intelligent infrastructure and construction

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Editorial

Updates in *Intelligent Infrastructure and Construction* Aims and Scope

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1. Introduction

Since its launch in 2025, *Intelligent Infrastructure and Construction* (*IIC*) has provided an international, peer-reviewed, open-access forum for research on information technologies across the infrastructure life cycle. Its remit extends from planning and design to construction, operation, maintenance, and disaster mitigation. The journal encourages detailed reporting of experimental and theoretical results and maintains no restriction on paper length, allowing authors to explain methods and findings sufficiently for scrutiny and replication [1].

We are updating the journal's aims and scope to give clearer visibility to emerging research directions while retaining its engineering focus. The revised framework brings artificial intelligence, autonomous systems, and digital methods into closer relation with construction practice, infrastructure renewal, sustainability, and resilience.

2. Rationale for the Update

Recent developments in civil engineering involve increasingly close connections between computational methods and physical assets. Large language models, multimodal learning, robotics, and digital twins are creating new research opportunities in design, construction, and operation. Their prominence in the 2026 ASCE International Conference on Computing in Civil Engineering reflects the breadth of this activity [2]. A useful journal scope should explain both the methods of interest and the engineering problems they can address.

The maturity of these technologies varies considerably. The RICS 2026 report describes increasing AI use alongside persistent difficulties in moving beyond pilot projects and embedding systems in routine practice [3]. We therefore welcome foundational methods, controlled experiments, and field studies, with conclusions matched to the evidence. Claims of autonomy, reliability, or general applicability require appropriate validation.

Civil engineering must also address the performance of existing assets and the environmental consequences of new construction. The UNEP and GlobalABC Global Status Report for Buildings and Construction 2025–2026 highlights the continuing need for decarbonization and climate resilience [4]. These priorities motivate greater attention to infrastructure renewal, circular construction and decisions informed by whole-life performance.

3. Updated Aims and Scope

The updated aims and scope reaffirm *IIC*'s position as an international, peer-reviewed, open-access journal that is dedicated to advancing intelligent, autonomous, sustainable, and resilient infrastructure and construction. We welcome research that develops or applies computational methods, sensing, automation, materials, and management approaches

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to improve engineering decisions and physical performance throughout the asset life cycle. Relevant applications include buildings, bridges, transportation networks, tunnels, underground spaces, water systems, hydraulic structures, and energy infrastructure.

The journal welcomes original research papers, reviews, editorials, communications, and other article types; it remains committed to promoting detailed and reproducible research, with no restrictions on article length. The updated scope comprises eight complementary themes. The topics below are illustrative rather than exhaustive.

3.1. Digital Design, Modeling, and Visualization for Infrastructure and Construction

- Computer-Aided Design (CAD) and Computational Engineering (CAE);
- Building Information Modeling (BIM), City Information Modeling (CIM), and infrastructure information modeling;
- Digital twins and real-time virtual simulation;
- Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) for design review, training, and on-site assistance;
- Generative design, topology optimization, and parametric modeling;
- Multiscale modeling and simulation of infrastructure systems.

3.2. Artificial Intelligence, Smart Sensing, and Cyber–Physical Systems

- Machine learning, deep learning, reinforcement learning, and foundation models;
- Large Language Models (LLMs), Generative AI, and AI agents for engineering design, management, and decision-making;
- Multimodal AI for infrastructure perception and analysis;
- Internet of Things (IoT) and wireless sensor networks;
- Edge/cloud computing and cyber–physical systems for real-time decision-making;
- Physics-informed machine learning and hybrid intelligent modeling;
- Predictive modeling, risk assessment, and intelligent optimization.

3.3. Intelligent Data Platforms and Autonomous Infrastructure Operation

- Real-time data fusion, knowledge graphs, and semantic modeling;
- Intelligent asset management and life cycle optimization;
- AI-enabled predictive maintenance and failure prevention;
- Autonomous inspection, diagnosis, and intervention systems;
- Infrastructure-as-a-Service (IaaS) and intelligent service platforms;
- Data governance, interoperability, and digital infrastructure standards.

3.4. Robotics, Automation, Embodied Intelligence, and Advanced Fabrication

- Autonomous construction equipment and robotic assembly;
- Robotics for construction, inspection, and maintenance;
- Unmanned Aerial Vehicles (UAVs/Drones) for surveying, inspection, and safety monitoring;
- Additive manufacturing (3D printing) of large-scale structural components;
- Embodied intelligence for construction robotics, adaptive operations, and intelligent agents;
- Human–robot collaboration and wearable technologies for worker safety;
- Automated construction progress tracking and quality control;
- Intelligentization of construction processes through autonomous systems and adaptive control.

3.5. Intelligent Transportation, Water, Energy, and Environmental Infrastructure Systems

- Connected and automated transportation infrastructure;

- Intelligent highways, bridges, tunnels, and urban mobility systems;
- Vehicle–Infrastructure–Cloud integration and intelligent transportation systems (ITSs);
- Smart water infrastructure and digital water systems;
- Intelligent dam, reservoir, hydraulic structure, and water network management;
- Smart energy infrastructure and renewable energy systems;
- Integrated water–energy–environment systems;
- AI-based environmental monitoring and prediction.

3.6. Sustainable, Resilient, and Functional Materials

- Sustainable and resilient infrastructure considering climate adaptation and disaster mitigation;
- Advanced functional materials, including self-healing concrete, shape-memory alloys, and smart coatings;
- Sensor-embedded materials and adaptive structural components;
- Biomaterials and bio-inspired materials for sustainable and self-repairing infrastructure;
- Bio-construction and bacteria-based construction technologies;
- Low-carbon construction technologies and circular economy principles;
- Life cycle assessment and sustainable infrastructure development.

3.7. Disaster Prevention, Resilience, and Human-Centric Safety Management

- AI-enabled disaster prediction, monitoring, and early warning;
- Digital twin-based disaster simulation and emergency response;
- Infrastructure resilience assessment and enhancement;
- Extreme event modeling, risk analysis, and uncertainty quantification;
- Intelligent decision-making for disaster mitigation and recovery;
- Climate-resilient infrastructure systems;
- Post-disaster assessment and autonomous recovery optimization;
- Human-centered AI for construction;
- Intelligent occupational safety management;
- Worker behavior recognition and risk prediction using AI;
- Wearable sensing and augmented human capabilities;
- Human–AI collaboration in engineering decision-making;
- Construction ergonomics and cognitive engineering;
- Intelligent facilities management and predictive maintenance.

3.8. Transdisciplinary Integration: Engineering, Management, and Society

- Digital delivery, asset management, and whole-life-cycle value optimization;
- Integration of engineering solutions with business models and urban planning;
- Stakeholder decision-making supported by digital platforms;
- Socio-economic impacts, policy frameworks, and regulatory aspects;
- Risk management, resilience planning, and social acceptance of emerging technologies;
- Digital transformation strategies for infrastructure and construction industries.

Across these themes, we encourage work on data governance, cybersecurity, interoperability, and responsible use of AI where these affect engineering practice. Studies on implementation, workforce skills, procurement, regulation, and social acceptance are also relevant when supported by a clear infrastructure or construction context. Research may span several themes, and the framework accommodates both new infrastructure and the stewardship of existing assets.

4. Looking Ahead

The updated scope gives authors and reviewers a clearer account of the research *IIC* seeks to publish. Its value will depend on contributions that explain an engineering problem, make a defensible methodological advance, and demonstrate what the results mean for design, construction, or asset performance.

We welcome laboratory, computational, and field research at different stages of technological development. Authors should identify the conditions under which their methods work, report relevant limitations, and distinguish simulated or controlled performance from deployment in practice. Sharing data, code, and model details, where possible, will help others assess and build on the work.

We invite researchers and practitioners across civil engineering, computing, robotics, materials science, and management to contribute original research and critical reviews. The journal's scope will continue to evolve with evidence from research and engineering practice.

Conflicts of Interest: The author declares no conflicts of interest.

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