THE SECOND GEO-INSTITUTE – KAZAKHSTAN GEOTECHNICAL SOCIETY JOINT WORKSHOP

on TC 305 "Geotechnical Infrastructure for Megacities and New Capitals"

Orlando, Florida, March 5-8, 2018
New York, NY, March 8-11, 2018

THE SECOND GEO-INSTITUTE – KAZAKHSTAN GEOTECHNICAL SOCIETY JOINT WORKSHOP

on TC 305 "Geotechnical Infrastructure for Megacities and New Capitals"

Co-Chair: Prof. Victor N. Kaliakin

Co-Chair: Prof. Askar Zhussupbekov

Co-Chair: Prof. Hoe I. Ling

Orlando, Florida, March 5-8, 2018
New York, NY, March 8-11, 2018

THE WORKSHOP ORGANIZERS

CO-CHAIRS:

Prof. Victor N. Kaliakin (the University of Delaware, USA)

Prof. Askar Zhussupbekov (L.N. Gumilyov Eurasian National University, Kazakhstan)

Prof. Hoe I. Ling (Columbia University, USA)

SECRETARIES:

PhD Assel Tulebekova (L.N. Gumilyov Eurasian National University, Kazakhstan)

Karlygash Borgekova (L.N. Gumilyov Eurasian National University, Kazakhstan)

ORGANIZING COMMITTEE

Prof. Jim Hanson (California Polytechnic State University, USA)

Prof. Tuncer Edil (the University of Wisconsin, USA)

Prof. John Scott McCartney (the University of California San Diego, USA)

PhD I-Hsuan Ho (the University of North Dakota, USA)

PhD Tugce Baser (the University of Alberta, Canada)

PhD Zhanbolat Shakhmov (L.N. Gumilyov Eurasian National University, Kazakhstan)

PhD Ivan Morev ("KGS" Ltd, Kazakhstan)

Bibigul Abdrakhmanova (L.N. Gumilyov Eurasian National University, Kazakhstan)

SCIENTIFIC COMMITTEE

Prof. Jean - Louis Briaud (Texas A&M University, USA)

Prof. Jorge G. Zornberg (the University of Texas at Austin, USA)

Prof. Yoshinori Iwasaki (Geo-Research Institute, Japan)

Prof. Anna Shidlovskaya (Saint-Petersburg Mining University, Russia)

SPONSORSHIP

AHMET DURAN KARAHAN

Yoshi IWASAKI

The Second Geo-Institute – Kazakhstan Geotechnical Society Joint Workshop on TC 305 “Geotechnical Infrastructure for Megacities and New Capitals” is sponsored by the following organizations and individuals:

- Geo-Institute, USA
- Kazakhstan Geotechnical Society, Kazakhstan
- TC 305 of ISSMGE
- L.N. Gumilyov Eurasian National University, Kazakhstan
- Columbia University, USA
- SHIMANSKI OY Co, Finland
- KaragandaGIIZ and K*, Kazakhstan
- Yoshinori Iwasaki, Geo-Research Institute, Japan
- Ahmet Duran Karahan, “KARAM INSAAT”, Kazakhstan-Turkey

BACKGROUND

The Second Geo-Institute – Kazakhstan Geotechnical Society Joint Workshop on TC 305 “Geotechnical Infrastructure for Megacities and New Capitals” will be held in Orlando, Florida, and New York City, USA, on March 5-11, 2018.

The formal relation between the ASCE’s Geo-Institute and the Kazakhstan Geotechnical Society traces back to an Agreement of Cooperation that was endorsed by Geo-Institute and the Kazakhstan Geotechnical Society in 2013 and was signed in Paris at the ICSMGE. The first Kazakhstan-USA Geotechnical Engineering Workshop, which was held in Astana and Almaty, Kazakhstan during 13-16 July, 2015 was another historical milestone because, the workshop resulted not only in productive technical discussions and exchanges of technical and professional knowledge as outlined in the aforementioned Agreement of Cooperation, but also in subsequent educational exchanges both in Kazakhstan and in the United States.

The objective of both workshops is to increase the interactions between the Kazakhstan Geotechnical Society and the ASCE Geo-Institute as well as to identify the opportunities for future collaborations. The workshop that will be held in 2018, will have a strong industry related component to highlight geotechnical and construction opportunities.

Workshop Theme and Topics:

Piling and Deep Foundations; Geotechnology; Ground Improvement; Energy Foundations; Piling Testing and Designing; Underground Constructions; Micropiles, Anchors and Soil Nailing.

Venue 1 (March 5-8, 2018)
Hilton Orlando Buena Vista Palace,
Room Lake Tower 2
Orlando, Florida
1900 Buena Vista Dr, Orlando, FL 32830

Venue 2 (March 8-11, 2018)
Columbia University,
Davis Auditorium (412 CEPSR)
NY 10027, USA, Metro line 1, 116th Station
New York, USA

SHORT WORKSHOP SCHEDULE

March 5, Monday	March 6, Tuesday	March 7, Wednesday	March 8, Thursday	March 9, Friday	March 10, Saturday	March 11, Sunday
Arrival day	Technical tour in Orlando	Work-shop	Departure day from Orlando to New York	Columbia University day	Technical tour in New York	Departure day
17:50		8:00 – 17:00	18:24 LH 464	8:30 – 16:30		23:20 LH 405

DISTINGUISHED WORKSHOP PARTICIPANTS,

Jim Hanson
G-I International Activities Council Chair
Professor, Civil and Environmental Engineering,
Cal Poly – San Luis Obispo

On behalf of the ASCE Geo-Institute International Activities Council (IAC), I am pleased to welcome you to the Second USA-Kazakhstan Geotechnical Engineering Workshop. This event follows the successful first workshop held in Almaty and Astana, Kazakhstan in 2015.

We are very pleased at the ambitious program that has been established for this workshop to include components in Orlando, Florida (in connection with IFCEE 2018) and New York City. In addition to exploring and sharing the latest deep foundation and earthwork technologies with the Kazakh delegation, this program provides sufficient time for continuing to develop new relationships and foster existing collaborations between geo-professionals from the two countries.

The IAC has provided support to this workshop to advance the profession through this targeted international interaction, to provide an effective venue for sharing and learning between industry and academia, to promote international business opportunities in the geo-industry, and to build a strategic alliance with the Kazakhstan Geotechnical Society for attaining common international goals. I would like to personally acknowledge the hard work of the workshop co-chairs Victor Kaliakin, Askar Zhussupbekov, and Hoe Ling in making this workshop possible.

I wish you all the best for a productive and enjoyable workshop*, Jim Hanson.*

DISTINGUISHED COLLEAGUES, DEAR FRIENDS,

Prof. Jean-Louis Briaud
Distinguished Professor, Texas A&M University
President of FedIGS,
the Federation of International Geoengineering Societies

I am delighted to be part of the celebration of the second Kazakhstan-USA workshop on geotechnical engineering. First let me say a few things about Professor Askar Zhussupbekov who is leading the Kazakh delegation and is our guest of honor. Askar and I go back a good way and I have gotten to know him quite well. He is a remarkable organizer with tremendous energy but more importantly he is someone you can count on. He was on the board of ISSMGE during my tenure as President and he was relentless on accomplishing the tasks that he led. There is no doubt in my mind that any workshop under his leadership will be a success. Add to this that he has a good sense of humor and enjoys a good laugh and you will understand why I am very proud to be one of his friends.

Now let me turn to the Geo-Institute and the people who contributed to this workshop as well as those more generally who enhance the international image of the GI. I wish to recognize Jim Hanson who leads the international activities committee, Bob Holtz who is and has been for a long time the international secretary for the GI, Hoe Ling and Victor Kaliakin who played a significant role in organizing this workshop. I also want to applaud the vision of the GI board in reaching out internationally and across geodisciplines. We are indebted to Youssef Hashash, Gary Gregory, Beth Gross, and the other Board members.

Finally, let me mention FedIGS since I am the President. FedIGS is the Federation of International Geo-engineering Societies, which regroups the societies for soils, rocks, geology, and geosynthetics. Our field is very broad and remarkably diversified and there is benefit in thinking about the bigger picture and in cooperating across boundaries between these fields. I wish you a very successful workshop and I urge you to think of a few action items at the end of the workshop which will create a permanent contribution of the time you spent together.

Take care and be safe, *Jean-Louis Briaud*.

DEAR COLLEAGUES,

Prof. Askar Zhussupbekov
Co-Chair of the Organizing Committee
of the Second GI-KGS Geotechnical Joint Workshop
President of Kazakhstan Geotechnical Society

The Second Geo-Institute - Kazakhstan Geotechnical Society Joint Workshop is dedicated to provide a platform to discuss the problems of geotechnical infrastructure of mega cities and new capitals (TC 305 ISSMGE). Invited keynote and special lecturers and speakers from the USA, Kazakhstan, Japan, Turkey, Russia will share their vision and wisdom through lectures and presentations on solving problems related to challenges of foundation engineering in problematic ground conditions. The international workshop will consist of two parts: from 5th to 8th March, in Orlando, within the International Foundations Congress and Equipment Expo - 2018 (IFCEE-2018), from 9th to 11th March in New York at Columbia University.

The main goals of this forum are to exchange scientific ideas, as well as studying advanced technologies in the field of design, installation, testing of foundations and basis in complex engineering-geological conditions. A very important outcome of the workshop is that the members of the Kazakhstan Geotechnical Society will get acquainted with the technical exhibition, which will be held during IFCEE-2018.

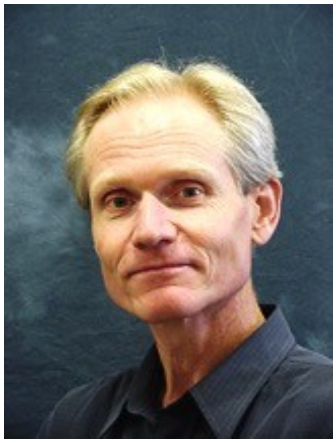
The second part of the workshop will be held at Columbia University (New York), where the members of the Kazakhstan Geotechnical Society will participate in a geotechnical seminar, will visit Donald M. Burmister and Robert A. W. Carleton Laboratories, and also participate in a technical tour to the construction sites of high-rise buildings and structures in New York. It should be specially noted that the well-known scientists and practitioners, as well as young specialists: Masters and Doctoral Students, will be attended on the geotechnical workshop and seminar.

I would like to express my deepest gratitudes to Prof. Jim Hanson, Prof. Hoe I. Ling, Prof. Victor N. Kaliakin, Mr. Brad Keelor, who have made enormous efforts to organize this important event.

I appreciate and thank the sponsors of this historical forum: GI (USA), KGS (Kazakhstan), L.N. Gumilyov Eurasian National University (Kazakhstan), Columbia University (USA), SHIMANSKI OY Co (Finland), KaragandaGIIZ and K* (Kazakhstan) and Mr. Ahmet Duran Karahan (KARAM INSAAT, Kazakhstan-Turkey), Prof. Yoshinori Iwasaki (Geo-Research Institute, Japan), who financially supported the organization of the second Geo-Institute - Kazakhstan Geotechnical Society Joint Workshop.

I express my deep confidence that running joint geotechnical workshops and seminars will provide a means to formalize the development of cooperation between GI - KGS in the field of solving the problems of the geotechnical infrastructure of mega cities and new capitals.

WELCOMING REMARKS



Prof. Victor N. Kaliakin
the University of Delaware
co-Chair for Orlando portion of workshop

Prof. Hoe I. Ling
Columbia University
co-Chair for New York City portion of workshop

We welcome all attendees to the Second Geo-Institute - Kazakhstan Geotechnical Society Geotechnical Workshop. Similar to the first workshop, which was held in Astana and Almaty, Kazakhstan in 2015, the current workshop brings together not only geo-professionals from Kazakhstan and the U. S., but also from other countries of the world. We look forward to the lectures, technical discussions, and social interactions that will take place in Orlando and then in New York City.

KEYNOTE and SPECIAL LECTURERS

Professor JIE HAN
the University of Kansas

Professor JOHN S. MCCARTNEY
the University of California San Diego

Professor YOSHINORI IWASAKI
Geo-Research institute

Professor EROL GULER
Bogazici University,
Visiting Professor at George Mason University

BURMISTER LECTURER

Professor VICTOR N. KALIAKIN
the University of Delaware

KEYNOTE LECTURERS

Professor ASKAR ZHUSSUPBEKOV
L.N. Gumilyov Eurasian National University

PhD MANOLIS VEVEAKIS
Duke University

PhD ZHANBOLAT SHAKHMOV
L.N. Gumilyov Eurasian National University

PROGRAM

5th MARCH 2018, MONDAY (Orlando)

17:50 Arrival at Orlando International airport (LH 464 Frankfurt-Orlando)

6th MARCH 2018, TUESDAY (Orlando)

09:00 – 13:00 **TECHNICAL TOUR** on the construction site in Orlando
Co-Chairman: **Prof. VICTOR N. KALIAKIN**
(the University of Delaware)
Co-Chairman: **Mr. OSVALDO VARGAS** (Geo-Institute)

13:00 – 14:00 **LUNCH**

14:00 – 18:00 **TECHNICAL TOUR** on the construction site in Orlando (continue)
Co-Chairman: **Prof. VICTOR N. KALIAKIN**
(the University of Delaware)
Co-Chairman: **Mr. OSVALDO VARGAS** (Geo-Institute)

18:00 – 20:00 **WELCOME RECEPTION** (by invitation)

7th MARCH 2018, WEDNESDAY (Orlando)

Venue: Hilton Orlando Buena Vista Palace, room Lake Tower 2,
Orlando, Florida, the USA, 1900 Buena Vista Dr, Orlando, FL 32830

07:00 – 08:00 **REGISTRATION**

08:00 – 08:15 **OPENING CEREMONY**
Chairman: **Prof. JIM HANSON**
(California Polytechnic State University)
G-I International Activities Council Chair

Prof. ROBERT D. HOLTZ
(the University of Washington)
G-I International Secretary

Prof. JEAN - LOUIS BRIAUD
(Texas A&M University),
President of Federation of International Geo-Engineering Societies

Prof. ASKAR ZHUSSUPBEKOV
(L.N. Gumilyov Eurasian National University),
President of Kazakhstan Geotechnical Society

08:15 – 09:00 **BRIEF PRESENTATIONS of PARTICIPANTS**
Co-Chairman: **Prof. VICTOR N. KALIAKIN**
(the University of Delaware)
Co-Chairman: **Prof. ASKAR ZHUSSUPBEKOV**
(L.N. Gumilyov Eurasian National University)

KEYNOTE LECTURES

Chairman: **Prof. JORGE G. ZORNBERG**
(the University of Texas at Austin)

09:00 – 09:30 **Prof. JIE HAN** (the University of Kansas)
WICKING GEOTEXTILE TO MITIGATE FREEZE-THAW POTENTIAL OF BASE COURSES IN COLD REGIONS

09:30 – 10:00 **Prof. JOHN SCOTT MCCARTNEY**
(the University of California San Diego)
PERFORMANCE OF GEOTHERMAL SYSTEMS INTEGRATED IN GEOTECHNICAL ENGINEERING INFRASTRUCTURE

10:00 – 10:05 **GROUP PHOTOGRAPHING**

Chairman: **PhD IVAN MOREV** ("KGS" Ltd)

10:05 – 11:05 **COFFEE-BREAK and FIRST BREAKOUT working group session (Education and Commercialization)**

Co-Chairman: **Prof. KAM WENG NG** (the University of Wyoming)
Co-Chairman: **PhD ASSEL TULEBEKOVA**
(L.N. Gumilyov Eurasian National University)

SPECIAL LECTURE

Chairman: **Prof. ANNA SHIDLOVSKAYA**
(Saint-Petersburg Mining University)

11:05 – 11:30 **Prof. YOSHINORI IWASAKI** (Geo-Research Institute)
ACTIVE FAULTS IN MEGA-CITY OF LOS ANGELES, OSAKA, AND ALMATY AND FAULT CHARACTERIZATION BY BORING DATA

TECHNICAL SECTION

Chairman: **PhD ANNA TIMCHENKO** (LLC "Kanex Project")

11:30 – 11:45 **Prof. ANNA SHIDLOVSKAYA** (Saint-Petersburg Mining University)
ST. ISAAC CATHEDRAL IN ST. PETERSBURG (RUSSIA): BEHAVIOR OF A HISTORICAL MONUMENT IN A MEGACITY
Jean - Louis Briaud (Texas A&M University)

11.45 – 12:00 **Prof. CHUNG SONG** (the University of Nebraska–Lincoln)
LESSONS LEARNED FROM HURRICANE KATRINA WITH EMPHASIS ON COST EFFECTIVE RETROFITTING TECHNIQUES
Ahmed Al-Ostaz, Alexander H.-D. Cheng, R. Mantena (the University of Mississippi)

12:00 – 13:00 **LUNCH**

	KEYNOTE LECTURES ***Chairman:* Prof. HOE I. LING** (Columbia University)
13:00 – 13:30	**Prof. EROL GULER** (Bogazici University, George Mason University) DESIGN OF COMPLEX BUILDINGS AND INFRASTRUCTURE IN TURKEY AND INNOVATIVE SOLUTIONS USING GEOSYNTHETICS
13:30 – 14:00	**Prof. ASKAR ZHUSSUPBEKOV** (L.N. Gumilyov Eurasian National University) GEOTECHNICAL CONSTRUCTION OF MEGA PROJECTS ON PROBLEMATIC SOILS OF KAZAKHSTAN **S. Baimukhanov, A. Omarov, G. Zhukenova, G. Tanyrbergenova** (L.N. Gumilyov Eurasian National University)
14:00 – 15:00	**COFFEE BREAK and SECOND BREAKOUT working group session (Practice and Research)** ***Co-Chairman:* Prof. CHUNG SONG** (the University of Nebraska-Lincoln) ***Co-Chairman:* PhD ZHANBOLAT SHAKHMOV** (L.N. Gumilyov Eurasian National University)
	TECHNICAL SECTION ***Chairman:* Prof. ADIL ZHAKULIN** (Karaganda State Technical University)
15:00 – 15:15	**Prof. KAM WENG NG** (the University of Wyoming) UNDERSTANDING PILE SETUP USING STATIC ANALYSIS METHODS **R. Ksaibati** (Drash Consultants, LLC)
15:15 – 15:30	**PhD TYMARKUL MUZDYBAYEVA** ("MG-Build" LLP) RESEARCH OF MULTI-STORY BUILDING IN EARTHQUAKE-PRONE REGIONS OF KAZAKHSTAN **Omarov A.S.** (L.N. Gumilyov Eurasian National University)
15:30 – 16:30	**SUMMARY of the BREAKOUT DISCUSSIONS**
16:30 – 16:45	**CLOSING CEREMONY** ***Chairman:* Prof. VICTOR N. KALIAKIN** (the University of Delaware) **Prof. HOE I. LING** (Columbia University) **Prof. ASKAR ZHUSSUPBEKOV** (Kazakhstan Geotechnical Society)
19:00 –21:00	**FRIENDSHIP DINNER** (by invitation)

8th MARCH 2018, THURSDAY (Orlando)

	Free day
18:24	Departure from Orlando to New York (DL 869 Orlando-New York)
21:10	Arrival in New York

9th MARCH 2018, FRIDAY (New York)

Venue:	Columbia University, Davis Auditorium (412 CEPSR), NY 10027, USA, Metro line 1, 116th Station, New York, USA
08:30 – 09:00	**REGISTRATION**
09:00 – 09:15	**OPENING CEREMONY** ***Chairman:* Prof. HOE I. LING** (Columbia University) **Prof. GEORGE DEODATIS** Chair of the Department of Civil Engineering and Engineering Mechanics Columbia University **Prof. SERIKTAY BAIMUKHANOV** Dean of the Faculty of Architecture and Civil Engineering L.N. Gumilyov Eurasian National University **Prof. ASKAR ZHUSSUPBEKOV** President of Kazakhstan Geotechnical Society
	KEYNOTE LECTURES ***Chairman:* PhD STEVE WAICHING SUN** (Columbia University)
09:15 – 09:45	**PhD MANOLIS VEVEAKIS** (Duke University) TOWARDS A UNIFIED MULTI-PHYSICS FRAMEWORK FOR ENVIRONMENTAL AND RESOURCE ENGINEERING
09:45 – 10:15	**PhD ZHANBOLAT SHAKHMOV** (L.N. Gumilyov Eurasian National University) ESTIMATION OF THE BEARING CAPACITY OF PILE FOUNDATIONS IN SEASONALLY FREEZING SOIL GROUND **A. Zhussupbekov, G.Tleulenova** (L.N. Gumilyov Eurasian National University) **Eun Chul Shin** (Incheon National University)
10:15 – 10:20	**GROUP PHOTOGRAPHING** ***Chairman:* PhD IVAN MOREV** (“KGS” Ltd)
10:20 – 10:40	**COFFEE-BREAK**
	TECHNICAL SECTION ***Chairman:* PhD MANOLIS VEVEAKIS** (Duke University)
10:40– 10:55	**Prof. AKITOSHI MOCHIZUKI** (L.N. Gumilyov Eurasian National University) RE-CONSIDERATION OF LIQUEFACTION PHENOMENA **G. Tanyrbergenova, G. Zhussipbekova, Y. Orazbayev** (L.N. Gumilyov Eurasian National University), **Risa Kousaka** (TEPCO Fuel&Power, Inc.)

10:55 – 11:10 **Prof. VITALIY KHOMYAKOV**
(Kazakh Leading Academy of Architecture and Civil Engineering)
EXPERIENCE IN IMPROVING WEAK STRUCTURALLY UNSTABLE AND LOESS BASES OF BUILDINGS IN SEISMIC REGIONS
E. Bessimbaev
(Kazakh Leading Academy of Architecture and Civil Engineering)

BURMISTER LECTURE

Co-Chairman: **Prof. HOE I. LING** (Columbia University)
Co-Chairman: **Prof. ASKAR ZHUSSUPBEKOV**
(L.N. Gumilyov Eurasian National University)

11:10 – 11:55 **Prof. VICTOR N. KALIAKIN** (the University of Delaware)
MODELING THE TIME- AND TEMPERATURE-DEPENDENT RESPONSE OF COHESIVE SOILS IN A GENERALIZED BOUNDING SURFACE FRAMEWORK

12.00 – 14:00 **FRIENDSHIP LUNCH**

TECHNICAL SECTION

Co-Chairman: **Prof. VITALIY KHOMYAKOV**
(Kazakh Leading Academy of Architecture and Civil Engineering)
Co-Chairman: **Prof. ADIL ZHAKULIN**
(Karaganda State Technical University)

14:00 – 14:15 **PhD LIMING LI** (Columbia University)
CENTRIFUGE MODELLING ON GRANULAR FLOW AND BOUNDARY EROSION
Chi-Yao Hung (National Chung Hsing University)

14:15 – 14:30 **PhD ASSEL TULEBEKOVA**
(L.N. Gumilyov Eurasian National University)
FEATURES OF USING CONTROL EQUIPMENT FOR PILE TEST ACCORDING AMERICAN AND KAZAKHSTAN STANDARDS
A. Zhussupbekov, N. Alibekova, A. Tleubayeva
(L.N. Gumilyov Eurasian National University)
V. Popov ("KaragandaGIIZ and K*" LLP)

14:30 – 14:45 **PhD IVAN MOREV** ("KGS" Ltd)
CHECKING INTEGRITY OF BORED PILES USING TWO METHODS: LOW STRAIN METHOD AND CROSS-HOLE SONIC LOGGING - EXPERIENCE OF APPLICATION
A. Zhussupbekov, N. Alibekova, N. Shakirova, K. Borgekova
(L.N. Gumilyov Eurasian National University)

14:45 – 15:00 **PhD Student KARLYGASH BORGEKOVA**
(L.N. Gumilyov Eurasian National University)
FIELD TESTS OF SOILS BY PRECAST CONCRETE JOINT PILES
A. Zhussupbekov, A. Omarov, B. Abdrakhmanova
(L.N.Gumilyov Eurasian National University)
Anatol Firtser (SHIMANSKI OY Co, Ltd)

15:00 – 15:15	**LEI XU** (Columbia University) CENTRIFUGE MODELING OF GABION FACING GEOSYNTHETIC REINFORCED SOIL RETAINING WALLS **H. I. Ling** (Columbia University), **J. G. Collin** (The Collin Group Inc.) **J. Han** (the University of Kansas), **D. Leshchinsky** (ADAMA Engineering Inc.) **B. Tanyu** (George Mason University), **L. Li** (Columbia University) **T. Kawabata** (Kobe University), **P. Rimoldi** (Officine Maccaferri SpA)
15:15 – 15:25	**CLOSING CEREMONY** ***Chairman:* PhD STEVE WAICHING SUN** (Columbia University) **Prof. VICTOR N. KALIAKIN** (the University of Delaware) **Prof. HOE I. LING** (Columbia University) **Prof. ASKAR ZHUSSUPBEKOV** (Kazakhstan Geotechnical Society)
15:30 – 16:30	**TOUR** on Laboratories of Columbia University ***Chairman:* PhD LIMING LI** (Columbia University)
18:30 – 22:00	**NEW YORK CITY LIGHTS DINNER CRUISE** ***Chairman:* Prof. HOE I. LING** (Columbia University)

10th MARCH 2018, SATURDAY (New York)

09:00 – 13:00	**TECHNICAL TOUR** on the construction site in New York ***Chairman:* PhD Student JUNG GEUN HWANG** (Columbia University)
13:00 – 14:00	**LUNCH**
14:00 – 18:00	**TECHNICAL TOUR** to observation of high-rise buildings in New York ***Chairman:* PhD LIMING LI** (Columbia University)
18:00 – 21:00	**TOUR on the Time Square** ***Co-Chairman:* PhD IVAN MOREV** ("KGS" Ltd)

11th MARCH 2018, SUNDAY (New York)

	Free day
23:20	Departure from New York to Astana (LH 405 New York-Astana)

BURMISTER, KEYNOTE AND SPECIAL LECTURERS

JIE HAN

Ph.D., PE, F.ASCE, Glenn L. Parker Professor of Geotechnical Engineering,
Department of Civil, Environmental, and Architectural Engineering, the University of Kansas

Dr. Jie Han is the Glenn L. Parker Professor of Geotechnical Engineering in the Civil, Environmental, and Architectural Engineering Department at the University of Kansas. He received his Ph.D. degree in Civil Engineering from the Georgia Institute of Technology in 1997. His research has focused on geosynthetics, ground improvement, pile foundations, buried structures, and roadways. Prof. Han is the sole author of the book entitled "Principles and Practice of Ground Improvement" published by Wiley and has published more than 300 peer-reviewed journal and conference papers. Prof. Han is the chair of the ASCE Geo-Institute Soil Improvement Committee. He serves as an associate editor for the ASCE Journal of Geotechnical and Geoenvironmental Engineering and the ASCE Journal of Materials in Civil Engineering and as an editorial board member for ten other international journals. He was the technical co-chair for the ASCE/IFAI GeoFrontiers Conference held in Dallas, Texas in 2011. Dr. Han has been invited to give more than 200 keynote/invited lectures and short courses around the world. He has received numerous awards from the profession including but not limited to two US Transportation Research Board Best Paper Awards in 2008 and 2017, the 2011 Shamsher Prakash Prize for Excellence in Practice of Geotechnical Engineering, the 2014 International Geosynthetics Society (IGS) Award, the 2014 Associate Editor of the Year Award from the ASCE Journal of Geotechnical and Geoenvironmental Engineering, and the 2017 ASCE Martin S. Kapp Foundation Engineering Award. Dr. Han was elected to the ASCE Fellow in 2014.

WICKING GEOTEXTILE TO MITIGATE FREEZE-THAW POTENTIAL OF BASE COURSES IN COLD REGIONS

It is well recognized that water has detrimental effects on roadway performance in cold regions due to the freeze-thaw potential and the reduction of soil strength and modulus. Reduction of soil moisture can improve the roadway performance, often through drainage and dewatering in the current practice, which require saturation of soil and hydraulic gradient. However, soil in roadways may not always be saturated. Even under partially saturated conditions, soil may have too high moisture content that is still susceptible to freeze-thaw. An innovative geotextile product (named the wicking geotextile) recently introduced into the market has deep-groove fibers with large surface areas that can generate capillary or suction force to suck water into the fibers when they are in contact with water. The sucked water can be transported to the exposed surface of the geotextile and evaporate into air due to the relative humidity difference between the wet geotextile and air. This process continues until the rate of water supply from the soil is equal or less than that of water evaporation from the geotextile. This presentation will discuss freeze-thaw problems in cold regions, explain the functions of wicking geotextile, and present experimental tests to evaluate the benefits of wicking geotextile in improving the behavior of base courses subjected to saturation and freeze-thaw. Two case studies will be presented using the wicking geotextile to eliminate freeze-thaw problems in the field.

JOHN S. MCCARTNEY

Ph.D., P.E., Associate Professor

Department of Structural Engineering, University of California San Diego

John S. McCartney is an Associate Professor in the Department of Structural Engineering at UCSD. He received BSCE and MSCE degrees from the University of Colorado Boulder and a PhD degree in civil engineering from the University of Texas at Austin. Dr. McCartney's research interests include unsaturated soil mechanics, geosynthetics, and thermally active geotechnical systems. He has received several research awards, including the Walter L. Huber Civil Engineering Research Prize in 2016, the J. James R. Croes medal from ASCE in 2012, the DFI Young Professor Award in 2012, the NSF Faculty Early Development (CAREER) Award in 2011, and the Young IGS Award from the International Geosynthetics Society in 2008. His teaching efforts were recognized by the 2012 Shamsher Prakash Prize for Excellence in Teaching of Geotechnical Engineering. For his service on ASTM Committee D18 on Soil and Rock, he has received the President's Leadership Award in 2013 and the Richard S. Ladd D18 Standards Development Award in 2011. He is an editor of the Journal of Geotechnical and Geoenvironmental Engineering and is on the editorial boards of Geotechnical Testing Journal, Computers and Geotechnics, Soils and Foundations, Geosynthetics International, Canadian Geotechnical Journal, Geomechanics for Energy and the Environment, Journal of GeoEngineering, and Gйotechnique Letters. Website: http://mccartney.eng.ucsd.edu

PERFORMANCE OF GEOTHERMAL SYSTEMS INTEGRATED IN GEOTECHNICAL ENGINEERING INFRASTRUCTURE

Abstract: This presentation will provide update on advances in applications of near-surface geothermal heat exchangers in geotechnical engineering infrastructure, including energy piles and municipal solid waste landfills. Further, the use of geothermal heat exchangers in solar thermal heat storage systems and in soil improvement for embankments with poorly draining backfill will be discussed. In addition to reducing the installation cost of geothermal heat exchangers by taking advantage of geotechnical infrastructure construction, the approaches described in this presentation permit access to sustainable thermal energy resources and potentially improve the infrastructure functionality. At the same time, several geotechnical and thermal issues must be considered to ensure a cost-effective and structurally-sound system.

YOSHINORI IWASAKI

Executive Director, Geo-Research Institute
Chair, ATC19, Geo-Heritage Committee

Prof. Yoshi IWASAKI is Executive Director of Geo-Research Institute and Chair of ATC19, Asian regional Technical Committee on Geo-Heritage, International Society of Soil Mechanics and Geotechnical Engineering. He graduated from department of Geophysics Kyoto University with BS in 1964. He studied geotechnical engineering at the Graduate School of University of California, Berkeley, USA and graduated in 1969 with MS. He obtained Ph.D. from Karaganda State Technical University (Karaganda, Kazakhstan) in 2001 and Dr. Eng. from Kyoto University in 2004.

Prof. Iwasaki worked for the study of earthquake disaster in Osaka in terms of seismology as well as geotechnical environments in 1970-90. He also established boring data system in urban area in Osaka for understanding geological condition in the area and for design use of life line infrastructures. Prof. Iwasaki developed the real time geotechnical observational system for deep excavation as well as shield tunnel construction from 1970-1995.

He was invited as the head of geotechnical unit for Japanese Government of Safeguarding Angkor in 1994. Since then, he studied geotechnical aspects of heritage structures in Angkor. He found the unique characteristics of sandy soils of filled mound based which high rise masonry towers stands for 800 years by shallow direct foundation. The soil is kaolin sand that becomes very stiff soil like soft rock under dried condition.

Prof. Iwasaki was recommended as a member of arbitration committee for Osaka District Court and devoted himself for solving complicated problems under dispute.

He is a member of TC301 of ISSMGE (International Society of Soil Mechanics and Geotechnical Engineering) for geotechnical engineering for cultural heritage and historical sites. He is also a member of TC302 of ISSMGE for forensic geotechnical engineering.

He organized ATC19 of Asian Regional Committee on Geo-Heritage, ISSMGE.

Prof. Iwasaki at present is working on fault displacement related disaster in Osaka area by a hidden faults as well as geotechnical conservation work of foundation mound in Angkor Cambodia.

ACTIVE FAULTS IN MEGA-CITY OF LOS ANGELES, OSAKA, AND ALMATY AND FAULT CHARACTERIZATION BY BORING DATA

Those Mega-cities like Almaty in Kazakhstan, Los Angeles in USA, and Osaka in Japan, where active faults are identified, need to estimate the deformation of the ground by these fault movements. At present, fault lines are estimated in Almaty only for Academic interests. Fault zones are shown in California to provide the land owners about the information of the area not to construct structures for people to stay in. In Japan, some local cities created a guideline of construction of building to be designed considering active faults. However, Osaka did not take any consideration of the active fault in the city except strong ground motions. In all of these cities, structural effects from fault displacements should be considered to not only independent buildings but also such lifelines of infrastructures of freeways, subway, and electric power as well gas lines. Especially, Almaty is the most dangerous situation among three cities. Geotechnical engineers in Kazakh should initiate the study of active fault and provide the damage potential and as well as effective countermeasures to protect the 1.5 million citizens in Almaty and to create resilient city.

EROL GULER

Dr., Professor

Department of Civil Engineering, Bogazici University

Dr. Guler is a Full Professor of Geotechnical Engineering at Bogazici University since 1989. For the 2017-2018 term he is a Visiting Professor at the George Mason University. Dr. Gьler has more than 35 years of experience in the field of geotechnical engineering. He has combined his academic experience to perform research and conduct multi-faceted geotechnical designs. His areas of expertise include foundation design with emphasis on pile foundations, slope stabilization, soil improvement, reinforced soil structures, soil stabilization and soil dynamics. He has performed also a large number of geotechnical investigations in various parts of Turkey for governmental agencies as well as private contractors. Dr. Gьler is a leading geotechnical engineer in Turkey with respect to his academic background, work experience and innovative practice in the field of geosynthetics. He has successfully implemented his research studies to practical problems in Turkey; he is particularly well known for his geosynthetic applications within the geotechnical engineering community. Professor Guler is very active in the Geosynthetics area and is an Elected Council Member of IGS (International Geosynthetic Society). He is also the Founding President of Turkish Chapter of IGS. He is also on the Editorial Board of the Journal “Geosynthetics International”. Professor Guler acts as the Convener of WG2 of ISO (International Standards Organization) Technical committee 221 on Geosynthetics and as Convener of WG2 of CEN (European Standards Organization) Technical committee 189 on Geosynthetics. He is an international Member of USA TRB AFS70 Geosynthetics Committee. Professor Guler is also active in ISSMGE and is Member of Board of the National Committee of Soil Mechanics and Foundation Engineering (ISSMGE) and Member of Soil Mechanics and Foundation Engineering (ISSMGE) Technical Committee on Reinforced soil Structures TC 218. At Bogazici University he served as the Chairman of Civil Engineering Department (2004 – 2010), Director of Environmental Sciences Institute (1996-1999), Senator (1996-1999). Professor Guler has more than 140 scientific publications, has supervised more than 20 Ph.D. and 60 M.Sc. thesis.

DESIGN OF COMPLEX BUILDINGS AND INFRASTRUCTURE IN TURKEY AND INNOVATIVE SOLUTIONS USING GEOSYNTHETICS

In this presentation designs of several complex foundations will be reported. These will include deep excavations and extreme foundation loads (both vertical and horizontal). Solutions for the difficult foundation and slope stability issues of the metro bridge across the golden horn will be summarized. Finally innovative solutions achieved with geosynthetics will be reported.

VICTOR N. KALIAKIN

Ph.D., Professor,
Department of Civil and Environmental Engineering, University of Delaware

Dr. Victor N. Kaliakin is a Professor in the Department of Civil and Environmental Engineering at the University of Delaware. He received his Ph.D. degree in Civil Engineering from the University of California, Davis in 1985. His research has focused on the computational geomechanics (development of robust continuum and interface elements; model implementation; simulation of field problems) and the constitutive modeling of cohesive soils, of "transition" silt-clay soils, and of geosynthetics. Prof. Kaliakin has supervised or been a member of more than 40 doctoral dissertation committees at the University of Delaware as well as other universities. He is the sole author of two books (*Approximate Solution Techniques, Numerical Modeling and Finite Element Methods*, published in 2001 by Marcel Dekker, and *Soil Mechanics: Calculations, Principles, and Methods*, published in 2017 by Butterworth-Heinemann) and has published more than 250 peer-reviewed book chapters, journal artices and conference papers. Prof. Kaliakin is a member of the ASCE Geo-Institute Soil Properties and Modeling Committee and the ASCE EMI Poromechanics Committee. He serves as an associate editor for Geosynthetics International. Prof. Kaliakin has been invited to give keynote/invited lectures and short courses in several countries. Prof. Kaliakin has been active in the organization of numerous syposia and workshops throughout the world.

MODELING THE TIME- AND TEMPERATURE-DEPENDENT RESPONSE OF COHESIVE SOILS IN A GENERALIZED BOUNDING SURFACE FRAMEWORK

The concept of a bounding surface in stress space was originally introduced to describe the of monotonic and cyclic behavior of metals. The prominent features of a bounding surface formulation are a) the existence of inelastic deformations for stress states within an outer ("bounding") surface, and b) the existence of a smoothly varying plastic modulus. These features represent definite advantages over classical rate-independent yield surface elastoplastic formulations, especially for "softer" materials such as cohesive soils.

Since the late 1970's, the bounding surface concept has been successfully used to simulate the response of cohesive soils. Initially, bounding surface models for such soils were developed in the context of rate-independent isotropic soil elastoplasticity. This was subsequently extended to include anisotropy and then time- and rate-dependence.

The predictive capabilities of bounding surface models for cohesive soils have been assessed by comparing numerical results with data obtained from standard laboratory tests, physical centrifuge models, as well as some field results. Typically, previous models for cohesive soils were based on the concept of a bounding surface in stress space have improved upon earlier versions of such models, enhanced the predictive capabilities of earlier models by expanding the model's features, or accomplished both of these tasks. Missing from the earlier development of bounding surface models for cohesive soils was any attempt to *synthesize* the many previous forms of these models. Such a synthesis was realized through the Generalized Bounding Surface Model (GBSM) for cohesive soils, which not only synthesizes many previous forms of the bounding surface model for cohesive soils, but also improves upon many aspects of these forms.

In its most general form, the GBSM for cohesive soils is a microscopically inspired, fully three-dimensional, time-dependent model that accounts for both inherent and stress induced anisotropy. In addition, to better simulate the behavior of cohesive soils exhibiting softening, the model employs a non-associative flow rule. Finally, the rotational hardening rule and the shape hardening function associated with the GBSM were chosen after a thorough review of past modeling practices; in both cases, the selected functional form simplified earlier versions of the bounding surface model without compromising the GBSM's predictive capabilities. In this lecture, the GBSM will be briefly outlined. Simulations of time-independent and time-dependent response will next be presented. Finally, the extension of the model to thermo-hydro-mechanical analyses will be outlined.

ASKAR ZHUSSUPBEKOV

Doctor of Technical Sciences, Professor
Department of Buildings and Structures Design, L.N. Gumilyov Eurasian National University
President of Kazakhstan Geotechnical Society

Prof. Askar Zhussupbekov is Head of the Department of Buildings and Structures Design of L.N. Gumilyov Eurasian National University (Kazakhstan) and President of Kazakhstan Geotechnical Society, member of ASCE and Russian Geotechnical Society. He received his Diploma of Civil Engineering (1977) from Saint-Petersburg State Architectural and Civil Engineering University (SPBGASU), Saint-Petersburg, Russia, and his Dr. Ph. Degree (1985) from SPBGASU (Russia), and his Doctor of Science degree (1996) from Karaganda State Technical University (Karaganda, Kazakhstan).

The main field of expertise of Prof. Askar Zhussupbekov is geotechnical engineering (piling and deep foundations), geomonitoring, undermining soil ground, disaster prevention and reduction, in situ testing. He carries out theoretical and experimental research, as well as consulting work for civil and geotechnical projects. He has been supervised more than 30 Dr. Ph. dissertations and 6 Dr. Engineering dissertations (included foreign Students from Russia, USA, Japan, Turkey, South Korea, Cambodia and Tajikistan). At 2015 he received the honorary Gersevanov medal from Russian Geotechnical society, at 2003 he received from President of Russia Mr. V.Putin the honorary medal which dedicated 300 years of celebration of Saint-Petersburg (Russia).

Prof. Askar Zhussupbekov has been extensively traveled to deliver the invited lectures regarding on the geotechnical problems with soft soil ground in different universities and companies all over the world. He has published more than 330 scientific papers including 3 books on Geotechnical Engineering. He organized several international geotechnical conferences around the world. He was Vice-President of ISSMGE for Asia since 2010-2013. Now Prof. Askar is Chairman of TC305 «Geotechnical Infrastructure for Megacities and New Capitals» of ISSMGE.

GEOTECHNICAL CONSTRUCTION OF MEGA PROJECTS ON PROBLEMATIC SOILS OF KAZAKHSTAN

Just as every civilization in the history is originated from the riverside, so the city of Astana - new capital of Kazakhstan has been developed around the Ishim River. As its result, there are many bridges across the river. Also high rise building such Palace of Peace, Khan Shatur, Abu-Dhabi Plaza, Ministry of Transporation Buildings, International Astana Airport, Mosque Hazret Sultan, New Railway Station, Expo2017 constructions site and other many structures founded in problematical soil ground of Astana. These unigue buildings need performing of deep driving and boring piling foundations. For designing of piling foundations on difficult soils are important investigations of behavior of piles by using of dynamic, static, O-cell, integrity piling tests. This paper includes of fresh results of several piling tests with comparison of numerical analysis by FEM. These investigations of interaction of piles with soil ground of new capital are important for understanding of mechanism of working of different piles on soft and hard soils of Astana. Also this paper introduced of experiences of piling constructions in winter season on freezing ground. The last page of paper includes recommendations and conclusion with proposing of methodic for the obtaining of bearing capacity and settlements of driving and boring piles on problematical soil ground of Astana.

MANOLIS VEVEAKIS

PhD, Assistant Professor

Department of Civil and Environmental Engineering Duke University

Manolis Veveakis earned a Ph.D. in 2010 from the Department of Mechanics of the National Technical University of Athens, Greece. Before joining Duke University, he was a Senior Lecturer at UNSW's School of Petroleum Engineering since 2014. Prior to that he was a Research Scientist in CSIRO's Division of Earth Sciences and Resource Engineering. Veveakis holds a Diploma (BSc+MEng) in Applied Mathematics and Physics (MEng in Materials Engineering), an MSc in Applied Mechanics and a PhD Geomechanics.

TOWARDS A UNIFIED MULTI-PHYSICS FRAMEWORK FOR ENVIRONMENTAL AND RESOURCE ENGINEERING

Sustaining the Earth's Critical Zone encompasses some of the biggest challenges in environmental and resource engineering. These include accommodating the increased need for extracting fuel energy in unconventional settings, enhancement of renewable resources (geothermal energy) and waste storage (nuclear, CO2) whilst ensuring the quality of water stored in the Critical Zone and minimizing the threat for catastrophic natural events like landslides. Tackling such vast challenges requires deep understanding of material responses under environments comprising a multiplicity of physico-chemical interactions and experiencing long-term natural loading.

In this work a multiphysical framework for Geomechanics is presented, aiming to account for and validate the contribution of the different processes taking place at various length and time scales. In sedimentary rocks, such processes include flow through porous media, diagenetic dissolution-precipitation reactions affecting the porosity and cohesion, as well as their influence on the macroscopic mechanical response of Geomaterials. The coupling of all these processes extends well-known material instabilities and localized failure modes (such as shear-banding) as bifurcations of the full thermo-poro-chemo-mechanical problem. Furthermore, such an approach can provide explanations for spatial (pattern formation) and temporal (stick-slip) periodicity frequently observed in engineering problems and geological formations, as well as earth science problems from engineering scale (landslides) to geodynamics (subduction zones).

Applications of this framework will be discussed for different settings. In particular, it is shown that considering thermo-chemo-hydro-mechanical couplings can regularize the mathematical system of equations and: 1. Provide novel information about the stability and lifetime prediction of deep-seated landslides and earth slides, 2. Determine the onset, spacing and thickness of any type of localized bands and fractures, like cracks, shear and compaction bands.

ZHANBOLAT SHAKHMOV

PhD, Associate Professor

Department of Buildings and Structures Design, L.N. Gumilyov Eurasian National University

Dr. Zhanbolat Shakhmov is Associate Professor of the Department of Buildings and Structures Design of L.N.Gumilyov Eurasian National University (Kazakhstan) and member of Kazakhstan Geotechnical Society, Kazakhstan Geosynthetical Society, also member Russian Geotechnical Society. Shakhmov Zhanbolat finished his bachelor diploma in July 2008, Master degree in July 2010 and finishing his study like PhD student of L.N. Gumilyov Eurasian National University. Also he has position Senior researcher of L.N.Gumilyov Eurasian National University. His major topic is related to frozen ground soil and influence to pavement or shallow foundations, also testing of the precast and cast in place piles. Also he participated in The 14th Asian Regional Conference on soil Mechanics and Geotechnical Engineering (2011, Hong Kong, China), Kazakhstan-Japanese joint geotechnical seminar (2010, Astana, Kazakhstan), Kazakhstan-Korean joint geotechnical seminar (2010, Astana, Kazakhstan), Kazakhstan-American joint geotechnical seminar (2011, Astana, Kazakhstan) and etc. He passed 5 month scientific training in Incheon National University (Republic Korea). He has published about 50 scientific papers on Geotechnical Engineering. Also there is published several articles related to frost heaving of the soil in Japan, Republic Korea, Uzbekistan, India. Participation on the scientific training courses in Germany (KIT Karlsruhe Institute of Technology and RWTH AACHEN University), Turkey (METU Middle East Technical University).

He has been supervised more than 10 Master dissertations and 1 PhD dissertations. At 2018 he received the rank as Best Teacher of 2017 by Ministry of Education and Science.

He co-organized several international geotechnical conferences around the world such as 8 The Eighth Asian Young Geotechnical Engineering Conference, Conference denoted to 75 years of the Tselinograd Civil Engineering Institute, Kazakhstan-USA Geotechnical Engineering Workshop.

ESTIMATION OF THE BEARING CAPACITY OF PILE FOUNDATIONS IN SEASONALLY FREEZING SOIL GROUND

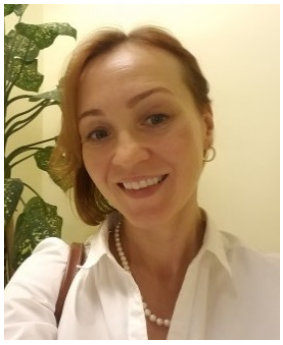
This paper incudes the short report about static load test of concrete piles (cross-section 4x4 cm and length of 60 cm) in seasonally freezing soil. Based on theoretical methods was calculated the ultimate load-carrying capacity of a pile by a simple equation as the sum of the load carried at the pile point plus the total frictional resistance (skin friction). There are several methods for the determination of the bearing capacity factors N_c^*, N_q^* . In this paper use the Meyerhof's method, which include the calculation of ultimate point bearing capacity of a pile in sand and reaches a maximum value at an embedment ratio and also was calculated the ultimate frictional resistance in sand (Q_s). Based on the values obtained was calculated the allowable pile load. According to Kazakhstan Standard, a safety factor (FS) of SLT is 1.2. In conclusion was presented analysis results of estimation of the bearing capacity of pile foundations in seasonally freezing soil ground.

ABSTRACTS

ST. ISAAC CATHEDRAL IN ST. PETERSBURG (RUSSIA):
BEHAVIOR OF A HISTORICAL MONUMENT IN A MEGACITY

Anna Shidlovskaya,
Associate Professor, Department of Hydrogeology and Engineering Geology,
St. Petersburg Mining University, Russia

Jean-Louis Briaud,
Professor, Zachry Department of Civil Engineering, Texas A&M University, USA



Abstract

The St Isaac Cathedral in St. Petersburg was completed in 1858 after 40 years of construction. The soils is a relatively soft saturated sediment and carries this 3138 MN structure which is 100 meters high with an imprint of 92 by 102 m. It is founded on a 7.5 m thick mat of granite and limestone blocks resting on relatively short timber piles of different lengths. The Cathedral has progressively experienced significant deformation including differential settlement causing cracks in the pillars and tilting of the porticoes. The paper summarizes the geotechnical engineering aspects of the soil on which the Cathedral is built as well foundation ultimate capacity and settlement analysis through simple calculations and numerical simulations. It also includes the influence of microorganisms on the behavior of the Cathedral through the changes the microbes and their activity create in the engineering properties of the soil.

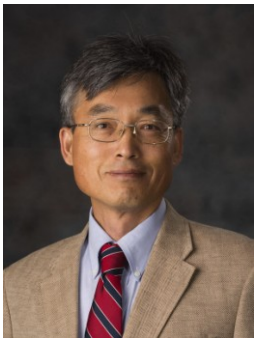
LESSONS LEARNED FROM HURRICANE KATRINA - WITH EMPHASIS ON COST EFFECTIVE RETROFITTING TECHNIQUES

Chung R. Song,
Associate Professor, Dept. of Civil Engineering, University of Nebraska – Lincoln,
362R Whittier, Lincoln, NE 68536, csong8@unl.edu

Ahmed Al-Ostaz,
Professor, Dept. of Civil Engineering, University of Mississippi,
207B Carrier, University, MS 38677, alostaz@olemiss.edu

Alexander H.-D. Cheng,
Professor and Dean, School of Engineering, University of Mississippi,
Brevard 229, University, MS 38677, acheng@olemiss.edu

R. Mantena
Professor, Dept. of Mechanical Engineering, University of Mississippi,
201B Carrier, University, MS 38677, meprm@olemiss.edu




Abstract

Hurricane Katrina brought unprecedented precipitation, causing widespread flooding in New Orleans and failure of its flood protection system in August 2005. The enormous destruction power of this tropical storm devastated the city causing 1,000+ casualties and $80 billion+ in property damage. Through the long recovery in the wake of this painful disaster, much research has been conducted and published regarding problems in administration, management, design, and construction. Engineers and researchers have applied these valuable lessons to design more resilient and sustainable flood protection systems. This paper presents new findings for cost effective but resilient retrofitting techniques. Some examples include placing a bentonite apron to prevent gap formation in the river side of the floodwall, erosion resistant materials at the levee crest, and reinforcing caps to prevent localized floodwall failure.

UNDERSTANDING PILE SETUP USING STATIC ANALYSIS METHODS

K. Ng,
Assistant Professor, Department of Civil and Architectural Engineering,
University of Wyoming, Laramie, WY, USA

R. Ksaibati,
Staff Engineer, Drash Consultants, LLC, TX, USA

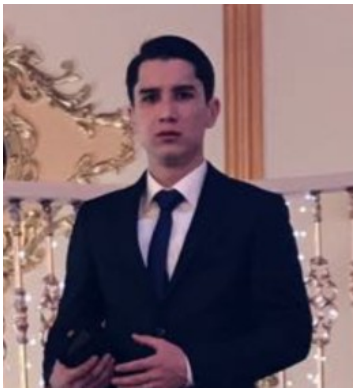
Abstract

Four medium-scale experiments were conducted in a laboratory setting at the University of Wyoming to better understand pile setup behaviors. Each experiment entailed compacting a soil profile consisting of cohesionless and/or cohesive soil in a large manhole and driving an instrumented steel pile model. Two experiments performed were entirely cohesive and cohesionless soil, and the other two experiments were conducted with mixed soil profiles simulating single and double drainage conditions. Cone penetration tests (CPT) were performed before driving and after static load tests to determine the change in soil properties as a result of pile setup. Alpha, Nordlund and CPT analysis methods were used to estimate both shaft resistance and end bearing of the pile models. Results showed that pile setup occurred in cohesive layers, facilitated by drainage layers, and is contributed mainly from the gain in shaft resistance.

RESEARCH OF MULTI-STORY BUILDING
IN EARTHQUAKE-PRONE REGIONS OF KAZAKHSTAN

T.K. Muzdybayeva
Scientific Director, Associate Professor of the chair "Designing of buildings and constructions",
L.N.Gumilyov Eurasian National University, Kazakhstan

A.S. Omarov
Master Student, Department of Civil and Structural Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan



Abstract

An earthquake is a seismic phenomenon that occurs as a result of sudden displacements and breaks in the earth's crust or upperpart of mantle that is transmitted over large distances in the form of sharp fluctuations that leads to destruction of buildings, fires and human victims. It takes first place in economic damage also in number of dead and injured people. Every year on earth happens to 100,000 earthquakes, but most of them are weak, they are fixed with high-precision devices – seismographs. Seismic resistance is the ability of buildings and structures to withstand earthquakes with minimal damage. Seismic resistance of an object depends on its height, its weight in general, the structural system, which assumes seismic effects, seismic regions, where a project is constructed, including micro seismic regionalization, as areas of low seismic activity may exist geological faults, which can be increased geodynamic hazard of the individual objects, especially high-rise buildings.

RE-CONSIDERATION OF LIQUEFACTION PHENOMENA

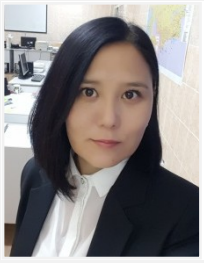
Akitoshi Mochizuki,
Visiting Professor of L.N.Gumilyov Eurasian National University, Japan

Gulzhanat Tanyrbergenova,
Lecturer, L.N.Gumilyov Eurasian National University, Kazakhstan

Risa Kousaka,
Engineering group, LNG, Futtsu TPS, TEPCO Fuel&Power, Inc., Japan

Gaziza Zhussipbekova,
Master Student, L.N.Gumilyov Eurasian National University, Kazakhstan

Yerkebulan Orazbayev,
Master Student, L.N.Gumilyov Eurasian National University, Kazakhstan


Abstract

Hyogoken-Nanbu quake, Kobe, Japan (1995, M=7.3., "Kobe quake") proved that the horizontal seismic intensity method was not enough to prevent damages of houses and infrastructures from quakes, which forced forward revisional study on every issue related to an earthquake event. The purpose of this paper is to revise liquefaction phenomena based on both a series of cyclic tests of a sand sample and records of liquefaction at several relict sites in Tokushima, Japan.

After a short history regarding to liquefaction events in Japan had been reviewed, first, a case from Kobe quake in which a liquefied layer works as a buffer layer to quake excitation was introduced. Then liquefaction mechanism is re-considered using a series of cyclic shear test under CU condition. From the fact of tests, a shrinkage phenomenon by cyclic shear is considered as phenomenon of homogenization of a sample, the mechanism of which is named as *"the packed train effect"*. And it is pointed out that an image of a liquefied soil sample like liquid which is used very often in many textbooks, is not correct.

The possibility of *"a kind of liquefaction"(*it means increase of pore water pressure in a layer) even in a dense sand layer from the viewpoint of newly presented concept "the packed train effect" is discussed about. It was emphasized that the essential condition for liquefaction of a layer was shear loading under CU condition, not the condition of saturation of a sample. Repeatability, selectivity properties and direction of sand jet chains of liquefaction from the investigation of reports and the records at relict sites in Tokushima, Japan are discussed.

EXPERIENCE IN IMPROVING WEAK STRUCTURALLY UNSTABLE AND LOESS BASES OF BUILDINGS IN SEISMIC REGIONS

V. Khomyakov,
Department of the Civil Engineering, Kazakh Leading Academy of Architecture and Civil Engineering, Almaty, Kazakhstan, khomyakov57@list.ru

E. Bessimbaev,
Department of the Civil Engineering, Kazakh Leading Academy of Architecture and Civil Engineering, Almaty, Kazakhstan

Abstract

The results of the improvement of bases from loess collapsing clay soils during construction of high-rise buildings in seismic regions of Kazakhstan are presented. On the example of strengthening the loess foundation of 9-storey buildings, the effectiveness of the use of non-pile foundations is shown, and the base reinforced with vertical elements. The reinforcing elements in the form of rolled wells with a diameter of 300 mm were used. The cavity of rolled elements was filled with concrete of class B7.5. Reinforcing elements allowed to increase the strength and deformation properties by 2-3 times. The depth and step of the arrangement of the elements is taken from the conditions for the base of an array of such dimensions, which ensures the operational desirability of the structure. The depth of the improved zone is made 8-11 meters within the height of the compressible basement. Technical conditions for the construction of bases reinforced with vertical elements have been developed. A layer of gravel or compacted local soil with a height of at least 600 mm is laid on the surface of the hardened foundation. This layer ensures a uniform transfer of load from the building to the improved base. The operability of the model of the adopted foundation is verified by analytical calculations on the PLAXIS PC. Laboratory tests of building models on a reinforced and non-reinforced base have been carried out. Models were tested in a tray on a vibrodynamic platform. Research have shown the effectiveness of a soil base reinforced with vertical elements under seismic conditions.

CENTRIFUGE MODELLING ON GRANULAR FLOW AND BOUNDARY EROSION

Liming Li,
PhD, Department of Civil Engineering and Engineering Mechanics,
Columbia University, New York, USA

Chi-Yao Hung,
PhD, Department of Soil & Water Conservation,
National Chung Hsing University, Taichung, Taiwan

Abstract

Boundary forces generated by debris flows can be powerful enough to erode bedrock and cause considerable damage to infrastructure during runout. Performing experiments large enough to generate realistic boundary forces is a challenge. An alternative is to run table-top simulationswith unnaturally weak but fast-eroding pseudo-bedrock, another is to extrapolate from microerosion of natural substrates driven by unnaturally weak impacts. A different approach was taken by using centrifuge modelling to scale up the granular impact forces and produce boundaryerosion. A 40cm-diameter rotating drum on the centrifuge at effective gravity levels up to 100 g was deployed to generate analog debris flows with an effective flow depth up to several meters. The granular flow and boundary erosion were studied (a) by using high speed video and particle tracking to measure their velocity fields, and (b) by mapping patterns of wear in a synthetic bedrock wall plate using 3D micro-photogrammetric methods. By combining these experimental results with theoretical developments, basic ingredients for constructing an erosion law for sliding wear at the margins of a dense granular flow were obtained.
Keywords: debris flow, dense granular flow, bedrock erosion, natural hazards, centrifuge modelling

FEATURES OF USING CONTROL EQUIPMENT FOR PILE TEST ACCORDING AMERICAN AND KAZAKHSTAN STANDARDS

A. Zh. Zhussupbekov,
Professor, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan

A.S. Tulebekova,
Associate Professor, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan

V.N. Popov,
General Director, "KaragandaGIIZ and K" LLP, Kazakhstan*

N.T. Alibekova,
Associate Professor, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan

A.K. Tleubayeva,
Associate Professor, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan





Abstract

This paper presented methodic of testing pile by ASTM D1143/D1143M-07 (USA) standard and GOST 5686-94 (Kazakhstan) standard. The methodic of testing piles by these standards have some differences. Discussion of using control equipments, technological features, advantages and disadvantages of aforementioned methodics might be important for understanding the difference points. The papers include the results of static tests of piles by using two different standards. This full field scale piling tests were performed in problematical soil ground of construction sites of new capital Astana (Kazakhstan).

CHECKING INTEGRITY OF BORED PILES USING TWO METHODS: LOW STRAIN METHOD AND CROSS-HOLE SONIC LOGGING - EXPERIENCE OF APPLICATION

Askar Zhussupbekov,
Professor, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan

Nurgul Alibekova,
Associate Professor, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan

Ivan Morev,
Test Engineer, KGS LLp, Kazakhstan

Nurgul Shakirova,
Ph.D student, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan

Karlygash Borgekova,
Ph.D student, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan





Abstract

At the present time, in Astana city is going on works by construction public transport system LRT (Light Railway Transport). LRT is an overhead road with two railway lines. The first stage of construction is including construction of overhead road (bridge) with 22,4 km length and 18 stations. The foundation of bridge is the bored piles with cross-section 1.0x1.5 m and length 8x35 m. Design bearing capacity of piles is 4500x8000 kN. For boring soil using Chinese drilling rigs Zoomlion without casing. To maintain the walls of boreholes in sand and gravel soils using polymer slurry. In these conditions, very important to control integrity of concrete body of each bored piles. For checking integrity applying two methods - Low Strain Method and Cross-Hole Sonic Logging. The aim of this paper is to discuss the advantages and disadvantages of each method using the examples of a real application.

FIELD TESTS OF SOILS BY PRECAST CONCRETE JOINT PILES

A. Zhussupbekov,
Professor, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan

A. Omarov,
Senior Lecturer, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan

K. Borgekova,
PhD Student, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan

B. Abdrakhmanova,
Master Student, Department of Civil Engineering,
L.N.Gumilyov Eurasian National University, Kazakhstan

A. Firtser,
President, SHIMANSKI OY Co, Ltd, Finland





Abstract

The paper presents the comparison of the results of field tests of soils on the construction site of Cargo offloading facility in the Northeast part of the Caspian Sea in Kazakhstan. Facility is designed to offload the cargo handling bulky and general cargo in the Caspian Sea delivered by river/sea transport. Field static and dynamic tests of soils were carried out by precast concrete joint piles with total lengths of 27,5 m and with cross section of 40x40 cm. Precast concrete piles are composed of two segments: the bottom segment with length of 16.0 m and upper segment with length of 11,5 m. Analysis of field tests results showed that the bearing capacities of piles in static and dynamic tests are more or less similar. Consequently, according to their results, the dynamic tests with PDA to determine bearing capacity of piles appeared to be reliable and more economical.

CENTRIFUGE MODELING OF GABION FACING GEOSYNTHETIC REINFORCED SOIL RETAINING WALLS

L. Xu, H. I. Ling, L. Li,
Department of Civil Engineering & Engineering Mechanics, Columbia University, USA

J. G. Collin,
The Collin Group Inc., USA

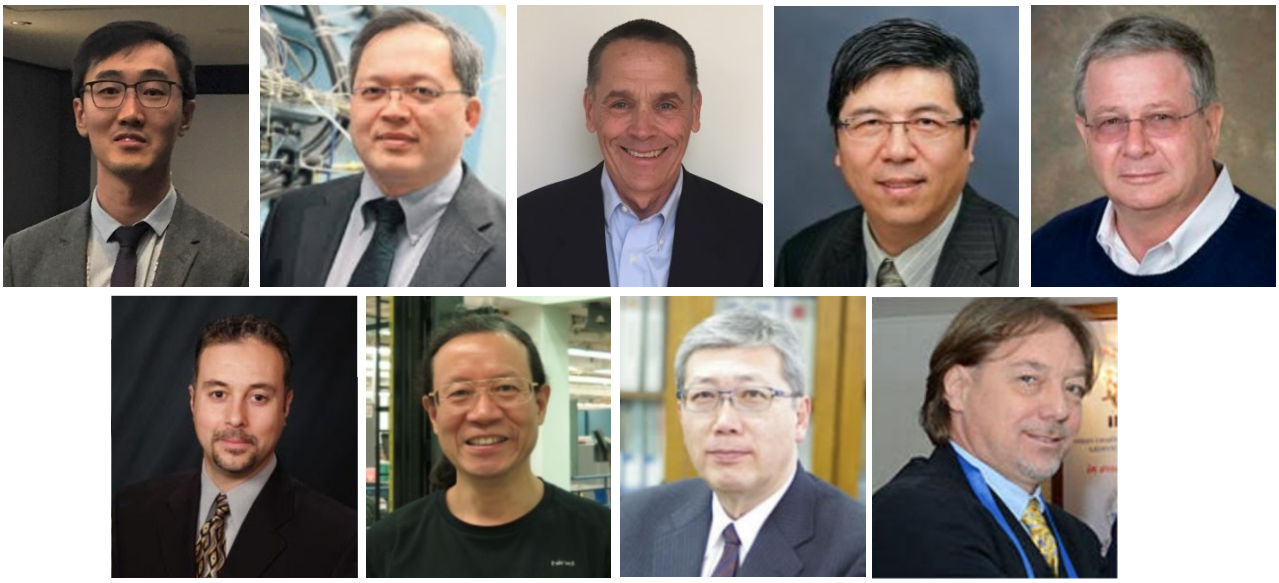
J. Han,
Dept. of Civil, Environmental, and Architectural Engineering, the University of Kansas, USA

D. Leshchinsky,
ADAMA Engineering Inc., USA

B. Tanyu,
Dept. of Civil, Environmental, and Infrastructure Engineering, George Mason University, USA

T. Kawabata,
Department of Agricultural Engineering, Kobe University, Japan

P. Rimoldi,
Officine Maccaferri SpA, Bologna, Italy



Abstract

Centrifuge modeling provides a less expensive mean of studying the behavior of reinforced soil retaining walls under well controlled testing environment. In this study, two reinforced soil retaining walls of height 15.3 m were tested in the centrifuge under 50g acceleration. The wall model was backfilled with a fine sand, compacted up to a height of 32 cm on a foundation soil of 5 cm. The wall facing was constructed using gabions replicating an existing system. A fiber glass mesh of length 35 cm was used in modeling a reinforcement having prototype length of 17.5 m. The first and second walls were of a vertical reinforcement spacings of 2 cm and 4 cm (prototype spacings of 1 m and 2 m), respectively. The walls were instrumented with a number of strain gages in the reinforcement layers and earth pressure transducers at the gabion facing as the centrifugal field is increased in steps to 50g. Photos were taken during spinning from which the deformation of the facing and settlements were obtained. Measured deformations, earth pressures and reinforcement strains of the two wall configurations are compared.

ADAPTATION OF EUROCODE "GEOTECHNICS-7" IN THE BUILDING NORMS OF THE REPUBLIC OF KAZAKHSTAN

A. S. Zhakulin,
Full Professor, Department of Civil Engineering and Architecture,
Karaganda State Technical University, Kazakhstan

A. A. Zhakulina,
Associate Professor, Department of Civil Engineering and Architecture,
Karaganda State Technical University, Kazakhstan

V.A. Nephedov, N.I. Popov, A. Tungatarov,
PhD students, Department of Civil Engineering and Architecture,
Karaganda State Technical University, Kazakhstan





Abstract

The introduction of Building Norms in construction in Republic of Kazakhstan taking into consideration principles of Eurocode “Geotechnics-7” in 2015-20 predetermines necessity of revision and clarification of provision of building codes and national standards for the design ground foundations. Building norms of foundation design developed nearly 40 years ago for the vast territory of the USSR taken without considering the behavior of soil conditions on the territory of Kazakhstan. The following article represents results obtained from foundation bearing capacity analysis carried out by international and Kazakhstani researchers. Evaluation of soil bearing capacity, that are used in USA and Europe, are based on Terzaghi-Prandl solution and that of Meyerhof. The solutions considered in this article based on premise of stiff wedge propagation under foundation base made of compacted soil. Advancing of following wedge further down impacts on surrounding soil and pushes it to ultimate state. The design of basements and foundations in Kazakhstan is planning to shift to Eurocode “Geotechnics-7”, in that case, approach of foreign researches will be used. In studies, conducted by the authors, there is an analysis of the differences between the regulations and principles of design in Eurocode. When determining the bearing capacity according to Eurocode "Geotechnics - 7", calculation is based on bearing capacity, and then is validated by the strain. In Kazakhstan’s building norms, the procedure requires first calculation of the strains, and only in certain cases, bearing capacity check takes place. Comparing methods to determine the limit pressure to the soil, we note that our regulatory documents used solutions of limit equilibrium theory, suggesting that the entire soil under the foundation is in the process of plastic flow. The paper presents comparative calculations of bearing capacity of shallow and pile foundations for engineering-geological conditions of the site for the city of Karaganda. Results of geological engineering survey analysis represent that the foundation soil in many design parameters are different. In recent years, the government has set a problem for building committee to adapt existing regulations to the basic principles of basement and foundations design of Eurocode "Geotechnics-7". Thus, to shift to the main aspects of international norms, it is necessary to adapt basic principles of basement and foundation design. Taking into account particular geological conditions on the vast territory of Kazakhstan, design characteristics of foundation soils needs to adapt as well.

THERMAL RESPONSE OF A HORIZONTAL HEAT EXCHANGER

T. Baser,
Postdoctoral Research Associate, Department of Civil and Environmental Engineering,
University of Alberta, Canada

Abstract

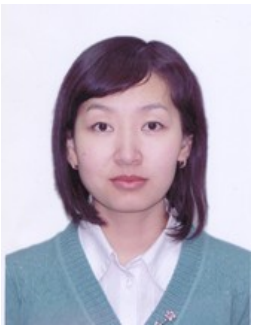
This paper focuses on the characterization of transient thermal response of horizontal heat exchange system installed in an unsaturated soil layer. Horizontal heat exchange systems are relatively cost-effective compared to vertical heat exchange systems when there is sufficient space available due to ease of installation in trenches and maintenance. Because these systems are installed very close to the surface (i.e. up to 5 m), there are numbers of factors affecting heat transfer such as ambient air temperature penetration into the ground and coupled heat transfer and water flow. Extensive heat transfer analyses have been developed to evaluate the vertical heat exchange systems, but fewer focus on the transient thermal response. To investigate the effect of different heat transfer mechanisms in the subsurface, a three-dimensional (3D), transient finite element model was built in COMSOL to investigate the effect of transient weather and thermal loading conditions as well as coupled heat transfer and water flow processes within a horizontal heat exchange system. The actual ambient air data and operational inlet fluid temperatures as well as coupled thermos-hydraulic soil properties were used in the analysis to assess the effect of different heat transfer mechanisms and outlet pipe temperatures were compared.

ASSESSMENT PECULIARITIES OF THE CONSTRUCTIONS STABILITY IN THE AREAS OF AFFECTED BY MINING OPERATIONS

G. Kadyralieva,
Institute of Geomechanics and Development of subsoil of the National Academy of Sciences of the Kyrgyz Republic, Bishkek, Kyrgyzstan, gulzat_7@list.ru

B. Dzhakupbekov,
Institute of Geomechanics and Development of subsoil of the National Academy of Sciences of the Kyrgyz Republic, Bishkek, Kyrgyzstan, belekjak@gmail.com

S. Kuvakov,
Institute of Geomechanics and Development of subsoil of the National Academy of Sciences of the Kyrgyz Republic, Bishkek, Kyrgyzstan, stalbekuvakov@gmail.com



Abstract

In connection with the migration flow and the growth of cities in recent years, there has been an active construction of high-rise buildings in the Kyrgyz Republic. The huge and chaotic development of the capital of the country of Bishkek has become a big problem for both city dwellers and environmentalists. In addition to the climatic and seismic conditions of the region, which complicate the stability of apartment house, construction is also carried out near mining operations that take place on the outskirts of the city. And in connection with the expansion of the city's areas, the growth of apartment houses has started more and more near such sites, which causes special issues and concern of the population and buyers of apartments of such houses. Concerning to this, the purpose of our study is assessing peculiarities of the stability of the foundation of structures in affecting zones of mining operation. Under these circumstances, it is first necessary to calculate the stability of the pit for the calculation of which the Bishop-Jambu method was used.

COLLAPSE MECHANISMS OF SHALLOW TUNNEL IN SANDY GROUND

Bartlomiej Dziuban,
Master Student, Columbia University, New York

Abstract

This paper presents the results of centrifuge tests on collapse mechanisms of shallow tunnels in sandy ground with varying cover-to-diameter ratio (C/D=0.3, 0.5, 0.7) and water content (dry, 5%, saturated), under increased gravitational acceleration 50g. The goal of these experiments was to investigate the shape and propagation of collapse mechanism at the tunnel face. Half-space tunnel was modeled, in which linear actuator was used to withdraw a tunnel face at a constant rate up to 5mm displacement (5% of tunnel diameter). Failure zone and surface settlement were observed through a transparent acrylic wall and measured by image analysis software. With increasing C/D ratios the extent of the funnel was wider. The water content influenced the extent of surface settlement. Test using dry sand had the biggest settlement, while tests performed under saturated conditions had smaller settlement but the deformation covered a wider area. Results were then compared with theoretical models.
Keywords: centrifuge modeling, face stability, shallow tunneling, collapse mechanism.