



NZEC P34

Termination Poles and Engineering Assessments

Revision 1

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Purpose

The primary purpose of this document is to provide practical guidance and an informed perspective on the application of NZECP 34 (New Zealand Electrical Code of Practice for Electrical Safe Distances), with a specific focus on termination poles. Navigating the intersection of regulatory compliance, structural considerations, and electrical safety can be complex. By unpacking these requirements and sharing practical industry insights, this piece aims to bridge the gap between the written code and on-the-ground reality. Ultimately, this report is designed to stimulate constructive discussion, assist stakeholders in understanding clearance and safety expectations, and promote smoother engagements with Lines Companies, Asset Owners, and regulatory bodies.

Standards Used

- AS/NZS 7000: 2016 - Overhead Line Design
- AS/NZS 3000: 2018 Electrical Installations (Wiring Rules)
- NZECP34: 2001 - New Zealand Electrical Code of Practice for Electrical Safe Distances

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Version History

Date	Revision	Description	Author
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1. Introduction

On overhead electricity networks, termination poles are utility poles used where overhead lines end, transition from overhead to underground (or vice-versa), or transition to service lines. This means that they have additional specialised hardware installed on both the poles and the crossarms that otherwise may not be located on intermediate poles, for example:

- Cable terminations.
- Sealing ends.
- Conduit standoffs.
- Cable guards.
- Isolating fuses and switches.

For the purpose of this report, the following applies:

- A conductor shall be interpreted as per NZECP34 Section 1.2.3:
Conductor - means a wire, cable or form of metal designed for carrying electric current but does not include the wire of an electric fence.
- ‘**NZEC34**’ is used short hand to refer to the New Zealand Electrical Code of Practice for Electrical Safe Distances
- A Lines Company is the local or regional organisation that owns, operates, and maintains the electricity distribution infrastructure within a specific geographic area. They are responsible for the physical network, including the power poles, overhead wires, underground cables, and local substations, that transports electricity from the national transmission grid to individual properties, homes, and businesses. A Lines Company was formally known as an Electricity Distribution Business (EDB) or Network Operator.
- ‘**Table 2**’ is often used as shorthand for NZECP34 Table 2 - Safe Distances from Conductors without Engineering Advice
- ‘**Table 3**’ is often used as shorthand for NZECP34 Table 3 - Minimum Safe Distances of Conductors from Buildings and Other Structures Where Specific Calculation of Conductor Movement Has Been Carried Out.
- ‘**Table 4**’ is used as shorthand for NZECP34 Table 4 - Minimum Safe Distances of Conductors from the Ground.
- PCBU - Person Conducting a Business or Undertaking. It can be a business entity or an individual. It includes companies, sole traders, partnerships, government agencies, and charities. In the context of this report it refers to anyone undertaking site activities.

NZECP34 and the requirements within it exist to protect people from risk of harm or death. Termination poles support live components and therefore must fall under all applicable sections of NZECP34.

2. Risks

Termination poles present several unique safety hazards that may not exist on intermediate poles, or the overhead cables strung between them.

2.1. Excavation and Underground Strikes

Intermediate poles may not have riser wires running vertically (though they often do), whereas this is standard on termination poles.

The Hazard: Excavating near the base of a termination pole (for retaining walls, fencing, driveways, or service cables) carries a higher risk of striking a primary distribution cable.

NZECP34 Section 2.2 strictly regulates excavation near poles. Because live cables radiate out from the base of a termination pole, often at shallow depths before dipping, blind digging or using mechanical excavators near these poles is exceptionally dangerous and usually requires a Close Approach Consent in accordance with NZECP34.

2.2. Lower Live Components

On a standard overhead run, the live conductors are strung high up and horizontally. On a termination pole, the transition equipment brings live components much closer to the ground.

The Hazard: Hardware like drop-out fuses, surge arresters, cable sealing ends (potheads), and the uninsulated tails connecting them project downward and outward from the crossarms.

NZECP34 Section 5 dictates Minimum Approach Distances (MAD) for mobile plant (like Hiabs, cranes, and elevated work platforms). Operating plant near a termination pole is significantly riskier because the live envelope extends much lower down the pole structure, making accidental encroachment into the 4-metre exclusion zone far easier.

2.3. Building Clearances and Encroachment

With Auckland’s push for high-density infill housing, new builds and scaffolding are frequently erected right on the boundary line near street poles.

The Hazard: Termination poles can be physically bulky. They can have mechanical riser guards (metal or heavy plastic casing over the cables) and extended crossarms to house the termination hardware.

NZECP34 Section 3 requires minimum clearances between buildings/scaffolding and live conductors. The bulky hardware and lower-hanging live tails on a termination pole can easily encroach on these safe distances, often forcing developers to redesign dwellings or scaffolding.

2.4. Static Hazard Profiles

Unlike mid-span overhead cables, which are subject to wind sway (often referred to as ‘blowout’), the termination hardware on a pole is rigidly fixed in place.

The Hazard: When erecting scaffolding or operating mobile plant near mid-span lines, the risk of the cables blowing closer to the work area can sometimes be managed with active site controls, for example, monitoring wind speed and halting work when gusts exceed 40km/h. Termination pole hardware, however, is a static, unforgiving hazard.

3. Requirement for an Engineering Assessment

This section of the report considers a structure to be a building and the temporary scaffolding required to construct a building, and identifies the scenarios that result in an Engineering Assessment of a structure being required. It primarily focuses on NZECP34 Section 3.3, including Table 2, and NZECP34 Section 9.

This section of the report considers two cases, the 'in construction' case and the 'in design' case.

3.1. Projects in Construction

This section of the report describes the parts of a building and structure that is part way through construction. It identifies when an Engineering Assessment is required in accordance with NZECP34 Section 3.4 and Table 3.

NZECP 34 Section 9

This report gives a higher consideration to the protection of people before the protection of property.

Giving consideration only to low voltage termination poles, section 9.2.1 (a) stipulates a minimum approach distance limit of 4m for non-competent people working near exposed live parts. This distance is taken as a spherical distance.

Assuming non-competent PCBU's (in terms of working with electricity) will be able to access any part of a building site and the scaffold structure used to construct buildings, the first check point should be whether any PCBU can come within 4m of a conductor or live component on a termination pole. An Engineering Assessment will be required if the 4m clearance cannot be maintained.

NZECP 34 Section 3.4

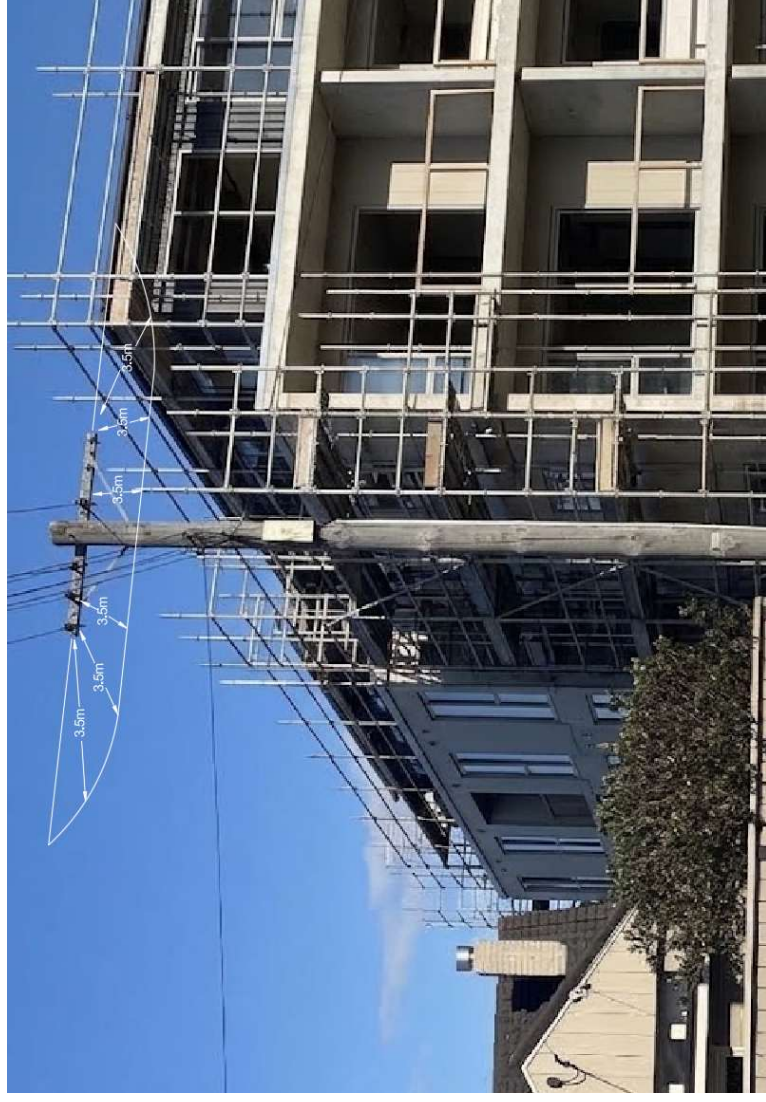
Table 2 includes the minimum horizontal distances to the side of conductors that must be maintained under normal conditions. For a termination pole, the horizontal distances apply in an arc around the closest live part to the structure.

For low voltage termination poles, a horizontal clearance of at least 3.5m must be demonstrated. If the nearest structure is less than 3.5m

As buildings are commonly higher than termination poles, the vertical clearances of Table 2 can be deemed to not apply in advance of an engineering assessment.



Non-competent scaffold worker able to get within 4m of a cable reticulating on the back of the pole. Engineering assessment required. (AI generated)



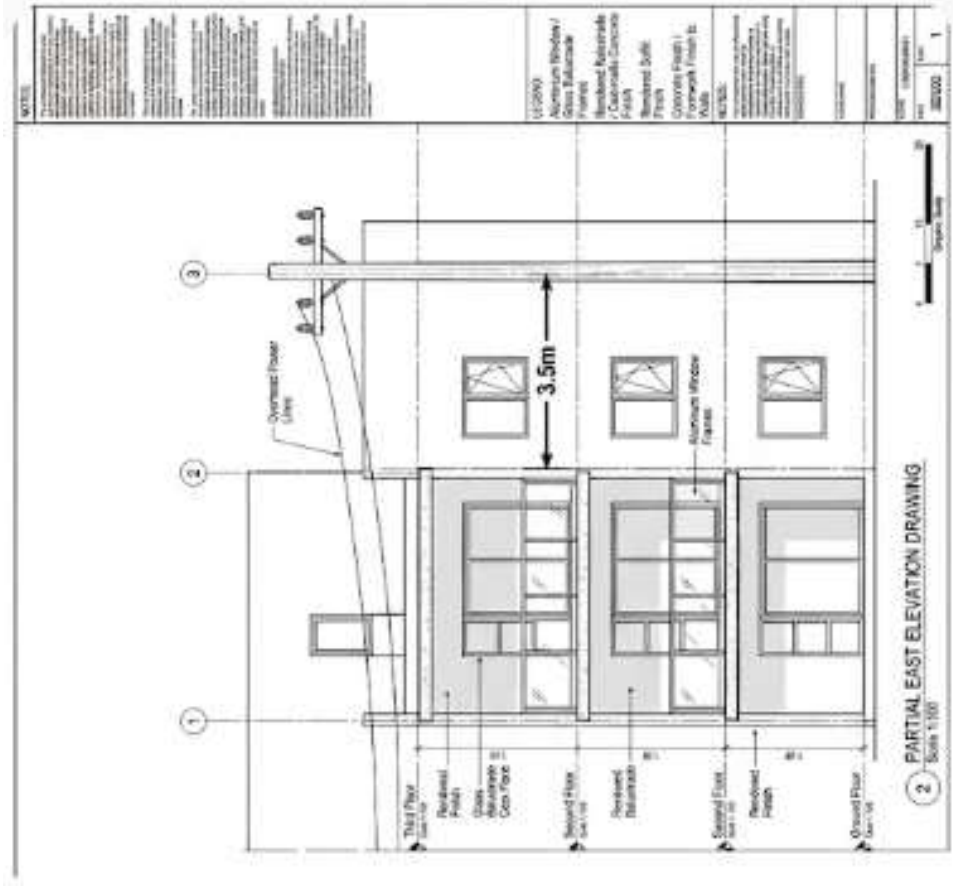
Scaffold structure is within 3.5m of the termination pole in its natural state. Engineering assessment required. (AI generated image)

3.2. Projects in Design

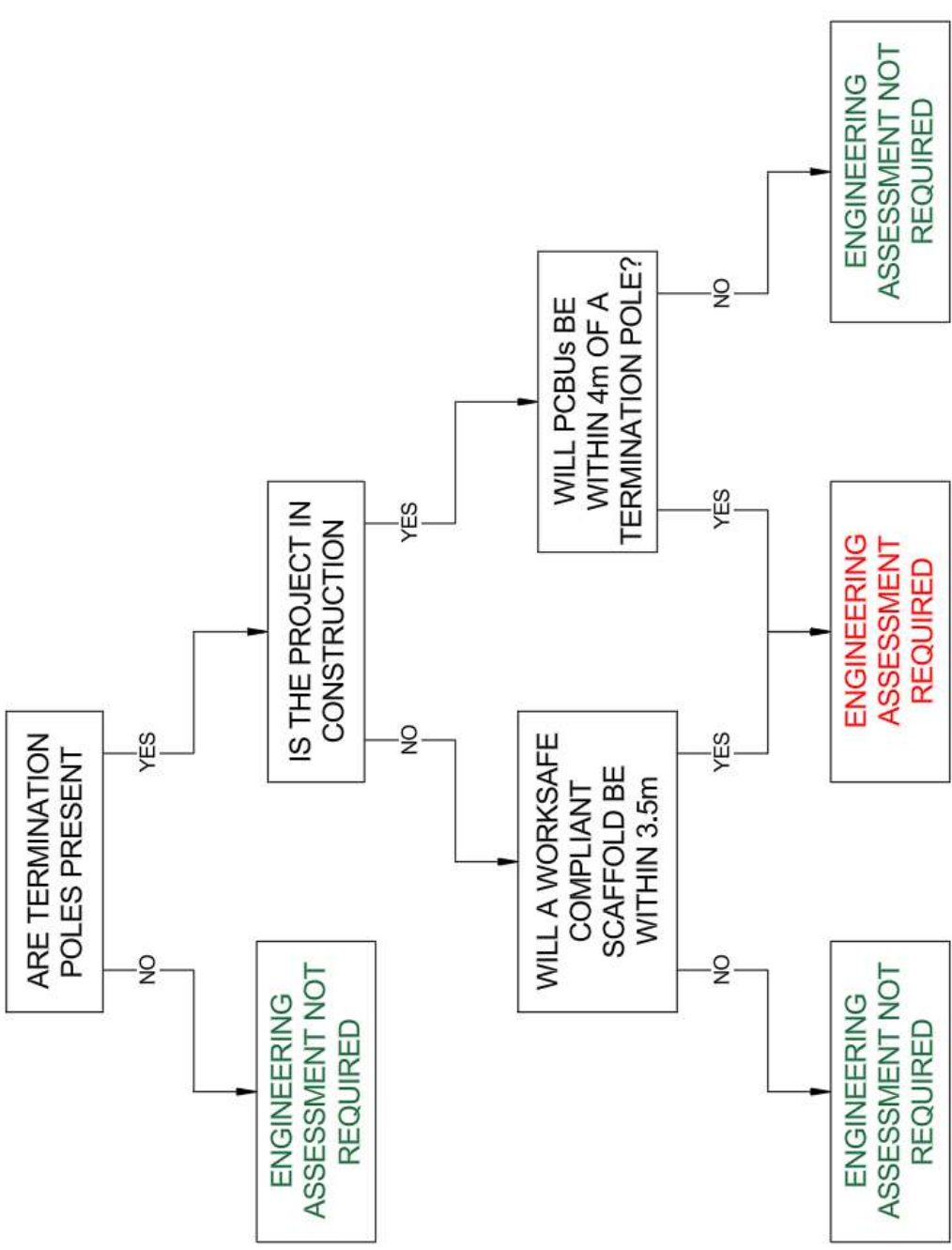
A 4m clearance zone per the requirements of NZECP34 Section 9.2.1 (a) cannot always be demonstrated during the design stage, for example scaffolding platforms may not be known until a qualified contractor is appointed. Therefore the design of the building should consider the horizontal clearances from termination poles in accordance with NZECP34 Table 2.

A WorkSafe compliant scaffold zone should be allowed for around the building. An Engineering Assessment will be required if this cannot be achieved.

Where compliance with section 9.2.1 (a) can be demonstrated during design is by the positioning of windows and balconies. These should be at least 4m away from any termination pole.



Engineering Assessment would be required for this design (AI generated image)



Termination pole flowchart

4. Surveying Process

Assuming an Engineering Assessment has been deemed to be required, the surveying and assessment of termination poles needs to be considerate of the risks identified in the previous section of this report, as well as the overarching assessment of the clearances from structures per NZECP34 Section 3.4 and Table 3.

4.1. Determine Pole Height and Pole Lean

Upon starting an on site survey of the termination pole(s), the first step is to determine the height and lean of the pole.

Where a pole is leaning towards the site, it should be assessed with that lean. Where the pole leans away from the site, it should be assessed with the pole straight. This ensures that the worst case scenario is accounted for and ensures additional safety of persons conducting a business or undertaking (PCBU) on a site.



4.2. Determine the Rotation of the Pole and Crossarms



Termination poles, and the crossarms upon them, will not necessarily be perpendicular to the adjacent structure. Therefore the rotation of the pole and the crossarms must be established to see if any live component is actually closer to the site than the pole.

The above helps to determine the actual minimum distance between the structure and the nearest live component.

4.3. Review Pole Structure for Other Live Components



The above steps determine the orientation of the pole, and the placement of crossarms and live components upon it. The remainder of the pole should now be reviewed to determine if there is a component that is actually closer to the structures that the pole, crossarms, and conductors on the crossarm, for example cable terminations and isolating fuses.

4.4. Cable Surveying

At the discretion of the surveyor, overhead cables can be surveyed where they may be closer to the site after wind speed modelling has been undertaken, or if there are any other NZECP34 related concerns, such as ground clearances or span distances.

If overhead cables are assessed, the pole and crossarms of the second pole must also be surveyed to ensure that an accurate survey of the cables is undertaken.



5. Engineering Assessment

The Engineering Assessment must focus on the following aspects:

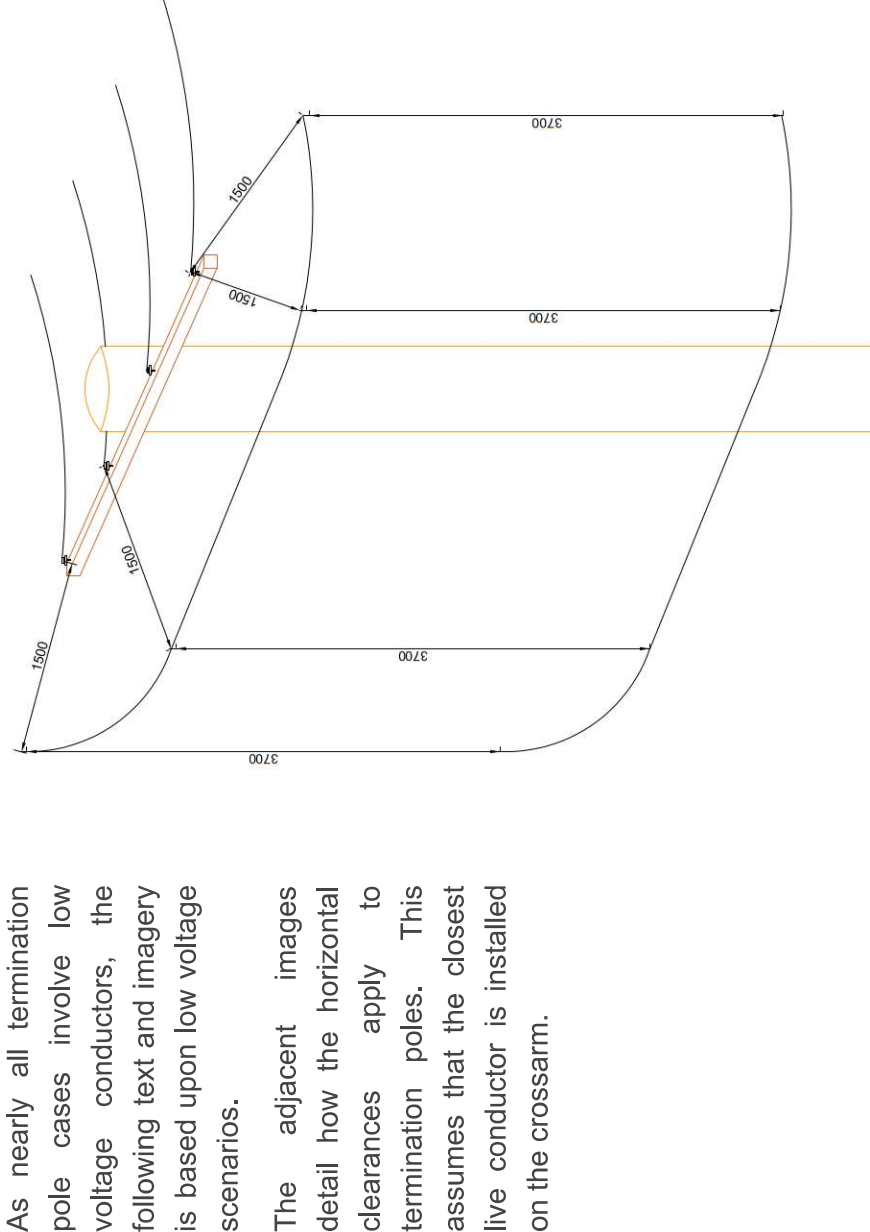
- Clearances from structure in accordance with NZECP34 Table 3.
- PCBU and minimum approach distances.
- Excavation.
- Fencing.
- Ground clearance.

5.1. Clearances from Structure

Once the closest live component (conductor) has been identified, the distance of the conductor to the scaffold must be assessed. This can be measured as part of the survey, or by using modelling software. Where overhead cables may become the closest conductor to the site, these must be wind modelled in accordance with NZECP34 requirements and any specific requirements set by the Lines Company.

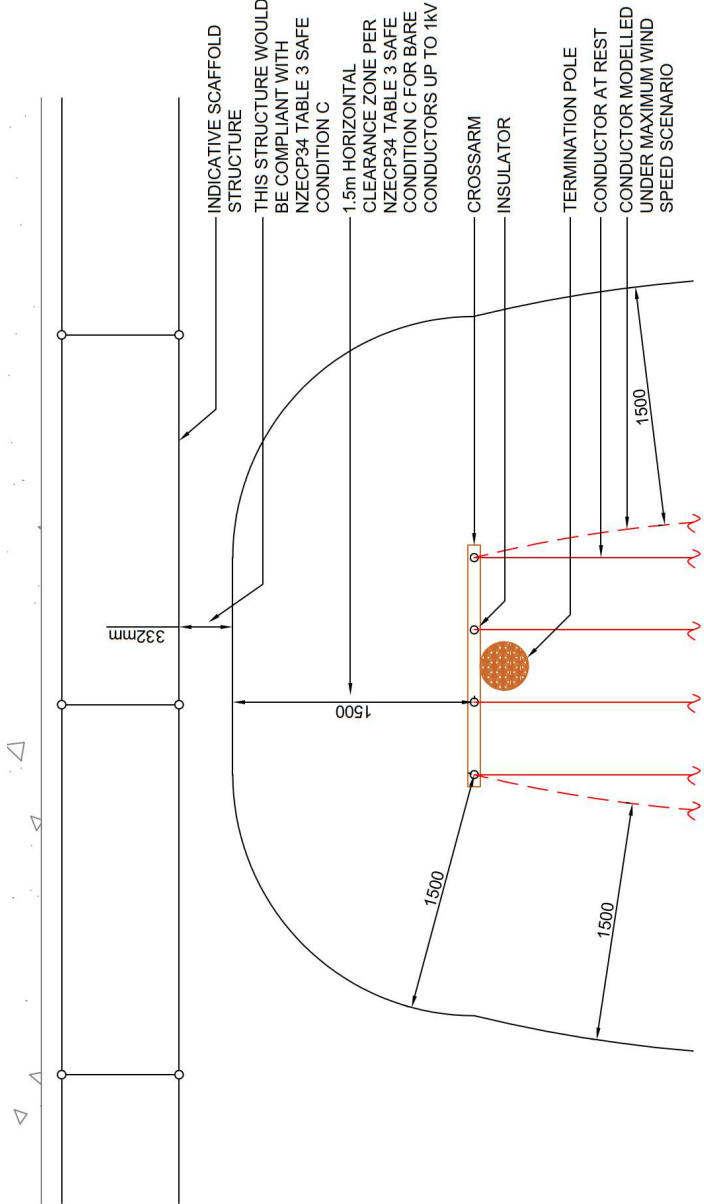
The clearance measurements must determine if the closest conductor exceeds the minimum clearances per NZECP34 Table 3. The applicable parts of Table 3 as they apply to the NZECP34 assessment process are tabulated below:

Safe Distance Condition	Not Exceeding 1kV (Bare active) (m)	Exceeding 1kV but not exceeding 33kV (bare) (m)
A Vertically above those parts of any structure normally accessible to persons	3.7	4.5
B Vertically above those parts of any structure not normally accessible to persons but on which a person can stand	2.7	3.7
C In any direction (other than vertically above) from those parts of any structure normally accessible to persons, or from any part not normally accessible to persons but on which a person can stand	1.5	2.1
D In any direction from those parts of any structure not normally accessible to persons	0.6	1.5



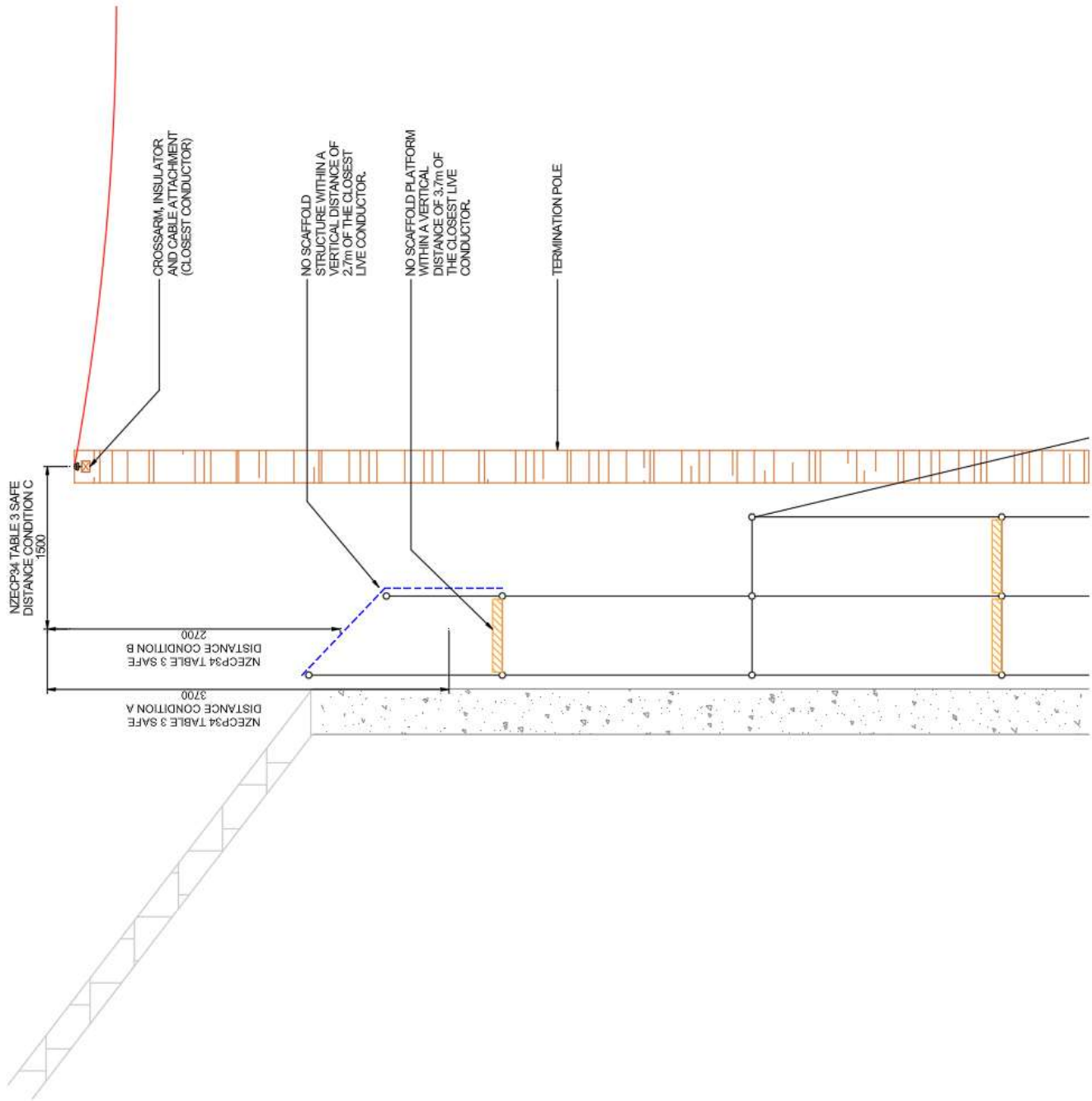
As nearly all termination pole cases involve low voltage conductors, the following text and imagery is based upon low voltage scenarios.

The adjacent images detail how the horizontal clearances apply to termination poles. This assumes that the closest live conductor is installed on the crossarm.



If the horizontal clearances cannot be maintained, then the scaffold structure needs to be considerate of NZECP34 Table 3 vertical safe distance conditions A and B. No scaffold platform can be within condition A distances, and no scaffold component can be within condition B distances. This may

require the construction of an engineered scaffold similar to that of the following image below. This assumes a pole without lean.



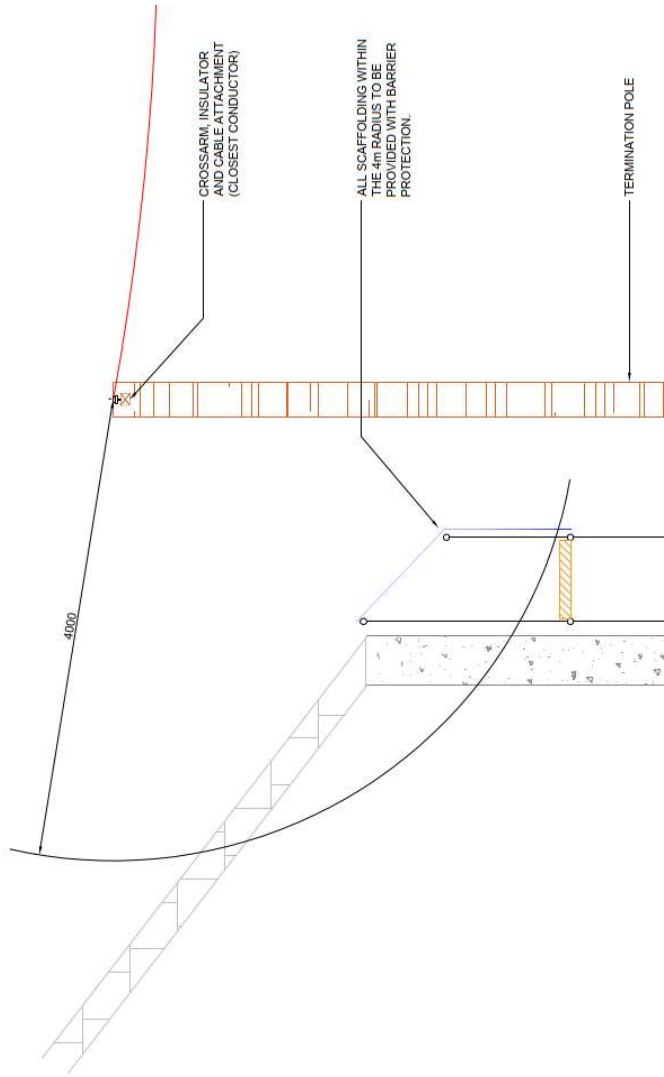
5.2. PCBU and Minimum Approach Distances

If the scaffolding structure is being assessed against NZECP34 Table 3 condition C, it is probable that the clearances need to also be assessed against NZECP34 Clause 9.2.1(a). It is recommended that the non-competent person rule is applied (4m) as it is not always possible to monitor the movement of all PCBUs upon a site. It is also unlikely that only skilled electrical workers will need to be working on the scaffolding adjacent the conductor.

The clearance assessment must also consider a 4m radius from the closest conductor to determine where physical protection is required on the outside of the scaffold.



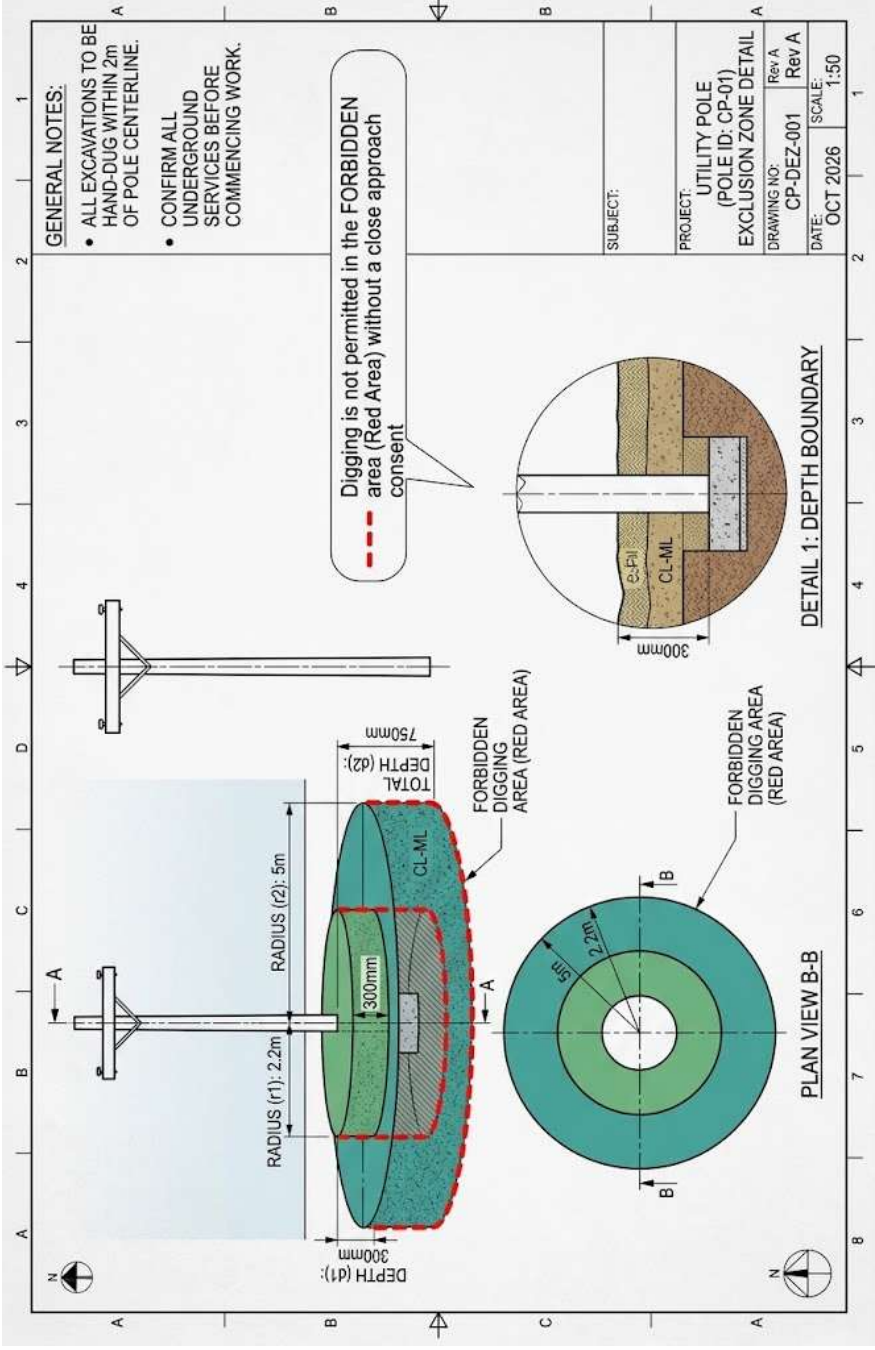
Netting installed to prevent workers being able to access within 4m of the nearest conductor



5.3. Excavation

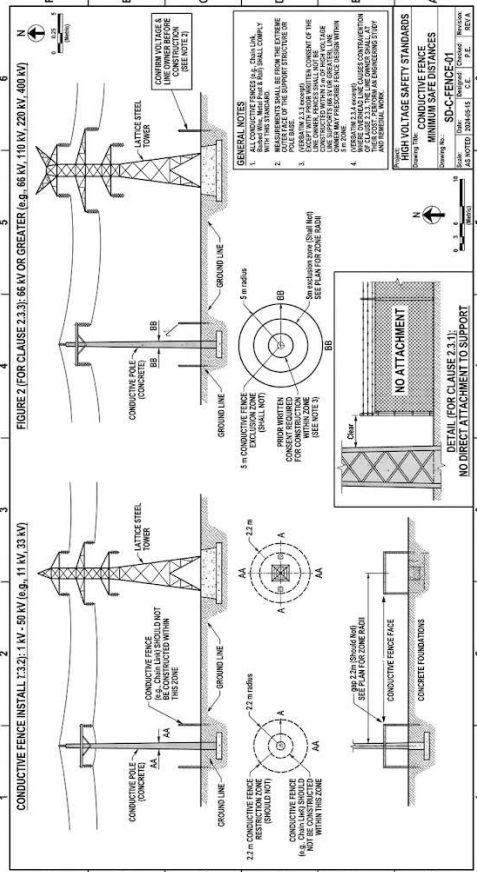
The architectural plans must be assessed to determine if there are any proposed excavations close to the pole and how these compare against the parameters of NZECP34 Section 2.2.1.

This is to determine the likelihood of a strike of an underground service cable, or if there may be planned works that affect the existing conditions and stability of the pole.



5.4. Fencing

The survey must also assess the planned fencing on the property and how this complies with NZECP34 Section 2.3.



5.5. Ground Clearance

If the survey has included cable spans, the heights of the cables above ground at their lowest point/sag must be determined. This is to ensure compliance with NZECP34 Table 4.

The purpose of this assessment is to notify the Lines Company or asset owner of any network non-compliances, rather than how any building works may or may not be compliant.

Circuit voltage	Vertical distance to ground (m)			Radial distance (m)
	Across or along roads or driveways	Any other land traversable by vehicles (including mobile plant) but excluding across or along roads or driveways	Any land not traversable by vehicles (including mobile plant) due to its inaccessibility (e.g. steepness or swampiness)	In any direction other than vertical on all land
Not Exceeding 1 kV and insulated	5.5	4.0	2.7	2
Not Exceeding 1 kV	5.5	5.0	4.5	2
Exceeding 1 kV but not exceeding 33 kV	6.5	5.5	4.5	2
Exceeding 33 kV but not exceeding 110 kV	6.5	6.5	5.5	3
Exceeding 110 kV but not exceeding 220 kV	7.5	7.5	6.0	4.5
Exceeding 220 kV a.c. or d.c.	8.0	8.0	6.5	5