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Background

What's the point of a meeting, anyway?

Fatal foundation failure in 2011

A number of contributing factors in this, however the foundation was identified in the QA of the pole installation which led to the site being revisited and subsequently climbed.

Consequences?

- ✗ Increased detail on designs, with specific placement & / or poles pegged on site
- ✗ Detail of the foundation shown (depth, aggregate, donut, blocks placement etc..)
- ✗ Notes to specify backfill material

Generally, adherence to AS/NZS 7000

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Where are we today



- ✗ It is reasonable to suggest that our industry approach to line construction and pole replacements has seen a marked improvement in recent years.
- ✗ As we continue to improve and refine our design focus, we inevitably begin to dive deeper into other connected components of the structure and its supports.
- ✗ This naturally starts with standardizing materials components and configurations, conductor types, regional loads maps and in some cases soil maps.
- ✗ The challenge here is that many of these factors can be reasonably defined and be consistent & have sufficient redundancy to withstand significant events. However, soils can and do vary considerably within a comparatively small area.

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Aurora's Network



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Aurora's Network



- ✘ Covers a broad region, Coastal & Central Otago
- ✘ Has a number of approved contractors (6 or so)
- ✘ They all have different installation methodologies (ie. use of hole boring, hydro vac & / or back-hacker)
- ✘ With numerous soil ground types, such as Greywacke, Basalt, Clays, Alluvial gravels / schists, reclamation silts & low level tidal (Sth Dunedin), drained wetlands (Taieri Plains etc..).

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Our Standard Approach



- ✘ We (at Aurora) have traditionally specified "compacted stabilised cement backfill" on our designs. This was AP40 gravel compacted in layers, not exceeding 150mm, 10% cement by weight.
- ✘ 900Dia x 1.8m deep – 4 x 40kg cement bags.
- ✘ 600Dia x 3.2m deep – 3 x 40kg cement bags.
- ✘ 750Dia x 3.2m deep – 5 x 40kg cement bags.
- ✘ 900Dia x 3.2m deep – 8 x 40kg cement bags.
- ✘ Its fair to say that we don't effectively QA this other than identifying embedment issues or sloping ground.
- ✘ Also during the Fastrack Pole replacement in 2016/17 a number of process "improvements"; predominately to free up Lines resource were introduced. These were around third party excavation, pre-bagged backfill to site and TMC.

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Considerations

- ✘ We (at Aurora) have traditionally specified "compacted stabilized cement backfill" on our designs. This was AP40 gravel compacted in layers, not exceeding 150mm, 10% cement by weight.
- ✘ We appreciate that pole foundation design is an important part of achieving safety for the public and for our contractors who attach themselves to our poles. Although in some cases our requirement for cement is likely to be conservative, erring on the side of caution/safety.
- ✘ In late 2019 one of our Contractors questioned Aurora over the use of cement in its standard approach to foundation reinforcement, principally from a Health & Safety perspective.
- ✘ Our conservatism is leading to a cement handling safety risk and we agree that we need to find a Safety in Design method that eliminates or reduces the need for other safety control measures (e.g. dust masks).
- ✘ The aggregates used in the standard Portland cement used to "blend" with either AP20 or AP40 backfills has been identified as a health risk..

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Cameron's Slides

- ✘ Add notes

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Our Learnings 

- ✗ It's what's underneath that matters
- ✗ Even good foundations may only be half the rating of the pole
- ✗ Compact....Compact....Compact
- ✗ B
- ✗ Y
- ✗ O
- ✗ B

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Our Learnings 

- ✗ It's what's underneath that matters
- ✗ Even good foundations may only be half the rating of the pole
- ✗ Compact....Compact....Compact
- ✗ Bring
- ✗ Your
- ✗ Own
- ✗ Backfill

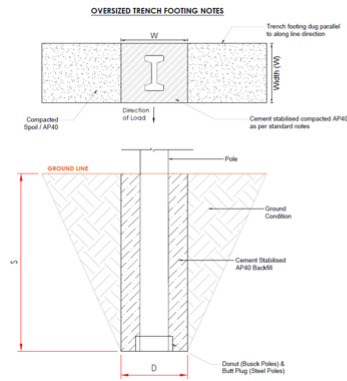
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Where from here?



- ✘ Universal foundation specification and methodology
- ✘ Tested
- ✘ Specific
- ✘ Measurable
- ✘ Achievable
- ✘ Repeatable



Note

- Standard footing may not achieved rated capacity of pile. Further heel/crest block may be required. Designer to check foundation capacity in accordance with AS/NZS 700:2016.
- Firm gravel, sand, silts, or clay ground have been adopted for the standard design.
- If weak ground conditions are encountered it will require specific engineering design.
- Pole foundations are to be backfill with cement stabilised AP40 gravel compacted in layers not exceeding 150mm thick, 10% cement by weight.

Cement Quantity			
Hole Diameter / Width (D)	Depth (D)	Cement / Bag	Quantity
600mm	1800mm	20kg	4
	2100mm	20kg	5
	2400mm	20kg	6
900mm	1800mm	20kg	7
	2100mm	20kg	9
	2400mm	20kg	10
1200mm	2100mm	20kg	12
	2400mm	20kg	15

- Cement to be evenly blended through AP40 backfill at ~10% cement. Ratio prior to placement in footing.
- Fill to be shovelled (not dumped) into footing.
- Each layer to be compacted using pneumatic hand rammer. Compaction to be between 1-2mins per layer.
- Where footing are oversized due to the use of an excavator, please refer to relevant notes.