Building Information Modeling (BIM)

How Does BIM Benefit BAC Members?

A recent healthcare project in Chicago illustrates how building information modeling (BIM) can increase and improve work opportunities for BAC members. BIM is the process of designing and building a construction project collaboratively using a coordinated set of computer models rather than separate sets of drawings. BIM offers savings in cost, time, greater accuracy in estimating, and the avoidance of conflicts in the field.

The BIM model shows MEP pipes and ducts passing through the masonry walls.

The intricate construction of CMU walls laden with structural requirements and mechanical penetrations for this project was greatly aided through the use of BIM by providing the mason contractor advance input and notice of the various mechanical, electrical and plumbing (MEP) requirements. As a result, the masonry on this project progressed in coordination with other trades, rather than in opposition. This was an obvious benefit to both the BAC signatory contractor and craftworkers working on the project. It also provided the opportunity to showcase the benefits of designing and constructing with masonry to the owner, designer and construction manager/general contractor.

BIM for Masonry (BIM-M)

The International Union in conjunction with IMI and other industry stakeholders is leading the charge in positioning masonry as an essential trade in the BIM workflow through the BIM for Masonry (BIM-M) initiative. BIM-M will provide the construction industry with an essential tool that will facilitate masonry’s application for the design community; constructability for the owner and construction manager community; while providing mason contractors the ability to influence design and sequence of operations on the work site. Most significantly, masons will realize increased work...
opportunities and superior working conditions.

**BIM on the Job**

The 45,000 sq. ft. basement of the healthcare project’s lab facility featured numerous small rooms and spaces constructed entirely of 17’-6” high CMU partitions, corridor walls, and shaft walls, all of which were grouted and reinforced vertically at 48” on center, and with horizontal bond beams at the midspans and the tops of each wall. Typical of laboratories, this project required extensive and well-coordinated mechanical, electrical, plumbing, and fire protection (MEP) systems, all running within and through the masonry walls, creating a construction challenge for all the trades involved. To simplify construction, the entire project, including the masonry, was built using BIM.

The contracting team worked with the architect to develop a 3-dimensional BIM computer model providing all information on the MEP elements passing through and within the masonry walls. The BIM model was particularly useful to the mason contractor, as it consolidated information from other trades and effectively replaced seven individual sets of MEP shop drawings that would otherwise be necessary.

The BIM model was used to generate dimensioned, 2D plans and elevations that were uploaded to a cloud storage server and accessible to the bricklayers in the field via tablet computer and/or printed drawings. These plans and elevations showed precise locations, sizes and elevations of over 1,500 penetrations through the masonry walls. The bricklayers then placed their sleeves and box-outs as specified in the BIM model drawings.

As the concrete masonry was constructed, BAC bricklayers installed 468 sleeves for HVAC, 69 sleeves for electrical, 159 sleeves for mechanical pipe, 257 sleeves for fire protection, 231 sleeves for plumbing, 343 sleeves for water, and 10 sleeves for miscellaneous, resulting in a total of 1,537 sleeves in the masonry walls.

**Project Team**

The general contractor was Power Construction of Chicago, Illinois. The masonry work was performed by BAC bricklayers of the Administrative District Council 1 of Illinois, employed by Richards and Weyer Construction Co., Inc. (Lyons, IL).

**Sequencing of Trades**

The general contractor made the early decision to sequence the installation of the
piping and ductwork within and through the masonry walls simultaneous to the masonry construction. Only a few large sections of ductwork direct-mounted to the structural slab above were installed prior to the masonry. The contractor rationalized that the thousands of pipes and ducts at various elevations would present an unnecessary obstacle to the masons if they were installed prior to the masonry. Conversely, installing the MEP components after the masonry would require excessive cutting through block walls, resulting in inefficiencies. Therefore it made sense to build the block walls with the accommodations for pipes and ducts in a single operation, with the MEP trades working side by side with the bricklayers.

The use of BIM also alerted the contracting team to the option of prefabricating plumbing and gas assemblies, thereby freeing up valuable work space and speeding up the construction schedule. The laboratory facility contained 50 lab sinks, 15 toilets, and 50 prefabricated gas assemblies with plumbing running either inside the block walls or in a chase between block walls. For the pipe trades to assemble the piping on-site, per conventional methods, would mean increased demand for work space in areas that were already congested. Therefore, the plumbing and gas lines were built in the plumbing contractor’s shop on racks made of steel struts and transported to the site prefabricated. Once they were in place, the bricklayers built their masonry around the plumbing and gas lines.

**Work Flow**

Weekly job meetings run by the masonry foreman were critical. The MEP trades needed to know the masons’ plans four to five days in advance in order to relocate their manpower from other areas on the job, and to stage their horizontal penetration sleeves and vertical in-wall piping, making sure to have them ready for the masons at the proper time. Each day, sometimes twice daily, the mechanical and plumbing foremen checked in with the masonry foreman on specific manpower and material needs.

According to Pete Sindic, project manager of Richards & Weyer Masonry, “There was a high level of cooperation and teamwork between the bricklayers and the other trades throughout the project.”

Chris Coyne, Superintendent with Power Construction, said, “This was one of the more intense masonry projects I’ve worked on with the prefab MEP units in the masonry walls coupled with all the overhead sleeves and the amount of reinforcing. It required a high degree of organization by the masonry contractor as well as working hand in hand with the MEP trades in a team environment. Every day was a new adventure in the basement. Now that the masonry is finished, we all get lost down there due to the amount of masonry walls and the maze-like configuration.”

**EDITOR’S NOTE:**

This project illustrates the emerging role that BIM is playing in the construction industry and the vital need for masonry to be part of that process. BIM-M represents our commitment to ensure that our crafts and the materials we work with are central to the future of the construction industry.

**Acknowledgements**

This article is based on a case study IMI developed for the 12th North American Masonry Conference, authored by IMI Director Scott Conwell, AIA. The information appears here with the permission of The Masonry Society (TMS). TMS will publish the more detailed case study in the Proceedings of the 12th North American Masonry Conference to be held in Denver, Colorado, May 17-20, 2015. For more information, visit [www.masonrysociety.org/namic](http://www.masonrysociety.org/namic).

1 Due to the sensitive nature of the building’s function, BAC is not authorized to disclose the name of this project.