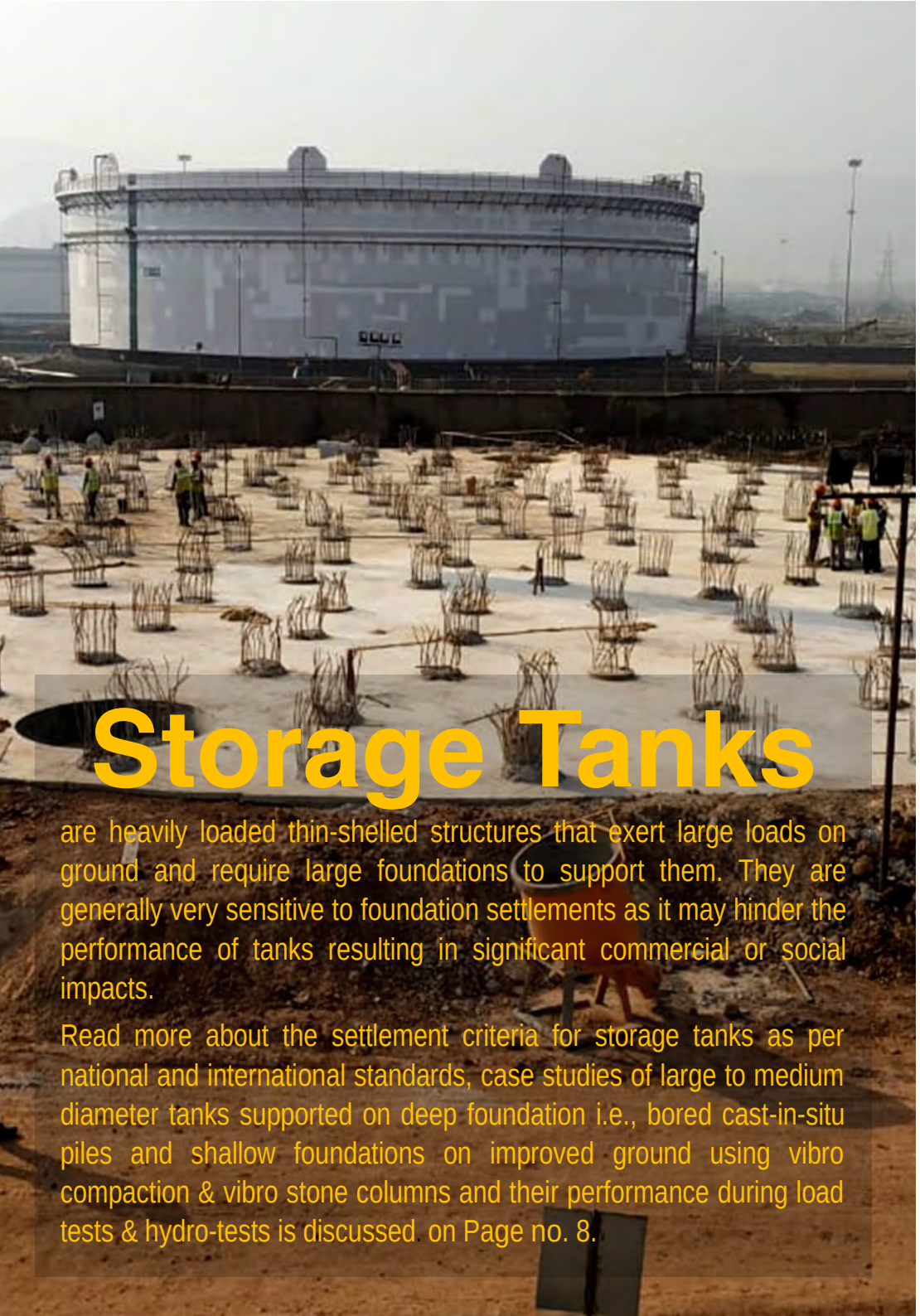

Storage Tanks

are heavily loaded thin-shelled structures that exert large loads on ground and require large foundations to support them. They are generally very sensitive to foundation settlements as it may hinder the performance of tanks resulting in significant commercial or social impacts.

Read more about the settlement criteria for storage tanks as per national and international standards, case studies of large to medium diameter tanks supported on deep foundation i.e., bored cast-in-situ piles and shallow foundations on improved ground using vibro compaction & vibro stone columns and their performance during load tests & hydro-tests is discussed. on Page no. 8.

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Quarterly Newsletter from Deep Foundations Institute of India

www.dfi-india.org

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Government of India (Regn. No:U91900TN2013NPL091176)
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Collaboration – Need of the Hour

Director of Operations Message

As a part of the recent DFI 45th Annual Conference, DFI US provided access to various technical committee meetings to all delegates the world over to have a feel of how DFI committees' function. It is a practice for DFI leadership to conduct all committee meetings during their annual conference, as this provides an opportunity to delegates to attend the meeting and overview the committee activities. I Attended the **DFI helical piles and tiebacks committee** during Oct'20 and found it very interesting. 50 plus participants attended this program that included 28 members of the committee. They discussed plans to organize a second tradeshow jointly with helicalpileworld.com for showcasing helical piles, tiebacks, and anchor products of different vendors, and for conducting an education seminar. They also discussed proposed revisions of one of the helical foundation systems & devices code, collaboration with other professional bodies, involving more contractors in committee activities, participation in programs catering to the student community, and other points. This committee is in vouge since 2014 and has been striving to advance helical piles and tieback construction practices through multiple activities. There are currently 28 technical committees of DFI pursing various developmental programs in specialized areas.

DFI India organized one webinar on **EFFC-DFI Guides to Tremie Concrete, Support Fluids, and Working Platforms for Deep Foundations** on 17th Sept'20 as a part of this year's annual conference. European Federation of Foundation Contractors (EFFC) and DFI formed a joint concrete task force, and by taking the help of 32 companies, the University of Munich and Missouri University of Science and Technology developed these guide. The guides covers design considerations including concrete rheology and mix design, reinforcement detailing and concrete cover, good practice rules for concrete placement, and review of methods to test the as-built elements and advice on the identification and interpretation of the results. The 3 years' work involving funding of 150,000 euro sponsored by various companies included various desk studies, laboratory testing, and on-site testing at worksites in Europe and the US. This document is available free of cost on the DFI website and aids in addressing all issues related to tremie concreting.

Mr. G Venkata Prasad

The common approach in above-mentioned points are the collaboration of multiple stakeholders. It is the need of the hour in addressing construction industry problems. In the Indian context, this is of paramount importance, as there is a phenomenal scope for improvement in multiple areas for successful implementation of many infrastructure projects that are under execution and in the pipeline.

During the last 3 years, DFII started a good number of initiatives in a similar manner with the help of its executive committee comprising of 18 members from leading organizations of different verticals in

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The executive committee members of DFI of India represent all the stakeholders in the foundation research, design and construction . The members will express their views about the role of DFI and other similar organizations in the development and transfer of modern technology for infrastructure development of India.

geotechnical and construction industry, 5 different committees covering new technologies, skill development programs, and student initiatives lead by 50 plus Indian and global experts. The advantage with DFI India is its ability to bring best practices from global level at the doorstep of India because of its international reach. This will aid in advancing good work practices/ technologies related to geotechnical and foundation construction which India is in dire need of.

Recently, I spoke to a geotechnical head from one of the major organizations, and he expressed his happiness and satisfaction of listening to his favourite keynotes on important topics of current relevance during the recently concluded DFII 2020 conference. He voiced that he has been longing to have an organization like DFI India to address the issues/advancements of geotechnical & foundation construction. He also offered his willingness to work with DFII more actively by being part of any committee. We happened to make an on-line presentation to his organisation in July'20 about DFII programs, and such presentations in the recent past to major contractors, consultants, owner, geotechnical consultants, and foundation equipment manufacturers are helping us to generate more interest in DFII and in expanding our family.

DFI India has many programs in the pipeline, developed to benefit all the sectors of geotechnical industry, and this, in the long run, will prove to be one of the best models the Indian construction industry can feel proud of.

Change in the DFI India Leadership

DFI India grew as a most respected and admirable professional institute under the leadership of Dr K S Ramakrishna by means of his 7 years of self-less and stupendous services since its inception.

With effect from Januray'21, the baton was handed over to **Mr. I. V. Anirudhan** to lead DFI India in **Chairman** position, who equally contributed yeoman services as on today. Further, **Mr. Mohan Ramanthan**, one of the active executive committee members and veteran with more than 40-year experience was vested with **Vice Chairman** responsibilities by inducting him to DFII Board of Directors. Under the continuing basis advice from Dr K S Ramakrishna and the new leadership, DFII will sure achieve more accomplishments in the future.

DFI India welcomes **Prof. N. K. Samadhya**, President IGS in to its **Executive Committee** group with effect from Feb'21. The executive committee of DFI of India has 18 members drawing representatives from various stakeholders in the foundation construction industry. premier academic institutions, government organisations, and professional bodies. IGS is the oldest professional body of geotechnical professionals and academia; the president IGS is taken as the member representing professional bodies. We are very thankful to Prof G L Sivakumar Babu, the past president of IGS and past EC member of DFI India for extending excellent support for the success of DFII.

It is worth mentioning that but for continually active support of DFI leadership, we would not have come this far. We are very hopeful to get guidance/support in future too from **DFI President Michael H. Wysockey**, Board of Trustees, Executive Director Mrs Theresa Engler, Mrs Mary Ellen, Technical Director.

- G Venkata Prasad, Director of Operations, DFI India

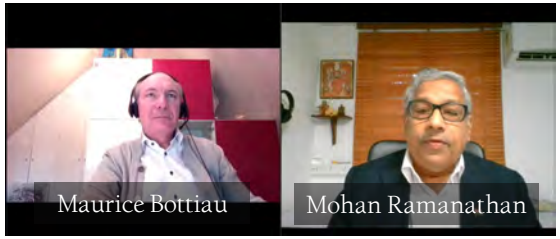
Many publications of DFI are available from OneMine.org , a web-based document library containing over 1,40,000 articles, technical papers and books from organizations all over the world. DFI Members can access OneMine at no additional cost, while non-members can purchase and download documents for $25 per download.

Recap - DFI India 2020 Virtual Conference

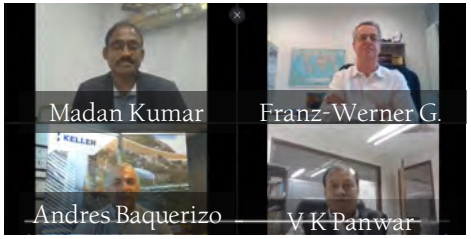
The year 2020 was all about virtual and virtual reality. DFI India took an early decision to go virtual for its conference and seminar programs. The ambitious grand 10th Anniversary Conference was reformatted with three components: three pre-conference webinars, a two-day virtual conference during November 2020 and a fitting physical event DFI India 2021 in November 2021 Chennai. The first two parts were successful, but uncertainty envelopes the physical event in 2021 because the pandemic is far from over, and we will continue to plan while monitoring the situation.

The three pre-conference webinars were conducted sucessfully in Aug, Sept & Oct'2020. The two-day virtual conference on 19-20 November 2020 was very well organised strictly following the schedule not to compromise the times allotted for QA sessions conducted via text for speaker interaction with the audience. The conference showcased four keynote presentations, two special presentations, and four presentations picked up from the conference's contributed papers. Out of more than 80 accepted abstracts for the 10th-anniversary conference, most of the authors agreed to carry forward these submissions for publication for the live conference in November 2021. The full-length draft papers are being received, and we plan to have about 60 full-length essays ready for the 2021 Conference.

The **keynote** presentation titled 'Recent Advances in the Understanding of Augercast Piles and Displacement Augercast Piles and Impact on their Design' by **Mr Maurice Bottiau** of Franki Foundations was the first one in the series. This presentation also set



the tone for the **panel discussion on the CFA piles applications in Indian foundation industry** during the second half of the first day sessions. **Mr Madan Kumar** of Keller India moderated the panel discussions after giving a brief introduction to the CFA piling system and the successful trial installations and testing CFA piles by DFI India. The discussions started with a positive note from **Mr V K Panwar** of Engineers India Limited (EIL) appreciating DFI India's efforts towards the implementation of CFA piles in infrastructure and heavy industry projects in India. **Mr. Andres Baquerizo**, P.E., Global Product Leader and the Vice President for Keller Florida (United States) presented three case histories highlighting successful deployment of the technique for private and public projects, and the use of advanced technology to prove pile designs. **Mr. Franz-Werner Gerressen**, Director of Method Development Department, BAUER Maschinen GmbH (Germany) discussed the availability of equipment, safety, modern tooling, materials, and instrumentation that the manufacturers are equipped to support Indian contractors in the implementation of CFA Piles.



The Recent Advancements to Enhance Performance and Reduce Risks in Deep Foundations and Ground Improvement were elaborated by

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Dr Antonio Marinucci, Advanced Foundation Solutions LLC, in his **keynote** presentation on the first day of the conference. The takeaway was the ideas on Smart Cell (post grouting device), Expander Body (grouted foundation element), SuperCell (bi-directional static load testing device) and EQ-drains (in situ vertical drains).

The **keynote** presentation 'Overview of the Use of Geotechnical Baseline Reports' by **Dr. Conrad Felice**, Owner and Managing Principal at C. W. Felice, LLC, was on a topic unfamiliar to the Indian audience. A well-prepared geotechnical baseline report is an evolving approach to provide a contractual basis for allocating risk by defining site conditions that should be anticipated and included within the contractual obligations and cost for executing a project.

Prof. Harry G Poulos, the Senior Consultant at Coffey Services Australia and Emeritus Professor of Civil Engineering, Sydney University made a wonderful **keynote** presentation, namely 'Applications of piling to infrastructure development'. He discussed several infrastructure applications of piles and piling, including piles for pavement support, piles for embankment support, and piles for slope stabilisation. The design methods and design charts were presented.

The **special presentations** by **Ms. Mary Ellen Large**, Director of Technical Activities, DFI USA, titled 'Non-Profit Profits', and **Mr. G Venkata Prasad,** Director of Operations, DFII, on DFI of India current initiatives added flavor to the virtual conference.

The selected authors made four presentations of their contributory **papers** during the sessions. **Mr. Franz-Werner Gerressen**, BAUER Maschinen GmbH, Germany, presented Future Challenge and Opportunity for Diaphragm Walling for Confined Space and Inner-City Projects. A Case Study for removing redundant steel joist piles under base slab of an operational metro station by NATM pilot tunnel for clearing the alignment for East West Metro line tunnels in Kolkata, India, was presented **Mr. Biswanath Dewanjee** of Kolkata Metro Rail. Presentations by **Mr. Sachin Kamat** of ITD Cementation titled 'Precast Driven Spun Concrete Pile- Overview with Case Studies' and by **Mr. PVSR Prasad** of Keller India titled 'Performance of Storage Tanks Supported by Shallow & Deep Foundations' enhanced the technical content of this successful virtual conference.

There were more than 350 registrants for the conference, and more than 200 delegates attended the sessions. DFI of India is keen to equip the future generation to deal with complicated foundation construction projects and launched its **Student's Outreach Program 'GroundWork'** during the virtual conference. One student's completion on problem-solving was held before the conference in which 57 students participated. Ten students who won the competition are offered free registration and financial assistance to attend the forthcoming 10th-anniversary conference.

The virtual conference was inaugurated by **Mr. Mohan Ramanathan**,

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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.

the **conference chair** and executive committee member of DFI of India. **Prof. A Boominathan**, the **technical chair** for the conference, released the conference souvenir.

The conference was sponsored by M/s Meever India, Teamwork Engineering Solutions Pvt Ltd, ITD Cementation, Keller Ground Engineering India Pvt Ltd, IRB Infrastructure Developers Ltd, The Liebherr Group, Sarathy Geotech & Engineering Service Pvt Ltd., MHWirth, ForceTec, Sri Vangatachalam Engineering Works Private Limited and Advanced Construction Technologies under different categories.

The conference was made successful by the untiring effort of Mr. Mohmad Athif, Mr. Pranav Jha, and Mr. T S Mahendran of DFI of India under the guidance of Mr. G Venkata Prasad, the Director Operations of DFI India. The GoToWebinar platform was made available by DFI USA. The great support from Ms. Theresa Engler, Ms. Mary Ellen and all the DFI staff is gratefully acknowledged.

Even though the conference was held virtually, the support from the hosting organisations IIT Madras and IGS Chennai Chapter was available in chairing the technical sessions. The sessions were ably chaired by **Mr. Mohan Ramanathan**, ACT Chennai; **Dr. N Kumar Pitchumani**, AECOM India; **Prof. Amit Prashant**, IIT Gandhinagar, **Prof Muttharam** and **Prof. A Boominathan**, IIT Madras.

- Anirudhan I V, Chair, DFI India

The video recordings of the two-day virtual conference are available, and the interested persons can contact activities@dfi-india.org.

Delegates Speak:

The virtual DFI India conference provided an excellent opportunity to hear from the renowned experts about the current technologies and practices in geotechnical engineering. The conference arrangements were very well managed and moderated by the hosts. The highlight was the keynote session by Prof. H. G. Poulos with great insights in the use of piling solutions, the other sessions on use of geotechnical baseline reports and risk reduction methods in deep foundations and ground improvement were equally enlightening. The preconference webinars on helical pile, tremie concrete and deep mixing methods also provided very useful information for practicing engineers.

-Mr. Manos De, TATA Consulting Engineers Limited

It gave me immense pleasure to participate in DFI 2020 which is one of the kind. In the past, I have had the privilege to be in the organising team of DFI 2017 at IIT Madras. I sincerely believe this as one of the most well-organized virtual conferences. The speakers were splendid, quality was quintessential, and the organizational energy was superbly overflowing. This has set a very high standard in the respective field. All the speaker/ presentation were beyond excellent. The most admirable parts are two: (1) The affordable registration fees will entice a large audience of diverse nature, and (2) The sharing of the conference recordings as well as technical documents is highly commendable. I wish DFI continues to soar with cutting edge technical deliberations in future to become No.1 technical organisation in India and Worldwide.

-Dr. B.R. Madhusudhan, IIT Madras

Cover Story

Ground Performance of Storage Tanks Supported on Shallow & Deep Foundations

Introduction

Storage tanks are heavily loaded thin-shelled structures that exert large loads on ground and require large foundations to support them. They are generally very sensitive to foundation settlements as it may hinder the performance of tanks resulting in significant commercial or social impacts. Selection of their foundation is dependent on availability of suitable ground and limitations imposed by design specifications. Design of the tank foundations is generally based on theoretical methods and validation by representative performance tests. This article reviews settlement criteria for storage tanks as per national and international standards, case studies of large to medium diameter tanks supported on deep foundation i.e., bored cast-in-situ piles and shallow foundations on improved ground using vibro compaction & vibro stone columns and their performance during load tests & hydro-tests is discussed.

Performance Requirements

To design the tanks for foreseen risks, performance criteria such as loading intensity and settlement limitations are required. Sub-soil settles depending on its origin, the layering, imposed load and its stress history. When the in-situ soil beneath the tank is relatively uniform settlement may occur and tanks may not undergo significant problems. However, it may cause damage or stress at pipe or equipment connections. Contrary to this case, if the sub-soil settles differentially, there will be sagging, circumferential and tilting settlement. Sagging causes buckling of tank bottom plate, tilting settlement increase in hoop stress on tank shell. All such deformations effect the serviceability of tanks.

Loading intensity is fixed based on the fluid carried by the tank, appurtenances and its self-weight. Whereas, many specifications provide limits on tank settlement. Selected list of ranges for allowable ground movement/settlement are shown in Table-1. The limits vary based on the type of tank roof: fixed, floating or mixed.

S. No.	Allow. Differential Settlements		Planar Tilt	Reference
	Radial (center to shell)	Circumferential (along the shell)		
1.	1:300	0.004L (1:250); (max. 300 mm)	-	Bowles (1996)
2.	-	1:300*	0.004L (1:250)	Fang (2013); * US Navy (1982)
3.	-	1:125	-	ASCE (1994)
4.	-	1:180	-	Mobil Engineering Guide
5.	-	-	1:200	API 650

Table 1. *Limits of tank settlements*

Challenges

Storage tanks are not always built on the best sites and the sub-soil may not be able to resist heavy loads. Most commonly, mixed bearing soils and fresh fills are encountered in the project sites. Such stratum below

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tank foundations cause differential settlements, offer maintenance challenges, can lead to catastrophic consequences. Accordingly, tanks are rested on shallow improved ground with grade beam, ring beam or on deep foundations with piles connected with slab. Generally, pile foundations are adopted as the most suitable foundation type to support these tanks in difficult and sensitive grounds. However, this may significantly impact the project's cost and timeline depending on the performance criteria and sub-soil conditions. In such conditions, ground improvement including vibro techniques is a viable solution alternatively to support these storage tanks. The following sections provides various case histories of tanks resting on both improved ground and deep foundations.

Case Histories

Deep Foundations: BCIS Piles

This case history deals with storage tank farm located few kilometres from the seashore in Visakhapatnam. Foundation is to be designed for the tanks where typical diameter and height of tanks are 48 m and 20 m respectively.. The ground consists of very soft clay up to 12 m depth overlain by 4m thick recent fills and followed by highly weathered rock. To resist the heavy load imposed by tanks and the settlement caused by them, the foundation is to be terminated in competent strata such as weathered rock located at > 20 m below existing ground. Therefore, bored cast in-situ piles were selected as suitable foundation solution. Maximum allowable uniform settlement is 150 mm owing to their floating roofs. The design was confirmed by initial and routine pile load tests.

Fig. 1. *Pile cap connecting the installed piles and tank erected on the foundation*

Shallow Foundations: Vibro Stone Columns

Foundation design for a tank farm with both floating and fixed roof storage tank was proposed in a refinery at Paradip with dimensions of 79 m x 13.6 m. The subsoil consists of top loose silty sand of 3 m thick underlain by medium stiff to stiff sandy silt of 5 m thick. The soil below is dense to very dense silty sand up to 30 m below existing ground level. The required bearing capacity of a tank foundation is 130 kPa and allowable settlement of < 150 - 300 mm. Project site is in seismic zone III and due to presence of loose sands in the top 10 m, soil is prone to liquefaction. Based on the comparative analysis of suitability, cost and time for the project, ground improvement using vibro stone columns was assessed to be an optimal solution. The solution is designed to improve the bearing capacity of virgin soil, reduce settlements and increase factor of safety against liquefaction, vibro replacement method is proposed up to a depth of 9 m. Performance of the tank was verified by plate load tests. Schematic of the tank supported by vibro stone columns and results of plate load tests are shown in Fig.2.

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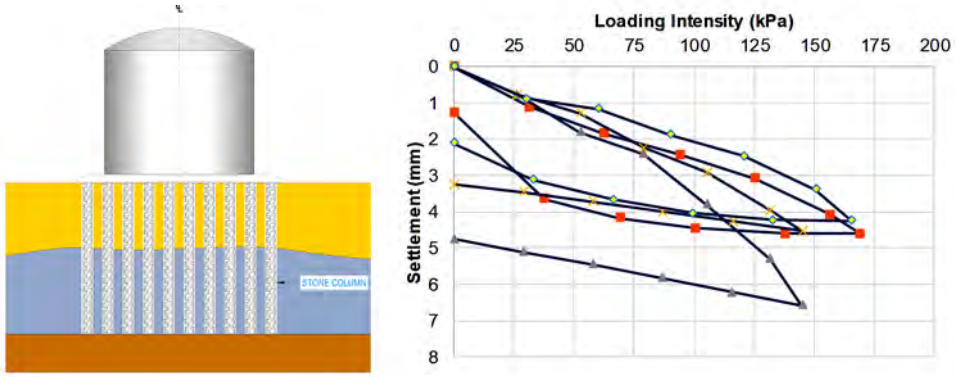

Fig. 2. *Schematic of tank supported on stone columns and results of plate load tests*

Shallow Foundations: Vibro Compaction

An oil storage terminal is proposed in Singapore which is located on a 3,200-hectare in an island made with reclamation. Tanks of diameter 20 m to 36 m and max. height of 22 m were to be supported on the loose to medium dense sand extending up to a max. of 20 m followed by firm to stiff clay. After careful analysis of the soil and foundation choice, ground improvement using vibro compaction works was selected. Vibro compaction helps in densifying the reclaimed sand fill. The maximum measured circumferential settlements during hydrotest ranged between 5 cm and 15 cm. The settlements were within the operating tolerance of the tanks.

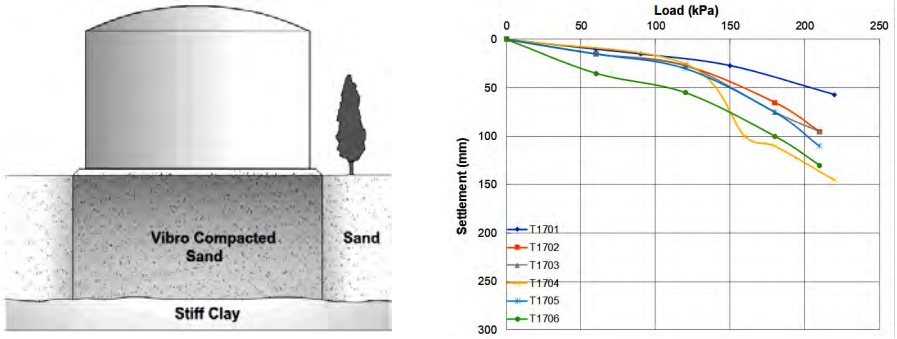

Fig. 3. *Schematic of tank supported on vibro compaction and settlements during hydrotests*

Conclusion

Based on the soil conditions shallow or deep foundation solutions can be adopted to support tank structures. Ground improvement techniques such as vibro replacement (stone columns) and vibro compaction can also be successfully designed to support the tanks apart from deep foundations using piles after detailed analysis.

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Fang, H. Y. 2013. Foundation engineering handbook. Springer Science & Business Media.

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DFI India & DFI is ready to bring a variety of interesting & engaging virtual webinars and conferences in the first half of 2021 followed by physical events in the second half of the year as the situation permits.

Below is the list of DFI Events in the pipeline. We hope to see your continuing support and active participation in the upcoming programs.

DFI Upcoming Events

Event	Date*	Venue
DFI India Student Outreach: Groundwork	Feb 16, Mar 16, 2021	Virtual Event
WiDF India: Civil Engineering Careers - Connect & Grow	Feb 24, 2021	Virtual Event
DFI 2021 Middle East Conference	Feb 16-18, 2021	Online Conference
Deep Mixing 2021	June 01-17, 2021	Online Conference
SuperPile 2021	June 23-25, 2021	Philadelphia, Pennsylvania
S3: Slope, Slides and Stabilization	Aug 03-05, 2021	San Francisco, California
46th Annual Conference on Deep Foundations	Oct 12-15, 2021	Las Vegas, Nevada
DFI-India 2021: 10thAnniversary Conference	Nov 18-20, 2021	Chennai, India

*Date subject to changes

Cover story in each issue of the newsletter showcases a technology/work practise that is not very popular in India, but has tremendous potential for India's infrastructure development. Readers may contribute to the cover story.

DFI of India News

DFI of India is very happy to announce the following updates:

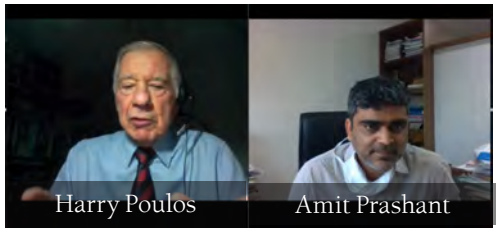
DFII CFA Pile Technology Implementation Committee is in continuous discussion with the industry leaders and has identified a few projects to implement CFA piling technology. Committee will regularly reach out to the industry persuading early implementation of this technology in India.

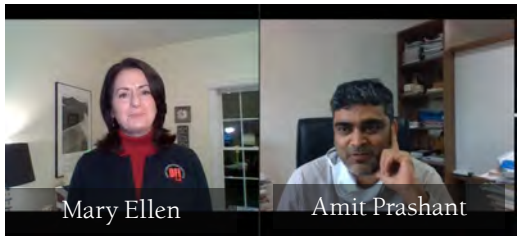
Committee is also in regular contact with BIS for having a CFA piling code in India. CFA Pile Guidelines document is now available on request. To get your copy send a request to DFI India office at activities@dfi-india.org

DFII Committee on Geotechnical Characterisation for Foundation (DCGCF) is developing a short term certification course for Soil Investigation Laboratory Technician. Any existing lab technician can undergo this course consisting of a brush up training followed by a competency mapping test. All candidates who pass the test will be certified. Committee is also working on a 3-month training program for fresh candidates, which will be referred to NSDC/CSDC to include it in their list of approved courses. National Academy of Construction (NAC), Hyderabad is setting up an Advanced Geotechnical Laboratory for conducting the training program. NAC is in final stage of inviting tender for Lab equipment and set up.

After the formal launch of *DFI India Student Outreach Program "Groundwork"* during DFII2020 virtual conference in Nov 2020, The **First webinar** under Groundwork was conducted on 19th Jan'21. The

program started with **Prof. M. R. Madhav**, JNTU, Hyderabad delivering an introductory presentation on '*Geotechnical Engineering - Ground vs. Soil*'. It was followed by **Prof. Harry Poulos**, Coffey Services, Australia, giving a technical presentation on *'Foundation Design Challenges for Tall Buildings'* . The last segment was a professional development session from **Mary Ellen Large**, DFI, USA on '*Body Language*'. **Prof. Amit Prashant**, IIT Gandhinagar moderated the session. The session had more than 400 registrations and about 200 attended the program.





Groundwork *Webinar 2 & Webinar 3* is scheduled on *16th Feb'21 & 16 March'21*.

All the registered students will get complimentary DFI Membership along with networking opportunities and other benefits.

Register here for the upcoming webinars in the series: http://www.dfi.org/dfieventlp.asp?13451

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DFI India Women in Deep Foundation (WiDF) group organised the first webinar titled "*Bridging Academia and Practice* " under the webinar series "*Civil Engineering Careers - Connect & Grow*".

Srilakshmi Nagrajan, Giken America, started the session with the overview of WiDF India group and activities, and introduced the session moderators **Annapoorni Iyer**, Engosym Consultants; and **Sangeen Desai**, Keller India. The Panel comprising of **Dr. N Kumar Pitchumani**, AECOM India; and **Dola Roychowdhury**, G-Cube Ltd, Consulting Engineers, LLP, presented their view points on how to bridge the gap between Academia and Industry, expectations from a fresher/young professional, interview tips, and answered questions posed by young professionals and students.

Second webinar of the series titled *"Education Beyond Classroom"* is scheduled on 24th Feb'21. Register for the webinar series here: http://www.dfi.org/dfieventlp.asp?13447

DFI of India on social media

Follow DFI India on LinkedIn for regular updates and announcements: *https://www.linkedin.com/company/dfi-india*

Follow DFI India YouTube channel for interesting programs and webinars: *Deep Foundations Institute of India - YouTube*

Read Deep Foundation Magazine Nov/Dec 2020 issue (Click)

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ENGINEERED SOLUTIONS FOR SHORING, FOUNDATION AND MARINE CONSTRUCTION WORKS

- Hot rolled sheet piles (Z & U profiles) on Sale - buy back and rental basis.
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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 30 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 15 active Technical Committees, Regional Chapters or a DFI group
- Gain visibility with a corporate member listing on the DFI website, which has 20,000 views each month
- Connect and communicate with industry peers through social media such as DFI's LinkedIn Groups
- Access OneMine.org and download up to 130,000 articles, technical papers & books from DFI & organizations all over the world - at no cost

DFI India 10th Anniversary Conference on Deep Foundation Technologies for Infrastructure Development in India

November 18 - 20, 2021*

IIT Madras,
Chennai, Tamil Nadu, India

DFI-India 2021, 10th Anniversary Conference on Deep Foundation Technologies for Infrastructure Development in India, is taking place in Chennai, Tamil Nadu, India. This event is being organized by DFI of India in collaboration with IIT Madras, and Indian Geotechnical Society - Chennai Chapter. It will present the successes and failures of geo-technical foundation work in major projects and current research in the advanced foundation design and implementation that are currently being pursued in premier technology institutions.

For more information, visit www.dfi.org/dfieventlp.asp?13430

*Dates are tentative

This e-newsletter of DFI of India is available at http://dfi.org/enews.asp?india

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