

# TIMBER POLE RAFT FOUNDATION FIELDS OF APPLICATION

## Technical Overview

The Raft Foundation is a specifically engineered timber surface structure with a shallow foundation using vertical UniLog jack studs<sup>1</sup> supported by MultiPole UniLog<sup>2</sup> timber rounds as horizontal primary and secondary foundation beams in a perpendicular lattice. It is a proven foundation solution for MBIE Guidance<sup>3</sup> sites classified TC3 or TC2 including those in the major lateral stretch category.

## Raft Foundation Field of Application

<b>Foundation Technical Category (TC)</b> (MBIE technical categorization of residential properties)	TC3 or TC2
<b>Global lateral movement category</b> (Lateral movement of a site)	Major, 300 to 500mm
<b>Lateral stretch category</b> (Lateral stretch of the ground surface across a building footprint)	Major, 200 to 500mm
<b>Subsoil Ultimate Bearing Capacity (UBC)</b> (Theoretical maximum pressure which can be supported without failure, measured at the base of the foundation)	100kPa or less, with specific design (normal ground 300kPa)
<b>Vertical land settlement Serviceability Limit State (SLS) Index Value</b> (Vertical consolidation settlement calculated over the upper 10m of the soil profile under SLS loadings)	The Raft Foundation can accommodate vertical land settlement up to 200mm in the first 10m under an SLS seismic event
<b>Foundation type</b> (Residential, commercial, timber, concrete or combined floors, stepped ground, transport infrastructure, Types 2A, 2B, 3A)	The Raft Foundation is an alternative surface structure with shallow foundation
<b>Repair options after major event</b>	Timber floor can be easily relevelled. Concrete floor can be re-levelled using cast-in jacking screws

## Raft Foundation features

### Structure

The Raft Foundation is a lightweight surface structure with a shallow foundation. MultiPole UniLog foundation beams (primary and secondary) are laid in a specifically designed perpendicular lattice, so that their tops are at, or below ground level. Cantilevered MultiPole UniLog jack studs are fixed to the intersections of the beams.

## Benefits

Lightweight surface structure





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Raft Foundation features	Benefits
<p><b>Loss of ground support criteria</b> The Raft Foundation has been designed to withstand a 4m internal span and 2m at the edge from loss of ground support without exceeding 1:400 and 1:200 curvatures respectively as per MBIE Guidance.</p>	<p>Designed to offer the same level of performance as a TC3 Type 2B surface structure</p>
<p><b>Suspended timber floor structure</b> A suspended timber floor structure as per NZS 3604 is supported on the UniLog jack studs. The finished floor level is generally 600mm above the ground surface.  The floor height can be increased after specific design.</p>	<p>Provides 450mm crawl space for ease of access and repair  Meeting flood level requirements</p>
<p><b>Concrete floor</b> A suspended concrete floor system designed for a light vehicle load or a concrete floor slab on ground (over secondary foundation beams) can be included in the design.</p>	<p>Mixed floor types can also be accommodated within one Raft Foundation</p>
<p><b>Raft Foundation footprint</b> The Raft Foundation footprint is generally within the building footprint.</p>	<p>The building can be constructed close to site boundaries</p>
<p><b>Gravel raft</b> In many cases the gravel raft underneath may be avoided or reduced (in comparison with the standard Type 2A and 2B solutions) depending on the geotechnical conditions of the site and the specific design of the Raft Foundation.</p>	<p>Dig-out for a Raft Foundation pit is generally 550mm deep, resulting in a more economical construction cost</p>
<p><b>Excavated material</b> Excavated material, including contaminated material, from the Raft Foundation excavation pit can be re-used and compacted between foundation beams (if suitable).</p>	<p>Compacted material increases global lateral resistance of the Raft Foundation, provides some resistance to impede the liquefaction ejecta to breach through the compacted layer, and minimizes removal of material from site</p>
<p><b>Installation time</b> The completion of a Raft Foundation to top of UniLog jack studs is generally very rapid.</p>	<p>Quick installation time</p>
<p><b>Site specific design</b> Site specific design and installation of Raft Foundations has been carried out on sites with worse ground conditions than allowed for in the Guidance, such as 30kPa ground with 50m peat; ground with 600mm lateral stretch. Site specific design factors that are taken into account also include the importance level of the building, the required end use, specific loads required, and building construction materials. Refer to Case Studies for further information.</p>	<p>Site specific design for ground conditions outside the Guidance categories</p>

<sup>1</sup> UniLog jack studs are Radiata Pine solid timber rounds machined to a uniform diameter. They are treated to H5 with CCA Oxide timber preservative after scalloping.  
<sup>2</sup> MultiPole UniLog foundation beams are Radiata Pine timber rounds that have been machined to a uniform diameter with a hollow core. They are treated to H5 with CCA Oxide timber preservative after drilling enabling excellent penetration.  
<sup>3</sup> Ministry of Business, Innovation and Employment (MBIE) Guidance – Version 3, dated December 2012 – “Repairing and rebuilding houses affected by the Canterbury earthquakes”. Whilst the MBIE Guidance was formulated in response to the Canterbury earthquakes it is increasingly being adopted as the reference standard for residential foundations New Zealand wide. The Guidance has also been updated as at 29 May 2018.

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