2013

Civil Engineering Abstracts

Third Annual International Conference on Civil Engineering
10-13 June 2013, Athens, Greece

Edited by Gregory T. Papanikos

THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

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Preface

This abstract book includes all the abstracts of the papers presented at the *3rd Annual International Conference on Civil Engineering, 10-33 June 2013,* organized by the Athens Institute for Education and Research. In total there were 27 papers and 40 presenters, coming from 18 different countries (Albania, Australia, Canada, China, Czech Republic, Egypt, Greece, Hong Kong, India, Israel, Italy, Jordan, Libya, Romania, Thailand, Turkey, UK, USA). The conference was organized into VIII sessions that included areas of Structural Engineering, Structural Damage Mitigation and Assessment against Natural Disasters, Transportation Engineering and Planning and other related disciplines. As it is the publication policy of the Institute, the papers presented in this conference will be considered for publication in one of the books of ATINER.

The Institute was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet in Athens and exchange ideas on their research and consider the future developments of their fields of study. Our mission is to make ATHENS a place where academics and researchers from all over the world meet to discuss the developments of their discipline and present their work. To serve this purpose, conferences are organized along the lines of well established and well defined scientific disciplines. In addition, interdisciplinary conferences are also organized because they serve the mission statement of the Institute. Since 1995, ATINER has organized more than 150 international conferences and has published over 100 books. Academically, the Institute is organized into four research divisions and nineteen research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

I would like to thank all the participants, the members of the organizing and academic committee and most importantly the administration staff of ATINER for putting this conference together.

Gregory T. Papanikos
President

FINAL CONFERENCE PROGRAM
3rd Annual International Conference on Civil Engineering, 10-13 June 2013, Athens, Greece
PROGRAM
Conference Venue: Titania Hotel (52 Panepistimiou Avenue)

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11. Mr. Moamer Gashoot, Researcher, Bournemouth University, UK.
12. Dr. Matthew Kubik, Associate Professor, Indiana University Purdue University Fort Wayne, USA.
13. Dr. Caterina Pizanias, Instructor, University of Calgary, Canada.
14. Dr. Virginia Sisiopiku, Associate Professor, The University of Alabama at Birmingham, USA.
15. Ms. Lila Skountridaki, Researcher, ATINER & Ph.D. Student, University of Strathclyde, U.K.
16. Mr. Vasilis Charalampopoulos, Researcher, ATINER & Ph.D. Student, University of Stirling, U.K.

Administration

Fani Balaska, Stavroula Kiritsi, Eirini Lentzou, Konstantinos Manolidis, Katerina Maraki & Celia Sakka

C O N F E R E N C E P R O G R A M

(The time for each session includes at least 10 minutes coffee break)

Monday 10 June 2013

09:00-09:30 Registration

09:15-09:30 Welcome and Opening Remarks

- Dr. Gregory T. Papanikos, President, ATINER.
- Dr. Nicholas Patricios, Head, Architecture & Engineering Research Unit, ATINER & Professor of Architecture, University of Miami, USA.
- Dr. Thomas Attard, Academic Member, Architecture & Engineering Research Unit, ATINER & Associate Research Professor, Arizona State University, USA.

09:30-12:00 Session I: Structural Engineering
Chair: Dr. Thomas Attard, Academic Member, Architecture & Engineering Research Unit, ATINER & Associate Research Professor, Arizona State University, USA.

1. *Abdul-Qader Al-Najmi, Professor, The University of Jordan, Jordan, Moayyad Al-Nasra, Chair, West Virginia University Institute of Technology, USA & Naiem Asha, Research Associate, University of Jordan, Jordan. Use of Swimmer Bars as Shear Reinforcement in the Reinforced Concrete Beams.
2. Vazul Boros, Lecturer, German University in Cairo, Egypt. Applications of Reliability Analysis in Structural Engineering.
3. Le Huang, Student, Wuhan University, China & Lihua Xu, Professor, Wuhan University, China. Deflection Analysis of Reinforced Concrete T-Beam Prestressed with CFRP Tendoms Externally.

12:00-13:30 Session II: Structural Damage Mitigation and Assessment against Natural Disasters
Chair: *Abdul-Qader Al-Najmi, Professor, The University of Jordan, Jordan

1. Andrei-Gabriel Bica, PhD Student, Technical University of Civil Engineering, Romania & Gabriel Danila, PhD Student, Technical University of Civil Engineering, Romania. Comparative Study on Seismic Vulnerability of the Bucharest Buildings.
2. Hatice Gazi, Research Assistant, Istanbul University, Turkey, Seda Oncu-Davas, Research Assistant, Istanbul University, Turkey & Cenk Alhan, Associate Professor, Istanbul University, Turkey. Comparison of Ground Motion Pulse Models for the Drift Response of Seismically Isolated Buildings.
3. Arcan Yanik, Researcher, Florida Institute of Technology, USA, Ercan Yuksel, Associate Professor, Istanbul Technical University Civil Engineering Department, Turkey & Cem Yalcin, Associate Professor, Bogazici University Civil Engineering Department, Turkey. Evaluation of High-Deformation Capability and High-Strength Steels as Reinforcement in Reinforced Concrete Members.
4. Seda Oncu-Davas, Research Assistant, Istanbul University, Turkey, Hatice Gazi, Research Assistant, Istanbul University, Turkey & Cenk Alhan, Associate Professor, Istanbul University, Turkey. Comparison of Ground Motion Pulse Models for the Acceleration Response of Seismically Isolated Buildings.
5. Lucio Nobile, Professor, University of Bologna, Italy. Nondestructive and Destructive Evaluation of Concrete Compression Strength.
6. Dr. Thomas Attard, Academic Member, Architecture & Engineering Research Unit, ATINER & Associate Research Professor, Arizona State University, USA. Tornado Debris Impact Tests of a New Composite Storm Shelter Room System.

13:30-14:30 Lunch (details during registration)

14:30-16:00 Session III: Transportation Engineering and Planning
Chair: Dimos Polyzois, Professor, University of Manitoba, Canada,

1. *Virginia Sisiopiku, Associate Professor, University of Alabama at Birmingham, USA, Daniel Hester, Research Assistant, University of Alabama at Birmingham, USA, Albert Gan, Associate Professor, Florida International University, USA, Despina Stavrinos, Assistant Professor, University of Alabama at Birmingham, USA & Andrew Sullivan, Instructor, University of Alabama at Birmingham, USA. Roadside Advertising and Traffic Safety.
2. Vijay Bansal, Associate Professor, National Institute of Technology Hamirpur, India. 4D Geographic Information Systems for Ensuring Safety in Building Construction.
3. Sunil Sharma, Assistant Professor, National Institute of Technology Hamirpur, India. Location based Planning and Scheduling of Highway Construction Projects.
4. Ghazi Al-Khateeb, Associate Professor and Vice Dean of Engineering, Jordan University of Science and Technology, Jordan & Riyada Al-Smadi, Researcher, Jordan University of Science and Technology, Jordan. Psi Models for Urban Highway Flexible Pavements in Jordan.

16:00-17:30 Session IV: Construction Engineering, Sustainability, and Energy Efficiency I
Chair: *Virginia Sisiopiku, Associate Professor, University of Alabama at Birmingham, USA

1. Dimos Polyzois, Professor, University of Manitoba, Canada, Eleoussa Polyzoi, Professor, University of Winnipeg, Canada, John Wells, Building Science Engineer, Crosier Kilgour and Partners Ltd, Canada & Theo Koulis, Assistant Professor, University of Manitoba, Canada. Housing as a Determinant of Children's Respiratory Health and School Attendance.
2. Dimitrios Goulias, Associate Professor, University of Maryland, USA & Sahand Karimi, Ph.D. Student, University of Maryland, USA. Variability Analysis and OC Curves for Assessing Contractor and Agency Risks Associated with Construction Materials Acceptance.
3. *Michael Woo, Associate Professor, The Citadel, USA. Stormwater Quality Management – Design Criteria and Sustainability.
4. Julinda Keci, Lecturer, Epoka University, Albania & Enea Mustafaraj, Lecturer, Epoka University, Albania. Practices, Barriers and Challenges of Risk Management Implementation in Albanian Construction Industry.
5. *Sanusi Elazhari, Professor, University of Tripoli, Libya. The Effect of Rate of Applied Load and Concrete Aging on Energy Dissipation of Plain Concrete Members Subjected to Static Cycled Load.

21:00–23:00 Greek Night (Details during registration)

Tuesday 11 June 2013

08:00-10:00 Session V: Material Behaviour Analysis and Composites
Chair: *Michael Woo, Associate Professor, The Citadel, USA.

1. Jitka Hroudova, PhD Student, Brno University of Technology, Czech Republic, Jiri Zach, Professor, Brno University of Technology, Czech Republic & Martin Sedlmajer, Professor, Brno University of Technology. Development of Masonry Blocks with Thermal Insulation.
2. Jana Kosikova, PhD Student, Brno University, Czech Republic, Vit Petranek, Professor, Brno University, Czech Republic & Michaela Vyhnankova, Professor, Brno University, Czech Republic. Basic Characteristics of an Appropriate Waste Fillers for Solvent Free and Water-Borne Industrial Polymer Floors and Their Utilization.
3. Khalid Ghuzlan, Assistant Professor, Jordan University of Science and Technology, Jordan, Ghazi Al-Khateeb, Associate Professor and Vice Dean of Engineering, Jordan University of Science and Technology, Jordan & Yazeed Qasem, Researcher, Jordan University of Science and Technology, Jordan. Rheological Properties of Polyethylene-Modified Asphalt Binder.

10:00-12:00 Session VI: Geotechnical Engineering, Climate Engineering, and Geo-environmental Engineering
Chair: Taisir Khedaywi, Professor, Philadelphia University, Irbid-Jordan.

1. Pradeep Kumar Garg, Professor, Indian Institute of Technology Roorkee, India & Kapil Pandey, PG Student, Indian Institute of Technology Roorkee, India. Remote Sensing based Landuse Change Analysis and its Impact on Climate.
2. Enea Mustafaraj, Lecturer, Epoka University, Albania & Yavuz Yardim, Epoka University, Albania. Repair and Strengthening of Historical Structures: Naziresha Mosque in Elbasan, Albania.
3. Uba Sirikaew, Lecturer, King Mongkut's Institute of Technology Ladkrabang, Thailand. Geotechnical Investigation of the Ban Koum Dam Site, LPDR-Thailand Boarder.

12:00-13:30 Session VII: Engineering/ Computational Mechanics
Chair: Khalid Ghuzlan, Assistant Professor, Jordan University of Science and Technology, Jordan.

1. Asaad Faramarzi, Researcher, University of Greenwich, UK & Amir M. Alani, Professor, University of Greenwich, UK. Probabilistic Sewer Pipe Analysis using Finite Element.
2. Pallab Das, Assistant Professor, National Institute of Technology Silchar, India, Prashant Sharma, Undergraduate Student, National Institute of Technology Silchar, India. Effect of Infill Modeling on Seismic Behaviour of Structures.
3. Taisir Khedaywi, Professor, Philadelphia University, Irbid-Jordan & Mohammad Alsheyab, PhD in Civil and Environmental Engineering (Assistant Professor), Qatar National Research Fund, Qatar. Effect of Electric Arc Furnace Dust (EAFD) on Dynamic Creep of Asphalt Concrete Mixtures.

13:30-14:30 Lunch (Details during registration)

14:30-16:00 Session VIII: Construction Engineering, Sustainability, and Energy Efficiency I Chair: Asaad Faramarzi, Researcher, University of Greenwich, UK
1. Kagan Poyraz, PhD Student, Czech Technical University, Czech Republic. Potential Energy Efficiency Ways for Residential Buildings. 2. Hussein Elnaas, Research PhD Student, University of Brighton, UK, Philip Ashton, Assistant Head, University of Brighton, UK & Kassim Gidado Gidado, Head, University of Brighton, UK. Selection Criteria Framework to Adopt Off-Site Manufacturing (Osm) Systems in House Building Projects.

17:30-20:30 Urban Walk (Details during registration)

21:00-22:00 Dinner (Details during registration)

Wednesday 12 June 2013
Cruise: (Details during registration)

Thursday 13 June 2013
Delphi Visit: (Details during registration)

Ghazi Al-Khateeb
Associate Professor and Vice Dean of Engineering, Jordan University of Science and Technology, Jordan
&
Riyada Al-Smadi
Researcher, Jordan University of Science and Technology, Jordan

Psi Models for Urban Highway Flexible Pavements in Jordan

Serviceability is the ability of a specific pavement section to serve high speed, high volume, and mixed traffic in its existing condition. Serviceability is one of the methods to measure pavement behavior or performance at a specific time. In this study, a multiple regression model was developed for the present serviceability index (PSI) of flexible pavements for urban highways in Jordan.

Thirty-five (35) pavement sections for urban highways were selected in this study. The length of each pavement section was 1,200 ft (366 m). The data collected included the present serviceability rating (PSR), the slope variance (SV) representing roughness, and physical measurements of pavements distresses. The pavement distresses included rutting, fatigue (alligator) cracking, potholes, linear (longitudinal and transverse) cracking, patching, debonding, potholes, bumps & sags, and depressions. The PSR was determined based on ride quality using a scale from 0 to 5, where 0 represents the poorest rate and 5 is the best rate. The PSR was measured by a panel of five engineers. Each engineer provided the rating independently of the others to avoid bias in PSR determination. In addition, the PSR was provided by a group of seven drivers (road users) of different types of trucks, buses, and passenger cars. This step was done to validate the results of the five-engineer panel.

An experimental model was developed for the PSI of flexible pavements for urban highways in Jordan. It was found that potholes, linear cracking and bumps and sags (combined as one variable), and alligator cracking and patching (combined as one variable) were the most significant variables that affected the PSR of urban highway flexible pavements.

In conclusion, for urban highways, potholes provided the most significant variable for computing PSI of flexible pavements. Linear cracking and bumps and sags (combined as one variable) provided the second major variable for computing PSI. On the other hand, rut depth had the lowest effect on the variation of PSR of urban highway flexible pavements.

Abdul-Qader Al-Najmi
Professor, The University of Jordan, Jordan
Moayyad Al-Nasra
Chair, West Virginia University Institute of Technology, USA
&
Naiem Asha
Research Associate, University of Jordan, Jordan

Use of Swimmer Bars as Shear Reinforcement in the Reinforced Concrete Beams

The sudden failure of the reinforced concrete beams due to shear made it necessary to explore more effective ways to design these beams. The reinforced concrete beams show different behavior at the failure stage in shear compare to the bending, which is considered to be unsafe mode of failure. The shear failure of beams is usually sudden without sufficient advanced warning, and the diagonal cracks that develop due to excess shear forces are considerably wider than the flexural cracks. The cost and safety of shear reinforcement in reinforced concrete beams led to the study of other alternatives. Swimmer bar system is a new type of shear reinforcement. It is a small inclined bars, with its both ends bent horizontally for a short distance and welded to both top and bottom flexural steel reinforcement. Regardless of the number of swimmer bars used in each inclined plane, the swimmer bars form plane-crack interceptor system instead of bar-crack interceptor system when stirrups are used. Three different shapes of swimmer bar system were explored in this study. The main purpose is to identify the most efficient shape to carry shear forces at the lowest cost. Several reinforced concrete beams were carefully prepared and tested in the lab. The results of these tests will be presented and discussed. The deflection of each beam is also measure at a given applied load. The propagation of shear cracks was also closely monitored.

Thomas Attard
Academic Member, Architecture & Engineering Research Unit,
ATINER & Associate Research Professor, Arizona State University,
USA

Tornado Debris Impact Tests of a New Composite Storm Shelter Room System

Vijay Bansal
Associate Professor, National Institute of Technology Hamirpur, India

4D Geographic Information Systems for Ensuring Safety in Building Construction

Safety planner uses construction schedule and 2D drawings for hazards identification. Planner visualises 2D drawings into a 3D model and associates its components with the respective activities defined in the schedule to understand construction sequence for safety planning. Sequence interpretation and accordingly hazards identification from the execution sequence vary with knowledge and experience of the safety planner. To keep away from this dilemma, Four Dimensional (4D) modelling or Building Information Modelling (BIM) has been widely used to create the graphical simulation of the construction process by linking construction schedule and component of a 3D model. Both however lack in the landscape modelling and geospatial analysis which is now a major requirement of construction safety planning in the construction industry. This work facilitates 4D modelling, geospatial analysis, and landscape modelling in the development of a safe construction plan by using Geographic Information Systems (GIS). During safety review process, if developed sequence results in a hazard situation, it may be corrected before implementation. This assists safety planner in examining what safety measures are required "when" and "where".

Andrei-Gabriel Bica
PhD Student, Technical University of Civil Engineering, Romania
&
Gabriel Danila
PhD Student, Technical University of Civil Engineering, Romania

Comparative Study on Seismic Vulnerability of the Bucharest Buildings

With a population over 2 million inhabitants and an existing building stock more than 110.000 buildings, Bucharest is considered, by many specialists, one of the capitals with the highest seismic risk in the world, being particularly vulnerable to seismic hazard due to: (i) high fragility of tall reinforced concrete buildings, built before World War II and even before the 1977 devastating earthquake; (ii) subcrustal seismic hazard from Vrancea source; (iii) soft soil condition characterized by long predominant periods (1.4 ÷ 1.6 s) of ground vibration during strong events. The paper presents a seismic vulnerability analysis of two different residential building types: reinforced concrete resisting moment frames and shear walls, designed according to the provisions of different codes in force at the moment of construction: low-code, moderate-code and high-code. The selected buildings are subjected to a nonlinear modeling through a representative set of 1977 Vrancea earthquake records, considered to be similar of an expected earthquake. The paper identifies the fragility curves for these typical existing Bucharest buildings and the results will consist in comparing the possible damage level of the studied structures. It shall also be observed the time improving of the seismic provisions from the Romanian design codes over the last 50 years.

Vazul Boros
Lecturer, German University in Cairo, Egypt
Balthasar Novák
Professor at the University of Stuttgart, Germany
Ahmed El-Shennawy
Teaching Assistant at the German University in Cairo, Egypt

Applications of Reliability Analysis in Structural Engineering

The reliability of our built environment is one of the key concerns of all civil engineers. Yet still we rely mostly on the provisions of the national codes if it comes to the matter of structural safety and only rarely try to quantify the reliability of structures. The present paper describes two examples, where the assessment of the reliability becomes necessary, as the investigated topics lie outside the scope of the codes.

Bridges play a vital role in a countries infrastructure, yet are also the most vulnerable parts of the road network. Therefore a research project was initiated focusing on bridges subjected to natural disasters, accidents and terrorist attacks. The aim is the identification of critical structures, taking into consideration three aspects: effects on road users, influence on the road network and structural aspects of a disastrous event. For selected reinforced concrete bridges a complex risk analysis is conducted, comparing reliability index, financial losses and the impact on bridge users for these hazard scenarios. The results constitute an important new tool for traffic administrations to identify critical scenarios and select sustainable protection measures.

In a different ongoing project the aim is to establish a detailed comparison of the design of reinforced concrete structures according to the provisions of the Egyptian Code of Practice and the Eurocodes. Based on a case study these codes are compared, considering the aspects of sustainability, usability and reliability. Also here the major challenge is the quantification of the reliability. As our world and the construction industry is focusing ever more on the topic of sustainability, it is paramount to reach in the design process of buildings optimal dimensions for structural elements, thus reducing the usage of construction materials, without compromising the safety and reliability of the building.

Pallab Das
Assistant Professor, National Institute of Technology Silchar, India,
Prasanth Sharma
Undergraduate Student, National Institute of Technology Silchar, India

Effect of Strut Modeling on Seismic Behaviour of Structures

The masonry infill is an integral part of masonry structures. It is an established fact that interaction between the frame members and relatively stiff infill elements depends upon the contact length in between them, which changes on application of seismic load. Contact length depends largely on width of infill strut, which is modeled using different modeling techniques. Correct distribution of forces and moments in a structure is very important for designing of RC members. Due to the variation in interaction between the frame members and infill, the distribution of forces and stiffness in members gets widely affected. In the present study, effect of variation in strut width on structural parameters is found out with different modeling methods and subsequently compared. The relative stiffness of frame with respect to infill elements considered in above methods is the key parameter for ascertaining the seismic behavior of structure. The infill frames are modeled and tested in SAP 2000 software.

Sanusi Elazhari
Professor, University of Tripoli, Libya

The Effect of Rate of Applied Load and Concrete Aging on Energy Dissipation of Plain Concrete Members Subjected to Static Cycled Load

Some structural members subjected to special types of static cyclic loading , when concrete structures are subjected to these types of loading they tend to dissipate the generated energy. The performance of concrete structures is widely measured by concept of energy dissipation. This paper presents an experimental works were conducted to investigate the effect of both the rate of applied load as well as the aging of concrete on energy dissipation. Two types of applied load namely gradually cycled applied load, and constant cycled applied were considered . The results showed that the smaller the rate of applied cyclic load (gradually and constant) the lesser the energy dissipation and also the found results indicated that the energy dissipation ratio decreases with increase in concrete aging.

Hussein Elnaas
Research PhD Student, University of Brighton, UK
Philip Ashton
Assistant Head, University of Brighton, UK
&
Kassim Gidado Gidado
Head, University of Brighton, UK

Selection Criteria Framework to Adopt Off-Site Manufacturing (Osm) Systems in House Building Projects

This research suggests that, where appropriately specified, Off-Site Manufacturing (OSM) systems can assure efficiency gains. However, the correct specification relies on there being a robust decision making system in place. OSM could be key to helping overcome the challenges that face the house building industry in the UK. Choosing the right system of build at the concept stage of a project is key to the success of a house building projects. This research suggests that there is a need for a decision making system for construction project leaders. In order to develop a decision strategy, the decision maker needs to be able to understanding, measure and evaluate a number of factors that influence the manufacturing processes. This research has identified key factors that need to be evaluated at the earliest opportunity in the project lifecycle. These factors have been established using a range of research methodologies; 30 interviews and 15 case studies from off-site and on-site projects provide a robust data source from stakeholders and projects. Ultimately, this research has established 16 key factors that need to be considered when choosing to use OSM processes for house building projects in the UK.

Asaad Faramarzi
Researcher, University of Greenwich, UK
&
Amir M. Alani
Professor, University of Greenwich, UK

Probabilistic Sewer Pipe Analysis using Finite Element

This paper presents results of an investigation into the probability of failure of cementitious buried sewer pipes using an advanced probabilistic analysis tool. This tool, Probabilistic Finite Element Method (PFEM), utilises the advantages of both finite element analysis and Monte Carlo simulation. Using this method, the effect of different random variables including loads and pipe material properties on the remaining safe life of the cementitious sewer pipes are investigated. The developed PFEM offers many advantages over traditional probabilistic techniques since it does not use any empirical equations in order to determine failure of pipes. The results of the PFEM can help water companies to better planning the resources by providing accurate prediction for the remaining safe life of the cementitious sewer pipes. The developed PFEM code is generic and can also be used to determine the probability of failure of other types of structures.

Pradeep Kumar Garg
Professor, Indian Institute of Technology Roorkee, India
&
Kapil Pandey
PG Student, Indian Institute of Technology Roorkee, India

Remote Sensing based Landuse Change Analysis and its Impact on Climate

Climate parameters are complex phenomenon and its impact on environment is due to Global warming. These parameters are collected by different government agencies having different standards and procedures for data collection. Further, many-a-times gaps in data records add to the complexity of the problem as data inadequacy means a loss of information in a time-series scenario. Some of modern technologies such as remote sensing and GIS can help in providing a continuous series of dataset in a cost-effective manner. Change Analysis due to climate is an important step in many environmental studies. A wide variety of methods have been developed in this concern.

The objective of this study is to study landuse and land cover changes with the help of satellite images and correlate the changes with different climate parameters. During this study, remote sensing images and GIS were used for environmental impact prediction in Doon Valley area, Uttarakhand, India, during the years of 1985~2010. Natural vegetation cover, urban areas were chosen as main environmental elements to study. meteorological data, land use and land cover classes within several years were prepared using satellite images. Supervised classification and change detection techniques were adopted in this work.

The detected changes in landuse classes were correlated with temperature and rainfall data of last twenty five years. Significant differences were observed as increasing temperature and decreasing rainfall. Finally, graphical models were used to present the changes. The results of the study revealed that time series remotely sensed data could be used to predict environmental impacts. Remote sensing images and techniques were used to obtain landuse changes on time series data and by correlating these changes with climatic variables the effect of climatic conditions on these was analyzed. Temperature data and rainfall data of last 25 years were analyzed. It was observed that there is an increase of 0.65^0C in mean maximum temperature whereas the total rainfall has a declined pattern that gives the evidence for climate change.

Hatice Gazi
Researcher, Istanbul University, Turkey
&
Seda Oncu-Davas
Researcher, Istanbul University, Turkey
&
Cenk Alhan
Associate Professor, Istanbul University, Turkey

Comparison of Ground Motion Pulse Models for the Drift Response of Seismically Isolated Buildings

Seismic isolation offers an improved protection to buildings by significantly reducing inter-story drifts, which is proven by the observed behaviors of seismically isolated buildings in the past earthquakes. On the other hand, with increasing database of earthquake records, researchers have come to realize that there exist ground motion records with near-fault effects characterized by long-period large-amplitude velocity pulses which threaten seismically isolated buildings with long natural periods of vibration. Therefore, drift responses of seismically isolated buildings under pulse-like near-fault earthquakes has been an important topic of discussion. As the number of recorded near-fault ground motions is scarce, researchers turn to use of artificially developed earthquakes. Makris (1997) and Agrawal and He (2002) developed ground motion pulse models that can be used in representing near-fault ground motions, which were used as excitation input in the investigations of the behavior of seismically isolated buildings previously. Therefore, investigation of the capability of these models in representing the effects of pulse-like ground motions on inter-story drift responses of seismically isolated buildings is essential. In order to examine this issue, the comparison of the inter-story drift responses of a prototype seismically isolated building with different seismic isolation systems under two historical earthquakes and their approximate counterpart Makris (1997) and Agrawal and He (2002) pulse models is presented here. Results show that the accuracy of the pulse models in representing near-fault earthquakes in terms of inter-story drift responses of seismically isolated buildings vary with respect to the earthquake and isolation system characteristics.

Khalid Ghuzlan
Assistant Professor, Jordan University of Science and Technology, Jordan
Gazi Al-Khateeb
Associate Professor and Vice Dean of Engineering, Jordan University of Science and Technology, Jordan
&
Yazeed Qasem
Researcher, Jordan University of Science and Technology, Jordan

Rheological Properties of Polyethylene-Modified Asphalt Binder

Polyethylene (PE) is the most common type of plastic. In daily life, plastic bags, plastic bottles, and many other PE products are seen everywhere. Significant amount of plastics are not disposed properly and therefore present as waste material in the environment.

Using polyethylene as an additive to asphalt binders may be considered a good way to utilize this material and at the same time may improve the properties of the asphalt binder used in asphalt paving mixtures.

In this study, the effect of PE on the rheological properties of asphalt binders at higher temperatures was investigated. PE was added to asphalt binder at different percentages by volume of asphalt binder. These percentages were: 3, 4, 5, 6, and 7%. The rheological properties included: the complex shear modulus of asphalt binders (G*), the phase angle (δ), and the rotational viscosity (RV).

Findings of the study showed that increasing the PE to asphalt binder (PE/A) ratio, increased the complex shear modulus (G*) and the rotational viscosity (RV) of asphalt binders at 135°C and 20 rpm, and also improved the Superpave rutting parameter (G*/sinδ). However, the phase angle was not significantly affected with the increase in the PE/A ratio.

Dimitrios Goulias
Associate Professor, University of Maryland, USA
&
Sahand Karimi
Ph.D. Student, University of Maryland, USA

Variability Analysis and OC Curves for Assessing Contractor and Agency Risks Associated with Construction Materials Acceptance

Over the past two decades the role of DOTs has shifted from quality control (QC) of materials and placement techniques to quality assurance (QA) and acceptance. This has placed more responsibility for quality during production on the contractor, producer and supplier. This shift eventually allows higher level of innovation and flexibility from the contractor, and lower involvement and resources from the agency. To adapt to such environment several materials acceptance specifications were revised. In some cases the revised specifications allow for the acceptance and payment of materials to be based on contractor, producer and/or supplier quality test results (QC and certification testing) with complimentary testing and inspection from SHA to verify results (QA).

It was the objective of this study to identify typical material QC/QA procedures and a) examine their conformance in relation to the federal requirements for defining QA plans, b) identify potential improvements to existing SHA QA plans; c) assess product variability based on production QC data; and iv) evaluate risks related to the contractor and the owner based on material acceptance data. This paper presents the results from the variability analysis and the development of OC curves for evaluating the risks associated to the contractor and owner/ agency.

Le Huang
Student, Wuhan University, China
&
Shimiao Ding
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Deflection Analysis of Reinforced Concrete T-Beam Prestressed with CFRP Tendoms Externally

Due to the increase of the train axle load, it brings a huge challenge to the safety of the railway bridges that exist already, so it is necessary to reinforce the structures quickly. This paper adopts a new external prestressing method with carbon fiber reinforced polymer (CFRP) tendons, which is used for railway bridges, to reinforce a group of reinforced concrete T-beams, aiming to study their deformation performance through static experiment, and estimates the influence of three parameters—the degree of concrete, reinforcement ratio of non-prestressed tension bars and stretching control stress of CFRP tendons—on the reinforced beams. The results show that the deflection of reinforced beams reduce obviously in different degrees under same load, compared with the unreinforced beams, especially after the beams crack. As to the deflection, the degree of concrete almost make no difference, and the reinforcement ratio of non-prestressed tension bars and stretching control stress of CFRP tendons have rather big effect on. In order to coordinate with the available codes and guidelines for reinforced concrete structure in China, this paper proposes a fitted formula of short-term bending rigidity which is suitable for the beams prestressed externally with CFRP tendons, taking the prestress of CFRP tendons and second-order effect into account, and hopes provide certain references for practical engineering application.

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Development of Masonry Blocks with Thermal Insulation

The requirements of today's society in the area of properties of building materials are increasing all the time. From point of view of masonry construction it is mean first thermal and acoustic insulation properties. In the case of improvement of thermal technical properties of masonry construction is possible to use external thermal insulation systems or build in thermal insulation layer directly into construction. Integration of thermal insulating material into cavities of blocks is an alternative production technology of thermal insulating ceramic blocks. Mechanical stability of the block provide the ceramics body. Thermal insulation material in block cavities provides mainly thermal insulation and acoustic properties of masonry blocks. This paper describes the possibility of using a wide range of insulation materials (alternative natural insulation, conventional insulation materials) as an integrated insulation layer in modern ceramic blocks with good thermal insulation properties.

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Practices, Barriers and Challenges of Risk Management Implementation in Albanian Construction Industry

The Albanian construction sector has for some time been suffering from problems that result in increased cost and time and in decreased quality. One of the main reasons of this situation is not managing the risks, which is about thinking ahead, simulating and searching for better solutions.

This study investigates the current attitude on the use of risk management practices in the construction industry. The main methodology used starts with a comprehensive literature review, followed by structured questionnaire and interviews with the construction professionals in Albania. The data collected were analyzed, identifying the main obstacles and challenges facing the organizations, and suggesting a few recommendations.

The overall result indicate that risk management application is not high and quite informal due to an unsupportive culture, lack of information and knowledge, lack of technical experience in implementing and interpreting the outputs, etc. This suggests that there is a need to systematically improve the RM in industry by using different strategies to increase both organizations and individual's knowledge and skills.

By focusing on overcoming these barriers through integrating risk management in organizational culture, maximum use of experience, making an early start of risk identification and assessment, right attitude toward risk, and training of employees; organizations can integrate the risk management tools and techniques receiving benefits realized by these practices.

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Effect of Electric Arc Furnace Dust (EAFD) on Dynamic Creep of Asphalt Concrete Mixtures

Electric Arc Furnace Dust (EAFD) is one of the by-products of steel making industry which has been classified as hazardous material. This research aims at solving the problem of this hazardous waste by solidification/stabilization through mixing it with asphalt concrete mixtures. One type of asphalt cement and one type of aggregate were used. EAFD was used as an additive to the asphalt cement at five contents (0%, 5%, 10%, 15% and 20%) by volume of binder. Marshall specimens were prepared, and the dynamic creep test was performed on the specimens according to ASTM D 4123. One testing temperature level (25^{o} C) and three loading frequencies (1, 4 and 8 Hz) were used. Resilient modulus, creep stiffness, and accumulated micro–strain were analyzed. Test results showed that 10 % EAFD content met the criteria for asphalt mixture properties. Finally, it was concluded that the results were promising for dual achievement: (1) to solve an environmental problem and (2) to use the dust for road construction.

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Basic Characteristics of an Appropriate Waste Fillers for Solvent Free and Water-Borne Industrial Polymer Floors and Their Utilization

Recently the manufacture of epoxy coating and flooring materials begun to be under strong pressure to use more environmentally friendly raw materials in its composition.

First tendency to reduce of solvents and diluents contained in the materials appeared at the end of 90´s. This situation was supported by the Council of Europe in 2004 to reduce VOC emissions to zero till 2020. Solvent materials were thus largely replaced by solvent free materials from which the volatile substances are not released into the air.

But pressure continued to increase, and over the past decade began to take centre stage water-based epoxy. On the Czech market solvent based material is still occasionally used, but predominant are solvent free materials. There are no commonly used materials containing wastes as fillers in new water-borne and solvent-free epoxy materials.

Characteristics identification of the waste material as a potential filler is a set of properties that determine the limits of secondary raw materials or waste as a filler. This paper describes the basic characteristics which must be selected to meet the requirements, to affect negatively the workability, sedimentation, properties and behavior of the final floor system. Some materials must comply with special requirements, such as resistance to chemicals, etc. Next part of paper talks about utilization of polymer floors and their mechanical properties.

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Repair and Strengthening of Historical Structures: Naziresha Mosque in Elbasan, Albania

Albania is one of the oldest countries in Balkan Peninsula and Europe. There are many historical buildings, religious monuments and ruins of ancient civilisations. The Naziresha Mosque in Elbasan, is one of the few Ottoman mosques still functional in Albania and the only preserved mosque of the city. It was built during 1590s. It has a square plan and only one cubic shaped central hall. The transition from the cube to the dome is provided by pendentives. This unique structure's current condition is alarming mostly due to lack of concern. Frequent Seismic activity, amortization, aging and non-proper maintenance have leaded the mosque towards degradation. In this paper, assessment of current structural conditions is carried out. A FEM analysis is applied to examine at what extent the structural defects endanger the stability of the mosque. As a result, solutions for the structural problems and enhancing the existing structural capability are suggested. The strengthening techniques are proposed, taking into consideration preservation of the cultural, historical and architectural values of the mosque.

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Nondestructive and Destructive Evaluation of Concrete Compression Strength

The evaluation of structural performance of existing concrete structures, built according to standards and materials quite different to those available today, requires procedures and methods able to cover lack of data about mechanical material properties and reinforcement detailing. This issue is more relevant when seismic zones are concerned and structural strengthening needs to prevent failures due to earthquakes.

Recent seismic codes give relevance to procedure and methods to establish the performance levels of existing structures. To this end detailed inspections and test on materials are required. As a consequence tests on drilled cores are required; on the other end, it is stated that non-destructive testing (NDT) cannot be used as the only mean to get structural information, but can be used in conjunction with destructive testing (DT) by a representative correlation between DT and NDT.

The poor reliability of rebound hammer and ultrasonic pulse velocity due to different aspects could be partially contrasted by using both methods together. One of the most employed NDT combined methods in practice is the SonReb method, described in RILEM 7 NDT and 43 CND. This technique achieves an improvement of the accuracy by the use of various correction factors taking into account the influence of different concrete mixture proportion. Some of the most reliable and employed formulations available in literature are considered.

The aim of this study is to verify the accuracy of some formulas of correlation available in literature between measured parameters, i.e. rebound index, ultrasonic pulse velocity and compressive strength (SonReb Method). To this end a relevant number of DT tests and NDT tests has been performed on many buildings. The above relationships have been assessed comparing ND test results to strength of core drilled in adjacent locations.

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Comparison of Ground Motion Pulse Models for the Acceleration Response of Seismically Isolated Buildings

An important objective of seismic isolation is to minimize floor accelerations for protecting sensitive contents. In this regard, the success of seismic isolation has been proven by many research studies and by the observed acceleration responses under real earthquakes. However, concerns with regard to the success of seismic isolated buildings have been declared by researchers who noted the long-period large-amplitude velocity pulses that appeared in the latest ground motion records, which may be harmful to such long-period structures. Consequently, acceleration responses of seismically isolated buildings subjected to near-fault earthquakes have been an important research subject in the last two decades. In the absence of adequate number of historical near-fault ground motions, there is need for simple analytical ground motion pulse models which are capable of simulating the effects of pulse-like earthquakes; particularly for conducting parametric studies. Among others, analytical ground motion pulse models developed by Makris (1997) and Agrawal & He (2002) are the popular ones used in research studies previously. In order to determine the capability of these models in representing the effects of real pulse-like earthquakes on the acceleration responses of seismically isolated buildings, in this study a benchmark seismic isolated building is subjected to historical near-fault earthquakes and their synthetically developed counterpart Makris (1997) and Agrawal & He (2002) pulse models. Floor accelerations are reported in a comparative fashion. Results show that the level of success of the pulse models in representing historical near-fault earthquakes in terms of acceleration response varies with respect to the earthquake and the isolation system characteristics.

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Housing as a Determinant of Children's Respiratory Health and School Attendance

According to the World Health Organization, asthma is now a serious public health problem with over 100 million sufferers worldwide. In Canada, approximately 2 million people are affected with asthma, 10-15% of them children; asthma is the leading cause of school absenteeism among inner-city school children. There is empirical evidence that links poor housing conditions and respiratory health. A survey designed to determine the relationship between housing conditions, respiratory health, and school absenteeism was completed by 3,423 parents of grades 3 and 4 children in Winnipeg, Manitoba, Canada.

The study encompassed two parts. First, a survey was sent to over 13,700 parents of nine-year-old children (all grades 3- and 4- children attending schools in six Winnipeg school divisions). Approximately, 3,400 parents agreed to participate in the study. The survey focused on children's respiratory-related illnesses and home-based triggers for these ailments. Second, an extensive home audit of 715 homes (examining condition of walls, roof, foundations, windows, air vents, furnace, etc.) was conducted by engineering faculty from the University of Manitoba. All home inspections included three air samples that were sent to a professional lab for culturing and spore analysis. A total of 2,145 air samples were taken.

The study clearly links poor indoor air quality and mould to respiratory illnesses and asthma, which in turn results in considerable school absenteeism. It also found that certain areas in Winnipeg are more susceptible than others.

Statistical analyses of the data obtained showed statistically significant relationships between common home maintenance conditions and interior building moisture content; including both relative humidity and material moisture content. The results also showed that 50% of children who had asthma and persistent colds

missed up to 5 days of school in the last year. Another 20% missed up to 20 days of school.

Understanding how respiratory health risks are associated with housing is essential to designing effective strategies to improve children's quality of life.

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Potential Energy Efficiency Ways for Residential Buildings

Using modern building techniques and good practices, all buildings can now offer an acceptable level of comfort without excessive use of air conditioners and heaters which result in big energy bills. Energy efficiency is one of the most important subject nowadays by reasons of energy demand and sustainable environment. Buildings consume big amount of energy, therefore low-energy consumption building design is an important factor. Low energy consumption building is any type of building that from the point of design, technologies and product materials uses less energy comparing to a average contemporary house. In the practice of sustainable design; low-energy houses use often renewable energy sources and they are constructed with using of convenient components to reduce their energy expenditures. Energy saving buildings typically have high levels of insulation, energy efficient windows, low levels of air infiltration and heat recovery ventilation to lower heating and cooling energy.

The paper consists explanations about current building construction trends, feasible ways for lowering energy expenses of residential buildings and multicriterial evaluation of potentials on the way of energy efficiency.

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Location based Planning and Scheduling of Highway Construction Projects

Highway projects span over long periods. Their planning and scheduling is vital to keep costs from escalating due to delays and poor planning. Predominantly used construction planning methods like Critical Path Method (CPM) have been observed to be not-so-suitable for projects having few activities to be repeatedly performed at all locations. Literature suggests that such repetitive projects like highways are better planned and scheduled using linear scheduling methods like flowline, time-location matrix, line-of-balance, etc. Location Based Planning (LBP) is a recent development in the field of construction project management. LBP shifts the focus from activities to locations. Estimating quantities and costs, scheduling tasks, and making payments are easier and logical to do when the project is divided into locations rather than activities. Scheduling of tasks is done on a time-location graph. This leads to some major improvements in project management like continuous crew engagement and knowledge of work location at all times. Continuous flow of work and crews is vital from both cost and quality perspectives. In spite of a number of advantages of LBP over CPM, CPM is more widely used due to non familiarity of planners with LBP. With increase in application of LBP on live projects, its merits will unfold and highway projects will be better planned and managed. This paper brings out the strengths of LBP specifically for highway planning.

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Geotechnical Investigation of the Ban Koum Dam Site, LPDR-Thailand Boarder

The Ban Koum dam site is located in Ban Khamtu, Khong Sedone District, Saravan Province, Lao People's Democratic Republic. It lies mostly between latitudes 15°26′ 36′′ and 15°27′ 43″N and longitudes 105°35′ 4″ and 105° 36′ 47′′E. The center line of dam lies on East, from Ban Khamtu of LPDR to West, Ban Tha Long of Thailand which crossed the Mekong River. It is a tourist attractive site. Geotechnical investigation comprised of engineering geological mapping, subsurface drilling and construction materials assessments. Rock mass of the center line of dam was mainly conglomeratic sandstone, slightly weathered rock with about 40-60 MPa of uniaxial compressive strength which rated as a good rock condition. The majority discontinuities showed the strike and dip of the sandstone bedding as 175 º-195 º /5 º-10 º and that value of the joints as 270 º-295 º /70 º-85 º N and 175 º-192 º /65 º-85 º W. The lugeon value from the ground surface to 15 m depth of the rock mass was 5-33 lugeon. From the depth of 15-50 m the lugeon value was decreasing as 0-8 lugeon. Impervious soil for the earth embankment was Lean clay (CL) and Clayey Silt (ML) with the total amount of 1,400,000 MCM. The purposed borrow area was 1.5-2.5 km far from the left abutment of the dam in north direction. The properties of the coarse aggregate and sand had been met the criteria of the concrete aggregate. Cement grouting is required to improve the shallow depth of the rock mass and to fill the potholes at the rock surface of the rapid.

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Roadside Advertising and Traffic Safety

This paper investigates the potential link between digital advertising billboards and traffic crashes. Earlier studies sponsored by billboard advertising companies state that the presence of digital billboards does not cause a change in driver behavior in terms of visual behavior, speed maintenance, or lane keeping. However, other studies provide evidence that a driver's diminished attention could result in more crashes in the vicinity of advertising billboards. Technical reports indicate that any interference that distracts the driver from forward roadway looking for more than two seconds significantly increases the chances of crashes and near crashes. Due to the growing debate on this issue, there is a need to document the state of practice with respect to digital advertising billboards and driver distraction in a clear, systematic, and concise manner.

This paper provides a comprehensive synthesis of findings from an extensive review of national and international literature on the topic of digital billboards and traffic safety. First, the paper discusses digital advertising billboard technology options and industry regulation practices. Then emphasis is placed on studies that investigate links between driver distraction associated with roadside advertising and traffic safety. Crash studies focusing on statistical analysis of historical data as well as behavioral studies (both naturalistic and driving simulator based) are discussed and contrasted. The paper concludes with a summary of findings and recommendations for future research.

Overall, this paper provides a thorough examination of roadside advertising practices and traffic safety risks. The study findings can be used to educate stakeholders on this issue and guide policy makers' decisions on the regulation of digital advertising billboards in the future.

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Stormwater Quality Management – Design Criteria and Sustainability

The purpose of this paper is to evaluate the design criteria and sustainability of maintaining the minimum water quality volume of detention and retention stormwater ponds. Stormwater ponds are one of the most widely used Best Management Practices (BMPs) for stormwater management in most counties and municipalities. Water quality is achieved by the settling out and removal of suspended sediments, particulate contaminants, and dissolved pollutants that are commonly found in urban stormwater runoff. A very closely associated aspect of this water quality volume is its removal rate or discharge from the ponds. The water quality of the effluent from a pond increases; the longer the stormwater resides in it. However, literature review has shown that the detention time ranges widely from 24 to 72 hours.

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Evaluation of High-Deformation Capability and High-Strength Steels as Reinforcement in Reinforced Concrete Members

One of the most important characteristics of a structure within an earthquake region is its ductility. A better ductile behavior can be achieved by constructing these structures with elements that have high energy absorption capacities during earthquakes. For reinforced concrete structures, the deformation capability and strength of structural steel as reinforcement make an important contribution to the entire behavior of the reinforced concrete member. In this study, use of a type of steel, which features high deformability capacity and high yielding strength (≈540 MPa) as reinforcement in reinforced concrete members, is analyzed experimentally and analytically.

The experimental portion of this study covers experiments with reinforced concrete members, which were tested under monotonical and reversed cyclic loads. These members were produced using two types of steel; one is the reinforcement steel which was used in the production of the members named "HSS", with high strength and deformability capacity, and the other is BCIII steel, generally used in the construction industry of Turkey. Within reinforced concrete member experiments, full-scaled prefabricated columns and full-scaled reinforced concrete beams were tested. Damage distributions of the same loading pattern were made for comparison purposes. The aim of the experimental program was to especially analyze stiffness, ductility, and earthquake performance characteristics of the members.

Analytical studies contain section analyses for reinforced concrete members with HSS and BCIII steel. These members include experimentally analyzed full-scaled, prefabricated columns.

The experimental and analytical results showed that beams reinforced with "HSS" exhibited more strength and toughness, in comparison with the ones produced with BCIII. And reinforced concrete columns reinforced with "HSS" steel reached bigger moment

and lateral load carrying capacities in comparison with the ones reinforced with BCIII. Singular reinforced concrete elements like beams reinforced with "HSS" were found to have more energy absorption capacity than the ones with BCIII.