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AI-Driven Design and Construction of a Bus Shelter: A Case Study

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Abstract:

MGM Macau, one of Macau's largest integrated resorts, recently secured the top position in the casino concession retendering. In collaboration with the Macau government, MGM aims to enhance public areas, create vibrant, engaging, and sustainable environments that benefit society and boost the region's appeal.

The Macau Government announced plans to construct a standard bus shelter adjacent to the MGM Cotai building. Recognizing this opportunity, MGM proactively negotiated an agreement to assume responsibility for the design and construction of a completely innovative bus shelter with no precedents in Macau.

This case study explores the innovative approach of designing and building a bus shelter using artificial intelligence (AI) and early contractor engagement, contrasting it with traditional workflows. Conventional workflows typically encompass distinct and sequential phases such as concept and schematic design, design development, and construction drawings before having contractor on-board to produce shop drawings. In contrast, this case study workflow using AI that integrates various phases allowing simultaneous development and iteration of designs. It also encourages real-time feedback and collaboration among architects, contractors, clients and government leading to a more dynamic decision-making process.

Our findings indicate that integrating AI into the design process significantly impacts projects in several ways: AI shortens the design problem solving loop, AI fosters innovation and adaptability, while early contractor engagement promotes integration, collaboration, optimizes costs, resource allocation, risk mitigation, and construction timeline. This case study demonstrates a more efficient and adaptive method for small construction projects.

Keywords:

Design and build, artificial intelligence (AI), early contractor engagement.