



## 07 / GROUND IMPROVEMENT

# Vibro replacement

Crane-suspended vibrolance and top-fed gravel forming compacted stone columns.

## How the technique works

In the illustrated wet top-feed method, a crane suspends a deep vibrator. Vibration, tool weight and tip water jets assist penetration to treatment depth. A wheel loader supplies gravel from the surface into the annular space around the vibrolance.

## Building the stone column

The vibrator is raised and re-penetrated in successive lifts to compact the supplied gravel. Repeated feeding and compaction build a dense granular column from the bottom upward to the working level.

## Where it applies

Ground improvement for selected building, industrial, infrastructure and earthwork foundations. The column and surrounding soil work together; suitability depends on the ground, loading, settlement criteria and engineered treatment layout.

## What it offers

Compacted stone columns can improve composite-ground stiffness, bearing response and settlement performance in suitable conditions. The illustrated process forms aggregate columns, without concrete or a reinforcement cage.

### Crane, vibrolance and wheel loader

The animation uses 20 ft treatment depth to explain the sequence. Column diameter, spacing, depth, aggregate, water management and acceptance are defined for the project. Other installation methods require a separate procedure.



## CONSTRUCTION METHOD

# Construction sequence

General procedure. Geometry and parameters follow the approved project.

## 01 Trial and preparation

Review the ground investigation, treatment layout, loads and settlement criteria. Agree trial columns, acceptance and monitoring. Prepare a stable platform, gravel supply and water/return handling.

## 02 Penetrate to depth

Position the crane and lower the vertical vibrolance. Use the specified vibration and water-jet procedure to reach treatment depth. Record penetration, depth and ground response.

## 03 Feed gravel from the surface

Use the wheel loader to supply the specified aggregate into the annulus around the vibrolance. Maintain controlled feeding, exclusion zones and the planned handling of water and spoil returns.

## 04 Compact successive lifts

Raise and re-penetrate the vibrator to compact each lift. Repeat gravel feeding and compaction from the base toward the surface, recording production parameters and aggregate consumption.

## 05 Finish and verify

Complete the column at the specified level. Preserve column identification and records. Perform the agreed trials, field verification and engineering review before accepting the treatment.

## Vibro replacement



The installation procedure follows the approved project design. Illustrated profiles do not replace the geotechnical report.



## SELECTION AND SITE CONDITIONS

# Application criteria

Evaluate the ground, equipment and restrictions together.

## Suitable ground

Review soft soils, silts, mud, sands, groundwater and ground variability. Very weak or sensitive layers require particular assessment of confinement, stability and the chosen improvement technique.

## Composite-ground design

Specify treatment diameter, spacing, depth and extent from loads and settlement requirements. A stone column is not interchangeable with a structural concrete pile; surrounding-soil behavior is part of the design.

## Aggregate and feed method

Define grading, durability and cleanliness of the gravel. The illustrated method is wet top-feed. Dry bottom-feed and other equipment configurations use different material delivery and execution details.

## Water, returns and access

Plan water supply, collection and disposal of returns, environmental requirements and drainage. Confirm crane access, loader travel, platform stability, utilities and working clearances.

## Project information

Send location, geotechnical report, groundwater, loads, settlement limits, treatment layout, required depth/diameter, access, water constraints, trial requirements and schedule.



## QUALITY AND TRACEABILITY

# Installation controls

One traceable record per column, from setting out to acceptance.

## Before treatment

Verify approved layout, equipment, aggregate supply, platform and water management. Establish trial, production-record and acceptance procedures.

## Penetration records

Record column position, treatment depth, time, vibration parameters where measured and ground observations. Review deviations or unexpected conditions.

## Feeding and compaction

Record gravel consumption and lift sequence with available production parameters. Monitor vibrator movement and re-penetration. Consumption alone does not prove the specified column geometry.

## Trials and verification

Apply the agreed trial and verification program. The engineer interprets treatment performance against the specified bearing and settlement objectives.

## Safety and traceability

Control suspended vibrolance, loader travel, water hoses, excavation edges and exclusion zones. Deliver column records, aggregate identification, trials, observations and review results.

### Discuss your project

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Method reference: Keller North America, Vibro replacement (stone columns), wet top-feed process. Project specifications govern.