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Message from TC212 ACTIVITIES OF TC 212-DEEP FOUNDATIONS & FUTURE GOAL

Chair: Prof.Dr.-Ing. Rolf Katzenbach

Greetings to all members of ISSMGE from the technical committee TC 212 on Deep Foundations which was earlier known as TC 18. As the Chairman of this technical committee on Deep Foundations, I welcome you to read this report which highlights various activities of our technical committee over the span of last four years, i.e. October 2009 to till date, including some additional information like various worldwide major research- and practice-based activities in this broad domain of deep foundations.

The following activities were prioritized by TC 212 - Deep Foundations during the last four years;

- (i) Formation of Task Forces for TC 212.
- (ii) Preparation of ISSMGE International Guideline for CPRF.
- (iii) Publication and Distribution of Proceeding of International Conference on Deep Foundations - CPRF and Energy Piles, 15 May 2009, Frankfurt am Main, Germany.
- (iv) Two official meetings of TC 212 members at IS-Kanazawa 2012 and PILE-2013 Bandung.
- (v) International Conferences hosted / supported / organized by TC 212.
- (vi) TC 212 Representative Picture for ISSMGE website.
- (vii) Special Issue of ISSMGE International Journal of Geoengineering Case History (IJGCH) on Deep Foundations in September 2013 issue, hosted by TC 212 - Deep Foundations.



Message from TC212 (CONTINUED)

Details about the above activities are given in the following section.

(i) Formation of Task Forces for TC 212.

Task Force - 1 : Design and Analysis of Piles and Pile Groups including Design Standards

- Bored Cast-in-situ Piles
- Driven Piles
- Downdrag in Piles
- Pile Stiffness
- Mechanics of Piles
- Pile-Soil Interaction
- Back Analysis, Reliability
- Experimental Validation etc.

Task Force - 2 : Combined Pile-Raft Foundation (CPRF)

- Theory and Experiment
- Numerical Modeling
- Applications
- Cost-effectiveness etc.

Task Force - 3 : Piles subjected to Earthquake and other Lateral Loads

- Piles in Liquefied Soil
- Effect of Lateral Spreading on Piles
- Piles under Wave Loads
- Offshore Piles
- Batter Piles etc.

Task Force - 4 : Energy Pile

- Theory and Experiment
- Seasonal Thermal Storage
- Thermal Soil Properties
- Climate Protection Aspects
- Applications etc.

Task Force - 5 : Quality Assurance of Pile Production with various Field Problems

- Non-Destructive Tests on Piles
- Pile Manufacturing Process
- Wake-Up of Piles
- Equipments for Pile Production and Testing etc.

(ii) Preparation of ISSMGE International Guideline for CPRF.

As an activity of Task Force - 2, for Combined Pile-Raft Foundation (CPRF), a complete ISSMGE international guideline has been prepared. This entire guideline has been published very recently in hard copy book format and now under circulation among all the members of ISSMGE. This ISSMGE guideline for CPRF was thoroughly discussed by the members and friends during the 1st meeting of TC 212 on 19th September, 2012 at IS-Kanazawa 2012 at Kanazawa, Japan. The final report with minor editorial corrections was accepted by huge majority of positive voting by members and friends showing a need for such guideline to be available for our community to practice.

Message from TC212 (CONTINUED)

- (iii) Publication and distribution of Proceeding of International Conference on Deep Foundations - CPRF and Energy Piles, 15 May 2009, Frankfurt am Main, Germany.

Darmstadt Geotechnics No. 18, International Conference on Deep Foundations - CPRF and Energy Piles, May 15, 2009, Frankfurt am Main, Germany, ISBN-10: 3-931396-91-6, ISBN-13: 978-3-931396-91-6, ISSN: 1436-6517, Ed. Prof. Dr.-Ing. Rolf Katzenbach and Compiled by Prof. Deepankar Choudhury and Dipl.-Ing. Hendrik Ramm, Institute and Laboratory of Geotechnics, Darmstadt, Germany, pp. 1-371.

The above publication (in hard copy) has been distributed among ALL the present Members of TC 212 - Deep Foundations, ALL corresponding authors of each technical papers published in this proceedings and ALL former members of TC 18 - Deep Foundations of ISSMGE. Various recipients of the hard copy of the above publications had communicated their words of appreciations by emails.

- (iv) Two official meetings of TC 212 members at IS-Kanazawa 2012 and PILE-2013 Bandung.

The first official meeting (in person) of TC 212 among all the members was held on 19th September, 2012 during IS-Kanazawa 2012 at Kanazawa, Japan. Total 19 members and friends of TC 212 attended the meeting and various issues were thoroughly discussed during this meeting and these deliberations have been recorded in the official minutes of the meeting which were circulated and approved during the next official meeting. This next (2nd) official meeting (in person) of TC 212 members was held on 2nd June, 2013 during PILE-2013 at Bandung, Indonesia. Total 24 members and friends of TC 212 had attended this meeting.

- (v) International Conferences hosted / supported / organized by TC 212.

The following international conferences / symposiums were/are organized with support from TC 212 - Deep Foundations.

- (a) IS Kanazawa 2012 at Kanazawa, Japan, during 18-20 September, 2012. This international symposium was supported by the ISSMGE TC 212 - Deep Foundations. First meeting (in person) of the members of TC 212 was held at this event on 19th September, 2012.

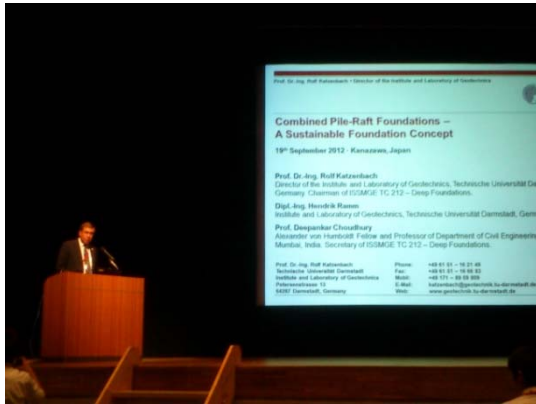


Opening ceremony of IS-Kanazawa 2012, Japan (L-R) Prof. T. Matsumoto, Prof. O. Kusakabe, Prof. I. Towhata, Prof. J.L. Briaud, Prof. A. Zhussupbekov, Prof. D. Choudhury and Vice Chancellor of Kanazawa University, Japan



Prof. Rolf Katzenbach's acknowledgement after receiving ISSMGE Tie from the ISSMGE President Prof. Jean-Louis Briaud at IS-Kanazawa 2012

Message from TC212 (CONTINUED)



Prof. Rolf Katzenbach is delivering keynote lecture at IS-Kanazawa 2012, Japan on 19th September, 2012



Chairman of the plenary keynote session and the ISSMGE Vice President-Asia, Prof. Askar Zhussupbekov is greeting Prof. Rolf Katzenbach after his keynote lecture at IS-Kanazawa 2012



Members and Friends of TC 212 with TC 212 Chair and Secretary during banquet dinner at IS-Kanazawa 2012, Japan



Participants of IS-Kanazawa 2012, Japan on 19th September, 2012

(b) 18SEAGC 2013 at Singapore during 29-31 May, 2013. This International Conference had three (3) exclusive special sessions on 'Deep Foundations' which were hosted and supported by the ISSMGE TC 212 - Deep Foundations. These three technical sessions on 'Deep Foundations' were held on 31 May, 2013 and were chaired by Prof. Rolf Katzenbach (Chair of TC 212) and Prof. Deepankar Choudhury (Secretary of TC 212).

Message from TC212 (CONTINUED)



After keynote lecture of Prof. B. Fellenius on theme Deep Foundations during 18SEAGC 2013 at Singapore



TC 212 Secretary, Prof. Deepankar Choudhury is chairing a technical session on Deep Foundations-I, during 18SEAGC 2013, Singapore.

(c) PILE-2013 at Bandung, Indonesia during 2-4 June, 2013. This International Conference was fully supported, hosted and organized by the ISSMGE TC 212 - Deep Foundations with other institutes and organizations. Among various keynote speakers, Prof. Rolf Katzenbach (Chair of TC 212), Prof. Sang Seom Jeong (Vice-Chair of TC 212), Prof. Deepankar Choudhury (Secretary of TC 212), Prof. Askar Zhussupbekov (Vice President Asia and Member of TC 212), Prof. Limin Zhang (Member of TC 212) delivered keynote addresses during PILE-2013. Also Prof. Deepankar Choudhury (Secretary of TC 212) and Prof. Limin Zhang (Member of TC 212) chaired two plenary sessions of the conference. Second meeting (in person) of the members of TC 212 was held at this event on 2nd June, 2013.



Two eminent keynote speakers Prof. Rolf Katzenbach and Prof. Harry Poulos are getting introduced by the Chairman of the Plenary session - 1 of PILE-2013



Keynote speakers Prof. Deepankar Choudhury and Prof. Limin Zhang are getting introduced by the Chairman of the Plenary session - 3 of PILE-2013 conference on 4th June, 2013

Message from TC212 (CONTINUED)



Selected participants of PILE-2013 conference, Indonesia on 3rd June, 2013



Special Indonesian dinner at hill top of Bandung city for selected dignitaries of PILE-2013 conference at Indonesia

(d) International Conference at Ho Chi Minh City, Vietnam during 5-6 June, 2013. This International Conference was supported by the ISSMGE TC 212 - Deep Foundations. Among various keynote speakers, Prof. Rolf Katzenbach (Chair of TC 212) delivered keynote address during this event. He also chaired a plenary session during this conference.



Prof. Rolf Katzenbach is getting introduced before keynote lecture at Ho Chi Minh City, Vietnam on 5th June, 2013



Question-answer session after the keynote lecture of Prof. Rolf Katzenbach at Ho Chi Minh City, Prof. B. Fellenius is chairing the session

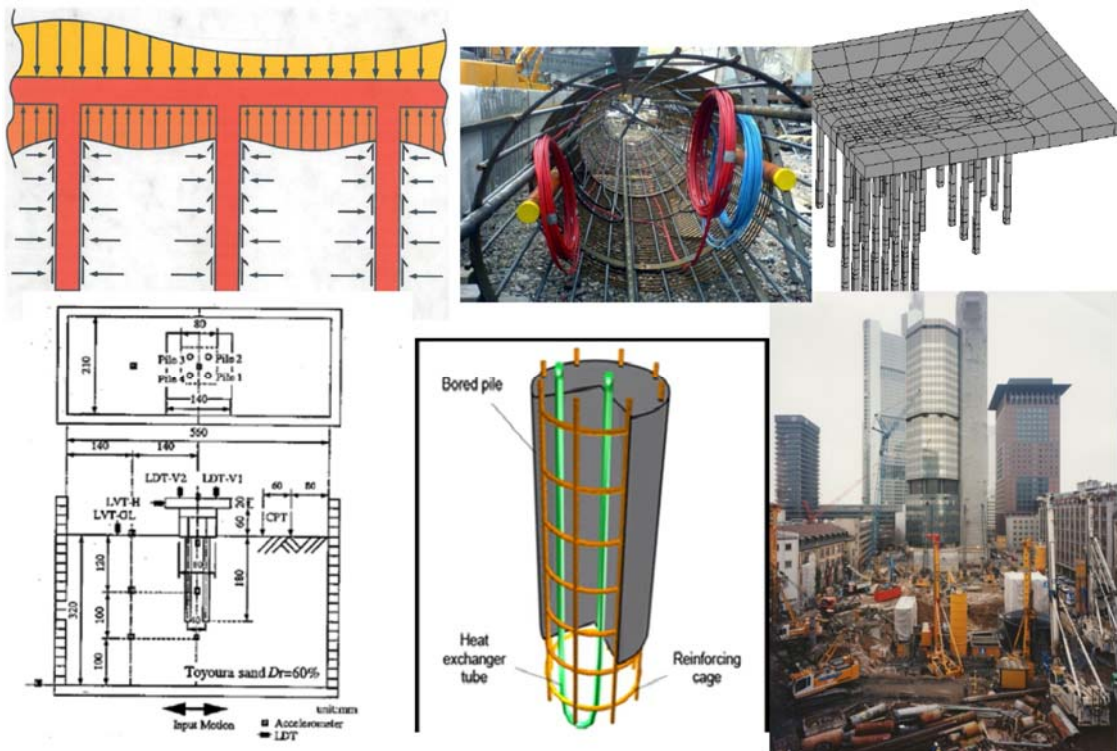
(e) 18ICSMGE at Paris, France during 2-6 September, 2013. This International Conference of ISSMGE will be having two (2) exclusive technical discussion sessions with total 62 numbers of papers which will be hosted by TC 212 - Deep Foundations. The first discussion session - 1 is scheduled to be held on September 5, 2013 during 11:00 - 12:30, which will be chaired by Prof. Rolf Katzenbach (Chair of TC 212) and General Reporter will be Prof. Deepankar Choudhury (Secretary of TC 212). The second discussion session - 2 is scheduled to be held on September 5, 2013 during 14:00 - 15:30, which will be chaired by Deepankar Choudhury (Secretary of TC 212) and General Reporter will be Prof. Der-Wen Chang (Member of TC 212). In addition to these two exclusive TC 212 sessions, a joint discussion session of TC 212+307 on 'Thermal Geomechanics' is scheduled to be held on September 4, 2013 during 16:00 - 17:30 hrs., which will be jointly chaired by Prof. Rolf Katzenbach (Chair of TC 212) and Dr. D. Basu (Chair of TC 307) and joint General Reporters will be Prof. Deepankar Choudhury (Secretary of TC 212) and Prof. A. Puppala (Vice-Chair of TC 307).

Message from TC212 (CONTINUED)

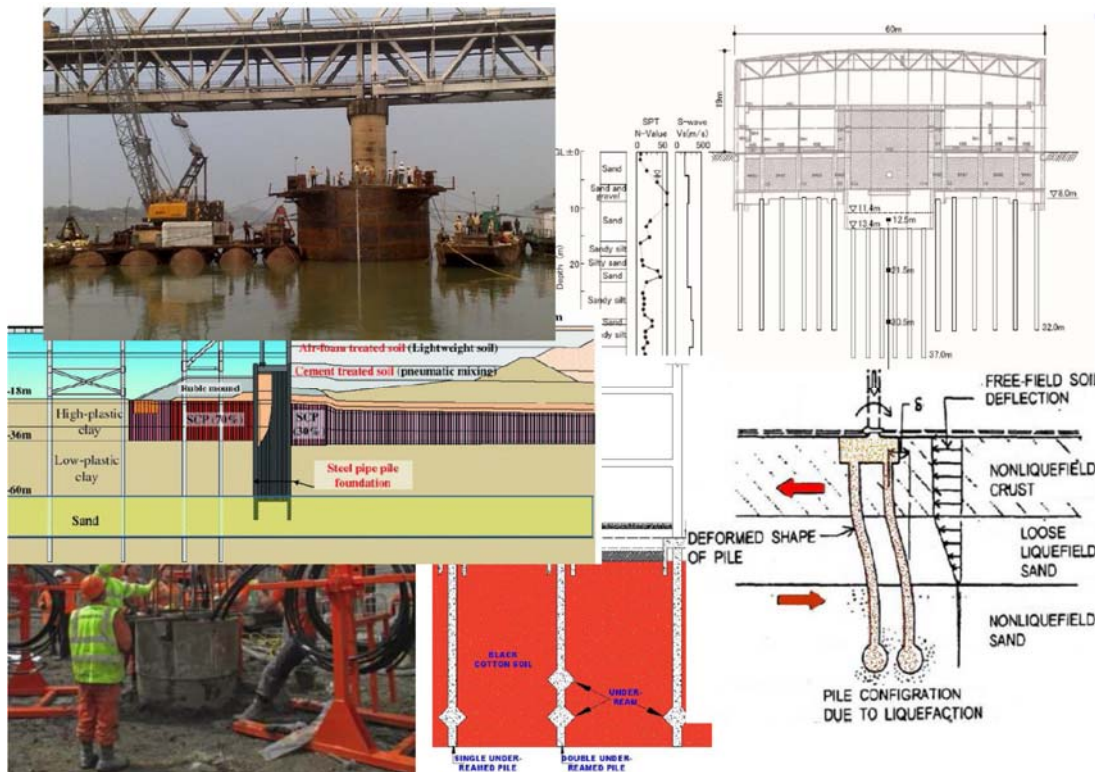
(f) ISAFE-2013 at Singapore during 5-6 December, 2013. This International Symposium is supported and hosted by the ISSMGE TC 212 - Deep Foundations with other organizations and institutes. Among various keynote speakers, Prof. Rolf Katzenbach (Chair of TC 212) will deliver the keynote address during this event.

(vi) TC 212 Representative Picture for ISSMGE website

Based on invitation from Prof. Marc Ballouz, Chair of ISSMGE Publications Committee, TC 212 - Deep Foundations committee has set up representative picture for ISSMGE new website. The following pictures are the representative pictures of TC 212 - Deep Foundations.



Message from TC212 (CONTINUED)



(vii) Special Issue of ISSMGE International Journal of Geoengineering Case History (IJGCH) on Deep Foundations in September 2013 issue, hosted by TC 212 - Deep Foundations.

It was planned to have one special issue of ISSMGE International Journal of Geoengineering Case History (IJGCH) specially related to Deep Foundations which will be conceptualized and edited by the TC 212 - Deep Foundations.

TC 212 was very happy to receive the email invitation from Prof. Pedro Seco Pinto, Former President of ISSMGE and the Editor-in-Chief of IJGCH regarding submission of proposal in January, 2013 which was addressed to all TCs of ISSMGE. In response to this email, with approval of the Chair of TC 212, Prof. Rolf Katzenbach, the Secretary of TC 212, Prof. Deepankar Choudhury took initiative and replied to Prof. Pinto on February 22, 2013 with the proposal for a special issue of IJGCH on theme 'Deep Foundations' to appear in September 2013 issue, hosted by TC 212 - Deep Foundations, with Prof. Deepankar Choudhury and Prof. Rolf Katzenbach as Guest Editors. The proposal was approved by Prof. Pinto.

This information was discussed during the meeting of TC 212 members at IS Kanazawa-2012 Kanazawa, Japan on 19th September, 2012 and again during the TC 212 members meeting at PILE-2013 Bandung, Indonesia on 2nd June, 2013. It was also mentioned that in near future (around mid 2014), another special issue of IJGCH hosted by TC 212 - Deep Foundations will come up and a request for submission of good quality of papers to all members were announced.

From the four years of activities and works carried out by TC 212 - Deep Foundations, it was observed that there is a need for the society to come up with design and practice guidelines for various deep foundations and quality control. TC 212 was instrumental and successful to bring out one of the most important ISSMGE international guidelines for Combined Pile-Raft Foundation (CPRF) during this current period. However the other similar guidelines are yet to be published and TC 212 is hopeful that in the next four year term, the other needy international guidelines for various deep foundations design, construction, monitoring, quality control can be published with support from all the members of TC 212.

Message from TC212 (CONTINUED)

The technical publications brought out by TC 212 in the current term is well accepted and recognized by the society for its need and usefulness for practical applications in the area of deep foundations.

All active members of TC 212 are the lifeline of the society and their contributions in various ways are highly acknowledged. It is also recommended to have more active members for TC 212 in near future (for next term) who can contribute for the society with visible outputs.

Various International Conferences/Workshops/Symposiums etc. were organized/supported by TC 212 - Deep Foundations in the present term and also proposed a few in the next term. During these events, one to one personal interaction between colleagues of like-minded who works for the area of Deep Foundations were well observed and the same will be continued in the next term also. The personal meetings of the members during these events as direct interactions of members for TC 212 committee meetings are also found to be fruitful and beneficial for the society and the same practice with more involvement of members is recommended to be continued in the next term also.

Additionally the ISSMGE society journal on case histories, IJGCH special issue hosted by TC 212 on major theme of Deep Foundations will give innovative research and case study details on this area in the entire community. The first such special issue of journal IJGCH will appear in September 2013. It is also recommended that such effort to bring out more such special issues of IJGCH hosted by TC 212 - Deep Foundations is society's need and will be brought out in near future also.

In carrying out all the above activities of our technical committee, all the supports provided by all the members and friends of TC 212 are highly acknowledged. But I must specially acknowledge the extensive help provided and the enthusiasm shown to start various new activities of TC 212 by the Honorary Secretary, Prof. Deepankar Choudhury. I am sure we all together will be able to serve the society much better in near future also.



Secretary of TC 212,
Prof. Deepankar Choudhury

PAST, PRESENT AND FUTURE OF DEEP FOUNDATIONS

Today's world and the future urbanization require more tall buildings and structures which essentially need deep foundations. Beginning in the 70's with the emergence of high rise buildings in Frankfurt am Main, Germany from 40 meters to 100 meters high buildings, the design and construction of foundations were thoroughly carried out by the research group at Technische Universität (TU) Darmstadt, Germany and I was happy to be a group leader of the present program in Geotechnics.

The concept of combined pile-raft foundation (CPRF) was practised and introduced for the foundation construction of Main tower and Messeturm in Frankfurt am Main way back in late 80's. The Combined Pile-Raft Foundation (CPRF) is a geotechnical composite construction that combines the bearing effect of both foundation elements raft and piles by taking into account interactions between the foundation elements and the subsoil shown in figure below. Later the highest building of Germany, 300 meters high Commerzbank Tower in Frankfurt am Main was constructed with CPRF technology for foundation in mid '90s. In addition to design and construction of deep foundations, a constant monitoring on settlements, mainly the differential settlement, is necessary as done for various buildings including the foundations of Deutsche Bank in Frankfurt am Main, Germany.

Message from TC212 (CONTINUED)



Skyline of Frankfurt am Main, Germany with several tall buildings having deep foundations

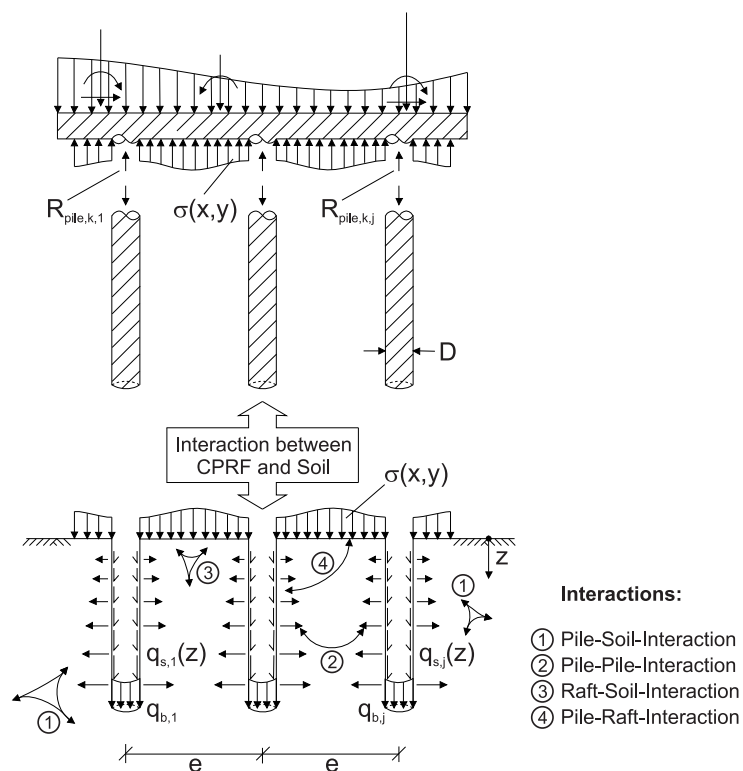
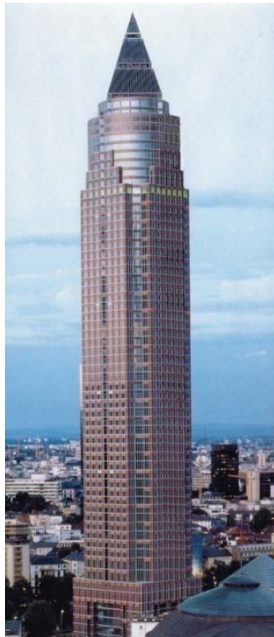
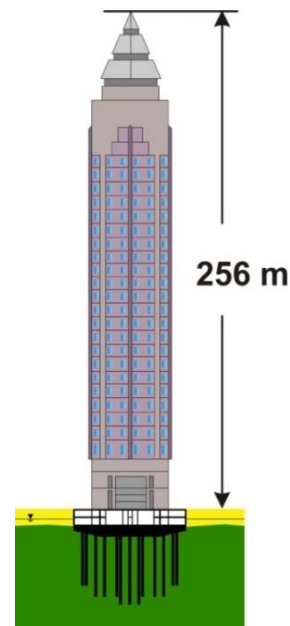


Figure. Combined Pile-Raft Foundation (CPRF) as a geotechnical composite construction and the interactions (after ISSMGE Combined Pile-Raft Foundation Guideline, 2013)

Message from TC212 (CONTINUED)

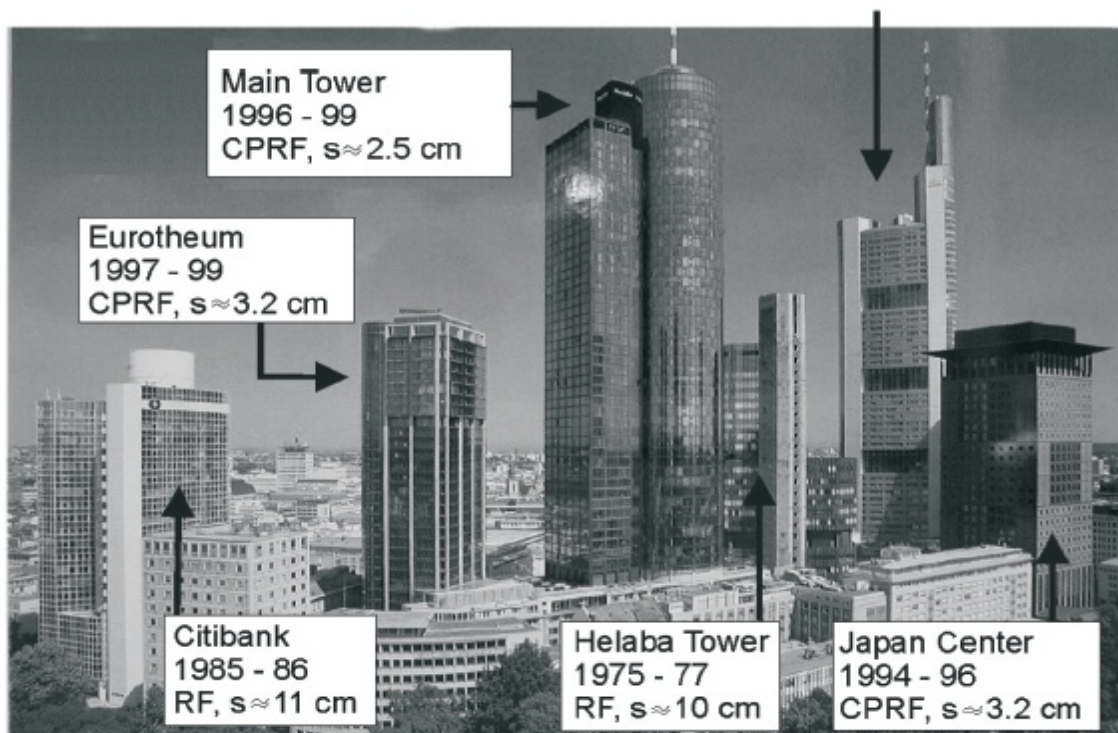


Messeturm, Frankfurt am Main, Germany



Messeturm, Frankfurt am Main, with CPRF

Commerzbank Tower 1994 –1997, PF, $s \approx 2.1$ cm

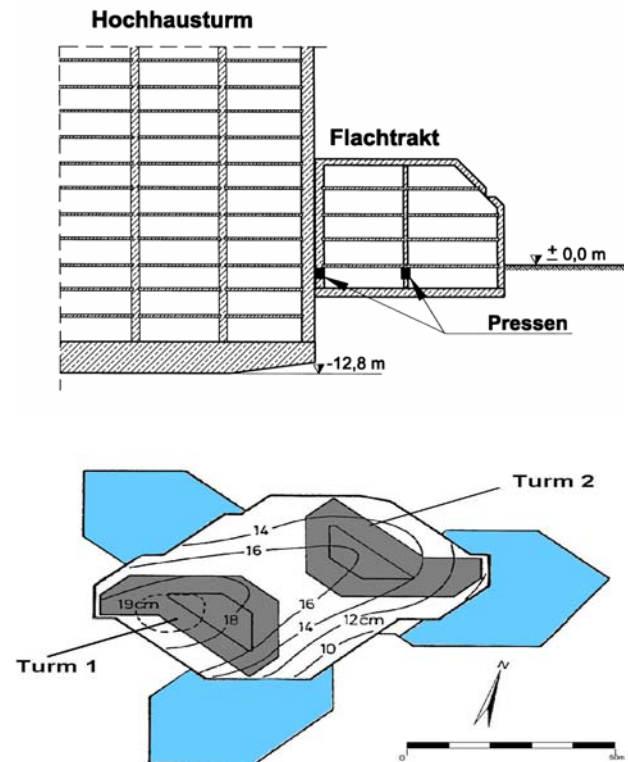


Deep foundations (CPRF applications) for various tall buildings in Frankfurt am Main, Germany

Message from TC212 (CONTINUED)



Deutsche Bank, Frankfurt am Main, Germany



Monitoring of differential settlements of different towers of Deutsche Bank, Frankfurt am Main, Germany



Plan of CPRF with monitoring system for European Central Bank, Frankfurt am Main



European Central Bank, Frankfurt am Main, Germany

Message from TC212 (CONTINUED)

Use of CPRF has not only been proved to be safe and economical but also it saves environment due to savings of CO₂ emissions as shown in several projects which were executed by using CPRF. It is a matter of great concern in present era among Civil Engineers to work towards the quantum of climate change issues and use of CPRF is the sustainable solution towards that aspect.

Also the use of Energy Piles by using the Geothermal energy is today's need for geotechnical engineers to do research and apply in practice. As the Director of the TU Darmstadt Energy Centre, I am pleased to co-ordinate this inter-disciplinary topic of energy conservation, uses and application of geothermal energy for practice in Deep Foundations through use of energy piles should take a lead in the entire world to maintain the conservation of energy and related issues.



Installation of heat exchanger pipes and connection through raft



Installation of Energy Pile

In my present capacity as 'peer reviewer' working with the North American architect, *Adrian Smith & Gordon Gill* designing the tallest building in the world, The Kingdom Tower (1001 meters high) at Jeddah on the Red Sea of the Saudi Arabian Royal family, it is an challenging experience to get involved in one of the complicated design review.

Message from TC212 (CONTINUED)

Proposed Tallest Building of the world
(1001 m) at Jeddah

Foundation plan and starting of construction for highest
building of world in Jeddah

Also in a leading role it was an excellent experience to save the UNESCO world heritage historical structure like the Cathedral of the Holy Family, Barcelona (Cathedral de la Sagrada Familia) from destruction due to adjacent tunnelling activities, which shows the need of research and practical experience of a geotechnical engineer in the field of deep foundations.

On behalf of our TC 212 - Deep Foundations and my personal behalf, I welcome you all to TC 212 meeting and at the discussion sessions of TC 212 at Paris 18ICSMGE in September 2013. Your valuable contributions for the society related to 'Deep Foundations' is a necessity for future growth of mankind and it will be highly acknowledged.