SILENT PILING METHOD
THE STATE-OF-THE-ART PILING TECHNOLOGIES

On construction sites, noise and vibration tends to be inevitable with classical piling methods. Those may cause not only physical damage to nearby buildings but also psychological effects on nearby humans and animals. Many engineers, who are planning piling works in noise and vibration sensitive areas may be facing challenges in mitigating such problems. This Japanese Silent Piling technologies might be the solution. Read more on **Page No. 3.**

Picture Courtesy GIKEN

Volume 11 Book 2, April 2025

DFI of INDIA News

Quarterly Newsletter from
Deep Foundations Institute of India
www.dfi-india.org

Volume 11 Book 2, April 2025

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Volume 11 Book 2, April 2025

Silent Piling Method - The State-of-the-Art Piling Technologies

Cover Story

Mr. Masaaki Katami, *Senior Expert, Global Business Strategy Department, Giken Ltd.*

Origin of Silent Piling Technology

The method known as the "Press-in Method" was developed in 1975 by Akio Kitamura, founder of GIKEN LTD. This innovation emerged during a period of rapid economic expansion in Japan, when the country was engaged in widespread infrastructure development. The Press-in Method quickly gained traction as a preferred technique for silent piling in urban construction. Today, it is widely recognized and officially authorized by the Japanese government for both sheet and tubular piling applications.

How are Piles Installed?

Traditional construction machinery tends to be large and heavy, relying on its own weight for operational stability. To apply a pressing force of 100 tons, for instance, conventional equipment would need to weigh significantly more than that to prevent displacement. As a result, such machinery becomes massive, unwieldy, and less practical, particularly in constrained work environments.

In contrast, the Press-in Method employs a unique piling rig known as the SILENT PILER™. This equipment clamps onto previously installed piles and utilizes their extraction resistance as a counterforce to hydraulically press the next pile into the ground. The extraction resistance is converted into downward pressing force, allowing the SILENT PILER™ to achieve more than 100 tons of press-in force despite its lightweight and compact design. Since the process uses static load rather than impact, it generates virtually no noise or vibration.

Applications of the SILENT PILER™

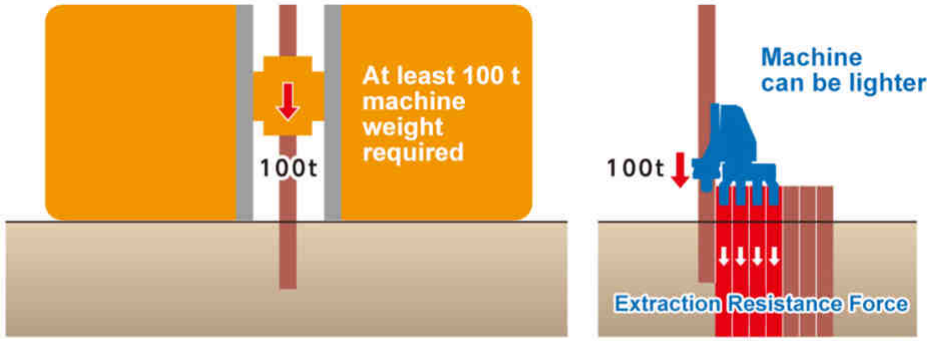

Fig. 1: Installation

The SILENT PILER™'s virtually vibration and noise-free operation, along with its compact and lightweight structure, make it suitable for a wide range of environments and project constraints. It is commonly used in various infrastructure developments, including:

- Roadways and railway lines
- Airports and energy facilities
- Water supply and sewerage systems
- Riverbanks, coastal regions, and harbors
- Erosion control and general construction projects

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What is the GRB System™?

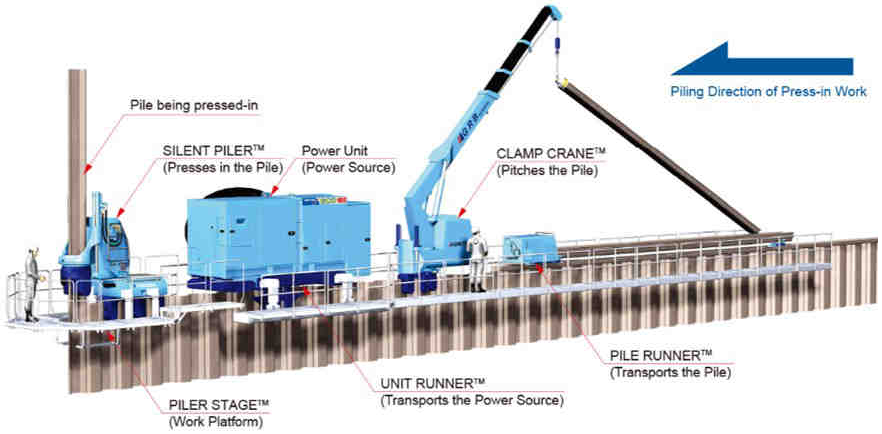

Fig. 2: GRB System™

The Press-in Method evolved further with the development of the GRB System™ (GIKEN Reaction Base System), a fully integrated press-in platform. This system enables the complete piling process—pile transportation, positioning, and press-in—to occur atop already installed piles, without the need for conventional ground-based equipment.

Because all machinery in the GRB System™ is supported by existing piles, there is limited risk of toppling, and the system can operate in unstable or restricted locations. Temporary working platforms or detour roads are not necessary—even on water bodies, slopes, or narrow sites—since the working area is limited to the width of the machinery itself.

The GRB System™ is composed of several key components:

- **SILENT PILER™** for pressing-in piles
- **Power Unit** as the energy source
- **CLAMP CRANE™** for pile pitching
- **PILE RUNNER™** for transporting piles from the storage area

This system has also been introduced in India, broadening its global footprint.

Fig.3: Bridge Foundation Reinforcement Project

The Press-in Method: A Modern Construction Solution

Since the debut of the first SILENT PILER™ model (KGK-100A), the Press-in Method has been utilized in more than 40 countries. GIKEN continues to enhance this technology to address diverse challenges at construction sites. Initially, hard ground conditions presented a major hurdle for press-in operations. However, the development of advanced SILENT PILER™ models equipped with driving assistance mechanisms now enables pile

Continued on page 15

DFI of India Director Message

- Mr. IV Anirudhan

Prelude

A group of foundation engineers decided to work on safe and economical deep foundation solutions for infrastructure development in India through discussions and knowledge sharing. The group had several ambitious plans, such as enhancing the skills of foundation construction personnel, including machine operators involved in deep foundation construction.

IV Anirudhan

Geotechnical Solutions;

Immediate Past Chair,

DFI of India

The Deep Foundations Institute of the US served as an inspiration. In consultation with DFI USA, the idea to form an Indian Chapter was proposed, and a conference on 'Deep Foundation Technologies for Infrastructure Development in India' was held in Chennai in 2012 in collaboration with Indian Institute of Technology Madras and the Chennai Chapter of Indian Geotechnical Society. The Deep Foundations Institute of India was officially established in 2013 and registered as a non-profit organization under the Government of India company rules.

I was honoured and enthusiastic to contribute my services to the organisation of the 2012 conference. I aspired to be part of the team dedicated to establishing DFI of India as a distinguished entity in the Indian foundation industry. I would like to extend my sincere gratitude to the team for welcoming me and facilitating my integration into the organization.

We initially focused on organizing one-day workshops and seminars, in addition to the annual conferences, following the volunteer model adopted for the 2012 conference. The involvement of teaching professionals, field engineers, consultants, students, and the Indian Geotechnical Society in these programmes contributed to the cost-effectiveness of our activities while enhancing the institute's visibility among stakeholders.

We have successfully established an office staffed with three dedicated personnel responsible for planning and organizing various programs. I am proud to offer my assistance in supporting them with their responsibilities.

Interlude

COVID-19, which lasted for over two years, subdued activities to some extent. Despite this, we adapted to the situation and continued to engage our supporters and the entire team of players effectively.

Several sideline discussions on various subjects were organized before the full-fledged online annual conferences in 2020 and 2021. Regular online discussions with the DFI USA team leading up to our annual conferences since 2012 have helped us become well-acquainted with the procedures and specifics of conducting an online conference. Maintaining a sense of togetherness was crucial during the challenging period of COVID-19.

Postlude

Establishing a physical institution to provide training for all categories of field personnel in the foundation construction industry has consistently

Continued

been a significant objective. Furthermore, integrating new technologies into Indian infrastructure projects was another crucial aspiration. I was pleased to participate in our Continuous Flight Auger (CFA) pile project successfully conducted at a site in Hissar, Haryana, with significant support from the industry. It is gratifying that the CFA trials, along with a comprehensive quality control and testing program, resulted in the development of an Indian Standard Guideline for the design, construction, quality control, and testing of CFA piles. Contributing to the preparation of this draft was highly fulfilling.

The DFI of India endeavoured to raise sufficient funds to achieve our most important goal of establishing an institute through various means. To this end, we formed a dedicated team; however, we subsequently recognized that further groundwork was needed to create the right environment for the essential upskilling of field personnel.

It is a significant accomplishment that the DFI of India has developed an extensive training program for laboratory technicians specializing in geotechnical testing. Furthermore, they conduct regular five-day training sessions for numerous lab technicians from various regions of India. The significant support provided by various geotechnical testing laboratories for this programme is commendable.

My role primarily involved organizing the annual conferences and workshops since the institute was established. I handled desktop publishing for the conference souvenirs and brochures for various programs. In 2014, we initiated a quarterly newsletter to communicate with over 5000 industry professionals, and it is continuing successfully.

The Deep Foundations Institute (DFI) of India has become a key organization for professionals in the deep foundation industry. I am proud to have contributed to its growth. Interacting with numerous professionals during various DFI programs has significantly enriched my expertise in foundation design, construction, and testing.

I am confident that with the support of our executive and technical committees, DFI of India can achieve its goal of establishing a physical institute. This confidence comes from the growing interest of professionals in DFI of India's activities.

Perquisite

In preparation for the DFI of India activities, I was encouraged to resume painting after a hiatus of over 35 years. Upon trying my hand at it once more, I discovered that the experience was highly rewarding.

A dedicated page is allotted for a nominal fee of Rs 10,000/- per issue for the profile of a reputed company involved in the deep foundation industry to showcase its capability in the field. Please contact DFI of India at dfiindiaoffice@gmail.com.

Building Resilience: How Innovative Pervious Concrete Piles Can Mitigate Liquefaction and Reliquefaction

Yogesh R V, S Ganesh Kumar, Santha Kumar G, AcSIR & CSIR-Central Building Research Institute, Roorkee

Background

"Nature shakes the ground, but poor construction shatters lives." Earthquake sequences, such as the Canterbury 2010-11, the Nepal 2015, and the Tohoku 2011, demonstrate their devastating impacts on infrastructure (Figure 1). The majority of damages are due to liquefaction and reliquefaction (Multiple times liquefaction at the same location). Under these earthquake sequences, traditional ground improvement methods, such as stone columns and sand compaction piles, lose their functionality due to clogging, reducing their drainage capacity. The reduced drainage capacity triggers liquefaction between columns, causing loss of lateral support of the stone column/sand compaction pile from surrounding soil, resulting in reduced bearing capacity and excessive settlement (e.g., Lancaster Park stadium failure in New Zealand). Similar observation was also observed in a laboratory study on stone column performance under repeated incremental acceleration loading using a 1g uniaxial shake table at Central Building Research Institute(CSIR), as shown in Figure 2. In recent days, Pervious concrete piles have emerged as a potential alternative to traditional stone columns due to its improved modular characteristics.

What is a Pervious Concrete Pile (PCP)?

Pervious concrete piles are rigid, porous inclusions formed using coarse aggregates and a limited/ complete absence of fine aggregates. The limited / complete absence of fine aggregates forms an internally connected network of drainage channels (Figure 3). The bonding of aggregates provides high stiffness, which enhances load carrying capacity and allows it to function independently of confinement provided from surrounding soil with permeability equivalent to a stone column. The typical comparison of pervious concrete pile performance in comparison with traditional ground improvement techniques is shown in Table 1.

Earthquake events sequences	Nepal Earthquake 2015	Tohoku Earthquake 2015	Canterbury Earthquake 2010-11
	Mainshock 25/04/2016 M_w 7.8 Aftershock 25/04/2016 M_w 6.7 Aftershock 26/04/2016 M_w 6.9 Aftershock 12/05/2016 M_w 7.3	Foreshock 09/03/2011 M_w 7.3 Mainshock 11/03/2011 M_w 9.0 Aftershock 11/03/2011 M_w 7.4 Aftershock 11/03/2011 M_w 7.7 Aftershock 11/03/2011 M_w 7.5 Aftershock 07/04/2011 M_w 7.1 Aftershock 23/12/2011 M_w 7.0 Aftershock 23/12/2011 M_w 7.3	Mainshock 04/09/2010 M_w 7.1 Aftershock 22/02/2011 M_w 6.2 Aftershock 13/06/2011 M_w 5.3 Aftershock 13/06/2011 M_w 6.0 Aftershock 23/12/2011 M_w 5.8 Aftershock 23/12/2011 M_w 5.9
No of Damaged Building	256697	300000	150000
No of Severely damaged buildings	498852	600000	30000

Fig. 1 Insights on damages caused by earthquake sequences

Table 1. Comparison of the properties of various ground improvement techniques

Method	Stress concentration ratio	Permeability, cm/sec
Sand compaction pile	1.5-6	0.05-0.65
Stone column	2-8.5	0.09-2.0
Pervious concrete pile	5-10	0.05-2.0

Experimental programme

The research was carried out in two phases. The phase one study focused on the development of sustainable pervious concrete through aggregate gradation and cement-to-aggregate ratios for both recycled aggregates and conventional aggregates to evaluate the applicability of recycled aggregate for pervious concrete development.

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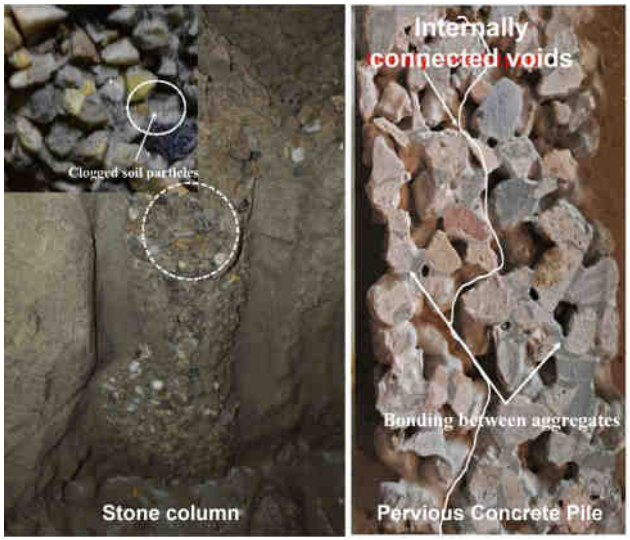

(Left) Fig. 2 Failed stone column post shake table testing under multiple dynamic loading at GEGH laboratory, CSIR CBRI, Roorkee
(Right) Fig. 3 Inner core of pervious concrete

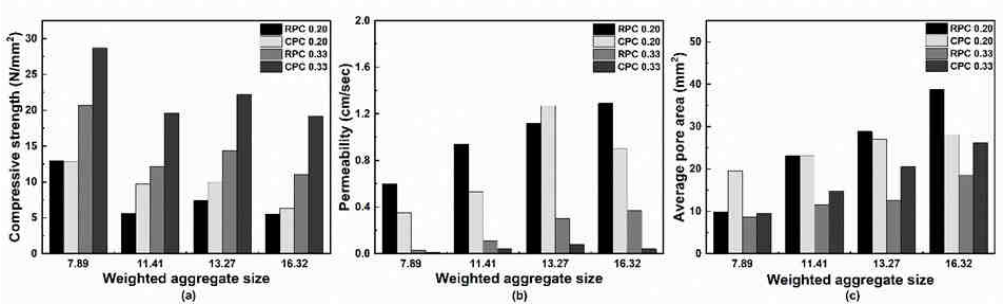

Fig. 4. Influence of aggregate gradation and cement to aggregate ratio on (a) compressive strength, (b) permeability, (c) average pore area of pervious concrete

In phase two, development of a 1:10 scaled-down recycled aggregate based pervious concrete pile from phase one to assess drainage and seismic resilience for liquefaction and reliquefaction mitigation. Using a 1g uniaxial shake table under repeated incremental shaking (0.1g–0.4g, 40s, 5Hz) on a saturated ground having 40% in-situ density, the investigations were performed. After each input acceleration loading 24 hours gap was given to dissipate the developed excess pore water pressure. The obtained results were also compared with conventional stone columns for liquefaction and re-liquefaction mitigation.

Sustainable pervious concrete development: Aggregate size and cement-to-aggregate ratio predominantly influence PC performance. The mixes with a low cement-to-aggregate ratio (0.20) enhanced permeability and average pore area, while the strength and density of CPC and RPC were reduced. Mixes with higher weighted aggregate size reduced the number of pores, but the average pore area was enhanced, resulting in improved permeability. Similarly, when smaller sized aggregates are used in mix design (i.e.7.89mm and 11.41 mm), permeability is reduced, whereas strength increases. On the contrary, mixes with larger sized aggregates (i.e., 13.27 mm and 16.32 mm) improved permeability with a reduction in strength due to the larger pore area.

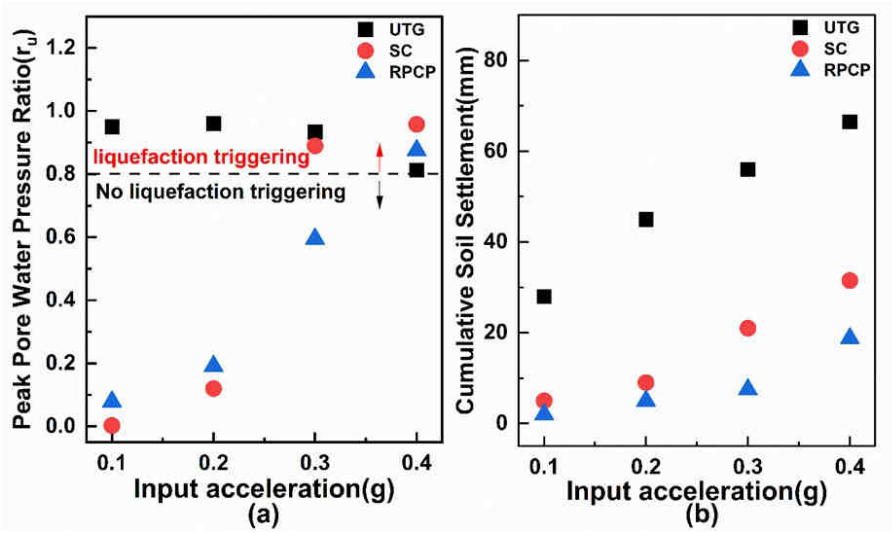

Fig. 5 Influence of repeated shaking on (a) peak pore water pressure ratio at shallow depth and (b) cumulative soil displacement

Continued

For the development of recycled concrete aggregate-based pervious concrete pile development, a weighted aggregate size of 16.32 mm was found to be suitable, and cement to aggregate ratio was increased by 0.25 to enhance strength.

Drainage and seismic resilience phase: Pore water pressure ratio (PWPR) defined as the ratio of excess pore water pressure to initial effective stress, was used to assess liquefaction. During the initial 0.1g shaking, untreated ground (UTG) exhibited a high PWPR of 0.95, indicating high liquefaction susceptibility. UTG maintained similar PWPR up to 0.2g but showed a decline thereafter due to densification (Fig. 5a). Despite this, PWP development emphasized the role of drainage in reliquefaction mitigation. Stone column (SC) and recycled pervious concrete pile (RPCP) treatments reduced PWPR by 99.68% to 80% up to 0.2g shaking. At 0.3g shaking, SC-treated ground liquefied, behaving similar to UTG, while RPCP maintained a 40% lower PWPR response. Soil displacement analysis (Fig.5b) confirmed RPCP's effective reinforcement, reducing displacement by 71.75%–92.85% compared to 52.63%–82.14% for SC. Figure 2 also showed that SC lost confinement after drainage reduction, leading to excessive settlement. In contrast, RPCP's internal bonding made it independent of external confinement, behaving like a conventional pile even under clogging.

Overall, RPCP-treated ground achieved 1.6–2.8 times greater displacement reduction than SC and demonstrated better performance under repeated dynamic loading. Additionally, using C&D waste for RPCP promotes sustainable construction practices alongside technical effectiveness.

The above work was awarded the best PhD thesis under DFI of India Student Awards 2024.

DFII & DFI Upcoming Events

Event	Date	Venue
SuperPile '25	June 18-20, 2025	Cleveland, Ohio
DFI of India Workshop on Design & Construction of	July 11-12, 2025	Chennai, India
S3 '25: Slopes, Support and Stabilization	Aug 5–7, 2025	Madison, Wisconsin
DFI-India 2025	Sept 11-13, 2025	Surat, Gujarat
DFI50	Oct 20-23, 2025	Nashville, Tennessee
7th Int. Symposium on Deep Foundations and Soil Improv.	Nov 6-7, 2025	Mexico City, Mexico
Shotcrete Short Course	Nov 12-13, 2025	Georgetown, Kentucky

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Sreevalsa Kolathayar, NIT Karnataka
K. Rangaswamy, NIT Calicut
Pijush Samui, NIT Patna
Akshay Kumar Sahoo, Works Department, Govt. Of Odisha

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DFI of India Training Committee is organizing a two-day workshop on 'Design and Construction of Diaphragm Walls.' The program will be conducted in-person at Chennai and invites both online and offline participants.

Program Details

Date & Time: July 11-12, 2025 from 9:30 a.m. to 5:30 p.m. IST

Venue: Holiday Inn Chennai OMR IT Expressway, 110, Rajiv Gandhi Salai, Thiruvanmiyur, Chennai, Tamil Nadu 600041

Mode of workshop: Hybrid (in-person and online attendance)

More than twelve national and international experts will present during the workshop on various aspects of diaphragm walls including case studies.

The topics include Introduction; Contract Specifications; Design & Engineering Aspects; Site Investigation; Equipment and Technologies; Construction Techniques & Execution; Concreting & Quality Control; Instrumentation, Monitoring & Risk Management.

To know the more details about the speakers, sponsorships, registration, visit the link dfi-events.org/dfii-d-wall

For group registrations, contact Pranav Jha, Manager-Operations at activities@dfi-india.org or +91-9182452620

DFII Technical Committee News & Reports

DFII Committee for Geotechnical Characterisation for Foundations

DCGCF committee is currently working on recruiting in experts for the webinar series "Practices for Efficient Subsurface Characterization". The committee is also planning to conduct 5-days workshop on geotechnical lab testing at different parts of the country.

DFII Training Committee on Foundation Technologies

DFII Training Committee has conducted five training programs to date with four online programs and the last one being a hybrid event in 2024. These events have seen increasing interest from the industry and academia with participants from different parts of the country.

The Committee is organizing another hybrid workshop on "Design & Construction of Diaphragm Walls," scheduled for July 11–12, 2025 at Hotel Holiday Inn, Chennai. The event will feature presentations by over 12 experts, both in-person and online. The workshop topics have been thoughtfully curated to benefit working professionals, young engineers, students, and others in the field.

DFII Student Outreach Committee-Groundwork

DFII Student Outreach Committee is planning to conduct in-person as well online Groundwork webinars for the year 2025. More details will be shared soon. DFII invited abstracts of the project work by masters students and the thesis by the PhD researchers for the DFII Student Awards 2025 in the deep foundation and ground improvement field. The winners will be awarded during the DFI-India 2025: 14th Annual Conference to be held at Surat.

CFA Pile Technology Implementation Committee

The committee is playing a pivotal role in Panel 20 sub-committee under CED 43 which is drafting the BIS code for CFA Guidelines. The guidelines document is currently under review and is expected to be out in 2025.

The committee is planning a knowledge dissemination program on CFA technology in November 2025. More details will be out soon.

Women in Deep Foundations India

WiDF India group is currently working on developing a WiDF event at DFI-India 2025. An in-person event in Mumbai during September 2025 is also under discussion. More details will be shared soon.

DFII Sustainability Committee

DFI of India has established a dedicated Sustainability Committee under the leadership of Dr. Venu Raju, Senior Advisor, Sustainability, Keller Group plc. The committee aims to to educate and guide the foundation industry in India to decarbonise and also in later stages expand to water conservation and resilience against climate change. The main goals for 2025 include to educate foundation industry engineers on carbon calculation through EFFC/DFI Carbon Calculator; to provide guidance on carbon reduction and to engage with supply chain (cement, concrete, steel) and to encourage them on use of low carbon materials.

Continued from page 4

installation even in soils with a Standard Penetration Test N-value exceeding 100.

Originally adopted for its virtually noise and vibration-free benefits, the Press-in Method has now become a fundamental piling technique, especially in urban areas. This cutting-edge technology minimizes environmental disturbances, enhances safety, shortens construction timelines, reduces overall project costs, and adds aesthetic and cultural value to infrastructure.

GIKEN's silent piling solutions continue to address complex construction challenges worldwide. With its proven benefits, the Press-in Method holds significant potential to contribute meaningfully to infrastructure development in India.

Fig.5: Drainage Improvement Project in Residential Area

Fig.4: Railroad Expansion Project

Fig.6: GRB System in India

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DFI of INDIA News

WHAT CAN DFI DO FOR YOU?

Overview

DFI is an international association of contractors, engineers, suppliers, academics and owners in the deep foundations industry. For more than 50 years, we have brought together professionals for networking, education, communication and collaboration. As a member, you help create a consensus voice and a common vision for continual advancement in the planning, design and construction of deep foundations and excavations.

Find Common Ground. Become a Member of DFI

- Network with thousands of members and industry professionals worldwide
- Get involved locally through DFI's active presence in Europe, India and the Middle East
- Strengthen your knowledge base and obtain practical information at seminars, short courses, workshops and conferences
- Collaborate with colleagues by joining one of 25 plus active Technical Committees, Regional Chapters or a DFI group
- Gain visibility with a corporate member listing on the DFI website, which has more than 20,000 views each month
- Connect and communicate with industry peers through social media such as DFI's LinkedIn Groups or follow DFI on LinkedIn, Facebook, Instagram or YouTube
- Access OneMine.org and download up to 145,000 articles, technical papers & books from DFI & organizations all over the world - at no cost

DFI-India 2025: 14th Annual Conference

Sept 08 - Sept 10, 2025 (Monday to Wednesday)

The DFI-India 2025 Conference is being organized in collaboration with SVNIT Surat and IGS Surat Chapter. This premier event will bring together top professionals from across the foundation industry, both from India and abroad. The conference offers a comprehensive program designed to foster knowledge exchange and collaboration.

Attendees can look forward to expert keynote lectures, insightful technical sessions, and presentations of the best papers from both practitioners and academia. The event will also feature awards, dedicated networking opportunities, a comprehensive exhibition showcasing the latest innovations, and a cultural program, among other highlights.

Join us to connect with industry leaders, explore cutting-edge technologies, and participate in power-packed technical discussions.

For details, visit: dfi-events.org/india25/

This e-newsletter of DFI of India is available at DFI of India website: dfi.org/india/

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