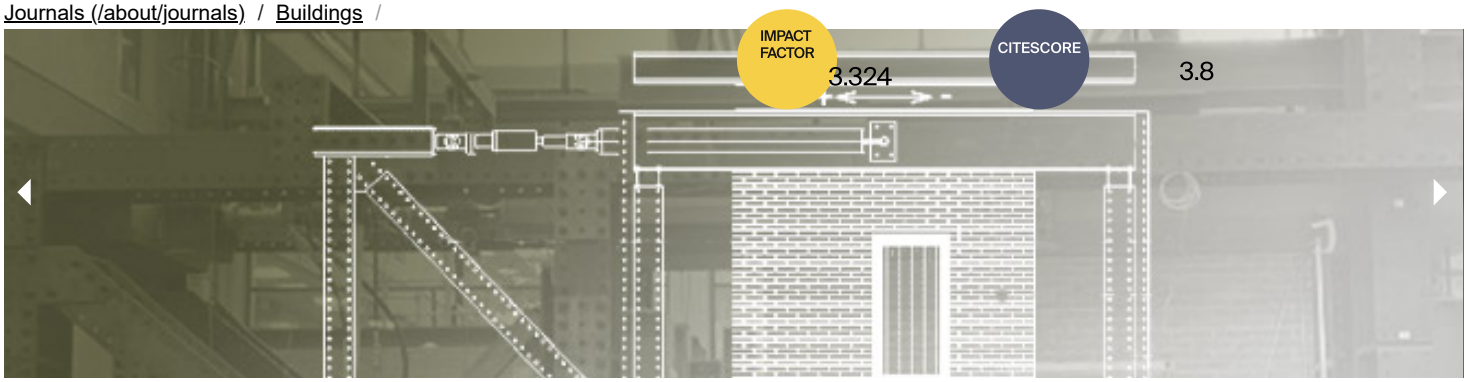

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Buildings **2023**, *13*(4), 977; https://doi.org/10.3390/buildings13040977 (registering DOI) - 06 Apr 2023

Abstract Green buildings (GBs) employ a wide range of passive and active energy-saving strategies to improve buildings' energy performance. The suitability and performance of some of these strategies depend on outdoor climate conditions and may change over time due to global warming. Therefore, a **[...] Read more.**

(This article belongs to the Special Issue **Cities and Buildings as Drivers for Climate Change Adaptation and Mitigation: New Models and Computational Tools (/journal/buildings/special_issues/L0IOVW618U)**)

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Timber Construction as a Solution to Climate Change: A Systematic Literature Review (/2075-5309/13/4/976)

by **Laura Tupenaite (https://sciprofiles.com/profile/188484)**, **Loreta Kanapeckiene (https://sciprofiles.com/profile/2544664)**, **Jurga Naimaviciene (https://sciprofiles.com/profile/author/MkdBWXNTQzlNd0xiZlFqZjJnL2JRRm0rUmNZa3lOTStpRmw4YzFkaDJycUwxM2dul**, **Arturas Kaklauskas (https://sciprofiles.com/profile/1502626)** and **Tomas Gecys (https://sciprofiles.com/profile/author/bGs4SDB6ZFBCZVE0OFNOYWJMSWE2NERmenFTcmhDTmJEbGptR1hEOWYvND0=)**

Buildings **2023**, *13*(4), 976; **https://doi.org/10.3390/buildings13040976 (https://doi.org/10.3390/buildings13040976)** - 06 Apr 2023

Abstract The built environment significantly contributes to climate change. There is pressure on the construction industry to find and use alternative sustainable environmentally friendly building materials to reduce the climate impact. Timber is increasingly being considered in the literature and used as a viable **[...] Read more.**

(This article belongs to the Special Issue **Developments in Sustainable Buildings (/journal/buildings/special_issues/5I6K30V1SV)**)

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Properties and Tensile Softening Laws of Hybrid Basalt Fiber Reinforced Recycled Aggregate Concrete (/2075-5309/13/4/975)

by **Shahrukh Shoaib (https://sciprofiles.com/profile/2360061)**, **Hilal El-Hassan (https://sciprofiles.com/profile/1205887)** and **Tamer El-Maaddawy (https://sciprofiles.com/profile/592409)**

Buildings **2023**, *13*(4), 975; **https://doi.org/10.3390/buildings13040975 (https://doi.org/10.3390/buildings13040975)** - 06 Apr 2023

Abstract The performance of hybrid basalt fiber (BF)-reinforced concrete made with recycled concrete aggregates (RCAs) and dune sand as an eco-friendly construction material is examined. Test variables comprised the base concrete grade (normal- and high-strength concrete (NSC and HSC)), the hybrid BF volume fraction **[...] Read more.**

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Simulation-Assisted Project Data Integration for Development and Analysis of As-Built Schedules (/2075-5309/13/4/974)

by Muaz Fagiar (https://sciprofiles.com/profile/2832673), Yasser Mohamed (https://sciprofiles.com/profile/2275816) and Simaan AbouRizk (https://sciprofiles.com/profile/1313849)

Buildings **2023**, *13*(4), 974; https://doi.org/10.3390/buildings13040974 (https://doi.org/10.3390/buildings13040974) - 06 Apr 2023

Abstract As-built schedules are an essential tool for evaluating contractors' schedule performance and analyzing delay and lost productivity claims. Yet, most often construction schedules are not updated frequently and/or accurately as required, which limit the availability of as-built schedules. Furthermore, the retrospective development of **[...] Read more.**

(This article belongs to the Special Issue **Advances and Applications of Modeling and Simulation in Construction Operations (/journal/buildings/special_issues/construction_operations)**)

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Enhanced ANN Predictive Model for Composite Pipes Subjected to Low-Velocity Impact Loads (/2075-5309/13/4/973)

by Emad Ghandourah (https://sciprofiles.com/profile/1399250), Samir Khatir (https://sciprofiles.com/profile/556832), Essam Mohammed Banoqitah (https://sciprofiles.com/profile/1646570), Abdulsalam Mohammed Alhawsawi (https://sciprofiles.com/profile/1379753), Brahim Benaissa (https://sciprofiles.com/profile/2283411) and Magd Abdel Wahab (https://sciprofiles.com/profile/176115)

Buildings **2023**, *13*(4), 973; https://doi.org/10.3390/buildings13040973 (https://doi.org/10.3390/buildings13040973) - 06 Apr 2023

Abstract This paper presents an enhanced artificial neural network (ANN) to predict the displacement in composite pipes impacted by a drop weight having different velocities. The impact response of fiber-reinforced polymer composite pipes depends on several factors including thickness, stacking sequence, and the number **[...] Read more.**

(This article belongs to the Special Issue **Advances in Inverse Problem Applications in Structural Health Monitoring (/journal/buildings/special_issues/OR578F0237)**)

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Thermal Characterization of Buildings with as-is Thermal-Building Information Modelling (/2075-5309/13/4/972)

by Víctor Pérez-Andreu (https://sciprofiles.com/profile/1028728), Antonio Adán Oliver (https://sciprofiles.com/profile/112608), Carolina Aparicio-Fernández (https://sciprofiles.com/profile/791733) and José-Luis Vivancos Bono (https://sciprofiles.com/profile/787014)

Buildings **2023**, *13*(4), 972; https://doi.org/10.3390/buildings13040972 (https://doi.org/10.3390/buildings13040972) - 06 Apr 2023

Abstract Developing methodologies to accurately characterise the energy conditions of existing building stock is a fundamental aspect of energy consumption reduction strategies. To that end, a case study using a thermal information modelling method for existing buildings (as-is T-BIM) is reported. This proposed new **[...] Read more.**

(This article belongs to the Topic **3D Computer Vision and Smart Building and City (/topics/3D_BIM)**)

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Competencies Driving Waste Minimization during the Construction Phase of Buildings (/2075-5309/13/4/971)

by

Edward Ayebeng Botchway (https://sciprofiles.com/profile/author/SXRoYjJVaU91Ym9xWE5jVGtjamhSMWRqQ0hLTGpzS1dRK1Uyb2pMaEF5N

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Buildings **2023**, *13*(4), 971; **https://doi.org/10.3390/buildings13040971 (https://doi.org/10.3390/buildings13040971)** - 06 Apr 2023

Abstract It is thought that there is a low level of awareness of key competencies that drive material waste reduction at the construction stage of a project which has led to the low impact of waste minimization in the construction industry. This study, therefore, **[...] Read more.**

(This article belongs to the Collection **Construction Management – Future Innovations, Methods, Techniques and Technologies (/journal/buildings/topical_collections/Construction_Management_Innovation_Methods_Technologies)**)

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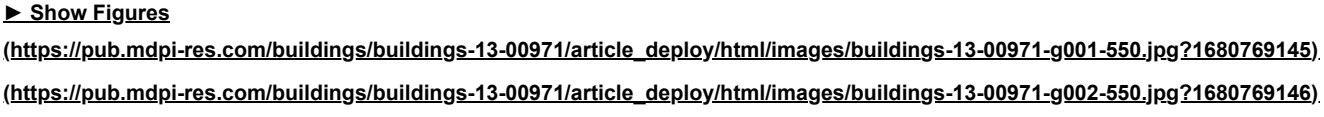

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Mechanical Behavior of Two-Side Bolted Steel Plate Shear Wall Considering Top-Seat Constraints with Frame Beams (/2075-5309/13/4/970)

by **Jianian He (https://sciprofiles.com/profile/1408763)**, **Lei Fu (https://sciprofiles.com/profile/author/c2JGdFNTcldXaEpOVkFLYzBvd2YwUHF5UkhMOTBPd0FNZWp1NUZoOVFadz0=)**, **Jie Hu (https://sciprofiles.com/profile/author/QkphRUJ6V1c3RndzQVBHRlVwZ3JvOE8zQkUra1ppTkZTNTlZZkd6R0gvYz0=)**, **Yanwei Lv (https://sciprofiles.com/profile/author/RlFUQlpxTTl2dkZQR2owd2Q0WU9ORkR4Ylgzd2NlZ1F2bU9WQm51a2xRcz0=)**, **Yicheng Li (https://sciprofiles.com/profile/2274336)** and **Shizhe Chen (https://sciprofiles.com/profile/855295)**

Buildings **2023**, *13*(4), 970; **https://doi.org/10.3390/buildings13040970 (https://doi.org/10.3390/buildings13040970)** - 06 Apr 2023

Abstract A steel plate shear wall (SPSW) is a useful component for resisting lateral action. To improve the performance of frame columns, some studies focus on a two-side connected SPSW, in which the wall plate is not connected with the frame columns. However, few **[...] Read more.**

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Residual Shear Capacity of Post-Fire RC Beams under Indirect Loading (/2075-5309/13/4/969)

by Yamin Song (https://sciprofiles.com/profile/2370809), Chuanguo Fu (https://sciprofiles.com/profile/2754664), Shuting Liang (https://sciprofiles.com/profile/229591), Ivan Topilin (https://sciprofiles.com/profile/2858479) and Xuanzhen Song (https://sciprofiles.com/profile/author/d1R5RTJaSkVPa05GdnU0VzZ1M0FHUmlycWZjSytZMVJobUYreGNYaWtLRT0=)

Buildings **2023**, *13*(4), 969; https://doi.org/10.3390/buildings13040969 (https://doi.org/10.3390/buildings13040969) - 06 Apr 2023

Abstract Building fire is one of the most frequent disasters. The mechanical properties of concrete and steel will deteriorate to different degrees under fire exposure, thus weakening the bearing capacity of reinforced concrete (RC) members. Therefore, it is of great theoretical and practical significance **[...]** **Read more.**

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Numerical Method for Creep Analysis of Strengthened Fatigue-Damaged Concrete Beams (/2075-5309/13/4/968)

by Yunfei Ding (https://sciprofiles.com/profile/author/di9MZ0ZVYlQxQkw1VlN1NitDQklFMmRTSG9za293M1VRRnl4YTdUN0lMaz0=), Yan Fang (https://sciprofiles.com/profile/author/UExJeko3RlpNSkNxU2lWL2pyWkJtcWtTb1NnOUpFd1MraHdJWUdxTGxRMD0=), Weiliang Jin (https://sciprofiles.com/profile/author/UEJNczdyWGc1dlJJVjd5bndJWlpwTUNuSTJLNHJaQXp0ajFJVmJ6ajV5VT0=), Jun Zhang (https://sciprofiles.com/profile/779324), Bixiong Li (https://sciprofiles.com/profile/510127) and Jianghong Mao (https://sciprofiles.com/profile/2660323)

Buildings **2023**, *13*(4), 968; https://doi.org/10.3390/buildings13040968 (https://doi.org/10.3390/buildings13040968) - 06 Apr 2023

Abstract Fatigue-damaged concrete improves the load-bearing capacity of components by increasing the cross section. However, the creep performance of damaged components after the repair has received less attention. Thus, this study establishes a constitutive creep model of strengthened fatigue-damaged concrete on the basis of **[...] Read more.**

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An Electricity Consumption Disaggregation Method for HVAC Terminal Units in Sub-Metered Buildings Based on CART Algorithm (/2075-5309/13/4/967)

by Xinyu Yang (https://sciprofiles.com/profile/author/dXJoT1A4cG93U2tBZGg5a2dmSXBRYk5TM0ZuZFpxMTFYUGVzL04ya2pUbz0=), Ying Ji (https://sciprofiles.com/profile/2431494), Jiefan Gu (https://sciprofiles.com/profile/author/MWxNbm93RUtMZXdXckoydmpjdnpNSk5rSk1hNFg0VVBsU0RwVGt3QUNWaz0=) and Menghan Niu (https://sciprofiles.com/profile/author/QU5lVmRLNVdENE5oNjFFWmlVaTNUL2pWcjluc3hlNnNYRDl0L2txYnZNST0=)

Buildings **2023**, *13*(4), 967; https://doi.org/10.3390/buildings13040967 (https://doi.org/10.3390/buildings13040967) - 06 Apr 2023

Abstract Obtaining reliable and detailed energy consumption information about building service (BS) systems is an essential prerequisite for identifying energy-saving potential and improving energy efficiency of a building. Therefore, in recent years, energy sub-metering systems have been widely implemented in public buildings in China. **[...] Read more.**

(This article belongs to the Special Issue **Study on Building Energy Efficiency Related to Simulation Models (/journal/buildings/special_issues/P8JFSBW089)**)

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Experimental Research on Motion Analysis Model and Trajectory Planning of GLT Palletizing Robot (/2075-5309/13/4/966)

by Rui Gao (https://sciprofiles.com/profile/2776824), Wei Zhang (https://sciprofiles.com/profile/1155790), Guofu Wang (https://sciprofiles.com/profile/author/bUxEZG12NDRXYlZnaUx3dWJpblYwUnFJQmJ2SFFqYU5HbFkzd0srTXc0dz0=) and Xiaohuan Wang (https://sciprofiles.com/profile/2147035)

Buildings **2023**, *13*(4), 966; https://doi.org/10.3390/buildings13040966 (https://doi.org/10.3390/buildings13040966) - 05 Apr 2023

Abstract To improve wood structure processing efficiency, a palletizing robot suitable for loading and unloading glued laminated timber (GLT) has been developed. The robot comprises a six-axis connecting rod mechanism and a sponge sucker as a grasping actuator, which can enable the intelligent automatic **[...] Read more.**

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Research on Corrosion Rate Model of Reinforcement in Concrete under Chloride Ion Environments (/2075-5309/13/4/965)

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Buildings **2023**, *13*(4), 965; https://doi.org/10.3390/buildings13040965 (https://doi.org/10.3390/buildings13040965) - 05 Apr 2023

Abstract In a chloride environment, taking reinforced concrete structures as the research object, the corrosion rate of reinforcement determines its corrosion expansion because multiple coupling parameters will affect the corrosion rate of reinforcement, which is extremely difficult to effectively predict. In this paper, 144 **[...] Read more.**

(This article belongs to the Special Issue **Green, Resilient, and Sustainable Composite Structures: Development, Design, and Construction** (/journal/buildings/special_issues/43EDOGG26W))

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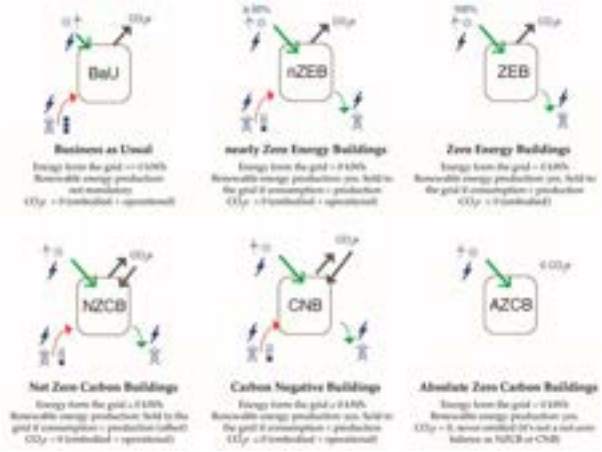
Daniela Besana (/search?authors=Daniela%20Besana&orcid=0000-0003-1237-5427)

Buildings **2023**, *13*(3), 684; **https://doi.org/10.3390/buildings13030684 (https://doi.org/10.3390/buildings13030684)**

Published: 5 March 2023



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by **Lijun Jia (/search?authors=Lijun%20Jia&orcid=)** et al.

Buildings **2023**, *13*(3), 669; **https://doi.org/10.3390/buildings13030669 (https://doi.org/10.3390/buildings13030669)**

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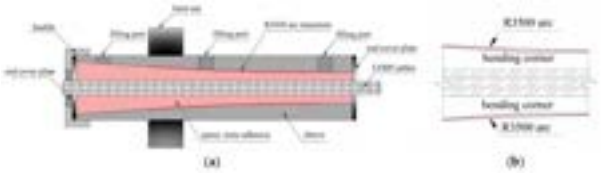

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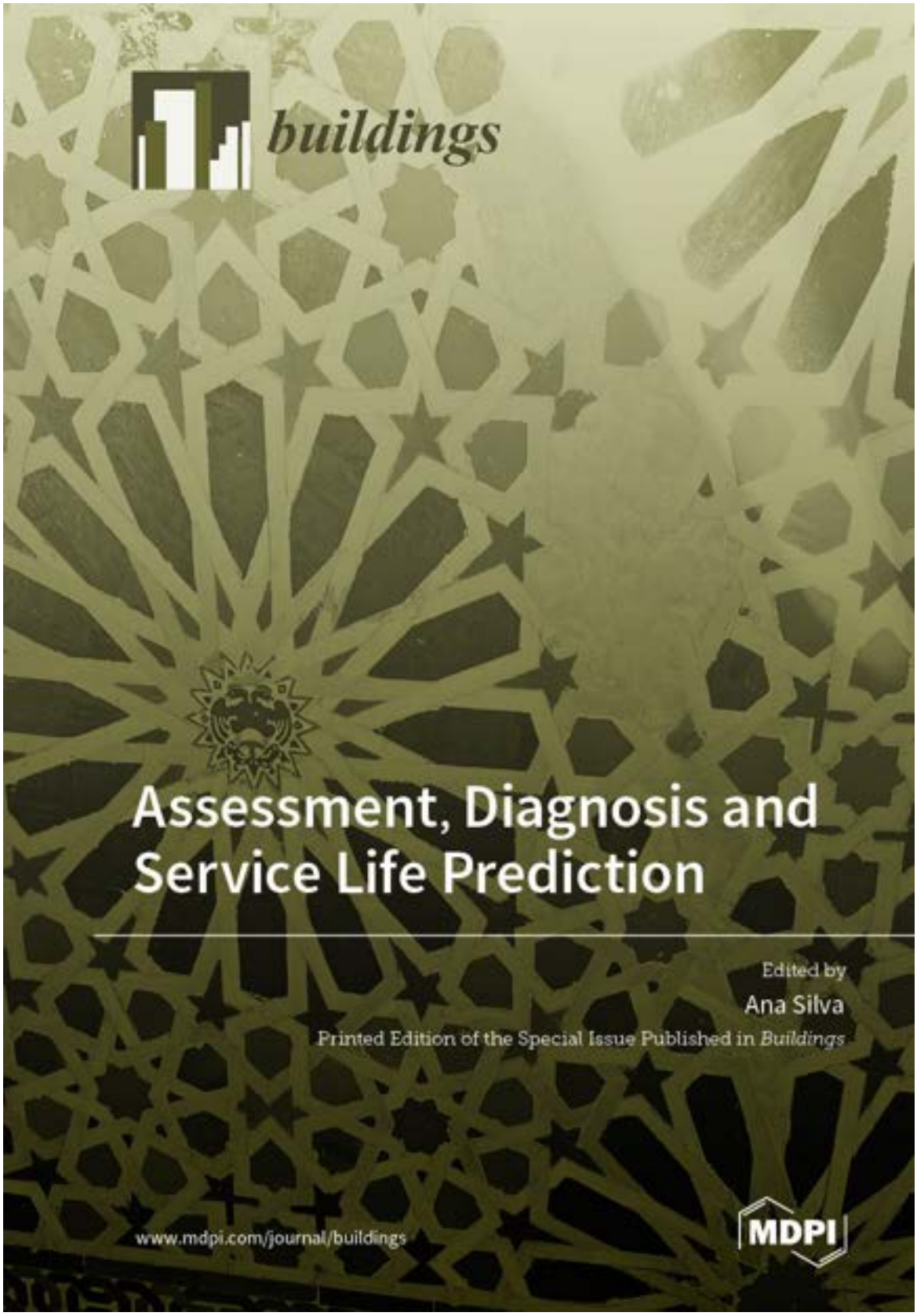

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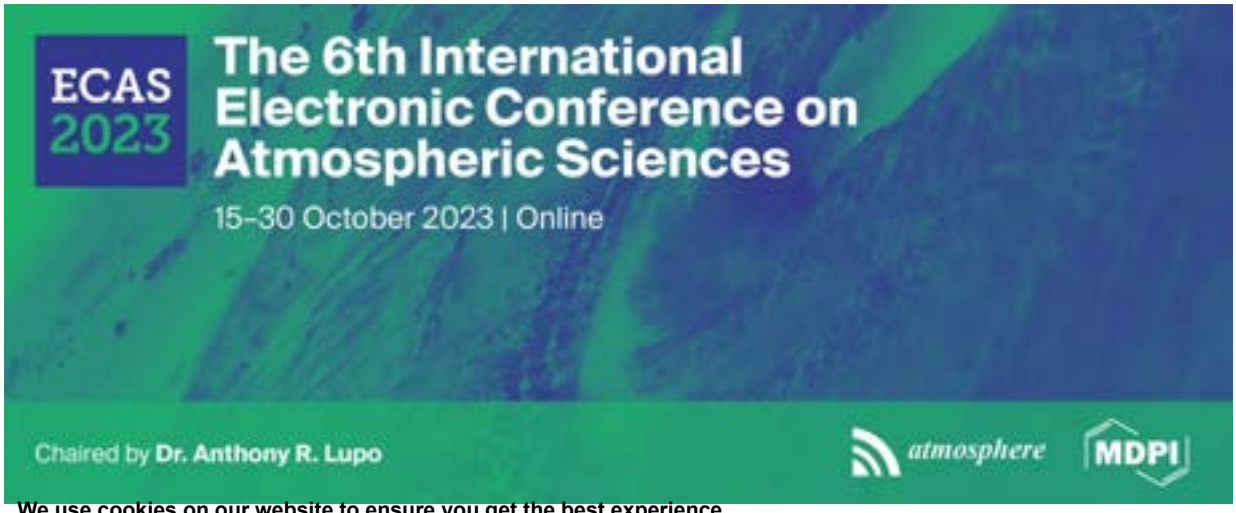

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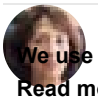

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Interests: advanced numerical modelling for structural analysis; progressive collapse; seismic design and analysis of structures; experimental testing
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Department of Civil Engineering, University of British Columbia, Vancouver, BC V6T 1Z4, Canada
Interests: seismic behaviour of masonry buildings; numerical modelling of masonry buildings; seismic retrofitting techniques for buildings; seismic evaluation of existing buildings; seismic rehabilitation of heritage structures; post-earthquake reconnaissance studies
Special Issues, Collections and Topics in MDPI journals

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Editorial Board Member
Department of Engineering, University of Perugia, 06125 Perugia, Italy
Interests: thermal, optical, and acoustic properties of opaque and transparent building materials; transparent insulating materials (TIMs); nanomaterials; heat transfer; circular economy; waste materials; environmental sustainability; building energy simulation; life cycle assessment; thermal, lighting, and acoustic comfort; environmental noise analysis; renewable energy, energy conversion of biomass
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Civil Engineering Department, University of Aveiro, Aveiro, Portugal
Interests: sustainability and health; information and communication technology; computing and modelling; structures; concrete; wood; timber; education
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Editorial Board Member
Department of Civil Engineering and Architecture, University of Catania, Via Santa Sofia 64, 95123 Catania, Italy
Interests: seismic vulnerability assessment of structures; seismic retrofitting of existing buildings; seismic isolation of structures and art objects;

computational modeling for masonry structures; computational modeling for reinforced concrete structures; analysis of structures with discontinuities
Special Issues, Collections and Topics in MDPI journals

Dr. Antonio Caggiano (https://sciprofiles.com/profile/460208)
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Editorial Board Member
Department of Civil, Chemical and Environmental Engineering, University of Genova, Genova, Italy
Interests: sustainability in construction and building materials; recycling; smart materials; smart buildings; energy-saving; green buildings; eco-friendly materials; nearly zero-energy buildings; energy efficiency; energy storage; phase change materials; renewable energy resources; zero CO_2 emissions; CO_2 storage in materials; modeling; multiscale; multiphysics; micro- and meso-scale
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Editorial Board Member
Department of Construction and Quality Management, Hong Kong Metropolitan University, Kowloon, Hong Kong, China
Interests: 3D-printed (additive-manufactured) metal structures; connections and joints; modular structures; steel structures; structural stability; structural fire resistance and composite structures
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Dr. John Kaiser Calautit (https://sciprofiles.com/profile/2416177)
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Department of Architecture and Built Environment, Faculty of Engineering, University of Nottingham, Nottingham NG7 2RD, UK
Interests: artificial intelligence; energy; HVAC, passive strategies and technologies; modelling

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Editorial Board Member
Department of Civil, Chemical and Environmental Engineering, University of Genoa, Via Montallegro 1, 16145 Genoa, Italy
Interests: earthquake engineering; structural analysis; structural and seismic analysis of masonry buildings; structural repair and maintenance of heritage buildings; structural testing and modelling
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2. National Research Council, Institute of Nanotechnology (CNR-NANOTEC), Via Monteroni 73100, Lecce, Italy
Interests: chromogenics; semitransparent photovoltaics; building integration of innovative technologies; energy saving; visual comfort and

daylighting; applied thermodynamics and thermal sciences
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Editorial Board Member
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Editorial Board Member
Faculty of Architecture and Town Planning, Technion – Israel Institute of Technology, Haifa 3200003, Israel
Interests: sustainable green architecture; lighting and daylighting in architecture; energy retrofitting of existing buildings; performance-based design; intelligent buildings; building envelope; zero energy buildings and communities; solar and daylight rights in urban design; design tools
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Prof. Roberto Capozucca (https://sciprofiles.com/profile/2471361)
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Editorial Board Member
Department of Civil Engineering, Building and Architecture (DICEA), Polytechnic University of Marche, Ancona, Italy
Interests: experimental analysis and modeling of masonry structures; experimental analysis of reinforced concrete and prestressed concrete structures; damage problems in reinforced concrete and prestressed concrete structures; strengthening techniques with composite materials; dynamic methods for the experimental assessment of civil structures.

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Editorial Board Member
School of Engineering, University of Basilicata, viale dello Ateneo Lucano 10, 85100 Potenza, Italy
Interests: earthquake engineering; performance-based design; seismic assessment of buildings and bridges; post-earthquake damage and repair costs; seismic isolation and energy dissipation; advanced materials for seismic applications

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Interests: architectural design; urban design; design thinking; visual thinking; creativity and innovation; place attachment
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Interests: environmentally sustainable binders and composites; technologies for sustainable construction; microstructure of materials; materials durability testing and performance; building materials
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Editorial Board Member
Associate Professor, Department of Civil, Chemical and Environmental Engineering, University of Genova, Via Montallegro 1, 16145 Genova, Italy
Interests: masonry existing buildings; numerical modelling; seismic risk; structural monitoring
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Editorial Board Member
Department of Materials and Structures, Université Gustave Eiffel, F-44344 Bouguenais, France
Interests: concrete mixing; processing in recycling building materials; constitutive laws in soil mechanics
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Editorial Board Member
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Interests: timber engineering; bamboo engineering; structural materials; building conservation; earthquake engineering; vibration control
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Editorial Board Member
Department of Building Environment and Energy Engineering, The Hong Kong Polytechnic University, Hong Kong, China
Interests: indoor air quality; aerosol deposition and detachment behavior; biomimicry; smart building materials; energy use in building; intelligent building energy management system; solar and waste heat driven cooling and refrigeration system; passive radiative cooling; nanofluid; fire dynamics and combustion
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Editorial Board Member
Department of Civil Engineering, NOVA University of Lisbon, Caparica, Portugal
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Special Issues, Collections and Topics in MDPI journals

Prof. Dr. Jianbing Chen
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Editorial Board Member
Department of Structural Engineering, College of Civil Engineering, Tongji University, Shanghai 200092, China
Interests: reliability; nonlinear analysis of structures; stochastic dynamics of structures; earthquake engineering

Prof. Dr. Jun Chen (https://sciprofiles.com/profile/1945773)
Website (https://structure.tongji.edu.cn/info/1012/2307.htm)
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Interests: structural vibration serviceability; vibraiton control; human-induced loads; big data in civil engineering; structure health monitoring
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Editorial Board Member
Department of Building, Civil and Environmental Engineering, Concordia University, Montréal, QC, Canada
Interests: Artificial Intelligence (AI) applications; image recognition; Virtual Reality (VR) and Augmented Reality (AR) applications; optimization of construction operations

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Department of Civil Engineering, Shanghai Jiao Tong University, Shanghai, China
Interests: numerical analysis; finite element modeling; architectural structure; large span structure; civil engineering

Dr. Xi Chen (https://sciprofiles.com/profile/1525807)
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Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong, The Central Ave, Hong Kong
Interests: green building; thermal comfort; natural ventilation; heat pump; renewable energy
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Prof. Dr. Yixing Chen (https://sciprofiles.com/profile/388420)
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Editorial Board Member
College of Civil Engineering, Hunan University, Changsha 410082, China
Interests: urban building energy modeling; building retrofit analysis; building energy efficiency; occupant behavior
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Editorial Board Member
Department of Civil and Construction Engineering, National Taiwan University of Science and Technology, Taipei 10607, Taiwan
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Editorial Board Member
Department of Architecture and Design (DAD), Politecnico di Torinodisabled, Turin, Italy
Interests: photogrammetry; uncrewed aerial systems; laser scanning; 3D reconstruction; 3D modelling; virtual reality/augmented ; SLAM; BIM/HBIM
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Prof. Dr. Samir Chidiac (https://sciprofiles.com/profile/2081962)
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Editorial Board Member
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Interests: structural materials; concrete; masonry; self-healing; building science; accessibility; numerical methods; sustainability
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Prof. Dr. Heap-Yih Chong (https://sciprofiles.com/profile/235095)
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Editorial Board Member
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2. School of Engineering Audit, Nanjing Audit University, Nanjing 211815, China
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Construction Engineering and Management, Civil Engineering Department, College of Engineering, Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh 11432, Saudi Arabia
Interests: Construction management; Health and safety management; Contract management; Claims and disputes resolution; Evaluating and managing risk; Delivery methods; Planning and scheduling; Behavior based safe
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Interests: sustainable cooling and dehumidification systems; sustainable thermal energy recovery; renewable solar thermal systems; thermal energy storage
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Dr. Denny Coffetti (https://sciprofiles.com/profile/372004)
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Department of Engineering and Applied Sciences, University of Bergamo, 24044 Dalmine, BG, Italy
Interests: concrete; cement; alternative binders to Portland cement; sustainability of construction materials; durability of concrete; admixtures for concrete; alkali activated materials
Special Issues, Collections and Topics in MDPI journals

Prof. Dr. Francesco Colangelo (https://sciprofiles.com/profile/49764)
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Editorial Board Member
Department of Engineering, University of Naples “Parthenope”, Isola C4, Centro Direzionale Naples (NA) 80143, Italy
Interests: sustainability of construction; innovative materials for eco-efficient buildings; waste recycling in building construction; innovative materials for civil applications; 3D printing; FRP; FRC; SCC; geopolymer; sustainability of construction materials; Life Cycle Assessment
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IRDL Institut de Recherche Dupuy de Lôme, Université de Bretagne Sud, UMR CNRS 6027, IRDL, F-56100 Lorient, France
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Laboratoire de Génie Civil et Génie Mécanique, Université de Rennes, Rennes, France
Interests: bio-based building materials; hygrothermal transfer; building physics; durability
Special Issues, Collections and Topics in MDPI journals

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Interests: energy; renewable energy; efficiency in buildings; thermal comfort; indoor air quality; building ventilation; CFD; human and building thermal simulation
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Prof. Dr. Ottavia Corbi (https://sciprofiles.com/profile/2291161)
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Department Structural Engineering and Architecture, University of Naples Federico II, Napoli, Italy
Interests: non-linear dynamics; structural control; sustainable materials and constructions; resilient buildings; seismic vulnerability; stochastic mechanics; masonry modelling and analysis; smart and composite materials and structures; preservation and refurbishment of historical constructions; structural optimization

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Interests: retrofitting buildings; sustainable construction materials; new advanced materials for upgrading of existing masonry and wood historic constructions; structural analysis and retrofitting of historic constructions; mechanics of structures and experimental analysis of existing structures
Special Issues, Collections and Topics in MDPI journals

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Interests: building physics; energy efficiency; thermal comfort; renewable energy; daylighting
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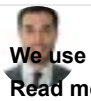

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Editorial Board Member

1. Department of Civil Engineering and Architecture (DECivil), University of Lisbon, Lisbon, Portugal
2. Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal

Interests: public–private partnerships; construction management; project appraisal; green infrastructure

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Interests: sustainable concrete; concrete durability; sustainable concrete–polymer composites; concrete repair; concrete carbonation.

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Instituto Dom Luiz, Faculty of Sciences, University of Lisbon, 1749-016 Lisbon, Portugal

Interests: energy; buildings; natural ventilation; renewable energy

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Interests: precast buildings; prestressed concrete structures; earthquakes; fire

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Editorial Board Member

School of Architecture and Design (SAAD), University of Camerino, Viale della Rimembranza 9, 63100 Ascoli Piceno, Italy

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Editorial Board Member

Faculty of Science and Technology, Free University of Bozen-Bolzano, Universitätsplatz 5, 39100 Bolzano, Italy

Interests: engineer-to-order; lean construction; Industry 4.0; Construction 4.0; supply chain management; lean manufacturing; production planning and control; logistics

Special Issues, Collections and Topics in MDPI journals

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Editorial Board Member

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Interests: space syntax; spatial cognition; pedestrian movement; architecture; user experience

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Department of Building and Real Estate, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong
Interests: sustainability; sustainable built environment; sustainable construction; green building; modular and offsite construction; digital applications including building information modelling (BIM), artificial intelligence (AI) and other digital technologies
Special Issues, Collections and Topics in MDPI journals

Prof. Dr. Flávio De Andrade Silva (https://sciprofiles.com/profile/628707)
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Editorial Board Member
Department of Civil and Environmental Engineering, Pontifícia Universidade Católica (PUC-Rio), Rio de Janeiro, Brazil
Interests: cement-based composies; TRC; SHCC; natural fibers; durability; mechanics
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Prof. Dr. Rui M.M. Carneiro De Barros (https://sciprofiles.com/profile/383598)
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Editorial Board Member
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Interests: structural dynamics; earthquake engineering; wind engineering; control of vibrations; towers and masts; long bridges; tall buildings; SHM; slender structures

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Interests: Masonry; earthquake; composites; monitoring; strengthening; heritage; assessment; retrofitting

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Editorial Board Member
Department of Civil Engineering, University of Salerno, Via Giovanni Paolo II, 132, Fisciano, Italy
Interests: economic and financial feasibility and quality assessment in redevelopment housing, urban and regional planning, appraisal of ordinary and extraordinary properties, compensation for expropriation, single and multi-dimensional evaluation procedures and techniques, risk analysis for projects in the civil sector, public-private partnership (PPP)

Prof. Dr. Gianfranco De Matteis (https://sciprofiles.com/profile/1847187)
Website (https://www.neduet.edu.pk/NED-Journal/ed_board.html)
Editorial Board Member
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Special Issues, Collections and Topics in MDPI journals

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land; property; risk management; environmental economics
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Editorial Board Member
Department of Structures for Engineering and Architecture, University of Naples Federico II, 80125 Naples, Italy
Interests: performance-based earthquake engineering; RC buildings; masonry infills; nonlinear modeling; fragility analysis; experimental testing
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Dr. Stefano De Santis (https://sciprofiles.com/profile/2427787)
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Editorial Board Member
Department of Engineering, Roma Tre University, Rome, Italy
Interests: structural rehabilitation; structural health monitoring; seismic assessment of existing constructions

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Editorial Board Member
Department of Engineering, University of Sannio, Benevento, Italy
Interests: earthquake engineering; reinforced concrete; beam-column joints; seismic retrofitting; composite materials; experimental test; integrated design

Prof. Dr. Lucia Della Spina (https://sciprofiles.com/profile/243115)
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Editorial Board Member
Department of Heritage, Architecture, Urban Planning, Mediterranea University of Reggio Calabria, Via dell'Università, 25, 89124 Reggio Calabria, Italy
Interests: construction and evaluation of sustainability of programs projects and buildings; public and private feasibility of urban transformation; economic evaluation of environmental and cultural assets; complex decision-making processes and integrated assessments; governance of local development processes; economic and financial feasibility of public and private investment; economic evaluations and real estate appraisals; enhancement and management of cultural and environmental assets; sustainability complex programs of urban transformation; project management; economic evaluation of the feasibility and sustainability of public and private programs and projects; economic evaluation of environmental and cultural heritage; complex decision-making processes and integrated evaluations; plans and models for managing cultural and environmental assets; reuse and urban regeneration; economic evaluations; multidimensional evaluation of urban plans and projects; real estate market and appraisal methodologies
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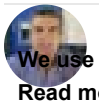
Editorial Board Member
Department of Structures for Engineering and Architecture, University of Naples Federico II, via Claudio 21, 80125 Napoli, Italy
Interests: Earthquake Engineering; Seismic vulnerability of masonry and reinforced concrete buildings; post-earthquake damage and repair costs, advanced materials for seismic retrofit of existing structures; protection of cultural heritage
Special Issues, Collections and Topics in MDPI journals



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materials; reinforced concrete; masonry structures; earthen buildings; additive 3D printing in construction.
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Editorial Board Member
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Buildings, Volume 12, Issue 6 (June 2022) – 167 articles

Cover Story (view full-size image (/files/uploaded/covers/buildings/big_cover-buildings-v12-i6.png)): Seismic assessment of building complexes, especially interconnected masonry buildings in historic towns, still presents challenges and is the subject of current research. The present case study shows the results of the application of dynamic testing in conjunction with an experimental survey and a subsequent computational model. In the present experience, ambient vibration testing has allowed establishing mutual constraints between a wing and the main building of the complex, thus significantly simplifying the computational modeling effort. In this sense, this methodology is deemed promising, and it is hoped that it will be further applied and assessed. **View this paper (https://www.mdpi.com/2075-5309/12/6/805)**

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(/2075-5309/12/6/867/pdf?version=1655973925)

Life Cycle Environmental Impact of Underground Plastic Recharge Chambers in Stormwater Management (/2075-5309/12/6/867)

by **Lisa A. Peterson (https://sciprofiles.com/profile/2145201)**, **Patricia M. Gallagher (https://sciprofiles.com/profile/2279681)** and **Sabrina Spatari (https://sciprofiles.com/profile/82561)**

Buildings **2022**, *12*(6), 867; **https://doi.org/10.3390/buildings12060867 (https://doi.org/10.3390/buildings12060867)** - 20 Jun 2022

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Abstract Life cycle assessment is used to systematically evaluate the environmental impact of underground plastic recharge chambers (RCs) used for stormwater management. Using cradle-to-gate life cycle assessment and a functional unit of 1 m^3 stormwater capacity, different RC structure types, manufacturing processes and **[...] Read more.**

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Date Palm Surface Fibers for Green Thermal Insulation (/2075-5309/12/6/866)

by Mohsin Raza (https://sciprofiles.com/profile/950531), Hyder Al Abdallah (https://sciprofiles.com/profile/2038425), Ayah Abdullah (https://sciprofiles.com/profile/2289690) and Basim Abu-Jdayil (https://sciprofiles.com/profile/1210383)

Buildings **2022**, *12*(6), 866; https://doi.org/10.3390/buildings12060866 (https://doi.org/10.3390/buildings12060866) - 20 Jun 2022

Abstract Some of the major challenges of the twenty-first century include the continued increase in energy consumption and environmental pollution. One approach to overcoming these challenges is to increase the use of waste materials and environmentally friendly manufacturing methods. The high energy consumption in **[...] Read more.**

(This article belongs to the Topic **Building Energy and Environment (/topics/building)**)

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Optimization of On-Street Parking in the Historical Heritage Part of Lviv (Ukraine) as a Prerequisite for Designing the IoT Smart Parking System (/2075-5309/12/6/865)

by Chengjun Zhou (https://sciprofiles.com/profile/author/VG9DUlhwZ052S1ZmUzVSRExUMFhTdU9wZThUTHBScURNUER1ZW5BaXVaMD0=), Halyna Petryshyn (https://sciprofiles.com/profile/author/ZmdzdW1jTmhCbm9DZVNkdTl3NC9Gbm83SUJkL0ovMk5jUXRQdzQxSGVMdz0=), Roman Liubytskyi (https://sciprofiles.com/profile/author/bzY1Nmt5MVFRTEI6dS9XMXkvRVR2T09scjZma1pxeUJqRjJlSTFFZHgxVT0=) and Orest Kochan (https://sciprofiles.com/profile/624638)

Buildings **2022**, *12*(6), 865; https://doi.org/10.3390/buildings12060865 (https://doi.org/10.3390/buildings12060865) - 20 Jun 2022

Abstract The city of Lviv faces a scarcity of parking lots, especially in its central zone. A comparison of the results of the in situ studies carried out in 2016 and 2021 in the city center showed the efficiency of the planning activities, due **[...] Read more.**

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Properties Evolution of Some Hydraulic Mortars Incorporating Graphene Oxides (/2075-5309/12/6/864)

by Popa Dorin (https://sciprofiles.com/profile/author/aTFJOGE2cEFQdUpNWjZnckM3SElqdz09), Prodan Doina (https://sciprofiles.com/profile/733822), Varvara Simona (https://sciprofiles.com/profile/1158389), Popa Maria (https://sciprofiles.com/profile/author/NGFLRk5zaUVaQnlvRHNKQjlrelZuQT09), Cuc Stanca (https://sciprofiles.com/profile/1479372), Sarosi Codruta (https://sciprofiles.com/profile/742049), Moldovan Marioara (https://sciprofiles.com/profile/1070574), Ivan Raluca (https://sciprofiles.com/profile/author/UHVld0FCck1KUzQxb1JZSFEydW9oSjYxU3dLYlBrd3FkRVRTdlVRR253Zz0=) and Ene Razvan (https://sciprofiles.com/profile/1151460)

Buildings **2022**, *12*(6), 864; https://doi.org/10.3390/buildings12060864 (https://doi.org/10.3390/buildings12060864) - 20 Jun 2022
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Abstract In this experimental study, the mechanical and adhesion properties of several hydraulic lime mortars incorporating graphene oxide (GO)-based nanomaterials were evaluated. Four different composite mortar samples were prepared by adding different percentages of GO-based powders (functionalized), i.e., 1 wt.% GO, 5 wt.% GO, **[...] Read more.**

(This article belongs to the Topic **Innovative Construction and Building Materials (/topics/Innovative_Construction_and_Building_Materials)**)

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Open Access Article (/2075-5309/12/6/863/pdf?version=1655795265)

Choices of the Critical Frequency for φ in TL-φ Algorithms When Applied to Multi-Degree of Freedom Systems (/2075-5309/12/6/863)

by Yu Tang (https://sciprofiles.com/profile/709870), Chao Luo (https://sciprofiles.com/profile/1626134) and Bo Fu (https://sciprofiles.com/profile/300079)

Buildings **2022**, *12*(6), 863; https://doi.org/10.3390/buildings12060863 (https://doi.org/10.3390/buildings12060863) - 20 Jun 2022
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Abstract TL-φ algorithms are newly developed explicit structure-dependent integration algorithms utilized for solving the temporally discretized equations of motion. In contrast to the existing algorithms, the most significant improvement of TL-φ algorithms is diminishing the amount of period errors by introducing **[...] Read more.**

(This article belongs to the Special Issue **Research on Statics and Dynamics of Structures (/journal/buildings/special_issues/Statics_Dynamics_Structures)**)

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Open Access Article (/2075-5309/12/6/862/pdf?version=1655866773)

Relationship between Project Space Types, Optimize Energy Performance Credit, and Project Size in LEED-NC Version 4 (v4) Projects: A Case Study (/2075-5309/12/6/862)

by Svetlana Pushkar (https://sciprofiles.com/profile/121558)

Buildings **2022**, *12*(6), 862; https://doi.org/10.3390/buildings12060862 (https://doi.org/10.3390/buildings12060862) - 20 Jun 2022

Abstract A previous study (Pushkar 2021) showed a significant non-parametric correlation between the Optimize Energy Performance credit from the energy and atmosphere category (EAc7) and project size in Leadership in Energy and Environmental Design for New Construction and Major Renovations version 4 (LEED-NC v4) **[...] Read more.**

(This article belongs to the Section **Building Energy, Physics, Environment, and Systems (/journal/buildings/sections/BEPES)**)

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The Effect of Smart Colored Windows on Visual Performance of Buildings (/2075-5309/12/6/861)

by Negar Heidari Matin (https://sciprofiles.com/profile/2086300), Ali Eydgahi (https://sciprofiles.com/profile/566476) and Payam Matin (https://sciprofiles.com/profile/author/emlyTTU4OUFSLzVDUmlHZ3ZjYkVlWmNiTS9PZU01b1E5NC84eHVrSXVQUT0=)

Buildings **2022**, *12*(6), 861; https://doi.org/10.3390/buildings12060861 (https://doi.org/10.3390/buildings12060861) - 20 Jun 2022

Abstract The photochromic coating is a promising smart technology that provides different optical properties in response to daylight variations. The application of photochromic coatings with various colors/shades on window glass is one of the current research approaches for finding better energy saving techniques. The **[...] Read more.**

(This article belongs to the Special Issue **Innovative Circular Building Design and Construction (/journal/buildings/special_issues/ICBDC)**)

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Open Access Article (/2075-5309/12/6/860/pdf?version=1655718899)

Study of the Convective Heat Transfer Coefficient of Different Building Envelope Exterior Surfaces (/2075-5309/12/6/860)

by Xiaotong Xue (https://sciprofiles.com/profile/author/WXRLL2d5Zk9teDRUeUxKb21RYTVtcHFKbTgrTk1lUzBabUlXclMyVW9SUT0=), Shouxu Han (https://sciprofiles.com/profile/author/ckhJd0dwYVJpbkxvbGpFQkRjNXZjeGJXcWY1VlhxMDRoMFJvbXJ6TFdMRT0=), Dongjun Guo (https://sciprofiles.com/profile/1132876), Ziwei Zhao (https://sciprofiles.com/profile/1949354), Bin Zhou (https://sciprofiles.com/profile/author/UUk3YWZMMXRSVjJpQWJma2ZubVhoQkZ4MHRQM3dSQWwxTGU3Yyt5Kyt0MD0=) and Fei Li (https://sciprofiles.com/profile/1808398)

Buildings **2022**, *12*(6), 860; https://doi.org/10.3390/buildings12060860 (https://doi.org/10.3390/buildings12060860) - 20 Jun 2022

Abstract Convective heat transfer on the exterior surface of the building envelope is an important component for building energy consumption. The calculation of energy consumption depends on the convective heat transfer coefficient (CHTC) of the exterior surface of the envelope. The existing research does **[...] Read more.**

(This article belongs to the Special Issue **Healthy Green Building Planning and Design (/journal/buildings/special_issues/buildingplan_design)**)

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Concomitant Impediments to the Social Acceptance of Sandbag Technology for Sustainable and Affordable Housing Delivery: The Case of South Africa (/2075-5309/12/6/859)

by Johnson Adetooto (https://sciprofiles.com/profile/2202025) and Abimbola Windapo (https://sciprofiles.com/profile/26656)

Buildings **2022**, *12*(6), 859; https://doi.org/10.3390/buildings12060859 (https://doi.org/10.3390/buildings12060859) - 20 Jun 2022

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Abstract There is a high level of homelessness in South Africa. Sandbag building technologies (SBTs) have been offered as economical and sustainable alternative building materials capable of speeding housing provision in South Africa. However, their degree of adoption in South Africa remains relatively low. **[...] Read more.**

(This article belongs to the Special Issue Sustainability in Construction: Techniques, Management and Life Cycle (/journal/buildings/special_issues/sustainability_construction))

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A Critical Review of Maturity Model Development in the Digitisation Era (/2075-5309/12/6/858)

by Samuel Adeniyi Adekunle (https://sciprofiles.com/profile/1693475), Clinton Aigbavboa (https://sciprofiles.com/profile/178846), Obuks Ejohwomu (https://sciprofiles.com/profile/1580723), Matthew Ikuabe (https://sciprofiles.com/profile/author/cXY3QS9naytRNG44MUhxaGhWbTMyTEZnblRYZmV2TWpGcVNpWmV3UlJaRT0=) and Babatunde Ogunbayo (https://sciprofiles.com/profile/2296700)

Buildings **2022**, *12*(6), 858; https://doi.org/10.3390/buildings12060858 (https://doi.org/10.3390/buildings12060858) - 20 Jun 2022

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Abstract Maturity models assess the prevailing capability level and proffer the necessary capabilities for effective adoption in a systematic roadmap. This is considered essential to achieve diffusion of the emerging technologies. The paper provides a guide to maturity model development in the digitisation era. **[...] Read more.**

(This article belongs to the Section Construction Management, and Computers & Digitization (/journal/buildings/sections/Construction_Management))

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Computer Vision-Based Hazard Identification of Construction Site Using Visual Relationship Detection and Ontology (/2075-5309/12/6/857)

by Yange Li (https://sciprofiles.com/profile/1830245), Hanwei Wei (https://sciprofiles.com/profile/2233462), Zheng Han (https://sciprofiles.com/profile/934983), Nan Jiang (https://sciprofiles.com/profile/author/THRrZjJNT0lwdW5zZXNvWXFyTzVGTVdJMG5SRi9zUHVoZTFKK1huRzRKMD0=), Weidong Wang (https://sciprofiles.com/profile/author/WWNiVm5kYUxlSmlKbzZMckZTcXlUczM0YzlxMVdlWWxlOEhDTlBNWU5iMD0=) and Jianling Huang (https://sciprofiles.com/profile/1209277)

Buildings **2022**, *12*(6), 857; https://doi.org/10.3390/buildings12060857 (https://doi.org/10.3390/buildings12060857) - 19 Jun 2022

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Abstract Onsite systematic monitoring benefits hazard prevention immensely. Hazard identification is usually limited due to the semantic gap. Previous studies that integrate computer vision and ontology can address the semantic gap and detect the onsite hazards. However, extracting and encoding regulatory documents in a **[...] Read more.**

(This article belongs to the Special Issue Digital Methods for Infrastructures Management towards Sustainability, Intelligence, and Resilience (/journal/buildings/special_issues/DigitalIn_frastructures_Management))

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Abstract At present, the integration of green building, the intelligent building industry and high-quality development are facing a series of new opportunities and challenges. This review aims to analyze the digital development of smart green buildings to make it easier to create contiguous ecological **[...] Read more.**

(This article belongs to the Topic **Sustainable Smart Cities and Smart Villages (/topics/Smart_Cities_Smart_Villages)**)

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A Novel Support-Vector-Machine-Based Grasshopper Optimization Algorithm for Structural Reliability Analysis (/2075-5309/12/6/855)

by Yutai Yang (https://sciprofiles.com/profile/author/VUtTcGxWc2YvWjhVRC9vK3hLWE9NSS9UOE1GTDRkLytGa1hjMDFLN2lxTT0=), Weizhe Sun (https://sciprofiles.com/profile/2178931) and Guoshao Su (https://sciprofiles.com/profile/author/K2FLSkxFR1pHQXcxQmJKRE96OGdETmczMndlMXYvQjd4YmMrQTBVemRjUT0=)

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Abstract Aiming at the characteristics of high computational cost, implicit expression and high nonlinearity of performance functions corresponding to large and complex structures, this paper proposes a support-vector-machine- (SVM) based grasshopper optimization algorithm (GOA) for structural reliability analysis. With this method, the reliability problem **[...] Read more.**

(This article belongs to the Section **Building Structures (/journal/buildings/sections/BS)**)

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An Exploratory Factor Analysis for Conflict Resolution Methods among Construction Professionals (/2075-5309/12/6/854)

by Benjamen Sunkanmi Adeyemi (https://sciprofiles.com/profile/2209840) and Clinton Ohis Aigbavboa (https://sciprofiles.com/profile/178846)

Buildings **2022**, *12*(6), 854; https://doi.org/10.3390/buildings12060854 (https://doi.org/10.3390/buildings12060854) - 19 Jun 2022

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Abstract This paper aims to evaluate various methods of resolving conflict among construction professionals (CPs) in Nigeria. A quantitative research technique was utilised. This study used well-structured questionnaires which were forwarded to numerous CPs in the Southwest of Nigeria. A total of 150 questionnaires **[...] Read more.**

(This article belongs to the Section **Construction Management, and Computers & Digitization (/journal/buildings/sections/Construction_Management)**)

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Numerical Simulation of Flood Intrusion Process under Malfunction of Flood Retaining Facilities in Complex Subway Stations (/2075-5309/12/6/853)

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Abstract In recent years, heavy rain and waterlogging accidents in subway stations have occurred many times around the world. With the comprehensive development trend of underground space, the accidents caused by flood flow intruding complex subway stations and other underground complexes in extreme precipitation **[...] Read more.**

(This article belongs to the Topic **New Trends in Rock Materials Mechanics and Engineering Geology (/topics/Geology)**)

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Linking BIM to Power BI and HoloLens 2 to Support Facility Management: A Case Study Approach (/2075-5309/12/6/852)

by Ashit Harode (https://sciprofiles.com/profile/1981315), Mahdi Ensafi (https://sciprofiles.com/profile/2820310) and
Walid Thabet (https://sciprofiles.com/profile/2527505)

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Abstract Facility lifecycle data captured in BIM during design and construction are very valuable for effective facility operations and maintenance. Traditionally, model authoring and analysis tools have been used to search and query model information. These tools are not well designed to search and **[...] Read more.**

(This article belongs to the Collection **Virtual Reality and Mixed Reality in Architecture, Engineering, Construction, and Operation and Maintenance (AECOM) Building Sector (/journal/buildings/topical_collections/Virtual_Reality_Mixed_Reality_AECOM_Building_Sector)**)

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Axial Load Enhancement of Lightweight Aggregate Concrete (LAC) Using Environmentally Sustainable Composites (/2075-5309/12/6/851)

by **Suniti Suparp (https://sciprofiles.com/profile/1735653)**, **Nazam Ali (https://sciprofiles.com/profile/1493447)**, **Ahmed W. Al Zand (https://sciprofiles.com/profile/1032476)**, **Krisada Chaiyasarn (https://sciprofiles.com/profile/1324229)**, **Muhammad Usman Rashid (https://sciprofiles.com/profile/2159475)**, **Ekkachai Yooprasertchai (https://sciprofiles.com/profile/1280760)**, **Qudeer Hussain (https://sciprofiles.com/profile/1661102)** and **Panuwat Joyklad (https://sciprofiles.com/profile/825850)**

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Abstract Salient features of lightweight aggregate concrete (LAC) include noticeable fire resistance, high strength-to-weight ratio, and low magnitude of dead loads. Further, LAC has a low cost, eases construction practices, and possesses an environment-friendly nature. On the downside, LAC has substandard mechanical properties in **[...] Read more.**

(This article belongs to the Special Issue **Strength and Performance of Building Materials (/journal/buildings/special_issues/Performance_Building)**)

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Modelling of Cyclic Load Behaviour of Smart Composite Steel-Concrete Shear Wall Using Finite Element Analysis (/2075-5309/12/6/850)

by **Hadee Mohammed Najm (https://sciprofiles.com/profile/2048634)**, **Amer M. Ibrahim (https://sciprofiles.com/profile/2279245)**, **Mohanad Muayad Sabri (https://sciprofiles.com/profile/1707705)**, **Amer Hassan (https://sciprofiles.com/profile/1885762)**, **Samadhan Morkhade (https://sciprofiles.com/profile/author/NFpvZmQ5Q0xtTDROQ1JmQTVaS0lZTnNLZHdvckNTT2haZGVrcEpOUWxUcz0=)**, **Nuha S. Mashaan (https://sciprofiles.com/profile/1211101)**, **Moutaz Mustafa A. Eldirderi (https://sciprofiles.com/profile/1622680)** and **Khaled Mohamed Khedher (https://sciprofiles.com/profile/802846)**

Buildings **2022**, *12*(6), 850; **https://doi.org/10.3390/buildings12060850 (https://doi.org/10.3390/buildings12060850)** - 17 Jun 2022

Cited by 4 (/2075-5309/12/6/850#metrics) | Viewed by 1133

Abstract In recent years, steel-concrete composite shear walls have been widely used in enormous high-rise buildings. Due to their high strength and ductility, enhanced stiffness, stable cycle characteristics and large energy absorption, such walls can be adopted in auxiliary buildings, surrounding the reactor containment **[...] Read more.**

(This article belongs to the Special Issue **Composite Structural Members in the Building Sector: From Design to Materials (/journal/buildings/special_issues/Composite_Members)**)

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Critical Factors Influencing the Performance of Highway Projects: An Empirical Evaluation (/2075-5309/12/6/849)

by Shumank Deep (https://sciprofiles.com/profile/478884),
Shankar Banerjee (https://sciprofiles.com/profile/author/dzY4a0MrYUVBQkVyaWtPUlV0T3kvYnMzK0pQQWNMNnJHb0VabVlxZm0rOD0=),
Saurav Dixit (https://sciprofiles.com/profile/author/V1hSY200R1diYTFWWFZhK3N2WXBSZW9KL0hOZHV0akI5SnRURE16UVZyND0=) and
Nikolai Ivanovich Vatin (https://sciprofiles.com/profile/994681)

Buildings **2022**, *12*(6), 849; https://doi.org/10.3390/buildings12060849 (https://doi.org/10.3390/buildings12060849) - 17 Jun 2022
Cited by 6 (/2075-5309/12/6/849#metrics) | Viewed by 1405

Abstract Highway construction projects have always suffered from cost overruns due to extended project delivery, causing a loss of public funds. Since highways are the backbone of a nation, the purpose of this study is to measure the criticality of the factors that influence **[...] Read more.**

(This article belongs to the Collection Buildings, Infrastructure and SDGs 2030 (/journal/buildings/topical_collections/infrastructure_SDGs))

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Experimental and Numerical Study on Rapid Evacuation Characteristics of Staircases in Campus Buildings (/2075-5309/12/6/848)

by Qian Zhang (https://sciprofiles.com/profile/author/OHo3dDJyV0xROUYrczZia0s4MGx0bXhrdFdmQng3SmFoZEx5UEtzcDdhYz0=),
Fei Yu (https://sciprofiles.com/profile/author/Nm1NRUoxMVJZaHNRcUZEaVZHZkdhZGF4WEZKa3hHR2wzSkxsaWoxTmlJOD0=),
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Chen Chang (https://sciprofiles.com/profile/author/VnZsNDc5WFp2bDUvUTQzQjRlSzUrUDdLeTlaVjdRNCtpUlNiKzFHM0ZSND0=) and
Xusheng Zhang (https://sciprofiles.com/profile/author/SkVOSjYraWJzOUUxQ1VNdDcrYkNOUFB5ajlLNzFzYlVYMlVVVHl4Rk9LVT0=)

Buildings **2022**, *12*(6), 848; https://doi.org/10.3390/buildings12060848 (https://doi.org/10.3390/buildings12060848) - 17 Jun 2022
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Abstract In this work, we conducted downward evacuation experiments in four types of staircases under various smoke visibility conditions of the naked eye, wearing sunglass and wearing eyeshades. Ten male and ten female college students were recruited to conduct the evacuation as a single **[...] Read more.**

(This article belongs to the Special Issue Sustainability and Resiliency of Building Materials and Structures (/journal/buildings/special_issues/Resiliency_Materials))

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Open Access Article (/2075-5309/12/6/847/pdf?version=1655460428)

Design and Experimental Analysis of Connections for a Panelized Wood Frame Roof System (/2075-5309/12/6/847)

by **Md Saiful Islam (https://sciprofiles.com/profile/2168820)**, **Ying Hei Chui (https://sciprofiles.com/profile/528848)** and **Mohammed Sadiq Altaf (https://sciprofiles.com/profile/author/eHNsT29nQUViZmhOZ2NyL1BGSTlieE9za0ErM21EdkxWMEE5Q1d4L1RpWT0=)**

Buildings **2022**, *12*(6), 847; **https://doi.org/10.3390/buildings12060847 (https://doi.org/10.3390/buildings12060847)** - 17 Jun 2022

Cited by 3 (/2075-5309/12/6/847#metrics) | Viewed by 1224

Abstract This paper presents the results of an experimental study on the short-term mechanical performance of timber screw connections comprising two types of fasteners suitable for a novel panelized roof design process. Thirty-seven specimens of five different connection configurations were tested under quasi-static monotonic **[...] Read more.**

(This article belongs to the Special Issue **Connections in Timber and Bamboo Structures (/journal/buildings/special_issues/timber_bamboo_structures)**)

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Position Paper Introducing a Sustainable, Universal Approach to Retrofitting Residential Buildings (/2075-5309/12/6/846)

by **Małgorzata Fedorczak-Cisak (https://sciprofiles.com/profile/507086)**, **Mark Bomberg (https://sciprofiles.com/profile/80797)**, **David W. Yarbrough (https://sciprofiles.com/profile/982872)**, **Lowell E. Lingo (https://sciprofiles.com/profile/author/VFY2RE9PL0kvbXhlcUNPeXhoZFhCUT09)** and **Anna Romanska-Zapala (https://sciprofiles.com/profile/850811)**

Buildings **2022**, *12*(6), 846; **https://doi.org/10.3390/buildings12060846 (https://doi.org/10.3390/buildings12060846)** - 17 Jun 2022

Abstract Protests during the 2021 Climate Conference in Glasgow exemplified our dilemma. The establishment perpetuates old thinking, while young people demand a new approach to mitigate the impact of climate change. The authors agree with the young people, and as a solution we propose **[...] Read more.**

(This article belongs to the Special Issue **Buildings' Thermal Behaviour and Energy Efficiency for a Sustainable Construction (/journal/buildings/special_issues/Build_Therm_Behav_Energ_Eff_Sus_Const)**)

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Open Access Article (/2075-5309/12/6/845/pdf?version=1655387276)

Seismic Resilience Assessment in Optimally Integrated Retrofitting of Existing School Buildings in Italy (/2075-5309/12/6/845)

by **Wilson Wladimir Carofilis Gallo (https://sciprofiles.com/profile/2170456)**, **Nicholas Clemett (https://sciprofiles.com/profile/2266732)**, **Giammaria Gabbianelli (https://sciprofiles.com/profile/1302982)**, **Gerard O'Reilly (https://sciprofiles.com/profile/970595)** and **Ricardo Monteiro (https://sciprofiles.com/profile/270607)**

Buildings **2022**, *12*(6), 845; **https://doi.org/10.3390/buildings12060845 (https://doi.org/10.3390/buildings12060845)** - 16 Jun 2022

Abstract Modern society requires that structures exhibit greater levels of resilience, especially under earthquakes. The seismic resilience of buildings is thus gaining increased attention as a particular, beyond-code approach. Seismically retrofitted buildings behave satisfactorily under expected earthquake scenarios; however, this does not guarantee operativity **[...] Read more.**

(This article belongs to the Special Issue **Synergies between Seismic, Energy and Environmental Performance in the Assessment and Retrofitting of Buildings (/journal/buildings/special_issues/Seismic_Retrofitting)**)

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Open Access Article (/2075-5309/12/6/844/pdf?version=1655391985)

Scientific Landscape of Embodied Experience in the Virtual Environment: A Bibliometric Analysis (/2075-5309/12/6/844)

by Sanghee Lee (https://sciprofiles.com/profile/2231206) and Eun Joo Park (https://sciprofiles.com/profile/939816)

Buildings **2022**, *12*(6), 844; https://doi.org/10.3390/buildings12060844 (https://doi.org/10.3390/buildings12060844) - 16 Jun 2022

Abstract The realm of architecture has been influenced by the expansion in virtual environments (VEs), along with Industry 4.0 technologies transforming human–VE interactions. Despite increasing scholarly interest in embodied experience-integrated VE, there have been few comprehensive literature reviews undertaken on VEs from a holistic **[...] Read more.**

(This article belongs to the Special Issue **Virtual and Augmented Reality Applied in Architecture, Engineering and Construction (/journal/buildings/special_issues/Virtual_Augmented_Reality_Buildings)**)

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Open Access Feature Paper Review (/2075-5309/12/6/843/pdf?version=1655376843)

Application of Nondestructive Testing Technology in Quality Evaluation of Plain Concrete and RC Structures in Bridge Engineering: A Review (/2075-5309/12/6/843)

by Yuanxun Zheng (https://sciprofiles.com/profile/672937), Shaoqiang Wang (https://sciprofiles.com/profile/2209496), Peng Zhang (https://sciprofiles.com/profile/693873), Tongxin Xu (https://sciprofiles.com/profile/author/SEtCVGZ1bmpJSzZFNGZyZHRoWVJxbUNrWHdtaU1JcUVsaEkwMFVSWFpNTT0=), and Jingbo Zhuo (https://sciprofiles.com/profile/2343509)

Buildings **2022**, *12*(6), 843; https://doi.org/10.3390/buildings12060843 (https://doi.org/10.3390/buildings12060843) - 16 Jun 2022

Abstract The development and application of nondestructive testing technology for prestressed reinforced concrete structures in the field of infrastructure construction were summarized in this study via the analysis of relevant literature worldwide. The detection methods, detection principles, and detection instruments in quality evaluation of **[...] Read more.**

(This article belongs to the Special Issue **Advances in NDT: Theories, Techniques, and Engineering Applications (/journal/buildings/special_issues/NDT_Theories_Techniques_Engineering_Applications)**)

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Open Access Article ((/2075-5309/12/6/842/pdf?version=1655459452))

Development of Exclusive Seismic Fragility Curves for Critical Infrastructure: An Oil Pumping Station Case Study (/2075-5309/12/6/842)

by **Alon Urlainis (https://sciprofiles.com/profile/2213783)** and **Igal M. Shohet (https://sciprofiles.com/profile/1226612)**

Buildings **2022**, *12*(6), 842; **https://doi.org/10.3390/buildings12060842 (https://doi.org/10.3390/buildings12060842)** - 16 Jun 2022

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Abstract Fragility curves are a common tool to appraise the expected damage to critical infrastructure (CI) after an earthquake event. Previous studies offer fragility curve parameters for CI that are suitable for a vast range of systems, without an in-depth examination of the system **[...] Read more.**

(This article belongs to the Special Issue **Seismic Safety Assessment of Existing Constructions (/journal/buildings/special_issues/Saf_Assess_Exist_Construct)**)

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Open Access Article ((/2075-5309/12/6/841/pdf?version=1655386832))

Predicting Construction Workers' Intentions to Engage in Unsafe Behaviours Using Machine Learning Algorithms and Taxonomy of Personality (/2075-5309/12/6/841)

by **Yifan Gao (https://sciprofiles.com/profile/2218790)**, **Vicente A. González (https://sciprofiles.com/profile/2260242)**, **Tak Wing Yiu (https://sciprofiles.com/profile/author/OG9Wb2VacGhUK2R5UFVkVFhMdWZmdWsvY3Y0Nk1MK3FRSGs0VlpWaUxraz0=)**, **Guillermo Cabrera-Guerrero (https://sciprofiles.com/profile/295211)** and **Ruiqi Deng (https://sciprofiles.com/profile/1777033)**

Buildings **2022**, *12*(6), 841; **https://doi.org/10.3390/buildings12060841 (https://doi.org/10.3390/buildings12060841)** - 16 Jun 2022

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Abstract Dynamic environmental circumstances can sometimes be incompatible with proactive human intentions of being safe, leading individuals to take unintended risks. Behaviour predictions, as performed in previous studies, are found to involve environmental circumstances as predictors, which might thereby result in biased safety conclusions **[...] Read more.**

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Experimental Evaluation of Brick Masonry Walls Strengthened with TRM (Textile Reinforced Mortar) Renders (/2075-5309/12/6/840)

by **Ana Isabel Marques (https://sciprofiles.com/profile/1255082)**, **João Gomes Ferreira (https://sciprofiles.com/profile/1066271)**, **Paulo Candeias (https://sciprofiles.com/profile/476368)** and **Maria do Rosário Veiga (https://sciprofiles.com/profile/843657)**

Buildings **2022**, *12*(6), 840; **https://doi.org/10.3390/buildings12060840 (https://doi.org/10.3390/buildings12060840)** - 16 Jun 2022

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Abstract Old masonry buildings, which are frequently part of the cities-built heritage, are vulnerable to seismic actions. Thus, it is important to conduct efficient seismic strengthening interventions that allow maintenance of the existing building to minimize the environmental and economic impact. The use of **[...] Read more.**

(This article belongs to the Collection **Green and Sustainable Building Materials (/journal/buildings/topical_collections/Green_Sustain_Build_Material)**)

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Open Access Article **(/2075-5309/12/6/839/pdf?version=1655353568)**

What Are the Readability Issues in Sub-Contracting's Tender Documents? (/2075-5309/12/6/839)

by **Ahmed Yousry Akal (https://sciprofiles.com/profile/219126)**

Buildings **2022**, *12*(6), 839; **https://doi.org/10.3390/buildings12060839 (https://doi.org/10.3390/buildings12060839)** - 16 Jun 2022

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Abstract Readability is an important aspect that each sub-contracting's tender documentation should have in order to ensure commonality in the interpretation of its terms by the general contractor and sub-contractor. Otherwise, their contractual relationship is fueled by conflict. Previous studies indicated that the documents **[...] Read more.**

(This article belongs to the Topic **Construction and Project Management (/topics/Construction_Management)**)

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Open Access Article **(/2075-5309/12/6/838/pdf?version=1655375509)**

Research on a Commercial Building Space Traffic Flow Design Based on Post-Occupancy Evaluation (/2075-5309/12/6/838)

by **Yitong Zhu (https://sciprofiles.com/profile/2105386)**, **Wenzhen Huang (https://sciprofiles.com/profile/2087479)** and **Linhui Hu (https://sciprofiles.com/profile/2041817)**

Buildings **2022**, *12*(6), 838; **https://doi.org/10.3390/buildings12060838 (https://doi.org/10.3390/buildings12060838)** - 15 Jun 2022

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Abstract The aim of traffic flow design in commercial building space planning is to create a comfortable, easily accessible, and identifiable spatial structure in a complex and changeable business environment. However, modern commercial building spaces often appear to be inconsistent with the

usage requirements [...] Read more.
(This article belongs to the Section Architectural Design, Urban Science, and Real Estate (/journal/buildings/sections/Architectural_Design))

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Open Access Article (/2075-5309/12/6/837/pdf?version=1655360396)

Energy Flexibility Comparison of Different Control Strategies for Zones with Radiant Floor Systems (/2075-5309/12/6/837)

by Ali Saberi-Derakhtenjani (https://sciprofiles.com/profile/2237300),
Andreas K. Athienitis (https://sciprofiles.com/profile/author/eHYxQ21QUVpPNUNPTU5nanFGaGJXUTdjQ0lwaVhMSlFPQUp3aDdwS21zdTdKdk
,
Ursula Eicker (https://sciprofiles.com/profile/1075882) and Edwin Rodriguez-Ubinas (https://sciprofiles.com/profile/49343)
Buildings **2022**, *12*(6), 837; https://doi.org/10.3390/buildings12060837 (https://doi.org/10.3390/buildings12060837) - 15 Jun 2022

Abstract Radiant floor systems offer significant potential for studying and developing energy flexibility strategies for buildings and their interaction with smart grids. Efficient design and operation of such systems require several critical decisions on design and control variables to maintain comfortable thermal conditions in [...] Read more.
(This article belongs to the Special Issue ZEMCH—Zero Energy Mass Custom Home International Research 2021 (/journal/buildings/special_issues/ZEMCH_2021))

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Open Access Article (/2075-5309/12/6/836/pdf?version=1655299201)

Collaborative Governance of Tower Crane Safety in the Chinese Construction Industry: A Social Network Perspective (/2075-5309/12/6/836)

by Ying Yang (https://sciprofiles.com/profile/author/SHp4WTYyUktCcXozNHhxdmpaQWg4TVEzazFFTGlwRGVlYzY0MjZQTUNJRT0=), Bo Shao (https://sciprofiles.com/profile/526097), Lianghai Jin (https://sciprofiles.com/profile/1041498) and Xiazhong Zheng (https://sciprofiles.com/profile/1055939)

Buildings **2022**, *12*(6), 836; https://doi.org/10.3390/buildings12060836 (https://doi.org/10.3390/buildings12060836) - 15 Jun 2022
Cited by 1 (/2075-5309/12/6/836#metrics) | Viewed by 1102

Abstract Tower crane safety governance is an important issue related to the sustainable development of China's construction industry. The complex collaborative relationship among stakeholders determines the efficiency of tower crane safety governance. From the perspective of social networks, this study constructs a collaborative governance **[...] Read more.**

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Open Access Article (/2075-5309/12/6/835/pdf?version=1655368037)

Genetic Algorithm for Optimal Placement of Steel Plate Shear Walls for Steel Frames (/2075-5309/12/6/835)

by Jianian He (https://sciprofiles.com/profile/1408763), Shuhong Lin (https://sciprofiles.com/profile/author/UngyTmF4MU90Mlp2M29aK1dlZm5OOFROWmNlL0xzK0JldkhtN0N1V09kND0=), Yicheng Li (https://sciprofiles.com/profile/2274336), Xian Dong (https://sciprofiles.com/profile/269590) and Shizhe Chen (https://sciprofiles.com/profile/855295)

Buildings **2022**, *12*(6), 835; https://doi.org/10.3390/buildings12060835 (https://doi.org/10.3390/buildings12060835) - 15 Jun 2022
Cited by 4 (/2075-5309/12/6/835#metrics) | Viewed by 991

Abstract Frame structures equipped with steel plate shear walls (SPSWs) have been widely used in high-rise buildings due to their good seismic performance. In this study, the strip model and combined strip model were used to analyze the performance of SPSWs. Furthermore, an improved **[...] Read more.**

(This article belongs to the Special Issue **Optimized Design and Modelling in Modern Steel and RC Structure Constructions (/journal/buildings/special_issues/steel_rc)**)

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Directed Representative Graph Modeling of MEP Systems Using BIM Data (/2075-5309/12/6/834)

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by Junjun Han (https://sciprofiles.com/profile/author/aTZMNmM5RW1sNEt5dmlrOHpPQ3pqSFRxeG85M3RCU21WVGlWazlrUEkrTT0=), Xiaoping Zhou (https://sciprofiles.com/profile/1600436), Weisong Zhang (https://sciprofiles.com/profile/2183285), Qiang Guo (https://sciprofiles.com/profile/author/TlpFUndvRm5FaDQ4SEhqRTkwbytBbjRubUNTcGtNQ0x6Y1F4NFgrM0VLQT0=), Jie Wang (https://sciprofiles.com/profile/author/VnBUeU4xb2pFTDV2SS9hQk9OQjVyVzlZUmpkZE5MQ0VKTGRyTG4rZTI1Zz0=) and Yixin Lu (https://sciprofiles.com/profile/author/ZUJhbEQ4QVV0OGZoUDFHcjJoTE44U0xvd2NESFRmd2h0ZEN4TlkzTlpCOD0=)

Buildings **2022**, *12*(6), 834; https://doi.org/10.3390/buildings12060834 (https://doi.org/10.3390/buildings12060834) - 15 Jun 2022

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Abstract Mechanical, electrical, and plumbing (MEP) systems are crucial to a building, which directly affect the building safety, energy saving, and operational efficiency. Building information models (BIMs) help engineers to view the connection structure of MEP elements, reducing the time for reading drawings and **[...] Read more.**

(This article belongs to the Topic **Smart Energy Systems (/topics/Smart_Energy)**)

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Multiple Tests for Dynamic Identification of a Reinforced Concrete Multi-Span Arch Bridge (/2075-5309/12/6/833)

by Vincenzo Gattulli (https://sciprofiles.com/profile/author/UVJlQXNPNEJ1UmlHNkcyc3lHTVNMTmNrdkJnZjBXYWRVRVA2U2VORU92ST0=), Francesco Potenza (https://sciprofiles.com/profile/466600) and Giulio Piccirillo (https://sciprofiles.com/profile/author/dFRCM25kRVppQ2NIeG1xemwrSkhvbXc1NEhhODQ1UXh5VEYyR2pwSkJnMD0=)

Buildings **2022**, *12*(6), 833; https://doi.org/10.3390/buildings12060833 (https://doi.org/10.3390/buildings12060833) - 15 Jun 2022

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Abstract This paper presents the results of an experimental dynamic campaign carried out on a reinforced concrete multi-span arch bridge. Five expeditious ambient vibration tests were conducted separately on five spans (one test in each span) of the bridge using only six piezoelectric uniaxial **[...] Read more.**

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Considering Consumers' Green Preferences and Government Subsidies in the Decision Making of the Construction and Demolition Waste Recycling Supply Chain: A Stackelberg Game Approach (/2075-5309/12/6/832)

by Yating Han (https://sciprofiles.com/profile/2272850), Haoxuan Zheng (https://sciprofiles.com/profile/2114890), Yicheng Huang (https://sciprofiles.com/profile/2057513) and Xingwei Li (https://sciprofiles.com/profile/478022)

Buildings **2022**, *12*(6), 832; https://doi.org/10.3390/buildings12060832 (https://doi.org/10.3390/buildings12060832) - 15 Jun 2022

Abstract Resource utilization of construction and demolition waste (CDW) is regarded to be an important means of achieving the sustainable development of the economy and the environment. However, previous research has not fully considered the green degree of products in the demand function of [...] Read more.

(This article belongs to the Special Issue Green Building Project Management (/journal/buildings/special_issues/greenbuildings))

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Detecting Damage Evolution of Masonry Structures through Computer-Vision-Based Monitoring Methods (/2075-5309/12/6/831)

by Marialuigia Sangirardi (https://sciprofiles.com/profile/2202231), Vittorio Altomare (https://sciprofiles.com/profile/2271280), Stefano De Santis (https://sciprofiles.com/profile/2427787) and Gianmarco de Felice (https://sciprofiles.com/profile/author/bG9XNitJOERoeFhlODBOcGx3NlNkOWlyMWNYeDdNMG5EVHRVcHJHYWxQUT0=)

Buildings **2022**, *12*(6), 831; https://doi.org/10.3390/buildings12060831 (https://doi.org/10.3390/buildings12060831) - 14 Jun 2022

Abstract Detecting the onset of structural damage and its progressive evolution is crucial for the assessment and maintenance of the built environment. This paper describes the application of a computer-vision-based methodology for structural health monitoring to a shake table investigation. Three rubble stone masonry [...] Read more.

(This article belongs to the Special Issue Advanced Methodologies and Technologies in Structural Monitoring (/journal/buildings/special_issues/Structural_Monitoring_Buildings))

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Building Information Modeling (BIM) Capabilities in the Operation and Maintenance Phase of Green Buildings: A Systematic Review (/2075-5309/12/6/830)

by Yu Cao (https://sciprofiles.com/profile/2174099), Syahrul Nizam Kamaruzzaman (https://sciprofiles.com/profile/2201592) and Nur Mardhiyah Aziz (https://sciprofiles.com/profile/2201593)

Buildings **2022**, *12*(6), 830; https://doi.org/10.3390/buildings12060830 (https://doi.org/10.3390/buildings12060830) - 14 Jun 2022

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Abstract In recent years, green buildings have gradually become a worldwide trend. Compared with traditional buildings, green buildings have advanced requirements and standards in their operation and maintenance phase. In such a context, some studies proposed that building information modeling (BIM) is an effective **[...] Read more.**

(This article belongs to the Special Issue **Building Energy Retrofit for Sustainable Urban Renewal (** /journal/buildings/special_issues/buil_ener_retro))

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Open Access Feature Paper Article (/2075-5309/12/6/829/pdf?version=1655364714)

Artificial Neural Network for Predicting Building Energy Performance: A Surrogate Energy Retrofits Decision Support Framework (/2075-5309/12/6/829)

by Haonan Zhang (https://sciprofiles.com/profile/2267664), Haibo Feng (https://sciprofiles.com/profile/1872495), Kasun Hewage (https://sciprofiles.com/profile/1788285) and Mehrdad Arashpour (https://sciprofiles.com/profile/1330863)

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Abstract Assessing the energy performance of existing residential buildings (ERB) has been identified as key to improving building energy efficiency and reducing associated greenhouse gas emissions in Canada. However, identifying optimal retrofit packages requires a significant amount of knowledge of building energy modelling, and **[...] Read more.**

(This article belongs to the Special Issue **AI-Aided Carbon Engineering in the AEC Industry (** /journal/buildings/special_issues/carbon_aecindustry))

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Creative Thinking in the Architecture Design Studio: Bibliometric Analysis and Literature Review (/2075-5309/12/6/828)

by Eun Joo Park (https://sciprofiles.com/profile/939816) and Sanghee Lee (https://sciprofiles.com/profile/2231206)

Buildings **2022**, *12*(6), 828; https://doi.org/10.3390/buildings12060828 (https://doi.org/10.3390/buildings12060828) - 14 Jun 2022

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Abstract It is increasingly important for researchers and educators to find effective ways to stimulate students' creativity. In design education, the specificity of design, defined as open-ended problems and ill-defined problems, provides a special opportunity to improve creativity. Nevertheless, design education itself encounters other **[...] Read more.**

(This article belongs to the Special Issue **Architecture: Integration of Art and Engineering (** /journal/buildings/special_issues/ArtI_Engineering))

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Open Access Article (/2075-5309/12/6/827/pdf?version=1655202390)

Visual Relationship-Based Identification of Key Construction Scenes on Highway Bridges (/2075-5309/12/6/827)

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by Chen Wang (https://sciprofiles.com/profile/author/cm5KekNrbDM4V29lMmdMeklHR1lGY1JRUFh3OVFQaWFzeUtxOXVYaEh3TT0=), Jingguo LV (https://sciprofiles.com/profile/1656740), Yu Geng (https://sciprofiles.com/profile/author/Y3BPc056MzliTVN1V1VEU01CTHF0clUrOWVuMFdUWUFmRGQ0TncvWDY1VT0=) and Yang Liu (https://sciprofiles.com/profile/author/akhsT0UrSFAzMGJmSFJvK0gwUHVvVloxM0plaEN2amJlWW9pUzdoYnFDbz0=)

Buildings **2022**, *12*(6), 827; https://doi.org/10.3390/buildings12060827 (https://doi.org/10.3390/buildings12060827) - 14 Jun 2022

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Abstract Highway bridges play an important role in traffic construction; however, accidents caused by bridge construction occur frequently, resulting in significant loss of life and property. The identification of bridge construction scenes not only keeps track of the construction progress, but also enables real-time **[...] Read more.**

(This article belongs to the Special Issue **Intelligent and Computer Technologies Application in Construction (** /journal/buildings/special_issues/Intelligent_Construction **)**)

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A Joint State-Parameter Identification Algorithm of a Structure with Non-Diagonal Mass Matrix Based on UKF with Unknown Mass (/2075-5309/12/6/826)

by Shiyu Wang (https://sciprofiles.com/profile/2193896) and Ying Lei (https://sciprofiles.com/profile/264025)

Buildings **2022**, *12*(6), 826; https://doi.org/10.3390/buildings12060826 (https://doi.org/10.3390/buildings12060826) - 14 Jun 2022

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Abstract Inaccurate mass estimates have been recognized as an important source of uncertainty in structural identification, especially for large-scale structures with old ages. Over the past decades, some identification algorithms for structural states and unknown parameters, including unknown mass, have been proposed by researchers. **[...] Read more.**

(This article belongs to the Special Issue **Structural Identification and Damage Evaluation by Integrating Physics-Based Models with Data (** /journal/buildings/special_issues/Models_Data **)**)

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The Influence of Vertical Arrangement and Masonry Material of Infill Walls on the Seismic Performance of RC Frames (/2075-5309/12/6/825)

by Jingchang Kong (https://sciprofiles.com/profile/2127457), Yuhan Su (https://sciprofiles.com/profile/author/QWNkVXhpSmZjWHBwRHJjOVcybkNEUnlYeVZlaXNINXlNMm1jQjRFUFpvST0=), Zhi Zheng (https://sciprofiles.com/profile/2711297), Xiaomin Wang (https://sciprofiles.com/profile/2221965) and Yukang Zhang (https://sciprofiles.com/profile/author/S0EyejRnQVhSRjFtaENiTThGZXhodm50N0Y2VEh5a2s4cUs1bnpsZjZxcz0=)

Buildings **2022**, *12*(6), 825; https://doi.org/10.3390/buildings12060825 (https://doi.org/10.3390/buildings12060825) - 14 Jun 2022

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Abstract This study presents a finite element (FE) model, the accuracy of which is verified by the comparison between the numerical and test results. The calibrated model is used to investigate the influence of vertical arrangement and masonry material of infill walls on the **[...] Read more.**

(This article belongs to the Special Issue **Resilience-Based Structural Seismic Design and Evaluation (** /journal/buildings/special_issues/seismic_design_evaluation **)**)

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A Comparative Study of Explicit and Stable Time Integration Schemes for Heat Conduction in an Insulated Wall (/2075-5309/12/6/824)

by Humam Kareem Jalghaf (https://sciprofiles.com/profile/1704891), Issa Omle (https://sciprofiles.com/profile/1767126) and Endre Kovács (https://sciprofiles.com/profile/1297594)
Buildings **2022**, *12*(6), 824; https://doi.org/10.3390/buildings12060824 (https://doi.org/10.3390/buildings12060824) - 14 Jun 2022

Abstract Calculating heat transfer in building components is an important and nontrivial task. Thus, in this work, we extensively examined 13 numerical methods to solve the linear heat conduction equation in building walls. Eight of the used methods are recently invented explicit algorithms which **[...] Read more.**
(This article belongs to the Section **Building Energy, Physics, Environment, and Systems (/journal/buildings/sections/BEPES)**)

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Open Access Article (/2075-5309/12/6/823/pdf?version=1655200206)

Experimental Study on the Bond-Slip Behavior of Steel-Steel Fiber Recycled Aggregate Concrete (/2075-5309/12/6/823)

by Rui Ren (https://sciprofiles.com/profile/2242105), Xinjiang Xu (https://sciprofiles.com/profile/author/Zk5wWUdLemJaQTV5ME40QzEvcHV2Y2NlMFVSNitEcG54elYxdmNkVVVaMD0=), Dongbo Li (https://sciprofiles.com/profile/710421), Lei Fan (https://sciprofiles.com/profile/2320340), Qiaomei Lia (https://sciprofiles.com/profile/author/MXNqbFpjT1VzWEpqZy9ZQjI2NThZbzJ4KzU3WWt3am9JMnFRbCtjWkRmQT0=) and Xiguang Liu (https://sciprofiles.com/profile/358140)

Buildings **2022**, *12*(6), 823; https://doi.org/10.3390/buildings12060823 (https://doi.org/10.3390/buildings12060823) - 14 Jun 2022

Abstract To study the bond–slip behavior of steel–steel fiber recycled aggregate concrete, push-out tests of 16 specimens were carried out using steel fiber volume ratio, steel fiber aspect ratio, steel protective layer thickness and steel embedded length as the design parameters. In addition, the **[...] Read more.**

(This article belongs to the Special Issue **High-Performance Fiber-Reinforced Composites: Latest Advances and Prospects (/journal/buildings/special_issues/FRC)**)

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The Emergence Process of Construction Project Resilience: A Social Network Analysis Approach (/2075-5309/12/6/822)

by **Dedong Wang (https://sciprofiles.com/profile/author/dHZ1aEwwbFFUejQzalh4b25Vdy9HelMvQXVrdUt3cEVmVzRYR2FEUFZWaz0=)**, **Peng Wang (https://sciprofiles.com/profile/2222199)** and **Yanjun Liu (https://sciprofiles.com/profile/2293514)**

Buildings **2022**, *12*(6), 822; **https://doi.org/10.3390/buildings12060822 (https://doi.org/10.3390/buildings12060822)** - 14 Jun 2022

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Abstract For construction projects, resilience is the process of resisting and recovering from adversity. With the global economic and social environment constantly changing, improving the resilience of construction projects has become a research hotspot in the field of project management. On the basis of **[...] Read more.**

(This article belongs to the Topic **Construction and Project Management (/topics/Construction_Management)**)

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Open Access Article **(/2075-5309/12/6/821/pdf?version=1655285669)**

Protection of Structural Layers of Transitions Zones on Railways against Freezing, Using Materials with a Low Coefficient of Thermal Conductivity (/2075-5309/12/6/821)

by **Stanislav Hodas (https://sciprofiles.com/profile/2152247)**, **Alzbeta Pultznerova (https://sciprofiles.com/profile/1743341)** and **Jana Izvoltova (https://sciprofiles.com/profile/2147142)**

Buildings **2022**, *12*(6), 821; **https://doi.org/10.3390/buildings12060821 (https://doi.org/10.3390/buildings12060821)** - 13 Jun 2022

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Abstract Structural elements of railway buildings in transition zones are important parts of railway lines, where the structure of their materials is fundamentally changing. In the presented research results, these are changes in the railway body between a railway with a classic trackbed and **[...] Read more.**

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Open Access Article (/2075-5309/12/6/820/pdf?version=1655173104)

Solar Chimneys as an Effective Ventilation Strategy in Multi-Storey Public Housing in the Post-COVID-19 Era (/2075-5309/12/6/820)

by Pau Chung Leng (https://sciprofiles.com/profile/749418), Siew Bee Aw (https://sciprofiles.com/profile/1648027), Nor Eeda Haji Ali (https://sciprofiles.com/profile/author/ckx2U1RTVnNMYk8rVjlPRi9NcUszMUQyWmQ1dERBRzZ3SnNJZ2MvNDQxZz0=), Gabriel Hoh Teck Ling (https://sciprofiles.com/profile/456294), Yoke Lai Lee (https://sciprofiles.com/profile/745895) and Mohd Hamdan Ahmad (https://sciprofiles.com/profile/760523)

Buildings **2022**, *12*(6), 820; https://doi.org/10.3390/buildings12060820 (https://doi.org/10.3390/buildings12060820) - 13 Jun 2022

Abstract This paper studies the effectiveness of a solar chimney for improving ventilation and air-exchange rates in multi-storey public housing in tropical climates for the potential mitigation of airborne disease transmission. Virtual models of a typical apartment room with natural cross-ventilation, replicated across four [...] Read more.

(This article belongs to the Special Issue Post-COVID Architecture Research (/journal/buildings/special_issues/Post_COVID_Architecture))

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A Framework of Community Pedestrian Network Design Based on Urban Network Analysis (/2075-5309/12/6/819)

by Xiaolin Yang (https://sciprofiles.com/profile/author/ZHpUa2tlS0s4K0JyL2VaODVSM1NJR25FOEJTRlg1TElNZHptWm9ET2I2QT0=), Haigang Sun (https://sciprofiles.com/profile/author/QjBMMlFKTW16ZHU4SUJRSGI4VFhESE1sOE1yM2R3S25NLzRlZVlRTkRYNDJCVHZKN1R(,
Yu Huang (https://sciprofiles.com/profile/2187224) and Kailun Fang (https://sciprofiles.com/profile/2563977)

Buildings **2022**, *12*(6), 819; https://doi.org/10.3390/buildings12060819 (https://doi.org/10.3390/buildings12060819) - 13 Jun 2022

Abstract Community is the foundation of modern cities, where urban residents spend most of their lifetime. Effective and healthy community design plays a vital role in improving residents' living quality. Pedestrian network is an indispensable element in the community. Successful pedestrian network design can [...] Read more.

(This article belongs to the Topic Bioclimatic Designs to Enhance Urban/Rural Resilience (/topics/urban_resilience))

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Open Access Article (/2075-5309/12/6/818/pdf?version=1655117001)

On the Interaction between the Depth and Elevation of External Shading Devices in Tropical Daylit Classrooms with Symmetrical Bilateral Openings (/2075-5309/12/6/818)

by Atthaillah (https://sciprofiles.com/profile/1905881), Rizki A. Mangkuto (https://sciprofiles.com/profile/1954218), Mochamad Donny Koerniawan (https://sciprofiles.com/profile/692878) and Brian Yuliarto (https://sciprofiles.com/profile/127276)
Buildings **2022**, *12*(6), 818; https://doi.org/10.3390/buildings12060818 (https://doi.org/10.3390/buildings12060818) - 13 Jun 2022

Abstract External shading devices are an important design feature in tropical buildings, particularly for climate mitigation. However, the interaction between the depth and elevation of the shading devices and their impact on indoor daylight performance is not fully understood, especially for the case of [...] Read more.
(This article belongs to the Section Architectural Design, Urban Science, and Real Estate (/journal/buildings/sections/Architectural_Design))

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CO_2 Curing on the Mechanical Properties of Portland Cement Concrete (/2075-5309/12/6/817)

by Yung-Chih Wang (https://sciprofiles.com/profile/author/OXk5VHVpekt5aS9XWWo4WSsza2thaTV1SmMwdC94NGR6Q2J0cTVnTlhUWT0=), Ming-Gin Lee (https://sciprofiles.com/profile/188913), Wei-Chien Wang (https://sciprofiles.com/profile/1530275), Yu-Cheng Kan (https://sciprofiles.com/profile/author/WmNlbC9lY3JyQlpPdVVlUGZ3MmF4a1hvcUgxZm5yY3VqdmwvNS9lQnhTND0=), Shih-Hsuan Kao (https://sciprofiles.com/profile/author/d3QrMHh4WVVBcnBEcVllRmV6cWhXWktTTGRlZnJLTnNucy9hTUVQYS8ybz0=) and Hsien-Wen Chang (https://sciprofiles.com/profile/author/QndobCt3bHJYMERUbXMyTjRnK0RJM0lISWY1aVBvWWNkUEtkU0gxSXMyST0=)
Buildings **2022**, *12*(6), 817; https://doi.org/10.3390/buildings12060817 (https://doi.org/10.3390/buildings12060817) - 13 Jun 2022

Abstract This study was to evaluate the CO_2 curing on mechanical properties of Portland cement concrete. Three different specimen sizes (5 × 10 cm, 10 × 20 cm, and 15 × 30 cm cylinders), three CO_2 concentrations (50%, 75%, 100%), three curing [...] Read more.
(This article belongs to the Special Issue Sustainable Development: New Trends in Energy Saving, Carbon Reduction and Green Building Materials (/journal/buildings/special_issues/Sustainable_Carbon))

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Open Access Article (/2075-5309/12/6/816/pdf?version=1655115890)

Exploring the Temporal and Spatial Evolution Laws of County Green Land-Use Efficiency: Evidence from 11 Counties in Sichuan Province (/2075-5309/12/6/816)

by Ting Yuan (https://sciprofiles.com/profile/1683034),
Jian Zhang (https://sciprofiles.com/profile/author/eE8zejNaYnhOeWZ6NkdWZks2aTMzN040Nm82cFFkVC9sNHYvTWlhTHp0MD0=),
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Liyu Lu (https://sciprofiles.com/profile/author/dmhiMkZDVHh6Q1dWNDRPWXN5WkNhcEp5L28vY24ydlZ4NVRURHRtMUFmRT0=)
Buildings **2022**, *12*(6), 816; https://doi.org/10.3390/buildings12060816 (https://doi.org/10.3390/buildings12060816) - 13 Jun 2022
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Abstract With rapid urbanisation in China, sustainable urban development faces a major obstacle due to insufficient consideration of land-use efficiency. Currently, despite progress in analysing land-use efficiency, not every land manager has enough knowledge of green land use from a county perspective. Therefore, the **[...] Read more.**

(This article belongs to the Special Issue **Assessment and Optimization of Building Carbon Emissions and Energy Efficiency in China (/journal/buildings/special_issues/building_carbon_energy_optimization)**)

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Open Access Article (/2075-5309/12/6/815/pdf?version=1655112368)

Decision-Making Model Based on Discriminant Analysis Fuzzy Method for Low-Carbon and Eco-Friendly Residence Design: Case Study of Conghua District, Guangzhou, China (/2075-5309/12/6/815)

by Sung-Lin Hsueh (https://sciprofiles.com/profile/25688),
Yue Sun (https://sciprofiles.com/profile/author/TG11TWNSZlFzbG15RU5SRlhFeS9Gb29iR1ZWcmNBQ2szL0lDbXpQYzljMD0=),
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Nan Xiao (https://sciprofiles.com/profile/author/YkFjUTNEdXVFSEZuRkZNeEMvS2FTSTNCMUdZeW8wLzlycExNZExod0JVND0=) and
Teen-Hang Meen (https://sciprofiles.com/profile/107927)
Buildings **2022**, *12*(6), 815; https://doi.org/10.3390/buildings12060815 (https://doi.org/10.3390/buildings12060815) - 13 Jun 2022
Cited by 1 (/2075-5309/12/6/815#metrics) | Viewed by 986

Abstract Many countries aim to promote low-carbon and eco-friendly development and find a route to sustainable development. For such development, a model that helps design and build appropriate constructions is necessary. Thus, this study is carried out to establish such a model by combining **[...] Read more.**

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Study on New Prefabricated Reinforced Concrete Structure Technology Based on Fault-Tolerant Design (/2075-5309/12/6/814)

by Shunyao Wang (https://sciprofiles.com/profile/2209032), Yilin Wang (https://sciprofiles.com/profile/2209209), Dapeng Sheng (https://sciprofiles.com/profile/author/ak5WdWRRZlNXY01nMUR0MlhPOFRiMndXMkhmY3ZEcjJYQjZZVmJNZWRuMD0=) and Yu Wang (https://sciprofiles.com/profile/author/MGxJbEdxeUZua2VaVHNMdXplaC82S0lxSWhybnRkcmNHZHRac3QzUVhmND0=)

Buildings **2022**, *12*(6), 814; https://doi.org/10.3390/buildings12060814 (https://doi.org/10.3390/buildings12060814) - 13 Jun 2022

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Abstract To reduce the impact of poor field connection on structural safety in prefabricated concrete structures, a new kind of prefabricated reinforced concrete structure—an FTPC (fault-tolerant prefabricated concrete) structure based on the fault-tolerant design concept—was proposed and studied in this paper. The horizontal load-bearing **[...] Read more.**

(This article belongs to the Section **Building Structures (/journal/buildings/sections/BS)**)

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Sustainability Assessment through Urban Accessibility Indicators and GIS in a Middle-Sized World Heritage City: The Case of Cáceres, Spain (/2075-5309/12/6/813)

by Montaña Jiménez-Espada (https://sciprofiles.com/profile/1539832), Aurora Cuartero (https://sciprofiles.com/profile/375) and Maguelone Le Breton (https://sciprofiles.com/profile/author/UUhOMklwNVlSdm54eFo0OTdFM0YwZGpNcXVzOGJJY1VEUk8wTXd0UVdZSjRld(

Buildings **2022**, *12*(6), 813; https://doi.org/10.3390/buildings12060813 (https://doi.org/10.3390/buildings12060813) - 13 Jun 2022

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Abstract The main objective of the research consists of quantifying the degree of sustainability of the city of Cáceres in terms of the inhabitant's accessibility to public services through the use of GIS tools and urban indicators, taking into account two areas of study: **[...] Read more.**
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Open Access Article **(/2075-5309/12/6/812/pdf?version=1655773144)**

Experimental Investigations of the Behavior of Stiffened Perforated Cold-Formed Steel Sections Subjected to Axial Compression (/2075-5309/12/6/812)

by
Fattouh M. F. Shaker (https://sciprofiles.com/profile/author/dUFtQVVrUDVLZU1WakNFdUhGYnVlQWlrcWRqMVhjRkRHN2NuN3plZzRZMD0=),
Zekriat Mamdooh (https://sciprofiles.com/profile/author/TEs4UThUUHkxeXQ2bkt1Z3ZJb1labnVxQnBrSmU1U1kvMjRwOEJ4NVlBcz0=),
Ahmed Deifalla (https://sciprofiles.com/profile/1702487) and
Mohamed M. Yehia (https://sciprofiles.com/profile/author/VThlUWh3OVRHZEE5cTg3RWJvTWN4Qkh4Vkt1aEZjRnQ4V2pPd2pURlNhRT0=)
Buildings **2022**, *12*(6), 812; **https://doi.org/10.3390/buildings12060812 (https://doi.org/10.3390/buildings12060812)** - 12 Jun 2022
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Abstract Cold-formed steel sections are becoming popular for different steel structures, because they have a high resistance against different straining actions, with a minimal weight compared with hard steel sections. Recently, perforated cold-formed steel (PCFS) sections have been used in many applications, such as **[...] Read more.**
(This article belongs to the Special Issue **Structural Performance of Cold-Formed Steel Structures (/journal/buildings/special_issues/stru_per_steel)**)

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Open Access Article **(/2075-5309/12/6/811/pdf?version=1655031211)**

Safety Risk Assessment of Prefabricated Buildings Hoisting Construction: Based on IHFACS-ISAM-BN (/2075-5309/12/6/811)

by **Junwu Wang (https://sciprofiles.com/profile/1345358)**, **Feng Guo (https://sciprofiles.com/profile/1727185)**,
Yinghui Song (https://sciprofiles.com/profile/1573949),
Yipeng Liu (https://sciprofiles.com/profile/author/SUhmb3ZKUU9wRXpBL0ZwM1h3UFUyai85NXN5UVhWeXlybDBZdFJFYW5rQT0=)

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Xuan Hu (https://sciprofiles.com/profile/author/RnM3dkZTOEgvU3JMNW1TelhLUkZkNkpqOGRmMTZZS1BJK2RnR2ZFdzJaWT0=) and Chunbao Yuan (https://sciprofiles.com/profile/2014205)

Buildings **2022**, *12*(6), 811; https://doi.org/10.3390/buildings12060811 (https://doi.org/10.3390/buildings12060811) - 12 Jun 2022

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Abstract Prefabricated buildings that are more environmentally friendly have been vigorously promoted by the Chinese government because of the reduced waste and carbon emissions during the construction process. Most of the construction processes of prefabricated buildings are completed in the prefabricated component factory, but **[...] Read more.**

(This article belongs to the Special Issue **Tradition and Innovation in Construction Project Management** (/journal/buildings/special_issues/tradition_innovation_construction_management))

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Open Access Article (/2075-5309/12/6/810/pdf?version=1655275096)

Damage Assessment of Road Bridges Caused by Extreme Streamflow in Montenegro: Reconstruction and Structural Upgrading (/2075-5309/12/6/810)

by Jelena Pejović (https://sciprofiles.com/profile/2166307), Nina Serdar (https://sciprofiles.com/profile/2268616) and Radenko Pejović (https://sciprofiles.com/profile/author/SGVzS05nN2gzNk1BWWpEMDQvbHFBSnRkNis0dlIEREdrd2g2R3NjOTQ5TT0=)

Buildings **2022**, *12*(6), 810; https://doi.org/10.3390/buildings12060810 (https://doi.org/10.3390/buildings12060810) - 12 Jun 2022

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Abstract The extreme river streamflow that occurred during floods in 2010 in Montenegro caused significant damage to infrastructure and road facilities. The most severe damages were located on bridges crossing the river Lim, where a rapid water level increase in several municipalities led to **[...] Read more.**

(This article belongs to the Special Issue **The Methods, Tools and Techniques for the Preservation of Existing Structures** (/journal/buildings/special_issues/Meth_Tool_Tech_Pres_Exist_Struct))

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Image Retrieval for Local Architectural Heritage Recommendation Based on Deep Hashing (/2075-5309/12/6/809)

by Kai Ma (https://sciprofiles.com/profile/1598918), Bowen Wang (https://sciprofiles.com/profile/author/c1ZTd1NVSGZGRXZUUU11aXNUVGlwM1ZRcXpPSjlOYWxJV2U0a2NqdWVxRT0=), Yunqin Li (https://sciprofiles.com/profile/author/aW1VYnBUYWFUQzVBQUMxbFYrL2VZeVpCY0ZEMjdVVGw1Vnp6ZEVhajYrZz0=) and Jiaxin Zhang (https://sciprofiles.com/profile/987717)

Buildings **2022**, *12*(6), 809; https://doi.org/10.3390/buildings12060809 (https://doi.org/10.3390/buildings12060809) - 12 Jun 2022

Abstract Propagating architectural heritage is of great significance to the inheritance and protection of local culture. Recommendations based on user preferences can greatly benefit the promotion of local architectural heritage so as to better protect and inherit historical culture. Thus, a powerful tool is **[...]** **Read more.**

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Open Access Article (/2075-5309/12/6/808/pdf?version=1655081435)

Investigation of the Appropriate Reverberation Time for Lower-Grade Elementary School Classrooms Using Speech Intelligibility Tests (/2075-5309/12/6/808)

by A-Hyeon Jo (https://sciprofiles.com/profile/2195987), Chan-Jae Park (https://sciprofiles.com/profile/1641855) and Chan-Hoon Haan (https://sciprofiles.com/profile/1683583)

Buildings **2022**, *12*(6), 808; https://doi.org/10.3390/buildings12060808 (https://doi.org/10.3390/buildings12060808) - 11 Jun 2022

Abstract Because speech recognition performance is significantly lower at the age of nine or younger, the acoustic performance standards of classrooms for young children should be investigated. This study derives the appropriate reverberation time for lower-grade elementary school classrooms in Korea. A virtual sound **[...]** **Read more.**

(This article belongs to the Special Issue **Acoustics of Buildings (/journal/buildings/special_issues/Acoustics)**)

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Open Access Article (/2075-5309/12/6/807/pdf?version=1655287793)

Maximal Multivariable Coefficient Analysis between Vibration Limits and Relevant Factors in General Buildings (/2075-5309/12/6/807)

by Lei Cao (https://sciprofiles.com/profile/2179447) and Jun Chen (https://sciprofiles.com/profile/1945773)

Buildings **2022**, *12*(6), 807; https://doi.org/10.3390/buildings12060807 (https://doi.org/10.3390/buildings12060807) - 11 Jun 2022

Abstract The vibration limit is an essential prerequisite for building vibration serviceability assessment, and various biological/environmental factors affect it deeply. Yet quantitative relationships between vibration limits and these factors in general buildings, such as the human weight, height and number of stories, stay unknown. **[...] Read more.**

(This article belongs to the Special Issue **Structural Vibration Serviceability and Human Comfort (/journal/buildings/special_issues/struct_vibration_comfort)**)

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Open Access Case Report (/2075-5309/12/6/806/pdf?version=1655343640)

Risk Assessment and Prevention Strategy of Virus Infection in the Context of University Resumption (/2075-5309/12/6/806)

by **Wanyue Chen (https://sciprofiles.com/profile/author/QXNLekQvSDlKSlRhYkJkM0ZDMkhyQU1RelQxRmxsLy9mVE1OZGQxMGdDcz0=)**, **Yan Ding (https://sciprofiles.com/profile/429992)**, **Yu Zhang (https://sciprofiles.com/profile/author/Z3l1Nkh2cytldnptYWdPNGNVeGV6dGs2L3Nhd3dFSUVSS2ZiZ3V5eWQyUT0=)**, **Zhe Tian (https://sciprofiles.com/profile/1841000)** and **Shen Wei (https://sciprofiles.com/profile/1557227)**

Buildings **2022**, *12*(6), 806; **https://doi.org/10.3390/buildings12060806 (https://doi.org/10.3390/buildings12060806)** - 11 Jun 2022

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Abstract The risk assessment system of virus infection probability and the prevention measures for virus transmission are keys to controlling epidemics. In the context of university resumption, this study identifies the risk elements in terms of the mechanism of virus transmission. The effect of **[...] Read more.**

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Dynamic Testing in Support of the Seismic Assessment of a Century Old Masonry Building Complex (/2075-5309/12/6/805)

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by Michele Dilena (https://sciprofiles.com/profile/author/dEEyeDRWeWFxeUNrOW9nMnFydXZtSDczUW5TV1NmSUlQeVFYOUhLZzczRT0=), Marta Fedele Dell'Oste (https://sciprofiles.com/profile/author/MEVhQ3VlYmNiNHNuYjZwTE5TQkljZXZyZ3hUZ05tdURiTFNMRzdsd0ZNbz0=), Alessandra Gubana (https://sciprofiles.com/profile/author/ZFRxWVhCaTFjT201SUVtSGgrMUZFY2R1b2Y5cEVvSUt2SDFlanJkdWxTZz0=), Antonino Morassi (https://sciprofiles.com/profile/998764) and Eric Puntel (https://sciprofiles.com/profile/2210135)

Buildings **2022**, *12*(6), 805; https://doi.org/10.3390/buildings12060805 (https://doi.org/10.3390/buildings12060805) - 11 Jun 2022

Abstract The vulnerability assessment of existing masonry buildings is a largely investigated research topic with some aspects still to be faced. In historic towns, masonry buildings are aggregated and together confined, and their final appearance is derived from interventions and additions during their lives **[...] Read more.**

(This article belongs to the Special Issue **Computational Models for Dynamic Analyses of Buildings and Structures (/journal/buildings/special_issues/Computational_Models_Analyses_Buildings)**)

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Open Access Feature Paper Review (/2075-5309/12/6/804/pdf?version=1655114335)

A Systematic Review on FabLab Environments and Creativity: Implications for Design (/2075-5309/12/6/804)

by Sohail Ahmed Soomro (https://sciprofiles.com/profile/1399405), Hernan Casakin (https://sciprofiles.com/profile/335791) and Georgi V. Georgiev (https://sciprofiles.com/profile/848096)

Buildings **2022**, *12*(6), 804; https://doi.org/10.3390/buildings12060804 (https://doi.org/10.3390/buildings12060804) - 10 Jun 2022

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Abstract Fabrication laboratories (FabLabs) and makerspaces are used to transform ideas into tangible products. Used in a design–learning context, they can enhance creativity and critical skills. Creativity is pivotal to the ability to practice. Studies have attempted to understand **[...] Read more.**

(This article belongs to the Section **Building Energy, Physics, Environment, and Systems (/journal/buildings/sections/BEPES)**)

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Open Access Article (/2075-5309/12/6/803/pdf?version=1655444403)

Flange Contribution to the Shear Strength of RC T-Beams with Flange in Compression (/2075-5309/12/6/803)

by Osman M. Ramadan (https://sciprofiles.com/profile/2656322), Ahmed H. Abdel-Kareem (https://sciprofiles.com/profile/author/YzlySjhkaUt5NFBETE1wc2ZTaG5jSmxPMFR0WlRFWkMxUXVnSlRZeVpWYmV)
,
Ibrahim A. El-Azab (https://sciprofiles.com/profile/2089288) and Hala R. Abousafa (https://sciprofiles.com/profile/2349982)

Buildings **2022**, *12*(6), 803; https://doi.org/10.3390/buildings12060803 (https://doi.org/10.3390/buildings12060803) - 10 Jun 2022

Abstract As is well known, in the current design codes, the shear strength of beams is calculated based on the modified truss theory, which does not consider the effects of the flange area of T-beams. The main objective of this paper was to gain **[...] Read more.**

(This article belongs to the Collection **Non-linear Modelling and Analysis of Buildings (/journal/buildings/topical_collections/Non-linear_Model_Analysis_Build)**)

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Open Access Article (/2075-5309/12/6/802/pdf?version=1655279724)

FEA Investigation of Elastic Buckling for Functionally Graded Material (FGM) Thin Plates with Different Hole Shapes under Uniaxial Loading (/2075-5309/12/6/802)

by Mohamed Elkafrawy (https://sciprofiles.com/profile/1891814), Adnan Alashkar (https://sciprofiles.com/profile/2045713), Rami Hawileh (https://sciprofiles.com/profile/1112171) and Mohammad AlHamaydeh (https://sciprofiles.com/profile/1134254)

Buildings **2022**, *12*(6), 802; https://doi.org/10.3390/buildings12060802 (https://doi.org/10.3390/buildings12060802) - 10 Jun 2022
Cited by 2 (/2075-5309/12/6/802#metrics) | Viewed by 803

Abstract In this paper, an investigation of linear eigenvalue buckling of functionally graded material (FGM) plates under uniaxial loading is carried out. The computer model is analyzed using the finite element (FE) package ABAQUS. An analysis is carried out to study the effect of **[...] Read more.**
(This article belongs to the Section **Building Materials, and Repair & Renovation (/journal/buildings/sections/BMRR)**)

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Experimental Investigation of Seismic Performance of a Hybrid Beam–Column Connection in a Precast Concrete Frame (/2075-5309/12/6/801)

by Weihong Chen (https://sciprofiles.com/profile/author/SzdsWDFmdnY2TnR4VVZSMnorSVc3SDRUN2kwYnovTnI4bzdWYWFxUzF3QT0=), Yujun Xie (https://sciprofiles.com/profile/author/ZDZUdnRGTExoWlNob0FlLzd3a1ZiVEdrMXYzSWVvcGQ4WXlweVhwS2VGcz0=), Xiaohui Guo (https://sciprofiles.com/profile/author/bHo0M25PSEVGSEdqek12MlhzUFExekxkbHZCSkJKbE1McmZVMUFjUDdLZz0=) and Dong Li (https://sciprofiles.com/profile/2221426)

Buildings **2022**, *12*(6), 801; https://doi.org/10.3390/buildings12060801 (https://doi.org/10.3390/buildings12060801) - 10 Jun 2022

Abstract Prefabricated beam–column connections are the most vulnerable components of prefabricated buildings during earthquake events. The seismic performance of the beam–column connection is functional as the critical component plays a key role in structural safety. This study aimed to develop a novel hybrid prefabricated **[...] Read more.**

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Framework for Computerizing the Processes of a Job and Automating the Operational Management on Site—A Case Study of Demolition and Reconstruction Construction Site (/2075-5309/12/6/800)

by Caterina Amici (https://sciprofiles.com/profile/2091699), Marianna Rotilio (https://sciprofiles.com/profile/576097), Pierluigi De Berardinis (https://sciprofiles.com/profile/1650548) and Federica Cucchiella (https://sciprofiles.com/profile/76003)

Buildings **2022**, *12*(6), 800; https://doi.org/10.3390/buildings12060800 (https://doi.org/10.3390/buildings12060800) - 10 Jun 2022

Abstract With regard to the topic of digitization for operational site control, it is clear that while there is an acceleration towards digitization of processes, especially complex ones, there are still clear research gaps to be filled. The present study is part of this **[...] Read more.**

(This article belongs to the Special Issue **Construction 4.0 (/journal/buildings/special_issues/Construction_industrialization)**)

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Analytical Implications of Mortgage Lending Value and Bottom Value (/2075-5309/12/6/799)

by Francesca Salvo (https://sciprofiles.com/profile/232478), Manuela De Ruggiero (https://sciprofiles.com/profile/1106165), Daniela Tavano (https://sciprofiles.com/profile/2123177), Pierfrancesco De Paola (https://sciprofiles.com/profile/213643) and Francesco Paolo Del Giudice (https://sciprofiles.com/profile/2205454)

Buildings **2022**, *12*(6), 799; https://doi.org/10.3390/buildings12060799 (https://doi.org/10.3390/buildings12060799) - 10 Jun 2022

Abstract This study concerns the analytical formulation and relative implications of bottom value (BV) and mortgage lending value (MLV) regarding properties where the existing building provides an income during its useful life, leaving thereafter only the land value. The bottom value is equal to [...] Read more.

(This article belongs to the Section Architectural Design, Urban Science, and Real Estate (/journal/buildings/sections/Architectural_Design))

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Open Access Article (/2075-5309/12/6/798/pdf?version=1654855413)

Experimental Studies on Seismic Performance of UHPSFRC-Filled Square Steel Tubular Columns (/2075-5309/12/6/798)

by Yunbiao Luo (https://sciprofiles.com/profile/author/YlR5R0hUUUQ5VTZXT0ZMc3ZSM0FzMlZISElDOHpVdklISkFnejMrSkZLST0=), Yucai Zhao (https://sciprofiles.com/profile/2161029), Yuebo Chen (https://sciprofiles.com/profile/author/L21yME10ME5rQUpTdnovM1BGMUE5Y0l1aThRM1pMdjVMV09zSmdvejhWbz0=), Xuchuan Lin (https://sciprofiles.com/profile/229898) and Jiabao Yan (https://sciprofiles.com/profile/1755501)

Buildings **2022**, *12*(6), 798; https://doi.org/10.3390/buildings12060798 (https://doi.org/10.3390/buildings12060798) - 10 Jun 2022

Abstract The excellent seismic performance of concrete-filled steel tube (CFST) structures has been widely recognized, but there is a paucity of research on composite columns using UHPC with added steel fibers. This paper presents the experimental studies and numerical analyses with OpenSees on seismic [...] Read more.

(This article belongs to the Special Issue High-Performance Steel–Concrete Composite Structures (/journal/buildings/special_issues/steel_concrete_composite))

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Open Access Article (/2075-5309/12/6/797/pdf?version=1654854973)

Determination of Tensile Strength at Crack Initiation in Dynamic Brazilian Disc Test for Concrete-like Materials (/2075-5309/12/6/797)

by Jie Wang (https://sciprofiles.com/profile/author/WWxBZFNTY2NNaitQZndkeHo0WU1WYkx2RmVRQ2dLbnhZYVdTUlhNMzFYcz0=) and Junlin Tao (https://sciprofiles.com/profile/2215904)

Buildings **2022**, *12*(6), 797; https://doi.org/10.3390/buildings12060797 (https://doi.org/10.3390/buildings12060797) - 10 Jun 2022

Abstract Concrete is a brittle material whose tensile strength is about one-tenth of its compressive strength. Tensile strength is a key parameter for concrete under impact loading. When a turning point occurs before peak load in the load–time curve from the dynamic Brazilian disc **[...] Read more.**

(This article belongs to the Special Issue **Advanced Sustainable Materials in Buildings (/journal/buildings/special_issues/Sustainable_Materials_Buildings)**)

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Open Access Article (/2075-5309/12/6/796/pdf?version=1655080925)

The Applicability of TOPSIS- and Fuzzy TOPSIS-Based Taguchi Optimization Approaches in Obtaining Optimal Fiber-Reinforced Concrete Mix Proportions (/2075-5309/12/6/796)

by Mohamed A. Warda (https://sciprofiles.com/profile/2264581), Seleem S. E. Ahmad (https://sciprofiles.com/profile/author/RjZSOEdTUkdvZ2FETUV0RU5BSUdFbE9QL2lyd0lSQ1dPblg2RHVLQjhtaz0=), Ibrahim M. Mahdi (https://sciprofiles.com/profile/2540057), Hossam El-Din M. Sallam (https://sciprofiles.com/profile/645557) and Hossam S. Khalil (https://sciprofiles.com/profile/author/UkJOdEo4aHJTTTFtRlJ1Z1FBdm9VY3grU0NHYnZXUmQyYjNKdVdqa0pUVT0=)

Buildings **2022**, *12*(6), 796; https://doi.org/10.3390/buildings12060796 (https://doi.org/10.3390/buildings12060796) - 09 Jun 2022

Abstract This research aims to illustrate the impact of multi-criteria techniques such as TOPSIS- and fuzzy TOPSIS-based Taguchi models on obtaining the optimum design of fiber-reinforced concrete (FRC).Three levels of silica fume content, fly ash content, water-to-cementitious (W/C) ratio, and superplasticizer content were **[...] Read more.**

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Experimental Study on the Effects of Freeze–Thaw Cycles on Strength and Microstructure of Xining Region Loess in China (/2075-5309/12/6/795)

by Banglong Xie (https://sciprofiles.com/profile/2146063), Wuyu Zhang (https://sciprofiles.com/profile/2167621), Xiaolong Sun (https://sciprofiles.com/profile/author/YkhNdExlWHBjYjEvTjlxVFJ4N216Zz09), Yuling Huang (https://sciprofiles.com/profile/author/WGtmUnd2UkdRMXlGd0pnVm0rQzZ2MFhqNTNBNUUvQjllcGl6cTQyQlRyOD0=) and Liqiang Liu (https://sciprofiles.com/profile/author/S1dBdTY1TWQ2N2cwOEI5dCtrc0VUQT09)

Buildings **2022**, *12*(6), 795; https://doi.org/10.3390/buildings12060795 (https://doi.org/10.3390/buildings12060795) - 09 Jun 2022

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Abstract Loess, a collapsible soil, is widely distributed in the Qinghai–Tibet Plateau in China. In the meantime, loess is a sustainable and green building material that is widely used in traditional residential buildings. However, previous studies have focused on the properties of loess itself, **[...] Read more.**

(This article belongs to the Special Issue **Application of Green Materials and Technology in the Construction Industry (/journal/buildings/special_issues/green_materials_technology_construction)**)

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DfMA for a Better Industrialised Building System (/2075-5309/12/6/794)

by Mohammed Izrai Abd Razak (https://sciprofiles.com/profile/1711865), Muhamad Azry Khoiry (https://sciprofiles.com/profile/1780032), Wan Hamidon Wan Badaruzzaman (https://sciprofiles.com/profile/1974572) and Afifuddin Husairi Hussain (https://sciprofiles.com/profile/1846024)

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Abstract To improve the performance of the construction industry, innovative methods were introduced to make them better. Industrialised building systems (IBS) and prefabrication construction are the popular methods used and studied. However, these methods are still unable to meet the demands of the stakeholders. **[...] Read more.**

(This article belongs to the Topic **Construction and Project Management (/topics/Construction_Management)**)

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Evaluation of Mixed-Mode Ventilation Thermal Performance and Energy Saving Potential from Retrofitting a Beijing Office Building (/2075-5309/12/6/793)

by Zhiyin Duan (https://sciprofiles.com/profile/2199196), Yan Sun (https://sciprofiles.com/profile/2264617), Minghui Wang (https://sciprofiles.com/profile/author/bjZRMEg0aDFpYnQ2RXJJQndGejVCMFhuOGpuRmZCcWR4T0l0NnBSbzF6RT0=), Ran Hu (https://sciprofiles.com/profile/author/bVdseUtjeU15Sk9aSnVWMmdVWUZQeW14aE5QT21uVE9LTnMwbXpXb2tJWT0=) and Xuelin Dong (https://sciprofiles.com/profile/1136995)

Buildings **2022**, *12*(6), 793; https://doi.org/10.3390/buildings12060793 (https://doi.org/10.3390/buildings12060793) - 09 Jun 2022

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Abstract Mixed-mode cooling can effectively reduce the energy consumption of building cooling while satisfying the thermal comfort of occupancy and indoor air quality requirements. This paper predicted the thermal performance and energy-saving potential of an existing Beijing office building (in continental climates) operated in **[...] Read more.**

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Investigation of Pedestrian-Level Wind Environment with Skyline Quantitative Factors (/2075-5309/12/6/792)

by **Xiaoyu Ying (https://sciprofiles.com/profile/590761)**, **Jing Gao (https://sciprofiles.com/profile/1758553)**, **Ziqiao Liu (https://sciprofiles.com/profile/author/aGs1Q0dBS1VxRmV3RFFDTEMxWkxoU3pncjdmSWZtLzRrdGV0MVo4YmFZYz0=)**, **Xiaoying Qin (https://sciprofiles.com/profile/author/aUNla2xYbjlMMmVyWVNPUkczNlINQWlQMWZEUFdtb012R1l4M0VsKzNETT0=)**, **Jiahui Chen (https://sciprofiles.com/profile/author/WU1oTFZUSWdoUmZqeWk4SEdvQTV2U2xiUGNPTnBTb3h0Zjd0bDNDS2tibz0=)**, **Liying Shen (https://sciprofiles.com/profile/2187535)** and **Xinyu Han (https://sciprofiles.com/profile/author/aEYwQUZoclEzVmlNUVZOV21rb1d6c0hPVC9CMDZHYktqaUlrL0xFblZ6MD0=)**

Buildings **2022**, *12*(6), 792; https://doi.org/10.3390/buildings12060792 (https://doi.org/10.3390/buildings12060792) - 09 Jun 2022

Abstract This paper presented a Computational Fluid Dynamics (CFD) study on the relationship between skyline quantitative factors and the wind environment. At present, most researches on skyline revealed the changes of skyline quantitative factors on the aesthetic degrees but neglected the influence of the **[...] Read more.**

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Open Access Article (/2075-5309/12/6/791/pdf?version=1654771990)

Window-Windcatcher for Enhanced Thermal Comfort, Natural Ventilation and Reduced COVID-19 Transmission (/2075-5309/12/6/791)

by Odi Fawwaz Alrebei (https://sciprofiles.com/profile/779692), Laith M. Obeidat (https://sciprofiles.com/profile/2196892), Shouib Nouh Ma'bdeh (https://sciprofiles.com/profile/336714), Katerina Kaouri (https://sciprofiles.com/profile/2204304), Tamer Al-Radaideh (https://sciprofiles.com/profile/956731) and Abdulkarem I. Amhamed (https://sciprofiles.com/profile/675412)
Buildings **2022**, *12*(6), 791; https://doi.org/10.3390/buildings12060791 (https://doi.org/10.3390/buildings12060791) - 09 Jun 2022

Abstract We investigate and test the effectiveness of a novel window windcatcher device (WWC), as a means of improving natural ventilation in buildings. Using ANSYS CFX, the performance of the window-windcatcher is compared to a control case (no window-windcatcher), in three different geographic locations [...] Read more.
(This article belongs to the Topic Ventilation and Indoor Air Quality (/topics/Ventilation_Indoor_Air))

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[Enhancing Wayfinding Performance in Existing Healthcare Facilities Using Virtual Reality Environments to Revise the Distribution of Way-Showing Devices (/2075-5309/12/6/790)](/2075-5309/12/6/790)

by Ammar Al-Sharaa (https://sciprofiles.com/profile/1129772), Mastura Adam (https://sciprofiles.com/profile/2187426), Amer Siddiq Amer Nordin (https://sciprofiles.com/profile/1465869), Ameer Alhasan (https://sciprofiles.com/profile/1129771), Riyadh Mundher (https://sciprofiles.com/profile/711660) and Omar Zaid (https://sciprofiles.com/profile/2187427)

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Abstract Wayfinding is the process of navigating the environment by using the available environmental cues. The issue of wayfinding difficulty in large healthcare facilities has grabbed the attention of many researchers in terms of its potential taxing effects on both users and institutions alike. [...] Read more.

(This article belongs to the Collection **Virtual Reality and Mixed Reality in Architecture, Engineering, Construction, and Operation and Maintenance (AECOM) Building Sector (/journal/buildings/topical_collections/Virtual_Reality_Mixed_Reality_AECOM_Building_Sector)**)

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[Effect of External Tendon Profile on Improving Structural Performance of RC Beams (/2075-5309/12/6/789)](/2075-5309/12/6/789)

by Gouda A. Mohamed (https://sciprofiles.com/profile/author/QW02aGJCU3lyZFA5UUdudGNya0ZmNWFCYkRTSnM1V2V2MXZaQ3dGVDNNVT0=), Ahmed S. Eisa (https://sciprofiles.com/profile/author/K3B2c3dybnFCdDZHMmtRVFRjL3JrWldWTHdJTGRXeDNCekNIR0o4T0ovST0=), Pavol Purcz (https://sciprofiles.com/profile/1928423), Rastislav Ručinský (https://sciprofiles.com/profile/2246170) and Mohamed H. El-Feky (https://sciprofiles.com/profile/1869829)

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Abstract The objective of the research is to improve the structural behavior of reinforced concrete (RC) T-beams by applying various techniques of external pre-stressing tendons, thus enhancing the load-carrying capacities and raising the resistance to applied forces. Seven identical RC T–beams were subjected to [...] Read more.

(This article belongs to the Special Issue **Application Research of GIS and BIM Integration in Urban Building Planning (/journal/buildings/special_issues/GIS_BIM)**)

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Open Access Article (/2075-5309/12/6/788/pdf?version=1654765146)

A Novel Computational Approach for an Improved Expression of the Spectral Content in the Lower Atmospheric Boundary Layer (/2075-5309/12/6/788)

by Theodore Potsis (https://sciprofiles.com/profile/2136163) and Ted Stathopoulos (https://sciprofiles.com/profile/2215346)
Buildings **2022**, *12*(6), 788; https://doi.org/10.3390/buildings12060788 (https://doi.org/10.3390/buildings12060788) - 09 Jun 2022
Cited by 2 (/2075-5309/12/6/788#metrics) | Viewed by 933

Abstract The paper presents an innovative methodology for the simulation of incoming wind conditions in computational domains that use large eddy simulation (LES) for the evaluation of wind loads on low-rise buildings. Simulating the atmospheric boundary layer has proven to be a challenging process **[...] Read more.**
(This article belongs to the Section **Construction Management, and Computers & Digitization (/journal/buildings/sections/Construction_Management)**)

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Open Access Article (/2075-5309/12/6/787/pdf?version=1654760717)

Evaluating the Annual Effect of the Sky View Factor on the Indoor Thermal Environment of Residential Buildings by Envi-met (/2075-5309/12/6/787)

by Bohong Zheng (https://sciprofiles.com/profile/999610) and Jiayu Li (https://sciprofiles.com/profile/745239)
Buildings **2022**, *12*(6), 787; https://doi.org/10.3390/buildings12060787 (https://doi.org/10.3390/buildings12060787) - 09 Jun 2022
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Abstract The effect of the sky view factor (SVF) on outdoor thermal comfort has been extensively explored, while its impact on the indoor thermal environment is ignored. This research combined Envi-met and kriging models to explore the annual effect of the sky view factor **[...] Read more.**
(This article belongs to the Section **Building Energy, Physics, Environment, and Systems (/journal/buildings/sections/BEPES)**)

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Open Access Article (/2075-5309/12/6/786/pdf?version=1654759599)

A Conceptual Model for Selecting Early Contractor Involvement (ECI) for a Project (/2075-5309/12/6/786)

by Farshid Rahmani (https://sciprofiles.com/profile/287889), Malik Khalfan (https://sciprofiles.com/profile/919548) and Tayyab Maqsood (https://sciprofiles.com/profile/1263659)
Buildings **2022**, *12*(6), 786; https://doi.org/10.3390/buildings12060786 (https://doi.org/10.3390/buildings12060786) - 08 Jun 2022
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Abstract Amongst different aspects of a capital construction project, procurement is found to be the most important area and represents over 80% of the contract value. The selection of an appropriate procurement strategy is an important contributor to overall project success. Within several procurement **[...] Read more.**

(This article belongs to the Special Issue **Procurement in Construction Industry (/journal/buildings/special_issues/Procur_Construct_Indust)**)

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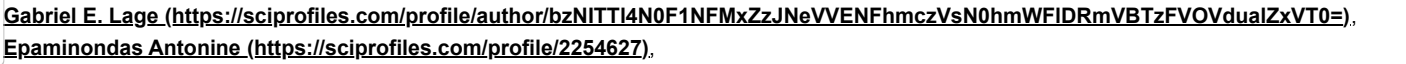
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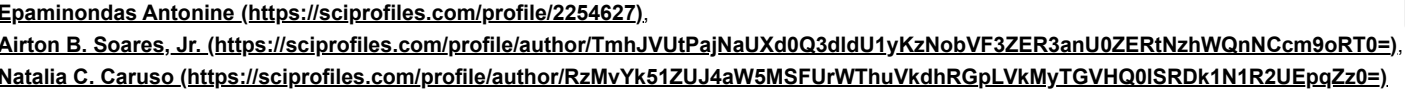
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Open Access Article **(/2075-5309/12/6/785/pdf?version=1654762859)**

Structural Health Monitoring of a Brazilian Concrete Bridge for Estimating Specific Dynamic Responses (/2075-5309/12/6/785)

by **Enrico Zacchei (https://sciprofiles.com/profile/643007)**, **Pedro H. C. Lyra (https://sciprofiles.com/profile/2125023)**, **Gabriel E. Lage (https://sciprofiles.com/profile/author/bzNITTl4N0F1NFMxZzJNeVVENFhmczVsN0hmWFlDRmVBTzFVOVdualZxVT0=)**, **Epaminondas Antonine (https://sciprofiles.com/profile/2254627)**, **Airton B. Soares, Jr. (https://sciprofiles.com/profile/author/TmhJVUtPajNaUXd0Q3dldU1yKzNobVF3ZER3anU0ZERtNzhWQnNCcm9oRT0=)**, **Natalia C. Caruso (https://sciprofiles.com/profile/author/RzMvYk51ZUJ4aW5MSFUrWThuVkdhRGpLVkMyTGVHQ0lSRDk1N1R2UEpqZz0=)** and **Cassia S. de Assis (https://sciprofiles.com/profile/author/OFd4ZlVlVVVLNmNaODRVZ09GVUt1cFlxOTF1WVNqQ1B2SlExaVFqU3phST0=)**

Buildings **2022**, *12*(6), 785; **https://doi.org/10.3390/buildings12060785 (https://doi.org/10.3390/buildings12060785)** - 08 Jun 2022

Cited by 1 (/2075-5309/12/6/785#metrics) | Viewed by 1155

Abstract A 3D coupled model to simulate vehicle–bridge interactions (VBI) to estimate its structural responses and impact factors (IMs) was developed in this study. By structural health monitoring (SHM) of a real concrete bridge, several data were collected to calibrate the bridge model by **[...] Read more.**

(This article belongs to the Special Issue **Structural Health Monitoring of Buildings, Bridges and Dams (/journal/buildings/special_issues/structural_health_monitor)**)

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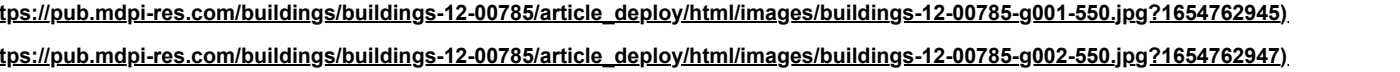
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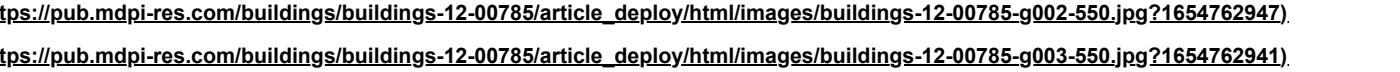
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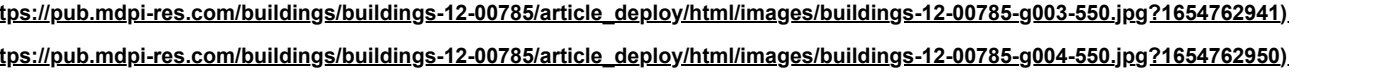
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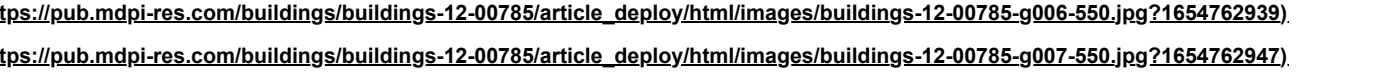
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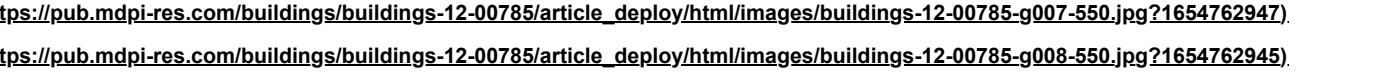
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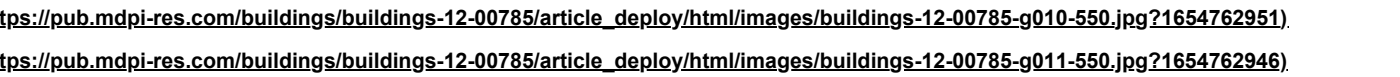
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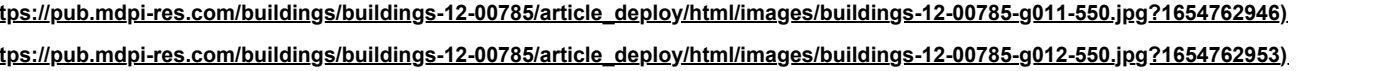
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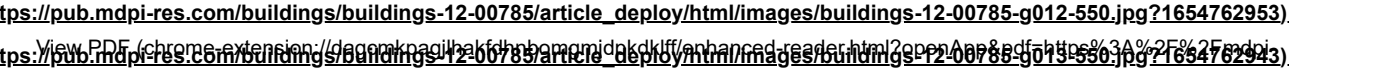
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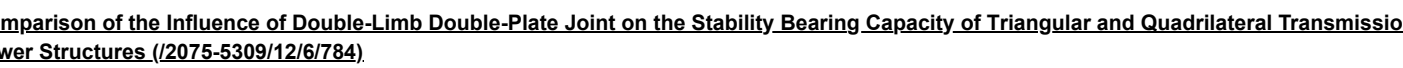
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Open Access Article **(/2075-5309/12/6/784/pdf?version=1654677588)**

Comparison of the Influence of Double-Limb Double-Plate Joint on the Stability Bearing Capacity of Triangular and Quadrilateral Transmission Tower Structures (/2075-5309/12/6/784)

by **Tengfei Zhao (https://sciprofiles.com/profile/1782851)**, **Aimin Li (https://sciprofiles.com/profile/2259987)**, **Hong Yan (https://sciprofiles.com/profile/931980)**, **Lei Zhang (https://sciprofiles.com/profile/1925934)**, **Zhiwen Lan (https://sciprofiles.com/profile/2291525)**, **Mojia Huang (https://sciprofiles.com/profile/2266200)** and **Han Wu (https://sciprofiles.com/profile/2177230)**

Buildings **2022**, *12*(6), 784; **https://doi.org/10.3390/buildings12060784 (https://doi.org/10.3390/buildings12060784)** - 08 Jun 2022

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Abstract The axial stiffness of the connection joints in a transmission tower will affect the stability bearing capacity of the tower. The axial stiffness of different forms of connection joints has different effects on the stability bearing capacities of triangular and quadrilateral lattice towers. **[...] Read more.**

(This article belongs to the Section **Building Structures (/journal/buildings/sections/BS)**)

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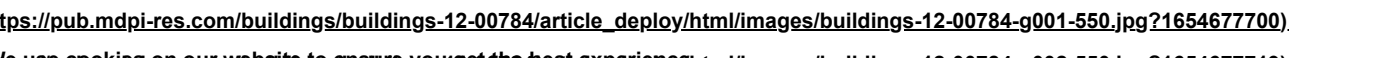
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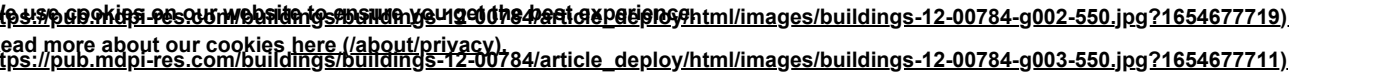
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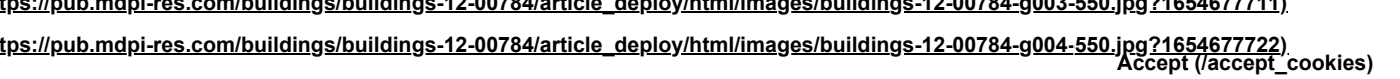
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Open Access Article (/2075-5309/12/6/783/pdf?version=1654615576)

A Brief Method for Rapid Seismic Damage Prediction of Buildings Based on Structural Strength (/2075-5309/12/6/783)

by Siwei Zhang (https://sciprofiles.com/profile/2189241), Yide Liu (https://sciprofiles.com/profile/author/ZGI5aUxnUWJSZE9xem9FaXV4SFgvcng3Zko0TlM5VGxNN01pVm1wM0VtQT0=) and Shuang Li (https://sciprofiles.com/profile/687270)

Buildings **2022**, *12*(6), 783; https://doi.org/10.3390/buildings12060783 (https://doi.org/10.3390/buildings12060783) - 07 Jun 2022

Abstract Rapid prediction of the post-earthquake structural damage to a region is of great importance to community relief and rescue. Detailed information on buildings in earthquake disaster areas is commonly inaccessible in the aftermath of an earthquake. Accurately assessing the seismic damage to urban [...] Read more.

(This article belongs to the Special Issue Earthquake Engineering and Urban Resilience (/journal/buildings/special_issues/Earthquake_Urban))

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Open Access Article (/2075-5309/12/6/782/pdf?version=1654606231)

Constructing Inclusive Infrastructure Evaluation Framework—Analysis Influence Factors on Rural Infrastructure Projects of China (/2075-5309/12/6/782)

by Aichun Jiang (https://sciprofiles.com/profile/2041696), Yunchu Zhang (https://sciprofiles.com/profile/2041788) and Yibin Ao (https://sciprofiles.com/profile/233202)

Buildings **2022**, *12*(6), 782; https://doi.org/10.3390/buildings12060782 (https://doi.org/10.3390/buildings12060782) - 07 Jun 2022

Abstract The theory of inclusive growth has been widely studied. However, most studies focus on the measurement of macro-field research, and no systematic research has been carried out on the realization and path of micro-field research, especially in project management. This paper clarifies the [...] Read more.

(This article belongs to the Section Architectural Design, Urban Science, and Real Estate (/journal/buildings/sections/Architectural_Design))

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Open Access Article (/2075-5309/12/6/781/pdf?version=1654656540)

Optimal Design of Tuned Mass-Damper-Inerter for Structure with Uncertain-but-Bounded Parameter (/2075-5309/12/6/781)

by Shaoyi Zhou (https://sciprofiles.com/profile/2196859), Jungang Huang (https://sciprofiles.com/profile/author/RmpKbldxbmFyQ09CQTBhN1RaQ1ltcDg0UTBxOVlhVVhOaER0V3QyNGhhOD0=), Quan Yuan (https://sciprofiles.com/profile/author/bTZCSkpNQnByeHozL3o1Njk4TFRISTkxc1VLMUl3eFJBYmlpS2hLdE0yOD0=), Dong Ma (https://sciprofiles.com/profile/author/dGE5M2t3UlZnQ2R5cCs0Zk14MTNrYXR2UnVtYUhObUhCS0VzL0l0cHQ5UT0=), Shuangling Peng (https://sciprofiles.com/profile/author/bEsvcVp4aVBESURmcmtHeG16WEJ4VnJsdFd5RjJvN01aOE9jN3FqVzV3VT0=) and Simon Chesne (https://sciprofiles.com/profile/author/b0VTSW1FTGdPRWpTdHkzaTB0QlgwcWhGelpxbndLUWZrWWR0dG96TUNUbz0=)

Buildings **2022**, *12*(6), 781; https://doi.org/10.3390/buildings12060781 (https://doi.org/10.3390/buildings12060781) - 07 Jun 2022

Abstract In this study we focus on the H_∞ optimization of a tuned mass damper inerter (TMDI), which is implemented on an harmonically forced structure of a single degree of freedom in the presence of stiffness uncertainty. Posed as a min-max optimization problem, [...] Read more.

(This article belongs to the Section Building Structures (/journal/buildings/sections/BS))

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Open Access Article (/2075-5309/12/6/780/pdf?version=1654598989)

A Design for Safety (DFS) Semantic Framework Development Based on Natural Language Processing (NLP) for Automated Compliance Checking Using BIM: The Case of China (/2075-5309/12/6/780)

by Yilun Zhou (https://sciprofiles.com/profile/2197345), Jianjun She (https://sciprofiles.com/profile/2197557), Yixuan Huang (https://sciprofiles.com/profile/author/dzZRY1pTVWpUOUdzQjE2eFRwQ2lib2tubVQyaE05Qzk2YWRzNitBRXlsWT0=), Lingzhi Li (https://sciprofiles.com/profile/2662759), Lei Zhang (https://sciprofiles.com/profile/2612620) and Jiashu Zhang (https://sciprofiles.com/profile/author/S3pHZWJYQUhWVUNkMEphTUZzc2VndVJyWXhDRWtyTXVkSU9lWEhZeUlURT0=)

Buildings **2022**, *12*(6), 780; https://doi.org/10.3390/buildings12060780 (https://doi.org/10.3390/buildings12060780) - 07 Jun 2022

Abstract Considering safety... have indicated the potential of BIM and ontology for automated compliance checking, an efficient methodology is still required for the interoperability and semantic representation of data [...] Read more.

(This article belongs to the Special Issue Artificial Intelligence for Sustainable Construction and Infrastructure Management (/journal/buildings/special_issues/intelligence_construction_infrastructure_management))

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Open Access Article (/2075-5309/12/6/779/pdf?version=1654595272)

Critical Energy Properties Study for Unsymmetrical Deformable Structures (/2075-5309/12/6/779)

by Leonid Stupishin (https://sciprofiles.com/profile/2185099) and
Vladimir Mondrus (https://sciprofiles.com/profile/author/THN6T29Pa28rNkJUN3hyZ0lyeE1LTGNzTjhYd3hRTnovOVl6alRWNGt4dz0=)

Buildings **2022**, *12*(6), 779; https://doi.org/10.3390/buildings12060779 (https://doi.org/10.3390/buildings12060779) - 07 Jun 2022
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Abstract There are difficulties in the formulation and solution of problems for follower loading, temperature actions, and whether the Lagrange principle is used. By dividing the external loads and internal deformation fields that exist according to their own laws, we focused on the advantages **[...] Read more.**

(This article belongs to the Special Issue **Timber in Construction: Trends and Perspectives (/journal/buildings/special_issues/timber_in_construction)**)

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Open Access Article (/2075-5309/12/6/778/pdf?version=1654580888)

A Technical Proposal for the Implementation of Transfer of Development Rights (TDR) on Preserved Historic Buildings in Turkey (/2075-5309/12/6/778)

by Yunus Konbul (https://sciprofiles.com/profile/2027740) and Mustafa Yanalak (https://sciprofiles.com/profile/2255047)

Buildings **2022**, *12*(6), 778; https://doi.org/10.3390/buildings12060778 (https://doi.org/10.3390/buildings12060778) - 07 Jun 2022
Cited by 1 (/2075-5309/12/6/778#metrics) | Viewed by 1137

Abstract Buildings that have cultural and historical significance are very important elements of our living spaces and they must be protected by public authorities. However, the preservation of these buildings prevents their landowners from using their development rights and causes economic losses. If those **[...] Read more.**

(This article belongs to the Collection **Strategies for Sustainable Urban Development (/journal/buildings/topical_collections/Sustainable_Urban)**)

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Open Access Article (/2075-5309/12/6/777/pdf?version=1654756179)

Simplified Approach for In-Plane Strength Capacity of URM Walls by Using Lower-Bound Limit Analysis and Predefined Damage Patterns (/2075-5309/12/6/777)

by Derya Karadeniz (https://sciprofiles.com/profile/author/SEVrRVdlWk82SzBLbmNmSlBjTDZ1azVjS2l1UUlGSnNiSlpYVlFYV2gxZz0=), Mustafa Tolga Yilmaz (https://sciprofiles.com/profile/author/cmc3WGFNVjVmMll0ZDZ3cWtSWW1VL3VRRVV3eitSU3J5bTNrMW5ub3VkWT0=), Cemal Icel (https://sciprofiles.com/profile/author/blRRMGlBWnBnNFBLa3dhQi9tSFYrcnlObXFNTGluaXRYZ0V3Qll6aU5JWT0=) and Murat Altug Erberik (https://sciprofiles.com/profile/2197121)

Buildings **2022**, *12*(6), 777; https://doi.org/10.3390/buildings12060777 (https://doi.org/10.3390/buildings12060777) - 07 Jun 2022

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Abstract In this study, a two-phase simplified approach is proposed to predict the in-plane strength capacity of unreinforced masonry (URM) walls. In the first phase, in-plane damage and failure patterns of URM walls are determined from available observational (field) data, experimental data and also **[...] Read more.**

(This article belongs to the Special Issue **Computational Modeling Strategies for Seismic Assessment of Unreinforced, Reinforced, and Confined Masonry Structures (/journal/buildings/special_issues/Masonry_Seismic)**)

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Open Access Article **(/2075-5309/12/6/776/pdf?version=1654668074)**

Determining Concrete Structure Condition Rating Based on Concrete Compressive Strength (/2075-5309/12/6/776)

by Henny Wiyanto (https://sciprofiles.com/profile/2210989), Chaidir Anwar Makarim (https://sciprofiles.com/profile/aUZPTzMwYXNEQkhEcEZjMEtRUEFqaGJSSTVHNzJQaE42aWhtUTB0RzBkUT0=), Onnyxiforus Gondokusumo (https://sciprofiles.com/profile/author/bHpDWFJnZWRKbEx4T2ZFRHdLdUVORFFHejBNOUplWTJDNkR1OStablh2), Januar Parlaungan Siregar (https://sciprofiles.com/profile/1701052), Agustinus Purna Irawan (https://sciprofiles.com/profile/2055616), Tezara Cionita (https://sciprofiles.com/profile/1701204) and Najid Najid (https://sciprofiles.com/profile/2668908)

Buildings **2022**, *12*(6), 776; https://doi.org/10.3390/buildings12060776 (https://doi.org/10.3390/buildings12060776) - 06 Jun 2022

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Abstract The need for concrete condition assessment for existing buildings increases because of high disaster vulnerability levels, as well as a large number of buildings that have reached their age of use. Currently, there is not any standard reference for assessing concrete condition rating **[...] Read more.**

(This article belongs to the Section **Building Materials, and Repair & Renovation (/journal/buildings/sections/BMRR)**)

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Open Access Feature Paper Article **(/2075-5309/12/6/775/pdf?version=1654519548)**

Machine Learning Algorithm for Shear Strength Prediction of Short Links for Steel Buildings (/2075-5309/12/6/775)

by Ghassan Almasabha (https://sciprofiles.com/profile/2154912), Odey Alshboul (https://sciprofiles.com/profile/2154759), Ali Shehadeh (https://sciprofiles.com/profile/2154607) and Ali Saeed Almuflih (https://sciprofiles.com/profile/2188883)

Buildings **2022**, *12*(6), 775; https://doi.org/10.3390/buildings12060775 (https://doi.org/10.3390/buildings12060775) - 06 Jun 2022

Cited by 15 (/2075-5309/12/6/775#metrics) | Viewed by 1239

Abstract The rapid growth of using the short links in steel buildings due to their high shear strength and rotational capacity attracts the attention of structural engineers to investigate the performance of short links. However, insignificant attention has been oriented to efficiently developing a **[...] Read more.**

(This article belongs to the Section **Construction Management, and Computers & Digitization (/journal/buildings/sections/Construction_Management)**)

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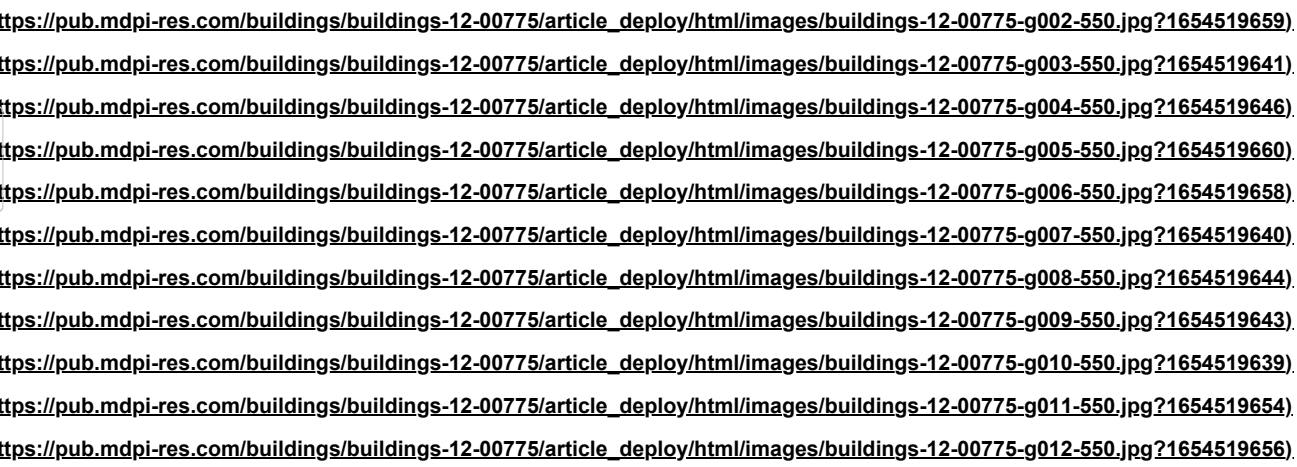

Open Access Article

(/2075-5309/12/6/774/pdf?version=1654521464)

Behavior of Scaled Infilled Masonry, Confined Masonry & Reinforced Concrete Structures under Dynamic Excitations (/2075-5309/12/6/774)

by **Asad Ullah Qazi (https://sciprofiles.com/profile/2537575)**, **Ali Murtaza Rasool (https://sciprofiles.com/profile/685119)**, **Yasser E. Ibrahim (https://sciprofiles.com/profile/636887)**, **Asif Hameed (https://sciprofiles.com/profile/2244871)** and **Muhammad Faizan Ali (https://sciprofiles.com/profile/author/NXB0THovaVUwTktham1aUFUvL3JxTkI5UmQzNjRBRGlRQTN2UXl6RkJ6cz0=)**

Buildings **2022**, *12*(6), 774; **https://doi.org/10.3390/buildings12060774 (https://doi.org/10.3390/buildings12060774)** - 06 Jun 2022

Cited by 1 (/2075-5309/12/6/774#metrics) | Viewed by 1080

Abstract This research investigates the nonlinear behavior of scaled infilled masonry (IFM), confined masonry (CM), and reinforced concrete (RC) structures by utilizing and validating two tests from the literature as benchmarks. The validation was based on a comparison with the pushover results of small-scaled **[...] Read more.**

(This article belongs to the Section **Building Structures (/journal/buildings/sections/BS)**)

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Open Access Article (/2075-5309/12/6/773/pdf?version=1654511183)

The Unsustainable Direction of Green Building Codes: A Critical Look at the Future of Green Architecture (/2075-5309/12/6/773)

by Isaac Guedi Capeluto (https://sciprofiles.com/profile/280135)

Buildings **2022**, *12*(6), 773; https://doi.org/10.3390/buildings12060773 (https://doi.org/10.3390/buildings12060773) - 06 Jun 2022

Cited by 3 (/2075-5309/12/6/773#metrics) | Viewed by 1931

Abstract Buildings are a major contributor to global energy consumption and energy-related carbon dioxide emissions. In light of the climate crisis, changes in the way we design, construct and use buildings are needed to reduce their environmental impact. Green Building Codes (GBCs) and rating **[...]** **Read more.**

(This article belongs to the Section **Building Energy, Physics, Environment, and Systems (/journal/buildings/sections/BEPES)**)

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Towards Sustainable Construction Materials: A Comparative Study of Prediction Models for Green Concrete with Metakaolin (/2075-5309/12/6/772)

by Jiandong Huang (https://sciprofiles.com/profile/1177472), Mengmeng Zhou (https://sciprofiles.com/profile/2154440), Hongwei Yuan (https://sciprofiles.com/profile/author/a3JuM1pnS3o3ZmZ0Z2VwcXBOdHg0dWtLazJIQXNscWtmV084Q21wNlNtcz0=), Mohanad Muayad Sabri Sabri (https://sciprofiles.com/profile/1707705) and Xiang Li (https://sciprofiles.com/profile/author/SU8xQ3R6aWNmTUJmK2hlcHNsd1RVbzY0VStubUNQa29YU1JMVkczVDFTYz0=)

Buildings **2022**, *12*(6), 772; https://doi.org/10.3390/buildings12060772 (https://doi.org/10.3390/buildings12060772) - 06 Jun 2022

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Abstract Cement-based materials are widely used in transportation, construction, national defense, and other fields, due to their excellent properties. High performance, low energy consumption, and environmental protection are essential directions for the sustainable development of cement-based materials. To alleviate the environmental pressure caused by **[...]** **Read more.**

(This article belongs to the Special Issue **Advances in Cement Composite Materials (/journal/buildings/special_issues/Cement_Composite_Materials)**)

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Influence of Different Ambient Temperatures on the Thermal Properties of Fiber-Reinforced Structural Lightweight Aggregate Concrete (/2075-5309/12/6/771)

by Payam Shafigh (https://sciprofiles.com/profile/863202), [illegible] Hafez (https://sciprofiles.com/profile/author/dzR2YVBBUHdoc0tqK3lrdGlDSlBLK3Jva1dkcEVJZlVlc2hiZ09oTEtZWT0=), Zakaria Che Muda (https://sciprofiles.com/profile/1106778), Salmia Beddu (https://sciprofiles.com/profile/1033988), As'ad Zakaria (https://sciprofiles.com/profile/author/ZEw4dGpZTy9ZY09FMXB4WHhaY0MwMS9xOXdTSVRkODl1K0wyYk1EbmhoRT0=) and Zaher Almkahal (https://sciprofiles.com/profile/author/b3RGRllySHNTaEJWdEsxUUpaN1h5RVloVXNWUlh4UDdEaGl2QlNUd08wTT0=)

Buildings **2022**, *12*(6), 771; **https://doi.org/10.3390/buildings12060771 (https://doi.org/10.3390/buildings12060771)** - 06 Jun 2022
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Abstract This study reports the influence of different climatic ambient temperatures on the thermal properties of fiber-reinforced lightweight aggregate concrete (LWAC). Lightweight expanded clay aggregates (LECA) with steel (ST) and polypropylene fibers were used in the mix proportions. The steady-state thermal test was performed **[...] Read more.**
(This article belongs to the Section **Building Materials, and Repair & Renovation (/journal/buildings/sections/BMRR)**)

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Integrated Building Maintenance and Safety Framework: Educational and Public Facilities Case Study (/2075-5309/12/6/770)

by **Kun-Chi Wang (https://sciprofiles.com/profile/2230547)**,
Reut Almassy (https://sciprofiles.com/profile/author/UW5xQW1BbW9RME1Zd25xUzYxMWdaZz09),
Hsi-Hsien Wei (https://sciprofiles.com/profile/806410) and **Igal M. Shohet (https://sciprofiles.com/profile/1226612)**
Buildings **2022**, *12*(6), 770; **https://doi.org/10.3390/buildings12060770 (https://doi.org/10.3390/buildings12060770)** - 05 Jun 2022
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Abstract The facility safety is a highly important issue in educational institutions and public facilities, where the safety and health of the occupants (students, educational and public service staff) is a high-order priority. The research hypothesizes that a synergy exists between the maintenance and **[...] Read more.**
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Impacts of Building Energy Consumption Information on Energy-Saving Intention of College Students (/2075-5309/12/6/769)

by **Menglin Xing (https://sciprofiles.com/profile/415929)**, **Xi Luo (https://sciprofiles.com/profile/1341674)**,
Xiaojun Liu (https://sciprofiles.com/profile/2015257), **Zhenchuan Ma (https://sciprofiles.com/profile/1621263)** and
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Buildings **2022**, *12*(6), 769; **https://doi.org/10.3390/buildings12060769 (https://doi.org/10.3390/buildings12060769)** - 05 Jun 2022
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Abstract As college students bear little energy cost of public buildings on campus, information intervention is more feasible than economic intervention to augment the energy-saving intention of college students. College students are sensitive to environmental information; thus, building energy consumption information, which reflects the **[...] Read more.**
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Spatial Characteristics and Driving Factors of Public–Private Partnership Projects Implemented in China (/2075-5309/12/6/768)

by Fan Yang (https://sciprofiles.com/profile/2120793), Jintao Li (https://sciprofiles.com/profile/1053901), Yi Wang (https://sciprofiles.com/profile/1053950), Shengyu Guo (https://sciprofiles.com/profile/762030) and Heqian Lei (https://sciprofiles.com/profile/author/Z1ZNRXFDakpGb3p5bkZhYWNRSzdWeDY2ZzViVjhwNDQwc1I5dXNOZWhTOD0=)

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Abstract In recent years, public–private partnership (PPP), as an alternative strategy in the delivery of infrastructure services, has developed rapidly in China. However, the implementation of PPP projects differs significantly between provinces and municipalities. Using the implementation data of national PPP demonstration projects, this **[...] Read more.**

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Development of Connection Technology between Multi-Point Press and Flexible Mold for Manufacturing Free-Form Concrete Panel (/2075-5309/12/6/767)

by Jiyeong Yun (https://sciprofiles.com/profile/1272038), Jongyoung Youn (https://sciprofiles.com/profile/author/UEJ2SVhDVlFlZjlycjdEb0hVMEtpNDhXdEthVkplUTFzME5RakNnVGd0MD0=), Jihye Kim (https://sciprofiles.com/profile/author/ZmJkcnREQTkwSllmUXVmMTBkQ2oxK21ha1RWMlkwTmJ5MGgrZ3BvMUpiUT0=) and Donghoon Lee (https://sciprofiles.com/profile/1245483)

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Abstract Many studies have been conducted for the accuracy of free-form concrete panel fabrication, but there still are errors in the process of fabrication. This study developed a connection technology of detachable shape part that can be applied to the existing multi-point Computer Numerical **[...] Read more.**

(This article belongs to the Special Issue **Innovative Manufacturing Technologies in Architecture and Structural Engineering (/journal/buildings/special_issues/Innovative_Manufacturing_Architecture_Structural)**)

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Key Adoption Factors for Collaborative Technologies and Barriers to Information Management in Construction Supply Chains: A System Dynamics Approach (/2075-5309/12/6/766)

by Fawad Amin (https://sciprofiles.com/profile/author/Qmh6bXdhSkZEZFcxbXFpRTZtSXV2eE5LYTBpU200aGZnWkN4QzgxbTZyZHQzckJhbDNTa,

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Abstract Construction processes are complex and dynamic. Like its other components, the construction supply chain (CSC) involves multiple stakeholders requiring varying levels of information sharing. In addition, the intensity and diversity of information in CSCs require dexterous management. Studies reveal that information complexity can **[...] Read more.**

(This article belongs to the Special Issue **Towards Smart Tech 4.0 in the Built Environment: Applications of Disruptive Digital Technologies in Smart Cities, Construction, and Real Estate (/journal/buildings/special_issues/smartech)**)

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Safety Risk Management of Prefabricated Building Construction Based on Ontology Technology in the BIM Environment (/2075-5309/12/6/765)

by Ye Shen (https://sciprofiles.com/profile/2127422), Min Xu (https://sciprofiles.com/profile/1752151), Yini Lin (https://sciprofiles.com/profile/author/OFFOWE44MFdZbWNvNmpGZVc3VUQxV1pXR0xhdzBWQThabHBRVXRkaHNvOD0=), Caiyun Cui (https://sciprofiles.com/profile/328276), Xiaobo Shi (https://sciprofiles.com/profile/2133516) and Yong Liu (https://sciprofiles.com/profile/355452)

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Abstract The extensive application of building information modeling (BIM) technology has brought opportunities and challenges to safety risk management in the field of prefabricated building construction. It is of great significance to provide timely information and knowledge for safety risk decisions in prefabricated building [...] **Read more.**

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Structural Performance and Reasonable Cross-Ratio of Cross-Cable Multi-Tower Cable-Stayed Bridges (/2075-5309/12/6/764)

by Sisi Yao (https://sciprofiles.com/profile/2213819), Biao Peng (https://sciprofiles.com/profile/606061), Luyao Wang (https://sciprofiles.com/profile/817877) and Hengda Chen (https://sciprofiles.com/profile/author/dE1iSVViODdBYXdTOERjSnFlMjZZbEdoQWc1elh5ZkVOemFQOGJLV2R6Yz0=)

Buildings **2022**, *12*(6), 764; https://doi.org/10.3390/buildings12060764 (https://doi.org/10.3390/buildings12060764) - 04 Jun 2022

Abstract The Queensferry Crossing in the UK is the first multi-tower cable-stayed bridge in the world to use mid-span cross-stayed cables to improve structural rigidity. To study the structural performance and economy of cross-cable multi-tower cable-stayed bridges, a total of 11 finite element models **[...]** **Read more.**

(This article belongs to the Special Issue **Construction Process Monitoring and Structural Damage Identification for Buildings and Bridges (/journal/buildings/special_issues/construction_structural_monitoring_damage)**)

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Importance of Autonomous Motivation in Construction Labor Productivity Improvement in Vietnam: A Self-Determination Theory Perspective (/2075-5309/12/6/763)

by **Nguyen Van Tam**, Tsunemi Watanabe (https://sciprofiles.com/profile/174661) and Nguyen Luong Hai (https://sciprofiles.com/profile/783533)

Buildings **2022**, *12*(6), 763; https://doi.org/10.3390/buildings12060763 (https://doi.org/10.3390/buildings12060763) - 04 Jun 2022

Abstract Labor productivity is an important aspect of the construction industry, and motivation is believed to be an influential factor that affects it. While previous studies have emphasized the role of controlled motivation (i.e., external factors), the role of autonomous motivation (i.e., internal factors) **[...]** **Read more.**

(This article belongs to the Section **Construction Management, and Computers & Digitization (/journal/buildings/sections/Construction_Management)**)

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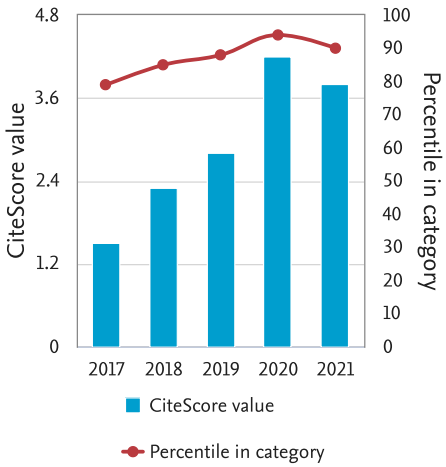

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Article

Determining Concrete Structure Condition Rating Based on Concrete Compressive Strength

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Abstract: The need for concrete condition assessment for existing buildings increases because of high disaster vulnerability levels, as well as a large number of buildings that have reached their age of use. Currently, there is not any standard reference for assessing concrete condition rating yet, so a concrete condition assessment method that can be measured quantitatively needs to be developed. The developed concrete condition assessment method combines concrete condition assessment based on visual inspection and testing. Assessment measures start with an assessment of visual inspection results, which is continued with concrete compressive strength testing. This article contains a concrete condition assessment based on concrete compressive strength testing. This method determines the concrete condition rating scale using five condition ratings as a reference for building condition assessment. The limit value of each condition rating is taken from concrete compressive strength values that are structurally sufficient, according to the structural concrete requirement code for buildings. Concrete compressive strength values have resulted from non-destructive tests and destructive or loading tests. Building condition rating (BCR) value determination factors in the effect of structure element damage towards building structure and concrete testing result accuracy rating, and also can decrease inaccuracy towards concrete quality condition rating determination on scale limit values, and minimize error risks in determining damage condition rating. The resulting method has the advantage of assessing structure element condition rating and building condition rating (BCR) that can be measured quantitatively, has five assessment scale ratings that can portray building conditions having to be demolished, and calculates structure element critical weight.

Keywords: condition rating; building assessment; concrete structure; concrete compressive strength

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1. Introduction

Concrete quality condition rating determination is a procedure where concrete structure condition is assessed based on the existence of field concrete quality discrepancy to the design concrete quality. The need for building condition assessment is currently rising because of a relative increase in natural disaster risk and the number of buildings that have reached their designed life expectancy. Periodical assessment of a building is conducted to ensure building reliability. Building reliability requirement assessment includes fulfilling building safety, health, comfort, and ease of use requirements. One of the safety requirements includes building structure requirements. To fulfill building safety requirements, existing buildings need to be maintained, repaired, or even demolished if building conditions cannot be maintained [1].

Building owners or building management frequently ignore a building's condition as long as it is still operational, and they do not practice proper building assessment due to cost considerations. However, building condition assessment can lower the risk of further building damage. Ignoring it like that can increase the risk of building users' safety and comfort and result in even higher reparation costs than the assessment cost. Assessment is not only conducted on post-disaster buildings or deteriorating buildings but also healthy buildings. Assessment results will describe the building condition and can provide the possible steps needed for buildings in bad conditions [2].

The first step to identifying building structure conditions is conducted by control inspection in the form of visual assessment. The lack of control inspection can speed up the building damage process and will result in damage reparation costs. In addition, control inspection will affect a building's functionality [3]. Visual assessment is the first measure in evaluating a building structure for continuous use or change, analyzing strength or deformation, and determining maintenance and rehabilitation needs [2]. Material condition rating on existing buildings is conducted using the visual assessment method, as well as testing composed of non-destructive and destructive testing from field and laboratory [1].

Building structure condition assessment can be conducted in two ways: early assessment and structure detail assessment. In early assessment, technical documentation study and visual assessment are performed. In structure detail assessment, reliability level is determined based on structure evaluation results after identifying existing building material quality. Existing building material quality is obtained from an arrangement of tests, non-destructive or destructive. In buildings with concrete structures, concrete material quality can be identified from testing results in the form of concrete compressive strength, concrete homogeneity quality, and reinforcing steel quality. Existing reinforced concrete material quality data will be used as input in building structure analysis to identify the existing structural component's ability to carry the design load. This building structure condition assessment is needed to identify existing building condition ratings (BCR). The condition rating is a numerical indicator that functions to give a rating. Assessment is meant to evaluate the real condition of the existing building structure, which shows the existence of a safety factor that is adequate against the load [1].

Concrete quality condition rating that is determined to perform reliability assessment needs to have a reference rating as a condition comparison scale. Therefore, an acceptable value is needed [4]. However, there is a problem, which is the method by which an acceptable structure condition rating is identified. Therefore, the structure reliability level can be determined based on the design target reliability level [5]. Reliability is the ability of a structure or structure element to fulfill the specific requirements in carrying the design loading according to the condition determined within a specific timeframe. A structure has the right reliability level if it fulfills the requirements and reaches a specific target level against the serviceability limit state, ultimate limit state, and structural integrity. Several condition rating assessment scales have been developed worldwide to overcome the qualitative nature of condition rating assessment based on visual assessment. The scale provides a measured condition in terms of damage and the proper reparation steps [6].

Condition rating assessment that is already developed using a concrete condition ratio scale is a concrete condition rating assessment based on visual examination [6–11]. Aside from that, there are also several researchers that have already developed concrete condition rating assessments based on concrete compressive strength testing with the destructive and non-destructive concrete testing types [12–14]. Concrete damage condition rating on existing buildings uses data from visual assessment, hammer test, ultrasonic pulse velocity (USPV) test, half-cell potential HCP test, and carbonation test results. The concrete condition rating scale and reference refer to the British Standards Institution [12]. Risk rating assessment on existing buildings uses data from hammer tests. Scale and reference are determined based on rebound value [13]. Bridge condition rating assessment uses data from the visual assessment, crack factor, and non-destructive testing factor by taking into account the important weight value that is processed with the analytical hierarchy process

(AHP) method. Non-destructive tests consist of resistivity meter, ultrasonic pulse velocity (UPV) test, and hammer test [14].

Concrete condition rating assessment is highly needed to portray all building conditions that can happen in situ, which is anywhere between the best condition rating and the worst—in which case the building cannot be used anymore. To implement this assessment, a scale and reference that can accommodate all BCR possibilities measured quantitatively for existing buildings need to be developed. This research develops a concrete condition rating assessment method to determine concrete structure condition rating based on in situ concrete compressive strength. The assessment method developed in this research is a method with the following novelty:

- Has a condition rating scale that can be used to assess a building up to the worst condition, where a building cannot be maintained anymore and has to be demolished.
- Takes the building structure element's critical weight into account.
- Minimalizes inaccuracy in condition rating determination from the in situ concrete compressive strength that exists within the limit point.
- Determines BCR based on concrete compressive strength with higher reliability to avoid the risk of building failure.

The resulted assessment method is used to identify whether the building is in good condition, requires concrete compressive strength testing, requires structure reinforcement or load reduction, or is no longer usable. This assessment method exists on the limit of the building examination measure and is not included in the structure redesign process. This examination measure consists of in situ building damage survey, visually or user testing, and building damage analysis using the resulted assessment method. If assessment results show that the building is in a condition that requires structural reinforcement or load reduction, the following step will be left up to the structure consultant to begin structure reinforcement design. This assessment method is used during the building's routine maintenance periods to provide a feeling of safety and comfort to building users.

2. Materials and Methods

The concrete condition rating assessment method is meant to evaluate existing concrete conditions towards building structure safety that is determined based on visual inspection and in situ testing. Based on the terms of SEI/ASCE (2000), assessment begins with a visual inspection, then is followed by in situ testing. Visual inspection assesses physical damage on the concrete surface in the form of cracks, scaling, spalls, and others [15]. Wiyanto et al. (2021) determined twenty types of concrete damage caused by poor implementation that is assessed with a visual inspection. Every damage type has different condition rating values. Concrete damage can happen because of environmental factors, such as chemical factors and disasters. Damage types resulting from those factors have different shapes and condition rating values from damage resulting from poor implementation. Concrete condition rating assessment results with a visual inspection will show whether assessment in the form of testing needs to be implemented on the building. Then, testing is conducted with in situ testing in the form of non-destructive and destructive or loading tests. This assessment result shows whether the building is in good condition and can be used, the structure needs to be strengthened, or weight needs to be reduced. If it needs structure reinforcement or load reduction, then it must be followed with a structured design that considers the compressive strength and flexure strength implemented by the planner consultants. This article is limited to building condition rating (BCR) assessment based on concrete compressive strength testing during the building assessment phase and does not include the structural design phase. The condition rating is determined with the following steps:

- Determining condition rating scale that will be the reference in performing existing building concrete structure condition rating based on the concrete compressive strength.

- Determining structure element condition rating and BCR by referring to the resulting rating scale.

2.1. Condition Rating Scale and Reference

Assessment development is conducted by determining a concrete condition rating scale and reference for assessment based on concrete compressive strength testing, which is equal to the assessment based on a visual assessment to be applied in Indonesia. For the sake of comparison, a literature study has been conducted regarding concrete condition rating scale and reference [9,12,16–18].

Currently, there is no basic standard for concrete condition rating assessment based on testing and visual assessment. The existing standard is a standard for concrete compressive strength testing processes. To determine building concrete condition rating, a measuring tool in the form of a condition rating scale and reference is needed. Scale and reference are determined based on concrete damage conditions and concrete compressive strength requirements that are described from very good to very bad conditions. Very good means that the building entirely fulfills the design concrete compressive strength requirements. Very bad means that the building is in such a low concrete quality condition that the building cannot be used anymore or has to be demolished. For a lower concrete compressive strength condition than the design condition, the reduction amount needs to be determined, as well as the steps needed to handle it on each level. The value on each scale limit point is determined based on the concrete compressive strength acceptance value for high-rise building structures according to Indonesian National Standards [19,20]. The acceptance value of each condition rating is determined by the ratio of the in situ concrete compressive strength value to the design concrete compressive strength value. In situ concrete compressive strength is taken from in situ testing results that are implemented with non-destructive or destructive testing. Design concrete compressive strength is taken from structure design according to the building function. This scale can be used as a reference to assess existing buildings in the form of buildings with reinforced concrete structures. The resulted condition rating scale from this research is determined by combining the scale for visual assessment with the scale for concrete compressive strength testing so that it can be used to perform building condition assessment based on destructive and non-destructive testing.

2.2. Condition Rating Determination

Concrete testing type identification is grouped based on non-destructive and destructive testing. Concrete testing type identification on buildings refers to standards [1,21].

Debates often happen about concrete compressive strength values that exist near the limit point. To anticipate it, the fuzzy logic method is used to determine condition rating values. The condition rating of each test is determined based on in situ test results referring to the determined condition rating scale and reference. Structure element condition rating is determined for all testing types that are processed with the fuzzy logic method, with the following equation [22,23]:

$$CR_{se} = \frac{\sum_{i=1}^{n} \mu_{f'c,in} i_n}{\sum_{i=1}^{n} \mu_{f'c,in}} \quad (1)$$

where CR_{se} is the structure element condition rating, $\mu_{f'c,in}$ is the membership function from in situ concrete compressive strength, $f'c,in$ is in situ concrete compressive strength, and i_n is the condition rating from the reviewed point. The condition rating is determined based on $f'c,in$ which results from each test type, destructive or non-destructive. The concrete compressive strength testing type used in this assessment method is the hammer test or ultrasonic pulse velocity (UPV) test for the non-destructive test and the core drill test or loading test for the destructive test.

Condition rating resulting from concrete compressive strength testing is determined based on the membership function from the concrete compressive strength values on each scale. Condition rating from concrete compressive strength value is determined based on the membership function from in situ and laboratory testing results. The membership function is used to map out concrete compressive strength into the membership degrees with a shoulder-shaped curve representation function [22,23]. Condition rating boundary is taken from the determined concrete condition rating scale and reference, which is very good, good, medium, bad, and very bad. The boundary point uses a comparison between in situ and design concrete compressive strength. The shoulder curve portrays the membership function on the concrete compressive strength resulting from this research.

Each structure element has a different critical risk according to the function of each element in the building structure. Therefore, this building damage condition rating assessment will take the critical weight of each structure element into account. Wiyanto et al. (2020) have determined the critical weight for four structure element types, as shown in Table 1. These critical weight values will be used to determine the BCR.

Table 1. Structure element critical weight.

Structural Elements	Critical Weight (w)
Shear wall (sh)	1
Column (c)	1
Beam (b)	0.7
Slab (s)	0.5

BCR assessment as a whole based on concrete compressive strength testing is determined with the weighted average method, which takes structure element critical weight into account. This structure element critical factor value is used to assess high-rise reinforced concrete building structures. The BCR is determined with the following equation [12,23]:

$$BCR = \frac{\sum_{se=1}^{n} w_{se}.CR_{se}}{\sum_{se=1}^{n} w_{se}} \quad (2)$$

where BCR is the building condition rating, w_{se} is the structure element critical weight, and CR_{se} is the structure element condition rating. The resulted BCR shows the building damage condition with the criteria and the action needed based on the damage condition. BCR similarity, as a whole, can also be used to determine condition rating per floor or building zone.

The results from the assessment method can be used to assess all physical conditions of buildings with reinforced concrete structures, whether the building is healthy or collapsed according to the research goals. There are no limits regarding the number of floors, building function or building life in using this method because all concrete compressive strength values used are in accordance with the in situ and design condition of each assessed building. Validation of the concrete damage condition rating assessment method resulted has already been conducted by applying a visual-based assessment method and testing on eleven existing buildings. This assessment method is applied to existing buildings with reinforced concrete structures that have different types, functions, and building life. These buildings are high-rise buildings with between 3 to 45 floors, between 10 to 58 years of building a life, and function as apartments, malls, offices, parking lots, factories, and hotels. Concrete compressive strength testing is conducted with non-destructive testing in the form of hammer test and UPV test. The building condition rating (BCR) value resulting from this method matches the results from the investigation and assessment conducted by the assessor consultant on the same building.

3. Results and Discussion

Concrete structure condition rating determination refers to the condition rating scale. Condition rating scale and reference are determined as a value between visual examination-based assessment and testing. This research determines a condition rating assessment scale with five ratings described as very good, good, medium, bad, and very bad, with damage condition and the appropriate follow-up for each rating, from the lightest, which is no repairs needed, to the heaviest where the building has to be demolished. The lowest condition rating can portray the worst condition of a building. For condition rating assessment based on testing, criteria in the form of limit values on each rating are needed. Criteria are determined using the concrete compressive strength acceptance value of the building structure. The acceptance limit value of each condition rating is determined by the ratio between the in situ and design concrete compressive strength values. In situ concrete compressive strength is obtained from in situ testing results. Testing is conducted from light testing in the form of non-destructive testing to heavy testing in the form of destructive testing. This condition rating scale determination as existing building condition rating (BCR) assessment reference up to the condition where the building has to be demolished is a research novelty that has not been portrayed in previous research [6,10,12–14]. Concrete damage condition rating characteristics for each condition rating can be seen in Table 2.

Table 2. Concrete damage condition rating characteristics.

Condition Rating	Description	Criteria	Damage Condition and Measure
1	Very Good (VG)	$r_{f'c} \geq 100\% f'c,d$	No damage. No repairs are needed, but routine maintenance is needed.
2	Good (G)	$85\% f'c,d \leq r_{f'c} < 100\% f'c,d$	Light damage. Repair is needed in routine maintenance.
3	Medium (M)	$75\% f'c,d \leq r_{f'c} < 85\% f'c,d$	Medium damage. Further testing is needed as soon as possible.
4	Bad (B)	$50\% f'c,d \leq r_{f'c} < 75\% f'c,d$	Heavy damage. Structure needs to be strengthened, or load needs to be reduced.
5	Very Bad (VB)	$r_{f'c} < 50\% f'c,d$	Very heavy damage or critical damage. Cannot be maintained or demolished.

Each condition rating has a value limit that is determined based on the percentage from the concrete compressive strength acceptance values according to Indonesia National Standards [19]. Concrete is considered structurally sufficient if the concrete compressive strength is at least 85% based on core drill testing. If the concrete compressive strength is below 85%, loading testing is implemented. If the concrete compressive strength is below 75%, the building can be maintained by implementing a strengthened building structure or decreasing the building load in its usage. The lowest value limit is determined based on assessment results on the questionnaires. If the concrete compressive strength is below 50%, then structure reinforcement or load decrease in building usage is unreasonable in terms of its costs and its risk to the building users' safety. $r_{f'c}$ is the percentage of in situ concrete compressive strength value ($f'c,in$) against the design concrete compressive strength ($f'c,d$). This resulted condition rating scale will be the reference in the next process, which is concrete condition rating determination for the existing upper building structure.

In the assessment process, inaccuracy can happen in determining the condition rating of an in situ concrete compressive strength value that exists within the condition rating limit point area. To accommodate this problem, condition rating determination in this research is developed with the fuzzy logic approach. Structure element condition rating is determined based on membership function from the condition rating of each reviewed point. Structure element condition rating is determined for all concrete compressive strength testing types that are implemented on the assessed building structure element. Membership value is determined using the functional approach that is represented by a shoulder curve [22,23].

strength testing types that are implemented on the assessed bu
Membership value is determined using the functional approach
shoulder curve [22,23]. The shoulder curve portrays membersh
concrete compressive strength ($f'c,in$) that is compared to the des
strength ($f'c,d$). The boundary point for each condition rating ref
criteria in Table 2. The relationship between the membership fun
crete compressive strength in each condition rating is illustrated

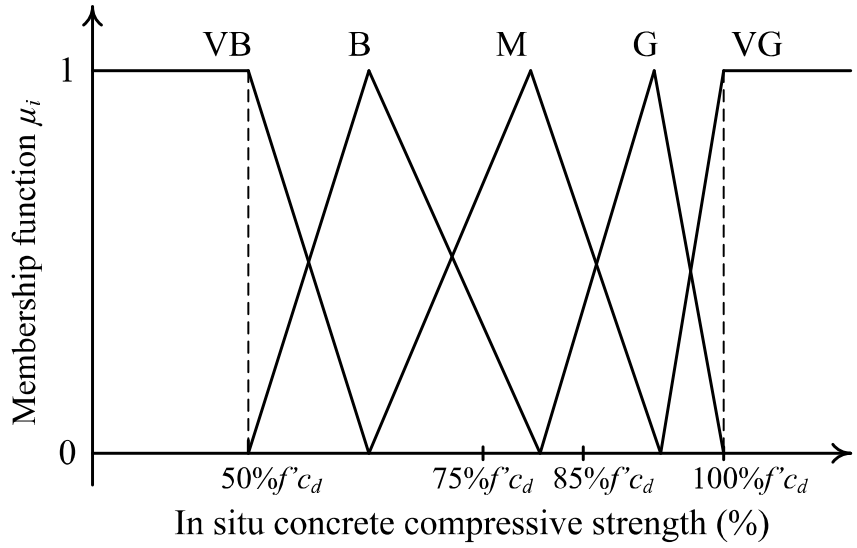

Figure 1. Membership function from concrete compressive strength.

Based on the illustration depicted in Figure 1 is determined membership function on each concrete condition rating which is described in the following equations:

- Very Bad Condition Rating

$$\begin{cases} r_{f'c} < 50\% f'c,d; \text{ therefore } \mu_{f'c,in} = 1 \\ 50\% f'c,d \le r_{f'c} < 62.5\% f'c,d; \text{ therefore } \mu_{f'c,in} = 5 - 8\, r_{f'c} \\ r_{f'c} \ge 62.5\% f'c,d; \text{ therefore } \mu_{f'c,in} = 0 \end{cases} \quad (3)$$

- Bad Condition Rating

$$\begin{cases} r_{f'c} < 50\% f'c,d \text{ or } r_{f'c} \ge 80\% f'c,d; \text{ therefore } \mu_{f'c,in} = 0 \\ 50\% f'c,d \le r_{f'c} < 62.5\% f'c,d; \text{ therefore } \mu_{f'c,in} = 8\, r_{f'c} - 4 \\ 62.5\% f'c,d < r_{f'c} < 80\% f'c,d; \text{ therefore } \mu_{f'c,in} = 4.57 - 5.71\, r_{f'c} \end{cases} \quad (4)$$

- Medium Condition Rating

$$\begin{cases} r_{f'c} < 62.5\% f'c,d \text{ or } r_{f'c} \ge 92.5\% f'c,d; \text{ therefore } \mu_{f'c,in} = 0 \\ 50\% f'c,d \le r_{f'c} < 80\% f'c,d; \text{ therefore } \mu_{f'c,in} = 5.71\, r_{f'c} - 3.57 \\ 80\% f'c,d \le r_{f'c} \le 92.5\% f'c,d; \text{ therefore } \mu_{f'c,in} = 7.40 - 8\, r_{f'c} \end{cases} \quad (5)$$

- Good Condition Rating

$$\begin{cases} r_{f'c} < 80\% f'c,d \text{ or } r_{f'c} \ge 100\% f'c,d; \text{ therefore } \mu_{f'c,in} = 0 \\ 80\% f'c,d \le r_{f'c} < 92.5\% f'c,d \text{ or } r_{f'c} \ge 92.5\% f'c,d; \text{ therefore } \mu_{f'c,in} = 0 \\ 62.5\% f'c,d \le r_{f'c} < 80\% f'c,d; \text{ therefore } \mu_{f'c,in} = 5.71\, r_{f'c} - 3.57 \\ 92.5\% f'c,d \le r_{f'c} < 100\% f'c,d; \text{ therefore } \mu_{f'c,in} = 13.33 - 13.33\, r_{f'c} \end{cases} \quad (6)$$

- Very Good Condition Rating

$$\begin{cases} r_{f'c} \ge 100\% f'c,d; \text{ therefore } \mu_{f'c,in} = 1 \\ 92.5\% f'c,d \le r_{f'c} < 100\% f'c,d; \text{ therefore } \mu_{f'c,in} = 13.33\, r_{f'c} - 12.33 \\ r_{f'c} < 92.5\% f'c,d; \text{ therefore } \mu_{f'c,in} = 0 \end{cases} \quad (7)$$

where $f'c,d$ is the design concrete compressive strength, $\mu_{f'c,in}$ is the in situ concrete compressive strength membership function, and $r_{f'c}$ is the percentage of in situ concrete compressive strength value ($f'c,in$) against the design concrete compressive strength ($f'c,d$). Based on this membership function value, a concrete condition rating based on testing can be determined

Based on the illustration depicted in Figure 1 is determined
each concrete condition rating which is described in the followi
- Very Bad Condition Rating
$r_{f'c} < 50\% f'c,d$; therefore $\mu_{f'c,in} = 1$
$50\% f'c,d \le r_{f'c} < 62.5\% f'c,d$; therefore $\mu_{f'c,in} = 5 - 8\, r_{f'c}$
$r_{f'c} \ge 62.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$
- Bad Condition Rating
$r_{f'c} < 50\% f'c,d$ or $r_{f'c} \ge 80\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$50\% f'c,d \le r_{f'c} < 62.5\% f'c,d$; therefore $\mu_{f'c,in} = 8\, r_{f'c} - 4$
$62.5\% f'c,d < r_{f'c} < 80\% f'c,d$; therefore $\mu_{f'c,in} = 4.57 - 5.71\, r_{f'c}$
- Medium Condition Rating
$r_{f'c} < 62.5\% f'c,d$ or $r_{f'c} \ge 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$50\% f'c,d \le r_{f'c} < 80\% f'c,d$; therefore $\mu_{f'c,in} = 5.71\, r_{f'c} - 3.57$
$80\% f'c,d \le r_{f'c} \le 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 7.40 - 8\, r_{f'c}$
- Good Condition Rating
$r_{f'c} < 80\% f'c,d$ or $r_{f'c} \ge 100\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$80\% f'c,d \le r_{f'c} < 92.5\% f'c,d$ or $r_{f'c} \ge 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$62.5\% f'c,d \le r_{f'c} < 80\% f'c,d$; therefore $\mu_{f'c,in} = 5.71\, r_{f'c} - 3.57$
$92.5\% f'c,d \le r_{f'c} < 100\% f'c,d$; therefore $\mu_{f'c,in} = 13.33 - 13.33\, r_{f'c}$
- Very Good Condition Rating
$r_{f'c} \ge 100\% f'c,d$; therefore $\mu_{f'c,in} = 1$
$92.5\% f'c,d \le r_{f'c} < 100\% f'c,d$; therefore $\mu_{f'c,in} = 13.33\, r_{f'c} - 12.33$
$r_{f'c} < 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$

- Very Bad Condition Rating
$r_{f'c} < 50\% f'c,d$; therefore $\mu_{f'c,in} = 1$
$50\% f'c,d \le r_{f'c} < 62.5\% f'c,d$; therefore $\mu_{f'c,in} = 5 - 8\, r_{f'c}$
$r_{f'c} \ge 62.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$
- Bad Condition Rating
$r_{f'c} < 50\% f'c,d$ or $r_{f'c} \ge 80\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$50\% f'c,d \le r_{f'c} < 62.5\% f'c,d$; therefore $\mu_{f'c,in} = 8\, r_{f'c} - 4$
$62.5\% f'c,d < r_{f'c} < 80\% f'c,d$; therefore $\mu_{f'c,in} = 4.57 - 5.71\, r_{f'c}$
- Medium Condition Rating
$r_{f'c} < 62.5\% f'c,d$ or $r_{f'c} \ge 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$50\% f'c,d \le r_{f'c} < 80\% f'c,d$; therefore $\mu_{f'c,in} = 5.71\, r_{f'c} - 3.57$
$80\% f'c,d \le r_{f'c} \le 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 7.40 - 8\, r_{f'c}$
- Good Condition Rating
$r_{f'c} < 80\% f'c,d$ or $r_{f'c} \ge 100\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$80\% f'c,d \le r_{f'c} < 92.5\% f'c,d$ or $r_{f'c} \ge 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$62.5\% f'c,d \le r_{f'c} < 80\% f'c,d$; therefore $\mu_{f'c,in} = 5.71\, r_{f'c} - 3.57$
$92.5\% f'c,d \le r_{f'c} < 100\% f'c,d$; therefore $\mu_{f'c,in} = 13.33 - 13.33\, r_{f'c}$
- Very Good Condition Rating
$r_{f'c} \ge 100\% f'c,d$; therefore $\mu_{f'c,in} = 1$
$92.5\% f'c,d \le r_{f'c} < 100\% f'c,d$; therefore $\mu_{f'c,in} = 13.33\, r_{f'c} - 12.33$
$r_{f'c} < 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$

- Very Bad Condition Rating
$r_{f'c} < 50\% f'c,d$; therefore $\mu_{f'c,in} = 1$
$50\% f'c,d \le r_{f'c} < 62.5\% f'c,d$; therefore $\mu_{f'c,in} = 5 - 8\, r_{f'c}$
$r_{f'c} \ge 62.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$
- Bad Condition Rating
$r_{f'c} < 50\% f'c,d$ or $r_{f'c} \ge 80\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$50\% f'c,d \le r_{f'c} < 62.5\% f'c,d$; therefore $\mu_{f'c,in} = 8\, r_{f'c} - 4$
$62.5\% f'c,d < r_{f'c} < 80\% f'c,d$; therefore $\mu_{f'c,in} = 4.57 - 5.71\, r_{f'c}$
- Medium Condition Rating
$r_{f'c} < 62.5\% f'c,d$ or $r_{f'c} \ge 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$50\% f'c,d \le r_{f'c} < 80\% f'c,d$; therefore $\mu_{f'c,in} = 5.71\, r_{f'c} - 3.57$
$80\% f'c,d \le r_{f'c} \le 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 7.40 - 8\, r_{f'c}$
- Good Condition Rating
$r_{f'c} < 80\% f'c,d$ or $r_{f'c} \ge 100\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$80\% f'c,d \le r_{f'c} < 92.5\% f'c,d$ or $r_{f'c} \ge 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$
$62.5\% f'c,d \le r_{f'c} < 80\% f'c,d$; therefore $\mu_{f'c,in} = 5.71\, r_{f'c} - 3.57$
$92.5\% f'c,d \le r_{f'c} < 100\% f'c,d$; therefore $\mu_{f'c,in} = 13.33 - 13.33\, r_{f'c}$
- Very Good Condition Rating
$r_{f'c} \ge 100\% f'c,d$; therefore $\mu_{f'c,in} = 1$
$92.5\% f'c,d \le r_{f'c} < 100\% f'c,d$; therefore $\mu_{f'c,in} = 13.33\, r_{f'c} - 12.33$
$r_{f'c} < 92.5\% f'c,d$; therefore $\mu_{f'c,in} = 0$

with the CR_{se} equation for each non-destructive and destructive testing type. Based on the $\mu_{f'c,in}$ value on each condition rating (Equations (3)–(7)), the condition rating value (Table 2), and the structure element condition rating equation (Equation (1)), CR_{se} is therefore determined for each concrete compressive strength value as shown in Table 3.

Table 3. Structure element condition rating.

Concrete Compressive Strength	Structure Element Condition Rating (CR_{se})
$r_{f'c} < 50\% f'c,d$	5
$50\% f'c,d \leq r_{f'c} < 62.5\% f'c,d$	$9 - 8\, r_{f'c}$
$62.5\% f'c,d \leq r_{f'c} < 80\% f'c,d$	$7.57 - 5.71\, r_{f'c}$
$80\% f'c,d \leq r_{f'c} < 92.5\% f'c,d$	$9.4 - 8\, r_{f'c}$
$92.5\% f'c,d \leq r_{f'c} < 100\% f'c,d$	$14.33 - 13.33\, r_{f'c}$
$r_{f'c} \geq 100\% f'c,d$	1

The BCR can be determined directly as a whole or can be determined per building floor or zone with the *BCR* equation (Equation (2)). *BCR* determination has to take the condition rating value on each floor or zone into account to avoid the risk of building collapse. *BCR* value is affected by CR_{se} value. Structure element condition rating value (CR_{se}) is determined based on the concrete condition rating value resulting from in situ concrete compressive strength testing, which is from non-destructive and destructive testing. For building structure elements that are tested with non-destructive and destructive testing, structure element condition rating values are not determined by the average values. However, structure element condition rating assessment is taken from concrete compressive strength values resulting from testing with higher reliability to avoid a higher condition rating than the real condition, which can cause building collapse. Concrete compressive strength testing with destructive testing is more reliable compared to non-destructive testing. Because destructive testing is implemented on the building's core concrete, while non-destructive testing is implemented on the concrete surface [24–26]. If non-destructive and destructive testing results exist in different condition ratings, the more reliable result from destructive testing will be taken. If the average concrete compressive strength value between both testing types is taken, it may result in a condition rating that is higher than the destructive testing results, which portrays a better building condition than reality. This will result in a high risk of building collapse. To prove this issue, a simulation has been conducted to a concrete condition rating determination that is taken from the average values resulting from non-destructive and destructive testing. From simulation results, the probability of condition rating increases on each combination. If condition rating values are taken from the average values resulting from non-destructive and destructive testing results, they can be identified. The probability of an increase in the resulted condition rating can be seen in Table 4.

Table 4 shows that there is a 22% to 86% probability that the average condition rating value from both testing types is 1 rating higher than the condition rating based on reliability rating. There is even a 4% chance of an increase by 2 ratings. There is a 70% chance that poses a lot of risk on the assessment result, which is a combination of condition rating 3 on the destructive test and condition rating 2 on the non-destructive test. This condition poses a risk to the building safety, keeping in mind that test results on conditions ratings 2 and 3 are the most common conditions in situ. Therefore, the structure element condition rating value (CR_{se}) from the non-destructive and destructive tests implemented in the same location is determined as such:

- If the structure element CR_{se} obtained from the concrete compressive strength value resulting from non-destructive testing is not uniform, it means different condition ratings exist, and therefore destructive testing is needed.
- If $CR_{se,nd}$ is random, then perform destructive testing.
- If the structure element CR_{se} obtained from non-destructive testing exists within the medium or worse condition rating, then destructive testing is needed.

- If $CR_{se,nd} \leq CR_{se,md}$, then perform destructive testing.
- If the structure element CR_{se} obtained from concrete compressive strength testing value resulting from non-destructive and destructive testing does not exist within the same condition rating, then take the condition rating value resulting from destructive testing.
- If $CR_{se,nd} \neq CR_{se,d}$, then take the $CR_{se,d}$ value.
- A loading test is needed if the structure element CRse obtained from concrete compressive strength testing value resulting from destructive testing exists within the bad or worse condition rating.
- If $CR_{se,d} \leq CR_{se,bd}$, then perform the loading test.
- If the structure element CR_{se} obtained from concrete compressive strength testing value resulting from destructive testing and loading test does not exist within the same condition rating, then take the condition rating value resulting from loading test.

If $CR_{se,d} \neq CR_{se,lt}$, then take the $CR_{se,lt}$ value.

The determined structure element CR_{se} is used to determine the building condition rating value as a whole (*BCR*), as shown in Table 5.

Table 4. The increment in the condition rating values resulting from the assessment.

Condition Rating Based on Testing		Condition Rating Based on Average Results Testing	Condition Rating Based on Reliability Rating	Probability	Description
Non-Destructive	Destructive				
4	5	5	5	74%	Appropriate
4	5	4	5	26%	Higher rating
3	5	5	5	39%	Appropriate
3	5	4	5	61%	Higher rating
2	5	5	5	14%	Appropriate
2	5	4	5	86%	Higher rating
3	4	4	4	78%	Appropriate
3	4	3	4	22%	Higher rating
2	4	4	4	28%	Appropriate
2	4	3	4	68%	Higher rating
2	4	2	4	4%	Higher rating
2	3	3	3	30%	Appropriate
2	3	2	3	70%	Higher rating

Table 5. Building condition rating determination.

Structure Element Condition Rating	Building Condition Rating
$CR_{se,nd}$ random, or $CR_{se,nd} \leq CR_{se,md}$, or $CR_{se,nd} \neq CR_{se,d}$	$\frac{\sum_{se=1}^{e} w_{se} CR_{se,d}}{\sum_{se=1}^{e} w_{se}}$
$CR_{se,d} \leq CR_{se,bd}$, *or* $CR_{se,d} \neq CR_{se,lt}$	$\frac{\sum_{se=1}^{e} w_{se} CR_{se,lt}}{\sum_{se=1}^{e} w_{se}}$

where w_{se} is the structure element type critical weight, $CR_{se,nd}$ is the structure element condition rating from non-destructive testing, $CR_{se,d}$ is the structure element condition rating from destructive testing, $CR_{se,lt}$ is the structure element condition rating from loading testing, $CR_{se,md}$ is the medium structure element condition rating, and $CR_{se,bd}$ is the bad structure element condition rating. Structure element critical weight for shear wall and column = 1, beam = 0.7, and slab = 0.5. Non-destructive concrete compressive strength testing uses a hammer test or ultrasonic pulse velocity (UPV) test, and destructive concrete compressive strength testing uses a core drill test or loading test.

To explain the proposed testing-based concrete condition rating assessment method, this method is applied to two buildings. These buildings are annotated as Building A and Building B. These buildings are a 13-year-old 8-storey high-rise mall building and a 20-year-old 3-storey factory building. Building A's design concrete compressive strength is

41.5 MPa, and Building B's is 33.2 MPa. Testing is conducted with non-destructive testing in the form of a hammer test. Based on the structure element concrete compressive strength data resulting from in situ testing, a concrete condition rating assessment is implemented on Building A and Building B, the results of which are shown in Tables 6 and 7.

Table 6. Building A condition rating assessment.

Element Number	Test Results		i_n		$\mu_{f'c,in}$		CR_{se}	w_{se}	BCR
	$f'c,in$ (MPa)	$r_{f'c}$	Upper Bound	Lower Bound	Upper Bound	Lower Bound			
1	32.79	0.79	3	4	0.94	0.06	3.06	0.7	
2	34.28	0.83	2	3	0.24	0.76	2.76	0.7	
3	46.90	1.13	-	1	-	1	1	0.7	
4	45.32	1.09	-	1	-	1	1	0.7	
5	43.66	1.05	-	1	-	1	1	0.7	
6	40.50	0.98	1	2	0.73	0.27	1.27	0.7	
7	43.66	1.05	-	1	-	1	1	0.7	
8	42.08	1.01	-	1	-	1	1	0.7	1.38
9	42.08	1.01	-	1	-	1	1	0.5	
10	43.66	1.05	-	1	-	1	1	0.5	
11	48.47	1.17	-	1	-	1	1	0.5	
12	43.66	1.05	-	1	-	1	1	0.5	
13	37.35	0.90	2	3	0.80	0.20	2.20	0.5	
14	46.90	1.13	-	1	-	1	1	0.5	
15	48.47	1.17	-	1	-	1	1	0.5	

Building A condition rating assessment results show a condition rating of 1.38. Referring to Table 2, Building A can be included in the 'good' condition rating, with follow-up in the form of reparation within the building's routine maintenance scope. However, there are parts of the structural element that exist between the 'good' and 'medium' condition ratings. Therefore, further testing in the form of destructive testing with a core drill test needs to be implemented on that element of Building A.

The Building B condition rating test results show a condition rating of 1.96. Therefore, referring to Table 2, it is determined that Building B can be included in the 'good' condition rating, with follow-up in the form of reparation within the building's routine maintenance scope. However, considering the condition rating value of 2.30 in zone 1, it means that zone 1 is within the 'medium' condition. Therefore, further testing in the form of destructive testing with a core drill test needs to be implemented in zone 1 of Building B.

Based on this explanation, it can be seen that this assessment method results in a value that can be measured quantitatively to portray a building's condition rating, with follow-up appropriate to the condition of each assessed building. Mapping concrete compressive strength value into the membership function can remove inaccuracy in determining condition rating from each concrete compressive strength value resulting from in situ testing, especially for concrete compressive strength values near the condition rating boundary points [22,23]. Condition rating value can portray a building's performance. Condition rating values are not directly proportional to a building's age. A building that is designed and implemented according to the existing rules is used according to its intended function. It is also regularly maintained along with its usage, which yields a higher condition rating.

Table 7. Building B condition rating assessment.

Element Number	Test Results		i_n		$\mu_{f'c,in}$		CR_{se}	w_{se}	*BCR*
	$f'c,in$ (MPa)	$r_{f'c}$	Upper Bound	Lower Bound	Upper Bound	Lower Bound			
Zone 1									
1	33.17	1.00	-	1	-	1	1	1	
2	28.39	0.86	2	3	0.48	0.52	2.52	1	
3	31.27	0.94	1	2	0.20	0.80	1.80	1	
4	29.88	0.90	2	3	0.80	0.20	2.20	1	
5	29.88	0.90	2	3	0.80	0.20	2.20	1	
6	29.88	0.90	2	3	0.80	0.20	2.20	1	
7	28.56	0.86	2	3	0.48	0.52	2.52	1	
8	28.43	0.86	2	3	0.48	0.52	2.52	1	
9	30.38	0.91	2	3	0.88	0.12	2.12	1	2.30
10	26.89	0.81	2	3	0.08	0.92	2.92	1	
11	26.89	0.81	2	3	0.08	0.92	2.92	1	
12	28.39	0.86	2	3	0.48	0.52	2.52	1	
13	28.39	0.86	2	3	0.48	0.52	2.52	1	
14	29.64	0.89	2	3	0.72	0.28	2.28	1	
15	29.88	0.90	2	3	0.80	0.20	2.20	1	
16	29.88	0.90	2	3	0.80	0.20	2.20	1	
17	30.17	0.91	2	3	0.88	0.12	2.12	1	
18	28.05	0.84	2	3	0.32	0.68	2.68	1	
Zone 2									
1	35.86	1.08	-	1	-	1	1	1	
2	34.28	1.03	-	1	-	1	1	1	
3	37.35	1.13	-	1	-	1	1	1	
4	35.86	1.08	-	1	-	1	1	1	
5	35.86	1.08	-	1	-	1	1	1	
6	28.30	0.85	2	3	0.40	0.60	2.60	1	
7	31.29	0.94	1	2	0.20	0.80	1.80	1	
8	29.88	0.90	2	3	0.80	0.20	2.20	1	
9	28.61	0.86	2	3	0.48	0.52	2.52	1	
10	34.28	1.03	-	1	-	1	1	1	1.65
11	31.29	0.94	1	2	0.20	0.80	1.80	1	
12	28.39	0.86	2	3	0.48	0.52	2.52	1	
13	35.86	1.08	-	1	-	1	1	1	
14	35.86	1.08	-	1	-	1	1	1	
15	29.14	0.88	2	3	0.64	0.36	2.36	1	
16	35.86	1.08	-	1	-	1	1	1	
17	31.29	0.94	1	2	0.20	0.80	1.80	1	
18	31.29	0.94	1	2	0.20	0.80	1.80	1	
19	26.89	0.81	2	3	0.08	0.92	2.92	1	
Zone 3									
1	34.28	1.03	-	1	-	1	1	0.5	
2	34.28	1.03	-	1	-	1	1	0.5	
3	34.28	1.03	-	1	-	1	1	0.5	
4	28.39	0.86	2	3	0.48	0.52	2.52	0.5	
5	32.79	0.99	1	2	0.87	0.13	1.13	0.5	1.93
6	34.28	1.03	-	1	-	1	1	0.5	
7	28.39	0.86	2	3	0.48	0.52	2.52	0.7	
8	26.27	0.79	3	4	0.94	0.06	3.06	0.7	
9	26.05	0.78	3	4	0.88	0.12	3.12	0.7	
10	31.29	0.94	1	2	0.20	0.80	1.80	0.7	
							Whole *BCR*		1.96

4. Conclusions

This research proposes an assessment method with a condition rating scale and reference that can be measured quantitatively, and can be applied to perform concrete damage condition rating assessment based on testing on the existing upper building structure. Condition rating scale consists of five ratings that can portray building condition, from best, to worst–in which case the building cannot be used anymore. Each rating is the boundary by a ratio value between the in situ concrete compressive strength value and the design concrete compressive strength value. The determination of condition rating on each testing point on the structure element is processed using the fuzzy logic approach, where condition rating is determined based on membership function. This method can decrease inaccuracy in determining concrete condition rating on the condition rating boundary value. The condition rating is also determined based on concrete testing results with a higher reliability rating so that the resulted method can minimalize the risk of determining a higher condition rating than appropriate to avoid building collapse. The building condition rating (BCR) is determined by considering the critical weight of each structure element against the building structure as a whole. The assessment method can be used to determine BCR in a detailed manner for condition rating per testing point, condition rating per structure element, condition rating per floor, condition rating per zone, and condition rating of the building as a whole. This can also anticipate building collapse caused by the poor condition of part of the building structure.

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