

HNTB Corporation
Turner Universal

Customer Success Story

Autodesk® Revit® Architecture
Autodesk® Revit® Structure
Autodesk® Revit® MEP
Autodesk® Navisworks®
Autodesk® 3ds Max® Design
Autodesk® Buzzsaw®
Autodesk Consulting

Technology is a key differentiator for us—especially within the federal marketplace, where we are doing better work, faster and more economically. We understand the benefits of BIM and are committed to using this process—100 percent. I really do not see how we could do business any other way.

—Bradley Schulz
Vice President
Federal Architecture Market
HNTB Corporation

Design-build smarter—and save.

HNTB delivers exceptional design value, flexibility, and cost savings with Autodesk BIM solutions.



Fort Knox Human Resources Center of Excellence. Image courtesy of HNTB.

The Firm

HNTB Corporation is a large, employee-owned organization known for its work in transportation infrastructure, architecture, and urban design and planning for federal, state, municipal, and private clients. Since 1914, the architects, engineers, and technical specialists at HNTB have completed thousands of major projects and won significant recognition, including three Grand Conceptor Awards from the American Council of Engineering Companies. HNTB draws on its nationwide resources to provide government-sector clients with a range of services, including planning, program and construction management, civil engineering, architecture, infrastructure development, and military facility design—both in the United States and abroad. On every project, HNTB is committed to providing high-quality work—on time, on budget, and to the client's satisfaction. That is why HNTB adopted the Autodesk® Revit® platform as its core building information modeling (BIM) solution and included complementary BIM products Autodesk® Navisworks® software, Autodesk® 3ds Max® Design software, and Autodesk® Buzzsaw® software.

A Paradigm Shift

Using an Autodesk BIM solution, HNTB can evaluate design alternatives more quickly, make better decisions earlier, and collaborate more effectively with construction teams. To accelerate the move to BIM, HNTB teamed with Autodesk Consulting, which delivered implementation planning, project-based training and setup, and HealthCheck services to provide ongoing feedback and prepare the team to meet deadlines and deliverables.

The firm's decision to adopt BIM is part of a much larger trend within the government sector. In fact, since 2003, the General Services Administration (GSA) has initiated more than 70 capital projects that employ a BIM approach. In 2007, the GSA began requiring all project teams seeking funding for major projects to submit a 3D model prior to final concept presentation. Since adopting Autodesk BIM solutions, HNTB has completed dozens of BIM projects, including the \$183-million U.S. Army Human Resources Center of Excellence (HRCoE)—the largest construction project ever undertaken at Fort Knox.

Autodesk®

Using an Autodesk BIM solution, the HNTB/Turner Universal team was able to provide the client best value for the proposal.

The Challenge

When complete, the HRCoE will encompass 883,000 square feet across 104 acres and house more than 4,300 administrative, computer, and command operations personnel. In addition to office space, the facility's six buildings will include a data center, conference and training rooms, storage areas, and an existing dining facility. To meet its sustainability goals, the U.S. Army Corps of Engineers (USACE) also required the new complex to achieve a LEED® Silver sustainable design certification.

Fast-Track Schedule

Although the client did not require BIM on the fast-track Fort Knox project, it did demand a design and a delivery method that would maximize efficiency, collaboration, cost effectiveness, and sustainability. "Meeting the schedule was particularly important," says Marwan Bakri, HNTB BIM federal technology manager.

The Solution

To meet these challenges, HNTB teamed with Turner Universal, a well-known construction company. Together, the two firms chose to implement a design-build project delivery method supported by an Autodesk BIM solution. "Both of our teams were already comfortable with BIM and understood the natural relationship it has with the design-build process," says Bakri.

The Fort Knox project is the HNTB/Turner Universal team's sixth design-build project for the military and one of dozens the two firms have completed together over the past decade. This close relationship helped them deliver greater design value and flexibility on the Fort Knox project—from the pre-award proposal process to construction.

Move Quickly—Deliver Greater Value

HNTB and Turner Universal won the design-build contract for the HRCoE in August 2007. "The client selected us based upon our qualifications, but also upon the innovative design strategies we developed during the pre-award phase and the technologies we used to present our designs," says Bakri.

For example, HNTB and Turner Universal proposed a double-chevron building design solution to the military as a more cost-effective design to the structure outlined in the original Request for Proposal (RFP). HNTB performed an analysis of the existing site that helped it develop a modified design that better integrated the new buildings. This change minimized the need for costly earthwork and grade changes during construction and dramatically reduced equipment, labor, and material expenses.

By using Autodesk® Revit® Architecture software to perform simple takeoffs from the building exterior, HNTB also discovered \$3 million in skin cost savings that it was able to reinvest in other areas of the project. "The software's ability to make changes and instantly tie them to the schedules and changing dol-

The Revit platform and its iterative design capabilities enhance all aspects of the design-build process.

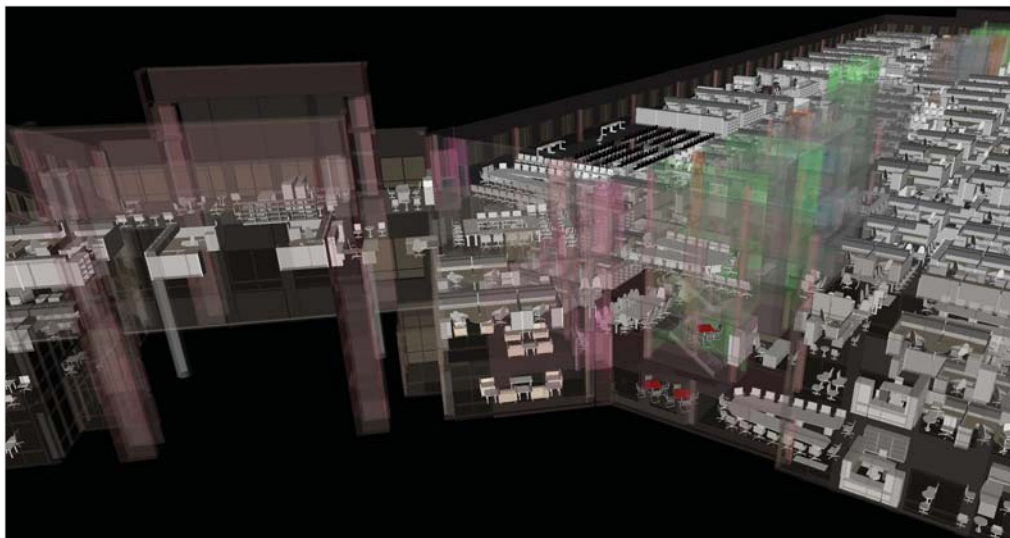
—Marwan Bakri
BIM Federal Technology Manager
HNTB Corporation

lar signs was huge," says Bakri. "Using traditional 2D methodologies, that would not have been possible."

HNTB also used Autodesk BIM solutions to position electrical utility runs close to the data center—the building with the largest power requirement—saving \$300,000 in primary utility run costs. As a direct result of these and other cost-saving measures, HNTB was able to provide additional value in materials and finishes in addition to meeting all of the design and functional requirements for the facility—a best value solution for the Army.

Visualize for Better Communication

To communicate these money-saving design changes to the client, HNTB relied on Revit Architecture and its powerful visualization capabilities. In addition, before presenting the project to the Fort Knox Board of Directors, HNTB exported the model to 3ds Max Design, created a realistic walk-through of the project exterior, and exported it into a Quest3D® gaming engine. As a result, the board members were able to navigate through the model using an Xbox® controller and better experience the space. Unlike other 3D graphics, the information pulled from BIM data was precise and accurate enough to demonstrate the appearance and the functionality of the space so that users could effectively review and assess them early in the design phase. "Autodesk 3ds Max Design software played a key role in helping us win this project," says Bakri.



Furniture placement, Fort Knox Human Resources Center of Excellence. Image courtesy of HNTB.

Improve Collaboration—Right from the Start

“Design-build projects encourage much greater collaboration among members of the extended design team because we are all in it together—first to win the project and then to complete it,” says Bakri. Throughout the pre-award process, the entire extended team met weekly to discuss the design and to set guidelines on how to use BIM to increase efficiency and collaboration.

For example, when designing a building wall, HNTB typically creates one continuous wall shaft. On this project, however, Turner Universal preferred a floor-by-floor breakdown because it would facilitate shaft wall quantity takeoffs during construction. As a result, HNTB changed its approach. “It took some extra effort on our part,” says Bakri. “But in the end, we created a model that was sophisticated enough for use in both design and construction.”

The Revit platform also facilitated earlier and ongoing collaboration with the external MEP consultants, who used Autodesk® Revit® MEP software. “We hosted the shared model on an Autodesk Buzzsaw site,” says Bakri. “Every Friday, all of the different disciplines—including the MEP engineers—would upload their work for coordination with our model. Because we could see issues as soon as we linked their files into our model, we caught a lot of things early, such as ducts coming out of the ceiling.”

The Autodesk BIM solution also improved collaboration within HNTB itself. “Our structural



Image courtesy of HNTB.

engineers share servers with our architectural team,” says Bakri. “That helped us view the Autodesk Revit Structure model in real time and avoid having to create our own temporary structural grid.” This easy exchange of data resulted in a tremendous increase in coordination throughout the model. It also helped the team make better decisions on a tight timeline and prevent time-consuming and costly duplication of effort.

Work More Efficiently

HNTB and Turner Universal developed the Fort Knox HRCOE initial design in only 60 days—a notable feat given the project’s scope. “One of the biggest advantages of using Revit Architecture was that we could change the design in one place and the software would automatically update the rest of the model,” says Bakri. “That helped us see the impact of our changes immediately and take a new course of action if necessary.” HNTB leveraged this capability to meet its deadline on a very tight schedule—even with almost constant design changes.

This capability also helped HNTB track inventory. “For example, the comprehensive interior design package required us to quantify every piece of furniture going into the buildings,” says Bakri. “Using the Revit Architecture model and its central database, we were able to track the furniture throughout the ongoing design changes. That was a huge efficiency for us.”

Easily Detect Conflicts

To manage the inevitable conflicts that arise in very large construction projects, HNTB instituted its own internal RFI process. “Whenever we spotted a conflict, we sent screen shots to everyone on the team and figured out what we needed to adjust,” says Bakri.

For more comprehensive clash detection, HNTB and Turner Universal used Autodesk® Navisworks® software. “In our meetings with the builder and consultants, we regularly performed clash detection tests,” says Bakri. “We saw huge value in them.” So much so, in fact, that Turner Universal Company nationwide actually purchased 1,000 licenses for Navisworks and trained its staff and subcontractors in its use.

By identifying conflicts during design, the project team anticipated reducing the need for onsite change orders that could delay construction and cause work stoppages. “Using traditional 2D methods, we simply would not have been able to discover as many conflicts until much later,” says Bakri.



Subcontractor coordination meeting.
Image courtesy of Turner Universal.

The U.S. Army Human Resources Center of Excellence is the largest construction project ever undertaken at Fort Knox.

Minimize Downtime with 4D Sequencing

Using Navisworks, HNTB and Turner Universal outlined construction phasing early in the project. This process also reduced the incidence of work stoppages, minimized downtime, and improved labor utilization rates. In combination with ongoing clash detection, this 4D sequencing helped shave hundreds of labor hours from the project. "Navisworks helped us control both schedule and cost on this project," says Tony Marks, general superintendent at Turner Universal.

Meet Stringent Environmental Standards

HNTB is committed to reducing the impact of its projects on the environment. BIM plays an important role in reaching that goal. "Revit Architecture definitely simplifies and expedites the LEED certification process," says Bakri. "For example, we now use a LEED template that we developed in Revit Architecture to track 25 key sustainable design points." On the Fort Knox project, HNTB also used 3ds Max Design to perform day lighting analysis on the model.

HNTB and Turner Universal took a variety of additional steps to meet its environmental goals. For example, the project features a white reflective roof membrane and high insulation values to reduce the amount of energy required to operate the facility. To further reduce waste and water usage, the facility incorporates low-water components, recycled material, and extensive recycling of construction waste.

The Result

HNTB completed the HRCoE design in September 2008. Currently, the HRCoE is under construction and on track for completion in early 2010. The client has also expressed interest in using the model for future facility management.

Even given the restraints of the fast-track design-build process, HNTB delivered tremendous design value and flexibility. "Using the Revit platform, we worked more efficiently and with a much greater degree of coordination," says Bakri. "BIM helped us to give more—even with the restrictions of schedule."

"Technology is a key differentiator for us—especially within the federal marketplace, where we are doing better work, faster and more economically," says Bradley Schulz, HNTB vice president and federal architecture market sector leader. "We understand the benefits of BIM and are committed to using the process—100 percent. I really do not see how we could do business any other way."

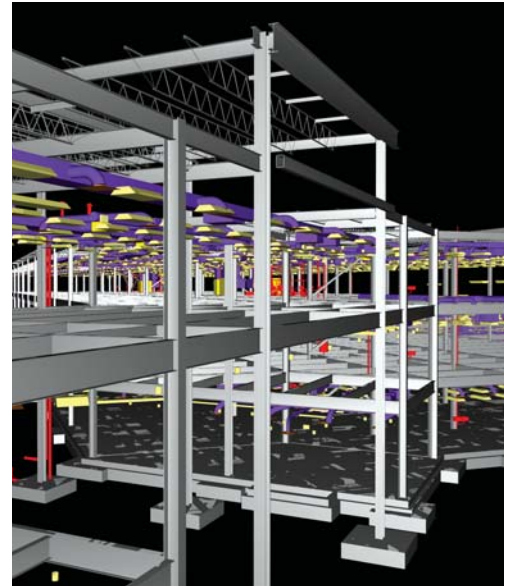


Image courtesy of HNTB.

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



Image courtesy of HNTB.

Using Navisworks for clash detection during the initial design coordination process, we reduced thousands of clashes to only a handful—helping us save time and money and decrease the overall time spent on design. During construction, Navisworks helped us push the completion of critical areas and significantly increase coordination with the trades.

—Evan Walker
Cost/BIM Engineer
Turner Universal