

EDITORIAL

Highway Design, Urban Landscape and Affordable Housing Policy

Welcome to the Twentieth Volume 2nd Issue of the Africa Habitat Review-Journal of the Faculty of Built Environment and Design. This issue presents critically analysed papers on matters relating to highway design, urban landscape, and affordable housing policy.

The article on *“Historic Urban Landscapes: Discourse since UNESCO’s 2011 Adoption”* seeks to illuminate HUL discourse in terms of scales, typologies, components, importance, emerging areas of concern, challenges in its implementation, public participation aspects, and the need for local laws and policies to protect, conserve, and manage them. It’s based on content analysis using the main term “Historic urban landscape” within open-access platforms, such as Google and Google Scholar. Findings reveal that major components of HULs are natural, built and socio-cultural. HUL scales/typologies include city-level, historic city centres, historic districts, historic ports, historic streetscapes, and historic gardens that extend beyond individual monuments. They are under threat from rapid urbanisation and fast-transforming developments. Historic urban areas exhibit dualism, being both historic and cultural, and are therefore considered cultural landscapes as well. The study concludes that public participation in HUL issues is critical for success, and there is a need for more empirical studies to popularise its adoption in urban heritage planning. Recommendations are for the enactment of laws and policies at various levels of government in different countries to identify, assess, and inventory, with the main aim being conservation from threats. The findings are important for policymakers and heritage professionals in guiding the conservation and management of HULs.

“Performance Comparison of SUPERPAVE and Marshall Asphalt Mix Designs in Relation to Kenya’s Climatic Conditions” is an article on the effectiveness of asphalt mixes designed using the Marshall and Superior Performing Asphalt Pavement (SUPERPAVE) methodologies, assessing their suitability for Kenya’s diverse climatic conditions and traffic demands. A comprehensive characterisation of materials, including asphalt binders and aggregates, was conducted to ensure compliance with design criteria, followed by performance analyses comparing the two mix design approaches. Laboratory evaluations of hot mix asphalt (HMA) samples focused on key mechanical properties, including indirect tensile strength, Marshall stability, rutting resistance, and moisture susceptibility, to determine their viability for Kenyan road infrastructure. The findings indicate that incorporating Styrene-Butadiene-Styrene (SBS) into 60/70 penetration-grade bitumen substantially enhances strength, thermal stability, and structural integrity, making it highly suitable for high-traffic, high-temperature environments. SUPERPAVE-designed mixes outperformed Marshall mixes by optimising binder content, reducing asphalt usage, and significantly improving resistance to moisture damage, rutting, and long-term deterioration. Marshall stability and indirect tensile strength tests indicated higher initial strength values in SUPERPAVE mixes than Marshall mixes, and they were also more durable following moisture conditioning. Additionally, rut depth analysis confirmed that polymer-modified bitumen enhances rut resistance in SUPERPAVE HMA, outperforming neat bitumen. The study verified that the tested aggregates conform to relevant standards, reinforcing their suitability for high-performance asphalt applications. Given these findings, the study strongly advocates adopting SUPERPAVE as Kenya’s climate-responsive, performance-driven pavement design system. It emphasises the need for targeted capacity-building through specialised training programmes, pilot projects with performance monitoring, and economic feasibility assessments integrated with policy advocacy to facilitate its implementation. Furthermore, it calls for developing Kenya-specific binder and aggregate selection standards using the Performance-Graded (PG) system, enforcing stringent quality assurance protocols, and making necessary updates to national road design standards. By prioritising long-term cost efficiency and pavement resilience, the study emphasises the importance of fostering collaboration and knowledge exchange among industry stakeholders, ensuring sustainable advancements in Kenya’s road infrastructure.

The article on “*Characterisation of Vibrations of a Precast Reinforced Concrete Bridge: The Case of Kangundo Road Bridge on Outering Road, Nairobi, Kenya*” assesses bridge vibrations using ADXL355 and MPU9250 accelerometers, collecting acceleration data at five soffit-mounted points. Acceleration, the most perceptible vibration parameter to humans, was analysed and compared to International Standards Organisation (ISO) 2631, Wright & Walker (1972), and American Institute of Steel Construction (AISC) Design Guide 11 comfort limits. T-test results showed that the measured peak accelerations significantly exceeded the ISO and Wright & Walker thresholds by up to 110%. At the same time, the AISC limits were only marginally surpassed. Heavy goods vehicles (HGVs) caused uncomfortable vibrations, while small vehicles remained within acceptable limits. Permanent deflections increase dynamic amplification, increase tensile stress and may cause fatigue damage. The study supports the use of stricter vibration limits in urban areas. It confirms the effectiveness of low-cost sensors in monitoring bridge performance and vibration-related serviceability.

The article on “*Evaluating the Performance of Bitumen Emulsion Stabilised Bases in Low Volume Sealed Roads: A Case Study from Kiambu County (E443 Road)*” presents a study on the performance evaluation of Bitumen Emulsion Stabilised Gravel Base on E443 road in Kiambu County. Kenyan manuals and guidelines do not provide criteria for the performance evaluation of bitumen emulsion stabilised materials (BESM). This research characterises the road construction materials and investigates their influence on the BESM base, evaluates both the quality compliance of the as-built constructed BESM base and the performance levels of the BESM base road against road construction standards. This study concludes that there was noncompliance with subgrade and subbase specifications, resulting in inadequate base support for the BESM. Additionally, the nonconformity of the as-built BESM base to the mix design specifications affected the base elastic modulus. E443 Road performance was rated poor due to poor drainage, poor road surface and low layers’ elastic modulus. Comprehensive studies on the characterisation of construction materials at a 10-year design life, BESM mix design for gravel use, and correlation with performance levels are recommended.

“*Kenya Dry Port Design Requirements: The Case Study of Inland Container Depot Nairobi*” is an article that examines the design requirements for dry ports in Kenya, with a focus on the Inland Container Depot Nairobi (ICDN). It specifically examines how logistics requirements and design considerations affect ICD operations. The study applied ICD and Queueing Theories and adopted a mixed-methods approach to understand the research problem. Stratified random sampling ensured representation across ICDN departments. Primary data were collected using a structured questionnaire, and both descriptive and inferential analyses were conducted. Hypothesis testing accepted the alternative hypothesis. Regression results showed that design considerations and appropriate design requirements had a positive and significant impact on ICDN operations. The study concluded that logistics requirements and design considerations have a significant influence on ICDN’s operational efficiency. Key factors include seamless container flow, dwell time management, and alignment of infrastructure with customs policies. Design considerations had the greatest impact, underscoring the need for strategic infrastructure planning, enhanced rail integration, and improved coordination among stakeholders.

The article on *Evaluation of Strength Performance of Cement Treated Graded Crushed Stones (GCS) for High Traffic Volume Roads Construction in Kenya* evaluates the strength performance of cement-treated Graded Crushed Stone (GCS) of 0/30 mm and 0/40 mm gradations, commonly used in Kenya for the construction of roads carrying over 10 million equivalent standard axles (MESA). While cement is often added to bind GCS fines, its effect on road performance has not been analysed. This research assessed the Unconfined Compressive Strength (UCS) of GCS from three quarries, treated with 1%–5% cement and cured for 7, 14, and 28 days. Results showed that the 0/40 mm gradation outperformed the 0/30 mm gradation in UCS, with strength increasing steadily up to a 4% cement content. The greatest UCS development occurred within the first 14 days of the curing process. A strong correlation ($R^2 = 0.893$) was found between UCS and the variables studied. The study recommends using 0/40 mm gradation, extended curing periods, and optimised cement content to meet performance requirements for roads with heavy traffic.

The article “*Reforming the National Affordable Housing Policy to Enhance Acceptance and Participation by Kenyans*” examines the implementation of the policy, arguing that the active engagement of all respective stakeholders —namely, persons working in government, persons working in the private sector, and people living on low incomes —is central to its effectiveness. The study employed a mixed-methods approach and included 270 respondents across the three stakeholder constituencies, as well as an analysis of policy documents and public discourse. It found low participation, trust, and perceived affordability, particularly from the target beneficiaries of the program. Only 30% of respondents supported the housing levy, while 70% did not trust how the money was spent. The stakeholders mentioned a lack of communication, perceived exclusion, and cost burden among significant hindrances to participation. The paper finds that stakeholder participation, government openness, and fiscal redesign must take centre stage in policy changes if AHP is to gain legitimacy and momentum. Proposals raised include voluntary contribution schemes, public audits, differential subsidies for housing, and strategic communication campaigns. Comparative observations of cross-country models reiterate the importance of participatory governance and responsive financing systems for the success of affordable housing. Ultimately, this research advocates for a paradigm shift in Kenya’s housing policy, from a top-down national project to a trust-based, participatory national partnership, if it is to fulfil its social mandate and improve urban living standards.

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