FACULTY OF CIVIL ENGINEERING & TECHNOLOGY FKTA
Universiti Malaysia Perlis (UniMAP)

UNIVERSITI MALAYSIA PERLIS
UniMAP

CIVENTECH

International Conference On Civil Engineering & Technology 2024

"Breakthrough Innovations and Technologies in Civil Engineering"

Conference Programme & Abstract Book

25 - 26 November 2024
Grand Alora Hotel, Alor Setar, Kedah

Content

Message from the Deputy Vice Chancellor (Research & Innovation) UNIMAP

Prof. Ir. Dr. Rizalafande Che Ismail

Assalamualaikum warahmatullahi wabarakatuh,

Distinguished Guests, Esteemed Speakers, Respected Delegates, and Dear Participants,

It is a great honor and privilege to be here today, as we gather for the second edition of the International Conference on Civil Engineering & Technology, better known as CIVENTECH. Organized by the Faculty of Civil Engineering & Technology, Universiti Malaysia Perlis (UniMAP), this conference, held from the 25th to the 26th of November 2024, serves as a beacon of innovation and excellence in the field of civil engineering.

The theme for this year's conference, "Breakthrough Innovations and Technologies in Civil Engineering", is not just a title; it is a call to action. It challenges us to explore new horizons, push boundaries, and drive change within our industry. As civil engineers, we are the architects of progress, and it is through our work that societies thrive and sustainable futures are built.

I am proud to note that this is the second time CIVENTECH is being organized, with the first edition taking place in 2023 at the UniMAP library. The success of the inaugural conference was a testament to the dedication, passion, and collaborative spirit of our academic and professional communities. This year, we aim to build on that success, bringing together an even larger and more diverse group of experts, researchers, and professionals from around the globe.

CIVENTECH provides an invaluable platform for the exchange of knowledge and ideas, the showcasing of pioneering research, and the forging of new partnerships. It is through such platforms that we can collectively address the challenges of our time, from sustainable construction and advanced materials to water management solutions and smart infrastructure technologies.

I would like to extend my sincere appreciation to the organizing committee of the Faculty of Civil Engineering & Technology, UniMAP for their tireless efforts in bringing this conference to life. Your hard work has created an opportunity for us to come together and make meaningful contributions to the field of civil engineering.

I also wish to thank our esteemed speakers, panelists, and all participants for joining us. Your presence and contributions are the driving forces behind the success of this conference, and we are grateful for the insights and expertise you bring.

As we embark on this two-day journey of discovery, learning, and collaboration, I encourage everyone to engage actively, share your thoughts, and explore new avenues for innovation. Together, let us harness the potential of civil engineering technologies to create a better, more sustainable future for all.

With that, it is my great pleasure to officially declare the International Conference on Civil Engineering & Technology (CIVENTECH) open. May this conference inspire new breakthroughs and foster impactful collaborations.

Thank you, and I wish you all a fruitful and successful conference!

Prof. Ir. Dr. Rizalafande Che Ismail
Deputy Vice Chancellor (Research & Innovation), UniMAP

Message from the Dean
Faculty of Civil Engineering & Technology, UNIMAP

Assalamualaikum warahmatullahi wabarakatuh,

A very good morning, distinguished guests, esteemed speakers, conference participants, colleagues, and friends.

It is my utmost pleasure to welcome all of you to the International Conference of Civil Engineering and Technology 2024, organized by the Faculty of Civil Engineering & Technology, Universiti Malaysia Perlis (UniMAP). Today, we gather under the banner of an exciting and highly relevant theme: “Breakthrough Innovations and Technologies in Civil Engineering.”

First and foremost, allow me to extend my deepest gratitude to our keynote speakers, session chairs, and presenters for their invaluable contributions to this conference. I also wish to thank our organizing committee and partners for their dedication in making this event possible. Your efforts have brought together academics, industry practitioners, and researchers from around the globe to engage in meaningful discourse on the future of civil engineering.

Civil engineering has long been the cornerstone of modern civilization, providing the infrastructure that supports economic growth, societal well-being, and sustainable development. However, in today’s rapidly evolving landscape, traditional methods and practices are no longer sufficient to address the mounting challenges of urbanization, climate change, and resource scarcity. The future demands innovation, adaptability, and interdisciplinary collaboration.

Associate Prof. Ts. Dr. Zulzikrami Azner Abidin

The theme of this conference–"Breakthrough Innovations and Technologies in Civil Engineering"–encapsulates our collective commitment to redefining the boundaries of possibility. It challenges us to think beyond conventional paradigms, embrace emerging technologies, and pioneer solutions that can shape a better tomorrow.

Today, we witness unprecedented advancements in areas such as artificial intelligence, green construction, smart materials, and digital twin technologies. These breakthroughs promise to revolutionize how we design, build, and maintain the critical infrastructure that connects us all. However, innovation is not without its challenges. The integration of these technologies into mainstream practice requires careful consideration of economic feasibility, sustainability, and societal impact.

At UniMAP, we are proud to contribute to this transformative journey through research, collaboration, and capacity building. Our faculty is actively involved in exploring cutting-edge solutions that align with the global push for sustainable development. I am confident that this conference will serve as a platform to amplify such efforts and catalyze new partnerships.

As we embark on this two-day intellectual journey, I urge all participants to make the most of this opportunity. Let us engage in thoughtful dialogue, exchange ideas, and explore collaborations that can propel civil engineering into the future. Together, we can translate academic discoveries into practical applications and bridge the gap between research and real-world impact.

n conclusion, let me express my sincere appreciation once again to all those who have contributed to the success of this conference. I hope the discussions and insights gained here will inspire us to rise above challenges and drive meaningful change in our field.

May this conference mark the beginning of many groundbreaking initiatives, and may it foster a community of innovators who are dedicated to advancing civil engineering for the betterment of society.

Thank you, and I wish you all a fruitful and enriching experience at the International Conference of Civil Engineering and Technology 2024.

Associate Prof. Ts. Dr. Zulzikrami Azner Abidin
Dean, Faculty of Civil Engineering & Technology, UniMAP

Message from the Conference Chairman CIVENTECH 2024

Assalamualaikum Warahmatullahi Wabarakatuh and a very Good Day,

Ladies and Gentlemen, Distinguished Guests, Esteemed Speakers, and Participants,

It gives me great pleasure to welcome each and every one of you to the International Conference on Civil Engineering & Technology (CIVENTECH), proudly organized by the Faculty of Civil Engineering & Technology, Universiti Malaysia Perlis (UniMAP). On behalf of the organizing committee, I extend my heartfelt gratitude for your presence here today as we convene on the 25th and 26th of November 2024 under the inspiring theme, Breakthrough Innovations and Technologies in Civil Engineering.

This conference marks a momentous occasion where we celebrate innovation, collaboration, and the shared vision of transforming civil engineering to meet the challenges of our time. It is through gatherings like CIVENTECH that we bridge the gap between academia and industry, foster meaningful dialogue, and create opportunities for knowledge exchange that propel our field forward.

The theme of this year's conference, Breakthrough Innovations and Technologies in Civil Engineering, speaks directly to the dynamic evolution of our profession. We are witnessing remarkable advancements in sustainable construction, smart infrastructure, advanced materials, and water resource management solutions. These innovations are not only redefining the scope of civil engineering but also addressing critical global challenges, including climate change, urbanization, and resource efficiency.

Dr. Roshazita Che Amat

CIVENTECH 2024 aspires to serve as a catalyst for transformative ideas by bringing together a diverse and distinguished group of researchers, academics, industry practitioners, and students from across the globe. Together, we aim to explore cutting-edge technologies and breakthrough concepts that will reshape the built environment and improve the quality of life for future generations.

At this juncture, I must take a moment to acknowledge and appreciate the tireless efforts of the Faculty of Civil Engineering & Technology, UniMAP. Your dedication and meticulous planning have made this event possible and ensured that every aspect of the conference meets the highest standards.

Additionally, I would like to extend my deepest appreciation to our esteemed speakers, panelists, and session chairs,whose wealth of knowledge and expertise will undoubtedly enrich our discussions. A special thank you also goes to our participants, who have traveled from near and far to contribute their ideas, insights, and research. Your commitment to advancing the field of civil engineering is truly inspiring, and your presence here today makes this conference all the more meaningful.

Over the next two days, we have an exciting agenda that includes keynote addresses by eminent experts, technical sessions, workshops, and networking opportunities. These sessions are designed not just to inform but also to inspire–to challenge conventional thinking and foster innovative approaches. I encourage all participants to engage actively, ask questions, share your perspectives, and forge connections that will last long after this conference concludes.

In closing, let us remember that the work we do today has far-reaching implications for tomorrow. As we delve into the topics of this conference, let us keep in mind our shared responsibility to build a sustainable, resilient, and inclusive world for future generations.

Once again, thank you for joining us at CIVENTECH 2024. I wish you a successful, inspiring, and productive conference.

Thank you.

Dr. Roshazita Che Amat
Conference Chairman of CIVENTECH 2024

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Programme Overview

Date: 25th November 2024
Venue: Grand Alora Hotel, Alor Setar, Kedah

DAY 1

TIME	PROGRAMME
8.00 – 8.30 am	Registration
8.45 am	Arrival of Guests
9.00 am	Welcoming address by Conference Chair
9.05 – 9.50 am	Speech by Keynote 1 – Dato'. Sr. Mohd Zaid Zakaria, Chief Executive Officer (CEO), CIDB Malaysia
9.50 – 10.35 am	Speech by Keynote 2 – Mr. Zaki Abdul Aziz M.H.Daud, Chief Executive Officer (CEO), E-Idaman Sdn. Bhd.
10.35 – 11.00 am	Coffee break
11.00 am – 12.30 pm	**Opening ceremony**
1.00 – 2.30 pm	Lunch break
2.30 – 4.30 pm	Parallel Sessions
4.30 – 5.00 pm	Tea

Date: 25th November 2024
Venue: Grand Alora Hotel, Alor Setar, Kedah

Programme Overview

DAY 1

Opening ceremony	
10.40 am	Arrival of Guests
10.45 am	Arrival of VIPs and senior officers of the University
11.00 am	Arrival of UniMAP's Deputy Vice Chancellor (Research & Innovation), Yang Berbahagia Prof. Ir. Dr. Rizalafande Che Ismail
	Singing of National Anthem & Wawasanku
	Prayer recitation
11.20 am	Officiating by UniMAP's Deputy Vice Chancellor (Research & Innovation), Yang Berbahagia Prof. Ir. Dr. Rizalafande Che Ismail
11.30 am	Opening ceremony and gimmick
11.40 am	Presentation of token of appreciation to Keynote Speakers & Sponsors Presentation of token of appreciation to Deputy Vice Chancellor (Research & Innovation) Photo session
12.30 pm	End of the Closing ceremony
2.30 – 4.30pm	Parallel Sessions

Programme Overview

DAY 2

TIME	PROGRAMME				
9.00 – 11.00 am	Online Parallel Session				
	THEME: BUILT ENVIRONMENT	THEME: CONSTRUCTION SAFETY CONSTRUCTION TECHNOLOGY & MANAGEMENT	THEME: GEOTECHNICAL ENGINEERING DISASTER MANAGEMENT EARTHQUAKE ENGINEERING	THEME: ENVIRONMENTAL ENGINEERING & TECHNOLOGY	THEME: STRUCTURAL ENGINEERING & TECHNOLOGY SUSTAINABLE INFRASTRUCTURE TRANSPORTATION & TRAFFIC ENGINEERING

Keynote Speaker 1

Dato' Sr Mohd Zaid Zakaria D.P.S.K
Chief Executive
CIDB Malaysia

Dato' Sr Mohd Zaid Zakaria holds a Master of Science in Civil Engineering majoring in Construction Engineering and Project Management from the Oklahoma State University, United States of America (1999) and the first degree in Quantity Surveying from Liverpool (1986), United Kingdom. He is currently the Chief Executive of Construction Industry Development Board Malaysia (CIDB), a government agency under the Ministry of Works, Malaysia. He has many years of experience in construction industry and now being responsible in developing and promoting program and tools to improve the quality, safety and professionalism across the construction industry other than ensuring the registered contractors are accredited according to the need of the national interest.

Keynote 1 Summary

Building Resilient Futures: Smart and Sustainable Construction Innovations

Dato' Sr Mohd Zaid Zakaria, Chief Executive CIDB

The construction industry is a major contributor to global CO2 emissions, responsible for nearly 40% of energy-related emissions and consuming about 50% of the world's resources annually, according to the UNEP. In Malaysia, the construction sector significantly impacts the economy, contributing to GDP and employment, but also poses environmental challenges as a major source of carbon emissions. Therefore, adopting sustainable construction practices is essential to reduce the ecological footprint while promoting economic growth and social well-being.

Sustainable construction, once a niche concept, has become a fundamental pillar in the industry. It involves building in ways that minimize environmental harm and maximize societal and economic benefits. As urbanization intensifies and the global population grows, the need for sustainable practices in construction becomes increasingly critical. The industry stands at a crucial juncture, with significant advancements and opportunities on the horizon.

Keynote 1 Summary

Key milestones in sustainable construction include the integration of renewable energy sources, the adoption of IoT and AI-driven building management systems, and the use of sustainable materials and practices. These innovations have set new standards and significantly reduced environmental impacts. The Fourth Industrial Revolution (4IR) is transforming the construction industry by merging digital, physical, and biological technologies, enabling more effective responses to sustainability challenges.

Embracing digital technologies and innovative practices can significantly reduce the sector's environmental impact and contribute to global sustainability goals. As the industry evolves, collaboration among stakeholders; governments, industry, and academia, will be crucial to overcoming challenges and maximizing the benefits of technological advancements. To achieve these goals, all construction players must unite in adopting sustainable practices, ensuring a resilient and sustainable future for generations to come.

Keynote Speaker 2

Mr. Zaki Abdul Aziz Daud
Chief Executive Officer (CEO), E-Idaman Sdn. Bhd.

Mr. Zaki Abdul Aziz M.H. Daud, born in Kedah on January 16, 1968, is a distinguished leader with vast experience in accounting, management, and environmental sustainability. After completing his SPM at MRSM Seremban in 1985, he pursued his Bachelor's and Master's degrees in Accounting at Case Western Reserve University, Ohio, USA. Upon returning to Malaysia, he worked with Sarawak Shell Berhad as an accountant before joining Renong/UEM Group in 1995, where he undertook assignments across industries, including property development, energy, telecommunications, and environmental management, working in South Africa and Indonesia. Currently focused on sustainability in Kedah and Perlis, Mr. Zaki transformed a solid waste management company into a resource management entity, introducing initiatives like Drive-Thru Recycling Centers and the idamanXchange app. His leadership emphasizes innovation, collaboration, and environmental stewardship, contributing to reduced greenhouse gases and increased recycling. Mr. Zaki's dedication inspires communities and promotes sustainable development.

Keynote 1 Summary

Roles of Engineers in Integrated Waste Management (IWM)

Mr. Zaki Abdul Aziz Daud, Chief Executive Officer (CEO), E-Idaman Sdn. Bhd.

The Government recently launched the Circular Economy Blueprint for Solid Waste in Malaysia 2025-2035. This Blueprint emphasizes the need for integrated waste management (IWM) in moving towards sustainable resources management. There is a very urgent need for the involvement of engineers in delivering IWM in Malaysia.

When we look at an IWM, obviously we will look into the collection, logistics, segregation and final treatment. A lot of solutions are being offered by many from international as well as local players. The challenge will be which ones will deliver the most desirable outcomes. To do this, Engineers will be the main players who will need to design segregation plant that can optimise the outputs of segregated materials that can in turn be used for the next treatment processes using the Engineering, Procurement, Construction and Commissioning (EPCC) approach. There is a need to integrate the system in the entire waste management ecosystem including the data collection for waste collection, separation, treatment and disposal. The data collected can be used for any planning in order to improve the waste management system and other projects.

Engineers must not be allowed to work in isolation. Engineers must be given the overall understanding of the objective of the integrated facility. Engineers need to understand the complexity of the integrated system and the even more challenging aspect of the commercial viability of the integrated plant.

Oral Presentation

DAY 1: 25th November 2024
Grand Alora Hotel, Alor Setar, Kedah
SESSION CHAIRPERSON: IR. DR. NUR ANIRA ASYIKIN HASHIM

PAPER ID	TITLE	TIME
CIVENTECH – 2	Enhancing Safety Management Practice In Railway Towards Sustainable Construction Projects Presenter : Yugeswaran A/L Chinniah	2.30 – 2.50 pm
CIVENTECH - 31	Green Roofs to the Rescue: Tackling Severe-Intensity Rainfall in Tropical Climate Presenter : Khairul Rahmah Ayub	2.50 – 3.10 pm
CIVENTECH - 32	Atmospheric Microplastic As An Emerging Pollutant: A Bibliometric Analysis Presenter : Mohd Rosiskada Mohamed	3.10 – 3.30 pm
CIVENTECH - 35	Assessing the Effect of Backflow on Flow Properties in Perforated Subsurface Drain Systems for Stormwater Drainage Applications Presenter : Junaidah Binti Abdullah	3.30 – 3.50 pm
CIVENTECH - 38	Evaluating the Impact of Stormwater Constructed Wetland Design on Phytoplankton Community Structure Presenter : Syafiq Shaharuddin	3.50 – 4.10 pm

Online Oral Presentation

PARALLEL SESSION 1
THEME: BUILT ENVIRONMENT
SESSION CHAIRPERSON: DR. HAZIRAH PENGIRAN

PAPER ID	TITLE	TIME
CIVENTECH – 4	IoT-based Rainwater Harvesting and Artificial Roof Misting System for Efficient Roof Cooling Presenter : Mawaddah Hasnan	0900 – 0920
CIVENTECH - 36	Digital Documentation of Cultural Heritage Buildings as a Strategy for Sustainable Preservation A Case Study of the Nyah Lasem Museum Presenter : Friska Amalia	0920 – 0940
CIVENTECH - 37	Built Environmental Design Implementation in Office Interior of High Rise Commercial Building Presenter : Christina Lim	0940 – 1000
CIVENTECH - 22	Evaluation of The Causes of Traffic Delay Based on The Road User Perspective by Using Statistical Analysis Presenter : Nur Farahida Ruslan	1000 – 1020

Online Oral Presentation

PARALLEL SESSION 2
THEME: CONSTRUCTION SAFETY, CONSTRUCTION TECHNOLOGY & MANAGEMENT
SESSION CHAIRPERSON: TS. DR. NURFADZILLAH ISHAK

PAPER ID	TITLE	TIME
CIVENTECH – 6	Perception of the factors affecting Building Information Modelling (BIM) adoption in Penang's construction industry Presenter : Nor Janna Tammy	0900 – 0920
CIVENTECH - 12	Identifying Passive Lighting Features for Buildings Presenter : Md Motiar Rahman	0920 – 0940
CIVENTECH - 21	Risk Assessment Analysis of Construction Project Based on Dynamic Bayesian Networks Presenter : Ragil Purnamasari	0940 – 1000
CIVENTECH - 23	Stressors, Stress, & Contractor Performance: An Infrastructure Project Perspective Presenter : Muhammad Afiq Fikri Bin Ahmad	1000 – 1020
CIVENTECH - 3	The Importance of Innovation Management System for Sustainable Residential Construction Companies in Malaysia Presenter : Mohd Zakwan Ramli	1020 - 1040

Online Oral Presentation

PARALLEL SESSION 3
THEME: GEOTECHNICAL ENGINEERING, DISASTER MANAGEMENT, EARTHQUAKE ENGINEERING
SESSION CHAIRPERSON: IR. DR. MOHD ZULHAM AFFANDI MOHD ZAHID

PAPER ID	TITLE	TIME
CIVENTECH - 8	Optimum Moisture Content and Unconfined Compressive Strength of Stabilized Peat Soil at Different Percentages of Admixtures Presenter : Nurhuda	0930 – 0950
CIVENTECH - 14	Natural Disaster Mitigation Education Learning Design in Bandung with Interactive Simulation Design Application Presenter : Laura Valencia Kamara	0950 – 1010
CIVENTECH - 20	Soil Classification in the Surabaya Area Using a Deep Learning Approach Based on Cone Penetration Test Data Presenter : Fitria Wahyuni	1010 – 1030
CIVENTECH - 25	The effect of earthquake direction under single and repeated earthquakes on multi-storey building Presenter : Ahmed Eshteewi Miftah Alriaaid	1030 – 1050
CIVENTECH - 26	A Study of Various Constitutive Soil Models Using FEM For Twin Tunnel in Kuala Lumpur, Malaysia. Presenter : Mohd Faiz Mohammad Zaki	1050 – 1110

Online Oral Presentation

PARALLEL SESSION 4
THEME: ENVIRONMENTAL ENGINEERING & TECHNOLOGY
SESSION CHAIRPERSON: ASSOC. PROF. TS. DR. ZULKARNAIN HASSAN

PAPER ID	TITLE	TIME
CIVENTECH - 9	Treatment of ammoniacal nitrogen in arowana aquaculture wastewater using sand, activated carbon and zeolite in a horizontal prototype model Presenter : Nur Aziemah Abd Rashid	0900 – 0920
CIVENTECH - 13	Quantitative Survey on Feasibility Study for Developing Integrated Small Hydropower Schemes in Pahang Barat Presenter : Sharifah Abdullah	0920 – 0940
CIVENTECH - 24	Investigating the Potential of Modified Sugarcane Bagasse and Coconut Husk for Dye Removal from Wastewater Presenter : Wan Nafisah Wan Mohd Sukri	0940 – 1000
CIVENTECH - 27	Applicability analysis of reclaimed water heat energy in urban heating and cooling in Beijing Presenter : Yu Yuan	1000 – 1020

Online Oral Presentation

PARALLEL SESSION 5
THEME: STRUCTURAL ENGINEERING & TECHNOLOGY, SUSTAINABLE INFRASTRUCTURE, TRANSPORTATION & TRAFFIC ENGINEERING
SESSION CHAIRPERSON: IR. DR. MUSTAQQIM ABDUL RAHIM

PAPER ID	TITLE	TIME
CIVENTECH - 7	The Effect of Fiber and Waste Paper As Additive for Lightweight Concrete Presenter : Mudiono Kasmuri	0900 – 0920
CIVENTECH - 19	Reliability of Non-Destructive Methods for Reinforced Concrete Water Tank Assessment Presenter : Syaufikhelmi yusoff	0920 – 0940
CIVENTECH - 33	Recycling Plastic and Incineration Ash for Construction: A Sustainable Solution for Rural Area Presenter : Seruni Kusumawardhani	0940 – 1000
CIVENTECH - 10	Temperature Optimization for Enhanced CO_2 Mineralization in Electric Arc Furnace (EAF) slag Presenter : Jing Cheng Ting	1000 – 1020
CIVENTECH - 18	Strength Characteristics of Concrete Blended with Cow-Bone Ash (CBA) in Sulphate Environments. Presenter : Taiwo Esan	1020 – 1040
CIVENTECH - XX	Properties of Different Type of Geopolymer Mortar at Early Stage Presenter : Dickson Ling Chuan Hao	1040 – 1100

List of Abstracts

ID 2

Enhancing Safety Management Practice In Railway Towards Sustainable Construction Projects

Yugeswaran Chinniah[1], Romeli Norsyakilah[2]

[1]Student, Department of Civil Engineering technology, Faculty of Civil Engineering Technology, UniMAP, Malaysia
[2]Lecturer, Technology in Building Construction, Faculty of Civil Engineering Technology, UniMAP, Malaysia

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Malaysia is one of the countries that have been influenced by the growth of the global railway network as a vital tactic for building sustainable infrastructure by enhancing the country's internal transportation system and increasing economic competitiveness. It is important to consider an organization's sustainable development plan with other aspects like workplace health and safety. Therefore, it is essential to implement safety management practices in railroads for sustainable building projects. This study was conducted in the objectives of (i) to investigate safety practice for improvement strategy in railway industrial engineering, (ii) to establish safety practice in railway engineering industry, and (iii) to implement safety practice elements in railway engineering industrial. The next step was to identify the challenges to improving safety practices from a total of 100 publications published in 20 prestigious journals. A plan for enhancing safety practices assessment can be established based on the framework's conclusions, which will help future railway engineering and construction. So, the research will help them better understand the processes and support SDG Goal 8: foster sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for everyone. This will help Malaysian construction be more sustainable. This study will supplement the current study by providing information that is missing about safety management procedures in railway project sites.

ID 3

The Importance of Innovation Management System for Sustainable Residential Construction Companies in Malaysia

Mohd Zakwan Ramli[1]*, Hassan Mohamed[2], Daud Mohamad[1], Ayu Nur Atika Mohamad Nasir[1], Ranti Hidayawanti[3], Iriansyah Sangadji[4] and Nursyadzatul Tasnim Roslin[1]

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International standards, including ISO 56002:2019, aimed at improving operational and managerial practices, have experienced slow adoption despite the widely recognized benefits. Therefore, the objective of this study is to determine important factors of Innovation Management Systems (IMS) and ISO 56002:2019 certification in Malaysian residential construction. A questionnaire survey was distributed to experts, yielding 21 responses. The Relative Importance Index (RII) method was used to rank important IMS factors. The evaluation revealed that Continuous Improvement (RII: 0.829), Innovation Goals and Roadmaps (RII: 0.819), Top Management Commitment and Organization Roles and Responsibilities (RII: 0.810), Internal Audits (RII: 0.810), Resource Allocation (RII: 0.800), Organisation Planning and Control (RII: 0.800), and Culture That Fosters Innovation and Implementation (RII: 0.781) are top IMS parameters. These findings also provide benchmarks for organizations to enhance innovation management and advise policymakers on how to promote sustainable innovation in the construction industry.

ID 4

IoT-based Rainwater Harvesting and Artificial Roof Misting System for Efficient Roof Cooling

Nur Mawaddah Syairah binti Haji Hasnan[1], Shahriar Shams[2], S.H. Shah Newaz[1], Sheik Mohammed Sulthan[3], Arif Bramantoro[1], Hj Ismawi Hj Md Yusuf[2] and Asmaal Muizz Sallehhin Hj Mohammad Sultan[2]

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Enhancing the implementation of green roofs is a key approach to fostering more sustainable urban development. Due to global warming, there is a projected increase in the frequency and intensity of extreme climate events in the future. To mitigate global warming and reduce its consequences, it is imperative to create a scalable and low-emission energy solution. A cool roof refers to a roofing system designed to lower surface temperatures, reducing heat absorption, and minimizing the transfer of heat into buildings that aims to decrease the need for energy consumption to cool down buildings. This study incorporates rainwater harvesting for artificial roof misting aided by Internet of Things (IoT) as a way forward to managing water and reduce energy-intensive cooling methods. The emphasis is on addressing challenges in tropical climates, such as Brunei Darussalam, where conventional cooling strains energy resources and environmental goals. An experimental study was conducted to make a comparison among standing fan, air conditioner (1hp), and IoT-based rainwater harvesting system with an artificial roof misting system. The result from the cost analysis is encouraging as the 15-year energy cost for the IoT-based roof misting system is free. The IoT-based roof system tackles issues like water wastage, overheating, and cooling by collecting rainwater for an artificial roof misting system. The IoT infrastructure, equipped with sensors and controllers, enables real-time data collection and remote control. This multifaceted approach aligns with the overarching goal of promoting sustainable practices in the context of water and energy usage.

ID 5

Landslide Susceptibility Mapping and Assessment: A Review

Sajid Siladjan[1]*, Nazaruddin Abdul Taha[2]

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Nowadays, the challenges in civil engineering, other than technology, construction, and building materials, include landslides, which significantly increase costs for constructing substructures such as foundations and piling. This is primarily due to a lack of information on unsuitable soil conditions and low bearing capacity, which cannot support the maximum load of proposed designs. Therefore, this review paper provides an overview of the importance of landslide susceptibility mapping and the need for effective methods to assess and predict landslide-prone areas. A multidisciplinary approach in previous research demonstrates the use of appropriate research methodologies, integration of diverse data sources through GIS applications, and validation of results using assessment modeling techniques to refine and improve the accuracy and reliability of landslide susceptibility assessments. Previous research also highlights a comparative analysis of different modeling techniques and their application in various regional areas, offering valuable insights for researchers and practitioners working in landslide risk management, planning future developments, and implementing mitigation strategies.

ID 6

Perception of the factors affecting Building Information Modeling (BIM) adoption in Penang's construction industry

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Collaboration and outcomes in the construction industry can be significantly enhanced by adopting Building Information Modeling (BIM). However, its adoption in Penang, Malaysia, faces various challenges. This study investigated stakeholders' perceptions and the factors influencing BIM adoption through a quantitative survey of 107 construction professionals. Data analysis using SPSS and ranking via the Relative Importance Index (RII) revealed a proactive integration of BIM into design processes. However, gaps in BIM education and technological infrastructure, coupled with resistance to change, high initial costs, and data security concerns, currently hinder broader implementation. Client demand emerged as a key driver for BIM adoption. To overcome these barriers, this study recommends prioritizing investments in BIM-related education, upgrading technological infrastructure, and fostering stronger client-driven initiatives. By addressing these challenges, Penang's construction sector can unlock BIM's potential to deliver more efficient and successful projects.

ID 7

The Effect of Fiber and Waste Paper As Additive for Lightweight Concrete

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Lightweight concrete is the latest innovation in the world of modern construction. The use of lightweight concrete as one of the materials for building walls is more efficient and environmentally friendly. However, lightweight concrete has challenges, such as being prone to cracking and brittleness, and its cost is not economical. Therefore, innovation is required to produce lightweight concrete that is strong, economical, and environmentally friendly. The purpose of this study is to develop a mixture incorporating paper waste additives and fibers to manufacture strong, eco-friendly lightweight concrete and to create lightweight brick innovations using these additives. The results showed that in the compressive strength test, the addition of fiber to lightweight concrete led to a reduction in strength, with a 5% fiber content causing a 12% decrease in strength compared to normal concrete. Conversely, the bending strength test demonstrated a 28% increase in bending strength due to the inclusion of fibers in the concrete. These findings highlight the potential for optimizing the balance between compressive and bending strength to improve the performance of lightweight concrete.

ID 8

Optimum Moisture Content and Unconfined Compressive Strength of Stabilized Peat Soil at Different Percentages of Admixtures

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Peat soil, composed of partially decomposed organic matter, has a low pH and high sensitivity. Due to its low bearing capacity, high compressibility, and high water content, rapid infrastructure development on peatlands, such as roads and railways, often results in severe foundation settlement issues. Stabilization techniques, however, can improve these challenging engineering properties. Various methods exist, including physical, mechanical, and biological stabilization, but chemical admixtures are frequently employed for peat soil stabilization. This study examines the effectiveness of different admixture contents and types in enhancing peat soil's optimum moisture content and unconfined compressive strength. A systematic review of 14 selected studies was conducted, and descriptive statistical analyses identified the most recommended chemical admixtures. Data from previous studies on peat stabilization using five admixture types were analyzed, including pond ash alone and combinations of cement with sand, fly ash with lime, fly ash with cement, and cement with fiber. Results indicate that a cement-sand combination offers the most effective stabilization, achieving maximum unconfined compressive strength and optimal moisture content. These findings provide valuable considerations for future construction projects on peatlands, particularly regarding soil stabilization in agricultural areas using chemical methods.

ID 9

Treatment of ammoniacal nitrogen in Arowana aquaculture wastewater using sand, activated carbon and zeolite in a horizontal prototype model

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The Arowana aquaculture industry began flourishing in Malaysia in 2008. The highest quality and most valuable species of Arowana is the Golden Arowana, which has been successfully bred in Bukit Merah due to its favorable inherent characteristics. However, the simultaneous and continuous use of the same water resource from the Bukit Merah reservoir by the Arowana aquaculture industry and the Kerian rice farming sector raises concerns about water scarcity for sustained usage in the future. Water usage from the Bukit Merah reservoir could be reduced if effluent water from Arowana farms is recycled and reused. One critical parameter to control for recycling or reusing the effluent is ammoniacal nitrogen (NH3-N). To address this, a horizontal prototype model comprising sand, activated carbon (AC), and zeolite was developed. To achieve a water quality comparable to the intake source, a target removal rate of 62% for NH3-N was set. The horizontal prototype model's bed depths for sand, AC, and zeolite were 5 cm, 5 cm, and 20 cm, respectively.
An experiment using the horizontal prototype model ran for sixty days (1440 hours), achieving a breakthrough time of 1200 hours. This demonstrated the model's effectiveness and potential application in Arowana farms, reducing reliance on the Bukit Merah reservoir water supply. Addressing critical issues of water management and economic sustainability, these findings contribute to the mitigation of climate change impacts and support the sustainable management of the Bukit Merah reservoir's water resources.

ID 10

Temperature Optimization for Enhanced CO_2 Mineralization in Electric Arc Furnace (EAF) slag

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This study investigates the effect of different temperature parameters on the CO_2 mineralization process of Electric Arc Furnace (EAF) slag, aiming to enhance both conversion efficiency and the stability of formed carbonate minerals. The research focuses on optimizing temperature conditions to maximize CO_2 uptake and improve the quality of mineralized products. Results from Energy-Dispersive X-ray Spectroscopy (EDX) analysis reveal a positive correlation between increasing temperatures and CO_2 conversion efficiency, with higher temperatures promoting enhanced carbonation reactions. These findings suggest that temperature control is a critical factor in optimizing the mineralization process, offering potential improvements in both environmental impact and material performance.

ID 11

Evaluation of PET plastic bottles waste's performance as an evaporation preventer

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The rapid expansion and industrial activities in urban areas have resulted in heightened greenhouse gas emissions, contributing to a rise in surrounding temperatures. These changes have intensified the water cycle, leading to increased evaporation from reservoirs such as lakes and rivers. The primary objective of this study is to assess the efficacy of PET (polyethylene terephthalate) plastic bottle waste in preventing evaporation. Additional goals include identifying the ideal surface area for various PET bottle dimensions and establishing a relationship between the evaporation rate and cover surface area using SPSS software. The study involved three treatments with varying sizes of PET bottle caps. Data collection spanned 60 days, during which the evaporation rate was determined using the Penman Formula Method and experimental data. A comprehensive analysis of water level data across the three treatments was conducted for comparative purposes. The findings indicated that PET bottle covers with 89.57% coverage significantly reduced the evaporation rate compared to the uncovered control. The investigation revealed a clear relationship between evaporation rate and cover surface area, suggesting that PET bottles could serve as a viable solution for reducing water loss from evaporation.

ID 12

Identifying Passive Lighting Features for Buildings

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Buildings in hot-humid and emerging economies pose a significant threat to climate change, as they consume and emit more energy and CO_2 than the global average. Passive design strategies can substantially reduce this impact, but not all passive features are equally suitable for all climate zones or countries. This study identified a set of passive design features, specifically for lighting, that are preferred in hot-humid countries. A questionnaire survey gathered responses from 122 participants in Brunei, revealing that nine out of the 13 features in the survey were suitable for lighting. These features include strategies such as the use of light-colored paints, glass window materials for daylighting, and overhangs or shading devices to reduce heat gain. However, some potentially more sustainable features, like building orientation and the use of natural light, were deemed less important. Conversely, the remaining four features were found to be more applicable in cold-dominated regions. While individual groups in the sample demonstrated agreement on the relative importance of most features, their priorities varied slightly. The findings highlight respondents' awareness of various passive lighting features and their level of implementation in buildings. These insights can inform policymakers in motivating design practitioners to adopt more sustainable and energy-saving features, such as orientation and configuration. The next phase of the study will identify motivators, challenges, and strategies for implementing these features before developing a framework for their broader adoption.

ID 13

Quantitative Survey on Feasibility Study for Developing Integrated Small Hydropower Schemes in Pahang Barat

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Small hydropower presents a promising pathway as part of sustainable energy solutions, especially in regions like Pahang Barat. The energy needs in Pahang Barat have been rising due to the industrial and economic growth in the region. These schemes not only have the potential to provide a sustainable energy source but also to reduce the environmental impacts associated with conventional energy production. This research aims to evaluate the feasibility of implementing integrated small hydropower schemes as a renewable energy source. The study employed a quantitative approach to gain a comprehensive understanding of the potential environmental impacts and mitigation measures of the proposed schemes. Findings indicate that soil erosion and sedimentation, classified as physical risks, emerged as the primary concern, followed by impacts on agricultural land and cultural heritage. Mitigation measures emphasized strategies such as environmental education initiatives, environmental flow management, and community-based conservation programs to address these challenges effectively. In summary, adopting a multidisciplinary approach that incorporates geological, hydrological, and environmental assessments provides valuable insights essential for informed decision-making on small hydropower implementation. By evaluating both technical feasibility and environmental considerations, this study supports the sustainable development of renewable energy resources in the Pahang Barat region, balancing energy demands with environmental conservation.

ID 14

Natural Disaster Mitigation Education Learning Design in Bandung with Interactive Simulation Design Application

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Natural disasters are caused by various factors such as geographical location and human activities. Additionally, climate change and global warming can influence the risk of natural disasters. Bandung is one of the cities that frequently experiences disasters, with impacts ranging from losses across various sectors to damage and even casualties. To minimize disasters and their potential impacts, it is crucial for people to have a good understanding of pre-disaster, during-disaster, and post-disaster situations. The purpose of this design is to create a space dedicated to disaster mitigation, serving as an educational platform to help the public understand how their activities can influence disaster risks, how to respond effectively during disaster situations, and how to reduce potential impacts. Through the application of interactive simulation design, visitors are actively engaged, providing them with a hands-on learning experience that fosters new insights and preparedness. The method used in this study is a mixed-method approach, combining a literature review, interviews with relevant stakeholders, and observations to gather comprehensive data and inform the design process.

ID 15

Identification Of Light Density Microplastic from Rubber Plantation Soil

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Microplastic contamination in agricultural ecosystems presents a growing environmental concern. This study investigated the presence and characteristics of microplastics and other contaminants within the soil matrix of a rubber plantation in Chuping, Perlis, Malaysia. Raman spectroscopy identified microplastics, with ethylene-based plastics–likely originating from agricultural films–dominating the samples. The observed size range of 2-5 mm supported this conclusion. The analysis also detected calcium carbonate (chalk) and Hostasol Green G-K, a dyestuff particle, underscoring the need for complementary techniques to achieve comprehensive microplastic characterization. The findings suggest potential ecological risks from microplastic contamination, including harm to soil biota, disruption of ecosystem processes, and increased exposure to pollutants. Additionally, the presence of the dyestuff highlights the necessity of further investigation into its origin, persistence, and ecological effects.

ID 18

Strength Characteristics of Concrete Blended with Cow-Bone Ash (CBA) in Sulphate Environments

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Concrete is a staple material in construction, valued for its durability and strength. In the quest for more sustainable and high-performing alternatives, this study investigates the potential of cow bone ash (CBA) as a partial replacement for cement in concrete mixes. CBA, derived from waste cow bones, offers an innovative approach to enhancing concrete's environmental and performance attributes. The study explores the impact of CBA on compressive strength, particularly under aggressive environmental conditions. CBA was produced from leftover cow bones, and its physical and chemical characteristics were analyzed. Concrete mixes were prepared with 0%, 5%, and 10% CBA as partial replacements for cement, using mix ratios of 1:2:4 and 1:3:6. These mixes were cured for 7, 14, and 28 days and tested for compressive strength in both aggressive and non-aggressive settings. The oxide composition analysis revealed a high calcium oxide content (68.34% by weight) in CBA, which contributed to improved workability in the concrete blends. At 28 days of water curing, the average compressive strengths were 12.47 N/mm², 26.34 N/mm², and 20.34 N/mm² for 0%, 5%, and 10% CBA content, respectively. While all concrete mixes experienced strength loss under harsh environmental conditions, the 5% CBA blend exhibited the highest resistance to these conditions. This study highlights the potential of 5% CBA as a promising alternative for concrete exposed to aggressive environments, particularly with Na_2SO_4, offering a sustainable and durable option for standard Grade C25 concrete mixtures.

ID 19

Reliability of Non-Destructive Methods for Reinforced Concrete Water Tank Assessment

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Several methodologies have been established to evaluate the behavior of structures under loads over time, ranging from conventional to modern approaches. Non-Destructive Testing (NDT) represents an innovative method for assessing reinforced concrete and steel structures. This paper reviews the reliability of NDT methods specifically for assessing reinforced concrete water tanks. The study focuses on the applicability of various techniques for evaluating the characteristics and condition of reinforced water tanks, considering both the NDT method and the primary causes of degradation. A comprehensive review of NDT methods is essential to improve structural analysis and reduce uncertainty in monitoring processes. The findings indicate that the most effective methods for monitoring reinforced concrete structures include Visual Site Surveys using Unmanned Aerial Vehicles (UAV), Rebound Hammer or Schmidt Hammer (BS 1881: Part 202), Ultrasonic Pulse Velocity (BS 1881: Part 203), and Concrete Cover Surveys (BS 1881: Part 204). Overall, this study advances the use of NDT methods for measuring and monitoring the performance of water tank structures while addressing site safety considerations.

ID 20

Soil Classification in the Surabaya Area Using a Deep Learning Approach Based on Cone Penetration Test Data

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Borehole and cone penetration tests are widely used in geotechnical engineering to determine soil classification. The Cone Penetration Test is an affordable and straightforward soil investigation method that provides parameters related to soil consistency at various depths. As Surabaya experiences significant growth through infrastructure and construction, soil investigation becomes a critical step in preliminary construction to determine soil classifications. This study proposes a soil investigation method leveraging deep learning techniques, utilizing established soil data collected from 2018 to 2023. The integrated prediction model estimates soil classification based on five classification algorithms: Logistic Regression, Decision Tree, KNN, SVM, and Naïve Bayes. The findings indicate that the decision tree algorithm was the most suitable due to its theoretical compatibility with datasets that have limited classification requirements. The decision tree achieved an accuracy training score and F1 score of approximately 99.608%. Given the limited number of data variables and categories, the decision tree algorithm proved to be highly efficient and effective for soil classification in this context. This approach demonstrates the potential for integrating deep learning methods in geotechnical investigations to enhance accuracy and efficiency.

ID 21

Risk Assessment Analysis of Construction Project Based on Dynamic Bayesian Networks

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In the construction industry, risk occurs not only at the company level but also at the project level, with significant impacts on a project's Key Performance Indicators (KPIs). Unmanaged risks can lead to substantial cost increases and schedule delays, especially in large-scale projects. In the risk management process, risk assessment and analysis are critical components. However, the subjectivity involved in determining the severity and likelihood of risks often poses challenges, as it heavily relies on intuition, which can lead to inaccuracies. To mitigate this drawback, risks must be managed systematically throughout every phase of the project. This study collected risk data through a literature review and compared it with case studies from construction projects. By leveraging this approach, the research aids stakeholders in predicting risk values more accurately based on data, reducing subjectivity. Additionally, the study identifies cause-effect relationships among risk factors, offering valuable insights for more effective risk management in construction projects.

ID 22

Evaluation of The Causes of Traffic Delay Based on The Road User Perspective by Using Statistical Analysis

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Traffic delays can be viewed as an outcome of a thriving economy, where the movement of people and goods increases during certain times of the day. However, traffic delays negatively impact the standard of living for road users. This study evaluates traffic delay issues and their causes from the perspective of road users on Hospital Road in Kangar, Perlis, Malaysia. Travel time data were collected using the Moving-Vehicle Technique for both directions of the road. The results showed longer travel times during peak hours, particularly during the evening peak. To understand the causes of delays from the road user perspective, 160 questionnaires were distributed to users of Hospital Road. The collected data were analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM)a SmartPLS software. The analysis identified key factors contributing to traffic delays, including driver behavior, inefficient control devices, road construction and maintenance, road and traffic management, and occasional events. These findings provide insights into addressing traffic delay issues and improving road user experiences.

ID 23

Stressors, Stress, & Contractor Performance: An Infrastructure Project Perspective

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This research investigates the correlation between stressors and work quality among infrastructure project contractors, addressing the construction industry's alarmingly high suicide rates. Utilizing SPSS, the study rigorously analyzed data reliability and explored inter-stressor correlations, employing central tendency analysis to identify key stressors that significantly affect work quality. Cronbach's Alpha validated the questionnaire's reliability, while normality tests and Spearman correlation analysis further supported the findings. The results indicate a substantial relationship between specific stressors—such as financial constraints, project uncertainties, stringent deadlines, and complex interpersonal challenges—and a corresponding decline in work quality. Beyond theoretical insights, the research provides evidence-based recommendations for interventions designed to create a more supportive and less stressful work environment. These interventions aim to promote contractors' mental well-being and address the industry's high suicide rates. By tackling these critical issues, the study seeks to enhance project outcomes and foster improved overall performance within the construction industry.

ID 24

Investigating the Potential of Modified Sugarcane Bagasse and Coconut Husk for Dye Removal from Wastewater

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This research investigates the potential of modified sugarcane bagasse (MSB) and coconut husk (CH) hybrid adsorbents to remove the color of methylene blue (MB) synthetic dye solution through a batch adsorption experiment. The study examines the effects of varied adsorbent dosages and contact times using the MSB and CH hybrid adsorbents. The adsorption process is analyzed using adsorption isotherms based on the Langmuir and Freundlich models. Additionally, adsorption kinetics are evaluated using the Pseudo-first order and Pseudo-second order models. The results indicate that 86% of the dye color was removed at an optimal hybrid dosage of 0.6 g MSB and 0.2 g CH, with an optimum contact time of 25 minutes. Isotherm analysis reveals that the Freundlich isotherm model provides a better fit for MB adsorption onto the MSB-CH hybrid, with a correlation coefficient R^2 of 0.9109. Moreover, adsorption kinetics demonstrate that the Pseudo-second order model is more suitable, with an R^2 value of 0.9921. In conclusion, the hybrid of modified sugarcane bagasse (MSB) and coconut husk (CH) exhibits high potential for removing dyes from industrial wastewater, making it a promising sustainable solution for wastewater treatment.

ID 25

The effect of earthquake direction under single and repeated earthquakes on multi-storey building

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The frequency of earthquakes is a significant concern as it exacerbates the extent of damage and casualties. Therefore, employing technologies that enhance buildings' ability to withstand seismic activity and mitigate the harmful effects of earthquakes–whether isolated incidents or repeated events–is crucial. This study evaluates the performance of a multi-story building subjected to seven different seismic loads. The loads include both single earthquakes and repeated earthquakes occurring in nearby areas. The criteria for earthquake loads were defined as: (1) a distance from the epicenter of less than 20 kilometers, (2) a magnitude equal to or greater than 5.5, and (3) a peak ground acceleration (PGA) equal to or greater than 0.10 g. To assess structural integrity, the study analyzed the building's energy levels and displacements caused by single and repeated earthquake events. The results indicated a displacement of 243.28 mm in the X-axis and Y-axis directions at the Italian Irpinia Storno Station (STN) during a single seismic event. This displacement remained constant during repeated events. However, when considering the Y-axis displacement in the same direction (X and Y), it increased to 262.92 mm, reflecting a rise of approximately 1.08%. These findings emphasize the importance of evaluating and enhancing building performance under varying seismic conditions to ensure resilience and safety in earthquake-prone areas.

ID 26

A Study of Various Constitutive Soil Models Using FEM For Twin Tunnel in Kuala Lumpur, Malaysia

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Tunnel construction in urban areas continues to increase due to limited above-ground space. The primary risk associated with this development is ground surface settlement caused by tunnel excavation, making the prediction of ground settlement a critical concern in tunnel design and construction. This study focuses on the twin tunnels of the Sungai Buloh – Kajang (SBK) KVMRT project, located in the Kenny Hill Formation (KHF) and the contact zone between KHF and KL limestone. This area is characterized by a stiffer soil layer overlying a deeper, softer layer. The study employed the finite element method (FEM) to predict ground settlement induced by tunneling. Three constitutive soil models–Mohr-Coulomb (MC), Hardening Soil (HS), and Hardening Soil-Small Strain (HSS)–were utilized to simulate the ground settlement during twin tunnel construction. Among these models, the HSS model demonstrated the closest agreement with the on-site monitored data, effectively replicating the ground settlement trough observed in the project. These findings highlight the HSS model's reliability for predicting ground settlement, offering valuable insights for optimizing tunneling operations in urban settings and minimizing associated risks.

ID 27

Applicability analysis of reclaimed water heat energy in urban heating and cooling in Beijing

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With the country's emphasis on resources and environmental protection, reclaimed water energy, as a component of shallow geothermal energy, has garnered increasing attention in recent years. Reclaimed water energy represents a new type of renewable and clean energy. Its development and utilization harness the thermal energy in water without consuming water resources or causing pollution. This process is characterized by zero emissions, pollution-free operations, environmental sustainability, high efficiency, and energy savings. Beijing is well-endowed with reclaimed water resources, and its utilization technology for reclaimed water energy is relatively advanced. Promoting the development and use of regenerated water energy can significantly alleviate heating challenges in Beijing and yield considerable social benefits. This energy source plays a pivotal role in enhancing Beijing's energy structure, establishing a high-quality, market-oriented energy system, achieving energy conservation and emission reduction goals, and fostering sustainable social and economic development. This paper explores the current status of reclaimed water energy development and utilization in Beijing, analyzing the resource conditions and the potential for its broader application. As the city continues to develop, the heating area that can be supported by reclaimed water energy will expand substantially, addressing urban heating issues more effectively. Its utilization is integral to improving Beijing's energy infrastructure, promoting energy conservation, reducing emissions, and advancing sustainable development in both social and economic contexts.

ID 28

Traffic Flow Optimization at Roundabout Using Signalized Metering In Kangar, Perlis

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This study explores the optimization of traffic flow at the Tuanku Syed Putra Roundabout in Kangar, Perlis, using signalized metering and the SIDRA INTERSECTION 8.0 software. With the continuous growth of urban traffic, particularly in central business districts, traditional roundabouts often face severe congestion and delays during peak hours. This research aims to mitigate such issues by implementing and optimizing signalized metering, which uses traffic signals to control vehicle entry, create gaps, and reduce bottlenecks. Traffic volume data, collected during peak hours, revealed a total flow of 4,819 PCU/h with significant directional imbalances. Simulations and calibrations demonstrated that the proposed metering roundabout significantly improved key performance metrics. The degree of saturation (DOS) decreased from 1.2 in the existing setup to 0.835 under the optimal metering configuration. Additionally, average vehicle delays were reduced from 35.2 seconds to 17.2 seconds, and queue lengths shortened from 383.4 meters to 148.5 meters. These improvements enhanced the Level of Service (LOS) from E to B. The study concludes that implementing signalized metering at critical urban roundabouts can substantially enhance traffic efficiency, reduce congestion, and provide safer and more sustainable infrastructure in Perlis.

ID 29

Site Management Improvement towards Sustainable Development for the IBS Projects in Perlis

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The Industrialized Building System (IBS) is a construction technique where components are manufactured in a controlled environment, either on-site or off-site. Despite numerous studies highlighting its benefits, the adoption rate of IBS remains relatively low, making further research necessary. This study aims to identify the critical issues in site management, analyze factors for site management improvement, and propose strategies to enhance site management in IBS construction. A set of questionnaires was distributed to targeted respondents, involving ten (10) Grade G7 IBS contractors based in Perlis. The collected data were analyzed to determine the mean value of each element. The findings revealed that management and transportation were the primary issues faced by respondents when handling IBS projects. Most respondents agreed with the elements discussed and emphasized the need for immediate action to address these challenges for future improvements. This study provides valuable insights and serves as a reference for newcomers and existing practitioners in the IBS sector to enhance site management practices in upcoming projects, contributing to the broader adoption and success of IBS construction.

ID 31

Green Roofs to the Rescue: Tackling Severe-Intensity Rainfall in Tropical Climate

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Due to its geographical factors, tropical climate countries like Malaysia receive a high amount of rainfall throughout the year. Many rainfall events are categorized as having high intensity with severe total rainfall depth. Managing rainfall water as a resource requires integration through various Best Management Practices (BMPs). This is crucial due to rapid urban development, which alters land use in developing areas. The transformation of land use from permeable to impermeable surfaces increases surface runoff during high-intensity rainfall. This runoff can lead to flash floods and other issues, particularly in downstream areas. This study examines the significance of green roofs as a BMP to address severe rainfall intensity. An intensive green roof was constructed, incorporating a combination of three vegetation species: Kalanchoe pinnata, Arachis pintoi, and Zoysia matrella. Multiple rainfall simulations were conducted in this study. Based on total rainfall depth, duration, and intensity, the percentage (%) of green roof volume retention was analyzed. The findings indicated that green roofs have the ability to retain rainfall water within a range of 0.21 m^3 to 1.95 m^3. However, no significant correlation was observed between the percentage of volume retention and rainfall depth, duration, or intensity. These results highlight the potential of green roofs for mitigating urban runoff issues, though further research is required to fully understand the factors influencing their performance.

ID 32

Atmospheric Microplastic As An Emerging Pollutant: A Bibliometric Analysis

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Microplastics are tiny plastic particles, ranging in size from 5 mm (0.2 inches) to 1 micron, composed of synthetic organic compounds. While research has documented the prevalence of microplastics in water and sediments in Malaysia, studies on their presence in ambient air remain scarce. Atmospheric microplastics are categorized into two types: primary microplastics, which are manufactured for specific applications such as microbeads, and secondary microplastics, which result from the breakdown and fragmentation of larger plastics, such as textile fibers. Understanding the leading publications, authors, and countries contributing to atmospheric microplastic research is essential for regulatory decisions, establishing standardized research methodologies, and refining definitions. A bibliometric analysis was conducted using Scopus to evaluate publication trends. A total of 685 publications were retrieved and analyzed, with the majority being journal articles. The data revealed a fluctuating but overall increasing trend in publications from 2015 to 2024. China emerged as the leading contributor to atmospheric microplastic research. Other prominent countries in the central cluster include the United Kingdom, United States, Germany, Italy, and Denmark. The publication "Synthetic fibers in atmospheric fallout: A source of microplastics in the environment?" recorded the highest number of citations (1,278), indicating its significance in the field. Key topics and keywords identified through dense clustering include "microplastics," "water pollutant," "atmospheric pollution," "controlled study," and "polymer." This analysis highlights the global research focus on atmospheric microplastics and underscores the need for further studies to inform policies and methodologies for managing microplastic pollution in Malaysia and beyond.

ID 33

Recycling Plastic and Incineration Ash for Construction: A Sustainable Solution for Rural Area

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In Gudang Kahuripan Village, Indonesia, this study investigates the innovative use of incineration ash and household plastic waste as substitute materials for architectural elements. Specifically, the study focuses on transforming these waste materials into pavement stones to mitigate environmental impacts, create high-value products, and promote environmental awareness. Through experimental trials, the study examines the optimal composition ratio of plastic waste to incineration ash for producing durable pavement blocks. Three ratios of plastic waste to ash–1:1, 5:1, and 10:1–were tested. The findings reveal that a higher proportion of plastic waste leads to superior block quality, with the 10:1 ratio yielding the most promising results in terms of density, surface smoothness, and potential structural integrity. This approach aligns with the village's efforts to achieve a zero-waste environment and supports the United Nations Sustainable Development Goal 12 (Responsible Consumption and Production). The results offer creative solutions for household waste management, encourage community participation in environmental preservation, and provide a potential model for sustainable development in rural areas facing similar challenges. Further research is recommended to refine the ideal material ratio, conduct comprehensive laboratory testing, and evaluate the long-term durability and scalability of the paving blocks. These efforts would help ensure the feasibility and broader application of this sustainable innovation.

ID 35

Assessing the Effect of Backflow on Flow Properties in Perforated Subsurface Drain Systems for Stormwater Drainage Applications

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This study examines the hydraulic performance of a perforated subsurface stormwater pipe, tested as a conveyance component in a laboratory flume at the Physical Laboratory of the River Engineering and Urban Drainage Research Centre (REDAC), Universiti Sains Malaysia. Manning's roughness coefficient (nn) was measured at nine points along the pipe to analyze its relationship with flow velocity, depth, and the Froude number under simulated runoff conditions. A specific scenario was investigated, involving a partially open gate, a longitudinal slope of 1:500, and a water depth of 15 cm. The results indicated predominantly turbulent flow within the pipe, with discharge and velocity increasing at the outlets. Manning's nn values ranged from 0.016 to 0.018, revealing an inverse linear relationship with flow velocity. This suggests that higher roughness reduces flow velocity, which can attenuate peak flow and improve stormwater management in urban subsurface drainage systems. These findings emphasize the importance of understanding flow characteristics and behaviors when designing drainage systems, as they can significantly contribute to reducing the risk of flash floods in urban areas.

ID 36

Digital Documentation of Cultural Heritage Buildings as a Strategy for Sustainable Preservation A Case Study of the Nyah Lasem Museum

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This study explores the role of digital documentation in preserving the Nyah Lasem Museum, a significant cultural heritage site in Lasem, Indonesia. By utilizing advanced tools such as 360° cameras, digital twins, and photogrammetry, the research captures both the architectural features and the cultural narratives of the museum. Additionally, augmented and virtual reality technologies are employed to provide visitors with interactive educational and recreational experiences. The findings demonstrate how digital preservation safeguards the museum's physical and cultural value while enhancing public access and fostering community involvement in conservation efforts. This innovative approach aligns with the United Nations' Sustainable Development Goal (SDG) No. 11, which promotes sustainable cities and communities. By leveraging technology, this study provides a model for accessible and sustainable heritage preservation, ensuring the protection of cultural assets for future generations.

ID 37

Built Environmental Design Implementation in Office Interior of High Rise Commercial Building

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The increasing waste and globalization are intensifying challenges in today's world. As societies progress and governments strive to achieve Sustainable Development Goals (SDGs), particularly in building sustainable cities, designers are encouraged to develop eco-friendly facilities that prioritize material selection, environmental impact, and long-term functionality for users. This study examines how sustainable design principles can be integrated into facilities to contribute to fulfilling SDG targets, specifically in the creation of eco-buildings. The study emphasizes material selection and the role of design in promoting sustainable, clean energy solutions and social well-being. The built environment holds significant potential to enhance social, environmental, and economic outcomes by advancing sustainable development through organizational, technical, and training perspectives. The application of biophilic design has demonstrated diverse benefits, including improvements in physical health, mental well-being, and behavioral responses. Using qualitative methods and a design-thinking approach, this study evaluates how responsive, adaptive, and intelligent sustainable designs can effectively contribute to sustainability goals in high-rise commercial buildings. The findings underline the importance of innovative and sustainable design strategies in addressing modern urban challenges and advancing global sustainability objectives.

ID 38

Evaluating the Impact of Stormwater Constructed Wetland Design on Phytoplankton Community Structure

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Constructed wetlands are cost-effective, nature-based solutions for stormwater management, providing benefits such as water quality improvement and biodiversity enhancement. This study investigates the influence of wetland design on water quality and phytoplankton community structure, utilizing the Water Quality Index (WQI) and phytoplankton analysis across three key zones: forebay, macrophyte, and micropool. The macrophyte zone exhibited the highest WQI values (Class II) and the greatest phytoplankton abundance, with Chlorophyta and Bacillariophyta dominating due to favorable nutrient conditions. In contrast, lower WQI values and reduced phytoplankton densities in the forebay and micropool zones indicated areas requiring further optimization. Principal component analysis revealed strong correlations between orthophosphate levels and phytoplankton groups, highlighting the critical role of nutrients in shaping community structures. Additionally, elevated BOD and TSS levels negatively impacted dissolved oxygen, further affecting water quality. These findings underscore the importance of strategic wetland design in fostering diverse phytoplankton communities, improving water quality, and mitigating eutrophication risks. The results provide valuable insights for optimizing constructed wetlands to achieve ecological sustainability and enhance stormwater treatment effectiveness.

ID 39

Evaluation of Coir as A Natural Geotextile for Enhancing the Strength and Stability of Clayey Soils

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Agricultural waste holds great potential for use as natural fibers in geotextiles due to their superior mechanical properties. Examples of potential agricultural wastes that are either in use or have potential for geotextile applications include jute, coir, sisal, kenaf, banana stem, and pineapple. Among these, coir, a natural fiber, possesses inherent properties well-suited to meet geotextile requirements. In clay soils, coir can be incorporated to enhance drainage and improve soil structure. This research aims to evaluate the effectiveness of different layers of coir mat in clayey soil by analyzing the chemical composition of coir fibers, the physical properties of clay soil, and the performance of strength characteristics in treated clay soil. Several laboratory tests were conducted to achieve the research objectives, including chemical, physical, and strength tests such as the specific gravity test, Atterberg limit test, and California Bearing Ratio (CBR) test. Based on the results and the AASHTO classification chart (A-7-5), the soil was identified as organic clayey soil, with a specific gravity value of 2.09 and a plasticity index (PI) of 30. The treated control samples with single- and double-layer coir geotextiles yielded CBR values of 76.28% and 80%, respectively. The use of double-layer coir geotextiles increased the CBR value by 4% compared to the single-layer configuration. This study demonstrates that coir fiber is an effective and sustainable natural geotextile, significantly enhancing the stability and strength characteristics of clay soil.

The Influence of Diverse Substitutions for Fine Aggregation on Concrete Strength in the Reduction of Natural Resources Reliances

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Enhancing concrete strength has become increasingly important in the construction sector. This study aims to evaluate the performance of concrete casting using laterite and coastal sand as individual replacements for traditional aggregates. The adoption of alternative soils in concrete casting is crucial to reducing reliance on river soil, a commonly used resource in the industry. The laterite soil used in this study was sourced from Bukit Chabang, Perlis, while the coastal sand was obtained from Kuala Perlis. The optimal replacement percentages were identified as 15% for laterite soil and 20% for coastal sand. A significant increase in concrete strength—approximately 25%—was achieved with a 20% replacement of coastal sand in concrete casting. Additionally, a water absorption test indicated that concrete cast with coastal sand exhibited the lowest absorption rate compared to control and laterite soil samples. These findings underscore the potential of using alternative soils, such as laterite and coastal sand, to enhance concrete strength and sustainability in construction practices.

Pyrolysis of Spent Coffee Ground: Optimisation of Temperature and Residence Time on The Product Yield

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This study aimed to optimize the pyrolysis process of spent coffee grounds (SCG) using a fixed bed reactor system. Response Surface Methodology (RSM) with Central Composite Design (CCD) was employed to determine the optimal conditions for maximizing the yields of bio-char, bio-oil, and bio-gas. The research investigated the effects of pyrolysis temperature and residence time on the yield of these products. The results identified the optimal pyrolysis temperature and residence time as 545.19 °C and 52.87 minutes, respectively. Under these conditions, the maximum yields of bio-oil, bio-char, and bio-gas were 44.70%, 27.32%, and 27.98%, respectively. All process parameters were statistically significant (pp-value < 0.05), with pyrolysis temperature being the most influential factor, as indicated by the highest F-value. The correlation coefficient (R2R2 < 0.9) demonstrated a strong relationship between the dependent and independent variables. In conclusion, optimizing pyrolysis conditions effectively converts spent coffee grounds into valuable products, including bio-char, bio-oil, and bio-gas, offering a sustainable waste management solution for Malaysia's increasing coffee consumption.

Evaluation of Morphology and Size of Cracks of The Interfacial Transition Zone in Ground Coal Bottom Ash Concrete

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Bottom ash is generated from the bottom of the incinerator of coal-fired furnaces. In this project, coal bottom ash (CBA) was collected from TNB Janamanjung Sdn. Bhd. As a by-product of coal combustion, CBA is typically disposed of in landfills or water retention ponds, which can cause environmental degradation if not managed properly. Utilizing CBA presents an opportunity to mitigate its environmental impact. This study investigated the properties of CBA through various analyses, including X-Ray Fluorescence (XRF), sieve analysis, slump test, water absorption, compressive strength, density testing, and microstructural evaluation. The goal was to compare standard concrete with concrete containing CBA and to assess the morphology and crack size at the Interfacial Transition Zone in ground CBA concrete. CBA was used as an additive in the concrete mixture at percentages of 0%, 10%, 20%, and 30%. The XRF analysis demonstrated that CBA and cement share a similar chemical composition, with silicon dioxide being the predominant component. Water absorption and compressive strength tests indicated that 10% CBA addition was the optimal condition for concrete mixtures, yielding an average water absorption rate of 1.40%. For compressive strength, the optimum values for 7 and 28 days were 23.46 MPa and 30.47 MPa, respectively. However, the density of concrete decreased when the CBA content exceeded 20%. Finally, a linear trendline showed that the average crack size decreased as the percentage of CBA increased, with 30% CBA addition being the most effective in reducing crack size. It is concluded that 10% CBA addition is optimal for water absorption and compressive strength, while 30% CBA is best for minimizing crack size in concrete. This study highlights the potential of CBA as a sustainable additive for improving concrete performance and reducing environmental impact.

Blue Colour Removal Using Commercial Activated Carbon Modified with Oxidizing Agent

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Dye-containing wastewater poses a serious environmental hazard with significant implications for human health. Among various treatment methods, adsorption on activated carbon is widely used due to its high efficiency, ability to separate chemical components, ease of production, and cost-effectiveness. This study investigated the modification of commercial granular activated carbon using NaOH, employing the one-factor-at-a-time (OFAT) method to optimize the process. Adsorption and color unit tests were conducted in a batch study to determine the optimal NaOH molarity, NaOH volume, and temperature for modification. The optimal conditions were found to be a NaOH molarity of 0.75M, a NaOH volume of 200 ml, and a temperature of 100 °C. The adsorption performance of the modified granular activated carbon was then compared with non-modified granular activated carbon and powdered activated carbon. The results demonstrated that the modified granular activated carbon removed methylene blue more effectively than the non-modified granular activated carbon. However, it still did not surpass the performance of powdered activated carbon. These findings indicate that while the adsorption capability of granular activated carbon was successfully enhanced, further research and modifications may be needed to match or exceed the efficiency of powdered activated carbon. This study contributes to the development of more effective and sustainable solutions for treating dye-laden wastewater.

Properties of Different Type of Geopolymer Mortar at Early Stage

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Concrete is one of the most widely used materials in the construction sector. However, concrete and other cement-based materials are often criticized for their contribution to greenhouse gas emissions, prompting the search for more sustainable alternatives. Geopolymer is emerging as a superior building material compared to Portland cement, offering significant environmental benefits. One-part geopolymer, in particular, is an eco-friendly alternative that uses a precursor and a solid activator formulation, requiring only water during manufacturing. This approach enhances consistency by utilizing a pre-mixed binder, making one-part geopolymer more reliable than traditional geopolymer compositions. The high specific gravity of ground granulated blast furnace slag (GGBS) contributes to the increased density of geopolymer mortar. The study revealed that compressive strength decreases when fly ash or kaolin partially replaces GGBS in the geopolymer composition. Additionally, geopolymers containing 50% GGBS and fly ash exhibited greater mass loss. Severe surface cracking was observed in geopolymers containing GGBS alone or with a 50% substitution by kaolin. These findings highlight the potential and limitations of GGBS-based geopolymers and underscore the importance of optimizing material formulations to achieve both structural integrity and environmental sustainability in construction practices.

Investigation on the Effect of Mixed Liquor Suspended Solids (MLSS) on Microbial Growth and Sludge Settleability in Sequencing Batch Reactor (SBR) for Rubber Industrial Wastewater

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The Sequencing Batch Reactor (SBR) utilizes microorganisms to biodegrade pollutants present in wastewater, making it one of the most widely used traditional biological treatment systems and an environmentally friendly technology. However, SBR is typically employed for treating wastewater with low-strength pollutants. This limitation necessitates an investigation into its potential for treating industrial wastewater containing high-strength pollutants. The aim of this study is to quantify microbial growth in SBR and to examine the effect of mixed liquor suspended solids (MLSS) on sludge settleability. The results revealed a significant reduction in sludge volume index (SVI) values, from 2500 mL/g to 1000 mL/g, with MLSS concentrations reaching up to 160,000 mg/L. By the 10th day of investigation, the system exhibited excellent liquid-solid separation. The study also observed a notable increase in microbial growth within the SBR when treating high-strength industrial wastewater. High organic loading was found to enhance microbial growth, leading to the formation of stable flocs in the reactor. These findings demonstrate the potential of SBR for treating industrial wastewater with high-strength pollutants, while maintaining effective sludge settleability and fostering microbial proliferation.

Flow Behavior and Hydraulic Performance of Boundary Shear Stress Distributions in Cross-Section of Drainage Systems with Composite Roughness

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This research investigates the flow behavior and hydraulic performance of drainage systems with composite roughness, focusing on boundary shear stress distributions. Using AutoCAD and Flow 3D software, the study designed and simulated various drainage structures incorporating different aggregate sizes (20 mm and 50 mm) to evaluate their impact on porosity, water infiltration, and hydraulic conductivity. Laboratory tests were conducted to determine material properties, and simulations were performed under varying rainfall intensities (light, moderate, heavy, and very heavy). The results revealed that surface roughness significantly influenced porosity, water infiltration, and hydraulic conductivity. The 20 mm aggregate demonstrated higher effectiveness than the 50 mm aggregate in managing runoff, particularly at a rainfall intensity of 10 mm/h over a period of 10,000 seconds. These findings highlight the importance of optimizing surface roughness in enhancing the performance of drainage systems and mitigating urban flooding risks. The study concludes that designing drainage systems with optimized surface roughness can significantly improve their hydraulic performance and reduce flooding risks in urban areas. Future research should focus on assessing the long-term effectiveness of such systems under diverse climate conditions and exploring their integration with green infrastructure solutions.

Preliminary Study on The Effectiveness of Compatibilizer for Recycled Plastic-Modified Bitumen

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Polymer-modified bitumen (PMB) is widely used in the asphalt pavement construction industry due to its proven effectiveness in enhancing performance and durability. PMB improves the rigidity of asphalt at high temperatures and its flexibility at low to moderate temperatures. With an increasing emphasis on sustainable practices, the focus has shifted toward using recycled polymers as a replacement for virgin materials in PMB production. This study presents preliminary findings on utilizing recycled polyethylene (rPE) as the primary polymer (3% by weight of bitumen) for PMB. Due to the high rigidity of rPE, it is combined with a secondary polymer (1% by weight of bitumen) to enhance elasticity. The secondary polymers studied include styrene-butadiene-styrene (SBS) and ethylene vinyl acetate (EVA). To address potential phase separation during high-temperature storage caused by the high total polymer content (4%), a compatibilizer (0.5% by weight of bitumen) was introduced into the hybrid PMB. Laboratory tests conducted included physical observation, penetration tests, softening point tests, and elastic recovery tests. Physical observations confirmed a homogeneous blend for all samples, evidenced by the smooth texture observed on the surface. The sample containing 4% rPE exhibited superior performance, achieving the highest softening point, the lowest penetration value, and the greatest elastic recovery, indicating its ability to rebound to its original shape after deformation compared to neat bitumen. Additionally, the sample with 1% secondary polymer showed significant improvements in the flexibility and mechanical properties of PMB. However, the addition of the compatibilizer did not produce notable improvements, suggesting that the selected compatibilizer failed to effectively bond the polymers and bitumen. Overall, the findings highlight the potential of using recycled plastics, such as rPE, to enhance pavement quality while addressing environmental concerns, contributing to a more sustainable approach in the construction industry.

Seasonal Trends of Particulate Matter Concentrations at Roadside Monitoring Stations in Rural, Urban and Industrial Areas

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This study investigates the seasonal trends of particulate matter (PM10 and PM2.5) concentrations at roadside monitoring stations in rural, urban, and industrial areas from 2019 to 2022. The primary objectives were to characterize and evaluate the seasonal patterns of PM10 and PM2.5 and to compare the results by mapping and visualizing the data using ArcGIS. Data were collected from multiple monitoring stations and analyzed using SPSS to understand particulate matter behavior. The findings revealed significant seasonal variations influenced by weather conditions, industrial activities, and traffic patterns. In 2019, PM10 and PM2.5 levels were higher across all urban, rural, and industrial areas compared to 2020-2022. In rural areas, particulate matter levels were generally lower, with peaks during dry seasons likely attributed to agricultural activities and biomass burning. Urban areas exhibited elevated concentrations year-round, with higher peaks during colder months, potentially due to increased vehicular emissions and heating activities. Industrial areas consistently recorded the highest particulate matter concentrations, with significant spikes corresponding to industrial operations. ArcGIS mapping highlighted distinct spatial patterns and hotspots of particulate matter pollution, emphasizing the disparities in pollution levels across different environments. This study underscores the importance of continuous monitoring and implementing targeted mitigation strategies to address particulate matter pollution effectively, providing valuable insights for policymakers in managing air quality.

Utilising Spent Molasses Concentrate (SMC) as Bio-Asphalt for Flexible Pavement Applications

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Road infrastructure is essential for economic development and connectivity, emphasizing the need for durable and sustainable materials in construction. This research explores the feasibility of using Spent Molasses Concentration (SMC) as a partial replacement for bitumen in hot mix asphalt. The primary objectives are to evaluate the physical and chemical properties of SMC to determine its suitability as a bitumen substitute and to optimize the mix proportions for hot mix asphalt with SMC, balancing environmental sustainability and performance. Various tests were conducted to assess the performance of SMC-modified asphalt mixtures, including the Softening Point Test (Ring and Ball) and Penetration Index (PI) analysis. The results of the Softening Point Test demonstrated that the modified mixtures complied with the Malaysian JKR standard for grade 60/70 bitumen. PI results confirmed acceptable values, indicating that the modified bitumen retained its consistency and temperature susceptibility within the required range. Overall, the findings indicate that SMC can be effectively utilized as a partial bitumen replacement in hot mix asphalt, meeting the necessary standards for road construction. This promotes a sustainable approach in the industry, contributing to environmental conservation while maintaining performance and durability.

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