

## Langan Engineering & Environmental Services

Customer Success Story

**AutoCAD® Civil 3D®**  
**AutoCAD® Land Desktop**

To meet the needs of our integrated project teams we wanted a civil engineering solution that could grow with us and help us manage our growth. We needed to use a consistent technology platform—and consistent processes—on all of our projects regardless of their size, location, or scope of services. We found that technology in AutoCAD Civil 3D.

—Jon Rizzo  
Project Engineer  
Langan Engineering &  
Environmental Services

# Integrated design.

Langan and AutoCAD® Civil 3D® software improves efficiency and quality for clients around the world.



A Conceptual Master Plan of Santa Maria Golf & Country Club in Panama, created with AutoCAD Civil 3D

### The Firm

Langan Engineering & Environmental Services provides land development, geotechnical, and environmental engineering services for a wide variety of project types, including commercial, residential, and industrial development. Headquartered in Elmwood Park, New Jersey, Langan employs 600 professionals and has regional offices in New York City, Virginia, Pennsylvania, Connecticut, New Jersey, Florida, Nevada, California, Abu Dhabi, Dubai, and Athens. Langan's core disciplines also include landscape architecture and planning, surveying, transportation planning, GIS, permitting, and natural and cultural resources.

Founded as a geotechnical specialty firm in 1970, Langan quickly became involved in many large, complex projects and has grown steadily since inception—using its highly technical base to expand into civil engineering and environmental services. The company prides itself on the integrated nature of its services, providing “one-stop shopping” for its clients. Langan engineers, environmental scientists, and other professionals are part of integrated project teams that address difficult site conditions and challenging schedules. This strong interaction and tight integration among various

Langan discipline-specific organizations has been accomplished by investing in communications and IT services and solutions.

Langan has been an AutoCAD® Land Desktop software user for 10 years, and the firm decided to move to AutoCAD Civil 3D software—Autodesk's building information modeling (BIM) software for civil engineering—to help manage its own growth and keep pace with the latest civil engineering design technology. AutoCAD Civil 3D provides Langan with the technology to create and deliver better designs for its clients, and to visualize, simulate, and analyze those designs to achieve optimal results.

### Managing Growth

“We undertake a broad range of projects that involve an equally broad range of engineering services and disciplines,” says Jon Rizzo, Langan project engineer. “To meet the needs of our integrated project teams we wanted a civil engineering solution that could grow with us and help us manage our growth. We needed to use a consistent technology platform—and consistent processes—on all of our projects regardless of their size, location, or scope of services. We found that technology in AutoCAD Civil 3D.”

# After each design change, Langan used AutoCAD Civil 3D to produce an updated documentation set almost 50 percent faster.

## A Firm Fit

An AutoCAD Land Desktop software user since 1999, Langan's decision to migrate to AutoCAD Civil 3D was a bottom-up initiative. "When AutoCAD Civil 3D was first released we were excited about its potential and followed the progress of the new software closely for several years," remarks Rizzo. During the same period, the firm was experiencing growing pains, tackling larger, more diverse projects using cross-functional and often geographically dispersed project teams. After several years of watching AutoCAD Civil 3D mature and investigating its production readiness by using the software for pilot projects, Langan engineers decided the product was a fit and convinced management to make the move.

## Workflow Changes

Langan first retooled its internal workflows to take full advantage of the building information modeling (BIM) approach that the AutoCAD Civil 3D software employs for civil engineering design. "Our biggest challenge was determining how we needed to adapt our internal processes to accommodate the new software and increase the efficiency of our AutoCAD Civil 3D workflow," explains Rizzo. "We believed we should do this ourselves—using our own personnel and expertise—and so we formed a small group of in-house experts dedicated to implementing AutoCAD Civil 3D."

## Factors for Success

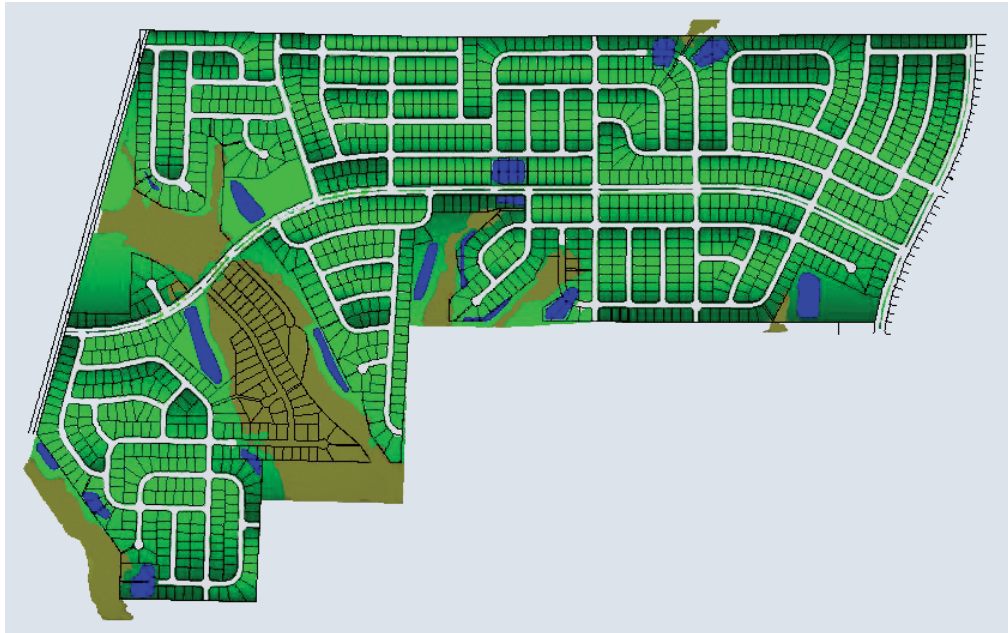
Langan's implementation of AutoCAD Civil 3D succeeded because of several key factors: the core group of in-house experts who focused on transitioning and training Langan's staff, the adoption of new CAD standards, and the use of customization and macros to automate repetitive tasks.

Over the years, Langan had developed its own set of CAD standards that worked well for the firm in the past, but proved problematic when working on large projects with partners who were using the U.S. National CAD Standards (NCS). AutoCAD Civil 3D provides a framework for customizing a firm's existing standards and also has an extensive library of production-ready CAD standards, including the NCS. Rather than creating a hybrid standard that combined its legacy CAD standards with the NCS, Langan chose to take full advantage of these ready-to-use libraries and decided to move to the NCS—allowing for easier coordination with partners.

In addition, Langan has used the customization capabilities of the software to its full potential. "We've created a variety of simple macros to automate repetitive tasks, saving us a tremendous amount of time—particularly on a large subdivision project where there's a lot of repetitive work," explains Rizzo. For example, one macro the firm wrote will generate a horizontal

The quality of the finished project even surprised the county review engineer, who commented that the project had the best looking set of plans he had ever seen... By using AutoCAD Civil 3D, we got it approved the first time around—a rare circumstance for land development projects on such a large scale

—Tiffany Toliver  
Senior Staff Engineer  
Langan Engineering &  
Environmental Services



Langan used Civil 3D to prepare site plans, paving plans, and grading and drainage plans for Sunny Hills Units 12-15. Unit 13, pictured above, contains roughly 1,400 of the 7,175 residential lots.

curve return and matching profile based on the selected intersection alignment, profiles, and specified radius in a subdivision intersection. "To do this task manually, one time, may not take that long. But when you do it thousands of times on a project, the time savings is dramatic," remarks Rizzo.

## Project Challenges

### Sunny Hills, Florida

Since adopting AutoCAD Civil 3D, Langan has used the software on more than 20 projects, and is currently working on one of its largest AutoCAD Civil 3D projects: a land development project located in the heart of the Florida Panhandle in Sunny Hills. The planned community was formally started in June 1971 with a master plan that included about 24,000 homesites. Recently, several large infrastructure projects in the Panhandle area have been launched—including a new international airport, a large new theme park and outdoor zoo, and widening of the interstate that connects Sunny Hills to Panama City and the beach-lined Gulf coast to its south. This has resulted in renewed development in Sunny Hills and prompted a



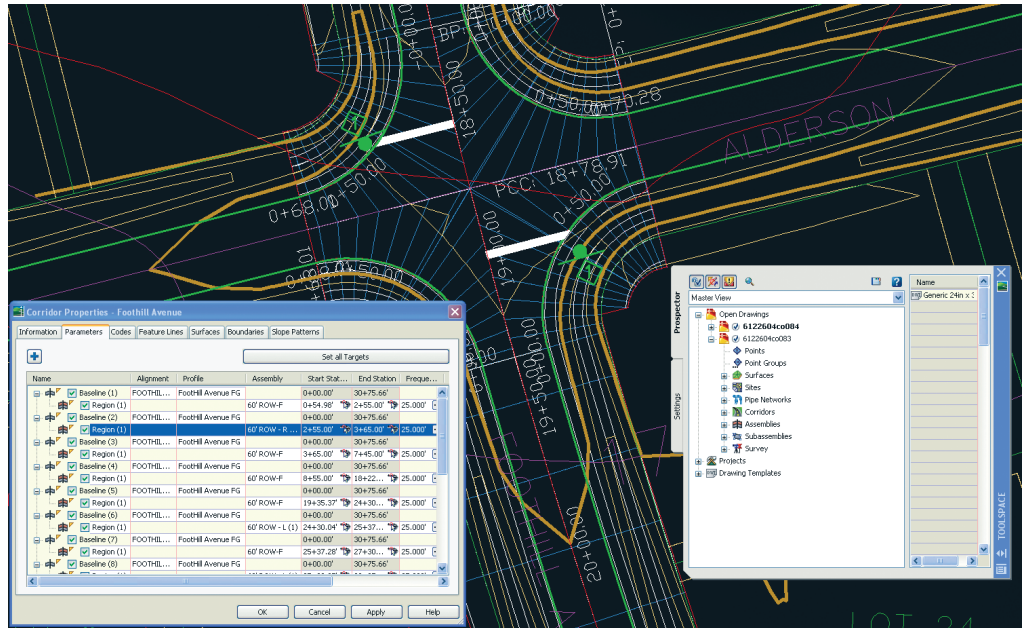
# Langan used the dynamic connection between the design model and related documentation to help to keep the entire project coordinated.

national real estate development company to purchase \$53 million worth of lots in Sunny Hills in 2006. The new 6.11-square-mile development is slated to include more than 7,000 single-family lots.

“The major challenge on this project is its sheer size,” says Tiffany Toliver, a senior staff engineer from Langan’s Tallahassee office. The site covers almost 4,000 acres and is pre-platted. The design of three of the four phases of the development is already done, and construction on the first unit has begun. When the project is completed, it will include 94 miles of roads and 147 retention ponds.

## Increased Productivity and Quality

The information model at the core of AutoCAD Civil 3D enabled Langan’s engineering team to better visualize the hilly terrain and optimize the design to balance the overall cut and fill for the project—reducing the amount of time and money spent to truck soil on, off, or around the site. “The site was challenging enough,” remarks Toliver. “But added to that, we were starting with original plats created when the development was first formed.” Since then, new state regulations have been adopted, providing for the protection of the wetlands and necessitating a buffer between the Sunny Hills



Grading plans for Sunny Hills, in the Florida Panhandle, included over 500 intersections modeled in AutoCAD Civil3D

development and the sensitive areas—limiting the accessibility to some homesites. In extreme cases, some roads were adjusted to protect the wetlands and adhere to the regulations. This retrofitting made the project more challenging. “The dynamic nature of AutoCAD Civil 3D allowed us to quickly work through design iterations,” says Toliver. “For example, we can easily adjust profiles to gauge the impact on earthwork volumes, or reposition a retention pond to maximize the number of developable lots.”

The intersection-building macro described earlier was particularly useful, considering that there are more than 500 intersections in the Sunny Hills development. “Using the macro, the time it takes for us to lay out an intersection is approximately 5 minutes, where it used to take 15 minutes,” explains Toliver. “That translates into more than 80 hours saved just on this task alone.”

## Exceptional Results

“The quality of the finished project even surprised the county review engineer, who commented that the project had the best looking set of plans he had ever seen,” reports Toliver. “The plan set we produced was incredibly easy to understand. In fact, there were no comments at all on our submittal. By using AutoCAD Civil 3D, we got it approved the first time around—a rare circumstance for land

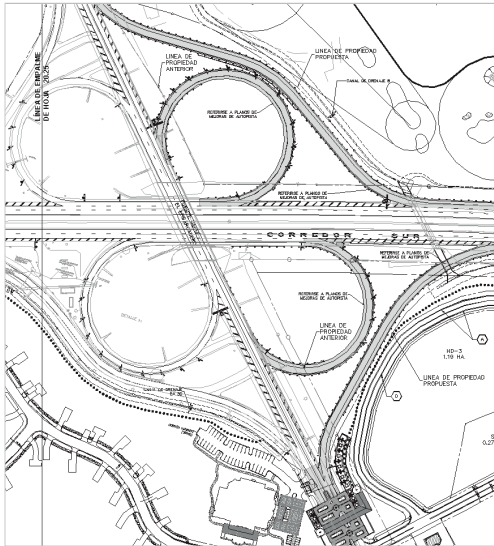
development projects on such a large scale.”

## Santa Maria Golf & Country Club, Panama

One of Langan’s recently completed AutoCAD Civil 3D projects is the Santa Maria Golf & Country Club, a high-end mixed-use development located east of Panama City, Panama, on a 700-acre site. This upscale development will include 275 single-family residential lots, 1,300 high-density residential units, an 18-hole golf course, and 100,000 square feet of retail and restaurant space.

## Aggressive Schedule

“The client’s schedule was very aggressive and—in addition to that pressure—our project team had to revise its design at least a dozen times to reflect changes the client made to the master plan,” recalls Claudia Correa, a staff engineer in Langan’s headquarters office. In this environment, the productivity benefits of using a BIM solution such as AutoCAD Civil 3D—with documentation that automatically updates when the model changes—proved to be invaluable. “Every time the master plan changed, we had to regrade the site, redo the profiles, and redesign the storm and sanitary systems,” reports Correa. “But with each change, we got an updated design and documentation set out the door quickly—almost 50 percent faster than it used to take.”



Langan designed a complex interchange for Santa Maria Golf & Country Club using AutoCAD Civil 3D

# AutoCAD Civil 3D makes it easier for Langan to develop sustainable, cost-effective design solutions.

## Interchange Design

The scope of services Langan provided on the Santa Maria project covered a broad range of civil engineering disciplines, including transportation design. The design involved widening the main highway that ran through the site and the completion of an existing half of a cloverleaf interchange to provide full access to the development. "There is existing superelevation on the main highway and we were adding a lane for acceleration and deceleration near the interchange, so our design had to match the superelevation," explains Rob Vincent, senior staff engineer at Langan's Elmwood Park, New Jersey, office.

Langan used AutoCAD Civil 3D software to complete the design of the widened highway and the new interchange. "The big advantage of AutoCAD Civil 3D was the dynamic, constant updating of the model," says Vincent. "We would make a change in a profile, and it would automatically ripple through the design." The whole interchange design hinges upon the inner cloverleaf; so by tweaking that profile and adjusting the cross sections, Langan's engineers could fine-tune the design of the entire interchange in real time—confident that the AutoCAD Civil 3D model would update accordingly.

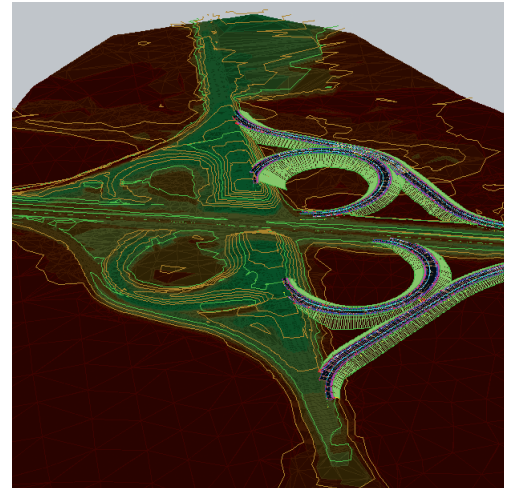
## Integrated Storm Sewer Analysis

Langan also used the Hydraflow Storm Sewers Extension for AutoCAD Civil 3D to design and analyze the project's storm sewer systems. "Instead of manually entering the design information into Hydraflow, we used AutoCAD Civil 3D to create

the pipe network—assigning elevations to the structures, inverts, and so on—then just exported the model (to LandXML) and used it directly in Hydraflow to analyze the network," explains Correa. "The integration between the design and analysis environment enabled us to interactively modify and analyze our pipe network in real time." For example, this tight integration was particularly useful to iterate on a more efficient box culvert design for one area on the site, minimizing hydraulic losses through the culvert and streamlining that part of the design.

## The Result

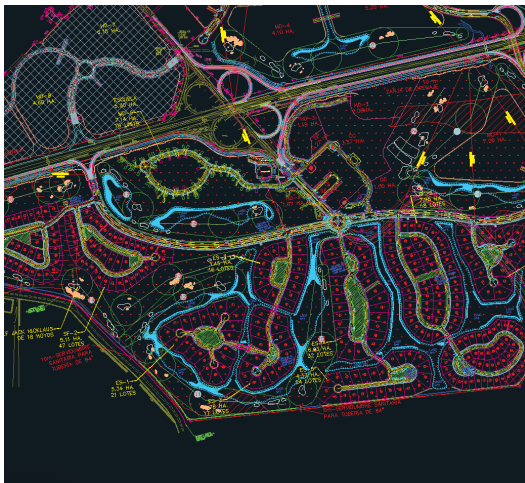
Langan currently has more than 25 AutoCAD Civil 3D users. The firm's goal is to standardize on AutoCAD Civil 3D in the first half of 2009. In addition, Langan anticipates the increased use of AutoCAD Civil 3D for sustainable design. The firm—an active member in the U.S. Green Building Council with more than 70 LEED® Accredited Professionals on its staff—has a long history of providing environmentally sound design solutions. Langan incorporates the latest in sustainable technologies, and brings an equalized approach of sustainable, constructible, and cost-effective solutions to every design project. Moreover, *Engineering-News Record* magazine ranked Langan among the top 20 "Green Design" firms in the country. "We're looking forward to using AutoCAD Civil 3D for increased green design, as more of our project requirements are guided by the principles of smart growth. AutoCAD Civil 3D will make it easier for us to find solutions that meet these requirements," comments Rizzo.



A Langan terrain model showing the completed interchange for Santa Maria Golf & Country Club

"When we decided to move to AutoCAD Civil 3D, we did so with the expectation of efficiency gains and consistency for all our design services," remarks Rizzo. "The software has certainly proved itself in that regard. It's also helped improve the quality of the finished product. We now use the time that we save with AutoCAD Civil 3D to create a better design and deliver a better product to our client."

To learn more about AutoCAD Civil 3D, visit [www.autodesk.com/civil3d](http://www.autodesk.com/civil3d).



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Project Engineer  
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On the left: Santa Maria Golf & Country Club, Panama