

Using BIM in Residential Renovation

Using Building Information Modeling for Job Hazard Analysis of Renovating Residential Buildings

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Overview

Research has shown that Building Information Modeling (BIM) can prevent and reduce safety hazards in construction. Most studies on this digital technology have focused on new or large-scale construction projects, primarily due to the limited availability of resources among smaller companies to implement BIM. To address that research gap, the researchers developed a case study in which BIM was used in the renovation of a rowhouse in Baltimore. The work included laser scanning the rowhouse to create a three-dimensional model and working with safety professionals to develop a risk assessment database that analyzed the frequency and severity of hazards associated with renovation activities. In addition, the demolition and renovation timetable were merged into the three-dimensional model, thereby producing a four-dimensional representation. The researchers' goal was to improve safety and health outcomes for smaller contractors involved in residential renovations.

Key Findings

- The study identified multiple injuries that could potentially result from demolition and construction during residential renovations. They occurred in this order of frequency of exposure: 1) eye injuries, 2) MSDs from lifting and carrying, 3) injuries from falls from heights, 4) shoulder injuries from overhead work, 5) hand and wrist injuries, 6) cuts and punctures from tools and materials, and 7) knee injuries from squatting.
- Other hazards, although not as prevalent in other types of construction, warranted additional attention in renovation projects: exposure to lead, asbestos, mold, and stooped postures.
- Safety professionals identified 14 hazards that could have either a "critical" or "crisis-level" impact on a project. Explosion from gas meter relocation was classified as crisis-level because of the level of damage it would cause, but because of its low probability, its overall risk is deemed moderate.
- Laser scanning of residential buildings to be renovated is technically viable for purposes such as safety planning and communication. However, the cost of scanning, along with the BIM expertise needed to create a 4-D model, seems beyond the financial reach of most smaller contractors. Nonetheless, if investments in technology and expertise are made with a long-term plan for repeat projects, BIM may become financially viable for these firms.

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