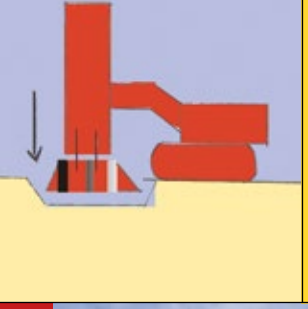


Rapid Impact Compaction (RIC)

Dynamic soil-compaction methods have historically involved the use of tall cranes and free-falling weights, imposing limitations on the types and size of sites that can be treated.

Rapid Impact Compaction has been developed to work on smaller size projects and particularly in urban environment. The technology is an innovative ground improvement method using controlled dynamic compaction at fast blow rate and brings the ability to carry out soil densification in the upper layers of soil with limited impact on the surroundings.

Rapid Impact Compaction is a safe controlled compaction technique where dynamic energy is imparted by a falling dropweight dropping from a controlled height onto a circular foot assembly. Energy is transferred to the ground safely and efficiently as the foot remains in contact with the ground at all times and eliminates the risk of flying debris.

Its base carrier is a track-mounted excavator, which provides the dual benefit of allowing improved mobility and site accessibility and it gives the versatility to move about in narrow and limited height spaces, such as within existing warehouses.

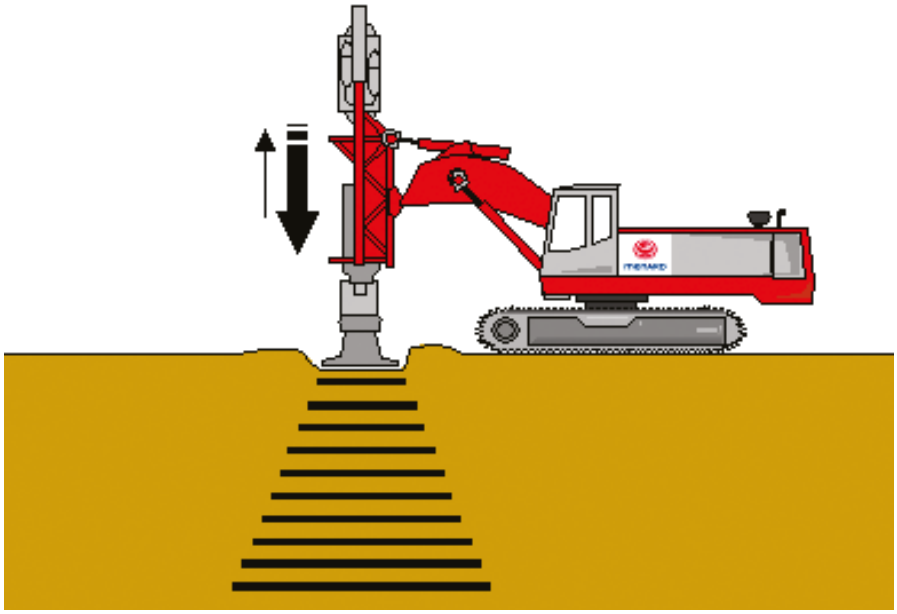
The primary usage is for shallow compaction of floor slab and roadway subgrades.

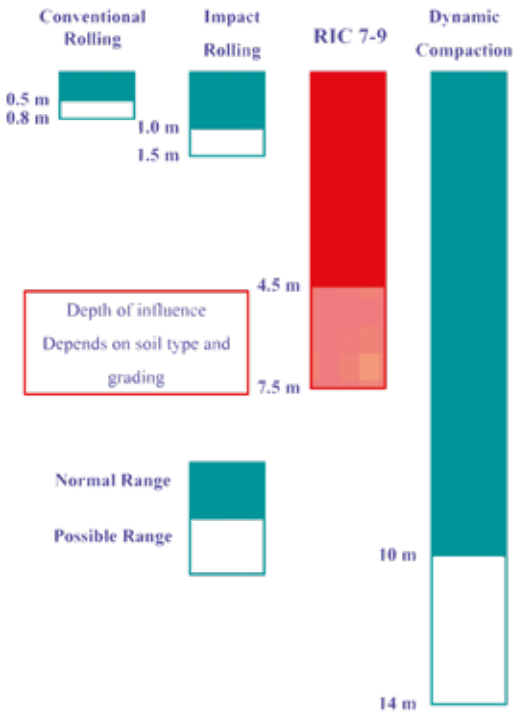
Rapid Impact Compaction (RIC)

Implementation and methods

Rapid Impact Compaction equipment consists of a hydraulic pile-driving hammer mounted on an excavator.

Dynamic energy is imparted by a falling dropweight dropping from a controlled height onto a circular foot assembly. The 5 to 12 tons hammer is hydraulically raised to a maximum height of 1.2 m and then drop in free fall. The drop height of the weight can be adjusted using the in-cab computer.





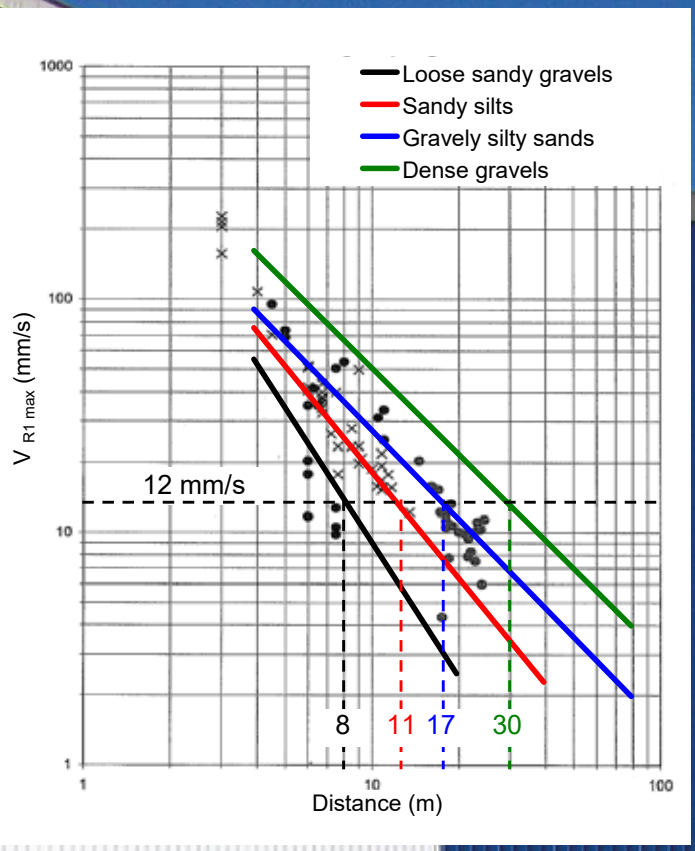
Depending on the size of machine used, the soil type and moisture content, the treatment is effective in the top layers typically up to 4 to 5 m depth, though improvements up to 7.5 to 8 m have been seen in some conditions.

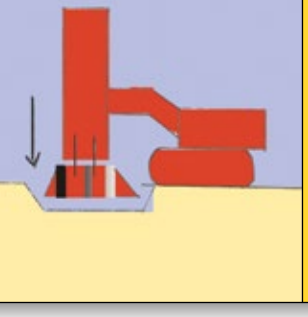
The RIC impacts the soil at a rate of 40-60 blows per minute and an unit energy of 6 to 18 Ton.m is thus transferred to the soil at a fast blow rate through a 1.5 m diameter steel “foot” that rests on the ground surface. Depending on specifications, up to 4 compaction phases are applied and between 10 and 40 blows are generally required per compaction points.

Vibration Control

High frequency compaction provides for better efficiency at lower vibration levels, allowing for work in close vicinity with existing structures.
Vibrations will vary with material type, and will increase as the degree of compaction achieved increases. Menard experience, based on numerous measurements on site, indicates that at 30 m distance, the peak particle velocities have been measured to vary from 1.5 to 10 mm/sec.

Without specific site precautions, a safe working distance to sensitive structures can usually be defined on the order of 8 to 10 m, as a distance of 5 to 6 m can usually be adopted for classical structures. At that distance, noise levels is lower than 90 dBA.





Rapid Impact Compaction (RIC)

Advantages

The Rapid Impact Compactor employs an on-board computer to control impact set termination criteria, and to record critical data. Acquired data at each impact point include: total energy input, total penetration, and penetration of final set.

RIC has been successfully used to consolidate gravel, sands, some silts, miscellaneous sand/silt/clay and industrial and mining waste fills.

Applications

- Surface consolidation: final treatment of upper strata following traditional dynamic compaction or vibrocompaction.
- Foundations support: increase bearing capacity and reduce settlement.
- Floor slab support: stiffen soils and create uniform bearing conditions.
- Liquefaction mitigation: increase shear wave modulus to help raise seismic site class.
- Waste stabilization: reduce waste volume and improve properties of loose fills.

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