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8th WMCAUS 2023

8th

WORLD MULTIDISCIPLINARY CIVIL ENGINEERING - ARCHITECTURE - URBAN PLANNING SYMPOSIUM

ABSTRACT BOOK

4-8 September, 2023 - Prague (Czech Republic)

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Preface

This is the Abstract Collection of 8th WMCAUS 2023 and consists of the abstracts of oral and poster presentations in the "8th World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium" in the city of romance Prague (Czech Republic) during 4-8 September 2023. The World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium (WMCAUS) aims to provide a forum for discussion of the latest findings and technologies in different fields of Civil Engineering, Architecture and Urban Planning, to give opportunities for future collaborations, to be a platform for sharing knowledge and experiences in the fields of Civil Engineering, Architecture and Urban Planning, to lead for providing a forum for early career researchers for presentation of their work and discussion of their ideas with experts in different fields of Civil Engineering, Architecture and City and Urban Planning such as; Construction Management and Engineering, Construction Materials, Geotechnics, Hydromechanics, Structural Engineering, Building Performance Simulations, Transportation, Architectural Space, Social Sciences and Architecture, Architectural Culture, Theories of Vision and Visuality, Architectural Design and Methods, Architectural Historiography, Architectural Heritage and Conservation of Historical structures, Sustainability in the Built Environment, Urban Planning, Public Space, Urban Design, Theories and Methods, Regional Planning, Archaeological Method and Theories, Sustainable Urban Development, Urban Sociology, Economics and Politics, Risk Management and Mitigation Planning, GIS-Based Modelling for Mitigation Planning, Computer Aided Design, Mathematical and Statistical Methods, Integrated Coastal Zone Planning and, Management, Accreditation of Civil Engineering, City and Regional Planning Education.

The main mission of the "8th World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium - WMCAUS" is to lead to contribute in multidisciplinary studies related with Civil Engineering, Architecture, City and Urban Planning and to improve interactions between people within these fields. As another mission it will provide a forum for this diverse range of studies which report very latest results and document emerging understanding of the related systems and our place in it.

We would like to express our sincere gratitude to almost 400 submissions to WMCAUS 2023 from 50+ different countries all over the world for their interests and contributions in WMCAUS 2023. We wish you enjoy the 8th World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium – WMCAUS 2023 and have a pleasant stay in the city of romance Prague.

We hope to see you again during next event "9th World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium - WMCAUS 2024" which will be held in Prague (Czech Republic).

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ABSTRACT

COLLECTION

DETECTION OF MOVEMENT RESISTANCE AND FRICTION COEFFICIENT IN THE TRANSPORT OF BUILDING MATERIALS AND CONSTRUCTION MATERIALS

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ABSTRACT

In the production of building materials and construction materials, continuously operating conveying equipment is commonly used, including roller conveyors. Roller conveyors are devices designed for horizontal, slightly ascending or descending transport of piece products moving on a system of rotating rollers of different shapes (cylindrical, conical, disc, pulley or according to the profile of the conveyed object). The rotating rollers are placed in the track frame (supporting structure), which can be either stable, relocatable or adjustable (height and length adjustable, so-called scissor conveyors). An analogue of the roller conveyor is the pulley conveyor, where instead of rollers, discs - pulleys are mounted on a non-rotating axis. Several discs are installed on the axis with gaps. The pulleys on adjacent axes overlap so that there is no continuous gap. The track is used for handling flat building parts and objects such as metal sheets, glass panes, furniture parts, etc. When transporting item building materials or bulk building materials placed in storage boxes which are transported on a powered roller track on pallets, a driving force is required depending on the angle of inclination of the roller track, the weight of the load, the number of rollers on which the load rests and the coefficient of shear friction during movement. The paper presents a laboratory device that has been designed to detect the adhesion force during the transport of piece loads by a roller conveyor. On the implemented device, it is possible to determine in laboratory conditions the amount of resistance to the movement of the load on the driven roller conveyor depending on the weight of the load. The paper presents measured values of the shear friction coefficient during the movement of a steel storage box on a driven roller track. In this paper, a driven roller track is used for laboratory tests, where the drive of the rollers is implemented by so-called short chains. In addition to horizontal tracks, this chain drive allows you to drive rising tracks with variable gradients or even rising curved tracks.

THE GEOMETRIC SHAPE OF THE TRANSPORTED MATERIAL BATCHES IN THE VERTICAL BRANCH OF A BELT CONVEYOR

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ABSTRACT

Loose materials, whether natural or artificial, must be handled in various areas of industry both in the horizontal and vertical planes. The requirement to transport the necessary volume or weight of material quantity to a specific offtake point places demands on the optimal selection, perfect design and precise implementation of the transport equipment. Of the whole range of continuously operating transport equipment, belt conveyors are the most widely used type for the transport of loose materials in practice. Despite a number of advantages, belt conveyors also have some shortcomings, among which a limited inclination angle for transport can be included, if a conveyor of standard construction is used as a load-bearing element. Transport above the limit angle of transport inclination provided using belt conveyors can be done in several ways. If we omit the methods based on an increase in the contact force of the transported material in relation to the surface of the conveyors belt and increase in the coefficient of friction, we will focus only on the method based on the principle of preventing the movement of the transported grains on the surface of the conveyors belt. This principle uses transverse cleats that prevent the movement (sliding or rotation) of material grains along the entire length of the conveyor belt, which is inclined at a high angle to the horizontal plane. Material grains are transported on the surface of a conveyor with cleats, distributed with a regular spacing along the entire length of the endless loop of the conveyor belt. To prevent material grains from falling of such a belt, corrugated sidewalls are fitted on both edges of the conveyor belt. This paper describes two variants that take into account the mutual position of the cleats in relation to the corrugated sidewalls. For each of the variant, the relationship is given with which it is possible to analytically quantify the volume of the bulk loose material batch that is spread over the area of the cleat in the vertical section of this conveyor belt design. The results of the measured values concerning the height of the loose material pile that were taken using laboratory instruments are listed in the tables and compared with the theoretically calculated values. Key data that must be known to calculate the pile height, and the volume of the transported material batch represent the exact value of the angle of repose for the loose material. The angle of repose of a particular loose material does not acquire a constant size, as it changes from its maximum (static angle of repose) depending on the shaking, flattening or absorbing liquid to its minimum (surcharge angle). The paper presents geometric shapes of batches for the transported material used for both limit values of the angle of repose.

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SEISMIC VULNERABILITY OF HISTORICAL STRUCTURES IN MARRAKESH CITY

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ABSTRACT

The 1755 earthquake is one of the most documented seismic events in the history of the region and destroyed several cities in Morocco, including Marrakech. In 2020, this last city was considered the capital of culture in Africa, as the city abounds in historic buildings such as: mosques, museums, palaces, etc, It is also considered the tourist capital of Morocco. Therefore, we need to evaluate the seismic vulnerability of these historic buildings. The purpose of our study is to assess the seismic risk of historic buildings in Marrakesh city. Menara Pavillon, Koutoubia Mosque, El Badîi Palace are among the monumental structures identified for this study. We considered the Vulnerability Index Method (GNDT), which is based on structural, architectural-artistic, urbanistic, social-economic parameters, and adapted it to the Moroccan and Islamic structural and architectural context. Vulnerability indices range from 0 (low vulnerability) to 1 (high vulnerability), while damage indices range from slight to total collapse. The 1755 earthquake is considered as a deterministic scenario for the seismic hazard assessment. Our findings had revealed that the expected damage for the Dar El Basha Museum , the Koutoubia Mosque and Menara Pavillon is moderate while the vulnerability index is between 0.67 – 0.73. This study aims at highlighting important aspects of the seismic performance of historic structures in order to avoid future earthquake damage.

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SCHENGEN RAILWAY BORDER OF EUROPEAN COMMUNITY AND CONNECTION POINTS

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ABSTRACT

The paper aims to study and present the actual railway connections along the West and South Romanian border, being also the East European Community border and Eastern European Community Schengen border, with neighbours Hungary, Serbia and Bulgaria. In the introduction of the paper, are presented the two corridors designed in Strategy for Mobility and Transport of European Community: the Orient/East – Mediterranean Corridor and Rhine – Danube Corridor, that are passing thru Romania. The second part of the paper is allocated to the punctual railway connections that existed and exists along the western and southern border that are active, can be activated and used as gates and passing points for freight and passengers trains using a high capacity of transport on a green transport infrastructure that is more and more used for all medium long and long routes. Finally, the campaign that Romanian Railway Administrator – CFR S.A is developing on border points is taken into account.

MODAL ANALYSİS OF LAMINATED COMPOSITE CYLINDER UNDER AXIAL TENSION LOADING IN ANSYS

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ABSTRACT

Static and vibration analysis of laminated cylindrical shells under various loading conditions is important research area because they are widely used as a structural element in civil, marine, aeronautical, and mechanical engineering. However, laminated construction has lower damage tolerance level. During operation external mechanical loads repeated cyclic stresses, and impacts lead to damage in laminated composites due to their low delamination resistance. Application of structural health monitoring and damage detection in composite engineering structures has become one of the most important keys in maintaining the integrity and safety of modern engineering structures, together with possibility to reduce operational costs. This study is part of the project for developing the technologies for structural health monitoring (SHM) of serial structures, using the methods of operational modal analysis. Use of piezoelectric films as sensors allows to create a modal passport of working structure and observe changes during operation. One of the monitoring problems is the influence of static load on modal parameters that may cause false alarm or target miss. In the present research a preliminary numerical investigation of the vibrations of a laminated composite cylinder that is vertically oriented and fixed at the top end of the special test bench under axial tension loading. In the natural testing the static load will be carried out by hanging the basket with appropriate number of weights to the bottom flange. Before the experimental test of composite structures, the effect of static loads was studied numerically by means of the ANSYS finite element program. The cylinder has diameter 300 mm and its wall of 1.45 mm is formed by eight layers having fibers orientation ±45º to alongside axis. Two wood discs were inserted into both ends of cylinder to give the structure rigidity. The upper load limit is 5000 N. 3D Finite element model of a closed composite cylinder was built using ANSYS16.0 software. The material properties used in modelling of composite cylinders were involved by the numerical-experimental method for determining the mechanical properties of a laminated composite material. The procedure for performing a modal analysis of a prestressed composite structure in the ANSYS finite element program is concerned with the influence of the initial stress from the tensile force on the dynamic response of the structure. The numerical result showed the dependence of natural frequencies of the model on the axial load, but there are minimal effects of natural frequencies between loaded and unloaded structures.

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DEFINITION OF INDICATORS FOR THE ASSESSMENT OF THE STRUCTURAL CONDITION AND RIDING COMFORT OF CYCLE PATHS

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ABSTRACT

In Germany, the importance of bicycles for everyday mobility has increased significantly in recent years and, in the course of the desired mobility turnaround, is to be raised even further. In order to increase the attractiveness of cycle traffic, the provision of safe cycle paths in good structural condition is essential, along with the expansion and new construction of cycle infrastructure. Against this backdrop, the Federal Ministry of Digital Affairs and Transport has been funding the research project "Recording and Assessment of the Structural Condition of Urban Cycling Facilities" (Erfassung und Bewertung des baulichen Zustandes von städtischen Radverkehrsanlagen) since September 2021. FH Aachen is collaborating with Schniering GmbH and the engineering office Feiler und Hänsel GbR on the development of a suitable measurement and assessment procedure. As a first step, an investigation into previously utilised methods for recording and assessing the condition of cycle paths was conducted. The results showed that different recording methods are being used nationally and internationally, which can be divided into visual and metrological techniques. Visual recording of the condition of cycle paths involves surveying the damage by walking along the length of the cycle path and inspecting it. The visual image-based recording of the condition is a further development here, with the evaluation of images or video recordings taking place in post-processing. Metrological recording methods use measuring bicycles and measuring vehicles equipped with sensor and camera technology. The assessment of the condition of the cycle path is carried out on the basis of various physical parameters. There is now a very wide range of recording techniques, which makes it quite difficult to compare the results. In addition, the methods used are very much based on established procedures for assessing the condition of roads. The damage characteristics on cycling facilities as well as their effects on traffic safety and riding comfort, however, can only be compared with roads to a limited extent. In the research project, structural assessments of cycle paths and developed a damage catalogue for urban cycling facilities were conducted. In order to be able to better assess the usability of cycling facilities, driving dynamics considerations of cycling were carried out. All relevant types of damage can be classified into the feature groups of evenness, surface damage, vegetation, geometry, skid resistance and rolling resistance. Based on the results, requirements for the measurement technology were defined. The conception of a measuring vehicle by the project partner Schniering GmbH is almost completed. This measuring vehicle is to be tested on various urban cycling facilities this year. With the condition indicators defined in the research project, an assessment procedure is being developed in order to be able to assess the usability as well as aspects of traffic safety and the structural condition of urban cycling facilities. The long-term goal is to create a standardised assessment procedure for cycling infrastructure in order to be able to conduct condition analyses as well as derive maintenance requirements and suitable maintenance measures.

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THE PARADIGM OF THE DIACHRONIC GREEK STILT HOUSE TYPE AS AN ANSWER TO THE CLIMATE CHANGE

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ABSTRACT

As a matter of fact, climate change is transforming the contemporary way of building. Stilt houses constitute another yet glamorous mystery of prehistoric "small/big world". It is about permanent human constructions in water areas (usually lakes or lagoons), that is a civilization which has been created and developed having as a special characteristic the water element. Even though, the first stilt houses have been appeared 8.000 years ago, people live up to now, in such a dwelling type, located on shallow water areas such as seaside, lakes or rivers worldwide. In Greece, the first stilt settlements appeared in the Neolithic era, about 5.000- 3.000 B.C., and only one of them has been excavated. Additionally, the later stilt settlements in Mesologgi lagoon area, are also important. These dwellings' stilts are not nailed down to the deep sea, but they are knit with bulrush and constitute a floating construction on the water. Nowadays, stilt or floating architecture is linked to the usable land's deficiency for building structures, which due to residential evolution, economic growth and transportation, belongs to the most important environmental pressures on landscapes worldwide, especially in urbanized areas. According to climate change progress and temperature increase, the sea level rises as ocean ice melts day by day. So, usable land in urban areas will be limited due to the continuous development expansion for residence. Concluding, the stilt house type which appeared in water settlements for the first time, in lakes and lagoons areas in Greece during the Neolithic era, and later in Mesologgi lagoon, is the type of residence, which is going to be used worldwide, as an answer to the climate change and the environmental damage.

HERITAGE AND PUBLIC SPACE; QASR AL-HOSN PLAZA IN ABU DHABI – RETHINKING URBAN SPACE

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ABSTRACT

Public spaces in Abu Dhabi have become part of the city's regeneration program as it manifests an interest in reviving its existing heritage within its living urban fabric especially in the downtown area. The Site of Qasr Al-Hosn had been closed for almost a decade undergoing renovations, and its recent opening as a public space in 2019/20, highlights that plazas are becoming important and represent a complex space especially in Gulf State Cities. They comprise new economic, social, architectural, urbanistic and symbolic dimensions. In Abu Dhabi as in many Gulf capital cities the choice between modernity and tradition and the search for a modern Arab style that integrates Gulf heritage is a challenge for contemporary architects. The creation of new urban plaza around Qasr Al-Hosn (1793) and the Cultural Foundation, by the Danish Company 'Cebra Architecture' reintroduced a new urban layer and public spaces to Abu Dhabi's Downtown area. The new Plaza emphasizes the duality of existing layers of urban history and attempts a reconciliation between new translations of desert landscape and the oldest existing monument in Abu Dhabi—Qasr Al-Hosn. This was achieved through dividing the site diagonally into contrasting landscapes, a plain open desert landscape created around Qasr Al-Hosn. It reinstates the symbolic meaning of the monument as a free-standing landmark with unobstructed views. A tribute to its existence in the desert sands before the Modern city of Abu Dhabi evolved. The paved and structured area with selected trees and water features around the Cultural Foundation creates a juxtaposition and contrast between a desert landscape newly introduced within the Modern city grid and its existing building stock. Abu Dhabi is currently undergoing urban changes that reshape the image of the city on a socio-cultural level through the creation of iconic imprints including heritage structures. Qasr al-Hosn, the oldest remaining building of Abu Dhabi's tangible heritage, the cultural foundation and existing mosque are being decontextualized so as to revive communal interest in the most important site in the Down town area. The new public space around Qasr Al-Hosn and cultural foundation represents an example of critical compromise between regional precedents and modern strategies of urbanism and landscape architecture. Here Public Space regeneration is focused on the role of culture, perception and creation of new experiences. This process of re-composition of the characteristics of public space reflects multiple readings of existing spaces and existing building stocks in the living city. In order to understand alternative ways of critical interaction between regional material culture and contemporary design practices it is essential to examine the complex layers of Qasr Al-Hosn Plaza and its surrounding urban context. This research examines the process of interaction and adaptation within urban space that emphasizes the two-way nature of Heritage and the Modern City.

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SUCEAVA DURING THE HABSBURG RULE - URBAN DEVELOPMENT AND IDENTITY COMPLETIONS

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ABSTRACT

This paper is part of the doctoral research concerning the places of sites and church towers in the development of urban patterns in the city of Suceava. For this article, we will dwell on the 18th and 19th century, when, in 1755, Suceava became a Habsburg territory, being part of Bucovina, an area that included the North-East of Moldova. This situation was maintained for a century and a half, Suceava also fulfilling the role of an Austro-Hungarian border town. In this period we can also mention an urban development of the city, a period that left numerous institutional buildings representing the new power. This impressive buildings are, as they follow: the Suceava Prefecture and the Suceava County Council (City Administrative Palace, completed in 1903-1904 and which originally housed the city administration, the police, the fire brigade, a savings bank and the history museum), Bucovina Museum (which includes the Seat Citadel of Suceva, the Museum of History, the Museum of the Bucovinian Village, the Museum of Natural Sciences, the Ethnographic Museum "Hanul Domnesc", the "Simion Florea Marian" Memorial House and several other buildings located outside the municipality) - initially the seat of the District Headquarters, dating from 1902-1903, Ștefan cel Mare National College (The Greek-Oriental Gymnasium, built between 1893-1895 on the site of the old Wood Market), the Old Hospital (General public home for the sick from Suceava, built in the period 1891-1903), the old Suceava Water Plant and many others. Also in these years, the city is equipped with construction equipment (for example, in 1908, the Electric Plant is commissioned), modernizations specific to modern times. A major interest was the establishment of modern institutions, characteristic of the Habsburg administration.

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DEVELOPING AN INTELLIGENT DECISION SUPPORT SYSTEM FOR MARBLE SELECTION IN ARCHITECTURAL SPACES

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ABSTRACT

Architectural design decisions might be considered as multilevel decision process in which a different and multiple variables should be taken into consideration. Among multiple variables the designer might decide for the priority of cost as an important variable, while other designer might refer to durability as his base decision variable, then other influential variables follow therefore. In a simple small design project, the architect finds himself facing hundreds of decisions to be manipulated with the awareness of the mutual influence of such decisions upon each other. The finishing phase is of great importance in the journey of realizing architectural projects, and for a single item in the finishing process, arises many questions in this regard: cost, durability, life cycle, maintenance, and beauty just to mention; so how the designer should qualify his strategy of decision making regarding materials selection. In this article, the researcher will develop a decision support system that might help the designer to select marble for indoor architectural spaces based on multi-dimensional criteria: design preferences, function, considering as well the many other variables that intersect with each other. The concept of such decision support system is based upon a database as a storage data for the system, and a subsystem of weighting factors, and finally an algorithm that develops decisions based on a benchmark preference variable. The system will be able to make decisions once an input preference choice is adopted. A list of multidimensional matrix of marble characteristics will be developed, classified, and coded. Then, a set of designer's conceptualization themes will be coded. A list of functional parameters for each architectural space will be taken as reference base points, and finally a moderator algorithm will compute and develop a decision based on the multi-dimensional dynamic interaction matrix. The research concludes that such decision support systems will help the researcher and the architect selecting a specific building material, (marble) in this case following different scenarios and adopting the best decision. A further development might include environmental impacts database that influence the decision to be taken as another dimension in the evaluation matrix.

ANALYSIS OF THE COLD RECYCLING ASPHALT PAVEMENTS METHOD FROM ROMANIA

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ABSTRACT

The present paper presents a documentation on the realization of the dosages from recycled mixtures, highlighting the change in the test methods regarding the composition and the determination of the physical-mechanical characteristics according to the latest technical regulations. Practically, the structure of the new norm for cold recycled road materials aligns with the new European requirements in accordance with the provisions that the mixtures must meet, but still the problem remains on how to prepare the samples in the laboratory and determine the value of the stiffness modulus of the considered mixture, value which practically in the norm is considered based on good practice. Determining the real value of the stiffness modulus is a decisive factor in the dimensioning of the road structure reinforcement because it can considerably influence the thickness of the layers that make up the resistance structure. Therefore, the paper presents a study on the new methods of making samples in the laboratory and values of the stiffness modulus taken into account when dimensioning the reinforcement of road structures according to the composition of the considered materials.

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COMPARATIVE ANALYSIS OF THE RESPONSE OF THE ROAD STRUCTURE WITH FULL/PARTIAL INTERLAYER CONNECTION TO TRAFFIC ACTION

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ABSTRACT

This paper investigates the response of the road pavement of a road sector analyzed to the action of traffic that was determined numerically by using two dedicated software. In this respect, the Romanian program CALDEROM 2000 (PD 177, 2001), respectively the French program for calculating the road pavements ALIZÉ-LCPC (ALIZÉ-LCPC, v2 and v1.5) were used. Both programs use the Burminster elastic model for the analytical evaluation of stress states and specific deformations in multilayer road pavements. However, unlike the CALDEROM 2000 program, the ALIZÉ-LCPC software allows the user to define the interfaces between layers and switch loads from single axle to multiple loads, being a rational method, based on the determination of the resilient stresses and deformations in road structures by using the classical linear elastic multilayer model. The aim of this study was to determine whether the road pavement with deficiencies of adhesion between layers is able to take over the calculated traffic considered in the project, possibly the proportion of calculation traffic that can be taken over, which would allow an assessment of the capable operation life of the road pavement and, implicitly, of the possibility of its yielding before the end of the perspective period considered.

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ANALYSIS OF THE CHOICE OF THE METHOD FOR THE ELABORATION OF DOSAGES FOR AN ASPHALT MIXTURE

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ABSTRACT

The purpose of this paper is to perform an analysis regarding the choice of a method for designing a dosage of an asphalt mixture. There have been concerns in the field of asphalt mix dosing since 1920 when Field and Hubbard introduced the impact compaction with the Proctor hammer for laboratory testing. Later, Marshall introduced the method that bears his name and which remained the most used method for determining the asphalt mixture dosages in Romania. Since it was found that the density of the samples obtained in the laboratory did not correspond to the density of the cores extracted from the compacted asphalt layers, the gyratory compaction was introduced, which is now frequently applied in the USA and other European countries. The study presented in this paper deals with the problem of establishing the mixture of aggregates, filler and bitumen in terms of the volumetric method (Superpave) and Marshall method, presenting both theoretically and experimentally the dosage study of an asphalt mixture type BA 16 (asphalt concrete with maximum grain size of 16 mm) but also the physical-mechanical characteristics obtained following the application of the two methods for determining the dosage for the studied BA 16 type asphalt mixture.

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USING POST-OCCUPANCY EVALUATION TO ANALYZE THE EFFECTIVE USE OF PHOTOVOICE AND FOCUS GROUPS IN DEVELOPING A SUCCESSFUL DESIGN PROGRAM FOR INTERNATIONAL EDUCATION PROJECTS

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ABSTRACT

Architectural programming has always been an integral part of building design and design education. Before the Pyramids or the Parthenon or the Pantheon were built, someone gathered information about what would go into designing and building these projects. Architectural programming has transformed over the centuries but has always maintained its importance in helping the project owners and architects to understand the scope of the project and to know what needs to be included in its development, from building layout and use, to design detailing, systems development, and materiality. In developing an architectural program for an other-culture educational studio project, the author introduced two participatory action research methodologies, photovoice and focus groups, to be used by the students in helping them better understand how important cultural influences are in the success of designing an educational facility in that culture.These research methodologies were used in the service-learning courses, run through the University of Oklahoma College of Architecture in 2014, 2015, and 2016, in Lusaka, Zambia. These courses developed three different projects for an American ministry located there. One was a village for 1,500 homeless children. One was a primary school for 1,200 compound-based students. The final project was a high school for 1,500 compound-based students. The project used for this study was the primary school because it was built and was being used for its intended purpose at the time of this study. In 2018 the author went back to Zambia to evaluate the primary school by developing a post occupancy report also using focus groups with the teachers, administrators, and students to gather information for the report. This paper will evaluate the success of using participatory research methodologies like Photovoice and Focus Groups in developing the design program used by the architect for designing the Chianda Primary School. The Post Occupancy Evaluation report showed that the program developed using these methodologies was successful and that much of the key cultural information needed to make this school function properly, was identified and included in the design program because of this process.

LEGAL ANALYSIS OF THE PROBLEMATIC ASSOCIATED WITH IRREGULAR URBANIZATION OF THE COUNTRYSIDE IN CHILE

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ABSTRACT

Population growth has led to the increase of the urbanization of the countryside, which can become a problem if not regulated properly. This can lead to the creation of new urban cluster and the subsequent use of large areas of agriculture land. Therefore, it is necessary to have a strong and clear legal framework that can adequately regulate and protect the countryside and rural areas. This paper studies the Chilean public and administrative laws that regulates the creation of new rural residential plots and the mechanism that are employed by private for sale and construction of illegal rural residential plots and urban cluster on the countryside. For this purpose, it was initially identified the different urbanization policy and permits that allows the rightfully creation of new parcel and urban clusters on the countryside, and the different governmental entities that have jurisdiction of this process. Later it was analyzed the jurisprudence though the study of emblematic cases; two penal process, two civil cases, and two administrative proceedings. As a result, it was determined that the main methods and mechanisms used by private and enterprise for the illegally subdividing rural plots of land and the creations of rural residential plots. The main mechanism employed by sale of rights to a percentage of the rural residential plot and/or the inadequate interpretation of a law used for the regularization of the site after five years construction (DL 2695/1979). As a result of these irregularities, it was possible to observe that the urbanization projects are located on exclusive agriculture land and in some cases areas that where declare as risk areas. Therefore, this housing complex don't have construction permits, municipal reception and unauthorize utilities. As a result, these urbanizations don't possess the minimal required by the national standard, are considered as unauthorize urbanization, and cannot be register with the real estate registrar, therefore the individual doesn't own the property.

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ANALYSIS AND CHARACTERIZATION OF THE ILLEGAL DUMPSITE LOCATED IN THE MUNICIPALITY OF EL BOSQUE

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ABSTRACT

Fly tipping or illegal waste dumping is a serious environmental and economic problem for the community's world wild. In Chile is estimated that more than 3.735 illegal sites exist and 931 are in the Metropolitan Region, and the majority of this sites are in socially vulnerable communities. According to Chilean law, municipalities are responsible for the clean-up and must design policies to avoid the proliferation of these waste sites. This study reveals the existence of 46 micro-dumpsites in the Municipality of El Bosque. The research focus on the composition and characteristic of each of the micro-dumpsites, determining the urban environment surroundings, size, and composition. Each site was georeferenced and divided into two categories, which dictated the method used for measuring the site volume. Afterward, the composition of each site was determined by visual inspection and photographic records, and in parallel the urban environment was recorded. As a result of the study, it was determined that 19,6% of the dump site had a reoccurring volume of over 4 m^3 and the largest volume recorded was 32,7 m^3. The median of Padre Hurtado avenue stands out, due to the constant fly tipping along its axis. The municipality estimated in the year 2022, the total volume recollected in the median of the avenue was approximately 1134 m^3 or 170 truckloads. With respect to the principal constituent found in each site were plastic bags and food packaging (100%), paper and cardboard (96%) and followed by construction debris (88%). With respect of the urban environment the principal factor surrounding the dump site were main road (52%), non-residential plot (48%), and near commercial centers or industries (46%). As a result of the study the municipality has implemented an interdisciplinary approach to reduce and eradicate the fly tipping and eliminated the number of dumpsites in the community.

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SMART CITY CONCEPT AND PUBLIC MASS HOUSING. REVIEW OF POLICIES AND SOLUTIONS

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ABSTRACT

According to the Institute of Data Policies in Slovakia, in the most densely populated 10 km2 (0,02% of its land, all of these areas are mass public housing areas) of Slovakia, 3% of its population (roughly 150,000 citizens) are located. Within this sample, the ageing index is positive, 85% of people are economically active and nearly 25% of population has university education. This shows that public mass housing developments built in the second half of 20th century is still a desirable location for skilled people who can choose where they reside and start their family (similarly to the situation in New Belgrade or other similar typologies of housing). However, from objective reasons, the built environment of these locations needs refurbishment and pose a great challenge for spatial planning in the whole CEE region. One of the leading development concepts at the moment, smart city, understood from holistic perspective as a way how to efficiently use the resources (smart use of resources, smart economy and smart community), provides various perspectives on how to deal with these specific mass housing projects. Smart city concept brings various ways to perceive housing policies and provides interventions for improved efficiency of energy use, better standards and increased quality of life for inhabitants. The objective of this contribution is to examine the potential of smart city concept and smart solutions for improving the quality of life in these mass housing projects and review the smart city solutions applicable to this specific typology of housing.

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GIS-BASED DECISION SUPPORT TOOL FOR EVIDENCE-BASED POLICY MAKING FOR BIODIVERSITY PROTECTION

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ABSTRACT

Geographic Information Systems (GIS) based decision support systems can play a crucial role in protecting biodiversity in spatial planning. These systems use spatial data and analytical tools to help decision-makers identify areas of high biodiversity value and prioritize conservation efforts. By integrating data on species distribution, habitat suitability, and land use, GIS decision support systems can also identify potential threats to biodiversity and assess the impact of different management scenarios. Additionally, GIS decision support systems can be used to monitor the effectiveness of conservation efforts and identify areas where additional action is needed. GIS decision support systems provide a powerful tool for integrating biodiversity considerations into spatial planning and can help to ensure that conservation efforts are targeted to where they will be most effective. In the area of biodiversity protection, we are also faced with two phenomena: (1) overflow of data and information from various countries and areas, supported by open data policies and technical solutions (e.g. GIS) for producing and storing copious amounts of data; and (2) challenge to navigate in the data and incompatibility of data due to various methodologies, scales etc. For policy makers it is increasingly difficult to produce evidence-based policies as it is relatively easy to find arguments to support multiple attitudes and measures. The aim of this paper is to present two tools produced by Interreg DTP SaveGREEN and ConnectGREEN Projects aimed at fostering evidence-based policy making in the field of biodiversity protection. The first tool, CCIBIS, is a web-based portal presenting various items of biological and environmental information about the Carpathian Ecoregion. This information helps stakeholders to understand the status quo and foresee the conflicts in land use and future investments. This tool is using open-source software and aims to comply with international data standards regarding the data accessibility and quality of metadata. The second tool is Decision Support Tool, an interactive GIS-based support tool prepared as a help mainly in the pre-planning phase of the decision-making process about new investments in the territory. Objective of both of these tools is to help nature conservationists and spatial planners to provide evidence for policy makers in the policy making preparation processes aimed at protecting the biodiversity of Carpathians.

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SENIOR-FRIENDLY CONCEPTS IN SPATIAL PLANNING OF CITIES

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ABSTRACT

The article focuses on the phenomenon of population aging and the application of senior-friendly concepts in spatial planning of cities. With the current trends of population aging and the shifting of the age limit for active aging, it is important to focus on the most vulnerable groups of citizens who, in a rapidly changing world, face the threat of loneliness and isolation due to the degradation of physical or mental health, social or cultural isolation, physical barriers, technological and communication barriers and the like. The center of interest of the article is mainly about seniors, with an indication of possible overlaps towards the needs of other vulnerable groups (persons with physical or mental disabilities, persons with sensory disabilities - deaf, blind or visually impaired people, homeless people, socially excluded groups, children and their accompanying persons, etc.) - especially in matters of urban safety, quality of public space, availability of services, social inclusion and the like. When creating development policies, cities apply different individual approaches to the issue of aging, bringing a diverse portfolio of tools and interventions applied in practice. Theoretical interpretations of approaches to spatial planning concepts, which can be collectively labeled as *senior-friendly*, are also diverse. Based on the review of existing theoretical and practical concepts which could be commonly denominated as *senior-friendly*, the article is aiming to provide insight into the current state of the issue and at the same time to indicate possible interpretations of the term *senior-friendly* for the needs of theory and practice in spatial planning. From a broader perspective, the article also notes the terms "social (or solidarity) economy", "silver economy" or "social innovation". The article points out the importance of changing the approach to aging issues within the framework of spatial planning, so that when planning the development of cities, not only do not forget the elderly and other vulnerable groups, perceived only as an aggravating object of increased costs for society (in SWOT analyzes reflected in the "threats" category), but to count them as a valuable asset that benefits the community (in SWOT analyzes projected into the "opportunities" category). It is not only economic benefits, but also cultural and social benefits, when the coexistence of generations and their alternation is accompanied by values of mutual respect, compassion and understanding, awakened in children from their early age. It is a paradigm shift in the perception of terms like success, abundance, quality of life, the value of landscape, the value of a human being, the meaning of life, etc., and their projection into the center of interest of spatial planning, with an emphasis on a harmonious relationship of a person of any age with other people and the landscape.

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FUNCTIONAL ASSESSMENT OF LONGITUDINAL ROAD EVENNESS BY THE WEIGHTED LONGITUDINAL PROFILE (WLP)

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ABSTRACT

Longitudinal evenness is one of the most important quality criteria of roads. Vehicles can be regarded as dynamic systems consisting of masses, springs, hydraulic dampers, anti-roll bar etc. They are governed by mechanical laws, i.e. when passing the road, the systems respond to the unevenness with vertical excitation. The impacts are multifaceted. In addition to effects on road safety, driving comfort and pavement loading, the dynamic forces enhance the vehicle's resistance to movement and consequently the vehicle's energy demand. This in turn leads to a higher energy consumption and subsequently to an increase in CO_2 emissions in road traffic. Against this background, the quality criteria for longitudinal evenness need to be defined by the mechanical impact on drivers and road construction in order to meet the concerns of road users and public authorities. For the assessment of longitudinal evenness, several indicators are in practice. In many countries, the IRI (International Roughness Index) is used for assessment purposes as well as for acceptance of construction works. However, the IRI depends on the velocity and, strictly speaking, on the mechanical system it represents. In order to overcome these shortcomings, the WLP (Weighted Longitudinal Profile) has been developed, which can describe and assess the longitudinal evenness in a more comprehensive way. Irregular, periodic and transient manifestations of unevenness can be individually addressed, safely detected and precisely located. It takes into account the entire range of speeds and dynamic properties relevant to road traffic. During the last three years, the WLP has been comprehensively tested in the context of new construction and road rehabilitation measures in Germany. Based on these results and experiences, a practical approach for the application of the WLP in the context of road infrastructure admission has been established. The paper covers the explanation of the indicator, the relationship to vertical dynamics, the deduction of limiting values and the application to road evenness data. The results are visualized and compared to the conventional approach.

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DETERMINATION OF SIGNIFICANT FACTORS AFFECTING ON-SITE TRACKING PROCESS EFFICIENCY IN TURKISH CONSTRUCTION INDUSTRY

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ABSTRACT

The construction industry is a vital sector in the development of infrastructure and buildings. The efficiency of tracking processes at construction sites plays a crucial role in determining the success of projects and overall productivity levels. To address this issue, this study aimed to provide valuable insights into the factors affecting the efficiency of tracking processes in the construction industry and to support initiatives aimed at improving productivity and project outcomes. The research methodology of this study involved conducting a comprehensive literature review of articles published in the last 20 years, resulting in the identification of 44 potential factors under six main categories that could impact on-site tracking efficiency. These factors were then evaluated and validated through a survey of experts working in the construction industry. The survey results were then analyzed using Relative Importance Index (RII) analysis which is commonly used for determining the significance level of identified factors. The results of the survey emphasized the critical role of resource allocation, technology utilization, and communication in determining productivity levels at construction sites. The findings highlight the importance of considering these factors in the implementation of strategies aimed at improving productivity in the construction industry. The survey also revealed that factors such as low fees and payment delays, lack of construction management skills, and the use of inappropriate equipment were among the most critical issues affecting the efficiency of tracking processes. In conclusion, this study sheds light on the complexities of the construction industry and the need to address the key efficiency factors affecting the tracking processes at construction sites. The results of the survey could guide future efforts aimed at enhancing efficiency in the construction industry and improving project outcomes.

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STEEL AND GLASS FIBERS ON MECHANICAL PROPERTIES OF HIGH STRENGTH PERVIOUS CONCRETE

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ABSTRACT

Generally, pervious concrete has good permeability, but its compressive strength is lower than that of ordinary concrete. Because the porosity is inversely proportional to the compressive strength, pervious concrete pavement can only be used in low traffic areas, sidewalks, parking lots or harbor breakwaters, etc. To avoid pavement damage and cracking, in order to improve its compressive strength, flexural capacity and toughness, this study aimed at a compressive strength of 42 MPa at the age of 28 days. The research content includes adding glass fiber and steel fiber to high-strength and ordinary-strength pervious concrete, and test discuss the mechanical properties of compressive strength, flexural strength, elastic modulus, toughness, etc. The test results show that the compressive strength of high-strength pervious concrete can be improved by adding enough glass fibers and steel fibers, but the compressive strength of low-fiber content is lower than that of high-strength pervious concrete without fibers. The flexural strength of pervious concrete will also change with the increase of curing age, but the mix proportion with glass fiber or steel fiber does not have this trend. The specific gravity of pervious concrete with different fibers varies greatly. The elastic modulus of ordinary strength pervious concrete is about 50% of that of high-strength pervious concrete, while the elastic modulus coefficient of high-strength fiber pervious concrete is different. High-strength pervious concrete uses glass fiber or steel fiber to improve its flexural toughness to a certain extent, and the effect of adding steel fiber is better. After the peak strength, there is still about 30% of the bearing capacity that slowly decreases until it is completely destroyed.

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URBANIZATION AND INDUSTRIALIZATION OF SPACE IN UKRAINE: REALITIES, CHANGES AND FORECASTS FOR THE FUTURE

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ABSTRACT

The purpose of this study is to characterize the processes and changes in the urban and industrial sphere of Ukraine, evaluate new realities and justify their future forecast in spatial manifestation. The article includes the concepts: urbanization, industrialization, spatial organization and development; nature and assessment of processes, phenomena and trends in urbanization and industrialization, spatial transformations in cities and regions; forecasting urban-industrial changes and their spatial manifestation. The research was conducted on the comparison of processes, phenomena and changes in the cities and regions of Ukraine. The authors try to combine rational and irrational components, to systematically assess the impact of the processes and phenomena of urbanization, industrialization and entrepreneurship on the spatial organization and development of cities and regions of Ukraine. The state and challenges in the relationship "urbanization - industrialization (entrepreneurship)" were investigated using the five-dimensional urban planning space model substantiated by one of the authors. Ukrainian cities combine industrial, trade, transport and administrative functions. There are also highly specialized centers: industrial, transport, resort, religious, military. Cities' growth is mainly due to the expansion of the service economy. Most jobs are created in this area. Migration flows lead to changes in the composition of the urban population with a characteristic predominance of women and people of post-working age. Some Ukrainian cities have a "motley" social structure. This causes a change in population settlement within the city itself. "Values", "needs" and "activities" of man and society should be central in state development and spatial organization concept. Having a multi-level character, cities have the following properties: reproduction; cyclicality; motivations; individualization, can be real and virtual; variable or permanent; depend on the means and conditions of implementation. Communities have become the most important level of spatial planning in Ukraine today — they make decisions about activities, construction and events on their territory. This will ensure the development of the state, its regions and cities along an effective trajectory. The author's proposals can be used in the General State Planning Scheme and the Regional Planning Scheme. Reconstruction in Ukraine after the war must begin with critical infrastructure: electrical networks, roads, railway connections, gas supply, water pipelines, communication systems; schools and hospitals, provision of temporary housing who have lost it. It is important to focus on creating jobs and generating income, supporting and developing entrepreneurship, spatial and urban policy, and strengthening the energy sector. At the same time, traditional values should not be lost. Relocated enterprises will return to their "historical homeland" after the war and the stabilization of the situation - we are talking about resource- and personnel-dependent, as well as areas with high added (intellectual) value. Exceptions will be made by enterprises relocated abroad.

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TENSION ESTIMATION FOR LINKED CABLE SYSTEMS BASED ON FITTED SINUSOIDAL FUNCTION

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ABSTRACT

To release the effect of complicated boundary condition on determining accurate cable force, an innovative approach based on mode shape was proposed recently by the authors. With multiple measurements to identify modal frequencies and mode-shape ratios, it has been verified numerically and then experimentally that excellent accuracy in tension estimation can be achieved with precise fitting of half-wavelength for the sinusoidal component of each chosen mode shape. This study aims to explore the feasibility of this approach in determining the tension of linked suspenders of arch bridges. It is confirmed with finite element method that the mode shapes in each segment of the linked strands still mostly follow a sinusoidal function with a variation only observable near the boundary or linkage due to the influence of hyperbolic components. Five cases with different combinations of cable force and flexural rigidity, in which hyperbolic sinusoidal components have different levels of contribution on mode shapes, are arranged for this study. The numerical analysis results show that accurate tension can be obtained with this approach. Then, the mock-up test with linked strands in laboratory is further conducted to verify the applicability of the approach in practice. The experimental results demonstrate that the errors of computed tension are pretty small. Although the results from the numerical study and mock-up test validate that the method based on mode shape can estimate high accuracy tension of linked strand, it is particularly noteworthy that the measurements together with careful mode selection and appropriate choice in covering range of measurement are all critical to hold such a superb accuracy for the practical application on the linked suspender of arch bridges.

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AN ARTIFICIAL NEURAL NETWORK APPROACH TO PREDICT ASPHALT MIXTURES' STIFFNESS MODULUS BASED ON TESTING FREQUENCY AND TEMPERATURE

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ABSTRACT

To successfully guarantee the proper durability and serviceability of asphalt pavements, it is crucial to investigate asphalt mixtures' performance and to design an accurate model to predict their mechanical behavior. In Machine Learning, Artificial Neural Networks (ANNs) consist of a set of layered and interconnected artificial neurons capable of learning a complex function that maps the input to the target output. This study is specifically aimed at their implementation within the field of pavement engineering. The paper thoroughly discusses the development of an ANN-based methodology capable of predicting the stiffness modulus of an asphalt mixture (AM). The AM under investigation was prepared with spilite aggregate, a 50/70 penetration grade bitumen, and limestone filler. The volumetric properties of each specimen were first determined, and then the sequence of a 4-Point Bending Test was carried out under different conditions. Four testing temperatures (0, 10, 20, 30 °C) and eleven loading frequencies (0.1, 1, 2, 3, 5, 10, 15, 20, 30 and 50 Hz) were selected to investigate the asphalt mixture's mechanical behavior. The resulting stiffness moduli represented the output of the designed neural model. Prediction accuracy was evaluated utilizing several goodness-of-fit metrics, and the results of this feasibility study proved to be very encouraging. They are certainly limited to the asphalt mixture under investigation. However, the high level of accuracy suggests that trained on a larger dataset, the developed methodology could allow the AMs' mechanical behavior to be predicted without the need to carry out the conventional tests that are usually expensive and time-consuming.

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THE IMPACT OF THE ORIENTATION OF FAMILY HOUSES ON A SLOPE ON THE ENVIRONMENT

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ABSTRACT

The contribution follows on from two previous researches, which dealt with the influence of the orientation of the construction of catalog family houses from the point of view of CO2 production during their operation. The previous research was focused on family houses (orientation of windows on all sides of the world) and terraced buildings (orientation of windows on two opposite sides of the world). The contribution in question is focused on family houses on a slope with one-sided orientation of the windows, which is the final phase of the research. The research methodology in the article in question remains the same as in previous researches. The reason is objective evaluation and comparison of results. The main reason for the overall research is the fact that developers are currently trying to realize the same type of family houses (catalogue houses) regardless of which side of the world the exposed glazed areas of the house are oriented. For this reason, the approval and energy certification often do not reach A0, which is a mandatory requirement of the energy assessment of buildings from 1 January 2021. The environmental impact research compares four basic types of streets with ten identical houses. The environmental impact research compares four types of basic streets with ten identical houses. if it is a comparison of the environmental impact of the same development of family houses on a slope, with different orientations to the cardinal points and with different local houses within the streets. The benefit of the research for practice will be the formulation of principles for the orientation of transparent areas in residential construction and the formulation of urban planning principles for the siting of houses in settlements on sloping terrain, where it is possible to place windows only on the front facade. The benefit for officials at the building authorities who grant planning permission is the realization that they have to approach the same family house different ways, as long as the house is oriented to a different side of the world, as it was drawn in the project documentation.

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APPLICATION OF VISUAL PROGRAMMING WITH THE DYNAMO SYSTEM IN STRUCTURAL ENGINEERING

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ABSTRACT

This publication discusses a technology based on visual programming. This is a modern tool that mainly supports the design of building structures, as well as the entire construction process. Popular programming environments used in the architectural and construction industry are introduced, with a focus on the Dynamo program. It is one of the fundamental and frequently used programs in structural design. To best demonstrate the capabilities of this environment, examples of the practical application of visual programming in the design of both simple and more complex building structures and its integration with other modeling and calculation systems is discussed. An overview of the possibilities of using visual programming and its directions for development in the architecture and construction industry is also provided.

MANAGEMENT OF A WATER DISTRIBUTION NETWORK BY COUPLING QGIS AND HYDRAULIC MODELING: A CASE STUDY IN SOHAR AREA, OMAN

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ABSTRACT

Rapid population expansion in arid regions, the increase in water consumption, thus rendered the current network system useless due to its inability to meet the needs of consumers. Along with disasters, like cyclones the Shahen cyclone, which can destroy the infrastructure, also inadequate management strategies and improper data gathering on the geographic location of water distribution networks may make this issue worse for arid regions. Therefore, it became necessary to conduct a study of the available water resources and establish a water supply network that connects the water source near the consumer, and effectively distributes it over the area. Using a geographic information system (GIS), hydraulic modelling (EPANET) and Google earth in the judgement process for directing water supply distribution is one potential option. This strategy is used to obtain the sultan's vision for Oman 2050 by implementing technology and remote sensing into the civil engineering field. These tools are suggested by the current study to design and evaluate the effectiveness of the water supply network for arid regions and especially urban areas. To construct the water distribution network for the residential scheme no. 112 in Liwa, Oman, a methodology was created by coupling GIS and a hydraulic model. The collected results confirmed that most junction nodes and pipes have sufficient pressures to supply water to the study area which was designed to cover the future demand of the region and the change of population till 2052. Thus, this will lead to the improvement of the city and increase the comprehensive development.

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IMPACT OF ARTIFICIAL INTELLIGENCE (AI) ON INDUSTRIAL DESIGN

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ABSTRACT

The article analyzes the impact of artificial intelligence (AI) on industrial design. It discusses how AI has revolutionized the creation and production processes by automating many steps such as virtual simulation, shape and material optimization and product personalization. It also explores how AI can improve efficiency and reduce costs, as well as contribute to the creation of innovative products and the exploration of new technologies and materials. The research also presents personal examples of the integration of AI in the development of design concepts in teaching activities. At the same time, it discusses the challenges and risks associated with using AI in industrial design, such as the issue of transparency and control over decisions made by algorithms and the loss of jobs in the human sector. The paper concludes with a call for a responsible and ethical approach to using AI in industrial design, which should leverage its advantages without negatively affecting people or the environment.

"URBAN RUINS" - THE STRATEGICAL USE OF ABANDONED BUILDINGS IN THE PROCESS OF URBAN REANIMATION

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ABSTRACT

One who studies the history of Architecture will inevitably come to the realization that entire generations of people, separated by time through history, are mentally connected through the memories stored in those buildings which had survived, and to which we refer today as "ruins". The ruins we find among ourselves today are imposing reminiscences of our past, through which we are able to connect mentally and spiritually to our ancestors. We might be therefore committing a grave mistake if we were to interpretate buildings exclusively through their physical layer, as no more than a quantity of space trapped inside a mass of solid matter defined by volume, shape and colours, instead of perceiving them more through their mental layer, as being an "objective witness of time". Needless to say, ruins ensure the survival of an entire civilization's culture, through the memories they store and pass on until the moment of their total physical eradication. Urban ruins are a natural urban phenomenon, a consequence of time and space, and also the direct result of the rapid urban development of a city, shaped constantly by internal and external social, political and economic conditions. Urban ruins can be found generally in almost every city, especially old industrial cities. "Urban ruin" is a proposed term used to describe usually those abandoned buildings and constructions, who lost their physical integrity due to the advanced state of material degradation their technical condition presents. This is primarily caused by the lack of periodic maintenance, and this is usually due to the buildings being abandoned by their owners, mostly because of economic reasons. Urban ruins are usually found in abandoned or contaminated sites, better know as "brownfields" and "greyfields". These old abandoned industrial and large commercial urban sites, had formed in time disused urban tissues that cause morphological and technical problems to the entire existing urban fabric of a city. Their lack of activity and advanced state of decay parasitizes the space they occupy within the city, endangers the urban hygiene and the safety of citizens, and overall damages the urban image of the city. The subjects of research are abandoned buildings and structures, as part of the global research theme of "Brownfields" and "Greyfields" or abandoned sites. Using Bucharest city as the study area, the purpose is to document the presence of all urban ruins, by mapping all the abandoned buildings and constructions and analyze their strategic value and importance, in order to establish the theoretical basis for a strategic urban planning regarding the urban reanimation of abandoned sites. "Urban reanimation" is also a purposed term used to describe the process of reintegrating disused urban tissues into the existing urban fabric of a city. The thesis aims to establish applicable theoretical principles for the urban morphological peculiarities of other cities which also may constitute the subject of this global phenomenon.

HEALING ARCHITECTURE - A DIFFERENT APPROACH OF HOSPITAL DESIGN

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ABSTRACT

Every day, in hospitals around the world, thousands of people spend hours, days, months for investigations, diagnosis or treatment, in search of healing. For patients and their families, the experience of the time spent in the hospital is often a crucial episode of their lives, whether their child was born there, whether it was the place where the life of a family member or loved one has been saved or an bout of illness was cured or treated there. The hospital often represents a milestone in people's lives, a landmark underlying society' life. The increase in the number of patients with chronic diseases, of the percentage of aging population and the number of patients requiring treatments influence the hospital's contemporary approach, and issues such as the above will become even more significant in the future. Future hospitals will have to meet the citizens' requirements, expectations, but especially their increasingly higher and more diverse needs. In this context, in order to gain the citizens' confidence, hospitals need to become a safety landmark for the community, where quality care and effective care spaces should be designed and developed so that they provide a positive contribution to the healing process. There is growing awareness that the patients' evolution and healing are influenced directly by the environment in which the healing process is carried out, so this concept has become the key to architectural layouts when hospitals and health care establishments are being designed or constructed. The aim of this paper is to define and present those innovative features of hospital design – both spatial and aesthetic - that would positively impact on the patients' healing process. By creating an environment with positive psychological stimuli, reflected in an efficient structure and friendly interior finishings, the architecture of hospitals would support a contemporary approach to the treatment, recovery and healing of the patients.

IS EGYPT LEAVING NO ONE BEHIND? TRACING EGYPT'S PROGRESS IN SDG INDICATORS

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ABSTRACT

The Sustainable Development Goals SDGs are the latest of a series of global attempts by the United Nations to persuade nations around the globe to work towards a more sustainable future. In 2019, the Egyptian ministry for planning and economic development signed a partnership with the United Nations Population Fund (UNFPA) to create a series of reports on Sustainable Development Goals SDGs localization in Egypt. The series consists of a report for each of the 27 governorates covering the progress in SDG indicators. Each report identifies SDG indicators and their targets tailored according to the governorate's conditions. This paper traces the progress in these indicators with special focus on Egypt's governorates with the largest vulnerable populations namely El-Menya, Sohag and Assiut governorates in upper Egypt. The results show that the rate of progress varies across governorates and indicators. A notable remark is that not all seventeen SDGs are included in the report. The report discusses only eleven of the SDGs while disregarding the remaining six i.e. goals 9,10, 12, 13,14, 15. This in itself can be an indicator of the need for more progress in these areas specifically. Moreover, in the goals discussed in the report not all the indicators proposed by the UN are introduced and reported. The paper shows that Egypt's most vulnerable governorates are working on achieving the SDGs but still have a long way to go.

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THE TIDE CHANGES: FROM THE WANE OF GREEN ARCHITECTURE TO WAX OF ADAPTIVE FACADES

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ABSTRACT

The building envelope plays a key role in improving building energy efficiency and indoor comfort for the occupants. The future lies in use of innovative strategies based on dynamic, active and integrated solutions for optimizing thermal performance while exploiting energy from renewable sources. Today, the construction industry represents the single largest contributor to carbon output. With higher energy demands and costs, along with the lack of design solutions that respond sufficiently to the changes in our environment, adaptation is required to overcome this daunting perspective to our future and allow us to enter a new era of innovation. Adaptive buildings are becoming more feasible due to advancements in technology along with significant reductions in production costs. Factors such as improved reliability of automated systems and more efficient versatile micro processing power, allow for greater distribution of embedded network. Adaptive systems use less energy, offer more occupant control in addition to better overall space efficiency. The aim of this paper is to address the role of interpreting adaptation concepts in building skins that would serve to control humidity, light and temperature transmission into the building. This technology mainly employs nano materials that will substitute for energy now expended to solve the problem of climate control in buildings. These nano materials will individually proceed with a specific action in place of waiting an external command. In other words, the future is moving towards “smart matter”, matter that has the ability to adapt, regulate and control.

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ARCHITECTURAL TECHNOLOGY: EDUCATIONAL OBJECTIVES

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ABSTRACT

Architecture requires many aspects to be considered – during research, concept development, detailing, construction and even post-occupancy, to name just a few phases quite different in their demands. Not many architects nowadays see to all the aspects mentioned as it is easier and sometimes better to collaborate with architects specialised in each area. However, knowledge about each aspect (and most of all understanding the importance of each in the whole building process) is essential in order to corroborate information and thus assure the quality of the final product – the building in use. Moreover, true architecture resides in how all these aspects come together, potentiate each other, beyond aesthetics and functionality. Specialisation is the result of the complexity assumed by each phase and aspect which makes mastering them all almost impossible. Thus, an important question arises in an architecture educational environment: which aspects must be considered as core elements to be taught? The answer surly depends on the specificity of the school of architecture, some being more conceptual, others more technical. We position ourselves between these two extremes, following the aims of the university we are part of. In this context, we wish to set the didactic objectives of architectural technology and follow specific pedagogical methods that underline its specific role in an academic environment, but also its role of reaffirming, refining and enriching the design. Activities at which the main author contributed or which he coordinated along the years become examples of applied methods and substantiate the results and conclusions of the study. Curricular, but most of all extracurricular activities like workshops, webinars, talks, gatherings and guided exercises, at which both students and practitioners participated, revealed outcomes to be further exploited and threads to be followed and developed during subsequent events. The co-author structures all this information, following her interest in academic objectives and in how students can be guided towards understanding how various aspects of design can work together, leading to a coherent and meaningful approach of the profession. The main conclusion is that, beyond its obvious constructive role, architectural technology can be regarded as a tool along the various phases of design, including post-occupancy. Its approach as such throughout the years of study has an undeniable effect upon its understanding and further application in practice. A secondary conclusion, but very important in an academic context, would be that how architectural technology is taught and guided can also contribute to the achievement of general competences and abilities linked to the general didactic objectives of a school of architecture.

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HIGHER-ORDER PARTIAL CROSS-CORRELATION ANALYSIS OF ADJACENT KARST SPRINGS

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ABSTRACT

Complex hydrological relationships in karst systems can be detected by analyzing rainfall and discharge time series using higher-order partial cross-correlation functions. The partial cross-correlation function separates control time series that significantly affect the cross-correlation of the considered input-output time series of rainfall and discharge. The groundwater recharge depends on the process of evapotranspiration and rainfall, so air temperature, relative air humidity and rainfall control the spatial and temporal distribution of this process. The contribution of this work is shown through the application of cross-correlation and higher-order partial cross-correlation analysis to determine the influence of air temperature, relative humidity and rainfall on the functioning of two adjacent karst springs in a dry and wet hydrological year. Rainfall time series from available meteorological stations were used as input series, and discharge time series from two karst springs were used as output time series. Control time series are air temperature, relative air humidity and rainfall. The study area is the catchment of karst springs Jadro and Žrnovnica in Croatia. The analysis is based on the available hourly meteorological and hydrological data from stations in the basins of the springs Jadro and Žrnovnica. It was proven that the time series of air temperature, relative air humidity and rainfall have a significant influence on the rainfall-discharge cross-correlation of dry and wet periods. The demonstrated approach represents an improvement in investigating adjacent karst springs. It can be used as an integral part of their hydrological and hydrogeological investigations, considering that the necessary data can occur in a relatively simple and inexpensive manner.

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THE WAY TO REINTERPRET THE REGIONAL IMAGE BY THE SEQUENTIAL EXPERIENCE LIKE ROAD MOVIES

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ABSTRACT

In Ruhr Region, coal mining continued from 1837 to 2018. In the background of the mining process, a lot of amounts of rock cannot be used to produce coke because of the less purity. This waste had been stacked in around 100m hills (called waste heaps (Halden in Germany)) near the mining sites and most of them still exist as the specific shape on the flat landscape. During 1989-1999, the regional transformation project IBA Emscherpark was held, and it started preserving and transforming not only the typical industrial sites (factories, and mining sites) but also waste heaps for educational and recreational way. Also, at the end of the IBA, the 400km round touristic route was established by the name of “Route der Industriekultur” and now it includes 57 industrial sites. Because of the wideness, it is not easy to understand whole the regional image for the visitor and residents, so it tends to be used landmarks or specific products for showing the image. In this research, it will be proposed a way to recognize the regional image through the transitional movements through the Route, especially between the top of the waste heaps by referring to the sequences in the locational films called “Road Movies”. In this type of film, not just the static places, the actual transportation between the places are recorded. I focused on this point, and describe the actual transition. During 23.7-31.8.2023, I visited 35 industrial sites including 10 transformed waste heaps selected in the route. On the top of the heaps, each sculpture is set and acts as an attractor for the people on the ground around the heaps. We can be motivated to climb the heap by the existence of the sculptures. During the climbing gentle slope, the sequence gradually changes because of the continuous disengaged view and light between the trees. Even if visitors have no regional image of the Ruhr Region initially, by climbing the waste heaps one by one, we will be able to find the shape of the heaps with sculptures and chimneys of other sites which we have already visited or will visit next. From the fieldwork, it was found that this experience affords a birds-eye view of the places we have already been to, and we can draw the orientation and the network of the regional spread gradually. Also, it was revealed that this experience is not a subjective idea, because the director of the IBA intended these sculptures on the heaps as landmarks, and made the static regional connection between them.

ANALYSIS OF TRAFFIC CONFLICTS AT BIG INTERSECTION TYPES IN URBAN AREAS

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ABSTRACT

In the past decades, intersections were developed with the car-oriented city. In particular, they were intended to handle motor vehicle traffic efficiently. However, especially in urban areas, which are currently characterized by a high proportion of private cars and thus congestion and high CO_2 emissions, the importance of and demand for sustainable mobility is increasing. More walking and cycling is taking place (Gerike, 2020). At the same time, pedestrians and cyclists, as vulnerable road users, are considered most at risk in road traffic. Transport policy aims to achieve Vision Zero, so that there are no serious injuries or fatalities in road traffic (Bundesministerium für Digitales und Verkehr, 2022). Many accidents occur mainly at intersections. Road authorities generally use the accident data from the accident atlas as a basis for assessing the traffic safety of intersections. Road safety can be improved by avoiding critical situations. For this purpose, an intensive study of the development of conflicts as a precursor to accidents can provide further insights (Gerstenberger, 2015). The research in this project shows that such data on near misses and traffic conflicts are not available to the road authorities. The project will investigate which and how many conflicts between pedestrian, bicycle and motor vehicle traffic frequently occur at individual types of intersections, such as signalized intersections or traffic circles. The target of the project is firstly to develop a survey concept that can be used in the future to quickly identify risks to pedestrian and bicycle traffic at the types of intersection studied. With the help of automobile sensor data (e.g. from emergency brake assistants), further findings on the frequency and course of conflicts are to be derived. In addition, a methodology is to be developed that will enable traffic planners and municipalities to carry out risk management for intersections in the future in order to improve traffic safety and promote local mobility. With the results of the conflict analysis, recommendations for traffic planning and policy will be derived and made available in the form of an action guide. The project is expected to be completed in the summer of 2024.

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OVERVIEW OF THE DEVELOPMENT OF TECHNICAL CONDITION ASSESSMENT ON CYCLE PATHS

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ABSTRACT

With the mobility turnaround initiated in Germany and other European countries, the topic of cycling and, thus, also the maintenance management of cycling infrastructure has become significantly more important in the last 10 years. Not least because of the associated political interest in the availability of cycling facilities, there has been a great interest on the part of the authorities responsible for construction - in Germany predominantly the public administrations - in condition surveys and assessments of the existing cycling facilities. Accordingly, a provider market for these services has developed in recent years. The procedures used are mainly based on the established procedures for roads and the applicable regulations. Up to now, there is no technical set of rules in Germany for the condition assessment and evaluation of cycling facilities that defines the requirements for the measurement devices, specifications for the measurement procedure, for data management and quality assurance. Experience shows that this has disadvantages for the clients. For them, the preparation of the tender documents and the subsequent awarding of contracts is already difficult. In addition, due to the current wide range of data collection techniques, the results are hardly comparable with each other. This makes it difficult to analyse the condition of larger cycle path networks, e.g. in order to determine the financial requirements for expansion and maintenance. Comparisons between survey campaigns over a period of time - which are useful in the context of maintenance management - are usually not possible if different survey techniques are used. The aim of this lecture is to present the currently available methods and techniques for the condition assessment and evaluation of cycle paths and to point out advantages and disadvantages. Special attention will be paid to the various challenges in carrying out condition assessments of cycle paths. Criteria that need to be taken into account in order to enable comparability and repeatability of the measurements will be named. Future expected developments, their potentials and limitations, will also be discussed. Three years ago, the Research Association for Roads and Traffic in Germany founded the working group "Condition Assessment and Evaluation of Cycle Routes". One of the aims of this working group is the creation of a set of rules for the standardisation of the recording technique and the definition of a uniform assessment procedure. The background for this is to be provided, among other things, by the research project "Recording and Assessment of the Structural Condition of Urban Cycling Facilities" commissioned by the Federal Ministry of Digital Affairs and Transport. The ongoing activities of the working group and the first results of the research project will be reported.

COMFORT EVALUATION OF NEW BICYCLE PATHS WITH A LASER PROFILOMETER: 15 YEARS OF EXPERIENCE IN BELGIUM

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ABSTRACT

The longitudinal evenness of the surface of a road or bicycle lane is an important factor for the comfort experience of the users. Indicators for the evenness evaluation, its relation to comfort for drivers and passengers in cars or trucks, and levels of acceptance for existing or newly constructed roads exist for decades. In Belgium, four indicators EC0.5, EC2.5, EC10 and EC40 called “Evenness Coefficients” are now in use. Considering the surface as a wave that can be decomposed as a sum of sinus functions with different wavelengths, each EC evaluates a different range of wavelengths. EC0.5, the one for the shortest wavelengths, was introduced in 2013, only about four years after the Flemish National Road Administration (Fl-NRA) felt the need for an extension of evenness evaluation for their newly built bicycle lanes and started the preparations for it. In 2013/2014 two measurement devices dedicated to the evaluation of longitudinal evenness of cycle infrastructure were put in service. One is operated by Fl-NRA, the second by BRRC. The equipment consists of a laser profiler in a trailer behind a scooter. The bicycle lane profile is measured combining the inputs from an accelerometer and a laser. The values of EC0.5 and EC2.5 are computed from the measured profile, analogous to what is common practice for determining EC2.5, EC10 and EC40 values for roads. The Fl-NRA now sets requirements for roughness on new bicycle lanes expressed in EC0.5 and EC2.5 and uses a combined indicator for the evaluation in two-year intervals of the global condition of their bicycle lane network. The BRRC helped investigating the potential causes in cases where the requirements were not attained. Where the EC indicators and the laser profiler evaluate the condition of the infrastructure itself, other measurement devices based on simple accelerometer data pretend to capture the comfort resentment by the users of the infrastructure. Parallel to the initiative of the Fl-NRA, such a simpler device and a comfort score were also developed in Belgium in the period of 2007-2010. After a period with adjustments to the design of the device, it is truly operational since at least 2014 and in use in different locations throughout the country, contributing to the assessment of the satisfaction of bicycle path users. This contribution reports on the development and introduction of the indicators, on more than a decade of experiences with the dedicated measurement devices, and on the factors that influence user comfort of newly built bicycle infrastructure. The paper discusses difference in perspective between the EC obtained with the highly accurate laser profiler and the comfort score obtained from the less costly measuring bike. The article concludes with addressing the perspectives on standardisation actions in Europe for roughness measurements on bicycle infrastructure.

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BELGIAN PRE-NORMATIVE RESEARCH PROJECT SUCHAR-BILAN ON SURFACE MONITORING OF BICYCLE LANES

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ABSTRACT

In recent years the need for more and better cycling infrastructure is soaring. The diversity of the means of transport other than ordinary bikes is increasing rapidly. Consequently, the expectations of the users change as well. In their endeavour to deliver, road authorities who manage cycle paths will benefit from new condition assessment and efficient asset management techniques. In the two-year project “Surface Characteristics of Bicycle Lanes” (SuChar-BiLan), which started on 1 November 2022, the Belgian Road Research Centre (BRRC) collects knowledge, information and practical experiences about measurement techniques and management allowing the assessment of the condition of bicycle infrastructure: evenness, skid resistance, texture and rolling resistance. The aim of the project is to help with developing European standards and with expanding the use of such techniques – to a better quality of the cycling experience. The first actions in the project consisted in a literature review and in the organisation of surveys addressed to different stakeholders. The BRRC compiled a list of fully operational or promising test methods for condition assessment of bicycle infrastructure, and asked researchers in the field from different counties in Europe and beyond, as well as Belgian road authorities who manage cycle paths to review it. Three further surveys were designed. One was addressed to users in Belgium covering the full diversity of the means of transport currently used on cycling infrastructure. The survey probes for their potentially different expectations with respect to the surface characteristics of cycle lanes when driving city bikes, eBikes, scooters, steps, etc.. Another survey was sent to Belgian road authorities who manage cycle paths, asking about their inventory of the cycle assets, their priorities, their knowledge of accident data, and their management approach. Another survey was launched to technology and service providers in Europe. They were asked about their offerings and if they have examples of current practice. This includes the practical application of measurements with existing devices, existing quality procedures, and accompanying data processing procedures. The project will ask several technology and service providers and some research organisations in Europe to come and demonstrate their solutions on sections of bicycle lanes in Belgium. The BRRC will use its own monitoring devices, mostly used on roads, to these sections and will ask the National Road Authorities in Flanders and Wallonia to do so too. The data thus collected, and the experience gained will form a basis for comparisons and evaluations of the quality of the data and the techniques, for advice on their potential scope of use, and for recommendations for European standards. Furthermore, BRRC will design a laboratory test method for evaluation of skid and rolling resistance. All this will contribute to the suggesting of indicators and thresholds useful for the asset management of cycle paths. In this contribution the intermediate results of the first four months of the project are presented. The next steps that are foreseen in the project are described. The importance of the expected outcome and of the aimed development of European standards is explained.

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PLACES OF MEMORY AND CONTEMPLATION: THE RATIONAL AND THE EMOTIONS AS FUNDAMENTAL ELEMENTS TO THE CONCEPTION OF ARCHITECTURE INTEGRATED IN THE LANDSCAPE

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ABSTRACT

Throughout the history of Western culture, the landscape has been transforming itself, according to the search for the representation of an image of paradise, and it has acquired and absorbed principles dictated by the framework of mind, culture, society and politics in which it is involved. Villas are contextualized interpretations of ways of using and occupying the landscape. Linked to forms of enjoyment of space, they were organized by cultural and economic elites, creating places where landscape and architecture complement each other in a harmonious way. From this harmony stands out the spatial multiplicity and diversity, in which buildings, gardens, productive areas and woodlands are organized, constructing versatile places where production and recreation share the same space, invading each other and where nature is constituted as an object of pure contemplation. The research focused on the suburban villa of Renaissance influence as a referent and on framing and contextualizing it in the historiography and culture of Architecture and Landscape in Portuguese historic areas. The evolution of the concepts of the suburban *villa*, the garden, the *Villegiattura* and the ideal *Villa*, fundamental to the consolidation of an art of conception of the architectural space in perfect interaction with the landscape and of mastery over the territory, was discussed. Research was carried out into the relationship between the mind, the rational, and the emotions of those who inhabit/appreciate space and those who design it - phenomenological and sensorial approach to perception and creation, among others. There is evidence of geometrical and perceptual relationships with the landscape, of spatiality and fruition in the architectural types investigated. As well as the intentionality in the choice of vegetation and certain elements (water, statuary -Art/allegories-, numerologies) that awaken certain emotions in those who use the spaces. In comparative case studies (Quinta de Bacalhoa; Palácio Fronteira; Palácio do Freixo; Solar de Mateus and Quinta de Serralves) the demonstration of invariants and evolution throughout history was made. Some are a reliable embodiment of a Renaissance *Villa* model, others are examples of extraordinary quality and richness - expressions of the evolution of a Renaissance suburban *Villa* model integrating Portuguese architectural culture, building traditions and ways of approaching the site, the original natural place. From the demonstration of the adequacy of the same structural, compositional and programmatic principles arising from a cultural and historical evolution to new times and regional cultures, and from its framework in times of artistic and Cultural Revolution, the same conceptual principles, spatial orders (in the definition of interior and exterior spaces) and kind of relationship with the landscape were adapted to avant-garde compositional grammars. This study proves the existence of an important contribution to Architecture and Modern and Contemporary Landscape Architecture of an architectural culture synthesized in the analysis of the cases treated, and for teaching and professional practice, from the identification of recent works that reveal the same principles, spatial orders, approach to place and relationship with the landscape.

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THE SHAKING TABLE – CONSTRUCTION, TUNING, AND CALIBRATION

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ABSTRACT

In the paper, the process of construction of the shaking table, as well as preliminary tests which allow calibrating of the laboratory stand was presented. The presented stand for the simulation of bidirectional seismic and paraseismic excitation (shaking table) was made by employees of the Department of Mechanics of Structures and Materials of the Cracow University of Technology and the Cracow Branch of ABB. The shaking table consists of an operating platform with regularly spaced holes that serve for mounting experimental models. The platform was made of a perforated steel plate stiffed with a steel section frame placed on a system of mutually perpendicular linear guides equipped with a system of linear carriages ensuring its smooth movement in two orthogonal directions. The motion of the platform is possible due to hydraulic actuators steered by a control system integrated with the hydraulic pump. The heads of the actuators that move the platform are attached to its two adjacent sides by a system of carriages and linear guides connected to the frame. The actuators and the line guide's system are rigidly attached to a foundation (steel support plate). At the shaking table, it is possible to generate horizontal vibrations in a sinusoidal form, sweeps of frequency varying in the range of 0.2-100 Hz, and also seismic and paraseismic vibrations. Depending on the frequency of a given excitation, the maximum amplitude ranges from 0.1 to 50 mm. Dynamic tests of models of the real object on a shaking table were preceded by preliminary tests. The preliminary tests were aimed at calibrating the test stand by determining the parameters of the control system, as well as eliminating undesirable phenomena such as resonance, the occurrence of torsional vibrations or vibrations caused by imperfect connections. In preliminary tests, an acceleration located in the center of the shaking table platform was used. During the tests, a series of excitations with a known frequency and amplitude of vibrations was applied. The platform's accelerations during the experiment were measured and processed and the obtained results were compared with the input signal. Based on the test results, the parameters of the control system were fine-tuned. Tuning guarantees that the shaking platform performs movements with the set characteristics (compliance of the signal registered on the shaking table platform with the input signal). Therefore, the correctness of the seismic experiments is ensured. As a result of preliminary tests, the range of stable excitation frequencies was determined and the resonance frequency range of the stand was diagnosed. To sum up, the conducted preliminary studies allowed to determine the possible values of the excitation parameters used in future studies conducted on the shaking table. Problems that may arise during the experiments were also diagnosed. The obtained research results gave rise to discussions and digressions on possible ways to improve the laboratory stand and reduce undesirable effects occurring during research.

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ANALYSIS OF THE DYNAMIC BEHAVIOR OF LIGHTWEIGHT CEILING SLABS

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ABSTRACT

Floor slabs are one of the integral load-bearing elements in buildings. When it comes to their serviceability limit state (SLS), one of the key aspects is their dynamic behaviour. In case of residential or administrative buildings, the knowledge of dynamic behaviour of slabs is important in terms of hygiene (psyche) of the user. When speaking of buildings such as medical facilities or laboratories that are using delicate machinery, the knowledge of the dynamic behaviour is important in order to prevent damage to given machinery. Nowadays, the requirements for saving of resources in combination with the desire for longer spans of slabs and more slender and subtle load-bearing elements are the ideal prerequisites for the use of voided reinforced concrete slabs. These slabs, thanks to their lower dead-weight, provide all the aforementioned benefits. When it comes to the design and calculation of dynamic parameters of slabs, there are several options. For standard, full cross-section slabs, there are empirical formulas that allow for preliminary calculation of first eigenfrequency / eigenfrequencies from general parameters of given slab. Then, more precise calculations may be conducted by finite element method (FEM) on a model of the slab or the building as a whole. For voided slabs, such empirical formulas are currently non-existent. Dynamic parameters need to be calculated on FEM model; however, there are several modelling methods for modelling of voided slabs and their results in case of modal analysis may vary. Calculated parameters may then be verified by in-situ measurements. These measurements are conducted using accelerometers and various methods of excitation based on the parameters of investigated structure. The aim of this paper is to provide a brief summary of dynamic requirements for slabs, stemming from the SLS. Next up, it is to provide a quick overview of various methods of calculation of dynamic parameters and last, but not least, to present outlines for in-situ verification of these parameters.

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ARCHITECTURAL CLASSIFICATION OF MIDTOWN RIVERSIDE BUILDINGS

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ABSTRACT

Scientists from all over the world are warning about global warming, melting glaciers and the rising state of the ocean waters. There have been many large-scale floods in Europe in recent years. Meanwhile, more and more buildings are being built in waterside and riverside areas. Urban buildings move closer to the water, "and the water moves closer to us." Many architects notice that it is necessary to prepare for this reality, which is why the architecture of the midtown riverside architecture are considered more important. There are large plans to transform riverside areas all over the world. Many architectural offices such as Bjarke Ingels Group or Snohetta, are doing so many projects concerning big urban waterside areas, that they even begin to specialize in it. The quality of good riverside architecture consists of many factors. The morphology of space, which means a comprehensive analysis and classification of basic spatial forms, helps in finding the success factors. In the preparation phase for this article, were noticed that there is a lot of graphic schemes are repeated in many of books and publications. This graphics are concern the shape of riverside buildings in cities, but only in terms of urban planning. In contemporary literature, there is not enough classification of urban riverside buildings, considered from an architectural point of view. The problem discussed in this article are concerns the issues of classification and assessment of downtown riverside buildings, it is also of a diagnostic character. The study includes the classification of midtown riverside buildings on an architectural scale - situated between urban planning and single examples of buildings which are usually described by the case study method. In this article, the research is divided into a global classification and a classification covering the country of Poland. Analyzes on a global scale concerned the characteristic shapes of buildings, designed by architects all over the world, in a more or less conscious and repeatable way. During the analysis of riverside buildings from Poland, it was noticed that many unusual ideas of this type are constantly being created, for example "periscopes". These are ideas worthy of extended analysis in order to promote the design of valuable and interesting buildings in urban riverside areas.

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DEMOGRAPHIC TRENDS IN URBAN STRUCTURES: COMPARISON OF DEVELOPMENT IN THE BROADER CENTRES OF THE CITIES OF BRNO (CZ) AND VIENNA (AT) IN THE 21ST CENTURY

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ABSTRACT

The transition from the communist regime to a market economy in 1989, the financial crisis in 2009 and 2013, and the pandemic COVID-19 have brought to the fore the longstanding issues in the field of housing in the Czech Republic. As was observed in many other European countries, the Czech Republic is facing housing insecurity and cities are challenged by a shortage of housing supply. The issue of housing affordability is demonstrated on the cities of Brno and Vienna, which are connected by a close geographical position and a similar urban development in the 19th century. After 1918 (the disintegration of the Austro-Hungarian Empire), the Austrian capital Vienna has focused on a continual support of social housing, which up to this day has had a positive effect on housing options and the quality of life in the city. The development of housing in the Czechoslovak city of Brno was changing and influenced by the period of socialism in the second half of the 20th century. Housing policy became more stable at the end of the 20th century in the conditions of the newly formed Czech Republic. Since the beginning of the 21st century, the housing development in Brno and Vienna has been therefore, after a politically different period, comparable again. Vienna has a similar historical development to Brno, and in the long term, it represents an adequate comparative study due to a successful social housing policy. A comparative method at the level of city districts has not yet been applied in the current analytical studies. In this paper, we mobilize a comparative study of broader city centres and ask the question, of whether living in the vicinity of the city centres could currently represent an alternative to living on the outskirts of cities. The development of housing can be monitored and reflected in the parameters of demographic trends in the cities. The paper reviews comparable demographic data obtained from databases of the office for national statistics of Austria and the Czech Republic: population development and population ageing expressed as a percentage of the population aged 65+ to the population aged 0-14. The study demonstrates the importance of these two indicators of demographic changes, which can reflect the attractiveness of housing for different groups of residents in a specific location. The results show that in both cities, there is a population decline in historical city cores. While in the vicinity of the historical core of Vienna, there is moderate population growth, especially the working-age population, a similarly uniform trend cannot be observed in Brno, where demographic trends are influenced by several different factors.

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THE ASSESSMENT OF THE PROPERTIES OF COMPOSITE LAYERS BASED ON POROUS ASPHALT AND COLORED MORTAR AT THE STAGE OF THEIR DESIGN IN LABORATORY CONDITIONS

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ABSTRACT

The paper presents the results of the properties of composite layers made of porous asphalt, with a void content above 28%, filled with a special-coloured mortar. Three mortars of white, red and blue color were selected, the compressive strength of which ranged from 50 to 60 MPa after 2 days. The study of composite layer aimed at determination of the water sensitivity expressed in ITSR (Indirect Tensile Strength Ratio) according to the standard EN 12697-12 (method A) and rutting resistance according to standard EN 12697-22 in the small apparatus (method B). The results indicate that such solutions will be justified in places with extremely heavy traffic, such as bus stops. In addition, the assessment of the surface condition of the layer was performed on the basis of the skid resistance according to the standard ASTM E2157-1, ASTM E303-9 and the brightness according to Polish National Specification WT-2:2014. The results indicate that they can be used in areas with low-speed limits. On the other hand, the possibility of introducing the pigment into the mortar has a positive effect on surface of those elements of the communication system, which should have a different colour than the road surface. These are the surfaces of bicycle paths, pedestrian and bicycle routes, areas of intersections, where their visibility plays an important role due to the safety of users.

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EXPLORING THE ROLE OF 'URBAN PHYSICS' ISSUES IN CITY AND REGIONAL PLANNING EDUCATION IN EUROPEAN AND AMERICAN UNIVERSITIES

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ABSTRACT

High increases in urbanization rates all over the world; brings with it many important problems. In the evaluation and solution of these problems, programs that provide city and regional planning education come to the fore with the aim of having an interdisciplinary content and raising the leading actor in a multi-disciplinary working culture. A significant part of these problems is about the "urban physics" issues. Urban physics is a common field of science and engineering that focuses on subjects of interest to physical science in cities and regions. The main topics of urban physics can be defined as: thermal environment, pollution spread, wind at pedestrian level, natural ventilation, wind loads, meteorology, wind effect rain, snow transmission, vehicle aerodynamics, wind energy, solar energy, wind-borne debris, fire and acoustic. Within the city and regional planning undergraduate programs; regarding to its vital importance, providing an education even including urban physics issues will create awareness in solving many problems related to urbanization. Thus, the content of education and training content will be enriched by emphasizing the basic concepts of sustainability, energy, energy transformations, renewable energy, etc. Within this study, compulsory and elective courses, which include urban physics issues in urban and regional planning undergraduate programs was explored by using keywords, examining their contents and evaluating them with the help of a scale. The cases are selected from the universities in United States of America (Massachusetts Institute of Technology, Princeton University, Harvard University, Yale University, Stanford University) and European universities (University College London, Delft University of Technology, ETH Zurich, Technical University of Berlin and TU Wien). Some of these keywords are: Urban Physics, Building Physics, Energy, Sustainability, Urban Morphology, Macroform, Environment, Energy Efficiency, Carbon Footprint, Thermal Environment, Renewable Energy, Solar Energy, Wind Comfort, Urban Heat Island and Urban Simulation. Evaluation was made according to the coverage the keywords of the related courses with using a scale from 1 to 100. As a result, it is foreseen that this study can present strategies on how urban physics subjects can be integrated into the city and regional planning vocational education system on a national scale.

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THE QUALITY OF CYCLE PATHS AS A PRECONDITION FOR A SUSTAINABLE TRAFFIC INFRASTRUCTURE IN THE CITY OF GRAZ IN AUSTRIA

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ABSTRACT

An essential precondition for the transition to an environmentally friendly transport and thus also the achievement of climate goals for sustainable urban development is the provision of a high-quality cycling infrastructure. This is also evident in the city of Graz, the state capital of Styria in Austria. In recent years, the modal split of cyclists has increased from 14.5% in 2013 to over 20% in 2021. In addition to an optimal structural design of the cycle traffic assets, the condition of the cycle path network also plays a decisive role. The better the quality, the higher the attractiveness of cycling. The city of Graz has been systematically recording the condition of the cycle paths since 2008 as part of visual condition assessments. This takes place in parallel to the inspection of all cross-sectional elements (roadway, sidewalk, curbs) and thus forms an integral part of the systematic maintenance planning of all urban traffic routes with a total length of more than 700 km in the administrative area of Graz Holding. Approximately 63 km of this is accounted for by cycle paths. The data and information collected flow directly into the Pavement Management System (PMS), which draws up an "optimal" proposal for maintenance treatments for each section under different budgetary constraints, using a multi-year life cycle cost analysis. The change in the condition over time is modeled using deterministic performance prediction functions. The PMS is used both as a technical and as a strategic planning tool and provides the input for the discussion with the city administration of Graz. Although cycle paths only make up a small part of the road network, they are becoming increasingly important. This also increases the requirements and the resulting need for maintenance. This paper describes the procedure for determining the condition, the evaluation and analysis methodology. The results that can be derived from this, such as condition development, maintenance requirements and fixed assets, form the basis for comprehensive reports, which are updated annually. These reports also show very clearly that due to the increasing aging of the transport infrastructure, there is a continuous increase in the need for maintenance and the need for maintenance measures can be underlined.

WALKABILITY EVALUATION OF ALVALADE DISTRICT FOR CHILD-FRIENDLY CITIES

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ABSTRACT

Promoting walkability in the city is to make it more sustainable and allow it to become an inclusive and safe place that guarantees quality of life. To understand whether walkability is thought of in urban design it is necessary to quantify it and to identity which urban fabric characteristics favor walkability the most. Our study studies the walkability of the Alvalade neighborhood in Lisbon, Portugal. This neighborhood was built from the mid-twentieth century (1945-1970) mostly as low-cost housing for workers, but is currently inhabited by the middle and upper classes. The neighborhood was structured in eight cells that took into account the maximum limit of 500 meters away from the housing to the school located in its premises. Each cell has a different urban morphology, some being more permeable than others. The neighbourhood is home to a large population of young people, including children and teenagers who attend the schools located in the area. We present an agent-based model which investigates the walkability of the neighborhood for these young people, focusing on the mobility patterns of children and teenagers as they navigate their daily routines of going to school. We simulate the pedestrian movement considering factors such as the availability of sidewalks, crosswalks, distance to schools, and the presence of other amenities. Our research reveals the mobility patterns emerging in this area and compares them across the different schools of the area. These results inform both urban policies and interventions that promote safe and accessible routes to school.

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EXPLORING ISOVIST FIELDS: A COMPARATIVE STUDY OF CHURCHES IN RECONSTRUCTION PLANS FOR POST-EARTHQUAKE LISBON

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ABSTRACT

Following the devastating earthquake that struck Lisbon, Portugal in 1755, Manuel da Maia, chief engineer of King D. José I, commissioned six plans for the city's reconstruction. In this paper we analyse these plans examine how they addressed the challenges of building a modern city of the XVIII century. In the plans that were made, churches had different roles in the urban morphology of the city. We will show how these urban elements interplay in the different plans with each other. The analysis of the importance of religious buildings in the city plan was made through the visual impact that those buildings would have in the public space. Using a variation of the Isovist process, we examine the visual impact of religious buildings on public space. Our results indicate that all plans, except the chosen one, had a greater visual impact of churches in public space. Plan 6, in particular, proposed a patriarchal church in Terreiro do Paço, which would have had an extreme impact on the city's visual landscape. Conversely the chosen plan presented a similar level of visual impact of churches in the plan as the pre-1755 city. This was the result of the removal of all churches from the main streets and integrating them inside the city blocks. This plan presented a similar level of visual impact, comparable to the pre-1755, but with a completely different approach to the street drawing. Overall, this study sheds light on how different reconstruction options for the city of Lisbon could have impacted the city being rebuilt. The aftermath of the 1755 earthquake provided an opportunity to not only rebuild the city, but also to redefine the power balance within the kingdom and to shift the importance of the church as a central aspect of city life.

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TRADITIONAL CITY, INVADED CITY AND RECONQUERED CITY: THE EXPERIENCES OF RE-FUNCTIONALIZATION OF PRAÇA DA FIGUEIRA IN LISBON (1885-2023)

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ABSTRACT

The square is a multifunctional and multidimensional space that incorporates the needs of the city of Lisbon. For this reason, it assumes the functions of space of socialization or collective manifestation, of structuring node of the urban mobility system or of space for commercial activity. Faced with the diversity of approaches and interventions in the public space, Jan Gehl and Lars Gemzøe (2001) develop a city typification according to the design of their public space, which they call: traditional city, invaded city and reconquered city. These different types of cities can also be associated with different times or interventions in the public space. From the observation of Praça da Figueira, in Lisbon, and, particularly, its historical journey, we were able to understand the current situation of this space, identifying the moments and principles inherent to the main functional and image transformations that this public space has undergone over the centuries. The experiences of refunctionalization and qualification of this Square conditioned its evolution from market square (1885-1949), the noble square (1969) to the square we observed in 2023.

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VERIFYING THE SHEAR LOAD CAPACITY OF VERTICALLY REINFORCED MASONRY WALLS BY THE V_{Rd}–N_{Ed} INTERACTION DIAGRAM

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ABSTRACT

The article is a continuation of the problem of checking the load capacity of walls using the V_{Rd} – N_{Ed} interaction diagram, which was presented by the author at the WMCAUS 2021 and WMCAUS 2022 conferences. In addition to the publication Jasiński (2022), the issues of vertically reinforced masonry walls were presented. The task of reinforcing masonry structures, similarly to reinforced concrete structures, is to limit the development of cracks and increase the load capacity. The paper presents the rules for checking the bearing capacity of reinforced masonry walls loaded horizontally and vertically using the provisions of the EN 1996-1-1:2010 standard and the draft Eurocode 6 (prEN 1996-1-1:2017). According to the mentioned regulations, three methods of reinforcement are distinguished: the V method, when only vertical reinforcement is used, the VH method, when both vertical and horizontal reinforcement is used, and the H method, when only horizontal reinforcement is used. In each method, cases a, b and c can be additionally distinguished, which differ in the course of normal stresses on the wall edges. The article concerns the V method in which the reinforcement is placed vertically. Similarly to the previous publication Jasiński (2022), the necessary equations determining the cross-section resistance as a function of the vertical load NEd are presented. Example graphs of the V_{Rd} – N_{Ed} interaction are presented.

HORIZONTAL STIFFNESS OF MASONRY WALLS INFILLED FRAME

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ABSTRACT

The article is a continuation of the reflections of the author Jasiński (2022) presented at the WMCAUS 2022 conference on masonry walls infilling frames. These types of walls are used as a visual, acoustic or fire barrier. In structural terms, infill walls should provide stiffening of the structure. The paper presents a proposal for an algorithm for determining the stiffness of a single structure field, taking into account the provisions of the CSA S304.1-04, FEMA 306 and FEMA 274 standards, adapted to the European design standards EN 1996-1-1:2010 and the draft Eurocode 6 (prEN 1996-1-1- 1:2017). Based on the review of various design standards applicable in Canada and the USA, an algorithm for determining the horizontal stiffness of a single-storey frame with masonry infill was proposed.

SURFACE EVENNESS MEASUREMENTS ON CYCLE PATHS FOR CONTRACT PERFORMANCE CONTROL IN SWEDEN

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ABSTRACT

In recent years it has been recognised that cycling can contribute towards the international goals for improving human health and the environment, as well as increase efficiency and improve quality of life. A high-quality cycling infrastructure is important for the safety, accessibility and comfort of cyclist and is thus essential to further encourage travel by bicycle. It is therefore natural that service quality indexes of cycle paths are based on the needs and desires of cyclists. The Swedish Transport Administration intend to update their requirements for contract performance control of newly constructed cycle paths. The requirements today are based on the International Roughness Index (IRI), which has been proven to be a non-relevant metric when describing the riding comfort of cyclists. A research project has therefore been initiated at the Swedish Transport Research Institute (VTI), conducted in cooperation with Ramboll Sweden AB. Based on earlier research, literature reviews, cyclist assessments and road condition measurements the aim of the project is to define a new performance indicator that is related to the riding comfort of cyclists. The literature review shows that the relation between riding comfort and the vibration to which cyclist are subjected to when riding over an uneven surface, has been the topic of several research studies in various countries in recent years. Most studies are based on measurements using accelerometers – sometimes in a smartphone – mounted on a bicycle. Such low-cost methods are valuable, but only for certain purposes for example as an overview inventory of the status. Since there are several confounding factors influencing the results from an accelerometer-based methods, such as rider style, the weight of the rider, speed and tyre pressure, wheel type, bicycle type and bicycle suspension, more precise measurements are needed for contract performance control. We have suggested road profile measurements based on a vehicle equipped with certified professional tools, such as laser sensors. In our research projects we have performed measurements on cycle path of various condition, with a van equipped with high resolution laser sensors (normally used for road condition assessment of highways), a smaller car with two lasers, and a bicycle trailer equipped with a line-laser. A selection of cycle path sections has also been evaluated by recruited cyclists riding over the sections. When relating our profile measurements to the assessment of cyclists we can conclude that the best correlation is in the spectra from 50 to 2000 mm with a certain focus on the smaller irregularities in the surface, in particular those in the mega texture size-range (50-500 mm). Further studies will be done in the project in order to define the performance indicator especially tailored to cycle paths. For example, we have concluded that besides the size-range of the irregularities we also have to consider that intermittent vibrations are perceived as more uncomfortable by cyclists than more evenly distributed vibrations.

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THERMOGRAPHY OF THE EXTENSIVE GREEN ROOF OF MULTIFUNCTIONAL BUILDING BRNO

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ABSTRACT

The article describes the state of the extensive green roof in winter. It deals with heat transmission on a vegetated roof with a vegetation layer thickness of up to 10 cm. The case study describes the condition of the green roof, which was implemented a year ago on a multi-functional building on Bratislavská Street in Brno. A pre-grown vegetation carpet on a coir mat was installed on the roof. A control segment of the vegetation roof is installed in the roof structure, the influence of which was also monitored as part of the preparation of the article. The article follows the control measurement of humidity in a green roof and the investigation of the influence of the vegetation composition on the thermal-technical properties of the roof.

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LEARNING FROM DATA TO IMPROVE ASPHALT ROAD CONSTRUCTION PROCESSES

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ABSTRACT

Asphalt road construction projects pose a lot of challenges in different disciplines, from the choice of construction methods, type and quantity of machines and personnel, pre-planning of all processes, ordering material from asphalt mixing plants, real-time logistics of handling material transport, and the asphalt paving and compaction process itself. Depending on the complexity and size of the construction site, preparation and execution can be influenced by a lot of unknown variables, like weather impact, material properties of the delivered asphalt or delays in the deliveries themselves. These circumstances might lead to irregularities in the asphalt material temperatures and thus suboptimal conditions for compaction, or at worst the entire stoppage of the construction process - in any case, they lead to a reduction in quality of the built asphalt road. In recent years, a lot of mobile devices, sensors and software have been emerging as viable solutions in the construction industry to digitize and support these processes. Such applications show and store all relevant information in real-time, which allows deeper insight into logistics or material properties on site, but also save all data for downstream analysis. These endeavours in process optimization now benefit construction companies to increase efficiency, however in regards of work safety and environmental aspects, it is crucial to optimize energy and CO2 consumption. Improved logistics and building roads with low-temperature asphalt will have to become a standard in road construction. The present study gives an overview of the digitalized processes in asphalt road construction with market-available solutions with an emphasis on the level of detail of the acquired data and information. The focus is on logistics data of the material delivery chain from mixing plant to paver, thermal imaging data of the built asphalt to validate asphalt temperatures, as well as machine and location data from asphalt paver and compaction rollers. Based on the datasets of up to 200 construction sites, an analysis has been done to show the weaknesses, irregularities, and variations within each of the processes, the impact of those on each other, and the consequence it might have on the overall asphalt quality.

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ADVANCE SEDIMENT TRANSPORT MODELLING, STUDY CASE BARZAVA RIVER, ROMANIA

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ABSTRACT

Study case is situated in Caras Severin county. To solve theoretical problems of movement of water in the river Barzava, it requires modelling of water flow in this case. Numerical modelling was performed using the program MIKE11. Advanced computational modules are included for description of flow over hydraulic structures, including possibilities to describe structure operation. The Hydrodynamic (HD) module is the nucleus of the MIKE 11 modelling system and forms the basis for most modules including Flood Forecasting, Advection-Dispersion, Water Quality and Non-cohesive sediment transport modules. The MIKE 11 HD module solves the vertically integrated equations for the conservation of mass and momentum, i.e. the Saint-Venant equations. The input data are: area plan with location of cross sections; cross sections topographical data and roughness of river bed; flood discharge hydrograph. Advanced computational modules are included for description of flow over hydraulic structures, including possibilities to describe structure operation. After simulation with MIKE 11 result the water level in each cross section. The Barzava River is 85 kilometers long. It springs from the Semenic Mountains (at a distance of 5 kilometers upstream from Resita Municipality), passes through the localities: Mun. Resita, Bocsa, Berzovia, crosses the national road Belgrade-Timisoara, about 4 kilometers from Deta crosses the border with Serbia and flows into the river Timis (Serbia) about 30 kilometers from the border. In the area studied or performed hydrological and topographic measurements on the watercourse and the nature of the land, these measurements were the basis for the numerical modelling of the watercourse by the method of finite differences. The main objectives of the paper are the modelling of the water course with the forecast of the evolution of water levels over time as well as the possibility of making flood risk maps.

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MODERNIZATION AND EXTENSION OF THE IRRIGATION SYSTEM - SPP1 - 1700 HA, SAHATENI, ROMANIA

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ABSTRACT

Through its rural development policy, the EU aims to help rural areas meet the many economic, social and environmental challenges of the 21st century. This policy forms the second pillar of the common agricultural policy (CAP). EU rural development policy is funded by the European Agricultural Fund for Rural Development (EAFRD), which has a budget of EUR 100 billion for the period 2014-2020. Infrastructure owned and managed by the O.U.A.I. Sahateni, is part of the arrangement of AHC CAMPIA BUZAULUI and serves the land area related to plot SPP1 on the Cvest 2 canal, Buzau county. The SPP 1 pressurization station supplies water for irrigation with a net surface of 1716 ha. Modernization and refurbishment of the irrigation system infrastructure are necessary to: ensure a much lower specific water consumption than today in the system, reduce electricity costs by reducing energy consumed per thousand cubic meters of pumped water, reduce operating costs. Reducing the risk and uncertainty in agriculture by reducing the incidence of natural phenomena (drought, soil erosion, etc.): due to unpredictable weather conditions from one year to another, a well-developed irrigation system will reduce the risk of obtaining a lower production per hectare in case of drought. Increasing the efficiency of agricultural activity by improving the supply of inputs and better use of the resulting products: eliminating water losses and water use where needed, which will lead to an increase in production per hectare and help increase the profitability of this activity.

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LIFE CYCLE COST MODELLING USING 6D BIM IN CONSTRUCTION: A COMPARATIVE STUDY

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ABSTRACT

Life Cycle Costing (LCC) as well as Building Information Modelling (BIM) belong to the current important trends in the construction industry. LCC contributes to the objective management and measurement of costs during the entire lifetime of a building facility and BIM represents one of the digitalization efforts related to the Construction 4.0 initiative. Because life cycle cost modelling using 6D BIM has the potential to bring significant positive effects such as cost savings or reduced environmental burden, this paper aims to reveal how this concept is developed in the Czech Republic and Austria. The legislative environment, the level of use of LCC and BIM in practice as well as problems that the Czech and Austrian construction industries face with were discussed in this comparative study. The results show that the practical level of use is still relatively low in both countries, yet specific differences were identified, for example related to the definition of legislative requirements or the availability of standards and specifications.

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FISH LADDERS HYDRAULIC CALCULATION, STUDY CASE MHC CUNTU, ROMANIA

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ABSTRACT

The Cuntu microhydropower plant is a hydropower development by derivation without a reservoir. The plant has 2 energy groups equipped with Pelton turbines. The power delivered by MHC Cuntu is 994.86 kW. The installed flow rate is 0.80 m3/s; gross drop: 152 m; catchment rate 833 mdMN. Catchment Sebesel 1 - is located on the Cuntu water course, the catchment is provided with a water outlet, it is of the Tyrolean type, equipped with a rare grill, with an upstream-downstream slope of approximately 3 m. It is located between the fish ladder and the sand filter. The fish ladder located between the water intake and the closing wing on the left slope and is of the pool ladder type. The Cuntu power plant building is located on the right bank of the Sebes River, approx. 300 m upstream of the intake belonging to SC Hidroelectrica SA. It is made of reinforced concrete walls. The MHC is equipped with 2 Pelton turbines. The fish ladders are of the technical ladder type with pools. The objectives of the studies were: to describe the qualitative and quantitative structure of benthic invertebrate and fish macro communities; assessment of the ecological status of the rivers in the areas of hydropower development; highlighting the presence of fish species of conservative interest and assessing the status of their populations. The methodology was carried out in accordance with the provisions of the Water Framework Directive, Annex V used took into account the following: Assessment of the status of aquatic communities; description of the structure of fish communities; assessment of the ecological status of the river sectors. The study led to obtaining some essential information for the exploitation and maintenance of the micro-hydroelectric plant as well as the fish ladder. The objectives of the studies were: description of the qualitative and quantitative structure of the communities of benthic macrononevertebrates and fish; assessment of the ecological status of the rivers in the areas of hydropower development; highlighting the presence of fish species of conservative interest (if present) and assessing the status of their populations

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APPLICATION OF PROJECT MANAGEMENT TOOLS IN CONSTRUCTIONPHASES TO OPTIMIZE THE IMPACT ON QUALITY; COST AND TIME: A CASE STUDY

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ABSTRACT

The above work deals with the topic of a disturbed construction process from the point of view of the iron triangle of capital, time and quality. The consideration refers in the emphasis to the transfer of the actual situation of the disturbed building process into a structured building process. In this context, the possibility of data analysis and the associated creation of a resilient initial situation is demonstrated. The disturbed construction process in the example project refers to the parameters capital time and quality. One factor, time, is classified into a measurability with the possibilities of Gantt and Lean Construction Management. A representation of the monetary situation is the determination of additional costs. Here, the best case and worst case are presented and evaluated. The execution of the quality requires the comparison with the fictitious, planning quality defaults at project initiation and the now under consideration of the defaults costs and dates possible degree of fulfillment. The measuring methods as well as the accompanying evaluation of the three parameters costs, time and quality are represented. The realization at the considered object has the following initial situation. Construction delay approx. 1 year, delta costs approx. 250 million Euro, quality approaches were revised and partly reduced. This starting point was the basis for the creation of a schedule. Appropriate milestones were entered into the system for the Lean Construction system. Between the milestones, the trades were measured using a fictitious red line based on the three parameters of time, quality and costs using monitoring.

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CLIMATE-NEUTRAL HISTORIC BUILDINGS: SLOWACKI THEATRE IN KRAKOW - CASE STUDY

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ABSTRACT

Global policy identifies achieving neutrality in sectors with the highest energy intensity rates as a priority for action. Countries are taking important and necessary measures to achieve this goal. The European Union has introduced a near-zero energy building standard in the construction sector. The next step is the Fit to 55 package, which is a milestone for Europe to achieve total neutrality in 2025. The climate-neutral policy has resulted in requirements and regulations already implemented in the sectors that consume the most energy and emit the most greenhouse gases. One such sector is construction, which accounts for around 40% of total energy consumption. Buildings newly designed in EU countries must now meet stringent thermal protection requirements. In Europe and Poland, governments are allocating substantial funds for the thermal modernisation of existing buildings. The exceptions to this are listed buildings and buildings under preservationist care. Such buildings are not subject to thermal protection regulations. In historic buildings, the priority is to protect the national heritage. However, the recent Energy Performance Directive introduced, for the first time, a recommendation that historic buildings should also be investigated for energy efficiency measures, under strict protection of the historic character of the building, of course. In this article, the authors present an analysis of a historic building of great historical significance. It is the Słowacki Theatre in Krakow. The research question the authors answer in their analysis is whether and how a historic building can be brought to a level of zero energy and climate neutrality. The second research question is whether, in addition to aspects related to energy saving and reducing greenhouse gas emissions, other aspects of designing the improvement of the historic building and its surroundings should also be considered in the analysis. The results of the authors' analysis indicate that a building level of near-zero energy demand can only be achieved for a listed building if the building undergoes thermal modernisation measures approved by the conservation officer and then the heat source is replaced with biomass or a heat pump powered by photovoltaic panels. To the aspects related to the preservation of the historical heritage, the improvement of energy efficiency and the reduction of CO2 emissions, the authors propose to include aspects related to the comfort of use of the building and aspects related to the accessibility of the building for people with special needs (the elderly and people with disabilities).

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A NEUTRAL SCHOOL FOR CLIMATE, ACCESSIBLE FOR PEOPLE WITH SPECIAL NEEDS: CASE STUDY

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ABSTRACT

Climate neutrality is a state in which greenhouse gas emissions produced by human activities are offset. In practice, this means that buildings, cities or countries do not make a net contribution to global warming, which is one of the greatest threats of our time. Climate warming translates into catastrophic anomalies for humans such as fires, floods, hurricanes or melting glaciers. We must take action to help stop global warming and environmental degradation. The sector most responsible for energy consumption and greenhouse gas emissions is the construction sector. Leaders of countries around the world are taking measures to reduce the energy intensity of the building sector. In Europe, a near-zero energy building standard applies from 2021. Around the world, passive or even plus energy buildings are becoming increasingly popular. Every year there is an increase in the use of renewable energy sources for heat and electricity production. European countries have taken on the ambitious challenge of achieving zero carbon by 2021. In order to meet these commitments, a number of measures need to be taken immediately in various areas of construction and other industries. One such action is the development of benchmarks for large groups of buildings, showing how zero carbon can be achieved. Such a group is the group of buildings functioning as schools. If the benchmark is to be implied for other buildings, the benchmark building must represent a group with similar geometry, material solutions, buildings preferably built in the same period. In Poland, such a group of buildings are the school buildings built in the action "Construction of Monumental Schools of the Millennium of the Polish State" carried out during the jubilee of the Millennium of the Polish State (1966). The list of schools includes 1423 schools. As they were built at the same time they are similar and repetitive. Most of the buildings are of low energy efficiency. These schools are often characterised by a lack of thermal insulation, outdated heating and ventilation systems, leading to high heating and cooling costs and also impacting the environment by increasing greenhouse gas emissions. This is a group for which similar energy efficiency improvement principles can be developed. The research question explored in the paper is whether such schools can achieve a near-zero energy building? Does this group have a chance to achieve climate neutrality? The second research question is whether, in addition to aspects of energy savings and greenhouse gas reductions, other aspects of the design of improvements to the building and its surroundings should also be considered in the analysis. In the analysis, the authors also considered the aspect of accessibility and blue-blue infrastructure.

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BUILDINGS MADE OF MASSIVE TIMBER LOGS WITH A DEROGATION FROM THE APPLICATION OF TECHNICAL CONDITIONS FOR TRADITIONAL MASONRY TECHNOLOGIES

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ABSTRACT

Timber log walls are a unique form of construction - erected from solid material, they are both a building structure and a thermal barrier. Walls of wooden logs have numerous advantages, especially favorable physical and mechanical properties, including insulation and thermal capacity. The technical conditions, which are the Polish interpretation of the NZEB building, which a newly designed building must meet, must meet 2 conditions simultaneously: the value of the EP index, which determines the annual calculated demand for non-renewable primary energy for heating, ventilation, cooling and preparation of domestic hot water for the entire building, and adequate thermal insulation of the external walls. Calculating the thermal insulation of a wood partition, relying only on thermal conductivity coefficients without considering other properties of the material, does not reflect the true insulating properties of wood. The lack of research on the insulating properties of wood, and thus the lack of national technical and installation requirements for log houses seriously limits the development of this type of construction and forces to undertake reliable research and development work in this area. The proposed introduction in this type of building of the methodology of the so-called Integrated Energy Design (IED) allows to carry out multi-criteria analysis of design variants at the stage of the virtual model in the BIM standard, in terms of the final energy efficiency of the building. Conducting various types of variant analyses and simulations allows to achieve optimal energy efficiency and to verify and correct the adopted solutions. The high energy efficiency of the building demonstrated by such simulations can be the basis for a deviation from the current regulations, which will allow the implementation of newly designed buildings in massive log technology, without the need for additional thermal insulation. As a result, it will be possible to preserve the unique architectural expression of buildings erected with this technology, with visible massive timber logs both on the exterior facades and on the interior.

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CYCLE WAY CONDITION EVALUATION USING LIDAR AND DEEP LEARNING

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ABSTRACT

The Austrian part of the Danube River, on its full length, is accompanied by towpaths, historically used by men or working animals to tow boats. Today, these paved towpaths are used as cycle ways and are part of the EuroVelo EV6 “The Rivers Route” at a length of ~400 km. Near Vienna, more than 500.000 cyclists are counted each year on the cycle way. Furthermore, the towpaths ensure the accessibility of the riverbank for emergency services, construction works, etc. With that in mind, viadonau, maintainer of the towpaths, decided to establish a management system for the maintenance of that network. This includes a yearly condition survey. Together with via donau, AIT established a survey and evaluation scheme, covering two aspects: structural condition and ride comfort/ride safety. The survey collects panoramic images of the cycle way corridor and Lidar data from the surface. Using a profile scanner, a width on the ground of 4.5 m is covered. From the raw Lidar data, high resolution 3D point clouds and 2D intensity images with a section length of 5 m are generated. As the width of the paved cycleway is usually below 4.5 m, in a first step a pre-trained convolutional neural network (CNN) is used to discriminate pavement from vegetation. Only the paved parts of the 2D images and the 3D point clouds are considered for further evaluation. For the structural evaluation, cracking, scaling/spalling and potholes are detected by the CNN on the images. Crack lengths are multiplied by a width 0.5 m to calculate the affected area. Scaling, spalling and potholes are detected as surface areas. Using different weights for crack area and scaling/spalling/potholes, a percentage of the area affected is calculated. This percentage is transformed to a five-stage dimensionless scale. For the ride comfort/ride safety evaluation, the point cloud of the remaining pavement is divided into tiles of 20x20 cm. For each tile the spread in z-direction is calculated. The spreads of all tiles are aggregated using the 95 % percentile for each 5 m section. The spread percentile is then transformed into a dimensionless evenness indicator. The evenness evaluation focuses on short-wavelength irregularities like root heaves and steps that present a fall risk for cyclists and reduce ride comfort. This evaluation approach ensures that the full width of the pavement is evaluated for structural and ride comfort/ride safety deficits. It equally covers the maintainer’s needs and user’s comfort and safety need respectively. Taking both indicators into account, the appropriate maintenance measures can be derived for each section.

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INFLUENCE OF REDUCING THE MAXIMUM SIZE OF COARSE AGREGATES ON DESTRUCTIVE AND NON-DESTRUCTIVE MEASUREMENTS USED FOR THE EVALUATION OF ORDINARY CONCRETE

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ABSTRACT

Assessing the current and future condition of concrete structures is a recurring topic, and this applies to both new and old structures. Several non-destructive techniques are available for investigating and assessing the deterioration state of concrete structures. These techniques provide an interesting approach to predicting concrete properties such as strength, modulus of elasticity, and surface hardness without damaging the structure. When assessing the structure's state of deterioration or concrete properties using NDT techniques, special attention should be paid to factors that can affect both destructive and non-destructive measurements. Among these factors, the parameters of the concrete mix and its components, particularly the maximum size of the aggregates, are considered to have the greatest influence on these measurements. Non-destructive testing is used to assess the performance status of structures based on correlation models developed on laboratory specimens; any extrapolation of these models outside the strength range or type of concrete for which they were developed must be done with caution in order to reduce the margin of error as much as possible. The applicability of these techniques is therefore restricted, necessitating the use of a calibration of these models. In this case, the validation of these models can be done using results obtained on the real structure; this step consists of comparing the results estimated using the developed regression model to the on-site results. Such procedure allows for the drawing of a correction coefficient of the correlation model that takes into account the influencing factors. The corrected curve will be more precise. The aim of this study is to highlight the influence of reducing the maximum size of coarse aggregates on the non-destructive rebound hammer and ultrasonic measurements, as well as the compressive strength. The rebound number, UPV, and the compressive strength results obtained on standard cylindrical specimens (16 x 32) cm of ordinary concrete, were compared to those obtained on specimens made from the same mix design but with the proportion of class 8/15 aggregates completely replaced by the same nature aggregates with a reduced diameter (class 3/8). This approach is used to derive a correction factor that takes into account the reduction in the maximum size of aggregates. This coefficient can be applied to calibrate and validate the associated correlation models. In the case of ordinary concrete, the results show that reducing the maximum aggregate size had no effect on the rebound index value. The variation in diameter, on the other hand, had an adverse influence on the ultrasonic measurements as compared to the compressive strength results. Indeed, when the ultrasonic values decrease due to a reduction in the maximum aggregate size, the compressive strength rises significantly.

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THE HISTORICAL EVOLUTION OF THE URBAN CENTERS OF THE HISTORICAL PROVINCES OF MOLDOVA AND BUKOWINA

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ABSTRACT

Throughout history, under various political, economic and military conditions, these cities had the role of capital of the historical provinces of Moldavia and Bukowina (Province of the Habsburg Empire), Siret between 1340 and 1388; Suceava from late 14th century to 1565; Chernivtsi (Czernowitz) between 1744 and 1918. Regional history did not treat these cities in the same way, so there was no direct relationship of subordination between these cities in terms of development, but only an exchange of political roles broken down over time. For each site, functioning as a capital is a significant period in the history of development. The three cities studied: Suceava, Siret and Chernivtsi today are located on the territory of two countries - Romania and Ukraine, however, they have a very interesting connection. The urban landscape of these cities has always been shaped and defined by geographical, anthropological, ethnological, ethnographic, social, political, economic boundaries, which has led, comparatively, to a different evolution from an urban point of view. The development of these cities has always depended on political factors, combined with military ones, and their development was artificial, based solely on the temporary political-military role. The purpose of this research is an analysis of the urban development of these cities and the highlighting of the preserved features in the current urban structure, represented by a unique architectural heritage.

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TEMPORARY HOUSING ENVIRONMENTS IN URBAN AREAS – CHALLENGES AND KEY FINDINGS FOR IMPLEMENTATION

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ABSTRACT

Cities are increasingly confronted with the need to provide short-term and cost-efficient housing as several factors, such as natural disasters, migration due to political or climatic circumstances or other unpredictable events can result in a sudden and at times temporary need for additional housing. Providing affordable, and flexible but at the same time sustainable and re-useable housing concepts that are easy to construct and quickly to implement are thus a requirement, that cities can face. Currently there is limited research available in this field, as disaster architecture and temporary housing have not yet been widely researched in a joint approach. The project "*Urban pop-up housing environments and their potential as local innovation systems*" has aimed at addressing this research gap by investigating in a highly interdisciplinary approach how and under which circumstances temporary housing solutions could be implemented under challenging framework conditions. The aim of the project was to systematically investigate and evaluate existing temporary housing options, and to develop and assess innovative and sustainable models for pop-up living systems in urban environments regarding resource uptake as well as social aspects, which may serve as incubators for urban innovation. From a technical perspective the models are focused on integrating aspects related to architecture, energy technologies, resources and materials, water as well as landscape design. Starting with a data pool of international examples, a classification and systematization of relevant typologies has been carried out in combination with user for profiles for the different uses. On this basis, potential urban areas have been identified for selected scenarios and finally six theoretical temporary housing models have been created and subsequently assessed and analysed in detail. The purpose of this paper is to present the key findings related to the scenarios and models, that have been developed within this fundamental research project and the methodologies that have been applied to assess them. The challenges of the scenarios and overall project results are summarized to provide an outline for potential implementation and future pilot projects.

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CONTRIBUTION TO AGRICULTURAL AREAS IN THE ORAVA REGION

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ABSTRACT

Agriculture is part of the identity of the Slovak nation and its country. Throughout history, it has gone through many historical and developmental stages and has shaped the appearance of the settlements and their surrounding areas. It also had an impact on the formation of settlements and the architecture of traditional dwellings. It later changed to cooperative systems and gradually began to merge into compact structures. The most significant transformation took place during the period of the promotion of communist power in Slovakia and the subsequent collectivisation of private property under state administration. The Unified Agricultural Cooperatives (JRD) were created - a system of sites that are more or less identical to those of today. With the gradual decline of communism and the transition to a democratic system of state governance, these areas are passed on to the people as commercial companies or have the legal form of a cooperative. The gradual opening of the borders and the incoming external changes and trends have had to adapt to these areas. However, most of them have failed to do so, and so the gradual decline of these sites begins and continues to this day. Many of them are decaying, neglected or abandoned. They often create an uncomfortable environment and their technical state does not meet today's requirements. These urban areas are currently being taken by municipalities and residents as a burden and an unwanted complication in further development. In view of the fact that there are many of these abandoned and unused sites in Slovakia and the current trends in revitalisation and architectural conversion, we have decided to explore, map and subsequently analyse these sites. We have chosen the Orava region for our analysis, because these are the branches of almost every village in the area and we know its circumstances. We have created the assumptions of new trends and requirements for new emerging architectural conversions and subsequently subjected this typological species to a public opinion poll. Through a series of questions, we have tried to verify whether or not the hypotheses are correct. This contribution is intended to open up a debate on the psychological perception of this area and thus create a space for bolder visions for these sites and to undermine the paradigm of this type of building, of which we have many, we cannot exploit its full potential, and its future remains unclear. Another attribute of why we have decided to pursue this topic is the current trend of sustainability and the return to the roots. The search for potential in brownfields and existing structures and the attitude of ‘ not to demolish, but to repair ’.

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REPLACING FLY ASH WITH A NATURAL POZZOLAN IN NORMAL STRENGTH CONCRETE AND ULTRA-HIGH PERFORMANCE CONCRETE

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ABSTRACT

Fly ash is a widely-used supplementary cementitious material (SCM) in concrete. Common reasons for using fly ash in normal strength concrete (NSC) are to reduce cement consumption and mitigate alkali-silica reaction. Additionally, fly ash is being used in ultra-high performance concrete (UHPC) to reduce use of silica fume which is more expensive than fly ash. Fly ash and silica fume are important SCMs in UHPC that provide a dense microstructure, improving UHPC strength and durability. However, fly ash is becoming less available because the energy industry has been investing in renewable energy production and removing coal burning power plants from operation. Therefore, there is a need to identify sustainable SCMs to replace fly ash in NSC and UHPC mixtures. Natural pozzolans are a diverse class of siliceous or siliceous and aluminous materials that can form compounds possessing cementitious properties in the presence of water. Since natural pozzolans are easily mined, they are usually considered to be more sustainable than portland cement and nearly as sustainable as other SCMs such as fly ash and silica fume. This experimental study evaluated the effects of a natural pozzolan (pumicite) as a potential replacement for fly ash that can produce comparable rheological and mechanical properties in NSC and UHPC mixtures. Results indicated that workability of both NSC and UHPC mixtures containing pumicite was consistent enough to achieve the targeted workability in just a few trials. Additionally, NSC mixtures with 30% pumicite had comparable compressive strength compared to NSC mixtures with 30% fly ash. Modulus of rupture (MOR) for NSC mixtures containing 30% pumicite (greater than 4.10 MPa) exceeded the MOR for specimens containing 30% fly ash. For UHPC mixtures, results showed that up to 75% of the fly ash in the control mixture could be replaced with pumicite while still producing acceptable compressive and flexural strengths. Based on these results, it appears that pumicite can be a reliable alternative for fly ash in NSC and UHPC mixtures in terms of rheological and mechanical properties.

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SPECIFIC RISKS OF FRAGILE CARGO TRANSPORTATION IN CRISIS SITUATIONS IN URBAN AGGLOMERATIONS

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ABSTRACT

The paper deals with ensuring the road transport of fragile or sensitive cargo, which is an increasingly topical problem for forwarding companies, which often use modern sensors for this purpose. The advantage of modern sensors is the relatively cheap feedback given by the collection of data during road (or any other modes of) transport, including the subsequent evaluation and possible adoption of appropriate corrective measures. A key aspect is the provision of adequate cargo securing during road transport (basically during any type of transport – i.e. with the use of multimodal transport). A specific area is the transport of such material during crisis situations or extraordinary events, when the transport infrastructure is disrupted and the material must be transported non-standard (e.g. on off-road vehicles, using available improvised means of material fastening). For the purpose of investigating aspects of the transport of fragile and sensitive cargo, a road transport experiment was carried out using a Tatra off-road truck equipped with appropriate sensors (three-axis accelerometers). Part of the experiment is the measurement and evaluation of acceleration coefficients in the urban agglomeration (Brno, Czech Republic) for pallet units using improvised material to absorb shocks and standard material (polystyrene foam). Statistical hypothesis tests showed that even in normal conditions, i.e. without the negative influence of disrupted transport infrastructure, the improvised fixation material does not absorb shocks as well as the standard one, and a statistically significant difference was found between the two measured data sets. In addition, the hygroscopicity of the improvised material, which would further reduce the effectiveness of protection against shocks, is not included in the experiment. The results show that the use of improvised material for fragile or sensitive cargo increases the risk of its damage during road transport, which further increased transport over damaged transport infrastructure in crisis situations, or extraordinary events.

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CYCLE PATHS COMFORT MEASUREMENTS IN THE NETHERLANDS

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ABSTRACT

Ever since cycling is an important way of transport in the Netherlands. As a matter of fact, each Dutch inhabitant owns an average of 1,3 bicycles. Besides the fact that the Dutch are used to bike anywhere, this is also beneficial in the fight against environmental issues and health deterioration. Therefore, reducing car use for short and medium distances is very much in the interest. For those distances cycling is a reasonable and very sustainable alternative which many governments want to promote. Improving bicycle facilities is a key factor to promote cycling. The two main aspects to be considered are safety and comfort for the users. This paper is mainly focused on an objective measurement for cycling comfort. Comfort on bike paths is mainly affected by vibrations felt by the users, therefore keeping vibrations on an acceptable level automatically results automatically in a comfortable bike path. This can be achieved by an adequate and on time maintenance. To help bike path owners to predict the best time for maintenance activities in 1996/1997 Kiwa KOAC developed the Bike Ridometer (BIRO). This measurement method has been validated using a representative group of cyclists, in order to convert the measured values into reliable cyclists' judgements. In 2010 the device has been upgraded, replacing the physical bike wheels with a contactless laser profiler system. The system has been developed in order to simulate two cyclists riding next to each other on a bike path. Once the profile of the bike path has been acquired, the characteristic response is calculated using a representative person seated on a representative saddle on an average city bike. The measured vibrations are converted to saddle level and then the comfort value is calculated according to ISO 2631/1. Each comfort level measurement is combined with a visual inspection of the bike path surface conditions. To convert the measured vibrations to a comfort value expressed as an absolute number from 1 to 10 Kiwa KOAC performed a case study, during which the influence of age, sex, bicycle type and road surface has been investigated. This presentation shows the results of this case study. Furthermore, it explains how the measured comfort values and the related inspection results can be used to optimize the maintenance planning on a bike path.

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A LOW-TECH APPROACH TO NZEB DWELLINGS IN DEVELOPING COUNTRIES: CASE STUDY ROMANIA

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ABSTRACT

This paper, based on larger research, focuses on evaluating the feasibility and challenges of implementing the nZEB standard on dwellings in Romania. It is proposed that implementing this new set of regulations and national strategies should be context-specific, heavily adapted to several factors which define the reality of a particular area in regard to the specific characteristics of housing and dwelling: the culture of dwelling, the dynamics of dwelling (occupancy, maintenance, use), household finances and expenditures, demographics, building habits and the construction market and, of course, climate considerations. These realities are however a product of long periods of evolution, adaptation to the context, or a result of certain habits. The new paradigm, oriented towards energetic efficiency, is in some regards divergent of these. As such, before using advanced technological means for a more energy efficient building, these traditions and habits should primarily be addressed. This means there should be a focus on the initial stages of the design (the decisions regarding the future building) and on the way it is used, which means that the architect and the end-user (the dweller) are central to the process. Initial decisions about the physical appearance of the building and the way it is built (orientation, building materials and technologies, internal layout etc.) as well as involving the future dwellers in the process, with their dwelling habits, affects the overall energetic footprint of the building in a more decisive manner than later technological additions. As a result, a low-tech approach to energy-efficient dwellings begins to take shape, based on a specific context. Rather than being a localized building code, it will be shown that these new strategies can affect much larger areas, even involving shifts in the way human settlements are designed and managed.

COMMON ISSUES REGARDING THE CHURCHES OF BANAT

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ABSTRACT

Banat is a south-western region of Romania in which all villages contain Orthodox Churches. The churches in question were constructed during the end of the 18th Century – beginning of the 19th Century. It is important mentioning that the religious activity was uninterrupted during this time. The churches are located in the following villages of Banat region, in the western part of Romania: Poganesti, Voiteg, Zgribesti, Balint, Sanmihaiu Roman, Hezeris, Unip, Capat, Saravale, Hodoni, Igris, Babsa, Ficatari, jebel, Visma, Cadar, Hodos, Olosag. The aim of the study is to identify the primary issues, decay, which became apparent with time and present during evaluation and identifying the cause of their apparition. The observations were made during the years of 2022-2023. Most of the Orthodox Churches from Banat consist of a central area (naos), sometimes accompanied by transepts on both sides, a sanctuary in the eastern part and a bell tower in the western part. The primary structural degradation consists of cracks in the walls, the arches and domes. The causes of all this are unequal leaning of the walls, uneven weight exerted by the structure, foundations with insufficient width and depth, and the effects of earthquakes from the past, as Banat area is the second most important seismic region in Romania. In addition, there is an overall exfoliation and peeling of the plaster, also excessive humidity among the lower part of the walls. This has happened due to capillary ascent of water and the frosting-defrosting process. Most of the time, improper interventions and the use of cement-based materials have accelerated the process of deterioration. Sometimes, local destructions of the roof and wooden extremities are present because of aging and lack of maintenance of the roof's cover, the effects can be noticed on the sheets of metal or ceramic tiles. All of this inevitably leads to a partial or complete decay of internal mural pictures, often times of great artistic value. The major conclusion represents a centralization of the damaging factors and the proposal of few measures of mitigating the effects of them.

PRINCIPLES AND TECHNOLOGIES OF HISTORICAL STRUCTURES CONSOLIDATION. CASE STUDY OF BANLOC CASTLE COMPLEX

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ABSTRACT

Historical monuments are an integral part of the national cultural heritage and are protected by law. Activities and measures to protect historical monuments are carried out in the public interest. The Banloc castle complex is located in the west of Romania, 47 km from the city of Timisoara and 11 km from the Serbian border and includes five buildings: the manor, the kitchen, the stall, the hunting pavilion and the house of the housekeeper. During the seismic sequence that took place in 1991 in the Banloc-Voiteg area, with the main shock having a Mw 5.6, the castle complex was severly affected. The approach is carried out through multidisciplinary studies on consolidation solutions. These studies involve historical, architectural, structural and physical-chemical analyzes with the aim of finding correct restoration solutions. They respect the architecture, respectively they aim to regenerate the area. The restoration of the building is carried out by approaching the functionality, structural solution and highlighting the artistic elements. All this respects the Venice Charter, respectively the Naia Charter. Some analytical techniques, as: X-ray diffractometry (XRD), Wavelength Dispersive X-ray fluorescence (WDXRF), optical microscopy (OM), zoom microscopy and scanning electron microscopy (SEM), Infrared spectroscopy with Fourier Transformed (FTIR), Raman spectroscopy, have been used in order to clarify the main aspects about the structure, composition and morphological of the investigated samples. The oxides composition has been recorded by X-ray fluorescence (WDXRF) and the possible organic impurities has been identified by FTIR/Raman spectra. The morphology has been investigated by optical, zoom microscopy, and scanning electron microscopy (SEM), which revealed the colors, fissures, cracks and even holes of these samples due to the time weathering processes, and damages they suffered in time. The present paper focuses on the pavilion building, which is part of the Banloc castle complex, in which consolidation solutions will be addressed, followed by the proposal of restoration solutions. The consolidation interventions are reversible and are in accordance with the new functional destination.

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THE INFLUENCE OF THE CHARACTERISTICS AND LOCATION OF THE FITTINGS OF FIRE DOORS ON THEIR FIRE RESISTANCE

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ABSTRACT

Analysis of statistical data from fires, especially residential buildings, indicates that the spread of fire occurs due to the fire hazard of materials used in door structures. In the door structures, materials of different origin and fire hazard are used. Structural elements made of plastics, as well as thermal insulation and other materials in a fire, as a rule, not only burn, but also emit toxic products that are dangerous to the human body. Currently, in the production of doors, gates and similar structural elements, various additional structural elements are introduced that have a number of technological and operational functions. The use of fittings leads to the fact that the door structure is subjected to more heat, and this follows that the limit of fire resistance will be significantly less. The purpose of the work is to assess the influence of fittings on the features of the behavior of door structures in fire conditions. To achieve the goal, the following tasks were set: analysis of scientific and technical literature and features of the behavior of door structures in fire conditions, development of a method for assessing the effect of fittings on the behavior of combustible materials used in door structures, as well as analysis of the results obtained after experimental studies using the developed methodology. The main method for testing door structures is a standard method of fire resistance tests for fire doors and gates. This method allows you to evaluate the fire resistance of door structures under conditions of exposure to a standard fire. A new research method has been developed that allows the study of small fragments of structures. The tested samples are installed in an opening measuring 250x250 mm with the help of fasteners and are isolated at the ends with non-combustible material. On one side, the impact of the fire is made. The sample must be a fragment of a real structure containing accessories - locks, closers, overhead or mortise hinges. In this work, according to the developed method, several samples of plates of various thicknesses from wood materials used in door structures were tested. In addition, samples made of wood materials were used with installed steel plates between the layers of wood and on its surface, which simulates the presence of accessories.As a result of the studies, the temperature on the unheated surface of the samples depended on the time of fire exposure to the samples. Based on the results obtained, the following conclusions were made: a. Functional elements of structural in the case of placement on an unheated part are cooling elements - they take on heat and release heat into the environment, however, with an increase in their thickness, their overheating and a decrease in the efficiency of heat removal are possible. b. In the case of placing fittings inside the material of the fire door, the heat removed is transferred to the outer unheated part of the door, thereby initiating its rapid warming up.

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A MULTIDISCIPLINARY INVESTIGATION OF THE KONOPI MANSION IN ODVOS, ROMANIA

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ABSTRACT

Architectural heritage represents one of the most important assets of a local community, representing the base of their authenticity and spirit of place. This paper takes a look at the nobiliary manor houses in the extra-urban area of the county Arad, which is located in the western part of Romania, close to the border with Hungary. Along the Mures River, there are many manor houses and the interest and curiosity for this type of former residences of the nobility in Romania has increased in the last few years, whether we are talking about entrepreneurs who want to restore them to their former glory or simple curious to discover hidden treasures in rural areas. This architecture, that of the extra-urban noble residences, is a particular feature of the modern era, very valuable in terms of cultural heritage because it was the result of a culture of the European area. It can be said that the noble architecture of the region Banat-Crișana is a result of the regional interpenetration of the Central European area. In this rural landscape of the Mures valley, the early modern noble residences are a common feature, where classical architecture is specific, with more than ten such mansions and valuable buildings. Of these, the Konopi mansion, whose architecture makes its presence felt, stands out the silhouette of the Mures valley and its presence in the consciousness of the community. The aim of this paper is to study the manor house and the ensemble Konopi and the way in which the residences were thought of and perceived at the time, both from the point of view of their function as a dwelling and as a symbol of the family power in the countryside. The overall objective of this paper is to identify the ways to intervene on the Konopi Castle complex and to generate a strategy for its long-lasting good functioning so that the historical monument of regional and local interest can be left to future generations.

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SIMPLIFIED SEISMIC VULNERABILITY ASSESSMENT OF HISTORICAL BUILDINGS WITH CULTURAL VALUE, IN BANAT AREA

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ABSTRACT

Earthquakes represents a common threat for many European countries and not only, affecting a large number of buildings with cultural value. One of the most vulnerable class of buildings are the historical residencial ones, as they are usually built in masonry. Banat region is located in the western part of Romania and is characterised by a moderate seismicity, with shallow earthquakes of crustal type and powerful vertical forces. A large number of historical buildings are located in the area, many of them in a poor conservation state. The majority of the historical palaces were made in masonry of burnt clay brick, with lime, with masonry arches or vaults, and masonry or stone foundations. This paper presents an investigation that was carried out on representative historical buildings in Banat area, which are considered as representative for the region, with cultural value and various decays. The paper highlights the problems that were identified during on-site investigation, as well as their causes and presents a simplified vulnerability assessment that was applied for the investigated buildings. The vulnerability assessment methodology is an empirical one, that determines the most probable damage state in a specified seismic scenario, considering in the same time the architectural-artistic, urbanistic and socio-economical value of the case study buildings. The results indicate the level of damage that can be expected in case of an earthquake in Banat region and highlights which of the buildings present the highest cultural vulnerability as well. The methodology was previously proposed by the authors, and can be easily applied on other similar buildings to determine their seismic vulnerability influenced by the cultural value.

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RECENT METHODS OF VISUALIZATION USED IN THE DIAGNOSIS AND CONSOLIDATION OF HISTORIC STRUCTURES

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ABSTRACT

The subject addresses heritage objects that are subject to degradation processes caused by both natural and anthropogenic factors. One of the current solution is directed towards a varied range of scientific instruments, thus facilitating the analysis and diagnosis of the concerned buildings, contributing also to the identification of materials and techniques used and providing information about any previous interventions of conservation attempts. Recent visualization methods used in the diagnosis and consolidation of historic structures can utilize both three-dimensional laser scanning technology and laser interferometry as a diagnostic method, as well as alternative methods such electrometry, magnetometry and ground penetrating radar devices. The topic is a current issue and falls within the sphere of conservation and consolidation of historical structures. The subject aims to address how heritage objects can be secured using 3D scanning technologies. Additionally, the paper provides an overview of this technology and investigates the potential benefits of combining it with other imaging systems used in digital heritage representation. The discourse is structured around key themes, which are interconnected and form the basis for hypotheses that lead to conclusions about the effectiveness of emerging visualization methods in heritage preservation. The case studies were conducted on the Bezdin Monastery Complex, the" Saint Martyr Gheorghe" Church, the "Saint Martyr Filimon" Monastery and the former Metropolitan Summer Residence in Sibiu. The selected case studies illustrate the methodology for obtaining and processing field data, as well as the use of this data in the diagnosis process and in selecting appropriate consolidation options for these historical structures based on the obtained results. From a structural analysis perspective, the first step involved creating a regularly shaped volume to encompass the entire building, allowing for a complete assessment of different levels and sections that lead to clear conclusions regarding the inclination of walls or vaults, wall curvatures, arch deflections, existing cracks, and their possible dimensioning, as well as the condition of the roof structure, coverings and attic. Additionally, as a result of the scanning analysis, areas with major thickness differences were obtained, which allowed for discussing exfoliation caused by infiltrations or faulty execution and in this case, deep scanning has been applied for a thorough research. Following the creation of the 3D scan, it was overlaid with the technical project, leading to a precise verification of the proposed interventions. These technologies have provided specialists with the possibility of extracting vital information both in the diagnostic phase and throughout the implementation of restoration works. Advanced scanning technologies of today have enabled the creation of a database with the capability of providing pertinent information about a building's past, starting from its initial stage, up to the completion of execution works, which significantly aids in facilitating the process of diagnostic analysis and structural calculation. Moreover, these technologies have represented a valuable tool in terms of monitoring the buildings' behaviour over time, with their evolution being directly monitored by comparing the previous virtual models with the current ones.

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INCREASE OF LANDSCAPE ECOSYSTEM SERVICES GENERATED BY THE AGRIVOLTAIC SYSTEM DEVELOPMENT

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ABSTRACT

UN estimated that the world population will possibly grow by 75% in 2050. This will push food and energy production to satisfy human needs. However, in recent years, the agricultural and energy sectors were in competition for land use, as many arable lands have been changed in photovoltaic farms with a loss of food production and ecosystem services. Indeed, in many photovoltaic farms, the flora is ruderal, with the prevalence of nitrophilous-type plants, and requires frequent mowing with a cost for the companies to prevent panel shading and reduce fire risk. The agrivoltaic system represents a new frontier for renewable energy policy, by associating energy production with food security. In fact, the agrivoltaic system combines the installation of photovoltaic panels with the possibility to develop crop production under them. This provides a new perspective of vegetation management in the agrivoltaic field, mainly allowing to replace invasive plants (passive vegetation management) into crop production (active vegetation management). This allows the implementation of food production and raw material, besides the improvement of ecosystem services provisioning. In this study, we estimated the ecosystem services increase by three agricultural scenarios of agrivoltaic systems, such as pastures, arable land and agricultural woods. The results show that these potential solutions can give the possibility to generate new economic activities in agrivoltaic farms with potential benefits from a local scale (e.g., cultural services) to a global one (e.g., regulation services). In the agrivoltaic system, the provisioning of ecosystem services is deviated by the feedback of agricultural knowledge, photovoltaic technologies and vegetation development. Therefore, they represent Innovative-based solutions creating more landscape and environmental externality for human needs through multifunctional land use.

MECHANICAL BEHAVIOUR OF BOLTED CONNECTION IN BENDING EVALUATED WITH SMALL-SCALE SPECIMEN

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ABSTRACT

A tensile experiment is usually adopted to evaluate the mechanical behaviour of bolted connections, such as slip, yield, and ultimate behaviours or resistances. Tensile force is given by a universal test machine. A small-scale specimen of a bolted connection with a few bolts in a half side is used for the experiment. The small-scale experiment gives the mechanical behaviours. Tensile force applies to the specimen in the experiment; however, the bolted connection in an actual structure is exposed not only to tensile force but also to shear force or bending moment. In this study, a small-scale bolted connection for a specimen was developed to evaluate the bending behaviour of the bolted connection. The bolted connection was cranked at the centre. The crank is intended to generate the bending moment by the eccentricity of the applying tensile force and the force axis line. The mechanical behaviour of the bolted connection was investigated by finite element analysis. The bending moment is obtained theoretically as a product of the force and the eccentricity. However, the analysis reduced the applied bending moment by 75% from the theoretical value. The cause of the reduction was the support condition at the ends of the bolted connection. In a theoretical pinned supported case, the applied moment was not reduced; on the other hand, in a clamped supported case, which was assumed clamping by chucks in a universal test machine, the applied moment was reduced. From this finding, the behaviour of bolted connection in bending would be obtained in a small-scale experiment; however, the specimen is needed to design considering the support condition at the ends of the specimen.

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URBAN MOBILITY SUSTAINABLE PLANS: TOOLS AND TRANSPORT POLICIES

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ABSTRACT

This paper provides indications on how to develop an Sustainable Urban Mobility Plan (SUMP) in small and medium-sized cities, bringing the case study of an Italian town located in southern Italy, Brindisi. The guidelines are part of the output of the SuMo (Sustainable Mobility in the Port Cities of the Southern Adriatic) project with the aim of specifically improving the sustainability of transport in Brindisi and, in particular, in the port area. The drafting of this paper is based on the dimensional element of the city which allows adopting a path adhering to the needs of the generators and users of a medium-sized city such as Brindisi in order to make the implementation action effective the adoption of the plan follows. The time frame is short-medium term, however, once the sustainability objectives have been pursued, the repercussions are also long-term. The paper anticipates possible solutions and interventions for the Brindisi port area in order to provide useful ideas in the subsequent phase of drafting and implementing the SUMP itself. The starting point is the analysis of the demand, of the mobility needs, in order to facilitate the matching of supply and demand and therefore to provide services and make infrastructures available that fit the territorial needs. To this end, the coordination of the various players in the transport system is essential so that the action is synergistic and appropriate with respect to the needs of citizens, economic operators and the territory in a perspective that is respectful of the economic-environmental-social paradigm of sustainability. Results indicate that at the basis of the preparation and implementation of the SUMP in the city of Brindisi there must be the real will to change the current structure, improving it, in a sustainable perspective. This implies having to act not only on mobility, which is the heart of the PUMS, but also on the quality of life and well-being of the resident population, as well as the transiting population and tourists. In general terms, therefore, it will be necessary: a. improve accessibility for all, regardless of income and social status; b. improve the quality of life and the attractiveness of the urban environment; c. improve road safety and public health; d. reduce air and noise pollution, greenhouse gases, emissions and energy consumption by limiting individual motorized mobility; e. ensure social equity.

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DISTRIBUTIVE EFFECTS OF TRANSPORT INFRASTRUCTURES IN FAVOR OF ELDERLY

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ABSTRACT

This paper provides indications on the distributive justice discussion and on who benefits from the transport investments as it is relevant for the allocation of substantial public funds to be directed to infrastructure investments, and for the relevant decision-making processes. Transport infrastructures can substantially change the organization of urban space, making it crucial to evaluate whether local governments mobilize these resources in a way to redress or reinforce existing patterns of urban inequality, especially by considering elderly needs. The contribution of this paper is given by the application of Social Return on Investments (SROI), by focusing on population structure, and measuring the distributive effects of public interventions in selected relevant geographical areas. The idea underlying this contribution is first of all to identify the characteristics of the mobility of elderly people, especially women. Second, to profile it by using a Random Utility Model based on gender differences. Finally, measure the degree of appropriateness of investments, intended to meet mobility needs, through the measurement of the SROI referred to a case study. Research results show that female and the elderly mobility needs are important to be accounted in mobility supply reforms and indicates the importance of clustering the population for providing useful infrastructures and services.

STRUCTURAL ANALYSIS AND DAMAGE ASSESSMENT OF A FORTIFIED CHURCH – A CASE STUDY: THE EVANGELICAL CHURCH OF APOȘ, SIBIU COUNTY

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ABSTRACT

Globally, there is a wide range of monuments that require conservation and restoration work in order to maintain their values as a whole, both from the aesthetic and historical perspective and to ensure their preservation for future generations. The aim of this paper is showcase the historical development of the fortified church structure in Apoș, in addition to examining the reasons for its structural damage and exploring possible ways to strengthen the entire church – tower complex. The Evangelical Church is located in the village of Apoș, in the central region of Transylvania, along the Hârtibaciu Valley. This region is of national importance, being part of the Hârtibaciu Plateau and also within the Natura 2000 sites. The church complex consists of the church itself, which is also listed in the Historical Monuments List with the code SB-II-a-B-12313, the bell tower and the parish house. However, this paper concerns only the church and the tower. The evolution of the church spans over several centuries, during which its structure underwent reconfigurations, consolidation works, but also invasive interventions with incompatible materials that further altered the entire structure and its behaviour. Thus, from the point of view of interventions, they were carried out progressively, the most extensive works being the replacement of the nave ceiling with cylindrical vaults and the replacement of the choir ceiling with a semi-spherical vault, as well as the consolidation works of the building in the 20th century. The investigation of the Evangelical Church was carried out, first of all, by conducting an on-site investigation, followed by using traditional survey methods in order to identify the structure failures. Additionally, contemporary visualization methods, such as three-dimensional laser scanning, were utilized to gather information on dimensions, heights and ornament details. Through these steps, a survey was obtained that includes accurate data on the church complex. Following these stages, the main degradations identified were a series of cracks caused by differential settlements and the lack of cooperation between structural elements, mechanical damage caused by the detachment of the buttresses from the walls and due to the sliding of the land towards the south, after the demolition of the fortifications. Additionally, two types of brickwork damage were identified: pronounced crack indicating its displacement, contributed by seismic activity and smaller but numerous cracks indicating the disintegration of the brickwork caused by differential settlements combined with prolonged moisture. Besides these, human factors and execution defects were identified, as well as physicochemical degradations with internal causes, such as composition defects or crystal cohesion defects. The repair and consolidation works, including seismic safety measures, have proposed technologies based on the principles of reversibility and preservation of the church's authenticity. Thus, the main interventions aim to strengthen the structural walls, arches and vaults, eliminate the source of humidity causing the erosion of the masonry through capillary water infiltration, strengthen the floors, roof structure and openings, as well as the interior elements, such as balconies and stairs.

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DECISION-MAKING PROCESS DURING WAYFINDING IN AN UNFAMILIAR ENVIRONMENT

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ABSTRACT

The problem of this study is how the first-time users find their way in an unfamiliar environment and which environmental cues they use during their decision-making process. Based on this question, we examine the collection of the visual data such as signs, colours, maps, graphs, texts in the decision-making process to reach the target. In other words, we believe that the first-time users who are unfamiliar to the environment process these data in the memory to find the direction. To carry out this study, Izmir University of Economics Campus Area was chosen as a case study. An interior walking route was determined by researchers beforehand. Eight participants were selected who are not familiar with the chosen route and the campus area. In this study, a mobile phone was used as an instrument to record the route walked by the participants. Video and audio recording was done by researchers. Prior to the study, consent was obtained from the participants. During the test phase, each participant was asked to walk the route without any help from the researchers and was asked to describe verbally their experiences. A video record was taken by the researchers during the way-finding process. It has been determined that users have difficulty in reaching the target because insufficient wayfinding information was provided to the users. Therefore, since they could not fully understand the place, it caused confusion in the way-finding process. In this experiment, the importance of the layout of the signage system was first understood. In addition, the necessity of the building's plan configuration to be perceivable by first-time users was discussed.

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SMART CITY NEIGHBOURHOOD BEYOND BRANDING

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ABSTRACT

The article aims to address models, criteria, and innovation for neighbourhood planning and designing in Europe by leveraging technology and data to make cities more efficient, livable, and sustainable as the current need of urban development scenario. By identifying urban and architectural factors through different neighbourhoods with various in-scale, project cases in Aspern (Vienna), Brainport (Eindhoven), Santa Gulia (Milan), Harbor City (Oslo), Hafen City (Hamburg), and Nordhavn (Copenhagen), were analyzed to find the most driven factors for planning and designing smart neighbourhoods. The contribution of this research is to present different relationships through the various factors for planning and designing smart neighbourhoods from the perspective of urban planners. The study explores the various literature for planning and designing smart neighbourhoods that can serve as a starting point of smart city initiatives for the urban development of smart cities, and should continue beyond city boundaries to entail decentralized energy generation systems, electric charging stations, electric vehicles, and storage facilities which help in the smart neighbourhoods' goal of being eco-friendly, and economical.

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PLAYFUL LEARNING IN HIGHER EDUCATION – A CASE STUDY

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ABSTRACT

Playful learning is well documented for children, but less researched for adults and university students, but it has been proven that play related to learning increases attention and social interaction, increases motivation and improves student engagement. At the same time, some studies show that learning through play brings an added creativity in approaching alternative topics, which is useful for architecture students and can be used especially in vocational education and social sciences education. The article presents an experiment of learning through play carried out at the Faculty of Architecture and Urbanism in Timisoara in a seminar with 45 students, aiming at a better integration of complementary disciplines in the curriculum. The focus was on students' understanding of the diverse perspectives and influence that personal hobbies have on how architecture can be approached. As methodology, firstly the paper introduces some of the chosen topics, the interactive presentations made in groups of two or three students and how they were conducted, how the presenting group interacted with the rest of their colleague and the feedback provided. Further a qualitative evaluation was made of the effect of these interactive presentation had on themselves and their peers. The evaluation was carried out by analysing the individual feedback provided by most of the seminar participants. The results show that the students have This seminar has a learning through play component that the team has been experimenting with for several years. The results show that the students are more willing to pay attention to each other, to exchange ideas about things they are passionate about, learned to work better as a team and they managed to approach the presentations very creatively. At the same time, for the case study, this approach of complementary subjects helps students to pay more attention to the connection between architecture and other disciplines. As a conclusion the results support other research in the field, related to the fact that playful learning has beneficial effects among young adults, such as: higher retention of information, increased creativity, real improvement of relationships with others, increased energy level, increased attention and motivation.

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AESTHETICS VERSUS SUSTAINABILITY IN ARCHITECTURE – IN SEARCH OF MEANING

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ABSTRACT

In recent years there have been many voices questioning the relationship between aesthetics and sustainability in architecture. Because architects have responded relatively late compared to other professions to the challenges posed by the idea of sustainability, systems for assessing and certifying the sustainability of buildings have hardly incorporated the aesthetic dimension. In current practice in Romania and beyond, it can be observed that the two aspects - aesthetics and sustainability - seem to be at opposite poles, since most architects understand the former as an attribute of quality architecture and the latter as an imperative that can be solved strictly technically: energy efficiency, greenhouse gas emissions, materials, etc. The consequence of this type of thinking has resulted in what we call green design versus great design. But this is not an uncommon idea, as in general in the world the standards of green design and great design do not coincide, despite the attempt in recent years to change the ideas of the majority, as the UIA documents or the latest Pritzker awards show. And yet, if education for sustainability in architecture would change perspective, perhaps the future of the profession would change too. What if we had a different approach to aesthetics in relation to sustainability (one based on intelligence rather than intuition)? A part of the aesthetics course and also sustainability course in Faculty of Architecture and City Planning in Timisoara treat this issue as a query field, with specific questions, presenting different approaches, in order to change student's perspective on this issue. Based on a 2001 article by S.Guy and G.Farmer proposing the reinterpretation of sustainable architecture in relation to spatial image, ideal image, idealized concept and technology, students were asked to envision their future in the profession by choosing two of six alternative approaches, which the authors call the compelling logics of sustainable architecture: eco-technical, eco-centric, eco-aesthetic, eco-cultural, eco-medical and eco-social and to explain their choice. Twenty-five students attending both courses responded. The evaluation of the results considered both quantitative and qualitative aspects. The results were interesting and deserve further attention in terms of their integration into the approach to projects developed in the architecture design studio: compared to previous years, there has been a migration from a preference for great buildings to a more human-centred and eco-centered approach. There are some possible explanations in the students' background and participation in many restoration workshops in the first years of study. Research will continue to see how the group of students will be able to integrate their vision into architectural projects next semester. As a conclusion, future architects should understand that the sustainability of a building is directly influenced by the usual design decisions, sometimes the same decisions that influence aesthetics, it is not something that should be seen as separate and not just a technical decision.

CONSERVATION, CONSOLIDATION AND RESTORATION OF THE HOLY ANNUNCIATION CHURCH, VĂTĂȘEȘTI VILLAGE, REGION OF OLTENIA, ROMANIA: ARCHITECTURAL AND STRUCTURAL PARTICULARITIES

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ABSTRACT

The present article discusses the process of architectural and structural diagnosis of a late 18th century, brick masonry built, Christian church located in Vătășești village, Vâlcea county, Romania, presenting the particularities discovered. The church is dedicated to Saint John the Baptist and The Holy Annunciation and it is listed under the LMI code (List of historical monuments of Romania) VL-II-m-B-09968. Its registration in the list of historical monuments inscribed in the National Cultural Heritage of Romania was realized especially thanks to its original byzantine style mural paintings (frescoes) still left almost intact on the interior walls, the only serious damage made to it being found on the paintings once found on the outside walls. In order to properly conserve, consolidate and restore the vernacular monument, the process of diagnosis had to include research and investigations of various and complementary areas such as 3D scanning using laser scan technology, the archeological report, the mural paintings restoration experts report, the chemical analysis of the painted surface, the biological analysis of different materials, humidity reports, stratigraphy research, the geological and topographical reports, the compression strength of bricks test and structural analysis using 3D modelling and the Etabs software. The materials and techniques used for the consolidation and restoration works had to be non-ivasive, ecological and reversible, using steel nets and hydraulic lime for the consolidation of the brick masonry. The architectural interventions on the drainage system, facades, roof, interior floors, lighting system, and all the interventions that the article describes were subordinated by the need to preserve and highlight the Romanian orthodox frescoes that give great value to the monument. This article explains the importance of proper research and measurements ought to be done in order to have a well-coordinated process later, designing the consolidation and restoration project.

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SUSTAINABILITY IN THE STRENGHTENING PROCESS OF THE LOAD-BEARING HISTORICAL STRUCTURES

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ABSTRACT

Preservation of the load-bearing historical structures represents a common research topic nowadays, as it stands a provocative and difficult task. At the same time, sustainability represents a concept of high interest in the light of recent climate change events, a concept that has become a responsibility in the past years. Safeguarding of the historical buildings with heritage value is an obligation of society to be able to pass on to future generations the historical cultural value of the buildings and the traditional construction techniques on which they were built. Nowadays, many historical buildings are consolidated with modern reversible materials and technologies, without attempting a sustainable consolidation with local traditional materials using the original building techniques and local building materials, which have already proved their effectiveness in the past. This article presents the sustainable consolidation methods proposed to consolidate the historic building of the Villa Abbatis guesthouse in the village of Apos, Sibiu County, Romania. The proposed consolidation techniques use bricks that are manufactured according to traditional method in a recently built brickworks and reuse existing building materials in the building and from abandoned buildings after the departure of ethnic Germans from Romania until 1990.
The aim of this paper is to highlight the value of the traditional materials and technologies, that can bring in the retrofitting process not only the assurance of the bearing capacity, but also the preservation of the authenticity and sustainability of the entire process, in a holistic approach.

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REVITALIZATION OF POTENTIALLY PERIPHERIC COMMUNITIES THROUGH RESPONSIBLE TOURISM - CASE STUDY: THE NETWORK OF CZECH SETTLEMENTS FROM ALMĂJ MOUNTAINS, BANAT, ROMANIA

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ABSTRACT

Initiated by the imperial Habsburg administration, Czech villages were established during the XIX century in the Almăj mountains, Romania, as part of the colonization process of these territories with Central Europeans. The purpose of these efforts was twofold: a. Efficient exploitation of the existing resources in the area (forestry, coal deposits and other resources) in an organised system, by communities with experience in these fields. b. Consolidation of the empire's borders - the Iron Gates being a critical area of direct contact with territories under Ottoman occupation (or influence). Developed in hilly regions close to resources, the Czech settlements in the Southern Banat Mountains are far from the major mobility corridors and are generally accessible by narrow, winding roads. The reduced accessibility and the gradual decline of the economic activities traditionally carried out by these communities contribute to their peripheral character - affected by phenomena such as depopulation, ageing or segregation. Over the past few years, however, these settlements are undergoing a phase of gradual revitalisation, a bottom up initiative, with local communities developing a series of projects aimed at promoting local values and heritage, with a view to increasing the level of tourist attraction and establishing a resilient economy. The aim of the present research is the development of an intervention guide for the protection, conservation and enhancement of the existing material heritage of the Czech settlements in the Almăjului Mountains - as a guideline accessible to all members of the community.

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DESIGNING FOR PUPILS WITH THE AUTISM SPECTRUM DISORDER: CASE STUDY OF THE NORTHERN SCHOOL FOR AUTISM, MELBOURNE, AUSTRALIA

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ABSTRACT

The manuscript presents the case study of The Northern School for Autism in Melbourne (2013), designed by Hede Architects. The building achieved several rewards including first place in the CEFPI Regional Award and the CEFPI Educational Facilities Award. It appeared on the list of finalists of the World Architecture News Awards 2013. Specialist Magda Mostafa classified it as one of the most dedicated facilities for people with autism spectrum according to ASPECTSS™ rating. Practician autism therapists have been interviewed to carry out the expert survey about the subject building. Responses have been based on photographic material and diagrams attached to the survey. Respondents have been based on so-called sensorisms, i.e. manifestations of discomfort in the receiving and processing of sensory stimuli. This symptom can be recognized in pupils' behavior, revealed in unfavorable conditions for people with ASD. The examined group has been also based on their own therapeutic experience during the usage of educational facilities. The survey determined the probable impact of the applied design solutions on the perception of a child on the spectrum. The special method of designing for people with autism is to follow sensory features of different spaces as the main superior design tool. As a consequence, sensor map determines building functional zones. The manuscript describes other specific architectural solutions used in the project to decrease the deleterious impact of external stimuli on the sensory integration of students. Presented survey method reveals, that designing architectural project with sensoral guidelines may have a positive effect on the concentration of attention of students on the autism spectrum. By providing appropriate educational and therapeutic conditions, students might have a chance to function better in the community and be revalidated.

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RESTORATION AND REVITALIZATION OF CULTURAL HERITAGE – EXHIBITION and EVENTS CENTER "PITTNER SCHOOL"

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ABSTRACT

This paper present Pittner School, a historical monument around the year 1890, located in Resita. The building has 2 level, ground floor and first floor and have several particularities. By structural point of view, the fabric of the wall is made from solid bricks and clay brick joined with furnace mortar. The ground floor has an inner courtyard surrounded by rooms and an access ladder to the wooden walkway on the first floor. On the courtyard façade there is a Sundial, a clever solution to represent school hours, letting children know when it's time to go home. The wooden walkway on the first floor from the inner courtyard continue to the backyard. With this project we succeeded to save a historical monument about to collapse. Structural consolidation with modern reversible materials and technologies in a way that does not disturb the interior spaces. There is ensured a long-term use of the building, by making it functional as after-school with different workshops, indoor and outdoor exhibition spaces. In conclusion, with this paper we want to highlight that, the fabric of the wall made from solid bricks and clay bricks (mostly clay brick) joined with furnace mortar, was a structural solution that kept the building standing despite advanced degradation over the years. And consolidation with modern reversible materials can restore and revitalize a historical building without disturbing the interior spaces.

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ENHANCING THE LANDSCAPE – INTERVENTIONS IN THE LANDSCAPE "APOS EVANGELICAL CHURCH"

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ABSTRACT

This paper presents the landscape revitalization and restoration proposal of Evangelical Church from Apos. A fortified church from the beginning of the 15th century, located in Apos, Sibiu. The landscape revitalization and restoration proposal aim to enhance the Apos Evangelical Chruch and the Transylvanian landscape in relation to the local cultural, historical and architectural heritage. The Apos Church enjoys a special landscape, defined by valuable natural elements, the village being traversed by the Apos Valley and "embraced" by the hills specific to the Romanian Transylvanian landscape. In order to highlight the monument-landscape relationship, respectively the Apos Evangelical Church and the natural context of proximity, this paper brings into discussion possible restorative interventions on the monument but also the landscaping strategy within the rural and natural landscape of the Apos village. The restorative interventions on the building with exposed materials, treating the monument as an object to be studied is an example of good practice in restoration and a promise of a good coexistence between tradition and the future. In conclusion, trough landscape interventions, the Apos Church Complex becomes not just a place with a restored monument, but a whole story that the visitor will want to feel again and again. The sum of the interventions proposed for the Apos Complex and the adjacent areas value and safely, in a contemporary manner, the cultural, historical and architectural heritage of the area for both the present and future generations.

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DEATH OF THE STATUES IN PUBLIC SPACES

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ABSTRACT

Memorials are part of the historical heritage of a society, linked to important events and ideals. However, given its character as a representative and significant element, it is subject to public scrutiny and, depending on social dynamics. Sometimes, monuments claim in favor of the redefinition of the cultural identity of the communities. The idea of a monument is subject to cultural changes. It depends on history, we ask what to do when it reflects, dignifies, or perpetuates memories that under the current context do not want to be commemorated. This research aims to analyze the processes of vandalization of some statues for its consideration as uncomfortable heritage. Most of them, for its symbolic signification, are in public space. Between 2020-22, In the American and European context, more than 500 statues have been damaged or destroyed. Vandalization processes are a phenomenon linked to different social dynamics. They generally appear in contexts of social discontent. Analyzing the different processes of vandalization of uncomfortable heritage, in the American and European spheres, proposing different strategies for its management, will be the ultimate objective of this research. Essentially, the statue assumes different roles in the modern social context. Of these, two are fundamental for this research. On one hand, as a unit of important artistic and historical value and, on the other hand, as a reflection of ideologies or contexts that go against the values and morals of modern society. In this sense, a dilemma arises with regard to the conception of statues and their valuation: to re-signify or to demolish? Relevant cases will be identified, highlighting the main historical, artistic, architectural, and social elements that configure them. The management of the different governmental and social, institutions that have faced these vandalization processes will be analyzed. Finally, we will conclude with some recommendations for the management and protection of these public spaces and their statues or monuments.

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ALGORITHMIC ANALYSIS AND APPLICATION OF STRUCTURAL TESSELLATION IN DESIGN AND OPTIMIZATION

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ABSTRACT

This paper highlights the use of structural tessellation in architecture and design, where a surface or space is divided into smaller repeating shapes or units to create visually striking and functional structures. When properly executed, a structural tessellation can offer numerous benefits, including enhanced stability, increased load-bearing capacity, and improved aesthetic appeal. The increasing use of digital tools and advanced manufacturing techniques has made it easier to create complex and intricate tessellations that can be customized to meet the needs of a given project. This research focuses on the algorithmic creation of tessellations and their application in structural engineering and design optimization. The study investigates diverse patterns and configurations of tessellation through mesh generation algorithms, parametric approaches, and pattern gradation and repetitions, with computing scripts and Grasshopper used for data visualization. The tessellation elements are used to discretize the design domain in structural topology optimization and create initial patterns of grid-shell. Numerical examples are used to investigate the structural responses to external loads of a continuum structure that is discretized with tessellation elements. The paper concludes that the use of structural tessellation can be an effective way to create unique and functional structures that are both visually striking and efficient in their use of materials and resources. This study demonstrates the potential of tessellation as a powerful tool in the creation of structures with improved performance and aesthetics.

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TOOLKIT FOR DESIGNING MORE SUSTAINABLE LARGE BUILDINGS IN PERI-URBAN AREAS

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ABSTRACT

The most sustainable action anybody in the building sector could actually take is decide not to erect any new building, in order to maintain the landscape as untouched as possible and preserved for the sake of our future generations. Unfortunately, this is rather impossible in this day and age, as the building decision usually comes from a necessity and an intention to provide appropriate shelter to a certain activity. This is precisely the reason for which the in depth study of the impact a building has both on its immediate surroundings and on the urban/ rural environment should be a common practice if we are to design and build in a sustainable manner. The impact a building has on its environment varies according to two main criteria: (1) the type of building we are referring to and (2) the environment in which the supposed building is set out to be inserted in. Thus, it is fair to state that a single-family house with a 150sqm gross area build on concrete frame with brick filling built in an urban regulated area is going to have a significantly different impact than a 2000 sqm construction materials storage warehouse built on a steel frame with term insulated panels in a rather rural and untouched area in the periphery of a village. This latter category makes the scope of the present paper. Concerning the 2-nd criteria, the urban environment is highly regulated and the majority of the space is set out to be built in a manner which mirrors the evolution of the last 130 years of urban studies. The majority of urban settlements in Europe, be it city, town or village have urban regulatory means of stating the way a certain building occupies a plot of land within the urban frame, its recommended hight and suggestion to integrate the areas' specific aesthetics. When referred to the expectancy to have similar regulations for the peri-urban areas, or even the ones outside the built-up area we are often met with a no-mans'-land, a rather empty regulatory area which falls in the jurisdiction of local and regional authorities. The present paper aims at offering a tool-kit for the local authorities to use as a negotiation frame between the interest of preserving as much as possible the natural qualities of the natural landscape while balancing with the economic reasons and benefits of a new investment in their area. The 'tools' which make up the study concern: volumetric composition of the buildings depending on their function, methods of generating green energy based on the local resources, regulating the percentage of concrete platforms versus greenery in complete harmony with the destination of the investment. Starting from the premise that the building permit conditions for large scale projects due to be erected in natural landscape need a thorough regulation and after having an overview of such projects in Romania, this paper provides a practical tool for making sure the current laws are to be applied in a more practical and hands-on manner.

CHEMICAL AND PHYSICAL IDENTIFICATION AND CLASSIFICATION OF AN ARTIFICIAL SOIL (CIRCULAR ECONOMY)

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ABSTRACT

The perception and explanation of changes in the mechanical behavior of contaminated soils are associated with physical classification and chemical composition. Elements are evolutionary in this type of soil and in the context of a contaminated environment. Let's start by evaluating a group of artificial soils. The matrix is a granitic residual soil with a mixture (M) of hydraulic lime with used lubricating oil. The samples used have proportions of 5, 10, 15 and 20% of M in the residual granitic soil. A soil sample with 5% oil (OS5) was also made, which constitutes the optimal oil content in the soil. Afterwards, the alteration of the physical-chemical identification and the evolutionary classifications of these artificial soils were studied. The structure of the soil is altered and this is associated with the flocculation of fine particles by the effect of lime and oil and will probably influence the mechanical behavior of the soils. In chemical terms, it is assumed an increase in the leaching index, a decrease in the chemical mobility index and an increase in losses when it comes to artificial samples. These indices show some potential in the assessment of pollution, but eventually need adjustments, mainly in the scales.

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EFFECT OF RISK ALLOCATION ON PUBLIC PROJECT PERFORMANCE USING STRUCTURAL EQUATION MODELING

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ABSTRACT

Construction projects are often exposed to multiple risks, which are allocated to the parties through contracts. Risk allocation is a complex process in real practice, as each party tries to transfer most of the risks to the other without considering who is in a better position to assume it. Inadequate allocation of risks leads to cost overruns and delays that negatively impact the final performance of the project. This study aims to deduce the relationship between risk allocation, contractor characteristics, project features, owner characteristics, and the final performance of public construction projects. To accomplish this, a literature review and an analysis of the legislation were carried out. In addition, a questionnaire was developed involving multiple professionals of public construction projects to establish the quantitative relationship between variables. To assess the effect of risk allocation on public project performance, the data was analyzed using Structural Equation Modeling (SEM). The study found that four characteristics of the contractor and three of the project influence risk allocation, and in turn, there are five risks that influence the final performance of the project. These variables should be emphasized when allocating risks and developing a project to improve its results. The results of this study provide theoretical knowledge and offer insights that can inform decision-making and risk management. Overall, this paper provides a contribution to the body of knowledge on risk allocation and management in construction projects. The findings of the study can inform policies and strategies aimed at improving the performance of public construction projects.

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ECO BACKSTAGE

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ABSTRACT

On the website of the European Parliament is stated that "The global economy uses the equivalent of one and a half of the planets' resources in order to produce global results and to absorb waste, and estimates show that these numbers will rise to the level of the resources of two planets by 2030". Almost 60 years after ecological, sustainable and resilient policies were adopted through legislation, we are at the moment when the linear economy and demographic growth are causing imminent depletion of natural resources, endangering the environment, the planet and the human species itself. In parallel with the implementation of these laws and policies, we aim to conquer new territories or to exploit other planets. Although modernized and beautified, extended at the level of the solar system, this is, in essence, still a primitive, colonizers' thinking. In these conditions, sustainable design has become a necessity, if not a means of survival sine qua non. Changing the traditional model of the economy into a circular one, it involves multiplying the life cycles of a product. Among the 7 arts, film and theater are the most significant sources of pollution. Setting manufacturers follow the traditional economic paradigm, based on the consumerist principle of exploitation of resources: acquisition, production and disposal ("take, make and waste/dispose"). The disadvantages of this model have become visible and are already the sources of some serious ecological problems. The proposed paper deals with topics related to the greening of the production of the theater settings, by implementing the circular design as the only means that can modify the material, the technology and the way the products are designed, as a sole method that prevents the waste production.

ENERGY RETROFITTING OF NON-RESIDENTIAL BUILDINGS UNDER HERITAGE VALUE CONSTRAINS

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ABSTRACT

Interior insulation can be a problematic necessity in case of the renovation of poorly insulated existing buildings of heritage value. The same applies to younger buildings with interior insulation that later might be qualified as worthy of protection due to their role in an established culture landscape. This article presents a complex of non-residential, complex buildings, which are part of a university campus. These buildings, from the 60's, built with mixed constructions of poured and prefabricated concrete with interior insulation. The buildings' performance, after more than 60 years in use, was analyzed based on theoretical knowledge and professional experience, available project documentation, observations, and examinations regarding the current condition of materials and components used previously. Based on gathered data and primary simulations of hygrothermal performance, the retrofitting potential using internal insulation as a measure of retrofit in consideration of heritage value restrictions was evaluated. Protected buildings of this construction type are, as far as we know, so far rarely part of analyses and therefor worthy to be looked at. The building technology used is considered typical for its construction place and time, making the results representative for a larger number of comparable buildings.

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PERFORMANCE EVALUATION OF SINGLE AND TWO BAY BUCKLING RESTRAINED BRACES UNDER BLAST LOAD

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ABSTRACT

Buckling-restrained braced frame (BRBF) is a lateral force-resistant system most commonly used to provide bracing for building structures during seismic events. Because of the effectiveness of the buckling-restrained braces (BRBs), they are used in various applications such as metal buildings, single brace retrofitting projects, high-rise outrigger systems, and many more. So far, the use of BRBF have been designed for seismic activity. However, no research has been done so as to analyze the behavior of the BRBF under blast loading. Because of the high use of the BRBFs in the industry, an explosive attack on the system component could prove to be devastating. Buckling-restrained braces (BRBs) have been researched and investigated under seismic activity. In this research, investigation on how a building with lateral framing system consisting of BRBFs behaves under the impact of blast loading. Particular focus was set on how the behavior of the frame was influenced by the varying concrete strength in the concrete fill of the BRBs. A single- and two-bay analyses were performed. The study found that the BRBs would start bend as a result of the blast load. This bending would lead to failure in the BRBs as the braces would rupture. The concrete encasing would also become the weakest member as it would fail first due to crushing by the steel brace. The loaded column would fail near the support on the flange and web intersection. A two-bay BRBF schematic was deemed better at resisting the blast load when compared with the single-bay BRBF.

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PLANNING THE KNOWLEDGE CITY: REALITY, FEASIBILITY, AND CHALLENGES

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ABSTRACT

This study examines a thorny topic: the rapid urbanization of the Jordanian capital, Amman, to understand its causes and consequences. And how this city crept and expanded at the expense of agricultural lands, and then moved from the city stage to a gigantic urban agglomeration inhabited by almost half of Jordan's population. This excessive expansion violently shakes the existing economic, social, and environmental equilibrium. The study began by defining the place concerned with the research through a geographical introduction that explains the land and the population and then dealt with the reasons that led to the resurrection of Amman, as well as the speed of its growth and growth expansion. What happened led to a change in Amman, i.e., its transformation from a city with a limited location and well-known features and regions to an unknown environment that extends without borders. The result is the final elimination of the traditional system in the use of land and the optimal distribution of population, resources, and available natural capabilities. Also, the study traced the development of urban planning policies that were taken and applied to the reality of the city's growth and spread and concluded with a discussion of the idea of the general trend towards decentralization with an attempt to explain its pros and cons. She shed light on the outcome, which is nothing more than an urban agglomeration that lacks identity and generates dispersed suburbs and marginal neighborhoods that are predominantly residential and lack the services and features services and features of contemporary cities.

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PHYSICOCHEMICAL PROPERTIES OF ACTIVATED SLUDGE ASH AS AN ADDITIVE IN MORTARS

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ABSTRACT

Wasted activated sludge is a by-product of the treatment of wastewater, that historically been considered a waste and disposed in landfill. This has resulted in the search for alternatives in its disposal and possible reuses of these wastes. This study focuses on the use of activated sludge ashes from wastewater treatment plants as an additive in mortars and the impact on its mechanical resistance. For this purpose, it was determined the physical and chemical properties of the ashes and the mechanical properties of different percentage of ash content used in the fabrication of mortar prisms. The physical-chemical properties were centred in the percentage of ash versus temperature and the pozzolanic characteristics of the ash generated. Therefore, the determination of the ash percentage by thermogravimetric analysis was perform. Two temperatures were employed in the generation of ash (550ºC and 750ºC) and measured its pozzolanic characteristics by a rapid determination of pozzolanic activity of materials method. As a result, the ash generated at a higher temperature had a stronger pozzolanic characteristics, than the ash generated at the temperature used for determining volatile content of the sludge. Afterwards, sludge was calcinated in presence of oxygen at 750ºC, and the ash was used int the manufacture of mortar prisms. Due to the variation in the size of the particles generated in the calcination processed, it was proceeded to separate them into two sizes (mesh sieve Nº 4 and Nº 100). The percentage by weight of the ash employed in the fabrication of the prism were 0%, 5, 10 and 15%. The prisms were tested for flexure and compression at 10, 21 and 28 days, and compared with a standard mortar. With regards of the consistency of the mortar, it was observed that the addition of ash had an impact on this property. The greatest loss of consistency was observed with the 15% of ash content and mesh sieve Nº4, decreasing by 32%, while the consistency of the mortar with 15% of ash content and mesh sieve Nº 100 decreased up to 20%. With regards of the mechanical properties, it was observed that the addition of ash as an additive for mortar, observing an increase in flexural strength of up to 11% at 28 days fir the mixture of 10% ash content and mesh sieve Nº4. In the case of compression, the resistance after 21 days of curing, increased by 22% for additions of 10% and 15% of ashes content for the mesh sieve Nº 100. Therefore, it is possible to use ashes from wasted sludge of activated sludge wastewater treatment plant as an additive in mortars, and this can be employed as an alternative to disposal in landfills.

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MANAGEMENT OF THE LEACHATE GENERATED IN COMPLIANT LANDFILLS

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ABSTRACT

The leachate is mostly formed by the infiltration of water into the mass of waste and by the natural process of decomposition of organic substances from waste, the percolation of waste. It is collected through a drainage system and sent to the leachate treatment station within the warehouse. The treatment station receives the leachate from the drainage system, the waste water from the sanitary groups and the water from the surface water drainage system. The construction of the leachate treatment station aims to protect the environment against contamination with leachate compounds. The provisions of the European Directive on waste deposits and of the Framework Directive of the European Union on water are thus respected. According to these legislative acts, only the water resulting from the treatment of the leachate can be discharged from a compliant landfill, and the water resulting from the treatment of the leachate with the Treatment Plant will meet the norms imposed by NTPA-001 for discharge into natural receptors. Many factors influence the production and composition of the leachate, but a major one is the climate of the landfill. For example: when the climate has a high degree of precipitation, there will be more water and therefore, more leachate will be generated. Another factor is the topography of the place where the landfill is located; this influences the landfill design models and the water table of the location.

ESTIMATION OF THE FUNDAMENTAL PERIOD OF VIBRATION OF THE BUILDINGS LOCATED IN THE DENTAL SCHOOL AND DENTAL CLINIC OF THE CATHOLIC UNIVERSITY OF CUENCA USING ENVIRONMENTAL VIBRATION RECORDINGS

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ABSTRACT

Due to Ecuador's geographic location, it is a country with high seismicity produced by the subduction process of the Nazca plate with the South American plate, there are also earthquakes generated by the activation of local geological faults. The Girón geological fault has a very high seismic activity, which is why earthquakes between five and seven degrees on the Richter scale can occur in the city of Cuenca. When structures enter a vibration process either by an earthquake or by some environmental vibration, this movement can be characterized by estimating the vibration period, which is the time it takes for the structure to complete an oscillation. This dynamic parameter is one of the most studied worldwide due to its great importance, since it is directly related to the stiffness and mass of the building. The vibration period is generally obtained analytically in a structural analysis software, which in some cases is a value far from reality. In this research the vibration period will be determined analytically and experimentally for two buildings constructed at the School of Dentistry and the Dental Clinic at the Catholic University of Cuenca. The estimation of the fundamental period of vibration of the structures will be done through environmental vibrations to each structure will be applied a seismograph on the terrace to obtain a record of accelerations captured by vibrations produced by the environment and to these data of accelerations as a function of time is applied the Fourier transform and is changed to the Frequency domain, then the inverse is taken and the vibration periods are obtained.

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CHARACTERIZATION OF LANDSLIDE AND MEASUREMENT OF GROUND VIBRATION PERIOD IN THE SALADO-PACCHA SECTOR USING GNSS EQUIPMENT AND REFRACTION SEISMIC TESTING

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ABSTRACT

A landslide is an earth movement that depending on its level can be a very risky event, causing from material losses to human lives in some situations. It can occur naturally or by anthropogenic means, the main causes are usually high intensity rainfall, soils with poor geomechanically characteristics, considerable seismic movements, erosion, lack of vegetation cover, among others. Paccha is a parish located in the city of Cuenca, Ecuador, where there are several active landslides that put the inhabitants and their material goods at risk. As a consequence of this, the present investigation analyses one of them with UTM17s coordinates 728845.38 E 9679536.46 N located in the Salado sector, measuring its displacement and velocity through a 36-day monitoring in 3 data collection campaigns with GNSS equipment using the RTK method, also a refraction seismic test is used to measure the period of vibration of the soil at the site, SPT tests provided by INGEO (consulting company) were also analysed, in order to know the type of soil in the sector. The results obtained indicate that the soil is clay and silt of high plasticity, the slip is extremely slow, semi-deep, with lateral propagation and rotational geometry. The displacement between points obtained is 4.14 cm while the velocity is 0.43 m/year, finally the vibration period corresponds to a value of 0.13 s and the shear wave velocity Vs is 178.85 m/s, so it is categorized as a type E soil according to Ecuadorian construction regulations. According to the analysis, it is recommended to maintain effective control of runoff in the area in order to avoid saturation of the material and thus curb possible increases in velocity. Avoid all forms of construction both in the upper zone and at the foot of the landslide, as well as in places adjacent to it. This project lays the groundwork for further analysis at the same site of interest, and presents future lines of research such as monitoring the sector during the first rainy season (March, April and May). In addition to studies focused on improving the geomechanically characteristics of the soil, and proposing possible solutions to the evident problem experienced by the site.

Corresponding Author: Miguel Román

EXPERIMENTAL DESIGN WITH GYPSUM COMPOSITE MATERIAL, REINFORCED WITH "CARLODUVICA PALMATA"

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ABSTRACT

Climate change is currently a global problem, product of the pollution generated by anthropic activities, being the construction sector one of the most prone to pollute by the waste and energy wasted in the life cycle of building materials, which is why this research presents a proposal for a prefabricated panel composed of gypsum, reinforced with Carloduvica Palmata plant fiber, for use in interior spaces as a sustainable alternative to mitigate this problem. The methodological design used is experimental with a quantitative approach, since the study variables are manipulated until the desired physical characteristics of the panel are achieved. It begins with obtaining the natural fiber from local suppliers, then a treatment consisting of: washing, chemical purification, bleaching and crushing is performed. This process mitigates the disadvantages presented, such as high sensitivity to moisture absorption, low interfacial strength, low fire resistance, durability, and UV degradation. The fibers are sorted per age, length, and diameter to create specimens with different compositions of gypsum and organic material, which are tested through flexural and compression tests. The analysis with the test specimens revealed that the L2 fiber (12mmx1mm) with a density of 3% in the mixture obtained the best results in compression and bending, demonstrating that both the 36mm and 1mm long fibers are of lower resistance. Similarly, the panels manufactured with this material proved to have superior characteristics to those of a conventional gypsum panel. In addition, the physical appearance of the reinforced panel does not differ from conventional panels, so it may represent a possible substitute. In conclusion, it was determined that the use of biodegradable materials such as Carloduvica Palmata plant fiber in the manufacture of construction materials represents a more environmentally friendly process to reduce the risk of environmental pollution and greater energy efficiency.

Corresponding Author: Pablo Munzón

PEAK RESPONSE OF SDOF SYSTEMS SUBJECTED TO GROUND MOTIONS USING MACHINE LEARNING ALGORITHMS: APPLICATION TO CUENCA ECUADOR

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ABSTRACT

The integration of machine learning algorithms (MLA) in seismic risk has recently captured the attention of the engineering community due to the improvement of accuracy and reliability in several applications. Some examples of these are focused on damage detection, ground motion prediction equations, and fragility assessment. In particular, the latter has often been surveyed using detailed three-dimensional models. Despite the advantage of using this modeling type, it is computationally time-consuming, making it necessary to explore alternatives that reduce time and remain reliable. This work introduces a framework for estimating the peak response of SDOF systems underground motions using MLA. First, the SDOF system features are presented, with particular attention has been given to the nonlinear model. Then, to understand the phenomenon and identify possible patterns, those SDOF located at Cuenca, Ecuador is subjected to synthetic ground motions records using nonlinear time history analysis (NLTHA). By employing it, it was possible to compile the peak response in terms of displacement of each analysis. Later, the compiled dataset is used as reference to explore and train different MLAs. Preliminary results show that the peak response of the SDOF system could be reasonably predicted with MLAs, giving the advantage of reducing time. Furthermore, it was also identified that different nonlinear models might compute similar responses; however, it should be carefully chosen to reproduce the type of building or structure in analysis.

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BIOREMEDIATION OF URBAN SOILS CONTAMINATED WITH OIL DERIVATIVES - CASE STUDY CUENCA, ECUADOR

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ABSTRACT

In Ecuador and several Latin American countries, the degree of contamination of urban soils by hazardous waste from petroleum derivatives is a matter of great concern, since per the Environmental Protection Agency of the United States explains that one gallon of used lubricating oil contaminates a million gallons of water, the same water that meets the needs of fifty people per year. The oil, when spilled on the land, causes infertility in the soil because the used oil contains hydrocarbons that produce the death of the soil and transforms the vegetation into inert. Despite the existence of legislation regulating the use, storage, processing and treatment of waste, there are very few efficient methods that guarantee adequate environmental management of urban soil, either because they are technically complex or economically unfeasible. The objective of this research is to evaluate the bioremediation of urban soils technically and economically contaminated with petroleum derivatives in the city of Cuenca, Ecuador, using pseudomonas bacteria. There are different methodologies and methods for soil remediation, the technique used for the recovery of soils contaminated with hydrocarbons derived from petroleum in this research was bioremediation, through the application of an association of Pseudomonas bacteria obtained from the same soil, technique called Bioaugmentation, and applied in three different concentrations and on the four soil samples obtained from the mechanics of the city of Cuenca. The Pseudomonas bacteria obtained, especially aeruginosa and fluorescens, demonstrated in the experimentation that they have the property of degrading hydrocarbons derived from petroleum, by feeding on carbon compounds in an exponential manner. For the calculation of the remediation cost-benefit, the value of the benefit acquired is divided by the remediation cost found. If the value is higher than the unit, the relation presents benefits; the relation obtained is 5.077, allowing to establish that the remediation process studied is economically viable. It is concluded that the method used is adequate and does not alter the soil with the introduction of foreign bacteria to it, in addition, the method studied serves for the remediation of soils contaminated with non-volatile petroleum hydrocarbons. The cost of its implementation is economically viable.

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DESIGN AND PROTOTYPING OF DYNAMIC WATERPROOF FAÇADES FOR MOISTURE PREVENTION IN MODERN BUILDINGS

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ABSTRACT

The trend of modern architecture promotes the creation of simplified forms without ornamentation and completely linear creating certain controversies, for example, one of them is to leave the facades exposed to weather factors, causing damage to the building due to the lack of elements that protect the faces of the building, the moisture caused by rain promotes the accelerated deterioration of the materials that cover these facades. Additionally, the concept of dynamic facade is fundamental for the sustainable design of modern cities, whose objective is to improve the comfort of the users and reduce the energy consumption of the buildings, therefore, the creation of an element that unifies constructive systems with intelligent systems positions it as an innovative bioclimatic mechanism, capable of facing and protecting the building from damages caused by external environmental agents, for this reason the present research focuses its study on the affection of the modern facades of existing buildings in the city of Cuenca, caused by the presence of humidity and rain. Through the experimental method, 3 digital prototypes of dynamic impermeable facades are proposed, which are constructively superimposed on the skin of a building for its analysis and evaluation. To generate these proposals, the variables of affection are determined in 15 case studies, being the wind and rain those that allow us to determine the angle of the incidence vector, data that is used to obtain the prototypes. Finally, after the analysis, the prototype is submitted to an expert judgment for its evaluation and feasibility analysis for its manufacture.

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ANALYSIS AND EVALUATION OF PROPOSALS FOR RAINWATER HARVESTING SYSTEMS FOR NON-CONSUMPTIVE USE IN THE CITY OF CUENCA – ECUADOR

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ABSTRACT

Due to the current population increase, the demand for the use of natural resources also increases exponentially, one of them being drinking water, this resource is one of the vital elements for human beings and has become the most exploited and specifically underutilized in residential buildings, currently this vital element has been used in cleaning activities, watering plants and other non-consumptive uses. The World Health Organization recommends that water consumption can be 100 liters/inhab/day, to consider a sustainable society; however, in the city of Cuenca - Ecuador, consumption doubles the recommended limit, studies show that this consumption It can be reduced with the application of bioclimatic strategies, one of which is the collection of rainwater. For all of the above, this research focuses on the analysis and proposals for the collection of rainwater to solve the underutilization of drinking water in residential buildings, for this, strategies are analyzed and proposed to take advantage of rainwater as a non-consumptive use (washing clothes, watering gardens, cleaning the house and use in toilets), for the collection of rainwater for domestic purposes the surface of the roof is used, this model being known as SCAPT (rainwater collection system on roofs). The research is of an experimental type because strategies and collection systems are proposed, analyzed and evaluated. With these rainwater collection systems, it is possible to determine that more than 55 liters/inhab/day can be incorporated into the house. managing to contribute to the reduction and control of drinking water in residential buildings.

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WATER RELATED HERITAGE. THE USE OF WATER FOR PRODUCTION OF FINAL OR SEMI-FINAL PRODUCTS IN THE PARISH OF CERNACHE DO BONJARDIM

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ABSTRACT

The use of water as a driving force for the production of goods is very old. Over time, techniques and constructions were developed to make the most of water energy. There are elements that use water energy to obtain final or semi-final products, such as horticultural, touristic and thermal products. In the parish of Cernache do Bonjardim, Central Portugal, there are several types of this kind of elements, such as dams and hotels related to agricultural production and tourism. This elements date from different periods, having different characteristics. The main objectives of this article are to characterize and analyze the current situation of this heritage and its dissemination, enhancement and subsequent protection. The methods used were based on bibliographic, iconographic, photographic, cartographic, webgraphic research, in situ surveys and interaction with local residents. The approach comprises the survey of the elements mentioned above, subsequent cataloging and analysis regarding their objectives and their geographic distribution. With this analysis it is possible to group the elements into categories that facilitate their characterization. Up to the preparation of this article, no document or record was found about the described elements in the studied area, which is a major limitation of the investigation. This is partly due to the fire of 1917, in the City Hall of Sertã (county capital), which destroyed all existing documents. Partly due to the disappearance of some of those heritage elements, it is difficult to recognize them, as well as the geographical and temporal location of their construction. The originality of this work is that this type of heritage has not yet been approached in the territory under study. The article contributes to another study about this parish. Being a vernacular heritage and already with few existing elements, it is intended to give to it the value it deserves and that it is appreciated as a collective memory of the territory where it is inserted.

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A PROPOSAL FOR SUSTAINABLE URBAN CONSERVATION: AKÇAKOCA CASE

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ABSTRACT

Akçakoca district, located on the Black Sea coast of Düzce Province, is an old Ottoman town with its partially preserved historical trade centre and its surrounding neighbourhood. However, both tourism and immigration from the surrounding provinces create urbanization pressure in the historical town, by both increasing demand for secondary housing and touristic accommodation. The subject of this study is Yukarı Neighbourhood, which was registered as an 'Urban Conservation Area' in 1996, and the new development areas around it. It is seen that this region has been preserved without losing its original texture despite devastating effects such as great fires, economic developments, and rapid urbanization. However, it is far from the new commercial centre, due to the increasing number of population, new housing developments continue to surround the Conservation Area by the east and the north sides. The south and west sides of the area on the other hand are relatively less occupied and have been designated as prospective housing developments. This study aims to propose a solution for the region, whose traditional architectural features were preserved until the 1990s, to become a living urban tissue that can be integrated with its environment, rather than a statuary historical region surrounded by new buildings and street texture. Thus, urban conservation will be possible by providing spatial and cultural sustainability. The framework of this proposal is aimed to ensure the continuity of the construction features and the original road pattern in the conservation area. The main purpose is to reveal the neighbourhood's identity and develop proposals for new settlement areas by analysing the existing urban tissue and examining the typological, typo-morphological, and social context of the area. Within the scope of this study, the urban conservation area was examined morphologically, and street patterns, building footprints, and building functions were investigated. In order to interpret the social dimension of the urban fabric, the street pattern was analysed and interpreted using the space syntax method. As a result, new construction criteria in harmony with the original historical texture and topography will be able to be established for the development zone located around the conservation area. Thus, the conservation area will be protected from the pressure of new settlements and spatial and cultural sustainability can be implemented.

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READING THE CHANGE OF HISTORICAL URBAN LANDSCAPE THROUGH STREET PATTERN

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ABSTRACT

The neighbourhood, which is the smallest planning unit, is the area where the closest people's relations, who are social beings, are constituted outside the house. They are the places where the accumulation of the society's life in the historical process is transferred to the space by layering. The subject of this study is the investigation of the transformation process of Sahabiye District, which is one of the historical settlement areas of Kayseri province, whose history goes back to 3000 BC. Traditional buildings in Kayseri were used until 1950. After 1950, with the increase in the population of the city, Sahabiye District began to transform. Along with modern buildings, new residential areas have been planned, old buildings have been demolished and modern architectural examples have been constructed. These activities can be called “urban transformation activities” of that period. Due to the changing socio-economic conditions over time, Sahabiye Neighbourhood lost its attraction, became abandoned, and turned into an unsafe poor quarter where the buildings remained idle. Upon the demands of the local people of the Sahabiye Neighbourhood, planning was initiated by the local government to make the area a centre of attraction again, a comprehensive urban transformation project was prepared, and the construction of the 1st Stage was started. The aim of this study is to research the historic neighborhood by morphologic approach. Urban morphology as a field of research provides a systematic basis for understanding and managing urban landscape change. In this study, Sahabiye District, a historical urban landscape has been evaluated within a certain time interval through the street pattern which is either a morphologic urban unit or a public space. The morphological change of the neighborhood over time has been examined in the context of the ownership pattern, street pattern, and land uses that make up the urban texture. The space syntax method was used to make readings of the change by the context of the social texture. The first and current zoning plan, the urban transformation plan of the neighbourhood, which constitutes the research material, was used. Digital data from these plans were obtained by using Autocad and photoshop programs. The changes in the street pattern in the historical process were analyzed with the depth map software. The street pattern's connectivity, integration, and choice values obtained for the different times from the post-Republican period to the present have been revealed and the legibility of the region has been discussed. With the new urban transformation application, it has been observed that the street pattern, which is the most important public space of the cities, is mainly planned according to the vehicle traffic, the pedestrian is ignored and this neighbourhood, which constitutes the historical centre of the city, has lost both the traces of the past and the legibility of the new environment created.

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PUBLIC SPACE AS A PALIMPSEST: REVITALISING YUKARI NEIGHBORHOOD CONSERVATION AREA

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Memory is defined as the ability to store and recall the results of interactions with the environment in the brain. Human beings in social life, interact in different places, and their memory is affected by the space and the actions that take place in the space. The development of the public space is shaped in line with the past experiences and changing needs of society. The images of the changing spaces are layered and recorded in the social memory. The layers of the collective memory with the accumulation of traces from the past are expressed as the palimpsest space in architectural literature. The concept of palimpsest space is used for spaces where the past and present come together and overlap, bearing traces of the past and entities of the present at the same time. Therefore, palimpsest spaces are valuable in creating a sense of belonging by preserving the memory of society. In this study, Yukarı Neighbourhood Women's Market, where the traces from the past intersect with new uses in the public space is examined. Yukarı Neighbourhood, used to be a commercial centre of Akcakoca until the early 1900s, on the northwest coast of Turkiye. The building typology in the area is typical with its small shops on the ground floor and residential units on the top. There was also a weekly vegetable market where only women could sell and buy. However, the town centre started to lose its significance due to a large amount of immigration settling on the seashore of the town and the great fire that took place around 1925 affected the area very badly. Although a new road system was applied and buildings were renewed, the old city centre could not reach its old heydays. Due to the changing socio-economic conditions and the attractiveness of the new town centre by the seashore, the shops became redundant. The women's market continued to be held until the mid-1950s, then, the neighbourhood lost most of its young population and also the marketplace. In 1996, Yukari Neighbourhood and its surroundings were declared a conservation area. In the 2000s, some of the derelict buildings were expropriated and restoration works were started for tourism purposes. However, the real tourism activity started in 2013, when a local women's organisation started a new street market selling their own homemade products and local foods on weekends. In this study, the local revitalization process and its results were examined through literature, city maps, zoning plans, population records, photographs, and interviews. It is found that although the marketplace was established for only economic purposes, and barely by the local women's own resources it becomes a successful attempt to revitalise the area. The market is adopted well by the public and supported by the local authority and created a very good example of a participatory revitalisation process using the public space as a palimpsest. This is an indication that not only re-using the buildings but also the public spaces can contribute to creating a sustainable future for conservation areas.

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FINITE ELEMENT ANALYSIS OF CONCRETE SLAB EXPOSED TO HIGH VELOCITY PRESSURE WAVE – SIMPLIFIED VS. SMOOTHED-PARTICLE HYDRODYNAMICS (SPH) METHOD

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ABSTRACT

Many structures are required to sustain the structural resistance also under extreme loading conditions, for example impacts of high-velocity objects (airplane crash into nuclear power plant), impacts of projectiles (defence structures), or while exposed to high velocity pressure wave caused e.g. by explosion of various chemicals in industry, nature gas, or also conventional weapons. Numerical analyses of these phenomena are feasible while utilizing explicit approach of the finite element method (FEM), available in commercially accessible software LS-Dyna. In order to predict the behaviour of the structure properly, advanced nonlinear material models are required to be considered, which are often mathematically described by numerous input parameters. Several approaches to model the exposure to blast load exist, from simplified, where the blast wave is considered as time-dependent pressure based on empirical equations, to more advanced ones, where the propagation of the pressure wave itself through the surrounding environment is being modelled (Arbitrary Lagrangian Eulerian, ALE method), or so called smoothed-particle hydrodynamics (SPH) method, which might be used to model the blast itself. In this paper, FEM analyses of a simply supported concrete slab with basalt fibre reinforced polymer (BFRP) bars exposed to close range explosion of TNT charge are presented. 3D numerical models are analysed utilizing explicit solver of LS-Dyna. Karagozian and Case (K&C) nonlinear material model for concrete is used, which is suitable when high strain rates are present in the quasi brittle materials. Two variants of the blast loads modelling are compared. The simplified empirical approach, which is less demanding on computational power, and feasible for utilization in case of simple structure geometry, and more demanding method using SPH method to model the TNT detonation and interaction with the exposed concrete slab. The results of these numerical analyses are compared with experimental data based on available literature, and properly discussed.

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CALIBRATION AND VERIFICATION OF CREEP PARAMETERS FOR CONCRETE

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ABSTRACT

Concrete is a material which undergoes slow increasing deformation while subjected to persistent mechanical stress. This phenomenon is known as creep. In concrete material, creep occurs at all stress levels. Additional deformation of concrete structures at the end of their design working life caused by creep is usually two to three times of the immediate elastic deformation value, but might be even more in some cases. The value is dependent on many parameters, e.g. concrete grade, cement class, ambient environment relative humidity, geometry of the structure (drying surface of concrete in contact with air) and also the age of concrete at the time of loading. According to corresponding European standard, the effects of creep are evaluated using creep coefficient, and should be considered for verification of serviceability limit states, and if significant, also at ultimate limit states. In order to evaluate the creep effects in geometrically more complex structures, numerical finite element (FEM) analyses might be conducted. In commercially available software ANSYS, there is a library of several implicit creep equations, with several input parameters. These parameters need to be calibrated in order to match the assumptions of the creep effects over time in accordance with the corresponding European standard. In this study, calibration process of European standard concrete C35/45 parameters for selected implicit creep equation from ANSYS library is presented. The parameters are calibrated for two different ambient relative humidity (RH) levels, 78.8% and 90%, each for concrete loaded in 28 days (also 90 days for RH 78.8% and 50 days for RH 90%) after its casting, and suitable for finite element analysis of creep effects within the first year after loading of the concrete structure. The calibration process is split into two parts, analytical one conducted in table processor, where approximate estimations of suitable parameter values are determined. The second part consist of the subsequent optimization process in OptiSLang software, where the optimal parameter values are determined in order to achieve the best match between the time dependent Eurocode standard creep coefficient and the creep coefficient based on the results of one solid element uniaxial compression test in ANSYS finite element software. The obtained parameters are then verified on an analysis of a simply-supported concrete beam modelled of solid 3D finite elements. The values of selected creep equation parameters are summarized in the table, and might be used in the subsequent ongoing research.

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STRESS RELAXATION OF CONCRETE BEAMS CAUSED BY CREEP AND SHRINKAGE EFFECTS

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ABSTRACT

Shrinkage and creep are two important physical properties of concrete material which cause increase of the deformation of the constantly loaded structure over long period of time, the feature known as rheology. Additional deformation of concrete structures at the end of the design working period (most commonly 50 years) caused by these phenomena is circa three times larger than the value of the immediate elastic deformation (or even larger in some cases). Hence, in accordance with the corresponding European standard, these effects should be taken in account while evaluating the serviceability limit state of concrete structures, and if significant, consideration of these phenomena is also needed for the verification of the ultimate limit state. In concrete material, creep occurs at all stress levels, and is dependent on many parameters, as cement class, concrete grade, relative humidity of the environment, surface of the structure in contact with the ambient air (drying surface), and the age of concrete (after casting) at the loading moment. Shrinkage of the concrete is independent on loading. It is caused by decrease of the pore water content in the hardened concrete, and is predominantly dependent on the ambient relative humidity. Relaxation describes stress reduction at a constant material strain, usually in prestressing steel tendons. In this study, the physical experiments of multiple concrete beams over time with respect to rheological processes are described. Each experimental system consists of two C35/45 beams horizontally bounded by a prestressed steel cylinder. Decrease of these pretension forces in cylinders over time have been monitored (stress relaxation). All together time histories of two forces are documented, based on measurements conducted in interior environment of an agricultural building. The experimental time histories of the pretension forces are then compared with the results of the finite element numerical analyses conducted in ANSYS software. Creep and shrinkage effects of the concrete material have been considered based on the corresponding European standard for design of the concrete structures. The time-histories of the forces in prestressed cylinders obtained from the numerical simulations are then compared with the experimental data, and discussed. It is concluded, that the estimation of the force decrease over analysed time with the creep and shrinkage effects considered according to the corresponding European standard appears to be slightly larger than the experimentally measured decrease of the force value, hence the assumption is more conservative.

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GEOVISOR IMPLEMENTATION FOR VISUALIZATION OF GEODYNAMIC AND GEOMORPHOLOGICAL PROPERTIES OF THE SUBSOIL: CASE STUDY CUENCA, AZUAY, ECUADOR

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ABSTRACT

Globally, the development of cities and the increase in their population accelerate construction processes, significantly contrasting with soil studies of the soils on which buildings are built, whose. research results advance at a slower pace than required, often resulting in the occupation of spaces without these previous studies. Mainly due to the null or limited available information is scattered across different sources, files, and formats, and searching for it is a long and difficult process that generates unproductive spaces. This leads to high vulnerability of structures to different events that modify soil behavior. To address these limitations, the present study aims to generate a standardized database that compiles existing information and processes it so that it can be easily and quickly accessed. A geovisor (based on geographic information systems GIS) is proposed as an ideal way to geographically display on the web the collected data from the studied region (for this work: Cuenca – Azuay – Republic of Ecuador). The information for this study has a seismic focus, being the variables of interest: primary wave speed Vp, secondary Vs, soil type according to the classification of local regulations (NEC-SE-DS) and international SUCS, and soil period. It also incorporates geological and geotechnical information, and stratigraphic subsurface profiles. This constitutes the first national-level database that combines all this information in a single format, forming a great tool for professionals and the community in general in making decisions when infrastructures are emplaced. This information is presented in a geovisor designed for quick access and easy understanding, avoiding the omission of important processes in civil works.

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CARBON FOOTPRINT ESTIMATION AT THE NATIONAL UNIVERSITY OF ROSARIO, ARGENTINA: EVALUATION AND PERSPECTIVE

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ABSTRACT

The National University of Rosario (UNR) is located in the city of Rosario, Argentina. Its current structure consists of 12 faculties, 3 secondary schools and 1 centre for interdisciplinary studies. It has a built-up area of more than 80,000 square meters. In 2019, its overall average population (students, professors, technical and administrative staff) was around 107,000 people. The campus policies include sustainability as one of its main objectives. To assess and eventually reduce the campus' environmental impact, its greenhouse gas (GHG) inventory was analysed and carbon footprint calculated, using the GHG Protocol (GHGP) and the ISO 14064 standard and series. In 2019, the campus produced around 3610 tonnes of CO2 equivalent; corresponding to Category 2 (Indirect GHG emissions caused by imported energy) generating electricity, 2937 tonCO2eq and natural gas, 673 tonCO2eq. As this is a preliminary report corresponding to 2019 (several years prior to the present) and because the information necessary to calculate GHG emissions has not been systematised, the final results are more indeterminate than expected, estimated at between 10% and 20%. Neither were minor contributions estimated (with respect to the sources with the highest contribution: Stationary Energy and Mobility), due to sources such as Waste, Fugitive Emissions, etc. Furthermore, it was not possible to obtain information for this First Report on the number of trees that are planted on the entire land area of the UNR (mainly in the Faculties of Agricultural Sciences and Veterinary Science), in order to estimate the removals of the main greenhouse gas, Carbon Dioxide (CO2). Given that in the Mobility Sector it was not possible to obtain direct information on GHG emitting sources (as only indirect data is available through the purchase of fuel in 2019 by the UNR), no data is presented for this sector. Consequently, the results presented in this Preliminary Report should be considered as minimum values for UNR emissions. However, taking into account the extensive experience from other reports and preliminary estimates, it is considered that the results of the UNR GHG emissions incorporate most of the emissions. The inventory will assist in the establishment of policies for GHG reduction and mitigation, resulting in potential environmental and economic benefits. Having completed the preliminary UNR Carbon Footprint Report, it is now time to move forward on a Greenhouse Gas (GHG) Emission Reduction Target and a Climate Action Plan to take this target forward. Consequently, and as part of the strategy to promote the development of sustainable campuses, the UNR decided to set a reduction horizon of 10% of the value calculated in the First Report until 2023, compared to the 2019 level.

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THE IMPACT OF LEVANTINE COMMUNITY ON THE WESTERNIZATION PROCESS OF OTTOMAN EMPIRE

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ABSTRACT

The aim of this research is to understand the role of Levantines in the westernization process of Ottoman Empire. The scope of the study covers the second half of 19th and the first quarter of 20th century of İstanbul, specifically Galata and Pera regions which took on the appearance of a European city. The method is Center – Periphery Theory. According to the Modern World-System approach, the world is divided into two, center and periphery, and the center means both; the center in geographical sense, and also the center of the cultural values, symbols, beliefs, and behavioral patterns. In this system, above mentioned are demanded and imported by the periphery. The importation process is performed primarily by the privileged actors such as, elite class, tradesman and bureaucrats in the periphery. Within the case of Ottoman Empire and Istanbul at the time, the center was west, particularly France and the way of life was associated to the Belle Epoque period. Ottoman elite living in the capital, desired a western lifestyle while the west was taken as a role model of progress during the 19th century and even later. In that period, the Ottoman elite was in a challenging attempt to westernize the Empire in every aspect of life, in collaboration with Levantines who were the European tradesman in İstanbul. Just as the West was recognized as the center of progressing and the Levantine community was the representation of west in the Ottoman capital, in other words, the West in the Orient, so Istanbul was the West in Anatolia as the center of progressing.

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NOISE IN CHILDREN PLAY AREAS " MALLS" CASE STUDY – MALLS IN AMMAN

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ABSTRACT

The children's play areas are one of the most important entertainment facilities in the Malls. Recently, the idea of play areas in Malls have been wide spread in the Arab world specifically in the Gulf countries and Jordan While the idea of shopping was turned to become more for entertainment and spending free time. These indoor spaces are representing noisy environments with all sources of noise inside, such as noisy games, and occupant's activities. The first statement in the seriousness of children's exposure to noisy games was published in 1960 by the Ministry of Health Canada After measuring the sound level of several noisy games. This paper describes the noise level in children play areas in several Amman Malls, by measurement. And describe the architectural variables such as size of architectural spaces and type of finishing materials; in terms of their effect on level of noise in this area. In addition to the quality of noisy games which exist in it and their effect on the level of noise. On the other hand, this paper confirms the importance of the application of international standards for noise in the early stages of the design of these areas to achieve a healthy, comfortable and safe environment to play without causing inconvenience and harm to children. The measurements were conducted during Fridays and Saturdays where most of the families are visiting Malls for shopping and other entertainments. The children spend 2-4 hours in these areas and their ages are between 2-15 years are playing in the same spaces. the measurements are including the sound pressure levels (SPL) at different frequencies, and cumulative sound pressure (dBA) within 2-3 hours, also include reverberation time to estimate the reverberant sound contribute to the final noise . The result is showing that the cumulative noise is higher than the maximum dose recommended by the ISO, OSHA, NIOSH, standards between (3-5 dBA). By discussing the effect of noise on human in particular on children. It is quite obvious that the aural conditions are not recognizing in the design of these spaces, and there is an urgent need to government regulation to make these places safe for everyone.

THE COATING AS A STRATEGY OF ECONOMIC REACTIVATION: THE CASE OF THE HISTORIC CENTER OF CUENCA

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ABSTRACT

The Historic Center of Cuenca is relevant for being the segment that originated the current city of Cuenca and, as a scenario that has been periodically coupled to the demanded economic activities; in recent years, the intervention carried out in several buildings has been executed with the purpose of rescuing the brick as a representative material of the city. As evidence, the present work registers 7 examples that, until the year 2022, have resorted to the elimination of the facade masonry cladding in order to leave brick as a visible material; based on this, 3 cases are prioritized and studied from implantation, context, architectural structure and the result of the intervention. The comparative analysis allows the identification of general characteristics and, subsequently, the hierarchy and quantification considering the state of the property, materiality, contextual influence and use; in a complementary way, the regulations and guidelines of current intervention are combined to design 3 types of protocols; 1) management, 2) technical execution and 3) control and maintenance, capable of rescuing the architectural identity of the city through the potentiation of brick. The results show that the interventions carried out are appropriate in the contemporary context, since they have generated a direct link with economic activities and aesthetically contribute to the urban image by adding values. In turn, the multi-parameter evaluation applied ratifies the previous results from the three case studies (95/100 case 1, 99/100 case 2 and 83/100 case 3). It is concluded that the interventions carried out are an alternative to enhance the economic use of the buildings in the CHC and could be repeated in others as a practice of economic reactivation, without ignoring that it may be subject to technical difficulties for the conservation of the brick.

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ANALYSIS OF SOIL MOISTURE CHANGES AFTER BIOCHAR APPLICATION

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ABSTRACT

Global climate has been changing dramatically in last decades. Content of soil water is very important indicator of climate change and sustainability of life. Biochar is relatively new option to improving soil properties. Biochar has impact on biological, chemical and physical properties, including hydro-physical properties such as soil moisture. The main goal of this research was to study impact of biochar application on soil moisture. Research was done at experimental site Malanta of Slovak University of Agriculture in Nitra (48°19'23"N 18°09'01"E). The soil in this locality is classified as a Haplic Luvisol. We used the biochar which was created from paper fiber sludge and grain husks by Sonnenerde Company using pyrolysis in a Pyreg reactor. Biochar was applicated in dose of 20 $t.ha^{-1}$ in 2014. Soil moisture was measured in 0.05-0.10 m depth at experimental plots by SMT 100 soil moisture sensors and datalogger TrueLog100 by Truebner GmbH Company. Soil moisture at plots with no biochar application and plots with biochar application was compared in this study. Statistical significance (T-test, alpha = 0.05) was calculated to evaluation of differences in the soil moisture values.

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VIBROINSULATION OF INDUSTRIAL FLOORS

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ABSTRACT

Industrial floors have other problems than floors used in residential buildings. There are two types sources of vibration which influence on the use of an industrial floor: internal, mainly related to human induced vibration and machine operation, and external kinematic excitations when the industrial building is located near to traffic routes. Vibrations of industrial floors are undesirable due to the high sensitivity devices that may be in the industrial building and people in that building. In general, due to the use of high sensitivity devices and people staying in the building, a frequency range from 1 to 100 Hz should be considered, with each time in the case of machines and devices it is necessary to know resonance frequencies, while in the case of people, the most undesirable frequencies are in the range from 5 to 25Hz (resonant frequency range of internal human organs). Vibration reduction in these cases can be implemented by the change of frequency range from the resonance zone or by increasing the damping factor. The technological challenge is to limit the vibrations influence on equipment located in industrial halls or in laboratories with simultaneous reduction of vibrations influence on people staying in office parts of these buildings. This problem is planned to be solved by developing an anti-vibration industrial floor with the use of materials that can dampen vibrations coming from both external sources (e.g. railway, tram) and from internal sources (e.g. operation of machines inside the hall). Anti-vibration materials will be implemented in the floor solution industrial, either in the form of anti-vibration mats under the screed, or in the form of a concrete mix with granules polyurethane offcuts. Both solutions bring new challenges. In the case of an anti-vibration mat, it is appropriate selection of its parameters, such as the loss angle tangent, but also its stiffness, floor deflections, mass density or Poisson's ratio, but also its thickness. In the case of a concrete mix with granules made of polyurethane offcuts, the technological challenge will be the appropriate mix design that will ensure uniformity distribution of granules in each of its cross-sections. The percentage of granulate cannot be too high so that the concrete still has their mechanical properties, adequate strength. These parameters can be selected by designing the concrete.

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TECHNICAL-ECONOMIC COMPARISON OF SUPERFICIAL FOUNDATIONS OF SEISMIC RESISTANT LOW AND MEDIUM HEIGHT STEEL AND REINFORCED CONCRETE BUILDINGS

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ABSTRACT

The foundation is one of the most essential parts of a structure, the present research starts from the reactions produced at the base of 9 archetypes of structural steel and 9 archetypes of reinforced concrete, a semi-rigid soil with similar characteristics of cohesion, load capacity, angle of internal friction has been considered for the analysis of the 18 archetypes in which there are 3 levels, 8 levels and 12 levels, varying in three occasions the distance between axes of the same. The foundation is considered from below level 0+00, analyzing and considering the correct structural performance of the foundations for shear, bending, punching and crushing. Verifying the reinforcement using finite element software. The type of foundations has been considered according to the need and characteristics of the archetype in such a way that it satisfies the structural needs, the following structural options have been considered: isolated footing, spread footing, and beam foundation, being the same shallow foundations. The dimensioning of the pedestal up to level 0+00 has also been considered, carrying out a pre-design of the steel base plate to dimension the pedestal and its reinforcement, the design has been carried out according to ACI 318-19 considerations. The same soil considerations have been assumed for all the archetypes analyzed. Finally, starting from structurally functional foundations, dimensions, sections and cost of the 18 archetypes are compared to determine the type of structural system that demands a more economical foundation, through a unit price analysis which includes all the possible items in the construction part.

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SEISMIC ANALYSIS OF BUILDINGS WITH SUBWAY COMPONENTS

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ABSTRACT

This research work analyzes how seismic waves affect buildings with subway components that are usually studied independently: surface structures for inertia forces originated by the movement of their base and subway structures considering deformations due to ground movement. A 12-story building with 5 subfloors is analyzed in an integral manner, considering that the subsoil is subjected to seismic excitations in a soil-structure assembly for which it is modeled together with its geotechnical components, using nonlinear finite element modeling for its analysis. The superstructure is integrated to the infrastructure and a time-history analysis is included with the most representative earthquakes that can affect the building. The present investigation has three basic components: seismic, geotechnical and structural, which will be merged by means of specialized structural engineering programs. Seismic component. Information is compiled on local and regional tectonic faults within Ecuador, points of energy accumulation by plates on the Coast and in the East. A seismic risk map is made and the magnitudes, types and other parameters are determined for the site. With the help of the Pacific Earthquake Engineering Research Center (PEER) and the results of the Earthquake Risk Evaluation Project (TREQ), three relevant seismic events are chosen for the Time-History Analysis that meet the seismic risk data of the building. Geotechnical component. The geotechnical parameters used in the design of the building foundation will be used for soil modeling. Structural component. The type of material, geometry, dimensions, joints between elements, among others, are taken from the original design of the building, both for the subfloors and the superstructure. The connection of these three components will be carried out using MIDAS GEN and MIDAS GTS NX. The results of stresses, deformations, as a function of time, will be compared with similar standards and research studies.

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EFFECT OF SOIL-FOUNDATION INTERACTION ON THE MODULUS OF SUBGRADE REACTION

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ABSTRACT

For design of raft foundations, the soil is commonly modeled by using elastic springs, which is known as Winkler`s model. In the static analyses, these springs are considered a constant value that is called the modulus of subgrade reaction. However, no foundation is infinitely flexible due to the interaction between the soil and foundation, which is investigated in the present work. For this purpose, the effect of dimensions of foundations and Young`s modulus of foundation materials on the subgrade reaction modulus are examined for square-shaped foundations with uniformly distributed load, and the results obtained from these analyses are compared with those in infinitely flexible foundations. It has been shown that the effect of Young`s modulus of foundation material on the k-value can be ignored while the foundation dimensions have a great effect on the k-value. The ratio of the modulus of subgrade reaction that is obtained from the analyses taking into account the soil-foundation interaction to the subgrade reaction modulus in infinitely flexible cases varies between 0.36 and 0.45 in the middle area of foundations as well as 0.45 and 0.76 on the edges of foundations with a width between 5 m and 20 m as well as a thickness between 0.25 m and 1.0 m

THE INFLUENCE OF SILICA-COATED BISMUTH OXIDE-GADOLINIUM OXIDE PARTICLES ON THE PERFORMANCE OF CEMENT-BASED COMPOSITES

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ABSTRACT

Heavyweight powders are widely used in concrete technology to increase the density of material and thus improve its radiation attenuation properties. In the recent years there is a growing interest in application of nanosized admixtures as their performance leads to better material characteristics when compared to their microsized counterparts. In general, to ensure proper density and attenuation properties higher amounts of nanomaterials, than most commonly used in the mix design, are required. Unfortunately, high dosages (> 5 wt%) of metal oxide nanoparticles lead to delay in the cement hydration process and strength gain of cementitious composites. Therefore, methods are sought to improve their binding ability within the cement matrix. This study presents the approach towards production of novel heavyweight admixture with attenuating properties for cement-based composites application. To improve both gamma-ray and neutron shielding properties, as a source (core) materials, bismuth oxide (Bi_2O_3) and gadolinium oxide (Gd_2O_3) particles were chosen, respectively. To reduce the negative impact of particles on the cement hydration process and to improve their incorporation within the cementitious matrix particles were coated with nanosized silica. Core-shell structures were synthesized via sol-gel process. Two methods of silica coatings were proposed and Portland cement pastes with 10 wt% replacement levels of cement were produced. Moreover, for comparison purposes pristine Bi_2O_3 and Gd_2O_3 particles were replaced with cement by 10 wt% (mass ratio 1:1). Rheological, hydration and mechanical properties of pastes were evaluated towards establishing the relationships between coating type. Study showed that both synthesis methods are accurate for cement technology applications, however they lead to noticeable different performances of produced material. Pristine particles were found to substantially delay the cement hydration process. In contrary, silica coatings of particles resulted in remarkable acceleration of the hydration process and early strength development of cement paste as a result of noticeable differences in the morphology and surface areas of produced nanostructures.

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THE INFLUENCE OF TRAFFIC VIBRATIONS ON BUILDINGS AND HUMAN INSIDE THE BUILDINGS

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ABSTRACT

The intricate relationship between traffic vibrations and the buildings as well as the occupants inside, particularly in masonry buildings, is a multifaceted issue that demands meticulous attention because of its adverse impact on the structural integrity of buildings and the well-being of those living or working in them. This problem is intricate since it involves several areas, including the dynamics of structures, wave propagation in soil, acoustics, and the individual's psychophysical response. Traffic shaking can cause important damage to masonry buildings, including cracking and structural deformation, due to their heavy mass and rigid construction. This damage can compromise the safety of the building and pose a danger to the occupants. Additionally, building occupants may experience discomfort, annoyance, and health issues such as headaches, stress, and sleep disturbances due to the vibrations. Furthermore, low-intensity para-seismic events like mining tremors may endanger human health in a manner akin to how vibrations from traffic do. Vibrations from traffic can cause plaster to crack, structures to be damaged, or even to collapse or fail structurally. To minimize the adverse effects of traffic vibrations on masonry buildings, it is imperative to develop effective strategies that do not compromise the structural integrity of the building. These strategies could involve adding dampers or isolators to the building's foundation or strengthening the structural elements to enhance their resistance to vibrations. Nevertheless, the distinct characteristics of masonry buildings can make it challenging to implement these strategies. Despite the efforts made so far, research on the impact of traffic vibrations on masonry buildings and the occupants inside remains somewhat limited, and further studies are required to achieve a better understanding of the problem. The outcomes from these studies can contribute to the development of better mitigation strategies, thus reducing the impact of traffic-induced vibrations on the well-being of people and the stability of masonry buildings. In general, the impact of traffic vibrations on masonry buildings and their occupants is a significant issue that cannot be overlooked. It is crucial to comprehend the effects of traffic shaking on masonry buildings and the individuals inside them to develop practical strategies that prioritize the safety and well-being of the building residents. So, it is indispensable to pay attention to this issue and implement appropriate measures to minimize its impact on masonry buildings and their inhabitants.

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ASSESSMENT OF THE BENDING PERFORMANCE OF RC BEAMS DEPENDING ON THE SHAPE OF THE EXTERNAL REINFORCEMENT BFRP

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ABSTRACT

BFRP stands for Fiber Reinforced Polymer, a composite material of fiber-reinforced polymer that has emerged as a new material in the modern construction industry. While traditional FRPs are mainly made from carbon fibers, glass fibers, etc., BFRPs are made from basalt fibers. Due to this characteristic, BFRP has the advantage of high fire and acid resistance compared to traditional FRPs. It also maintains a high level of durability and does not contain any environmentally harmful substances during production and disposal, making it actively researched. In this study, which investigated the flexural performance by externally attaching BFRP plates (N-plate, T-plate, Double T-plate) to the bottom center of reinforced concrete (RC) beams to analyze the mechanical properties of BFRP mentioned earlier. Four specimens were tested, including a normal beam, an N-plate reinforced beam, a T-plate reinforced beam, and a Double T-plate reinforced beam. To obtain more accurate results, the surface of the concrete specimen was treated and the FRP plate was reinforced using an epoxy resin. Then, a load was applied at an average speed of 0.6 mm/min using a UTM with a capacity of 300 kN. Strain gauges, LVDT (Linear Variable Displacement Transducer), and a Potential Monet camera were attached to different positions for measurement. The number of cracks, crack length, crack width, and crack propagation at each moment were calculated and measured. As a result of the experiment, the number of cracks and maximum crack width of all reinforced beams decreased (by 6.25%-31.25% and 16.67%-45.83%, respectively), compared to the normal beam. In addition, crack length, yield stress, ultimate stress, and stiffness increased significantly (by 17.29%-78.57%, 21.79%-34.33%, 14.72%-30.71%, and 8.78%-23.57%, respectively). This is believed to be due to the difference in effective bonding area and inertial moment, resulting in an increase in the stiffness and strength of the reinforcement material. It was also found that T-plate and Double T-plate had the best reinforcement ability to resist vertical forces compared to N-plate. In conclusion, the BFRP reinforcement method presented can significantly strengthen RC beams in terms of stiffness and strength, and it is considered a possibility for the next-generation FRP material that can replace traditional FRPs.

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ANALYTICAL STUDY FOR THE EVALUATION OF PERFORMANCE OF THE POST-INSTALLED ANCHORS UNDER AN ON-SITE INSTALLATION CONDITIONS

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ABSTRACT

Most of the electrical devices in charge of control in power plants are composed of cabinets, which are fixed to the floor using post-installed anchors, and are recognized as vulnerable areas when external forces such as earthquakes are applied. However, anchor performance evaluation is generally limited to measuring mechanical performance, making it difficult to predict field installation performance. To compensate for this, previous studies have compared the pullout loads of anchors measured through general material tests and static performance tests reflecting field installation conditions to identify performance differences and analyze failure types and loading trends. However, in the case of shear load generated by anchors, it was found that it could not be measured inevitably because there is no equipment in Korea that can measure the transfer load of anchors installed in structures like the experimental method in the previous study. In this study, an analysis study using ABAQUS, a commonly used structural analysis program, was conducted to verify the reliability of previous studies. In case 1, a reference point was created by connecting nodes around the area to which the anchor was applied without modeling the anchor, and the reaction force was measured at that point. case 2 modeled the anchor so that it behaves integrally using the tie function on the surface in contact with the anchor, and case 3 modeled the anchor and used the contact function on the surface in contact with the anchor to set analysis between different materials. The pull-out load of the anchor applying the case 1 boundary condition was measured to be 32.51 kN, showing a difference of about 5% compared to the pull-out load of 30.90 kN measured in the experimental study. When the Case 2 boundary condition was applied, it was measured at 33.90 kN, showing a difference of approximately 9% of the test result. In case 3, the tension load of the anchor was 30.59 kN, which shows a difference of about 1% from the nearest test result. When comparing the results according to the anchor boundary conditions, it can be seen that the error range with the test results narrows as the modeling proceeds similarly to the actual installation conditions. However, in the actual analysis, a complex mechanism was reflected in the modeling, resulting in a longer time to meet convergence. Therefore, for analysis, it can be seen that the case 1 method has a fast convergence period and is relatively easy compared to the detailed analysis.

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THE MEASURING DISK AS A SOLUTION TO THE PROBLEM OF MEASURING IMPACT OF VIBRATIONS ON PEOPLE IN BUILDINGS IN THE NORMATIVE ASPECT

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ABSTRACT

Real problem in the implementation of vibration measurements in terms of determining their impact on people staying in buildings is the method of mounting measuring point. The method of assembly and location itself have a critical influence on the obtained measurement results, and thus on the actual comfort of people staying in the building and receiving vibrations in a passive way. Different laboratory units, doing tests in the same place, could obtain completely different results, despite the fact that they had the same equipment and maintained the same data analysis procedures. Based on many years of measurement experience of our Laboratory, we decided to recommend a comprehensive solution to this problem and lead to greater repeatability of the obtained test results. It is a measuring disc. During the work on the actualization of the Polish standard: PN-B-02171 "Assessment of the impact of vibrations on people in buildings" - a provision was created that obliges to use this type of solution in vibration measurements used to assess the impact of vibrations on people inside buildings. This happened as a result of negative experiences and bizarre measurement solutions found in various studies and literature. This publication presents a short historical overview (developing process) of measurement disc solution, practical aspects of its use, as well as the results of comparative tests for several popular solutions for mounting vibration sensors.

INNOVATIVE METHOD OF MATERIAL PARAMTERS ESTIMATION USING IMAGE PROCESSING AND DYNAMIC RESPONSE SPECTRUM

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ABSTRACT

Increasing levels of noise and vibrations from transportation and other building occupants are significant issues during progressive urbanization process. This highlights the need to provide solutions that can decrease the nuisance of noise and vibration from various sources. One of commonly used method is Finite Element Method (FEM) modelling of engineering solutions. However, engineers often encounter problems when estimating the material parameters required for FEM simulations. Although many engineering standard methods can provide necessary quantities for FEM models - density, Young modulus, Poisson ratio, and damping parameters, which are necessary to perform simulations considering structural dynamics. To obtain information about these quantities, different tests should be performed, which could be burdensome. In response to the issue of multiple tests needed for a single simulation, a combination of image processing and response spectrum measurement can be proposed. The presented methodology consists of a unique combination of dynamic response spectrum and image processing methods to identify the required parameters such as Young's modulus, Poisson ratio, and damping parameters. The tests were conducted using a single machine with cylindrical samples of methyl vinyl silicone rubber (VMQ) with various shape factors under normal compressive stress. There is shown the possibility of obtaining the necessary quantities using this innovative method of synthesizing dynamic response and FEM-supported image analysis. Additionally, a discussion of the limitations and optimal ranges of sample deformation concerning load stress and shape factor is presented.

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INFLUENCE OF EMBEDDED STEEL MESH INSERTS ON POST-BREAKAGE CAPACITY OF LAMINATED GLASS

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ABSTRACT

Glass, as a building material, has been known for a long time. The first glass uses were limited to filling window frames, mainly to illuminate rooms with natural light. In recent years, the popularity of glass in construction has increased significantly. All this is due to the growing trend to bring as much natural sunlight into the buildings as possible. The increasingly popular treatment of glass as a construction material requires using laminated glass, in which two or more glass panes are permanently joined together by a film. This unique behaviour is because the film between the glass sheets holds the glass fragments in place when fractured. In this way, avoiding the risk of injury to people in the vicinity is possible. As part of the ongoing project “Innovative solution for point-fixed laminated glass with improved capacity after glass fracture” for Research financed by the National Center and Development (NCBR) within the LIDER XI Program, the idea of laminating a steel woven mesh to glass laminates is being investigated. The steel mesh insert is designed to increase the load-bearing capacity of the sample in the post-breakage phase thus increase the safety of people in the buildings. The article deals with the post-breakage capacity of laminated glass elements subjected to three types of loading: in-plane, out-of-plane and combined in- and out-of-plane conditions.

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EVALUATION OF ELEKTRICITY CONSUMPTION DURING THE CONSTRUCTION PHASE

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ABSTRACT

This paper deals with the assessment of electricity consumption during the construction phase, using the example of construction projects in Slovakia. The aim of the study is to provide an analysis and evaluation of the energy performance of construction and to identify the factors that influence electricity consumption. The research methodology involved the collection of energy consumption data on several construction sites through the installation of metering equipment. This data was then analysed to identify energy intensive areas and processes in the construction project. The results of the study provide quantitative information on energy consumption during the construction phase and highlight opportunities to improve energy efficiency. The discussion includes the interpretation of the results obtained and provides recommendations for optimising energy consumption on construction sites. The conclusion highlights the importance of energy efficiency in the construction industry and the need for further research in this area. The findings of this study can serve as a starting point for the implementation of measures to optimise energy consumption in the construction phase and contribute to a more sustainable and energy efficient future for the construction industry.

BAYESIAN OPTIMIZATION ALGORITHM BASED SUPPORT VECTOR REGRESSION ANALYSIS FOR ESTIMATION OF RESILIENT MODULUS OF CRUSHED ROCK MATERIALS FOR PAVEMENT DESIGN

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ABSTRACT

The precise determination of the resilient modulus (M_R) of the base and sub-base materials is a major preoccupation and a key criterion in the flexible pavement design process. The experimental determination of M_R implies a challenging process which requires usually very difficult test procedures and extreme precautions and manpower. This is why soft computing techniques are increasingly popular and of growing importance. Many prediction techniques based primarily on linear and non-linear regression could not provide flexible use and consistent prediction of M_R for practical engineering. This article introduces a hybrid of the Bayesian optimization algorithm (BOA) and support vector regression (SVR) as a new modelling tool for the M_R prediction of crushed stone materials used as base and sub-base layers for pavement design. For this purpose, an experimental database was utilized to generate the hybrid BOA-SVR model of indirect estimation of the resilient modulus based on material type, basic engineering characteristics and loading conditions. The database consists of 260 experimental datasets obtained from repeated loading triaxial tests performed by the laboratory of the Central Transportation Agency located in Algiers, Algeria. To develop the model, all hyperparameters were optimised using the BOA technique. It was found that the average, median, standard deviation, minimum, maximum and interquartile range of the expected values of the developed hybrid model are very close to the experimental results. Results revealed that the hybrid BOA-SVR model predict the M_R of the crushed stone materials with a coefficient of determination of 99.91% and root mean squared error of 3.55. Comparisons with traditional and other machine learning models showed that BOA-SVR hybrid model predictions are more accurate and robust than those of other models.

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PARTICIPATORY TOOL DEVELOPMENT TO WEIGHT INDICATORS IN TERRITORIAL VULNERABILITY ASSESSMENT

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ABSTRACT

The ability to employ and comprehensively hold an extensive set of properly weighted indicators has become a crucial element to approach the complexity of Socio-Ecological-Technical systems (SETS) in territorial analyses. These overall analyses are increasingly important to provide decision-makers and stakeholders with adequate tools to understand territorial vulnerabilities and elaborate effective policies for transformative resilience in perspective of the increasingly uncertain scenarios also triggered by the consequences of climate change. This research presents a participatory weighting tool applied as part of the territorial vulnerability assessment tested in Moncalieri, Northern Italy. The assessment of territorial vulnerability employed Geographic Information System (GIS) analysis that involves weighting the relationship among the indicators of sensitivity, pressure, and hazard. Indicators weighting of the indicators followed a participatory process by which a panel of experts assigned intensity to each relationship through an online graphical interface. The large number of both indicators and the number of researchers involved in the weighting, often physically distant from each other, prompted the decision to renounce the use of pre-existing instruments such as questionnaires and to develop a purpose-built tool which, through a simple graphical interface temporarily published online, made it possible to weight the indicators relationship in a matrix with 12 rows and 9 columns in a quickly, tidily and intuitive way. The article provides an overview of participatory weighting tools, describes the case study and tool details, and discusses the results and potential applications in other contexts involving a large number of indicators and stakeholders engaged in their weighing.

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OPTICAL METHODS IN MATERIAL TESTING OF DX51D+Z275 STEEL - SPECIMENS OBTAINED BY LASER CUTTING AND PUNCHING

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ABSTRACT

As part of the standardisation of specimens for materials testing, international standards give detailed guidelines for determining the shape and geometry of specimens depending on the type of metal product and its thickness. The way specimens are prepared for testing should not affect the properties of the specimen. Any areas that have been strengthened, e.g. by shearing or burnishing, if this affects the properties, should be removed by machining or grinding. Determination of the mechanical properties of a material is carried out as part of internal or acceptance quality control of a product, or as part of scientific research, usually to establish the stress-strain relationship of the material from which test models, such as structural members, are made. Currently, laser cutting and numerically controlled punching are commonly used in the metalworking industry. The main objective of the present study was to establish a reliable stress-strain relationship for 0.8 mm thick flat sheet metal of the material DX51D+Z275, from which thin-walled member models were made for bending tests. Material standard EN 10346 does not specify a nominal yield strength for this grade of steel, and the tensile strength is given over a very wide range. Two groups of specimens prepared by laser cutting and by punching were tested. The results from the uniaxial tensile test were compared, and the effect of thermal treatment (specimen gr.1) and mechanical treatment (specimen gr.2.) on the microstructure was revealed by metallographic examination using a scanning electron microscope. Tensile test deformations were recorded using an extensometer and digital image correlation (Aramis 3D DIC system). The modern optical method of recording elongations required adequate surface preparation, but additionally enabled the tracking of specimen constrictions. The results obtained show high convergence of the measured elongations and reveal the benefits of optical techniques. Analysis of the microstructure and morphology of the machined edges of the specimens revealed that laser cutting caused a slight grain growth at the edge to a depth of about 2-3 grains of material, while punching resulted in a zone of local crushing and grain displacement to a depth of up to 25-30 grains from the edge. Although two different phenomena of microstructural changes near the edge were revealed in the light of microscopic observations, the results from the uniaxial tensile test show high convergence. However, the stress-strain relationship obtained for laser-cut specimens with negligible effects on material property changes at the edges was taken as reference. The main conclusion of the study is that commonly used modern metal cutting technologies can be an alternative to the traditional acquisition of material specimens by machining. On the other hand, the use of digital image correlation in uniaxial tensile testing can be a valuable addition to the measurement results compared to traditional extensometric elongation measurement. The uniaxial tensile test can also be used to validate the performance of a non-contact 3D surface displacement and strain measurement system, with a view to then using this system for experimental testing of entire structural members with ultra-thin-walled sections as an alternative to traditional strain gauges and displacement sensors.

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SUSTAINABLE TOURISM IN CAPE VERDE: MATERIALIZING THE IMMATERIAL - CIDADE VELHA AND THE BOAVISTA RESORT'S

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ABSTRACT

This article aims to analyse cultural tourism and its importance in the development of Cape Verde, with reference to Cidade Velha, island of Santiago, which from the fifteenth century, was an important cosmopolitan center, benefiting in 2009 from the status of World Heritage and how local identity is represented both in Cidade Velha and, in contrast, in the resorts of Boavista Island, one of the main places of influx of tourists in Cape Verde. We seek to understand how to materialize the immaterial, how to involve local populations, without culture, cultural heritage, the city, and its inhabitants, are not transformed into mere actors in a scenography built for "tourists to see", while analysing the construction of an identity based on the imaginary of a reality that shows nothing of local culture and dematerializes the place and the country, as happens in Boavista. For the execution of this work, we tried to combine qualitative and quantitative methodologies, using interviews and content analysis with technicians from both the former curatorship of Cidade Velha and the municipality of Sal Rei (Boavista). It is important to highlight that the information obtained through questionnaires launched to the inhabitants of Cidade Velha as well as to tourists visiting, was crossed with the results obtained by a study where 1000 tourists were interviewed by the former curatorship, being also important the photographic and in loco analysis of the sustained mage of both Cidade Velha and the Boavista Resorts.

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EVALUATION OF THE SHEAR STRENGTH OF RESIDUAL SOILS OF THE BATOLITO-ANTIOQUEÑO STABILIZED WITH QUICKLIME AND ITS USE IN EMBANKMENTS AND ROAD FILLS

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ABSTRACT

In general, the construction of roads demands the exploitation of high amounts of granular materials, and this generates important economic and environmental impacts. The use of materials from excavations for the construction of fills and embankments is an ideal solution to reduce the exploitation of virgin materials. However, the use of excavation materials may be limited when these materials are fine-grained or have low mechanical specifications. In this sense, soils stabilized with quicklime have become a viable alternative for road construction, reducing the use of quarry materials. Although there are standards and techniques for the use of soils improved with quicklime for pavements, today the process for evaluating these materials for the construction of embankments and fills is not well established. This research presents the evaluation of the resistance behavior of residual soils resulting from the weathering of the Antioquian Batolito (Antioquia-Colombia) when are subjected to quicklime stabilization. The optimal percentage of quicklime was determined by means of unconfined compression tests for dosages of 1%, 2% and 3%. Direct shear tests were used to study the influence of quicklime in soil properties like cohesion and friction angle in both natural and stabilized soils. The soil studied corresponds to a silty sand (SM). A factorial 2x3 experiment design was made to determine the number of tests with density, quicklime percentage and curing temperature as independent variables and unconfined compressive strength (qu) as response variable. A total of 54 unconfined compression tests and 27-seven direct shear tests were conducted. The results showed a significant increase in the strength of the materials treated with quicklime in relation to the natural state. There were increases greater than 100%, 50% and 15% in cohesion, unconfined compression, and friction angle respectively. The larger increment was calculated with 2% and 3% of quicklime dosage. However, due to cost benefits the optimum percentage of quicklime considered was set to 2%.

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EVALUATION OF THE USE OF RESIDUAL SOILS OF THE BATOLITO OF ANTIOQUEÑO STABILIZED WITH QUICKLIME FOR THE CONSTRUCTION OF EMBANKMENTS AND MECHANICALLY STABILIZED RETAINING STRUCTURES

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ABSTRACT

In general, the construction of roads demands the exploitation of high amounts of granular materials, and this generates important economic and environmental impacts. The use of materials from excavations for the construction of fills, embankments, and reinforced earth retention structures is an ideal solution to reduce the exploitation of raw materials. However, the use of excavation materials may be limited when these materials are fine-grained or have low mechanical specifications. In this sense, soils stabilized with quicklime have become a viable alternative for road construction, reducing the use of quarry materials. Although there are standards and techniques for the use of soils improved with quicklime for pavements, today the process for evaluating these materials for the construction of embankments and fills is not well established. This paper presents the results of an investigation to determine the incidence of soil stabilization with quicklime in the sizing of embankments and retaining structures reinforced with geosynthetics. First, a highway embankment is presented for which a sensitivity analysis was carried out in terms of geometry and volume of material required. Secondly, a mechanically stabilized wall with geosynthetic is presented in which a sensitivity analysis is made in terms of the amount of geotextile reinforcement required. In both cases, the models were analyzed using the shear strength parameters of a residual soil of the Antioquia batholith in its natural state and stabilized with quicklime obtained in laboratory tests. Quicklime contents of 2% and design processes according to FHWA manuals were used. The results show that in the embankment a reduction in the volume of material is obtained when using soil stabilized about 15%, since greater slope and heights can be used compared to the geometry of the soil in its natural state. In the case of the stabilized wall, a reduction of approximately of 50%in the amount of geosynthetics required was noted as larger thickness and lower strength reinforcements of layers can be reached with the stabilized soil case than those obtained with the soil in its natural condition. Both cases show that the implementation of quicklime stabilized soils may be beneficial in costs as a reduction in terms of resources and materials can be presented.

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AN EVALUATION OF SPATIAL DISTRIBUTION OF GREEN AREAS IN TERMS OF ACCESSIBILITY IN THE EVENT OF EARTHQUAKE

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ABSTRACT

Turkey is mainly located on earthquake zone with a population of approximately 85 million people. The country is composed of different geographical regions and most of these regions are under the influence of active faults such as in North Anatolian Fault Zone, East Anatolian Fault Zone and West Anatolian Fault Zone. Due to the location of Turkey, there is always the possibility of earthquakes in many regions of the country. The country has faced many strong earthquakes until today. The last earthquakes that happened in Kahramanmaraş Province with the magnitude of Mw 7.7 and Mw 7.6 on February 6, 2023 affected severely both Kahramanmaraş and many provinces around. The successive earthquakes that have happened in Kahramanmaraş reveal once again how important it is to examine the spatial distribution of gathering areas in cities. In this study, the spatial distribution of green areas at the city center of Uşak, located in the Inner Aegean region of western part of Turkey, is evaluated in terms of their potential usage as gathering areas in a possible earthquake. In this framework, the evaluation is conducted through quadrat analysis which is used in the studies of examining the spatial distribution of point data. Through the quadrat analysis, the whole city center is examined first and it is seen that there is a clustered distribution of green areas. When focusing on the area of clustering, it is inferred that there is a random-like distribution of the green areas. In order to quantitatively determine them, Kolmogorov-Smirnov test is utilized in the quadrat analysis. Hypothetical distributions are used and comparisons are made with the observed distribution. It is conjectured that, it would be more appropriate to have a uniform distribution in order that inhabitants escape from the danger and access a safe area in the event of the earthquake. It is recommended that the spatial distribution of the green areas could be considered in this manner in the spatial planning studies in the case of Uşak and other cities especially which were affected by recent earthquakes and will be planned in near future in Turkey.

INVESTIGATION OF THE MINARETS OF SOME HISTORICAL MOSQUES DAMAGED BY THE EARTHQUAKE TO UNDERSTAND THEIR VULNERABLE POINTS

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ABSTRACT

Historical monuments are non-renewable, valuable parts of the built environment, and they are vulnerable to earthquakes. Exact realization time of the earthquakes are unpredictable and emergency actions are required to protect the historical buildings. Religious buildings represent an opportunity for the community to heal the wounds caused by the earthquake; preservation of them from the damage of the earthquake is essential. Minarets are known as vulnerable parts of the historical mosques and they may cause damages to the main building of the mosques when they are demolished. The aim of this study is to understand the vulnerable points of minarets of historical mosques to prevent their demolishment and the damages occurred by their collapse. Thus, urgent interventions that should be taken for the other mosques located on earthquake zone can be guided properly. With this aim, totally eleven minarets collapsed by the Kahramanmaraş centered earthquakes with a magnitude of Mw 7.7 and Mw 7.6, dated to 6th of February 2023, in Turkey were investigated visually. These minarets belong to nine mosques of which main building is standing or partially collapsed caused by its minaret's demolishment. Demolished parts of the minarets were detected. The two parts which are separated from each other due to the demolishment were examined in terms of their construction technique and material usage. The study shows that in nine minarets while the material type of the investigated parts was the same, their construction technique was different. In one of the minarets studied, while the construction technique of the parts examined was the same, their materials were different. Apart from these, only in one minaret both the construction technique and material usage of the parts were different. As a conclusion, the most vulnerable points of the minarets against earthquakes could be listed as follows. These are connected parts namely upper part of the body and balcony, body and transition element, and pulpit and transition element include different construction technique and/or material, and the connected parts of the body in itself which are made out of different material type. Strengthening these kind of connections and reconsidering minimum intervention criterion as more sophisticated by taking into account this study; ensuring that the minarets act as a whole in the event of an earthquake may prevent both the minaret and the main building of the mosque from the damage.

A MODEL FOR SELECTING THE BEST SCHEDULE DELAY ANALYSIS METHOD IN CONSTRUCTION DISPUTES

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ABSTRACT

Claims and disputes are a common occurrence in capital projects, with only a tiny fraction being exempt. According to a 2022 survey by Arcadis, the global average time taken to resolve disputes is 15.5 months, with the global average value of disputes being $52.6 million. In the Middle East, the average value is $90.4 million, while in Continental Europe, it is $57.5 million. Of particular concern are disputes related to schedule delays, which are on the rise. Various methods exist for analyzing the effects of schedule delays, and parties must agree on the method to be used in case of disputes if it is not specified in the contract. Appraisers must select the method and analyze the effects of delays if the parties cannot reach an agreement. Since each schedule delay analysis method can produce different result and appraiser may choose a different method, it is essential to select the right analysis method. The selection process should consider factors such as the presence of a baseline schedule, the type and level of detail of the schedule, and the timing of updates. Other factors to consider include the environment of delays, contract conditions, and more. This study aims to provide a model for choosing the best schedule delay analysis method, which appraisers can use as a guideline. Additionally, it will provide parties with a guide for maintaining the necessary information and documents during the project execution phase.

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SOME NOTES OF THE CONTEMPORARY URBANIZATION PROCESSES AT SUBURBAN ZONES IN POLAND

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ABSTRACT

The article investigates the ongoing urbanization processes at suburban zone's in Poland. The results of these processes are particularly visible in the case of suburban small cities which, in contrast to cities in the EU-15 countries with similar populations, are expanding excessively, causing a growth of urbanized areas exceeding several times the growth of their population. Polish urban structures are becoming increasingly chaotic, which increases the cost of urban infrastructure. This often happens as a consequence of abuse of property right, in the name of economic profit. The process of systemic transformation, after 1989, has reversed the general trends in the development of small and medium-sized cities, which are now evolving towards the dominance of residential areas and basic services. Due to the weak spatial planning system and the lack of legal restrictions inhibiting the expansion of urbanized areas only in the last 15 years their surface per capita in Poland has increased by approx. 20% (according to the Central Statistical Office of Poland). The spatial policy of polish cities needs to cope with the process of excessive dispersion of development. According to the strong position of private properties owners in Poland, there can be seen the weakness of urban planning, which in fact is unable to use well known planning tools, like reparceling or other types of urban planning regulations. The effect is the high intense of spontaneity of urbanization process, special seen at the suburban zones. The paper shows characterization of urbanization processes on examples of few Polish cities. The result is characteristics of typical phenomena of development of susburban zones in Poland.

A CLOSER LOOK: ADDITIONAL STUDY OF RELATIONSHIP BETWEEN INDOOR RADON EXPOSURE AND THE COVID-19 CASE FATALITY RATE

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ABSTRACT

One year ago, the author of this text asked the scientific community an astonishing question. Is there a specific field within civil engineering connected to the impact of Covid-19? Is there a connection between the Covid-19 case fatality rate and the radon exposure in interior spaces? And – if so – is it a correlation? Is it just a coincidence or even a causality? Radon exposure is particularly high in regions that have seen high mortality rates related to SARS-CoV-2. At the WMCAUS 2022 conference it was demonstrated that there is at least a correlation. This statement based on a comparison of four states of Germany and the data available for them last year. Of course, such a comparison is rather vague, as the geological situation is not limited to state borders. It is relatively rough, as the measures against the spread of the SARS-CoV-2 have been different from one state in Germany to another. Due to that, this paper takes a closer look to that phenomenon. This closer look focuses on three districts in northern Bavaria: Ansbach, Bad Kissingen and Wunsiedel. The last one is situated in the east, close to Thuringia as well as the Czech Republic. In 2021 it was declared as radon preservation area – the only one in Bavaria. Such an area is rather affected by radon. Bad Kissingen represents a region with a medium average indoor radon activity concentration. It is located at the north at the border to Hesse. Ansbach is characterized of a lower risk to get affected by radon. It is in the vicinity to Baden Wuerttemberg in the west. Even this second comparison cannot provide a definitive answer to the questions named above. Nevertheless, this article will push that topic a little forward and by that support the answer to a possible relationship between indoor radon activity concentration and the covid-19 case fatality rate. Possibly it puts little more focus more on radon protection than it happened during the pandemic years.

ASSESSMENT OF THERMAL COMFORT IN EDUCATIONAL BUILDINGS: THE CASE FOR NAJRAN IN HOT AND DRY CLIMATE REGION

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ABSTRACT

Thermal comfort is one of crucial factors in designing educational buildings due to different users and variety of spaces. This research aims to evaluate thermal comfort in educational buildings considering architectural configurations such as layout, space orientation, and other passive design elements like courtyards. The study was conducted on College of Engineering at Najran University for three months starting from August to October 2022. In this study, indoor environmental parameters, including air temperature, relative humidity, air velocity, and mean radiant temperature weremeasured. The total sample size is 145, 120 students and 25 staff. In parallel, a subjective survey adminstrated wherein occupants asked to answer thermal comfort questionnaire including several aspects.The results showed that the building is thermally uncomfortable as users voted less than 80% according to ASHRAE-55. T-test showed that there is a statstical significant difference between TSV and PMV, the average of TSV was lower (0.01) than PMV which was (0.34). Also, the calculated neutral (comfort) temperature from TSV is 22.5°C and the one from PMV is 23.5°C.Thermal discomfort leads to lower productivity, and might have indirect impact onlearningoutcomesalongside uneeded massive energy demands.

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SEISMIC PERFORMANCE OF ISOLATION BEARING DEVICES IN DYNAMIC BEHAVIOR OF TYPICAL BOXE GIRDER BRIDGE

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ABSTRACT

In this study, three seismic isolation systems made of elastomeric laminated are examined in order to illustrate their performance in the three-dimensional dynamic behavior of variable inertia box-section bridges and the particularities of their modeling. In this work, the energy dissipation bearings, such as conventional neoprene bearings with high damping bearin (NRB), neoprene bearings with high damping (HDRB) and neoprene bearings lead core (LRB) are considered for better seismic design performance and rational sizing of this particular category of bridge structures. For the purpose of the study, a 3-D finite element numerical model of a typical bridge is developed for this purpose. The nonlinear dynamic analysis is carried out using models of bilinear hysteretic behaviors of the anti-seismic isolators. The results indicate, among other things, that isolators have a significant effect on seismic response in the longitudinal direction and can effectively reduce seismic demand in bridge structures.

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ALTERING STORIES: READING URBAN MEMORY THROUGH THE CHANGING SPACES AND LIVES OF COURTYARDS IN KEMERALTI

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ABSTRACT

This paper explores the evolution of spaces over time, with a particular focus on the courtyards of Kemeraltı district in Izmir, which have been home to vibrant and colorful caravansaries since the 17th century. The study aims to describe how changes in these spaces have impacted the collective memory of the city through personal stories of individuals who have experienced these transformations. Courtyards are transitional spaces where organic relationships break and reconnect over time, providing a direct reading of urban memory as heterotopic spaces. While many of Kemeraltı's caravansaries have been demolished or are unusable due to economic transformation and gentrification projects, some still retain their importance in the daily cycle of urban life. To understand the place of these spaces in the cycle and their relation to subjects, this study evaluates the courtyards in Kemeraltı through the dialectic established by the subjects and their guests, exhibiting traces of transformation through their narratives. The methodology of the study involves in-depth interviews with residents currently living in selected caravansaries in Kemeraltı, along with personal observations by the authors. The study focuses on the stories of Büyük Karaosmanoğlu Han, Fazlıoğlu Han, Küçük Demirhan, Büyük Demirhan, Arap Han, and Bey Han, which are prominent in the historical texture of Kemeraltı. The paper examines the alterations occurring with the diminishing borders, enclosure of permanent but temporary looking spaces, consumed memories, shifting practices, and abandoned spaces, which are due to altering socio-economic structures, politics, and their implications on the changing production and consumption patterns. Overall, this study highlights the importance of personal stories in understanding the impact of spatial transformation on urban memory and emphasizes the need to preserve and protect these spaces as a vital part of urban life.

THE LONDON UNDERGROUND MAP AND ITS INFLUENCE ON MODERN IMAGE AND SPACE

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ABSTRACT

Sony Walkman released a series of advertisements based on underground maps in 2008. These advertisements were postproductions of underground maps, re-assessing them in a different context; the music. The images of underground maps were turned into adverts by changing the station names with artists and bands, and using earphones and cables as underground lines. One of the maps included was the London Underground Map. London Underground Map was a unique work for its era and still today it is a powerful representation of modern life, space and image. The map was a revolutionary idea for its period. What is also unique about the map, that it has been used in different context for various times. The reason for this is that the image holds lot of meanings. Why did Sony Walkman use an image like that for advertisement? The reason why it has been used in other contexts is that with its geometry and content it goes beyond being a map, but it has become a cultural artefact. Other than Sony and its advert, London Underground Map was re-produced in other fields. The reason for various postproductions of the image corresponds with the idea of changing notion of contemporary art within modern life. In this context it could be argued that the London Underground Map is a connected network that transcends any kind of space, real and represented. There is no topos, no locus and nowhere to sit and stay. It is a narrow corridor to integrate with. It is a drawing on a paper, a manipulation of perception with its symbolical geometrical forms of distances.

"WHITE" PLAGUE ON THE SILVER SCREEN: EXPLORING THE SPATIALITY OF TUBERCULOSIS IN CINEMA

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ABSTRACT

Tuberculosis is universally known as the "white" plague and as the "white" sickness (*beyaz hastalık*) in Turkish. However, "white" is also associated with hygienic settings to prevent its infectious nature.[1] In cinematographic works, the venues of tuberculosis are also represented via visual discourses of "white". For example, in the film *Una Breve Vacanza* (*A Brief Vacation*, 1973, director Vittorio De Sica), the healing environment of an Alpine Italian sanatorium is presented as purely "white" with its snowy mountains, sanatorium terraces and interiors. "White" becomes a synonym for hygiene, "contrasted with the sickness of those they accommodated" (Overy, 2007). A similar discourse can be followed in Turkish cinema. Films with the word "white" in their titles, such as *White Handkerchief* (*Beyaz Mendil*, 1955, director Ömer Lütfi Akad) and *White Roses* (Beyaz Güller, 1970, Süreyya Duru), are just a few examples that portray tubercular patients and settings of the treatment of tuberculosis. Even though, scientist Selman Waksman and his team developed the "cure" in 1943, in Turkey, the effective dissemination of the drug-therapy took even longer. Therefore, tuberculosis was depicted as incurable in the representation of tuberculosis in the Turkish cinema of the 1950s-1980s' era. The cinematographic use of "white" portrayed desperation (cinematographic expressions), and/or hygienic treatment spaces (architectural representations), and/or the lives of disadvantageous social groups and women (political criticisms). The struggles of the proletariat also prevail in the film *Dream of a Butterfly* (*Kelebeğin Rüyası*, 2013, Yılmaz Erdoğan) which depicts tubercular patients and uses the Heybeliada Sanatorium (Istanbul) as its main setting for storytelling. In the context of these discussions, this study will look at universal and Turkish films comparatively and examine the ways in which "white" -contextualizing tuberculosis- is architecturally, socio-culturally and politically utilized on the silver screen.

REVIEW OF METHODS FOR DEFLECTED BUILDINGS LOCATED IN MINING AREA OF UPPER SILESIA

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ABSTRACT

The underground coal mining creates the post-mining void, which causes displacements of a massif, both above and under the void. One of the consequences of underground mining is a change in inclination of the surface area. Hence, buildings in the mining area are vertically deflected. Deflection is a defect, which impairs operation of buildings, underestimates their value, and in extreme situations can lead to structural collapses. This paper presents the procedure for constructions whose deflection was caused by underground coal mining in Upper Silesia. It describes the historical approach, theoretical analyses, and successful rectification processes performed by non-uniform elevation of buildings. The first method of rectification is removing the soil from under the part of the building which is positioned too high. Removing the soil from under the part of the building can be achieved by drilling holes under the building or cutting parts of the soil under the building. After removing the soil, the building returns to the vertical. The second method to remove the deflection of building is elevating using the hydraulic jacks. These jacks are usually built-up in the openings made in the walls of the lowest level. Removing deflection through elevating is performed through inflicting shifting to the jacks. The reviewed literature on procedures for deflected building, most of them observed by the author, and the concepts described in the literature lead to conclusions that the method guaranteeing the purpose of restoring the deflected building is rectification based on non-uniform elevation of jacks with pistons. The scope of other methods is limited to very special cases.

EVALUATION OF U-NET TRANSFER LEARNING MODEL FOR SEMANTIC SEGMENTATION OF LANDSLIDES IN A COLOMBIAN TROPICAL MOUNTAIN REGION

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ABSTRACT

Landslides in tropical regions present unique challenges and pose significant risks due to the interplay of various factors. The combination of intense rainfall, steep slopes, and geologically complex terrains found in some tropical regions, as Andean zone of Colombia, can contribute to heightened landslide susceptibility. The inventory of morpho-dynamic processes plays a relevant role in establishing the relationship between the conditioning factors and the likelihood of landslides. A comprehensive understanding of the spatial extent of historical and current landslide activity, represented through a landslide inventory map, is crucial for effective management of landslide risks, especially in tropical mountainous regions. Satellite-derived high-resolution data is frequently employed to map landslides by identifying morphological features associated with past and/or recent deformation. However, this process can be time-consuming, challenging, and often relies on extensive manual efforts, limiting the availability of landslide inventories in affected regions. In recent years, Deep Learning (DL) models, particularly Convolutional Neural Networks (CNNs), has emerged as a powerful technique for a wide range of remote sensing applications involving Very High Resolution (VHR) imagery. These applications include classification, segmentation, and object detection. However, despite the significant advancements in DL and CNNs, their utilization in landslide detection remains relatively limited in the literature. In this study, we evaluate the potential of a deep transfer learning architectures as U-Net for automated landslide detection using spectral information from the optical satellite imagery (RGB bands), two DEM-derived indices (slope and curvature), and two Synthetic Aperture Radar (SAR) layer (VV amplitude, pre -and- post event). In the first place, we stack data in a multi-band image. Then, the deep transfer learning model is trained in the “La Argelia” river basin in the Pacific region in Colombia, and finally, the trained model is tested in the “La Liboriana” river basin in the western zone of the Andean region. Once obtained the landslide within the testing area, the results were validated considering the conformity between the landslide inventory and the results of segmentation applied method. According to the results, we obtained good performance of the U-Net model for landslide detection purposes as has been validated in other geographical contexts. In conclusion, by harnessing the power of DL models and leveraging the detailed information provided by fusion of VHR satellite imagery, topographical and SAR data, it becomes feasible to achieve a comprehensive space-time mapping of landslides. This advancement holds the potential to significantly enhance the accuracy and effectiveness of landslide mapping processes, enabling a more holistic understanding of the temporal dynamics associated with these natural hazards.

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THERMAL, CHEMICAL AND MINERALOGICAL PROPERTIES OF SOIL BUILDING BLOCKS FOR ECO-HABITAT SUSTAINABLE

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ABSTRACT

This research evaluates the effect between thermal conductivity of Compressed Earth, Block Stabilized by cement and the mineralogical and chemical analyses of soil for eco-habitat, all the samples in the dry state and, with different content of cement, the samples made by soil stabilized by Portland cement optimum. The soil used collected from fez city in Morocco. That determination of the thermal conductivity of Compressed Earth Block Stabilized by cement plays an important role when considering it's suitability for energy saving insulation. The thermal conductivity of the tested samples is strongly affected by the quantity of the cement added. The soil of Fez, mainly composed of calcite, quartz and dolomite improved the behavior of the material by the addition the optimum content of cement. The findings suggest that to manufacture lightweight samples with high thermal insulation properties, it is advisable to use clays that contain quartz. In addition, quartz has high thermal conductivity.

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HYDRODYNAMIC MODELING STUDY ON A SECTOR OF THE TIMIŞ RIVER

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ABSTRACT

To determine the water flow regime through the minor and major bed of the Timiș River, in the area associated with the studied sector, (levels, flow rates, hydrodynamic slopes, flood zones), as well as determining the discharge capacity of the bed on this analysis section, it was necessary to carry out a discrete numerical modeling in different variants of water flow transit. The assessment of the existing situation was based on the current topographic elevations materialized on the situation plan, the cross-sections and the maximum flows corresponding to the arranged regime, by the Waters National Administration. The analysis sector of the Timiș River was divided into segments limited at the ends by cross-sections obtained in accordance with the actual topographic elevations. The numerical modeling was carried out with the specialized program HEC-RAS version 4.1 respectively. The calibration of the numerical model was carried out at the transit of the historical hydrograph where the maximum level reaches the recorded value Hmax and corresponds to a maximum value of the flow rate Qmax. Next, the transit of the synthetic flood hydrograph was carried out resulting in the identification of the flooded areas on the discrete numerical model as well as where the flow reaches the maximum value.

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IMPACT ON STORM WATER RUNOFF

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ABSTRACT

The hydrological changes, which occur in a catchment area, are due to the rapid increase of the urbanization of both the area nationally and globally. Modifying impermeable surfaces, such as streets, sidewalks, parking lots, etc. causes negative changes in the hydrological cycle, as well as the groundwater resources, deterioration of water quality, and ecosystems. In recent years, climate change and poor stormwater management from urban areas have led to a major risk of flooding. This paper analyses changes in land use land cover types and their impact on stormwater runoff, using ArcGIS software.

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SOME NOTES OF THE CONTEMPORARY URBANIZATION PROCESSES AT SUBURBAN ZONES IN POLAND

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ABSTRACT

The article investigates the ongoing urbanization processes at suburban zone's in Poland. The results of these processes are particularly visible in the case of suburban small cities which, in contrast to cities in the EU-15 countries with similar populations, are expanding excessively, causing a growth of urbanized areas exceeding several times the growth of their population. Polish urban structures are becoming increasingly chaotic, which increases the cost of urban infrastructure. This often happens as a consequence of abuse of property right, in the name of economic profit. The process of systemic transformation, after 1989, has reversed the general trends in the development of small and medium-sized cities, which are now evolving towards the dominance of residential areas and basic services. Due to the weak spatial planning system and the lack of legal restrictions inhibiting the expansion of urbanized areas only in the last 15 years their surface per capita in Poland has increased by approx. 20% (according to the Central Statistical Office of Poland). The spatial policy of polish cities needs to cope with the process of excessive dispersion of development. According to the strong position of private properties owners in Poland, there can be seen the weakness of urban planning, which in fact is unable to use well known planning tools, like reparceling or other types of urban planning regulations. The effect is the high intense of spontaneity of urbanization process, special seen at the suburban zones. The paper shows characterization of urbanization processes on examples of few Polish cities. The result is characteristics of typical phenomena of development of susburban zones in Poland.

Corresponding Author: Bartosz Czarnecki

ANALYSIS OF CAUSES OF DAMAGE TO MASONRY WALLS IN THE HISTORIC BARRACK NO. B-115 IN THE FORMER KL AUSCHWITZ II – BIRKENAU CAMP

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ABSTRACT

Brick barracks in the former German Nazi Concentration and Extermination camp KL Auschwitz II-Birkenau have a historic importance and are protected by the register of monuments and inscripted on the World Heritage List. One of them is the barrack having the current inventory number B-115. It was built as a temporary construction in autumn and winter at the turn of 1941 and 1942. The works were conducted in a hurry in poor atmospheric conditions and the construction material was taken from dismantling houses of nearby villages. Some works were performed by unskilled workers, that is, the prisoners. Walls in the barrack B-115 are damaged in many places. The main damage observed outside is corrosion caused by wall exposure to environmental factors. Wall cracking and breaking apart are found inside the barrack. The most serious damage was found in gable walls, which were deformed and detached from inside lateral walls. Moreover, signs of tension were found in connections between the lateral walls and external longitudinal walls, partition walls were cracked, and cracks were also observed in areas of transmitting concentrated forces. The inventoried types of damage to the barrack and analysed causes of its formation were used to identify the mechanisms responsible for damage. The repair plans included the elimination of identified causes of damage and the damage itself. The renovation was designed in such a way as to limit the intervention in its historical layers to the minimum necessary and preserve the documentary value while securing access by visitors. New foundation will be performed under all walls and the existing foundation particularly due to a lack of proper foundations under some internal walls and heterogeneous foundation conditions. Then, perimeter drainage will be performed to collect run-off water and groundwater. Deflected and deformed walls will be rectified and anchored to the adjacent walls. Moreover, roof structure, roof cover, and finishing elements will be strengthened and preserved. Start your abstract here… 250 to 500 words concise and factual abstract is required. The abstract should include the purpose of research, principal results and major conclusions. References should be avoided, if it is essential, only cite the author(s) and year(s) without giving reference list. Prepare your abstract in this file and upload it into the registration web field.

Corresponding Author: Lukasz Szoblik

DETERIORATION IN CONCRETE EXPOSED TO SODIUM CHLORIDE AND COLD TEMPERATURE: MITIGATION STRATEGIES

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ABSTRACT

Many infrastructure domains required material research as an initial phase of project development life cycle. One such futuristic domain is the bridge engineering where there is a critical need of study of environmental impact and material strength. This paper focuses on the premature deterioration of concrete infrastructures exposed to sodium chloride (NaCl) salts. Also, thermal cycling is a major concern for governmental transportation agencies and academia, especially in cold reasons. NaCl salts can cause damage and rapid deterioration of concrete due to physical and chemical aspects, including salt scaling, corrosion of rebars, ice and salt crystallizations and/or deleterious chemical reactions. This paper discusses how NaCl solutions can cause damage in concrete in the presence of thermal cycling and how such damage can be mitigated. Two approaches were evaluated to mitigate the damage because of the change in chemical formation, modification of the chemistry concerning the ordinary Portland cement (OPC) and use of alternative binder that does not react with NaCl. This paper attempts to provide an advanced thermo-chemo-physical understanding of NaCl salt damage in concrete. This paper also discusses specific structural and chemical alterations during thermal cycling that are caused by NaCl to develop damage to concrete. The research recommends the use of sulfate-resistant cements, slag, class-F flay ash, and silica fume as well as calcium aluminate cement (CAC) to improve the robustness of concrete exposed to NaCl salts and cold temperature.

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THERMAL CONFORT ANALYSIS AND SIMULATION CALIBRATION OF HIGH-RISE FREE-RUNNING BUILDINGS IN SUBTROPICAL HIGHLAND CLIMATE

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ABSTRACT

The construction of high-rise buildings results from a constant increase of population. One of the challenges of high-rise building construction and energy rising is guaranteed thermal comfort. Since a large part of people's time is spent at home, when high-rise buildings are used for residential function, they should offer a standard residential thermal comfort to their users, while considering only natural ventilation and bioclimatic strategies. Some thermal comfort past studies were evaluated by means of the adaptive comfort model included in ASHRAE 55 and CEN Standard EN15251. The results show areas in the subtropical Andean Highlands where there is a significant thermal comfort deficit, which may cause health problems for inhabitants. This research aims to evaluate the effect of passive strategies over thermal comfort in three high-rise free-running mixed-use buildings located in Quito, capital of Ecuador, by data measuring and performing energy simulations. These buildings take into account a mixed use among offices, amenities and residential areas. The selected methods for thermal evaluation were the adaptive method of ASHRAE 55 considering 80 % of acceptance. This method allows the determination of overheating and overcooling hours in the building. Four thermohydrometers sensors where installed in different floors and collected data for 24 hours. By using DesignBuilder software, the buildings were calibrated with the measured data and then were modelled in detail for one typical meteorological year (TMY) to obtain simulated data of the yearly thermal comfort in each one of the buildings. Results show that the application of passive strategies in buildings lead to indoor temperatures within 80 % reaching temperatures between 18 C and 25 C of the acceptance range defined by ASHRAE 55.

Corresponding Author: Luis Godoy-Vaca

CHITIN AND CHITOSAN: STRUCTURE, PROPERTIES AND APPLICATIONS - SOME PERSPECTIVE ON BUILDING PRESERVATION

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ABSTRACT

Chitin and chitosan, as the most abundant amino polysaccharides in nature, have characteristics such as high biocompatibility, low toxicity, biodegradability, and acceptable antimicrobial properties. These unique properties led Chitin and Chitosan to pay great attention not only in terms of the abundance of natural resources but also because of their high potential for the preparation of applied materials. Extensive improvements have been made in improving their properties for use in tissue engineering and medication, wound healing and re lief agents. This paper tries to show a general perspective on the many applications of these biopolymers. The text ends with the description of the potential application of this material in building preservation.

Corresponding Author: Mehdi Savary

A FIELD STUDY OF GREENHAUS GAS EMISSIONS REDUCTION THROUGH INTELLIGENT ROOM HEAT MANAGEMENT AS LOW-INVESTMENT MESSURE TESTED ON THE DISTRICT HALL OF LIPPE IN GERMANY

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ABSTRACT

The construction of climate-friendly new buildings is not enough to enable greenhouse gas neutrality by the second half of this century. To achieve it, the existing building stock needs to be renovated or retrofitted step by step. This study investigates the impact of a low-investment greenhouse gas emission reduction measure based on intelligent room heat management (IRHM) which is being tested to date on the main administrative building of district Lippe (built in 1979-80) in Germany. This system intends to reduce the energy consumption of further districts' buildings that, due to the high costs, cannot be intensively renovated in the medium term. IRHM consist in the installation of an intelligent controller that, based on dynamic usage profiles, optimise the operation of the existing heating system. Through presence sensors in the office rooms, the employee's worktime routine is continually registered to enable the creation of heating patterns that maximize heat comfort during worktime while energy is saved by reducing room temperature when the office is unoccupied. The analysis is based on collected data of heat energy consumption, room climate and user behaviour in five corridors: three with IRHM and two control corridors without it. In both control corridors and two of the IRHM corridors the façade was completely refurbished in 2021 while the remaining one still preserves the original façade to date. Heating demand calculations were conducted to enable a wider exploration of usage scenarios. The results obtained so far, show significantly lower heat consumption in the corridors with IRHM, reaching a maximum of 90% energy consumption reduction compared to the control corridors. An optimized operation of the radiators is clearly recognizable as the system anticipates the employee's presence and reach the comfort room temperature (set-up temperature) before the beginning of the working time, keeping it while the room in use. It also reacts properly switching down to set-back temperature so far, no presence is detected. According to the heating demand calculations, the implementation of a set-back temperature out of worktime can reduce the energy consumption up to a 48%. Combined with the refurbishment of the façade, the heating demand sinks up to an 87%. Field data shows an even more optimistic perspective, as energy consumption was in average even lower than the calculated demand. The on-site implementation of the IRHM is accompanied by social science research aiming at getting feedback on thermal comfort as well as on employees' experience with the handling of the intelligent room heat management device. Up to now three online surveys were conducted during heat periods between 2021 and 2023 with 18 to 21 participants from two-person offices. First analyses show that occupants' satisfaction with temperature changed from a neutral ranking to a slightly positive voting. Room temperature was found to be comfortable as soon as entering the office in the morning. Preferred room temperature shifted over the survey time points from 21C°- 22C° to under 21C°. Further analyses will focus on general energy-relevant attitudes and habits such as windows-door opening.

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DIGITAL TWIN FOR EDUCATIONAL PURPOSE: THE CASE STUDY OF THE U-BUILDING AT THE KTH IN STOCKHOLM

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ABSTRACT

Digital Twin (DT) concept is one of the most talked-about topics nowadays in the Architecture, Engineering, Construction and Operation (AECO) sector. Previous researches addressed both the definition of such a concept and related aspects and the development of applications towards specific purposes, such as the use of DT for logistics intelligent scheduling, facility and asset management, built environment performance monitoring etc. However, the specificity of such applications reduces both its replicability and understanding from non-technical or unexperienced audience. This results in the spread of confusion when approaching such concepts. For this reason, this study explores how to communicate efficiently the Digital Twin concept for educational purposes, by identifying three main phases of data capture, connection and communication when establishing the "twinning" between the physical and the digital assets. The methods used to achieve the expected results include the integration of several systems and tools, from BIM platforms and Visual Programming Language (VPL) to Virtual (VR) and Augmented Reality (AR), highlighting different approaches for data integration and capture. The proposed methodology was tested on a real case study and specifically on the U-building on the KTH Campus in Stockholm. This building has been conceived as an educational building and is equipped with a Building Management System (BMS) that includes a network of devices, located in several rooms within the building, monitoring real-time energy-related indicators, such as internal temperature, relative humidity and carbon emissions. The building itself is used as a pilot in master courses to enable students a first development of a digital twin, by establishing a connection between real-time monitored data and digital objects, in order to exploit such a connection for further analysis and comparison among, for instance, predicted and real building performance. The results show how the optimization and definition of specific goals helped students towards the assimilation of complex concepts. Furthermore, the presentation of several approaches towards the realization of a dynamic set of interlinked domain-specific models proved students the replicability and flexibility of the method, which could be developed based on the most efficient strategy for the specific field of application.

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SENSORY EXPERIENCE: OPTIMISING COMMUNITY WALKING ENVIRONMENTS FOR HEALTH INTERVENTIONS

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ABSTRACT

In the context of high-stress urban life, chronic diseases seriously impact people's health. Sensory experience in the field of urban design is closely related to such diseases. Under the perspective of sensory experience, firstly, the principle of community walking environment intervening in residents' health is elaborated: sensory experience is formed by the human body's sensory perception of environmental elements, and a good sensory experience directly improves the level of human health and also attracts more walking activities, thus indirectly promoting human health. Secondly, an evaluation system of the community walking environment is established. We selected nine streets in Yulin and Shuangqiao neighbourhoods in Chengdu, China, and used the Walking Environment Intervention Degree to assess the performance of community walking environments on residents' health interventions based on four sensory experiences: visual, auditory, olfactory, and tactile. This study shows that community walking environments that perform well in 10 environmental elements, including guidance systems, visible greenery, and facility materials, have higher levels of intervention in sensory experience and can promote residents' health. Finally, we applied the K-means spatial clustering method to divide the streets into 3 categories. Then we summarised the characteristics and problems of each type of community walking environment, and put forward suggestions to optimise the community walking environment, such as improving the guidance system, increasing street greening, and maintaining environmental sanitation. This paper attempts to quantitatively analyse spatial health interventions, explores environmental construction that enhances the sensory experience, and expects to provide a reference for urban design to improve residents' health.

PLACE MEMORY: COLLEGE DORMITORY DESIGN BASED ON THE TRADITIONAL CHINESE ACADEMY SYSTEM

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ABSTRACT

Culture is the soul of a country, and traditional cultural space should be valued. The traditional Chinese academy space is valuable for the construction of humanism in the dormitory area of colleges and universities. In this paper, under the perspective of memory of place, firstly, the memory elements of place are categorised into visible elements such as topography, site layout and architectural form, and sensible elements such as sound, odour, event and physical practice. Then, the memory methods to enhance the subject's spatial identity are summarised into four: context method, clarity method, participation method, and reinforcement method. Secondly, by analysing the spatial characteristics of traditional Chinese academies, we found a correlation between memory elements and memory methods. We elaborated on the principle of place memory generation in the academy dormitory: places are transformed in the body and brain through human engagement to form place memories. In this case, inserting design strategies in the acquisition phase of memory elements can facilitate the generation of good place memories. Finally, four design principles are proposed: taking direction based on the context method, planning based on the clarity method, shaping space based on the participation method, and rendering mood based on the reinforcement method. And specific design strategies are provided for each design element. It is expected to provide suggestions for activating the memory of modern college dormitory places in China and ideas for the development of traditional cultural spaces worldwide.

INFLUENCE OF FINES LESS THAN 0.125 MM ON ABRASION RESISTANCE OF CONCRETE

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ABSTRACT

Abrasion resistance is very important in concrete intended for making roads, canals, floors or pavements and it can be defined as the ability of a surface to resist wear due to rubbing. It is tested by grinding the specimen according to the standard procedure and the measurements are done through volumetric loss of the specimen. Abrasion resistance is influenced by many factors such as the type of aggregate, placement, concrete composition, etc. It is desirable that the concrete contains less cement matrix and that this cement matrix achieves as much strength as possible. Cement matrix achieves the highest strength if it consists of a binder without or with small amount of very fine aggregate particles. The purpose of this paper is to examine the influence of these particles on abrasion resistance and compressive strength of concrete. Six concrete mixes were made, which differ in the granulometric composition of the aggregates and the origin of the aggregates. Same type and quantity of the cement and superplasticizer were used in all mixtures with the same water/cement ratio. The workability of the concrete was tested using the slump method. The ultrasound pulse velocity (UPV), density, dynamic modulus of elasticity, compressive strength and abrasion resistance were tested after 28 days of specimens curing. The measured UPVs are within the limits of 3989.36 to 4128.44 m/s, which indicates a good quality of concrete. Compressive strengths ranging from 61.6 to 95.6 MPa were achieved. Abrasion resistance was determined by the loss of volume of the specimen in cm^3 in an area of 50 cm^2, and values from 21.6 to 27.3 $cm^3/50cm^2$ were measured. According to the test results, no harmful effect of very fine aggregate particles on the abrasion resistance of concrete was observed in this investigation. Also, the positive effect of quartz sand on abrasion resistance was confirmed.

Corresponding Author: Sandra Juradin

ENHANCED PEDAGOGICAL METHODOLOGIES FOR FACILITATING THE PROGRESSION OF THE MASTER'S FINAL EXAM BETWEEN THE PROFESSOR AND THE STUDENT, FOCUSING ON THE PROJECT TITLED: VITA NOVA - THE REHABILITATION OF NATURE, ARCHITECTURE, AND THE SPIRIT

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ABSTRACT

An article that unites theory and practice, architecture as a union between a final-year architecture student and a professor or advisor at the Faculty of Architecture of the University of Lisbon, throughout the course and throughout the monitoring of the final master's project. This accompaniment began in the first semester of the fourth year, and since then it has been a construction between teacher and student where a series of pedagogical intentions have been explored, from the deep reading and correlation between architecture and nature through the graphic process recorded daily to the most appropriate rehabilitation methodologies in the explored architecture. This whole system was divided into several phases, all of them divided by the themes and chapters addressed in the project. This work culminated in a deeper understanding of the methods of organization and design of a different work. The uninterrupted monitoring by the teacher towards the student resulted in numerous debates and different conceptions, so that the work in question had the best possible result. This procedure resulted in a continuous search for a clearer understanding through pedagogical incitement, guiding the work so that it took the most appropriate course for the student's project. Nature and rehabilitation were the central themes of all the work, where the aim was to establish qualities across the two areas of knowledge. The main objective has always been the research for architecture and rehabilitation and the deep relationship between the built architecture, the one to be built, and the surrounding nature, through the study for the best possible conclusion of the Master's Final Exam.

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EXPANSION AND BONDED IN (SHALLOW) FASTENERS IN CONCRETE SUBSTRATE REINFORCED WITH STEEL AND POLYPROPYLENE FIBERS

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ABSTRACT

Along with the development of engineering construction techniques, the interest in the issue of fastenings increases. In the construction of new facilities as well as in renovation works, a wide range of fasteners is currently used, enabling quick connections and safe fastening of various types of structural and installation elements. This progress is particularly visible in fixings made in concrete substrates. During assembly and during operation, the fasteners are subject to the influence of many external factors that may significantly affect their load capacity. Such factors include the type and nature of the load to be transferred, the strength and condition of the substrate, the temperature at which the fasteners will be installed and used. The technical parameters of fasteners determined by means of theoretical calculations still do not provide adequate accuracy, so that this method can be used to determine their impact on the behaviour of fasteners during their long-term operation. Therefore, their experimental verification is still required. In the countries of the European Union, the development of the rules for the use and assessment of expansion and bonded fasteners has been entrusted to the European Organization for Technical Assessment - EOTA. This organization groups bodies authorized by EU Member States to provide European technical assessments on the terms set out in Regulation No. 305/2011 (CPR) 2013. The current list of EOTA guidelines for expansion and bonded anchors used in the construction industry, specifying the basis for their use as well as standards for the design of fasteners, is presented. The scope and methods of fastener testing are presented in the EOTA guidelines. The purpose of these tests is to determine whether the behaviour of the fasteners during their use will be safe and effective, taking into account the unfavourable conditions that can be encountered both during its installation and use. The publication will present the basic structural properties of fasteners made in drilled holes in concrete substrates reinforced with steel and polypropylene fibres.

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ARCHITECTURE ON ARCHITECTURE

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ABSTRACT

Rewriting in the plot of the present is an inherent condition in the practice of architecture, especially at a time when the action of the project finds itself acting in a set of parts that make up the space and that have lived lives that have led them towards 'infamous' destinies (CATUCCI, 2018). The practice of architectural composition is, therefore, a political choice understood as an action that takes place in a palimpsest deriving from choices which, sometimes, are the result of social criticalities. The research carried out by the SHArch group – Second Hand architecture for confiscated property falls within one of the cases in which architecture must necessarily deal with the idea of dishonor. The confiscated architectures tell the story of an error, of a virus that has spread throughout a territory and the task of the project is to reactivate that device and return it to the hands of the community. The case study examined is located in Southern Italy, in Campania and precisely in the municipality of Villa Literno, in the province of Caserta. The object to be reactivated is an ex-sugar factory which, together with numerous properties, were confiscated from the family who had made that place into something else for which it was designed. The area had been abandoned for more than ten years and the research, after an analysis of the conditions of the building from a strategic and structural point of view, tried to imagine new functions that could make sure that a place symbol of crime could transform in a community space. The design choices were conveyed by the idea of making the existing architecture the starting point for a second life without demolishing the existing one but enhancing the trace of what previously insisted in the area. «The co-presence of heterogeneous temporalities [...] shows that the experience of time is determined not only by individual inclinations, but even more by cultural variables» (SETTIS, 2023) and in this happy superimposition between past and present are manifested new possibilities of a second life that does not deny what has been but that enhances the intrinsic possibilities of the pre-existence, with an attentive look towards the future.

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INNOVATIVE GROUNDWATER MANAGEMENT IN NITRA INDUSTRIAL PARK: OPTIMIZATION AND MODELLING OF EXTRACTION SYSTEM

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ABSTRACT

The research presented in this paper focuses on the optimization and modelling of an innovative groundwater extraction system and addresses the challenge of managing the increased groundwater level in Nitra Industrial Park, where the Land Rover Jaguar car manufacturer is located. The primary objective of this research was to determine the optimal pumping rate of the system, ensuring the maintenance of the groundwater level at the required elevation without depleting the surrounding water resources. To achieve this goal, a numerical groundwater modelling approach was utilized, employing the TRIWACO simulation package and the Finite Element Method (FEM). The study involved various simulations under steady and unsteady flow conditions, utilizing hydrological, geological, and hydrogeological data, including the results of three proposed pumping tests conducted by the INGEO, Ltd. Company, as well as measured groundwater level data from boreholes monitored by the Slovak Hydrometeorological Institute (SHMI). The implementation of transient groundwater flow simulations considered the impact of a 1000-year flash flood wave (Q_{1000}). This paper presents numerical modelling results, offering insights into maintaining the required groundwater elevation while considering key parameters and uncertainties for design purposes. Additionally, on-site optimization was performed to ensure efficient system operation and minimize associated costs. In conclusion, this research contributes to sustainable groundwater management in Nitra Industrial Park, addressing the challenge of the increased groundwater level and providing valuable findings to optimize the extraction system's performance.

Corresponding Author: Dana Baroková

BENEFITS AND RISKS OF APPLICATION OF NON-METALLIC COMPOSITES AS AN ALTERNATIVE TO STEEL REINFORCEMENT IN CONCRETE ELEMENTS

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ABSTRACT

The paper presents an overview of possible alternative reinforcement solutions to the most popular steel reinforcement currently used for concrete elements. Particular emphasis was placed on the use of composite reinforcement, taking into account the types of components concerned, possible applications and presenting an analysis of the risks and opportunities facing the construction industry related to the use of this type of reinforcement. In addition, an analysis of the material parameters taking into account the division of composite reinforcement due to the different types of fibers used in their production is presented. The paper also presents a comparative analysis of the parameters of steel and composite reinforcement, among others: tensile strength, susceptibility to corrosion, compressive and bending strength, fire resistance. It also analysed the needs of the construction market in the search for alternative concrete reinforcement in reinforced concrete structures, particularly in the context of recent events such as the Covid-19 pandemic and armed conflicts, which disrupt the supply chain and force the search for alternative materials that can replace reinforced steel. The availability of standards and instructions for the design of concrete elements and the related responsibilities of structural designers were analysed, identifying the research directions necessary to popularize and ensure the safety of the design of concrete elements with the use of alternative material solutions – in particular composite reinforcement in concrete slabs.

Corresponding author: Maciej Dutkiewicz

CHURCH IN RADOMIEROWICE AS AN EXAMPLE OF HALF-TIMBERED SACRAL ARCHITECTURE DURING THE PERIOD OF FREDERICIAN COLONIZATION

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ABSTRACT

The article presents an overview of half-timbered construction in Opole Silesia (south Poland). Its unique forms on the example of the church of N.M.P. in Radomierowice. It shows the genesis of the Prussian colonial style (log construction). Influence of colonial settlements and types of wooden folk architecture in Opole Silesia from the 17th century. The article presents an analysis of frame structures on the example of the church of N.M.P. in Radomierowice by architect Christian Isemer. Which were used in religious architecture during the Friderite colonization (the turn of the 18th and 19th centuries). Was presented a result of the analysis, the problem of the disappearance of the historical substance of monuments from the landscape of the Silesian countryside.

Corresponding Author: Agnieszka Grzybowska

LABORATORY TESTS OF THE STABILITY OF DISINFECTANTS FOR DIFFERENT QUALITY WATER

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ABSTRACT

The last water treatment process is disinfection and it has two purposes. The main purpose of disinfection is to kill or inactivate pathogens. A secondary purpose is to provide a residual disinfectant concentration in drinking water and to prevent microbial growth in water distribution systems. Although most pathogens (99 to 99.9%) are removed by coagulation, flocculation, sedimentation, and filtration, disinfection is a critical process for protecting the public from waterborne infections. Common disinfectants include chlorine gas, sodium hypochlorite, chloramines, chlorine dioxide, ozone and ultraviolet radiation. Each disinfection method has its advantages and disadvantages. Among the disadvantages of using sodium hypochlorite, in addition to the formation of disinfection by-products, the stability of the used agent is also important. Laboratory tests of the stability of disinfectants were carried out in drinking water of different quality depending on the pH value, water temperature and total water mineralization at different contact time in water (from 0 to 48 hours). To monitor the stability of disinfectants, chlorine-based disinfectants were selected, namely sodium hypochlorite prepared in the classic way and by electrolysis of brine. The stability of these disinfectants was verified in treated surface water before disinfection from the Turček water treatment plant, groundwater before disinfection from the Sihoť water source and groundwater from the village of Oľdza. In the Turček water treatment plant, low-mineralized surface water from the Turček water reservoir is treated. The Sihoť water source is medium mineralized groundwater that supplies the western part of Bratislava and drinking water from this source is brought to the southern part of Malaciek. The ground water from the village of Oľdza was taken from a private well and belongs to highly mineralized waters. Active chlorine doses in the range of 0.28-0.35 mg/l were used to verify the stability of sodium hypochlorite prepared in the classic way in selected drinking waters. When verifying the stability of sodium hypochlorite prepared by electrolysis of brine, doses of active chlorine in the range of 0.25-0.30 mg/l were applied. When verifying the stability of sodium hypochlorite produced by two different methods (chemical process, brine electrolysis), the dependence of the increasing stability of these disinfectants with a decrease in pH value and water temperature was demonstrated. The dependence of chlorine stability is significantly influenced by the water temperature, less so by the pH value of the water. Reaction kinetics of 0th, 1st, 2nd and 3rd order were studied for better understanding of this process.

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DEVELOPMENT OF NEW Cu COMPOSITE PROCESSED BY PLASTIC DEFORMATION USABLE IN THE CONSTRUCTION INDUSTRY

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ABSTRACT

Copper materials in the form of wires are currently mainly used in the construction industry as electrical energy conductors (e.g. as electrical distribution in buildings). This study deals with the design of a Cu composite strengthened by a dispersion of (fine) La_2O_3 oxides. The mechanically alloyed mixture of Cu powder with La_2O_3 oxide powder was vacuum-sealed into tubular containers, which in the next step were subjected to gradual direct consolidation using rotary swaging technology at elevated temperatures. In order to optimize the final properties of the composite, the final passes were performed both at elevated temperature and at room temperature. The composite conductors were finally swaged to a diameter of 10 mm, with an overall swaging degree of 1.82. These were subsequently subjected to electrical conductivity measurement, mechanical behavior investigation using pressure tests, and microstructure observation. The results showed that the chosen method of preparing the Cu composite is very favorable for improving the mechanical properties of Cu while maintaining its favorable electrical conductivity. The degree of swaging applied was sufficient to fully consolidate the mechanically alloyed powders both at elevated temperatures and at room temperature. The final structures showed fine grains with a relatively homogeneous dispersion of oxides, showing no visible pores. The flow stress curves were characterized by a steady state with increasing strain, regardless of the applied strain rate. The electrical conductivity of the composite compacted at elevated temperatures, characterized by a homogeneous distribution of reinforcing oxide particles and an average grain size of 1.8 μm^2, reached 81 % of IACS (International Annealed Copper Standard).

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