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Building Information Modeling a key component to Suffolk University's Modern Theatre restoration

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A complex historical faÃ§ade restoration, a new high-rise residence hall, a postage-stamp-sized project site that ties into two existing buildings in one of the busiest sections of downtown Boston, and a fast-track schedule all culminate to make the Modern Theatre Residence Hall project for Suffolk University an extremely challenging construction project. Suffolk Construction's Education Division, has begun work on this challenging project guided by the practical use of Building Information Modeling (BIM).

Project overview

The Suffolk University Modern Theatre Residence Hall project entails the demolition of an existing 7-story structure and the construction of a new, 60,000 s/f, 12-story residence hall and theatre at 523-525 Washington St. in downtown Boston.

Suffolk Education has razed the existing Modern Theatre building, with the exception of the stone faÃ§ade along Washington St. This faÃ§ade is a registered historic landmark, and will be restored and reconstructed in its exact location once the new steel superstructure is erected. Suffolk's masonry contractor has carefully disassembled the faÃ§ade, cataloged its approximately 900 stones and moved them off site for restoration.

Suffolk Education's project team carefully created a logistics plan to minimize impact on surrounding businesses and pedestrian and vehicular traffic. The building's superstructure and restored facade, terra cotta exterior, and metal panel and curtain wall panels are being erected with a "tower crane" that is set inside the footprint of the building.

New theatre space, including a proscenium, will occupy the first two levels of the building. This area will include a balcony area, gallery space and the main lobby. The main lobby will be decorated with select stone flooring, architectural woodwork and custom draperies. The upper balcony area will be accessed by a curved grand stair with decorative metal plating and an elevator. The theatre walls will be finished with hand-painted wall covering. Above the theatre, Suffolk will create suite-style resident units that will accommodate 197 students.

The Modern Theatre project has been designed and is being constructed to meet green building and LEED certification standards. The project team is using environmentally friendly materials and systems, and CBT Architects has designed the building to ensure lean and efficient operation once construction is complete and the facility is fully functional.

Suffolk's use of BIM

Suffolk Education and the entire project team are using BIM to coordinate the construction details of

the faÃ§ade restoration and the new building's mechanical and structural systems. By combining 3-D models from the engineers, architects, and subcontractors, Suffolk created a complete or "federated" 3-D model of the building. This model allowed the project team to virtually walk through the building very early in the planning process and identify any conflicts or clashes between structure and other systems and between the new structure and the historic newly restored faÃ§ade.

Through the use of BIM, Suffolk's team was able to identify that the stones of the historic faÃ§ade were not modular in depth. In fact, the depth from stone to stone varied several inches from one another. However, because the team cataloged and modeled each of the stones using BIM, it was able to apply the virtual facade to the virtual steel structure, revealing the previously unforeseen conflicts. Identifying these potential issues early allowed the team to modify the steel and shave the back side of some stones prior to the steel being fabricated and the historic faÃ§ade returning to the site.

Early identification of constructability issues through the use of BIM has allowed the team to address these issues before construction began, thereby saving time in the project schedule, reducing the overall project cost, and providing for a construction process that has produced very little waste.

This use of BIM has been a great success on the Modern Theatre project and, in general, has proven to increase collaboration and coordination on projects, resulting in significantly reduced RFIs, construction-related change orders, schedule conflicts and project risk. For the Modern Theatre, BIM has been instrumental in managing the construction process more effectively by allowing Suffolk to more easily coordinate trades, perform laser scanning of existing conditions to provide the most accurate information, develop the schedule and logistics plan, and perform design visualization.

The Modern Theatre Residence Hall is on schedule and on budget. The new residence hall topped off on October 22, and the project will be completed in fall 2010.

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