



By Shawn Foster and Steve Hutsell

Better Design. Quicker Delivery. Improved Energy Efficiency. More with Less. These catch phrases are everywhere in the private sector, but are especially highlighted within the Military Construction (MILCON) Programs in the U.S. Army Corps of Engineers (USACE). In 2006, with the task of supporting the daunting Army MILCON Transformation (MT), 2005 Base Realignment and Closure (BRAC), Army troop re-stationing, modularity and Grow-the-Army initiatives, USACE decided to revamp and improve design and construction deliverables by adopting a BIM methodology in designing, constructing and modifying facilities.

In adopting BIM, USACE decided to reach out to a collection of individual private-sector firms. This was to ensure that USACE's design, construct and hand-over requirements using BIM methodology could be achieved by the private sector. As a result, the USACE/Industry BIM Committee was conceived.

Starting a Committee

Requirements are normally born of necessity, and project-specific necessity was the basis for the USACE BIM Contract Requirements. Steve Hutsell, then BIM implementation manager in the USACE Fort Worth District (and a co-author of this article), had a project need.

"A customer with a medical research facility project wanted to use BIM, and asked, 'Do you have contract language for BIM?' That started us down this road," recalls Hutsell.

With additional responsibility as a Center of Standardization (CoS) project coordinator, Hutsell learned soon thereafter that

all MILCON projects with CoS facility types would require a BIM methodology. This sparked him to take language from the medical research facility contract and work with USACE Headquarters to turn it into USACE agency-wide contract language. To support that effort, he reached out to the private sector and contacted "BIM-aggressive" firms—especially those already using an intelligent modeling process for USACE projects.

Initially, the group was made up of architectural/engineering (A/E) firms with various backgrounds. Construction firms, legal firms and academia joined later, further expanding the committee's wide-ranging experience with various required BIM technologies.

Mutually Beneficial Topics

Being part of the committee requires an investment, as none of the private-sector members are compensated for their involvement; all labor and travel costs are incurred by their firms. They make this investment for the mutual benefit of USACE, their own firms and the architecture/engineering/construction (A/E/C) community at large. To ensure maximum participation, monthly sessions are held at a pre-determined location, with those unable to travel joining via web conference. Between sessions, impromptu telephone and web conferences tackle issues in greater detail.

Eric Baker, from Mason & Hanger, states, "We had to set marketing aside and focus on how each firm was *really* using BIM software and what each BIM platform could do, towards establishing a BIM baseline as the framework of the initial contract language requirements."

Down to Business

The initial goal was lofty: Push for innovation within a BIM application-neutral context, yet ensure that the BIM-based deliverable contract language requirements are **fair, practical and reasonable** within the existing state of the technology and standards.

The group has kept those words in the forefront of all decisions while crafting the BIM Contract Requirements. Early round-robin sessions ensured requirements would be technically achievable. The group also ensured application-neutral terms were used.

Shawn Foster, with Black and Veatch, Energy Division (the other co-author of this article), reflects, “The first meetings were interesting. We went around the table to the firms with specific BIM technology experience and asked questions, such as: ‘Can your preferred platform create various schedules from components?’ ‘What does that door look like in plan?’ ‘What about a variable air volume (VAV) box?’ We had to go around for three different technology platforms and multiple disciplines to ensure the contract language was neutral, and verify what USACE was specifying was possible. It was a great exercise.”

The first internal iteration assumed a single delivery method for all project types. This had to be sidelined, however, as the BRAC and CoS programs moved towards design/build and adapt/build methods to meet suddenly expanded needs. General contractors’ experience was needed, and many answered the call.

Dan Russell, Sundt Construction, remarks, “I joined the group at the request of USACE because I saw it as an opportunity to show that the industry could develop a system utilizing BIM that was acceptable to A/E firms and general contractors that met the construction needs of the owner. During our meetings, it was refreshing for an owner’s representative [Steve Hutsell] to fully explain the end goal and take into consideration the concerns and financial implications of the design firms and contractors in the group. As a team, we were able to reach consensus that minimized the cost impacts, yet still [provided] an acceptable final deliverable to the client.”

To meet all the USACE needs, including internal and client-driven requirements, CoS and non-CoS versions of the contract language were created. In all versions, only the scope and deliverable were specified. The **means and methods** were left up to the private-sector partner. To help USACE understand the private-sector partner’s process, and provide input to help them meet the requirements, submittal of a BIM implementation plan was required.

USACE/Industry BIM Committee

The goal of the USACE/Industry BIM Committee is to “push for innovation within a BIM application-neutral context, yet ensure that the requirements are fair, practical and reasonable within the existing state of technology and standards.”

An Auspicious Beginning

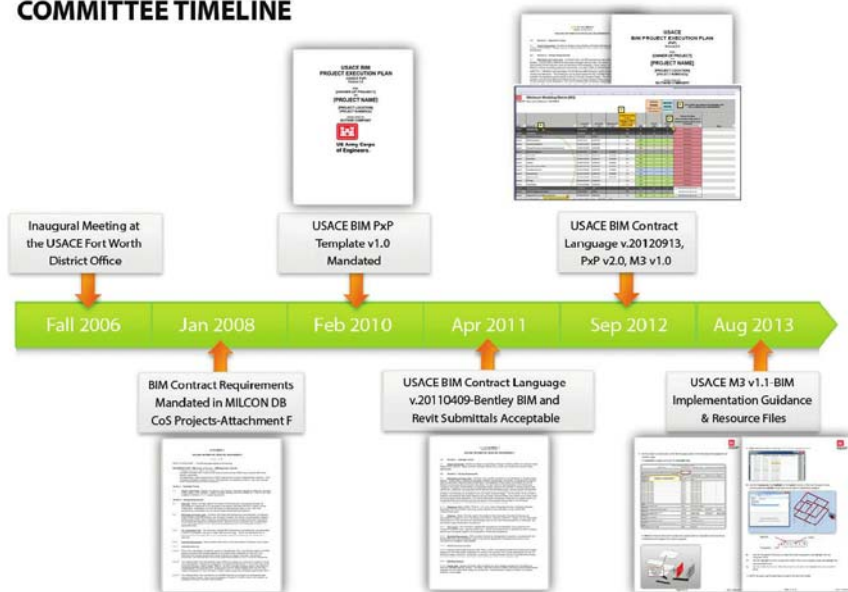
In January 2008, the first release of the BIM Contract Requirements was included in “Section 01 33 16-Design After Award” of the MILCON Transformation Model RFP Language, designated as “Attachment F.” (That’s how “Attachment F” became the shorthand name for the BIM Contract Requirements, as it is still known by many firms, local industry organizations and national technology groups.)

It was important to USACE that industry understand these requirements were well thought-out, achievable and created with industry input. USACE started educating internally, while at various BIM vendor conferences, the committee started educating the industry on the new requirements. Once again, committee members were not compensated for their delivery of these presentations and education sessions; they did it to support their investment in the language and its development process.

Project Execution Plan

To help USACE districts determine whether a firm was truly prepared to use a BIM process, the BIM implementation plan needed standardization. The *BIM Project Execution Planning Guide*, published in 2009 by the Computer Integrated Construction (CIC) Research Group of The Pennsylvania State University, included a project execution plan (PxP) template. The PxP template provided a framework to jointly create a USACE-specific PxP template as part of the BIM Contract Requirements in January 2010. This also opened the

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door for academia to join the committee. Graduate students from the CIC Research Group joined, bringing an academic perspective.

The M3—Minimum Modeling Matrix

As the use of BIM methodologies grew, deviations and interpretations of the BIM Contract Requirements, with respect to minimum level of development (LOD), started to appear. Once again, the committee worked together and created a better communicated process and procedure, now known as the minimum modeling matrix or the M3.

The M3 is an example of USACE and the USACE/industry group building upon current items within the industry, such as the AIA E202 (now E203/G202); the AIA/AGC LOD; OmniClass; UniFormat; and MasterFormat products. Rather than reinvent the wheel, USACE enhanced existing practice documents with all of the pertinent information, creating one easy-to-implement document. (For an in-depth discussion of the M3, refer to “Boosting MILCON Project Performance” in the November/December 2012 edition of *The Military Engineer* at www.themilitaryengineer.com.)

The Group

Lauren Collier, BIM/CAD technical leader at SSOE Group, says, “Each committee member comes to the table with unique skillsets and work experiences, but our collective goal is to push and improve our industry. The USACE/Industry BIM Committee has given us a pretty powerful voice, and we are creating meaningful language and deliverables for USACE, as well as other owners and A/E/C firms.”

Through this process, USACE released products with industry perspectives and concerns in mind. Members of the committee, including USACE HQ representatives, value frank and honest feedback as foundational assets. It is only through such discourse that the group creates documents, processes and procedures that are currently changing how the A/E/C industry approaches BIM. The group understands that “BIM egos” and personal agendas remain at the door, in order to ensure the development of mutually beneficial products.

Committee Expansion and Sphere of Influence

As the committee developed requirements, other items found their way into the process, including quality control and quality assurance; as-builts and record models; and others that help clarify the BIM Contract Requirements. Because it is not always conducive to discuss these at both the micro and macro level in a large group, subcommittees were created to bring small-group results back for whole-committee consideration.

Furthermore, the group’s success has spawned tangential groups and efforts. A major one is the Civil Information Modeling (CIM) Committee. The need for similar contract language, requirements, processes/procedures and deliverables within the CIM arena is just as important as in the BIM arena, and the two are complementary. Many committee members are in both groups.

Other efforts include:

- Input on the current USACE BIM Roadmap—strategic implementation plans for using BIM technology to improve USACE planning, design and construction processes.
- Submittal of the USACE BIM Contract Requirements (contract language, PxP template and M3) to be considered and voted upon as an officially recognized best practice of the *National BIM Standard-United States*® (NBIMS-US™). [Authors’ Note: Voting on the ballot is scheduled for early 2014.]
- Educational presentations at Department of Defense-sponsored events, vendor-sponsored conferences and local industry organizational meetings.
- Construction Operations Building information exchange (COBie) data required on forthcoming projects, the resulting impact on BIM Contract Requirements and the A/E/C industry at large.

Hutsell explains, “USACE did not want to develop BIM Contract Requirements in a ‘black box,’ and the collaborative effort with industry representatives has proven to be a winning formula. The USACE BIM Contract Requirements were an essential component of USACE’s successful BIM delivery on the MILCON program, as demonstrated by the 500-plus single- and multi-facility BIM projects executed since January 2008, comprising 46 million-plus square feet, and more than \$9 billion in construction programming. More than

600 facilities, comprising 25 million-plus square feet, have been constructed to date. Additionally, projects have been executed by other programs or agencies, such as U.S. Army MILCON Non-CoS projects, Military Health Systems, U.S. Air Force, Naval Facilities Engineering Command and Federal Aviation Administration. There also is evidence of private-sector firms having adapted the requirements into their corporate BIM standards. Accordingly, the committee has been recognized within USACE as a thought leader in developing groundbreaking contract requirements that serve as a model for the industry.”

The Future

Due to its volunteer structure, the committee has maintained this fundamental guideline: Only initiatives that are mutually beneficial to both USACE and industry representatives will be pursued. As owners and the A/E/C industry expand beyond traditional BIM uses into more sophisticated analysis and project coordination BIM uses in the planning, design, construction and operations and maintenance arenas, the committee will continue to provide frank, honest feedback and guidance to proponents. When additional initiatives and BIM uses are analyzed and vetted, the committee also is positioned to adapt the proven USACE BIM Contract Requirements or to create new **fair, practical and reasonable** requirements. It’s a win for owners and a win for the A/E/C industry. **ENR**

[Authors’ Note: The authors wish to acknowledge all members of the USACE/Industry BIM Committee who contributed to this article.]

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