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Call for Abstract

From the New Secretary General

Daisuke Hirose

My name is Daisuke Hirose, appointed as the new Secretary General in this January. I am very pleased and honored to serve as a member of the IPA, and will do my best to facilitate the activities of the IPA.

I joined GIKEN LTD. in 1997 and have spent most of my career in the Administration Headquarter. In 2019, I was transferred to the International Business Planning Section, where I have been involved in the promotion of Press-in Methodologies and machinery overseas. Through those experiences, I came to strongly realize that the Press-in principle and Press-in method are unparalleled technology in pile construction and have significant advantages and enormous impacts, such as low noise, low vibration, safe operation, narrow space execution, high-precision piling, no need temporary works, data logging and automatic operation. On the other hand, I also recognized that the technology is just widely applied only to pile construction, and I feel further development and success will not be possible without pursuing and promoting the value that pile structures constructed by Press-in could provide to society.

GIKEN Group is currently implementing an action plan titled "GIKEN GOALS 2031," which is based on a roadmap for long-term development. "Press-in" is the root of our business, but it is just one part of the whole construction work. We recognize that how we could change the construction itself and provide value to society are essential for the diffusion and expansion of Press-in technology in the global construction market. I believe that the same thing can be said for an academic association. An academic association is a place for activities that serve the public interest, and I believe that the target of such activities would be society. If the impact of academic development on society is not clearly visible, and if it appears to serve only its members, I think it will not be able to gain wide support from society as a whole. Since its establishment in 2007, IPA has developed its activities not only in geotechnical engineering but also in mechanical engineering, information engineering, environmental e ngineering, as well as construction methodology, and many other academic fields related to Press-in piling. In addition to academic pursuits that delve deeply into subdivided research areas, I believe that the IPA is an association that can explore how pile structures and social infrastructures constructed by Press-in technology are different from other structures and what value and impact they have for society from multiple perspectives and angles.

I am confident that IPA will attract more members (not only researchers and engineers but also project owners, designers, contractors, manufacturers, suppliers, etc.) and develop into a future-oriented organization that can provide comprehensive, academic and practical solutions to the problems or challenges faced by construction industry worldwide. I hope to be involved in the activities to achieve this goal with all of you.

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Special Contribution

The challenge to Structural Health Monitoring of Expressway Embankment

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1. Introduction

Structural Health Monitoring (SHM) is a method of evaluating and monitoring structural health. SHM has been widely applied in various engineering structures such as bridges and buildings. On the other hand, there are some unresolved issues in applying SHM to expressway embankments, namely

A) Appearance check cannot evaluate the soundness of road embankment if there is no deformation or damage.
B) Borehole investigation cannot evaluate the overall soundness of road embankment.
C) Embankment is not constructed based on mechanical properties (stiffness & strength).
D) Change in the soundness of road embankment is not monitored continuously.
E) Extension of the road embankment is long. Monitoring road embankments in service is difficult.

Collapses of road embankments due to heavy rain or earthquake often close transportation and resulted in serious damage in the community (see Fig. 1). Therefore, it is necessary to assess the current soundness and predict the future soundness of road embankment. Fig. 2 shows the typical curves which explain the different changes in the soundness of road embankment with time [1]. The change in the soundness of road embankment depends on "initial condition" and "subsequent factors". In this research project, some challenges have been done to solve the unresolved issues mentioned above.

Fig. 1. Collapses of road embankment due to heavy rain or earthquake

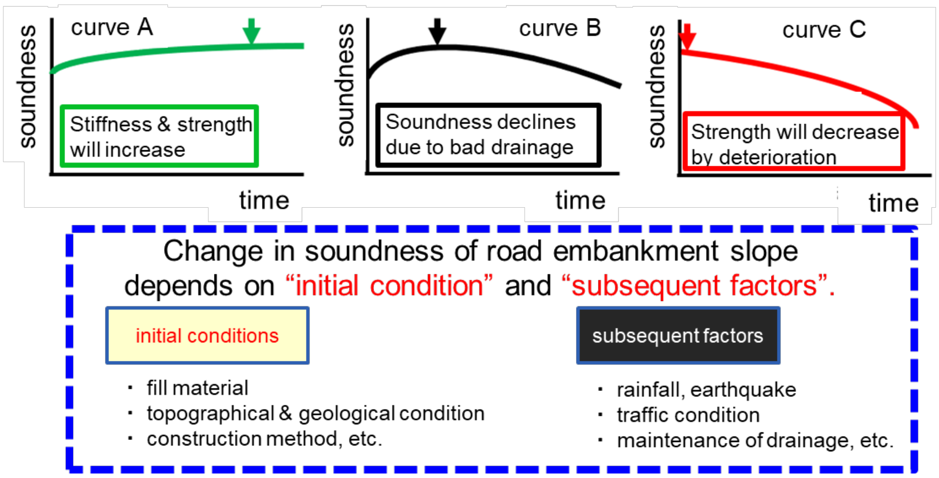

Fig. 2. Change in soundness of road embankment with time

2. Geophysical exploration techniques for inspection

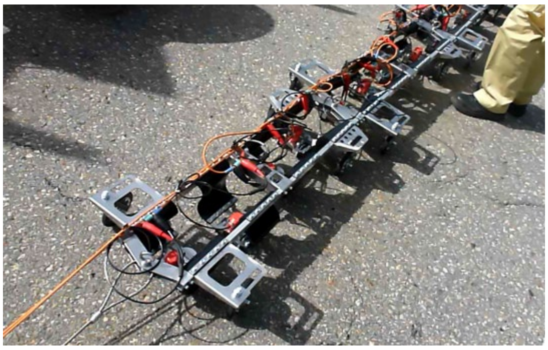

Photo 1 Cart with geophones

In order to evaluate the initial mechanical property and the change in the soundness of expressway embankment and to survey the expressway embankment efficiently under the heavy traffic condition, the following geophysical exploration techniques were applied in this research project, namely

1) 2-dimensional (2-D) surface wave exploration
2) Electric resistivity exploration
3) Passive linear array exploration
4) Distributed Acoustic Sensing (DAS)

Newly designed carts were manufactured to save inspection time. Photo 1 shows the cart with geophones for 2-D surface wave and passive linear array explorations [2], [3].

3. Evaluation of initial mechanical property of expressway embankment

The initial condition of the expressway embankment depends on fill material, topographical and geological conditions, construction methods, etc. However, the expressway embankment was not constructed based on mechanical properties such as stiffness and strength but relative density, at least in Japan. Therefore, the initial stiffness and strength of the expressway embankment are unknown. In this chapter, the initial mechanical property of the expressway embankment was evaluated [3].

Geophysical exploration inspection works were carried out on the newly opened sections of four expressways such as Tokai-Hokuriku expressway, Shin-Tomei expressway, Shin-Meishin expressway and Tokai-Kanjo expressway in Aichi, Mie and Gifu Prefectures in Japan. The locations of the inspection works are shown in Fig. 3. The electric resistivity exploration inspections were carried out in addition to 2-D surface wave exploration on Shin-Meishin expressway and Tokai-Kanjo expressway.

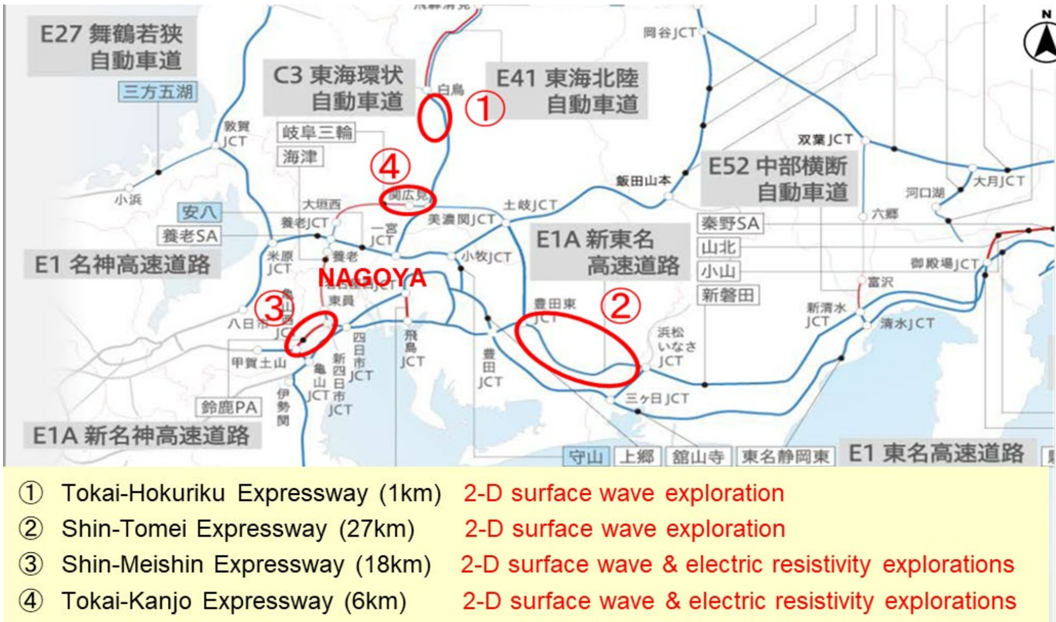

Fig. 3. Locations of the inspection works for four expressways

The distribution of the shear wave velocity for Tokai-Hokuriku expressway from the road surface down to the depth of 20 m is shown in Fig. 4. It is found that low shear wave velocities are observed around the fill/cut boundary and close to the box culvert. The distribution of the shear wave velocity for some extensions of Shin-Tomei expressway is also shown in Fig.5. The difference between the shear wave velocity for the fill section and cut section is easily understood. The shear wave velocity around the embankment slope surface is found to be low.

The following findings were obtained from geophysical exploration inspection works for the newly opened sections of four expressways,

1) Initial shear wave velocity differs depending on the fill material and topographical condition of the foundation

ground.

2) Initial low shear wave velocities are observed around the fill/cut boundary and embankment slope surface, and close to the underground structure.
3) Initial shear wave velocity in the embankment can be evaluated from the stiff pavement.
4) Initial water content in the embankment can be estimated by the electric resistivity exploration.
5) The exploration speed increased dramatically by introducing FWD (Falling Weight Deflectometer) impact. The FWD impact improves the S/N ratio for 2-D surface wave exploration.

Therefore, it is possible for engineers to narrow down weak points requiring future inspection based on the initial inspection results.

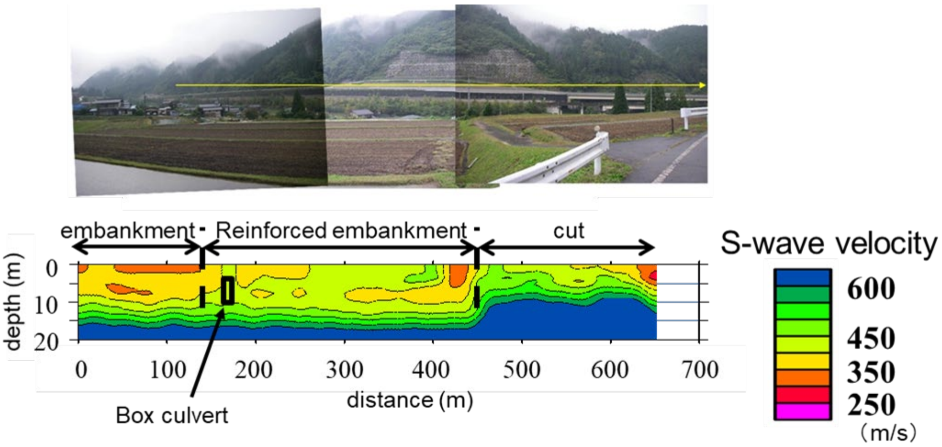

Fig. 4. Distribution of the shear wave velocity of road embankment for Tokai-Hokuriku expressway

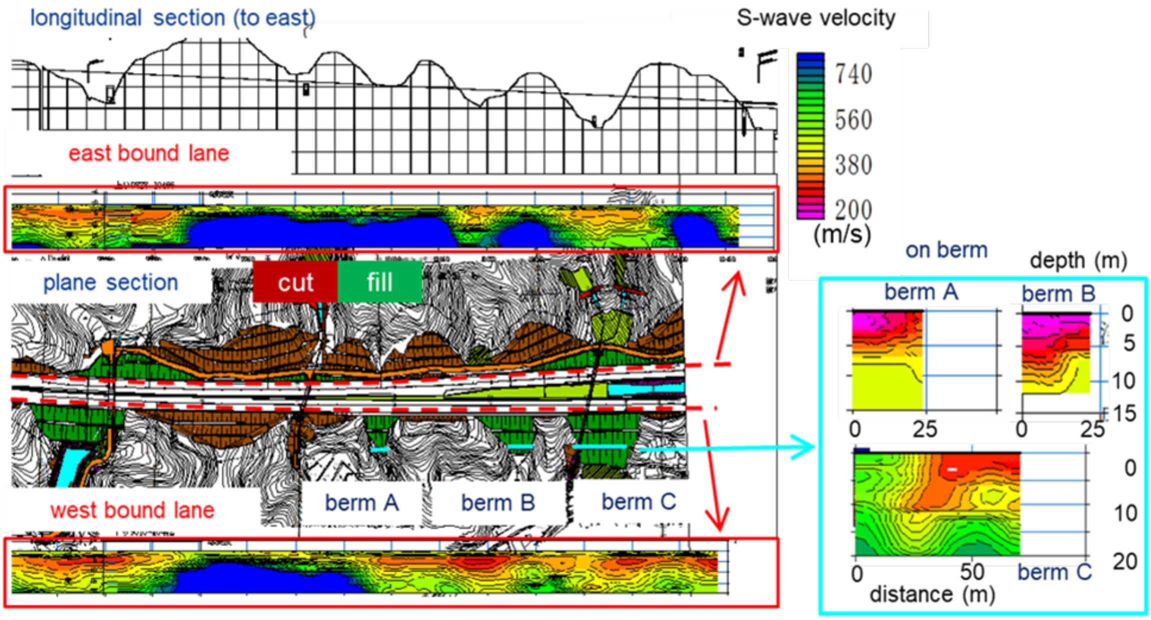

Fig. 5. Distribution of the shear wave velocity for some extension of Shin-Tomei expressway

4. Change in shear wave velocity with time

In order to predict the change in the soundness of the expressway embankment, continuous (or scheduled) monitoring is needed. In this chapter, the initial and subsequent mechanical properties obtained by geophysical exploration along the road embankment were compared. The target road embankment is located on Tokai-Hokuriku Expressway in Gifu Prefecture. The initial inspection result obtained in 2008 was shown in the previous chapter. Subsequent 2-D surface wave exploration was carried out for the same extension of Tokai-Hokuriku Expressway in 2020.

Fig.6 shows both the distribution of the shear wave velocity for the same extension of Tokai-Hokuriku expressway obtained in 2008 and that obtained in 2020. Fig.7 is also prepared to easily understand the change in the shear wave velocity for the same extension. The change rate is defined by (B-A)/A×100 (%), in which A is the shear wave velocity obtained in 2008 and B is that obtained in 2020. It is found from these figures that a large drop in the shear wave velocity was observed around the fill/cut boundary. This area corresponds to repair marks on the pavement. This means that the area where a large drop in the shear wave velocity with time is observed should be carefully inspected and maintained. It is also possible for engineers to understand the soundness degradation even if there is no deformation or damage.

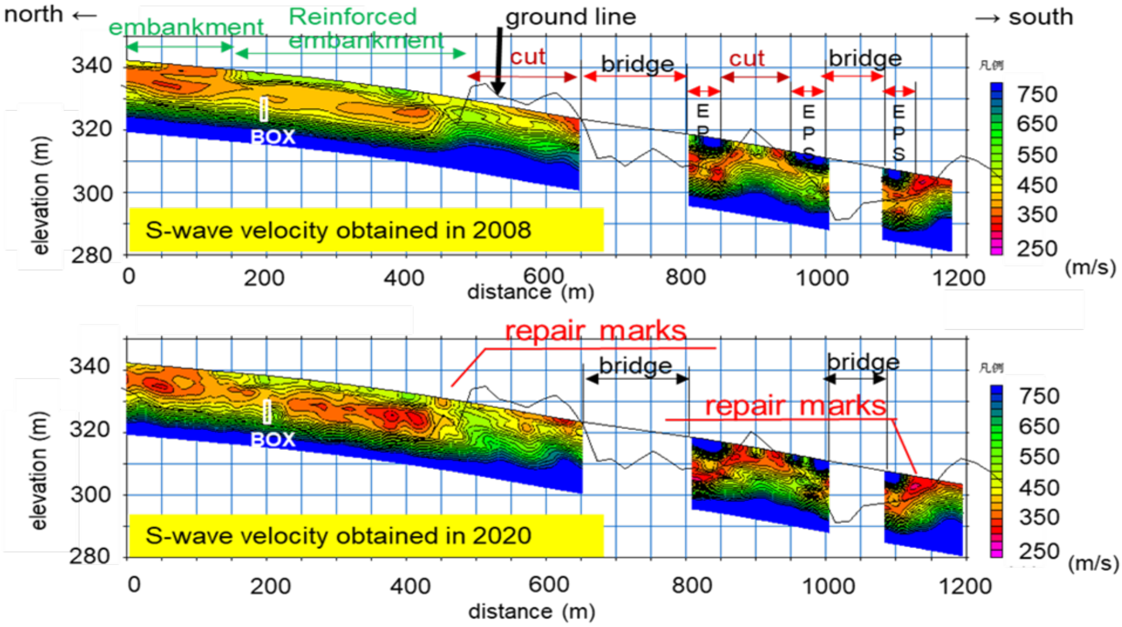

Fig. 6. Inspection results obtained in year 2008 and 2020

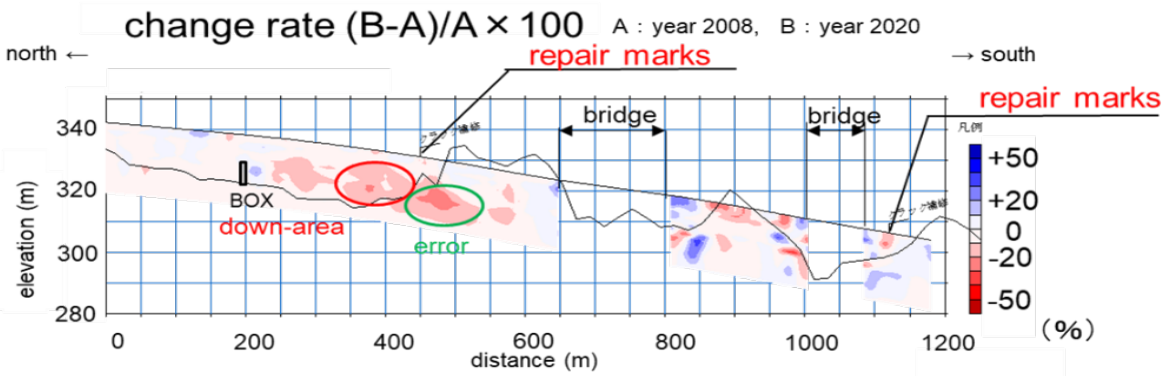

Fig. 7. Change in shear wave velocity for same extension

5. Passive linear array exploration

The heavy vehicle vibration reduces S/N ratio for 2-D surface wave exploration and the exploration efficiency on expressways. Active surface wave exploration can evaluate the shear wave velocity down to about 20m. There are many high expressway embankments with more than 20m. Therefore, we would like to carry out the inspection work efficiently under the heavy traffic condition and evaluate the shear wave velocity in the embankment deeper than 20m from the road surface. To satisfy these requests, the passive linear array exploration technique was applied [4].

First target embankment is located on Shin-Tomei expressway in Shizuoka Prefecture. The embankment fill material is mad stone. The embankment height is about 27m. On the embankment slope, lots of spring water and damages of drainage facility were observed as shown in Photo 2. These damages are thought to be partially due to the

Photo 2 Target embankment with damage

abundant groundwater in the embankment and the embankment settlement.

The procedure of the passive linear array exploration is as follows, namely

1) 12 carts were connected at 5m intervals.
2) Vibrations induced by heavy vehicles were monitored for 6 minutes.
3) Move all carts 30m. Monitor vibrations again for 6 minutes.
4) Repeat movement and measurement.

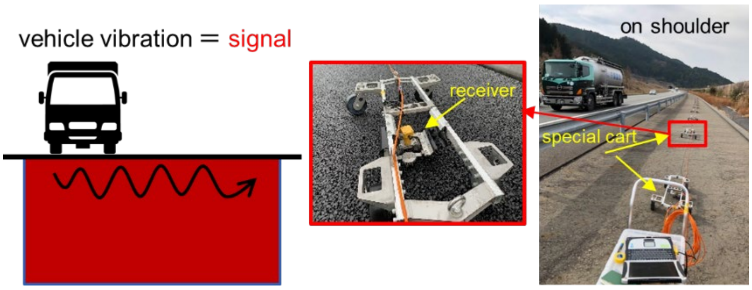

Fig. 8. Actual condition of passive linear array exploration

Fig.8 shows the actual condition of the field inspection.

The inspection result by the passive linear array exploration is shown in Fig.9. It is found that the passive linear array exploration can evaluate the distribution of shear wave velocity from the ground surface down to about 30m under heavy traffic condition. The region with low shear wave velocity and low electric resistivity corresponds to the area where spring water, gaps of drainage ditch and cracks of cover concrete were observed.

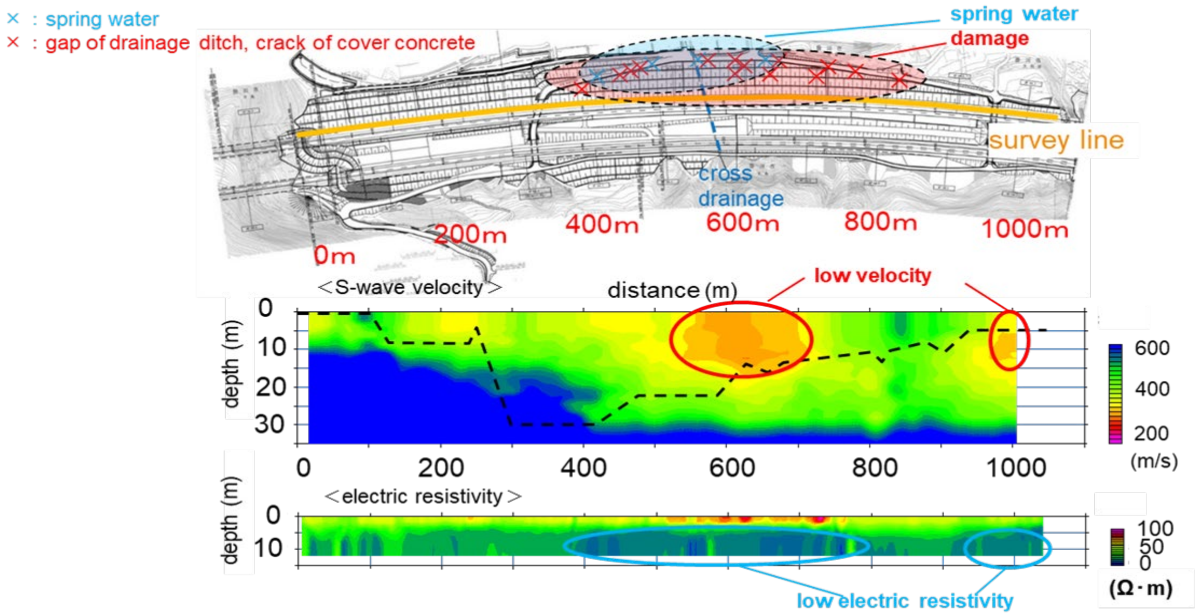

Fig. 9. Inspection result by the passive linear array exploration for Shin-Tomei expressway

Second target embankment is located on Chuo expressway in Nagano Prefecture. The embankment slope surface collapsed in a certain section some years ago. The same inspection procedure as Shin-Tomei expressway was employed. The inspection result by the passive linear array exploration is shown in Fig.10. It is found that the low shear wave velocity area corresponds to the damaged area where the embankment slope surface collapsed some years ago.

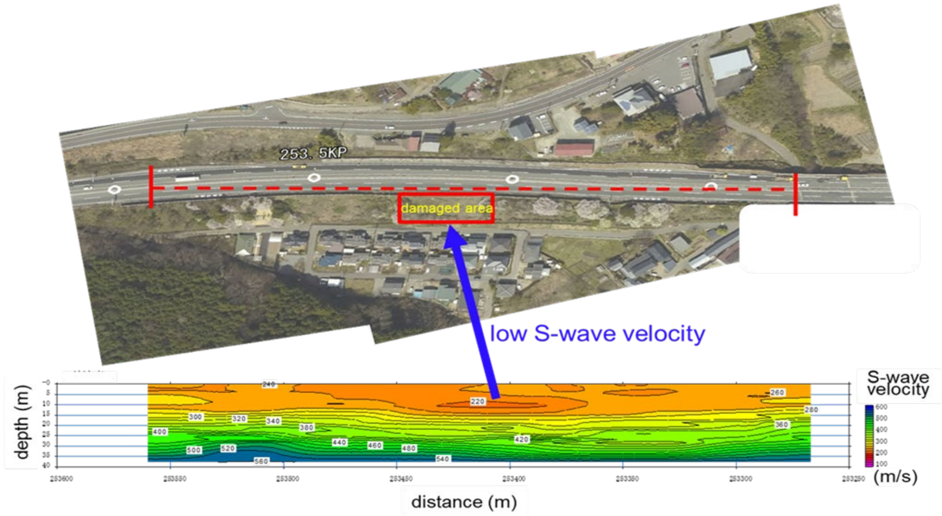

Fig. 10. Inspection result by the passive linear array exploration for Chuo expressway

6. Distributed Acoustic Sensing (DAS)

Geophysical explorations introduced in the previous chapters often demands the regulation of road traffic. In order to prevent such regulations, alternative monitoring techniques which enable remote measurement or use existing infrastructure should be developed. One candidate satisfying this request is the Distributed Acoustic Sensing (DAS) using existing optical fiber [5], [6]. If we have subsurface telecom optical fibers under the pavement of embankment, we can utilize it as DAS (see Fig.11). DAS measurement can be carried out from the hand hole on the pavement under the traffic regulation condition. On the other hand, the measurement from the road maintenance office does not require the traffic regulation. This is a big advantage.

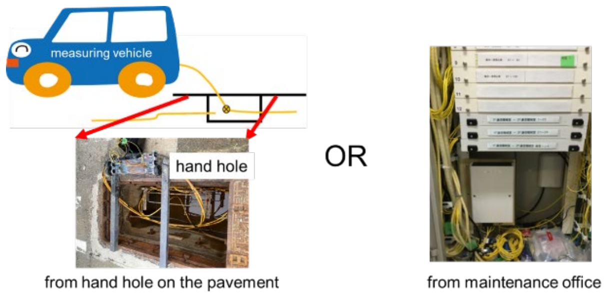

Fig. 11. DAS using optical fiber

The comparison of the inspection result by the passive linear array exploration with geophones with the traffic regulation and that by DAS with the subsurface telecom fiber is shown in Fig.12. It is found that the shear wave velocity distribution measured by DAS is very similar to that by the passive linear array exploration with geophones. However, it is necessary to improve DAS measurement technology for bringing DAS accuracy and resolution closer to the result by the passive linear array exploration with geophones in the future.

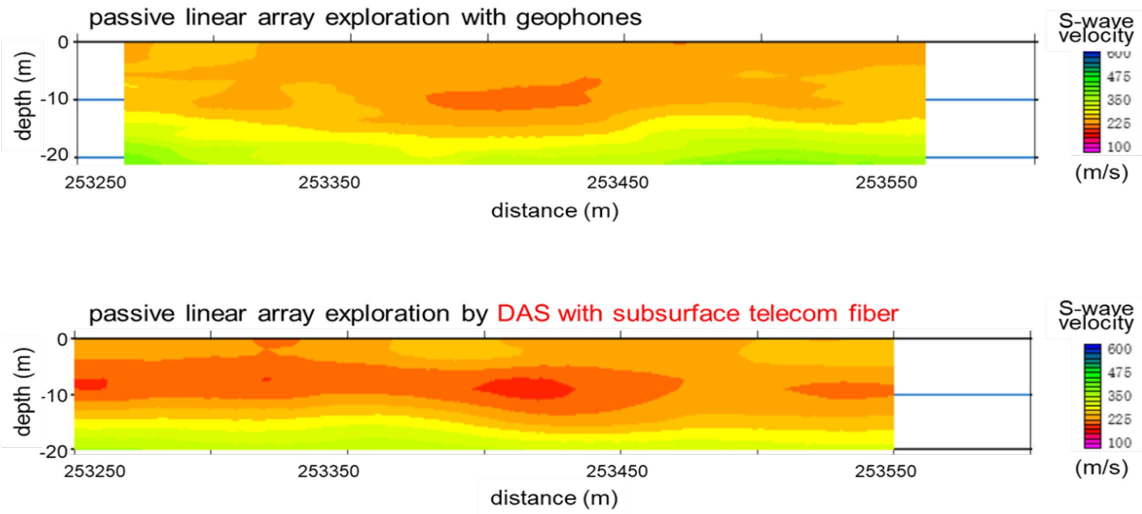

Fig. 12. Comparison of the inspection result by passive linear array exploration and DAS

7. Conclusions

Some challenges have been done to solve the unresolved issues in applying Structural Health Monitoring (SHM) to expressway embankments. Based on field inspections for different expressway embankments, the following conclusions were obtained.

1) Geophysical explorations can evaluate the initial stiffness and electric resistivity of expressway embankments. It is possible for engineers to narrow down weak points requiring further inspection based on these inspection results.
2) If a large drop in the shear wave velocity with time is observed at some area, that area should be carefully inspected further and maintained. Engineers can understand the soundness degradation based on the drop in the shear wave velocity with time even if there is no deformation or damage.
3) Passive linear array exploration can evaluate the overall stiffness of expressway embankments under heavy traffic conditions.
4) Geophysical explorations introduced often demands the regulation of road traffic. In order to prevent such regulations, alternative monitoring techniques which enable remote measurement or use existing infrastructure should be developed.
5) DAS measurement from the road maintenance office does not require traffic regulation. However, it is necessary to improve DAS measurement technology for bringing DAS accuracy and resolution closer to the result by the passive linear array exploration in the future.

Acknowledgments

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◆ A brief CV of Prof. Atsushi Yashima

Atsushi Yashima is Specially Appointed (Research) Professor, Professor Emeritus of Gifu University and Technical Adviser of Central Nippon Highway Engineering Nagoya Co., Ltd., Japan. He earned his PhD in Geotechnical Engineering from Kyoto University in 1986. Dr. Yashima's areas of expertise are geo-disaster mitigation, earthquake engineering and numerical analysis. He has developed many numerical codes to predict geo-disaster and design new countermeasures.

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Directors' Research and Development Activities

Use of Silent Piler in Bangkok MRT Orange Line Project Thailand

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ATT Consultants Company Limited

Introduction

Thailand's capital city, Bangkok has been planning to construct many underground infrastructure development projects. MRT Orange line is one of the most challenging projects in Bangkok because the tunnel alignment passes through the congested urban areas in the city. There are inevitable interactions between existing structures and new construction, such as tunnels, intervention shafts and stations. Many underpinning works are required along the route. The low headroom, limited working space and vibration have become concerned issues to be considered during construction. Silent Piler is used in those constraint areas. MRT Orange Line Project is implemented by The Mass Rapid Transit Authority of Thailand (MRTA) to develop a train system network in Bangkok Metropolitan Region. MRT Orange Line is divided into two sections, i.e., East Section (Thailand Cultural Centre – Min Buri) and West Section (Bang Khun Non – Thailand Cultural Centre). Ch. Karnchang PLC. and Si-no Thai Engineering and Construction PLC. (CKST Joint Venture) have been awarded for MRT Orange Line (East Section) Project, Contract E1 and E2. I was a member of the design team for this design and build project. Contracts E1 and E2 involve the construction of about 9.73km, comprising 7 underground stations, ventilation and intervention shafts, cut-and-cover tunnels, depot access, and stack and parallel twin tunnels. The Diaphragm wall is used as a retaining wall with the aid of a base slab and bored piles or barrettes for deep excavation.

The soil condition in Bangkok consists of a thick soft to very soft clay layer on the top deposit, namely Bangkok clay, and encountered with stiff to very stiff clay before reaching the first dense silty sand layer. The hard clay is encountered below the first silty sand and underlain by the second very dense silty sand layer. The subsoil profile of MRT Orange Line Contract E1 and E2 are presented in Fig.1 and Fig.2, respectively. Bangkok clay is very sensitive to deformations and has low shear strength. Most of the foundations in Bangkok is the pile foundation. For low-rise buildings, the piling work consists of a driven pile and a jack-in pile. For high-rise buildings and highways, BTS sky train and MRT subway, bored pile and barrette pile with the tip penetrated in the second dense silty sand are utilized. The tunnel alignment needs to be adjusted to evade the existing buildings and elevate the expressway as much as possible. However, underpinning work must be conducted in some parts of the project to mitigate the settlement of existing buildings in congested spaces. The working space, vibration, and pollution, especially PM 2.5, have become concerned issues to be considered during construction.

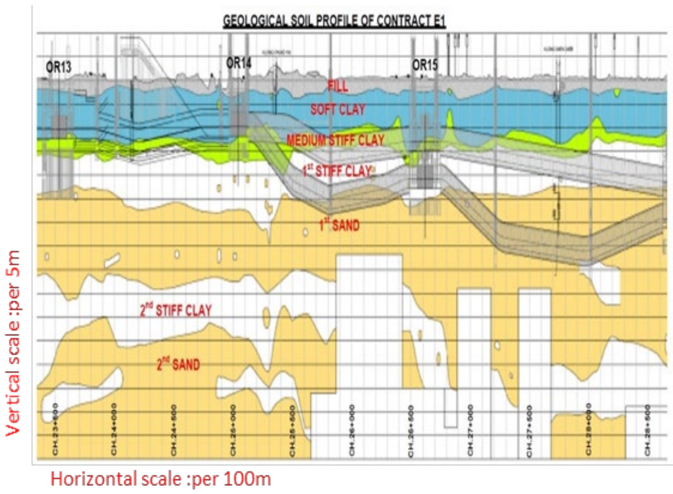

Fig. 1. Geological soil profile of Contract E1

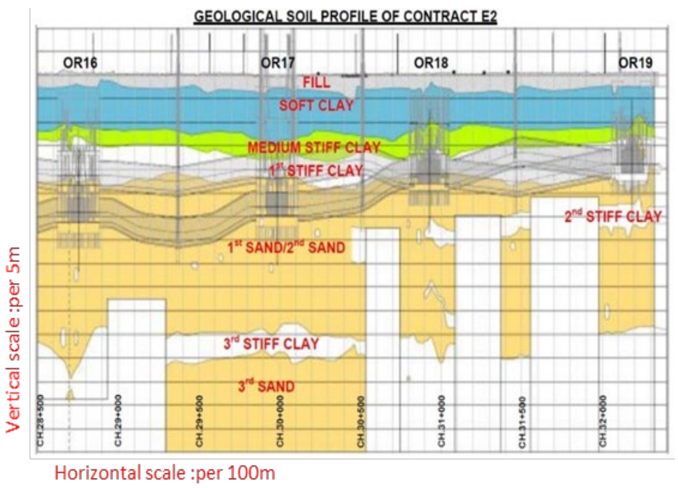

Fig. 2. Geological soil profile of Contract E2

The tunnel alignment compels the underpinning works required for the project. As a result, attention has been paid to the alignment design such that minimal clashes occur between the tunnel alignment and the existing structures. In addition, if such a clash is unavoidable, the underpinning work needs to be conducted. Underpinning for the existing structures may be required if the existing structures either clash with the tunnel alignment or are in its proximity. For example, if the clearance between the edge of the existing pile and the exterior surface of the tunnel is less than 900mm, this location requires underpinning. This clearance is inclusive of a tunnel driving tolerance of plus or minus 100mm and a construction tolerance of 1 in 100 for the verticality of the existing pile. The following information will be taken as the bases for the design development of the underpinning work on the project: Tunnel alignment, Station layout, Topographic survey of the site, As-built information and condition survey of the existing structures, and Right of Way (ROW) of the project.

Underpinnings at Ram Khamhaeng Junction Flyover in Contract E1 and Contract E2

The location of Ram Khamhaeng Junction Flyover in Contract E1 (Chainage 28+200) and that in Contract E2 (Chainage 29+300) need to be underpinned as shown in Fig. 3 and Fig. 4. One at Chainage 28+200, the proposed bored tunnels will pass underneath the existing flyover, and it will cause an adverse effect on the existing foundation system. Underpinning work is required to reconstruct a new supporting system with minimal impact on the operation of the viaduct. In the beginning, the associated barrettes and temporary steel portal frame will be constructed as the supporting structure for the existing flyover structures. Sheet piles will be installed around the pile cap by Silent Piler, as presented in Figs. 5 and 6. Where it is acted as a permanent structure. The conventional method of pile installation could not be applied due to insufficient headroom under the flyover. Temporary vertical jacks between the portal frame and the existing girder will be placed. Subsequently, preloading will commence to alter the load path from the existing flyover piled foundation to the new barrette foundation through the vertical jacks and portal frame. After the preloading, the existing steel pier will be disconnected, followed by demolishing the existing pile cap and piles. Thereafter remaining portions of the transfer beam will be constructed. A steel pier will be reinstated and connected to the transfer beam to remove the temporary jack to complete the load transfer. Finally, TBM works will be carried out underneath the underpinned foundation structure after the completion of load transfer.

For the site location at Chainage 29+300, as the proposed bored tunnels will pass underneath the existing flyover and will be partly in conflict with the existing foundation system, underpinning work is required to reconstruct a new supporting system with minimal impact to the operation viaduct as presented in Fig. 4. Headroom under flyover is less than 5.0m. Therefore, Silent Piler needs to be used for sheet pile installation, as shown in Fig. 7. The sheet pile needs to be divided into short lengths and reconnected by welding during the sheet pile installation, as presented in Fig. 8. The sequence of underpinning is similar to the underpinning at CH. 28+200. However, after the pre-loading, a gap between the existing deck soffit and the portal beam will be grouted in order to remove the temporary jack. The second cast of pile caps for connecting to the existing cap will be constructed. TBM works will be constructed underneath the underpinned foundation structure after the completion of load transfer.

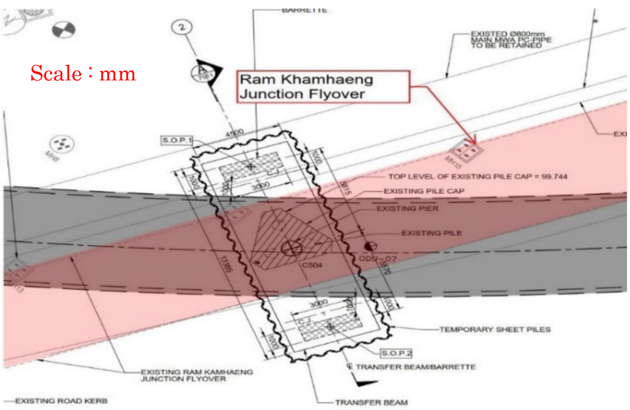

Fig. 3. Site location plan at Chainage 28+200

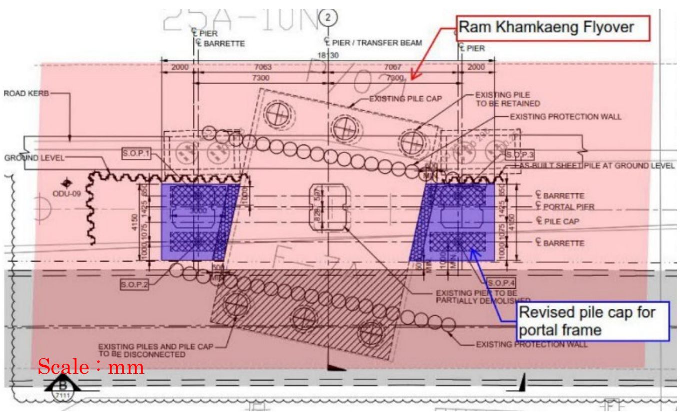

Fig. 4. Site location at Chainage 29+300

Fig. 5. Sheet pile installation at Chainage 28+200

Fig. 6. Site condition after sheet pile installation

Fig. 7. Sheet pile installation at Chainage 29+300

Fig. 8. Sheet pile connection

Design Analysis Approach

For underpinning works, internal forces of the structural members have been carried out by two computer programs – PLAXIS2D and SAP2000. PLAXIS2D is used to analyze the effects due to TBM tunneling. However, the load transfer and the loads from the flyover will be analyzed by SAP2000. Fig. 9 shows the section of the load transfer system in SAP2000. Jack loads were installed between the existing deck and the newly constructed portal beam. Installation of a sheet pile by Silent Piler will be applied around the newly piled cap and the existing pier to act as a retaining wall. The load transfer due to volume loss during tunneling will be acquired by PLAXIS2D, as shown in Fig. 10. The flyover structures are supported on piled foundations where it is affected by sub-surface soil movement due to TBM tunnelling works. The vertical soil movement induces negative skin friction on the piles. The lateral soil movement also induced additional bending moments on the piles. These additional stresses on the piles and the consequences of underpinning works are analyzed on PLAXIS 2D. The results will be checked against the structural and geotechnical capacity of piles to assess the impact on the piles due to ground movement by tunnelling works.

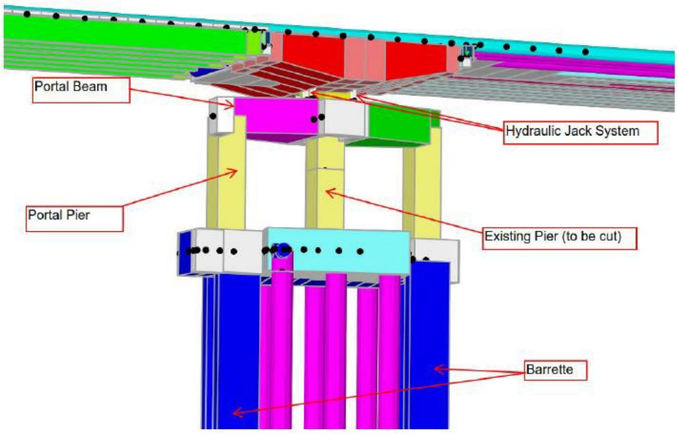

Fig. 9. Load transfer at CH.29+300 by SAP2000

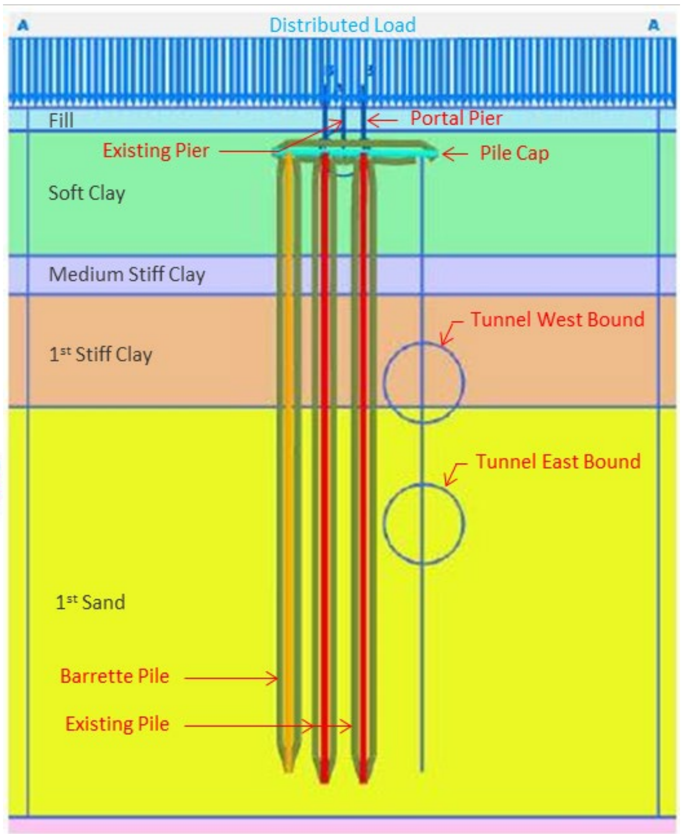

Fig. 10. Plaxis2D model with TBM at CH.29+300

Conclusion

Silent Piler is very useful to be applied in the constraint condition such as low headroom, limited working area and nearby operating transportation. For MRT Orange Line Project, it is compulsory that the traffic needs to be operated during the underpinning process. The conventional sheet pile installation using a Vibro hammer causes excessive noise and ground vibration. The vibration may generate adverse effects on existing buildings.

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Case History

Pa Sak River Improvement Project in Thailand

Hiroki Kitamura

Giken Seisakusho Asia Pte., Ltd.

Introduction

Climate change has become a serious problem worldwide. The number of reported natural disasters from 2000 to 2019 totaled 7,348, which was 1.7 times larger than the number of reported natural disasters from 1980 to 1999. Meanwhile, 44% of the total disasters from 2000 to 2019 were floods. (United Nations Office for Disaster Risk Reduction, 2020) In 2011, Thailand was devastated by a flood, where the total damage and losses amounted to THB 1.43 trillion (World Bank, 2012). It was reported that the flood was one of the worst floods in the modern Thailand history. To cope with increased precipitation due to climate change, the Thailand government has implemented some flood protection measures. This report introduces a case study of flood protection for the Pa Sak River in Ayutthaya.

Project Overview

The Pa Sak River is located in the northern area of Ayutthaya, as shown Fig. 1. It is extremely important for logistics, which spans from the northern area of Thailand to the industrial area of Ayutthaya. Furthermore, it is connected to the Chao Phraya River, which flows through Bangkok to the sea. Local people use the Pa Sak River for not only transporting industrial materials, but also for daily transportation. This project involves improving the Pa Sak River revetment, which spans 52km. One of the purposes of this project is to prevent flood and excavate the riverbed for larger cargo boats to ensure the appropriate navigation. New revetments such as sheet pile walls can prevent the riverbanks from collapsing when the riverbed is excavated as well as from erosion via flash floodings and waves generated by large cargo boats.

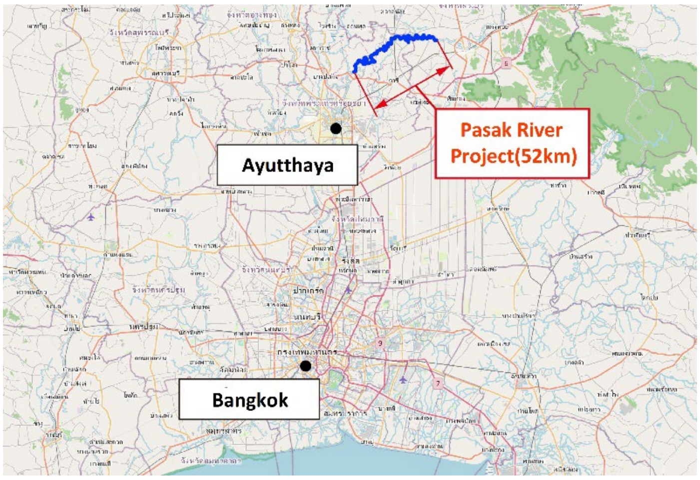

Fig. 1. The map of Pa Sak River Project
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(https://www.openstreetmap.org,
https://opendatacommons.org)

Phase 1 of the project commenced in 2015 and was completed in 2019. In Phase 1, a U-shaped steel sheet pile wall and a concrete wall were utilized as flood protection, as shown in Fig. 2. Currently, Phase 2, which began in 2021, is now in progress and will be completed in 2025.

Fig. 2. U-shaped sheet pile revetment in Phase 1

Structural Type

The project (specifically Part 1 of Phase 2) is the first in Thailand to adopt SILENT PILER^{TM} F301-900 and hat-type steel sheet piles. Hat-type sheet piles were utilized as a revetment and they were used to form a double hat-type sheet pile wall, as shown in Figs. 3 and 4. The hat-type sheet pile offers some advantages, one of which is its width. The width of a hat-type sheet pile is 900 mm, which is 2.25 times greater than that of a U-shaped 400 mm sheet pile. Therefore, the total number of sheet piles to be used can be reduced. In other words, the construction period can be shortened, particularly in soft ground. The other advantage is no consideration of a reduction factor in design stage. The hat-type sheet pile does not require the consideration of a reduction factor as the interlocking position is not located on the center line of the sheet pile wall. Therefore, the total weight of a sheet pile wall is less than that of a U-shaped sheet pile.

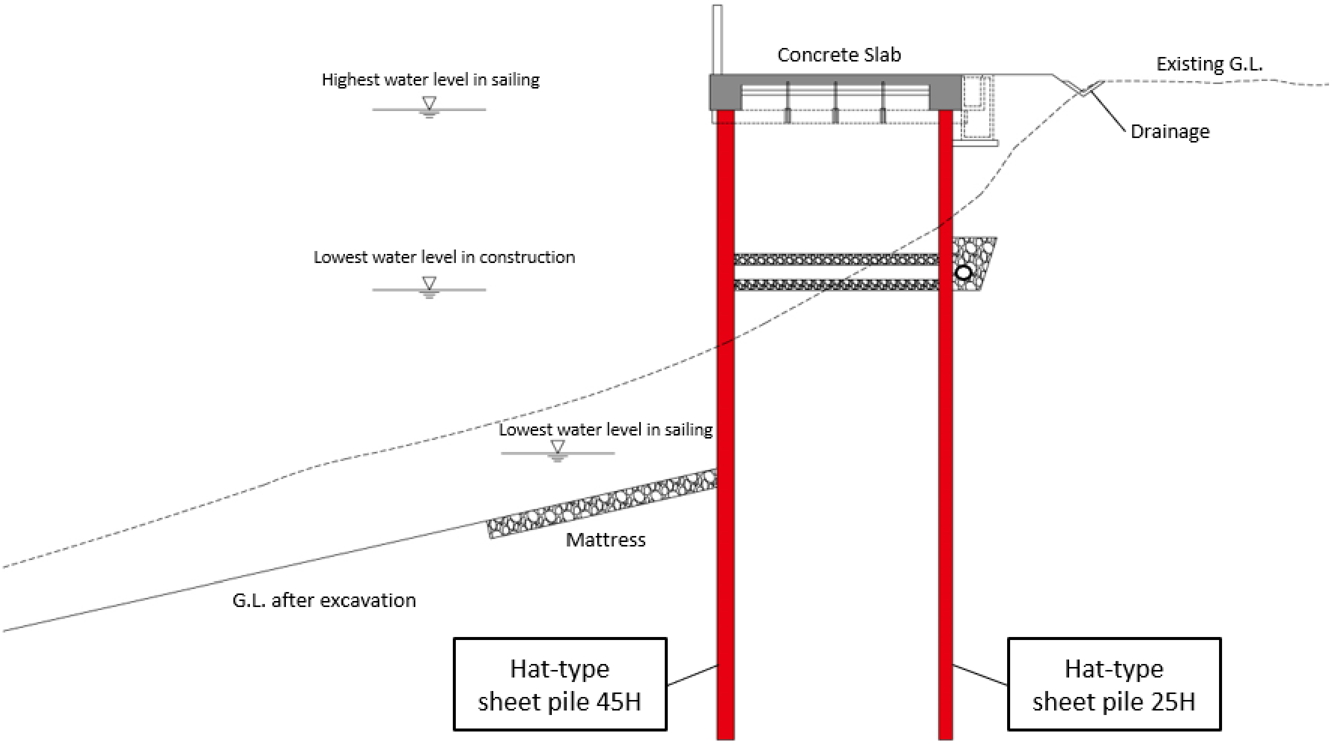

Fig. 3. Cross section of hat-type sheet pile wall

In this project, 45H and 25H hat-type sheet piles were utilized on the riverside and landside respectively. The total number of sheet piles installed at those locations was 4,238. In addition, 2,797 of the 4,238 were installed using SILENT PILER F301-900 to ensure accuracy as they must be placed adjacent to residential areas. After the hat-type sheet piles were installed, excavation was performed to allow large vessels to be operated on the Pa Sak River. To serve the community, the top of the sheet pile was laid with a concrete slab to function as a road for pedestrians. Moreover, stairs on the riverside allowed the locals to use their boats for crossing the river as a means of transportation. The sheet pile wall, which comprises sidewalks and stairs, improves the living environment of the local residents and eliminates the fear of floods.

Fig. 4. Double hat-type sheet pile wall

Press-in Piling Method

As shown in Fig. 5, the SPT N value of this project is approximately 50. Therefore, the press-in with water jetting method (water jetting mode) was adopted. Water jetting is one of the press-in penetration technologies. Press-in with water jetting can reduce the penetration resistance force efficiently. High-pressure water jetting can increase the porewater pressure between soil particles and allow them to easily propagate temporarily. In addition, water that is approaching the ground can reduce the skin friction of the piles and interlock resistance by removing the soil between the interlocks. Consequently, the piles can be installed using the minimum press-in force. Driving assistance such as water jetting is critical for preventing damage to the piles. Figs. 6 and 7 show the main components of the water jetting mode and a photograph of the Pa Sak River project. The main components comprised a press-in machine with JET REEL™, a power unit, a water jet pump, a water tank, a generator, and a water pump.

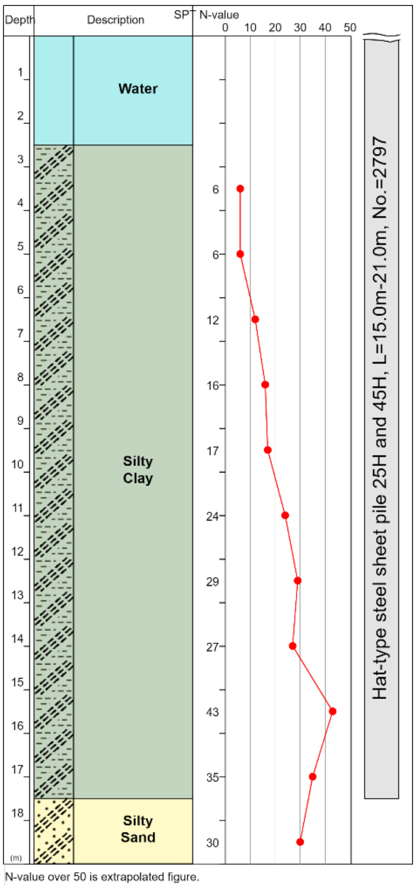

Fig. 5. Borehole data

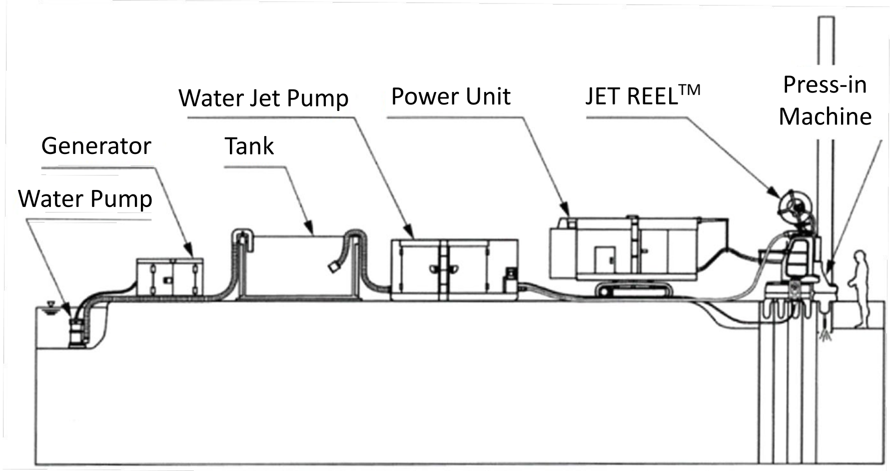

Fig. 6. Main components of water jetting mode

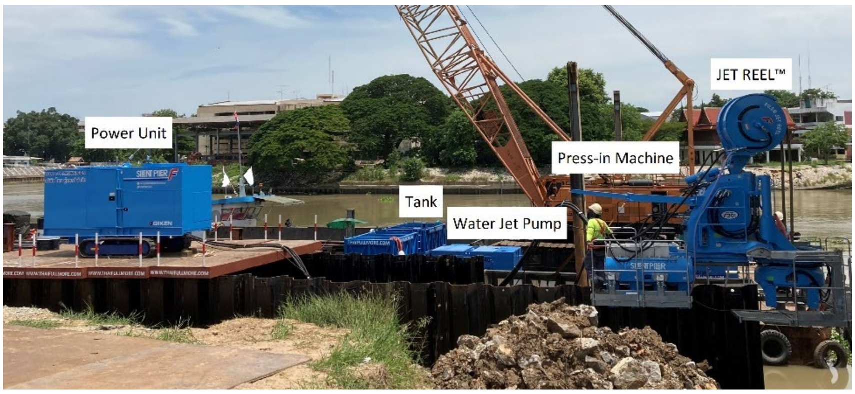

Fig. 7. Photograph of Pa Sak River

(Generator is behind the power unit and water pump is on the riverside)

Fig. 8 shows the details of the equipment, and Fig. 9 shows the press-in with water jetting process. The most significant difference in the standard press-in process is indicated when comparing between Steps 2 and 7, which primarily involve the JET REEL and PILER ECO™ Hose, respectively. The reel is used to wind the hose. The hose is wound up and unreeled automatically by the reel. In Step 2, the jet nozzle is inserted into the JET LOCK™, which is welded on the pile and locked by the pin. In Step 7, after the pile is installed, the hose is extracted by the reel. Therefore, the PILER ECO Hose can be utilized repeatedly.

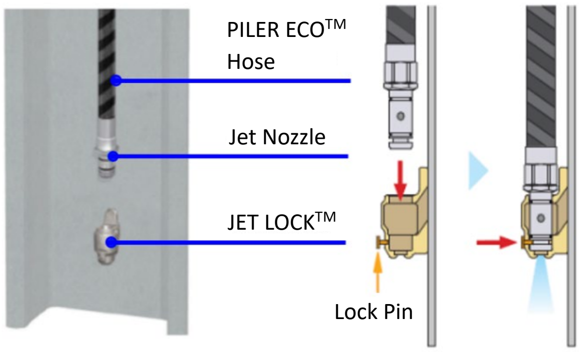

Fig. 8. Water jetting equipment

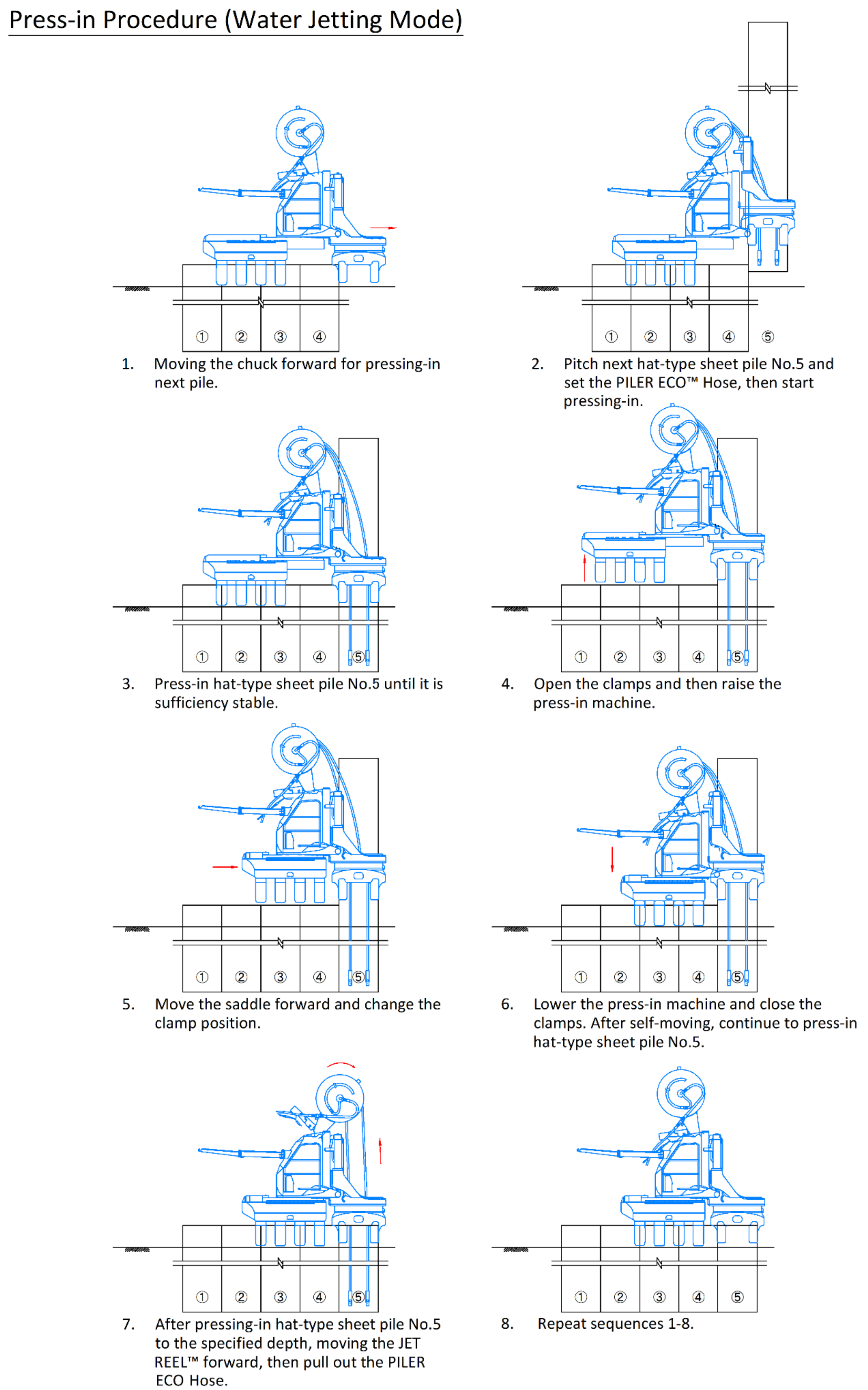

Fig. 9. Construction process

Among the various reasons, the Press-in Method was adopted owing to its environmental friendliness. The press-in machine emits minimal noise and is almost vibration-free. Therefore, it can be applied adjacent to residential areas, as shown in Fig. 10. The other reason is the highly accurate installation afforded by the method. The press-in machine grips the sheet pile near the ground, thus allowing the appropriate amount of press-in force to be transmitted to the pile. Consequently, the alignment and verticality achieved are extremely accurate. In this project, hat-type sheet piles were used as permanent structures. Therefore, the completed shape is critical.

Fig. 10. Construction performed adjacent to buildings

Conclusion

A case study of the Pa Sak River improvement was introduced herein. It is the first project that adopted SILENT PILER F301-900 and the hat-type sheet pile in Thailand, which has demonstrated some advantages. For instance, the Press-in Method adopted, which is low in noise and vibration, can minimize adverse effects to the environment. The hat-type sheet pile, which features a width of 900 mm, affords a shorter construction period. Owing to climate change, natural disasters such as heavy rains, typhoons and hurricanes are expected to increase in the future. In addition, the increasing sea level is a critical issue. In Thailand, both coastal and flood protection must be implemented to ensure the safety of the public. We strongly believe that the Press-in Method can mitigate the above-mentioned issues.

References

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Report
From IPA America Regional Office

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Introduction

IPA America Regional Office resides at Giken America Corporation (GAC) which is a Florida-based corporation established in 1999. As of February 2023, GAC has two offices in the United States; one in Orlando, Florida and the other in Manhattan, New York. The author is acting as a liaison between IPA and GAC while IPA-specific activities in this region have been still limited except the 2nd IPA International Workshop and General Assembly held back in 2008 in New Orleans, Louisiana. This article will briefly describe GAC's history, current business activities and future prospects, which may interest IPA members and also possibly assist IPA's standing in other regions of the world.

Brief History

Since its incorporation in 1999 as a wholly-owned subsidiary of Giken Limited, GAC had been promoting the press-in piling method by directly undertaking press-in piling work; i.e., being a piling subcontractor using Giken press-in piling machines. However, from 2009 to 2010, the corporate policy changed not to be directly involved in construction and rather to focus on promulgation of the press-in piling method with increased sales and rentals of press-in piling machines. In the process of this transition, GAC transferred its construction crew and open subcontracts to one of the current press-in piling machine user companies. Since then, GAC's business focus remains the same to date. Its New York office was opened in 2018. Figure 1 shows the office building where the current Orlando office is situated.

Fig. 1 GAC's Orlando Main Office on 5th Floor

Geographical Areas to Cover (Territory)

GAC is to cover North, South, and Central Americas. However, the United States of America has been thus far the largest press-in piling market among these regions. California, Florida, Louisiana, and New York are the states where the highest number of press-in piling projects have been built (See Fig. 2). Outside the U.S., GAC has been involved in projects in Canada, Mexico, and recently in Brazil, which appears to be a promising market.

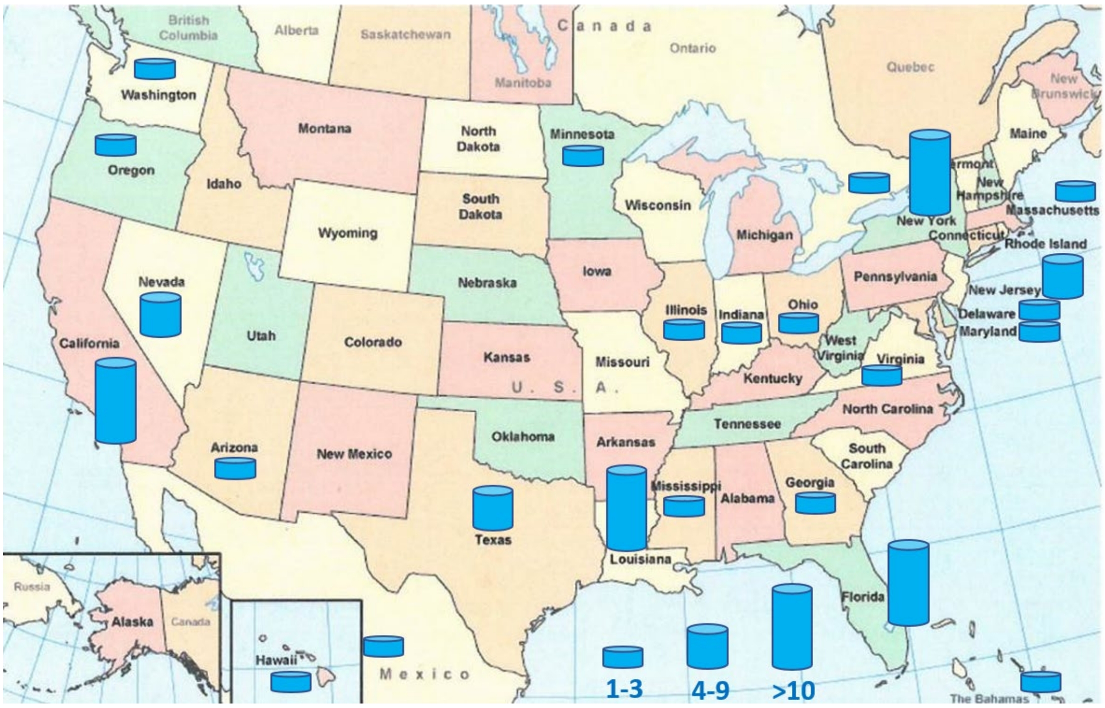

Fig. 2. Approximate Past Press-in Piling Project Counts per State of U.S.A. (up to the end of 2022)

Types of Structures Press-in Piling Adopted for

The dominant sheet piles used in the U.S. are Z-shaped, while U-shaped sheets are rarely used. And, typical installation requires coupled Z-shaped sheets for easier and faster installation, requiring significantly larger press-in piling machines, such as F401-Z1400, than those used with U-shaped sheets, such as F111. Although Z-shaped sheet piles could be reused multiple times, the author's understanding is that they are not as durable as U-shaped sheets for repeated installations and extractions. In the U.S., Z-shaped steel sheet piles have been utilized both for permanent and temporary structures but not as often as in Japan's temporary use where temporary and repeated use of the same sheet piles is very common probably for the above reason.

The following are the structure types in which press-in piling has been utilized in the U.S. on many occasions.

- Excavation Support (temporary and permanent use)
- Upgrade of Existing Bulkhead (permanent use)
- Earthen Levee Upgrade (permanent use)
- Shore Protection (permanent use)
- Basement Walls (permanent use)

Press-in Piling for Americas Future

The U.S. is the most populous country in Americas and its population base is still growing. Further urbanization and redevelopment of downtown cores are taking place at major metropolitan areas like New York, Los Angeles, Chicago, Boston, Houston, and San Francisco. The need for countermeasures against flooding and obsolete infrastructures is imminent for many cities and towns in the country. Besides that, other developed and developing countries in this region, such as Canada, Mexico, Brazil, and Chile have similar challenges and appear to have the will and means to solve them. GAC sees increasing opportunities and will keep providing solutions in collaboration with IPA for some of these challenges that people in Americas face.

Acknowledgment

I appreciate the assistance provided by my colleagues, Masashi Nagano and Ian Vaz, for this article.

Reports

Publications related to Press-in Technology (2020-2022)

NO.	Authors	Year of Publicatio	Title	Published in	Volume/Page	Language
1	Doubrovsky, M., Dubravina, V.	2020	Physical Modelling of Steel Tubular Piles Installation into Sandy Soil	Bases and Foundations. Issue 41, Kyiv, Kyiv National University of Civil Engineering.	Issue 41 pp. 14-21	Ukrainian
2	Hoang, LT., Matsumoto, T.	2020	Long-term Behavior of Piled Raft Foundation Models Supported by Jacked-in Piles on Saturated Clay	Soils and Foundations	Vol. 60, Issue 1 pp. 198-217	English
3	Ishihara, Y., Haigh, S., Koseki, J.	2020	Assessment of Base Capacity of Open-ended Tubular Piles Installed by the Rotary Cutting Press-in Method	Soils and Foundations	Vol. 60, Issue 5 pp. 1189-1201	English
4	Ishihara, Y., Ogawa, N., Mori, Y. et al.	2020	Simplified Static Vertical Loading Test on Sheet Piles Using Press-in Piling Machine	Japanese Geotechnical Society Special Publication, 8th Japan-China Geotechnical Symposium	pp. 245-250	English
5	Ishihara, Y., Yasuoka, H., Shintaku, S.	2020	Application of Press-in Method to Coastal Levees in Kochi Coast as Countermeasures Against Liquefaction	Geotechnical Engineering Journal of the SEAGS & AGSSEA	Vol. 51, No. 1 pp. 79-88	English
6	Kasama, K., Yamamoto, S., Ohno, M. et al.	2020	Seismic Damage Analysis on the River Levees Reinforced with Steel Sheet Pile by the 2016 Kumamoto Earthquake	Japanese Geotechnical Journal	Vol. 15, Issue 2 pp. 395-404	Japanese
7	Kato, T., Kato, R., Nishimura, M. et al.	2020	Design Method of Cantilever Steel Pipe Sheet-Pile River Revetment Reinforced with Partial Solidification Soil Improvement	Journal of Japan Society of Civil Engineers, Ser. B3 (Ocean Engineering)	Vol. 76, Issue 2 pp. I_420-I_425	Japanese
8	Momiyama, T., Taenaka, S., Hara, T. et al.	2020	Study on Reinforcement Method of Small Earth Dams Using Steel Sheet Piles — Verification of Reinforcement Effect Against the Liquefaction through the Shaking Test —	Transactions of The Japanese Society of Irrigation, Drainage and Rural Engineering	Vol. 88, Issue 1 pp. I_47-I_58	Japanese
9	Saleem, MA., Malik, AA., Kuwano, J.	2020	Eng Shape and Rotation Effect on Steel Pipe Pile Installation Effort and Bearing Resistance	Geomechanics and Engineering	Vol. 23, Issue 6 pp. 523-533	English
10	Takuma, T., Kajino, K., Nagano, M.	2020	Prevention of Landslides with Rows of Pressed-in Pipe Piles on Steep Slope	Proceedings of 2020 Deep Foundations Institute Annual Conference	pp. 374-383	English
11	Takuma, T., Kajino, K., Nagano, M.	2020	Landslide Mitigation for Bridge Piers on an Unstable Slope with Rows of Pressed-in Pipe Piles	Proceedings of 2020 Annual International Bridge Conference	pp. 7-14	English
12	Takuma, T., Kajino, K., Nozaki, T. et al.	2020	Construction of Large and Deep Bridge Pier Foundations with Pressed-in Pipe Pile Cells	Proceedings of 2020 ASCE Annual GeoCongress	pp. 163 - 174	English
13	Takuma, T., Nagano, M., Vaz, I.	2020	Repair of a Flood-damaged Subway Tunnel with Pressed-in Sheet Piles in New York City's Congested Streets	Proceedings of 2020 ASCE Metropolitan Section Annual Geotechnical Seminar	10p	English
14	Yamazaki, H., Kikuchi, Y., Noda, S. et al.	2020	Unit Inner Friction Resistance and Unit Resistance of Actual part of Open-Ended Piles Based on the Double-Pile Model Pile Experiment	Journal of Japan Society of Civil Engineers, Ser. B3 (Ocean Engineering)	Vol. 76, Issue 2 pp. I_450-I_455	Japanese
15	Yang, ZX., Gao, YY., Jardine R. J. et al.	2020	Large Deformation Finite-Element Simulation of Displacement-Pile Installation Experiments in Sand	Journal of Geotechnical and Geoenvironmental Engineering	Vol. 146, Issue 6	English
16	Zhang, Y., Yang, X., Wu, W. et al.	2020	Torsional Complex Impedance of Pipe Pile Considering Pile Installation and Soil Plug Effect	Soil Dynamics and Earthquake Engineering	Vol. 131	English

NO.	Authors	Year of Publication	Title	Published in	Volume/Page	Language
17	Doubrovsky, M., Dubravina, V.	2021	Model Testing of the "Pile-Soil" Interaction Under Axial Force	Herald of Odessa Academy of Civil Engineering, Odessa.	Vol. 83 pp. 102-111	English
18	Doubrovsky, M., Kusik, L., Dubravina, V.	2021	Bearing Capacity of Tubular Piles: Technological Improvements and Model Testing	Advances in Geoengineering along the Belt and Road. BRWSG 2021. Lecture Notes in Civil Engineering, Springer, Singapore.	Vol. 230 pp. 137-154	English
19	Fujiwara, K., Ogawa, N., Nakai, K.	2021	3-D Numerical Analysis of Partial Floating Sheet-Pile Method as Countermeasure Liquefaction	Journal of JSCE	Vol. 9, Issue 1 pp. 138-147	English
20	Ishihara, Y., Okada, K.	2021	Automatic Operation of Press-in piling Machine and Estimation of Subsurface Information by Using Press-in Piling Data	Symposium on Construction Machinery and Methods	pp. 15-20	Japanese
21	Kikuchi, Y.	2021	Development of Tenacious Breakwaters and Coastal Levees	Journal of Japan Society of Civil Engineers	Vol. 69, No. 3 No.758 pp. 11-15	Japanese
22	Kuroyanagi, N., Ito, A., Yamazaki, M.	2021	Vertical Bearing Capacity of Sandy Ground Reinforced with Expansion Steel Pipe Pile	Journal of Structural and Construction Engineering (Transactions of AIJ)	Vol. 86, Issue 779 pp. 89-96	Japanese
23	Maeda, T., Shimada, Y., Takahashi, S. et al.	2021	Development of Design Method for Inclined Braceless Excavation Support Applicable to Deep Excavation	Journal of Japan Society of Civil Engineers, Ser. C (Geosphere Engineering)	Vol. 77, Issue 1 pp. 1-17	Japanese
24	Nakai, K., Fujiwara, K., Ogawa, N.	2021	Seismic Performance Evaluation of PFS Method by Soil-Water Coupled Finite Deformation Analysis	International Journal of GEOAMTE	Vol. 22, No. 89 pp. 94-99	English
25	Sharif, Y. M., Brown, M. J., Cerfontaine, B. et al.	2021	Effects of Screw Pile Installation on Installation Requirements and In-Service Performance Using the Discrete Element Method	Canadian Geotechnical Journal	Vol. 58, No. 9	English
26	Takuma, T., Kajino, K., Nozaki, T. et al.	2021	Building a Tall Self-standing Retaining Wall into a Steep Slope with Pressed-in Pipe Piles	Proceedings of 2021 International Foundations Congress and Equipment Expo	pp. 75-84	English
27	Takuma, T., Nagano, M.	2021	Diverting Volcanic Debris Flow with Pressed-in Sheet Piles Installed in Lava Rock	Proceedings of 2021 GeoExtreme Conference	pp. 504-512	English
28	Takuma, T., Nagano, M.	2021	Enhancing Coastal Levee's Resiliency against Strong Earthquakes and Tsunamis with Pressed-in Piles	Proceedings of 2021 GeoExtreme Conference	pp. 21-33	English
29	Takuma, T., Nozaki, T., Nagano, M.	2021	Constructing Tsunami Walls with Pressed-in Sheet and Pipe Pile Combi-walls	Proceedings of 2021 Deep Foundations Institute Annual Conference	pp. 446-457	English
30	Truong, Q.B., Vu, A.T., Pham H.K. et al.	2021	Numerical Modelling on Settlement Influence of Highway Embankment on Adjacent Ground	Modelling and Methods of Structural Analysis, Moscow 2021	Paper 98 (Section 3); under publication of the proceedings	English
31	Yang, Y., Tanimoto, S., Kiriyama, T.	2021	Centrifuge Modelling for Seismic Retrofit Evaluation of Bridge Abutment Pile Foundation in Liquefied Ground	Journal of Japan Society of Civil Engineers, Ser. A1 (Structural Engineering & Earthquake Engineering (SE/EE))	Vol. 77, Issue 4 pp. I_184-I_195	Japanese

NO.	Authors	Year of Publication	Title	Published in	Volume/Page	Language
32	Doubrovsky, M., Dubravina, V., Shokarev, V. et al.	2022	Ensuring the Piles Bearing Capacity Under Pressing Loads	Proceedings of the 20th International Conference on Soil Mechanics and Geotechnical Engineering– Rahman and Jaksa (Eds)	pp. 3247-3252	English
33	Fellenius, B., Tan, SA.	2022	Increase of CPT Cone Resistance in Sand Due to Installation of Press-In Piles	DFI Journal	Vol. 6, Issue 1	English
34	Haigh, A.	2022	Performance of Implant Structures	University of Cambridge Department of Engineering	52p	English
35	Ho, HM., Malik, AA., Kuwano, J. et al.	2022	Experimental and Numerical Study on Pressure Distribution under Screw and Straight Pile in Dense Sand	International Journal of Geomechanics	Vol. 22, Issue 9	English
36	Hoang, LT., Dao, KX., Xiong X. et al.	2022	Performance Analysis of a Jacked-in Single Pile and Pile Group in Saturated Clay Ground	Soils and Foundations	Vol. 62, Issue 1	English
37	Kido, R., Suezawa, R., Sawamura, Y. et al.	2022	Experimental Investigation of Bearing Mechanism of Closed- and Open-Ended Piles Supported by Thin Bearing Layer Using X-ray Micro CT	Soils and Foundations	Vol. 62, Issue 4	English
38	Kyle, B. O'Hara., Alejandro, Martinez.	2022	Load Transfer Directionality of Snakeskin-Inspired Piles during Installation and Pullout in Sands	Journal of Geotechnical and Geoenvironmental Engineering	Vol. 148, No. 12	English
39	Lehane, BM., Liu, Z., Bittar, E. J. et al.	2022	CPT-Based Axial Capacity Design Method for Driven Piles in Clay	Journal of Geotechnical and Geoenvironmental Engineering	Vol. 148, No. 9	English
40	Li, W., Deng, L., Chalaturnyk, R.	2022	Centrifuge Modeling of the Behaviour of Helical Piles in Cohesive Soils from Installation and Axial Loading	Soils and Foundations	Vol. 62, Issue 3	English
41	Miyanohara, T., Suzuki, N.	2022	Technical Evaluation for the Design and Construction Method for Rotary Press-in Piling Method (Gyropress Method)	The Foundation Engineering & Equipment, Monthly 50 (12)	pp. 45-47	Japanese
42	Suzuki, N.	2022	Geotechnical Mapping using Press-in Piling Data to Estimate Bearing Layer	11th International Symposium on Field Monitoring in Geomechanics (ISFMG2022)	7p	English
43	Suzuki, N.	2022	Three-parameter Lognormal Distribution to Estimate Ultimate Bearing Capacity of Pile Foundations with Extrapolation of Load-settlement Curves	Proceedings of the 8th International Symposium on Geotechnical Safety and Risk (ISGSR), December 2022, Newcastle, Australia	6p	English
44	Taenaka, S., Mochida, Y.	2022	Reinforcement Method of River Dykes by Steel Sheet-piles Against Earthquakes and Floods	Journal of Japan Society of Civil Engineers	Vol. 70, No. 3 Ser.No.770 pp. 14-17	Japanese
45	Tamboura, H. H., Isobe, K., Ohtsuka, S.	2022	End Bearing Capacity of A Single Incompletely End-Supported Pile Based on the Rigid Plastic Finite Element Method with Non-Linear Strength Property Against Confining Stress	Soils and Foundations	Vol. 62, Issue 4	English
46	Vu, A.T., Matsumoto, T., Xiong, X. et al.	2022	Behaviours of Batter-pile Foundations Subjected to Combination of Vertical Load and Cyclic Horizontal Loading	International Journal of Geotechnical Engineering	Vol. 16, Issue 5 pp. 592-605	English
47	Wang, K., Cui, C., Ren, J. et al.	2022	Model Testing Study on Engineering Performances of Circular Helicoid Piles During the Whole Process of Installation and Bearing in Sandy Soil	Soils and Foundations	Vol. 62, Issue 3	English

Note: The above publications were peer-reviewed papers but excluded the proceedings of the Second International Conference on press-in Engineering 2021.
You can also refer to the following URL to access the papers.
URL: https://www.press-in.org/_upload/files/Newsletters/Reports/Report_Vol.8.1_Publications_2020-2022.pdf

Event Report

13th IPA Press-in Seminar 2022 in Chiba

IPA Secretariat

The 13th Press-in Engineering Seminar was held on February 13, 2023, in Chiba City, Chiba Prefecture. The seminar was attended by about 100 people, including policymakers, researchers, engineers, practitioners, and general audience members. The seminar was held both online and onsite, and featured lecturers from industry, government, and academia who presented on the theme of disaster countermeasures, specifically flood control and river improvement.

The seminar began with an opening address by Prof. Matsumoto, IPA Vice President, followed by four presentations covering the following topics.

- Prof. Takaaki Kato, from the University of Tokyo, delivered the keynote lecture titled "How can community development prepare for the era of climate change". He introduced initiatives and urban planning in regions at high risk of disasters in the era of climate change, highlighting the diversity of response in each region.

- Mr. Kazuya Higashiyama from Chiba Prefecture, presented on the flood control project in the Ichinomiya River basin management. He explained that they are preparing for frequent flooding due to climate change, not only in the rivers but also in the surrounding areas.

- Mr. Syuichi Yamamoto from Shimizu Corporation presented on the river improvements in the Ichinomiya River basin projects. He provided an overview of the construction cycle, safety management and the Information and Communication Technology tools used in this project.

- Ms. Yuki Soga introduced the latest topics about Press-in Piling technology such as the Implant NAVI System which is a precision management system of press-in piling, and PPTS (Pling Penetration Test System).

After the seminar, a questionnaire survey was conducted to gather feedback from the participants. According to the results of the questionnaire, 89% of the respondents were satisfied with the seminar's contents, 96% said they were interested in Press-in Technology, and 74% said they would attend the seminar again. In addition, since about 60% of the participants attended the seminar online, it would be effective in the future to hold the seminar in a hybrid format that would allow people from distant locations to participate easily. Prof. Kikuchi commented that the seminar was very successful for the first hybrid seminar, and the Research Committee will make use of the results of the questionnaire survey for the next seminar.

Young Members

Erosion and subsequent failure of river dykes

Muhammad Umer Afzal

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I am Muhammad Umer Afzal from Pakistan. It is my great privilege to share my academic journey, work experience, and ongoing research activities for IPA Newsletter. I enroll in the Master of Engineering program at the Department of Civil and Environmental Engineering, Saitama University, Japan. I hold an Undergraduate degree in Civil Engineering from the University of Engineering & Technology (UET) Lahore in 2014, one of the top engineering institutes in Pakistan. My first professional stint was in October 2014 with National Engineering Services Pakistan (Pvt.) Ltd. (NESPAK), the premier engineering consultancy firm in Pakistan. It served as a stepping stone for my career, and professionally, I have benefitted immensely from my work at NESPAK. Before starting my graduate degree at Saitama University, Japan, I was employed as a Senior Geotechnical Engineer in the Geotechnical and Geo-environmental engineering Division of NESPAK. Here I worked in a broad spectrum of geotechnical design applications ranging from geotechnical investigations, design of foundations, seepage and slope stability analysis, and geotechnical design of dams and hydropower projects.

Earlier in my career, I developed a keen interest in geotechnical engineering and wanted to pursue higher education in this field to broaden my knowledge base in my chosen field. Japan, being home to a diverse, multicultural academic community involved in innovative research activities, was ideal for realizing my goals. Japanese Higher Education Institutes are among the world's leading research centers with state-of-the-art laboratories.

Considering my academic achievements and passion for higher education, I was awarded an ADB-JSP scholarship to pursue my graduate degree at Saitama University, Japan, where I work with the Geotechnical and Geosphere Research Group (GGRG) under the supervision of Prof. Jiro Kuwano. As part of my graduate education, I am working on my research titled "Experimental Study on Erosion Control of River Dyke Slope with Geosynthetics Surface Cover by Overtopping Flow". Dykes are earthen embankments along river flood plains that essentially confine the river to a guided channel, protecting agricultural lands and built-up areas from flooding. Typically, earthen dykes are very long structures along the river channel and can sometimes go kilometers in length. Every year, an increasing number of earthen dykes fail or are seriously damaged due to heavy rainfall events. Recent climate change and global warming phenomena are exacerbating the problem with erratic rainfall patterns and cloud bursts. Usually, earthen dykes are not designed to resist overtopping river flows, and consequently, they are sensitive and vulnerable to overflow conditions causing monetary and human losses all around the world. As part of my research, a series of model tests were conducted to investigate the effects of different particle sizes and different slope inclinations on the erosion process due to overtopping. Additionally, the application of geosynthetic surface cover to river dyke slopes was evaluated to avoid the failure of dykes

Although not a part of my ongoing research, I am well aware of several previous studies that advocate press-in technologies for stabilizing river dykes. It is especially true for the construction of dykes on soft ground susceptible to settlement and lateral displacement, as press-in piles have been found to be very effective in such ground conditions. The efficiency and effectiveness of press-in piles depend upon the spacing and penetration depth of the piles. Furthermore, dyke reinforcement with sheet piles is an effective measure to protect river dykes. In addition to being reliable, adaptable, efficient, and economical, this technique is considered to have minimal environmental impacts.

With complete certainty, I can say IPA is a highly professional platform to learn about the latest developments of press-in technologies in the construction industry worldwide. I look forward to sharing my research work in the coming future.

The Posterity of press-in piling method in Singapore

Jian Wei Liaw

Bachelor Student, College of Engineering, Science and Environment – Civil Engineering
Newcastle Australia Institute of Higher Education (Singapore)

I am Jian Wei from Singapore; I am a bachelor's student of Civil Engineering at Newcastle Australia Institute of Higher Education (a wholly-owned entity of The University of Newcastle, Australia – Patenered with BCA Academy), Singapore. I have completed the course requirements and will soon complete (expected date: April 2023) the Industrial attachment with Woh Hup Private Limited as a site engineer (intern). During my course of studies, I developed a great interest in geotechnical engineering and, eventually, chose geotechnical as my topic for my final year project under the supervision of Dr. Kar Winn. I was given the topic, "Tunneling in Close Proximity of Major Infrastructures in Singapore", focusing on past LTA Thomson-East Line (TEL) projects, contracts T225 and T216. These two projects focus on deep excavation up to 55m, where the geological profile predominantly comprises Fluvial Clay and Marine Clay.

Recently, I had the opportunity to attend the IPA 15th Anniversary Seminar in Singapore. It was truly an eye-opening experience to see numerous usages of GIKEN Silent Pilers worldwide. IPA conducted a live site demonstration in which three sheet piles were installed (Press-in method) in a short span of 15 minutes in close proximity (zero clearance) to the neighboring terrace house by Guan Chuan Engineering Pte Ltd, site located at Begonia Road. The press-in method is truly revolutionary and is a solution that fits the current global issues of environmental sustainability, climate, and geopolitical changes. The press-in method was used for several Deep Tunnel Sewage Service (DTSS) projects in Singapore. I hope to see more applications in future projects locally and globally because it's revolutionary and a solution that fits the current global issues of environmental sustainability, climate, and geopolitical changes.

Understanding the failure modes of screw pile

Dwe Nge Oo

Bachelor Student, College of Engineering, Science and Environment – Civil Engineering
Newcastle Australia Institute of Higher Education (Singapore)

I am Dwe Nge Oo from Myanmar. In 2020, I completed my Diploma in Civil Engineering from the Building and Construction Authority (BCA) of Singapore. I am a final-year Bachelor of Civil Engineering student at the Newcastle Australia Institute of Higher Education, Singapore (a wholly-owned entity of The University of Newcastle, Australia – Partnered with BCA Academy).

Throughout my academic career, I was driven by a strong desire to further my education in Civil Engineering. During my final year project, I had the opportunity to do research on the screw pile (installed with the rotary press-in method) failure modes. And thanks to the assistance of my supervisor, Dr. Adnan Anwar Malik, I was able to learn and analyze the significance of the screw pile inter-helix spacing ratio. The study titled " A review on the influence of inter-helix spacing on screw pile failure modes" was primarily concerned with optimizing the inter-helix spacing ratio based on published literature and its effect on screw pile axial bearing capacity. It is critical to appropriately identify the inter-helix spacing ratio that separates the failure modes, i.e., Cylindrical Shear Mode and Individual Bearing Mode. Otherwise, the design will be either overestimated or underestimated, which will have an impact on the project's safety and cost, with considerable changes required during the construction phase. IPA is a fantastic platform for students because it provides detailed insight into the latest technologies being used worldwide in deep foundations.

Announcement

ICPE 2024: Call for Abstracts

The International Press-in Association (IPA) will hold its Third International Conference on Press-in Engineering (ICPE 2024) in Singapore in collaboration with the Centre for Soft Ground Engineering, the National University of Singapore (NUS), the Geotechnical Society of Singapore (GeoSS), and the Tunnelling and Underground Construction Society (Singapore) (TUCSS) on 3rd – 5th July 2024. The conference will focus on the latest press-in piling technologies featuring the theme "Superiority of Press-in Piling towards Sustainable Construction in tackling Climate Change for Infrastructure Development".

The IPA will seek submissions of abstracts, technical papers and presentations from industry professionals, in relation to the press-in piling method. To begin with, we would like to offer you the opportunity to submit abstracts for the conference. Clearly, demand for sustainable construction is steadily increasing regardless of country and region. We would hope that your submissions help us to enhance the compatibility and advantages of the press-in piling method, so as to increase its applicability to meet the demand.

Please refer to the following links to see details of abstract submission procedures.

Conference bulletin: https://2024.icpe-ipa.org/about
Abstract submission: https://2024.icpe-ipa.org/abstracts

◆ **Important Dates**

Deadline of Abstract Submission	30-Jul-2023
Notice of acceptance of abstract	August/September 2023
Submission of full paper	30-Nov-2023
Submission of revised final paper	30-Apr-2024

New Members

Members who joined IPA from October 2022 to February 2023.

- New Individual Members

Mitsuhiko Mukaitani Muthusamy Karthikeyan Aung Thu Win Aung Thu

- New Student Members

Chengjiong Qin Sergio Andrew Manigniavy Jian Wei Liaw
Nur Abdikarim Abdulaleem Omar Abdulaleem Dawood

- The number of Members (as of 28 February 2023)

Individual Members: 715 Student Members: 52 Corporate Members: 54

Event Dairy

Title	Date	Venue
■ **IPA Events** https://www.press-in.org/en/event		
The Third International Conference on Press-in Engineering (ICPE 2024)	3-5 July 2024	Singapore
IPA Seminar on Press-in Technology in Taiwan	14 June 2023	Taipei
■ **International Society for Soil Mechanics and Geotechnical Engineering** http://www.issmge.org/events		
GEO-CONGRESS 2023	26-29 March 2023	Los Angeles, United States
8th International Conference on Unsaturated Soils	2 May 2023	Milos Island, Greece
9TH INTERNATIONAL CONGRESS ON ENVIRONMENTAL GEOTECHNICS	25-28 June 2023	Chania, Greece
17TH ASIAN REGIONAL GEOTECHNICAL ENGINEERING CONFERENCE	14-18 August 2023	Astana, Kazakhstan
■ **Deep Foundations Institute** https://www.dfi.org/events/		
Structures Congress 2023	3-6 May 2023	New Orleans, United States
SuperPile 2023	7-9 June 2023	Atlanta, Georgia
■ **Others**		
58th Japan National conference on Geotechnical Engineering	11-14 July 2023	Fukuoka, Japan
Japan Society of Civil Engineers 2023 Annual Meeting	11-15 September 2023	Hiroshima, Japan

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Editorial Remarks from persons in charge

A series of devastating earthquakes hit southern Turkey and north-west Syria on the 6th of February, 2023. More than 40 000 people have died, and many thousands are injured in Turkey and Syria, with numbers expected to rise. More than 20 million people live in the affected area, many of them in urgent need of shelter, food, and medical aid.

From: https://xtech.nikkei.com/atcl/nxt/column/18/01162/00215/

The first deadly earthquake struck while people were inside their homes, asleep in their beds, with no warning signs. Thousands of buildings, including hospitals and schools, have collapsed, and infrastructure has been badly damaged. Local responders were desperately searching through the rubble for survivors.

We are all shocked by the scale of the losses and destruction. The tragedy once again demonstrated the vital need to prioritize high-quality and reliable design and construction technology. First of all, this applies to seismically dangerous areas, where destructive earthquakes have already occurred and may occur again.

Experience based on the Press-in Method application in Japan has shown the effectiveness of using this advanced technology in earthquake-prone areas, and it is hoped that this experience will be seen and used in countries with a high risk of increased seismic activity. Among other things, the relevant publications in IPA Newsletter also serve this purpose.

Michael Doubrovsky

Pastsakorn Kitiyodom

Adnan Anwar Malik