TECHNIQUE SHEET

**VIBRO STONE COLUMNS**

Vibro Stone Columns (VSCs) offer a highly economical and sustainable alternative to piling and deep foundation solutions; removing the need to by-pass problem ground by densifying and strengthening weak or poorly compacted soils in-situ.

**BASIC TECHNIQUE**

A vibrating poker known as a vibroflot is fitted to a purpose-built vibropiling rig and is used to penetrate the ground. Penetration is achieved using the vibroflot’s own mass, the pull down facility of the rig (when used) and pressurised air flushes. All our rigs are fitted with our Data Logger computer system to monitor column installation.

**Top Feed Method**

Once refusal or design depth is reached the vibroflot is withdrawn and charges of graded stone aggregate are tipped into the bore hole from the surface; this is known as the Top Feed Method.

The vibroflot is then re-inserted to compact the stone into the surrounding soils. In granular soils the effect of the vibratory action produces a marked improvement in the density of ground, significantly improving the bearing capacity and settlement characteristics of the soils. In cohesive soils the columns act as reinforcement and provide a drainage path for excess pore water pressures to speed up consolidation times.

**Bottom Feed Method**

Where a high water table or weak soils are present the collapse of the bore hole is much more likely when the vibroflot is withdrawn. In these conditions the purpose-built Bottom Feed system is used to ensure integrity of the stone column from top to bottom. The vibro rig is fitted with a hopper which feeds stone into a tremie pipe running down the length of the vibroflot.

**BOTTOM FEED CONSTRUCTION SEQUENCE**
STRENGTHS

Environment
- Ground Improvement techniques contain no cement, concrete or steel, considerably reducing the carbon footprint
- Vibro systems typically generate only 10 – 25% of the CO₂ per rig day in comparison to piling systems
- No spoil produced
- Locally sourced and recycled aggregate can be used in Vibro Stone Column technique to give a 30% reduction in CO₂ compared to newly quarried stone (e.g. railway ballast or site-won crushed concrete)
- Just over 40% of the aggregate used to form stone columns on our contracts is Recycled Aggregate. This saves approximately 575 Tonnes of CO₂ per year.

Community
- Most systems are low noise
- Vibro Rigs are fitted with low emissions and noise Tier 3 engines
- High frequency vibrations mean the Vibro system can generally be used up to 2.5m from buildings in good condition

Economic
- Generally the most cost-effective solution when dealing with poor ground, with Vibro schemes typically 50-70% cheaper than piling
- No spoil ensures no expensive waste to landfill
- Foundations and floor slabs are much quicker and cheaper to construct compared to those required after piling.

TECHNICAL CAPABILITIES – VIBRO STONE COLUMNS

<table>
<thead>
<tr>
<th>Specification</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical Depth</td>
<td>1m</td>
<td>12m</td>
</tr>
<tr>
<td>Diameter</td>
<td>0.3m</td>
<td>0.8m (Typically 0.5 - 0.6m)</td>
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<tr>
<td>Typical Load Capacity</td>
<td>N/A</td>
<td>200kN/m² (higher in granular soils)</td>
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<tr>
<td>Rig Height</td>
<td>10.8m</td>
<td>16.4m</td>
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<tr>
<td>Rig Weight</td>
<td>22,000kg</td>
<td>49,000kg</td>
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<tr>
<td>Rig Length</td>
<td>5m</td>
<td>7.5m</td>
</tr>
<tr>
<td>Rig Width</td>
<td>2.7m</td>
<td>3.4m</td>
</tr>
</tbody>
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