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Editorial Article

Green and Resilient: Strategies for Next-Generation Infrastructure

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Summary

We are pleased to announce the second edition of the Disasters in Civil Engineering and Architecture journal. The pursuit of sustainable and resilient infrastructure continues to be a key focus in the fields of civil engineering and architecture. The second volume features recent studies that explore innovative and eco-friendly approaches in pavement and geotechnical engineering, address structural challenges, tsunami disaster and provide insights into seismic analysis.

To begin, let us explore the potential of waste cooking oil (WCO) in enhancing the performance of warm mix asphalt (WMA). Hamzah et al. [1] conducted a study evaluating the impact of chemically treated WCO on the mechanical properties of WMA, particularly focusing on stability, resilient modulus, and dynamic creep performance. The WCO was treated through transesterification and incorporated into 60/70 penetration grade asphalt at varying dosages (0%, 3%, 4%, and 5% by weight of asphalt). The findings revealed that the asphalt modified with 3% WCO exhibited the highest stability and an acceptable resilient modulus, while also maintaining good resistance to rutting. However, increasing the WCO content beyond this level resulted in reduced stiffness and poorer creep performance, likely due to excessive softening of the asphalt binder. The study concludes that when used in optimal amounts, the WCO treated can effectively enhance WMA performance and support more sustainable pavement solutions.

Seismic performance analysis plays a vital role in ensuring the structural safety of buildings, especially in earthquake-prone regions. In this context, Mahi et al. [2] conducted a study assessing the seismic performance of regular and irregular reinforced concrete structures with regular and irregular plan configurations using ETABS v17 and the Equivalent Static Force Procedure (ESFP), in accordance with the Bangladesh National Building Code (BNBC) 2020. Key seismic parameters examined include lateral displacement, story drift, base

shear, torsional irregularity, and overturning moment. The findings reveal that irregular structures experience significantly higher lateral displacement and story drift compared to regular forms—particularly above the seventh story—indicating greater vulnerability to seismic activity. Among the models analyzed, the W-shaped structure exhibited the highest base shear, while T-, U-, and H-shaped configurations showed pronounced torsional irregularities, highlighting their sensitivity to rotational seismic effects. The authors recommend that future research incorporate advanced nonlinear dynamic analysis and explore retrofitting strategies to further enhance the seismic resilience of irregular high-rise buildings.

Addressing tsunami risk requires strong preparedness measures within educational institutions, especially in vulnerable coastal regions. This concept is examined by Rizky et al. [3] in their study titled “Mapping School Community Preparedness for Tsunami Disasters in Coastal Indonesia,” with a particular focus on the Meuraxa and Kuta Raja districts of Banda Aceh. Their methodology involved distributing questionnaires to school administrators, teachers, and students to assess preparedness levels. The results revealed notable disparities across various dimensions of preparedness. Key challenges identified include the lack of standardized disaster management policies and insufficient institutional readiness. By mapping these preparedness levels, the study offers practical insights for policymakers to design targeted interventions and foster long-term disaster resilience. The research highlights the pressing need for integrated disaster education, regular evacuation drills, and well-coordinated emergency response strategies to strengthen the resilience of both schools and the broader community.

Early detection of damage in bridges is critical for ensuring structural safety and is therefore a key concern for bridge managers and policymakers. Traditional visual inspection, which remains the most commonly used method, is often inefficient, time-consuming, costly, and hazardous. It also relies heavily on the subjective judgment of highly qualified inspectors. As a result, the use of unmanned aerial systems (UASs) has attracted growing interest in the field of bridge inspection. In this context, Muhammad et al. [4] conducted a study on the 3D reconstruction of a precast concrete bridge using images captured by a low-cost unmanned aerial vehicle (UAV). Their findings suggest that 3D reconstruction via low-cost UAV technology holds significant promise for efficient and accurate bridge assessment applications.

The final article in this volume highlights an eco-friendly approach to improving peat soil properties. In their study, Sulaiman et al. [5] investigate the potential of xanthan gum, a biodegradable biopolymer, as a sustainable alternative to conventional soil stabilizers. A series of laboratory tests—including Atterberg limits, moisture content analysis, and compaction tests—were conducted to evaluate the effectiveness of xanthan gum at concentrations of 0%, 2%, and 4% by weight. The results demonstrate a substantial reduction in moisture content, from 135.42% in untreated soil to 39.5% with a 4% xanthan gum application. These findings confirm that xanthan gum significantly enhances

peat soil stability, making it a promising and environmentally friendly solution. However, the study also emphasizes the need for further research to assess the long-term durability of xanthan gum under varying environmental conditions, its effectiveness in large-scale field applications, and its potential when combined with hybrid stabilization methods. Addressing these factors could pave the way for its broader adoption in sustainable geotechnical engineering.

In conclusion, this second volume aims to advance the knowledge and engagement of researchers and practitioners by showcasing the latest developments and innovations in disaster-related civil engineering and architecture.

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Author Contributions

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