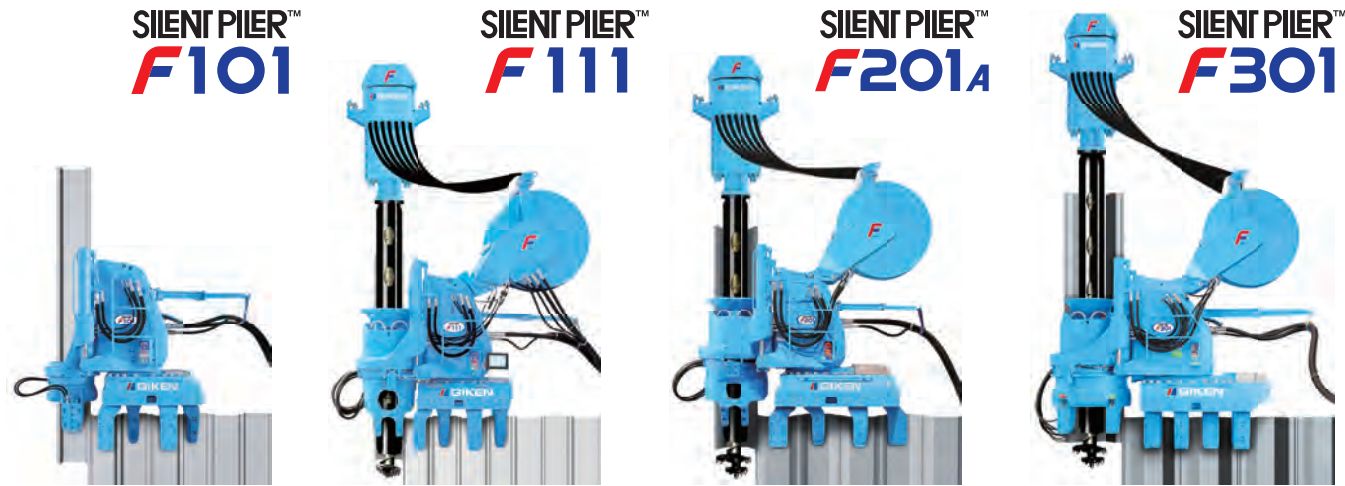


■ Press-in Machines which can be Equipped with PPT System™ As of February 2018



	F101	F111	F201A	F301-900
PPTS™ Ground Information Estimation	○	○	○	○
PPTS™ Autonomous Operation	—	○	○	○

* The specifications of the PPT System are subject to change without notice.
For details of compatible machines and scope of application, contact the offices listed below.



Construction Solutions Company

www.giken.com

CONTACT US



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Ver 1.0EN02 / 06 Jun 2023

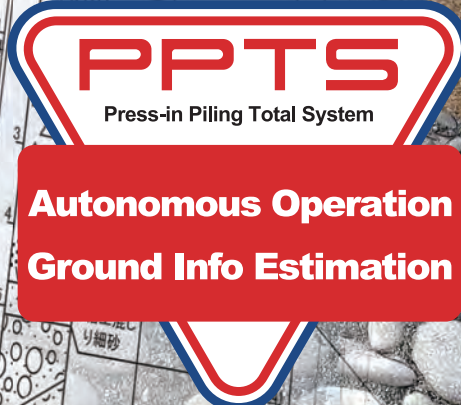
Construction Revolution

Enhance productivity at construction sites with the advantages of the press-in principle combined with ICT

PPT System™

NETIS Registration Number: SK-170006-VE

チャック上下動作	2013/09/17	開始時刻	14:36:00	機種+号機	F301 001号機
圧入データ	下: 23 上: 2	圧入工程	同時圧入	天候	曇り
		所要時間	00:12:17	緯度	131356628.00000
		使用総水量	0 L	経度	503557776.00000
				地盤カッター部	2条



**Autonomous Operation
Ground Info Estimation**



New technologies innovating the productivity of the press-in piling

PPT System™ Press-in Piling Total System

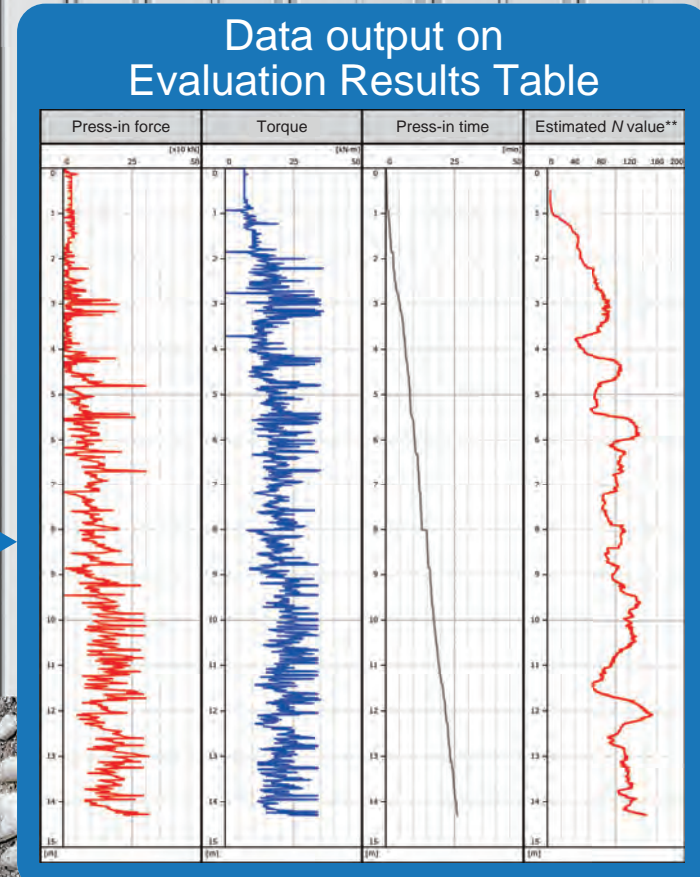
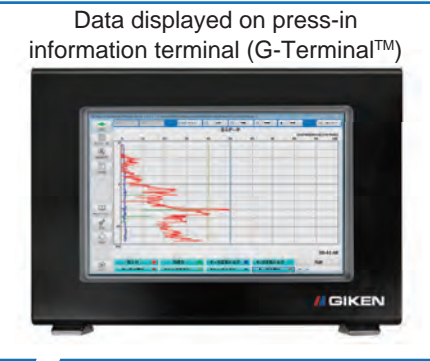
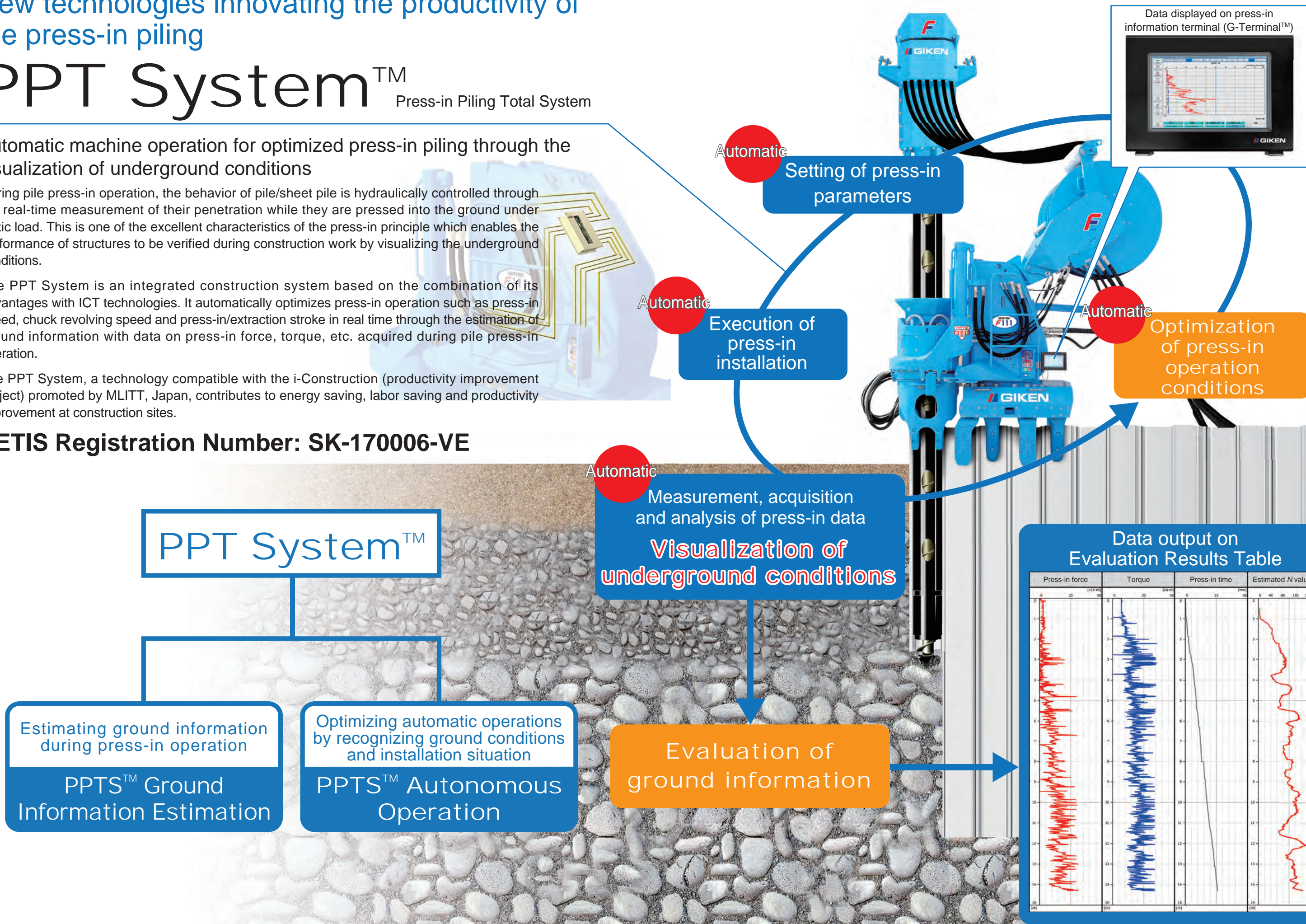
Automatic machine operation for optimized press-in piling through the visualization of underground conditions

During pile press-in operation, the behavior of pile/sheet pile is hydraulically controlled through the real-time measurement of their penetration while they are pressed into the ground under static load. This is one of the excellent characteristics of the press-in principle which enables the performance of structures to be verified during construction work by visualizing the underground conditions.

The PPT System is an integrated construction system based on the combination of its advantages with ICT technologies. It automatically optimizes press-in operation such as press-in speed, chuck revolving speed and press-in/extraction stroke in real time through the estimation of ground information with data on press-in force, torque, etc. acquired during pile press-in operation.

The PPT System, a technology compatible with the i-Construction (productivity improvement project) promoted by MLITT, Japan, contributes to energy saving, labor saving and productivity improvement at construction sites.

NETIS Registration Number: SK-170006-VE



PPT System™

Estimating ground information during press-in operation
PPTS™ Ground Information Estimation

Optimizing automatic operations by recognizing ground conditions and installation situation
PPTS™ Autonomous Operation

Automatic Measurement, acquisition and analysis of press-in data
Visualization of underground conditions

Evaluation of ground information

Automatic Setting of press-in parameters

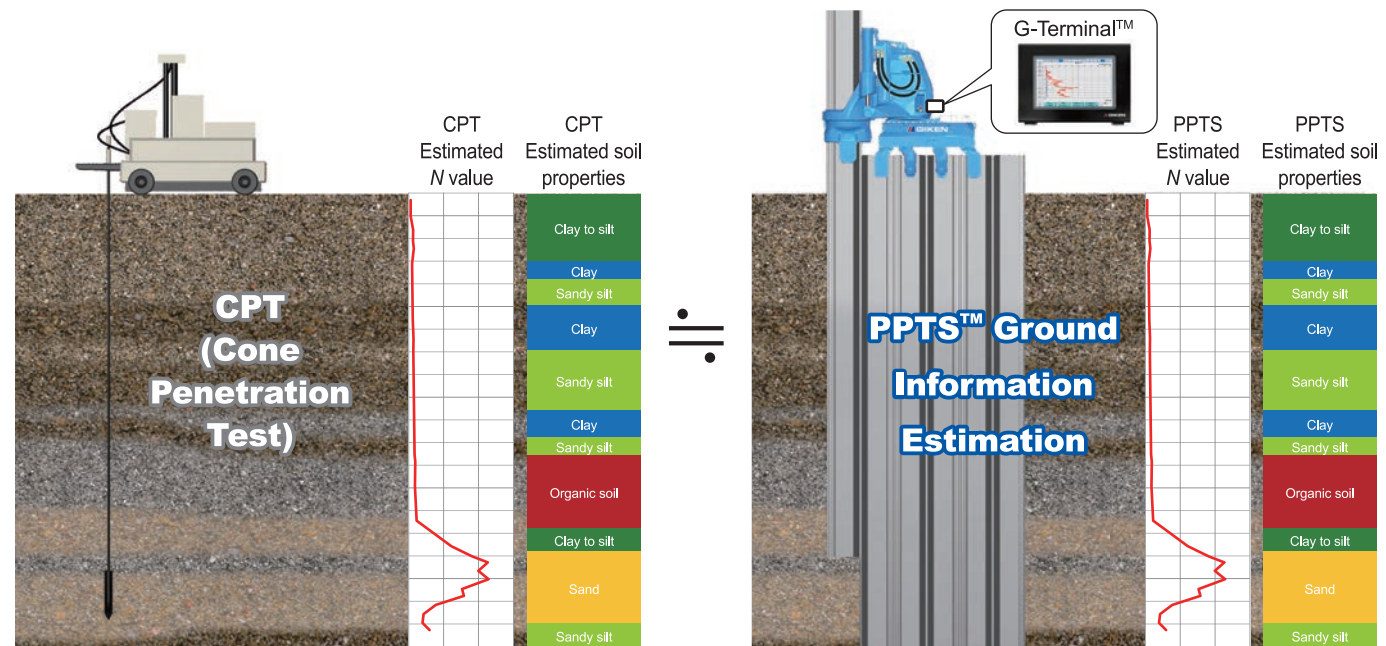
Automatic Execution of press-in installation

Automatic Optimization of press-in operation conditions

PPTS™ Ground Information Estimation

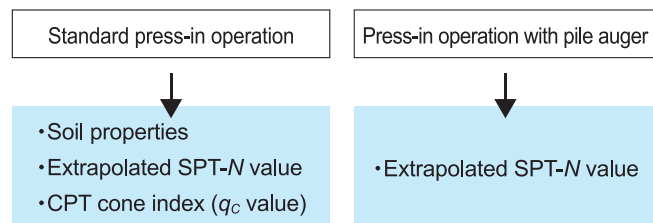
Estimation of ground information with data acquired during press-in operation

The PPT System analyzes press-in monitoring data (press-in force, torque, speed, time, and depths) automatically acquired during press-in operation, thereby estimating ground information such as soil properties and extrapolated SPT-*N* value as in the case of CPT (Cone Penetration Test) and SPT (Standard Penetration Test). The PPT System has the feature of creating and displaying the Evaluation Results Table while continuously recording and storing estimated data on the G-Terminal (press-in information terminal) mounted on the press-in machine.

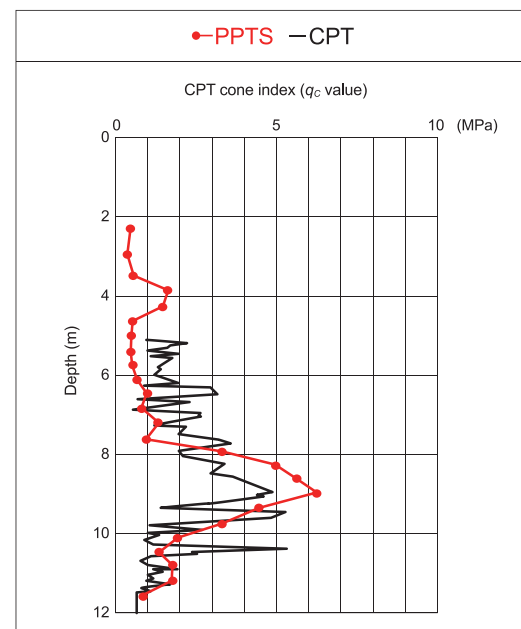


Comparison of the other soil investigations

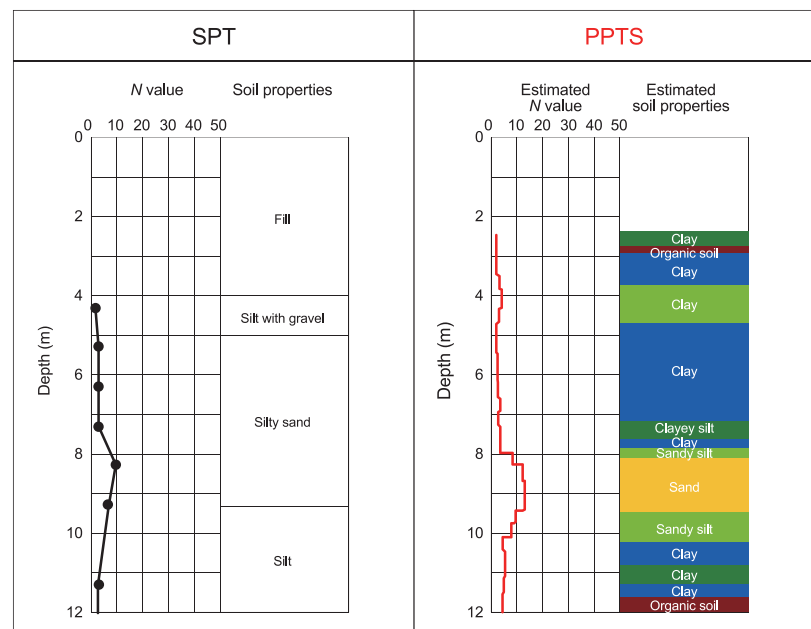
Ground information estimation using PPTS covers soil properties, extrapolated SPT-*N* value and cone index (q_c value) in the standard press-in operation and extrapolated SPT-*N* value in the simultaneous augering press-in operation. As shown in the example below, the waveform recorded by the PPTS ground information estimation is almost identical with those obtained in CPT and SPT.



Estimation results of CPT cone index (q_c value)

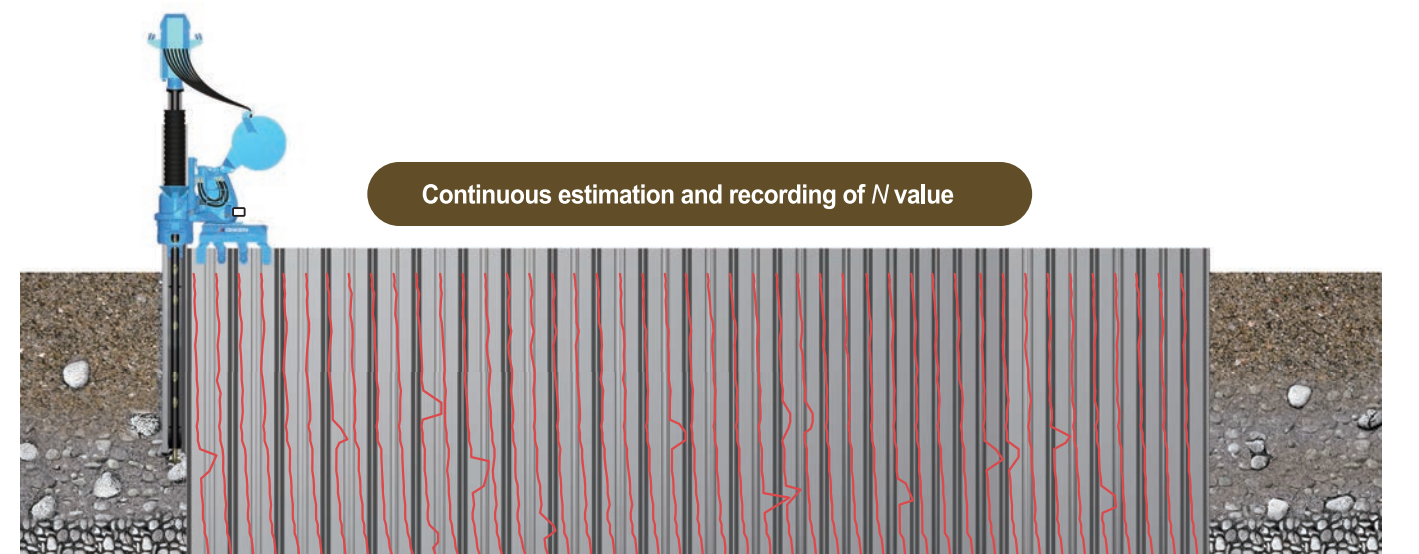
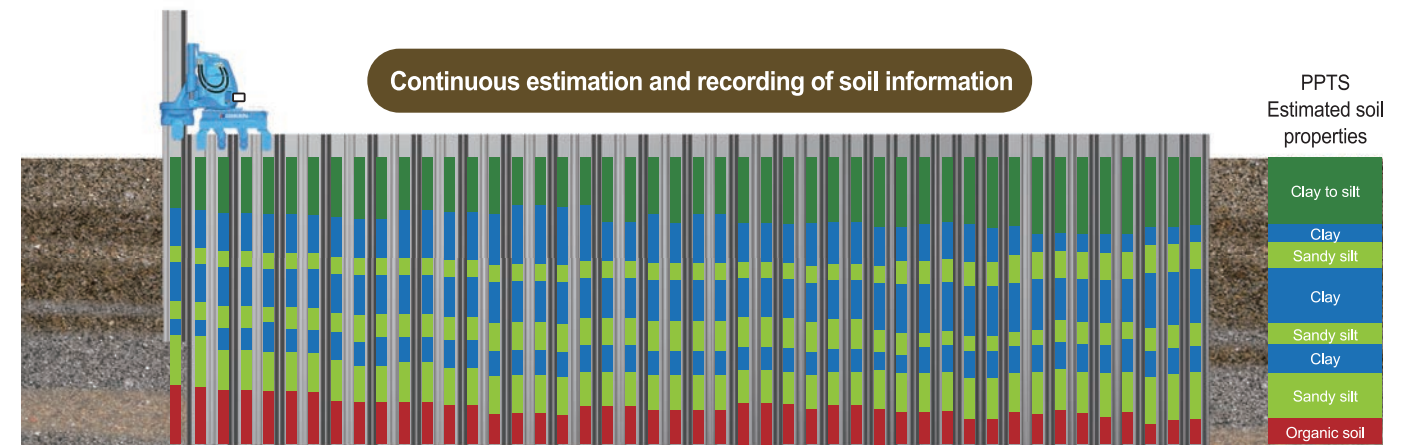


Estimation results of *N* value and soil properties



Availability of Continuous Estimation of Ground Information

With its capability to continuously estimate ground information with data acquired in pile press-in operation, ground information estimation using PPTS will allow you to objectively choose optimal processes, especially when you encounter unexpected ground conditions.



Note: The above graphics are schematic diagrams of continuous estimation of ground information, and different from the actual appearance displayed by PPTS™.

Advantages of PPTS™ Ground Information Estimation

1. Availability of construction management through on-site comparison of on-going work with design conditions

Even when a piling location is away from a location where a soil investigation was conducted, PPTS allows you to acquire the actual ground information at each pile position, thereby implementing construction management while comparing on-going work with background information at the design stage.

2. Easy decision making on design changes

PPTS allows you to make objective decisions on whether the initial design should be changed when you encounter unexpected ground conditions during construction work.

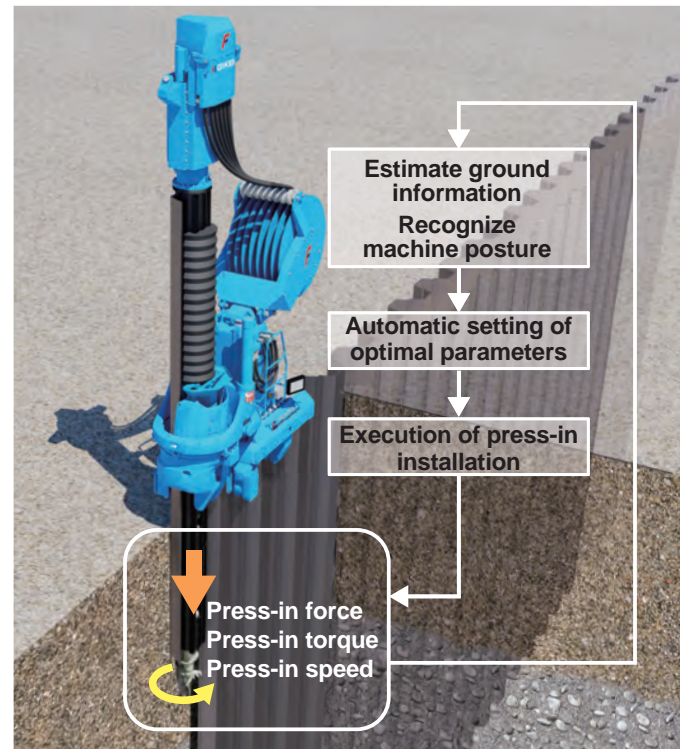
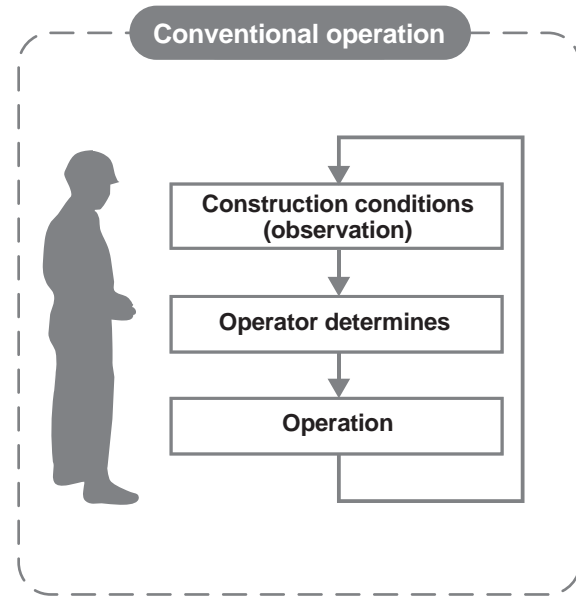
3. Trustworthy evidence for quality control

Data of pile embedment control and refusal criteria control for each individual pile can serve as reliable evidence of quality of driven piles. They may contribute to saving energy and streamlining operations including on-site witness inspections and completion inspections.

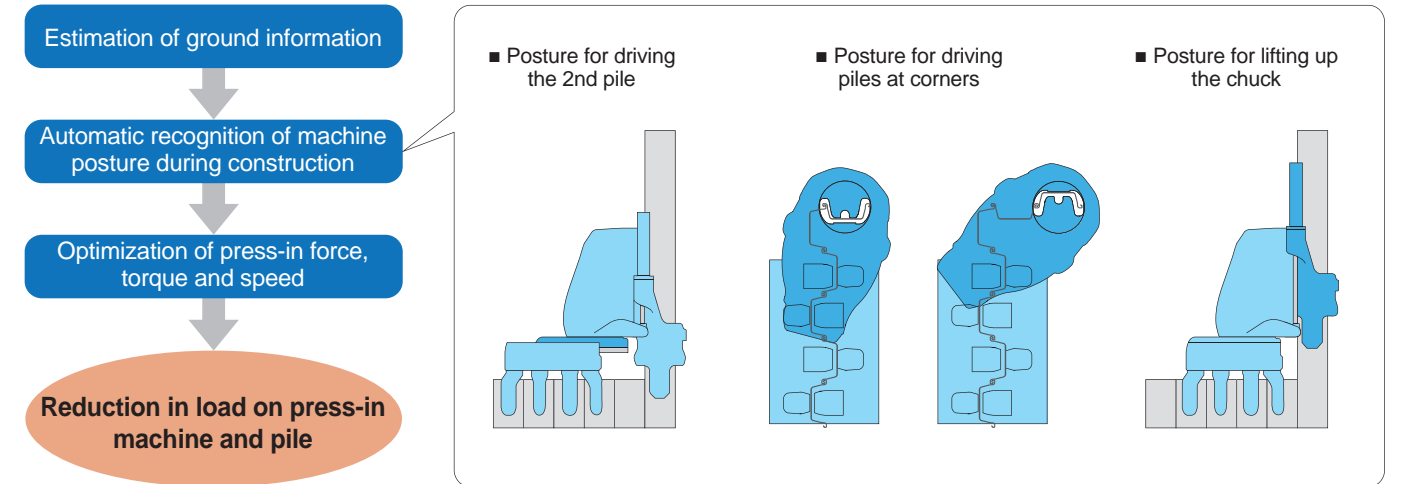
PPTS™ Autonomous Operation

Press-in machine autonomously determines ground information and construction conditions for optimized automatic operation

Conventionally, operators needed to manually set operation parameters such as press-in force, torque and machine posture based on preliminary investigation reports and monitoring active situations. In contrast, the automatic operation available with PPTS achieves optimized piling operation under the press-in machine's control with acquired data, autonomously recognizing machine posture and ground conditions.



Optimized Construction

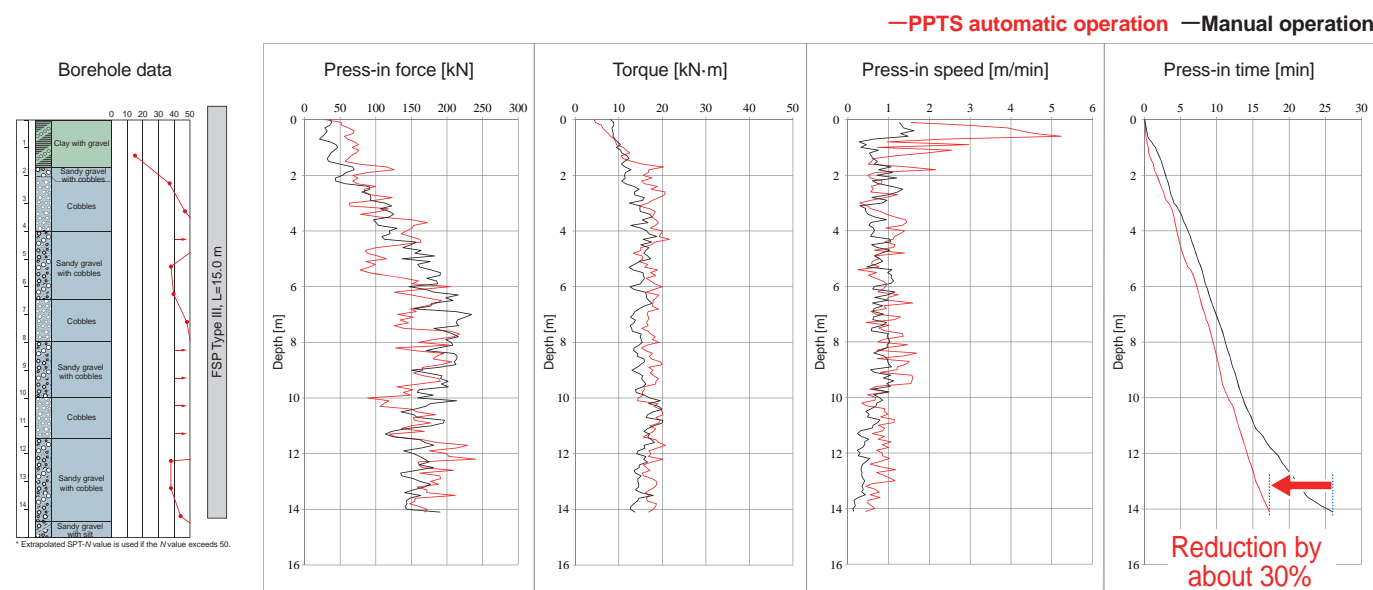


Advantages of PPTS™ Autonomous Operation

- Shortening of operating time**
The press-in machine's autonomous determination always optimizes press-in parameters thereby improving construction speed.
- Effective solution to shortage of skilled operators**
Enabling construction work to be carried out independently of the operator's skills, PPTS automatic operation is a good solution to the shortage of skilled personnel and reduces the time for operator training.
- Maintenance of high piling accuracy and extension of the service life of press-in machine**
PPTS automatic operation enables a press-in machine to be always operated in optimized conditions, thereby protecting piles and the press-in machine from overload.

Shortening of Construction Time

In conventional manual operation, pile installation time is greatly affected by the operator's individual judgement for parameter setting and time lag spent for shifting operation switches. The following examples of application of the PPTS automatic operation and manual operation show that PPTS optimized the balanced combination of press-in force, torque and press-in speed, thereby reducing press-in construction time as a result.



“PPT System™” is a factor for getting a score in the work performance rating system



In the work performance rating system, a contractor gets a score of up to 1.2 points by using technologies registered in the New Technology Information System (NETIS) promoted by MLITT, Japan.

“The PPT System” was registered in the NETIS in 2017.

Name of technology: PPT System
Registration Number: SK-170006-VE

技術名称	登録番号	登録年月
PPTシステム	SK-170006-VE	2017.12.28

NETIS 新技術情報提供システム
New Technology Information System

上記の情報は、登録申請に基づき掲載されています。申請情報の最終更新年月日: 2017.09.29

1. 技術の名称
2. 技術の概要
3. 技術の利点
4. 技術の適用分野
5. 技術の普及状況
6. 技術の普及促進策
7. 技術の普及促進効果
8. 技術の普及促進に関するお問い合わせ先

(Excerpt from a web page of the NETIS website)

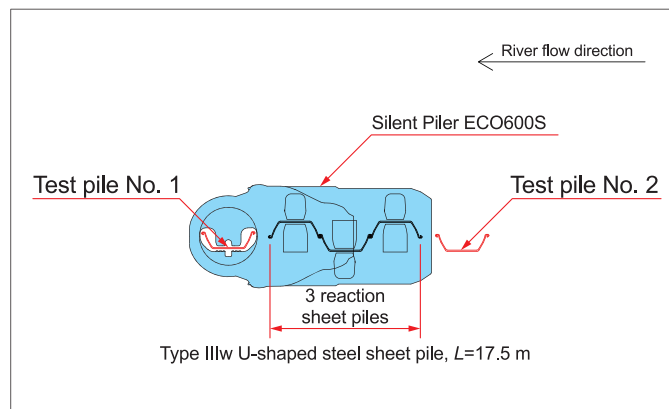
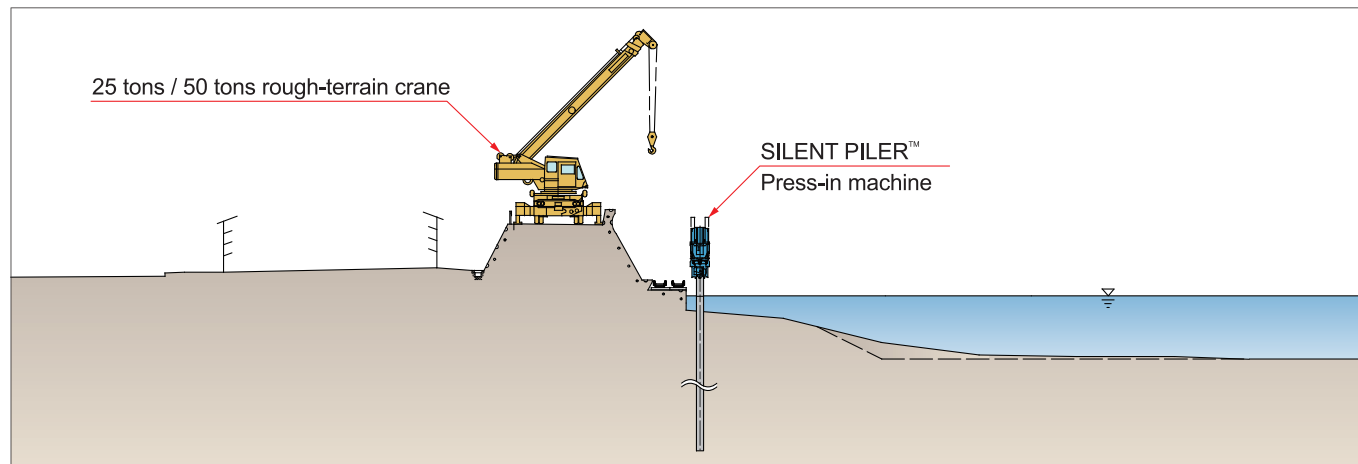
Application to Pilot Project PPTS™ Ground Information Estimation

Outline of Verification Test

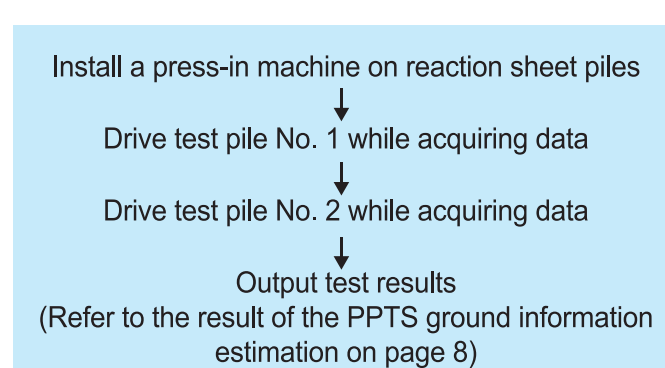
Name of verification test	Test for checking the performance of ground information estimation system (2013 Kochi Prefectural Industry Creation Research Promotion Project through industry-academia-government collaboration "Development of disaster mitigation technologies to alleviate tsunami damage and shorten inundation time due to Nankai Earthquakes")
Test period	January 6 to 8, 2014
Location	Kochi City, Kochi Prefecture
Purpose	Estimation of ground information (<i>N</i> value, layer thicknesses and soil type) during steel sheet pile press-in operation
Test method	Acquisition of data while steel sheet piles are pressed into the ground to the depth of 20 m (through standard press-in)
Silent Piler	Silent Piler ECO600S
Sheet piles	Type IIIw U sheet pile, <i>L</i> =17.5 m



Test Layout



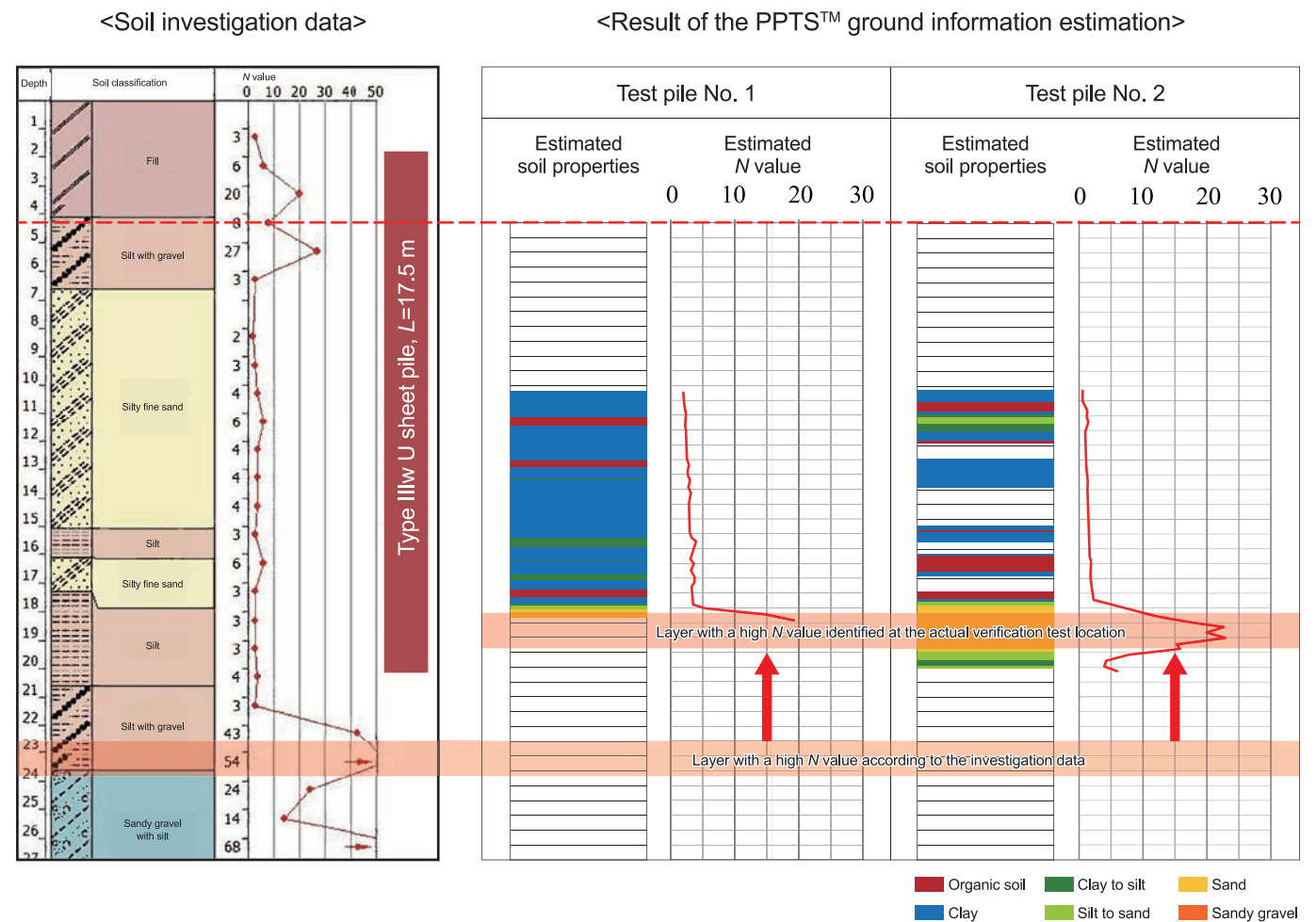
Verification Flow



Locations of Verification Test and Soil Investigation



Verification Results



The layer with high *N* value was found at much shallower depth than expected from the investigation data, because the test location is closer to a river than the location where the investigation was conducted.

Actual ground condition can be recognized without past soil investigation data.

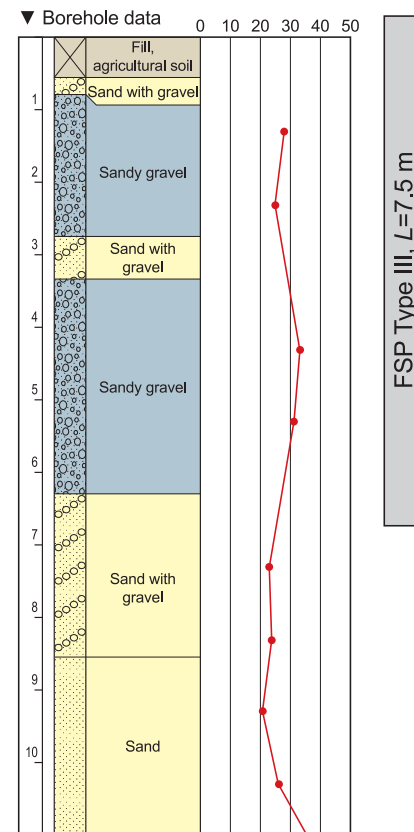
Outline of Construction

Project name	2015 River improvement project for flood control in the basin of Ama River, a first-class river
Owner	Hamamatsu Civil Engineering Office of Shizuoka Prefecture
Construction period	August 2016
Location	Hamamatsu City, Shizuoka Prefecture
Purpose	Comprehensive flood control project
Silent Piler	Silent Piler F201
Sheet piles	Type III U sheet pile, L=7.5 m
Press-in method	Hard ground press-in method



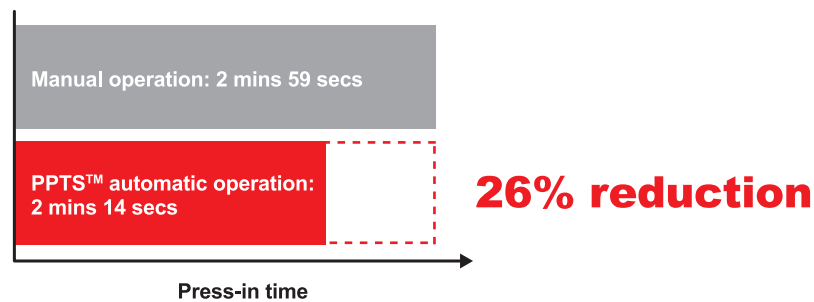
Acquired Data

Operation method	Pile No.	Press-in length [m]	Press-in time [min: sec]	Press-in speed [mm/s]	Average speed [mm/s]
Manual	No. 1	4.38	3:23	21.53	23.01
	No. 2		2:59	24.49	
PPTS automatic operation	No. 9		2:37	27.99	29.01
	No. 10		2:40	27.36	
	No. 11		2:14	32.68	
	No. 12		2:31	29.07	
	No. 13	2:37	27.95		



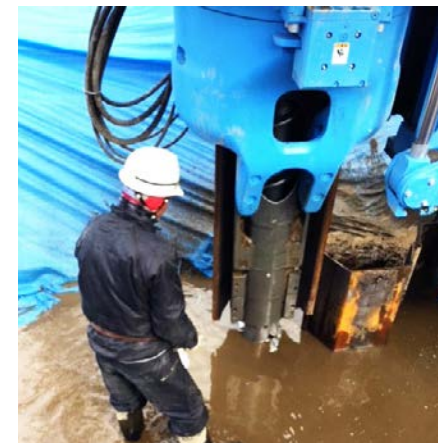
* Extrapolated SPT-N value is used if the N value exceeds 50.

Comparison of Minimum Press-in Time



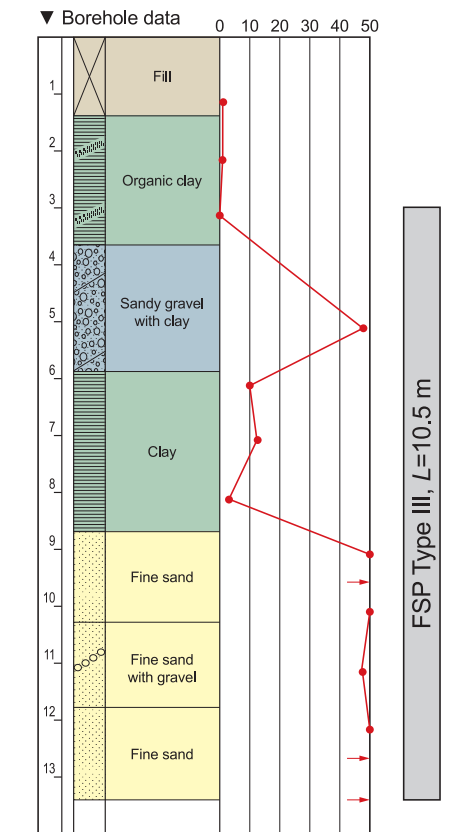
Outline of Construction

Project name	2015 River Improvement Work, Prefectural Independent Project (Phase 2)
Owner	East Center of Atsugi Civil Engineering Office, Kanagawa Prefecture
Construction period	February 2017
Location	Atsugi City, Kanagawa Prefecture
Purpose	River improvement work
Silent Piler	Silent Piler F111
Sheet piles	Type III U sheet pile, L=10.5 m
Press-in method	Hard ground press-in method



Acquired Data

Operation method	Pile No.	Press-in length [m]	Press-in time [min: sec]	Press-in speed [mm/s]	Average speed [mm/s]
Manual	No. 1	6	8:44	11.45	11.18
	No. 2		11:23	8.78	
	No. 3		8:52	11.28	
	No. 4		7:58	12.55	
	No. 5		8:28	11.83	
PPTS automatic operation	No. 7		7:55	12.63	14.84
	No. 8		7:32	13.27	
	No. 9		6:19	15.85	
	No. 10		5:27	18.34	
	No. 11		7:06	14.84	



* Extrapolated SPT-N value is used if the N value exceeds 50.

Comparison of Minimum Press-in Time

