

## COMPANY

**McCarthy Building Companies, Inc.**

## LOCATION

**New York, United States**

## SOFTWARE

**Autodesk® AutoCAD® Architecture**  
**Autodesk® Navisworks® Manage**

# Better Buildings with Autodesk solutions

## McCarthy builds complex physical sciences building for Cornell University, on time and on budget, with help from Autodesk solutions

The model let us visualize the architecture holistically. The architect could view wall elevations and better understand the integration of research equipment and utilities. Together, we worked through the building virtually, solving both architectural and mechanical coordination problems.

—**Fran Birdsall**

Senior Project Manager  
McCarthy Building Companies



Image courtesy of McCarthy Building Companies, Inc.

### Project summary

Founded in 1864, McCarthy Building Companies, Inc. is one of the oldest privately owned construction firms in the United States—and it shows. McCarthy brings intimate knowledge of the construction process to every job, earning its reputation for delivering high-quality projects safely, on time, and on budget. When McCarthy started a complex physical sciences building project for Cornell University, the company and its subcontractors had just begun exploring the power of Autodesk® Navisworks® Manage software for model coordination. From preconstruction planning through construction and inspections, Navisworks Manage software helped facilitate nearly every aspect of McCarthy's work on the project. With help from Navisworks Manage, McCarthy was able to:

- Deliver a high-quality project on time
- Reduce rework and associated costs
- Prefabricate systems, saving time and money

### The challenge

McCarthy needed to build a 195,331-square-foot physical sciences facility in a space surrounded by three existing Cornell buildings. The structure would contain more than a hundred physics and chemistry labs, supported by complex mechanical, electrical, and plumbing (MEP) systems that would have to tie into existing systems in an adjacent building. "Our single biggest challenge was coordinating construction," explains Fran Birdsall, senior project manager at McCarthy. "We had to place a highly complex, low-vibration structure very precisely on the site. It was exponentially more complicated than building a structure in the middle of a field."

Although the project wasn't designed in 3D and its subcontractors had limited experience with it, McCarthy believed that doing 3D coordination was the only way to deliver a quality building with little rework. "We knew there would be a steep learning curve for subcontractors, but the payoff would be worth it," says Birdsall.

### The solution

Using 2D drawings provided by the architect, McCarthy and its mechanical subcontractor created a 3D model in Autodesk® AutoCAD® Architecture software, detailing every part of the project from walls and doors to mechanical and plumbing utilities. The team then integrated the model with design files from subcontractors in Autodesk Navisworks Manage software, enabling fly-throughs and reviews. During meetings, team members from McCarthy, Cornell, the architectural firm, and subcontractors viewed the Navisworks model on a SMART Board interactive whiteboard, helping the team to collectively see the project in 3D on a large screen, identify any problems areas, and collaborate on the resolution. "The model let us visualize the architecture holistically," says Birdsall. "The architect could view wall elevations and better understand the integration of research equipment and utilities. Together, we worked through the building virtually, solving both architectural and mechanical coordination problems."

# 3D coordination helps reduce rework and control costs

## 3D Model drives prefabrication and preconstruction reviews

In fact, reviewing the design for constructability on a large screen helped McCarthy avoid problems during construction—and helped save Cornell money. For example, the team realized that the complex mechanical systems simply wouldn't fit into the ceilings as designed. "We had ceiling problems on nearly every floor," says Alyssa Thomas-Partridge, who managed the coordination process and Navisworks model. After the ceilings were adjusted to fit the systems, the team discovered that one ceiling was too low to meet OSHA requirements. "If we were working in 2D, we probably wouldn't have discovered the problem until inspection," Thomas-Partridge says. "If we'd had to correct the issue after construction, it would have cost \$56,000 in rework."

Not only did viewing the model in Navisworks Manage help McCarthy with constructability issues, it helped the firm tackle one of the project's biggest challenges: integrating new and existing systems. "It was one of the best uses of Navisworks on the project," says Thomas-Partridge. "We modeled every connection point and discovered many problems we were able to resolve before walls went up."

In addition, McCarthy and its subcontractors were confident enough in the project model's accuracy and the coordination capabilities of Navisworks that they prefabricated several systems, including a pump skid in the penthouse. "We prefabricated everything we could," says Birdsall. "It let us build in a controlled shop environment and have things ready when we needed them on-site, helping to advance the schedule."

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—**BIM Manager**  
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McCarthy Building Companies

## Navisworks in the field

During construction, McCarthy loaded field staff's tablet PCs with the model, PCOs, RFIs, submittals, project specifications, and drawings. Subcontractors hosted daily toolbox talks for workers, using Navisworks fly-throughs to help plan each day's tasks. The result: improved quality and efficiency. Having the model and associated information on hand also supported onsite coordination. For example, onsite fly-throughs helped mason and drywall subcontractors see how they would interface with MEP systems and where they should install penetrations.

McCarthy relied on the models to help make sure work would pass inspection. To check fire caulking, McCarthy created PDFs of all systems, highlighting rated walls, then loaded the PDFs onto tablets for subcontractors to take into the field. "They could more easily see what walls were rated and needed to be fire caulked," explains Thomas-Partridge. "As a result, we were on the same page as the inspector."

Teams also checked completed work against the model. In one case, McCarthy found a Phoenix valve installed in the wrong location. "We took it out and installed the correct one before inspection, which was significant as it would have otherwise set back the schedule," says Birdsall.

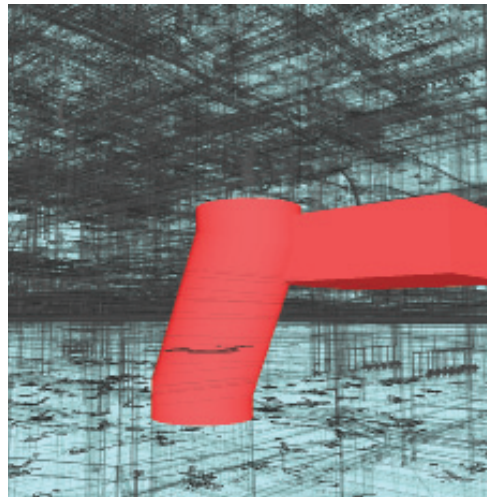


Image courtesy of McCarthy Building Companies, Inc.

## Results

Navisworks Manage, together with the SMART Board interactive whiteboard, helped McCarthy improve quality, speed construction, resolve issues digitally, and control costs on the Cornell project—while impressing the client along the way. "Even though this was Cornell's first 3D model-based project, its team started using every model we created almost immediately," says Adam Lega, BIM manager at McCarthy.

"McCarthy's use of Navisworks on Cornell University's physical sciences building provided the level of real-time feedback required to better coordinate the complicated and space-challenged project," says Gregory L. Crosssett, senior project manager for preconstruction and construction services. "The 3D coordination process helped save the project both time and man-hours during the installation process."

Birdsall adds, "With help from Navisworks, everyone can view the information they need all at once. They can sequence things correctly, complete higher-quality work, and address problems virtually. There's absolutely no question that Navisworks helped to save time and money on the Cornell project."

Navisworks Manage not only helped McCarthy deliver the Cornell project successfully, it also helped make it easier for the company to secure new work in a tough economy. Clients are impressed that the firm can deliver as-built models for building operations and maintenance—and reassured when McCarthy shows them how Navisworks addresses sensitive issues during construction. For example, the owner on a recent hospital project was concerned about how construction would affect the facility's dining area. McCarthy modeled and phased the work in Navisworks Manage to help illustrate what would happen at every stage of construction. "The day after our presentation, we won the job," says Lega. "It makes all the difference if you understand the client's needs and communicate how you'll meet them very clearly." Lega adds, "The bottom line is that Autodesk and its products help make us even better builders."