24 HOURS OF CONCRETE KNOWLEDGE

Hosted by the American Concrete Institute • July 9-10, 2024

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24 HOURS OF CONCRETE KNOWLEDGE

TUESDAY, JULY 9, 2024

Welcome from ACI Global Moderators Michael Paul and Maria Juenger

WEDNESDAY, JULY 10, 2024

Closing remarks from ACI Global Moderators Michael Paul and Maria Juenger

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American Concrete Institute
Always advancing

ACI Global Moderators

Michael Paul, ACI President, Larsen & Landis

Maria Juenger, ACI Vice President, University of Texas at Austin

Tuesday, July 9, 2024
9:00-10:00 PM Baghdad Time / 2:00-3:00 PM EDT (New York Time)
Co-Host Organization: ACI Iraq Chapter

Website: https://aci-iraq.com

The ACI Iraq Chapter was established in August 2013. The aim of the Chapter is to promote concrete knowledge through academic institutions and concrete industries. To achieve its objective, the main Chapter activities are education seminars, training workshops, student project competitions, and ACI Certification programs. Recently, the Chapter successfully coordinated between the Iraqi Ministry of Construction, Housing, Municipalities and Public Works and ACI, where they signed an International Partnership Agreement (IPA). The ACI Iraq Chapter started to translate ACI 318 into Arabic to increase the use of this Code in the Arabic world.

Local Moderator: Ali Naji Attiyah, Assistant Professor, University of Kufa

Dr. Ali Naji Attiyah is an Assistant Professor in the Department of Civil Engineering at the University of Kufa, Kufa, Iraq. He graduated from the Department of Civil Engineering in 1986 and completed his higher studies in structural engineering at the University of Baghdad, Baghdad, Iraq. After graduation, he worked in both academic and professional fields and had good experiences in the structural design of concrete buildings and other structures. At the University of Kufa, he was the Manager of the Engineering Consulting Office and, through this mission, was the Director of many important projects. In addition, he taught different courses dealing with concrete, such as concrete technology and concrete design. He succeeded with his colleagues from other Iraqi universities in establishing the ACI Iraq Chapter, where he was elected as the first Executive Director of the Chapter in September 2013.

From 2015 to 2016, Attiyah was awarded $50,000 from the U.S. Department of State as a part of the University Linkages Program (ULP). The program was implemented at the College of Engineering and administered by the American organization International Research & Exchanges Board (IREX) and was titled "Move from Traditional Education to Outcomes-Based Education." In mid-2015, he was appointed by the Ministry of Higher Education and Scientific Research as a member of the Iraqi Council of Improving the Quality of Engineering Education. In 2018, the council's name was changed to the Iraqi Council of Accreditation for Engineering Education (ICAEE); Attiyah was appointed Chair from 2018 to 2020.

1st Speaker: Haitham Hassan Muteb, Professor, University of Babylon

Dr. Haitham Hassan Muteb is a Professor of structural engineering in the College of Engineering at the University of Babylon, Hillah, Iraq. He has supervised 70 MSc students and 32 PhD students. He worked as a structural designer (steel and concrete structures) in Iraq using computer software aiding structural design and drafting (Abaqus, Ansys, ETABS, SAFE, SAP2000, Tekla, STAAD.Pro, PROKON, Revit, Autodesk 3ds Max, and AutoCAD). He also worked as Director of Scientific Affairs and Graduate Studies at the College of Engineering at the University of Babylon. He was the Head of the Consulting Bureau of the Iraqi Engineers Union (Babylon Branch) in 2006. He participated in the Iraqi Codes Committees, such as the Iraqi Code of Steel Structures and the Iraqi Code of Protecting Building from Fires. He has participated in international conferences, such as

ICEFA VII 2016: 7th International Conference on Engineering Failure Analysis in Leipzig, Germany; the 2017 World Congress on Advances in Structural Engineering and Mechanics in Seoul, South Korea; the 2nd International Conference on Structure and Civil Engineering Research (ICSCER 2018) in Prague, Czech Republic; and the ACI Concrete Convention – Fall 2019 in Cincinnati, OH, USA.

Muteb received his BSc in civil engineering from the University of Mosul, Mosul, Iraq, in 1989; his MSc in civil engineering (structures) from Al-Nahrain University, Baghdad, Iraq; and his PhD in civil engineering (structures) from the University of Baghdad, Baghdad, Iraq.

Presentation Title: Factors to Consider for Hot Weather Concreting

The average temperature in Iraq is approximately 38°C (100.4°F) in July and August and below zero in January and February. Most of the rain occurs between December and April, and its average ranges between 340 and 512 mm annually. From this, we conclude that Iraq's climate is hot and dry in summer and cold and rainy in winter. As a result, study and instruction on the topic of concrete production in hot climates are crucial.

When the temperature of freshly mixed concrete rises to approximately 25°C (77°F), adverse site conditions can have an impact on the concrete's quality. Ambient temperatures above 33°C (91.4°F), as well as a lack of a protected environment for concrete placement and finishing (an enclosed building), can make it difficult to produce high-quality concrete. With proper planning and execution, concrete can be successfully placed and finished at 33°C or higher, producing high-quality, long-lasting concrete.

The effect of high ambient temperatures and high-temperature concrete component materials on the setting time of concrete mixtures is a topic of concern due to the reduced time in which concrete must be placed, consolidated, and finished; increased potential for plastic shrinkage cracking, thermal cracking, and cold joints; potential strength reduction due to high water demand and high curing temperatures; difficulty in controlling air content; and increased urgency.

This study will focus on the most crucial factors, precautions, and aspects that need to be taken when placing concrete in hot weather.

2nd Speaker: Dr. Nabeel Abdulazeez Ibraheem, Civil Engineering Department Head, National Center for Engineering Consultancy (NCEC), Ministry of Construction and Housing of Iraq

Dr. Nabeel Abdulazeez Ibraheem has been a Consulting Engineer for the last 20 years and a practicing engineer for 10 years prior. He is currently the Head of the Civil Engineering Department in the National Center for Engineering Consultancy (NCEC)/Ministry of Construction and Housing of Iraq. NCEC is one of the most recognized design and consultancy organizations in Iraq. Since 1991, he has worked in a design, supervision, and consultancy environment. In addition to reinforced concrete, he specializes in the design of structural steel. His work career started in Iraq, Malaysia, Jordan, the United Arab Emirates (UAE), and Syria, where he worked in some of the recognized consulting firms and leading companies. He is an ACI member. Periodically, he presents seminars and lectures on different subjects in the structural engineering field through the Iraqi Engineers Union, the Society of Iraqi Engineers, and others. He received his BSc in building and construction engineering from the University of Technology, Iraq, Baghdad, Iraq, in 1991, and his MSc and PhD in structural engineering from the same university.

Presentation Title: Tips on Shotcrete

The hardened properties of shotcrete are similar to those of conventional cast-in-place concrete; the nature of the placement process results in an excellent bond with most substrates and rapid or instant capabilities, particularly on complex forms or shapes. Shotcrete is applied using a wet- or dry-mix process. The wet-mix shotcrete process mixes all ingredients, including water, before introduction into the delivery hose. The dry-mix shotcrete process adds water to the mixture at the nozzle. Shotcrete has been used for structural concrete sections for decades. Although many engineers allowed shotcrete placement in their projects, there were no Code provisions directly in ACI 318. In 2019, ACI 318-19 recognized the value of shotcrete in structural concrete for buildings and added shotcrete-specific Code requirements.

Shotcrete can be used instead of conventional concrete in many instances; the choice is based on convenience and cost. Shotcrete offers advantages over conventional concrete in a variety of new construction and repair work. Reinforcement details may complicate the use of shotcrete, but shotcrete is particularly cost-effective where formwork is impractical or where forms can be reduced or eliminated; access to the work area is difficult; thin layers, variable thickness, or both, are required; or normal casting techniques cannot be employed. The excellent bond of shotcrete to many materials is sometimes an important design consideration.

The future of shotcrete is limited only by the speed of development of new materials, equipment, and techniques. A prime example of the major expansion in the use of shotcrete is the early and final linings of ground support in tunnels and mines. Improvements in prepackaged products; accelerating and set-controlling admixtures; the use of fibers; and specially designed equipment, including robotic and remote-controlled shotcrete devices, have spurred the development of ground support techniques competitive with conventional steel rib and lagging supports.

Tuesday, July 9, 2024
2:00-3:00 PM Bogotá Time / 3:00-4:00 PM EDT (New York Time)
Co-Host Organization: ACI Colombia Chapter

Website: https://acicolombia.org.co/

The ACI Colombia Chapter is a technical and educational society dedicated to promoting the design, construction, manufacture, and maintenance of concrete structures. The Chapter was created in 1977, and since then, it has published quarterly newsletters and held seminars to promote knowledge among its members and professionals or students interested in expanding their research. The Chapter promotes the objectives of ACI, which are to encourage education, technical practice, and scientific research for the development of new techniques.

Local Moderator: Gonzalo Gallo, PhD

Gonzalo Gallo is the Director of the Structural Engineering Division of INGETEC. He has overseen the structural analyses for projects worldwide and has been part of the structural engineering designs for many of INGETEC's main civil works. With over 15 years of experience, he has been involved in the design of hydraulic structures, dams, spillways, powerhouses, water supply systems, water treatment plants, tunnels, pipelines, steel and reinforced concrete structures, warehouses, roads, bridges, transmission lines and switchyards; preparation of technical specifications and terms of reference; coordination of civil designs; and technical advisory for the construction of hydraulic, urban, and industrial works. He has been involved in the ACI Republic of Colombia Chapter for several years. He is also a member of ACI Committee 207, Mass and Thermally Controlled Concrete.

Gallo received his bachelor's degree in civil engineering from the Universidad San Francisco de Quito, Quito, Ecuador, and his master's and doctoral degree in structural engineering from the University of Illinois Urbana-Champaign, Urbana, IL, USA. He also completed his postdoctoral studies in mass concrete at the University of Florida, Gainesville, FL, USA, working with the Florida Department of Transportation (FDOT).

1st Speaker: Juan F. Correal, PhD, PE, FACI

Juan F. Correal is a Civil Engineer with over 25 years of experience. He was previously the Director of the Integrated Civil and Environmental Engineering Laboratory and Chairman of the Department of Civil and Environmental Engineering at the Universidad de los Andes, Bogotá, Colombia. Through the Research Center on Materials and Civil Works (CIMOC) of the Universidad de los Andes, he has been working as a Director and Principal Investigator of different projects in the public and private sectors on issues related to the seismic design and performance of structures. He has advised more than 100 students in the structural field and has more than 150 publications on materials, design, and seismic behavior of structures.

Correal is an ACI Fellow and a member of ACI Committee 374, Performance-Based Seismic Design of Concrete Buildings, and ACI Subcommittees 318-D, Members; 318-L, International Liaison; and 318-S, Spanish Translation. He received the ACI Design Award for the paper "An Insight into the Space Building Collapse" in 2018. He is also a member of the American Society of Civil Engineers (ASCE), and in 2020, he received the "Outstanding Journal Paper Award for 2018" from ASCE's *Journal of Performance of Constructed Facilities*. Correal is the Past President of the Colombian Association for Earthquake Engineering (AIS), where he has

been working on the development of different Colombian building and bridge regulations. He is currently President of the Colombian Association of Structural Engineers (ACIES) and is a member of the National Advisory Commission on the Colombian Building Code, the technical authority for the seismic design of buildings in Colombia.

Correal received his undergraduate and master's degrees from the Universidad de los Andes, and his PhD from the University of Nevada, Reno, Reno, NV, USA. He is also a licensed professional engineer in the state of California, where he designed different housing projects and commercial and civil infrastructure works.

Presentation Title: **Study of Intermediate Structural Wall Based on Colombian Seismic Code**

Colombia is perhaps the only country in the world that includes in its Seismic Resistance Construction Regulation (NSR-10) requirements for the seismic design of intermediate structural concrete walls with moderate energy dissipation capacity (DMO in Spanish). These design requirements have been in place since the 1998 version of the regulation and were established to ensure an adequate seismic-resistant design for areas of intermediate seismic hazard, where approximately 47% of the country's population lives. Additionally, this system is one of the most used in the country, as approximately 50% of residential buildings over six stories have been built with reinforced concrete walls. On the other hand, due to recent earthquakes in the world (Chile in 2010 and New Zealand in 2011), some deficiencies in the design of buildings with this type of system have been evidenced. Based on the aforementioned and considering that to date, there have been no earthquakes of considerable magnitudes in areas of intermediate seismic risk in Colombia, the Research Center on Materials and Civil Works (CIMOC) of the Universidad de los Andes and Estrenar Vivienda, for the first time in the country, developed research aimed at evaluating the seismic behavior of buildings with DMO structural wall systems and to determine if the requirements of NSR-10 are adequate. For this unprecedented research in Colombia, it was decided to use the methodology established by the U.S. Federal Emergency Management Agency, FEMA P-695. It involved conducting tests on walls at full scale, simulating multiple floors in height, as well as the development of computational models of buildings that allow for incremental dynamic analysis to establish whether the seismic performance of the system meets the target performance levels of the seismic-resistant design set by NSR-10.

2nd Speaker: Kevin Andrés Tami Torres, MSc

Kevin Andrés Tami Torres is a Civil Engineer from the Universidad Nacional de Colombia, Bogotá, Colombia. He received his master's degree in structural engineering from the Escuela Colombiana de Ingeniería Julio Garavito, Bogotá, Colombia, where he has been a full-time Professor since 2022. He is Co-Director of the structures, materials, and construction undergraduate investigation group at the university, where he currently leads investigations regarding the behavior and sustainability of concrete with various additions.

Presentation Title: **Shear Behavior of Post-Installed Anchor Connections Strengthened with FRP Laminates**

Anchoring systems are not always considered in design stages, leading to a large amount of post-installed steel-to-concrete connections that are embedded in a concrete mass without anchor reinforcement. In shear-loaded anchor connections, the edge distance is crucial in determining the capacity of the system. In a wide range of applications, the distance between the anchoring system and the concrete edge is minimal, which may result in the need for a reinforcement alternative that prevents the concrete breakout mode of failure. An experimental program was conducted to compare different external fiber-reinforced polymer (FRP) laminate reinforcement schemes. The investigation involved unreinforced and externally reinforced specimens, as well as current code-compliant specimens with cast-in anchor reinforcement. The results show an increase in the strength and ductility of FRP-reinforced specimens compared to unreinforced specimens, thus presenting an attractive alternative for improving the performance of shear-loaded post-installed anchored connections with reduced edge distance.

Tuesday, July 9, 2024
2:00-3:00 PM Guatemala City Time / 4:00-5:00 PM EDT (New York Time)
Co-Host Organizations: **ACI Guatemala Chapter** and **Instituto del Cemento y del Concreto de Guatemala (ICCG)**

American Concrete Institute Guatemala Chapter

INSTITUTO DEL CEMENTO Y DEL CONCRETO DE GUATEMALA

Websites: https://www.concrete.org/chapters/findachapter/chapterhome.aspx?cid=C0C11100 and https://www.iccg.org.gt/

The ACI Guatemala Chapter was founded in 2006 and currently has 31 international members, 30 local members, and 1429 student members. Within their main activities, the Chapter sponsors events targeted to the 24 active Student Chapters in Guatemala—for example, seminars, ACI Certifications (reduced price), and competitions (National Competition of Concrete Cylinders since 2012, Research Award since 2015, and Concrete Soccer Ball Competition since 2019). Chapter members have also been active participants in the National Standardization Technical Committees of Cement and Concrete. The ACI Guatemala Chapter conducts seminars aimed at professionals and technicians and is also a Local Sponsoring Group (LSG) that currently develops six ACI Certification programs. Most of the Chapter activities are developed with the support of the Instituto del Cemento y del Concreto de Guatemala (ICCG), an ACI International Partner with whom ACI has a Memorandum of Understanding.

ICCG was founded on the initiative of the country's cement and concrete industry in November 2006. ICCG is an autonomous, private, civil, nonprofit, nonreligious, and nonpolitical association formed by companies from the cement and concrete industry in Guatemala. ICCG has relationships with entities and associations at a national and international level whose objectives are similar to theirs, including ACI, the Inter-American Cement Federation (FICEM), the Ibero-American Federation of Ready Mixed Concrete (FIHP), ASTM International, and others. ICCG's Mission is to promote and develop the cement and concrete industry in Guatemala. ICCG's Vision is to develop Guatemala as a country with a culture of cement and concrete use and a sustainable future in construction, consistent with the conservation of the environment, safety, performance, durability, and social responsibility.

Local Moderator: Plinio E. Herrera, Concrete R&D Manager, Cementos Progreso, FACI, President, ACI Guatemala Chapter

Plinio E. Herrera is the Concrete Research and Development (R&D) Manager at Cementos Progreso in Guatemala City, Guatemala. During his more than 35 years of experience in concrete materials, he has promoted the research and development of products and solutions related to concrete and its applications and has worked on knowledge transfer to the construction industry and academia in subjects like cement, concrete, aggregates, concrete pavements, housing, and three-dimensional (3-D) printing. He has reviewed and sponsored several theses and experimental projects with students from state and private universities in Guatemala. He has participated in proposing, reviewing, and translating national standards related to cement, concrete, and their applications. He has been a speaker in international seminars and meetings related to cement, aggregates, concrete technology, concrete roads, housing, and 3-D printing. Herrera is an ACI Fellow and President of the ACI Guatemala Chapter. He is also a member of ACI Committees E701, Materials for Concrete Construction; 130, Sustainability of Concrete; 211, Proportioning Concrete Mixtures; 225, Hydraulic Cements; and 237, Self-Consolidating Concrete, and ACI Subcommittees C601-E, Concrete Construction Sustainability Assessor; 130-G, Education; and 211-N, Proportioning with Ground Limestone and Mineral Fillers. He has participated in translation reviews for ACI International Development and ACI University. He is also a member of ASTM

International and the American Society of Civil Engineers (ASCE). His research interests include self-consolidating concrete, fiber-reinforced concrete, high-strength/high-performance concrete, ultra-high-performance concrete, and 3-D printing materials and processes. He received his degree in civil engineering from the Universidad de San Carlos de Guatemala (USAC), Guatemala City, Guatemala, in 1994, and his MBA from the Pontificia Universidad Católica de Chile (PUC), Santiago, Chile, in 2008. He is a licensed civil engineer in Guatemala. Recently, he received the distinction of 25 years of professional service as a civil engineer in Guatemala.

1st Speaker: Gabriel Casasola, Eng.

Gabriel Casasola is the Technical Manager of the Ready Mixed Unit of Cementos Progreso in Guatemala. He has more than 19 years of experience in the construction industry and more than 17 years in ready mixed concrete technology. He is currently President of the Concrete Standardization Technical Committee for Guatemala and President of the Latin American Association of Quality Control, Pathology and Recovery of Construction (ALCONPAT Internacional) Guatemala Chapter. He is a Professor of the master's courses in structural and construction engineering. He is an active member of the Guatemalan Association of Structural and Seismic Engineering (AGIES). He was certified as an ACI Concrete Field Testing Technician—Grade I and Concrete Construction Special Inspector and as a Pathology Technician by ALCONPAT Internacional. Casasola has also taken an important role in the preparation of future certificates and in the training of current construction professionals and future professionals through the ACI Student Chapters in Guatemala. The focus of his career has been the correct use of concrete, its raw materials, technical customer service, cost analysis, and innovation. Today, he leads the Technical Area of the largest concrete producer in Central America located in Guatemala, ensuring quality, technical support, research, and development.

Casasola received his civil engineering degree and master's in structural engineering from Universidad Mariano Gálvez de Guatemala, Guatemala City, Guatemala, as well as his master's in administration and strategic marketing.

Presentation Title: Cracking, Recurrent Pathologies in Concrete Structures

Because the nature of concrete entails cracking, one of our most important missions as builders is to prevent it. This presentation aims to provide the participants with the technical skills to identify the most recurrent cracking pathologies in concrete structures; beyond identifying them, it also provides relevant information to detect the causes and, therefore, good construction practices to prevent them. We will take a tour of cracking due to drying, plastic shrinkage, linear cracks, cold joints, overloads, and mass concrete, among others. An introduction and relevant conclusions will be provided to understand the importance of preventing cracking and the procedures that can easily provide good results, significantly contributing to greater durability of the structures.

2nd Speaker: Hans Calel, Civil Engineer

Hans Calel is a Civil Engineer currently working in Concrete R&D at Cementos Progreso, Guatemala. Focused on quality control and concrete optimization, he has also obtained the ACI Concrete Construction Special Inspector Certification. His previous experiences are in structural design and structural pathology. He is currently working on the research of innovative construction systems and materials such as i3D, prefabricated systems, and LC3 Concrete. He is an active member of the ALCONPAT Guatemala Chapter.

Presentation Title: Durability Study of Concrete with Calcinated Clays – Experiences in Guatemala after Four Years

The present work evaluates the performance of the first limestone-calcined clay cement (LC^3) produced in Guatemala versus portland pozzolana cement after 4 years of performing in concrete slabs-on-ground. The tests performed in the concrete range from basic to specific, such as core extraction and chloride penetration, in specimens exposed to the environment. The results of these comparative tests will be presented in detail, and the conclusions suggest that the use of either type of cement will depend on the purpose of the concrete application and the specifications of the project. It is imperative to consider the environmental conditions of the project, among other topics.

Tuesday, July 9, 2024
6:00-7:00 PM São Paulo Time / 5:00-6:00 PM EDT (New York Time)
Co-Host Organization: Instituto Brasileiro do Concreto (IBRACON)

Website: https://site.ibracon.org.br/

The Instituto Brasileiro do Concreto (IBRACON) is a technical-scientific organization for the defense and enhancement of civil engineering—nationwide, associative, nonprofit, and with unlimited duration. It was founded in 1972 by professionals and stakeholders in the concrete production chain. Its objective is to provide professionals and stakeholders in the national construction sector with information and knowledge on research, development, and innovation in concrete technology and its construction systems. To this end, IBRACON promotes specialization courses, edits technical publications, encourages and supports the formation of technical committees, offers certification programs, and organizes technical events. Every year, IBRACON organizes the Brazilian Concrete Congress, the largest national technical-scientific event on concrete technology and its construction systems, which aims to bring together the national and foreign technical and scientific community to debate and learn more about research, developments, and innovations related to concrete and its constituent materials, structural analysis and design, construction methodologies, management and technical standardization, and other related topics.

Local Moderator: Rafael Timerman, Civil Engineer

Rafael Timerman is a Civil Engineer, Director of Engeti Consultoria e Engenharia S/S Ltda, and Professor of postgraduate courses for rehabilitation, reinforcement, and inspection of structures of bridges and viaducts. He has been the Coordinator of the Technical Division of Structures and Materials of the Institute of Engineering since May 2019 and a member of the Deliberative Council of the Institute of Engineering since April 2020. He was the Director of Events for IBRACON from 2019 to 2023. Timerman is a member of ACI Committee 364, Rehabilitation. He graduated from the School of Engineering of Universidade Presbiteriana Mackenzie, São Paulo, SP, Brazil, in 2008.

1st Speaker: Dr. Edna Possan, Civil Engineer

Dr. Edna Possan is an Associate Professor and Coordinator of the Laboratory of Performance, Structures and Materials (LADEMA) at the Federal University of Latin American Integration (UNILA), Foz do Iguaçu, PR, Brazil. She is a Founding Member of the Brazilian Association of Construction Pathology (ALCONPAT Brasil) and is a member of the National Association of Built Environment Technology (ANTAC), the Brazilian Concrete Institute (IBRACON), and the Latin American Association of Quality Control, Pathology and Recovery of Construction (ALCONPAT Internacional). She has also been a member of the Brazilian Association of Technical Standards (ABNT) Technical Committee ABNT/CB-18 Study Committee 18:300.006, Concrete Durability, since 2009. She has been an Associate Editor of the *IBRACON Structures and Materials Journal* (*Revista IBRACON de Estruturas e Materiais*) since 2020 and a member of the Editorial Board of the *Journal of Building Pathology and Rehabilitation* since 2021 and *Case Studies in Construction Materials* since 2023. She is an evaluator of journals such as *Materials Research*, *Construction and Building Materials*, *Journal of Cleaner Production*, *Neural Computing & Applications*, *Cement and Concrete Composites*, and *Journal of Building Engineering*, among others. She has received several awards, including the Outstanding or Productive Young Researcher Award from ALCONPAT Internacional and the Educator of the Year Award from the Regional Council of Engineering and Agronomy of Paraná (CREA-PR).

Possan received her degree in civil engineering from the Western Paraná State University (UNIOESTE), Cascavel, PR, Brazil, in 2003, and her master's degree and PhD in civil engineering from the Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, RS, Brazil, in 2004 and 2010, respectively. Her research interests include construction pathology, construction materials, and the environment. She has experience in engineering, with an emphasis on durability, probabilistic and deterministic useful life prediction, emissions and CO_2 capture, use of solid waste, construction sustainability, and the circular economy and eco-efficiency (Sustainable Development Goals [SDGs] 11 and 12). She also works on the theme of women in science (SDG 5).

Presentation Title: Sustainability in Construction Chain

One of the most important themes in civil construction is the sustainability and decarbonization of construction materials. The lecture will talk about sustainability in civil construction in Brazil and technologies used to decarbonize the materials involved.

2nd Speaker: Rafael Timerman, Civil Engineer

Rafael Timerman is a Civil Engineer; Director of Engeti Consultoria e Engenharia S/S Ltda, a consulting company on structural designs; and Professor of postgraduate courses for rehabilitation, reinforcement, and inspection of structures of bridges and viaducts. He has been the Coordinator of several rehabilitation projects, reinforcement, and enlargements of bridge structures, with interventions in more than 500,000 m^2. He has been the Coordinator of the Technical Division of Structures and Materials of the Institute of Engineering since May 2019 and a member of the Deliberative Council of the Institute of Engineering since April 2020. He was the Director of Events for IBRACON from 2019 to 2023 and Assistant Director of Relationships for the Brazilian Association of Structural Engineering and Consulting (ABECE) from 2018 to 2022. Timerman is a member of ACI Committee 364, Rehabilitation. He is also a member of the International Association for Bridge and Structural Engineering (IABSE), IBRACON, the Brazilian Association of Bridges and Structures (ABPE, the Brazilian Group of IABSE), and ALCONPAT Brasil. He graduated from the School of Engineering of Universidade Presbiteriana Mackenzie, São Paulo, SP, Brazil, in 2008.

Presentation Title: The New Brazilian Standard for Assessment and Rehabilitation for Bridges

Updated and released in December 2023, the new Brazilian standard for the assessment and rehabilitation of bridges involves the types of inspection, management programs, and assessment levels on bridges in relation to structural safety, user safety, and durability. The lecture will present the main aspects of this standard, the level of inspection of Brazilian bridges, and the main management program for bridges in Brazil.

Tuesday, July 9, 2024
4:00-5:00 PM Merida Time / 6:00-7:00 PM EDT (New York Time)
Co-Host Organization: ALCONPAT International

Website: https://alconpat.org/

ALCONPAT International is a non-profit association of professionals dedicated to the construction industry in all its areas, who jointly help to solve the problems that arise in the structures from the planning, design, and project to the execution, construction, maintenance, and repair of the same, promoting professional updating and education as fundamental tools to safeguard the quality and integrity of the services of its professionals.

Local Moderator: Dr. Jorge Alberto Briceño-Mena

Dr. Briceño Mena has worked as a Researcher for Mexico at the National Council of Humanities, Sciences and Technologies (Conahcyt) within the Centre for Research and Advanced Studies of National Polytechnic Institute, Mérida Unit (Cinvestav-Mérida), Yucatán, México, since 2024. He received his degree in civil engineering from the Technological Institute of Mérida as well as an MSc and PhD in physicochemical from Cinvestav-Mérida and a postdoctoral stay at the same Institute. His primary areas of interest include local materials and revaluation, housing and urban environment, corrosion, durability, and sustainability of reinforced concrete. During his relatively short period as a researcher, Mena has received national and international awards, such as Honorable Mention for Scientific Technical Excellence in Construction Recovery (Category B) from ALCONPAT International. He has been awarded with Honorable Mention for his doctoral thesis in the Yucatán State Theses Award 2023 (Postgraduate Level) in the field of engineering, awarded by the Government of the State of Yucatán through the Secretary of Research, Innovation and Higher Education, and the Dr. Alonso Fernández González Award for the best postgraduate theses of Cinvestav-Mérida. Mena has also been recognized with the ALCONPAT Award for Outstanding or Productive Young Researcher from ALCONPAT International. He has authored or coauthored publications in indexed journals, national and international congresses, and diffusion articles and reports. Mena is member of the National Research System (SNII). He is the deputy director of technical recommendations of ALCONPAT (Latin-American association for quality control, pathology, and repair of constructions) and is also member of the National Organization for Standardization and Certification of Construction and Building, S.C. (ONNCCE).

1st Speaker: Professor Enio Pazini

Enio Pazini received his degree in civil engineering from the Pontifical Catholic University of Rio Grande do Sul (1985); specialization in construction pathology from Instituto Eduardo Torroja / Spain (1988); master's degree in civil construction from the Federal University of Rio Grande do Federal University of Rio Grande do Sul (1989); PhD in civil and urban construction engineering from the Polytechnic School of the University of São Paulo in a sandwich program with Aston University / UK and the Eduardo Torroja Institute / Spain (1994); and post-doctorate at the Norwegian University of Science and Technology (NTNU), Norway (2009). Since 1995 he has been a Full Professor at the Federal University of Goiás. Pazini has experience in civil engineering with an emphasis on durability of reinforced concrete structures, working mainly on the following subjects: concrete, durability, monitoring by nondestructive techniques (electrochemical and ultrasonic), corrosion, and rehabilitation of concrete structures. In 2013 he received the title of Doctor Honoris Causa from the Universidad Científica del Perú (UCP).

Presentation Title: What is ALCONPAT International?

This presentation provides a brief history and overview of ALCONPAT International.

2nd Speaker: Professor Alejandro Durán Herrera, University Professor, Universidad Autonoma de Nuevo Leon

Alejandro Durán Herrera is a civil engineer, receiving his PhD in materials engineering from the Universidad Autonoma de Nuevo Leon (UANL. He is a visiting postdoctoral scholar at the University of Sherbrooke, Quebec, Canada.

Herrera has more than 30 years of practical experience in the area of concrete technology. Since 1998, he has taught concrete technology to undergraduate and graduate students at the Facultad de Ingenieria Civil at UANL. Since 2004 he is the advisor to the ACI-FIC-UANL Student Chapter as well as the Head of the of Concrete Technology Department of the Civil Engineering Institute.

He is a member of technical associations such as ACI, the ACI Northeast Mexico Chapter, RILEM (Coordinator for Latin America from 2018 to 2023), ASTM, ALCONPAT, and the Mexican Society of Structural Engineering (SMIE).

Awards and recognitions or his outstanding contributions in the broad area of concrete technology: National Researcher Level II awarded by CONAHCYT of Mexico; Academic Holder in the Specialty Commission of Civil Engineering awarded by the Mexican Academy of Engineering; ACI Fellow (2006); and ACI Board of Directors (2013-2017).

From 2012 to 2016 Herrera was a member of the Editorial Advisory Committee of Elsevier's scientific journal *Construction and Building Materials*, a journal of which he has been Editor since March 2016. Since its creation in October of 2020, he is the Technical Editor of the *Revista Concreto Latinoamerica*, a journal devoted to translating from English to Spanish the technical articles published in ACI's *Concrete International* magazine.

Herrera's research interests are high-performance concrete, self-compacting concrete, volumetric stability of concrete, internal curing of concrete, use of fly ash in concrete production, evaluation of the performance of fibers in concrete, NDT testing for concrete, and concrete durability.

Presentation Title: Estimation of Equivalent f'_c According to ACI 214.4-21 and Core Strength Results

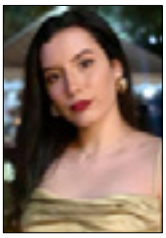
The American Concrete Institute (ACI) has great relevance within the construction industry. To cite examples, its standards such as ACI 214.4-21 and ACI 318.19-22 are important documents for the design, construction, and rehabilitation of concrete structures. In this sense, for cases of structural rehabilitation, to evaluate the structural capacity of concrete elements and structures, core testing is the most used method to determine the in situ compressive strength. In practice, architects, engineers, contractors, and testing laboratories are involved in the design and construction of concrete structures. On many occasions, there is a controversy about which method should be used to determine the compressive strength of concrete. The purpose of this study was to determine if the estimation of the specified compressive strength of concrete (f'_c), by adopting the criteria established in ACI 318-19-22, to evaluate the accomplishment of the concrete specified strength level through concrete core testing, could correlate with the unique criteria established by ACI 214.4-21 for the estimation of the equivalent f'_c. For this purpose, the evaluation includes concretes with target strengths of 25, 30, 50, and 70 MPa, and concrete cores with nominal diameters of 75 and 100 mm, at ages of 14, 28. and 56 days. The results allowed correlations between the equivalent f'_c and the results of ACI 318-19-22 to be established, which—for laboratory control—present linear regressions with correlation coefficients greater than 0.99.

Tuesday, July 9, 2024
5:00-6:00 PM Tuxtla Gutierrez Time / 7:00-8:00 PM EDT (New York Time)
Co-Host Organization: ACI Southeast Mexico Chapter

Website: https://acisurestemx.org/

The ACI Southeast Mexico Chapter aims to further the objectives of the American Concrete Institute. It was organized to further education and technical practice, scientific investigation, and research by organizing the efforts of its members for a nonprofit public service in gathering, correlating, and disseminating information for the improvement of the design, construction, manufacture, use, and maintenance of concrete products and structures. The Chapter's activities extend through Chiapas, Campeche, Tabasco, Quintana Roo, and Yucatán, Mexico.

Local Moderator: Maria Dominguez Ramos, Director, ACI Southeast Mexico Chapter



Maria Dominguez Ramos serves as Director of the ACI Southeast Mexico Chapter and teaches concrete laboratory courses at the Technological Institute of Sonora, Obregón, Sonora, Mexico. She actively participates in technical committees and engages in roundtable discussions and International Forums at ACI Concrete Conventions. She has also coordinated the International Reinforced Concrete Seminar. Ramos holds the ACI Concrete Field Testing Technician—Grade I Certification.

1st Speaker: Genaro L. Salinas, ACI Honorary Member

ACI Honorary Member Genaro L. Salinas is a Construction Consultant. He was awarded Fellow of the American Concrete Institute in 2016 and named an Examiner of the ACI Certification Program in 2018. In 2020, ACI recognized Salinas as an ACI Honorary Member.

Presentation Title: Reduction of CO_2 Footprint in Concrete Construction

This presentation covers participants' efforts to diminish the CO_2 footprint in the use of concrete as a construction material and the role that each participant plays in the actions they must take for that purpose.

2nd Speaker: Prannoy Suraneni, Associate Professor

Prannoy Suraneni is an Associate Professor in the Civil and Architectural Engineering Department at the University of Miami (UM), Coral Gables, FL, USA, where he heads the Advanced Cement Chemistry, Engineering, Sustainability, and Science (ACCESS) Lab. The major research interests of the lab are supplementary cementitious materials and coastal infrastructure. The lab has received continuous federal funding since 2019, which is expected to continue until at least 2027. Suraneni has won numerous prestigious awards, including the UM College of Engineering David J. Sumanth Early Career Research Award and the RILEM Gustavo Colonnetti Medal.

Presentation Title: **Emerging Approaches for Reducing Concrete CO_2 Emissions**

It is well-known that concrete production contributes 6 to 8% of global CO_2 emissions. Significantly reducing this amount is critical in the fight against climate change. An introduction to concrete CO_2 emissions and traditional ways in which these emissions can be reduced is presented. Two emerging approaches to reduce the CO_2 emissions of concrete are highlighted: novel supplementary cementitious materials (SCMs) and carbon mineralization. Novel SCMs, including “manufactured SCMs,” are discussed. An overview of various carbon mineralization strategies, such as carbonation curing during mixing, carbonation of recycled concrete aggregates, carbonation hardening/curing, and carbonation of SCMs/fillers, is presented. Research needs, fundamental and applied, in this research space are highlighted.

Tuesday, July 9, 2024
5:00-6:00 PM Hermosillo Time / 8:00-9:00 PM EDT (New York Time)
Co-Host Organization: ACI Northwest Mexico Chapter

México Capítulo Noroeste

Website: http://aci-mexico-nw.org/

The Northwest Mexico Chapter is a non-profit association dedicated to the research, teaching, and dissemination of cement and concrete application techniques. Our objective is to gather, exchange, and disseminate information related to the design, construction, and maintenance of concrete structures.

Local Moderator: Arturo Gaytán Covarrubias, FACI, Innovation and Sustainability Manager

Civil Engineer; graduated from the Faculty of Engineering of the National Autonomous University of Mexico (UNAM). Master in Engineering with a specialty in Quality and Productivity from the Tecnológico de Monterrey.

He was president of the Student Chapter of the American Concrete Institute UNAM, where he obtained several international awards and was founder of the Concrete Canoes Team of the UNAM in 2001. He was President of the ACI Central and Southern Mexico Chapter in 2013-2014. Founder of the ACI Northwest and Southeast Chapters in Mexico. He is currently President of the Mexican Institute of Sustainable Concrete (IMCS), of which he is also the founder. Likewise, he is Treasurer of the Mexican Association of the Ready-Mix Concrete Industry (AMIC).

He has been at CEMEX for more than 17 years, where he has served in various positions. He is certified as a LEED Green Associate and Sustainability Professional ENVISION from the Institute for Sustainable Infrastructure. At ISO, he coordinates the Construction Sustainability Committee and the Concrete and Concrete Structures Environmental Management Committee. He is the Mexican delegate of the Ministry of Economy for APEC for Sustainability in Construction.

He has received recognition from the IEC International Electrotechnic Commission as a Young Professional in Australia and received the ACI Young Member Award for Professional Achievement. In 2018, he received the category of Fellow from the American Concrete Institute and the Chapter Award for his activities throughout Mexico.

1st Speaker: Raul Bracamontes, Civil Engineer

ACI member Raul Bracamontes is a civil engineer, having graduated from the ITESO University of Guadalajara Mexico, with specialties in underground construction, shotcrete, controlled demolition, and concrete materials.

- International shotcrete consultant, international speaker, ACI international certifier of shotcrete
- Honorary member of the IMCYC (Mexican Institute of Cement and Concrete)
- IPCYC (Peruvian Institute of Cement and Concrete)
- Member of American Shotcrete Association (ASA)
- Member of American Concrete Institute (ACI)

Bracamontes has more than 30 years of experience in underground construction. He is President of Bracamontes Consulting, LLC, consulting company and Director of Adra Ingeniería SA de CV. He received an award from ASA of international recognition for the reinforcement of the deep drainage of Mexico City, with a pumping of more than 1500 meters long to place the shotcrete.

He has worked in different projects in more than 26 countries such as Mali, Peru, Chile, Mexico, Nicaragua, Guatemala, USA, Canada, Dominican Republic, Haiti, and Chile. He is an external trainer of the Secretary of Labor and Social Prevention

He worked on the construction of the soccer hall of fame museum, shaped like of a 30-meter ball, with

shotcrete in Pachuca, Hidalgo, Mexico. He received third place in the world in demolition controlled by IACIDS (Switzerland 2009).

He has authored seven shotcrete books in Spanish, some of which are out of print:

- *Concreto Lanzado* (*Shotcrete*) (2002)
- *Concreto Lanzado para Obras Subterraneas* (*Shotcrete for Underground Construction*) (third national place in unpublished concrete books 2002 Popol Vuh IMCYC Award)
- *Manual for the Design and Application of Shotcrete* (2014)
- *Shotcrete for Rock Support* (2014)
- *Manual for the Design and Application of Shotcrete, Second Edition* (2017)
- *Problems and their Causes in Shotcrete* (2018)
- *Application and Finishing of Shotcrete* (2019)

Presentation Title: The Use of Sensor for Maturity Test in Shotcrete

The importance of determining the early strength of shotcrete, mainly in underground construction work, is well-known, for reasons of safety and advance of the production cycle.

Currently, there are various ways to determine the resistance of shotcrete such as the penetrometer test, the nail test (known as the Hilti method), the end-beam test, and the rebound hammer, to name a few. Sometimes measurements are made in the field, which can pose a risk to personnel because the concrete may not have sufficient strength and may fall. Other times, a shotcrete panel is made where the tests are carried out, but it has to be moved, and issues arise with the handling of very heavy specimens.

With the use of sensors, the information is obtained in real time directly on a cell phone or tablet without exposing personnel to areas with freshly applied concrete. Through a prior calibration process, the sensors have demonstrated their great usefulness in underground construction, increasing security. The sensors are single-use and very easy to install. They can take a reading every 15 minutes and predict the development of resistance, and measure the real placement conditions, including the temperature of the site and the evolution of the resistance of the concrete. It is a great technology that is revolutionizing the way we measure the resistance of shotcrete at an early age.

2nd Speaker: Daniel Manzanares, Civil Engineer

Graduated as a Civil Engineer from the National Autonomous University of Honduras, Manzanares has a master's degree in structural engineering from the Metropolitan Autonomous University of Mexico and a master's degree in constructive solutions with prefabricated concrete from the Isabel I International University of Spain.

He has worked as a teacher at the Catholic University of Honduras, at the Benemérita Universidad Autónoma de Puebla (BUAP), and at De Lasalle University, in León, Guanajuato, teaching subjects related to structural analysis and prefabricated concrete systems. He also holds the position of National Secretary of the Mexican Society of Structural Engineering and is a member of the Reinforced Concrete and Prefabricated Concrete committees of the aforementioned society.

An expert in prefabricated concrete structural systems for buildings, he has more than a decade of experience in the precast concrete industry. He is the author and co-author of four manuals related to prefabrication and prestressing. He currently works as General Director of “ANIVIP” and a consultant in structural engineering for various companies.

Presentation Title: Prestressed Concrete Slabs Using Precast 5-inch Beam

Due to its ease of construction, competitive prices, and structural safety, prestressed concrete slabs using 5-inch precast beams are one of the most used construction systems for slabs and roofs in Mexico and many Latin American countries. The system consists of four main components, which are: the prestressed, precast concrete beam as a structural component; the vault that lightens the weight of the structure; a concrete topping that integrates the slab system to the building; and complementary reinforcing steels. Typically, its installation does not require the use of cranes or qualified labor. Furthermore, these types of solutions are very durable and do not require maintenance. The presentation aims to show the characteristics of the system components, the construction process, and the basic concepts of design and specification.

Wednesday, July 10, 2024
1:00-2:00 PM Auckland Time / 9:00-10:00 PM EDT (New York Time)
Co-Host Organization: Concrete New Zealand – Learned Society

Website: https://concretenz.org.nz/page/learned_society_home

The Concrete New Zealand (NZ) – Learned Society is a professional society that sits under the umbrella of Concrete NZ. The Learned Society facilitates the sharing of industry knowledge, participates in the development of concrete and construction, and provides a foundation for building valuable business networks in New Zealand and overseas. The Learned Society aims to encapsulate the wealth of expertise of its membership and to output this in the form of seminars, technical publications, and conferences for the betterment of the concrete and construction industry at large. With an emphasis on 'Learned', the Society is focused on technical excellence and is not influenced by any external commercial interests. The Concrete NZ Learned Society maintains strong relationships with affiliated organizations internationally, including the American Concrete Institute (ACI), the Concrete Institute of Australia (CIA), and the Federation Internationale du Beton (*fib*).

Local Moderator: Rick Henry, Associate Professor

ACI member Rick Henry is an Associate Professor in the Department of Civil and Environmental Engineering at the University of Auckland, Auckland, New Zealand, where he teaches the design of concrete structures. His research interests include the seismic design and assessment of reinforced concrete structures and in particular precast concrete construction and low-damage design. Henry is the President of the Concrete NZ – Learned Society. He a has served as a member of the technical committee for the NZ Concrete Structures Standard (NZS 3101:2006) and is a current member of ACI Subcommittee 318-H, Seismic Provisions.

1st Speaker: Enrique del Rey Castillo, Structural Engineer

ACI member Enrique del Rey Castillo is a structural engineer with extensive experience in the seismic behavior and strengthening of concrete structures, which was the topic of both his master and PhD projects. He is currently a Senior Lecturer at the University of Auckland, where he combines his role as Associate Dean for Teaching and Learning with extensive research mainly related to strengthening and seismic behavior of concrete structures, and sustainability of concrete. Outside of his academic career, del Rey Castillo is director of FRP Designs, an engineering consultancy focused mainly on seismic strengthening and behavior of structures.

Presentation Title: Seismic Strengthening of Concrete Floor Diaphragms with FRP

Existing buildings often are not designed to modern seismic standards, and/or are deemed to be deficient should the structure be subjected to current seismic hazards. Additionally, buildings sometimes experience change of use and/or degradation (for example, corrosion) that further compromises the behavior of the building. A common issue is that floors cannot fulfil their seismic roles as diaphragms, tying the building together and transferring inertial forces to the lateral load-resisting system. Common reasons for this deficiency are insufficient steel reinforcement, increased demand, poor detailing, or a combination of all of them. Fiber-reinforced polymers (FRPs) are one of the most common methods used for diaphragm strengthening due to their versatility, light weight, and strength-to-thickness ratio, all very good qualities for this application. The problem is that existing design methods are based on limited research on thin and short FRP ties, without anchorage, and based on mechanical principles that are not well understood.

An extensive research program is under way, funded by the New Zealand Government and heavily supported by industry partners (both in New Zealand and the United States). The behavior of FRP ties has been characterized, leveraging over 1800 data points from previous research and complemented with over

100 new tests on thick and long ties (both anchored and unanchored). Over 50 tests have been completed on flexural and shear strengthening of diaphragms, as well as several tests investigating three-dimensional deformations at the floor-beam connection. These results offer a glimpse into the best practice for designing seismic strengthening of concrete floor diaphragms using FRP, but the research is ongoing and will be completed by the end of 2025 or early 2026. Further work includes extensive collector testing and large-scale diaphragm testing. Analytical and computer modeling will conclude the project.

2nd Speakers: Jonathon Watkins, Technical Principal and Acting National Manager of Bridge Design, WSP NZ, and Natalia Uran, Principal Bridge Asset Engineer, WSP NZ

Jonathon Watkins has extensive international experience in the design and construction of large-scale civil infrastructure. He is highly regarded for his engineering expertise and delivery on bridge and major civil infrastructure projects. He currently leads the WSP New Zealand bridge design business. Watkins led many aspects of WSP's response to the Cyclone Gabrielle emergency for local authority bridges. He is now leading many of the bridge rebuild projects.

Natalia Uran is a WSP Principal Bridge Engineer with 17 years' work experience in the United Kingdom and New Zealand. Her work experience has primarily concentrated in bridge asset management, risk management, long-term planning, strengthening designs, and live load bridge assessments. She is the Team Leader of the Hawke's Bay and Gisborne State Highway Structures Management Contract and currently leads the bridges and civil structures team for the WSP Napier office.

Presentation Title: Forensic Investigation of Bridge Performance during Cyclone Gabrielle

Cyclone Gabrielle caused widespread devastation across the East Coast region of New Zealand's North Island during February 2023. It resulted in 30 bridges with collapsed spans or sub-structures. More than 100 other bridges experienced varying levels of flood-related damage. This presentation will share our on-the-ground experience responding to the bridge damage. It will also review the performance of the 1000 bridges across the region to answer two key questions. What attributes of a bridge's configuration are likely to lead to collapse or significant damage during an extreme flood event? Are New Zealand design codes and practices appropriate for floods?

We collated data for each structure, including structural configuration details and damaged experienced during Cyclone Gabrielle. The results show that certain bridge configurations are more likely to be damaged during extreme flooding, such as undersized foundations, insufficient hydraulic area, and year constructed. Regarding design codes, we found that the typical substructure flood design loading has increased dramatically over the years. Key inflection points were code revisions in 1976, introducing debris mats, and in 2013, significantly increasing the drag coefficient associated with debris mats.

The East Coast bridge stock is reflective of that around Aotearoa New Zealand and was shown to exhibit several key vulnerabilities. Knowing this will better inform new design and strengthening of existing structures. The findings from this study will also inform improved scour screening process.

Wednesday, July 10, 2024
12:00-1:00 PM Sydney Time / 10:00-11:00 PM EDT (New York Time)
Co-Host Organization: Concrete Institute of Australia (CIA)

Website: https://concreteinstitute.com.au/

The Concrete Institute of Australia (CIA) is an independent, not-for-profit organization made up of members who share a common interest in staying at the forefront of concrete research, technology, application, design, and construction in Australia. The Concrete Institute of Australia's vision is for excellence in concrete.

Local Moderator: David Millar, Chief Executive Director

ACI member David Millar is the Chief Executive Officer of the Concrete Institute of Australia (CIA). As a civil engineering graduate from the University of Sydney, Sydney, NSW, Australia, Millar began his career in the concrete aggregates industry, before expanding into precast concrete, construction chemicals, and concrete materials. With a great appreciation of what industry and professional associations can provide to the concrete industry, he has been, and is still, an active member on a number of concrete-related committees as a volunteer. He was also the Executive Director of the Concrete Pipe Association of Australasia from 2005 to 2013 before commencing his current role with the Concrete Institute of Australia in 2014.

In his time as CEO with the CIA, Millar has convened five major conferences for the Institute, and was at the forefront of the fib Congress held in Melbourne, VIC, Australia, in 2018. He has had numerous positions on Standards and technical committees and is currently the CIA representative on the Australian Standards BD90 Task Group 5 for Bridge Design – Concrete and BD10 Portland and Blended Cements.

Millar's 30 years in the construction industry have revolved entirely around concrete, and through this experience, he understands the importance this most traditional, but ever evolving, material has on society and the environment.

1st Speaker: Dr. Reza Hassani, Senior Associate, BG&E

Reza Hassani is a Senior Associate for BG&E with over 17 years of experience in structural design and construction in a wide range of architectural and engineering structures in Australia and overseas. He has solid technical knowledge and skills in structural analysis and design, value engineering, concrete technology, and numerical modeling. This enabled him to take the lead for BG&E as the structural engineers for Quay Quarter Tower (QQT) in Sydney, transforming an existing commercial building into a world-class vertical village. QQT is a hallmark of world-class engineering and ingenuity and has set a global benchmark for adaptive reuse, as well as workplace and mixed-use spaces.

Presentation Title: Breaking Boundaries: Unveiling the Structural Design & Construction Complexity of Quay Quarter Tower

Quay Quarter Tower, located in the Sydney central business district, is the world's tallest adaptive reuse project involving the redevelopment of a 45-year-old reinforced concrete building via partial demolition and the addition of new structures—both vertically and horizontally. The new upcycled tower is a 216 m tall building with a hybrid structure consisting of the existing and new structural elements and an extended service life until 2070. It added 45,000 m^2 of new office space to the existing building in the heart of Sydney without the demolition of the existing tower.

The project has been recognized worldwide for the way it overcame unprecedented challenges throughout the project to set a new global standard for the effective conservation and building lifetime extension of tall concrete buildings thanks to several unique and innovative engineering solutions. Among many accolades Quay Quarter Tower took both the CIA Kevin Cavanagh Trophy for Excellence in Concrete, and the American Concrete Institute's Overall Award for Excellence in 2023.

2nd Speaker: Jonathon Turley, Associate, Bridges and Civil Structures, Aurecon

Jonathon Turley is an Associate in the Bridges and Structural division at Aurecon, based in Melbourne. An accomplished and ambitious professional with over 11 years of experience in engineering consulting, throughout this period, Turley has proven to be a capable and resilient leader through the delivery of the structural design of major infrastructure projects, most recently on the Central Station Metro development and Bankwest Stadium. He has also held significant responsibility in the delivery of a diverse range of building projects in different market sectors including education, residential, retail, and commercial. With strong technical capability, attention to detail, and in-depth understanding of construction practices, he has been pivotal to the success of these structurally complex and architecturally motivated projects.

In his role, Turley is driven to constantly expand his knowledge of engineering, business, and commercial management while maintaining a focus on project delivery and client-centered outcomes.

Presentation Title: The Sydney Central Station Metro Upgrade

Winner of the Concrete Institute of Australia's Medal for Excellence in Concrete in the Infrastructure category in 2023, Sydney Central Station Metro is the largest urban rail infrastructure investment in Australia's history and will revolutionize the way the community navigates the city. Advanced concrete construction techniques brought to life the new underground station while minimising disruption to 270,000 daily commuters within the live station environment.

The scope of the works includes the excavation and construction of the new 230 m long metro station box beneath existing platforms 13 to 15, the new 19 m wide Central Walk, and a revitalization of the Grand and Northern Concourse entrance on Eddy Avenue. The metro box is a concrete basement structure linking the existing intercity platforms at ground level with the new metro tunnels 27 m below ground.

The novel 'top-down' construction approach allowed the upper levels to be constructed first while major tunnelling occurred simultaneously beneath. The Northern Concourse is a new urban space interconnecting the metro box with the existing station and offers a modern reflection of the site's heritage fabric. The exposed concrete intercity cantilever and underlying 'tree-head' columns required a modular 'design for manufacture and assembly' approach and digital fabrication techniques to achieve the organic, curvilinear forms.

Faceted façade panels comprised of glass fiber-reinforced concrete transition the Hawkesbury sandstone aesthetic of the precinct within the metro insertion. Advanced construction techniques and over 84,000 tonnes of concrete in various applications have made viable 'open-heart' surgery within Australia's busiest railway interchange.

Wednesday, July 10, 2024
12:00-1:00 PM Seoul Time / 11:00 PM-12:00 AM EDT (New York Time)
Co-Host Organization: Korea Concrete Institute (KCI)

Website: https://www.kci.or.kr/eng/

The Korea Concrete Institute (KCI) is an institution composed of professionals from all fields of concrete research, education, industry, and applications in the areas of concrete material, structural analysis and design, construction, repair and strengthening, and concrete-related manufacturing and production. In the past century, rapidly advanced concrete knowledge and technology have greatly contributed in construction of various buildings, roads, bridges, offshore structures, dams, and other civil infrastructures. Especially, in the past two decades, technology associated with concrete quality and production have seen incredible growth and transformation all over the world in the areas of material, design, construction, repair and strengthening, manufacturing, and so on. The advancement of concrete technology will only gain momentum for achieving better and newer concrete technology in the future. Therefore, to maintain Korea's concrete technology at the world-class level, everyone associated with the field of concrete, ranging from businessmen to professors and from practicing engineers to researchers, must cooperate and collaborate. To achieve this endeavoring task, KCI was found to develop, supply, and advance concrete-related technology. KCI is an association of professionals working in the field of concrete. The institution's main goal is to advance knowledge, technology, applications of concrete materials, structural analysis and design, construction, repair and strengthening, and manufacturing. The goal can be made possible by active participations in KCI by academic institutions, industries, research laboratories, and government branches on fundamental research, international collaborations, technical instructions, and other programs. By everyone in the concrete field working together as one and as partners, we can surely advance concrete technology, research, applications, and industry-academia collaborations in Korea.

Local Moderator: Thomas Kang, Professor

Dr. Thomas Kang, FACI, is a professor in the Department of Architecture & Architectural Engineering at Seoul National University (SNU), Seoul, Korea. Before that, he was a professor in the School of Civil Engineering and Environmental Science at the University of Oklahoma, Norman, OK. He also has held various affiliated positions in the United States, Japan, and South Africa, including the University of Illinois Urbana-Champaign, University of Hawaii at Manoa, University of Tokyo, and University of Cape Town. Kang received his BS from SNU in 1998; his MS from Michigan State University, East Lansing, MI, in 2000; and his PhD from the University of California, Los Angeles, Los Angeles, CA, in 2004. He is Fellow of the Post-Tensioning Institute (PTI), American Concrete Institute (ACI), and the Korean Academy of Science and Technology (KAST), and a member of National Academy of Engineering of Korea (NAEK). He received the Kenneth B. Bondy Award from Most Meritorious Technical Paper as Lead Author from PTI in 2012 and 2023, the ACI Wason Medal for Most Meritorious Paper as Lead Author in 2009, and the Martin P. Korn Award from PTI in 2023. He currently serves as Editor-in-Chief for *Wind and Structures* and as the Associate Editor for *PTI Journal*. Kang has published over 175 international journal papers, including over 55 in *ACI Structural Journal*. His research interests include the design and behavior of reinforced, prestressed, and post-tensioned concrete structures, as well as dynamic effects (wind, seismic, impact, and blast) on structures.

1st Speaker: In-Seok Yoon, Professor

In-Seok Yoon is a Professor at Induk University, Seoul, Korea. He received his PhD from the University of Seoul, Seoul, Korea. His research interests include the durability of concrete and repair and rehabilitation technology to enhance the service life of concrete structures.

Presentation Title: Measurement of Water/Gas Permeability Coefficient of Cementitious Materials using Yoon's Test

The water/gas permeability coefficient is a key parameter in the penetration of harmful substances, and in relation to this, it is important to better understand microstructure-based durability performance in cementitious materials. The coefficients of cementitious materials have typically been obtained by measuring the amount of water or gas entry based on Darcy's Law. However, such measurement is challenging, and it is difficult to study penetration behavior along the longitudinal section of cementitious materials. In this work, a new experimental method was designed to measure the chloride penetration depth of cementitious materials and enable visual examination of hydraulic behavior in the longitudinal section of materials under a hydrostatic pressure gradient. The chloride penetration depth can be converted into the water permeability coefficient if the hydrostatic pressure applied to the materials, the chloride penetration depth, and the chloride concentration at the depth are known. In the meantime, a method to measure gas permeability coefficient was introduced. As part of the work, the effect of capillary pore water on the coefficients and the relationship between two coefficients were examined.

2nd Speaker: Wonchang Choi, Professor

Wonchang Choi is a Professor in the Department of Architectural Engineering at Gachon University, Seongnam, Korea. Prior to joining Gachon University, he was a Professor in the Department of Civil, Architectural, and Environmental Engineering at North Carolina Agricultural & Technical State University, Greensboro, NC. His main research interests include the application of sustainable low-carbon construction materials, fiber-reinforced composites, and large-scale experimental research in reinforced concrete structures. He received his PhD in 2006 in structures from North Carolina State University (NCSU), Raleigh, NC. He is also a licensed professional engineer in the state of North Carolina.

Presentation Title: Application of Engineered Biochar as Carbon Sequester in Cementitious Composites

Biochar, derived from biomass through thermal decomposition in an oxygen-limited setting, is characterized by its high carbon content. Common sources of biomass include rice husk, food waste, and wood. While biochar is currently used effectively in soil enhancement and carbon sequestration, it also shows potential for revolutionizing its use in cementitious composites. Due to its high carbon content, biochar has a propensity to absorb significant quantities of water within cement composite materials. Consequently, researchers have investigated the porous structure of biochar to devise methods for reducing its density and enhancing its permeability, especially with increasing incorporation into a mixture. Previous studies consistently highlight the beneficial impact of integrating biochar into cement mortar and composites. This impact is particularly evident in the improvement of compressive strength, toughness, and overall mechanical properties. The outcomes are expected to contribute to the advancement of eco-friendly practices within the cement industry, facilitate the development of more sustainable construction materials, and advocate for a greener future.

Wednesday, July 10, 2024
1:00-2:00 PM Tokyo Time / 12:00-1:00 AM EDT (New York Time)
Co-Host Organization: Japan Concrete Institute (JCI)

Website: https://www.jci-net.or.jp/index-e.shtml

The Japan Concrete Institute (JCI) has been striving to develop the science and technology of concrete in Japan. As of 2024, the number of members is approximately 6850. Since 1979, JCI has been holding an annual Convention once a year (over 3 days), which is attended by concrete researchers and engineers from various fields. The 46th Annual Convention will be held in Matsuyama, Ehime in June 2024. JCI publishes the monthly *Concrete Journal* and presents a multifaceted range of information including commentaries, technical reports, construction records, and international information on a regular basis. *Concrete Research and Technology* and *Journal of Advanced Concrete Technology* (*JACT*) are posted on the "Japan Science and Technology Information Aggregator, Electronic" (J-STAGE) website at the same time they are published for uncharged access. JCI awards include the Honorary Membership Award, Lifetime Membership Award, JCI Fellow, the Japan Concrete Institute Awards (Meritorious Deed Award, Best Paper Award, Technology Award, Encouragement Award, and Work Award), as well as other awards bestowed under the independent award schemes of JCI chapters. To raise the technical skills and ability of concrete engineers, JCI has been administering Authorized Concrete Engineer qualification examinations since 1970 and Authorized Chief Concrete Engineer qualification tests since 1971, certifying approximately 61,130 people thus far. JCI has been holding Concrete Diagnosis & Maintenance workshops and Authorized Concrete Diagnosis & Maintenance Engineer qualification examinations every year since 2001, certifying approximately 14,860 people.

Local Moderator: Koichi Kusunoki, Professor

1997-2000	Assistant Professor, Institute of Industrial Science, University of Tokyo, Tokyo, Japan
2000-2001	Researcher, Building Research Institute, Ministry of Construction
2001-2006	Senior Researcher, Building Research Institute, Ministry of Construction
2006-2014	Associate Professor, Yokohama National University, Yokohama, Japan
2014-2018	Associate Professor, Earthquake Research Institute, the University of Tokyo
2018-present	Professor, Earthquake Research Institute, the University of Tokyo

1st Speaker: Kenji Kawai, Professor

Kenji Kawai is a Professor of the Civil and Environmental Engineering Program at the Graduate School of Advanced Science and Engineering, Hiroshima University, Japan. He received his bachelor's degree in 1985, master's degree in 1987, and doctoral degree in 1990 from the University of Tokyo, Tokyo, Japan. He has been working at Hiroshima University, Hiroshima, Japan, since 1990. His research interests include cement hydration, effective use of mineral admixtures, mass transfer in concrete caused by carbonation, heavy metal behavior in concrete, sulfuric acid deterioration of concrete, and environmental impact assessment of cement and concrete. He is a past Chair of the Subcommittee on Assessment for Environmental Impact of Concrete (Subcommittee 317) and the Subcommittee for Survey Research on Technology for Demolition, Reuse, and Repair of Concrete Structures Taking CO_2 Reduction into Account (Subcommittee 219) in the JSCE Concrete Committee, and the Research Committee, the Sustainability Committee, and the Technical Committee on Environmental Impact Assessment of Cement and Concrete of JCI. He was also a convenor of ISO/TC 71/SC 8/WG 1, WG 3, and WG 7.

Presentation Title: **Technical Committee Report on Environmental Impact Assessment of Cement and Concrete**

The Technical Committee on Environmental Impact Assessment of Cement and Concrete was organized by JCI in 2022 to conduct a survey and research to present an appropriate method for evaluating multifaceted environmental impacts towards the environmental impact reduction of the cement and concrete field. In presenting the evaluation method, the validity of conventional methods and advanced methods were verified by surveying domestic and foreign codes and standards, and domestic academic literature; recommended methods were proposed. In addition, to establish the latest inventory data for this field, the technical committee conducted a literature review and interview surveys, and developed inventory data for each stage of the life cycle, including energy and transportation, cement production, aggregate production, water production, mineral and chemical admixtures production, reinforcing bar and prestressed concrete steel production, concrete production, execution, demolition, and disposal and recycling. Furthermore, based on the results of the aforementioned activities, model cases of environmental impact assessment for cement, civil infrastructures, and buildings were presented. The activities of the technical committee ended in March 2024, and the technical committee report will be published in September 2024, including a set of inventory data related to cement and concrete.

2nd Speaker: Takuya Nagae, Associate Professor

2002-2005	Postdoctoral Fellow, Tokyo Institute of Technology, Tokyo, Japan
2005-2006	Postdoctoral Fellow, Disaster Prevention Research Institute, Kyoto University, Kyoto, Japan
2006-2009	Researcher, National Research Institute for Earth Science and Disaster Prevention
2009-2014	Senior Researcher, National Research Institute for Earth Science and Disaster Prevention
2014-present	Associate Professor, Disaster Mitigation Research Center, Nagoya University, Nagoya, Japan

Presentation Title: **Current Seismic Design and Full-Scale Shaking Table Test**

Takuya Nagae has worked in E-Defense (NIED) from 2006 to 2014, and at Nagoya University since 2014, where he has continued a series of large-scale tests on reinforced concrete (RC), steel, and wood structures. Substructure representations regarding high-rise building responses were substantially developed during his career. He has enthusiastically promoted various of international joint projects. He will introduce and discuss the process of the arrangement of such projects.

Wednesday, July 10, 2024
1:00-2:00 PM Shanghai Time / 1:00-2:00 AM EDT (New York Time)
Co-Host Organization: ACI China Chapter

Website: https://www.concrete.org/chapters/findachapter/chapterhome.aspx?cid=C0C10600

The ACI China Chapter was established in 2002, covering the geographic area of the country of China and the islands of Hong Kong and Macau.

Local Moderator: QianQian Yu, Professor, Tongji University

Dr. QianQian Yu is a professor at Tongji University, Shanghai, China. She received her PhD from Tongji University in 2014 and spent 2 years (from 2011 to 2013) at Monash University, Melbourne, VIC, Australia, as a visiting student. Her research interests include the rehabilitation of infra-structures and innovative structural systems.

1st Speaker: Yufei Wu, Professor

Yufei Wu is a Distinguished Professor in the College of Civil and Transportation Engineering at Shenzhen University, Shenzhen, Guangdong, China, and a national distinguished expert. He was a Lecturer at Shanghai Jiao Tong University, Shanghai, China, from 1989 to 1992; an Associate Professor (tenured) in the Department of Architecture and Civil Engineering at the City University of Hong Kong, Hong Kong, China, from 2004 to 2015; and a Full Professor (Metro Chair) in the School of Engineering at RMIT University, Melbourne, VIC, Australia, from 2015 to 2019.

He has published more than 200 Science Citation Index (SCI) papers with a Google Scholar h-index of 67. He has been listed by Elsevier as one of the "Highly Cited Chinese Researchers" and has been ranked high by Stanford University's ranking of the world's top 2% of scientists in recent years (top 100 for "lifetime impact" and top 50 for "annual impact" in civil engineering). Wu is the inventor of several new structural and concrete technologies and has been granted numerous U.S. and Chinese patents. He has received two second prizes of the National Science and Technology Progress Award of China and was awarded the Moisseiff Medal by the American Society of Civil Engineers (ASCE) in 2018.

Wu's research interests include structural engineering, including concrete materials and structures, marine structures, composite structures, fiber-reinforced polymer (FRP), and structural rehabilitation. He received his bachelor's, master's, and doctoral degrees from Zhejiang University, Hangzhou, Zhejiang, China; the National University of Singapore, Singapore; and The University of Adelaide, Adelaide, SA, Australia, respectively. He has over 10 years of experience in structural design and management as a licensed professional engineer in China, Singapore, and Australia.

Presentation Title: Green and High-Performance Concrete Material—Compression-Cast Concrete and Its Marine Floating Structure

A new concrete technology, compression-cast concrete, has recently been developed by the speaker and his team at Shenzhen University in China. This technique pressurizes the freshly cast concrete (with a pressure of 5 to 15 MPa) to make it denser. Holding the pressure for approximately 2 to 5 minutes, the concrete is demolded immediately. Concrete made in this way has a higher density, greater strength, larger elastic

modulus, and significantly improved durability. With the same concrete strength, 20 to 50% of cement can be saved. Apart from the final mechanical pressing process and its stronger mold, the manufacturing process of the concrete is the same as regular concrete and does not require additives. It is a practical technology that not only greatly improves the performance of concrete materials but also reduces costs and carbon emissions. Therefore, it can be widely used in the production of precast concrete elements. The compression-cast concrete technology was developed for a major research project—a new biomimetic sustainable marine floating structure. The goal of the project is to establish a new type of economical but resilient offshore floating structure. The system is characterized by being sustainable, having a low cost of construction and maintenance, and being able to survive in harsh marine environments. The team owns intellectual property rights to all key technologies, including compression-cast concrete technology, the bionic honeycomb floating unit, the flexible floating unit connector, new marine energy harvesting systems, new mooring systems, and the survival method in harsh sea conditions.

2nd Speaker: Guang-Ming Chen, Professor

Dr. Guang-Ming Chen is a Full Professor in the School of Civil Engineering and Transportation at South China University of Technology (SCUT), Guangzhou, Guangdong, China. He was a Visiting Researcher at the University of California, Berkeley, Berkeley, CA, USA, from 2015 to 2016. He is now an Associate Editor of the international journal *Advances in Structural Engineering* and a member of the International Editorial Board for ASCE's *Journal of Composites for Construction*. He has served as a council member of the International Institute of FRP in Construction (IIFC) since 2016. He is Principal Investigator (PI) of five National Natural Science Foundation of China (NSFC)-funded research projects. He has published more than 70 peer-reviewed journal papers, achieving an h-index of 31 in Google Scholar and 29 in the Web of Science.

Chen's research interests include exploring the potential of fiber-reinforced polymer (FRP) in bridge structures, encompassing both strengthening and new construction applications. He received his PhD from The Hong Kong Polytechnic University, Hong Kong, China, in 2010.

Presentation Title: Use of Hybrid FRP-Concrete-Steel Double-Skin Tubular Structures in Bridges: Concept and Practices in China

Over the past 6 years, Dr. Guang-Ming Chen has successfully led a multidisciplinary research team comprising members from universities and the industry. Their collaborative efforts have been essential in advocating for the adoption of fiber-reinforced polymer (FRP)-concrete-steel double-skin tubular members (DSTMs) in new bridge construction. In the DSTMs, the combined use of FRP, concrete, and steel leads to a number of benefits, including but not limited to the following: high load capacity, light weight, ease of construction, good resistance to corrosion/fatigue, and low carbon emissions. To date, a total of 10 bridges have been constructed in China using DSTMs. Among these are eight arch bridges (including two 36 m clear span deck arch bridges with open spandrels), one girder bridge, and one pedestrian bridge with DSTM piers. For his excellent work in implementing FRP-concrete-steel DSTMs in new bridge constructions, in 2023, he won two awards from the scientific committees of the conferences on Using FRP in Civil Engineering (FRP-12) and Emerging Structural and Material Systems (ESMS2023). This presentation will introduce the concept of DSTMs and the advantages of using DSTMs as bridge structures, as will be shown in several application cases.

Wednesday, July 10, 2024
2:00-3:00 PM Singapore Time / 2:00-3:00 AM EDT (New York Time)
Co-Host Organization: ACI Singapore Chapter

Website: https://www.concrete.org.sg/

The ACI Singapore Chapter (ACI-SC) was founded in 1985. The purpose of this Chapter is to further the chartered objectives for which the American Concrete Institute was organized; to further education and technical practice, scientific investigation, and research by organizing the efforts of its members for a nonprofit, public service in gathering, correlating, and disseminating information for the improvement of the design, construction, manufacture, use, and maintenance of concrete products and structures. The Chapter continues to support the National University of Singapore's Endowment Fund and proceeds are used for an annual medal and book prize to be awarded to the best Civil Engineering graduate in concrete-technology-related subjects leading to the Degree of Civil Engineering. Every year, the chapter organizes the Performance-Controlled Concrete Competition, where ready mixed concrete companies, concrete admixture suppliers, universities, and polytechnics are invited to produce and send their best concrete cubes for testing under the various criteria.

Local Moderator: Sook Fun Wong, Lead Scientist

Dr. Sook Fun Wong is a Lead Scientist (Built Environment) and former Head of the Centre for Urban Sustainability and Senior Lecturer at Temasek Polytechnic (TP), Singapore. She is the Immediate Past President and Current Director of the American Concrete Institute-Singapore Chapter (ACI-SC). She received her BE(Hons) in civil engineering and her MEngSci in materials engineering from Monash University, Melbourne, Australia, and her PhD in civil engineering from the National University of Singapore (NUS), Singapore. She was the recipient of Scott and Furphy Engineers Pty Ltd Prize (Australia) and SsangYong Young Concrete Researcher Award (Singapore), as well as Monash Research Scholarship in Australia and NUS Research Scholarship in Singapore. Wong represents TP in the Centre of Innovation Built Environment-Advanced Materials (COIBE-AM) as Deputy Chair to achieve innovative project deliverables and industry engagements under the Enterprise Singapore (ESG)'s Innovation Infrastructure Funding. She is also the Co-Chair of TP Environment Sustainability Technology Cluster Committee as well as a member of the Technical Committee for Singapore Green Building Council (SGBC). Wong's fields of expertise include civil, structural, and environmental engineering as well as materials science and technology. She has more than 16 years of experience working in these areas. Her research interests cover advanced materials and environmental technology, sustainable development of composites and structural components, integration of materials design with structural performance for the built environment, and utilization of waste materials and industrial by-products. Wong has published over 60 journal articles and international conference papers. She has been a Reviewer of the American Concrete Institute (ACI) *ACI Materials Journal* and *ACI Structural Journal* since 2006.

1st Speaker: Kevin Emanuel Suhartono, Senior Engineer

Kevin Emanuel Suhartono is a Senior Engineer in the Sustainability Department at JTC, where he spearheads the development of sustainability frameworks and strategies, driving Singapore's industry toward decarbonization. His notable achievements include leading key sustainability projects, such as the successful implementation of solar deployment for industrial buildings in support of Singapore's Green Plan 2030. Through his leadership, his team was honored with prestigious awards, including the IES Sustainability

Awards 2023 and the Firefly Awards – Innovative Project/Policy Award 2023, conferred by the Institution Engineers Singapore (IES) and the Singapore's Ministry of Trade & Industry, respectively. Suhartono is also actively engaged in research and development projects, collaborating with Institutes of Higher Learning (IHLs) in the field of sustainability and the built environment. With a diverse and extensive background in the construction industry, Suhartono previously served as a Senior Engineer in the Civil & Structural and Sustainability Department at JTC, where he led an in-house civil and structural design for an infrastructure project developed by JTC. His experience also encompasses managing and designing the structure of underground mass-rapid-transit (MRT) infrastructures in Singapore and Saudi Arabia during his tenure at the Land Transport Authority (LTA) and Arup Singapore. He received his bachelor's degree in civil and environmental engineering from Nanyang Technological University (NTU), Singapore, and his master's degree in geotechnical engineering from the National University of Singapore (NUS), Singapore. He is also a member of the Institution of Engineers Singapore (IES), the Institution of Structural Engineers (IStructE) UK, and the Society of Rock Mechanics & Engineering Geology (Singapore).

Presentation Title: **Recycled Waste Plastic as Fine Aggregate Replacement of Nonstructural Concrete Elements**

In 2021, Singapore generated 982,000 tons of plastic waste, with only 6% being recycled. The non-recycled plastic waste is incinerated, contributing to carbon emissions and incineration ash. Additionally, the construction industry heavily relies on imported natural aggregates, posing challenges to long-term resource and environmental sustainability. To address these concurrent issues, JTC, the National Environment Agency, and Temasek Polytechnic collaborated on a project to recycle plastic waste into valuable construction materials and develop alternative natural aggregates for construction.

The project involved recycling plastic waste by pulverizing it into 1 to 4 mm recycled plastic aggregate (RPA) using an extruder and pelletizer. Concrete samples were produced with varying proportions of sand replacement with RPA, ranging from 0% (control) to 50%. Tests were conducted to assess workability, compressive and flexural strength, water absorption, and surface resistivity of the produced samples. Through the lab experiment, the project developed a plastic-concrete mixture formulation, allowing up to 20% of natural sand to be replaced with recycled plastic in nonstructural concrete applications. Precast concrete curbs and drain channels were selected as nonstructural concrete prototypes, with a pilot trial installation conducted at a construction site in Tuas Link, Singapore.

The project is the first-of-its-kind in Singapore to be test-bedded, with plans to explore its scalability and adoption by the construction industry. Future studies will focus on the non-lab assessment of the environmental impact of the new material by conducting surface runoff water sampling, life-cycle reusability of recycled plastic-concrete, potential reduction of carbon emissions, and the economic feasibility of large-scale production of plastic-concrete elements.

This project represents a significant step toward addressing plastic waste management and resource sustainability in Singapore's construction industry, with the potential for far-reaching environmental and economic benefits.

2nd Speaker: Kevin Lee Jia Le, Lecturer

Kevin Lee is a Lecturer at the Centre for Urban Sustainability (CUS) at School of Applied Science (ASC), Temasek Polytechnic (TP), Singapore. He concurrently sits on the Management Committee of Singapore National Centre of Innovation for Built Environment – Advanced Materials and Environment Sustainability Technology Cluster Committee under TP Sustainability Office. His research interests include protection and fire resistance of concrete materials, low-carbon concrete with industrial and municipal wastes, advanced manufacturing of three-dimensional (3-D) printable composites, and life-cycle assessment. He has authored/coauthored over 10 peer-reviewed international journals publications and technical disclosures. Beyond his research endeavors, Lee undertook supervisory and mentorship responsibilities to empower polytechnic students and adult learners, as well as advocacy roles through active involvements in professional bodies and government entities to catalyze transformations in environmental technological advances. The students under his mentorship have

clinched multiple local and international awards, which include Seatrium Green Wave Environmental Care and American Concrete Institute (ACI) Singapore Chapter Project Competition Awards.

Presentation Title: **Laboratory Testing and Site Monitoring of Recycled Mixed Plastics Concrete Footpath**

Presently, the amount of plastic waste generated globally has doubled since the early 2000s, yet the recycling rate for plastic waste remains below 10%. The literature extensively examines the use of sorted single-type plastic waste from postconsumer waste streams as a sustainable substitute for natural sand in cement concrete. However, severe heterogeneity of plastic waste in municipal solid waste streams, including variations in polymer types, grades, shapes, sizes, and cross-contamination of other commingled waste materials poses a significant challenge in adopting findings from prior research that necessitates high-purity single-type plastic waste for concrete applications. While recent studies have demonstrated the suitability of using mixed plastic waste in cement concrete, the long-term field performance under natural weathering conditions remains unclear.

This presentation reports the findings from laboratory tests and field investigation carried out to characterize the long-term mechanical, durability, and environmental properties of a novel mixed plastic fine aggregate concrete under tropic climate in Singapore. Full- scale concrete test sections were constructed with control and mixed plastic fine aggregate concrete for field investigation. Groundwater and surface runoff samples were analyzed to examine the water quality and presence of microplastics at the field trial site.

Wednesday, July 10, 2024
12:30-1:30 PM Mumbai Time / 3:00-4:00 AM EDT (New York Time)
Co-Host Organization: ACI India Chapter

INDIA CHAPTER OF ACI

Website: https://icaci.com

The ACI India Chapter was established on December 26, 1979, by a few enthusiastic concrete technologists with ACI for the "development and advancement of good practices in concrete technology" in India. Today, the chapter membership consists of over 2000 concrete professionals and organizations, including consulting civil and structural engineers, concrete practitioners, academicians, researchers, material scientists, constructors, students, and so on. They are driven by the chapter's motto, "Progress Through Knowledge." The chapter is distinctly active in organizing seminars, symposiums, technical lectures, meetings, and workshops with the participation of experts in the field and associated professional bodies.

Local Moderator: Dr. Surendra K. Manjrekar, Honorary Member ACI, Past President ACI India Chapter, CMD Sunanda Global, India

Surendra K. Manjrekar is CMD of Sunanda Specialty Coatings Pvt. Ltd. which has manufactured an entire range of construction chemicals and offers consulting services in related fields for its use for the last 45 years. Sunanda has operations in India along with an international presence in UAE, Oman, Nepal, Africa (Tanzania), and the United States.

Manjrekar received ACI's highest honor—Honorary Membership—in 2018. He was bestowed with Honorary Fellowship of the Institute of Concrete Technology UK (in 2022). RILEM international association of 90 countries honored him with a "Lifetime Achievement Award" in Vancouver in 2023 as an acknowledgement to his scholarship and service to the fraternity. In March 2017, he was honored with the prestigious Industry Doyen award by the Construction Industry Development Council (CIDC) Government of India, the highest recognition of construction industry in India.

Manjrekar is currently a visiting professor working with international universities as a knowledge partner. He is a visiting professor at University of Leeds, UK, in the field of carbon footprint reduction. He is a Special Signatory to MOU for technical co-operation between India, Singapore, Vietnam, and Malaysia, organized by ACI in Singapore in 2019. Manjrekar is Vice Chancellor appointee on "Internal Quality Assurance Cell" at Dr. Homi Bhabha State University, Mumbai, as an industry representative.

He is active in concurrent R & D work in the fields of corrosion prevention in RCC/PSC structures with special emphasis on infrastructure, newer generation corrosion inhibiting admixtures, internal curing, repairs of dams, bridges, irrigation canals, water related structures, polymers, underwater concreting, CO_2 sequestration in polymers, nano molecule soil stabilization, waterproofing, anti-freezing admixtures in concrete, and fire resistance- concrete/steel.

1st Speaker: K. Srinivas Reddy, Managing Director, DesignTree Service Consultants Pvt. Ltd.

K. Srinivasa Reddy is a co-founder and Managing Director of DesignTree Service Consultants Pvt. Ltd., founded in 2008. Reddy is a 1990 civil engineering graduate of Bangalore University. He has undergone advanced training in cost and time management, CPM, and PERT.

Reddy has over 30 years of experience and expertise in providing engineering design consultancy services for sophisticated structures for the various projects, not limited to multi-storied, residential, commercial, hotels, malls, hospital, industrial, institutions, and so on. With his unbridled attention toward the last detail and focus in making sure the assignments are

being delivered to the client's satisfaction, he imbibes a culture of continual improvement among the work force through critical design solutions, feasibility studies, construction friendly technologies, the latest management techniques, project planning, costing, and QA/QC, to deliver to his client's delight rather than just to satisfy.

He has provided quality management services for successful casting, single raft of 28000 cum of concrete with thermal monitoring with 60% GGBFS cement replacement.

Reddy is proponent of sustainable concrete and presently specifies GGBFS with 50 to 60% cement replacements to avail the benefit of later-day compressive strength results (56 and 90 days) of rafts/ foundations for design optimization.

Headquartered in Bangalore, DesignTree Service Consultants Pvt Ltd-DTSC has emerged as one of the front-runners in consulting groups across all construction domains. The company began its operations in 2008 and has carved a niche for itself in the industry with all the major developers across the country and predominantly the southern markets patronizing their services. Currently with 500+ dynamic and innovative professionals, DesignTree is making progress in leaps and bounds.

Most recently, the *Consultants Review Magazine* ranked DesignTree as one of the Top 25 Most Promising Consulting companies in India.

Presentation Title: Emphasis on Sustainable Concretes in India—An Overview

The presentation discusses sustainable development practices in concrete technology in India including:
1. Replacement of cement—Concrete has high embodied energy due to cement production but has the potential to be efficient over its long lifespan. Supplementary cementing materials and reducing cement content can lower environmental impact. The presentation discusses studies on replacing cement with GGBS, fly ash, metakaolin, rice husk, and micro mineral additives such as Icrete.
2. Concrete to minimize energy consumption—Concrete's thermal mass allows it to reduce operational energy usage in buildings through passive heating and cooling. It also enables more efficient radiant heating systems which is enhancing towards GREEN contribution by minimizing energy consumption and improving efficiency.
3. Concrete for high-rise construction—Demand in high-rise structures in urban areas has drastically pushed the requirement of less viscous concrete, which should be low in stickiness and high in pumpablity. Also, more workability with 2-hour retention and to achieving early strength for quick de-shuttering, which is discussed in this presentation.
4. Upcoming concrete technologies—A glance at future technologies like 3-D printing, self-healing concrete, permeable concrete.

2nd Speaker: Dr. Sanjay Mukherjee, Metropolitan Commissioner, Mumbai Metropolitan Region Development Authority

Sanjay Mukherjee is currently the Metropolitan Commissioner of Mumbai Metropolitan Region Development Authority (MMRDA). Mukherjee is a 1996 batch IAS officer who received his bachelor's degree in surgery, MBBS, from Nagpur's Government Medical College, in addition to taking a short-term course on public finance from the Indian Institute of Management, Ahmedabad; Chartered Financial Analyst of India; and Degree of Public Administration and Finance from Toronto University. Mukherjee previously worked as Vice Chairman and Managing Director, CIDCO (City & Industrial Development Corporation of Maharasthra Limited). Additional Commissioner (Projects) include Brihanmumbai Municipal Corporation Commissioner at Maharashtra State Excise Department, Joint Managing Director at Maharashtra Airport Development Company, Commissioner at Jalgaon Municipal Corporation, and Additional Commissioner at Nagpur Municipal Corporation.

Presentation Title: The Mumbai Story—Concrete Megastructures of Mumbai

Mumbai is one of the top ten largest trading centers in the world in terms of global financial flow, generating ca. 6.16% of the Indian GDP and accounting for 25% of industrial production, 70% of Indian maritime trade, and 70% of capital transactions to the Indian economy.

The Mumbai Metropolitan Region (MMR) is the fastest growing urban agglomeration in the world, spread over 6,328 sq. km., consisting of nine municipal corporations viz. Greater Mumbai, Thane, Kalyan-Dombivali, Navi Mumbai, Ulhasnagar, Bhiwandi- Nizamapur, Vasai-Virar, Mira-Bhayandar, and Panvel; and nine municipal councils viz. Ambarnath, Kulgaon-Badalapur, Matheran, Karjat, Khopoli, Pen, Uran, Alibaug, and Palghar, along with more than 1,000 villages in Thane, Raigad, and Palghar Districts. MMRDA is responsible for the balanced development of the MMR.

Mukherjee will present the vision for Mumbai's sustainable development plan and some of the concrete megastructures that have been recently completed using the most current cutting-edge technologies as well as major infrastructure projects for the city of Mumbai that are currently under execution, including 14 metro lines, Asia's longest sea bridge, Mumbai's ring road, and a third new city under development—Mumbai 3.0.

Wednesday, July 10, 2024
11:00 AM-12:00 PM Alexandria Time / 4:00-5:00 AM EDT (New York Time)
Co-Host Organization: ACI Egypt Chapter

Website: https://www.concrete.org/chapters/findachapter/chapterhome.aspx?cid=C0C08600

The ACI Egypt chapter was founded in 1988. The chapter has held several technical events nationally and internationally and has received several awards from ACI. The ACI Egypt Chapter co-hosted and shared in the first 24 hours of Concrete Knowledge conference in 2021 and works in close collaboration with similar local and international organizations and the Egyptian Concrete Society.

Local Moderator: Dr. M. Nasser Darwish, Professor Dr. Eng., ACI Fellow, Egypt Chapter Organizing Chair

ACI Fellow Dr. M. Nasser Darwish is a Professor of concrete structures and bridges at Alexandria University, Alexandria, Egypt. He is Chair of the ACI Egypt Chapter; Chairman of the Egyptian Concrete Society; member of the Egyptian Concrete Code Committee, Egyptian Repair & Strengthening Code Committee, Egyptian FRP Code Committee, and Egyptian High Rise buildings Code Committee; member of ACI Committee 325, Concrete Pavements; and a Structural Consultant and Arbitrator.

1st Speaker: Dr. Salah El-Din El-Metwally, Professor of Concrete Structures at Mansoura University, Mansoura, Egypt

Dr. Salah El-Din El-Metwally is Professor of concrete structures at Mansoura University, Mansoura, Egypt. He received his BSc from Mansoura University; his MSc from The George Washington University, Washington, DC; and his PhD from Purdue University, West Lafayette, IN. He has been a visiting professor at several U.S. and German universities and a Fellow of the Alexander von Humboldt Fellowship in conducting research in Germany several times. He is also a licensed structural consultant with broad practical experience and a member of several engineering committees, including the permanent committee of the Egyptian Concrete Code. He has published several papers and authored and co-authored three international technical books.

Presentation Title: The Role of Strut and Tie Model in the Test

The development of strut-and-tie modeling (STM), as an extension of lower-bound limit theorem-based design procedures, has been a major breakthrough in design for a consistent theory in the design concept of reinforced concrete covering both discontinuity and Bernoulli regions with similar models. In particular, the method provides a formal design procedure for reinforced concrete detailing. STM has stood the test for different roles in the area of structural concrete. These include: 1) the design of both discontinuity and Bernoulli regions; 2) the development of appropriate reinforcement detailing; 3) assistance during the stage of conceptual design in deciding on the appropriate system; and 4) acting as a tool for the interpretation of the response of some concrete elements under certain conditions. This presentation gives an overview on the STM method, demonstrating the success of the method in playing the different aforementioned roles.

2nd Speaker: Dr. Abdel Hamid I. Zaghw, Professor of Concrete Structures at Cairo University, Cairo, Egypt

Dr. Abdel Hamid I. Zaghw is Professor of concrete structures at Cairo University, Cairo, Egypt. He received his his BSc from Cairo University and his PhD from Cornell University, Ithaca, NY. He is a licensed consulting engineer in Egypt with vast experience. He has been involved in local and international projects and is a member of several Egyptian Code committees.

Presentation Title: Reinforced Concrete Structures Designed for Internal Blasts and Explosions

The threat of accidental explosions poses significant risks to structural and life safety. This presentation delves into the main design considerations for reinforced concrete structures subjected to internal blast loads. Several design strategies are discussed, such as increasing the concrete sections and reinforcement, providing adequate ductility, and incorporating blast-resistant details to effectively mitigate the destructive effects of accidental explosions. Design considerations are demonstrated in some structures.

3rd Speaker: Dr. Sameh S. Mehanny, Professor of Structural Engineering at Cairo University, Cairo, Egypt

Dr. Sameh S. Mehanny is Professor of structural engineering at Cairo University, Egypt. He received his BSc from Cairo University and his PhD from Stanford University, Stanford, CA. His scientific interests include performance-based analysis and design of bridges and special structures under extreme load conditions. He has published several scientific papers internationally and was the recipient of the 2003 Raymond C. Reese Research Prize from SEI of ASCE, and is currently an Associate Editor of Springer's *Journal of Engineering and Applied Science*. He is a licensed structural consultant and is an active member of several Egyptian Code committees (for Loads, for Bridges, and Guidelines for the evaluation and mitigation of seismic risk of historical and monumental structures) and a member of the scientific committee of the COMPDYN biennial international conference series. He has also conducted several research studies funded by international research agencies.

Presentation Title: Creep-Induced Design Moments in Prestressed Concrete Long-Span Bridges—Traditional Formulae versus Time-Dependent Analysis

Creep-induced design moments in prestressed concrete segmental bridges constructed by the balanced cantilever method are discussed. Simplified ad-hoc methods are compared to real sophisticated step-by-step, time-dependent finite element analysis. Three case studies of real segmental balanced cantilever bridges constructed over the Nile in Egypt, accounting for, among other things, sequence of construction and concrete age at casting of consecutive segments, are reported. The study concludes that creep-induced moment redistribution from simplified traditional formulae may lead to notable discrepancies in estimating the design time-dependent moment in balanced cantilever bridges.

Wednesday, July 10, 2024
12:00-1:00 PM Kampala Time / 5:00-6:00 AM EDT (New York Time)

Co-Host Organization:
Uganda Institution of Professional Engineers (UIPE)

Website: https://uipe.co.ug/

The Uganda Institution of Professional Engineers (UIPE) was formed in 1972 to bring together the engineering fraternity to share ideas and to promote engineering. Today, UIPE is the leading independent organization for the engineering profession in Uganda and embraces engineers, technicians, and technologists right from when they start college, as they progress as young professionals and then as they mature into senior practitioners.

Local Moderator: Eng. Julius Ceaser Kintu, Professional Development Manager

Julius Ceaser Kintu is a versatile professional with a Bachelor of Science in electrical engineering from Makerere University, Kampala, Uganda; a Master's in Business Administration (MBA) from Uganda Management Institute, a licensed engineer (ERB No. 1777) with the Engineer's Registration Board (ERB), and a Corporate Member (PE/1905) of the Uganda Institution of Professional Engineers (UIPE) with a proven track record in roles such as electrical engineer, sales engineer, business development manager, and professional development manager. He is experienced in technical sales, strategic business development, and designing and implementing professional development programs for engineers. Kintu is an experienced engineer with more than 18 years of broad experience in programs focused on project management, resource mobilization, developing project proposals for financial support, business planning and development, electrical design and installations, carrying out feasibility studies, capacity building, market research, and brand positioning strategies. He is also an innovative leader with experience in managing donor-funded and private-sector assignments.

1st Speaker: Jackson A. Mwakali, Emeritus Professor of Structural Engineering and Building Construction

Jackson A. Mwakali has been involved with industrial practice for 40 years since receiving his bachelor's degree. He pursued postgraduate studies in the United Kingdom, where he received his MSc and PhD degrees in structural engineering, becoming arguably the first Ugandan to obtain a PhD in structural engineering. He has assumed a prominent role as a high-caliber consultant and trainer in most major construction materials. He has been team leader in several consultancy assignments, including planning, design, and documentation and construction supervision of public and private civil infrastructure, such as buildings, roads, bridges, water works, and hydropower dams. Mwakali was the first person ever to attain the rank of full professor in engineering at Makerere University, Kampala, Uganda. He was Head of the Department of Civil Engineering for 10 years. In 2000, he co-authored a book, *Theory and Analysis of Structures*; in 2006, he convened the First International Conference on Advances in Engineering and Technology, and co-edited the *Proceedings* thereof, published by Elsevier Ltd. of Oxford, UK, and available on Amazon; he likewise co-edited *Proceedings of the Second International Conference on Advances in Engineering and Technology* published by Macmillan in 2011. Mwakali is acquainted with all major structural design standards and codes of practice, including all Uganda Standards (which he has been at the forefront of formulating); British Standards, and Eurocodes. He is an

accomplished computer programmer with hands-on experience in several computer-aided analysis and design suites. Mwakali has sat on a number of committees in statutory and private-sector bodies, including the Engineers Registration Board, Uganda National Bureau of Standards, Uganda Investment Authority, National Environment Management Authority, Bugema University, and Adventist Development and Relief Agency (ADRA), among others. Mwakali is also well-traveled, visiting Africa, Asia, Europe, and North America.

Presentation Title: The Trouble with Concrete in Uganda

Concrete is by far the most predominantly used construction material in Uganda and elsewhere. Every builder thinks they understand how concrete works. This is the beginning of trouble in Uganda. There have been far too many failures of concrete structures, especially buildings. The immediate blame always goes to either insufficient reinforcement or a low cement content, even before any investigations have been carried out. Concrete is generally never used on its own, but in combination with reinforcing bars to form a reinforced concrete composite material in which the reinforcement will resist bending while the concrete will resist compression. It is very unusual for reinforced concrete structures to be under-designed. Once the reinforcing bars (which are manufactured under stringently controlled factory processes) are specified and installed as per the drawing, there should be no reason to worry. Trouble arises in the "manufacture" of concrete. Concrete is a matrix of many materials, including cement, coarse aggregate, fine aggregate, water, and sometimes plasticizing additives. These have to be carefully proportioned to get the correct concrete strength and durability. Correct proportioning, however, is not sufficient; the concrete must be correctly placed, compacted, and cured. That's the trouble with concrete—there are many variables required to produce a quality product. In this presentation we will explore some not-so-good practices in concrete use in Uganda.

2nd Speaker: Eng. Kisauzi Carolyne Namagga, Civil/Structural Engineer

Kisauzi Carolyne Namagga received her Bachelor of Science degree in civil engineering from Makerere University, Kampala, Uganda, and her Masters of Science degree in civil engineering (structural engineering and structural mechanics) from Colorado State University, Fort Collins, CO. She is a licensed engineer with over 16 years of engineering experience. She has extensive experience having worked in Uganda as a Civil/Structural Engineer with Seka Associates Consulting Engineers Ltd; as Engineer-Structures with ILISO Consulting (Pty) Ltd; as Pile Design Engineer/Consultant with Roko Construction Ltd, and presently working as a Principal Engineer with Cornerstone Design and Engineering Ltd. While in the United States, she worked with Crownjade Design and Engineering Ltd as an Assistant Civil Engineer and with Colorado State University as a Graduate Research Assistant. Having been a key contributor to several projects, she has enjoyed hands-on experience with several structural, civil, and geotechnical designs and supervision and project management funded and owned by the Government of Uganda (GOU), European Union (EU), African Development Bank (ADB), institutions, individuals, and industries. Participation in feasibility studies, design, structural appraisals, management, and supervision of new and existing projects provided 10 years of technical competency and expertise in concrete and steel design, project management, and supervision. She has assumed lead responsibility on various projects with a hands-on management style and attained merit on outstanding jobs done; and acquired problem-solving skills and teamwork abilities through numerous interactions in site meetings, field supervision, and research experience. Research work experience acquired has amplified her management skills, knowledge, and quality assurance practices on concrete materials. Through the practice she has acquired great quantitative, analytical, and interpersonal skills, with excellent verbal and written communication skills.

Presentation Title: Concrete and Its Impact in Uganda

The inception of concrete as a material has directly impacted the revolution of structures in Uganda, elevating aspects such as the durability (a major upgrade from the delicate adobe structures), complexity (the ability to construct multilevel buildings and complex structures such as bridges), and efficiency (enhancing fast-paced construction through the use of precast elements such as blocks and so on). In

addition, the advent of concrete has also spurred economic growth creating job opportunities for businesses that hire both technical and nontechnical personnel and contributing to the rise of economic structures. However, the misuse of concrete has led to significant negative impacts, including the failure to meet intended objectives—that is, required compressive strength and durability, not forgetting the increase in construction-related disasters, such as building and retaining wall collapses. The emergence of these issues raises critical questions for the industry that may include but are not limited to: How can we improve training and reshape practices to prevent misuse? What measures can be taken to mitigate the negative consequences of concrete misuse? Might there be untapped opportunities within the concrete sector that could be explored? Lastly, which guided research opportunities are available to advance concrete technology and its applications? Addressing these questions is essential for maximizing the benefits of concrete while minimizing its risks in Uganda's construction landscape.

Wednesday, July 10, 2024
1:00-2:00 PM Cairo Time / 6:00-7:00 AM EDT (New York Time)

Co-Host Organization:
Housing and Building National Research Center (HBRC)

Website: https://www.hbrc.edu.eg/en/

HBRC was established in 1945 as a building research institute. In 2005, Republican Decrees No. 63 and 64 were issued to rename the institute as the Housing and Building National Research Center (HBRC) and follows the Minister of Housing and Urban Communities and has its main headquarter in Cairo, Egypt.

Local Moderator: Dina M. Sadek, Professor, Building Materials Research and Quality Control Institute, Housing and Building National Research Center (HBRC), Egypt

Dr. Dina M. Sadek is a Professor at the Building Materials and Quality Control institute, HBRC, Egypt. She has more than 20 years of experience in the field of quality control and testing of construction materials, and about 10 years of experience in quality control on ready-mixed concrete plants. She also works as a freelance Technical Assessor for the accreditation of testing laboratories, certification bodies, and inspection bodies. She is a member in many Egyptian Codes such as The Egyptian Code for the Design of Reinforced Concrete Structures, High-Rise Buildings Code, Solid Wastes Code, Earth Building Code, and Green Building Rating System Code. Sadek has published numerous technical papers in the fields of sustainable development, recycling, durability and fire resistance of concrete, ultra-high-performance concrete, self-compacting concrete, lightweight concrete, heavyweight concrete, geopolymer concrete, and rehabilitation of concrete structures. She is a reviewer for many local and international journals. Sadek has supervised many MSc and PhD theses since 2009. She is an ACI certification Examiner at HBRC for the program “Concrete Laboratory Testing Technician – Grade I.”

1st and 2nd Speaker: Saaid I. Zaki, Professor, Material Institute, HBRC, Cairo, Egypt

Dr. Saaid I. Zaki is a Professor at HBRC, Cairo, Egypt, and the former Manager of the Central Laboratory of Materials and Quality Control at HBRC. Previously, he was the Manager of the Central Lab in 6th of October City, Egypt.

Zaki has been a Consultant Engineer in Quality Control for several projects and concrete patch plants in Egypt since 1999. Currently, his main research interest is “Nanotechnology in Construction for Enhancing Concrete Sustainable Buildings and Geopolymer Concretes.” He managed several internal research projects at HBRC in addition to external project No. 1097, funded from STDF Egypt since 2010. He supervised three post-doctoral research papers, five Ph.D. students, and three M.SC. students. He has published work in more than 20 international publications.

Zaki is a member of the ACI Egypt Chapter since 2009; a member of the Nanotechnology Society in Egypt since 2009; an Associate Member in the Institute of Nanotechnology (ION) at U.K. since 2011; an ordinary member of fib with No. 10629 since 2014; and a member of the Committee of the Egyptian Code for Design and Practice of Reinforced Concrete Structures, HBRC, Egypt, since 2001. He is also a technical reviewer for Construction and Building Material Journal (El SEVIER) and International Journal of Nano Dimension since 2015.

Zaki produced patent No. 1817 in November 2015, submitted to Egyptian Patent Office. He participated in several international conferences held in Germany, Singapore, China, Arab Emirates, Algeria, and Saudi Arabia. He has participated as a lecturer in the Higher Technology Institutes, 6th of October City, Egypt, since 2013.

1st Presentation Title: **Comparing the Effect of Nano-Calcium Carbonate and Nano-Kaoline Additions on Developing Properties of Reinforced Concrete**

The current study is carried out to investigate the effect of some nanomaterials on the properties of concrete. An experimental program included nanoparticles of both calcium carbonates ($CaCO_3$) and Kaoline (K) with different percentages. The nano-$CaCO_3$ was added at percentages 1, 2, 3, 4, and 5% as a partial mass replacement for cement. NK was added at percentages 5, 6, 7, 8, 9, and 10%. The experiment results showed that the addition of these nanomaterials did not reduce the flowability of concrete significantly, but the early compressive strength of concrete was both improved to some extent when the dosage of both was suitable. The optimum amounts of nano calcium carbonates and nanokaolin are 1 and 7% respectively. Results of microstructure analysis agreed with the results of strength tests.

2nd Presentation Title: **Effect of Magnetic Water on Properties of Fresh and Hardened Concrete**

This study involves the investigation of influence of magnetic water on the workability and compressive strength of fresh and hardened concrete. The water is initially magnetized with the help of 0.5 HP motor having a 1 and 3 Tesla magnets at its inlet pipe. Concrete samples are then prepared and cured with magnetic water and normal water in four main different cases. About 36 concrete and mortar cubes are cast and tested for 7, 14, and 28 days. Results show that the compressive strength of concrete samples mixed with magnetic water is higher than those prepared with normal water. The compressive strength of concrete samples mixed with magnetic water at a magnetic strength of 1T increases by 10 to 20% more than that of normal water. Also, the consistency of fresh concrete is improved in case of magnetic water than that of normal water.

Wednesday, July 10, 2024
1:00-2:00 PM Kigali Time / 7:00-8:00 AM EDT (New York Time)

Co-Host Organization:
Federation of African Engineering Organizations (FAEO)

Website: https://faeo.org/

The Federation of African Engineering Organizations (FAEO) is an international non-governmental organization that represents the interests of all engineering practitioners in Africa, most notably at the World Federation of Engineering Organizations (WFEO).

Local Moderator: Papias Dedeki Kazawadi, President, FAEO

Papias Dedeki Kazawadi is an activist advocating and inspiring Africa's transformation through engineering. A visionary engineer yearning for proper shaping of Africa's destiny and a catalyst for change in the engineering landscape for reliable solutions aimed at sustainable progress and prosperity. With 25+ years of expertise, he is the President of the Federation of Africa Engineering Organizations (FAEO), Immediate Past chair of the WFEO Committee on Anti-Corruption (CAC), the Immediate Past President of the Institution of Engineers Rwanda (IER) and the Founder of Star Construction and Consultancy Ltd among others. Mastery in Circular Economy, Construction Project Management, Arbitration and Mediation. IAPM, AETDEW, and AAET Fellow. Kazawadi is also an entrepreneur and the driving force behind Tasks Africa CBC, which is a dynamic social enterprise committed to transforming the landscape of the built environment in Africa. Committed to nurturing future leaders' talents for problem-solving mindsets and advancing AfCFTA for the "Africa we want" in 2063.

1st Speaker: Ivy Mwango Getanda, Graduate Civil Engineer

Ivy Mwango Getanda serves as an Assistant Engineer at the Kenya Rural Roads Authority (KeRRA), specializing in the design and supervision of road projects, leveraging her background in Civil Engineering. In addition to her technical expertise, Getanda is deeply committed to mentorship. She initiated a program aimed at mentoring high school and primary students in the vicinity of the road project. This initiative has made a significant impact on numerous schools, earning Getanda national-level recognition through awards for her exemplary commitment to service. Beyond her role as an Engineer and mentor, Getanda is recognized as a thought leader. She has actively engaged in various research endeavors and contributed to paper writing, presenting her findings at both national and international conferences held in locations such as Kenya, Zimbabwe, Rwanda, and the Czech Republic. Her research themes encompass critical topics such as Climate Change, Affordable Housing, Flood Mitigation, Capacity Building, and Sustainable Development. Getanda's commitment extends to her involvement in research and publication committees, as well as Policy, Advocacy, and Governance Committees. Her overarching goal is to contribute to reshaping the world through the field of engineering.

Presentation Title: The Role of Self-Healing Concrete in Sustainable Construction

Sustainable construction mainly aims to reduce the negative environmental impacts. However, carbon emissions have steadily grown in every country in the world, with 38% of the global annual carbon emissions from the Construction sector. These emissions are attributed to the construction and repair of buildings. Concrete failure leads to corrosion of the embedded steel reinforcement, and as the steel corrodes, it expands and exerts pressure on the concrete so that, eventually, the concrete cracks, spalls,

weathers, leaks, and bends. There's, therefore, a need for solutions for Self-healing concrete, which contains limestone-producing bacteria that repair the crack when it comes into contact with air and water. Along with concrete, these self-healing bacteria can repair mortar for already existing structures—repetitive dry and wet cycles with a width of 0.05 to 0.1 mm completely seal cracks. The self-healing product acts as a capillary, and the water particles go through the cracks soaking and hydrating the cement, causing it to expand, thus filling the crack.

Self-healing concrete is prepared in two ways: By direct application: After mixing the concrete, calcium and bacterial spores are added to the mix. The process of sealing cracks occurs when water comes into contact with these bacteria, then they germinate on calcium lactate, and the production of limestone creates self-healing concrete. Secondly, by encapsulation in lightweight concrete, where the bacteria and calcium lactate are in clay pellets and mixed in with concrete preparations. Only 6% of the clay pellets are included for making self-healing concrete. When there is a crack in the structure, the clay pellets break down, and the bacteria germinate and feed on the calcium lactate and produce limestone.

In conclusion, incorporating self-healing concrete would address sustainable construction challenges such as carbon emissions, cracks appearance, concrete failure, corrosion of the reinforcement, water ingress, and loading damage.

2nd Speaker: Eng. Peterson T. Mutabazi, CEO Africonsult International Ltd

Peterson T. Mutabazi is a Civil Engineer and with a specialization in highways and transportation engineering; he is a part-time lecturer at the University of Rwanda. His career progression has been in urban infrastructure planning and development, project management, institutional review, and strategic management, with great involvement in research and consulting. He is currently a World Bank Consult on urbanization and affordable housing development and was the consultant with the KFW on fiscal decentralization project, the JICA on the skills development, the UNICEF on learn through play project in the education sector, the GTZ/GIZ on infrastructure planning and was formerly the Director General at the ministry of infrastructure in charge of all modes of transport. In the education sector, he is still a visiting assistant lecturer in civil engineering, traffic, and transportation areas and remains the Vice Chairperson of the local community mediation committee in the Kagarama sector of Kicukiro district. He has been involved in research-related assignments, presently being the project manager of the project for the establishment of the city management office for the Rwandan secondary cities. In institutional review, he headed the team for restructuring the public transport company for the rural and urban transport systems, while in transportation, he has been the client's resident engineer for the construction of secondary cities' urban infrastructure.

Presentation Title: Self-Healing Concrete: A Pathway to Resilient and Sustainable Infrastructure Development in Africa

Africa's infrastructure faces unique challenges, including rapid urbanization, harsh climatic conditions, and a need for sustainability. The continent's vast infrastructure, critical for economic growth and community well-being, is often compromised by structural deterioration, costly maintenance, and environmental concerns. This paper explores the adoption of self-healing concrete as a revolutionary solution to these pressing issues. Self-healing concrete, embedded with healing agents that are activated upon the formation of cracks, offers a promising pathway to extend infrastructure lifespan, reduce maintenance costs, and enhance sustainability.

This innovative material not only self-repairs but also contributes to carbon sequestration, addressing Africa's urgent need for resilient and eco-friendly infrastructure solutions. The deployment of self-healing concrete in Africa could significantly mitigate maintenance challenges, lower lifecycle costs, and reduce the environmental footprint of construction projects. This study highlights the potential benefits, including enhanced durability, cost-effectiveness, and environmental sustainability, positioning self-healing concrete as a pivotal material for advancing Africa's infrastructure resilience. By embracing this cutting-edge technology, Africa can spearhead a new era of infrastructure development that is both durable and sustainable, ensuring the continent's growth is built on a foundation of resilience.

Wednesday, July 10, 2024
2:00-3:00 PM Milan Time / 8:00-9:00 AM EDT (New York Time)

Co-Host Organization:
International Federation for Structural Concrete (*fib*)

Website: https://www.fib-international.org/

The International Federation for Structural Concrete (*fib*) is a not-for-profit association formed by 40 national member groups in more than 100 countries and approximately 2500 corporate and individual members. The *fib*'s mission is to develop at an international level the study of scientific and practical matters capable of advancing the technical, economic, aesthetic, and environmental performance of concrete construction.

The knowledge developed and shared by the *fib* (*fib* Bulletins, *fib* events, *fib* workshops, *fib* courses, and so on) is entirely the result of the volunteer work provided by *fib* members.

Local Moderator: Jean Michel Torrenti, Professor

Jean Michel Torrenti has 40 years of experience in the mechanical behavior and durability of concrete. He has held successive positions in engineering schools (École des Ponts ParisTech [formerly École Nationale des Ponts et Chaussées], Champs-sur-Marne, France, where he was Dean of Studies and is a Professor, and École Supérieure d'Ingénieurs des Travaux de la Construction de Paris [ESITC Paris], Arcueil, France, where he is Research Director); at Gustave Eiffel University, Champs-sur-Marne, France; and in research centers. Some of his accomplishments include conducting research into the mechanical behavior and durability of concrete structures (he has published approximately 100 papers and was Director of 30 PhDs); research management (laboratory or research department management); expertise in the durability of engineering structures; standardization (he is involved in writing the next generation of Eurocode 2 and the French guidelines for low-carbon concretes); and teaching at institutions.

He is Chairman of the Scientific Council of the Association Universitaire de Génie Civil (AUGC); a member of the Scientific Council of the French National Radioactive Waste Management Agency (Andra); Chair of *fib* Commission 4, Concrete & Concrete Technology, and a member of the *fib* Presidium; and President of the Board of Directors of the foundation École Française du Béton. Recently, he was Director of the €3 million national FastCarb project (fastcarb.fr), which brought together 23 partners and aimed to identify the mechanisms and conditions for accelerating the carbonation of concrete, intending to increase the amount of CO_2 stored in recycled concrete aggregates (RCA) during a controlled industrial process to turn them into carbonated recycled concrete aggregates (CRCA) and thus increase their use in new concretes.

1st Speaker: Marco di Prisco, PhD, Full Professor of Structural Design

ACI member Marco di Prisco is a Full Professor of structural design in the Department of Civil and Environmental Engineering at Politecnico di Milano, Milan, Italy. He was also the Coordinator of the Master of Science in Civil Engineering for Risk Mitigation from 2013 to 2018.

He is an Honorary Editor of the *European Journal of Environmental and Civil Engineering* and Associate Editor of the *J. of Cement and Concrete Composites*. He is a member of ACI; a member of the *fib* (the *fib* Presidium, a Deputy Member of the Italian Delegation, and a member of several technical groups); an expert member of the Development Advisory Committee of the International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM); Convener of the European Committee for Standardization (CEN) Technical Committee 250, Subcommittee 2, Working Group 1, Task Group 2 (CEN/TC 250/SC 2/WG 1/TG 2) to introduce fiber-reinforced concrete (FRC) into Eurocode 2; a member of the Italian Association for Structural Concrete (AICAP); and a member of several

national technical committees (the Italian National Standards Body [UNI], the Italian National Research Council [CNR], and CC.SS.). He is also President of the Italian Cultural Association CTE on the Industrialization in Building Constructions. He is a member of many scientific committees of international conferences and was Co-Chairman of the 8th International Conference on Concrete under Severe Conditions – Environment and Loading (CONSEC 2016).

di Prisco's research interests include constitutive modeling of cement composite materials, reinforcement-concrete interaction basic mechanisms; reinforced concrete (RC), P/C, and FRC structural elements; prefabricated structures; soil-structure interaction; structural response at exceptional loads; tunnel safety; and risk mitigation.

Presentation Title: Fiber-Reinforced Concrete/Ultra-High-Performance Concrete in the MC2020

The *fib* Model Code 2020 looks at fiber-reinforced concrete (FRC) as a generalized concrete able to exhibit a significant toughness in uniaxial tension; integrates its resistance equations with those of conventional concrete as much as possible; guarantees, in many structural cases, a sustainable choice for the reinforcement; and pays more attention to high- and ultra-high-performance materials, and, at the same time, to hybrid solutions for the reinforcement. Although it is based on the same concepts introduced in the *fib* Model Code 2010, it is mainly concentrated on existing structures and sustainability and, like the previous one, extends to all types of fibers. The classification introduces three other classes: 10, 12, and 14 MPa, which correspond to the characteristic values of the serviceability residual flexural strengths f_{R1k}. This prevents the risk of having a shaded area between the common FRC and the ultra-high-performance FRC (UHPFRC), thus aiming to continuously improve the mechanical performance and take a more sustainable approach to the best mixture depending on the special use required. It introduces a different coefficient, κ_G, to take into account structural redundancy, simplifying the computation of the coefficient in the case of hybrid solutions and clarifying the concept of the orientation factor. It introduces the effect of fiber reinforcement in uniaxial compression and modifies the constitutive laws in uniaxial tension for quasi-hardening materials. Shear and torsion are made compatible with the equations valid for reinforced concrete, introducing a multi-level approach, and punching suggests an equation that contrasts the one introduced in Annex L of Eurocode 2 (EC2). Equations related to durability are also improved. Finally, a very significant change is represented by the possibility of updating the code without needing to wait for the next edition in more than 10 years.

2nd Speaker: Professor Nikola Tošić

Nikola Tošić is an Assistant Professor of construction engineering in the Department of Civil and Environmental Engineering at Universitat Politècnica de Catalunya (UPC), Barcelona, Catalonia, Spain. A former Marie Skłodowska-Curie Actions (MSCA) Individual Fellow and Fulbright Visiting Scholar, he is a member of UPC's Concrete Sustainability and Smart Structures (C_3S) Research Group, focusing on the use of recycled and waste materials in concrete composites, design code development, and sustainability assessment of concrete structures. He has co-authored more than 60 publications and worked on numerous research projects. He is an active member of the *fib* and CEN and leads the *fib* Task Group 4.7, Structural Applications of Recycled Aggregate Concrete – Properties, Modeling, and Design.

Presentation Title: Design Code Provisions for Recycled Aggregate Concrete Structures

Recycled aggregate concrete (RAC) has been extensively researched in previous years, both on the material and structural levels. This has enabled the formulation of material and structural resistance models that can be safely and reliably used for the structural design of RAC members within the new *fib* Model Code 2020 and new Eurocode 2. Thus, an increased market uptake of recycled aggregate (RA) can be achieved, leading to potential sustainability improvements in concrete structures. To familiarize the scientific and engineering community with the new provisions for RAC, this presentation presents the background and rationale for the adopted provisions for RAC.

Wednesday, July 10, 2024
2:00-3:00 PM London Time / 9:00-10:00 AM EDT (New York Time)
Co-Host Organization: The Institute of Concrete Technology (ICT)

The Institute of Concrete Technology

Website: https://www.theict.org.uk/

The Institute of Concrete Technology (ICT) was formed in 1972. Full membership is open to all those who have obtained the Diploma in Advanced Concrete Technology and MSc in Advanced Concrete Technology (University of Leeds). The Institute is internationally recognized, and the Diploma and MSc have worldwide acceptance as the leading qualification in concrete technology. The Institute sets high educational standards and requires its members to abide by a Code of Professional Conduct, thus enhancing the Professional Affiliate body of the UK Engineering Council. The Institute's mission is to preserve and promote concrete technology as a recognized engineering discipline and to consolidate the professional status of practicing concrete technologists worldwide. Membership of The Institute of Concrete Technology is open to a wide range of people with a professional interest in concrete—from students to those who have worked in the industry for many years.

Local Moderator: John Reddy, Vice President, The Institute of Concrete Technology

John Reddy is a Chartered Civil Engineer with a master's degree in advanced Concrete Technology from Queen's University Belfast. He has 20 years of experience working with low-carbon cement and concrete. He is the current Vice President of the Institute of Concrete Technology and will take office as President in 2025. Working with Ecocem since 2004, he has held a variety of technical roles. He is now working on the deployment of Ecocem ACT Low Carbon Concrete Technology in Ireland, UK, and Holland.

1st Speaker: Nina Cardinal, National Technical Manager, Cement, Heidelberg Materials UK

Nina Cardinal has a degree in Materials Science from the Technical University of Aachen, RWTH, an MBA from the University of Warwick, and a PhD in fracture mechanics from the University of Birmingham. She has worked for more than 20 years in the steel industry in R&D and technical positions related to the manufacture of engineering steels before joining the cement industry as Hanson UK's national technical manager in 2019. She has recently completed an MSc in Advanced Concrete Technology. She is involved in the development of low-carbon cement and is a member of CEN and BSI committees related to SCMs.

Presentation Title: The Circular Economy in Practice: The Potential of Recycled Concrete Paste

Recycled concrete fines have recently been recognized as a main constituent in the European standard for cement. Their value can be further elevated through carbonation, creating a new reactive supplementary cementitious material. This provides an example of true circularity contributing to both the preservation of natural resources and decarbonization through the permanent sequestration of CO_2. This presentation

summarises the status of the research carried out at Heidelberg Materials' Global R&D function to optimize the carbonation process of recycled concrete fines and the resulting mineralogy of the reactive pozzolan. This is followed by an account of the ensuing industrial pilots to develop and upscale the separation and carbonation technologies.

2nd Speaker: Aneeta Mary Joseph, Materials Engineer

Dr. Aneeta Mary Joseph is a Materials Engineer in Mott Macdonald with a background in Civil engineering and academic and industrial experience in Concrete Technology. She is currently working on a wide range of projects, specializing in material specification and durability assessment for major projects, circular economy, sustainability, and low-carbon concrete roadmaps. She completed her doctoral studies on sustainable binders derived from processed incineration ash. Her research covered topics such as incineration ash processing, reactivity, mechanical properties, durability, and environmental impact. She also has academic research experience in the durability of alkali-activated materials and limestone calcined clay cement (LC3). She is also an Associate Member of the Institute of Concrete Technology and serves as the secretary of the ICT Student and Young Professional Network (ICT SYPro).

Presentation Title: National Highways Net Zero Concrete Roadmap

Roads are a vital part of zero-carbon travel. National Highways has announced an ambitious carbon plan that will set them to rapidly cut carbon from road construction, maintenance, and operations and support the transition to zero-emission vehicles. They have committed to achieving net zero emissions from construction and maintenance activity by 2040. This involves significant reductions in emissions relating to the materials used and how they are manufactured, transported, used, and recycled. Concrete is the most used material. A roadmap for concrete was published to establish the ambitious decarbonization activities required to deliver their net zero targets and the areas where they need to work with the industry to realize them. This talk delves into the process behind the development of a roadmap for concrete that includes the development of a carbon calculation approach, determining the baseline emissions, and modeling emissions reduction measures in five-year periods from 2020 to 2040. The main measures modeled were emission reduction from clinker production, cement replacement by supplementary cementitious materials, reduction in cement content, the transition from 'ST' to 'GEN' mixes, and reduction in transportation and plant emissions. Modelling shows that a 48% reduction in the carbon intensity of concrete against the 2020 baseline is achievable by 2040. This roadmap is the starting point, and we will be updated regularly as technology develops and data improves in the years ahead.

Wednesday, July 10, 2024
2:00-3:00 PM Accra Time / 10:00-11:00 AM EDT (New York Time)
Co-Host Organization: Ghana Institution of Engineering (GhIE)

Website: https://ghie.org.gh/

Ghana Institution of Engineering (GhIE) was officially founded in 1968 to succeed the Ghana Group of professional Engineers as an autonomous professional body with no political affiliation. The Institution derives its authority from the Engineering Council Act 2011, Act 819, and the Professional Bodies Registration Decree NRCD143 of 1973. The late Ing. Dr. E. Sackey became its first President.

Local Moderator: Ing. Joseph K. Oddei, Project Manager, ACI – GhIE Partnership

Joseph K. Oddei is a geotechnical engineer with over 25 years of practicing experience. Currently, he is the Director at AESL handling the Geotechnical Department. He was the Chairman of the Civil Technical Division, GhIE, between 2016 and 2023. He has worked on several civil engineering projects in Ghana and Liberia by providing geotechnical support. He represents GhIE, as the Project Manager, for the ACI Partnership.

1st Speaker: Ing. Charles Kwame Kankam, Professor of Structural and Materials Engineering

Charles Kwame Kankam is a Professor of Structural and Materials Engineering in the Department of Civil Engineering at the Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi, Ghana. He received his BS degree (first class) in Civil Engineering from KNUST, his MS and DIC from Imperial College, University of London, and his PhD from the University of Leeds. He is a fellow of the Ghana Institution of Engineering, the American Society of Civil Engineers, the Structural Engineering Institute, and a member of the International Society of Ferrocement. His research interests include bond and deformations of reinforced concrete structures, structural behavior of concrete structures reinforced with conventional ferrous and innovative non-ferrous materials, conventional and innovative concrete materials, forensic and restoration of distressed/over-stressed structures, structural integrity assessment, fiber-reinforced concrete, and innovative concrete prestressing technology. He is credited with several research investigations and publications that cover the above areas of his interest.

Presentation Title: Overview of Research Studies of Reinforcing Steel and Non-Conventional Reinforcing Materials in Concrete

This presentation is about the investigation of various structural reinforcing materials, focusing on steel milled from recycled scrap metal and glass fiber-reinforced polymer (GFRP) bars. In Ghana, where infrastructure development is ongoing, the quality of locally manufactured steel bars has raised concerns due to deviations in size and chemical composition. These deviations impact the mechanical properties of the bars, potentially compromising the structural integrity of buildings and other constructions. Reinforced concrete with steel reinforcing bars has served most of these needs, but in recent years, the use of GFRP reinforcing bars in place of steel reinforcing bars in these structures cannot be overlooked as they offer advantages such a higher tensile strength, corrosion resistance, lighter in weight and cost-effectiveness compared to steel reinforcing bars. The use of composite materials has expanded during the last few decades across a variety of sectors and businesses. This increase is partially a response to the corrosion problems that regular steel encounters. Fiber-reinforced polymers (FRPs) are suitable answers to problems in the quickly evolving construction industry since they have several advantages. Further

research is needed to fully understand the mechanical properties of GFRP bars and optimize their use in structural applications.

2nd Speaker: Engr. Humphrey Danso, Professor

Humphrey Danso is a highly motivated individual with sustainable construction, competency-based training (CBT), and TVET education background. He is a professor, a consultant, and a researcher in Sustainable Construction Materials, Construction Management, and TVE Education. He is currently the Dean of School of Graduate Studies of the Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development, Kumasi-Ghana. He was the former Dean of the Faculty of Technology Education and Head of the Department of Construction and Wood Technology Education. He has twenty-seven (27) years of working experience in both pre-tertiary and tertiary education in Ghana, Russia, the United Kingdom, and Australia. He is a holder of PhD (Civil Engineering) from the University of Portsmouth, UK, MPhil (Civil Engineering) from the Voronezh University of Architecture and Civil Engineering, Russia; MTech (Competency-Based Training) from the University of Education, Ghana; and B.Ed. (Construction Technology) from the University of Education, Ghana. He also holds an MSc. in Strategic Management and Leadership from the Kwame Nkrumah University of Science and Technology. Ghana. Danso possesses excellent communication and writing skills, interpretation and analytic skills, and is fluent in written and oral English. This is evident in his over 90 international journal articles published and international conference presentations. He has consulted widely for the Commonwealth of Learning (COL), Internationale Zusammenarbeit (GIZ) GmbH, NUFFIC, National Teaching Councils (NTC), and the Commission for Technical and Vocational Education and Training (CTVET). Danso is a member of the Institution of Engineering and Technology, Ghana; African Foundation for Quality e-Learning in TVET; International Union of Laboratories and Experts in Construction Materials, Systems and Structures; Ghana Institute of Construction; International Building Performance Simulation Association; UK Higher Education Academy for Teaching and Learning; and International Association of Engineers.

Presentation Title: The Use of Lateritic Aggregate (LA) and Coconut Husk Fibre (CHF) in Concrete Production

Natural stone aggregate forms the bulk volume of concrete, constituting between 50 to 60% of the total volume of concrete. The use of natural stone as aggregate has contributed to the increased cost of concrete production. This has led to the search for alternate aggregates, such as lateritic stone, for concrete production. This study investigated the engineering properties of concrete produced with lateritic aggregate (LA) as coarse aggregate and coconut husk fibre (CHF) as reinforcement. Natural stone aggregate was replaced by LA at 0 (control), 10, 20, 30, 40, and 50%, with 0.25% constant CHF by weight. A mix proportion of 1:1.5:3 with a water/cement ratio of 0.6 was used for producing M40 concrete. A total of 162 specimens (90 cubes and 72 beams) were prepared and tested at the 7, 14, 21, and 28 days of curing. It was found that the specific gravity of lateritic stone aggregate was 2.885. The density of the concrete ranged from 2398.44 to 2404.11 kg/m^3. The water absorption of the concrete increased from 2.8% (control) to 3.57% (50% replacement LA). The highest compressive strength of 43.36 N/mm^2 (10% LA replacement) as compared to the control of 41.51 N/mm^2, represents a 4.5% increase in strength over the control. Flexural strength followed a similar trend, with the 10% LA replacement obtaining the highest flexural strength of 5.35 N/mm^2 compared to the 5.29 N/mm^2 for the control, translating into 1.1% increased flexural strength over the control. Scanning Electron Microscopy (SEM) revealed micro gaps between CHF and LA concrete. The study, therefore, concludes that the use of LA and CHF positively influenced the strength properties of concrete. 10% LA replacement of coarse aggregate and 0.25% CHF is recommended to practitioners for use.

Wednesday, July 10, 2024
5:00-6:00 PM Madrid Time / 11:00 AM-12:00 PM EDT (New York Time)

Co-Host Organization:
Spanish Association of Structural Engineering (ACHE)

Website: http://www.e-ache.com/

The Spanish Association of Structural Engineering (ACHE) is the main Spanish association of structural-related professionals, including engineers and architects. Originally created as ATHEP in 1951 by Eduardo Torroja and later merged with the Spanish Concrete Group (GEHO), ACHE promoted knowledge and research in the field of structural concrete first, and structural engineering later. ACHE has published the journal *Hormigón y Acero* since 1951 with all the issues published in open access, thus providing valuable insight into Spanish structural engineering over the years.

Local Moderator: Miguel Ortega, M.Sc. Civil Engineer

Miguel Ortega is the current President of the Spanish Association of Structural Engineering (ACHE). He is the Managing Director of TYLin Spain and the Sector Leader of Bridges and Buildings for TYLin Europe-LATAM, and he is also a member of the Steering Committee of TYLin Europe-LATAM. He is an M. Sc. Civil Engineer, having graduated from the Technical University of Madrid in 1997 and, since 2009, been serving as an Associate Professor of Steel and Composite Bridges and Structures. His contributions to the Eurocode Project Teams, particularly in Composite (steel and concrete) structures (EN 1994-1-1, EN 1994-2), Bassi of Design (EN 1990-A2), and Thermal Actions (EN 1991-1-5), underline his commitment to advancing structural engineering standards. Additionally, he is the President of the Spanish Mirror Subcommittees UNE-CTN 140 Eurocodes and UNE-CTN 140/SC-4 Composite Structures. Ortega has participated in the writing of 12 technical books, 31 articles in national and international technical publications, and 70 articles in proceedings of scientific-technical conferences, and he has participated in the project of more than 600 road and high-speed railway bridges, in addition to 5 notable buildings that cover a cumulative surface area of more than 200,000 m^2.

1st Speaker: Miguel Vicente, PhD, Civil Engineer, Associate Professor at the University of Burgos (Spain)

Miguel Vicente holds an MS and PhD in civil engineering (University of Cantabria, Spain, 1997 and 2002). He is an Associate Professor of the Department of Civil Engineering at the University of Burgos (Spain). He has been Vice-Rector of Infrastructures and Resources at the University of Burgos (2004-2008). He has carried out several stays in different universities worldwide. In 1998, he did a 1-year pre-doctoral stay at the Institut für Konstruktion und Entwurf II of the Universität Stuttgart (Germany) under the tutelage of Prof. Jörg Schlaich. In 2012, he did a 3-month research stay at the Armour College of Engineering of the Illinois Institute of Technology (IIT) (Chicago, IL, USA). In 2018, he completed a 1-year stay at the Parks College of Engineering, Aviation and Technology at Saint Louis University (SLU) (Saint Louis, MO, USA). Since 2016, he has been an active member of several American Concrete Institute (ACI) technical committees, including ACI Committee 209, Creep and Shrinkage in Concrete; 215, Fatigue of Concrete; 228, Nondestructive Testing of Concrete; 378, Concrete Wind Turbine Towers; and 444, Structural Health Monitoring. Among other activities, he has actively participated in the drafting of two international technical documents: ACI PRC-215-21, “Concrete Structure Design for Fatigue Loading – Report” and ACI PRC-444.2-21, “Structural Health Monitoring Technologies for Concrete Structures - Report.” He is currently Chair of ACI Technical Committee 215, Fatigue of Concrete (2024-2027). His areas of expertise are fatigue of concrete, mainly oriented to concrete

wind turbine towers and foundations, fiber-reinforced concrete, computed-tomography scanning technology applied to concrete, and structural health monitoring of bridges. He is the author of more than 50 papers in international journals, 10 books or book chapters, and numerous communications to international congresses.

Presentation Title: Introduction to Fatigue of Concrete. The Phenomenon Behind the Design of Wind Turbine Concrete Towers

Fatigue of concrete is a rather unknown phenomenon, even for civil engineers. However, in recent years, it has gained quite a lot of relevance. The development of high- and ultra-high-performance concretes makes it possible to build increasingly slender structures (bridges and buildings, for example) in which the variable loads that cause fatigue problems are proportionally more important.

In addition, there are some unique structural elements in which fatigue loads are dimensioning: the wind turbine concrete towers. In these breathtaking structures, fatigue loads are even more important than extreme loads. Fatigue is also behind the design of road pavements, among others.

The behavior of concrete under fatigue loads shows very different aspects from those under conventional static tests. Thus, for example, the dispersion of results is astonishingly large, which greatly conditions the post-processing of the results and the decision-making. In addition, fatigue response is extremely sensitive to many parameters, both macroscopic and microscopic.

In recent years, there has been a significant advance in understanding this phenomenon, its behavior, and the factors that most affect it. This presentation will describe the most relevant aspects of fatigue of concrete that every civil engineer should know.

2nd Speaker: Silvia Fuente García, Senior Engineer at Carlos Fernández Casado S.L.

Silvia Fuente is working for Carlos Fernández Casado, S.L. since 2001 on bridges and structures engineering department as senior engineer and team leader of major bridge projects. She specialized in the design of major bridges, with experience in various typologies and construction methods, including cable-stayed bridges, long-span archs, cantilever or incremental launched bridges. Her career has been primarily international, having worked extensively with various standards, including Eurocodes and Aashto. Her work covers all stages of bridge design and construction, from preliminary conception to detailed design, project follow-up, and supervision. Her areas of expertise are seismic bridge design and wind design. The projects in which she has been involved include 2024-2022. CENTENARIO BRIDGE SEVILLE. Cable substitution. Total length: 565 m. Main span 265 m; 2017-2023. - HARBOR BRIDGE. CORPUS CHRISTI. USA. Cable-stayed bridge. Design Main span 506 m; 2017-2021. VIADUCTO OVER THE MAGDALENA RIVER. COLOMBIA. Total length: 1360 m. Main span 200 m; 2020-2021. YARUMO BLANCO BRIDGE. COLOMBIA. Total length: 620 m. Main span 75 m; 2005-2015 - BRIDGE OVER CADIZ BAY. SPAIN. Length 3157 m. Main span 540 m. Design and construction; 2013 - BRIDGE OVER MAGDALENA RIVER. COLOMBIA. Cable-stayed bridge over the Magdalena River in Barranquilla, Colombia. Maximum span 380; 2011 – BRIDGE OVER BASARAB RAILWAY STATION. ROMANIA Bridge over Basarab Railway Station in Bucharest (Romania). Cable-stayed bridge with a single tower and a composite deck with a main span of 170 m; 2009-2016 - BRIDGE OVER THE TAJO RIVER. SPAIN Arch bridge over Tajo River in the Alcántara Reservoir. Madrid-Portugal high-speed railway line, Spain. Length 1488 m Main span 324 m; and 2009 - BRIDGE OVER CONTRERAS RESERVOIR. SPAIN Arch bridge over the Contreras Reservoir in the Madrid-Valencia high-speed railway, Spain. Length 587 m. Main span 261 m.

Presentation Title: Seismic Retrofitting of Concrete Bridges during Construction

CFC has been involved in several projects in areas of high seismicity in Colombia, in bridges that were initially monolithic and had to be modified to isolated solutions during construction for different reasons.

The Project of the Bridge Over the River Magdalena consists of a road Bridge 1360 m long, being the span distribution 17 x 40.0 m + 140.0 m +2 x 200.0 m + 140.0 m.

The main bridge was initially conceived as a frame, with a main span of 200 m long, two side spans of 100 m, and two V piers encastred into the deck. While the foundations were under construction, the expected 100 years scour occurred, so it was not possible to finish the remaining foundations. This

compelled to modify the span length distribution and the horizontal configuration, that was changed to seismic isolation of the deck, using lead bearings and vertical piers.

The Yarumo Blanco viaduct of the Bogotá-Buenaventura corridor is a prestressed concrete structure 640 m long and has a typical span of 75 m. It has a marked curvature in plan, with a monolithic link between the deck and the rectangular piers with marked differences in height. The execution of the work was interrupted for more than three years, with the structure partially completed. The review of the initial project and the inspection campaign carried out detected both the lack of capacity of the piers to resist seismic action due to an inadequate seismic configuration and the poor quality of the constructed parts, showing many pathologies and structural deficiencies.

After several studies, it was concluded that it was necessary to change the seismic configuration of the bridge. Once the deck was finished, the bases of the shortest columns were cut to intercalate friction pendulum isolators with the pile caps.

Wednesday, July 10, 2024
11:00 AM-12:00 PM Bogotá Time / 12:00-1:00 PM EDT (New York Time)

Co-Host Organization:
Inter-American Cement Federation (FICEM)

Website: https://ficem.org/

The Inter-American Cement Federation (FICEM) represents cement producers, institutes, and associations in Latin America, the Caribbean, Spain, and Portugal. FICEM's mission is to disseminate and strengthen the statements of the global cement agenda, such as climate protection, energy efficiency, and the use of alternative fuels and raw materials, as well as the promotion of good practices in the use of cement and concrete through its applications (housing, pavements, and infrastructure, among others). Likewise, the Federation works in the survey of the different regulatory frameworks, trends, and construction systems, as well as generates spaces for the exchange of good practices related to models of social responsibility and environmentally friendly technologies, seeking progress and welfare for the communities where its associates operate.

Local Moderator: Matías Polzinetti, MSc, Eng.

Matías Polzinetti is a Civil Engineer (University of Buenos Aires, Buenos Aires, Argentina) with postgraduate studies in integrated project management for construction (Universidad Austral, Buenos Aires, Argentina, and the Polytechnic University of Madrid, Madrid, Spain). Currently, he serves as Concrete Area Director at FICEM.

Polzinetti has more than 15 years of experience in cement and concrete technology, with a focus on standardization, quality control, sustainability, research and development, education, and training. He has been Vice President of the Argentinian Association of Concrete Technology (AATH) and an Assistant Professor in the School of Engineering at the University of Buenos Aires. He has also worked at the National Institute of Industrial Technology (INTI) of Argentina and at the Argentinian Portland Cement Institute (ICPA).

1st Speaker: Ricardo Pareja Soto, MSc, Eng.

Ricardo Pareja Soto is an Acoustic Engineer and Master in Environment (University of Santiago, Chile, Santiago, Chile) with postgraduate studies in mining safety, geology, and mining service in Chile. He has more than 25 years of experience in the cement industry, with a focus on health and safety, sustainability, and CO2 reduction agenda. From 2016 to date, he has served as Director of Innovation and Climate Action at FICEM, overseeing the deployment of the FICEM CO2 Roadmap Program for a low-carbon industry and toward net zero, along with other related projects.

Presentation Title: Towards Net Zero – FICEM Analytical Data Ecosystem and 3C (Cement, Concrete, and Construction) Calculator

This development is about an expert ecosystem of data analytics with web applications, which contains statistics of production and performance indicators of the global, regional, and local industry; a comparison of indicators with the regional and global industry; a technical module for pre-verification and benchmarking GNR ("Getting the Numbers Right") CO_2 emissions spreadsheets; decarbonization strategies of the roadmaps

in the world; a methodology to determine the potential for geolocated co-processing in the surroundings of each plant and its contribution to the circular economy; a cost-benefit analysis of technologies for decarbonization in clinker and cement production to 2050; a risk analysis model of the different carbon pricing instruments and their impact on this local cement industry; real-time measurement of CO_2 (more than 20 types) for cements, aggregates, and concretes; and a repository of technical data and economic and demographic indicators for scenario analysis in Latin America.

2nd Speaker: Matias Polzinetti, MSc, Eng.

Matías Polzinetti is a Civil Engineer (University of Buenos Aires, Buenos Aires, Argentina) with postgraduate studies in integrated project management for construction (Universidad Austral, Buenos Aires, Argentina, and the Polytechnic University of Madrid, Madrid, Spain). Currently, he serves as Concrete Area Director at FICEM.

Polzinetti has more than 15 years of experience in cement and concrete technology, with a focus on standardization, quality control, sustainability, research and development, education, and training. He has been Vice President of the Argentinian Association of Concrete Technology (AATH) and an Assistant Professor in the School of Engineering at the University of Buenos Aires. He has also worked at the National Institute of Industrial Technology (INTI) of Argentina and at the Argentinian Portland Cement Institute (ICPA).

Presentation Title: Decarbonization of Cement and Concrete Industry in Latin America and the Caribbean – Role of Codes and Standards

Some of the most significant challenges for the present construction sector are identified around the sustainability and carbon footprint reduction agenda; efficient use of energy and resources; improving process productivity; and industrialization, digitalization, and deployment of new technologies.

A broad decarbonization strategy will imply, in addition to considering the local context of each country and region, the need to resolve gaps in the knowledge, availability, and use of data to determine the carbon footprint of each project more accurately; integrate the design, project, and construction processes with a collaborative and holistic vision between the different stakeholders; disseminate and promote low-carbon products, including green cement and concrete; and ensure the adequacy of regulatory frameworks for decarbonization. Within this last issue, standards and building codes are part of the scope of work to facilitate the transition to low-carbon products and technologies.

The speaker will present a vision of the topic, from the needs and challenges in Latin America and the Caribbean to its opportunities.

Wednesday, July 10, 2024
6:00-7:00 PM London Time / 1:00-2:00 PM EDT (New York Time)
Co-Host Organization: RILEM

Website: https://www.rilem.net/

The International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM, from the name in French) was founded in June 1947, with the aim to promote scientific cooperation in the area of construction materials and structures. Today, the new meaning of the acronym RILEM (Réunion Internationale des Laboratoires et Experts des Matériaux, systèmes de construction et ouvrages) emphasizes its dominant focus on people as well as its worldwide activities, covering 90 countries.

Local Moderator: Dimitri Feys, Associate Professor

ACI member Dimitri Feys is an Associate Professor at the Missouri University of Science and Technology, Rolla, MO, USA. He has been the Regional Convenor for RILEM for North America and the Caribbean since 2018 and has facilitated a strong collaboration between ACI and RILEM. He is Chair of the ACI Student and Young Professional Activities Committee (SYPAC) and is a member of ACI Committees 237, Self-Consolidating Concrete; 238, Workability of Fresh Concrete; and 309, Consolidation of Concrete. He has been a RILEM member since 2004 and is active in several technical committees. He served as Deputy Chair of RILEM Technical Committee 266-MRP, Measuring Rheological Properties of Cement-Based Materials, from 2015 to 2023. The committee recently published its state-of-the-art report and a topical collection in *Materials and Structures* on a round-robin concrete rheometer testing campaign held in France.

His research interests include the mixture design, rheology, and placement of cement-based materials, and the consequences of placement on the performance of concrete. He received his combined BSc and MSc from Ghent University, Ghent, Belgium, in 2004, and his PhD at the same university in 2009.

1st Speaker: Nele De Belie, Full Professor

Nele De Belie has been a Professor of the durability of cement-bound materials at Ghent University since 2000. Since 2018, she has been Director of the Magnel-Vandepitte Laboratory in the Department of Structural Engineering and Building Materials, with approximately 140 staff members. She is head of the Concrete and Environment research group of approximately 15 postdoctoral and PhD researchers. She has supervised more than 60 (inter)national projects in these areas, has been Vice Chair of the recent Self-healing As preventive Repair of COncrete Structures (SARCOS) European Cooperation in Science and Technology (COST) Action, and is Coordinator of the European Marie Skłodowska-Curie Innovative Training Network (ITN) Self-Healing, Multifunctional, Advanced Repair Technologies in Cementitious Systems (SMARTINCS). She is President-Elect of RILEM, Chair of RILEM Technical Committee 281-CCC, Carbonation of Concrete with Supplementary Cementitious Materials (over 100 members), and outgoing Chair of the RILEM Technical Activities Committee (coordinating approximately 40 technical committees).

De Belie is the author of over 350 Web of Science (WoS) publications and 20 book chapters, editor of 10 books, inventor in four patent applications, and an Editorial Board member of three Science Citation Index (SCI)-indexed scientific journals. She is a laureate of several awards in recognition of her scientific work, such as the Robert L'Hermite Medal, which she received in 2010. Since 2022, she has been appointed as a member of the Royal Flemish Academy of Belgium for Science and the Arts.

Her research interests include sustainable concrete with supplementary cementitious materials, concrete durability, biodeterioration, bioconsolidation, smart concrete with self-healing or self-cleaning properties, circular economy, and life cycle assessment.

Presentation Title: Overview of the Work of RILEM TC 281-CCC, Carbonation of Concrete with Supplementary Cementitious Materials

The use of supplementary cementitious materials (SCMs) to replace part of the portland cement clinker can help reduce CO2 emissions associated with concrete production. However, carbonation of concrete with SCMs is often progressing faster and may increase the risk of reinforcement corrosion. RILEM Technical Committee (TC) 281-CCC has compiled an extensive literature review, elucidating the effect of SCM characteristics, exposure environments, and curing conditions on the carbonation mechanism, kinetics, and structural alterations in cementitious systems containing SCMs. Further, they conducted a critical analysis of at least 16 different standard testing methods that are currently applied to determine the carbonation resistance of concrete in different regions. An extensive interlaboratory test (ILT) with 22 participating laboratories was set up to compare the carbonation of mortar and concrete with three cement types (CEM I, CEM II/B-V, CEM III/B), both in natural and accelerated test conditions. Furthermore, a comprehensive literature database has been established, consisting of 1044 concrete and mortar mixtures with their associated carbonation depth data over time. The effects of binder composition and mixture design, curing and preconditioning, and relative humidity on the carbonation rate were evaluated, as well as possible correlations between compressive strength and carbonation resistance. Carbonation data were also analyzed for alkali-activated concrete, indicating that in this case, instead of the $w/CaO_{reactive}$ ratio, a better indicator of the carbonation resistance appears to be their $w/(CaO + MgO_{eq} + Na_2O_{eq} + K_2O_{eq})$ ratio. In another ILT, the combined action of carbonation and mechanical loading was studied. The results indicated that the carbonation depth is lower in the case of a limited compressive load and higher in the case of a high compressive load or tensile load compared with unloaded specimens. Regarding the effect of reinforcing steel corrosion, it was seen that the influencing factors are moisture state, microstructure of the carbonated concrete, various (minor) species that may be present in the concrete pore solution, and cover depth. The circumstance that a reduced pH alone is not sufficient to lead to significant steel corrosion suggests that the focus should shift from studying carbonation to studying the corrosion of steel in carbonated concrete.

2nd Speaker: Dimitri Feys, Associate Professor

ACI member Dimitri Feys is an Associate Professor at the Missouri University of Science and Technology, Rolla, MO, USA. He has been the Regional Convenor for RILEM for North America and the Caribbean since 2018 and has facilitated a strong collaboration between ACI and RILEM. He is Chair of the ACI Student and Young Professional Activities Committee (SYPAC) and is a member of ACI Committees 237, Self-Consolidating Concrete; 238, Workability of Fresh Concrete; and 309, Consolidation of Concrete. He has been a RILEM member since 2004 and is active in several technical committees. He served as Deputy Chair for RILEM Technical Committee 266-MRP, Measuring Rheological Properties of Cement-Based Materials, from 2015 to 2023. The committee recently published its state-of-the-art report and a topical collection in Materials and Structures on a round-robin concrete rheometer testing campaign held in France.

His research interests include mixture design, rheology, and placement of cement-based materials, and the consequences of placement on the performance of concrete. He received his combined BSc and MSc from Ghent University, Ghent, Belgium, in 2004, and his PhD at the same university in 2009.

Presentation Title: Overview of RILEM TC 266-MRP, Measuring Rheological Properties of Cement-Based Materials

This presentation gives an overview of the work accomplished by RILEM TC 266-MRP on measuring the rheological properties of concrete. The first part of the presentation highlights the recently published state-of-the-art report by the committee, primarily focusing on tools, procedures, and challenges when measuring the rheological properties of cement-based materials. The second part of the presentation will discuss the results from the round-robin tests on concrete rheometers held in Béthune, France, in 2018. A

description of the rheometers, testing, and analysis procedure is included. The comparison of flow curves—that is, yield stress and plastic viscosity results for six devices and eight mixtures, is detailed, as well as several methods to assess the structural build-up of concrete. The main takeaways from the analysis are that for the analyzed rheometers, differences of a factor of 2 in assessed properties still exist and that the certainty of a measurement appears to decrease with an increase in the yield stress-to-plastic viscosity ratio, coarse aggregate content for yield stress, and the value of viscosity of the viscosity assessment. To quantify structural build-up, a clear peak in stress versus time or stress versus strain is required to determine the static yield stress, and more than two data points are essential to ensure a sufficiently precise estimation of the structuration rate of the concrete.