Field to Finish with BIM.

Timmons Group uses Autodesk BIM for Infrastructure solutions to streamline the surveying and mapping of a botanical garden.

Civil 3D helps us cut our time by at least 30 percent. Moreover, Civil 3D helps us improve our accuracy and overall quality—and, ultimately, deliver a better product to our clients.

—Dwayne Dunevant, LS
  Principal
  Timmons Group

Project included 20 acres of complex garden topography.
Image courtesy of Timmons Group.

Project Summary

Timmons Group is a multidisciplined engineering and technology firm headquartered in Richmond, Virginia. Founded in 1953, Timmons Group provides civil engineering, environmental, GIS/geospatial technology, landscape architecture, and surveying services to a diverse client base. To help increase the speed and accuracy of its projects, the firm has been using AutoCAD® Civil 3D® software, Autodesk's Building Information Modeling (BIM) solution for civil engineering and surveying, since 2009.

One of the firm's recent projects was the field survey of the Lewis Ginter Botanical Garden. Located in Richmond, Virginia, the Garden features over 50 acres of plants. In 2011, the Garden finished a major update of some of its grounds and gardens. Improvements included new beds and irrigation, better lighting, more seating and shaded areas, and added pathways to enhance pedestrian circulation.

The Challenge

"Due to the complexity of the site, the Garden's project team needed very detailed maps and tolerances of hundredths of a foot to support their redesign efforts," explains Dwayne Dunevant, LS, principal at the Timmons Group and surveyor in responsible charge on this project. "The only way to meet the tolerance requirements was through a field survey.

"They needed approximately 20 acres of topography surveyed and mapped in less than four weeks and they didn't have the budget for a large field crew," says Chris Marston, a survey project manager at Timmons Group. "We couldn't damage any of the vegetation during our survey and we couldn't disrupt the operations of the Garden or its visitors," adds Dunevant. "So even without the budget restrictions, a large survey crew was impractical."

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Reduce time by more than 30 percent.

The Solution
Timmons Group used AutoCAD Civil 3D model-based software to help conduct an intricate topographic survey of the Garden in a short amount of time with minimal field resources. Conventional surveying workflows typically require field work to be completed before processing data in the office. "We used Civil 3D to process field data in parallel with the collection, helping to reduce the time it took us to complete the project," says Marston. "And based on careful data capture and field coding, the software automatically created near production-ready maps of the Garden for us."

Increase Speed and Accuracy
"To stay out of the way of the visitors and avoid damaging the vegetation, we usually limited the crew to two surveyors per day," reports Dunevant. "In addition, there was too much hardscape and vegetation to get long lines of sight, which meant a lot of setups and moves. This slowed us down even more." In fact, it took almost the full length of the job to complete the field work. Nevertheless, Timmons Group was able to shrink the overall project schedule by performing model creation and mapping almost in tandem with data collection. Furthermore, its office personnel could collaborate more closely with surveyors to field-verify any inconsistencies, increasing project quality.

Streamline Your Survey
During its survey, Timmons Group used special field coding to capture its survey data and define feature lines, enabling the Civil 3D software to generate line work and symbology automatically as the points were processed. In addition, the Civil 3D software can process double, triple, or multicoded points that define more than one object or line.

"Using conventional surveying, the field crew would sometimes reshoot a point again and again," says Marston. "But during this survey, we could define multiple points with a single shot, which helped save our field crew a lot of time."

Incorporate Changes with Ease
As the survey data was imported, Timmons Group used Civil 3D software to create a digital terrain model and automatically generate contours. "In the past, any manipulation of the terrain model—changing vertical data for example—was basically a redo," says Marston. "With Civil 3D, there was no editing or reprocessing needed." For example, when the team incorporated new spot elevations, the terrain model, the contours, and the associated annotation were updated instantly. "We could see, in real time, the effect of any edits we made," says Marston.
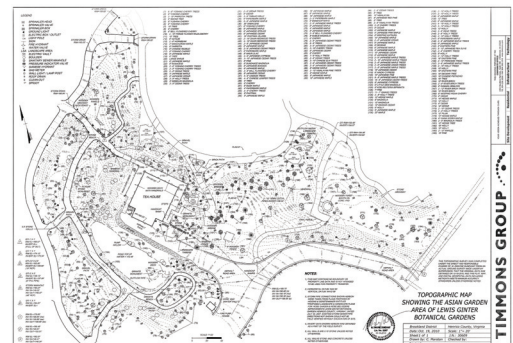
The Result
"With a model-based approach, we worked in a 3D world from field to finish," says Marston. "We didn't flatten 3D field data onto 2D sheets. We didn't have to wait until the field work was done to process the survey data, and we didn't have to redo work when changes happened. The whole process was just faster."

"On average, Civil 3D helps us cut our time by at least 30 percent," reports Dunevant. "Moreover, Civil 3D helps us improve our accuracy and overall quality—and ultimately deliver a better product to our clients."

For more information, visit **www.autodesk.com/civil3d**.

Project included surveying and modeling a complex garden with walkways and ponds.
Image courtesy of Timmons Group.

Civil 3D map created from survey data.
Image courtesy of Timmons Group.

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—Chris Marston
Survey Project Manager
Timmons Group

Project team processed field data in parallel with the collection.
Image courtesy of Timmons Group.

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