Stevens & Wilkinson
The Beck Group

Customer Success Story

Client:
The General Services Administration

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Autodesk® Revit® Structure
Autodesk® Revit® MEP
Autodesk® Navisworks®
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Autodesk® Constructware®
Autodesk® Design Review

BIM expedited the whole process. It absolutely led to better coordination among the disciplines, helped us focus on quality, and eliminated many of the conflicts associated with traditional 2D approaches—including the number of RFIs.

—Paul Dehaven
Design Manager
The General Services Administration

Propose. Design. Build—with BIM.

Using Autodesk BIM solutions, two firms streamline design and construction on the Tuttle Courthouse Annex project.

Tuttle Courthouse Annex. Image courtesy of Stevens & Wilkinson.

Project Summary

Under the auspices of the Design Excellence Program, the General Services Administration (GSA) recently initiated an extensive construction and renovation project at the Tuttle Courthouse Annex in Atlanta, Georgia. Managed by the GSA's Public Buildings Service, this program streamlines the selection process for design professionals while cutting costs and encouraging creativity. The ambitious 100,000-square-foot Tuttle Courthouse Annex project includes the renovation of four historic buildings, expansion of administrative offices, LEED® Silver certification, and the design of a new, two-level addition. To help achieve these goals, the GSA mandated the use of building information modeling (BIM) software throughout the entire design and construction process. In addition, the GSA chose a bridging project delivery process, in which A/E/I consulting firm Stevens & Wilkinson performed all programming and design before transferring the resulting model to The Beck Group, the design/build firm chosen to complete detailed design documents and construction.

The Challenge

In 2005, Stevens & Wilkinson won the Tuttle Courthouse Annex project in a pre-award process involving more than 50 competitors. "Our firm has a rich portfolio of government work," says Ronald V. Stang, Jr., AIA, LEED AP and principal at Stevens & Wilkinson. The firm also possesses considerable expertise in sustainable design, historical redevelopment, and the BIM process using software based on the Autodesk® Revit® platform. In 2005 the firm made a companywide commitment to using Autodesk® Revit® Architecture software as its primary design software; since then, it has completed more than a dozen major projects with the software.

At the heart of the Tuttle Courthouse Annex project was the renovation of four existing historic buildings, three built from timber and one from concrete—all of which lacked a usable planning grid. "The GSA wanted a 21st-century workspace in a building almost 80 years old—a goal that involved significant challenges," says Stang.

Autodesk®

Using Autodesk Revit Structure software, designers determined how to lift several floors and build a new, more effective foundation.

"For example, we had to design a new underground parking structure underneath two of the timber buildings, where the existing floors had very tight column spacing and low ceiling heights," says Stang. Construction teams had to be able to use these designs to remove two of the existing lower floors and replace them with an entirely new structure while supporting the other four floors of timber construction.

The GSA also requested construction of a tunnel connecting the new facilities with the existing Tuttle Courthouse, located across a narrow street. "With all of the existing utilities in the rubble-foundation walls, it was quite tricky," says Stang. Additionally, although only two-stories high, the new building had to support the future addition of four more stories.

Finally, because the facility is located on a congested block in the historic Fairlie-Poplar district, Stevens & Wilkinson had to design a system that would meet all the programmatic requirements—including stringent space allocation—while maintaining access to the adjacent buildings during construction.

The Solution

For help with training, developing best practices, and multidisciplinary coordination, Stevens & Wilkinson contracted with Autodesk reseller Applied Software. "Their support was extremely valuable in helping us get up to speed quickly on this project," says Jae Chong, associate vice president at Stevens & Wilkinson. Applied Software also helped create a variety of customized Revit templates and visualization tools.

Finalize Design Details

In early 2008, after Stevens & Wilkinson had completed a model capable of incorporating architectural, structural, and interiors data, the GSA used this model to solicit proposals for detailed design and construction. The Atlanta office of The Beck Group, a national integrated design/build firm, impressed the GSA with a series of animations created with Autodesk Revit Architecture and Autodesk® 3ds Max® Design software, leading to their ultimate selection. "BIM completely mirrors the culture of our firm," says Josh Oakley, BIM manager at The Beck Group.

After being awarded the project, The Beck Group mandated BIM use among its consultants. "We formulated an execution plan that included a structural, an interior, and an existing site model as well as a model that we created with Autodesk® Revit® MEP software and later split into four separate models for mechanical, electrical, plumbing, and fire protection," says Damian Hamlin, architectural project manager at The Beck Group.

To share information among team members, The Beck Group initiated biweekly coordination meetings and also used Autodesk® Constructware® web-based project management software. To further enhance coordination, The Beck Group employed Autodesk® Navisworks® software. "Because none of the existing walls were square, nothing was exactly where we wanted it to be when we laid it out," says Oakley. To precisely locate all building elements, the design team laser-scanned the entire building and input the resulting point cloud into the Navisworks model.

"This data made it very easy to compare the square footage from the conceptual model with both the actual conditions and our updated plan layouts," says Hamlin. "Spatial validation was ten times more effective, more accurate, and easier to communicate than it would have been without BIM."

> We find tremendous value in BIM, whether we are designing, building, or executing on both the design and construction side at once. BIM provides benefits at every stage—including better coordination, higher-quality designs, and more accurate estimating.
>
> —Damian Hamlin
> Architectural Project Manager
> The Beck Group

Tuttle Courthouse Annex: End-user program validation. Image courtesy of Stevens & Wilkinson.

Help Make Better Decisions

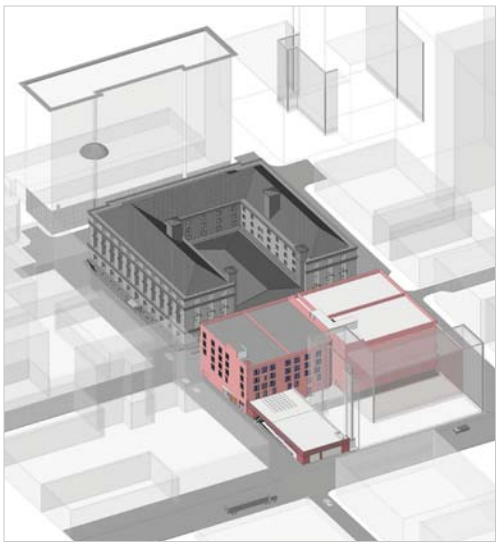
Throughout the project, the ability to easily create multiple design options helped The Beck Group and the stakeholders make better design decisions faster. "Each discipline—architects, structural engineers, MEP engineers, and interior designers—had to provide independent design options," says Chong. "Using Revit-based software, we rotated these models, created sections on the fly, and showed the client what we were talking about—helping to take much of the guesswork out of the process."

For example, one stakeholder was concerned that construction of the tunnel between the annex and courthouse would restrict parking. "Using the Revit Architecture model, we showed them how we were going to sequence construction of the tunnel to avoid impacting parking," says Hamlin.

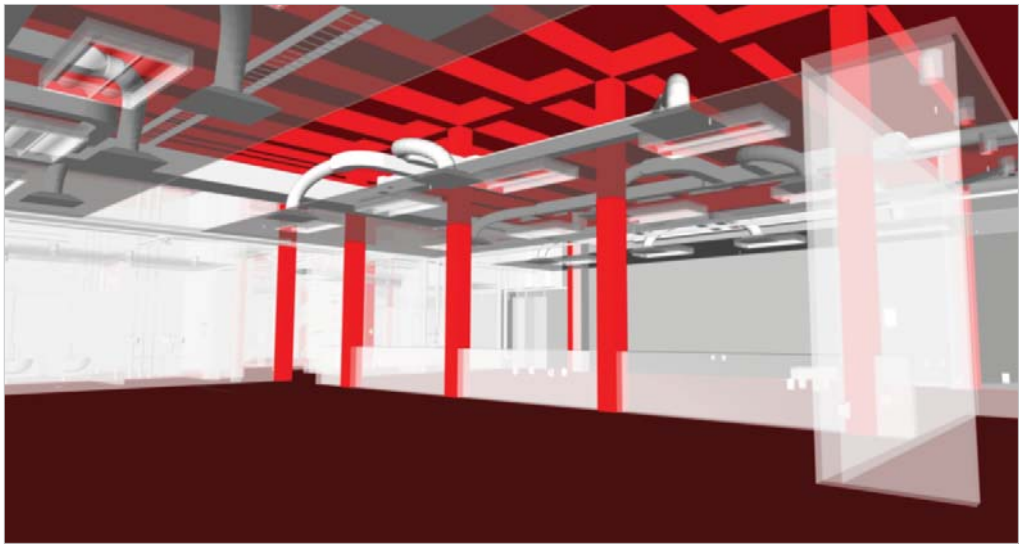
In portions of the largest building, the designers had to replace much of the existing wooden structure with steel, an extremely complex process involving lowering the basement floor elevations and installing new columns, footings, and foundations on a large segment of the building. "Modeling was truly critical to understanding, coordinating, and visualizing that work—not just for us, but also for our contractors," says Hamlin.

Make Changes—Faster

The original design from Stevens & Wilkinson called for a steel-framed parking garage. "Once we started getting into the specifics of the structure, construction sequencing, and the escalating prices of steel, we decided to switch the entire structure to concrete," says Hamlin. "Using Revit Structure software, the structural engineers made those changes in less than two-and-a-half days and more easily obtained owner approval. With 2D methods, that process would have taken three weeks."



Tuttle Courthouse Annex: Project axonometric. Image Courtesy of Stevens & Wilkinson.



Tuttle Courthouse Annex: Interior view. Image Courtesy of The Beck Group.

"Every square inch mattered on this project," says Hamlin. "Our client tracked that data very closely." Using Revit Architecture, the team moved walls, trying to give each attorney an identical amount of space, and the software automatically updated all of the schedules. "Not having to recalculate a separate spreadsheet helped to save us a lot of time and money and also made it easier for the end user to understand how we allocated space."

Throughout the design phase, The Beck Group linked the models into its cost-estimating software. "Because we built our models carefully in the beginning, we were able to provide an accurate and updated estimate at each of the four design submissions on this project," says Oakley.

Build More Effectively

As soon as construction began, Oakley brought the model onto the construction site. "During weekly coordination meetings with subcontractors, we used Navisworks software to run collision reports and project the model onto the wall," says Oakley. The team then used Navisworks software to analyze and resolve the clashes.

Oakley also put Autodesk® Design Review software on computers belonging to the superintendent and the project engineers, administrators, and manager, providing access to all of the data created during design. In one case, the concrete subcontractor actually used Autodesk® Revit® Structure software to modify the original model for detailed rebar drawings and site layout.

BIM helped The Beck Group dramatically reduce Requests for Information during construction.

"BIM dramatically increased our productivity during construction," says Hamlin. "With a smaller team, we produced more information and answered far more questions during the design phase instead of waiting until construction and having to deal with a thousand Requests for Information (RFIs) and all of the associated emails, paperwork, and RFI logs." The Beck Group further enhanced their productivity by sharing the model with the sheet metal subcontractor, who imported it into a CAD program and then exported it to a plasma cutter for digital prefabrication.

Work Toward LEED Certification

Both firms relied upon the BIM process to help work toward LEED Silver certification. For example, Stevens & Wilkinson proposed a green roof and used Revit Architecture software to quantify that space and present it to the GSA and the court system as an amenity space.

The Result

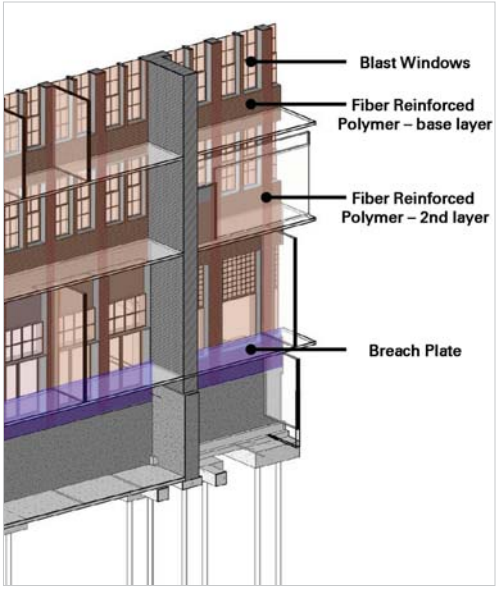
The Tuttle Courthouse Annex project is currently under construction, with completion scheduled for August 2010. At that time, The Beck Group will deliver a variety of as-built Revit models to the client, as well as an as-built Navisworks model that contains hyperlinks to manufacturers' data for all of the building elements. "Our goal is to provide the client with as many options for future facilities management capabilities as possible," says Oakley.

"BIM helps enable us to have a cohesive, central language across the disciplines, at every stage of a project," says Oakley. "It greatly facilitates the integration we strive for as a firm. Being able to model a project before beginning construction gives us a tremendous competitive advantage."

Better Client Relationships

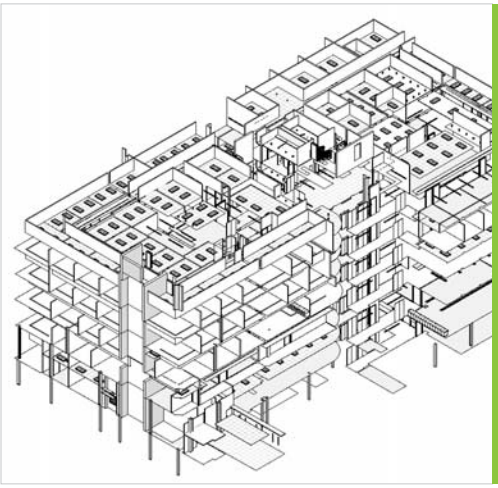
"Autodesk BIM solutions helped us work more effectively, reduce overall team size, and improve our relationship with the GSA," says Stang. "The client really saw how we were able to work as a close-knit team and give them what they wanted."

"BIM expedited the whole process," says Paul Dehaven, design manager at the GSA. "It absolutely led to better coordination among the disciplines, helped us focus on quality, and eliminated many of the conflicts associated with traditional 2D approaches—including the number of RFIs." This project was the first initiated by the GSA in which all disciplines used BIM from project outset. "It will not be the last." Following occupancy, the GSA also plans to use the model for facility management and maintenance purposes.



Tuttle Courthouse Annex: Blast mitigation visualization. Image courtesy of Stevens & Wilkinson.

For more information, visit **www.autodesk.com/gov** and **www.autodesk.com/bim**.



Tuttle Courthouse Annex: 3D axonometric model created in Revit Architecture. Image Courtesy of The Beck Group.

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—Ronald V. Stang, Jr.
AIA LEED AP Principal
Stevens & Wilkinson

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