



## An Education in Site/Civil BIM

### Miramar College's New Student Center Reflects a Virtual Edge

As envisioned by San Diego Community College District (SDCCD), the \$33.3 million, 70,000-sq-ft Student Center and Cafeteria Bookstore at Miramar College in San Diego, Calif., will provide inspiration to students, faculty, visitors and, perhaps most surprisingly, to the entire building community.

For the first time in the SDCCD, the project team of NTD Architecture, along with RBF Consulting, an international planning, design and construction firm, will design and coordinate the building, site grading and utility design using building information modeling (BIM) tools and techniques.

"We have seen significant value created due to energy optimization, reduction in change orders, end user visualization, and back-end utility in our ongoing maintenance and operations that are uniquely available by integrating BIM into project delivery," says Dave Umstot, vice chancellor of Facilities Management at SDCCD. "Now

we're looking to realize these same benefits in the site and civil design aspects of the process."

RBF serves as campus civil engineer for the Miramar campus and is the engineer of record for many projects on the campus. Miramar College is the first project on the campus to utilize technology fully to achieve full BIM on the site.

#### A virtual vision

For RBF, BIM is far more than a modeling tool—it's a translation of the firm's decades of expertise into the virtual environment. Key in RBF's successful transition and application of BIM has been to have the right tools that drive a full collaborative BIM process.

In 2008, RBF partnered with U.S. CAD, an Autodesk Reseller, to meet its virtual design goals. With help from U.S. CAD, RBF relies on Navisworks Manage and AutoCAD Civil 3D.

Ron Moreno, senior associate with RBF, says, "We initiated discussions with U.S. CAD in order to understand what would be needed from various focus areas in order to develop this "design to virtual-build" environment. With U.S. CAD's help and input, we compiled the various workflow outlines including modified training guides, templates to integrate already in-place company standards and digital workflow guides built within our design platforms."

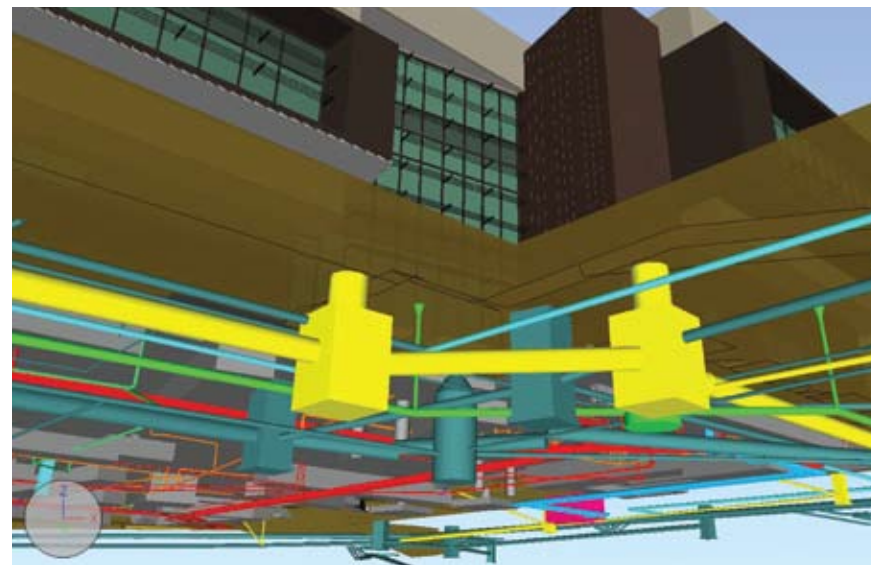
In addition, RBF was able to harness these same efficiencies and in-place resources to maximize areas of BIM not yet realized, such as 3D scanning, asset management and pre- and post-construction. RBF is now on the cutting edge of BIM technology for sitework, and is the first to implement such technology for SDCCD.

"By partnering with U.S. CAD so early, we were in an advantageous position to help our clients apply BIM on the site and civil aspects of a project, such as Miramar College," says Moreno.

#### Miramar and modeling

Envisioned as a multi-service gathering place, the Miramar College Student Center and Cafeteria Bookstore will house the campus bookstore, food services, staff offices and meeting rooms. Features include a three-story open atrium, large exterior access ramp and bridge, and surrounding walkways and gardens. The facility will also include photovoltaic panels as an alternative energy source among other energy optimization features. In addition to typical design and coordination items, the project was unique in that it involved the relocation of all major utility systems through a tight 25-ft wide corridor between two buildings.

To create a feasible design, RBF modeled the 3.2-acre site's grading, walkways and proposed utilities in AutoCAD Civil 3D. The existing surface and web of utility mains



"Population growth, environmental changes and economic challenges will continue to challenge the engineering profession. Implementing solutions using newer technologies, such as Virtual Planning, Design, and Construction, allows the engineering profession to continue to meet the public's needs at a higher level of efficiency while finding creative ways to solve problems in a virtual format prior to construction."

*Jim McDonald, CEO, RBF Consulting*

were also modeled using record drawings, utility mark outs, supplemental surveys and some potholing to expose underground utilities safely. In addition to utilities, RBF modeled the finish surface in detail to show accurate visualization and coordination of site grades, which included 10 site retaining walls and raised planters.

Using Civil 3D software for full plan production, RBF generated all utility and grading plan labels, including utility pipe data tables using the dynamic tools. RBF took advantage of custom developed utility structures, pipes and labeling to generate seamless final plans that were comparable to a traditional 2D set in look, feel and completeness, but with all the benefits of dynamic 3D.

John Prince, associate at RBF Consulting, adds, "The 3D surface eliminated the need to manually draw elevation contours. The software generates the grading contours

and automatically adjusts when changes are made, driving an efficient design process. The digital process also ensured an accurate design that was free of human labeling errors."

#### Streamlined coordination

Mechanical, electrical and plumbing (MEP) design and construction of the student center was performed in a design-build delivery method, while the rest of the project team completed design in the traditional design-bid-build format. The combined delivery method allowed the architect, landscape architect, structural engineer and civil engineer time to work through the design on a manageable schedule, while the integrated involvement of the MEP contractors allowed for direct contractor input.

Prince says, "Due to the coordination with other site consultants and the dedication to

implementing full BIM on the site, we were able to fully stake the BIM coordinated site electrical system using the electrical layout modeled by Gould Electric."

By implementing BIM techniques for the sitework, the contractor was able to move forward with confidence and perform critical early electrical relocations over the school winter break, which required a shutdown of the entire campus. The contractor is currently staking and trenching for work on the remaining utility systems.

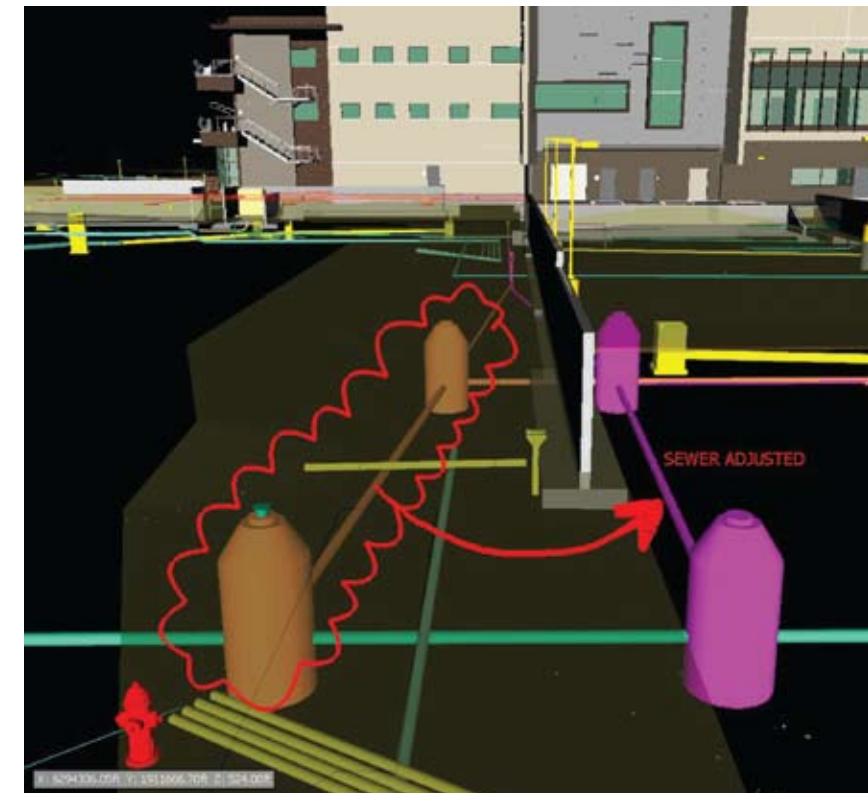
Prince says, "The BIM models along with all electronic files and research drawings were readily available to each team member in their own office on the web-hosted video system, creating a confident and clear communication forum to come up with feasible solutions to challenges as they occurred."

#### Facility management

Once the student center is constructed, RBF will provide final plan form documents as well as an as-built 3D model to the owner. The firm is also coordinating with SDCCD to evaluate facility management software for maintaining, repairing, locating and planning utility systems in the future.

Moreno concludes, "Working with U.S. CAD, our goal is to find a solution that can work seamlessly with the Civil 3D and Revit models, or with GIS software for post-construction applications."

The student center will be completed in 2012. All SDCCD projects moving forward will require BIM on the site.



#### About U.S. CAD

U.S. CAD is a BIM and manufacturing industry consultant and the largest Autodesk Authorized Value Added Reseller on the West Coast. U.S. CAD specializes in helping its customers integrate BIM, sustainable design, and digital prototyping technologies within their organizations by incorporating a variety of Autodesk solutions along with implementation, training, BIM modeling and production, and configuration services.

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