

TIMBER POLE DEEP PILE FOUNDATION



Six-storey 87-apartment buildings, Otahuhu, Auckland, NZ

Deep Pile Foundations using timber poles were designed for a new six-storey precast concrete 87-apartment building complex in Otahuhu, Auckland.

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Project background:

Six-storey 87-apartment buildings, Otahuhu, Auckland, NZ

- Foundations for a new six-storey precast concrete 87-apartment building complex were required.
- The ground conditions were soft clay, sand, and peat.
- The foundations were completed in 2019.

Project challenge:

- The client required a more economical foundation solution to the expensive screw pile (installed to 25m depth) option they had been given.
- The client had been quoted a time frame of 3 months for foundation installation but required a quicker option.
- The foundations needed to be able to support the weight of six-storey precast concrete 87-apartment buildings.
- The design had to achieve high design loads – both compression and tension.
- The ground conditions were very soft clay, sand, and peat.
- The project had to be cost effective or it would not be economical to proceed.
- H5 treated Radiata Pine timber piles were determined as the best solution to be installed down to the founding layer.

The NZ Ground Control solution:

- Static Load Testing (compression) was carried out to 2,400 kN to prove the efficacy of the proposed foundation solution.
- The Static Load Test took 8 hours per pole using a purpose-built test rig capable of 3,000 kN loads.
- Pile Driver Analyzing (PDA) testing was also carried out to verify the Static Load Test results.
- PDA results indicated half the load was achieved through skin friction from the Uglie poles.
- Uglie poles and MultiPole Uglie poles, 10.0m x 450mm SED, were identified as being able to satisfy the stringent foundation requirements.
- Uglie poles, 10.0m x 400mm SED, were used to construct a separate crane foundation pad 7.5m x 7.5m square for the construction tower crane.
- The poles provided a flush foundation with no tie rods protruding which meant that pre-made steel cages could be easily installed rather than constructed on site. This combined with rapid pole installation (only 3 weeks) meant that the overall construction programme was ahead of schedule by over 3 weeks.
- Static Load Testing (tension) to 750 kN was carried out after installation was complete.
- The foundation solution offered by NZGC cost approximately one-third of the original screw pile option.
- The 35 tonne installation equipment required a 150mm thick layer of gravel to be laid over the site to support access.
- Approximately 220 poles were installed for this project.



TOP: Static Load Test equipment

ABOVE: Steel cages installed on top of Deep Pile Foundation

LEFT: Installing reaction piles during setup for Static Load Testing