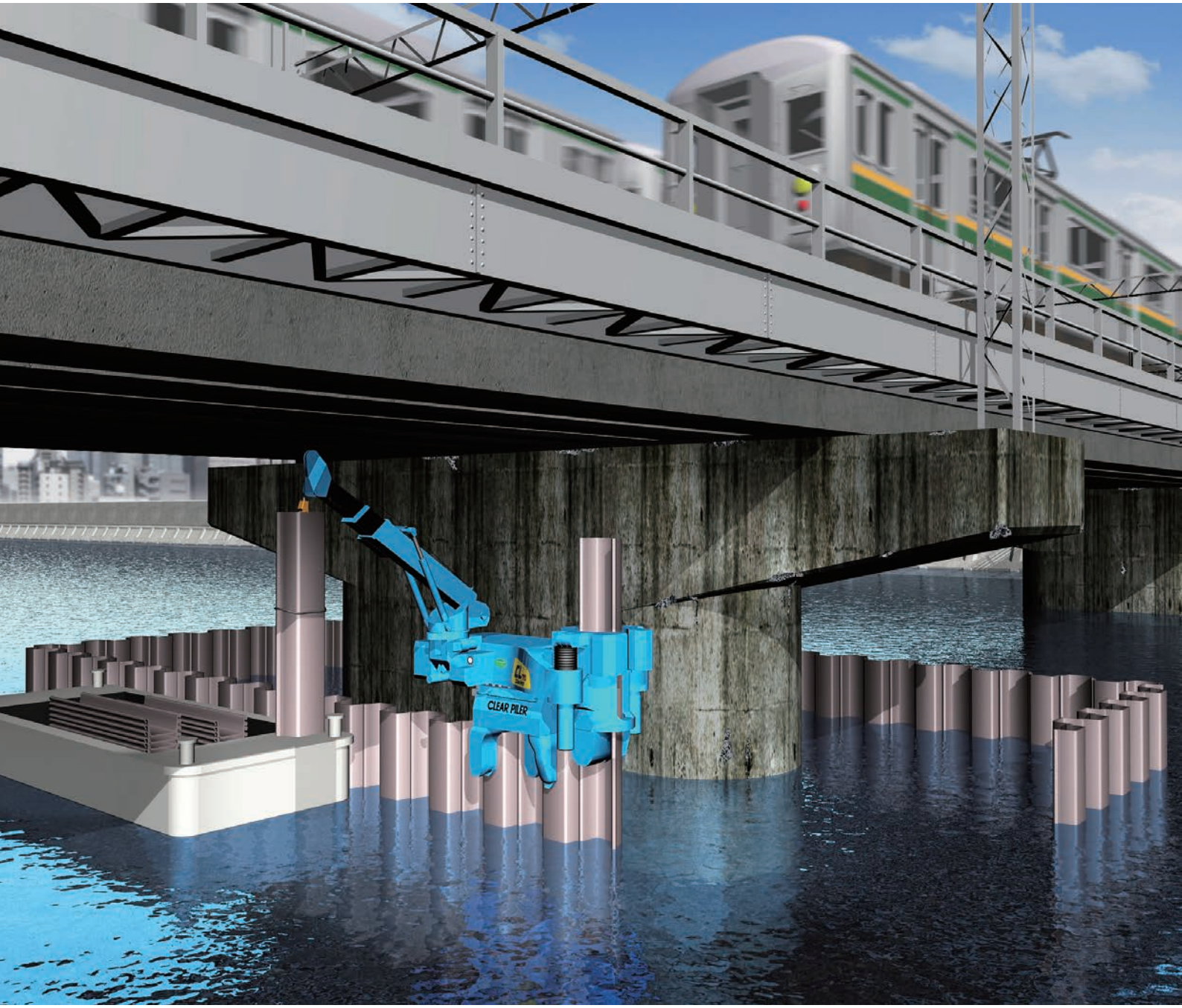
Construction Revolution

Constructing continuous pressed-in pile wall in a limited workspace under overhead restrictions

Overhead Clearance Method

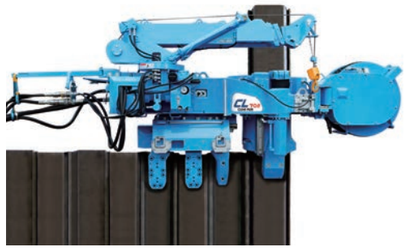


GIKEN

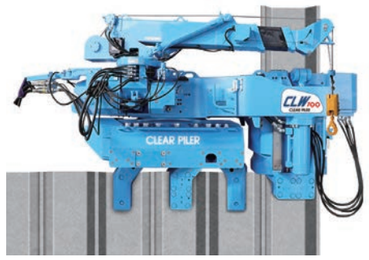
Method Overview

Enables construction work under overhead restrictions that were not possible with conventional methods, and allows for restoration and reinforcement while maintaining the infrastructure functions

The Overhead Clearance Method enables the press-in of steel sheet piles and tubular sheet piles using the SILENT PILER™, which is compatible with low headroom, even under overhead restrictions that make it difficult to work with conventional machines, such as under bridges and high-voltage cables.



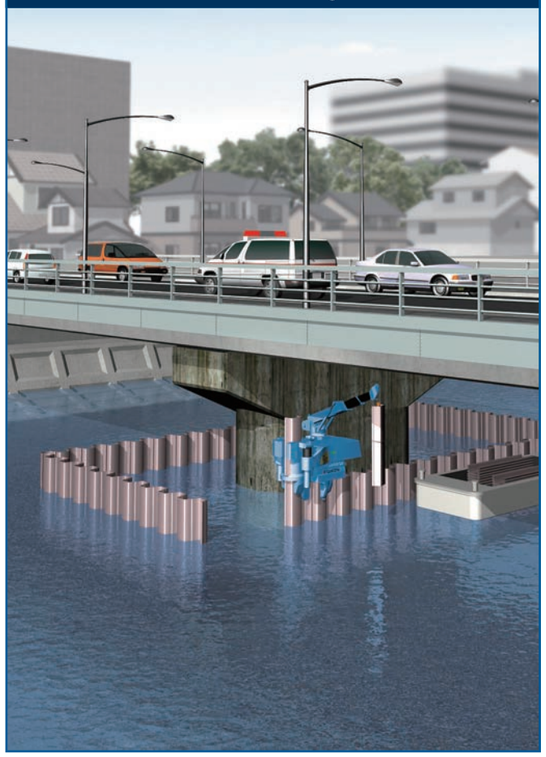
CL70B



CLW100

Overhead Clearance Method

No Effect on Existing Traffic



Conventional Method

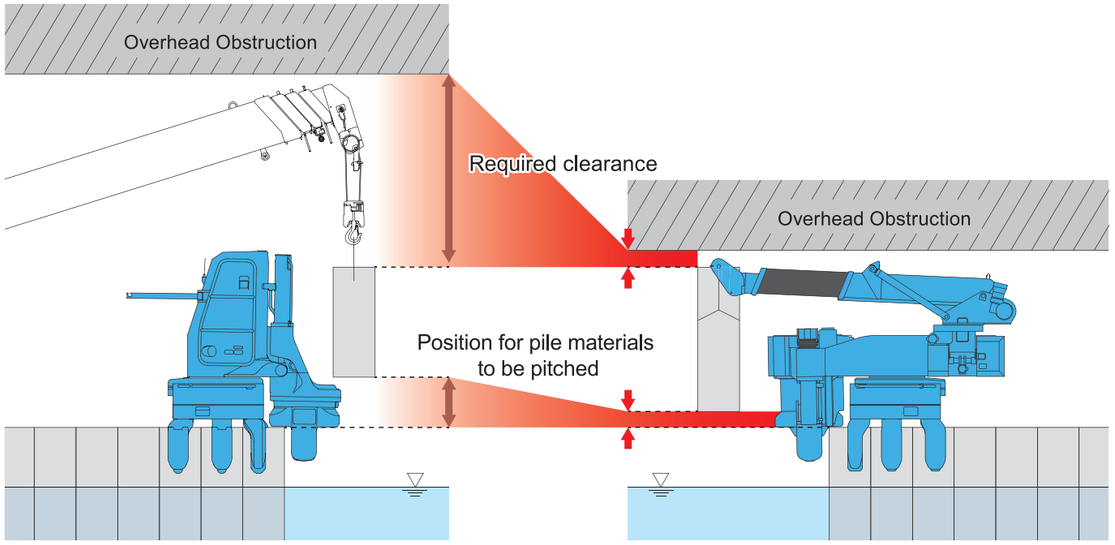
Traffic Cut Off due to Temporary Bridge Construction, etc.

SILENT PILER specialized for construction under overhead restrictions

The SILENT PILER specialized for low headroom reduces the workspace necessary for pitching a pile element using an attached pile pitching machine. The specially designed chuck mechanism enables highly efficient construction since the pile element pitching position can be lowered to obtain the maximum pile element length.

Regular press-in machine with a crane

Machine for low overhead clearance



Features of Overhead Clearance Method

◇ Outstanding press-in performance with limited space overhead

The pile pitching machine was integrated by thoroughly reducing the machine dimensions. This enables effective press-in construction even under overhead restrictions without compromising the superiority of the press-in method.

◇ Quick construction without disturbing existing urban functions

The compactness of the system allows the simultaneous operation of multiple machines and does not require the removal and restoration of existing overhead structures, dramatically reducing the construction period.

◇ Highly economical and environmentally-friendly

In this method, construction costs can be greatly reduced because no temporary works such as installation of temporary roads and piers are required and because of the minimal machinery and simple working procedures. Furthermore, the static-load press-in method was applied, preventing the generation of noise, vibration, or other pollution.

◇ High level of safety with no risk of machine overturning

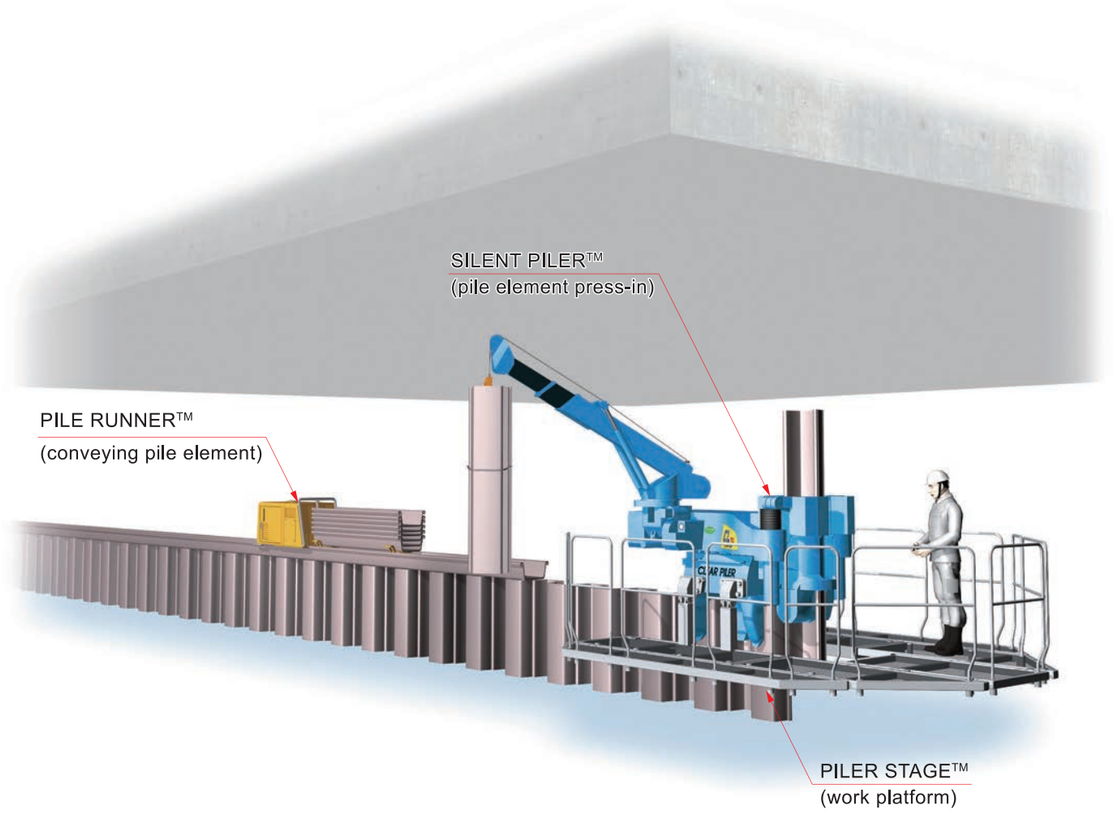
The main body firmly holds the completed piles, eliminating any risk of machine overturning.

Construction works can be carried out with environmentally-friendly considerations, lower cost, and shorter work duration at any work conditions.

GRB System™

GRB System for Temporary Work Free Construction

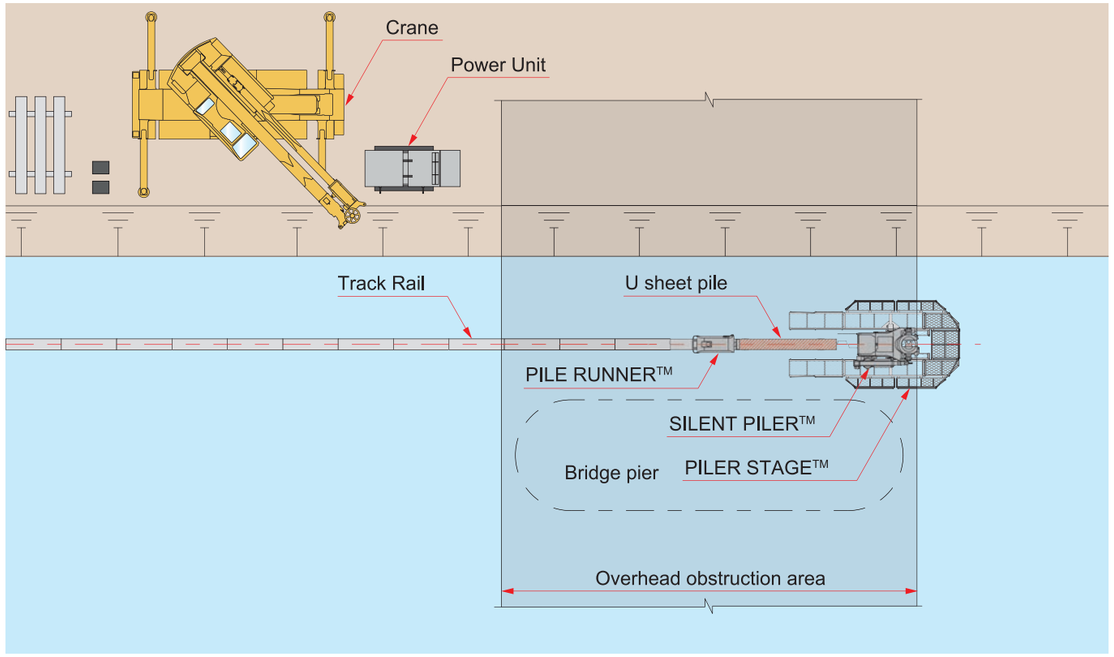
The GRB System is a construction system that applies the "press-in principle," which obtains reaction force from completed piles. The entire process of press-in construction from pile conveying, pile pitching, and press-in work can be completed on top of completed piles, and all machines are self-supporting by gripping the completed piles. This eliminates any risk of machine overturning and the area necessary for work is minimized to the machine widths on the piles.
Temporary work such as a temporary piers or detour roads are not required even on waterfront areas, slopes, uneven terrain, narrow areas, or areas with low headroom. The GRB System achieves “temporary work free construction” by focusing on the original purpose of efficiently performing the main construction work only.



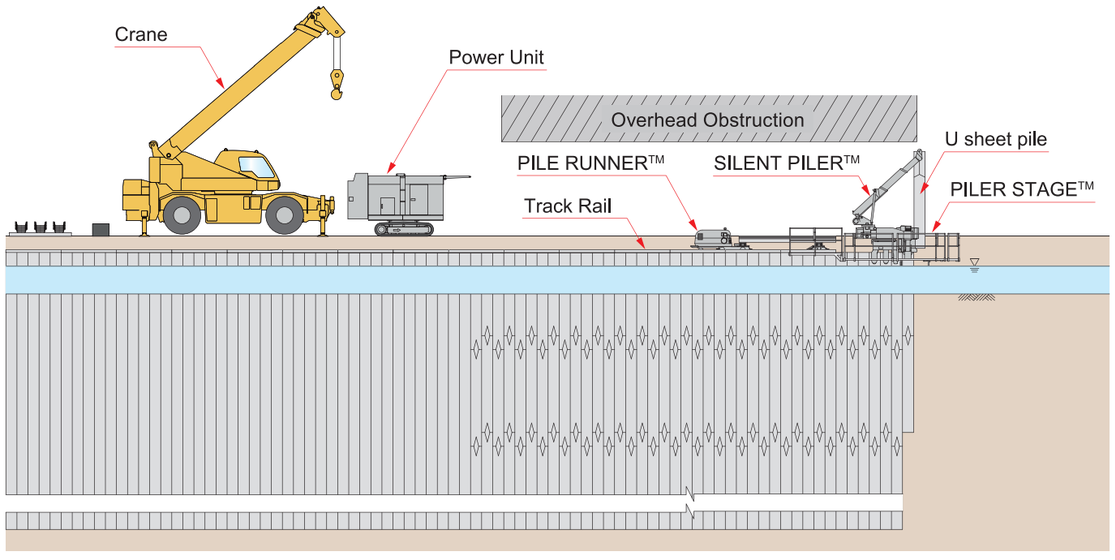
Standard machine layout diagram

GRB System

▼ Plan View

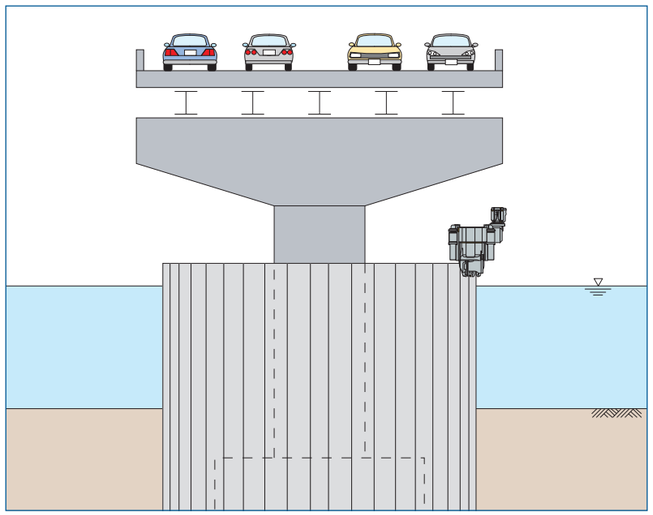


▼ Side View



Application & Example

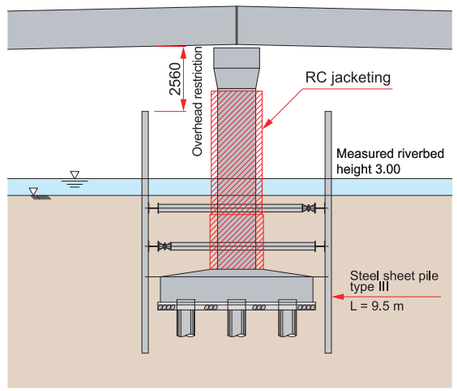
Bridge Pier Construction



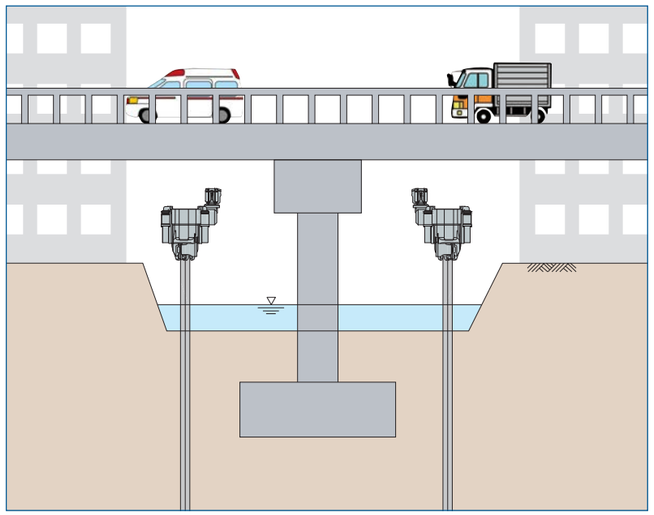
A temporary cofferdam can be built without replacing or detouring the bridge pier even under overhead restrictions that are difficult to handle with conventional methods. This enables the completion of construction work while maintaining the existing conditions.

Example Sukano Bridge seismic reinforcement work — Shizuoka, Japan

Temporary cofferdam for bridge pier reinforcement
Completed construction under low headroom (2.56 m) without replacing or detouring the bridge pier



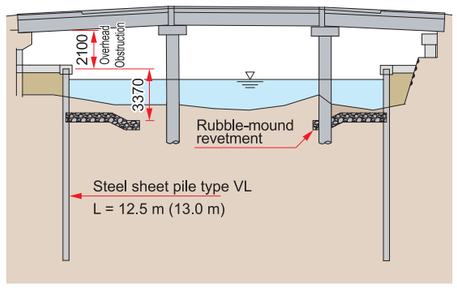
Riverbank Construction Work



Riverbank revetment work can be performed without relocating or removing water pipe bridges, road bridges, overhead cables, and other overhead obstacles for riverbank reinforcement work.

Example Riverbank reinforcement work, public (Katabira River No. 3) — Kanagawa, Japan

Riverbank reinforcement work under in-service road bridge
Completed construction without causing any traffic restrictions since the influence range did not extend over the road



Design

■ Scope of Overhead Clearance Method

Types II, III, and IV (400P)

Work type	Press-in	Press-in with water-jetting (with one unit)	Press-in with water-jetting (with two units)	Extraction
Max. SPT-N value	Nmax ≤ 20	20 < Nmax ≤ 40	40 < Nmax ≤ 50	—
Compatible model	CL70B			

Types VL and VIL (500P) Types IIIw and IVw (600P)

Work type	Press-in	Press-in with water jetting	Extraction
Max. SPT-N value	Nmax ≤ 25	25 < Nmax ≤ 50	—
Compatible model	CLW100		

■ Minimum clearance for construction per pile element

Pile element		Types II, III, and IV (400P)	Types VL and VIL (500P) Types IIIw and IVw (600P)
Applicable model		CL70B	CLW100
Minimum clearance for construction	At press-in		
	With backward self-moving attachment		

■ Calculation method of the maximum pitching length for construction under girders

Maximum pitching length = h - a - b

h: Overhead clearance
(distance between the pile top end and overhead obstacle)

a: Allowable pitching height
(200 mm for CL70B, 100 mm for CLW100)

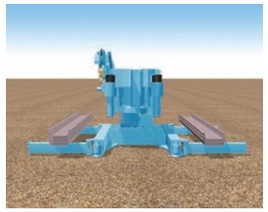
b: Separation from the overhead obstacle
(*depends on the site conditions, however, 100 mm or more is recommended)

Standard construction process

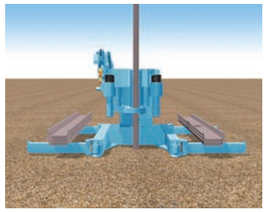
Initial press-in

1 Install the press-in machine main body and the reaction stand horizontally.

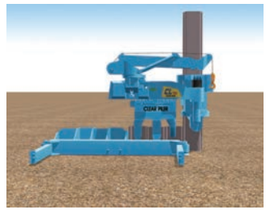
2 Place counter weights on the reaction stand according to the soil conditions and pile length.



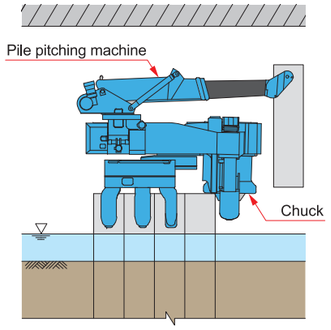
3 Press in the first pile using the gross weight on the reaction stand.



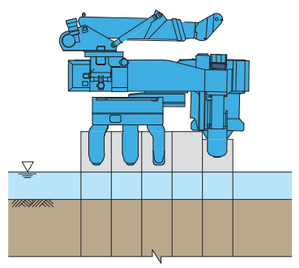
4 After piling the required number of piles, remove the counter weights.



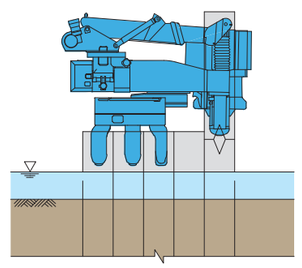
Standard mode



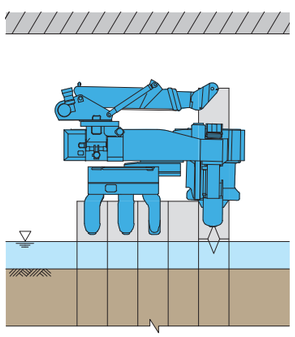
1 Hold the pile element with the pitching chuck of the pile pitching machine.



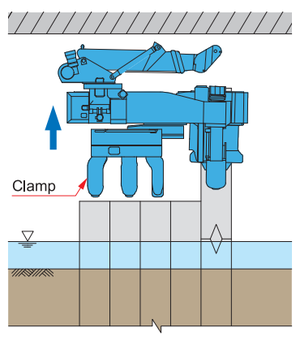
2 After checking the alignment and verticality, press in the pile element to the required position.



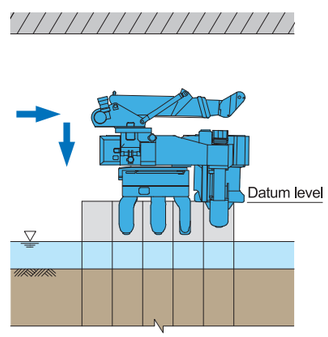
3 Pitch the pile element to be added, adjust the center, and join them.



4 Repeat steps 2 and 3, and press in until sufficient bearing capacity for self-moving is obtained.



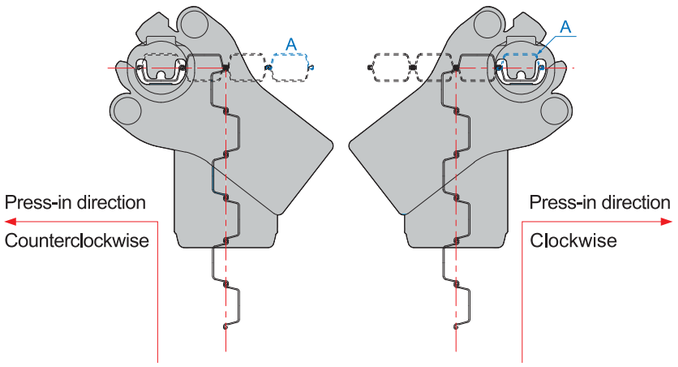
5 Open the clamp and start self-moving.



6 After completing the self-moving, press in the pile element to the datum level.

Workability

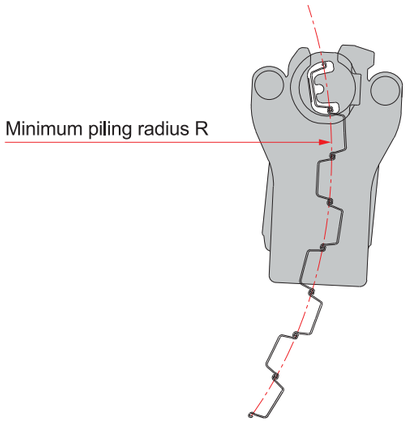
Corner piling



*Piling cannot be performed when the corner piling (second pile in clockwise direction) is at position A because the chuck rotation will be restricted.

*One reaction force steel sheet pile needs to be installed on the opposite side of the moving direction when self-moving the corner.

Curve piling



CL70B

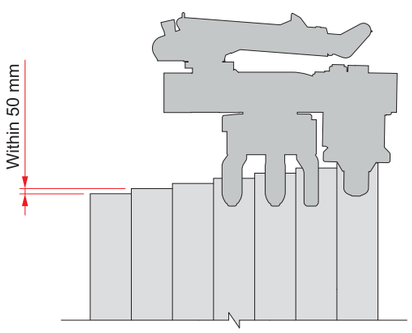
Model	Minimum piling radius (R)
U sheet pile 400 mm-width	3800 mm

CLW100

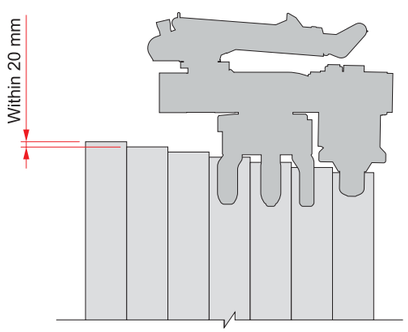
Model	Minimum piling radius (R)
U sheet pile 500 mm-width VL	4800 mm
U sheet pile 500 mm-width VIL	5000 mm
U sheet pile 600 mm-width IIIw	5700 mm
U sheet pile 600 mm-width IVw	5700 mm

Slope piling

Ascending slope



Descending slope

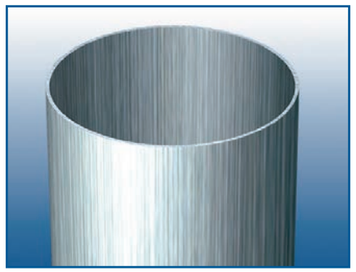


*Slope piling is not possible when using a self-moving attachment.

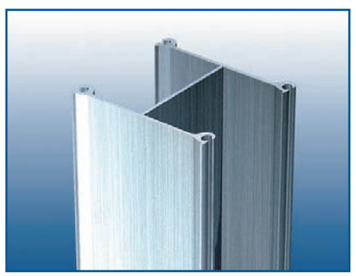
Application to other pile elements

Tubular sheet pile

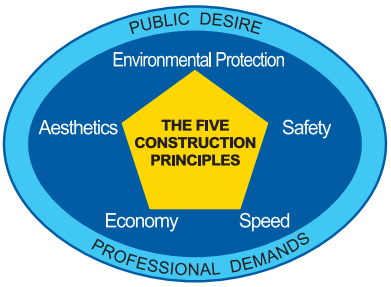
Tubular pile (Gyropress Method™)



H sheet pile



THE FIVE CONSTRUCTION PRINCIPLES



"The Five Construction Principles" are the universal criteria for the construction method selection and construction quality, by considering ideal situations for construction work under public perspective.
In any construction project, the five aspects i.e. Environmental Protection, Safety, Speed, Economy and Aesthetics, should be fulfilled in the form of equilateral pentagon.

Environmental Protection	Construction work should be environmentally friendly and free from pollution.
Safety	Construction work has to be carried out in safety and comfort with a method implementing the highest safety criteria.
Speed	Construction work should be completed in the shortest possible period of time.
Economy	Construction work must be done rationally with an inventive mind to overcome all constraints at the lowest cost.
Aesthetics	Construction work must proceed smoothly and the finished product should portray cultural and artistic flavour.

GIKEN Construction Solutions Company

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