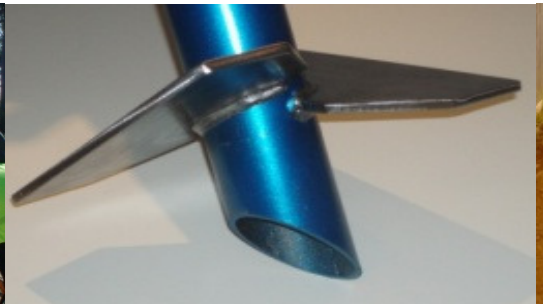
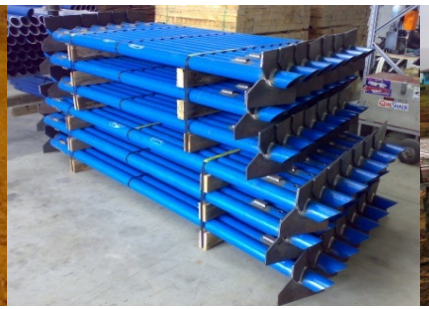
BLADE PILE

Group www.bladepile.com

It’s what’s down under that counts!

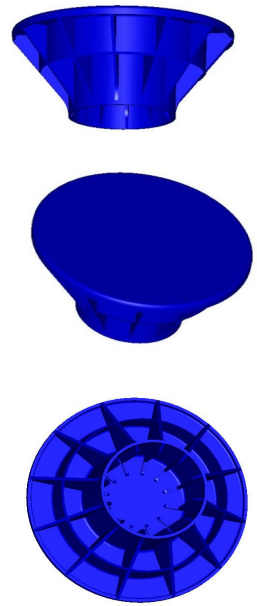



Patented Blade Pile & Pile Cap

BLADE PILE Group

www.bladepile.com

- Patent – The Worlds first ever structural slip joint pile cap
- Pile cap third party certified (Pearl Street) to 208 kN
- Patent – Blade pile design that outperforms screw piles
- Measured result at every pile location on installation
- Will perform where many other piles will not
- AS2870 compliance, Isolated pile for residential slabs
- AS2159 compliance, piling durability & performance
- Savings to developers & builders in direct costs & time



Blade Piles vs. Traditional Screw Piles

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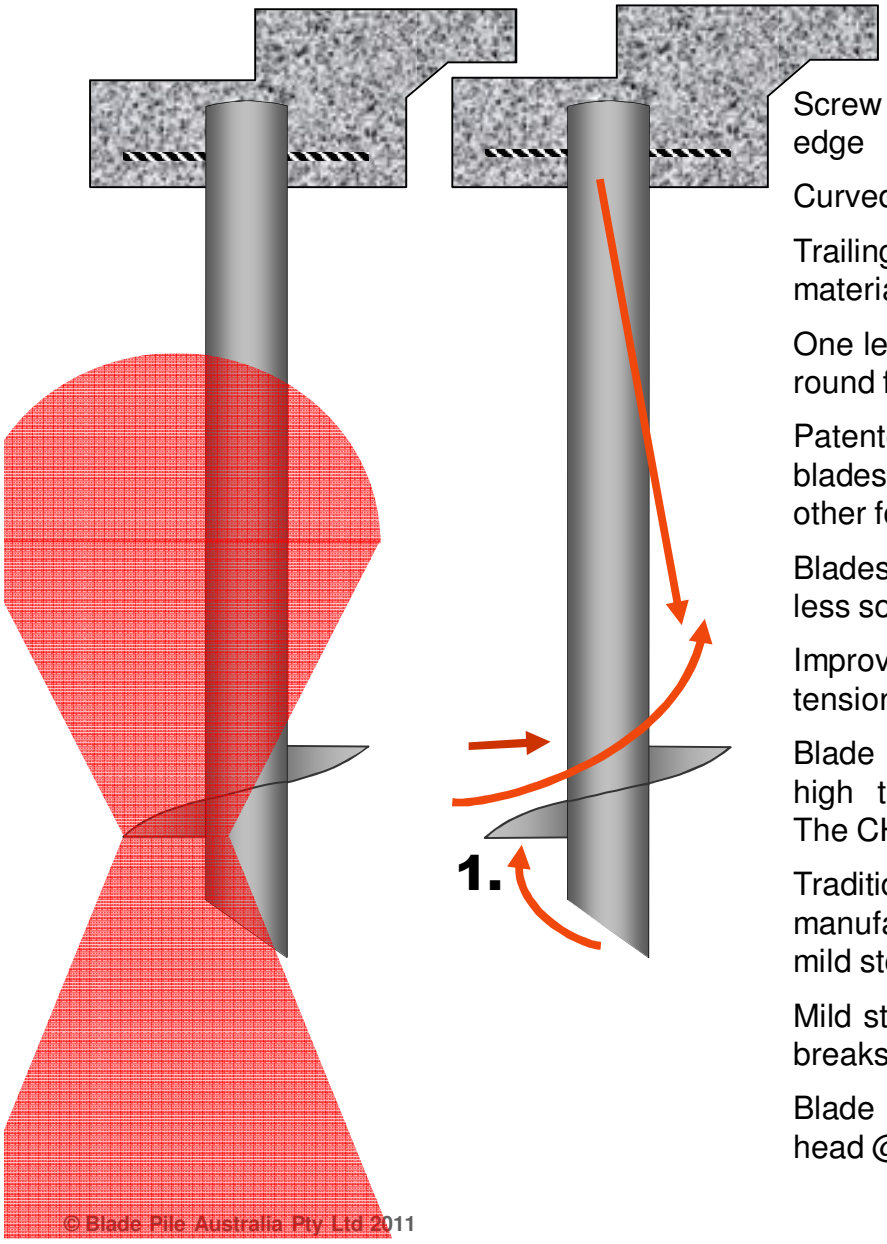


Screw piles have one leading edge

Curved pitch helix – Augers soil

Trailing edge in disturbed material

One leading edge creates out of round forces

Patented 'Blade Pile' has two blades to counter balance each other for improved verticality.

Blades 'sliver' into soil with less soil disturbance

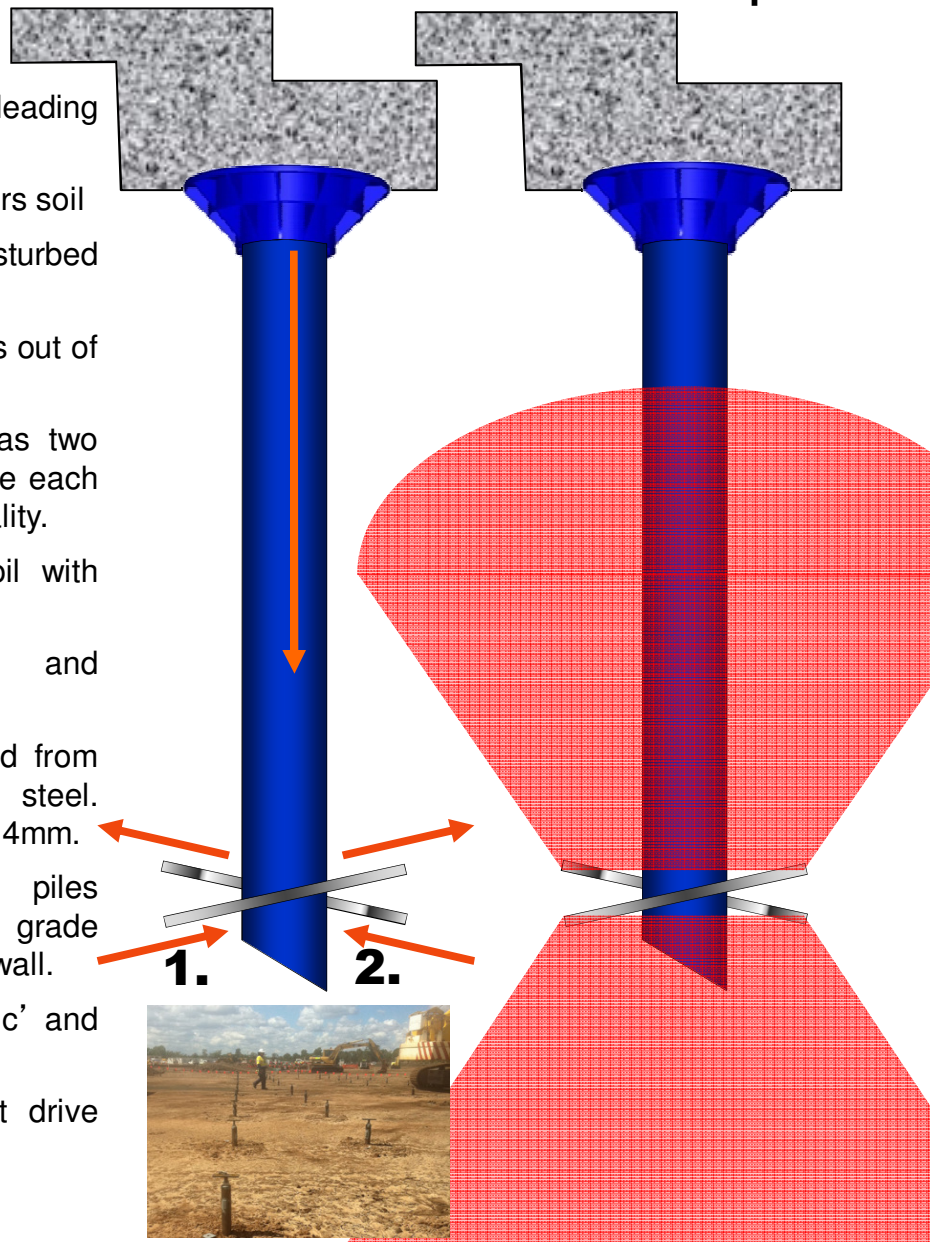
Improved compression and tension load capacity.

Blade Piles manufactured from high tensile 350 grade steel. The CHS pipe is 76mm x 4mm.

Traditional screw piles manufactured from 250 grade mild steel, with a 3.6mm wall.

Mild steel piles go 'plastic' and breaks @ 5,600 Nm.

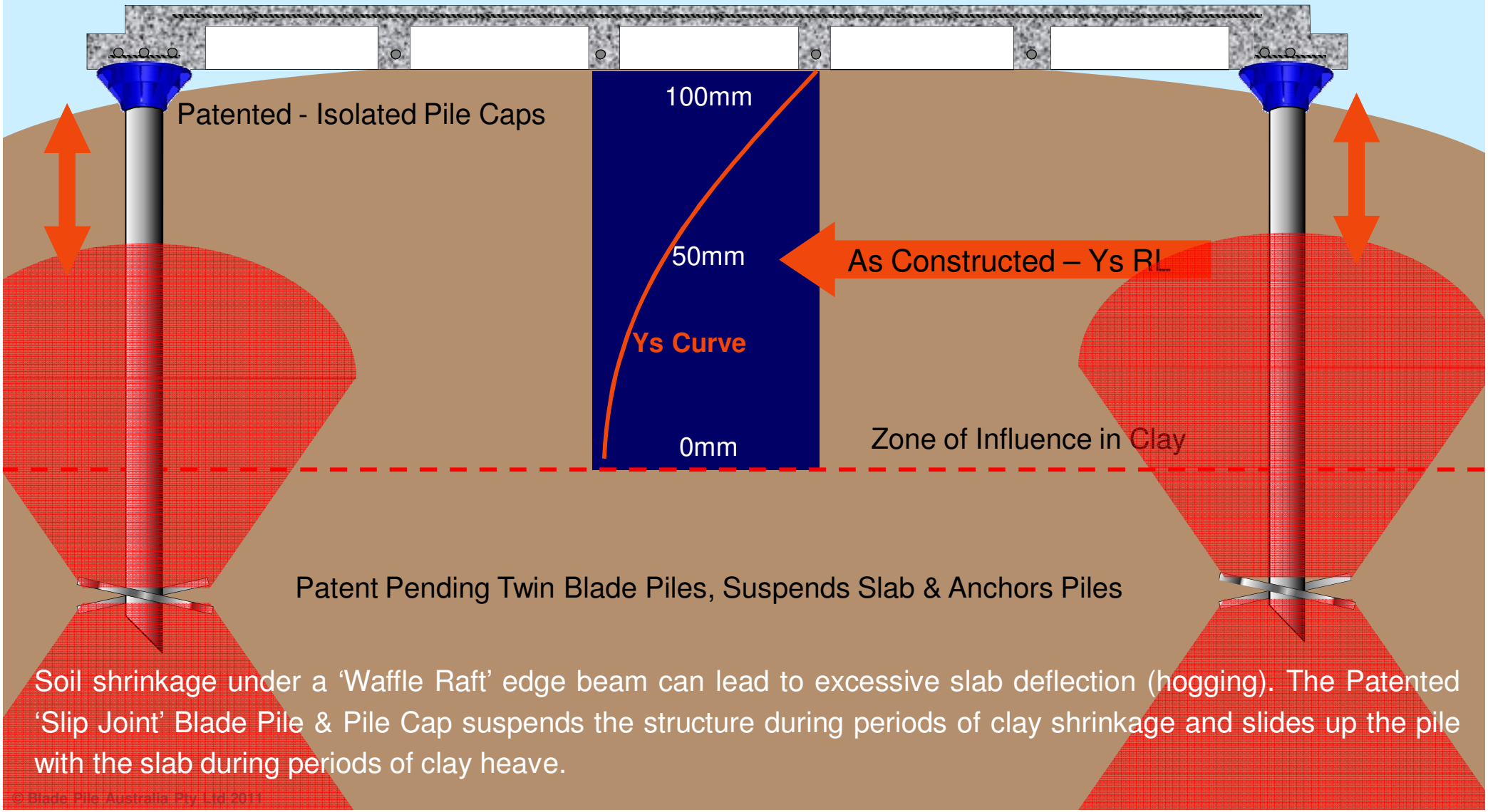
Blade piles 'shear' at drive head @ 11,600Nm.



Pile Cap Slab System – For M, H & P Sites

BLADE PILE Group

www.bladepile.com

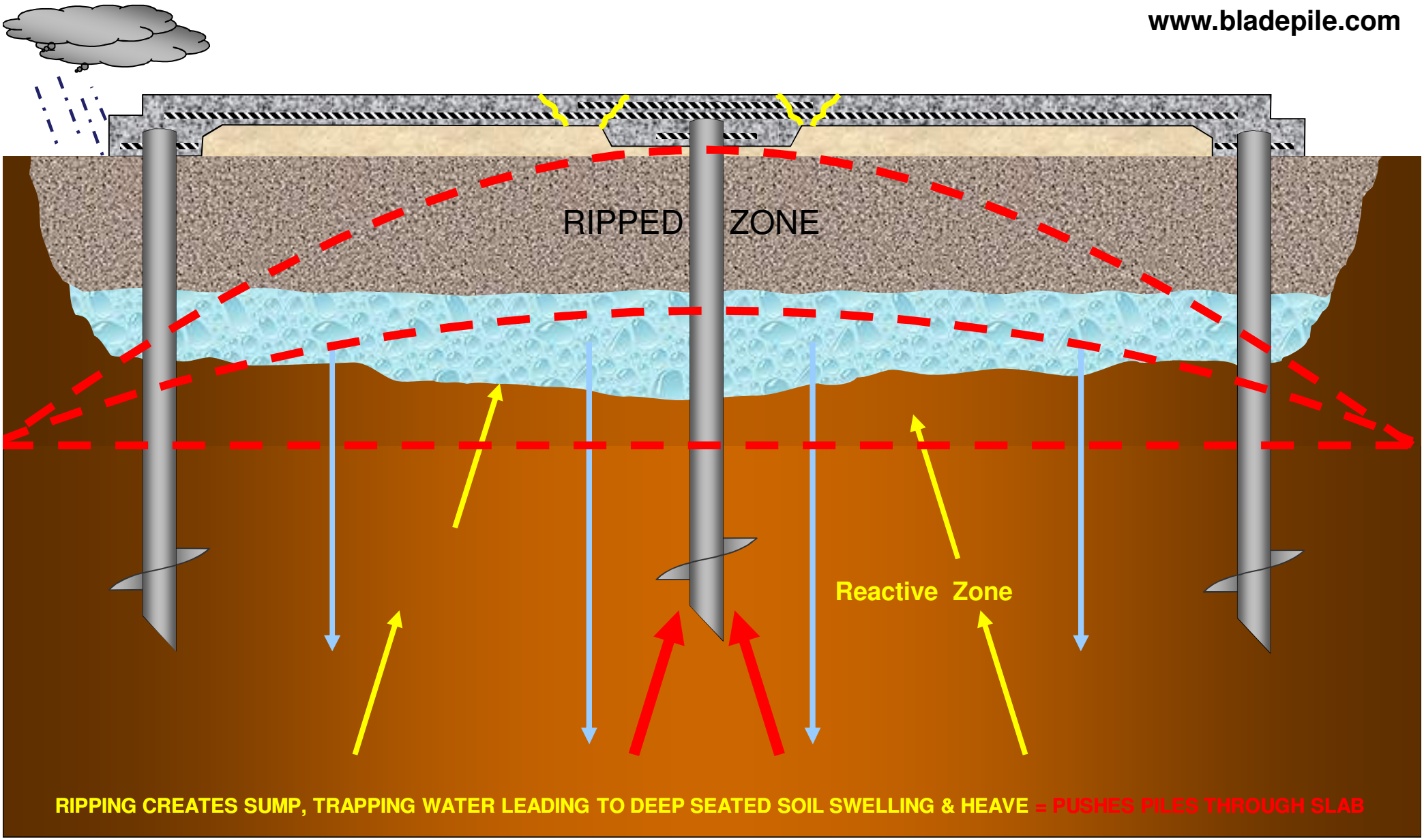


Soil shrinkage under a 'Waffle Raft' edge beam can lead to excessive slab deflection (hogging). The Patented 'Slip Joint' Blade Pile & Pile Cap suspends the structure during periods of clay shrinkage and slides up the pile with the slab during periods of clay heave.

Traditional Screw Pile Slab Designs for Reactive Clay Soils = Failures!

BLADE PILE Group

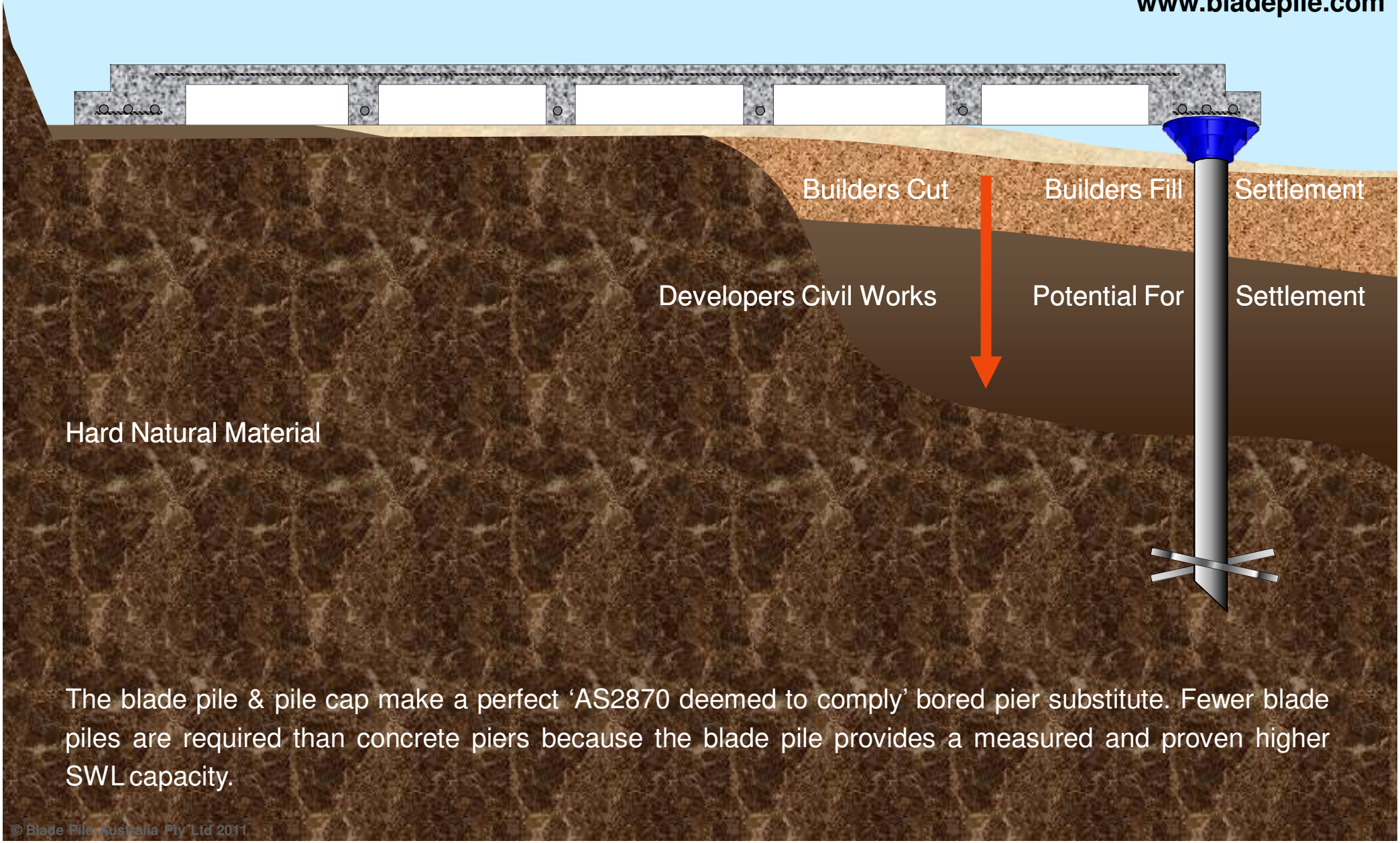
www.bladepile.com



Blade Pile & Pile Cap – For all P Sites

BLADE PILE Group

www.bladepile.com

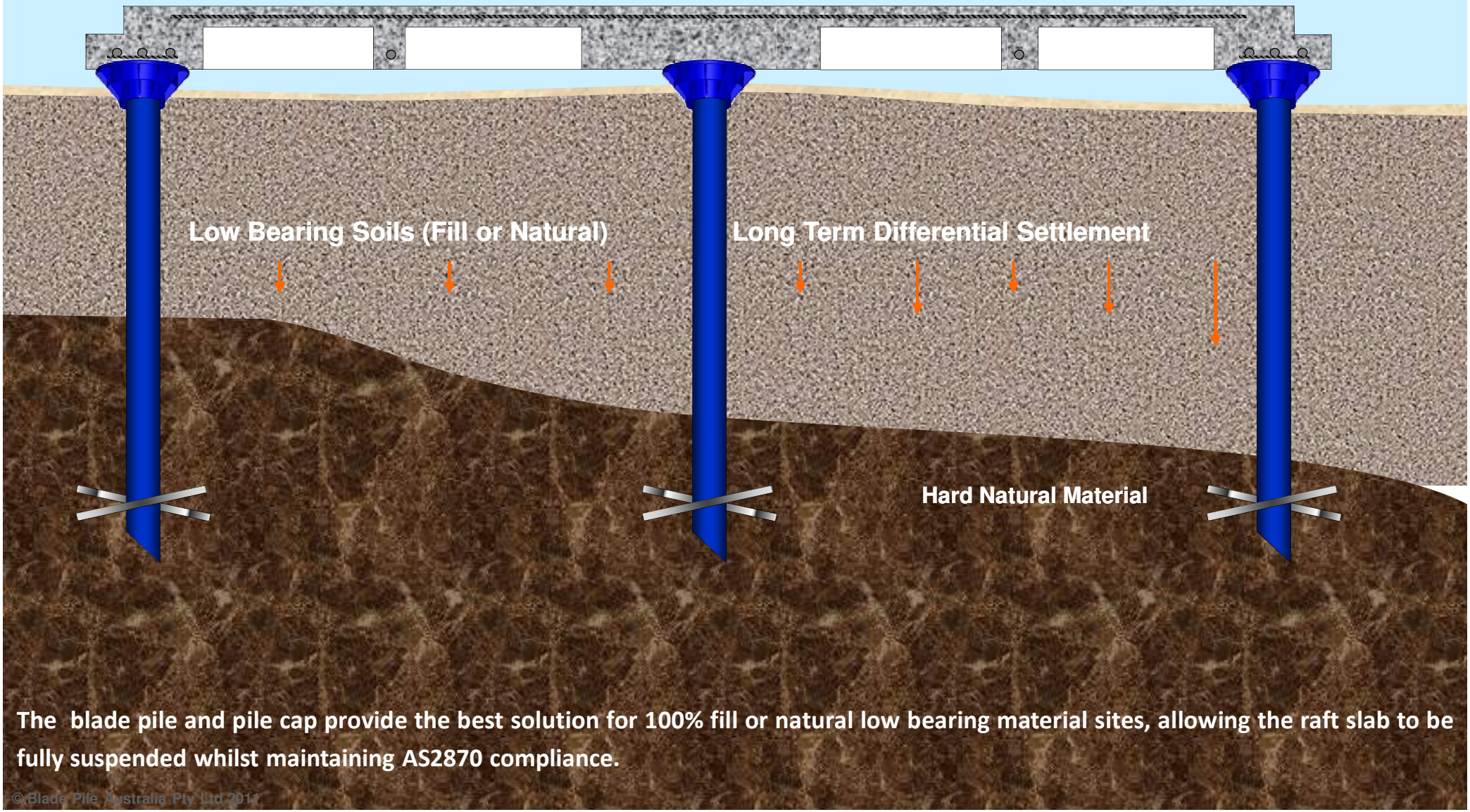


The blade pile & pile cap make a perfect 'AS2870 deemed to comply' bored pier substitute. Fewer blade piles are required than concrete piers because the blade pile provides a measured and proven higher SWL capacity.

Blade Pile & Pile Cap – For all P Sites

BLADE PILE Group

www.bladepile.com



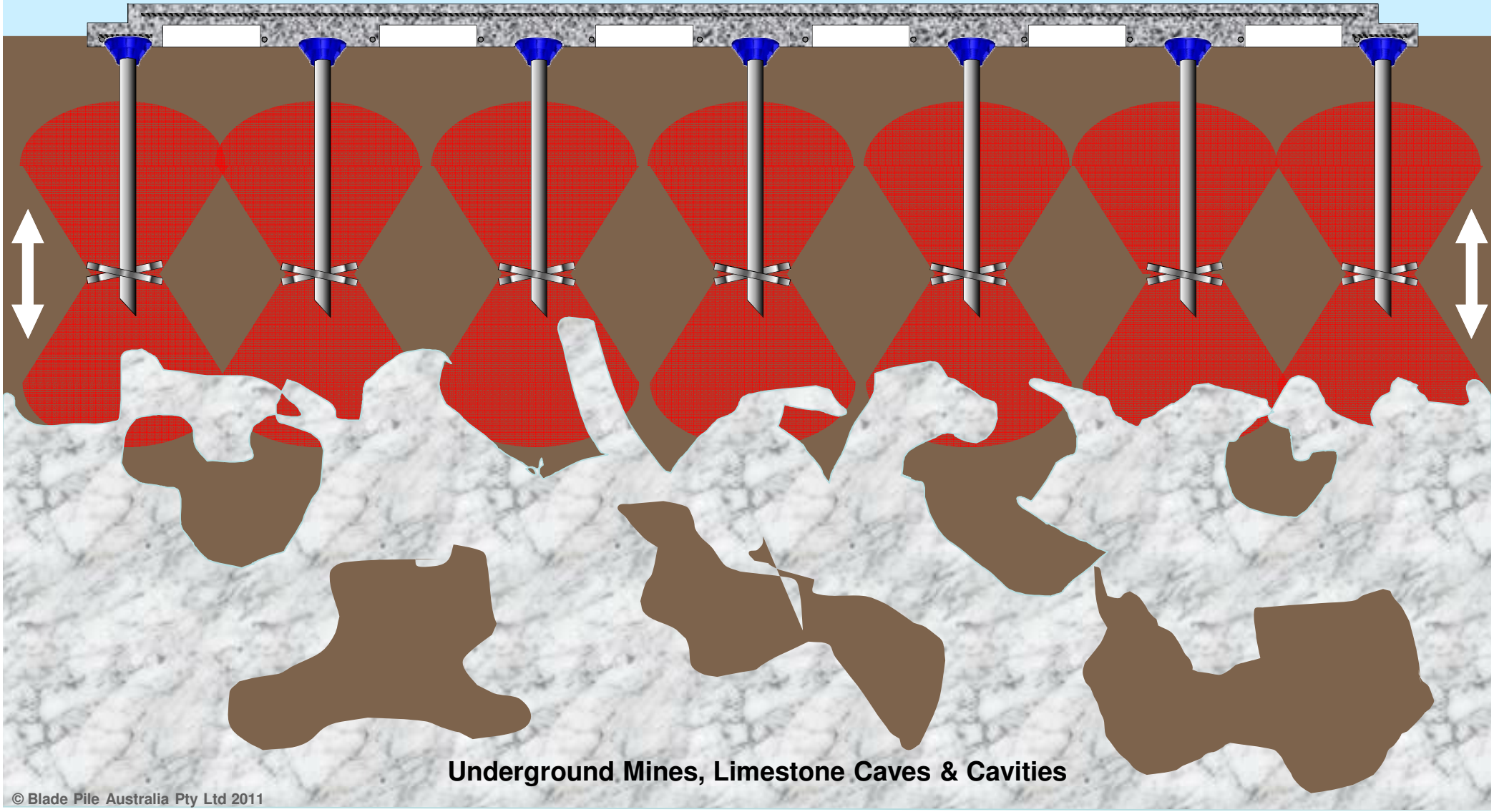
The blade pile and pile cap provide the best solution for 100% fill or natural low bearing material sites, allowing the raft slab to be fully suspended whilst maintaining AS2870 compliance.

Blade Pile & Pile Cap – For all Mine, Cave or Cavity Sites

BLADE PILE Group

www.bladepile.com

To prevent pile ‘punch through’, simply distribute load with MORE PILES to lessen load and create a softer ‘pressure bulb’

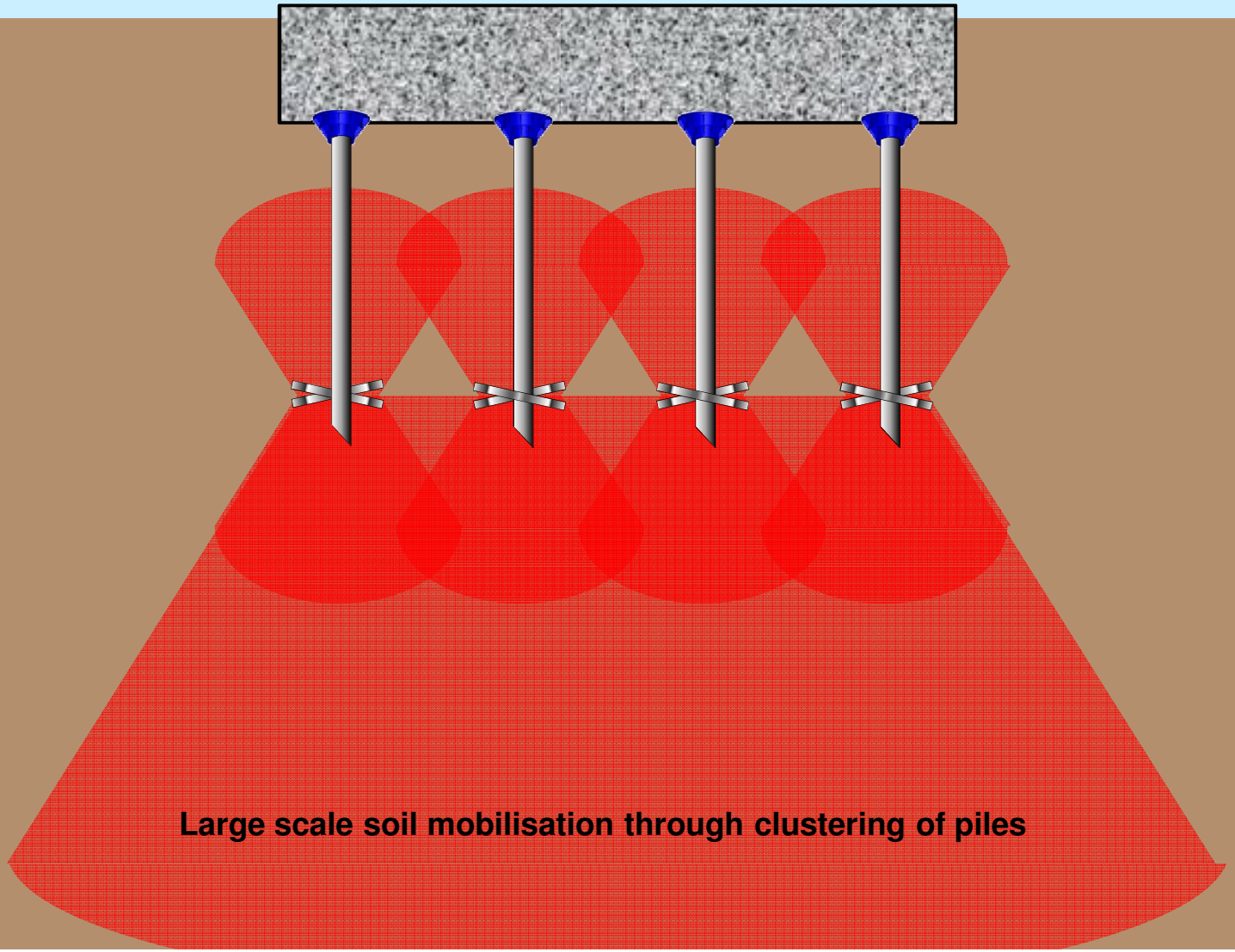


Underground Mines, Limestone Caves & Cavities

Blade Pile – Pile Cap Cluster Pack — For Raft or Engaged Pile Caps

BLADE PILE Group

www.bladepile.com

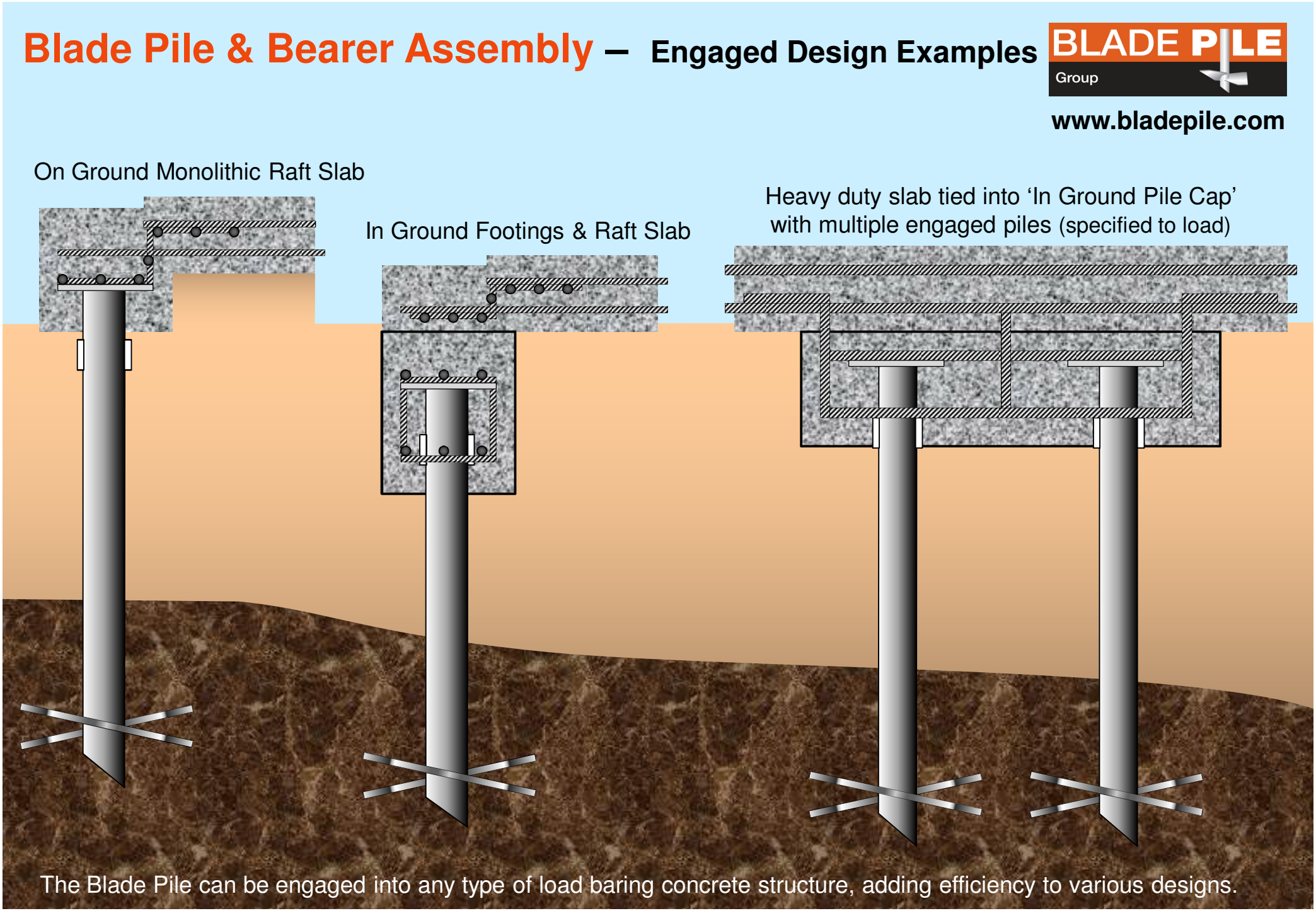


Large scale soil mobilisation through clustering of piles

Blade Pile & Bearer Assembly – Engaged Design Examples

BLADE PILE Group

www.bladepile.com



The Blade Pile can be engaged into any type of load baring concrete structure, adding efficiency to various designs.

Bracing Pile & Bearer Assembly – For ALL compression, tension & lateral loads

BLADE PILE Group

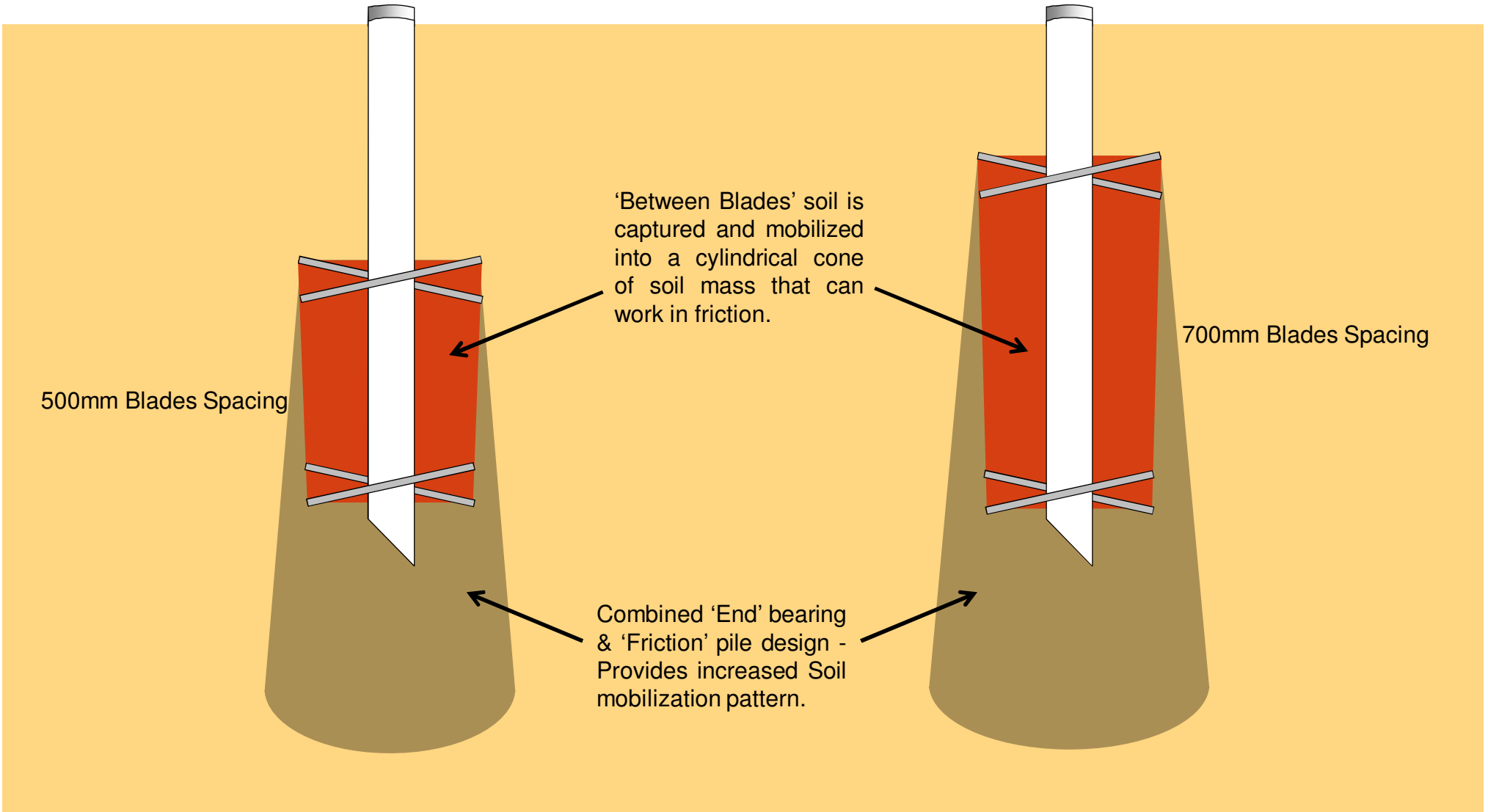
www.bladepile.com

Concrete, steel & timber beams can be supported & braced

The Bracing Pile & 'custom designed' Bearer Assemblies are 'fully adjustable' and will support ALL types of bearers & Joists, columns, posts and above ground structures

Hybrid Blade Pile - Both end bearing & skin friction with option to shape for added soil mobilization

www.bladepile.com



Earthquake Blade Pile - Design Overview

www.bladepile.com

‘Free Plate’ Spring Assembly

7 Ton rated spigot spring, sandwiched between & fusion welded into 10 mm x 200 mm square HT steel plates.
Bottom HT steel plate fusion welded to ‘male’ Blade Pile connector.

Lateral Bracing Fin Assembly

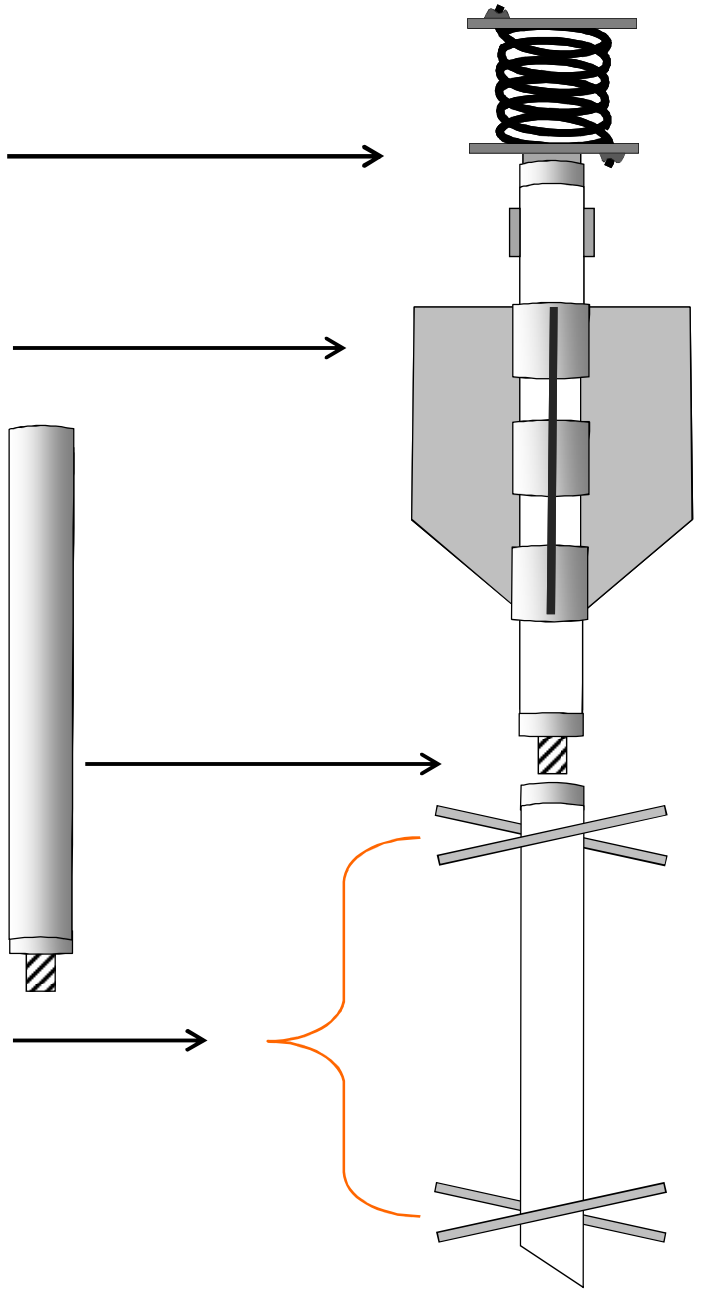
The bracing fin assembly rotates freely and is pulled down into the soil by the pile during install, mobilizing an enlarged ‘bulb’ of soil within and surrounding the fin assembly to provide high levels of lateral bracing to resist above or below ground lateral forces. During periods of ‘liquefaction’ the fin assemblies are released, to allow the full length of the pile to absorb energy between the ‘lateral lock’ blades at the base of the pile and the free plate spring assembly at the top of the pile.

Blade Pile Extensions

Multiple 1, 1.5 or 2.0 metre screw lock extensions are fitted between the ‘lateral lock dual twin blade units’ and the ‘lateral bracing fin assemblies’, the number of extensions is determined by the ‘spring flexibility’ in the total pile length and also the required depth to ensure the end bearing load is below the ‘zone of liquefaction’ which is relative to the targeted earthquake Richter scale.

Lateral Lock – Dual Twin Blades

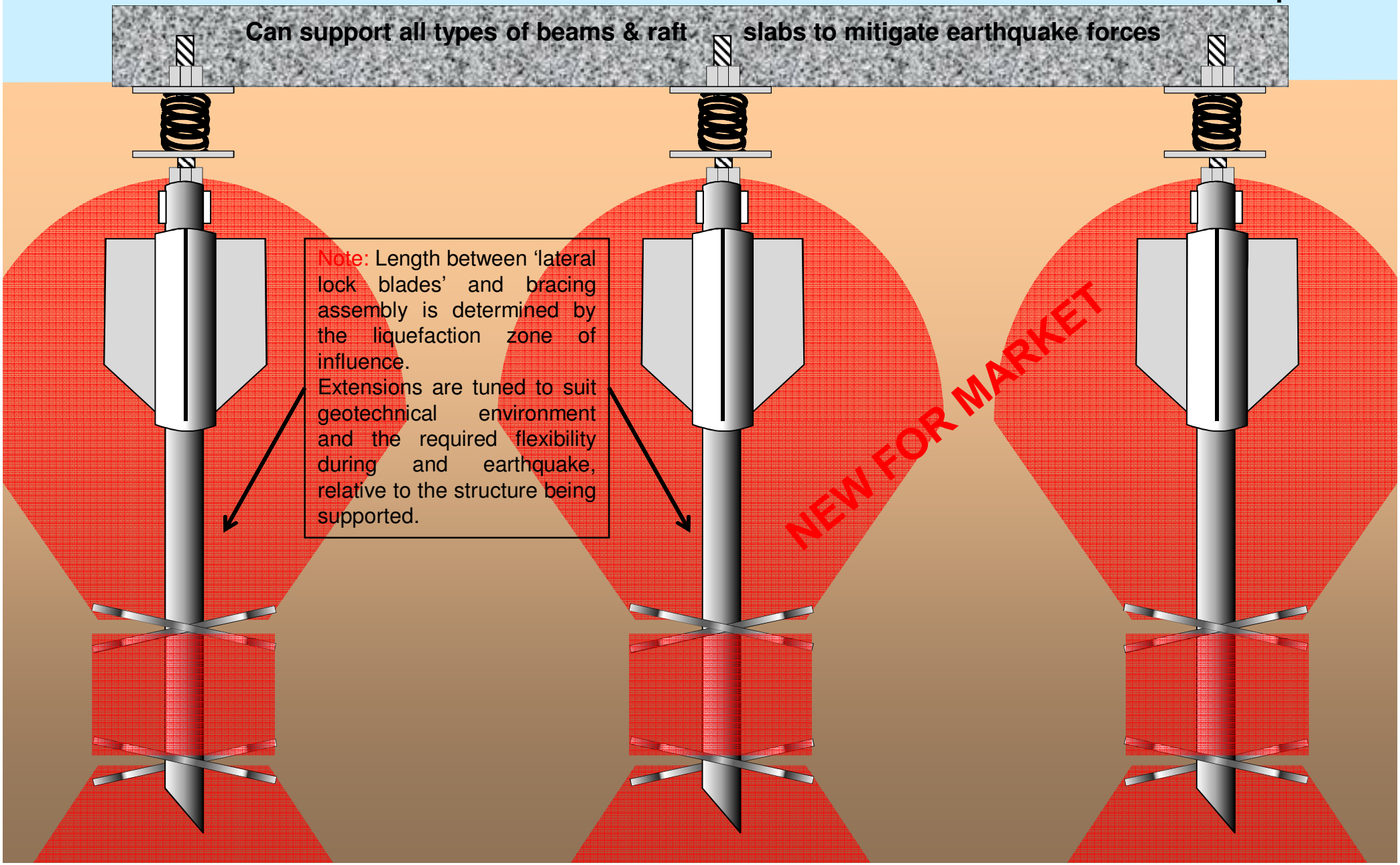
The ‘twin blades’ are end load bearing and work for both tension and compression loads. When arranged as a spaced dual set, they lock the base section of the pile by mobilizing the soil between the dual blade sets. This creates a ‘friction mass’ to resist rotation of the pile base when lateral ‘spring loads’ are applied to the above lengths of the Blade Pile during an earthquake.



Residential Earthquake Pile – A World first & patented!

BLADE PILE Group

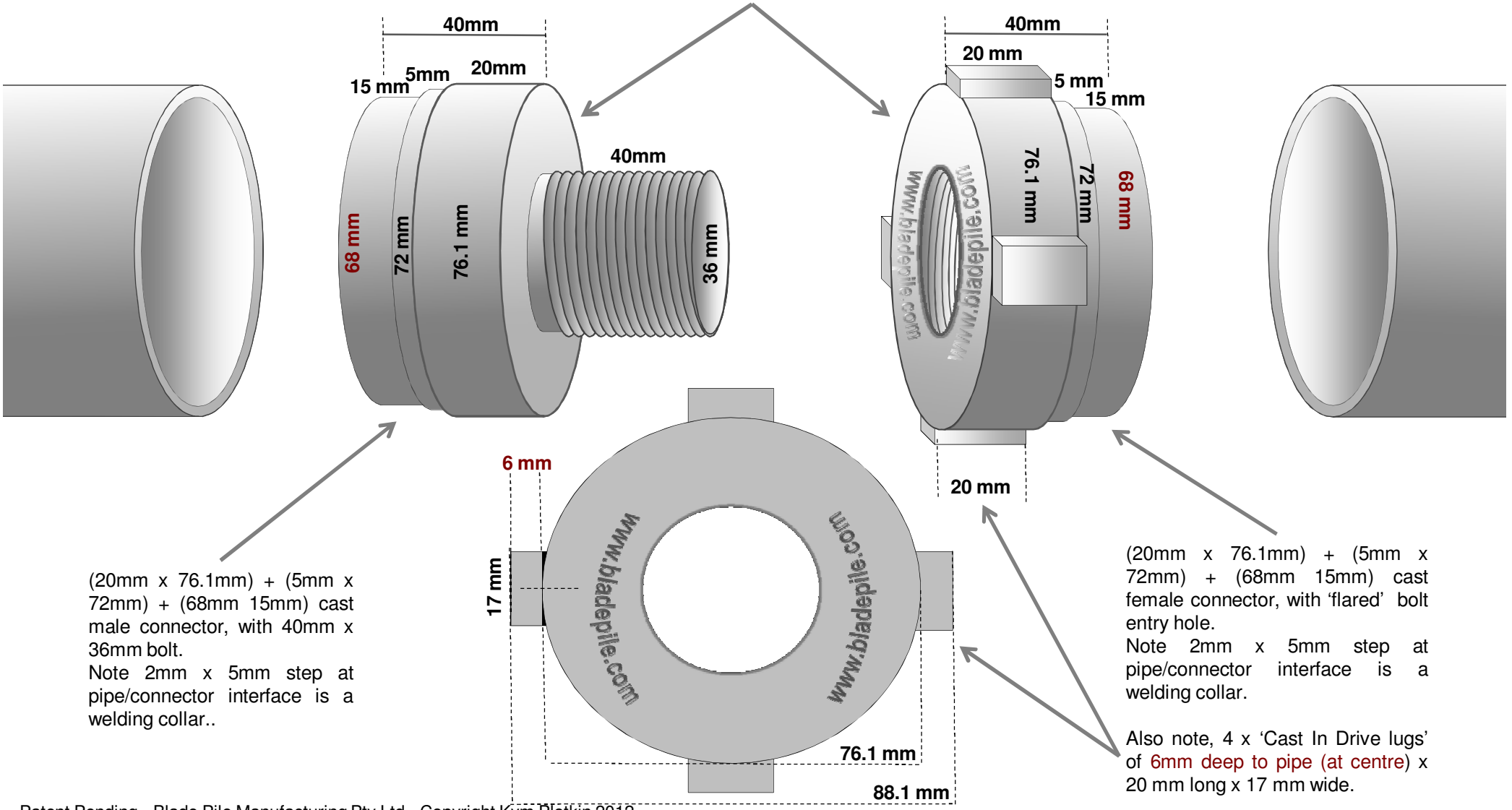
www.bladepile.com



Blade Pile - Gen 3 - Extension Connection

www.bladepile.com

Male Interface plate is flat. Female face has a recessed website/logo and a 'flared' bolt entry hole, to enable locking of faces when connection is torqued into place.



(20mm x 76.1mm) + (5mm x 72mm) + (68mm 15mm) cast male connector, with 40mm x 36mm bolt.
Note 2mm x 5mm step at pipe/connector interface is a welding collar..

(20mm x 76.1mm) + (5mm x 72mm) + (68mm 15mm) cast female connector, with 'flared' bolt entry hole.
Note 2mm x 5mm step at pipe/connector interface is a welding collar.

Also note, 4 x 'Cast In Drive lugs' of 6mm deep to pipe (at centre) x 20 mm long x 17 mm wide.

Earthquake Blade Pile – Connection Methods To Structures

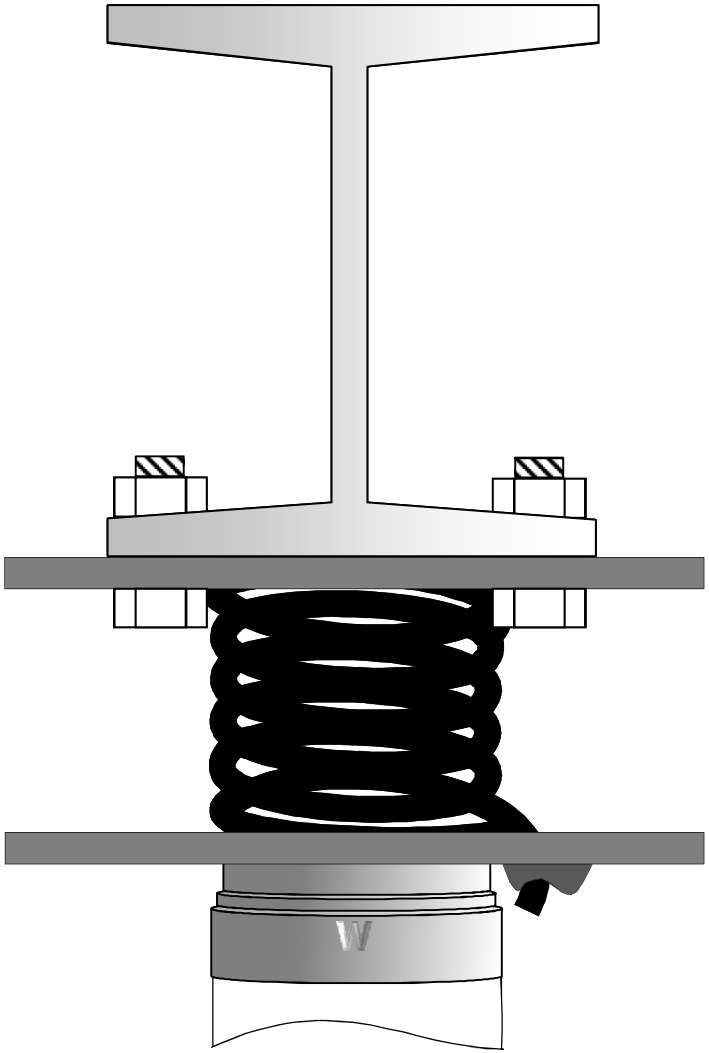
www.bladepile.com

Connection to – Concrete Slabs or Beams

There are a variety of methods to engage the 'free plate spring' top plate into a concrete structure.
Dependent upon the level of earthquake forces, the connection can range from a single pin to a fully engaged bar or plate system.

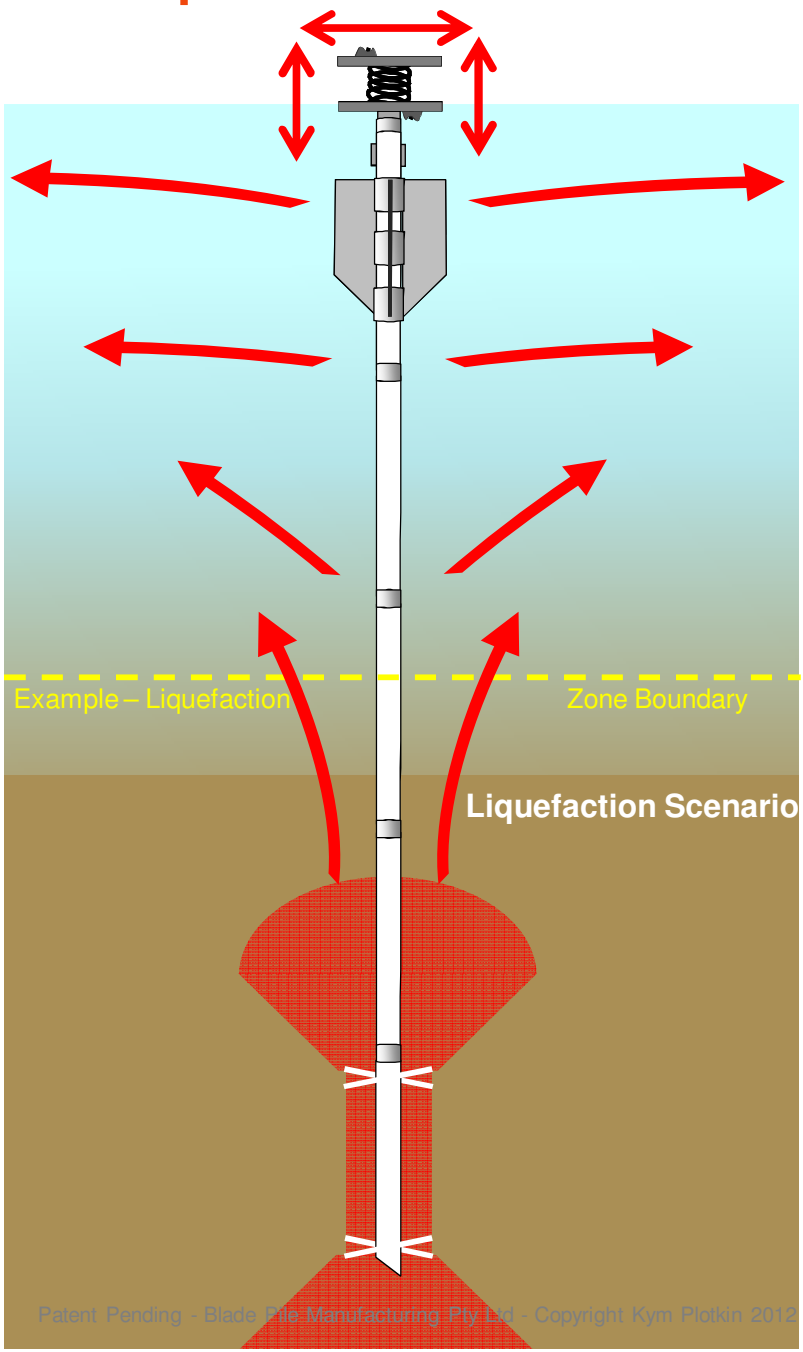
Connection to – Steel or Timber Beams

There are a number of newly developed construction systems that are designed to resist earthquake forces.
These systems mostly use steel beams, timber beams or panels, any of which will connect to the Earthquake Blade Pile.



Earthquake Blade Pile - The Concept

www.bladepile.com

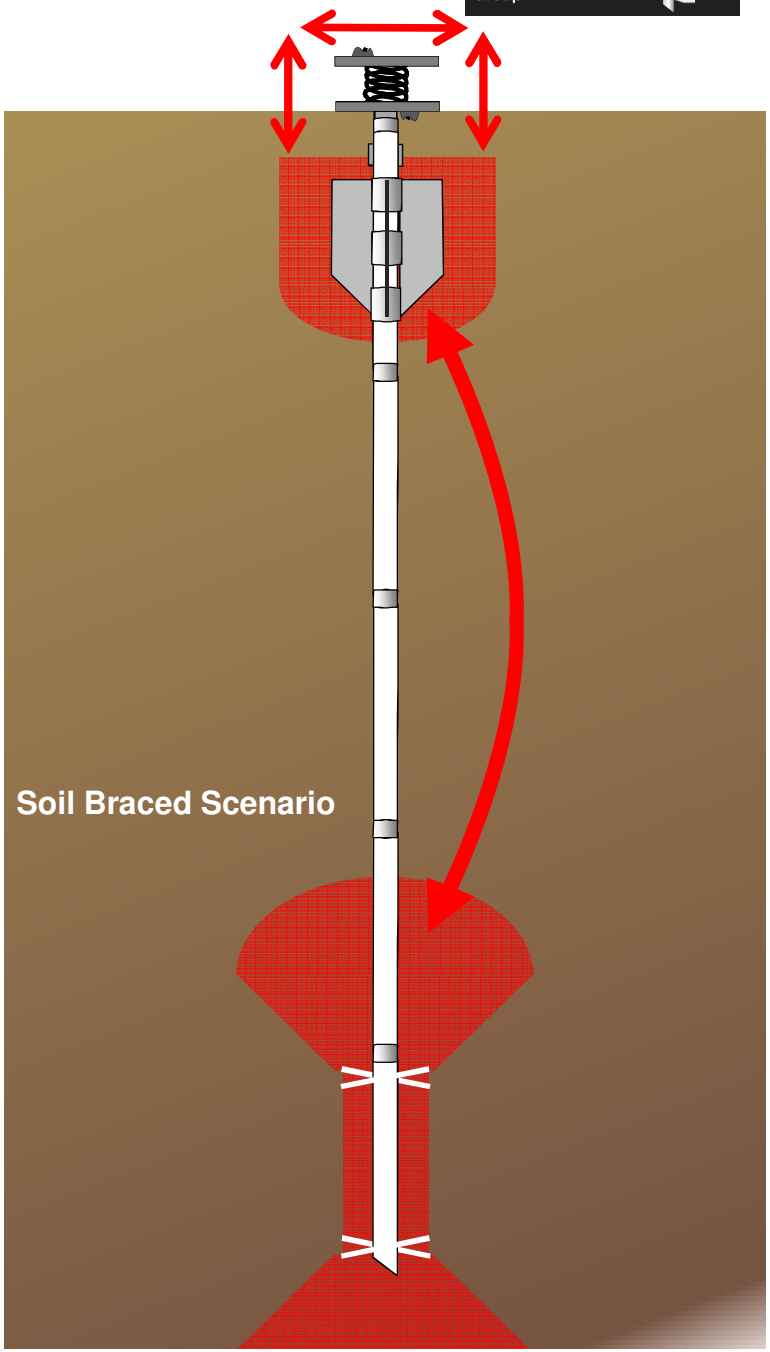


Liquefaction Scenario

Liquefaction during an earthquake commonly occurs in saturated sand or marine clay soil areas and is more often activated by lateral 'shaker' earthquakes. It is therefore essential that the 'Liquefaction Zone' depth is first determined so that the 'lateral lock' dual blade sets will be engaged below the zone of influence to support and maintain the structure at the original as constructed RL. The piles will sway gently during an earthquake and the free plate spring assemblies will 'take out' a large proportion of the residual lateral and horizontal shock energy.

Soil Braced Scenario

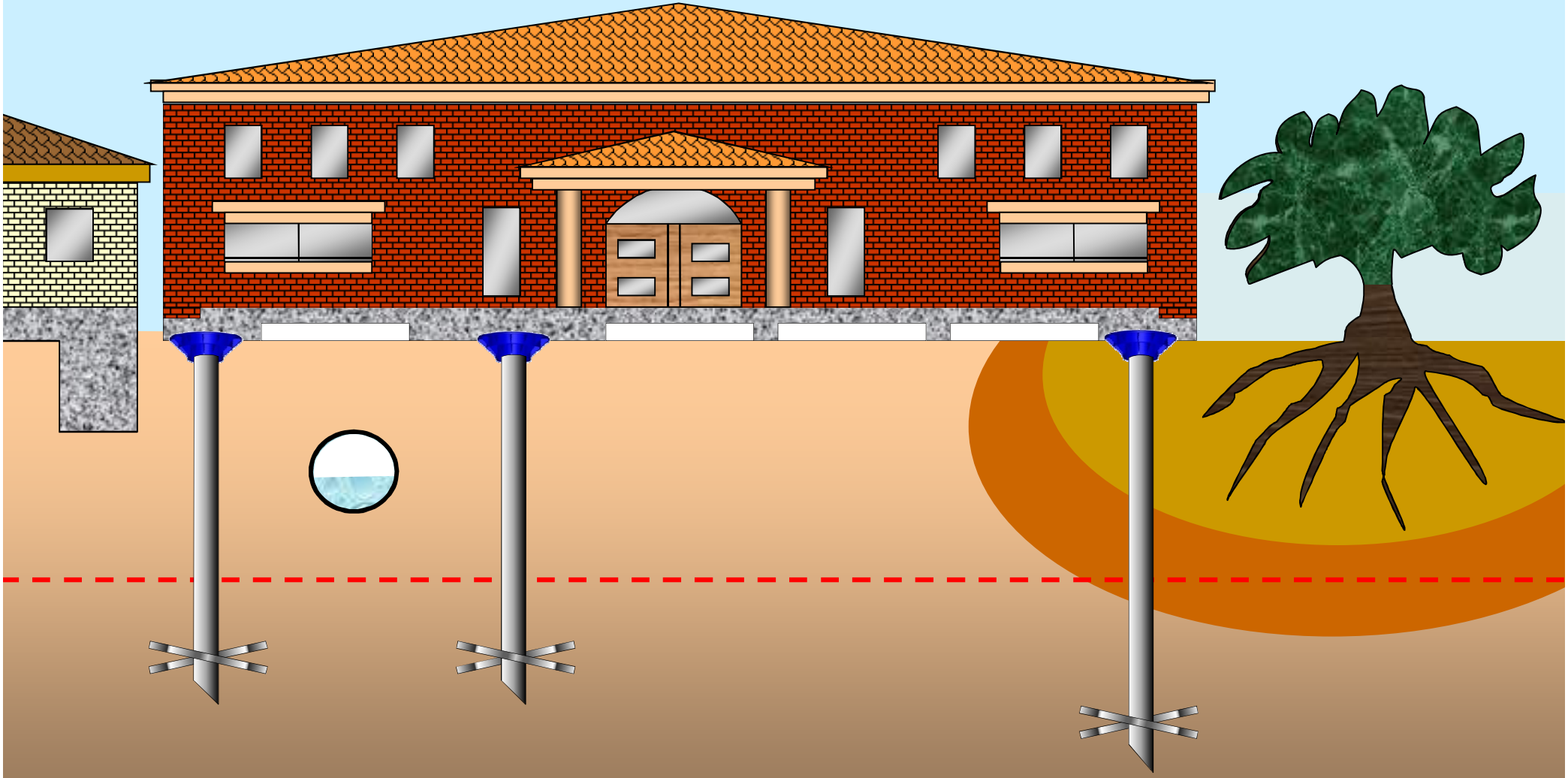
If the soil type maintains strength and bearing capacity during either a 'shaker' or 'roller' earthquake, the piles are able to compress, flex or bow between the Blades and the Bracing Fin Assembly during the earthquake, maintaining the original as constructed RL. The free plate spring assemblies will 'take out' a large proportion of the residual lateral & horizontal shock energy



Blade Pile & Pile Cap – For all P Site situations

BLADE PILE Group

www.bladepile.com



The Blade Pile and Pile Cap also provide a simple solution for tree affects, neighbouring footings, zero lot line boundaries, zone of influence, swimming pools, sewer lines and many other issues.

Blade Slab System - Introduction

BLADE PILE Group

www.bladepile.com

- For decades Builders and Engineers World-Wide have sort a low cost foundation method/design for high to extreme reactive clay soils when designing footings and foundations for residential structures.

- With the impending revision to AS2870 (Australian Standard for residential slabs), tree affects and many other issues will need to be considered when designing residential slabs.

- To date, methods to separate the slab from heaving or shrinking clay soils include the use of screw piles with decomposing cardboard void formers or ripping/fluffing of the soil below the slab area. Or designing massive or ribbed slabs that are very stiff, so the structure can in affect 'float' in or on the soil as it heaves and shrinks during seasonal variations in moisture content.

- Decomposing cardboard void formers are too unreliable.

- The ripping process has proved to fail due to 'sump' and heave issues.

- Massive or ribbed slab structures are too costly, or still prone to failures.

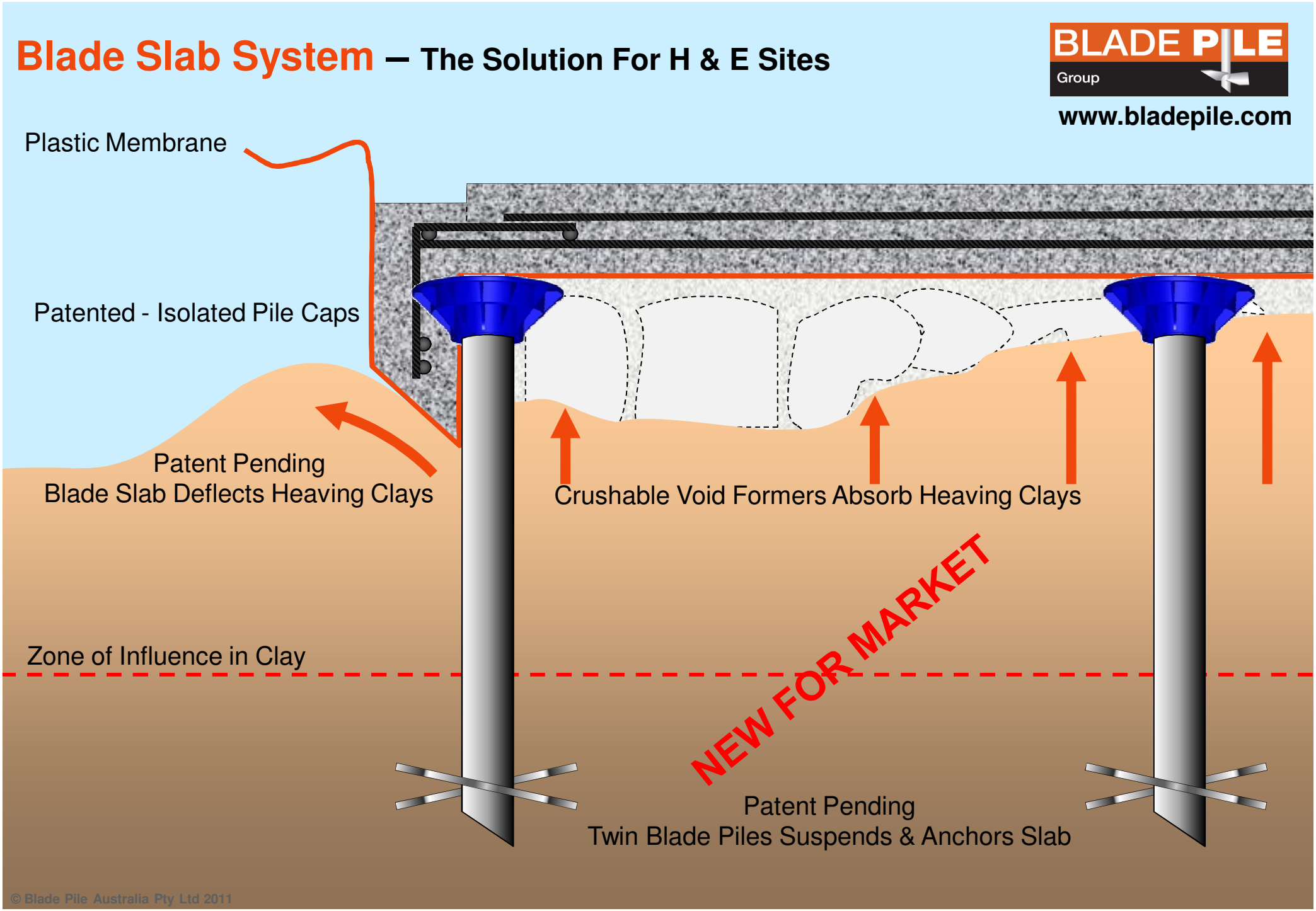
NEW FOR MARKET

- The Patentented 'Blade Slab System' is a new concept. It uses several patented foundation products from the Blade Pile Group, when these products are combined, they create the Blade Slab System.

Blade Slab System — The Solution For H & E Sites

BLADE PILE Group

www.bladepile.com

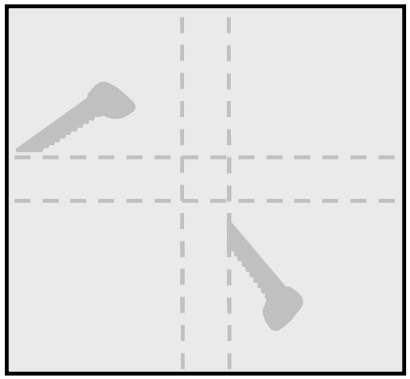


Blade Pod - Crushable void former

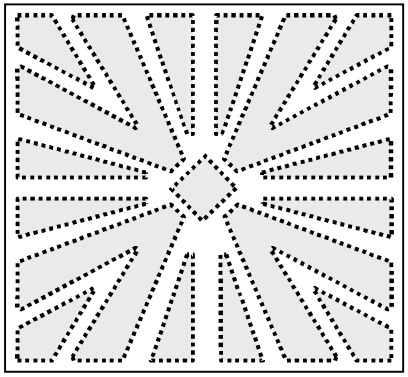
BLADE PILE Group

www.bladepile.com

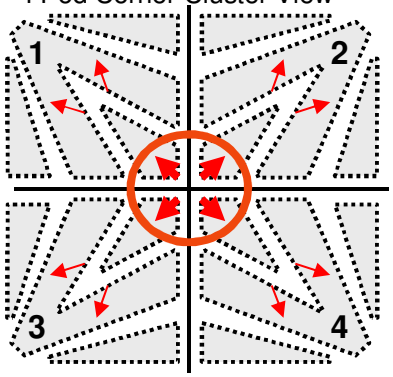
Top View



Underside View



4 Pod Corner Cluster View



The Blade Pod (using Polyvoid product) is 1000mm x 1000mm square x 225mm high and manufactured in polystyrene.

The Pod is configured to allow for 'cutting down' to smaller useable units, to fit under odd sized corners or beam areas.

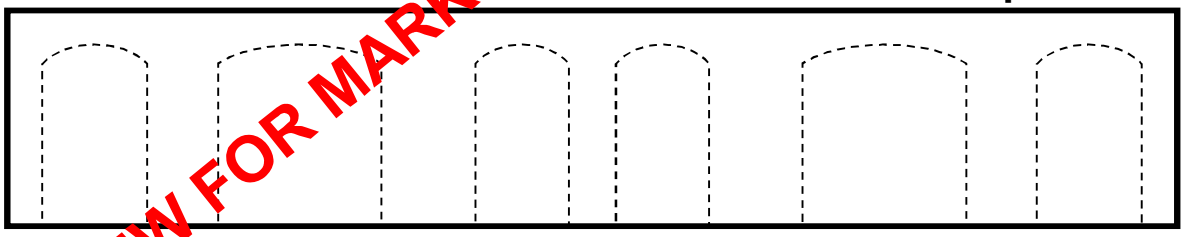
The Pod hollow chambers and ribs are designed to crush and deform into the shaped hollows as variable pressure from heaving clay soils is applied from below.

NOTE: Plastic membrane is placed over pods and under blade beam for tight wrapping of pods and under the beam areas for complete envelopment of all concrete poured areas, for minimum concrete wastage. This method provides direct contact of the Pod with the soil to optimize crushing and deformation of the pod chambers.

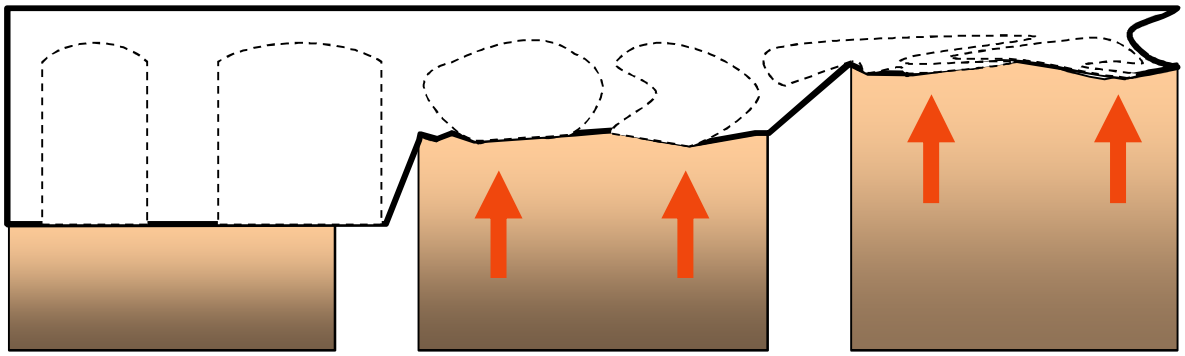
The pod design follows the 'egg' principle. The upper sections of the hollow chambers are arched and distribute load evenly to the shaped rib supports, to carry 'working' load requirements during slab construction.

When **4 pods** are clustered together it is critical that the 'strong point' where they meet is designed to deform, to push away from each other during periods of clay heave.

NEW FOR MARKET



Elevation view showing internal hollows and arches



Clay – At construction | Clay – @ 100 mm swell | Clay – @ 180 mm swell

Clay sites are already at a percentage of their swell potential for a given Ys range at time of construction. Most sites have the potential to shrink and heave 20% to 70% of the maximum Ys. This is evidenced in the Ym factor used by Engineers to determine the potential centre heave mound, under a slab structure.

The 225mm high Pod will crush 180mm before applying pressure to the underside of the slab.Therefore, even if a site has an extremely high E class Ys range of 230 mm and was only at 20% of its potential Ys being 69mm (bottom of the Ym curve) at time of construction, the Pod will take up the maximum balance of potential swell being 161mm (top of Ym curve), which is 19mm less than its maximum crush absorption capability.

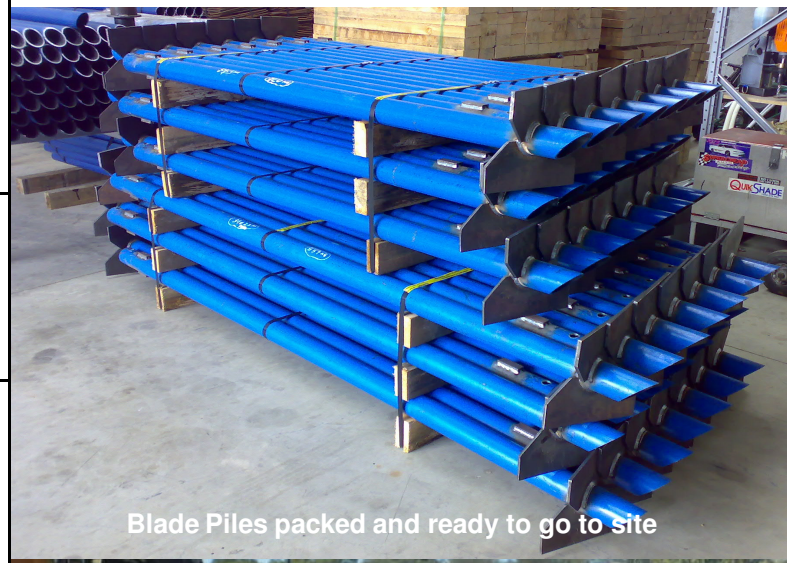
It would be extremely rare to find a site at 20% (bottom of the Ym curve) of its Ys range, generally most sites hover between 40% to 60% of the Ys range at time of construction, providing even higher factors of safety than stated above.

Product Summary – Blade Pile

BLADE PILE Group

www.bladepile.com

Applied to	•Screw Pile Alternative •Timber Pile Alternative •Concrete Bored Pier Substitute – When used with Pile Cap
Features	•350 Grade High Tensile Steel Pipe (HTS) •HTS twin blade design – Patent Pending •45° cut providing attack point
Benefits	•Ability to take high torque capacity, providing greater load •Extended design life, provided by steel durability as per AS2159 •Load tested (as per AS2159) and 3rd party certified •Smoother penetration due to flat blades, helps minimise installation issues •Blades counter balance the pile for enhanced verticality during installation •Penetrates into most forms of weathered rock •Can be used in acid sulphate soils
Notes	The Blade Pile is a superior design in comparison to the conventional screw piles. Blade Pile manufacture all products with High Tensile Steel (HTS), using HTS rather than Mild Steel ensures 'best practice' and quality for all residential applications throughout Australia.



Blade Piles packed and ready to go to site

URS Engineering, inspecting SA pile test

Product Summary – Pile Cap

BLADE PILE Group

www.bladepile.com

Applied to	•Isolates a blade pile from the slab structure •Functions as a structural slip joint for clay sites
Features	•High density long life PVC •Ultimate load capacity of 208kN (200mm cap within 300mm wide beam) •Structural slip joint
Benefits	•Top section of the pile cap creates an enlarged point of separation between the slab and the blade pile •Provides builders with a AS2870 compliant bored pier alternative •Supports stiffened rib raft slabs during periods of heave or shrink in reactive clay soils •Independently tested by Pearl Street Energy Services (ETRS)
Notes	A copy of the testing document for the Patented Blade Pile Cap is available through Head Office upon request. Blade Pile use the highest quality materials to ensure a maximum design life for all products.

Product Summary – Bearer Pile Assembly

BLADE PILE Group

www.bladepile.com

Applied to	To be used in conjunction with the Blade Pile. For all types of; •Bearers •Joist or •Columns
Features	•High Tensile Steel (HTS) Samson Bar – Threaded Rod •HTS Nuts •HTS adjustable top plate
Benefits	•Minimum 80 kN SWL capacity •220mm vertical adjustability – Perfect for mine subsidence areas •Customised top plate for horizontal adjustability •Reduced on site time for frame or columns •Significant savings compared with traditional methods •All locations can be removed for the site and re-used if required. •Top plate is adjustable during and after construction •Ideal in extreme clay and mine subsidence sites
Notes	The Blade Pile Bearer Assembly provides a new dimension in time, quality and adjustability when constructing bearer and/or joist floors or steel frame and column structures. Blade Pile manufacture all products with High Tensile Steel (HTS), using HTS rather than Mild Steel ensures 'best practice' and quality for all residential applications throughout Australia.

Product Summary – Pile Cap Slab System

BLADE PILE Group

www.bladepile.com

Products	•Blade Pile •Pile Cap
Applied to	•Residential slabs ○Replacement for concrete bored or driven piers ○Replacement for timber piles
Features	•Rapid installation •Completely isolated from the slab structure •Fully compliant with AS2870 for supporting residential slabs •Fully compliant with AS21519 commercial piling code
Benefits	•Cost less than concrete piers over 1.0m in depth (min 20 pile locations) •Eliminates potential for varying pile depths, leading to cost blow outs •Avoid collapsing bore hole issues on sandy sites or caused by weather conditions. •Eliminates the requirement for an engineering inspection •Less piles required compared with bored piers, due to load capacity •Fixed price with no on site variations •Can help to minimise issues if pool is dug at a later date.
Notes	The Patented Trilink 'Blade Pile System' provides the first deemed to comply isolated steel pile, with the PVC cap for residential slab structures. It is independently tested and certified. Trilink manufacture all products with High Tensile Steel (HTS), using HTS rather than Mild Steel ensures 'best practice' and quality for all residential applications throughout Australia.

Blade Pile & Pile Cap – Dr. Peter Mitchell Letter

www.bladepile.com

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22 November 2011
Project No. 214714

Trista Technology Pty Ltd
Level 2/389 Scottsdale Drive
Robina Qld 4226

Attention: Kym Plotkin, CEO

Dear Sir,

Subject: Blade Pile and Pilecap

We confirm that we have examined the Blade Pile and have successfully carried out designs of residential footings incorporating this method of pile construction.

The Blade Pile comprises a 350 grade high tensile steel shaft with a high tensile twin blade at the base which has a cutting edge at 45°.

The Blade Pile falls under the classification of a "steel screw pile" by AS 2159-2009 "Piling – design and installation", Section 1.3.32.

The pile cap for the Blade Pile is made of high density PVC which provides an enlarged support to the surface footing. The pile cap has a slip joint that accommodates soil heave. The pile cap also provides a compression only connection to the surface footing.

The Blade Pile is an alternative method of piling to the conventional steel screw pile with a helical circular base, a timber pile, and a bored and cast-insitu concrete pile.

The design of a footing incorporating the Blade Pile will follow the intention of AS2870-2011 "Residential Slabs and Footings" Section 4.8, i.e. the design is to be in accordance with engineering principles.

Informative design procedures are given in AS2870-2011 Section G6.

In particular, the Blade Pile can be designed to meet the following requirements:

- The pile must have an adequate compressive structural and geotechnical strength,
- The pile must have adequate tensile structural and geotechnical strength,
- The pile must have adequate flexural (bending) structural strength,
- Fins are attached to the pile in order for it to have adequate lateral geotechnical strength if subjected to significant horizontal loading,
- The pile cap can be designed to accommodate the expected soil swell for the site,
- The pile cap can be designed to carry the compressive load from the surface footing, and
- The pile must be adequately anchored in the soil. In the case of reactive sites, the pile must be founded in the stable zone below the depth of reactive soil movements.

With the above design requirements being met, we have found the Blade Pile to be a very effective method of pile construction.

Yours sincerely
Aurecon Australia Pty Ltd

Dr. Peter W. Mitchell
Technical Leader Ground Engineering

Pile Cap Slab System – Dr. Peter Mitchell Letter

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22 November 2011
Project No. 214714

Trista Technology Pty Ltd
Level 2/389 Scottsdale Drive
Robina Qld 4226

Attention: Kym Plotkin, CEO

Dear Sir,

Subject: Pile Cap Slab Footing System

We confirm that we have examined the Pile Cap Slab System and have successfully carried out designs of residential footings using this method of footing construction.

The Pile Cap Slab Footing System comprises several elements as follows:

1. A 350 grade high tensile steel shaft with a high tensile twin blade at the base which has a cutting edge at 45°(Plate A). This blade pile falls under the classification of a "steel screw pile" by AS 2159-2009 "Piling – design and installation", Section 1.3.32. It is an alternative method of piling to the conventional steel screw pile with a helical circular base, a timber pile, and a bored and cast-insitu concrete pile. Plate B shows the installation of a Blade Pile.

Plate A – Blade Pile	Plate B – Installation of Blade Pile

2. A pile cap made of high density PVC which provides an enlarged support to the surface footing (Plate C). The pile cap has a slip joint that accommodates soil heave. The pile cap also provides a compression only connection to the surface footing.

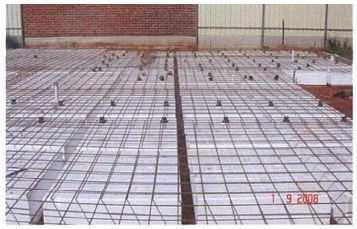

Plate C – Pile caps in place	Plate D – Waffle raft on blade piles and pile caps

3. A surface footing which is either a conventional stiffened slab system (such a waffle raft, such as shown in Plate D) designed for the reactive soil movement for the site, or alternatively a suspended reinforced concrete slab supported on the blade piles and pile caps, and cast on void forms comprising collapsible polystyrene "Star Pods". For the former system, the blade pile and pile cap minimises the development of edge settlement of the stiffened shallow footing. For the latter system, the blade pile and pile cap enables the floor slab to be suspended above the reactive soil movements.

The design of the Pile Cab Slab System will follow the intention of AS2870-2011 "Residential Slabs and Footings" Section 4.8, i.e. the design is to be in accordance with engineering principles.

Informative design procedures are given in AS2870-2011 Section G6.

In particular, the Pile Cap Slab System can be designed to meet the following design requirements:

- The pile must have an adequate compressive structural and geotechnical strength,
- The pile must have adequate tensile structural and geotechnical strength,
- The pile must have adequate flexural (bending) structural strength,
- The pile cap can be designed to accommodate the expected soil swell for the site,
- The pile cap can be designed to carry the compressive load from the surface footing,
- The pile must be adequately anchored in the soil. In the case of reactive sites, the pile must be founded in the stable zone below the depth of reactive soil movements,
- When the Pile Cap Slab System is used to suspend the floor slab above the reactive soil, the footing must be isolated from the reactive soil, and
- There must be isolation and flexibility of the services connecting to the structure supported on the Pile Cap Slab System.

With the above design requirements being met, we have found the Pile Cap Slab System to be a very effective method of footing construction.

Yours sincerely
Aurecon Australia Pty Ltd

Dr. Peter W. Mitchell
Technical Leader Ground Engineering

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‘H’ Pattern - Pile Test Beam System

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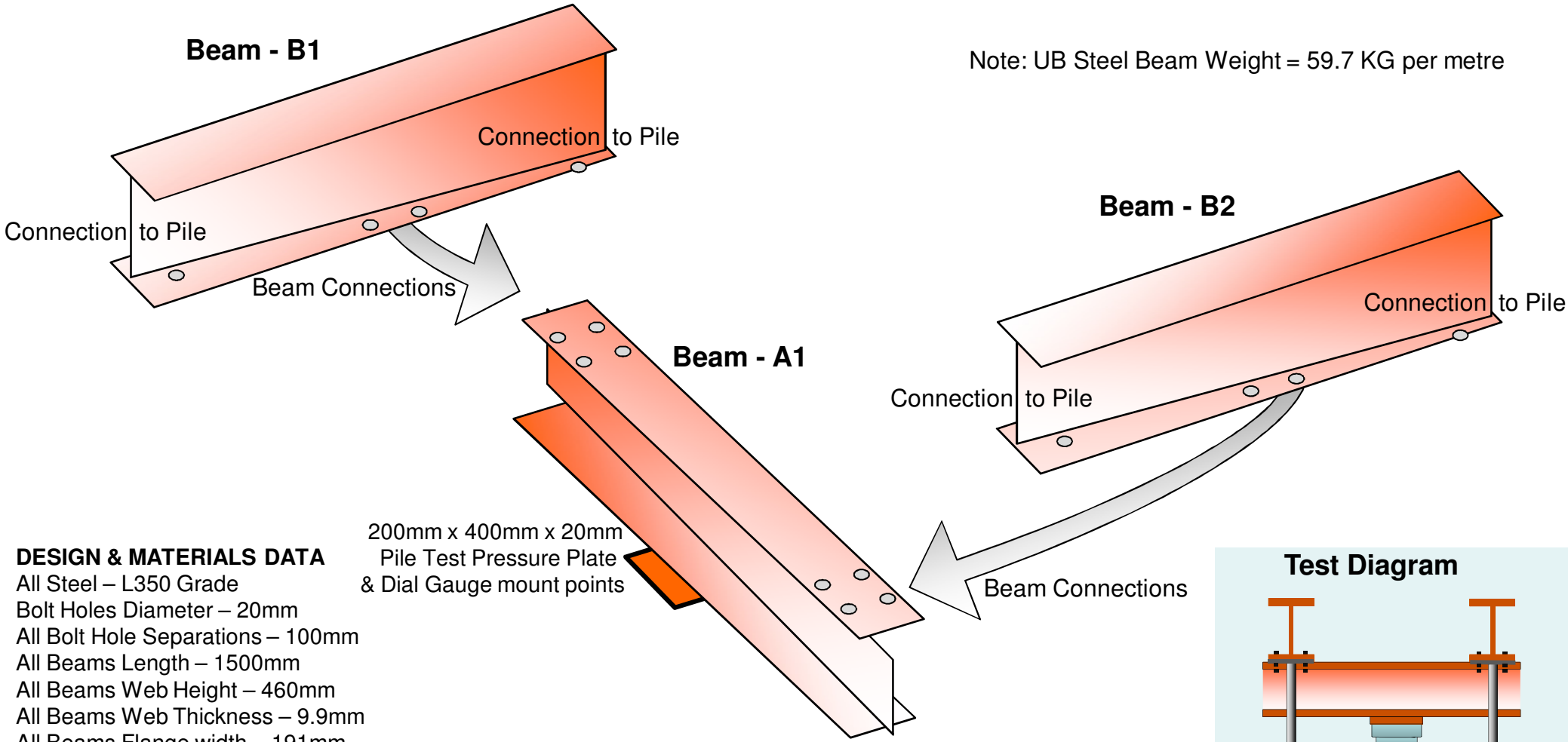
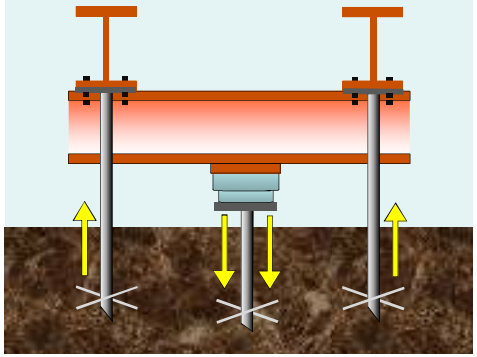


Note: UB Steel Beam Weight = 59.7 KG per metre

DESIGN & MATERIALS DATA

All Steel – L350 Grade
Bolt Holes Diameter – 20mm
All Bolt Hole Separations – 100mm
All Beams Length – 1500mm
All Beams Web Height – 460mm
All Beams Web Thickness – 9.9mm
All Beams Flange width – 191mm
All Beams Flange Thickness – 16mm
Beam A1 Overlap to Beams B1 & B2 – 50mm inboard
Beams B1 & B2 Overlap to Blade Pile Bearer Plates - 50mm inboard
Beam A1, Central Underside Pressure & Mount Plate – 400mm x 200mm x 20mm (welded to

Test Diagram



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