BER | the international journal of bridge engineering management and research

Editorial
Vol. 3, No. 2 (2026) Issue of International Journal of Bridge Engineering, Management and Research (IJBEMR)

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Submitted: 07 April 2026 **Accepted:** 07 April 2026 **Publication date:** 10 April 2026

DOI: 10.70465/ber.v3i2.84

It is my pleasure to publish the January issue (2nd issue) of Vol. 3 of the *International Journal of Bridge Engineering, Management and Research*. In this issue, we are pleased to bring to you seven papers in innovative areas of bridge engineering.

Electrical resistivity tomography has been widely employed for landslide investigations. Few studies have addressed its use for bridges, where it primarily serves to characterize foundation soils and bridge foundations rather than superstructures. The paper entitled "**Electrical Resistivity Tomography and Ground-Penetrating Radar in Landslide and Bridge Studies: A Bibliographic Overview**" deals with bridge failures and provides a comprehensive bibliographic review of nondestructive testing, focusing attention on electrical resistivity tomography and ground-penetrating radar for investigating bridges and their interactions with landslides. The bibliographic analysis reveals growing interest in remote sensing and in situ geophysical techniques applied to these fields, but also identifies critical knowledge gaps. In the literature, the use of the ground-penetrating radar for investigating bridge superstructures is well documented, whereas studies focusing on bridge substructures and bridge–landslide interactions are relatively limited. To date, no comprehensive reviews have examined the use of ground-penetrating radar in landslide investigations, nor have any studies integrated bridges, landslides, and ground-penetrating radar. The interactions between bridges and landslides have not also been examined in the literature using electrical resistivity tomography. This review highlights the pressing need for further research to advance and promote the effective use of ground-penetrating radar and electrical resistivity tomography in bridge and bridge–landslide investigations. It also highlights the importance of developing standardized protocols to ensure the accurate and consistent application of these techniques. Furthermore, the complementary capabilities of these techniques can greatly enhance the understanding of bridges and their interactions with landslides, thereby supporting more resilient infrastructure management.

As per current design specifications, bridge barriers must be designed to resist the lateral impact from errant trucks with specified weights and speeds. While most past research has focused on the performance of the interior regions of barriers, the structural capacity of the edge region remains less understood. Unlike the interior, the edge of a barrier is limited by its unsupported edge boundary, making it more vulnerable to damage. To address this gap, the paper entitled "**Capacity Evaluation for the End Region of Concrete Barriers under Lateral Loading**" uses high-fidelity computational simulation models to study the resistance mechanisms of barrier edges subjected to pushover loads. The results are synthesized into design equations to estimate both flexural and punching shear capacity of the barrier edge. The findings provide new insight into barrier edge behavior and offer guidance for potential updates to current design specifications.

The paper entitled "**Seismic Analysis of Cable-Stayed Bridge Equipped with Novel Hybrid Cables**" presents the design, experimental characterization, and structural integration of novel steel–carbon fiber–reinforced polymer (CFRP) hybrid cables developed within the European Union FIber-Reinforced STeel-WIRE project, and evaluates their effect on both static and seismic behavior of a pedestrian cable-stayed bridge. The hybrid cable consists of a CFRP section covered by a stainless steel coating. The mechanical behavior of the hybrid wires and the corresponding cable is experimentally determined and serves as the basis for the development of a finite element modeling approach. Subsequently, a short-span pedestrian cable-stayed bridge equipped with a hybrid cable is comprehensively analyzed to demonstrate its practical advantages. We compared the results of this analysis with those obtained from a similar bridge using steel stay cables. The findings highlight the

Discussion period open till six months from the publication date. Please submit separate discussion for each individual paper. This paper is a part of the Vol. 3 of the International Journal of Bridge Engineering, Management and Research (BER), ISSN 3065-0569.

hybrid stay cable's superior performance in achieving the final design strength and seismic resilience, as evidenced by response quantities such as cable tension, tower moment, and deck moment.

Bridge digitalization increasingly relies on scan-to-building information model (BIM) techniques to generate accurate as-built models from point-cloud data; however, existing approaches mainly focus on geometric reconstruction or standardized model export, providing limited support for engineer-controlled and editable infrastructure modeling workflows. The paper entitled "**BIM-Integrated Parametric Modeling of Existing Box Girder Bridges Using Point Cloud Data**" presents a parametric scan-to-BIM framework for existing box-girder bridges that combines automated geometric extraction with interactive modeling and real-time BIM generation. The proposed workflow starts from drone-based photogrammetric point clouds and reconstructs bridge components through parametric modeling, where cross-sectional geometry and longitudinal arrangement are controlled by structured parameters stored in a spreadsheet environment. A live synchronization mechanism enables real-time transfer of the parametric model to the BIM platform, while a dedicated user interface allows non-expert users to generate and verify bridge models through guided input of engineering parameters.

Unlike previous reconstruction-oriented methods, the approach prioritizes controllable modeling, editability, and practical usability, enabling rapid generation of information-rich as-built models suitable for rehabilitation and asset management applications. The results demonstrate reduced manual modeling effort, improved consistency, and enhanced adaptability compared to traditional modeling workflows, supporting the integration of existing bridges into digital-twin-oriented infrastructure management processes.

The paper entitled "**Challenges and Solutions for Sustainability Practices in Bridge Construction of Metro System: A Case Study of Anhsin Bridge Construction of MRT System in New Taipei City**" presents the challenges and solutions to sustainability issues in constructing the Anhsin Bridge (AHB). The AHB is one of the prime sections of the Ankeng Light Rail MRT System, which is located in New Taipei City. The construction work follows a design-build contract between the client and contractor. The original idea for the construction of AHB, a steel arch bridge (SAB), could cause obviously harmful impacts, such as influences on river flow, damage to species, and deterioration of river water quality, on the Hsindian River. The contractor modified the bridge's design to an asymmetrical cable-stayed design with truss frames. This new design applies the advanced construction methods, including the heavy-duty tower crane system, truss-frame erection system, large-load pile tests, wind tunnel tests, high-quality steel cable system, management system for extraneous member sizes, and BIM application for bridge-building to prevent any impact on the river. The engineers employed key sustainability issues, including risk mitigation and reliability, ecology, environmental protection, carbon emissions reduction, energy savings, waste reduction, and durability, which achieved friendly construction in this project. From the test reports, construction records, and species monitoring reports, all obtained data present excellent results. It can be concluded that the sustainability practices mentioned above were highly effective in the AHB construction. In this paper, the authors share their extraordinary experiences with the implemented sustainability achievements. Furthermore, the development of sustainability indicators and concepts is introduced in this paper.

The paper entitled "**Real-Time Risk Assessment of Bridges Subject to Storm-Induced Scour**", presents a novel, proof-of-concept, model-free bridge-pier structural assessment framework that can be used to evaluate risk during a storm event or as part of planning exercises. This framework is built on a pre-generated library of bridge-pier failure surfaces—curves that define failure limits for combinations of scour, wind speed, and surge heights—for a range of structural configurations and site conditions. Bridge failure surfaces—generated with basic user inputs—are coupled with real-time storm forecast data to rapidly perform fragility-based risk assessment through Monte Carlo simulations. The resulting fragility curves provide maintenance engineers with actionable information, in the form of estimated failure probabilities, for the bridge of interest as the storm evolves. The results can be combined with real-time scour hole measurements to provide decision support for emergency response as the storm approaches. The risk assessment framework has been demonstrated on a case study bridge near Cedar Key, Florida, which was in the path of two hurricanes: Ian (2022) and Idalia (2023). The results illustrate how the framework generates fragility curves that are specific to the bridge and the data provided in each storm advisory, without the need to perform detailed finite element analyses. In addition to providing real-time risk assessment, the concepts presented in this paper are also well-suited to performing scenario planning for bridge inventories that may be subject to storm-induced damage. By using historical or projected storm data, bridge vulnerabilities can be explored to inform emergency planning or prioritize bridge maintenance.

Current timber pile splicing mechanisms utilize various steel, concrete, or wooden components. The paper entitled "**Timber Bridge Pile Splicing with Traditional and Fiber-Reinforced Polymer Wrap Methods**" evaluates the strength capacities of steel and wood splicing mechanisms in addition to the fiber-reinforced polymer (FRP) wrap splice mechanism. Splicing mechanisms studied herein are flat steel plate, C-channel steel plate, wooden plate splices, and FRP wrap splices, consisting of unidirectional glass/epoxy composite with three and six layers of glass fabrics, which were reinforcing wooden components in both the longitudinal and hoop directions. These four splicing mechanisms were tested and compared under shear, bending, and axial loads. Of the three traditional splicing mechanisms (excluding FRP wrap), the C-channel was the strongest for each loading scenario. The FRP wrap method was the strongest under axial loading; it lacked in bending capacity compared to other methods. Bending failure in the FRP splicing mechanism occurred due to the lack of adequate fiber reinforcement in the hoop direction of the timber pile. To improve the bending and shear capacity of FRP-spliced pile along the hoop direction, a six-layer fabric architecture was adopted, which showed significant improvement in bending and shear capacities from the original three-layer glass FRP composite wrap design. Even though the bending failure capacity of FRP-wrapped composites with six layers is slightly lower (~15%) than the bending capacity of piles repaired with traditional splice mechanisms, axial and shear capacities of FRP-spliced system were higher than those from traditional methods. With increases in the number of wrap layers and FRP fabric density, even bending capacity can be improved, and the deformation is far less than the deformation of wood piles with traditional splice mechanisms.

With this editorial note, it is also my pleasure to invite you to submit your papers addressing research with new and substantial contributions in bridge engineering to the *International Journal of Bridge Engineering, Management and Research*. The journal is committed to a prompt peer review process and online publication of the paper within 4 weeks of acceptance. We are also committed to completing our peer review process within 90 days of paper submission. All accepted articles are generally published within 3 months of acceptance. You are invited to submit your papers to the next issue of the journal as soon as possible.