



Case Study for Planners & Architects
Use of Helical Piles Within Tree Root Protection Areas (RPAs)



Executive Summary

This case study outlines the suitability of **helical pile foundations** for development within or adjacent to **Root Protection Areas (RPAs)**, with particular relevance to **planning officers, architects, arboricultural consultants, and design teams**. Modern helical piling systems offer a **low-impact, BS5837-aligned foundation solution** that significantly reduces excavation, protects mature trees, and supports planning approval where constraints involve retained trees on development sites.

Planning Context & BS5837 Compliance

Development near mature trees typically triggers requirements under **BS5837:2012 – Trees in Relation to Design, Demolition and Construction**.

Key constraints:

- Avoiding excavation within RPA
- Preventing root severance
- Minimising soil compaction
- Maintaining natural hydrology
- Designing structures to coexist with retained trees

Helical piles directly address these constraints by providing a **minimal-dig foundation approach** that preserves root systems and prevents long-term arboricultural damage.

Why Helical Piles Are Suitable for Use in RPAs

✓ Minimal Root Disturbance

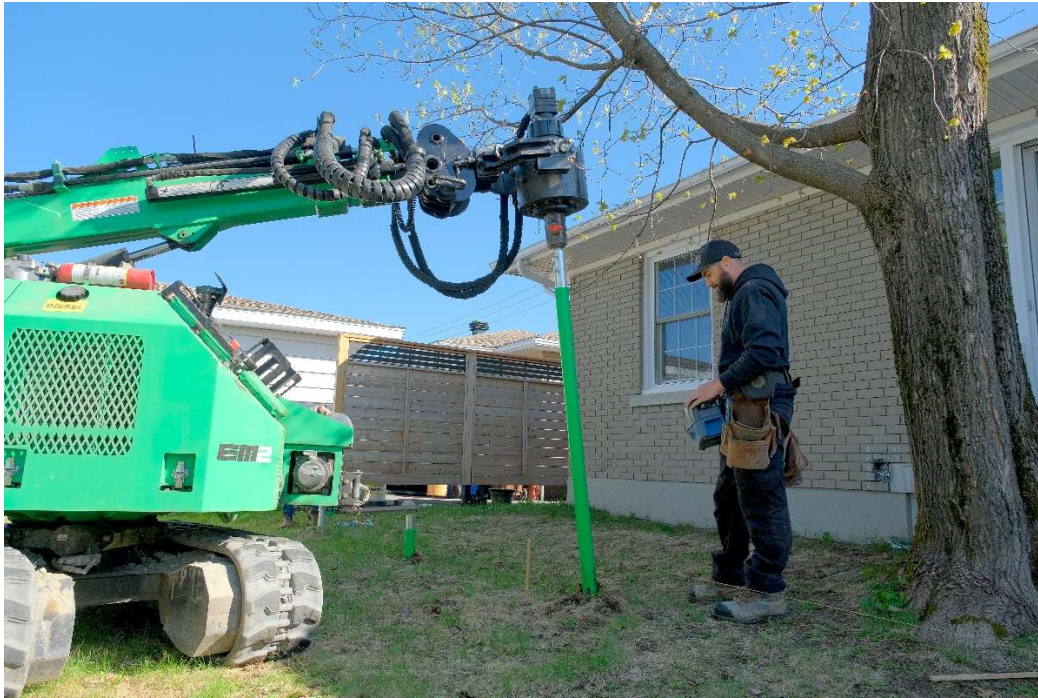


Hot-dip galvanisation provides 60-70 years of corrosion resistance with no impact on soil alkalinity over the same period. Green sleeve on the shaft reduce soil contact with pile shaft allowing for movement with the ground during heaving events which keeps pile foundations stable in all weather conditions.

Helical piles are installed by **rotational penetration**, requiring *no trenching* and causing significantly less disturbance to roots compared to conventional concrete excavation. Helix whilst driven cuts through the soil with front edge only and progressively drives shaft into the ground without further disturbance. Only area of direct ground penetration is reduced to diameter of the pile shaft – this depends on application and varies from 75mm/2.5” to 125mm/5”.

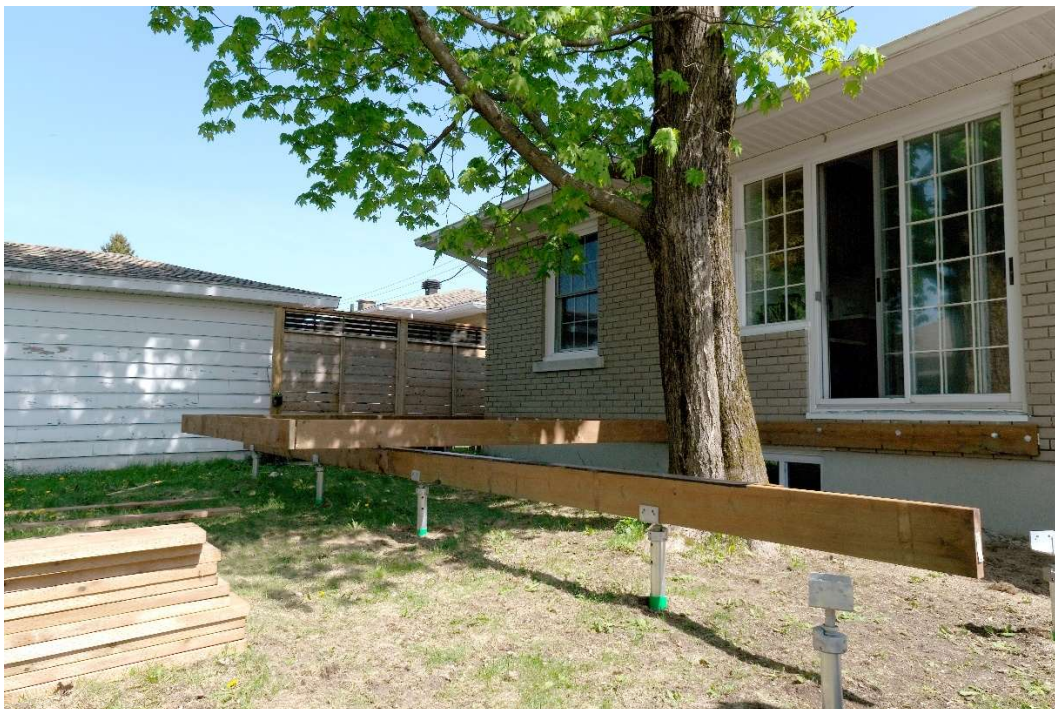
During foundation layout design process distance from protected tree and main roots is considered aiming at distance from tree trunk greater than 1.0m. Selection of helix diameter is guided mainly by ground conditions and load distribution, near trees smaller helix diameter is selected to avoid excessive ground disturbance – this involves deeper ground penetration and load transfer below root zone.

✓ Reduced Soil Compaction



Concrete pads distribute point loads into surrounding soil, increasing compaction within the RPA.

Helical piles distribute loads vertically, through **helical bearing plates**, avoiding lateral stress on key roots. Standard length of the pilot pile is 2.0m with further extensions of the same length added (subject to loadbearing expectancy) places bearing plate deep in the ground avoiding compression of upper layers of the soil.



✓ Low-Impact Machinery

EM-1 Specification

Dimensions (L x l x H) : 2362mm x 1219mm x 1676mm (93" x 48" x 66")

Weight : 2,025kg (4,464lb)

Maximal height of mast: 3,683mm (145")

Mast rotation : 360°

Maximum installation out-reach : 1.4-2.9m

Minimum clearing required for installation: 203 mm (8")

Maximally allowable bearing capacity in compression per single installed TMP helical pile: 150 kN (33,750 lb)



Specialised compact machinery (as used by Techno Metal Post) accesses constrained sites such as gardens, courtyards, or tree canopies with very low ground impact. Use of tracked drivetrain due to increased contact area reduces pressure of operating machine on the soil below 0.4kg/cm². Additionally working practice involving maximum outreach of mast reduces impact of machine weight on immediate tree vicinity.

✓ No Excavation, No Spoil Removal & No Concrete



Traditional footings require excavation, spoil removal, shuttering, and concrete pouring — all highly disruptive around trees. Helical piles eliminate these processes entirely.



✓ Immediate Bearing & Rapid Installation



Concrete requires curing; helical piles can be loaded immediately. This reduces project timelines and supports staged construction when working around ecological or planning constraints.





Technical Benefits for Architectural & Structural Design

Predictable Load Path & Engineered Performance

- Torque-correlated installation ensures each pile reaches verified bearing strata.
- Real-time load capacity calculations improve reliability and reduce over-design.

Suitable for Complex or Sensitive Sites

Helical piles can bypass obstructions (roots, services, soft soils) and reach stable ground, making them ideal for:

- Extensions near trees
- Garden structures
- Boardwalks and platforms
- Lightweight buildings adjacent to sensitive landscapes

Reversible & Low-Carbon Solution

Helical piles can be removed and reused and avoid the carbon footprint associated with cement production.

Advantages vs Traditional Concrete Foundations

Criteria	Helical Piles	Concrete Footings
Root disturbance	Very low (no excavation)	High (requires digging)
Soil compaction	Minimal	Significant
Installation time	Hours; immediate load capacity	Days; curing required
Impact on RPA	Very low	Substantial
Ground access	Compact machinery	Large machinery often required
Environmental impact	Reusable steel, no spoil	High concrete footprint

Planning Benefits

Using helical piles within RPAs assists planning approval by demonstrating:

- A committed effort to *retain and protect mature trees*
 - Compliance with **BS5837** construction principles
 - Minimised ecological and hydrological disturbance
 - Reduced long-term risk of tree decline (preventing TPO complications)
 - A construction methodology that can be included directly within AMS & Tree Protection Plans
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