

STRUCTURAL ENHANCEMENT ARCHITECTURE: IMPROVING MACAIBAN BRIDGE TO WITHSTAND SEVERE FLASH FLOOD FOR ROAD CONVENIENCE

ABSTRACT

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Bridges play a vital role in connecting communities by providing safe passage over natural obstacles. Macaiban Bridge, located in Sta. Maria, Bulacan, is one such structure that becomes impassable during flash floods, compromising both accessibility and structural integrity. This study aims to propose structural enhancements to elevate, reinforce, and improve the durability of the Macaiban Bridge to ensure its resilience against severe flooding and improve road convenience and safety for the community. The study employed a quantitative-descriptive research design and utilized purposive sampling. Data were collected through a survey questionnaire distributed via Google Forms to five civil engineers and five structural engineers. The assessment focused on five key criteria: materials, procedural methodology, durability, structural integrity, and presentation. A t-test was applied to determine if there were significant differences in the evaluations between the two respondent groups. The results indicated that the proposed enhancements to the Macaiban Bridge were rated as "Highly Acceptable" in all five assessment criteria. The civil engineers reported an overall mean of 3.30 with a variance of 0.174, while the structural engineers gave a mean of 3.25 with a variance of 0.158. Both groups shared the same t-computed value of 0.217, which was lower than the t-critical value of 2.145 at a 0.05 significance level ($df = 326$). Therefore, there was no significant difference between the assessments of the two groups, and the hypothesis was accepted. Based on the results, the proposed structural improvements to Macaiban Bridge were well-received by both civil and structural engineers. Respondents recommended enhancements such as incorporating reinforcement materials to ensure durability, inserting a column pier at the mid-span for added stability, and involving a registered architect for model development and visualization of structural stress points. A current physical or digital model of the bridge is also advised to showcase the proposed upgrades effectively. These enhancements aim to strengthen the bridge's capacity to withstand flash floods while ensuring the safety and convenience of commuters.

RECOMMENDED CITATION

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