

Quiet Sonic hum silences pounding pile drivers

WORKING or living near a construction site can generate more than a few headaches but none worse than listening to piles being driven into the ground. The repetitive percussions and thumping ground vibrations are enough to make most people reach for the nearest bottle of painkillers.

But, despite the headache factor, piles are integral to the foundation of any building and, in coastal British Columbia (BC), Canada – a zone-six earthquake-risk area – piles play a significant role in the future safety of building inhabitants.

For example, in some parts of the Vancouver area, the soils lack the capacity to support the buildings constructed on them. Major tracts of this metropolitan area have been built on an alluvial plain – in essence, a city built on a big, sandy beach and now covered with tall skyscrapers.

To erect buildings here, piles have to be driven deeper to a more competent rock stratum to act as bearing piles or driven into soft materials for a reasonable distance to act as friction piles.

In some cases, this is only required along the perimeter wall and, in other cases, a grid pattern is installed to support the entire floor slab. Creosoted timber is the typical choice. Fortunately, in BC, timber grows in abundance. Most of Canada has been blessed with abundant forest reserves; indeed, early settlers were heard to exclaim: “Trees, all we see here are damn trees.”

But what happens if you want to build in an area that does not have acres of trees nearby waiting to be driven into the ground as piles. In these areas, many builders opt for cast-in-place concrete piles.

As well as the clear advantage that concrete does not need to be ‘grown’, these piles have offer benefits compared to timber piles. They are free from decay or attack by insects, they generate a higher resale value for the building, they can bear heavy loads and they provide greater flexibility in building design. Cast-in-place concrete piles are also cheaper than creosoted timber piles, even in areas like BC.

Normally, concrete piles are formed by drilling a hole with a large, heavy, high-torque auger but, in recent years, a quieter and more economical option has become available. Some foundation contractors, including Roger Bullivant of the UK, have begun experimenting with a Sonic drill rig for use in pile drilling.

By using Sonic’s patented technology, pile holes can be drilled with high-frequency low-amplitude vibrations along with high-pressure water to clear the cuttings.

The sonic vibrations are much higher than the natural frequency of the surrounding soil and are not transmitted beyond the immediacy of the hole – unlike a pile driver hammer, which can cause severe vibrations to be transmitted a distance.

With a Sonic rig, as the outer casing is vibrated out of the hole, concrete is forced to flow into the void created by the casing. With concrete and soil particles now intermingled, an extremely strong bond can be created, once the concrete has cured.

During the 1960s, much research, money and testing went into creating a sonic pile driver. The rig of that time period generated an impressive 1,000 hp from two former army tank engines. The result was a small measure of limited success but not enough to pave the way towards commercialization.

It would take another 30 years before Sonic Drill Corp’s patented drill-head would find its market niche – not in pile driving – but in environmental studies, geothermal installations and mineral exploration.

Today, the modern Sonic rig is again being debated for pile drilling use on projects such as low-rise commercial buildings, warehouses and residential developments.

A Sonic Drill Rig: Using Sonic technology, pile holes can be drilled with high-frequency low-amplitude vibrations.

