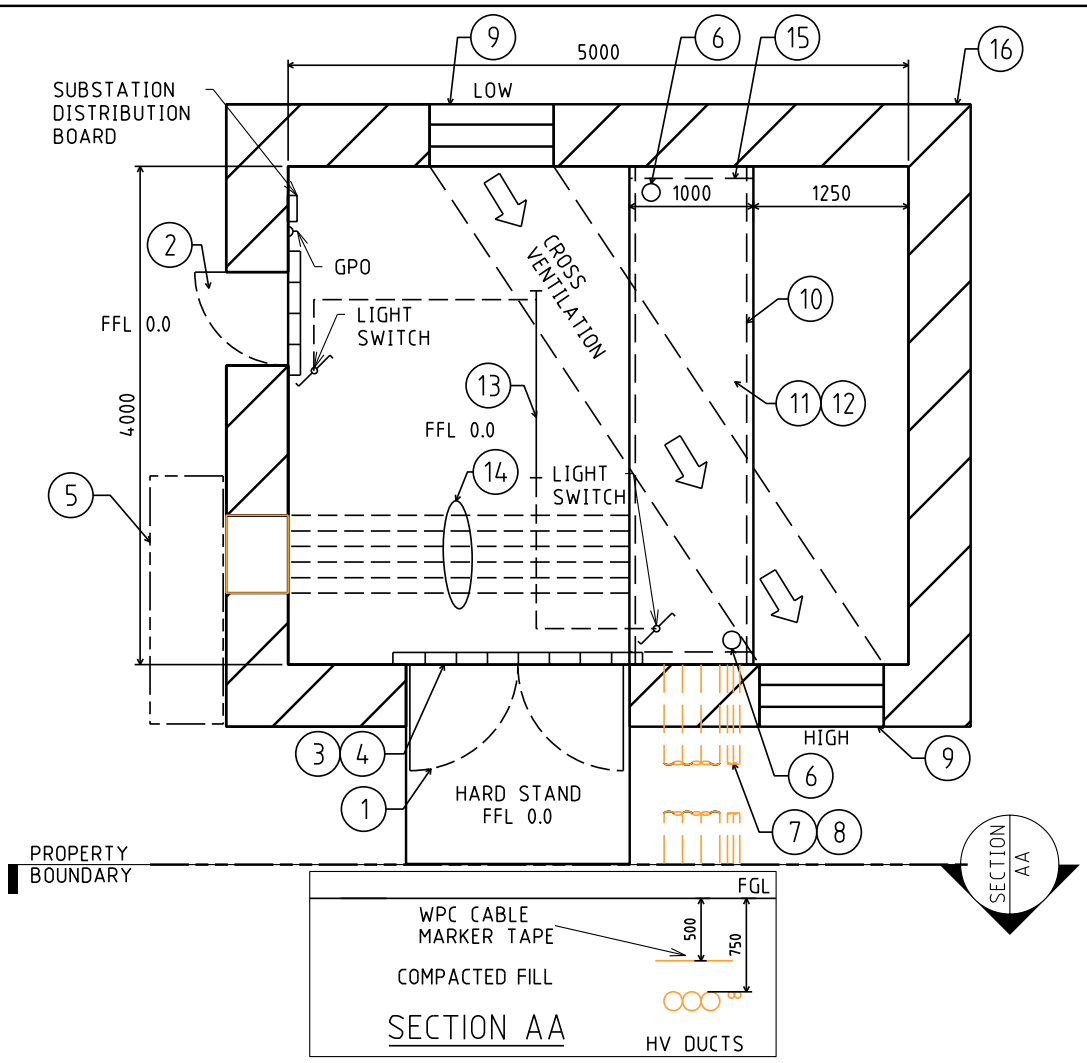
TITLE: SOLE USE SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITHOUT HV SWGR
SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025 | DRG. No.
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR | REV. C | SHT. 1/5

DSM-3-17



1	DOUBLE DOORS 2340x1720 CLEAR OPENING.
2	DOOR 2040x820 CLEAR OPENING.
3	75 HIGH BRICK BUND.
4	BUND LAID AFTER EQUIPMENT INSTALLED.
5	CUSTOMERS MAIN DISTRIBUTION BOARD.
6	75 DIA PENETRATION THROUGH SLAB FOR EARTHING - TO BE SEALED WITH CN81.
7	3-150 & 2-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
8	750 COVER AT BOUNDARY.
9	600x800 WIDE FIRE DAMPERED VENT AT HIGH (TOP 200 MAX BELOW CEILING) & LOW (BOTTOM MAX 200 ABOVED FINISHED FLOOR LEVEL) LEVELS.
10	50mm WIDE x 38mm DEEP REBATE FOR TRENCH COVERS.
11	TRENCH COVER 35mm THICK x 26kg/m² FRP SLAB PANEL FRONT OF HV SWITCHGEAR ONLY. 38mm THICK x 18.2kg/m² MESH GRATING ELSEWHERE. REFER TO DSM-6-04 AND DSM-6-08.
12	1200 DEEP TRENCH WALLS & FLOOR OF TRENCH TO BE PAINTED WITH SILICONE GLAZE S50.
13	LED LIGHTS BATTEN FITTING (2 WAY SWITCH WITH NEON INDICATOR).
14	6-150 ID HEAVY DUCTS INSTALLED AT FLOOR OF TRENCH - TO BE SEALED WITH CN81.
15	COVER SUPPORTS - 100x75x6 UA (H.D.G.) FIXED TO WALL OF TRENCH.
16	WALLS, CEILING & DOORS TO BE 2HR FIRE RATED, CEILING HEIGHT TO BE MIN 2500mm.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

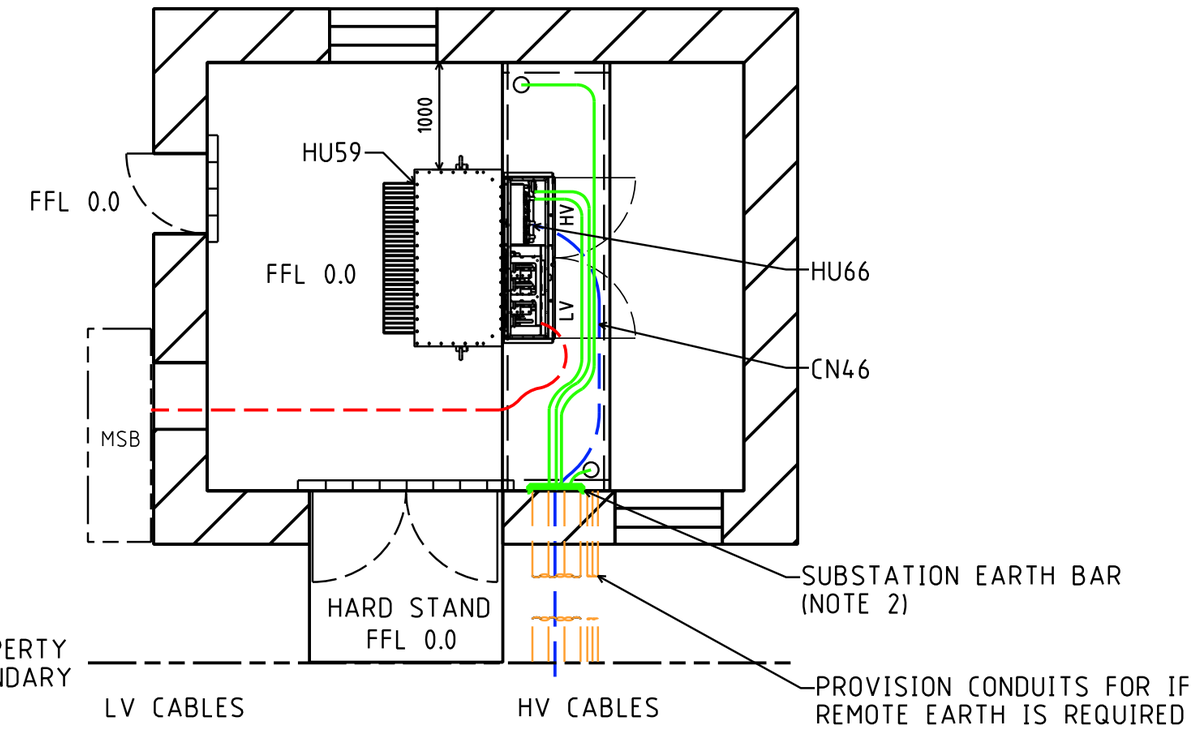
SOLE USE SUBSTATION
UP TO 1000 kVA (NON-MPS)
FIRE RATED - WITHOUT HV SWGR
REQUIREMENTS AND DUCT INSTALLATION

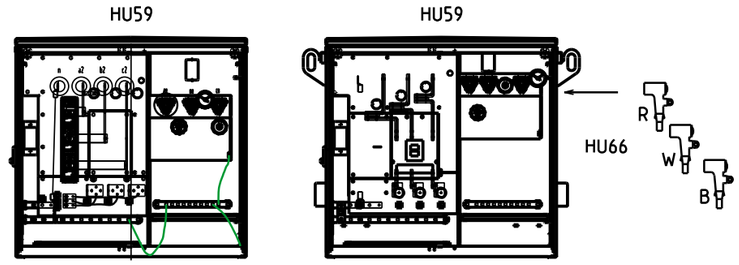
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

ORG. No. DSM-3-17
REV. C
SHT. 2/5





HV MATERIAL				
EQUIPEMENT	CU	QTY		
		6 kV	11 kV	22 kV
TRANSFORMER	HU55/315	SELECT 1		
	HU55/630			
	HU55/1000			
	HU59/315	SELECT 1		
	HU59/630			
	HU59/1000			
CABLE	HU66	1		
	CN46	AS REQUIRED FROM FSSW		
EARTHING	HU70_1	1		

NOTES:-
1. CABLE TRENCH TO BE WATER/OIL TIGHT.
2. INDICATIVE LOCATION OF EARTH BAR SHOWN. EXACT LOCATION TO BE CONFIRMED IN DESIGN.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

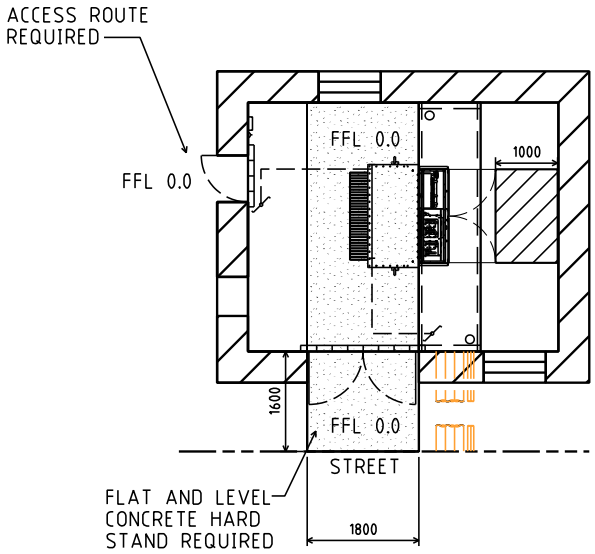
SOLE USE SUBSTATION
UP TO 1000 kVA (NON- MPS)
NON-FIRE RATED - WITH HV SWGR
EQUIPMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

DRG. No. DSM-3-17
REV. C | SHT. 3/5



INSTALLATION AND MAINTENANCE CLEARANCE

OPERATIONAL CLEARANCE

NOTES:-
1. DESIGNER TO ENSURE SAFE ACCESS AND EGRESS ROUTES ARE PROVIDED.
2. WHERE THE SITE IS SET BACK FROM THE STREET, CRANE ACCESS IS REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

SOLE USE SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITHOUT HV SWGR
CLEARANCES

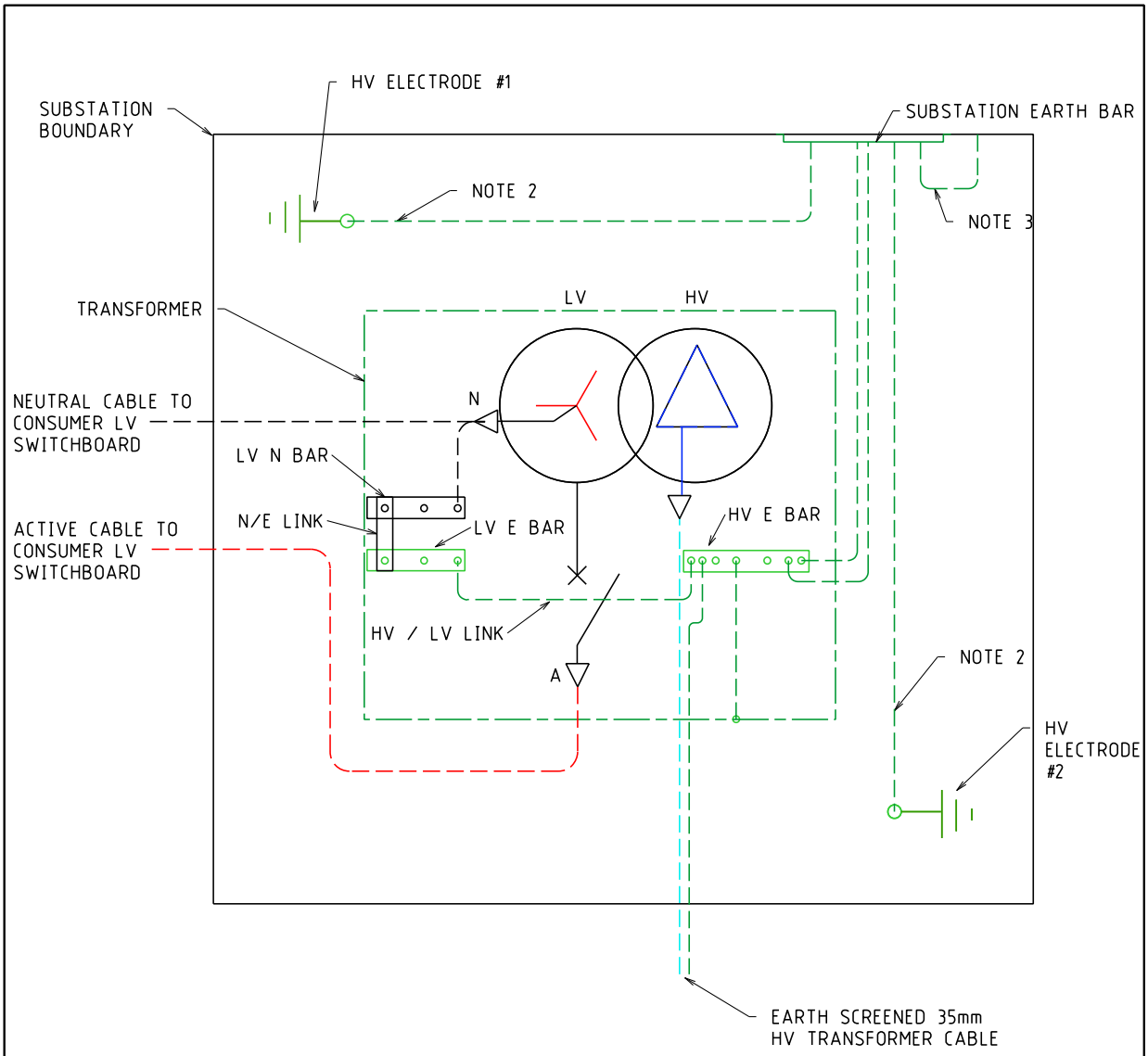
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

ORG. No. DSM-3-17

REV. C | SHT. 4/5



NOTES:-

1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES AS PER ITEM 7 ON SHEET 2 - TO BE SEALED WITH CN81.
3. BUILDING EARTH CABLE BOND IS TO BE PROVIDED BY THE CUSTOMER.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

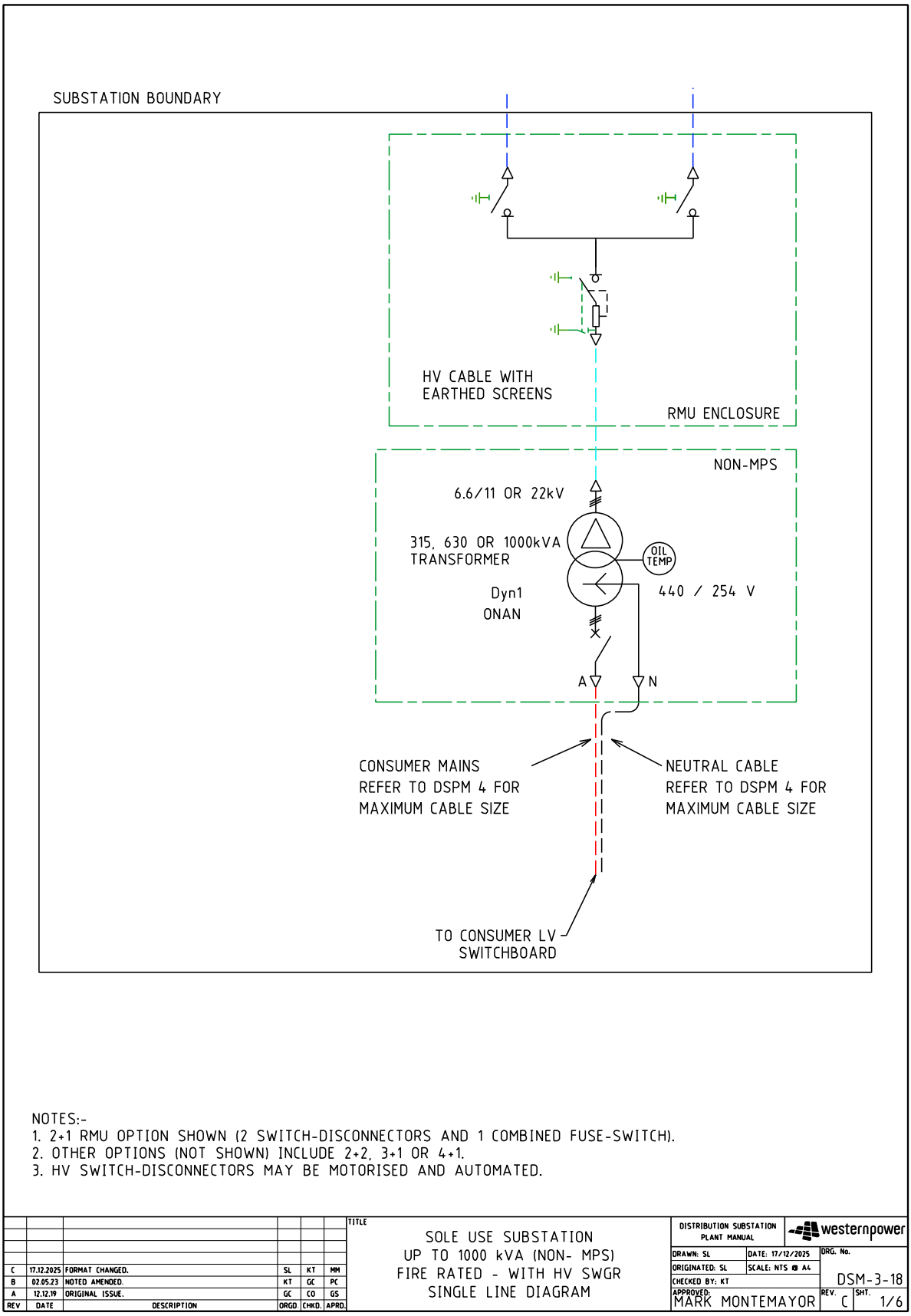
SOLE USE SUBSTATION
UP TO 1000 kVA (NON- MPS)
NON-FIRE RATED - WITHOUT HV SWGR
EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	ORG. No.
ORIGINATED: SL	SCALE: NTS @ A4	DSM-3-17
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 5/5

4.5.2 DSM-3-18 Up to 1000kVA (Non-MPS) with HV SWGR



NOTES:-
1. 2+1 RMU OPTION SHOWN (2 SWITCH-DISCONNECTORS AND 1 COMBINED FUSE-SWITCH).
2. OTHER OPTIONS (NOT SHOWN) INCLUDE 2+2, 3+1 OR 4+1.
3. HV SWITCH-DISCONNECTORS MAY BE MOTORISED AND AUTOMATED.

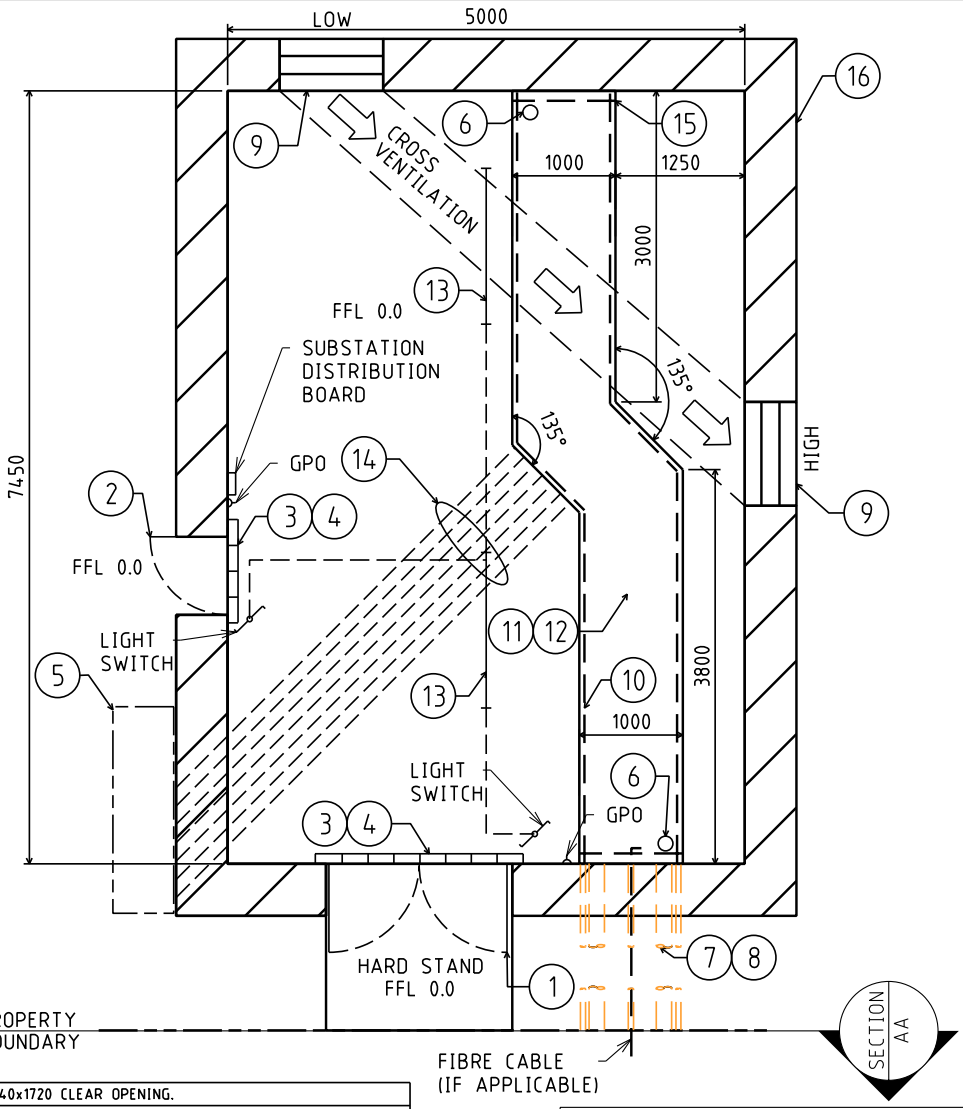
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE: SOLE USE SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
SINGLE LINE DIAGRAM

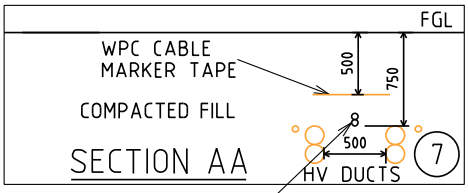
DISTRIBUTION SUBSTATION PLANT MANUAL

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

ORG. No. DSM-3-18
REV. C | SHT. 1/6



1	DOUBLE DOORS 2340x1720 CLEAR OPENING.
2	DOOR 2040x820 CLEAR OPENING.
3	75 HIGH BRICK BUND.
4	BUND LAID AFTER EQUIPMENT INSTALLED.
5	CUSTOMERS MAIN DISTRIBUTION BOARD.
6	75 DIA PENETRATION THROUGH SLAB FOR EARTHING - TO BE SEALED WITH CN81.
7	4-150 & 2-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
8	750 COVER AT BOUNDARY.
9	600x800 WIDE FIRE DAMPERED VENT AT HIGH (TOP 200 MAX BELOW CEILING) & LOW (BOTTOM MAX 200 ABOVED FINISHED FLOOR LEVEL) LEVELS.
10	50mm WIDE x 38mm DEEP REBATE FOR TRENCH COVERS.
11	TRENCH COVER 35mm THICK x 26kg/m2 FRP SLAB PANEL FRONT OF HV SWITCHGEAR ONLY. 38mm THICK x 18.2kg/m2 MESH GRATING ELSEWHERE.
12	1200 DEEP TRENCH WALLS & FLOOR OF TRENCH TO BE PAINTED WITH SILICONE GLAZE S50.
13	LED LIGHTS BATTEN FITTING (2 WAY SWITCH WITH NEON INDICATOR).
14	6-150 ID HEAVY DUCTS INSTALLED AT FLOOR OF TRENCH - TO BE SEALED WITH CN81.
15	COVER SUPPORTS - 100x75x6 UA (H.D.G.) FIXED TO WALL OF TRENCH.
16	WALLS, CEILING & DOORS TO BE 2HR FIRE RATED. CEILING HEIGHT TO BE MIN 2500mm.



2 x 50mm DUCT WITH DRAW STRING REQUIRED FOR FIBRE FOR CBD AUTOMATION WHEN REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

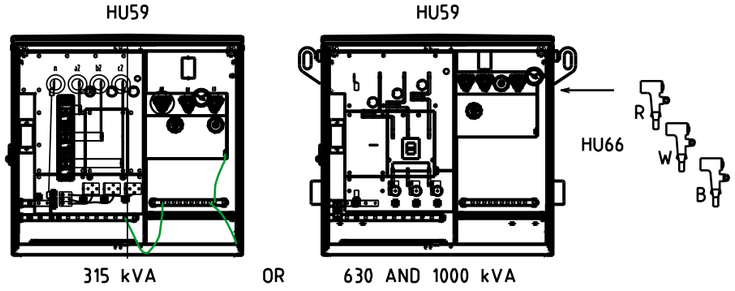
SOLE USE SUBSTATION
UP TO 1000 kVA (NON-MPS)
FIRE RATED - WITH HV SWGR
REQUIREMENTS AND DUCT INSTALLATION

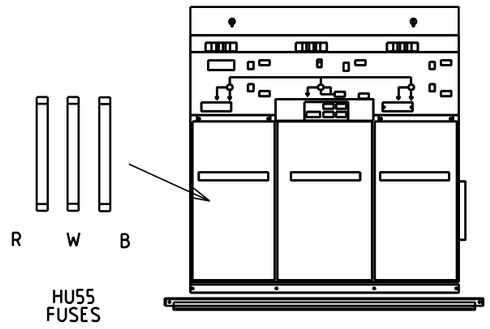
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

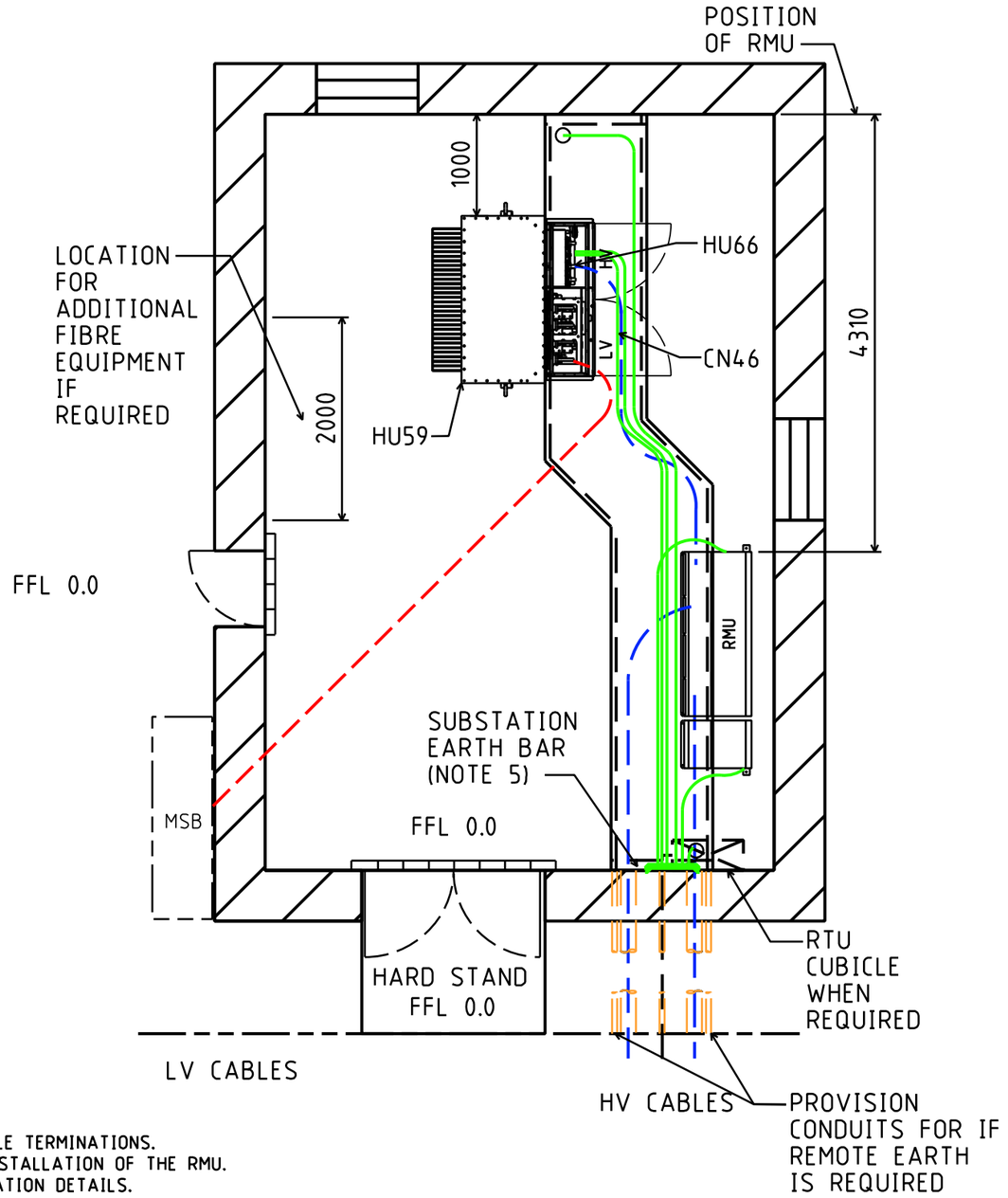
DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

ORG. No. DSM-3-18
REV. C
SHT. 2/6





HV MATERIAL				
EQUIPEMENT	CU	QTY		
		6 kV	11 kV	22 kV
TRANSFORMER	HU55/315	SELECT 1		
	HU55/630			
	HU55/1000			
	HU59/315	SELECT 1		
	HU59/630			
	HU59/1000			
RMU	HU22	SELECT 1		
	HU23			
	HU24			
	HU25_2S			
	HU25_3S			
EARTHING	HU70_2	1		
CABLE	HU66	1		
	CN46	7		
AUTOMATION	DA6_LVS	1		
	DA6_NG_SE	1 (OPTIONAL)		



NOTES:-
1. RMU SUPPLIED WITH BASE AND HV CABLE TERMINATIONS.
2. REFER TO SHEET 6 FOR THE CORRECT INSTALLATION OF THE RMU.
3. REFER TO DSPM CHAPTER 4 FOR AUTOMATION DETAILS.
4. CABLE TRENCH TO BE WATER/OIL TIGHT.
5. INDICATIVE LOCATION OF EARTH BAR SHOWN.
   EXACT LOCATION TO BE CONFIRMED IN DESIGN.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

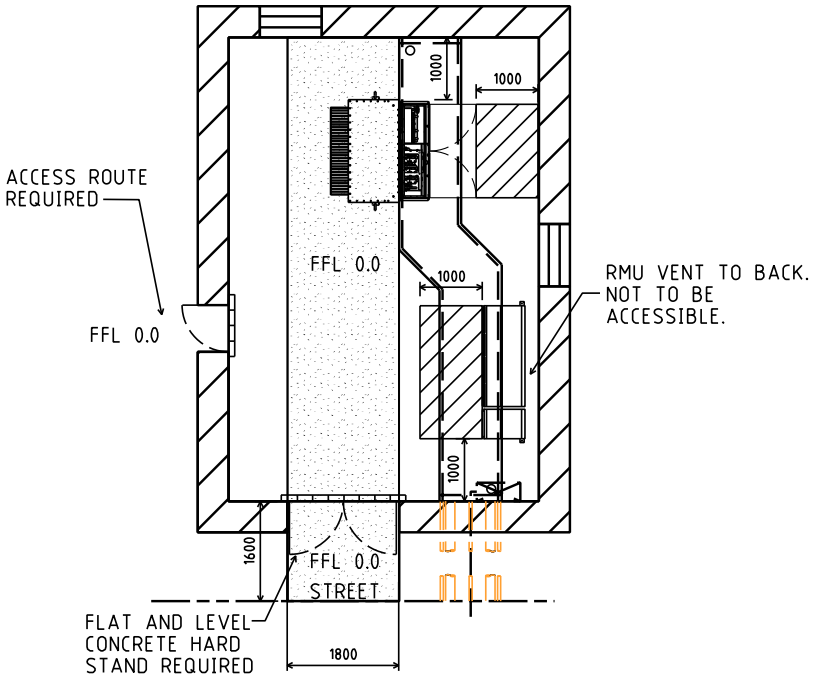
SOLE USE SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
EQUIPMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

DRG. No. DSM-3-18
REV. C | SHT. 3/6



INSTALLATION AND MAINTENANCE CLEARANCE

OPERATIONAL CLEARANCE

NOTES:-
1. DESIGNER TO ENSURE SAFE ACCESS AND EGRESS ROUTES ARE PROVIDED.
2. WHERE THE SITE IS SET BACK FROM THE STREET, CRANE ACCESS IS REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

SOLE USE SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025

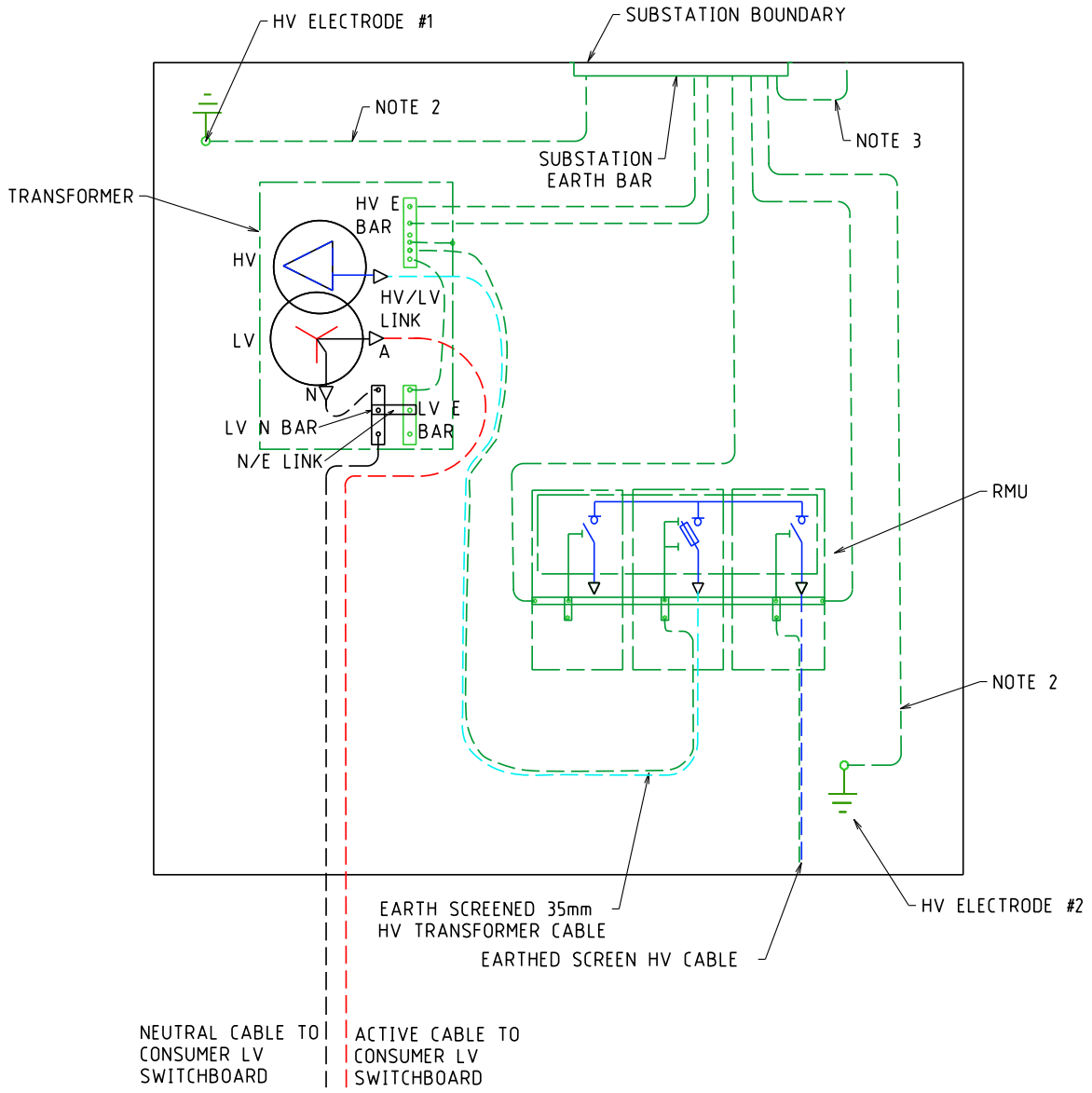
ORIGINATED: SL | SCALE: NTS @ A4

CHECKED BY: KT

APPROVED: MARK MONTEMAYOR

ORG. No. DSM-3-18

REV. C | SHT. 4/6



NOTES:-

1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES AS PER ITEM 7 ON SHEET 2 - TO BE SEALED WITH CN81.
3. BUILDING EARTH CABLE BOND IS TO BE PROVIDED BY THE CUSTOMER.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

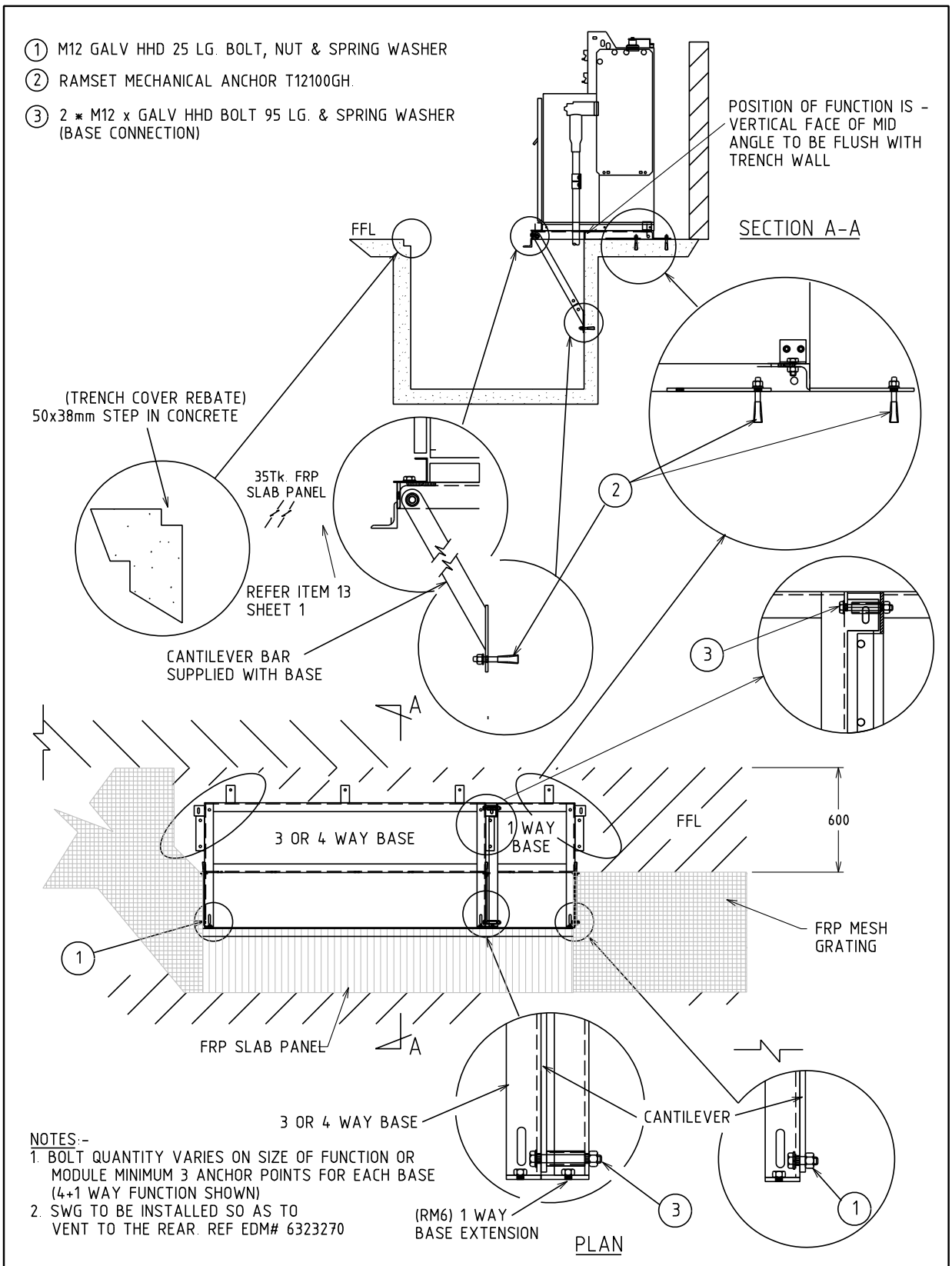
TITLE

SOLE USE SUBSTATION
UP TO 1000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	ORG. No.
ORIGINATED: SL	SCALE: NTS @ A4	DSM-3-18
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 5/6



NOTES:-
1. BOLT QUANTITY VARIES ON SIZE OF FUNCTION OR MODULE MINIMUM 3 ANCHOR POINTS FOR EACH BASE (4+1 WAY FUNCTION SHOWN)
2. SWG TO BE INSTALLED SO AS TO VENT TO THE REAR. REF EDM# 6323270

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

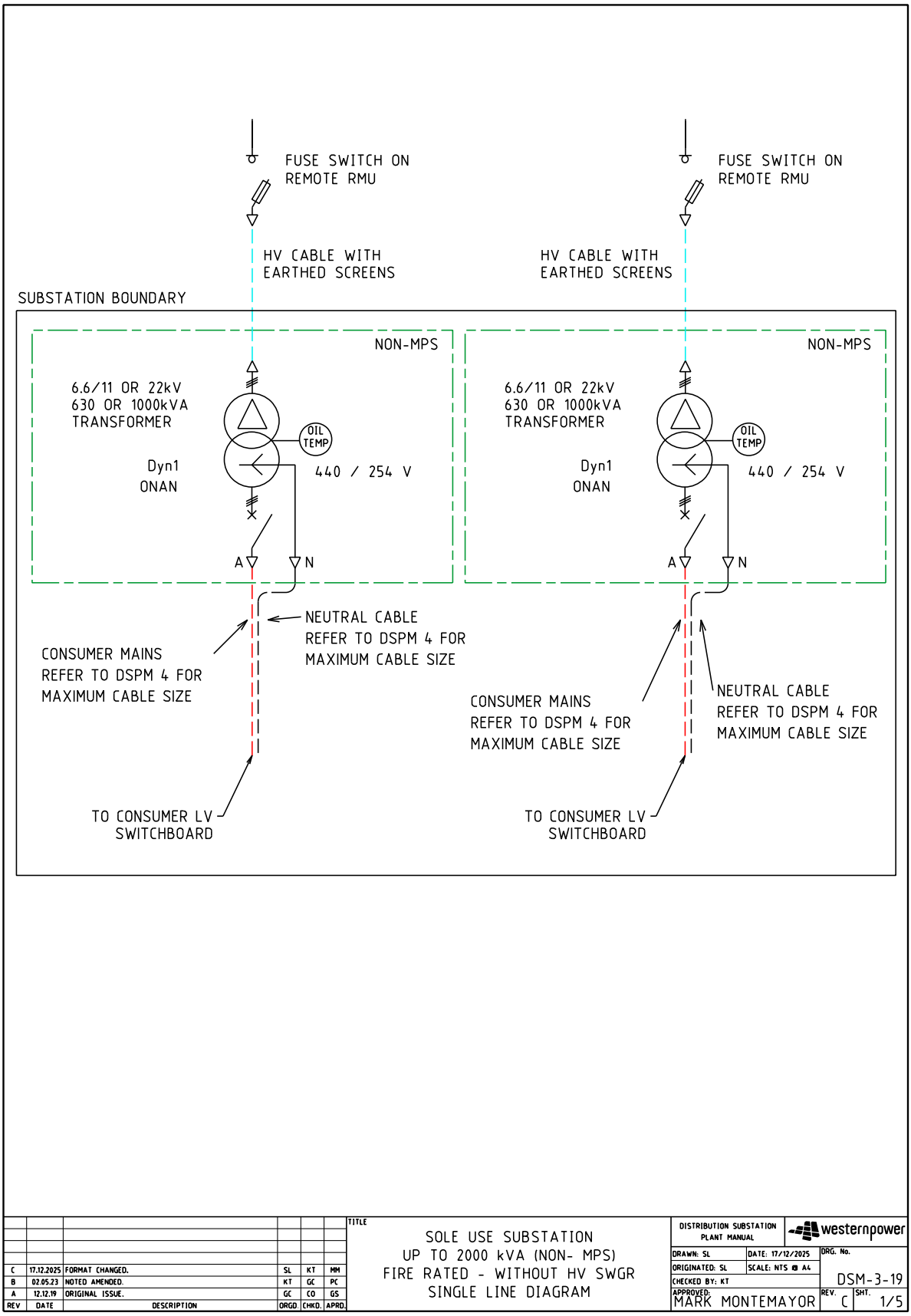
TITLE: SCHNEIDER SWITCHGEAR 3 & 4 WAY WITH 1 WAY EXTENSION FIXING DETAILS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	ORG. No. DSM-3-18
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 6/6

4.5.3 DSM-3-19 Up to 2000kVA (Non-MPS)



REV	DATE	DESCRIPTION	ORGD	CHKD	APRD
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

SOLE USE SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITHOUT HV SWGR
SINGLE LINE DIAGRAM

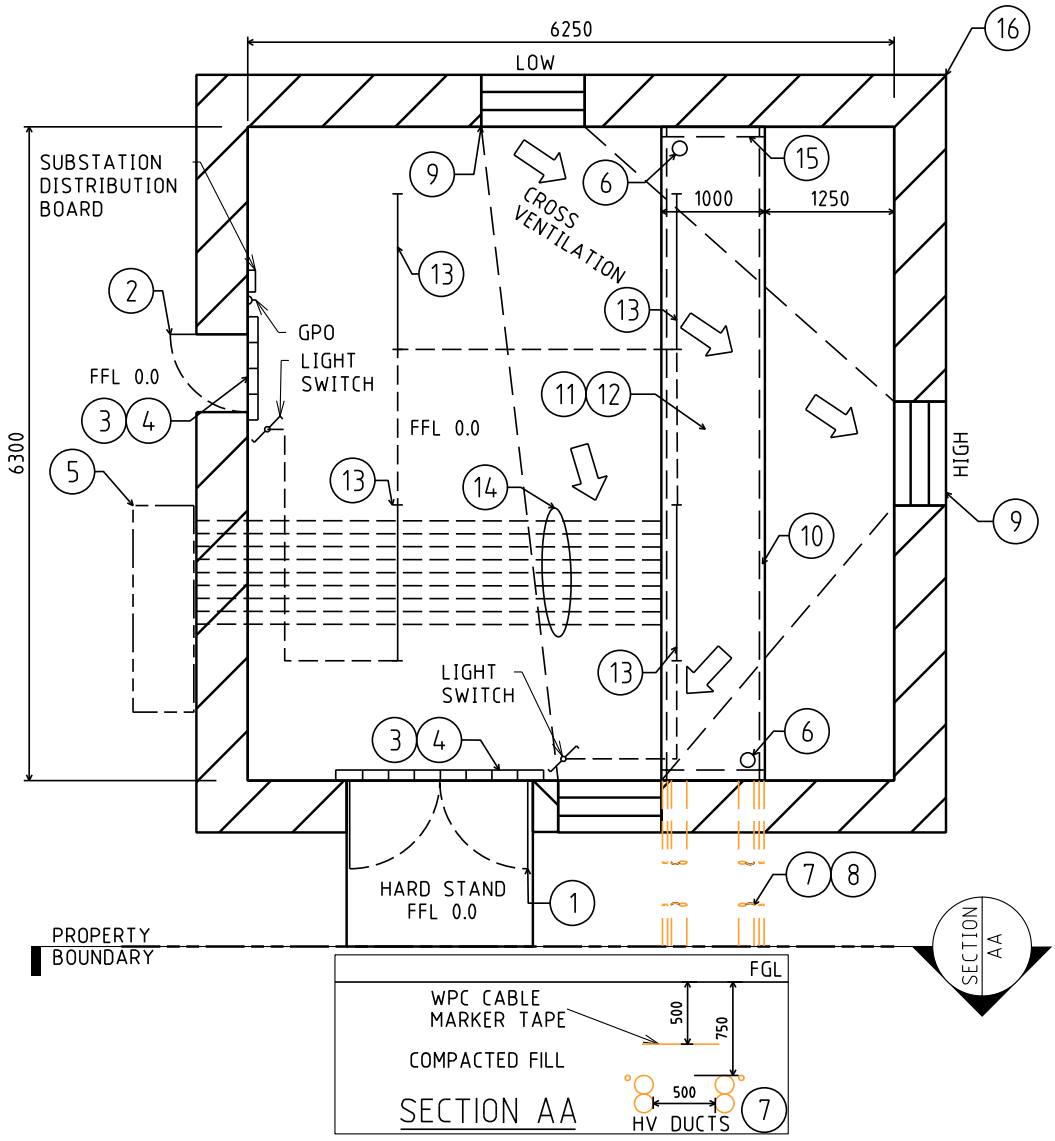
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

ORG. No. DSM-3-19

REV. C | SHT. 1/5



1	DOUBLE DOORS 2340x1720 CLEAR OPENING.
2	DOOR 2040x820 CLEAR OPENING.
3	75 HIGH BRICK BUND.
4	BUND LAID AFTER EQUIPMENT INSTALLED.
5	CUSTOMERS MAIN DISTRIBUTION BOARD.
6	75 DIA PENETRATION THROUGH SLAB FOR EARTHING - TO BE SEALED WITH CN81.
7	4-150 & 2-50 ID HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
8	750 COVER AT BOUNDARY.
9	600x800 WIDE FIRE DAMPERED VENT AT HIGH (TOP 200 MAX BELOW CEILING) & LOW (BOTTOM MAX 200 ABOVED FINISHED FLOOR LEVEL) LEVELS.
10	50mm WIDE x 38mm DEEP REBATE FOR TRENCH COVERS.
11	TRENCH COVER 35mm THICK x 26kg/m2 FRP SLAB PANEL FRONT OF HV SWITCHGEAR ONLY. 38mm THICK x 18.2kg/m2 MESH GRATING ELSEWHERE.
12	1200 DEEP TRENCH WALLS & FLOOR OF TRENCH TO BE PAINTED WITH SILICONE GLAZE S50.
13	LED LIGHTS BATTEN FITTING (2 WAY SWITCH WITH NEON INDICATOR).
14	12-150 ID HEAVY DUCTS INSTALLED AT FLOOR OF TRENCH, STACKED 2 ON 2 - TO BE SEALED WITH CN81.
15	COVER SUPPORTS - 100x75x6 UA (H.D.G.) FIXED TO WALL OF TRENCH.
16	WALLS, CEILING & DOORS TO BE 2HR FIRE RATED. CEILING HEIGHT TO BE MIN 2500mm.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

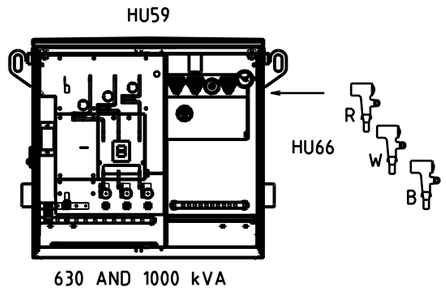
TITLE

SOLE USE SUBSTATION
UP TO 2000 kVA (NON-MPS)
FIRE RATED - WITHOUT HV SWGR
REQUIREMENTS AND DUCT INSTALLATION

DISTRIBUTION SUBSTATION PLANT MANUAL

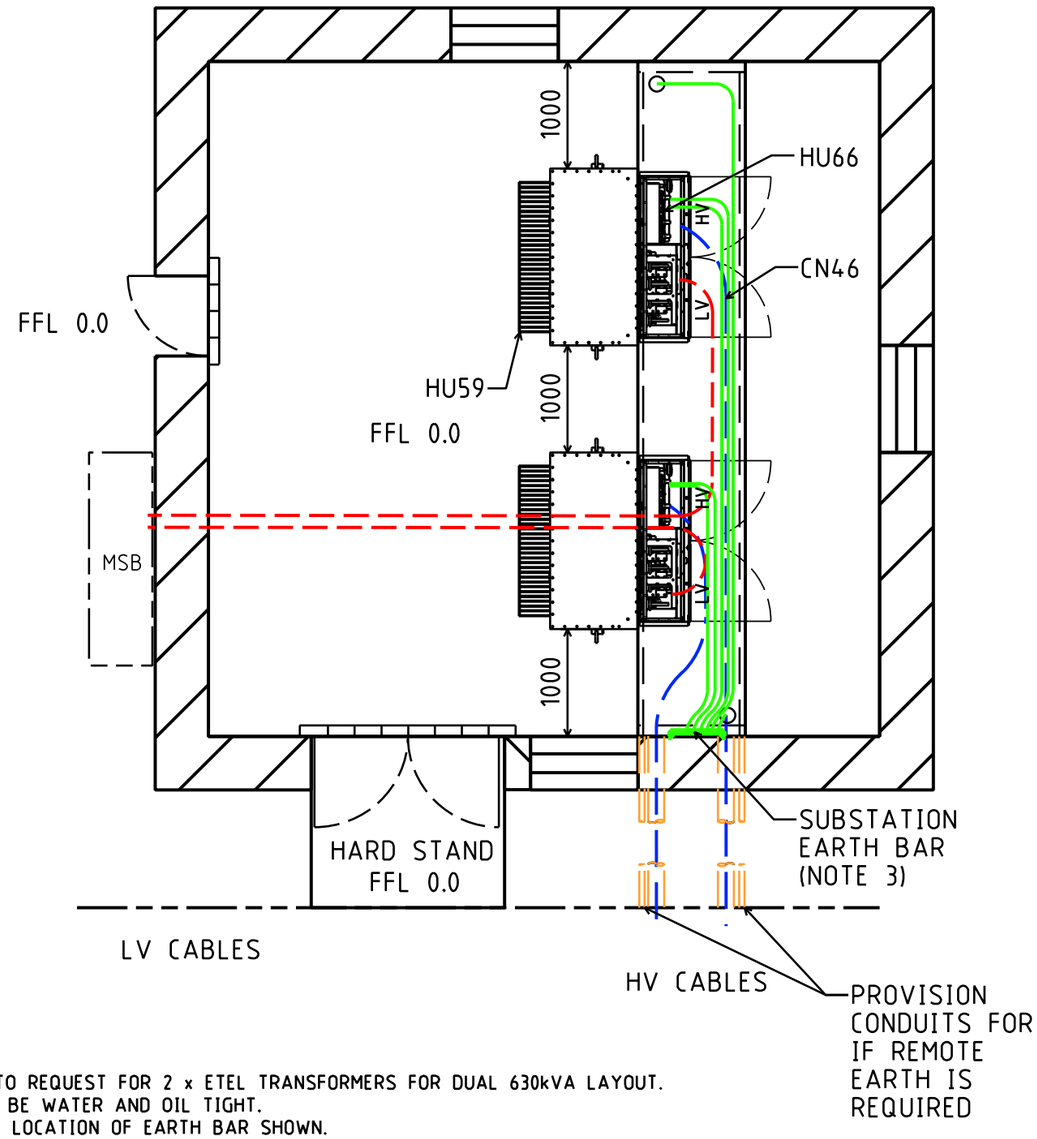
westernpower

DRAWN: SL | DATE: 17/12/2025 | ORG. No.
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT | DSM-3-19
APPROVED: MARK MONTEMAYOR | REV. C | SHT. 2/5



630 AND 1000 kVA

HV MATERIAL				
EQUIPEMENT	CU	QTY		
		6 kV	11 kV	22 kV
TRANSFORMER	HU55/630	SELECT 2 OF THE SAME TYPE		
	HU55/1000			
	HU59/630	SELECT 2 OF THE SAME TYPE		
	HU59/1000			
CABLE	HU66	1		
	CN46	AS REQUIRED FROM FSSW		
EARTHING	HU70_1	1		



NOTES:-
1 DESIGNER TO REQUEST FOR 2 x ETEL TRANSFORMERS FOR DUAL 630kVA LAYOUT.
2. TRENCH TO BE WATER AND OIL TIGHT.
3. INDICATIVE LOCATION OF EARTH BAR SHOWN.
EXACT LOCATION TO BE CONFIRMED IN DESIGN.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

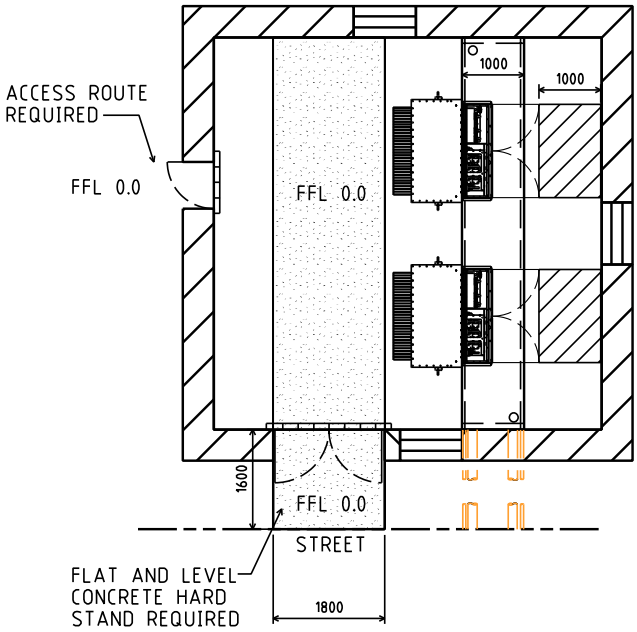
SOLE USE SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITHOUT HV SWGR
EQUIPMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

DRG. No. DSM-3-19
REV. C | SHT. 3/5



INSTALLATION AND MAINTENANCE CLEARANCE

OPERATIONAL CLEARANCE

NOTES:-
1. DESIGNER TO ENSURE SAFE ACCESS AND EGRESS ROUTES ARE PROVIDED.
2. WHERE THE SITE IS SET BACK FROM THE STREET, CRANE ACCESS IS REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

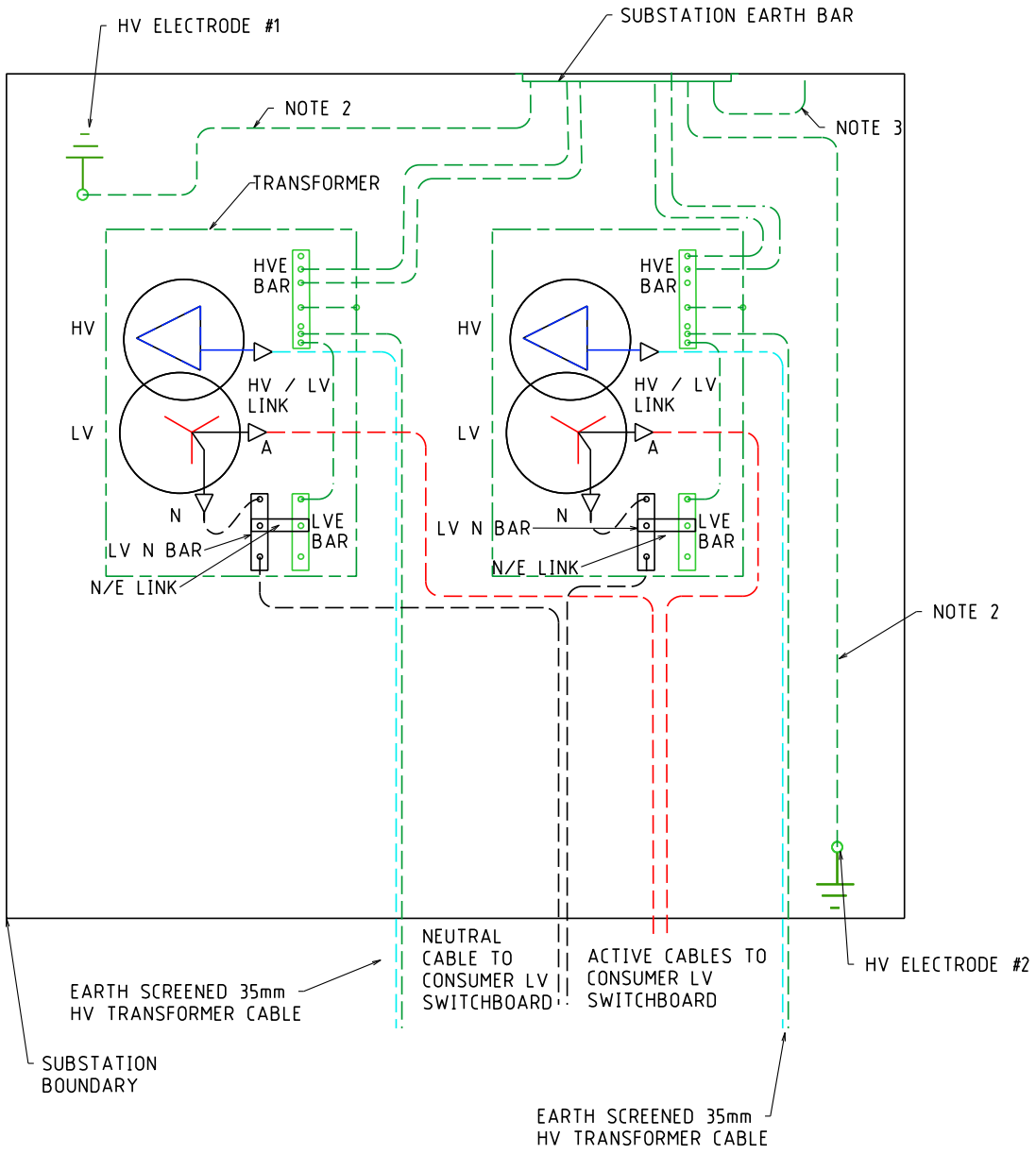
TITLE

SOLE USE SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITHOUT HV SWGR
CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025 | ORG. No.
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT | DSM-3-19
APPROVED: MARK MONTEMAYOR | REV. C | SHT. 4/5



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES AS PER ITEM 7 ON SHEET 2 - TO BE SEALED WITH CN81.
3. BUILDING EARTH CABLE BOND IS TO BE PROVIDED BY THE CUSTOMER.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

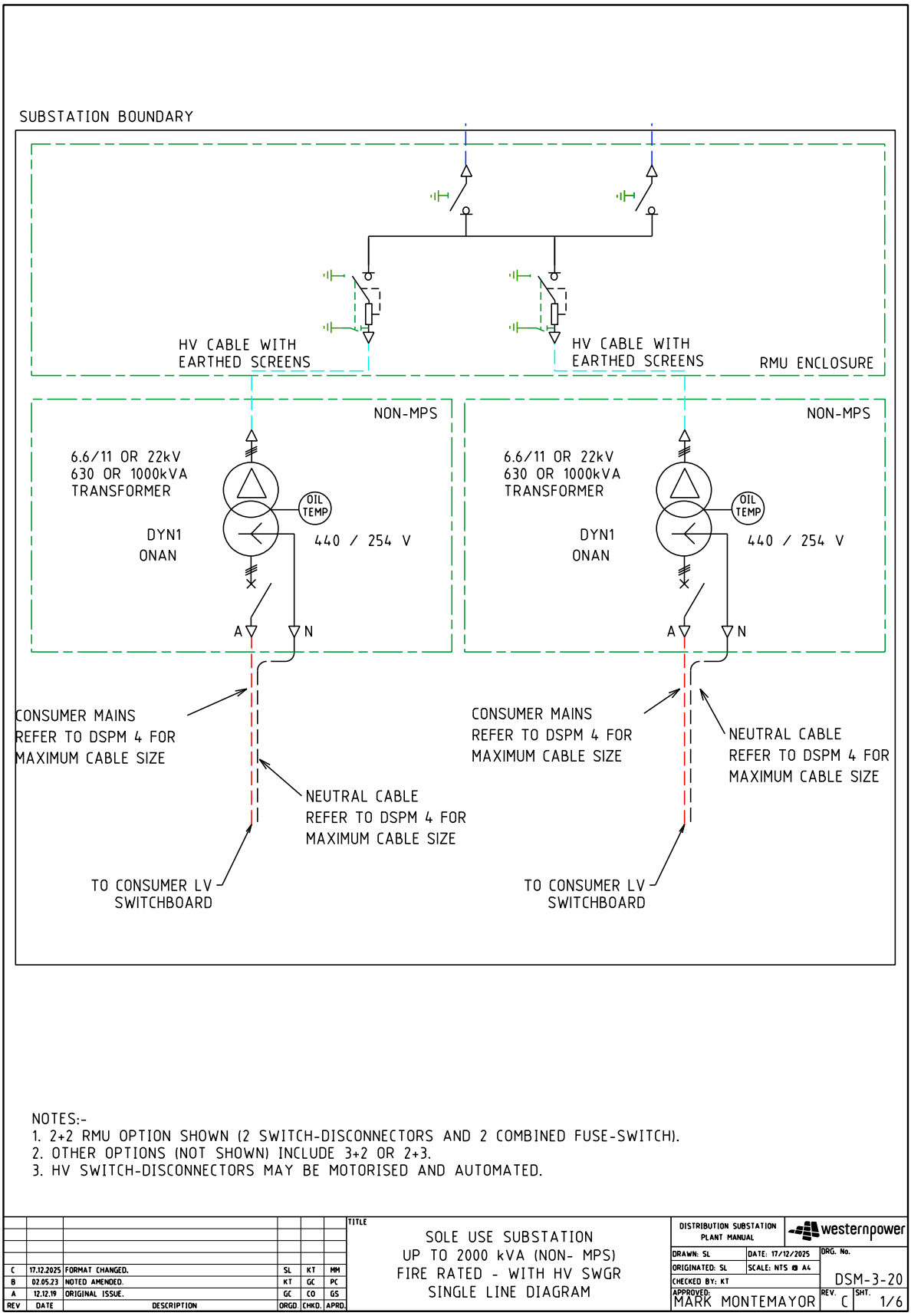
TITLE: SOLE USE SUBSTATION UP TO 2000 kVA (NON- MPS) FIRE RATED - WITHOUT HV SWGR EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	ORG. No. DSM-3-19
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 5/5

4.5.4 DSM-3-20 Up to 2000kVA (Non-MPS) with HV SWGR



NOTES:-
1. 2+2 RMU OPTION SHOWN (2 SWITCH-DISCONNECTORS AND 2 COMBINED FUSE-SWITCH).
2. OTHER OPTIONS (NOT SHOWN) INCLUDE 3+2 OR 2+3.
3. HV SWITCH-DISCONNECTORS MAY BE MOTORISED AND AUTOMATED.

REV	DATE	DESCRIPTION	ORGD	CHKD	APRD
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

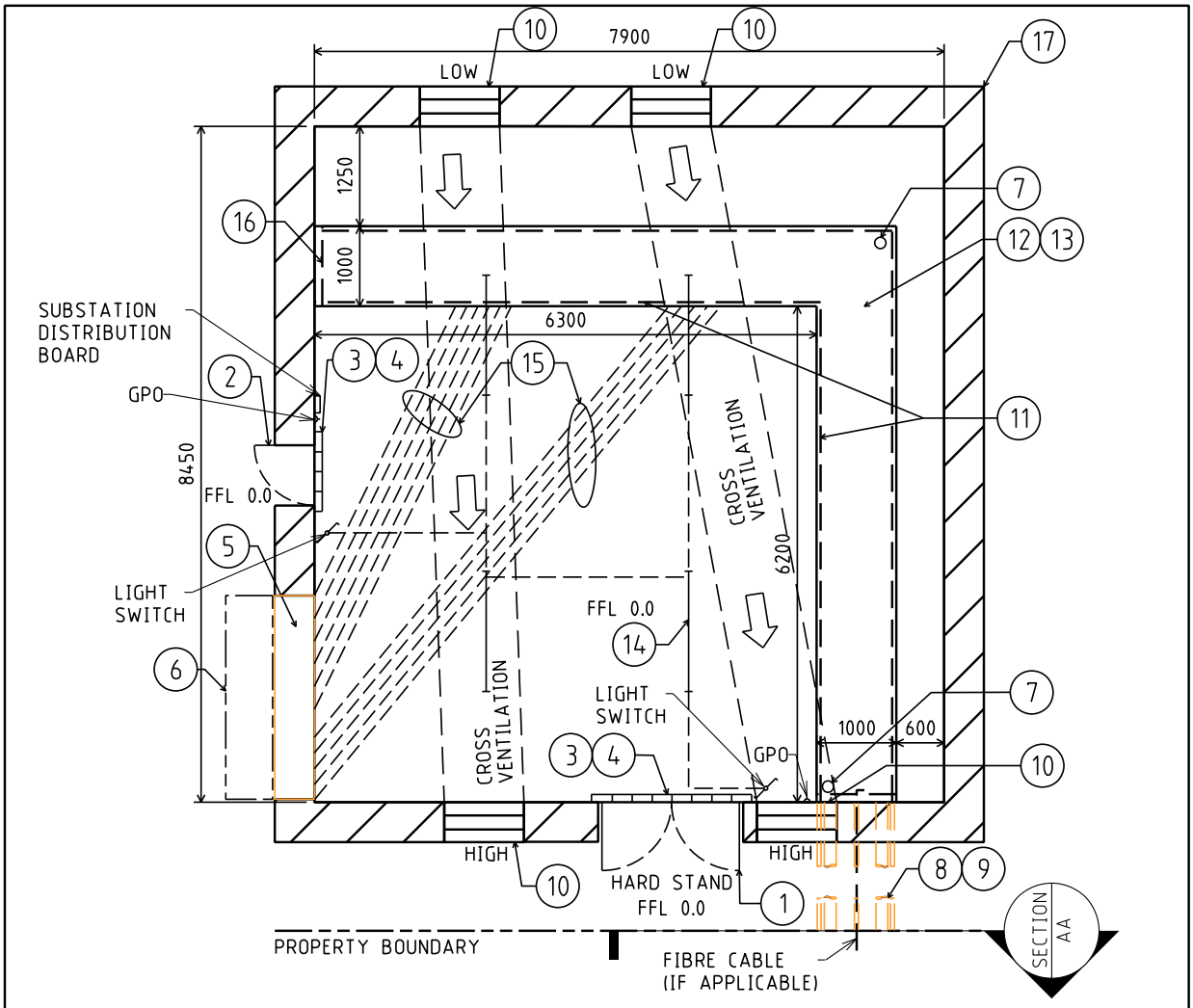
TITLE: SOLE USE SUBSTATION UP TO 2000 kVA (NON- MPS) FIRE RATED - WITH HV SWGR SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL

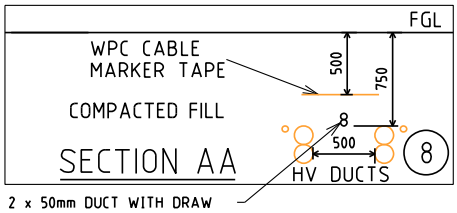
westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

ORG. No. DSM-3-20
REV. C | SHT. 1/6



1	DOUBLE DOORS 2340x1720 CLEAR OPENING.
2	DOOR 2040x820 CLEAR OPENING.
3	75 HIGH BRICK BUND.
4	BUND LAID AFTER EQUIPMENT INSTALLED.
5	CUSTOMERS DUCT(S) AT FLOOR OF TRENCH.
6	CUSTOMERS MAIN DISTRIBUTION BOARD.
7	75 DIA PENETRATION THROUGH SLAB FOR EARTHING - TO BE SEALED WITH CN81.
8	4-150 ID & 2-50 HEAVY DUTY DUCTS - TO BE SEALED WITH CN81.
9	750 COVER AT BOUNDARY.
10	600x800 WIDE FIRE DAMPERED VENT AT HIGH (TOP 200 MAX BELOW CEILING) & LOW (BOTTOM MAX 200 ABOVED FINISHED FLOOR LEVEL) LEVELS.
11	50mm WIDE x 38mm DEEP REBATE FOR TRENCH COVERS.
12	TRENCH COVER 35mm THICK x 26kg/m2 FRP SLAB PANEL FRONT OF HV SWITCHGEAR ONLY. 38mm THICK x 18.2kg/m2 MESH GRATING ELSEWHERE.
13	1200 DEEP TRENCH WALLS & FLOOR OF TRENCH TO BE PAINTED WITH SILICONE GLAZE S50.
14	LED LIGHTS BATTEN FITTING (2 WAY SWITCH WITH NEON INDICATOR).
15	10-150 ID HEAVY DUCTS INSTALLED AT FLOOR OF TRENCH - TO BE SEALED WITH CN81.
16	COVER SUPPORTS - 100x75x6 UA (H.D.G.) FIXED TO WALL OF TRENCH.
17	WALLS, CEILING & DOORS TO BE 2HR FIRE RATED. CEILING HEIGHT TO BE MIN 2500mm.



2 x 50mm DUCT WITH DRAW STRING REQUIRED FOR FIBRE FOR CBD AUTOMATION WHEN REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

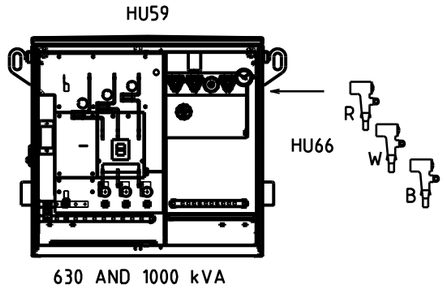
TITLE

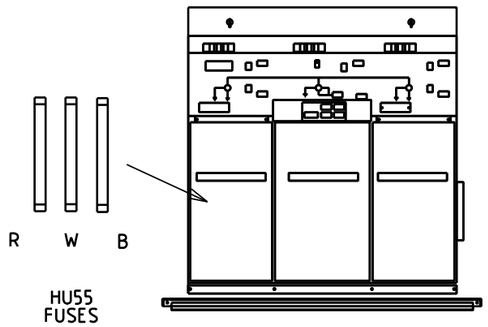
SOLE USE SUBSTATION
UP TO 2000 kVA (NON-MPS)
FIRE RATED - WITH HV SWGR
REQUIREMENTS AND DUCT INSTALLATION

DISTRIBUTION SUBSTATION PLANT MANUAL

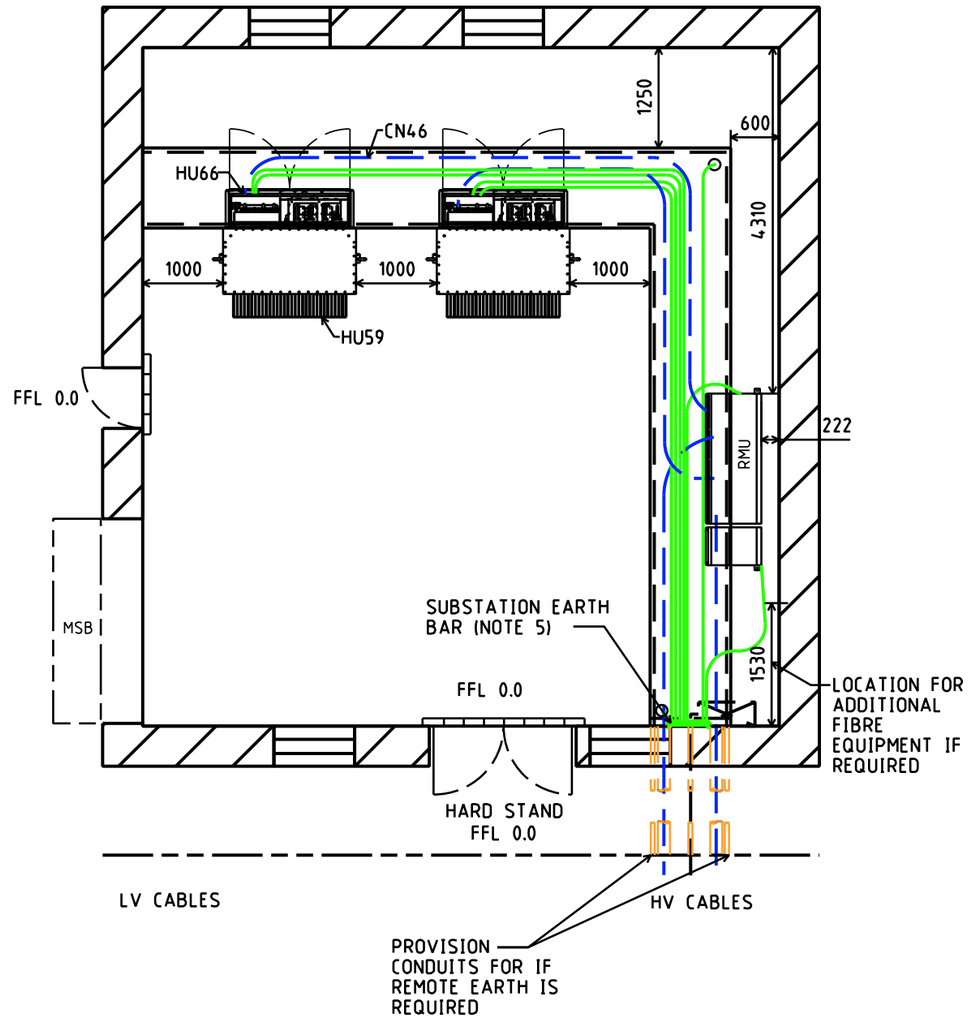
westernpower

DRAWN: SL | DATE: 17/12/2025 | ORG. No.
ORIGINATED: SL | SCALE: NTS @ A4 | DSM-3-20
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR | REV. C | SHT. 2/6





HV MATERIAL				
EQUIPEMENT	CU	QTY		
		6 kV	11 kV	22 kV
TRANSFORMER	HU55/630	SELECT 2 OF THE SAME TYPE		
	HU55/1000			
	HU59/630	SELECT 2 OF THE SAME TYPE		
	HU59/1000			
RMU	HU24	SELECT 1		
	HU25_2S			
	HU25_3S			
EARTHING	HU70_3	1		
CABLE	HU66	2		
	CN46	14		
AUTOMATION	DA6_LVS	1		
	DA6_NG_SE	1 (OPTIONAL)		



NOTES:-
1. RMU SUPPLIED WITH BASE AND HV CABLE TERMINATIONS.
2. REFER TO SHEET 6 FOR THE CORRECT INSTALLATION OF THE RMU.
3. REFER TO DSPM CHAPTER 4 FOR AUTOMATION DETAILS.
4. CABLE TRENCH TO BE WATER/OIL TIGHT.
5. INDICATIVE LOCATION OF EARTH BAR SHOWN. EXACT LOCATION TO BE CONFIRMED IN DESIGN.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

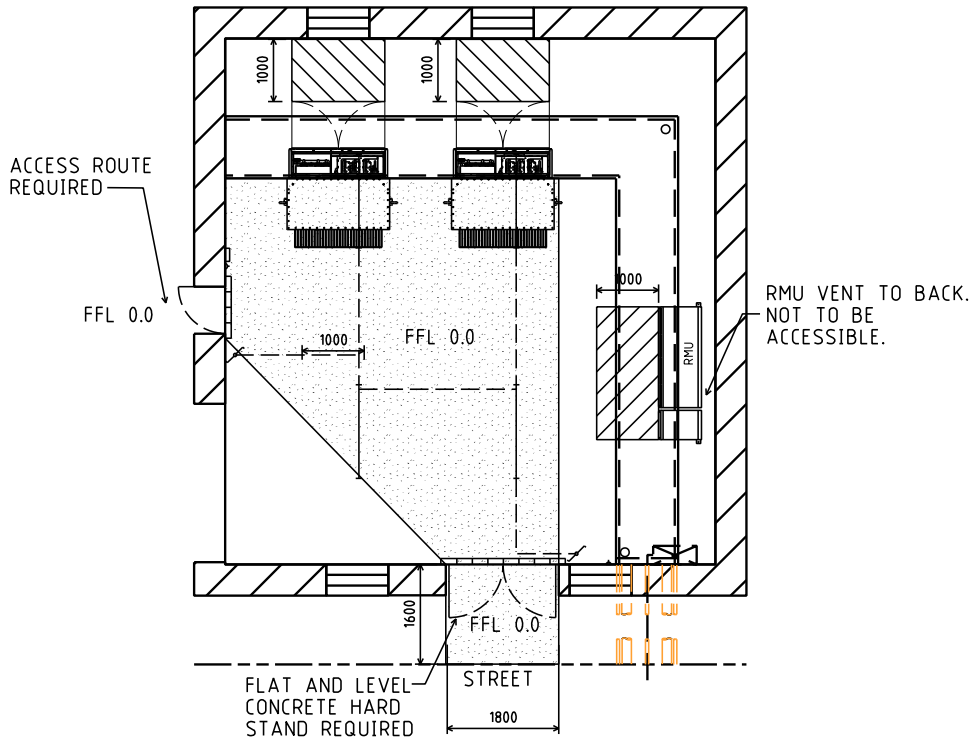
SOLE USE SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
EQUIPMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

DRG. No. DSM-3-20
REV. C | SHT. 3/6



INSTALLATION AND MAINTENANCE CLEARANCE

OPERATIONAL CLEARANCE

NOTES:-
1. DESIGNER TO ENSURE SAFE ACCESS AND EGRESS ROUTES ARE PROVIDED.
2. WHERE THE SITE IS SET BACK FROM THE STREET, CRANE ACCESS IS REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

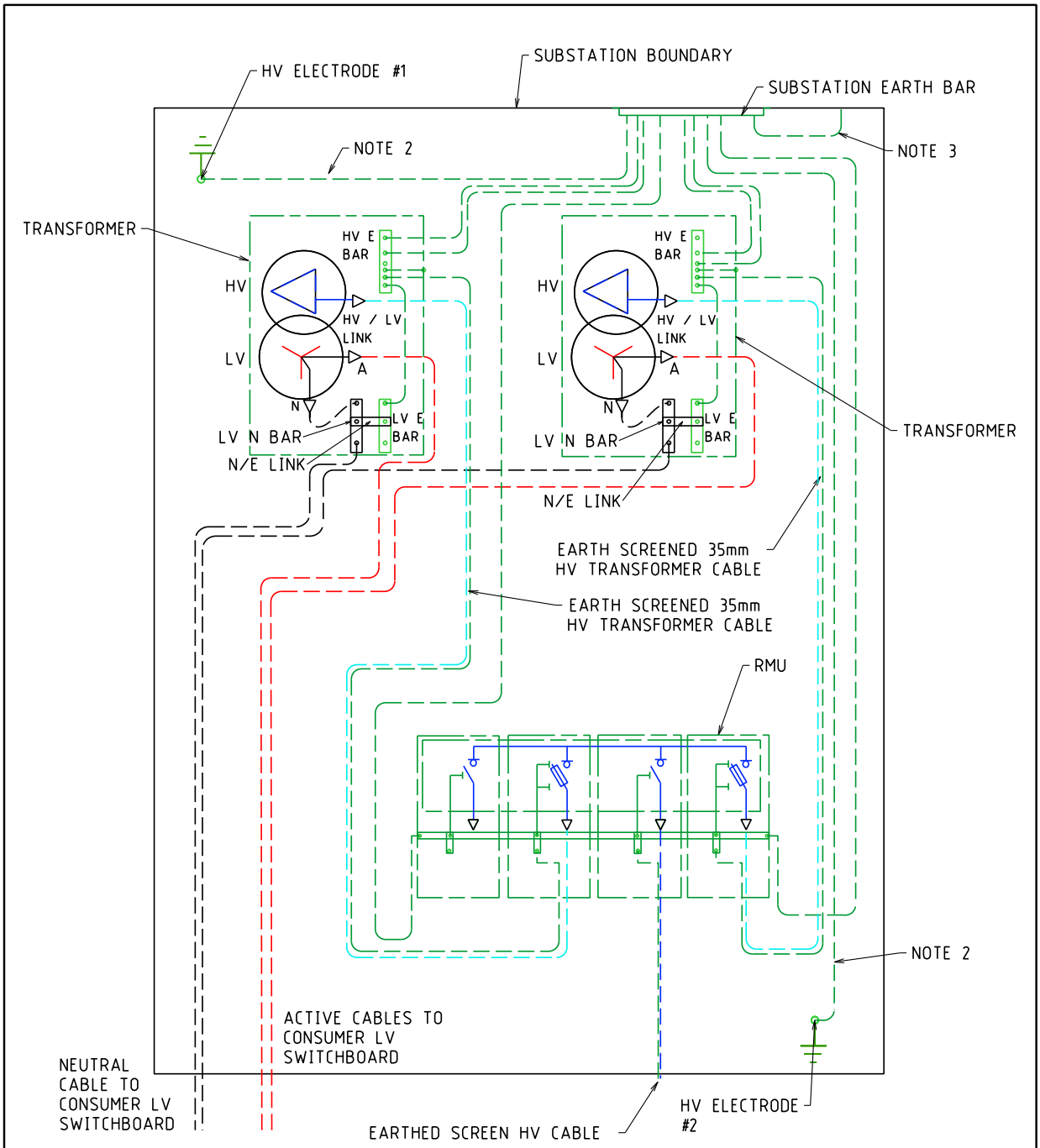
TITLE

SOLE USE SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025 | ORG. No.
ORIGINATED: SL | SCALE: NTS @ A4 | DSM-3-20
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR | REV. C | SHT. 4/6



NOTES:-

1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES AS PER ITEM 7 ON SHEET 2 - TO BE SEALED WITH CN81.
3. BUILDING EARTH CABLE BOND IS TO BE PROVIDED BY THE CUSTOMER.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

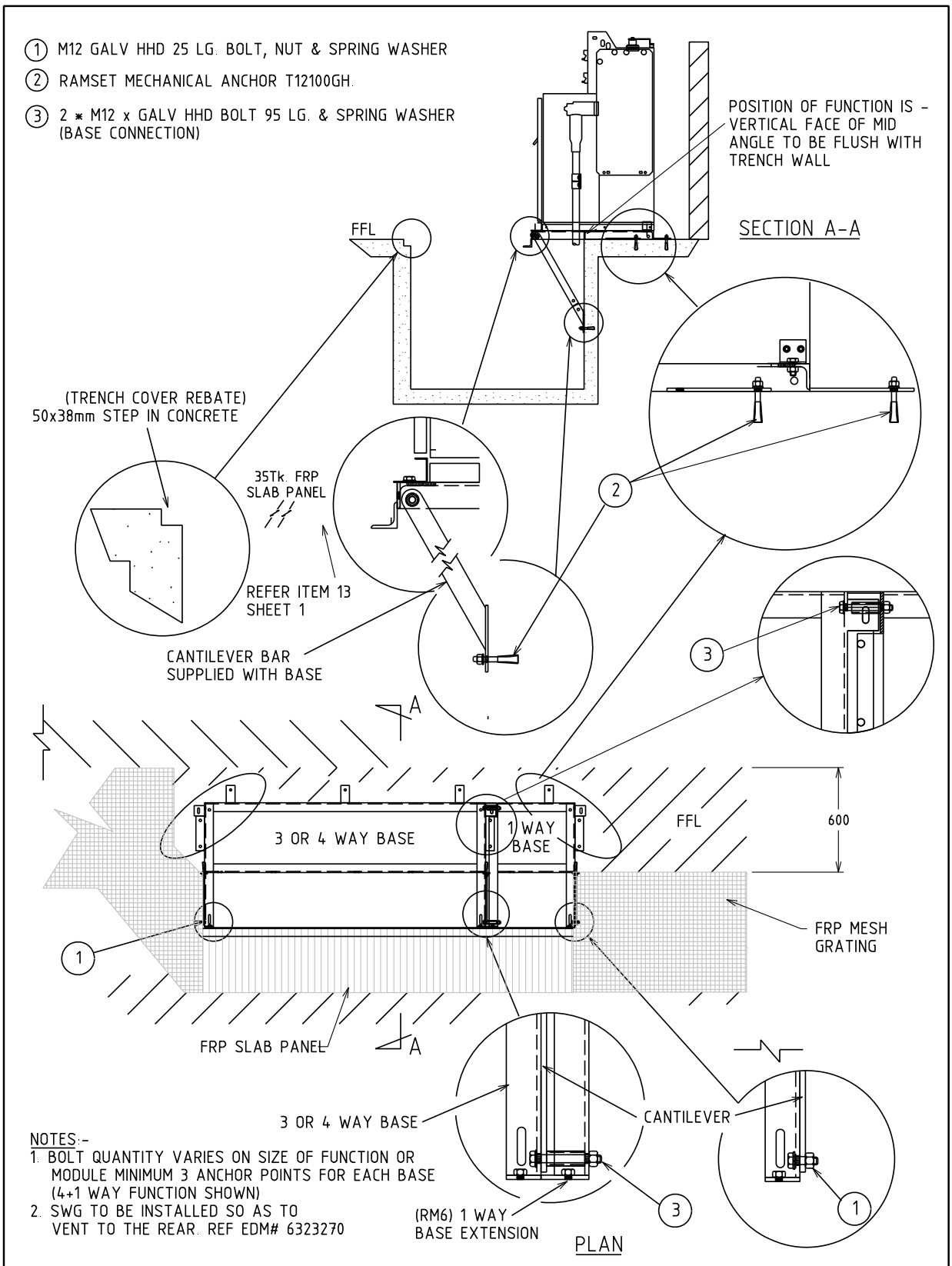
TITLE

SOLE USE SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	ORG. No.
ORIGINATED: SL	SCALE: NTS @ A4	DSM-3-20
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 5/6



NOTES:-
1. BOLT QUANTITY VARIES ON SIZE OF FUNCTION OR MODULE MINIMUM 3 ANCHOR POINTS FOR EACH BASE (4+1 WAY FUNCTION SHOWN)
2. SWG TO BE INSTALLED SO AS TO VENT TO THE REAR. REF EDM# 6323270

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

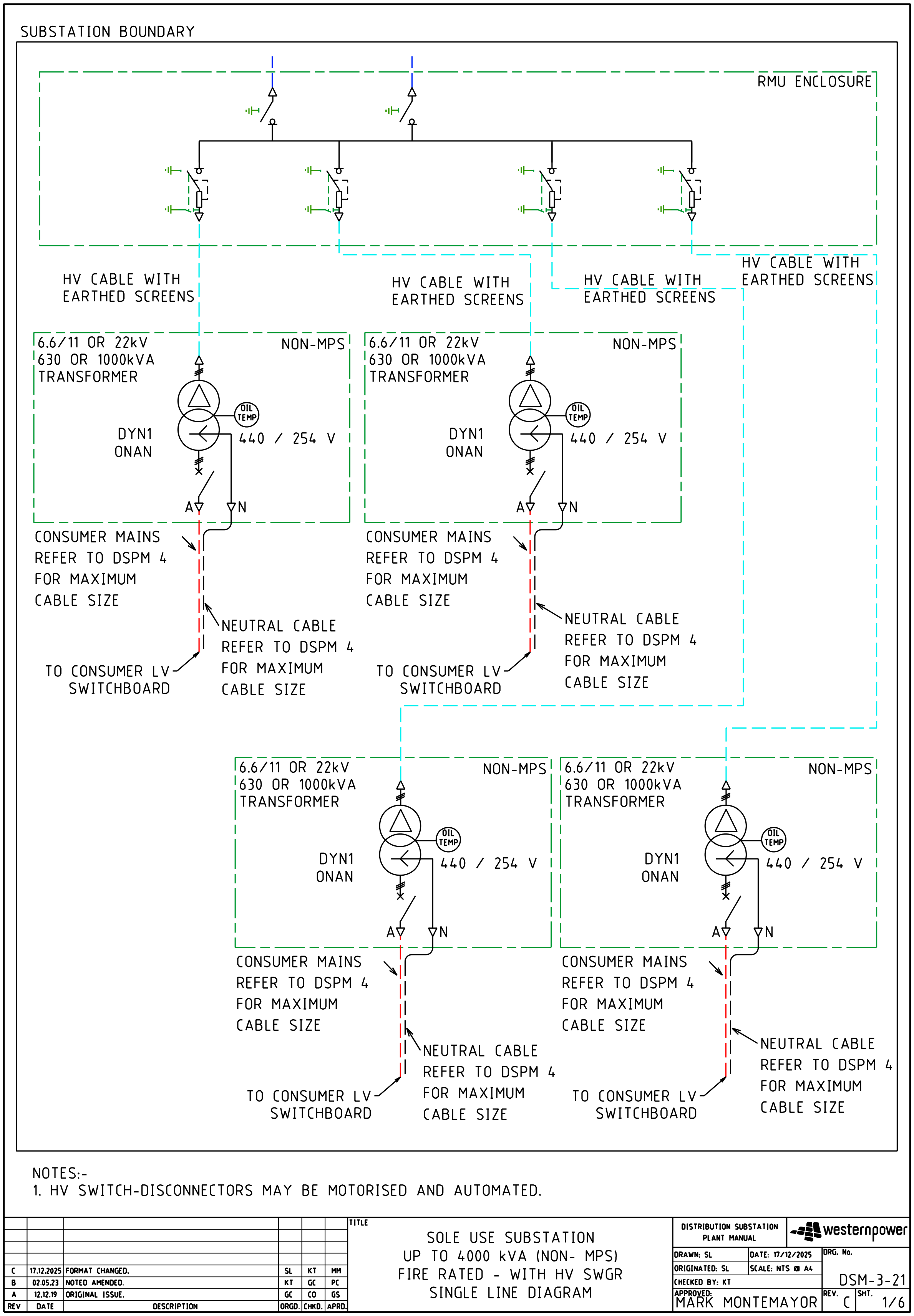
TITLE: SCHNEIDER SWITCHGEAR 3 & 4 WAY WITH 1 WAY EXTENSION FIXING DETAILS

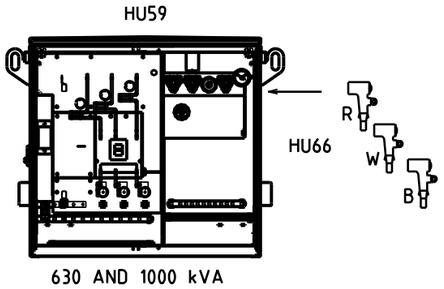
DISTRIBUTION SUBSTATION PLANT MANUAL

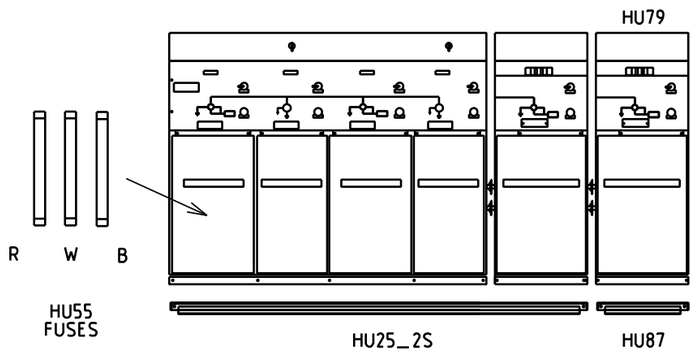
westernpower

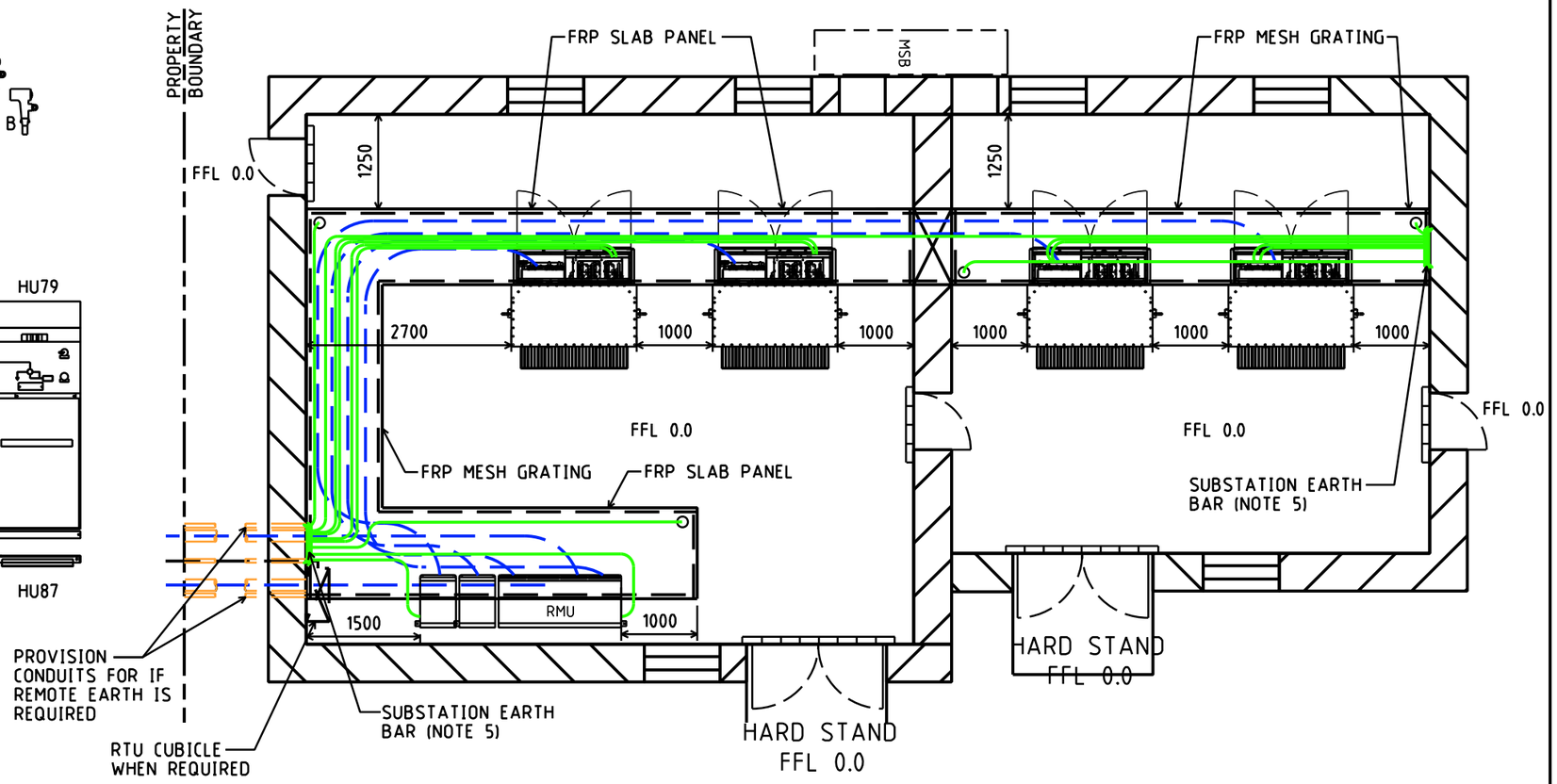
DRAWN: SL	DATE: 17/12/2025	ORG. No. DSM-3-20
ORIGINATED: SL	SCALE: NTS @ A4	
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 6/6

4.5.5 DSM-3-21 Up to 4000kVA (Non-MPS) with HV SWGR









HV MATERIAL				
EQUIPEMENT	CU	QTY		
		6 kV	11 kV	22 kV
TRANSFORMER	HU55/630	SELECT 4 OF THE SAME TYPE		
	HU55/1000			
	HU59/630	SELECT 4 OF THE SAME TYPE		
	HU59/1000			
RMU	HU79	1		
	HU25_2S	1		
	HU87	1		
EARTHING	HU70_3	1		
	HU70_2	1		
CABLE	HU66	4		
	CN46	125		
AUTOMATION	DA6_LVS	1		
	DA6_NG_SE	1 (OPTIONAL)		

NOTES:-
1. RMU SUPPLIED WITH BASE AND HV CABLE TERMINATIONS.
2. REFER TO SHEET 6 FOR THE CORRECT INSTALLATION OF THE RMU.
3. REFER TO DSPM CHAPTER 4 FOR AUTOMATION DETAILS.
4. CABLE TRENCH TO BE WATER/OIL TIGHT.
5. INDICATIVE LOCATION OF EARTH BAR SHOWN. EXACT LOCATION TO BE CONFIRMED IN DESIGN.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

TITLE

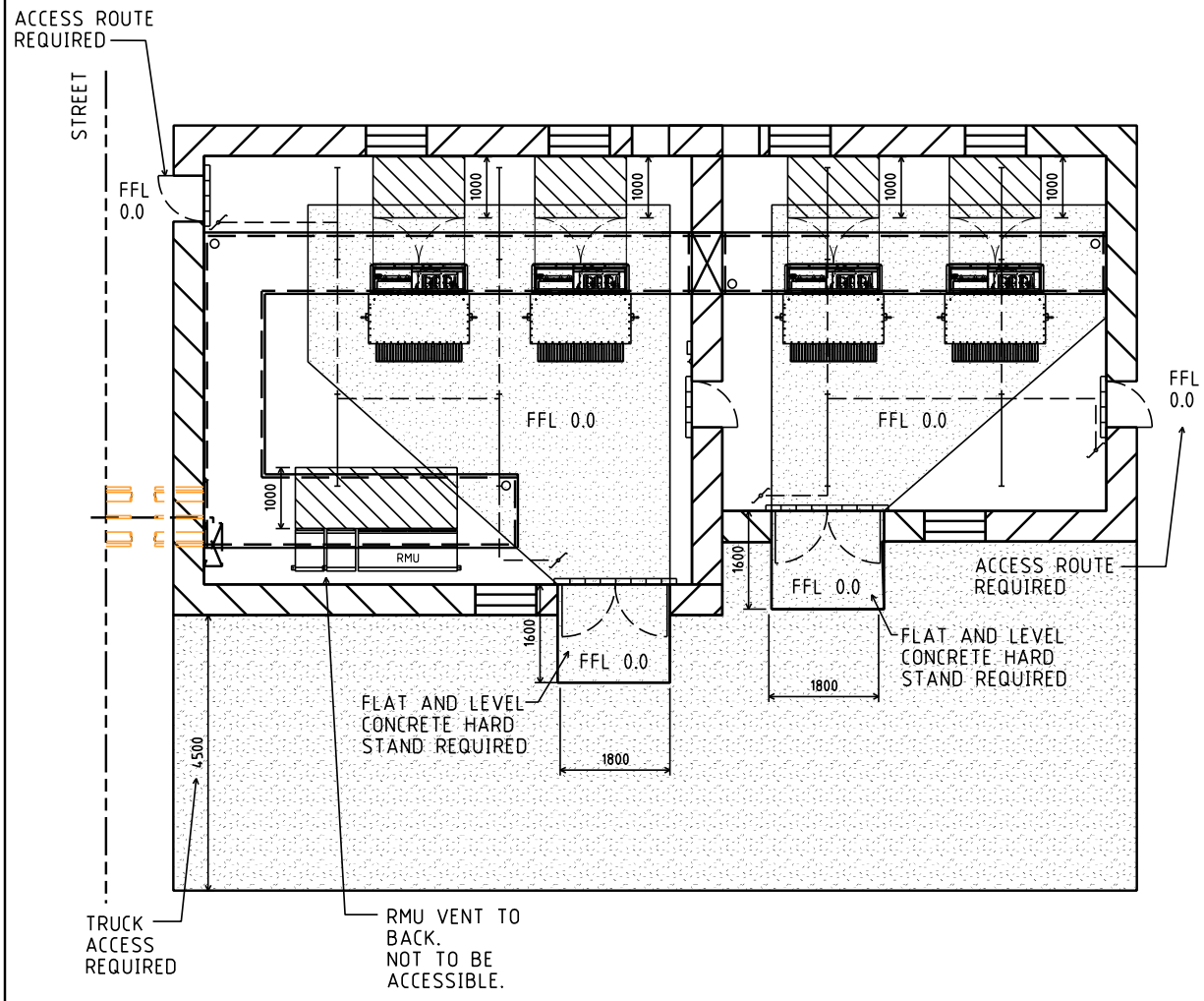
SOLE USE SUBSTATION
UP TO 4000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
EQUIPMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL | DATE: 17/12/2025
ORIGINATED: SL | SCALE: NTS @ A4
CHECKED BY: KT
APPROVED: MARK MONTEMAYOR

ORG. No. DSM-3-21
REV. C | SHT. 3/6



INSTALLATION AND MAINTENANCE CLEARANCE

OPERATIONAL CLEARANCE

NOTES:-
1. DESIGNER TO ENSURE SAFE ACCESS AND EGRESS ROUTES ARE PROVIDED.
2. WHERE THE SITE IS SET BACK FROM THE STREET, CRANE ACCESS IS REQUIRED.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
B	02.05.23	NOTED AMENDED.	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

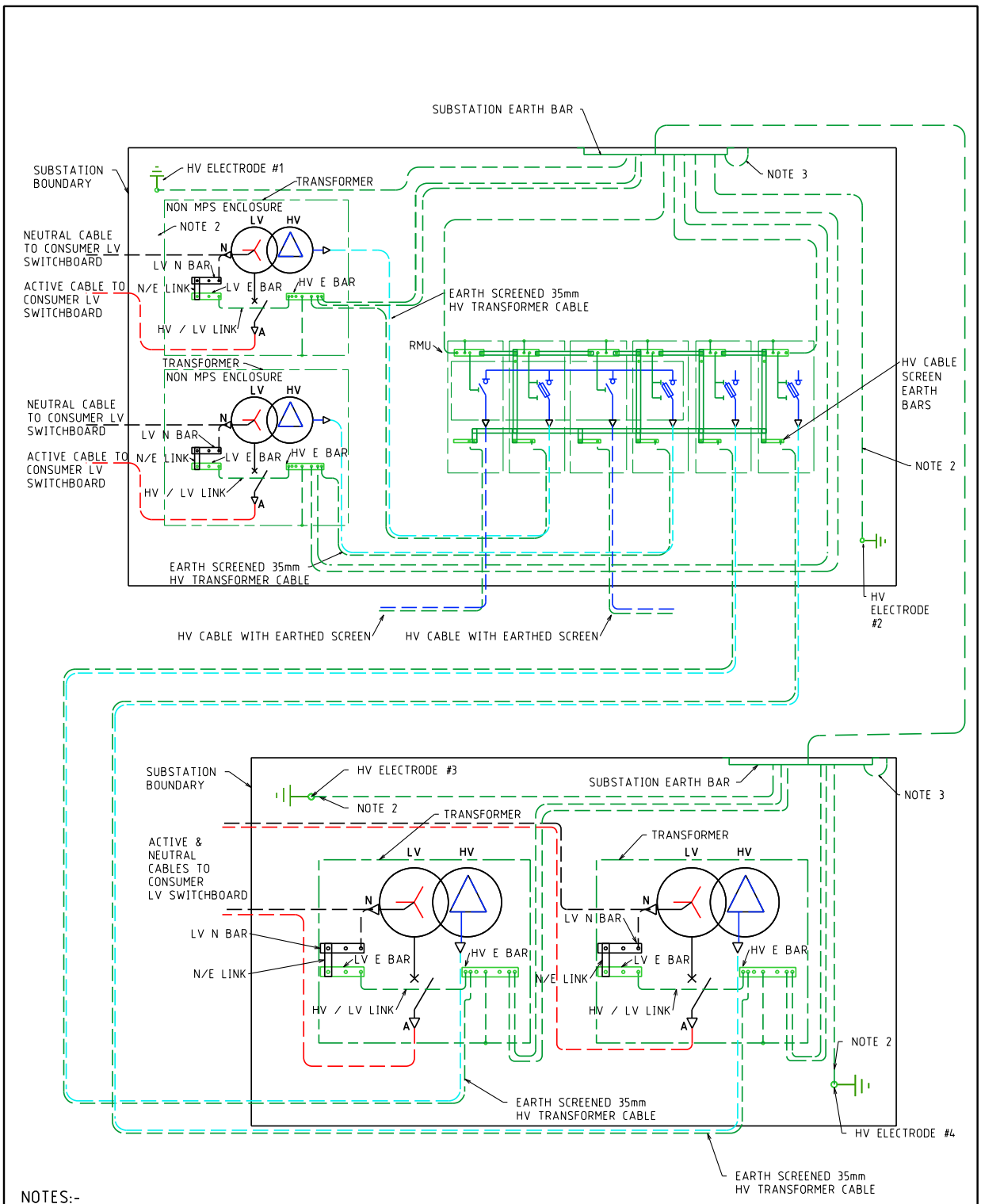
TITLE

SOLE USE SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	ORG. No.
ORIGINATED: SL	SCALE: NTS @ A4	DSM-3-21
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 4/6



NOTES:-

1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES AS PER ITEM 7 ON SHEET 2 - TO BE SEALED WITH CN81.
3. BUILDING EARTH CABLE BOND IS TO BE PROVIDED BY THE CUSTOMER.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
C	17.12.2025	FORMAT CHANGED.	SL	KT	MM
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A	12.12.19	ORIGINAL ISSUE.	GC	CO	GS

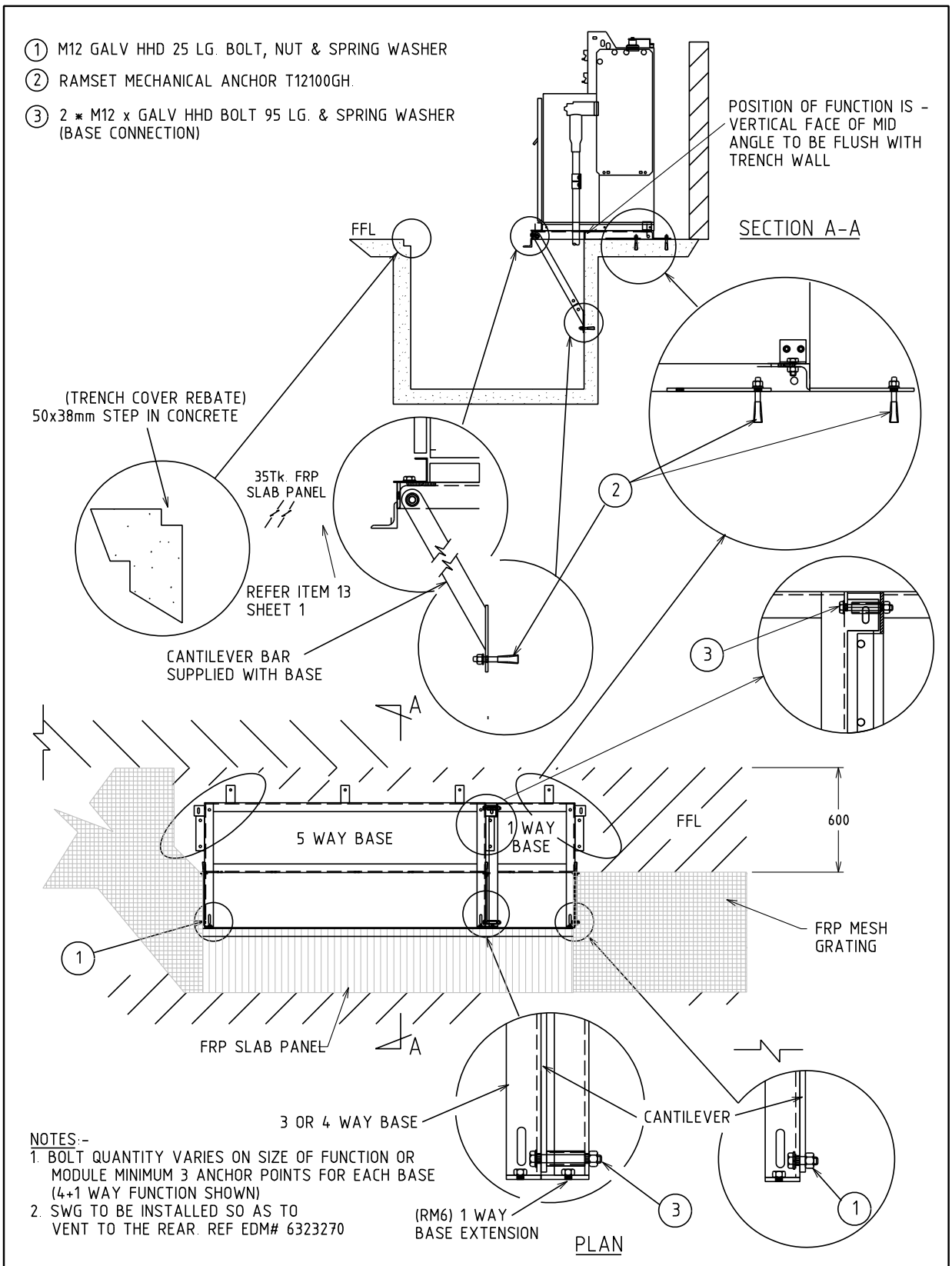
TITLE

SOLE USE SUBSTATION
UP TO 2000 kVA (NON- MPS)
FIRE RATED - WITH HV SWGR
EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	ORG. No.
ORIGINATED: SL	SCALE: NTS @ A4	DSM-3-21
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 5/6



NOTES:-
1. BOLT QUANTITY VARIES ON SIZE OF FUNCTION OR MODULE MINIMUM 3 ANCHOR POINTS FOR EACH BASE (4+1 WAY FUNCTION SHOWN)
2. SWG TO BE INSTALLED SO AS TO VENT TO THE REAR. REF EDM# 6323270

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
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TITLE: SCHNEIDER SWITCHGEAR 5 WAY WITH 1 WAY EXTENSION FIXING DETAILS

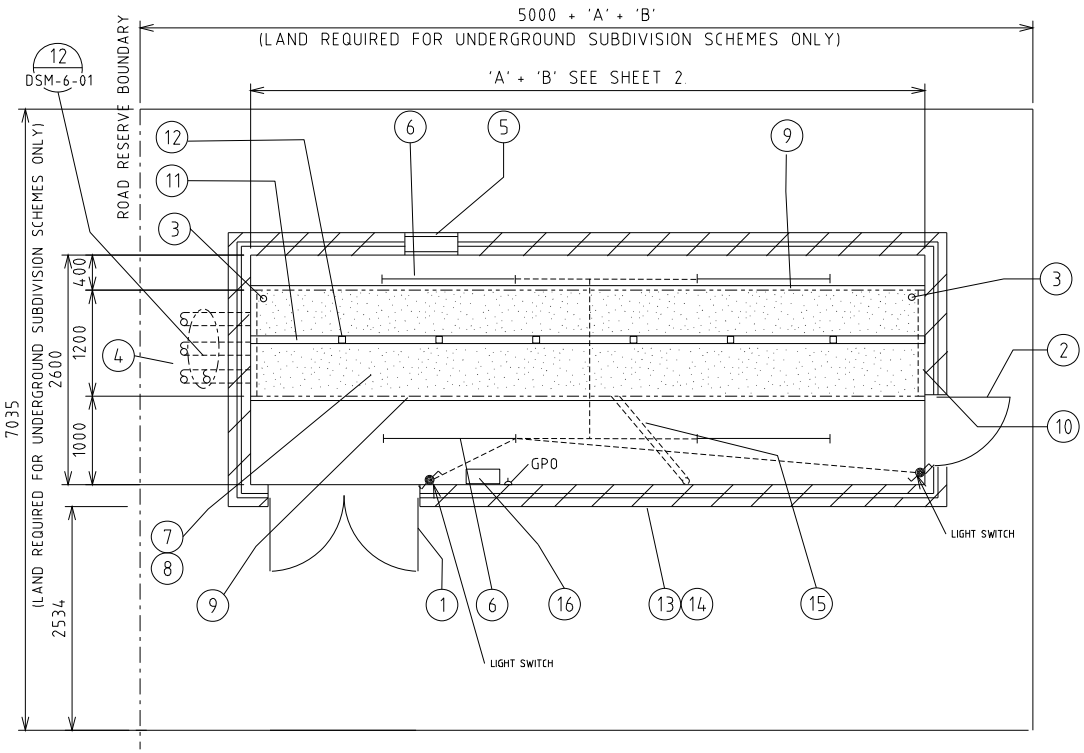
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: SL	DATE: 17/12/2025	ORG. No.
ORIGINATED: SL	SCALE: NTS @ A4	DSM-3-21
CHECKED BY: KT		
APPROVED: MARK MONTEMAYOR	REV. C	SHT. 6/6

4.6 Customer Owned Substations

4.6.1 DSM-3-22 Up to 15000 kVA HV Indoor Schneider Switchgear



NOTE:
CUSTOMERS DUCTING NOT SHOWN. POSITION DEPENDANT ON LOCATION OF CUSTOMERS MDB.

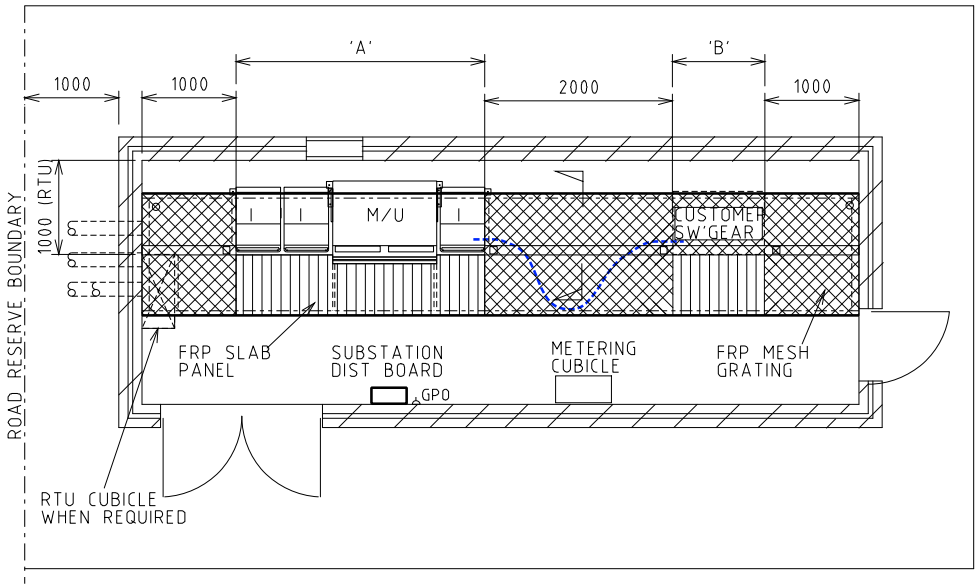
1	DOUBLE DOOR 2 x 820 x 2340 CLEAR OPENING
2	DOOR 2040x820 CLEAR OPENING
3	75 DIA PENETRATION THROUGH SLAB FOR EARTHING (2Nos.)
4	150 ID HEAVY DUTY DUCTS (1 EACH UNIT + 1 SPARE) – TO BE SEALED WITH CN81
5	600 x 800 WIDE VENT AT HIGH LEVEL FITTED WITH LOUVRES
6	LED LIGHTS BATTEN FITTING (2 WAY LIGHT SWITCHES WITH NEON INDICATORS)
7	1200 DEEP TRENCH. WALLS & FLOOR OF TRENCH TO BE PAINTED WITH SILICON GLAZE S50
8	TRENCH COVER: 35 THICK x 26 Kg/m² FRP SLAB PANEL FRONT OF SWITCH GEAR ONLY . 38 THICK x 18.2 Kg/m² FRP MESH GRATING ELSEWHERE.
9	50mm WIDE x 38mm DEEP REBATE FOR TRENCH COVERS
10	COVER SUPPORTS – 100 x75x6 UA (H.D.G.) FIXED TO WALL OF TRENCH
11	SUPPORT BEAM FOR SWITCHGEAR SECURED WITH M12 SCREWS
12	STANCHION CENTRES 1000 FROM ENDS THEN EQI-SPACED 1000 FROM WP END
13	DOUBLE BRICK CAVITY WALLS
14	WALLS, CEILING AND DOORS TO BE 2Hrs. FIRE RATED, CEILING HEIGHT TO BE MIN. 2500mm
15	75 DIA. DUCT INSTALLED AT BOTTOM OF TRENCH FOR METERING – TO BE SEALED WITH CN81
16	SUBSTATION DISTRIBUTION BOARD

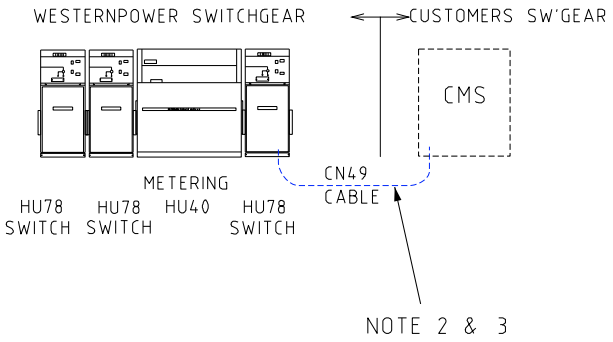
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AMENDED	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: CUSTOMER OWNED SUBSTATION
HV INDOOR GROUND MOUNTED SWGR
CABLE CONNECTION
(WP. SCHNEIDER HV SWITCHGEAR)
CIVIL & LAND REQUIREMENTS

DISTRIBUTION SUBSTATION MANUAL
westernpower

DRAWN: JRR	DATE: 14-11-2019	DRG. No.	
ORIGINATED: GC	SCALE: NTS	DSM-3-22	
CHECKED: CO			
APPROVED: GRANT STACY		REV: B	SHT. 1





RMU MATERIALS (QTY) AND DIMENSIONS

CU	DESCRIPTION	DIMENSION (W)	QTY REQUIRED	TOTAL WIDTH(mm)
HU78	ISOLATOR (I)	515		
HU40	METERING UNIT (M/U)	1149		
HU79	FUSE SWITCH (Q)	515		
CN49	240mm Cu HV CABLE	PER METRE		
DA6	RTU			
DA10	RTU ANTENNA			
CN81	CABLE DUCT SEAL			
WESTERN POWER EQUIPMENT DIMENSION 'A'				
CUSTOMER EQUIPMENT DIMENSION 'B'				
WESTERN POWER CABLE INSTALLATION SPACE REQUIRED				4000
CUSTOMER CABLE INSTALLATION SPACE REQUIRED				
TOTAL SWITCH ROOM LENGTH				

DIMENSIONS (W) INCLUDES 43mm FOR COUPLING EACH FUNCTION

NOTES:-
1. FOR EARTHING ARRANGEMENTS SEE SHEET 6
2. CUSTOMER POINT OF SUPPLY IS AT WESTERN POWER'S ISOLATOR UPSTREAM OF CMS
3. 240mm 22kV XLPE CABLE AND TERMINATION KIT SUPPLIED AND INSTALLED BY WESTERN POWER ONTO WESTERN POWER ISOLATOR.CUSTOMER RESPONSIBLE FOR SUPPLY OF THEIR TERMINATION KIT AND TERMINATING CABLE ONTO THEIR CMS
4. TRENCH TO BE OIL AND WATER RIGHT
5. REFER TO DSPM CHAPTER 4 FOR AUTOMATION REQUIREMENTS

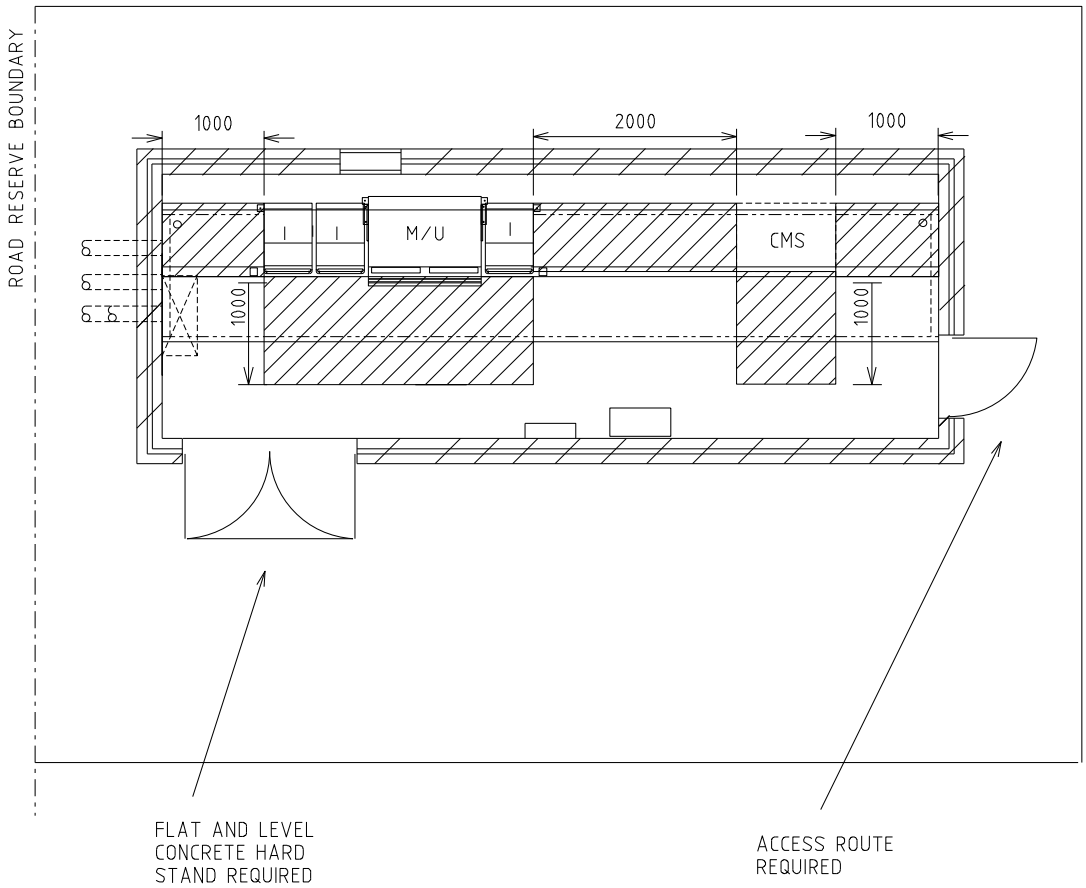
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	NOTES AND MATERIAL LIST AMENDED	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: CUSTOMER OWNED SUBSTATION HV INDOOR GROUND MOUNTED SWGR CABLE CONNECTION (WP. SCHNEIDER HV SWITCHGEAR) EQUIPMENT & INSTALLATION DETAILS

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR | DATE: 14-11-2019 | DRG. No. DSM-3-22
ORIGINATED: GC | SCALE: NTS
CHECKED: CO
APPROVED: GRANT STACY | REV. B | SHT. 2



MINIMUM CLEARANCE REQUIRED FOR OPERATIONAL PURPOSES

NOTES:-
1. DESIGNER TO ENSURE SAFE ACCESS AND EGRESS ROUTES ARE PROVIDED
2. WHERE THE SITE IS SET BACK FROM THE STREET CRANE ACCESS IS REQUIRED

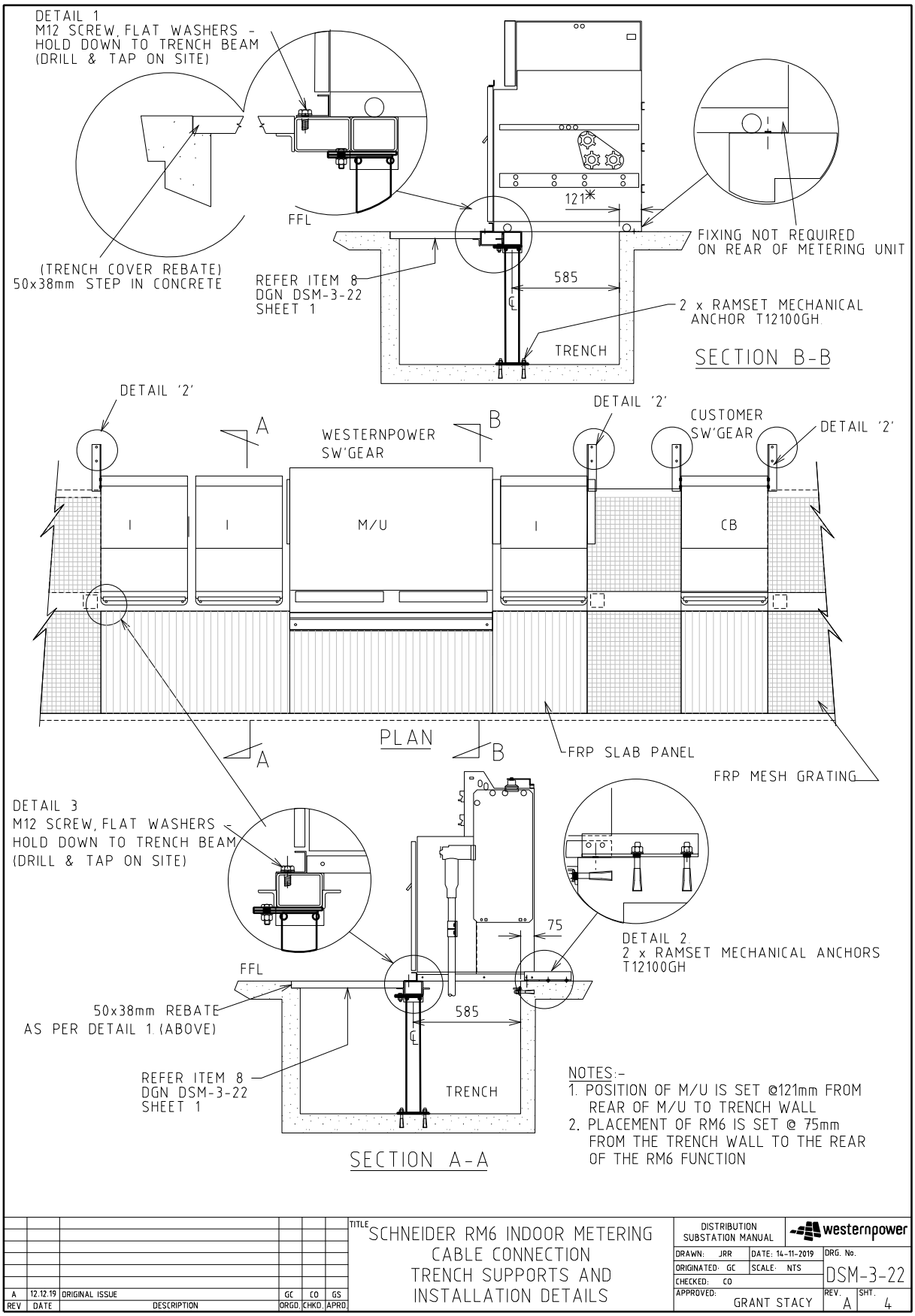
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: CUSTOMER OWNED SUBSTATION
HV INDOOR GROUND MOUNTED SWGR
CABLE CONNECTION
(WP. SCHNEIDER HV SWITCHGEAR)
OPERATIONAL CLEARANCES

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 14-11-2019	DRG. No. DSM-3-22
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. A / SHT. 3



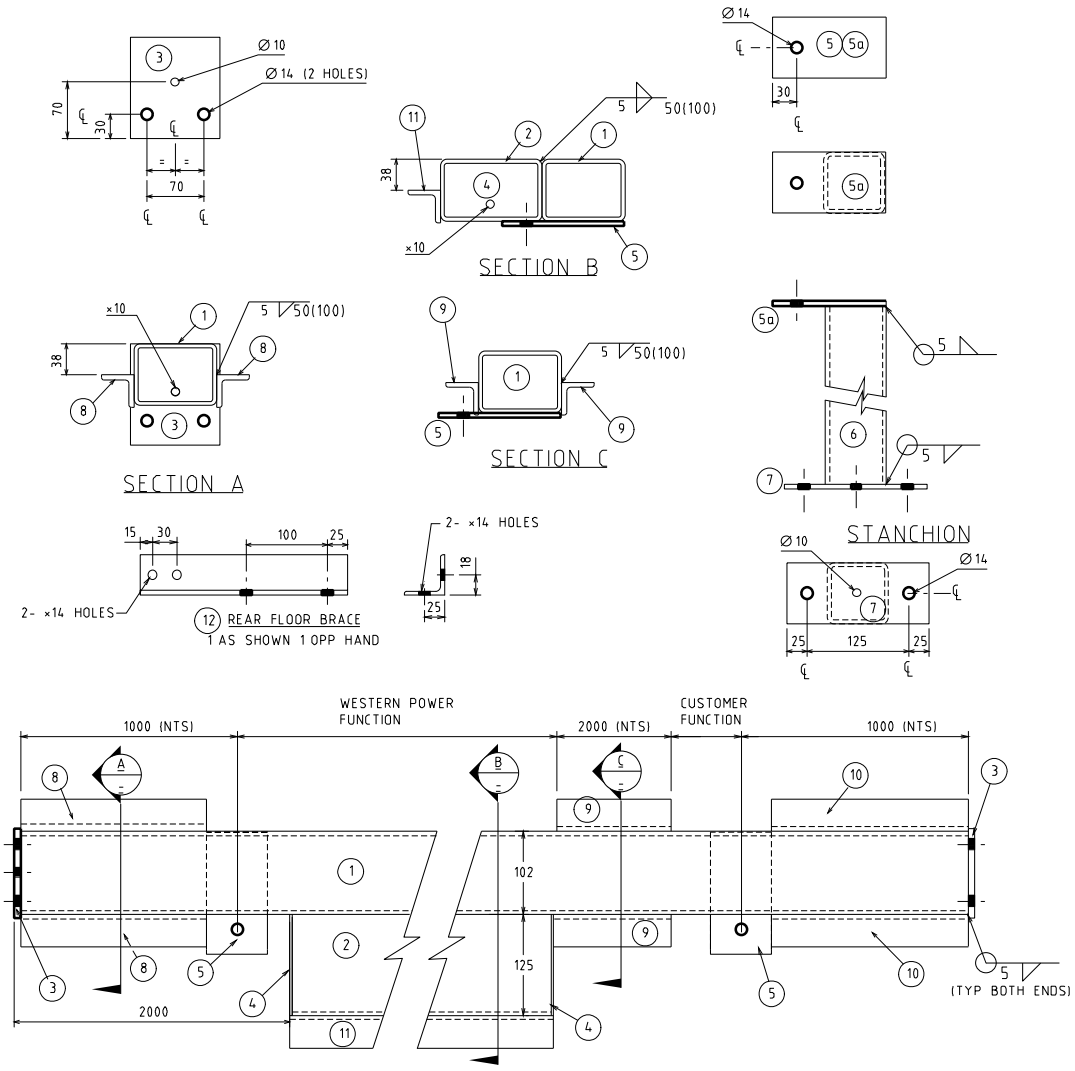
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: SCHNEIDER RM6 INDOOR METERING CABLE CONNECTION TRENCH SUPPORTS AND INSTALLATION DETAILS

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 14-11-2019	DRG. No. DSM-3-22
ORIGINATED: GC	SCALE: NTS	
CHECKED: CO		
APPROVED: GRANT STACY		REV. A / SHT. 4



REF	QUANT	MATERIALS	REMARKS
BEAM			
1	1	102x76 x5 RHS x LENGTH DEPENDENT OF SWITCHROOM TRENCH	
2	1	125x76 x5 RHS x 1170 LG (FLOOR PLATE FOR METERING UNIT).	
3	2	110x6 MS PL. x 125 LG. (BEAM END PLATES)	
4	2	75x2 MS PL. 125 LG. (BLANKING PLATES)	
5	REMARKS	75x6 MS PL. 150 LG. (APPLIES TO NUMBER OF STANCHIONS)	SPACED 1000 FROM EACH END OF BEAM AND THEN @ 1000mm CTR'S
STANCHIONS (EACH)			
5a	1	75x6 MS PL. 140 LG.	
6	1	75x5 SHS 1106 LG.	
7	1	75x6 MS PL. 175 LG.	
ANGLE FLOOR SUPPORTS			
8	2	50x5 E.A. 1000 - BETWEEN TRENCH WALL AND FUNCTION	LENGTH MAY VARY ON REQUIREMENTS
9	2	50x5 E.A. 2000 - BETWEEN CUSTOMER AND WESTERNPOWER FUNCTION	CABLE CONNECTION METHOD
10	2	50x5 E.A. x VARIABLE LENGTH FROM FUNCTIONS TO TRENCH WALL	
11	1	50x5 E.A. x 1170 LG.	
REAR FLOOR BRACE			
12	REMARKS	50x5 E.A. 245 LG.	2 REQUIRED EACH FUNCTION

NOTES:-
1. ALL WELDED CONSTRUCTION WITH 5mm FILLET WELDS
2. LONG LENGTHS STITCH WELD 50 (100)
3. 10 dia. HOLES FOR EXPANSION ON H.D.G.
4. REMOVE ALL BURRS AND SHARP EDGES
5. H.D. GALV AFTER CONSTRUCTION TO AS/NZS 4680

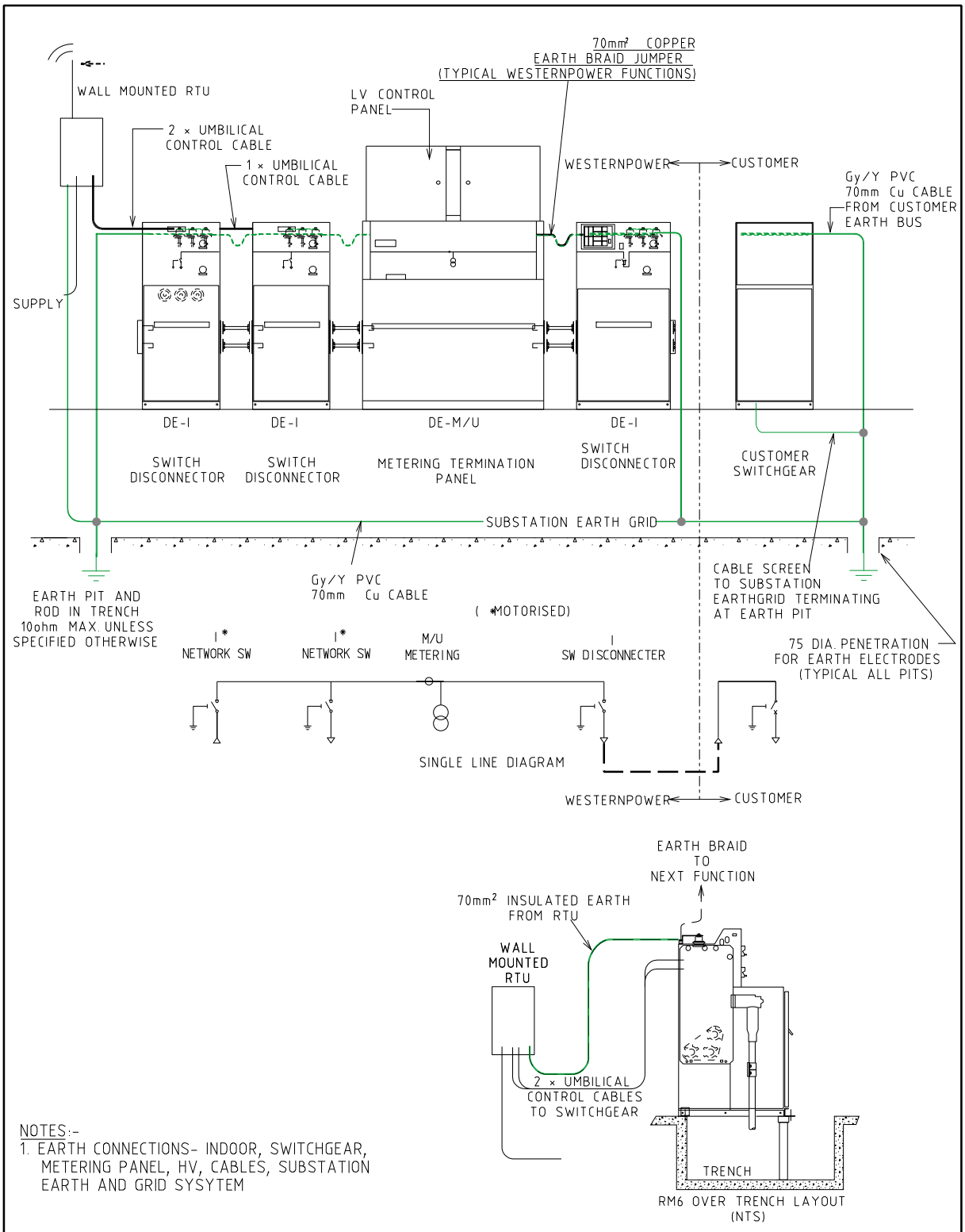
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

TITLE: SCHNEIDER RM6 INDOOR CABLE CONNECTION SWITCHGEAR SUPPORTS AND FABRICATION DETAILS

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 14-11-2019	DRG. No.	
ORIGINATED: GC	SCALE: NTS	DSM-3-22	
CHECKED: CO			
APPROVED: GRANT STACY		REV. A	SHT. 5



NOTES:-
1. EARTH CONNECTIONS- INDOOR, SWITCHGEAR, METERING PANEL, HV, CABLES, SUBSTATION EARTH AND GRID SYSYTEM

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
B	02.05.23	DETAILS AMENDED	KT	GC	PC
A	12.12.19	ORIGINAL ISSUE	GC	CO	GS

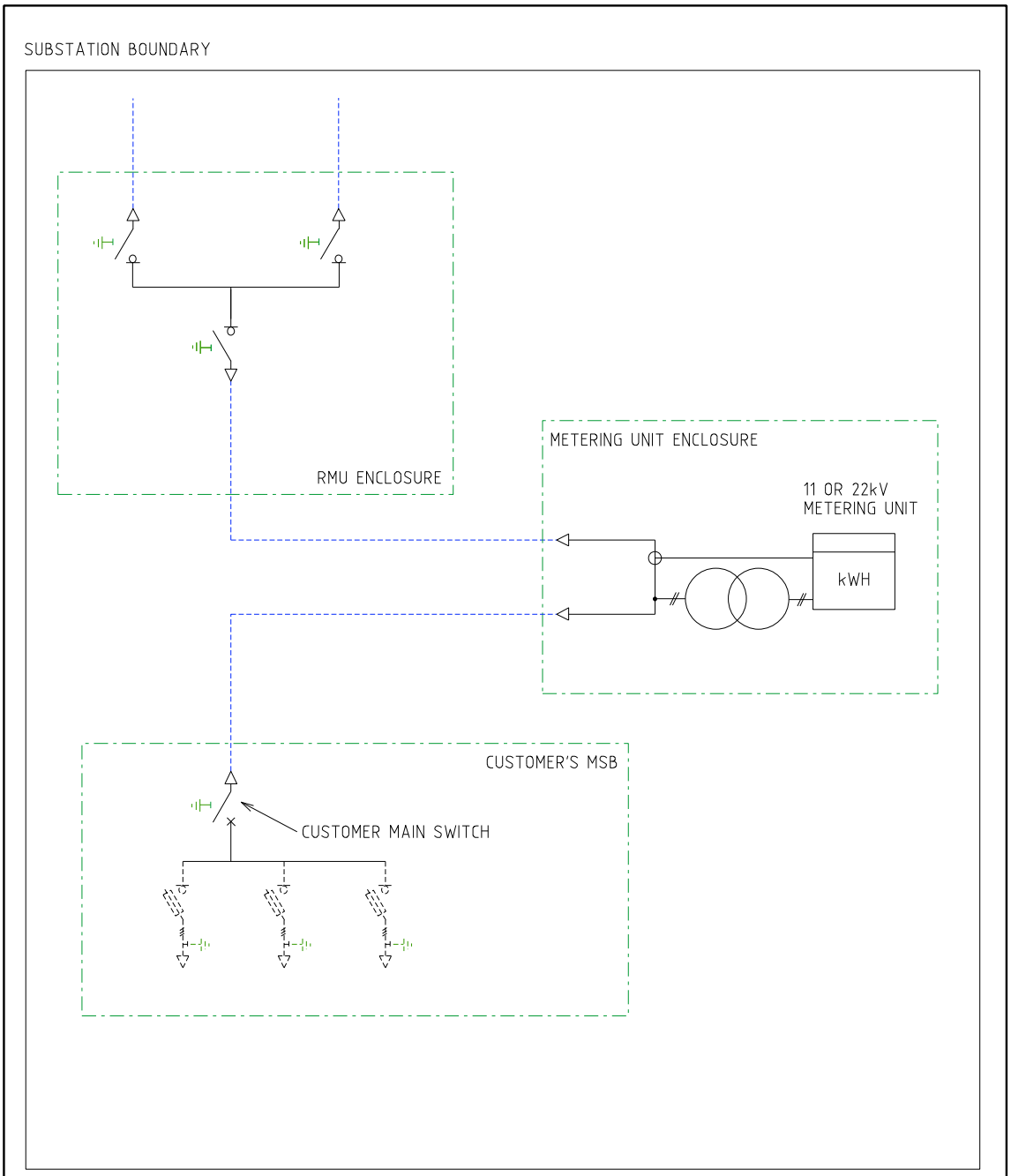
TITLE: SCHNEIDER RM6 INDOOR CABLE CONNECTION EARTH ARRANGEMENT AND CONNECTIONS

DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: JRR	DATE: 14-11-2019	DRG. No.	
ORIGINATED: GC	SCALE: NTS	DSM-3-22	
CHECKED: CO			
APPROVED: GRANT STACY		REV. B	SHT. 6

4.6.2 DSPM-3-23 Up to 4000kVA HV Outdoor Ground Mount SWGR



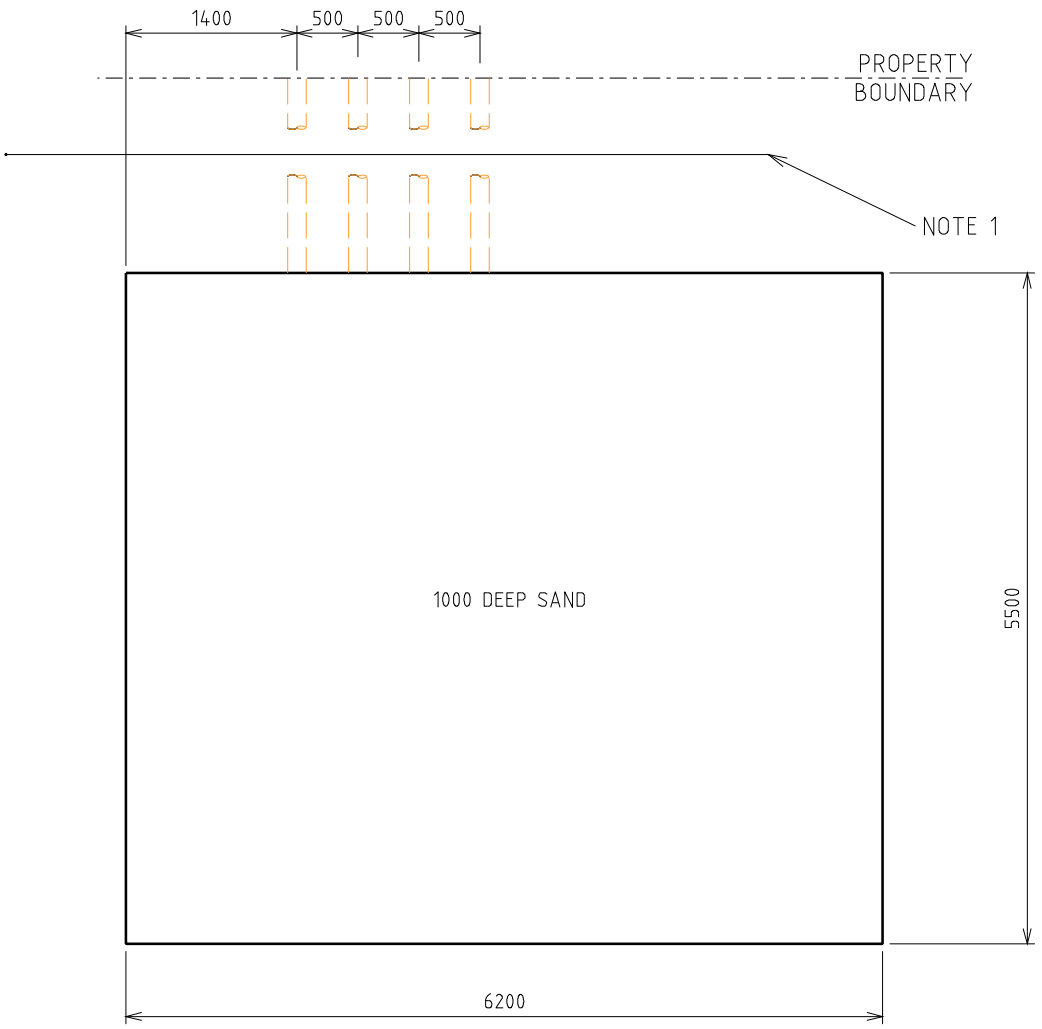
NOTES:-
1. 3+0 RMU OPTION SHOWN (3 SWITCH-DISCONNECTORS)
2. OTHER OPTIONS NOT SHOWN
3. HV SWITCH-DISCONNECTORS MAY BE MOTORISED AND AUTOMATED

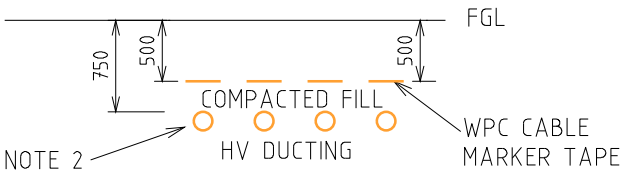
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE
CUSTOMER SUBSTATION
HV OUTDOOR GROUND MOUNTED SWGR
SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL
westernpower

DRAWN: KT	DATE: 06-04-2022	DRG. No. DSPM-3-23
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A SHT. 1





SECTION AA

NOTES:-
1. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
2. 4x150 (HV) ID HEAVY DUTY DUCT (CN56).
3. LAND AREA TO BE INCREASED IF SCREENING IS REQUIRED. SEE SHEET 6 FOR DETAILS.
4. LAND AREA SHOWN IS INDICATIVE. FINAL LAND AREA REQUIRED IS DEPENDENT ON CUSTOMER'S EQUIPMENT SIZE AND ORIENTATION.

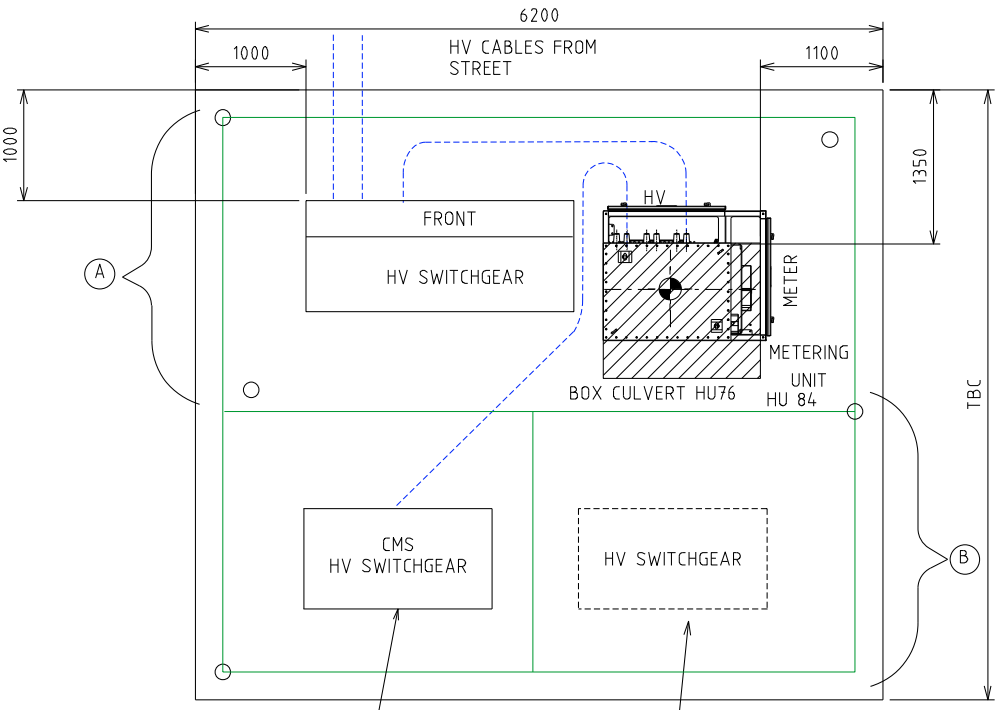
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

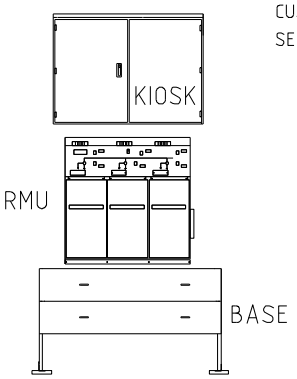
TITLE: CUSTOMER OWNED SUBSTATION HV OUT DOOR GROUND MOUNTED SWGR DUCTS & LAND REQUIREMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

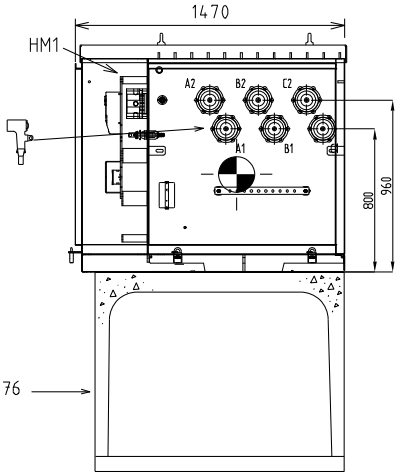
westernpower

DRAWN: KT	DATE: 07-04-2022	DRG. No. DSPM-3-23
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 2





HV SIDE DOOR REMOVED



ELBOW CONNECTIONS (SUPPLIED WITH METERING UNIT CU)

BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416 x 1022 x 1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg

RMU MATERIALS (QTY)

CU	
HU5	
HU9	
DA6	
DA10	

METERING UNIT MATERIALS (QTY)

METER	MOBILE
HM1	

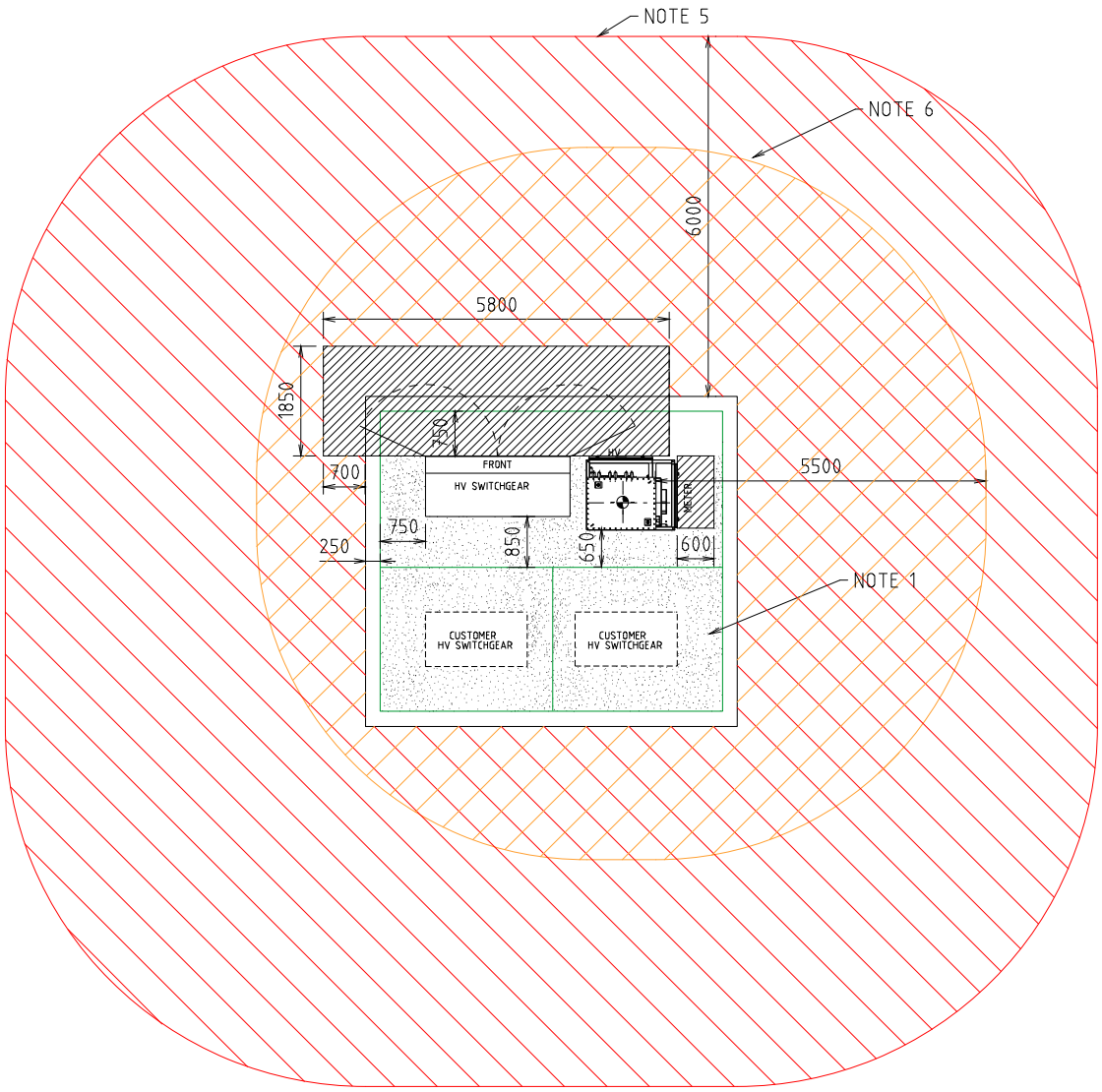
METERING UNIT	11KV	22KV
HU 84		
HU 76		

NOTES:-
1. THIS INSTALLATION IS ONLY SUITABLE FOR LOADS UP TO AND INCLUDING 4 MVA
2. SECTION A EARTHING IS TO BE INSTALLED BY WESTERN POWER, SECTION B EARTHING TO BE INSTALLED BY CUSTOMER AND CONNECTED TO WESTERN POWER'S EARTH GRID
3. IF WESTERN POWER'S AND THE CUSTOMER'S HV EQUIPMENT IS BEING INSTALLED SIMULTANEOUSLY, THE CUSTOMER IS RESPONSIBLE FOR INSTALLING ALL OF THE EARTH GRID.
4. CUSTOMERS MAIN SWITCH TO HAVE INTEGRAL EARTH SWITCH THAT IS USED UNDER A CUSTOMER AND WESTERN POWER OPERATING AGREEMENT
5. CUSTOMER EQUIPMENT SHOWN IS INDICATIIVE ONLY. CUSTOMER'S EQUIPMENT SHOULD BE INSTALLED AS PER MANUFACTURER'S AND CONSULTING ENGINEER'S INSTRUCTIONS.
6. OIL IS TO BE CONTAINED WITHIN THE SITE.
7. REFER TO DSPM CHAPTER 4 FOR AUTOMATION REQUIREMENTS.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	X	02.05.23	KT	GC	PC

TITLE
CUSTOMER SUBSTATION
HV OUTDOOR GROUND MOUNTED SWGR
EQUIPMENT & INSTALLATION DETAILS

DISTRIBUTION SUBSTATION PLANT MANUAL
westernpower
DRAWN: KT | DATE: 11-04-2022 | DRG. No. DSPM-3-23
ORIGINATED: KT | SCALE: NTS
CHECKED: GC
APPROVED: PHIL CAPPER | REV. A | SHT. 3



NOTES:-

1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO TRANSFORMER AND TRANSFORMER. USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION DESIGN DRAWING.
5. FIRE RISK ZONE IS TO BE SHOWN FROM THE EDGE OF THE SUBSTATION SITE. OIL CONTAINMENT TO BE USED TO KEEP THE OIL WITHIN THE SITE. FIRE RISK ZONE MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER DSPM CHAPTER 5.
6. NOISE IMPACT ZONE IS BASED ON GROUND MOUNTED METERING UNIT AND IS MEASURED FROM THE EDGE OF THE TANK. NOISE IMPACT ZONE MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER TO "NOISE COMPLIANCE REQUIREMENTS FOR DISTRIBUTION TRANSFORMERS" GUIDELINE.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
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TITLE: CUSTOMER OWNED SUBSTATION HV OUTDOOR GROUND MOUNTED SWGR OPERATIONAL CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 11-04-2022	DRG. No. DSPM-3-23
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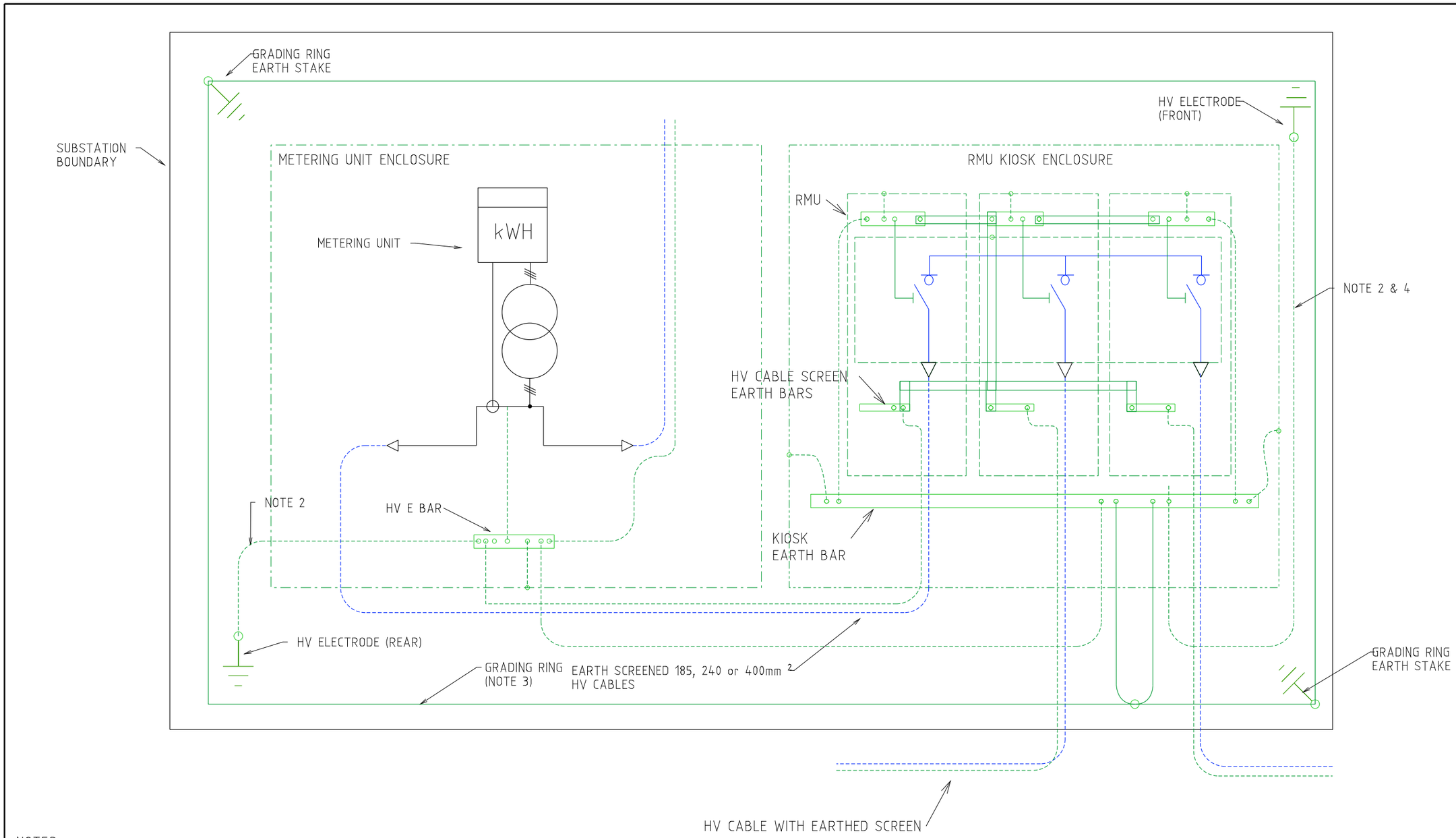
APPROVED: PHIL CAPPER		REV. A / SHT. 4



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS.
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.
4. LOOP EARTH CABLES TO EARTH RODS INSIDE KIOSK FOR EASE OF TESTING.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
A	02.05.23	ORIGINAL ISSUE	GC	GC	PC

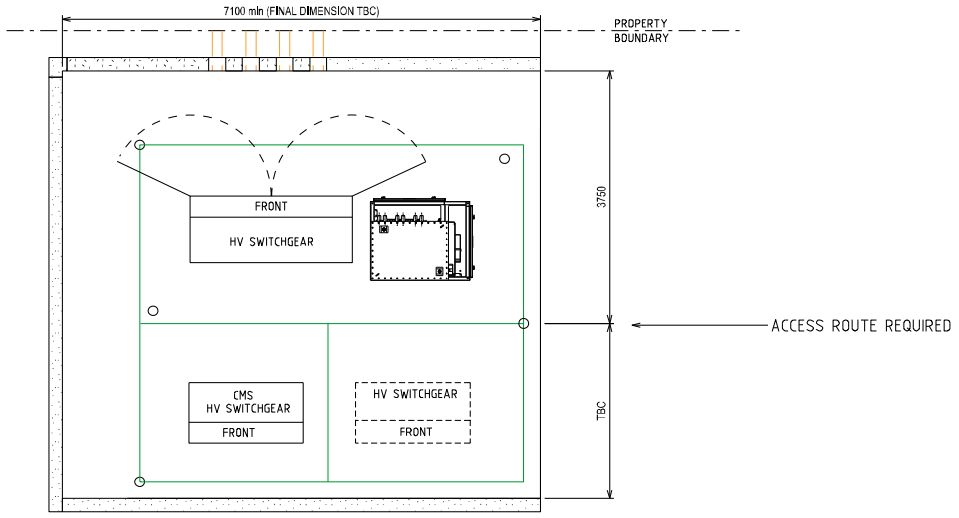
TITLE

CUSTOMER SUBSTATION
HV OUTDOOR GROUND MOUNTED SWGR
EARTHING ARRANGEMENT

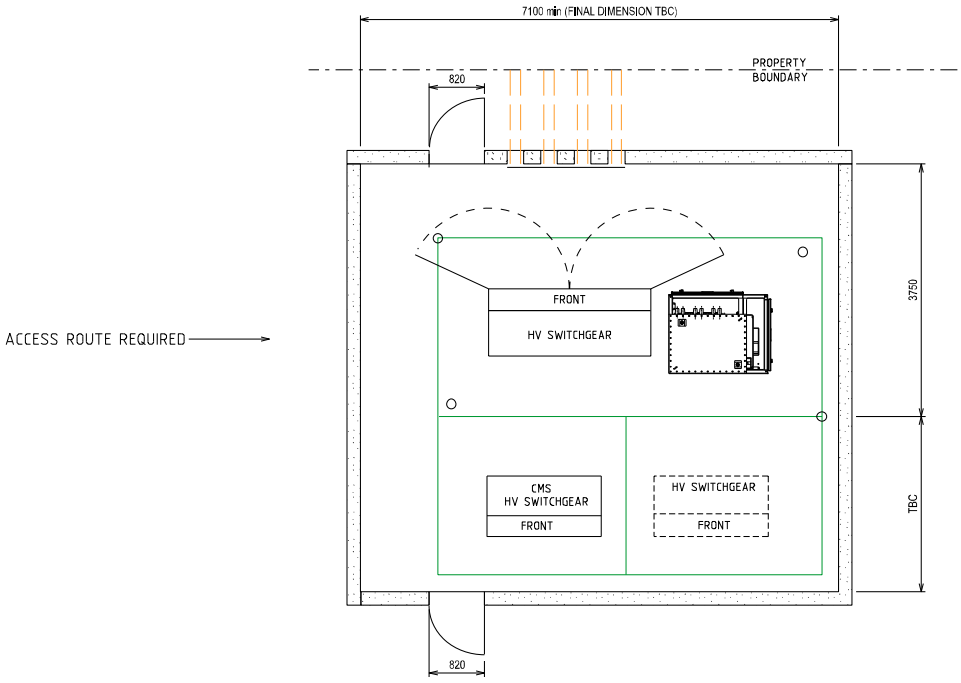
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 06-04-2022	DRG. No. DSPM-3-23
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER	REV. A	SHT. 5



PARTIAL SCREENING



FULL SCREENING

NOTES:-

1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTO SUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE.
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING (MASONARY, ETC.)
6. 2HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER DSPM CHAPTER 5 (FIRE RISK)
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8m (HEIGHT OF TRANSFORMER + 300mm).
8. VEHICLE ACCESS. CLEARANCES MUST BE MAINTAINED. AREA TO BE KEPT CLEAR TO ENSURE ACCESS. SITE SPECIFIC REQUIREMENTS TO BE DETERMINED BY THE DESIGNER.
9. LAND REQUIREMENTS SHOWN ONLY FOR WESTERN POWER EQUIPMENT. THE FINAL DIMENSION OF THE LAND IS DEPENDENT ON CUSTOMER EQUIPMENT. THIS IS TO BE DETERMINED BY THE DESIGNER.
10. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: CUSTOMER OWNED SUBSTATION HV OUTDOOR GROUND MOUNTED SWGR PERMISSABLE SCREENING ARRANGEMENTS

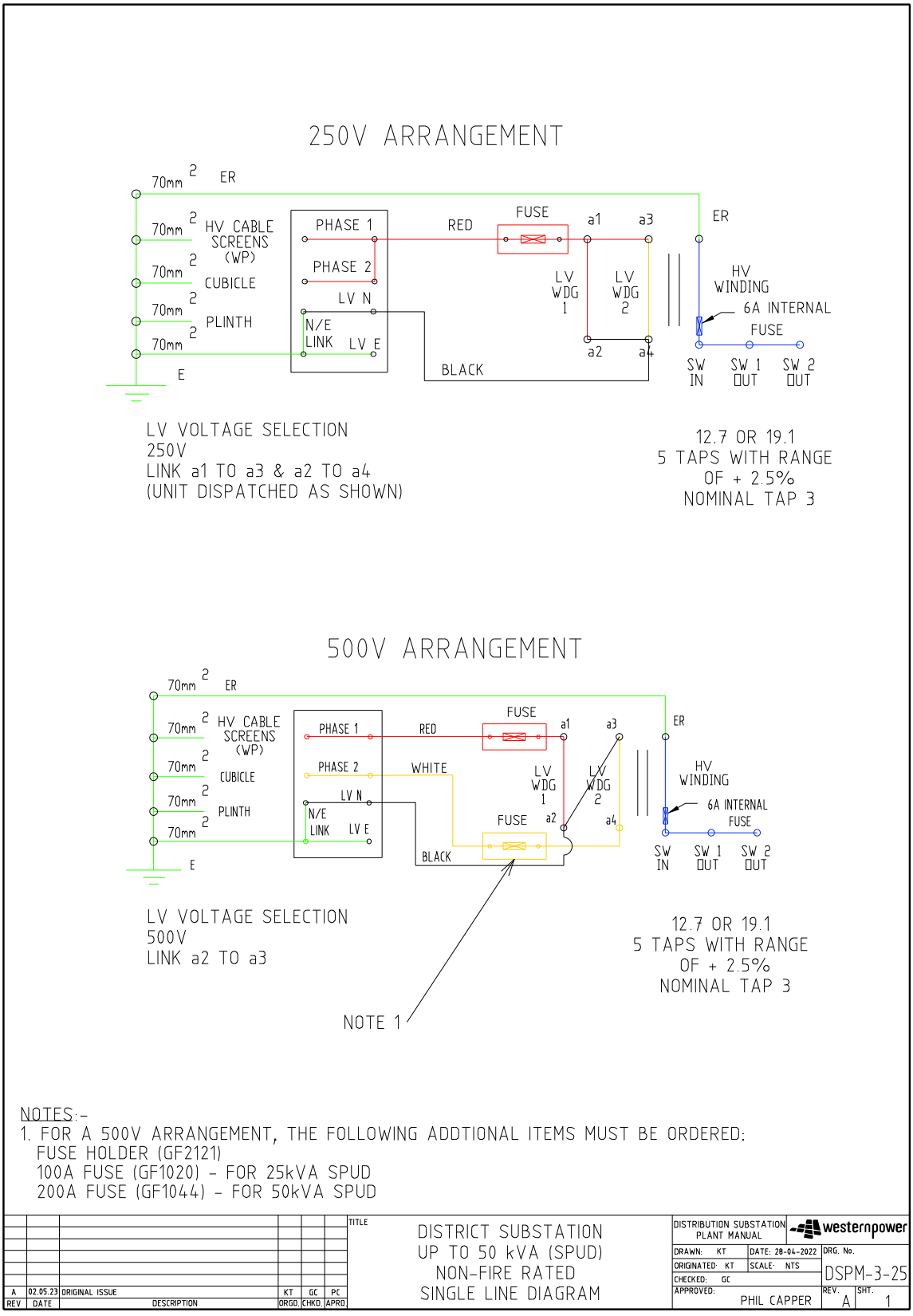
DISTRIBUTION SUBSTATION MANUAL

westernpower

DRAWN: KT	DATE: 11-04-2022	DRG. No. DSPM-3-23
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 6

4.7 Single Phase & Three Phase Ground Mounted Rural Substations (SPUDS & THUDS)

4.7.1 DSPM-3-25 Up to 50kVA



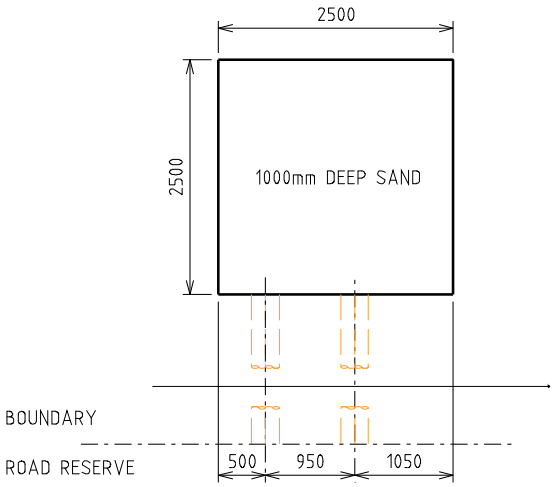
NOTES:-
1. FOR A 500V ARRANGEMENT, THE FOLLOWING ADDTIONAL ITEMS MUST BE ORDERED:
   FUSE HOLDER (GF2121)
   100A FUSE (GF1020) - FOR 25kVA SPUD
   200A FUSE (GF1044) - FOR 50kVA SPUD

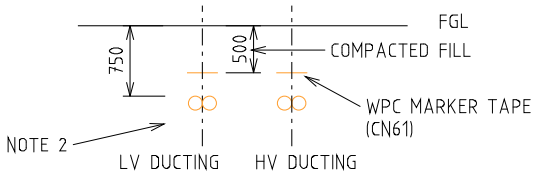
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: DISTRICT SUBSTATION UP TO 50 kVA (SPUD) NON-FIRE RATED SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL — westernpower

DRAWN: KT	DATE: 28-04-2022	DRG. No. DSPM-3-25
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A SHT. 1





SECTION AA

NOTES:-
1. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
2. 2x100 (LV) & 2x150 (HV) ID HEAVY DUTY DUCT (CN56).

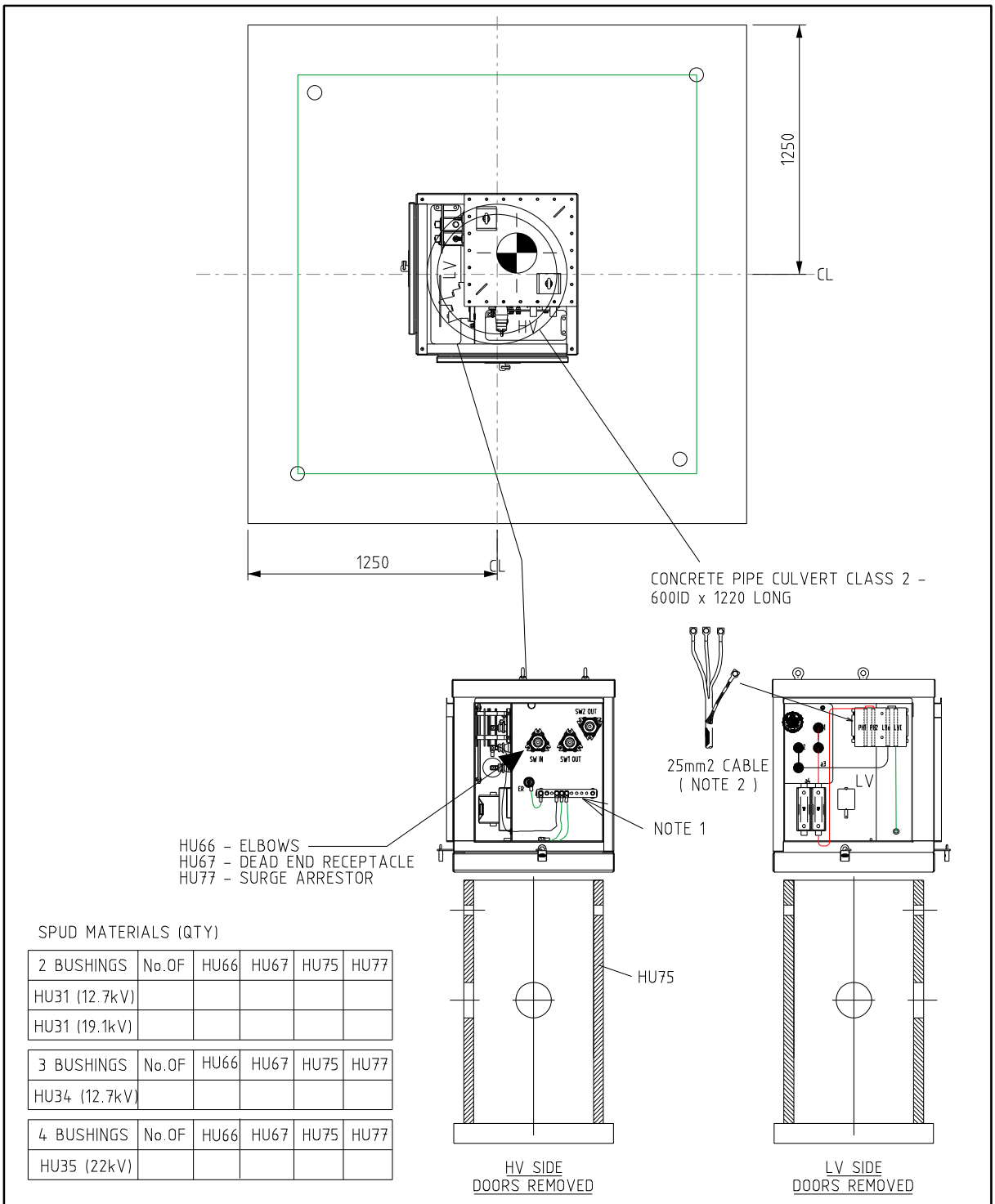
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: DISTRICT SUBSTATION UP TO 50kVA (SPUD) NON FIRE RATED DUCTS & LAND REQUIREMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 28-04-2022	DRG. No. DSPM-3-25
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 2



SPUD MATERIALS (QTY)

2 BUSHINGS	No.OF	HU66	HU67	HU75	HU77
HU31 (12.7kV)					
HU31 (19.1kV)					

3 BUSHINGS	No.OF	HU66	HU67	HU75	HU77
HU34 (12.7kV)					

4 BUSHINGS	No.OF	HU66	HU67	HU75	HU77
HU35 (22kV)					

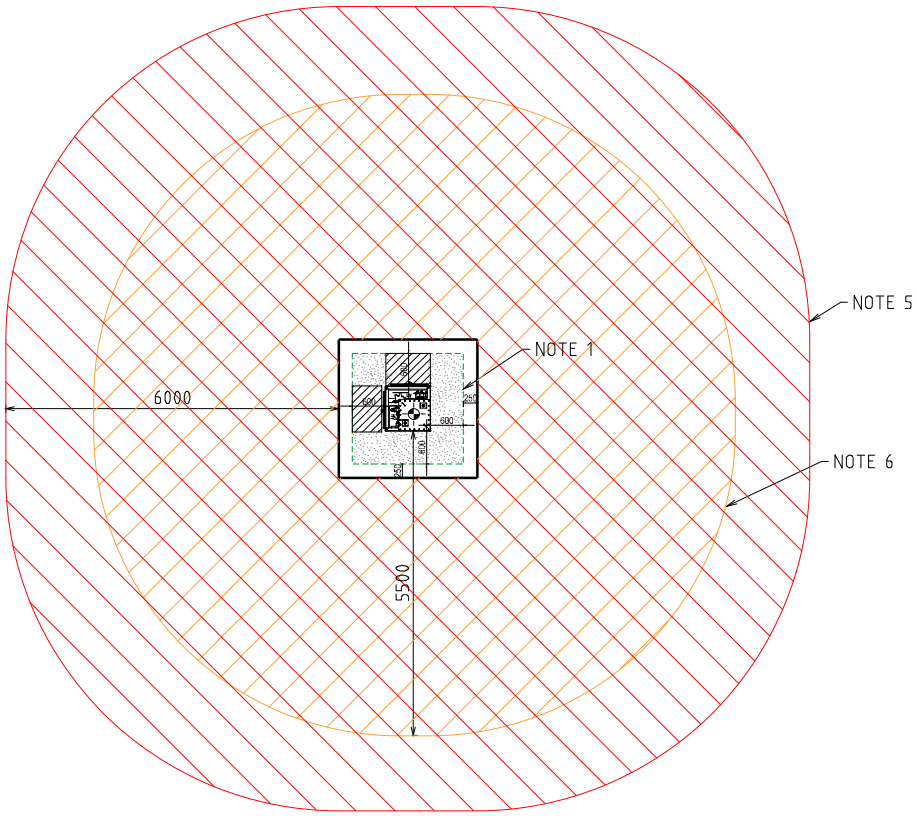
NOTES:-
1. SEE DDC FOR EARTHING MATERIALS
2. ORDER 3 x FL1448 & 1 x FL1442 LUGS FOR EVERY 25mm² TERMINATION
3. REFER TO DSPM CHAPTER 4 FOR INSTALLATION REQUIREMENTS
4. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	02.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE
DISTRICT SUBSTATION
UP TO 50kVA (SPUD)
NON FIRE RATED
EQUIPMENT SELECTION & SITE LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL
westernpower

DRAWN: KT	DATE: 28-04-2022	DRG. No. DSPM-3-25
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 3



FIRE RISK ZONE

EARTHING (STEP AND TOUCH)

TRANSFORMER NOISE IMPACT ZONE

OPERATIONAL

NOTES:-
1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO TRANSFORMER.
   USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION DESIGN DRAWING.
5. FIRE RISK ZONE IS TO BE SHOWN FROM THE EDGE OF THE SUBSTATION SITE.
   OIL CONTAINMENT TO BE USED TO KEEP THE OIL WITHIN THE SITE. FIRE RISK ZONE
   MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER DSPM CHAPTER 5.
6. NOISE IMPACT ZONE IS BASED ON 50 kVA TRANSFORMER AND IS MEASURED FROM THE EDGE
   OF THE TRANSFORMER TANK. NOISE IMPACT ZONE MAY BE REDUCED IF MITIGATION OPTIONS
   ARE USED. REFER TO "NOISE COMPLIANCE REQUIREMENTS FOR DISTRIBUTION TRANSFORMERS" GUIDELINE.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

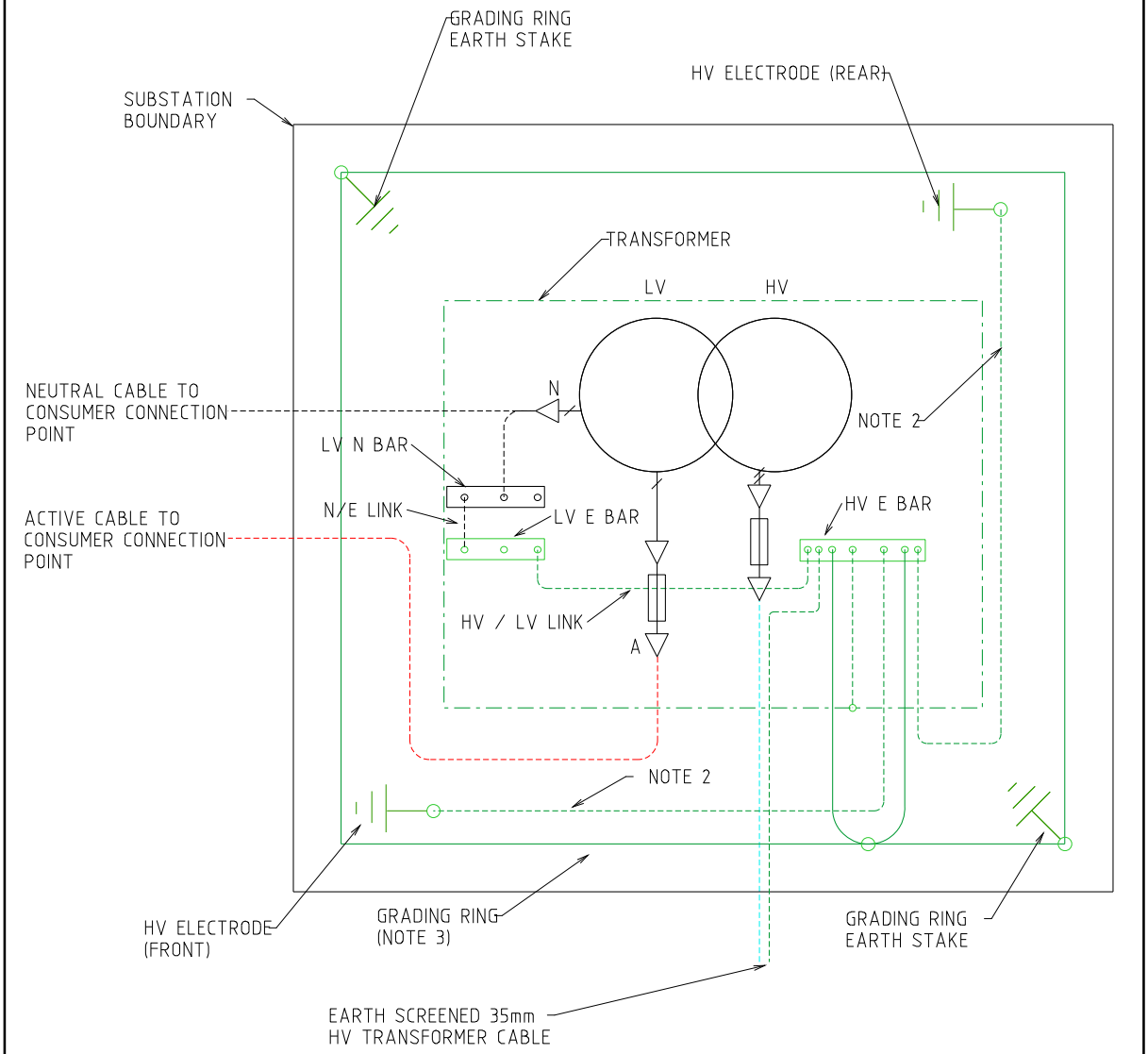
TITLE

DISTRICT SUBSTATION UP TO 50kVA (SPUD) NON FIRE RATED OPERATIONAL CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 28-04-2022	DRG. No. DSPM-3-25
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 4



NOTES:-

1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

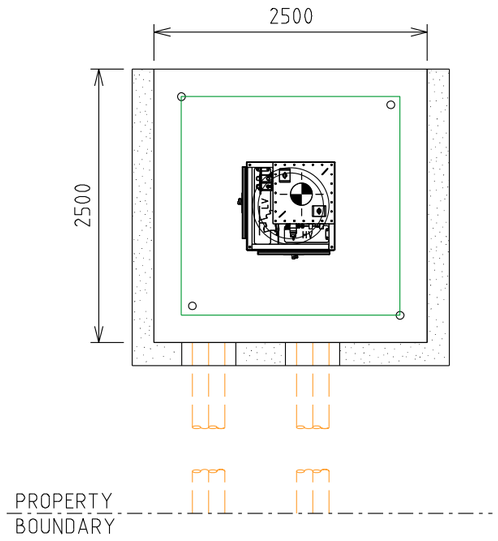
TITLE

DISTRICT SUBSTATION UP TO 50 kVA (SPUD) NON-FIRE RATED EARTHING ARRANGEMENT

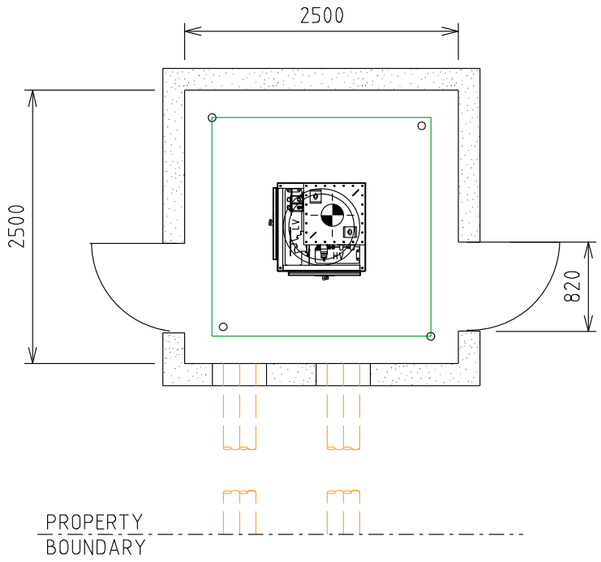
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

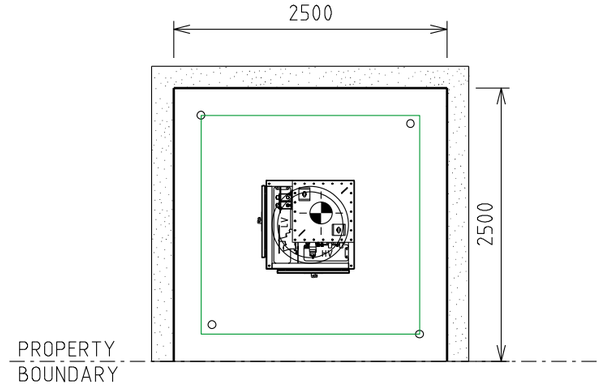
DRAWN: KT	DATE: 28-04-2022	DRG. No. DSPM-3-25
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 5



PARTIAL (FRONT) SCREENING



FULL SCREENING



PARTIAL (REAR) SCREENING

NOTES:-

1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTO SUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE.
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING (MASONARY, ETC.)
6. 2HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER DSPM CHAPTER 5 (FIRE RISK)
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8m (HEIGHT OF TRANSFORMER + 300mm).
8. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

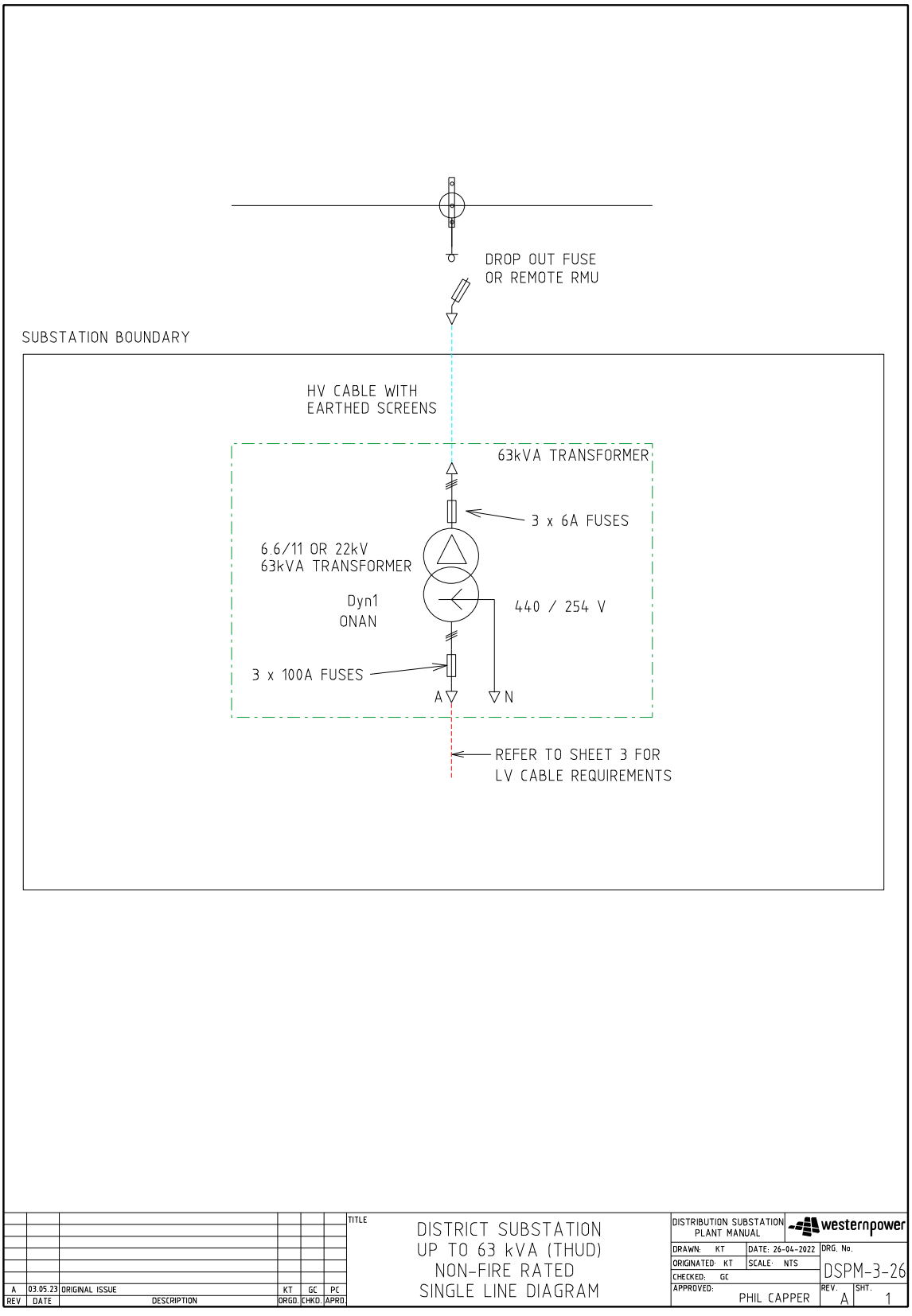
DISTRICT SUBSTATION UP TO 50 kVA (SPUD) NON-FIRE RATED SCREENING ARRANGEMENTS

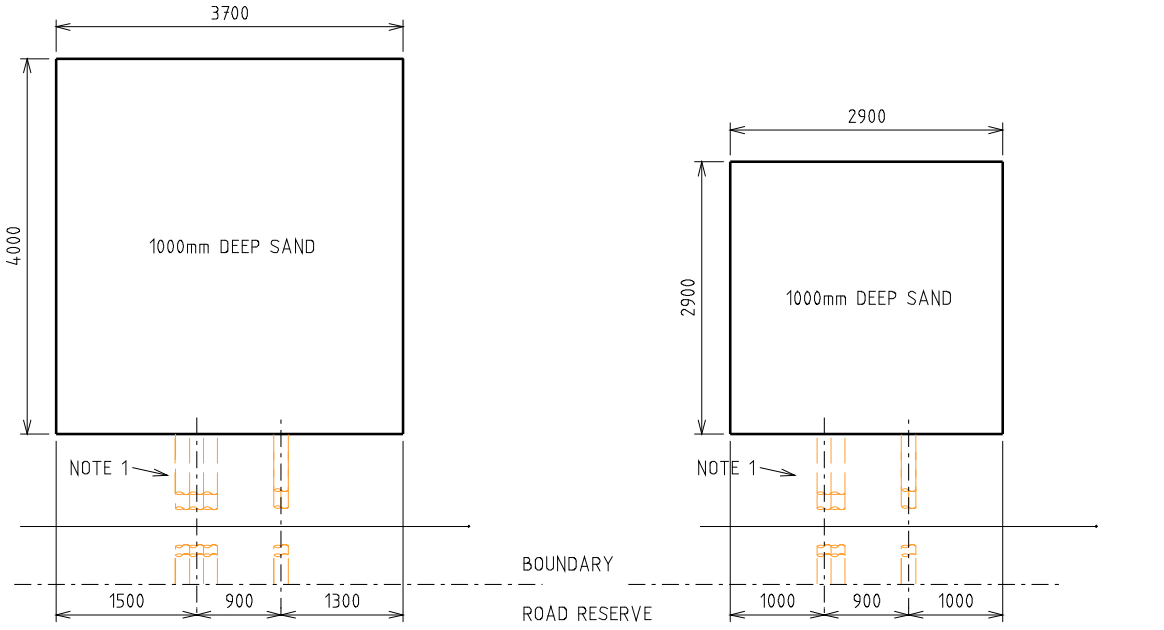
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 28-04-2022	DRG. No. DSPM-3-25
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER	REV. A	SHT. 6

4.7.2 DSPM-3-26 Up to 63kVA





SECTION AA

SECTION BB

LAND FOR FUTURE CONVERSION TO MPS

LAND FOR 63kVA ONLY

NOTES:-
1. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
2. 6x100 (LV) & 2x150 (HV) ID HEAVY DUTY DUCT (CN56).
3. 4x100 (LV) & 2x150 (HV) ID HEAVY DUTY DUCT (CN56).
4. LAND AREA TO BE INCREASED IF SCREENING IS REQUIRED (SEE SHEET 6)

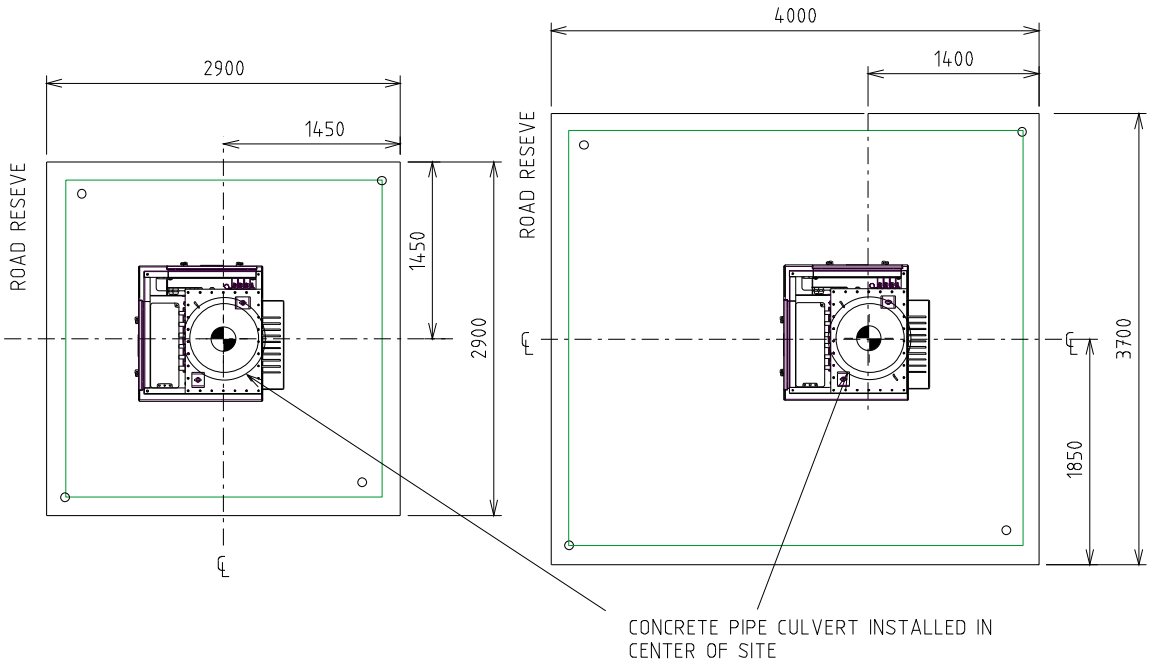
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

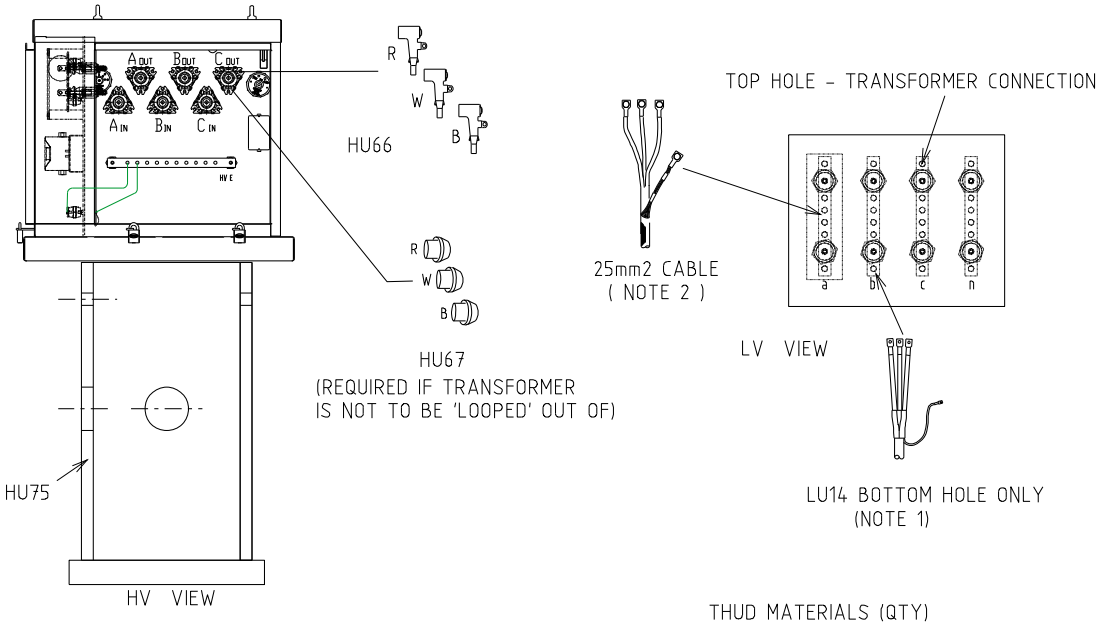
TITLE: DISTRICT SUBSTATION UP TO 63kVA (THUD) NON FIRE RATED DUCTS & LAND REQUIREMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 26-04-2022	DRG. No. DSPM-3-26
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 2





THUD MATERIALS (QTY)

CU	6/11kV	22kV
HU82_63		
HU66		
HU67		
HU75		
LU14_120		

NOTES:-

1. MAXIMUM OF 2 x LU 14 (BACK TO BACK) CAN BE CONNECTED TO LV DISTRIBUTION BARS OF THE TRANSFORMER
   MAXIMUM ALLOWABLE LV FEEDER CABLE SIZE IS 120mm² FOR A BACK TO BACK ARRANGEMENT.
   MAXIMUM ALLOWABLE LV FEEDER CABLE SIZE IS 240mm² FOR A SINGLE CABLE ARRANGEMENT.
2. MAXIMUM OF 4 x 25mm² PLUS LU 14 CAN BE CONNECTED TO LV DISTRIBUTION BARS OF THE TRANSFORMER. ORDER 3 x FL1448 & 1 x FL1442 LUGS FOR EVERY 25mm² TERMINATION.
3. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

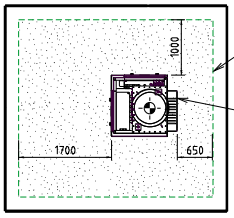
TITLE

DISTRICT SUBSTATION
63kVA (THUD)
NON FIRE RATED
EQUIPMENT SELECTION AND LAYOUT

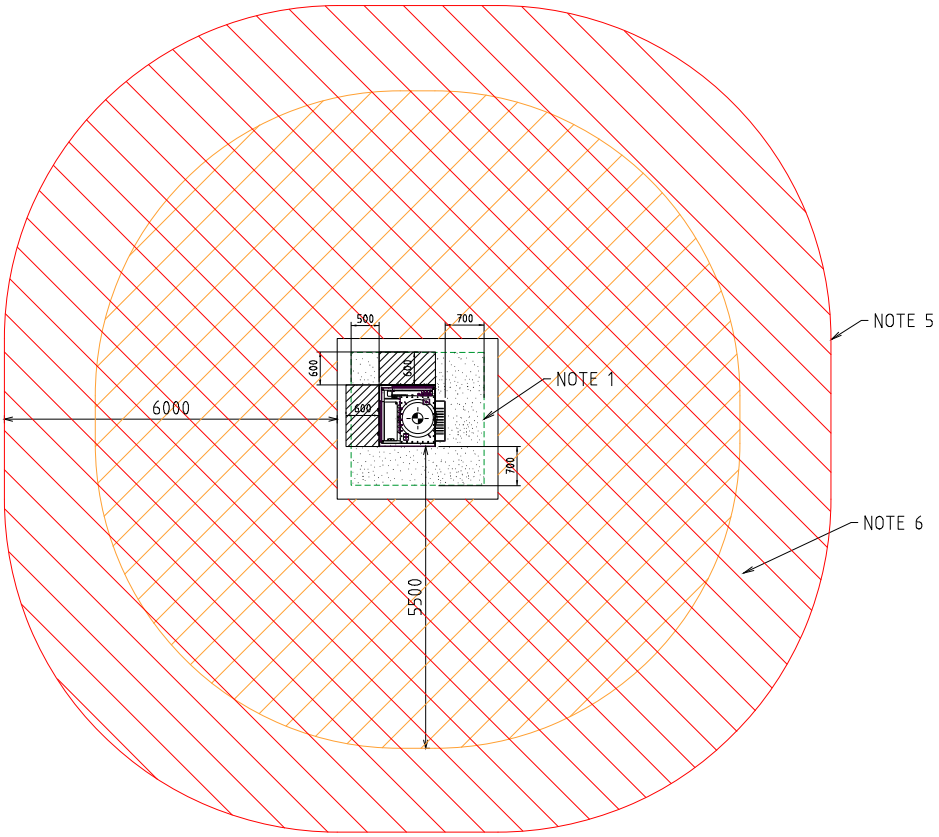
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 26-04-2022	DRG. No. DSPM-3-26
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 3



LAND FOR FUTURE CONVERSION TO MPS



FIRE RISK ZONE

EARTHING (STEP AND TOUCH)

TRANSFORMER NOISE IMPACT ZONE

OPERATIONAL

NOTES:-
1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO TRANSFORMER.
   USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION DESIGN DRAWING.
5. FIRE RISK ZONE IS TO BE SHOWN FROM THE EDGE OF THE SUBSTATION SITE.
   OIL CONTAINMENT TO BE USED TO KEEP THE OIL WITHIN THE SITE. FIRE RISK ZONE
   MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER DSPM CHAPTER 5.
6. NOISE IMPACT ZONE IS BASED ON 63 kVA TRANSFORMER.
7. REFER TO DSPM 3-01 FOR CLEARANCE REQUIREMENTS.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

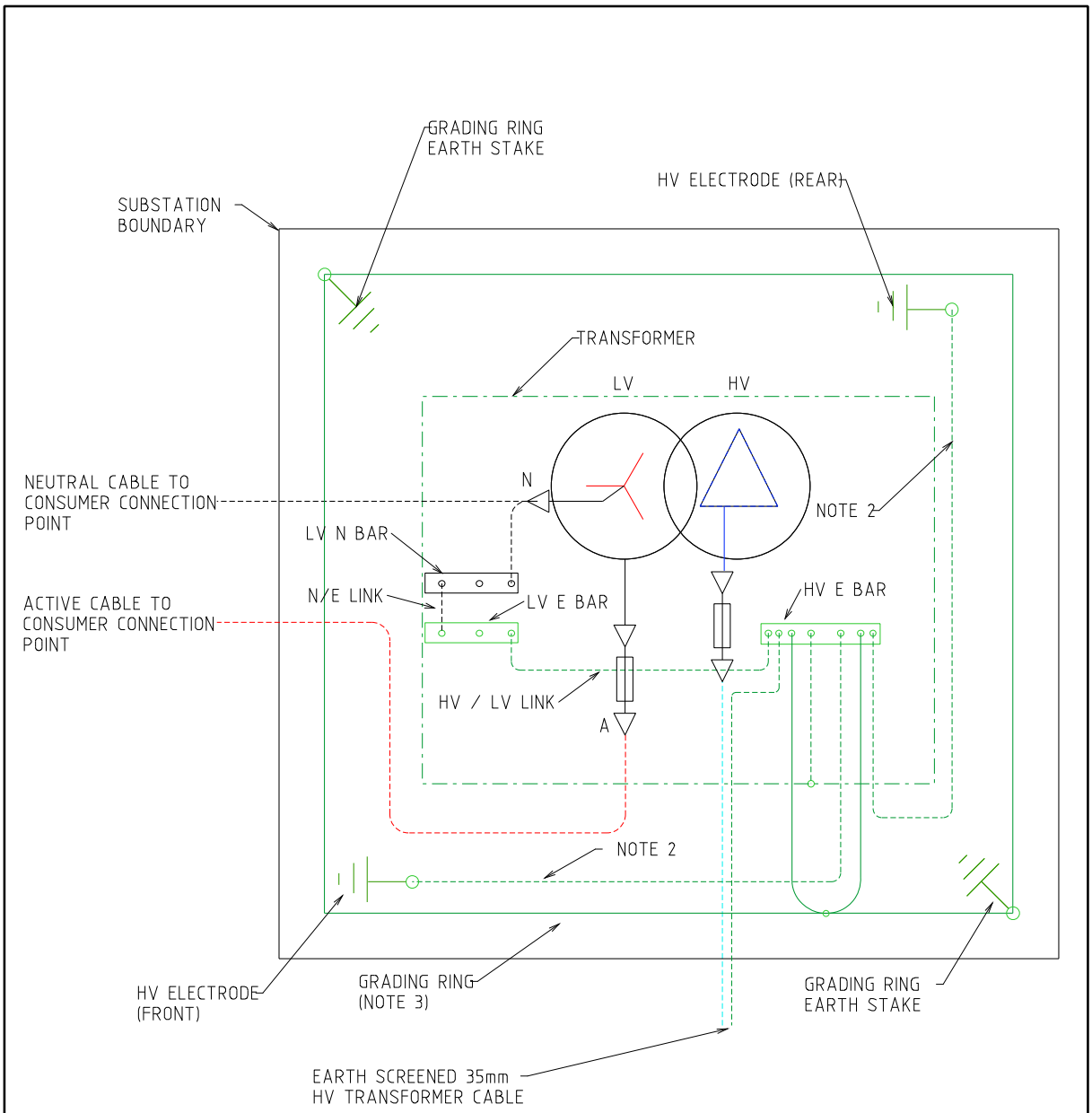
TITLE

DISTRICT SUBSTATION UP TO 63kVA (THUD) NON FIRE RATED OPERATIONAL CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 26-04-2022	DRG. No. DSPM-3-26
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 4



NOTES:-

1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAS/FLAME TRAP, IN SOIL.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

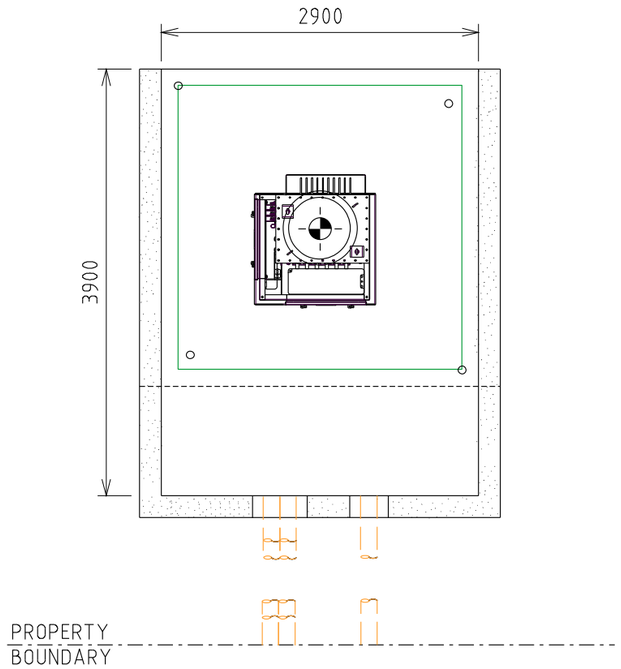
TITLE

DISTRICT SUBSTATION UP TO 63 kVA (THUD) NON-FIRE RATED EARTHING ARRANGEMENT

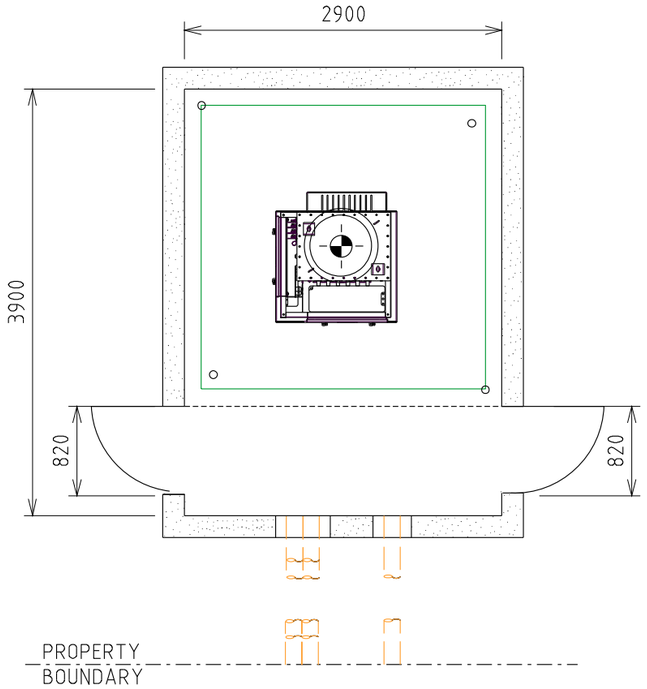
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

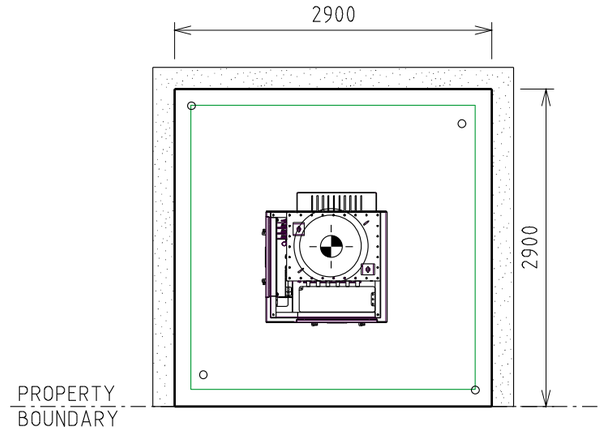
DRAWN: KT	DATE: 26-04-2022	DRG. No. DSPM-3-26
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 5



PARTIAL (FRONT) SCREENING



FULL SCREENING



PARTIAL (REAR) SCREENING

NOTES:-

1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTO SUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE.
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING (MASONARY, ETC.)
6. 2HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER DSPM CHAPTER 5 (FIRE RISK)
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8m (HEIGHT OF TRANSFORMER + 300mm).
8. REFER TO DSPM 3-01 FOR SCREENING REQUIREMENTS FOR SITE WHICH WILL BE CONVERTED TO MPS IN THE FUTURE.
9. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

DISTRICT SUBSTATION UP TO 63 kVA (THUD) NON-FIRE RATED SCREENING ARRANGEMENTS

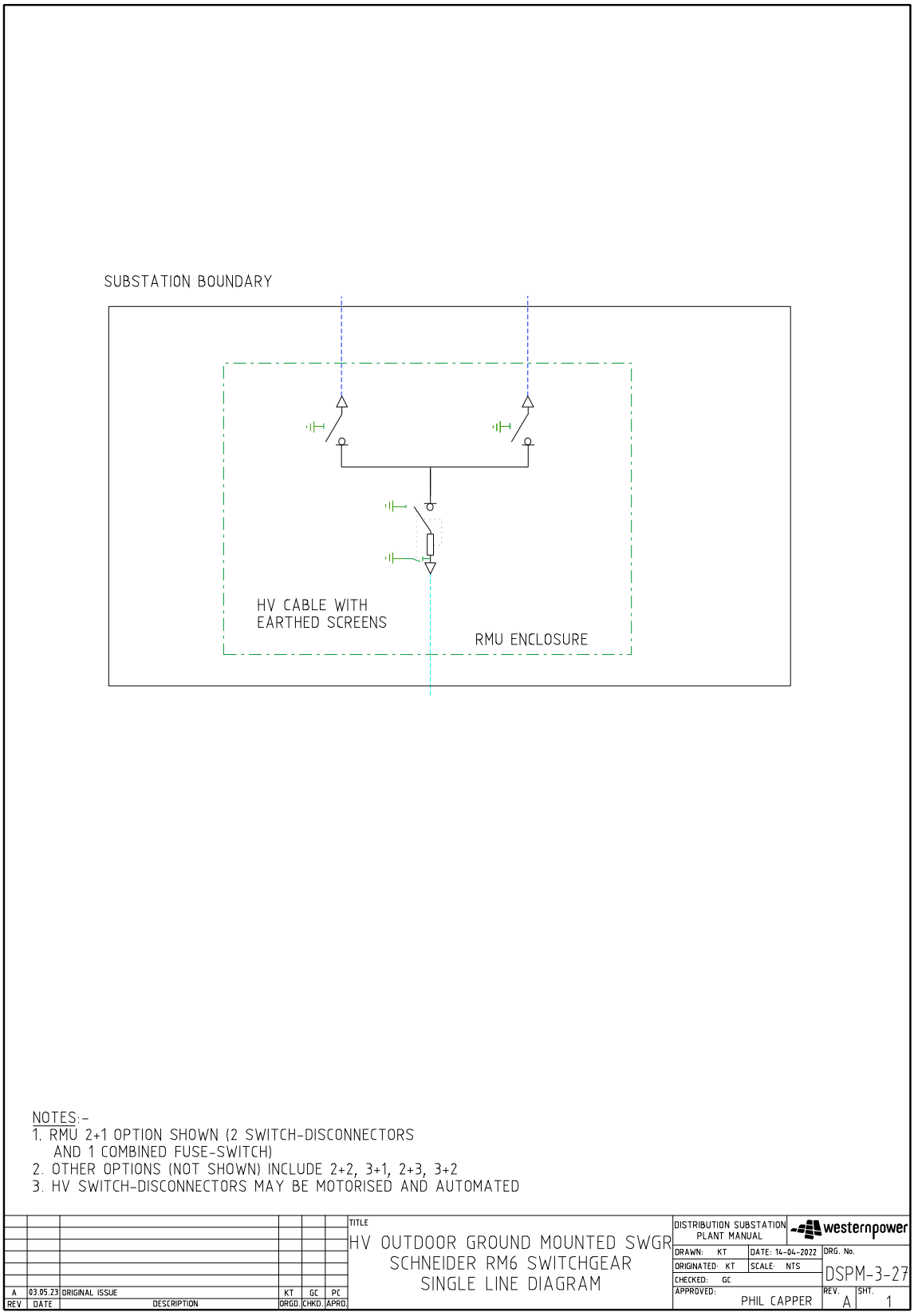
DISTRIBUTION SUBSTATION PLANT MANUAL

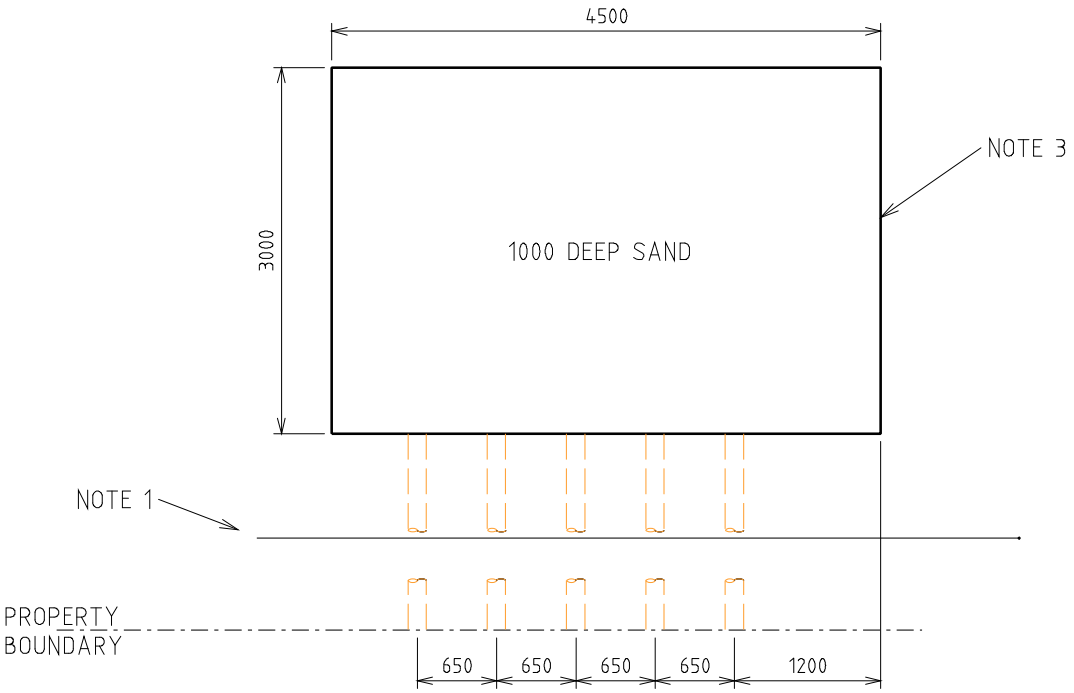
westernpower

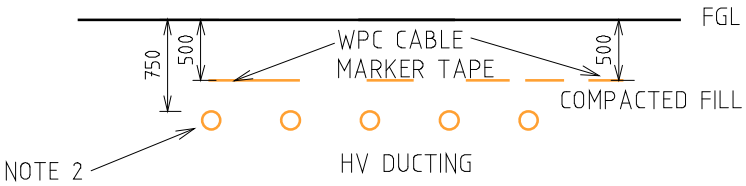
DRAWN: KT	DATE: 26-04-2022	DRG. No. DSPM-3-26
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER	REV. A	SHT. 6

4.8 Standalone HV Switchgear

4.8.1 DSPM-3-27 – Schneider RM6 Outdoor in a Kiosk







SECTION AA

NOTES:-
1. DUCTING REQUIRED IF LAND IS SET BACK FROM THE ROAD RESERVE BOUNDARY OR IF SCREENING IS REQUIRED.
2. 5x150 (HV) ID HEAVY DUTY DUCTS (CN56)
3. LAND AREA TO BE INCREASED IF SCREENING IS REQUIRED. SEE SHEET 6 FOR DETAILS

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

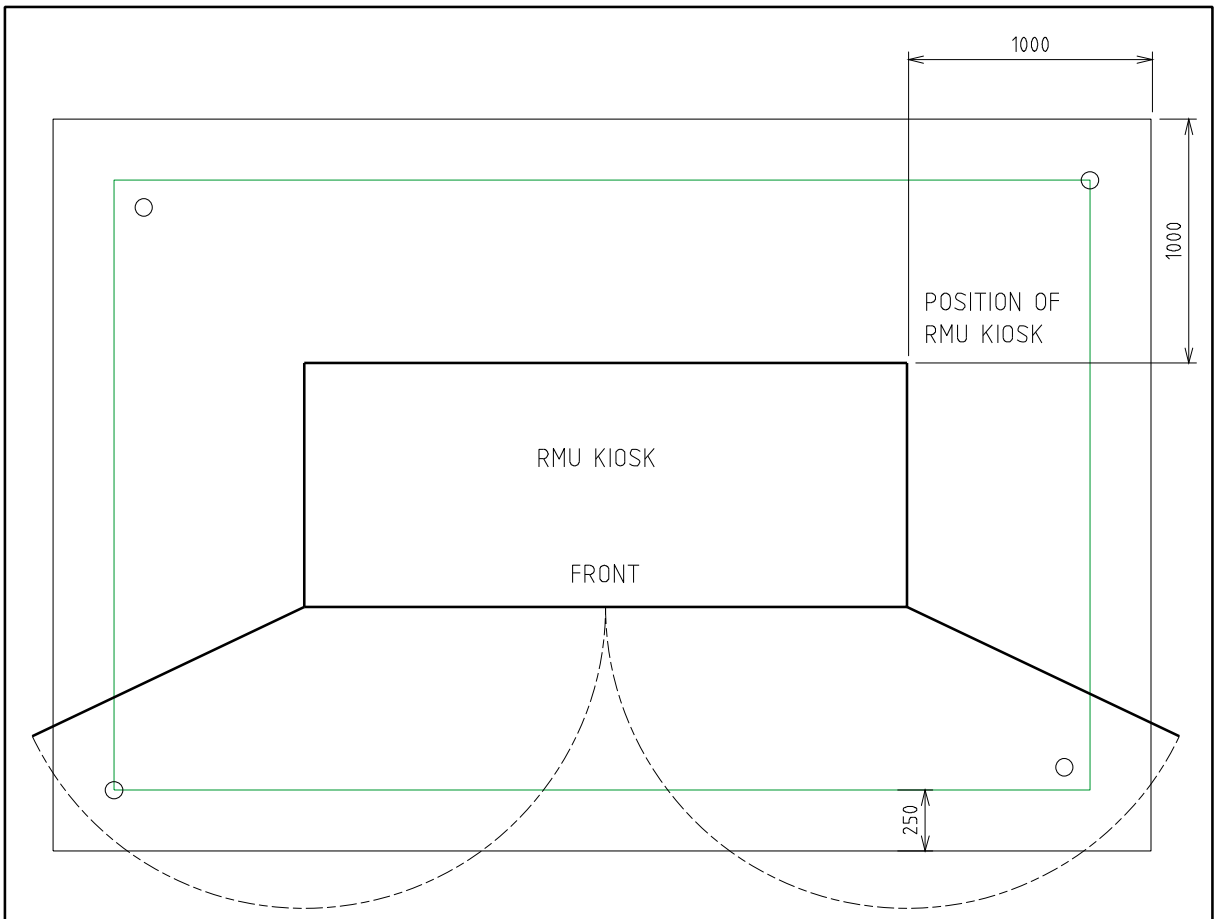
TITLE
HV OUTDOOR GROUND MOUNTED SWGR
SCHNEIDER RM6 SWITCHGEAR
LAND REQUIREMENTS & DUCTS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

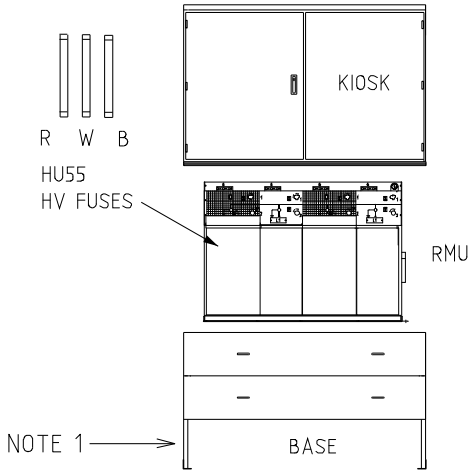
DRAWN: KT | DATE: 14-04-2022
ORIGINATED: KT | SCALE: NTS
CHECKED: GC
APPROVED: PHIL CAPPER

DRG. No. DSPM-3-27
REV. A
SHT. 2



RMU MATERIALS (QTY)

CU	6KV	11KV	22KV
HU55/315			
HU55/630			
HU55/1000			
HU5			
HU6			
HU7			
HU8			
HU9			
HU80			
HU81			
CN46			
DA6			
DA10			



NOTES:-
1. REFER TO DSPM CHAPTER 4 FOR THE CORRECT INSTALLATION OF THE RMU BASE.
2. MEASUREMENTS SHOWN ARE ± 50mm, SAME CONSTRUCTION TOLERANCE APPLIES.
3. RMU, KIOSK BASE AND CABLE TERMINATIONS SUPPLIED IN RMU CU.
4. REFER TO DSPM CHAPTER 4 FOR AUTOMATION REQUIREMENTS.

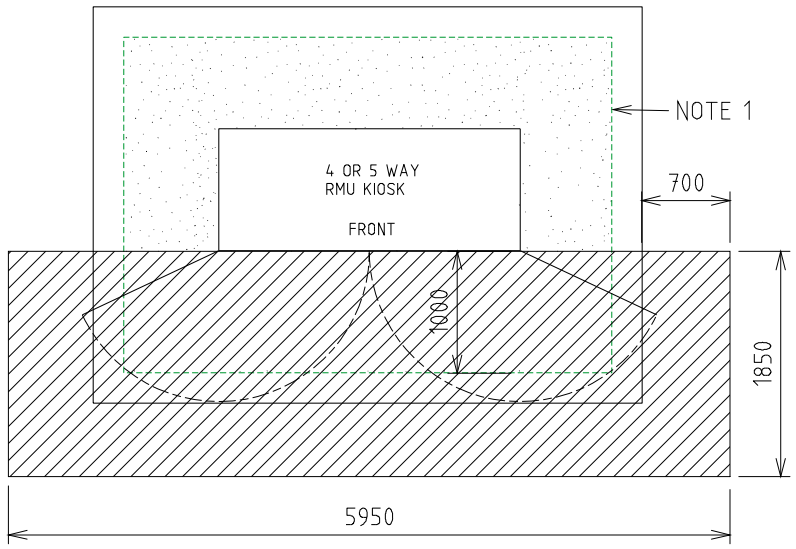
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE
HV OUTDOOR GROUND MOUNTED SWGR
SCHNEIDER RM6 SWITCHGEAR
EQUIPMENT SELECTION AND LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT | DATE: 14-04-2022 | DRG. No. DSPM-3-27
ORIGINATED: KT | SCALE: NTS
CHECKED: GC
APPROVED: PHIL CAPPER
REV. A | SHT. 3



EARTHING (STEP AND TOUCH)

OPERATIONAL

NOTES:-
1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO RMU.
   USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION
   DESIGN DRAWING.

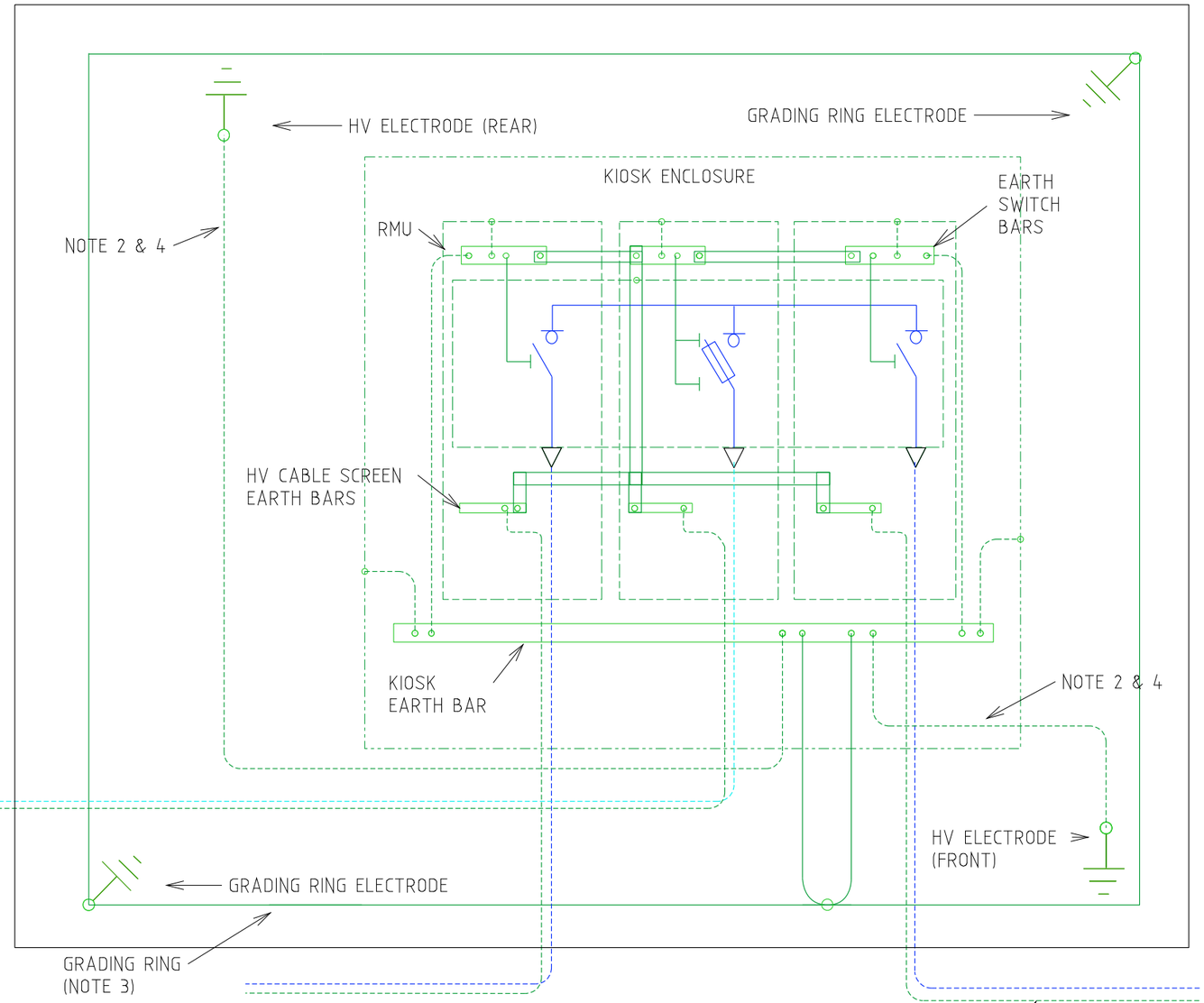
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: HV OUTDOOR GROUNG MOUNTED SCHNEIDER SWITCHGEAR CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 14-04-2022	DRG. No. DSPM-3-27
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER		REV. A / SHT. 4



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS.
2. CONNECT 70mm^2 PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAS/FLAME TRAP, IN SOIL.
4. LOOP EARTH CABLES TO EARTH RODS INSIDE KIOSK FOR EASE OF TESTING.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

HV OUTDOOR GROUND MOUNTED SCHNEIDER RM6 SWITCHGEAR EARTHING SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

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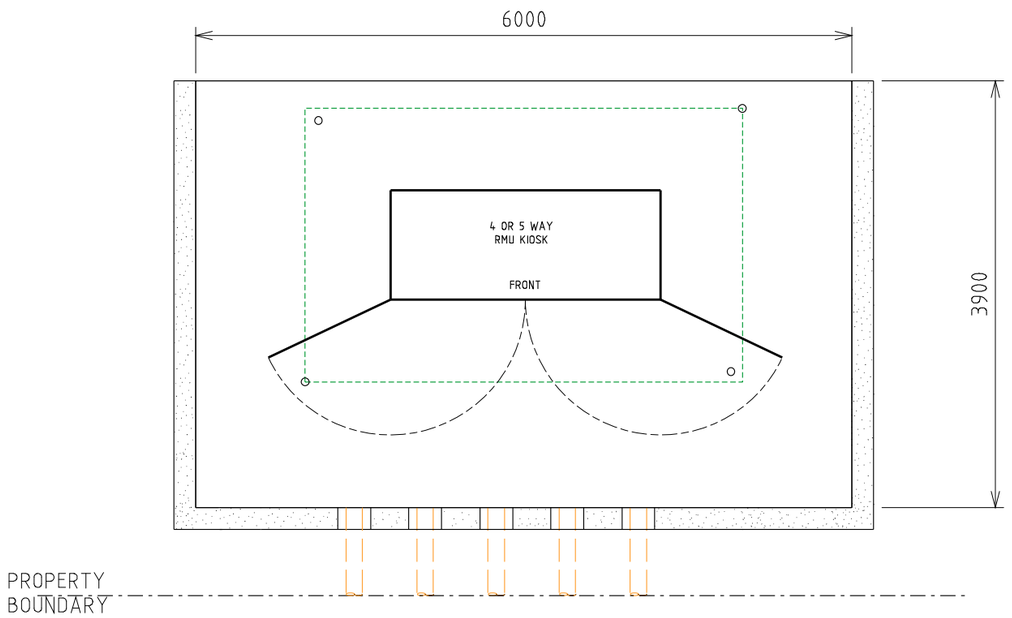
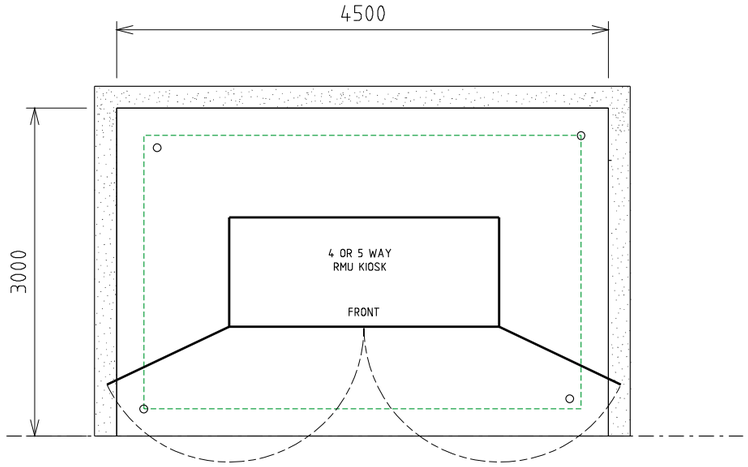
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER	REV. A	SHT. 5



PARTIAL SCREENING (FRONT)



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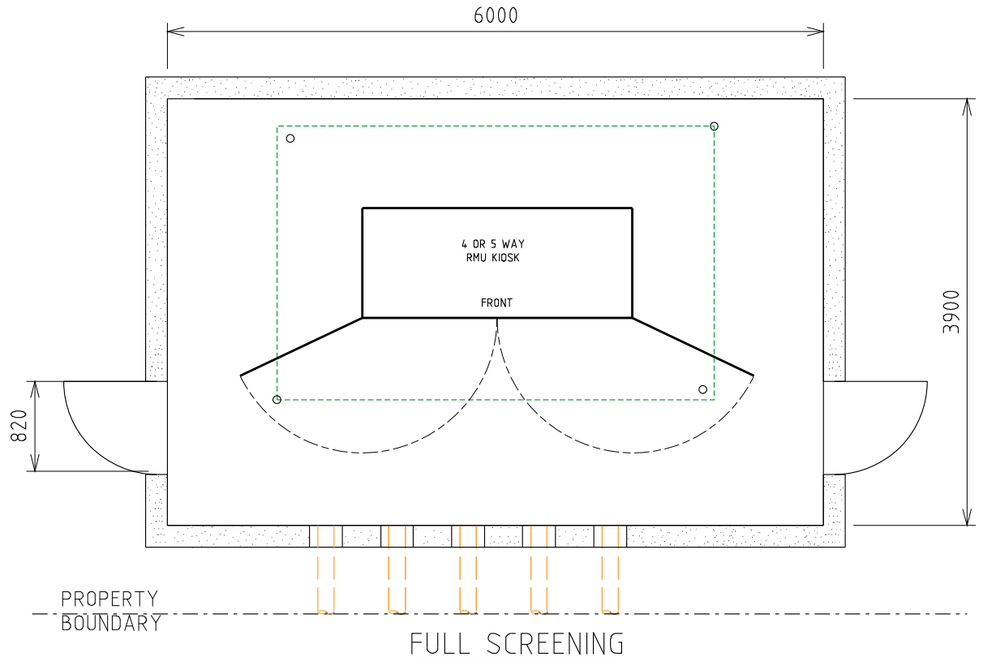


FULL SCREENING

NOTES:-
1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTO SUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING WITHIN FIRE RISK ZONE (MASONARY, ETC.)
6. 2 HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER TO DSPM CHAPTER 5 (FIRE RISK).
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8m (HEIGHT OF TRANSFORMER + 300mm).
8. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV.	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

HV OUTDOOR GROUND MOUNTED SWGR SCHNEIDER RM6 SWITCHGEAR PERMISSIBLE SCREENING ARRANGEMENTS

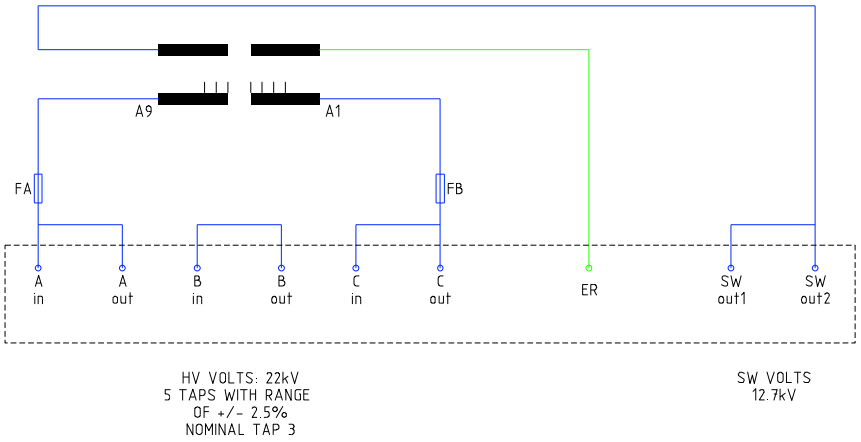
DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE: 14-04-2022	DRG. No. DSPM-3-27
ORIGINATED: KT	SCALE: NTS	
CHECKED: GC		
APPROVED: PHIL CAPPER	REV. A	SHT. 6

4.9 Isolating Transformer

4.9.1 DSPM-3-29 315kVA, 22kV / 12.7kV Single Phase Earth Wire Return Isolating Transformer



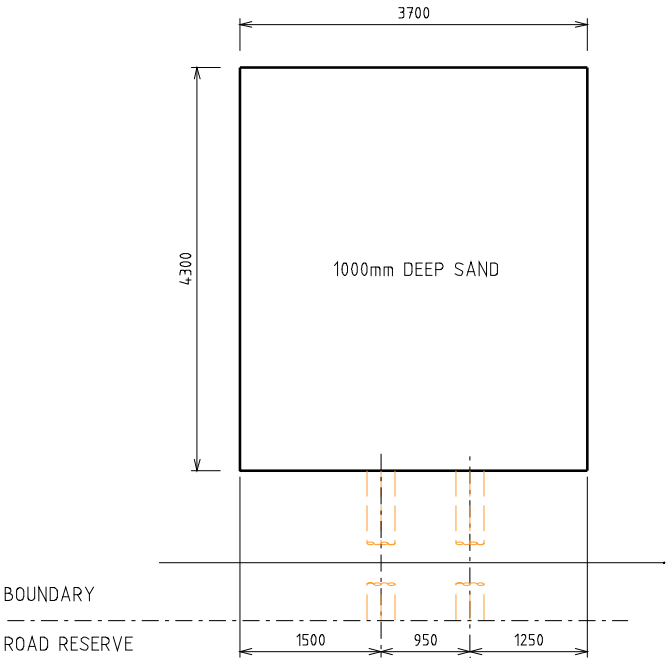
REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

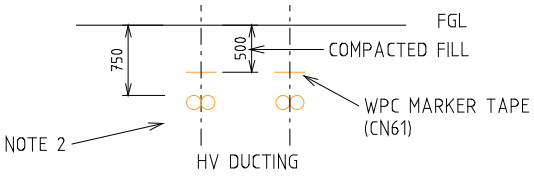
TITLE: 315kVA, 22kV / 12.7kV SINGLE WIRE EARTH WIRE RETURN (S.W.E.W.R.) ISOLATING TRANSFORMER SINGLE LINE DIAGRAM

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT | DATE: 28-04-2022 | DRG. No.
ORIGINATED: KT | SCALE: NTS | DSPM-3-29
CHECKED: GC
APPROVED: PHIL CAPPER | REV: A | SHT: 1





SECTION AA

NOTES:-
1. DUCTING REQUIRED IF LAND REQUIREMENT IS SET BACK FROM ROAD RESERVE BOUNDARY.
2. 4x150 (HV) ID HEAVY DUTY DUCT (CN56).

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: 315kVA, 22kV / 12.7kV SINGLE WIRE EARTH WIRE RETURN (S.W.E.W.R.) ISOLATING TRANSFORMER DUCTS & LAND REQUIREMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

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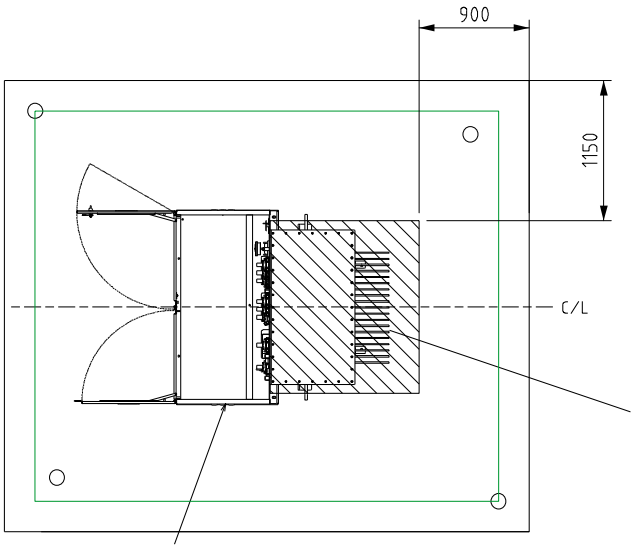
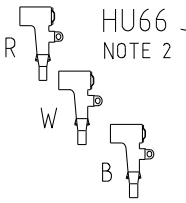
ORIGINATED: KT | SCALE: NTS
CHECKED: GC
APPROVED: PHIL CAPPER
REV. A | SHT. 2



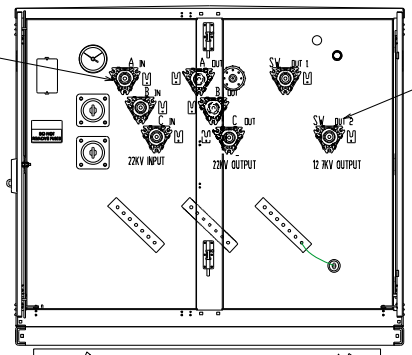
HU27/315
TRANSFORMER

BOX CULVERT - CROWN AND BASE TYPE
EXTERNAL SIZE = 1416 x 1022 x 1220 LONG
CROWN WEIGHT = 1038 kg
BASE WEIGHT = 384 kg

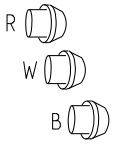
SEE DSPM-4-06
FOR INSTALLATION DETAILS



HU66
NOTE 2

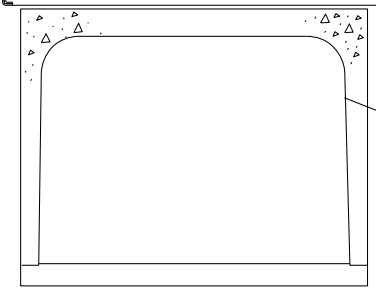


HU67
NOTE 1



ISOLATION TX MATERIALS (QTY)

CU	22KV
HU27_315	
HU66	
HU67	
HU76	



HU76

NOTES:-
1. DEAD END RECEPTACLES MUST BE USED TO INSULATE UNUSED TRANSFORMER HV BUSHINGS.
2. HV ELBOWS TO BE USED ON WHERE CABLES ARE TO BE CONNECTED TO ALL INCOMING OR OUTGOING BUSHINGS
3. REFER TO DDC FOR EARTHING LAYOUT
4. TRANSFORMER OIL IS TO BE CONTAINED WITHIN THE SITE

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
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TITLE: 315kVA, 22kV / 12.7kV SINGLE WIRE EARTH WIRE RETURN (S.W.E.W.R.) ISOLATING TRANSFORMER EQUIPMENT SELECTION & SITE LAYOUT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT | DATE: 29-04-2022 | DRG. No. DSPM-3-29
ORIGINATED: KT | SCALE: NTS
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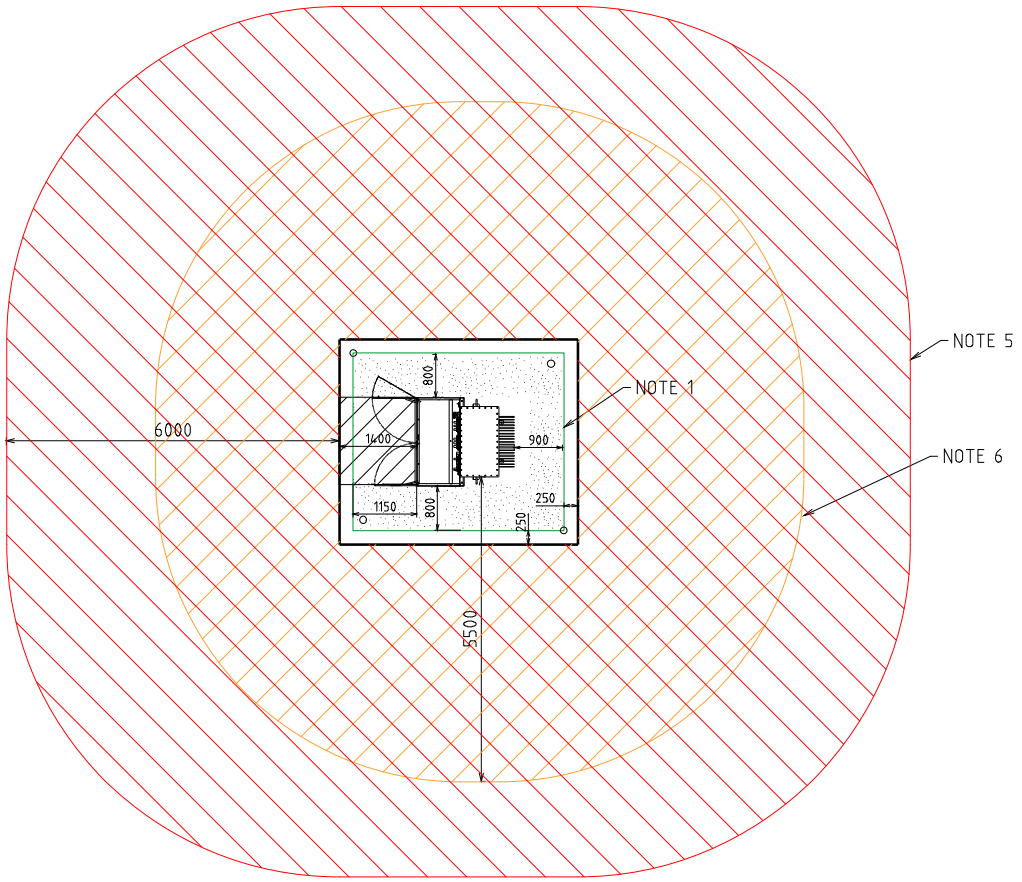
REV. A | SHT. 3



FIRE RISK ZONE

EARTHING (STEP AND TOUCH)

TRANSFORMER NOISE IMPACT ZONE

OPERATIONAL

NOTES:-

1. STEP AND TOUCH CLEARANCE FROM GRADING RING TO TRANSFORMER.
   USE EARTH RODS ON GRADING RING. SEE DDC HU CUs FOR EARTHING MATERIALS
2. SEE SHEET 5 FOR EARTHING SINGLE LINE DIAGRAM
3. USE THESE DIMENSIONS FOR EARTHING STUDY (WITH THE DOORS CLOSED).
4. DESIGNER TO SHOW ACCESS AND EGRESS ROUTES ON THE SUBSTATION DESIGN DRAWING.
5. FIRE RISK ZONE IS TO BE SHOWN FROM THE EDGE OF THE SUBSTATION SITE.
   OIL CONTAINMENT TO BE USED TO KEEP THE OIL WITHIN THE SITE. FIRE RISK ZONE
   MAY BE REDUCED IF MITIGATION OPTIONS ARE USED. REFER DSPM CHAPTER 5.
6. NOISE IMPACT ZONE IS BASED ON 315 kVA TRANSFORMER AND IS MEASURED FROM THE EDGE
   OF THE TRANSFORMER TANK. NOISE IMPACT ZONE MAY BE REDUCED IF MITIGATION OPTIONS
   ARE USED. REFER TO "NOISE COMPLIANCE REQUIREMENTS FOR DISTRIBUTION TRANSFORMERS" GUIDELINE.

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TITLE: 315kVA, 22kV / 12.7kV SINGLE WIRE EARTH WIRE RETURN (S.W.E.W.R.) ISOLATING TRANSFORMER OPERATIONAL CLEARANCES

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

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ORIGINATED: KT | SCALE: NTS

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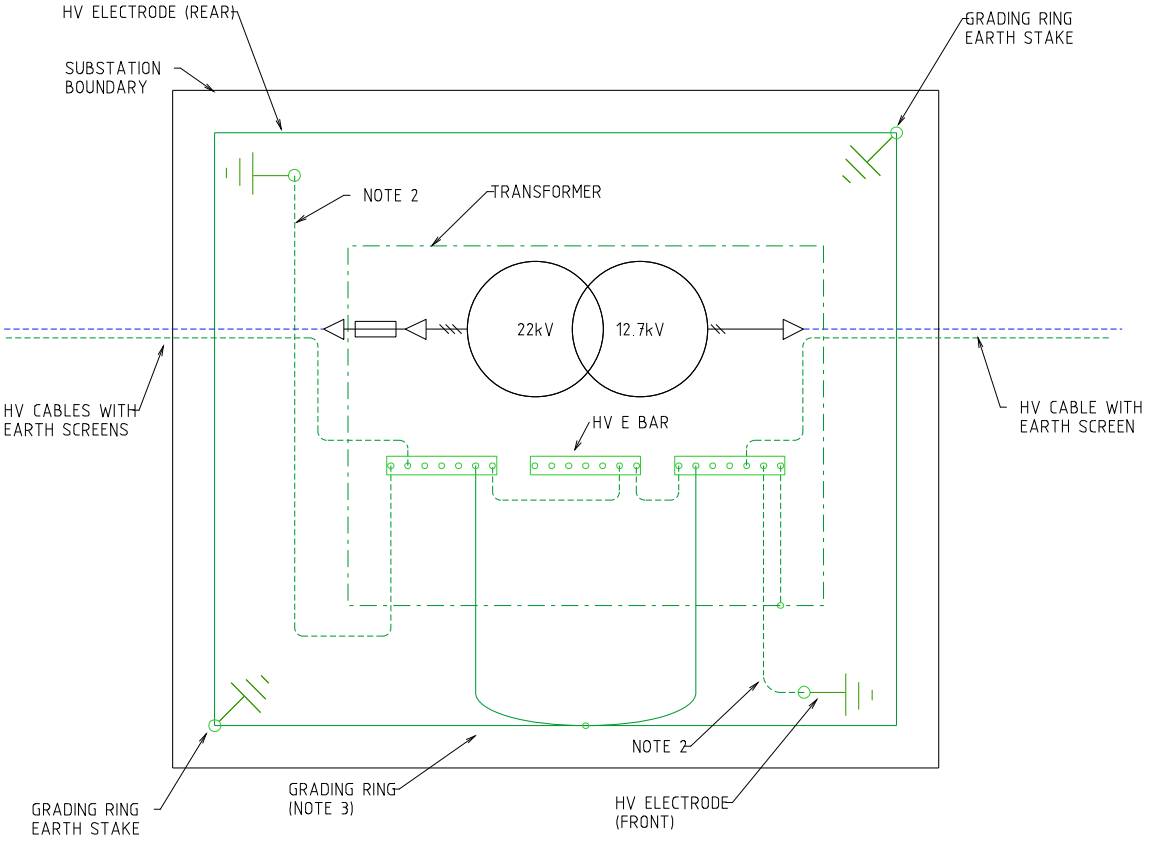
APPROVED: PHIL CAPPER

REV. A | SHT. 4



NOTES:-
1. SEE HU CU IN THE DDC FOR EARTHING MATERIALS
2. CONNECT 70mm² PVC INSULATED COPPER CABLE (GREEN/YELLOW) TO EARTH ELECTRODES. INSTALL CABLE AND RODS 1200mm BELOW FGL IN NEW SITES.
3. BURIED GRADING RING TO BE 100mm BELOW RAILWAY BALLAST/FLAME TRAP, IN SOIL.

REV	DATE	DESCRIPTION	ORGD.	CHKD.	APRD.
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE: 315kVA, 22kV / 12.7kV SINGLE WIRE EARTH WIRE RETURN (S.W.E.W.R.) ISOLATING TRANSFORMER EARTHING ARRANGEMENT

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

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ORIGINATED: KT | SCALE: NTS

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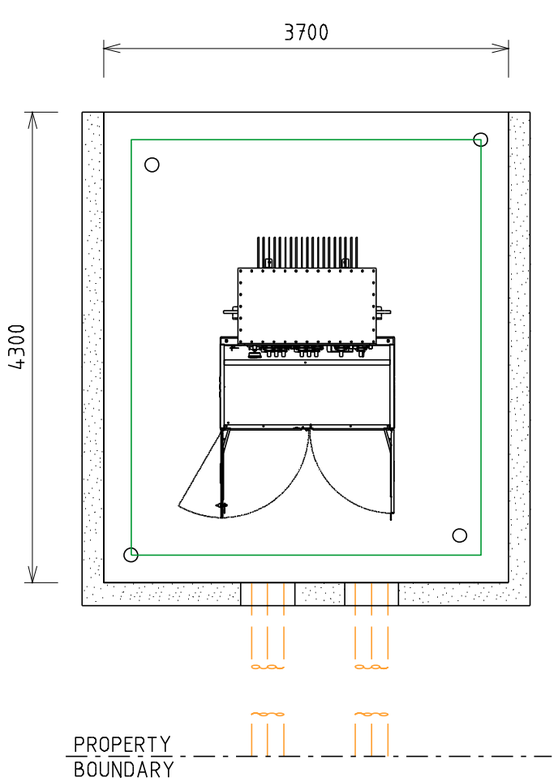
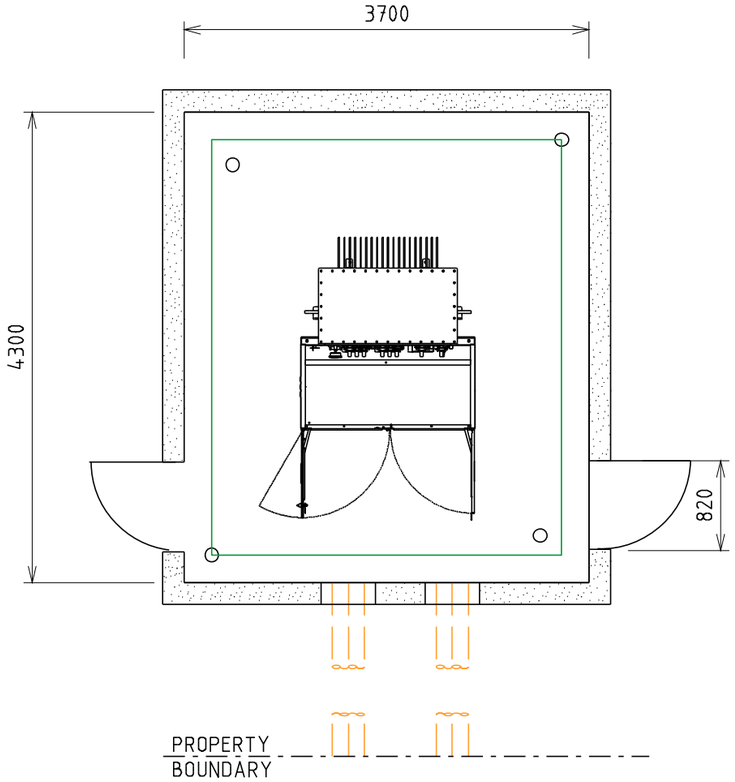
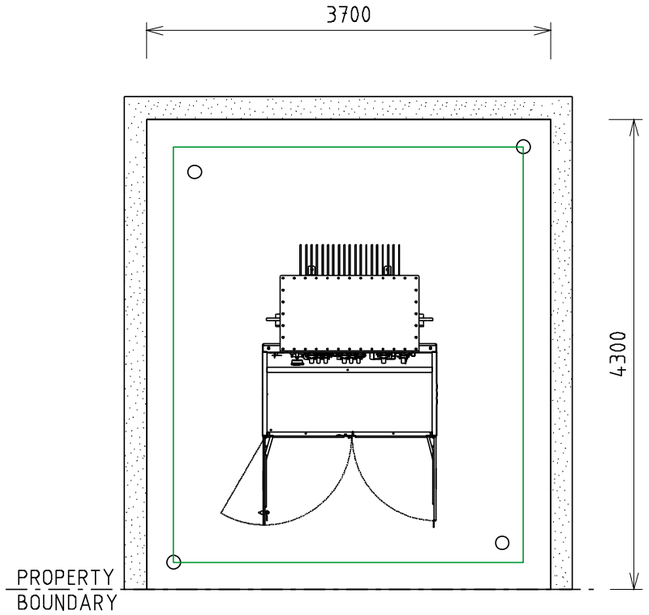
REV. A | SHT. 5



PARTIAL (FRONT) SCREENING



FULL SCREENING



PARTIAL (REAR) SCREENING

NOTES:-

1. FOUNDATIONS SHALL FULLY RETAIN THE SITE TO ALLOW FUTURE EXCAVATION 1200mm DEEP WITHIN THE SUBSTATION SITE.
2. SCREENING OR FOUNDATIONS SHALL NOT ENCROACH INTO SUBSTATION SITE.
3. SCREENING SHALL NOT IMPACT OPERATIONAL CLEARANCE AND EGRESS REQUIREMENTS SHOWN ON SHEET 4.
4. DOORS (WHERE FITTED) MUST BE A MINIMUM OF 820 WIDE.
5. NON-COMBUSTIBLE MATERIALS TO BE USED FOR SCREENING (MASONARY, ETC.)
6. 2HR FIRE RATED SCREENING MAY BE USED TO REDUCE THE FIRE RISK ZONE. REFER DSPM CHAPTER 5 (FIRE RISK)
7. MINIMUM HEIGHT OF SCREEN WALL IS TO BE 1.8m (HEIGHT OF TRANSFORMER + 300mm).
8. DUCTS ARE REQUIRED WHERE CABLES PASS THROUGH WALL OR FOUNDATIONS. REFER TO SHEET 2 FOR DUCTING DETAILS.

REV.	DATE	DESCRIPTION	ORGD	CHKD.	APRD
A	03.05.23	ORIGINAL ISSUE	KT	GC	PC

TITLE

315kVA, 22kV / 12.7kV
SINGLE WIRE EARTH WIRE RETURN
(S.W.E.W.R.) ISOLATING TRANSFORMER
SCREENING ARRANGEMENTS

DISTRIBUTION SUBSTATION PLANT MANUAL

westernpower

DRAWN: KT	DATE 29-04-2022	DRG. No.	DSPM-3-29
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