HARD GROUND PRESS-IN METHOD

The Silent Piler for Hard Ground

Super Crush Piler

SCU-400M
SCU-600M

Technical Brochure

GIKEN

Introduction

The Press-in Method has variety of superiorities, but had one weakness. It was to press-in at hard ground conditions. It has been a long time pending issue in the Press-in Industry. By the standard press-in method and the press-in with water jetting method cannot enable to install sheet piles into hard ground stratum such as sandy gravel layer with boulders and rock layer.

Super Crush Piler was designed for the solutions such issue. By the realisation of a GIKEN's unique concept, "the Coring Theory", which is press-in with simultaneous augering, made sheet piling work possible at hard ground conditions. It dramatically expands the sheet piling range without vitiating the superiorities of the Press-in Method.

Even though Super Crush Piler has an augering device, the press-in machine main body is so light and compact that its physical appearance does not give negative power of impression that typical massive augering machines have. The lightness and compactness of Super Crush Piler makes sheet piling work possible at limited working spaces and slopes. In addition, because Super Crush Piler firmly grips reaction piles, it hardly overturns during operations. This mechanism provides ultimately high safety performance.

The environmentally friendly designs are strictly applied in Super Crush Piler. The Power Unit has the world highest level of engine in smoke emissions and fuel consumption. Biodegradable hydraulic oil and grease are applied as its standard specifications. They can prevent fatal contamination in water and soil, if they are accidentally spilled over, because natural bacteria degrade them in a short period of time.

The introduction of Super Crush Piler expands the applicable ground range of press-in work. We believe not only that it improves the superiorities of the Press-in Method but also that it creates new chapter in the history of piling work. This brochure will give you detailed information about the features and superb functions of Super Crush Piler for your new recognitions.

Contents

Overview

When sheet piling work is carried out at hard ground condition, such as sandy gravel layers with boulders and rock, massive augering and piling machines are generally used. They are time consuming and not economical. They are even not environmentally friendly and not a safe piling method, neither. GIKEN has developed “the Hard Ground Press-in Method” to overcome those negative aspects. Noise and vibration generated from piling work can be minimised by pressing-in sheet piles with simultaneous augering. This Silent Piler, so called the Crush Piler, is so compact and light that it can eliminate negative psychological impact that massive conventional piling machines give to neighbours. Moreover, if piling alignment is located on slope or on the water, conventional piling machines require large temporary platform. Because such temporary facility is not necessary in the Hard Ground Press-in Method, environmental burden of the piling work is greatly reduced.

Superiorities of Press-in Method

- No vibration and no noise
- No machine overturning
- Compact and light machine
- Press-in load can be monitored during installation
- High piling quality

The Coring Theory

(Press-in with Simultaneous Augering)

“The Coring Theory”, a GIKEN’s original theory for press-in with simultaneous augering, makes sheet piling at hard ground possible without losing superiorities of Press-in Method.

Various Advantages

- Can install sheet piles at hard ground such as boulder, gravel and rock.
- No risk of machine over-turning and no negative psychological impact that massive conventional machines give.
- Compact and light machine makes piling work possible at limited working area and on slope.
- The augering section area is minimised just for sheet pile installation, so the amount of discharged soil can be minimised. It provides proper stability on the sheet pile wall.
- An environmentally friendly piling method with GIKEN’s original system technologies.

  * GIKEN’s Press-in System technologies won **“Environment Prize”** in 2001.

Features

The Five Construction Principles

The Hard Ground Press-in Method is a piling method that fulfils “The five construction principles” in a well-balanced manner.

Any construction work should be fair and appropriate for citizen. GIKEN defines what construction works are supposed to be by “the Five Construction Principles” which consists of Environmental Protection, Safety, Speed, Economy and Aesthetics. They are GIKEN’s fundamental of machine developments and construction method developments.

Environmental Protection

Construction work should be environmentally friendly and free from pollution.

- Static load is applied to press-in sheet piles, so there is no construction pollution like noise and vibration.
- Silent Piler is so light and compact that its extent of the piling activities can be minimised.
- GIKEN’s system technologies don’t require temporary platforms so that environment burden of construction work is minimised.
- The augering section area is minimised just for sheet pile installation, so the amount of discharged soil can be minimised. It gives no negative impact to surroundings.

Safety

Construction work has to be carried out in safety and comfort with a method implementing the highest safety criteria.

- The compact Silent Piler doesn’t have risk of overturning, because the rig grips reaction piles firmly.
- The Pile Auger and sheet pile being pressed-in are locked by high safety functions.
- The Crush Piler can be controlled by wireless control system, so the operator can control the Crush Piler at a safe spot.

Speed

Construction work should be completed in the shortest possible period of time.

- Construction duration can be greatly shortened, because highly efficient piling work can be carried out with systemised packages of machineries and apparatuses.
- Multiple sets of compact machines and apparatuses can be used at the same time to greatly shorten construction period.
- Speedy piling progress is available, because there are least limits in working hours even at highly restricted areas and night works.

Economy

Construction work must be done rationally with an inventive mind to overcome all constraints at the lowest cost.

- GIKEN’s system technologies don’t require temporary platforms so that construction cost is greatly reduced.
- This systemised package of machines and apparatuses can minimise number of work force so that labour cost is greatly reduced.
- All machines are so compact that it is not necessary to completely close active traffics.

Under construction

After completion

Aesthetics

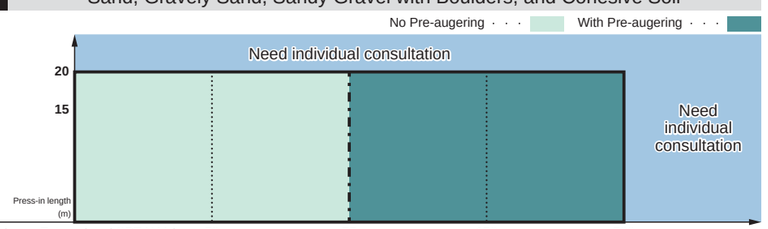
Construction work must proceed smoothly and the finished product should portray cultural and artistic flavour.

- Smooth piling works are available by selecting the most effective package of machineries and apparatuses for individual project conditions.
- Artistic looking structure is available by installing decoration panels on sheet pile walls.
- With superiorities of the Press-in Method, highly accurate and high quality sheet pile walls are available.

Applicable Ground Condition

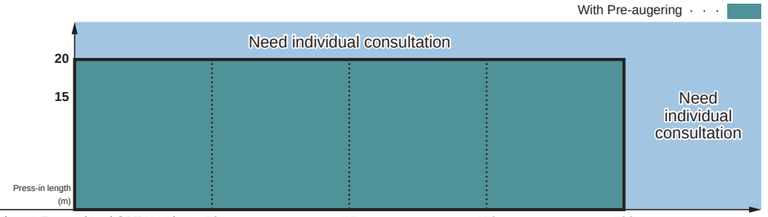
Table for Applicability

SCU-400M — Sand, Gravely Sand, Sandy Gravel with Boulders, and Cohesive Soil



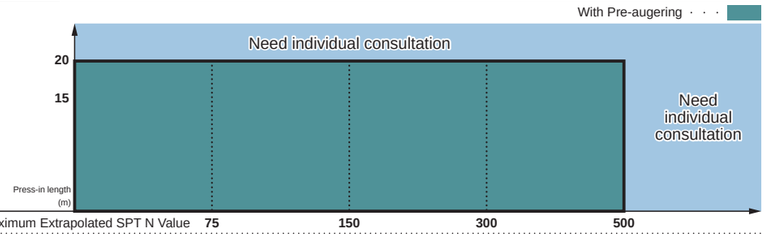
Borehole Data	Maximum Extrapolated SPT N Value	50	75	150	500
	Maximum Gravel-Boulder Size		D75	D120	D200
	Gravel-Boulder Proportion				60%
	Uniaxial Compressive Strength(N/mm²)				50

SCU-600M — Sand, Gravely Sand, Sandy Gravel with Boulders, and Cohesive Soil



Borehole Data	Maximum Extrapolated SPT N Value	50	75	150	500
	Maximum Gravel-Boulder Size		D75	D120	D200
	Gravel-Boulder Proportion				60%
	Uniaxial Compressive Strength(N/mm²)				50

SCU-400M, 600M — Rock



Borehole Data	Maximum Extrapolated SPT N Value	75	150	300	500
	Uniaxial Compressive Strength(N/mm²)		5	20	40
	Rock Classification		D – CM		
	Strength		E – C		

(Note) 1. Various numerical values that distinguish the nature of soil must be referred from the value indicated in borehole data.
2. The maximum values in borehole data must be applied to determine the applicability.
* GIKEN has many experiences at area where defined “Need individual consultation”.
Please contact the nearest GIKEN office for detailed information. (Project achievements P25-P32)
For the further information about applicable ground conditions, please refer **“Standard Estimation Guide Book of Hard Ground Press-in Method”** issued by **Japan Press-in Piling Association**.

Various Auger Heads

The type of auger heads shall be selected based on ground conditions.


For press-in 2 Wings

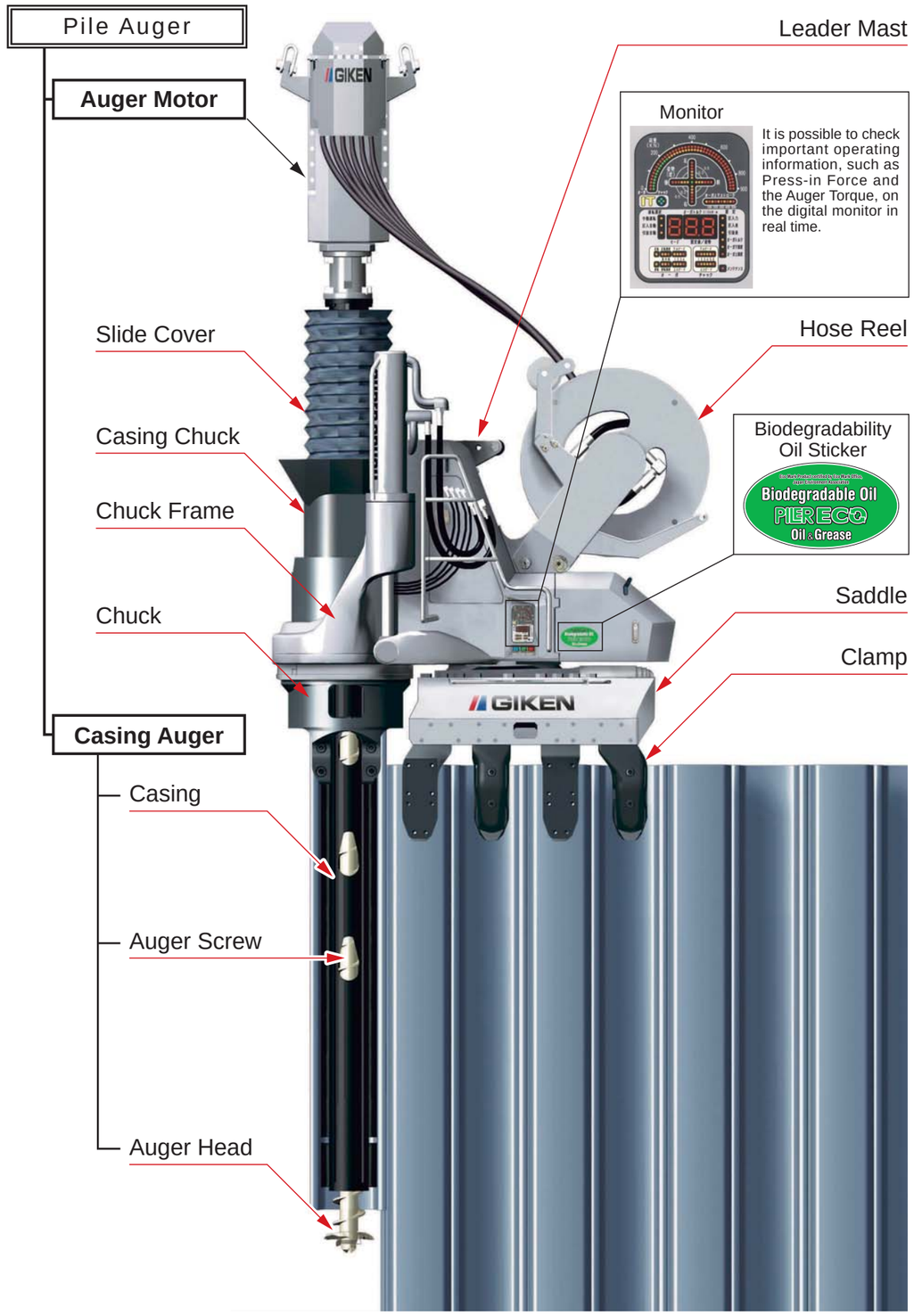

For cobble 2 Wings


For rock 3 Wings

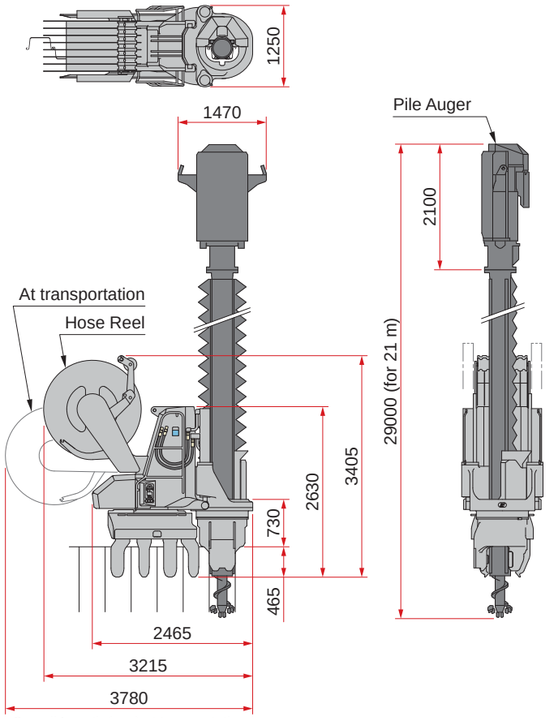
* GIKEN keeps developing original auger heads for further improvements in terms of body designs and materials.

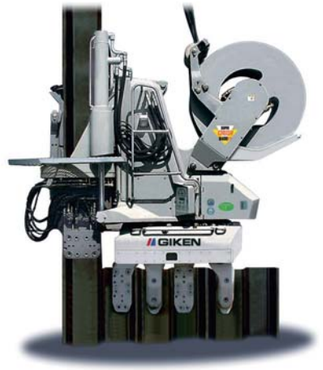
Silent Piler

Super Crush Piler (Component Names)



Super Crush SCU-400M Specifications





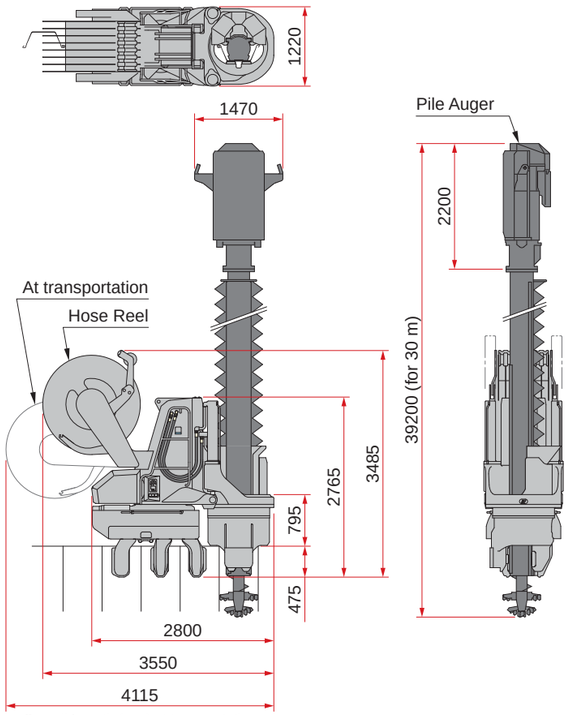
Press-in Machine Main Body	
Press-in Force	800 kN
Extraction Force	900 kN
Stroke	1,000 mm
Mass	10,600 kg (Including Hose Reel)
Applicable Sheet Piles	Sheet piles Type Ⅱ, Ⅲ, and Ⅳ
Control System	Radio control

*For other sheet pile sections, please contact the nearest GIKEN office.

Pile Auger	
Mass	9,600 kg (for 21.0 m)

Total mass 20,200 kg (21.0 m)

Super Crush SCU-600M Specifications



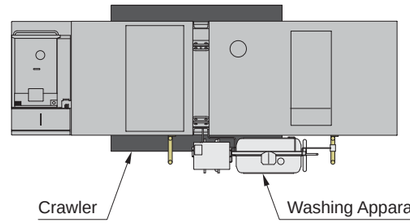
Press-in Machine Main Body	
Press-in Force	800 kN
Extraction Force	900 kN
Stroke	1,000 mm
Mass	13,400 kg (Including Hose Reel)
Applicable Sheet Piles	Sheet piles Type ⅤL and ⅥL Sheet piles Type ⅡW, ⅢW, and ⅣW
Control System	Radio control

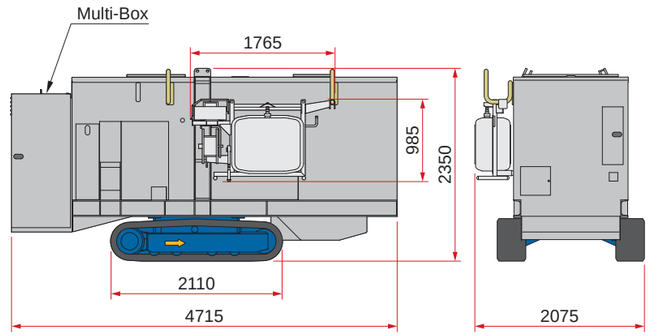
*For other sheet pile sections, please contact the nearest GIKEN office.

Pile Auger	
Mass	14,400 kg (for 30.0 m)

Total mass 27,800 kg (30.0 m)

Power Unit EU300F3 Specifications





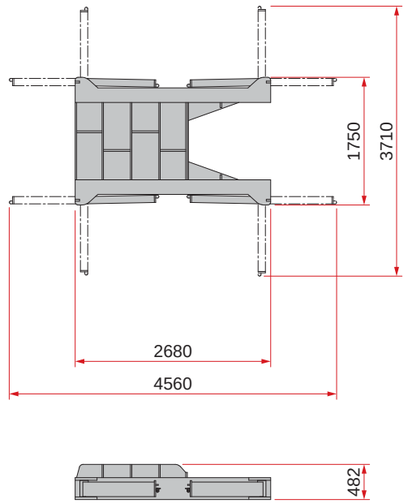
Power Unit		
Power Source		Diesel Engine
Rated Output	Power Mode	230 kW(313 ps) / 1,800 min^{-1}
	Eco Mode	204 kW(277 ps) / 1,600 min^{-1}
Fuel Tank Capacity		500 L
Hydraulic Oil Tank Capacity		Piler Eco Oil 630 L
Driving Speed		1.4 km/h
Vibration Regulations		Approved by MLIT (Ministry of Land, Infrastructure, Transport and Tourism) as an Ultra-low noise standard equipment
Exhaust Emission Regulations		Fulfils Off-road Regulation Requirement
Mass		7,980 kg

*Includes 20m hydraulic pressure hoses, the volume of rating capacity of hydraulic oil and full fuel.

Washing Apparatus	
Mass	320 kg

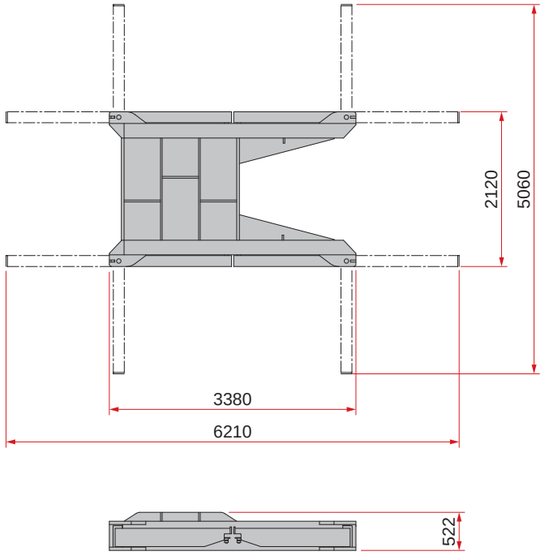
Total mass 8,300 kg

Reaction Stand for SCU-400M Size



Total mass 1,250 kg

Reaction Stand for SCU-600M Size



Total mass 2,000 kg

* The above specifications are subject to alternation without a prior notice.

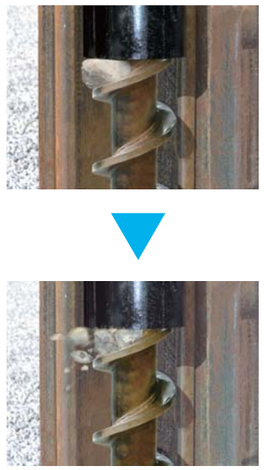
Mechanism of Press-in

Coring Press-in (Press-in at Sand Gravel & Boulder Strata)

Under “the Coring Theory”, a GIKEN’s original technology, the Pile Auger penetrates into hard stratum by augering the minimum area to create a coreless zone underground. While the Pile Auger is being extracted, sheet pile is being pressed-in simultaneously. In this manner, augering is applied just for a driving assistance purpose. It does not decrease baring capacity of driven piles, because the least volume of soil is discharged and ground disturbance is minimised.

Starting installation

Augering



Crushing boulders by wedge effect

Extracting the Pile Auger and installing sheet pile

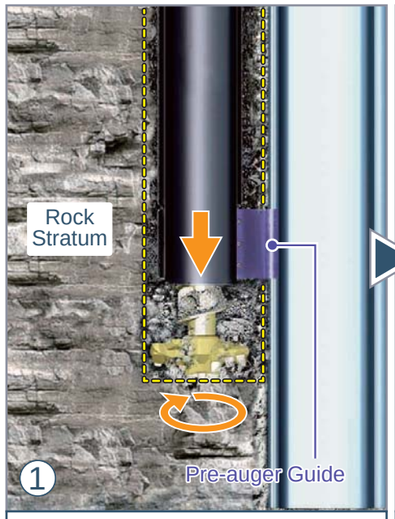
End of one work cycle

Penetration through boulder

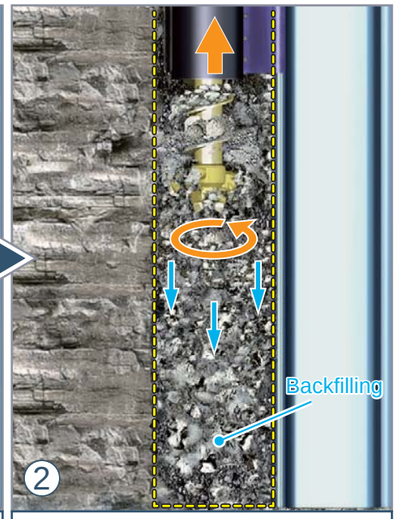
Press-in with Pre-augering (Press-in at Boulder & Rock Strata)

If sheet piles are installed into rock strata by conventional method, usually large area of rock are crushed and then replaced by sand prior to sheet piling. With this piling method, it takes more cost and time. The Super Crush Piler can solve such problems. The Pile Auger equipped on Super Crush Piler pre-augers prior to pressing-in sheet pile just necessary area of rock and then sheet pile is installed. The Super Crush Piler can handle the both pre-augering work and sheet pile installation work by the one unit. It makes sheet piling work at hard ground significantly efficient. In addition, the Pile Auger can pre-auger with high level of accuracy, because it is fixed with a guide attachment which is connected to the leading interlock of previously installed sheet pile.

Pre-augering Area

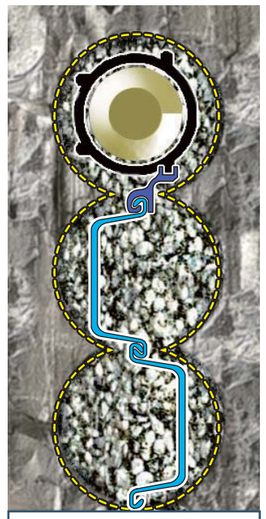


Pre-augering (with Pre-auger head)

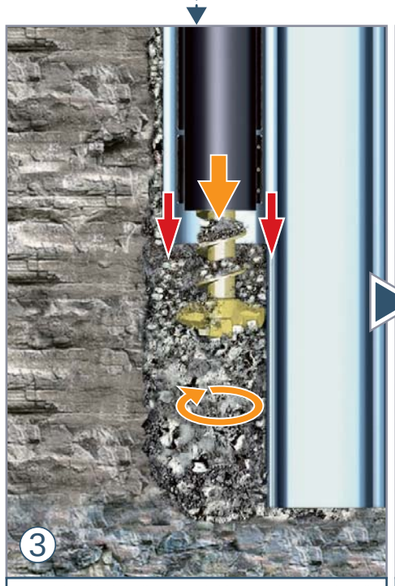


Extracting the Pile Auger and backfilling

The soil inside the casing is removed by auger reverse revolution.

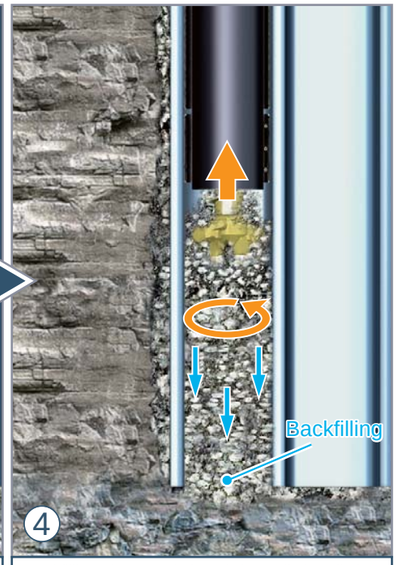


Layout of pre-augering area



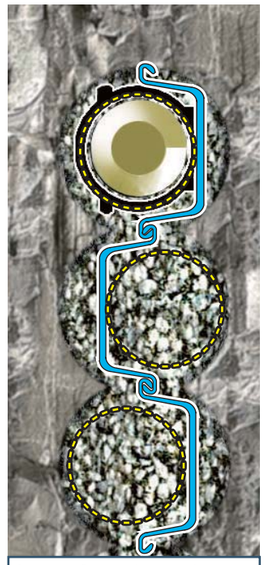
Press-in with the Pile Auger (with press-in auger head)

Replace the pre-auger head to the press-in auger head



Backfilling after completion of sheet pile installation

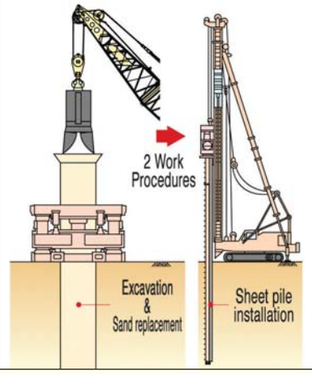
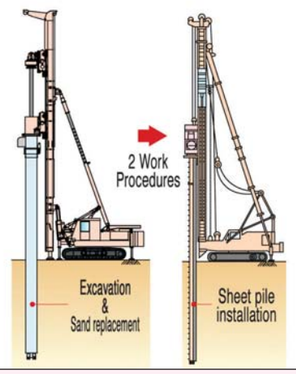
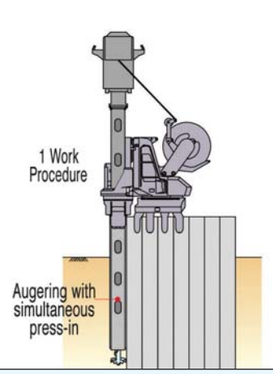
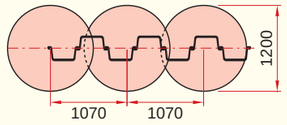
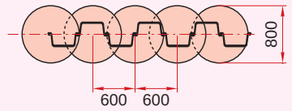
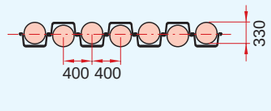
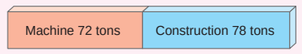
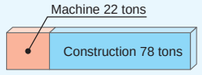
After completion of installation, while the Pile Auger is being extracted, the soil inside the Pile Auger are removed for backfilling.



Layout of press-in augering area

Method Comparison

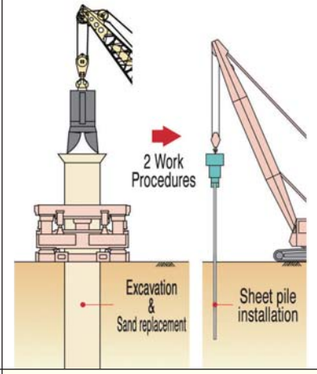
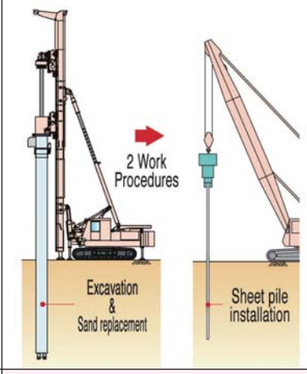
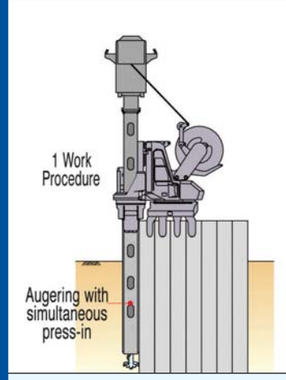
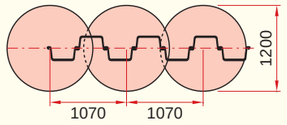
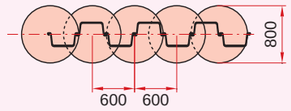
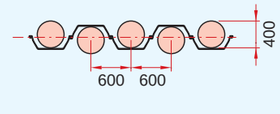
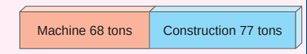
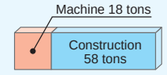
Comparison Table (SCU-400M)

	All Casing Sand Replacement Piling Method	Uniaxial Double Earth Auger Pre-boring Sand Replacement Piling Method	**Hard Ground Press-in Method**
Cross Section			
Augering area			
Method Outline	A casing with cemented carbide tips on the edge is driven by gyration jack-in, and the soil inside the casing are excavated by a hammer grab. The casing is then driven farther in, and this process is repeated as required. While the casing is being extracted, sand is poured inside the casing to construct a sand pile. Sheet pile is then installed by a jack-in piling rig equipped with auger.	A boring shaft is driven by double gyration. Special cutting edges are mounted on the casing edge and auger head. The casing and auger head revolves in different directions one another. After completing excavation, sand is poured inside the casing to construct a sand pile. Sheet pile is then installed by a jack-in piling rig equipped with auger.	A sheet pile is pitched to the Crush Piler. The Pile Auger penetrates together with the sheet pile into the ground.
Features	• There are 2 work procedures required prior to sheet piling work. I. Casing jack-in with gyration, excavation, backfilling. II. Sheet pile installation by a jack-in piling rig equipped with auger. • The great torque enables to penetrate into rock, boulder and reinforced concrete materials. • During excavation work, the hammer grab generates noise and vibration. • This method requires a large working area, because it requires massive construction equipments such as casing gyration jack-in machine, crawler crane and excavator.	• There are 2 work procedures required prior to sheet piling work. • The penetration capability into boulder is lower than "All Casing Sand Replacement Piling Method". • This method requires a large working area, because it requires massive construction equipments such as casing gyration jack-in machine, crawler crane and excavator.	• This method doesn't cause construction pollutions such as noise and vibration, because sheet piles are installed by static load. • This method requires less work procedures than other methods, because it doesn't require sand replacement work. • The piling rig hardly overturns, because it clamps previously installed piles so that the rig is fixed with those reaction piles. • The piling rig is so compact that it can be used at narrow site conditions and on slope. • This method can install sheet piles with high accuracy.
Duration	110 days (170 %)	93 days (143 %)	65 days (100 %)
Budget *1	Excavation & Sand replacement = JPY 72 million Sheet pile jack-in = JPY 5.5 million Total = JPY 77.5 million (189 %)	Excavation & Sand replacement = JPY 51 million Sheet pile jack-in = JPY 5.5 million Total = JPY 56.5 million (138 %)	Sheet pile press-in = JPY 41 million Total = JPY 41 million (100 %)
Environmental Burden *2 (CO_2 Emission)	 Σ = 149 t (149 %) (Add 130 tons for temporary work platform work.)	 Σ = 150 t (150 %) (Add 130 tons for temporary work platform work.)	 Σ = 100 t (100 %)
Evaluation	△	△	◎

Comparison Conditions	· Sheet Pile: FSP IV, L = 15.0 m · Alignment: 100 Linermeter · No of Piles: 250 nos · Soil condition: Sand Nmax < 50 (GL to 12.0 m) 12 - 15m: Soft rock (uniaxial compressive strength 15 N/mm^2)

*1: Installation budget only.
(Excluding erection charge, transportation charge and material charge)
*2: Excluding sheet piles.

Comparison Table (SCU-600M)

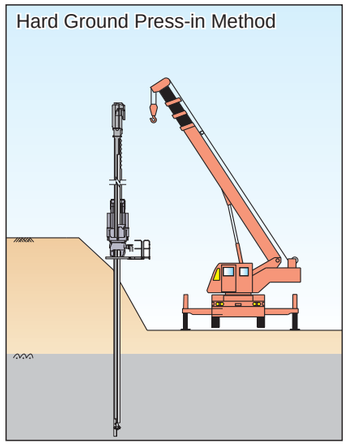
	All Casing Sand Replacement Piling Method	Uniaxial Double Earth Auger Pre-boring Sand Replacement Piling Method	**Hard Ground Press-in Method**
Cross Section			
Augering area			
Method Outline	A casing with cemented carbide tips on the edge is driven by gyration jack-in, and the soil inside the casing are excavated by a hammer grab. The casing is then driven farther in and this process is repeated as required. While the casing is being extracted, sand is poured inside the casing to construct a sand pile. Sheet pile is then installed by a vibratory hammer.	A boring shaft is driven by double gyration. Special cutting edges are mounted on the casing edge and auger head. The casing and auger head revolves in different directions one another. After completing excavation, sand is poured inside the casing to construct a sand pile. Sheet pile is then installed by a vibratory hammer.	A sheet pile is pitched to the Crush Piler. The Pile Auger penetrates together with the sheet pile into the ground.
Features	• There are 2 work procedures required prior to sheet piling work. I. Casing jack-in with gyration, excavation, backfilling. II. Sheet pile installation by a vibratory hammer. • The great torque enables to penetrate into rock, boulder and reinforced concrete materials. • During excavation work, the hammer grab generates noise and vibration. • This method requires a large working area, because it requires massive construction equipments such as casing gyration jack-in machine, crawler crane and excavator.	• There are 2 work procedures required prior to sheet piling work. • The penetration capability into boulder is lower than "All Casing Sand Replacement Piling Method". • This method requires a large working area, because it requires massive construction equipments such as casing gyration jack-in machine, crawler crane and excavator.	• This method doesn't cause construction pollutions such as noise and vibration, because sheet piles are installed by static load. • This method requires less work procedures than other methods, because it doesn't require sand replacement work. • The piling rig hardly overturns, because it clamps previously installed piles so that the rig is fixed with those reaction piles. • The piling rig is so compact that it can be used at narrow site conditions and on slope. • This method can install sheet piles with high accuracy.
Duration	103 days (215 %)	86 days (179 %)	48 days (100 %)
Budget *1	Excavation & Sand replacement = JPY 72 million Sheet pile jack-in = JPY 2.2 million Total = JPY 74.2 million (207 %)	Excavation & Sand replacement = JPY 51 million Sheet pile jack-in = JPY 2.2 million Total = JPY 53.2 million (148 %)	Sheet pile press-in = JPY 36 million Total = JPY 36 million (100 %)
Environmental Burden *2 (CO_2 Emission)	 Σ = 147 t (194 %) (Add 130 tons for temporary work platform work.)	 Σ = 145 t (191 %) (Add 130 tons for temporary work platform work.)	 Σ = 76 t (100 %)
Evaluation	△	△	◎

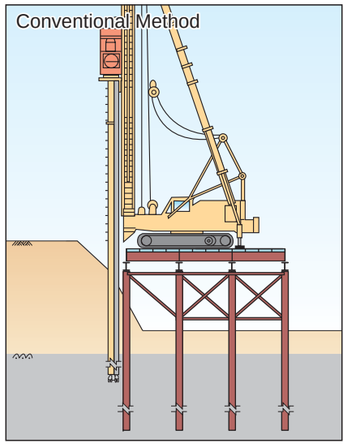
Comparison Conditions	· Sheet Pile: IVw, L = 15.0 m · Alignment: 100 Linermeter · No of Piles: 166.7 nos · Soil condition: Sand Nmax < 50 (GL to 12.0 m) 12 - 15m: Soft rock (uniaxial compressive strength 15 N/mm^2)

*1: Installation budget only.
(Excluding erection charge, transportation charge and material charge)
*2: Excluding sheet piles.

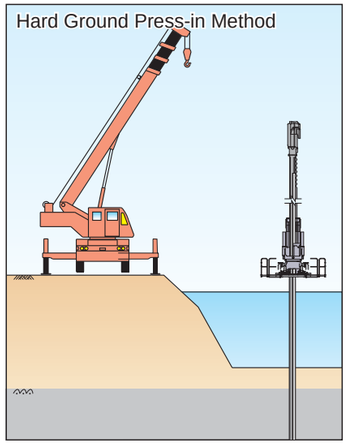
Superiorities of the Hard Ground Press-in Method (under physical restrictions at site)

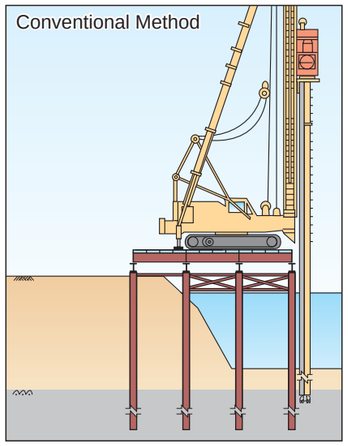
On Slope: No temporary working platform is required.
It can shorten construction duration and reduce construction cost.



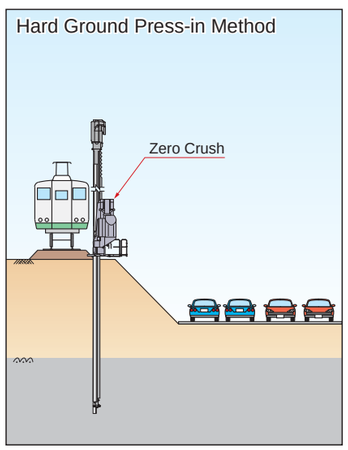


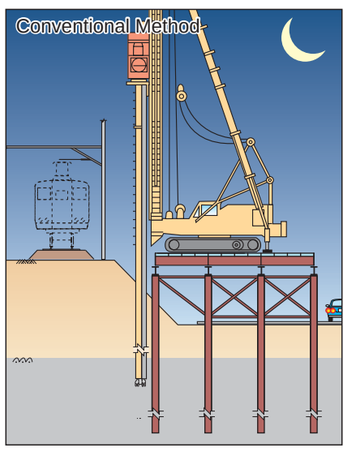
On The Water: No temporary working platform is required.
It can shorten construction duration and reduce construction cost.





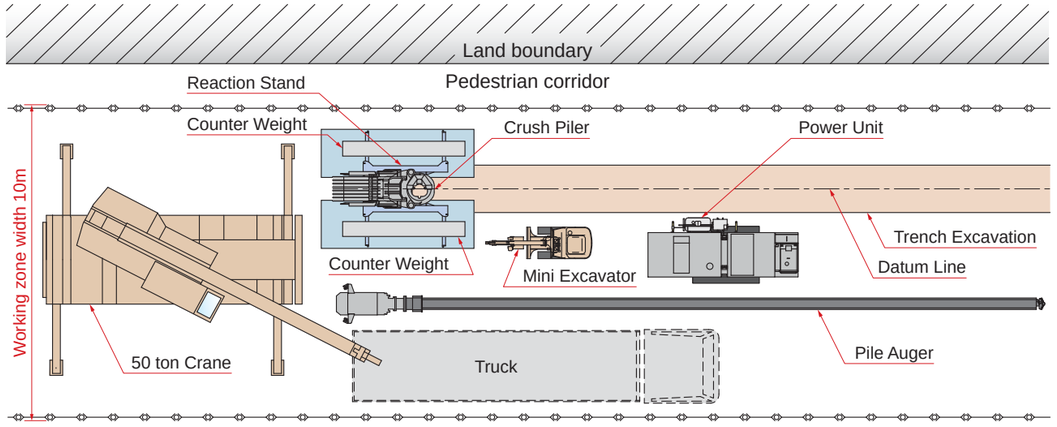
Adjacent to Structure: **There is no working time restriction, because it is such a safe method that there is no risk of the machine overturning.**





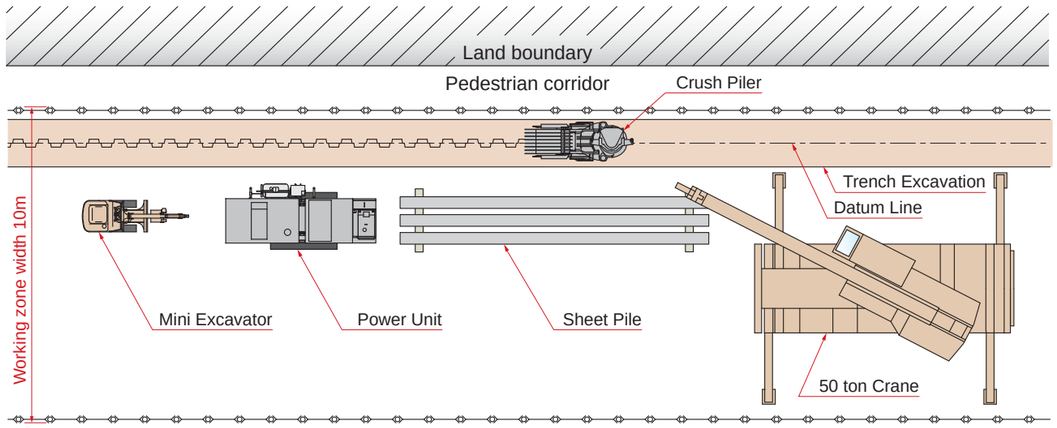
Machine Layout

Plan for Standard Assembling Work for Initial Piling



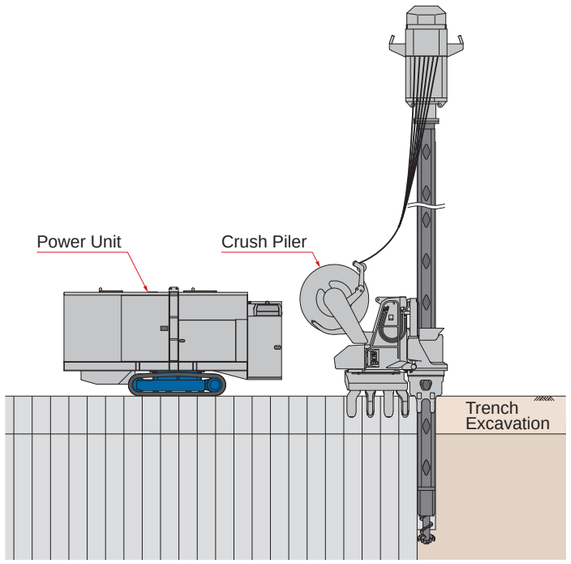
*A 80 ton crane is required for SCU-600M when sheet pile length is more than 15m.

Plan for Standard Press-in Work



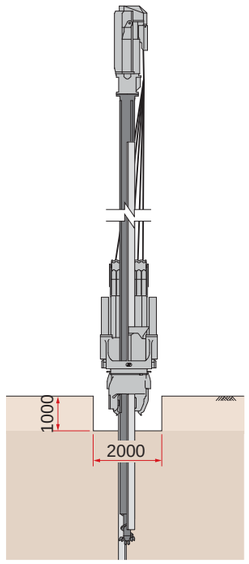
*A 80 ton crane is required for SCU-600M when sheet pile length is more than 15m.

Side View for Standard Press-in Work



* Removed soil treatment is not included.

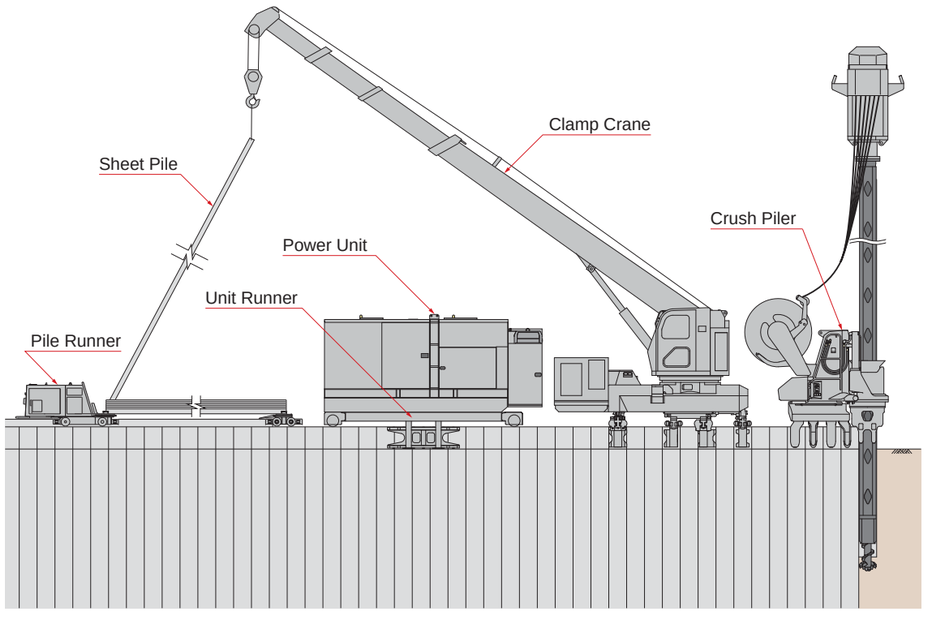
Standard Trench Excavation



* Trench excavation is not always required.

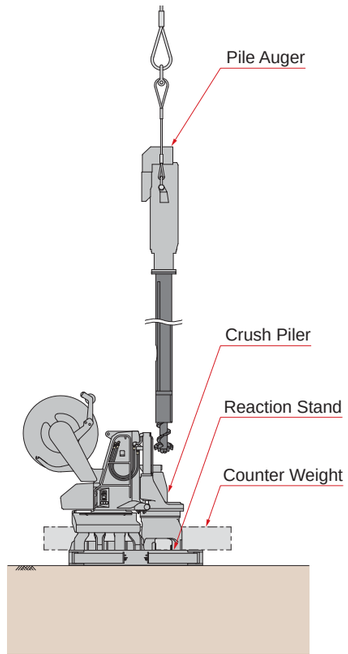
Crush Piler with GRB System

The GRB System makes press-in work possible on the water, on slopes, and at narrow space without work platforms.

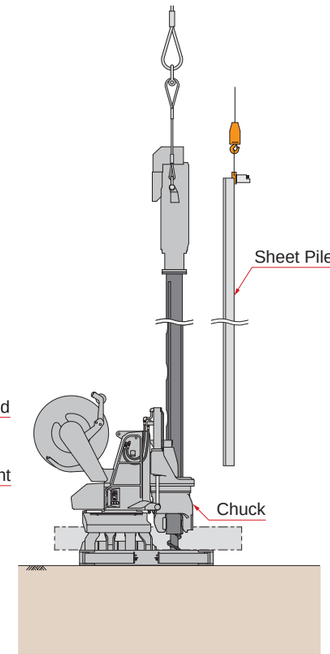


Press-in Procedures

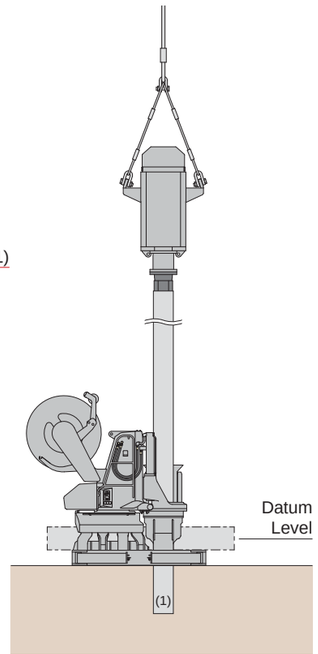
Initial Press-in Procedures



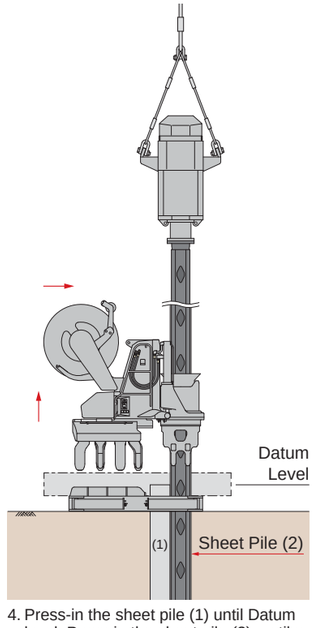
1. Set the Reaction Stand on the datum line horizontally, then set up the Crush Piler and counter weights on the Reaction Stand. The Pile Auger is then assembled with the Crush Piler.



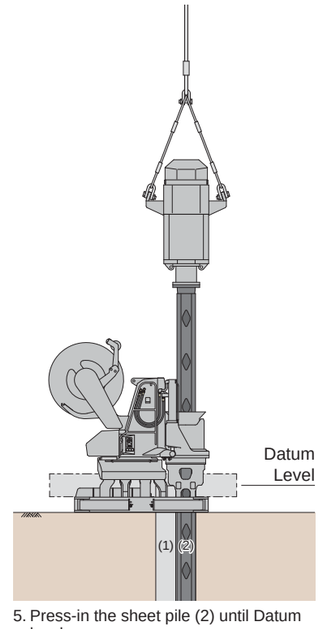
2. Pitch the sheet pile (1) into Chuck and grip it by Chuck.



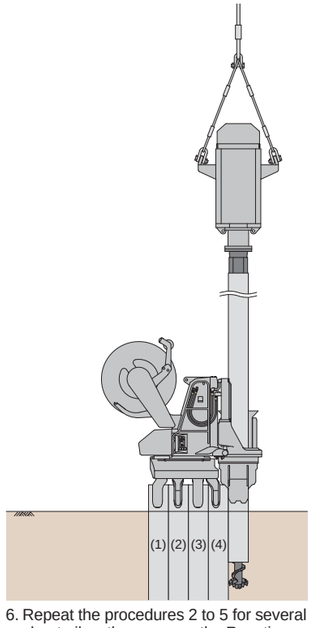
3. After checking the alignment and verticality, start pressing-in the sheet pile (1).



4. Press-in the sheet pile (1) until Datum level. Press-in the sheet pile (2), until a depth where the Pile Auger gets enough resistance to support the weight of Crush Piler. Then self-move the Crush Piler forward.

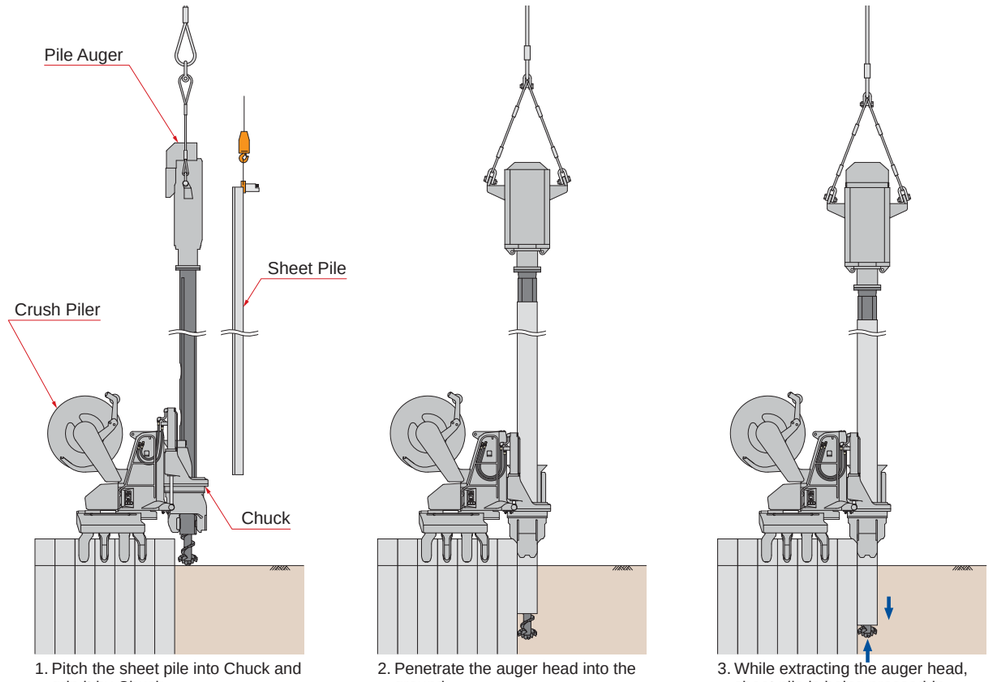


5. Press-in the sheet pile (2) until Datum level.

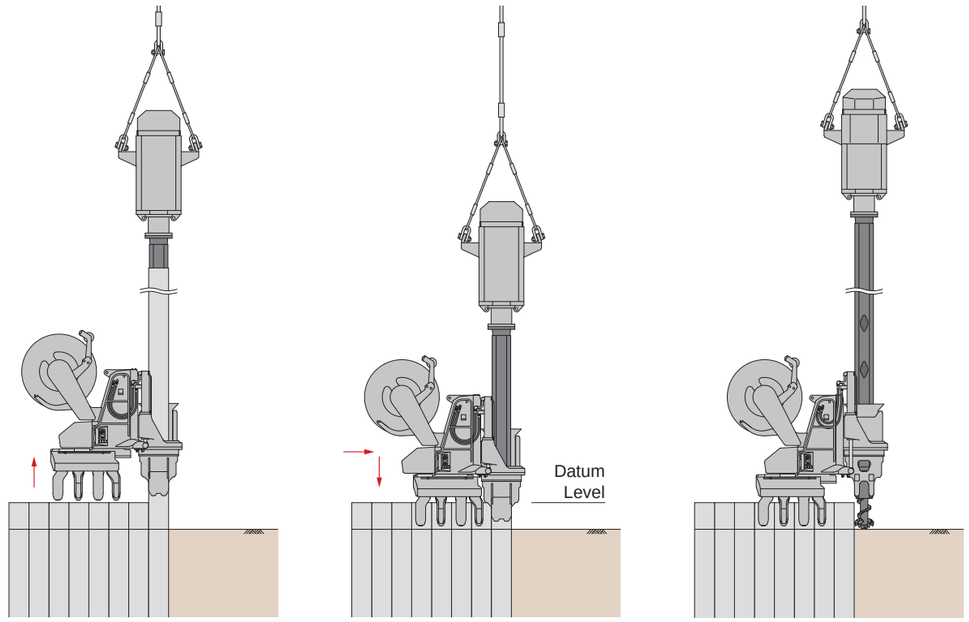


6. Repeat the procedures 2 to 5 for several sheet piles, then remove the Reaction Stand to complete initial piling.

Simultaneous Press-in Procedures



1. Pitch the sheet pile into Chuck and grip it by Chuck.
2. Penetrate the auger head into the ground.
3. While extracting the auger head, sheet pile is being pressed-in.

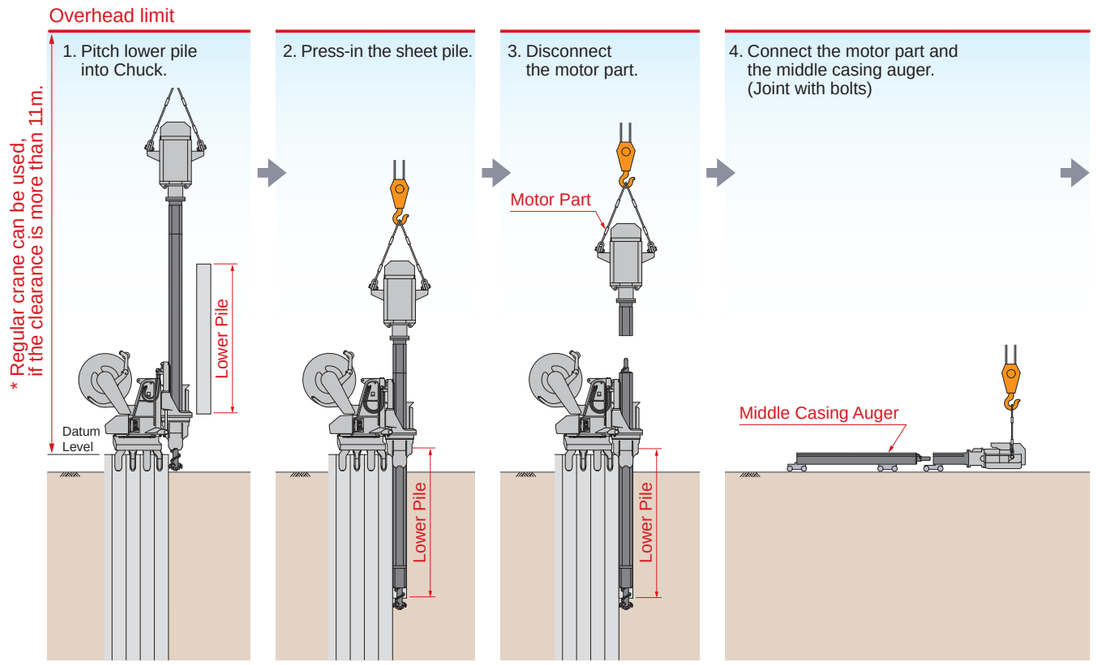


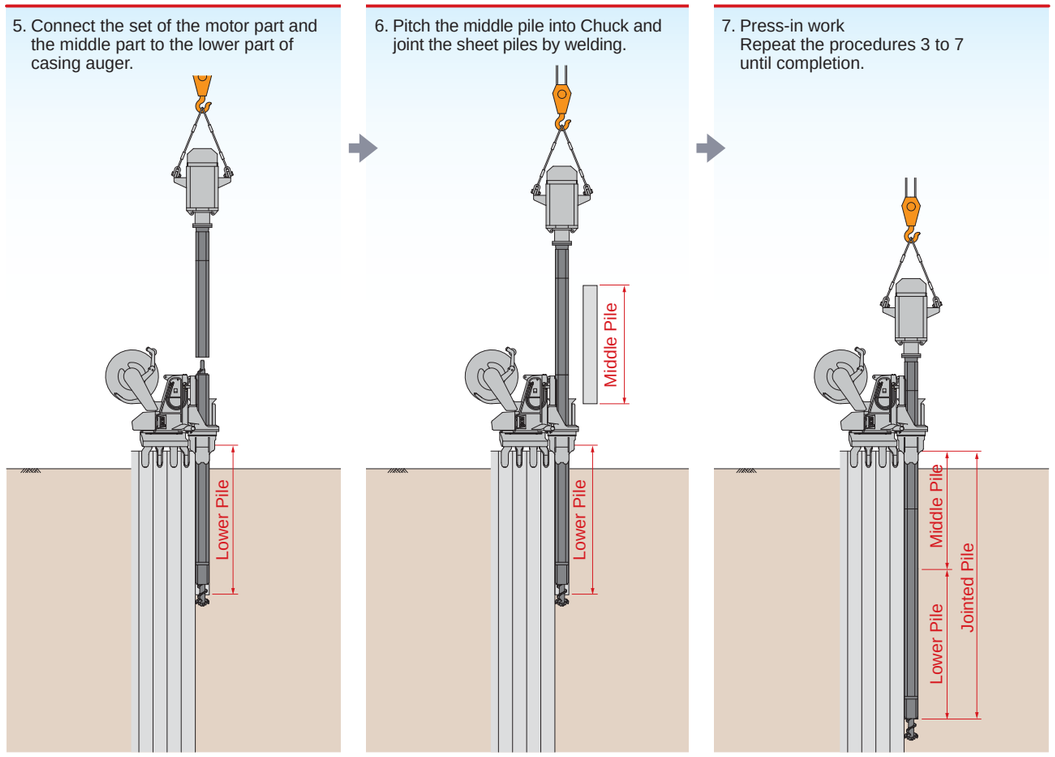
4. Repeat the procedures 2 to 3 until a depth where the Pile Auger gets enough resistance to support the weight of Crush Piler. Then self-move the Crush Piler forward.
5. Press-in the sheet pile until Datum level.
6. Extract the Pile Auger, then continue the procedures 1 to 6 press-in work in that order.

Press-in Procedures under Limited Headroom

Under limited headroom, it is possible to press-in sheet piles by jointing the casing augers and welding sheet piles.

*Though head room clearance is more than 11m, piling work may not be possible due to the winding limit of the service crane to be used.
*In case the headroom clearance is less than 11m, please contact the nearest GIKEN office for individual consultation.



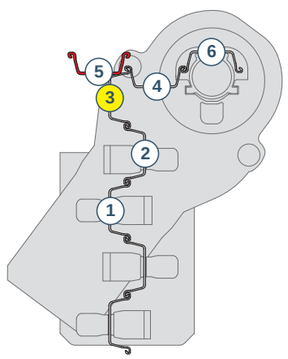


Corner, Curve & Slope Piling

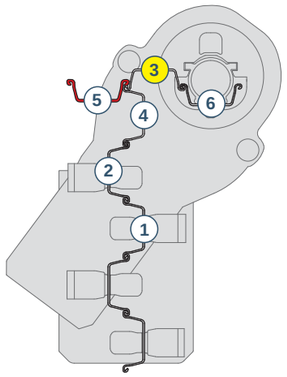
Corner Piling

= Corner pile ① = Installation order = Dummy pile

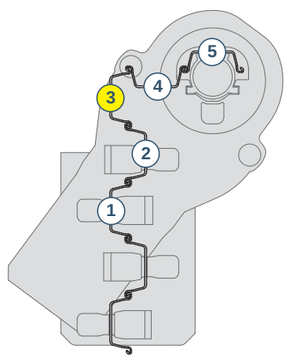
Pattern 1



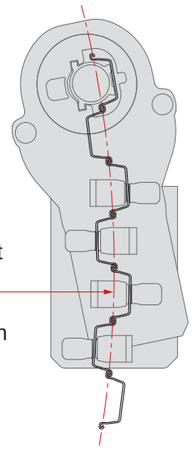
Pattern 2



Pattern 3



Curve Piling

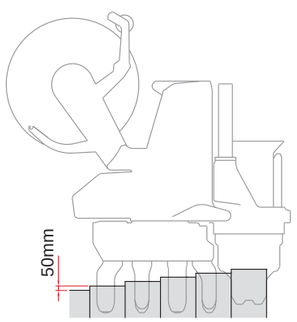


Minimum Radius of Alignment
R=8,000mm (recommended)

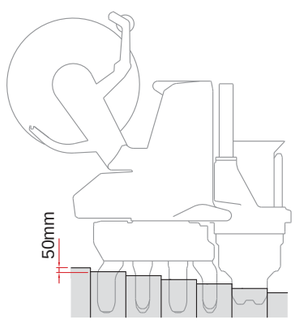
* If you need to consider the radius of alignment less than 8,000mm, please contact to the nearest GIKEN office.

Slope Piling

Up Slope



Down Slope



* Applicability of slope piling depends on ground condition, the sheet pile lengths above ground and installation depth, etc. Please contact to the nearest GIKEN office for individual consultation.

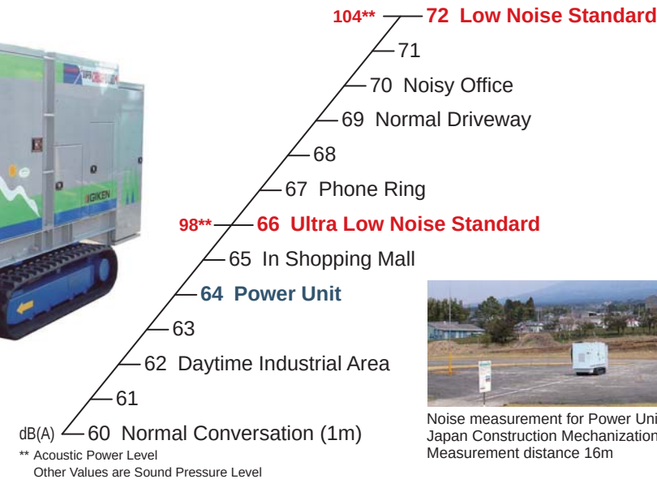
Environmental Measures

Silent Piler is designed with strict concept for environmentally-friendly machine. It meet with the Ultra Low Noise Standard and latest emission restrictions which are established by MLIT.
By applying biodegradable oil (the Piler Eco Oil and the Piler Eco Grease), if hydraulic oil or grease is spilled to soil or water in any possibility, those are degraded by bacteria in natural environment so that they will be no risk of contamination.

* A Japanese act for Emissions from Non-Road Special Motor Vehicles

Reduction of Vibration and Noise

The Power Unit meets with the “Ultra-low noise standard” established by the MLIT.



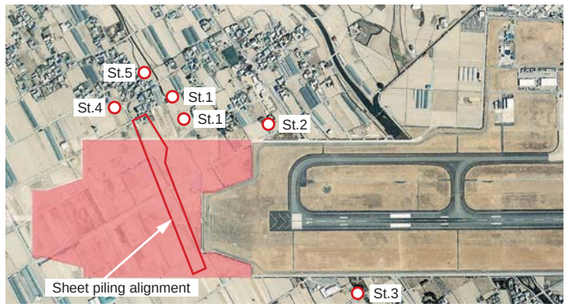
** Acoustic Power Level
Other Values are Sound Pressure Level

Noise measurement for Power Unit
Japan Construction Mechanization Association
Measurement distance 16m

Vibration & Noise Measuring Sample

▼ Sheet Piling in Progress

▼ Measurement Location



▼ Project Summary

Project Name: Kochi airport runway extension project

Location: Nankoku City, Kochi Prefecture

Employer: Kochi Aviation & Port Project Office, Shikoku Local Regeneration Authority of The Ministry of Land, Infrastructure and Transport

Main Contractor: Shimizu - Sato JV.

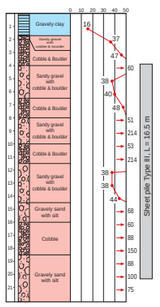
Piling Contractor: Giken Seko Co., Ltd.

Duration: H12.5 - H12.9

Silent Piler: Super Crush SCU-400M, 7 units

Pile Section / Length: Type III, L= 15.5 -16.5m, n= 2,000 pieces

▼ Borehole Log



▼ Noise Level Measurement Result (night time)

Location	St.1		St.2		St.3		St.4		St.5	
Time	LAeq	L50	LAeq	L50	LAeq	L50	LAeq	L50	LAeq	L50
Back ground noise	54(50)	45(41)	48	43	45	43	–	–	–	–
May	43	41	51	47	44	43	–	–	–	–
August	52	50	56	53	48	46	–	–	–	–
September	56	54	54	51	51	48	–	–	–	–
January	–	–	52	49	58	55	48	46	44	43
February	–	–	48	45	46	43	48	45	48	45
Environmental standard	50dB									

* Distances from the measuring locations to Silent Pilers differ from 15 to 80m according to construction progress.

▼ Noise Level Measurement Result

The top value L10 in vibration level 80% range was less than 30dB.

Exhaust Emission

Exhaust Emission Regulations

- SCU-400M (since No.45) and SCU-600M (since No.14)
  The new generation environmentally-friendly engine conforms the emission level to the off-road act.
  (It meets with the 3rd standard of emissions from construction equipment by MLIT)
- SCU-400M (No.1-No.44) and SCU-600M (No.4-No.13)
  It conforms 2nd standards in abroad for exhaust emissions that past engines could not conform.

GIKEN's Standard

- Setting more strict original standards from the viewpoint of citizens.
  Highly energy-efficient utilisation ➡ High combustion efficiency
  Elimination of other environmental burden ➡ White smoke and dark smoke

Large reduction of white smoke : When the engine starts (warming-up time)

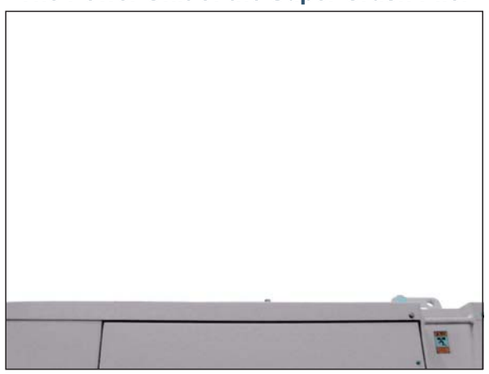
The Power Unit of the Super Crush Piler

The engine with the electronic controlled fuel injection system reduces white smoke.

A Past Power Unit

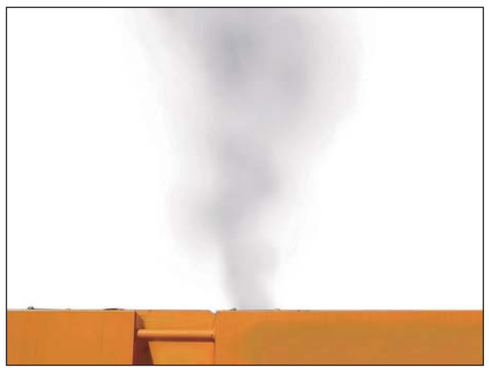
Large reduction of dark smoke : When the engine load is applied

The Power Unit of the Super Crush Piler



The dark smoke emission are reduced by GIKEN's original designs on hydraulic control and fuel injection control.

A Past Power Unit



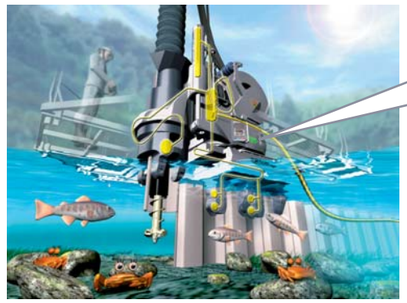
Environment-Friendly Biodegradable Oil (the Piler Eco Oil and the Piler Eco Grease)

GIKEN's Original Product

Biodegradable oil is applied to Silent Piler, so if hydraulic oil or grease is spilled to soil or water in any possibility, those are degraded by bacteria in natural environment in short term.

Design Concept

- Environmentally friendly concept has been adapted as the primary design concept.
- A biodegradable oil has been developed by GIKEN with a hydraulic oil manufacturer.

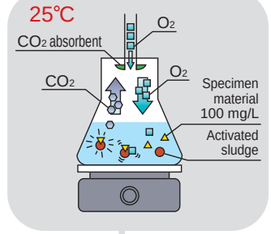


No need to worry about contamination when working at river, canal and ocean.

Standard Application of Biodegradable Oil

- The label of Piler Eco Oil & Piler Eco Grease is affixed on Silent Piler.

Their biodegradability has been certified by biodegradability test.



Biodegradability test: OECD*1 301C

Activated sludge was used as microorganism source. Biochemical oxygen consumption (BOD) of specimen material (Piler Eco Oil & Piler Eco Grease 100mg/L) was continuously assayed by automatic assay system to valuate biodegradability (percentage of volume of degrade into carbon dioxide and water) after 28 days.

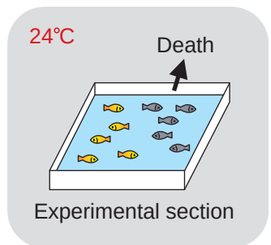
Result

Piler Eco Oil
Degraded 77.2%
→Meet the standard
Piler Eco Grease
Degraded 66.2%
→Meet the standard

After 28 days (Required more than 60% degraded.)

Eventually 100% will degraded. Time differs from conditions for 100% degrade.

Avirulence is certified by Fish Toxicity Test.



Acute Toxicity Test: JIS*2 K 0102

This test is carried out to investigate the survival rate of 10 killifishes within 4 days in the water contains specimen material 100mg/L.

Result

Piler Eco Oil
100% alive
→Meet the standard
Piler Eco Grease
100% alive
→Meet the standard

After 4 days (Survival rate needs to be more than 50%)

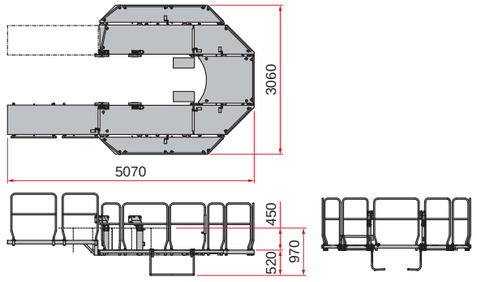
*1: The Organization for Economic Co-operation and Development Standards.
*2: Japan Industrial Standards.

AUXILIARY EQUIPMENT **for improvement of safety and work efficiency under various site conditions**

Generally speaking, many sheet pile works are carried out where work platform is necessary, such as on water, at slope and at high pile head from ground surface. Under such working conditions, GIKEN's Piler Stage and Auger Head Replacing Attachment make piling work safe and efficient. In addition, many auxiliary equipment are lined up to improve environmental and safety aspects.

Piler Stage

- Piler Stage is an easy handling platform.
- Junctions on the Crush Piler are easy insert type as well as junctions of each pieces. You can set the stage on the only one side.
- Adjustable handrails make flexible entry and exiting.

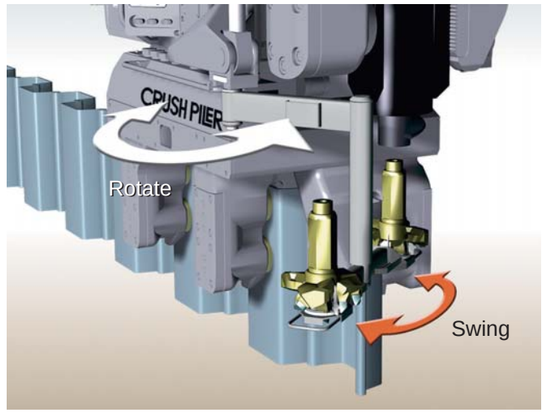


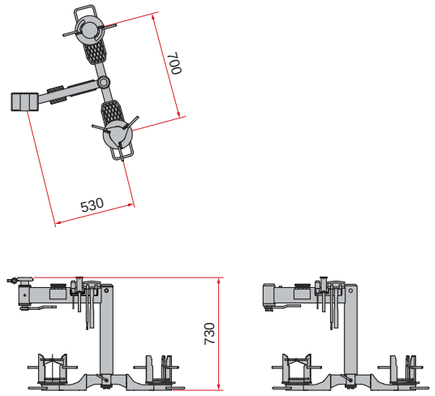
- Maximum loadable mass
  - Attaching both side ..... 350 kg
  - Attaching one side ..... 200 kg
  - Middle Stage ..... 150 kg
- Mass ..... 530 kg

Auger Head Replacing Attachment

It is necessary to use more than 2 types of Auger Head according to soil condition. Auger heads are so heavy that it takes time and needs hard work for the replacement. But Auger Head Replacing Attachment makes such replacement work much faster and safer.

If sheet pile alignment is close to any structure, or if site condition is too narrow to set the Piler Stage, or when corner piling is required, you can use the Adjustable Arm Type Attachment.





GIKEN'S ORIGINAL ACCESSORIES **for improvement of work efficiency (Seek better environmental protection and safety work)**

Pile Laser

Sheet pile alignment is quickly and accurately set by palm-size laser diode pointer.

- Mass ..... 1.5 kg
- Operation time ..... More than 50 hours with size D battery.

Pile Roller

Pile Roller eliminates noise and friction between piles while sheet pile is being pitched up. It makes crane work smoother and safer.

- Mass
  for U Sheet Pile 11kg
  for Hat Sheet Pile 900mm ...13kg
- Applicable sheet pile sections ...U Sheet Pile (400, 500, 600 mm)
  *Type IVA is not applicable.
- Applicable sheet pile length
  for 400 & 600 mm.....Max. 20 m
  for 500 mm .....Max. 25 m

Hose Roller

Hose Roller can protect hydraulic hose damages by avoiding lugging hydraulic hoses on the ground, and make the hose handlings much easier.

- Mass ..... 8 kg
- Applicable sheet pile sections ..... U Sheet Pile (400, 500, 600 mm)

Radio Control Safety Shackle

The pitching shackle can lock and released the sheet pile by radio control. The latest model has improved in the safety function.

- Mass .....9 kg
- Locking & Release Operation.....Radio Control
- Maximum lifting load.....2,000 kg

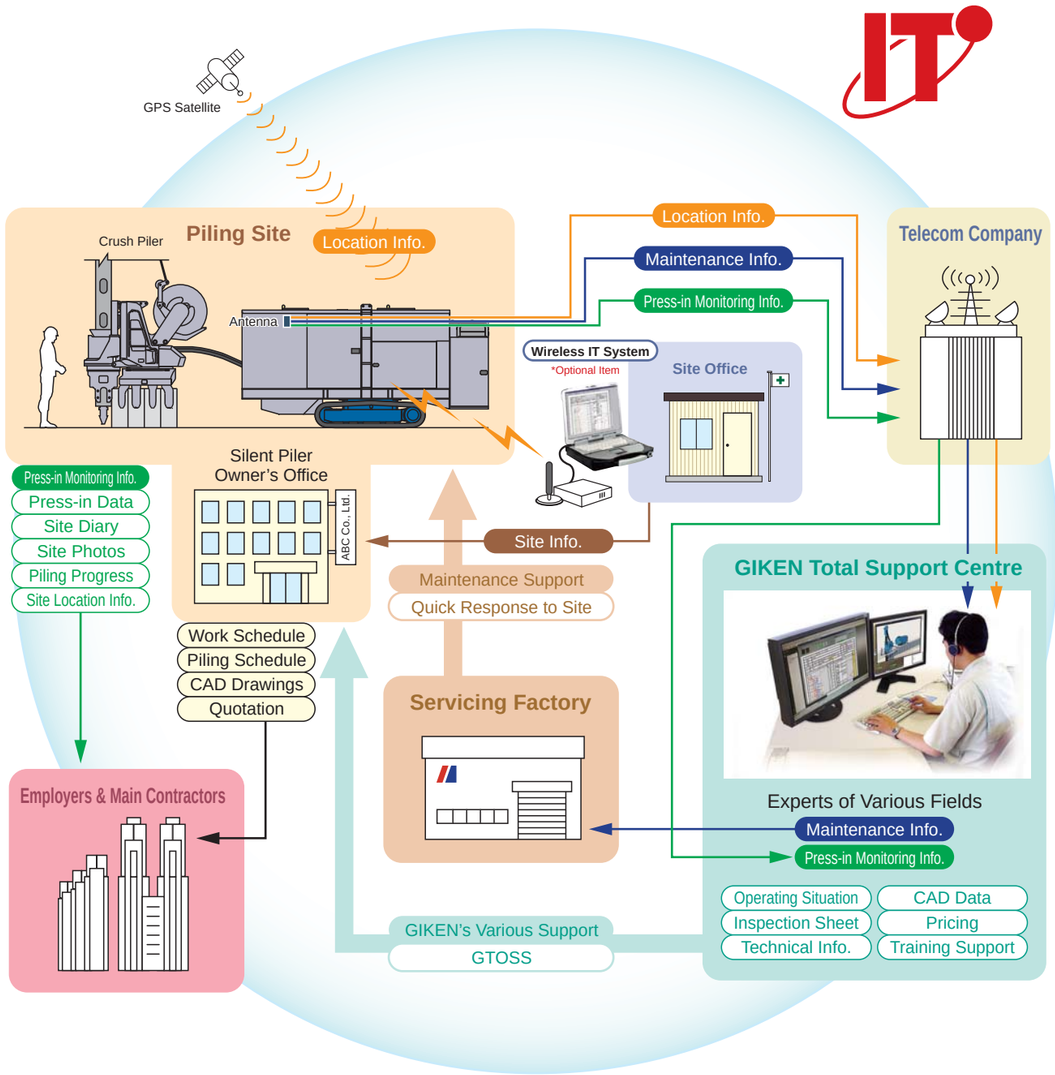
* This accessory is available only in Japan at this moment. (February, 2010)

Informatised Piling

IMPROVEMENT of piling efficiency by connecting GIKEN Total Support Centre and piling site

GIKEN IT SYSTEM

GIKEN IT System can exchange various real time information such as Press-in Management Information, Maintenance Information, and location information between piling site and GIKEN Total Support Centre. For instance, information of Press-in Monitoring System can be utilized for advices to improve piling productivity, and Maintenance Information can be utilized for advices to prevent machine trouble and to reduce repair time.

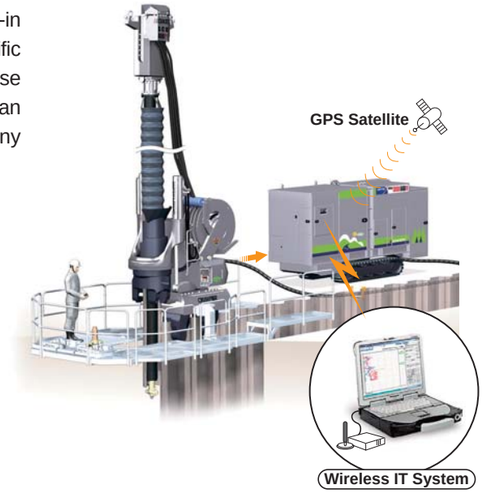


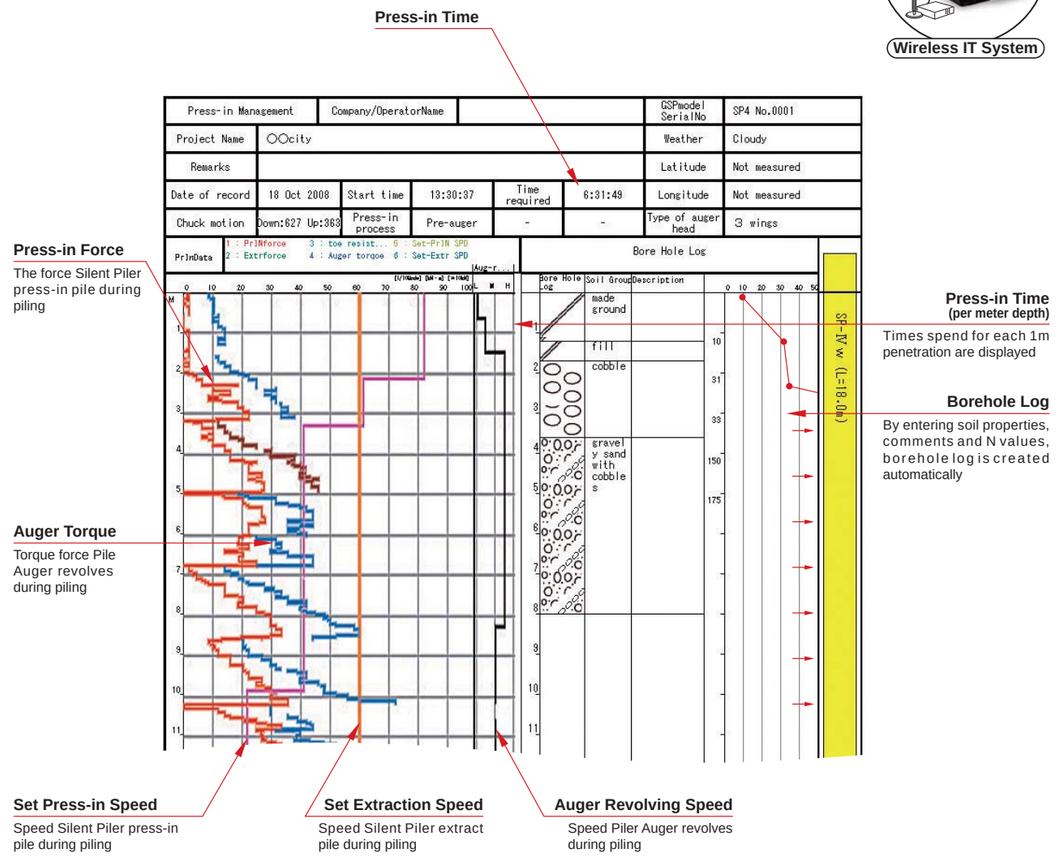
* This service is available only in Japan at this moment. (February, 2010)

Highly reliable sheet piling operations are available with Press-in Monitoring Data as a scientific evidence which can be passed to employers and engineers.

Press-in Monitoring System

Press-in Monitoring Data for each single pile, such as press-in force, auger torque and press-in time, is available for scientific analysis. Such data can be linked to borehole data to optimise operation settings for each ground condition. Proper advice can be given for any change in soil strata and presence of any underground obstacle.





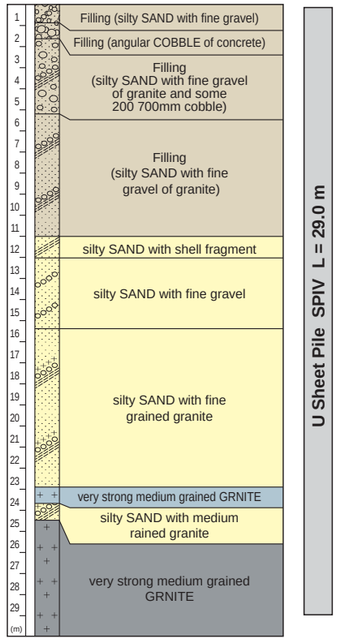
Project Achievements

U Sheet Pile

Construction of East Tsim Sha Tsui Station and pedestrian subway
Kowloon, Hong Kong

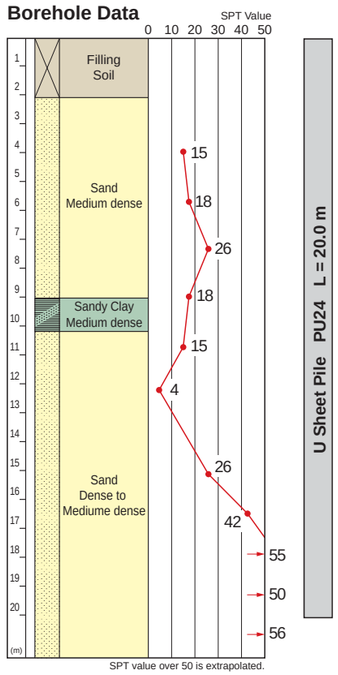
Uniaxial Compressive Strength
40N/mm^2 - 130N/mm^2

Borehole Data



New Metro Rail Track Construction
Perth, Australia

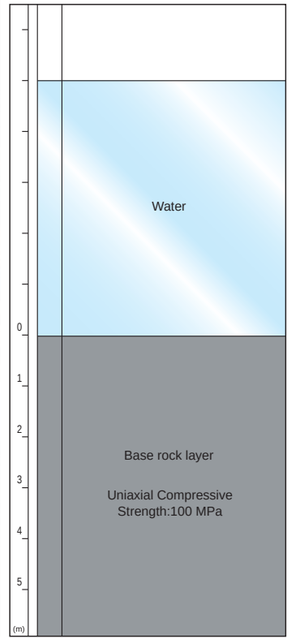
Borehole Data



SPT value over 50 is extrapolated.

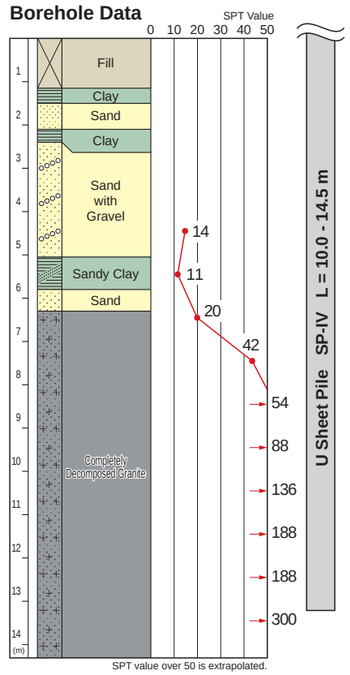
Construction of New Water Intake Pumping Station
Kandy, Sri Lanka

Borehole Data



Fukuoka Ring Utility Conduit
Fukuoka, Japan

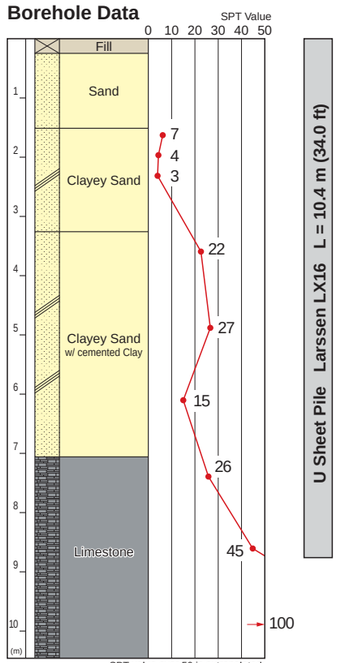
Borehole Data



SPT value over 50 is extrapolated.

Shands Hospital, Subterranean pathway
Gainesville, Florida, U.S.A.

Borehole Data

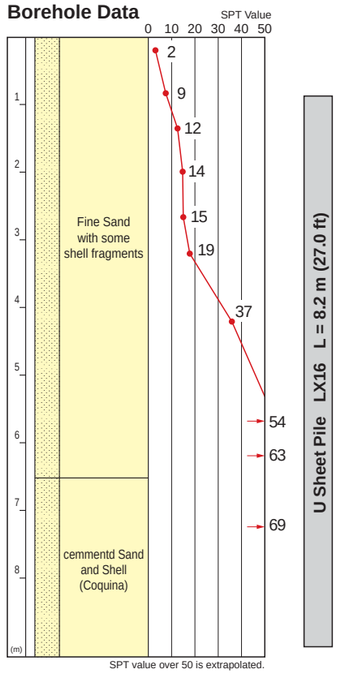


U Sheet Pile Larssen LX16 L = 10.4 m (34.0 ft)

SPT value over 50 is extrapolated.

Palm Beach
Palm Beach, Florida, U.S.A.

Borehole Data

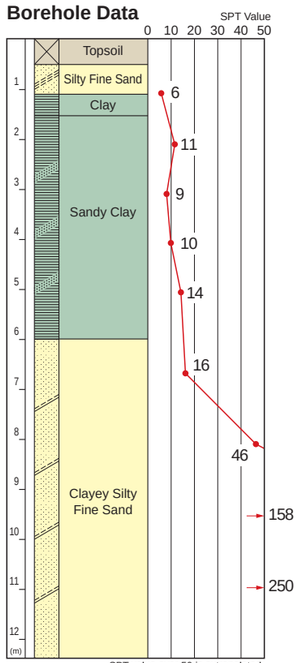


U Sheet Pile LX16 L = 8.2 m (27.0 ft)

SPT value over 50 is extrapolated.

Blackheath-Hill
London, U.K.

Borehole Data

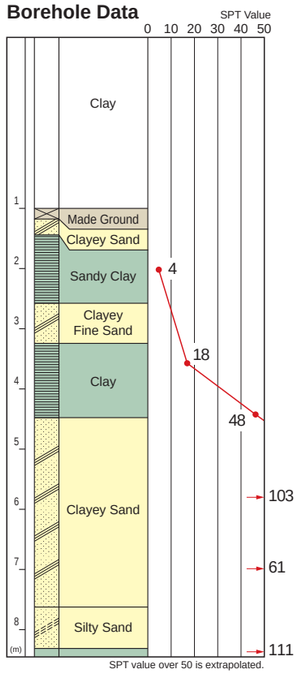


U Sheet Pile LX20 L = 8.0 m

SPT value over 50 is extrapolated.

St.Johns Working
St. Johnes, Working, U.K.

Borehole Data

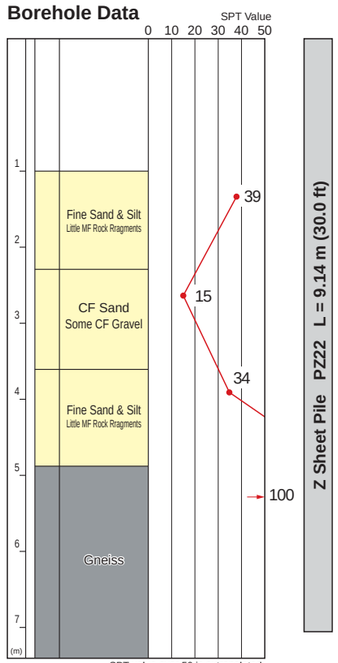


U Sheet Pile L606 L = 11.0 m

SPT value over 50 is extrapolated.

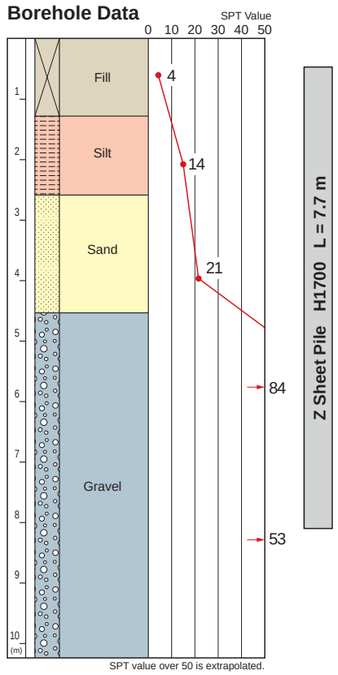
Other Pile Sections

I-495 Washington Capital Beltway
Maryland, U.S.A.



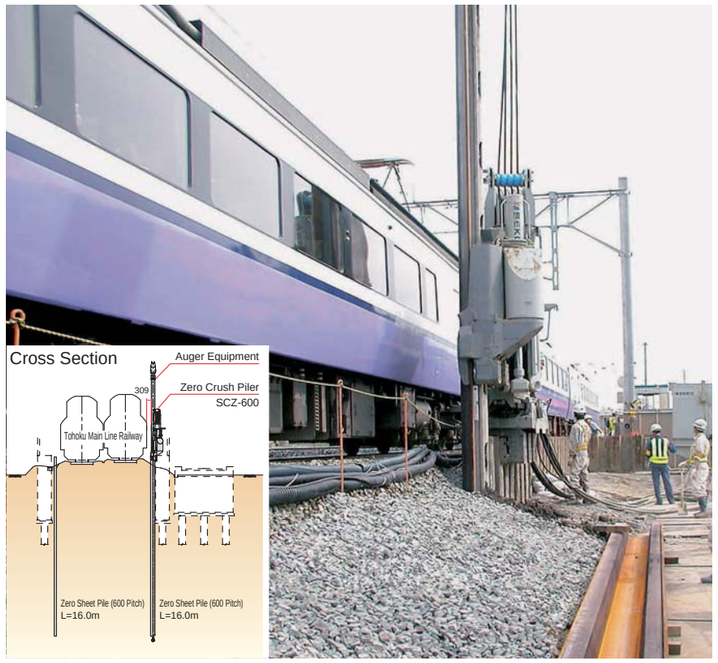
SPT value over 50 is extrapolated.

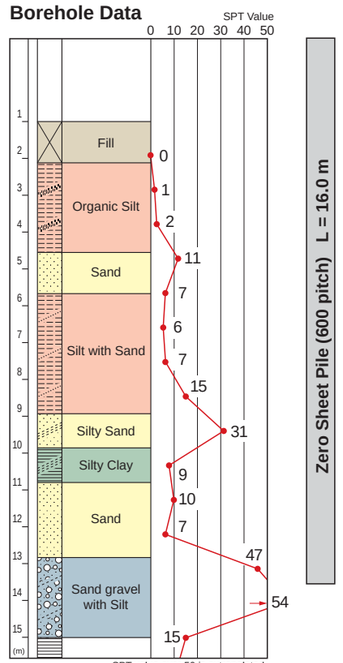
Hochwasserschutz Koeln-Rodenkirchen Uferstrasse
Koeln, Germany



SPT value over 50 is extrapolated.

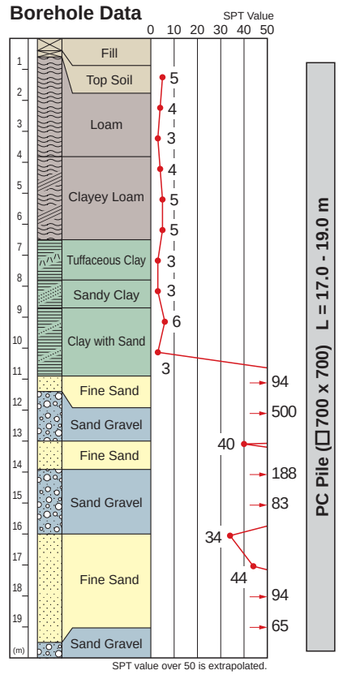
Reconstruction Work for Tohoku Main Line Yadamae
Aomori, Japan





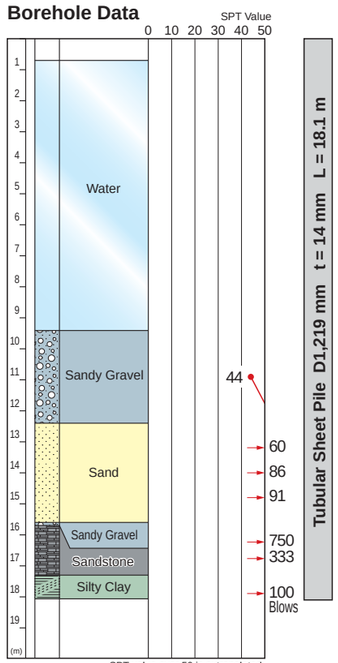
SPT value over 50 is extrapolated.

SJ51 Phase 2 Street Retaining Wall Construction Work
Tokyo, Japan



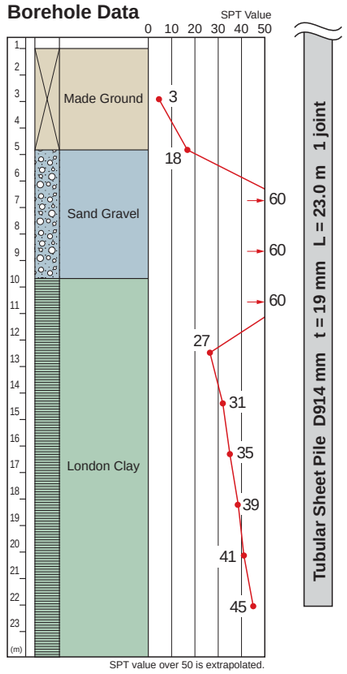
SPT value over 50 is extrapolated.

Canary Wharf Isle Of Dogs Station
Canary Wharf, London, U.K.



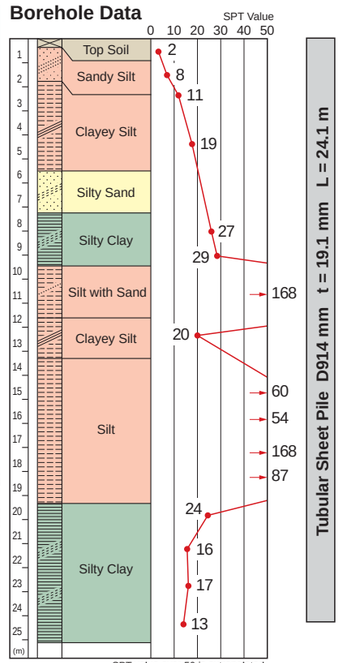
SPT value over 50 is extrapolated.

BBC
London, U.K.



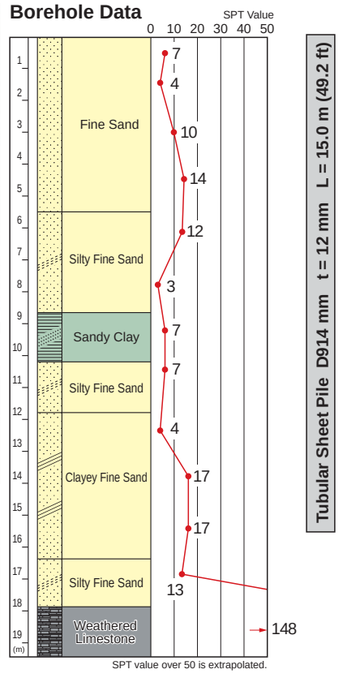
SPT value over 50 is extrapolated.

West Toronto Diamond Rail to Rail Grade Separation
Toronto, Canada



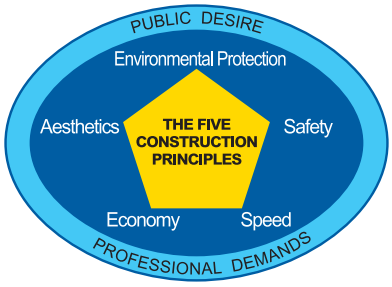
SPT value over 50 is extrapolated.

Woodhill Apartment Complex
Orlando, Florida, U.S.A.



SPT value over 50 is extrapolated.

THE FIVE CONSTRUCTION PRINCIPLES



If we analyse all the parties involved in any construction work, we can categorise them into three main groups: the client, the contractor and the general public. The ideal situation is when all three parties are in agreement and satisfied with the successful outcome of the construction work. Problems arise when one of the parties becomes a victim of imbalance in this relationship. The conventional construction methods based upon principles that "more is paid for less efficient work" are no longer appropriate to present-day society. Universally acceptable construction methods must embody the Five Construction Principles.

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** www.giken.com

GIKEN LTD.
International Business Department
3948-1 Nunoshida, Kochi-shi, Kochi 781-5195, Japan
Tel. : +81-(0)88-846-2980 Fax : +81-(0)88-826-5288
Email : international@giken.com

Global Network : Japan, UK, Germany, USA, Singapore, China

For more contact information, please visit:
http://www.giken.com/en/contactus/groupcompanies

Ver 5.1EN08 / 09 Sep 2014