Section 5: SWER system installed - practical considerations

Bruce McLaren.
IARC
Eskom South Africa

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Key components of this section

- Isolation transformer installation
- Protection and metering (SWER)
- Reticulation structures
- Distribution transformer installations

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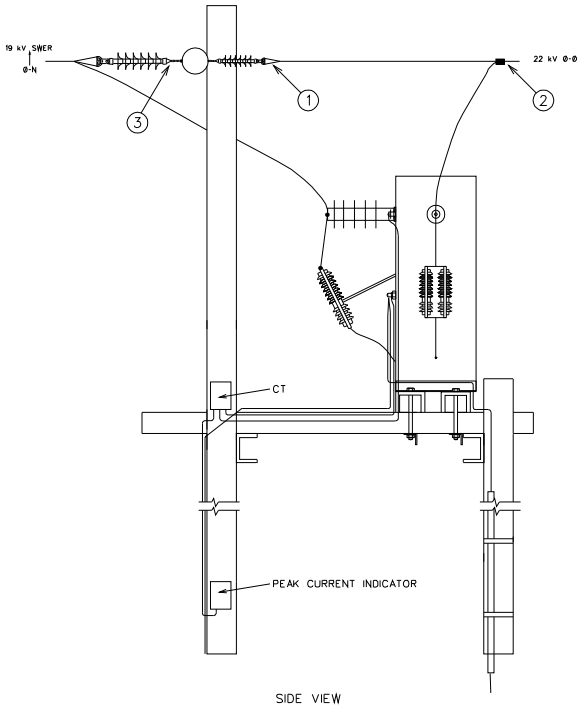
Isolation transformer installation



NOTE:

- BARE CONDUCTOR
- FLEXIBLE CABLE
- 2.5MM² 4C CABLE
- 10MM² INSULATED COPPER
- 16MM² PVC COPPER

NOTE :
1. ALL 25mm/kV 33kV INSULATORS
2. REFER TO D-DT-0461 FOR AUXILLIARY DETAIL.
3. LINKS MAY BE INSTALLED ON THIS STRUCTURE BUT ARE NOT SHOWN.
4. REFER TO D-DT-0461 FOR AUXILLARY DETAIL.

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Isolation transformer installation

- Isolation transformer location.
  - *Space available - adjacent infrastructure.*
  - *Soil type, alternative sites.*
  - *Capacity requirements and structure type.*
  - *Upgrade considerations.*

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Isolation transformer installation

Isolation transformer

Key components

- Transformer
- Steelwork
- Poles
- *Primary protection*
- *Secondary protection*
- Metering
- Surge protection
- Earth connections, leads and redundancy
- Electrodes

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Isolation transformer installation

Isolation transformer installation

Focus points

- Structure drawing, spacing and orientation.
- Cross check components and compatibility (Channel lengths and transformer dimensions)
- Correct depth of poles, and steelwork levelling.
- Correct installation of protection devices, leads (redundancy) and surge arrestors.

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Isolation transformer installation

Upgrade considerations.

Increase in transformer capacity.

Additional isolation transformers - share electrode - multi circuit SWER

Shift isolation transformer position - convert SWER to MV

Split system - alternative intake point.

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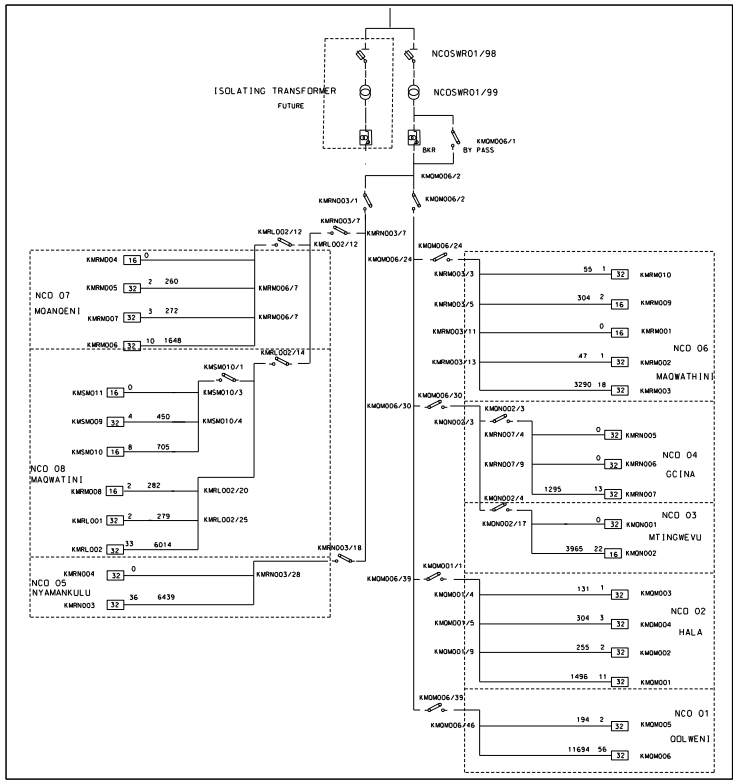
Isolation transformer installation



Schematic of an upgrade proposal

Isolation transformer installation

Protection and metering components

MV system protection

Substation protection scheme and downstream reclosers

MV fuse links

SWER (MV) protection

SWER fuse installation and/or

SWER recloser installation with by pass.

MV metering options.

CT/VT unit

SWER metering options

SWER CT/VT combination.

Additional /supplementary options

SWER peak current meter

Electrode potential rise meter

Protection and metering

MV protection - MV links

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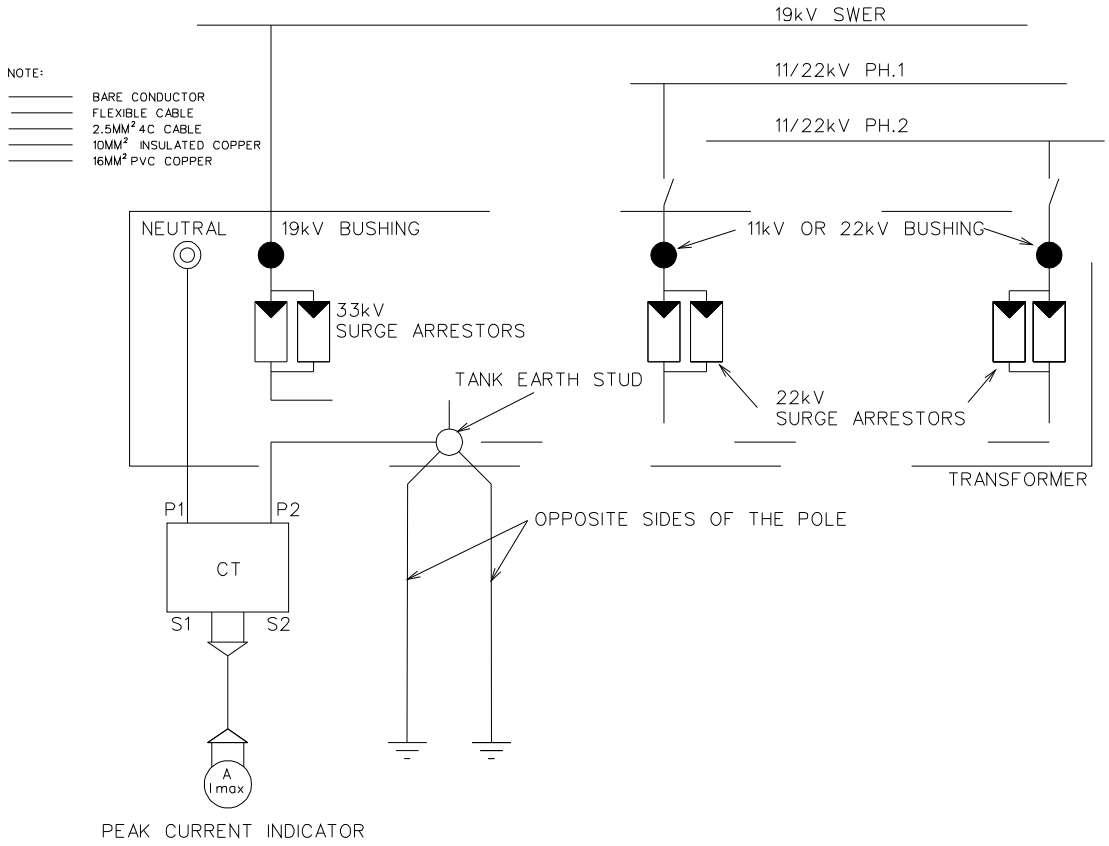
Protection and metering

SWER protection - SWER “recloser” with fused “by pass”

Protection and metering

SWER protection - SWER links/fuse installation

Protection and metering



CT - Peak current meter schematic drawing.

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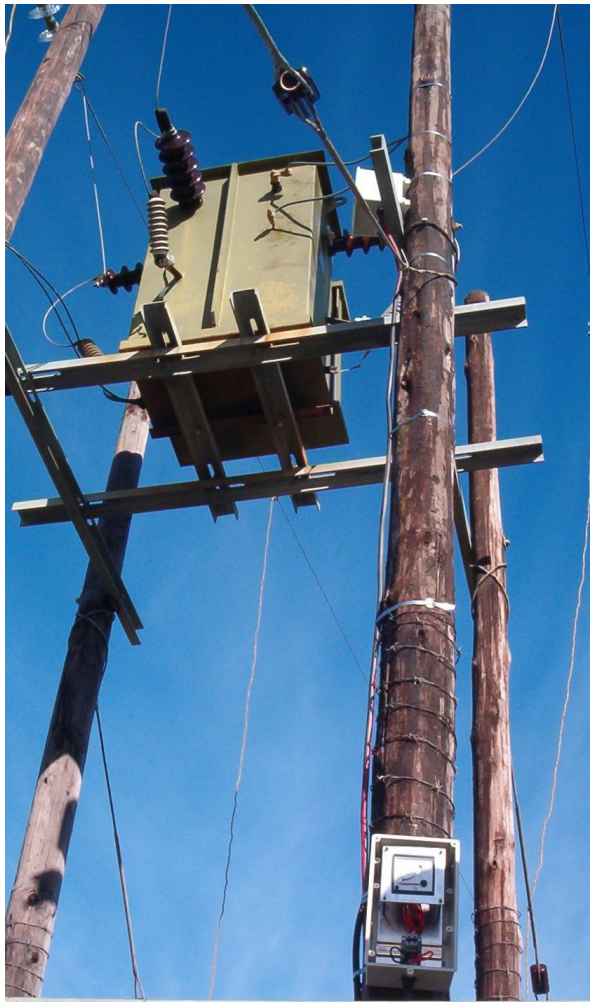
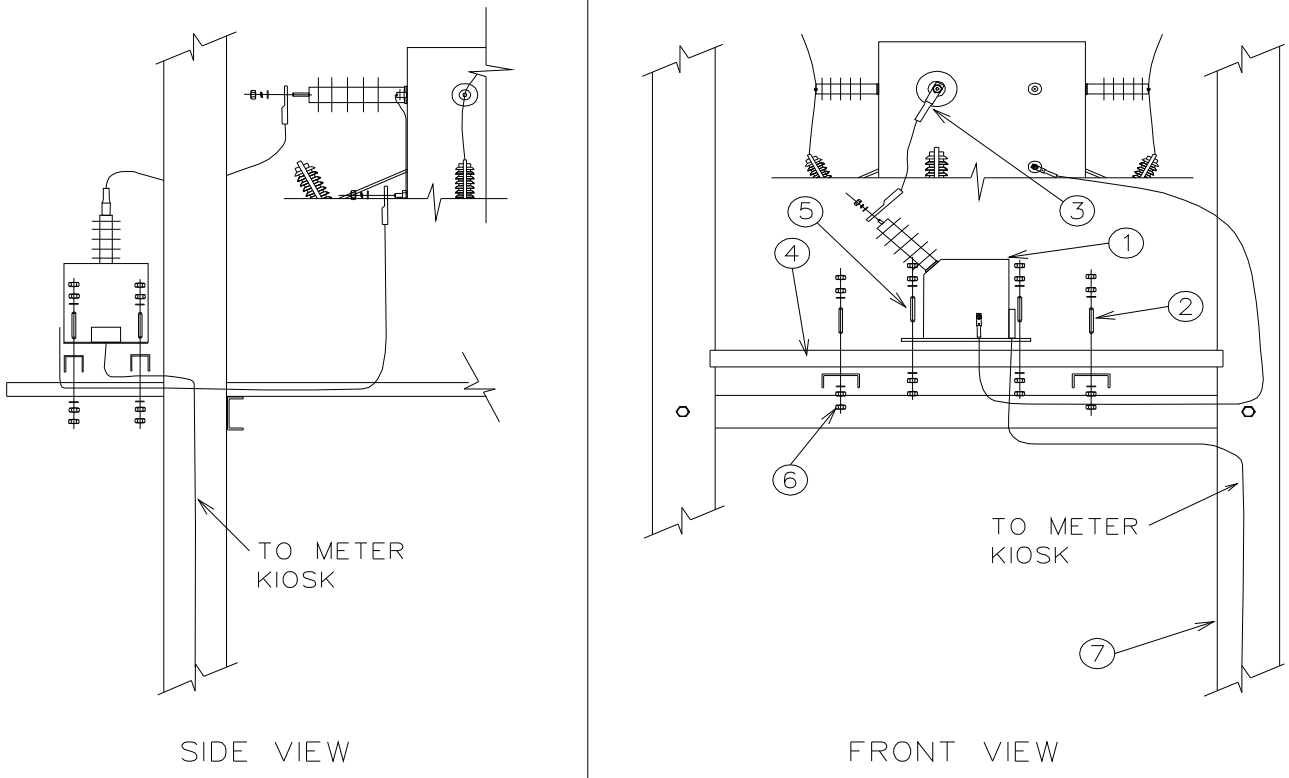
Protection and metering



Peak current meter installation.

Protection and metering



VT installation drawing.

Line structure designs and span lengths.

Key factors

- Wind span
- Weight span
- Ground level span
- Electrical span.

Key components

- Poles
- Insulators
- Hardware
- Wireform products

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Structure details

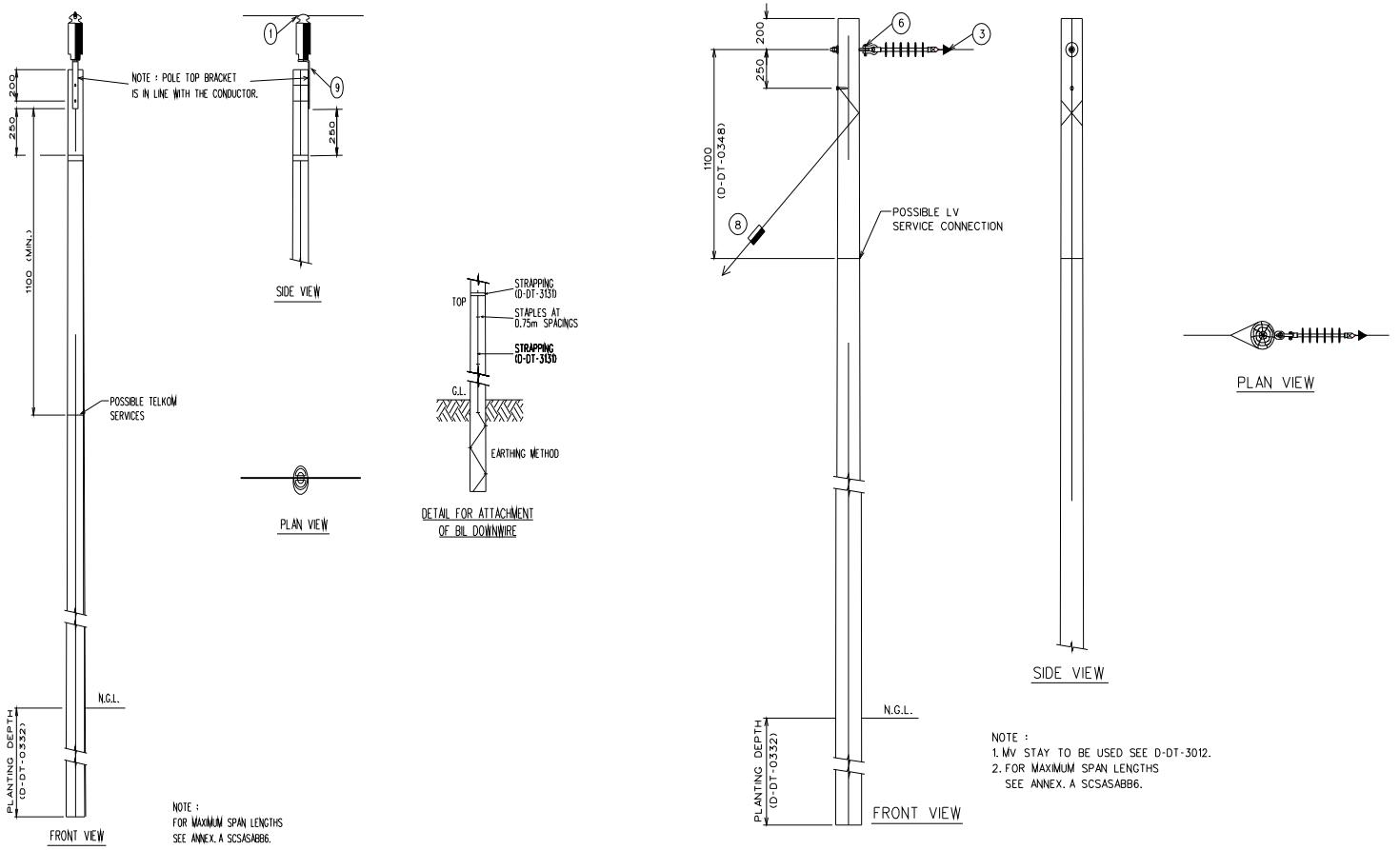
Structure earthing and BIL

Understrung/remote earth electrodes.

Stays and struts.

Insulators, hardware and wireform products.

Intermediate, angle and strain structures.



SWER intermediate and angle structures

Comparison between typical 22 and 33 kV line post insulators (porcelain).

Line post insulator on support bracket.

Note

Line post insulator on support bracket.

Note

Three phase structures

Note

SWER intermediate and angle structures

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Optimum design considerations.

Conductor/Structure trade off-

Wood pole/conductor cost differentials
12 m structure most cost effective - for most conductor types.

Survey and templating-

Long/short span length impact
Angles, strainers and vibration dampers
Optimum route and proximity trade off
Beware of SWER conductor to LV pole clearance,
when skipping structures.
Upgrade SWER structures -
Initial profile for final state, remove structures where possible.
Additional intermediates (theoretical)
Electrical span, ground span & wind span.
Ganged link requirement.

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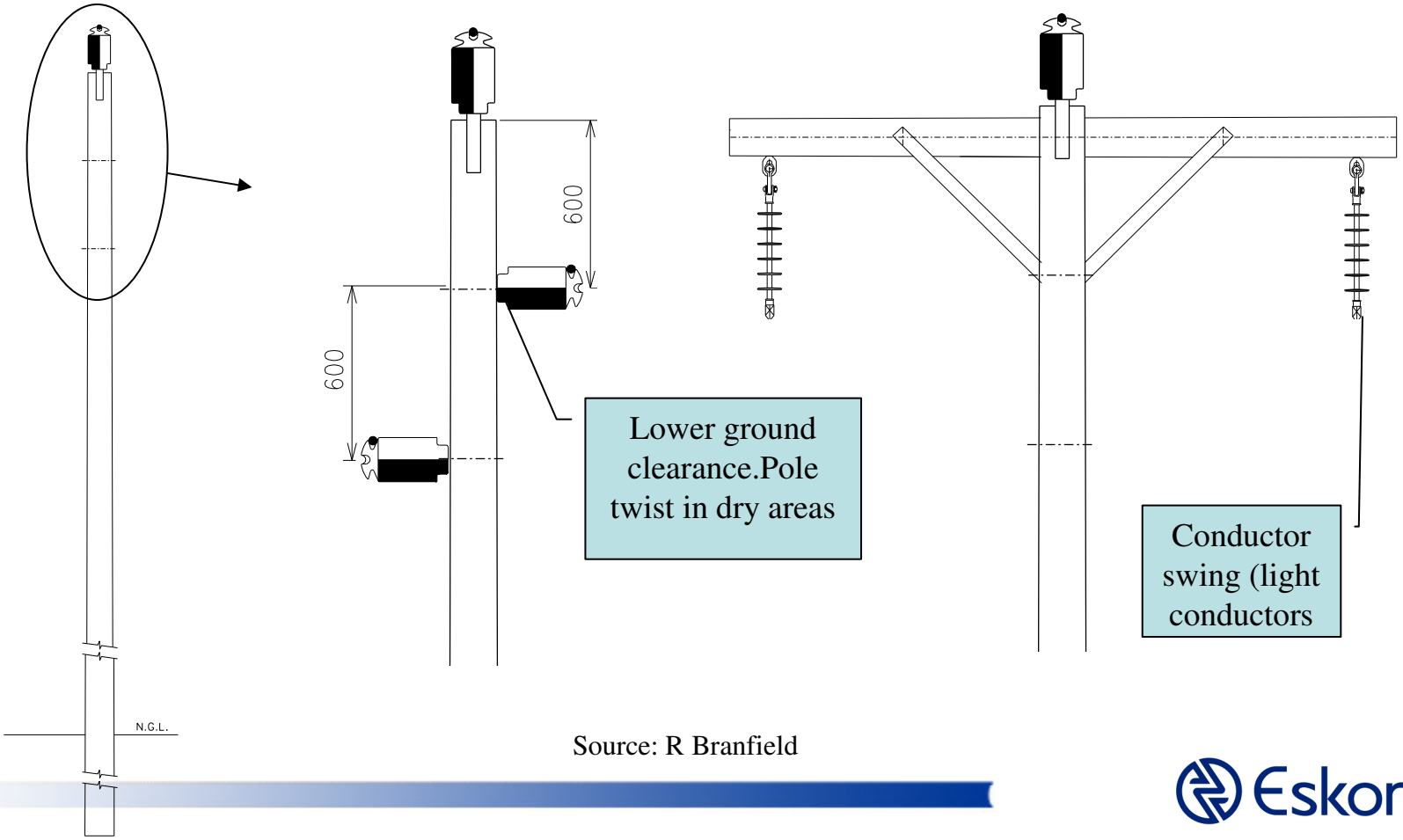
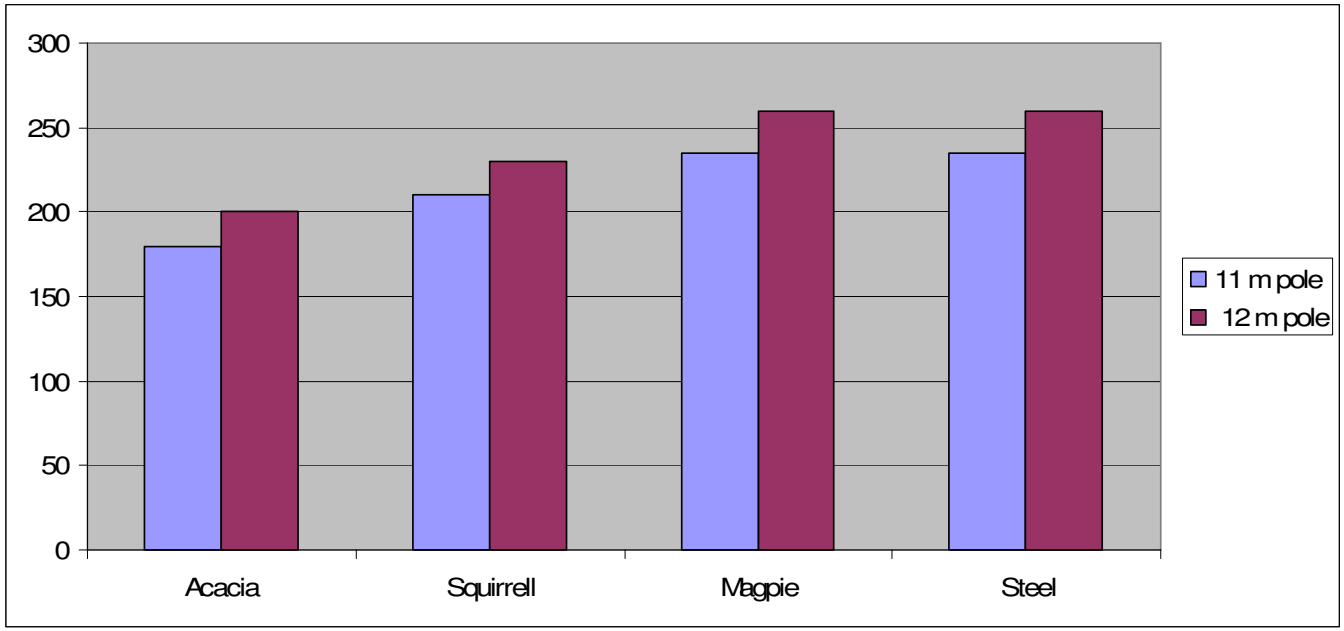
Structure upgrades

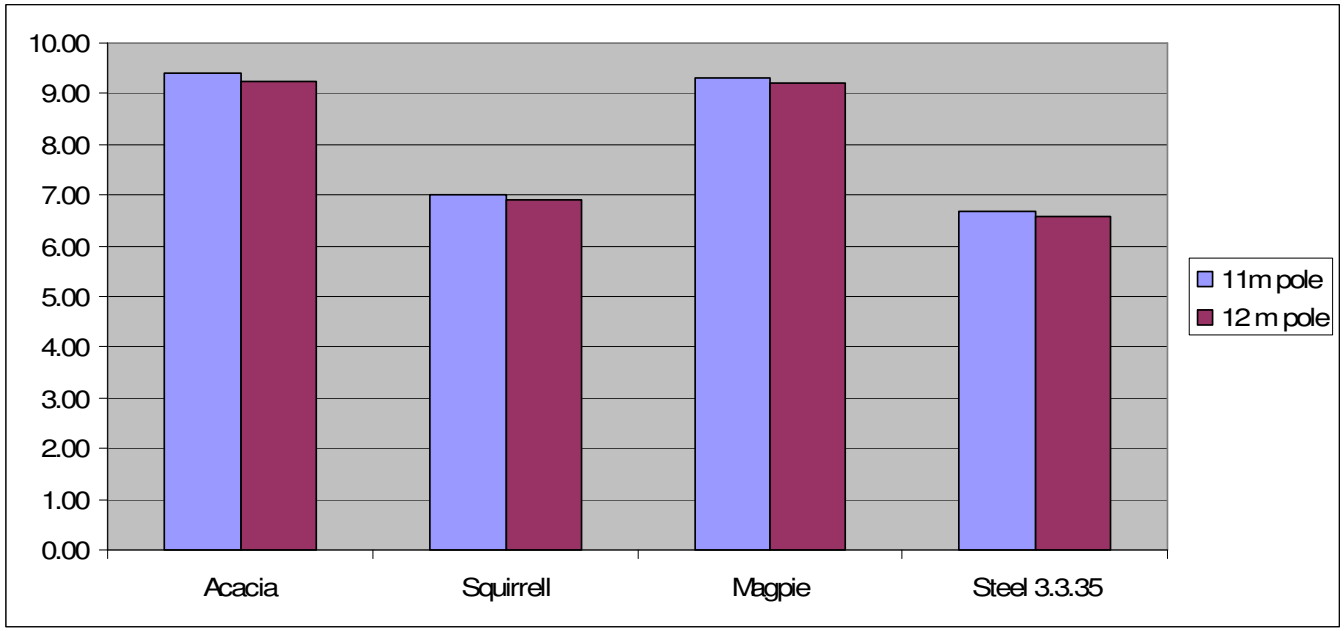


Source: R Branfield

Maximum ground level span by conductor type



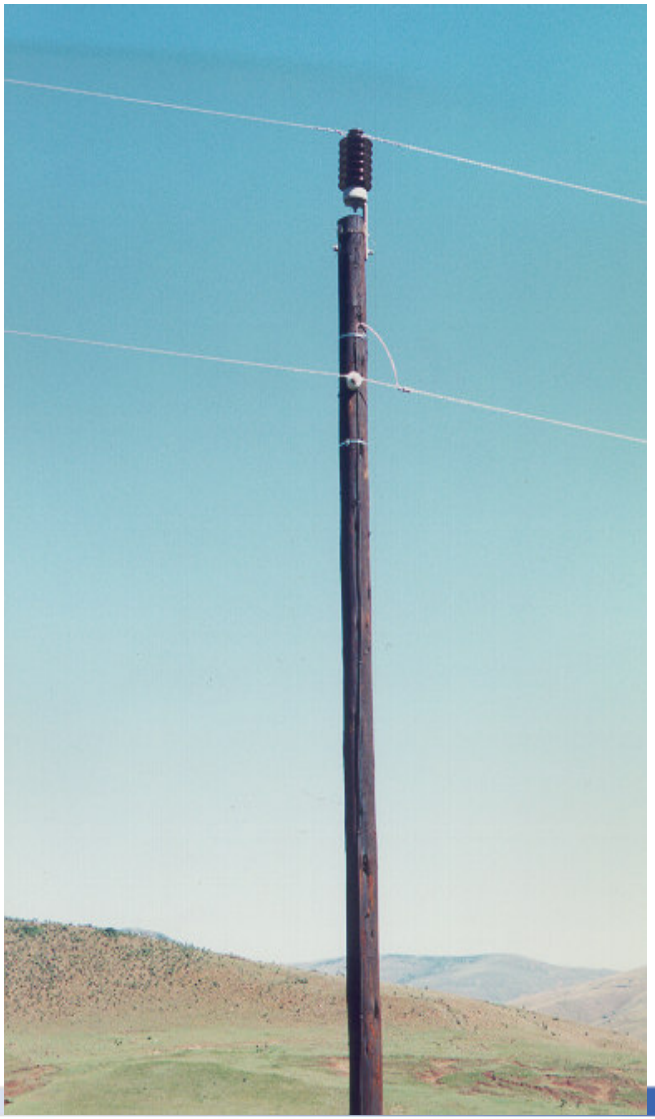
Effective cost/m conductor pole combination GLS



Optimum spans

Optimum spans

Optimum spans the use of undulation



Intermediate structure with under strung earth wire.

SWER/LV intermediate and service

SWER/LV intermediate and service technique utilising separate LV pole requires detail design

SWER, LV and services

SWER and Dual phase shared.

SWER/LV intermediate and service technique utilising separate LV pole requires detailed design focus. SWER to LV structure clearance.

SWER and LV ABC optimum spans

SWER and LV ABC strain structure.

SWER intermediate and LV ABC strain - see insulator bracket lean

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SWER and
Dual phase
LV open wire

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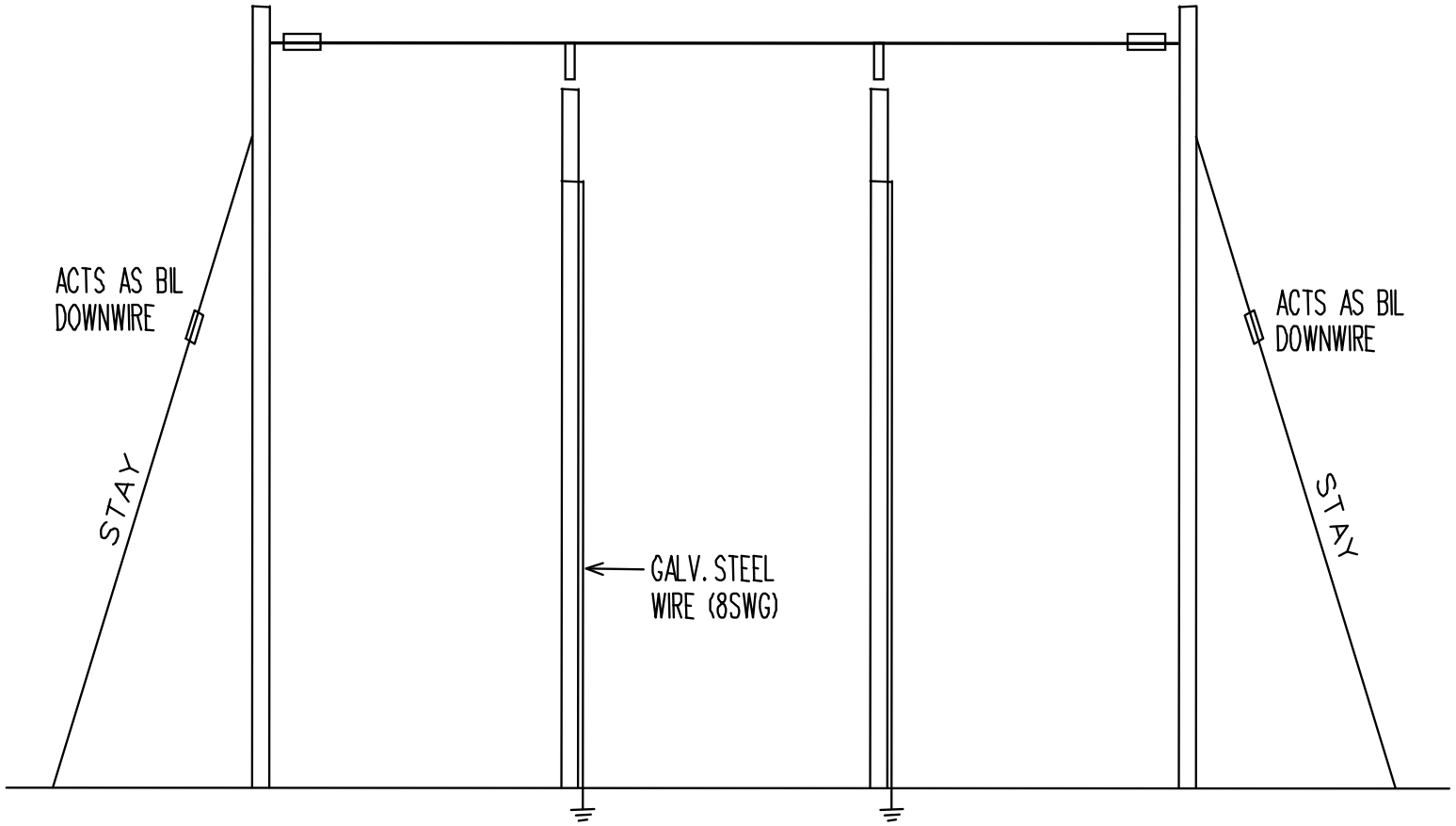

SWER LINES WITHOUT UNDERSTRUNG EARTHWIRE

Distribution transformer installation

Transformer rating and prospective upgrades.

Doubling or change out.

Links and clearances

Earthing, redundancy, separation LV surge arrestor and electrode installations

Consumer earths and separation violations

Metering and protection.

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Distribution transformer installation

Distribution transformer
with LV ABC

Distribution transformer installation

Off set transformer with under strung lead to trench electrode

Distribution transformer installation

Off set transformer with local electrode

Distribution transformer installation

Off set transformer with local electrode

Distribution transformer installation

SWER transformer with under strung earth and LV ABC

Distribution transformer installation

SWER transformer installation.

Distribution transformer installation

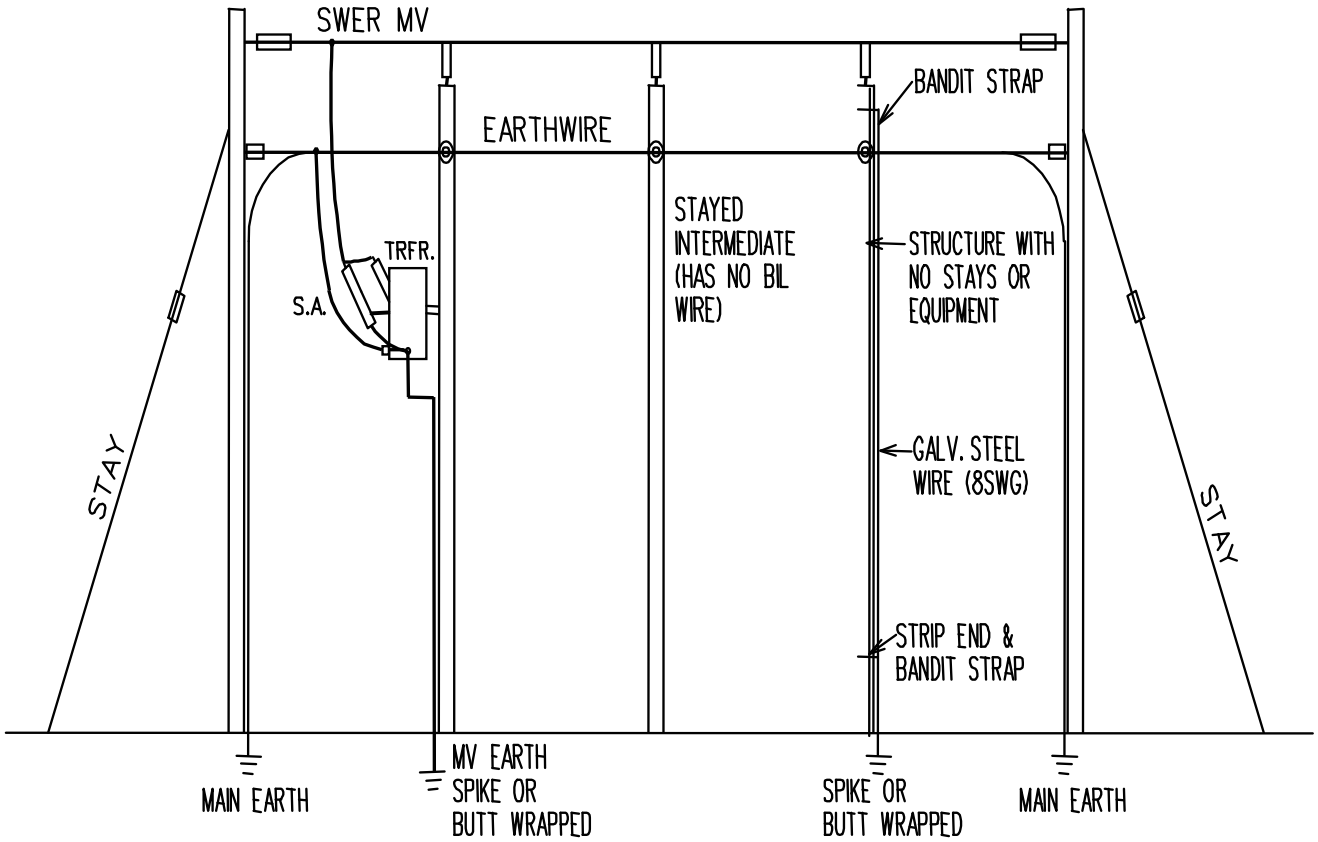
Distribution transformer with LV open wire.

Distribution transformer installation

SWER transformer 16 kVA

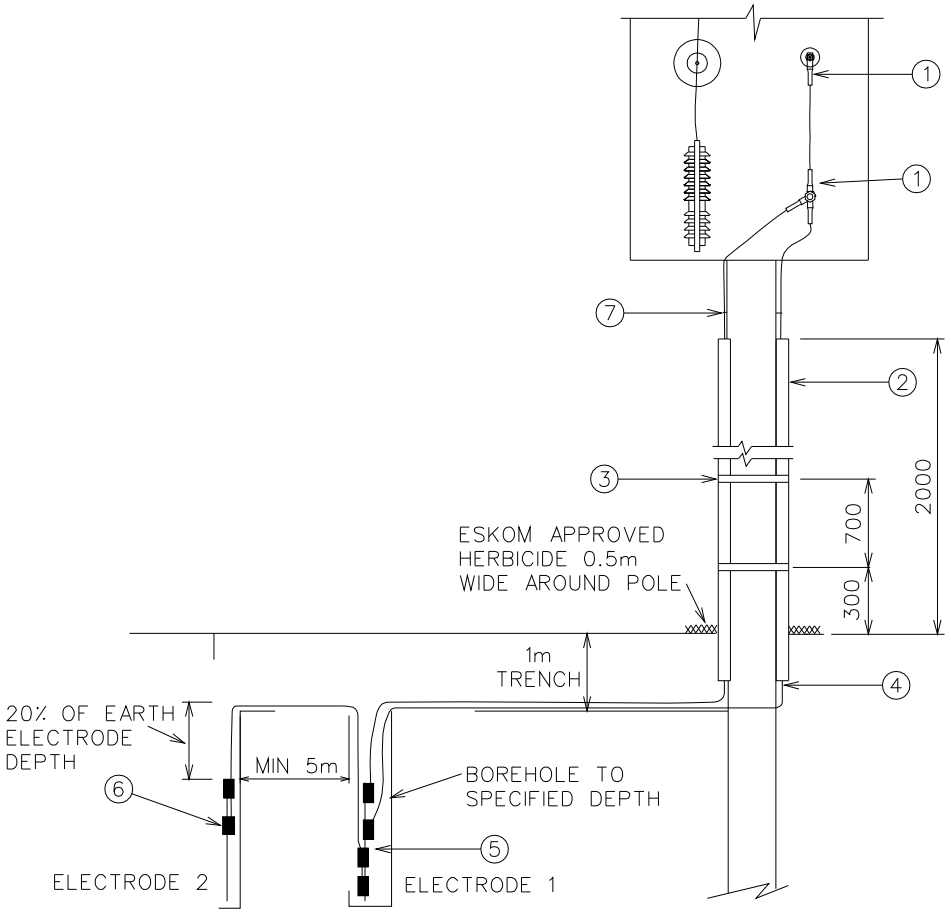
Distribution transformer installation

SWER transformer with Line and neutral surge arrestors



SWER LINES WITH EARTHWIRES FOR INSIDE VILLAGES AND TRANSFORMERS CONNECTED

Distribution transformer installation



Transformer rod electrode installation

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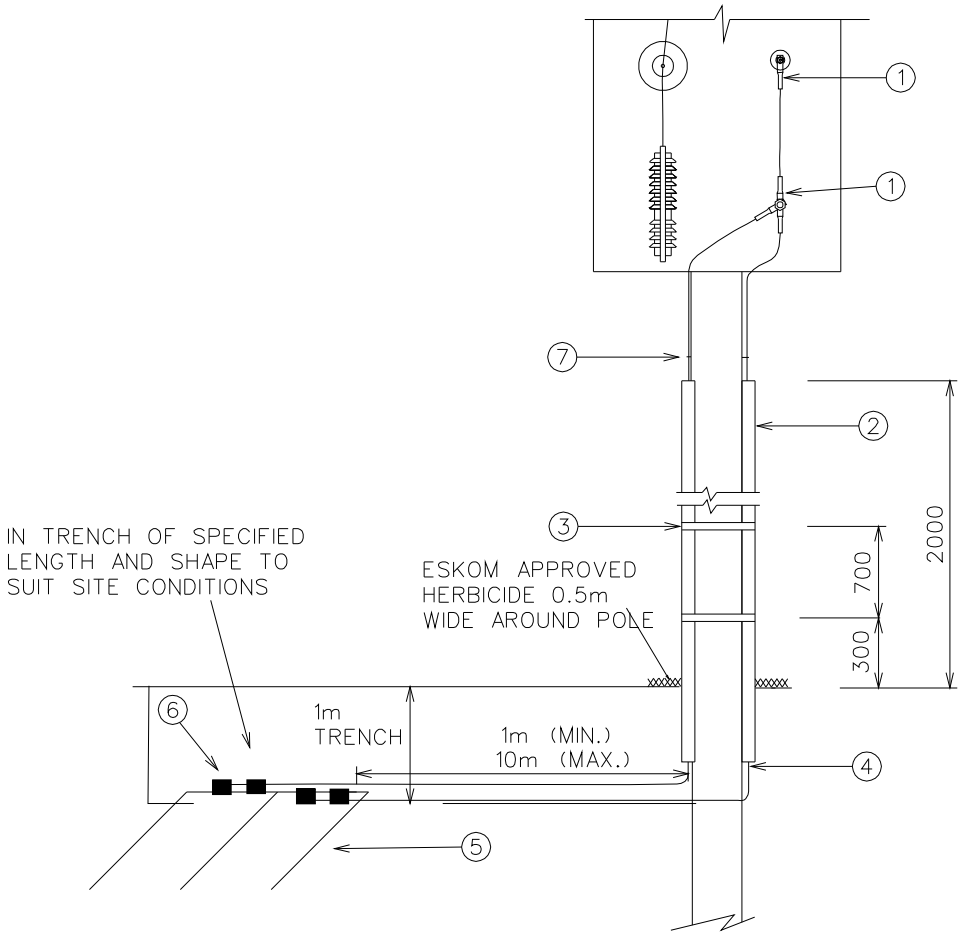
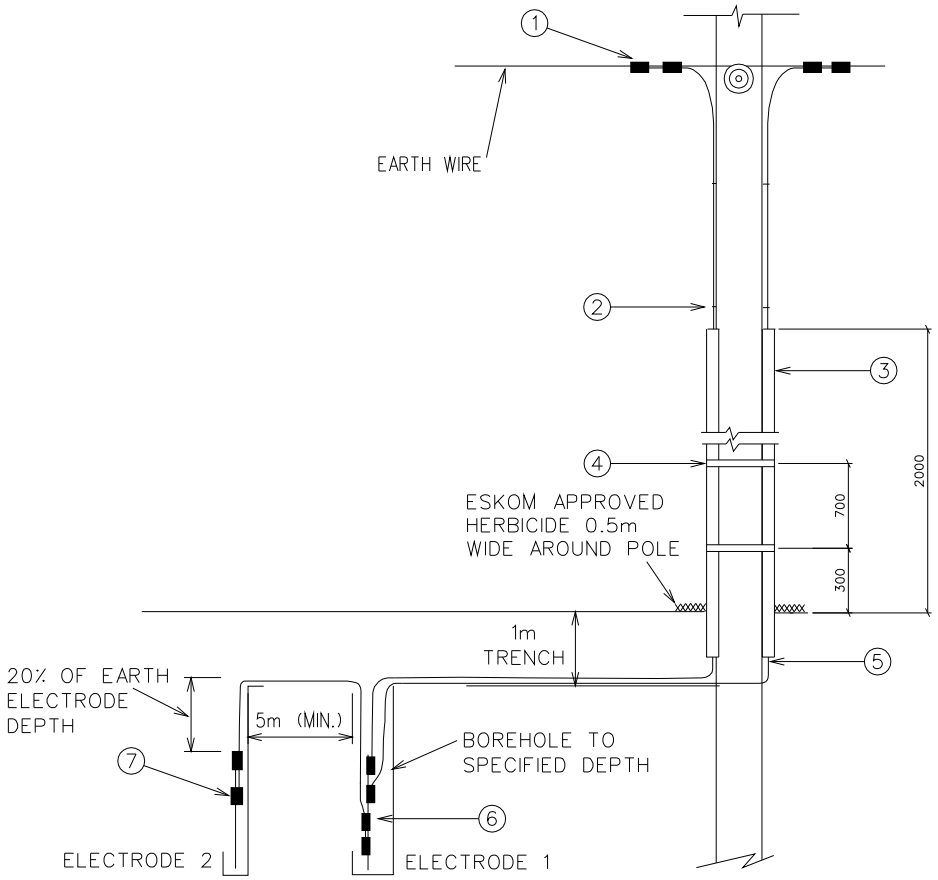
Distribution transformer installation



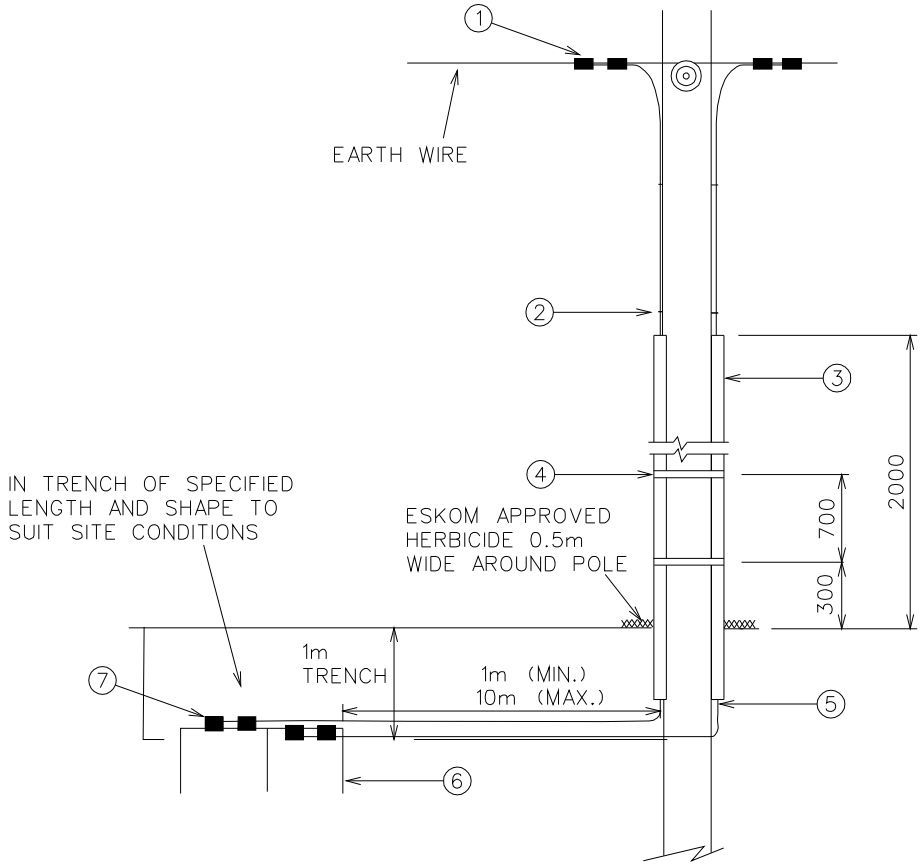
Transformer trench electrode installation

Distribution transformer installation



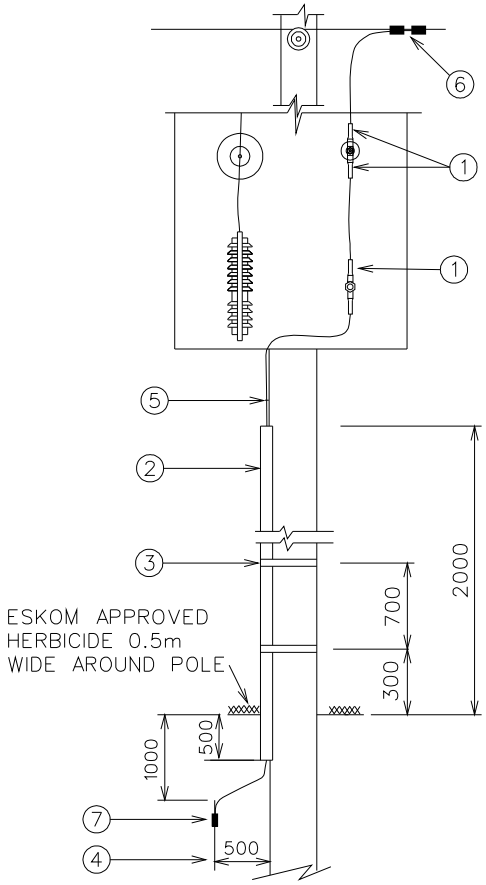
Understrung rod electrode

Distribution transformer installation



Understrung trench electrode

Distribution transformer installation



Transformer local redundancy earth.