

S. A. Miro, Inc.  
Phipps-McCarthy  
H+L Architecture  
Zimmer Gunsul  
Frasca Architects

Customer Success Story

Autodesk® Revit® Structure  
Autodesk® Revit® Architecture  
Autodesk® Revit® MEP  
Autodesk® Navisworks® Manage

Without a doubt, our use of Revit Structure helped us to complete the advanced detailing work with greater accuracy and meet our aggressive schedule. Revit Structure was incredibly functional—better than any other tool we could have used.

—Gregg Behmer  
BIM Manager  
GH Phipps Construction  
Companies

# Do more with design data.

Innovative Autodesk BIM solutions drive faster project completion and reduce costs on major addition to Children's Hospital Colorado.

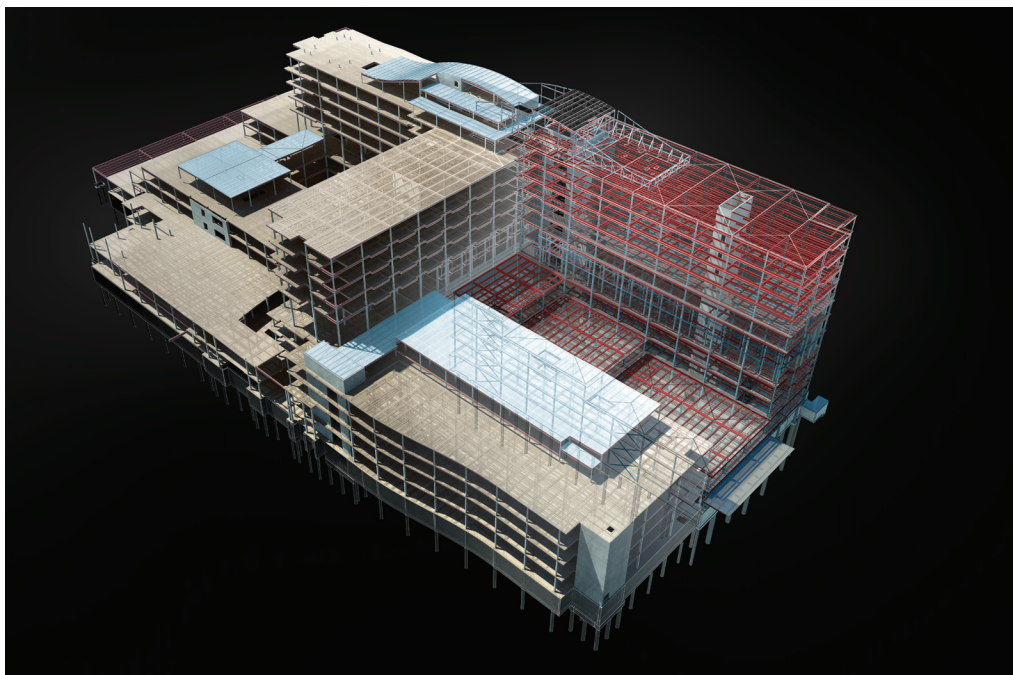


Image Courtesy of S.A. Miro, Inc.

## Project Summary

The main campus of Children's Hospital Colorado is located in Aurora, Colorado at the eastern edge of the Denver metropolitan area. Blending high-tech and healing in a family-friendly environment, Children's Hospital Colorado provides outstanding pediatric care to thousands of children every year. To better serve its patients and their families, Children's Hospital Colorado recently initiated a 150-bed, \$155-million expansion to its existing facility. The architectural team consisted of a joint partnership between H+L Architecture and Zimmer Gunsul Frasca Architects. For help completing the fast-track project, the H+L / ZGF partnership engaged Denver-based S. A. Miro, Inc. as the structural engineer of record. One challenging component of the firm's work was to deliver pre-approved fabrication drawings of the new ten-story building's embed plates, anchor bolts and setting plates, and reinforcing steel. For help completing this advanced detailing work, S. A. Miro, Inc. used Autodesk® Revit® Structure building information modeling (BIM) software for a variety of tasks, including coordination with the other design consultants that used model-based Autodesk® Revit® Architecture, Autodesk® Revit® MEP, and Autodesk® Navisworks® Manage software.

## The Challenge

After kicking off the project with a BIM execution meeting in March of 2010, S. A. Miro, Inc. was contracted directly by the general contractor, a joint venture between GH Phipps and McCarthy Building Companies, Inc. to provide advanced detailing services. "The team knew from the earliest days of the project that significant efficiencies could be achieved by moving the detailing process upstream and bypassing the traditional shop drawing and submittal process," noted McCarthy Project Director Doug Mangers. Close collaboration and the utilization of cutting-edge technology tools would be critical for success. By assigning the detailing to S. A. Miro, Inc., Phipps-McCarthy put that portion of the work in the hands of the team member with specific knowledge of the structural aspects of the project. S. A. Miro, Inc. maintained separate in-house design and detailing teams. "To meet the project's aggressive schedule, we had to complete the advanced detailing work concurrently with the design deadlines," says Ben Roberts, Associate at S. A. Miro, Inc.. Their goal was to avoid unnecessary duplication of work, while creating high-quality drawings that surpassed what most detailers / fabricators are capable of producing.

# Revit Structure and Navisworks helped the team identify more than 20 structural conflicts long before construction.

## The Solution

Unlike most fabrication subcontractors, who start with a stack of 2D documents, S. A. Miro, Inc. began the detailing process with an in-progress Revit Structure model. This model formed the basis for the detailing / fabrication model. As design progressed, the advanced detailing team was able to regularly coordinate its model with both the in-house structural model and the Revit® Architecture model used by the project architects.

Ultimately self performing the structural concrete work, Phipps-McCarthy had access to weekly updates of design team models, including the earliest preliminary structural models. This early and ongoing access to models was very valuable, particularly during the advanced detailing effort. It allowed the team to preplan many of the most difficult elements of construction, including concrete pour sequences, pour breaks, and 3D coordination of the building's climbing form work system.

This preplanning yielded powerful results. By combining the Revit Structure model from S. A. Miro, Inc. and the details from the climbing formwork system in Navisworks Manage to perform clash detection, Phipps-McCarthy discovered more than 20 conflicts between the embedded supports of the climbing formwork system and the structural embeds. They were able to resolve all but six—and they were able to determine a fix for these remaining conflicts months in advance of doing the work in the field.

Revit Structure also helped S. A. Miro, Inc. assemble a complete bill of materials and bend schedules based on CRSI standards that Phipps-McCarthy could use for performing more accurate quantity take-offs and cost estimating. During the buyout process, Phipps-McCarthy typically sees more variance in bids that can add considerable cost due to the associated uncertainty. On this project, the bid spread was much tighter because the pre-approved fabrication drawings were included with the bid drawings and the scope of work was very precisely defined.

## The Result

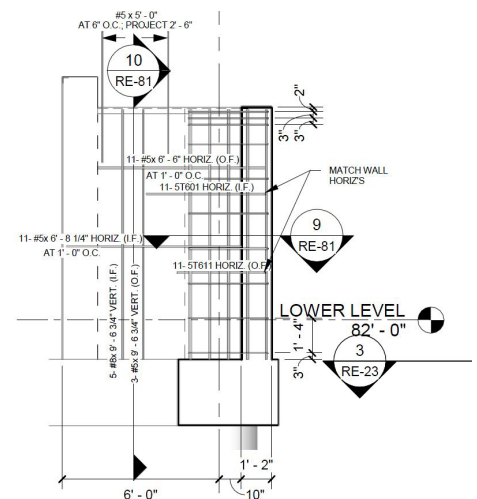
Construction on the expansion is underway. "The ability to coordinate all of the models—detailing, formwork, structural, architectural, and mechanical—was absolutely vital to the success of this project," says Erich Bretz, project engineer at S. A. Miro, Inc. and liaison between the design and detailing teams. "Having all that data at our fingertips allowed us to expand the scope of services that we provide, while delivering a fantastic project that will showcase our technical capabilities for years to come."

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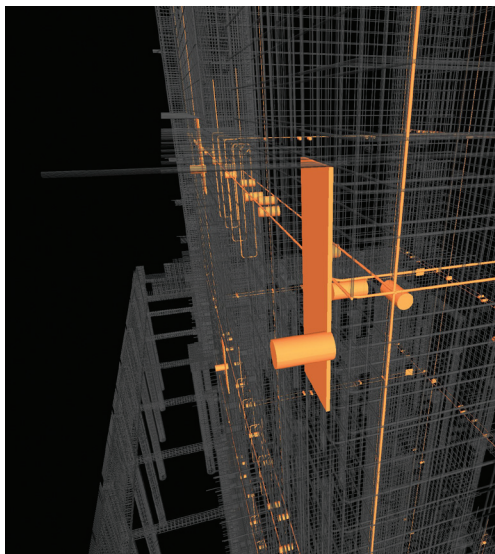
For more information, visit [www.autodesk.com/BIM](http://www.autodesk.com/BIM) and [www.autodesk.com/revitstructure](http://www.autodesk.com/revitstructure).



Construction in Progress  
Image Courtesy of Phipps-McCarthy



Basement Wall Rebar Detailing  
Image Courtesy of S.A. Miro, Inc.



Formwork clash identified in Autodesk Navisworks Manage  
Image Courtesy of Phipps-McCarthy

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