AutoCAD®
Civil 3D®

# Implementing AutoCAD Civil 3D: Three Case Studies

Autodesk asked CAD consulting firm Engineered Efficiency, Inc. (EE), to prepare the three case studies presented in this white paper in order to summarize different successful approaches for moving to the AutoCAD® Civil 3D® application. The white paper examines each organization's experience with the transition. The organizations selected range in size from a small, single-office firm with 7 CAD users (a mix of engineers, designers, and drafters) to a 235-person firm with 65 CAD users in five offices. EE worked with these firms in varying capacities to help make the transition as easy as possible and to help ensure that the Civil 3D implementation projects were successful.

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# Executive Summary

The small firm, Delaware-based Element, works primarily on residential and commercial development. The firm implemented AutoCAD Civil 3D software during a six-month period, using little outside help.* Most of the setup and configuration was done by in-house staff members. When deploying Civil 3D, Element chose to implement Autodesk® Vault software as its project management tool. And before using Civil 3D on a real project, staff members received training on the software from the local Autodesk reseller. To date, Element has completed 10 projects using Civil 3D as its primary design tool and says the implementation of Civil 3D has gone "phenomenally well."

**Before joining the EE team, one of our consultants provided implementation services to Element.*

The midsize firm, Illinois-based Joseph A. Schudt and Associates (JAS), focuses primarily on residential and commercial development projects as well as municipal, public works, and roadway designs. JAS implemented Civil 3D during a four-month period, using a mix of in-house staff and an outside consultant. The outside consultant provided assessment, planning, and training services, while in-house staff handled installation, styles creation, and project management. To date, JAS has submitted more than 50 projects that were prepared using Civil 3D as the primary application. According to the implementation team leader, "We can get a more complete answer quicker: value engineering occurs much earlier in the process than ever before. This absolutely makes us more valuable to our clients."

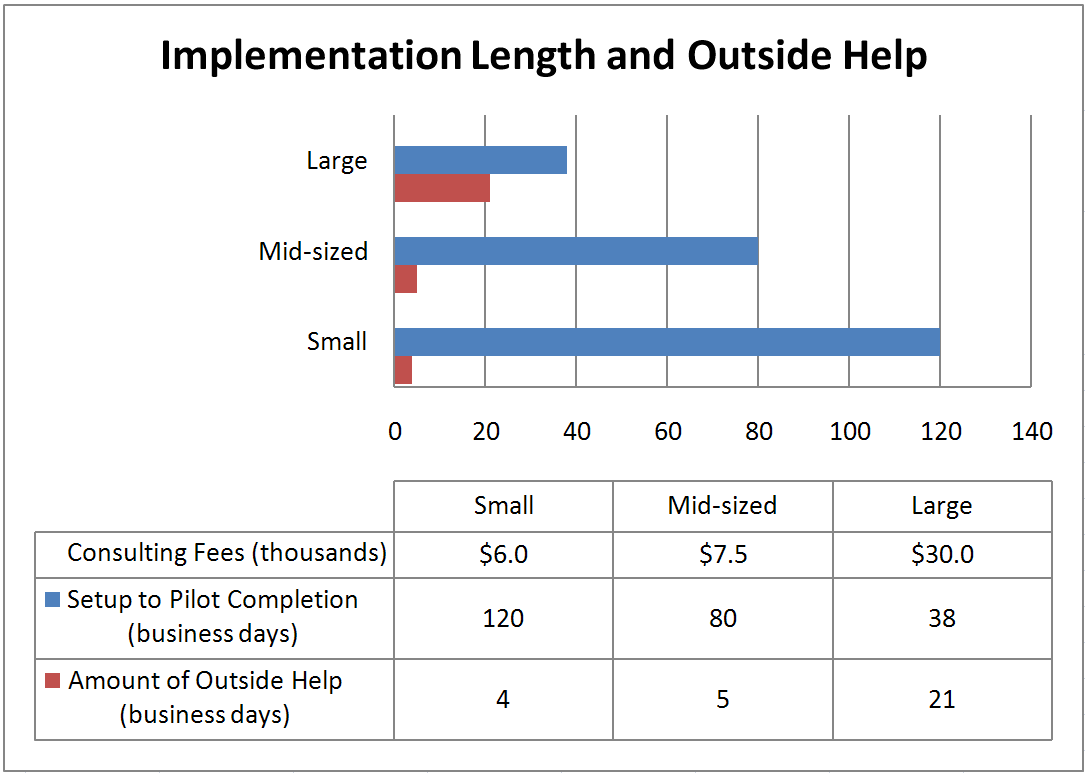
The large firm, George Butler Associates, Inc. (GBA), is headquartered in Lenexa, Kansas, and has four additional offices located throughout the Midwest. The company works on a wide range of projects, including civil engineering/site development, land planning, municipal development, surveying, and transportation. GBA implemented Civil 3D in two months and made extensive use of outside consulting. Nearly all aspects of the Civil 3D implementation project were a collaboration between the GBA staff and outside consultants. GBA chose to implement Vault as a data sharing and data management solution. GBA currently has 12 projects in various stages of design with Civil 3D, and another 12 projects have been completed. A GBA project manager says, "It's scary how quickly you can pull a set of construction drawings together [in Civil 3D]."

The following graphics provide additional detail about the degree to which consultants were involved in deploying Civil 3D at the various firms and the amount of time required.

| Who Did What? | | | |
|---|---|---|---|
| **Implementation Task** | **Small** | **Mid-Size** | **Large** |
| **Assessment** | | | |
| Review Project Types | NA | HC | H |
| Establish Implementation Goals | NA | HC | H |
| Define Success Measures | H | NA | NA |
| Outline Existing Workflows | H | HC | HC |
| Review User's skills | H | HC | H |
| Review Hardware and Network | H | HC | H |
| Review 3rd Party Applications | H | HC | NA |
| **Planning** | | | |
| Determine Implementation Delivery Method | HC | HC | HC |
| Develop Installation Guidelines | HC | H | HC |
| Establish File Management (common support files) | H | H | HC |
| Civil 3D Config (Styles; Templates; paths; etc) | HC | H | HC |
| Establish Proposed Workflow Process | HC | HC | HC |
| Project Management (Vault or shortcuts) Plan | H | H | HC |
| Training Schedule | C | HC | HC |
| **Execution** | | | |
| Install and Configure Civil 3D | H | H | H |
| Install and Configure Vault | H | NA | HC |
| Create Styles and Templates | HC | H | HC |
| Classroom-style training | C | C | C |
| Advanced Training | HC | HC | C |
| Pilot Project Mentoring | HC | NA | C |
| Documentation of Procedures | HC | NA | NA |
| **Implementation Review** | | | |
| Post-pilot assessment | HC | H | HC |
| Plan for full roll-out | C | H | HC |

| LEGEND | |
|---|---|
| H | In-house staff |
| C | Outside Consultant |
| HC | Consultant worked with in-house staff |
| NA | Not Applicable or Not Performed |

Figure. 1. The tasks associated with a Civil 3D implementation and who was involved in completing the task for each of the firms.




| | Small | Mid-sized | Large |
|---|---|---|---|
| Consulting Fees (thousands) | $6.0 | $7.5 | $30.0 |
| Setup to Pilot Completion (business days) | 120 | 80 | 38 |
| Amount of Outside Help (business days) | 4 | 5 | 21 |

Figure. 2. The overall length of the implementation compared to the amount of outside consulting time and consulting expenditures for each of the firms.

# Case 1: Small Organization (1–20 People)

The first case study involves the small engineering design firm, Element, located in Lewes, Delaware. Founded in 2004, Element has a total staff of 15 people working out of one location in Delaware. The company works on a variety of project types, including single- and multifamily residential developments, commercial and retail projects, and occasional local roadway improvements associated with a development project. Although the length of projects vary and it is difficult to define a typical project, on average, Element completes preliminary and final design (first submittal) for projects in about 12 weeks.

Element provides engineering, drafting, and architectural services for these projects and works with outside consultants for survey-related tasks. To provide the in-house services, Element employs 11 full-time technical staff members, including five civil engineers and two civil designers.

As a new company, Element needed to make a decision regarding which design and drafting software it would adopt as a company standard. Having done some research in 2004, the firm was aware of the soon-to-be-released AutoCAD Civil 3D 2005. Although many of the new employees had extensive experience with AutoCAD® and AutoCAD® Land Desktop applications, Element chose to implement AutoCAD Civil 3D 2005.

At the outset of the AutoCAD Civil 3D software implementation, the nature of Element's design projects required little intensive design work. "The first 10 or so projects we did were all preliminary submittals," recalls David Okonewski, senior designer and CAD manager. "These take over a year to work through the county, so no major civil design work was done using Civil 3D until early 2006." At about that time, Element began seriously exploring the features and functions of Civil 3D.

Element took a prudent approach to implementing Civil 3D by first exploring its functionality, and then preparing for deployment by training users and creating styles. The company immediately followed these initial preparations by starting its pilot project.

Before its Civil 3D pilot project, Element turned to its local reseller for the basic training and setup services. These services included three days of introductory Essentials training, several half-day classes covering certain topics in greater depth, and styles and template setup. Overall, the reseller worked with the Element staff for about 12 days over a six- to eight-month period.

In addition to these preparations, Element staff also examined the firm's equipment to ensure it met the requirements needed to effectively run Civil 3D. The company found that the workstations it had purchased as part of its normal IT budget were more than adequate to run Civil 3D and that no additional hardware expenditures were needed.

The pilot project selected was The Estuary, located in the town of Dagsboro, Delaware. The project involved 17 single-family lots on a total of 12.21 acres. The project included many of the features common to residential development, including a detention (storm water management) pond; two roads and two cul-de-sacs; roadway intersections; storm, sanitary, and water utilities; and minor off-site roadway improvements. The pilot team consisted of Okonewski and a project engineer, and it took approximately 10 weeks to prepare drawings and other documents for submission for approval. By selecting a manageable project for its pilot, Element was able to use and evaluate most of the features and functions of Civil 3D and explore how they would fit into the firm's existing workflow process, while avoiding the potential for being overwhelmed by a larger, more complex project.

Using the knowledge gathered during the completion of the Estuary project, Element staff made in-house adjustments to the styles previously created, evolving them into a fully functional set of Civil 3D

standards. With the confidence obtained in the pilot project, the Element staff moved more quickly to embrace Civil 3D and use it on more projects. Along the way, staff members continued to improve their skills and refine their processes, incorporating more features of Civil 3D into their everyday use.

One specific example is in Element's use of Civil 3D data management features. Originally, the project team was somewhat intimidated by Autodesk Vault and used data shortcuts to manage the exchange of data among team members. Then Okonewski decided to first run Autodesk® Data Management Server locally, on his workstation, to test and learn it. After he became familiar with it and understood the interface, he was impressed by the functionality. As other members of the Element staff began using it, they too were convinced of its benefits. "Autodesk Vault software provides a large benefit [over data shortcuts] because of the automatic and secure sharing of data," says Okonewski. "It's harder for users to make mistakes." He adds that from his personal experience, managing data in Civil 3D is easier than it is in Land Desktop.

To date, the Element technical staff have completed 10 projects for submittal using Civil 3D exclusively as their design and drafting application. These projects include

- 72 single-family lots on 106.6 acres in Sussex County, Delaware: two wet ponds, one dry pond, full roadway design, and storm sewer utilities
- 400 single-family lots on 234.8 acres, also in Sussex County: 38.8 acres of recreational ponds; more than four miles of residential roadway with 20 fully modeled intersections; and storm, sanitary, and water utilities
- 607 mixed single- and multifamily lots on 230.5 acres in Lewes, Delaware: 17-acre natural pond, full tidal storm water discharge, full utility layout, and more than 100 acres of open-space design

It's interesting to note that aside from the initial 12 days of outside help, Element has accomplished all this on its own, using in-house personnel and low-cost or no-cost publically available online resources, such as Autodesk discussion groups, knowledge bases, and blogs. Okonewski states that learning time was relatively long, but once they got past it, Civil 3D works "phenomenally well."

Elements project manager Dave Kuklish notes, "Plans are coming together in a more efficient manner, which positively impacts the bottom line, and as a manager that's what I'm concerned about." He adds that the more the Element team learns, the more efficient they become.

Although, as a company, Element never used Land Desktop as its primary production tool, individual team members had. Citing specific examples of efficiency gains experienced with Civil 3D, Okonewski and Kuklish say that initial road and lot grading design are 15–20 percent faster. They also state that when revisions are needed, "there is no comparison between Land Desktop and Civil 3D; Civil 3D blows Land Desktop away." Another team member points to the layout and labeling of pipe networks: "In Land Desktop, structure updates and labeling were a manual process. In Civil 3D this is all automatic."

While the Element team is happy with where they are now in their use of Civil 3D, early product issues and lack of certain features added a level of difficulty to the implementation. However, staff members are quick to add that any negatives they encountered are more than offset by the positives, and the positives are increasing all the time.

As a final note, Element offers the following advice to other firms considering the move to Civil 3D. First, make sure the implementation has the proper support from both users and management. Also, to be successful in using Civil 3D it is vital to get the essentials down early and use them as much as possible. "This solid foundation lets you dig deeper [into Civil 3D software's features] and take full advantage of the advanced functionality," says Okonewski.

# Case 2: Midsize Organization (20–50 People)

The second case study involved Joseph A. Schudt & Associates (JAS), a midsize civil engineering, land surveying, and site planning firm located in Frankfort, Illinois. JAS was founded in 1952 and has a total staff of 28 employees working in a single office in Illinois. Project types include single- and multifamily residential, commercial retail and office, industrial parks and single-user locations, municipal and public works, and roadway design. Project sizes range from one-acre sites to several-hundred-acre planned unit developments.

As full-service land development and engineering consultants, JAS staffs engineering, surveying, and land planning departments with three project managers, five licensed engineers, two licensed surveyors, and eight drafting technicians. The remaining 10 employees consist of six field surveyors and four administrative personnel. Of the 18 technical staff, 12 are regular CAD users. The firm had been using DCA software since 1990 and Softdesk software since 1994. It then began using Land Desktop (and the Civil Design and Survey modules) with the third release of the product and continued to use it until 2005 and the implementation of AutoCAD Civil 3D 2006. With this extensive company and individual experience, the organization's design and drafting workflows and processes were well established.

When Autodesk released AutoCAD Civil 3D 2004, JAS project manager Matt Anderson's interest was piqued. As it was his responsibility to oversee the firm's CAD and design software, he researched the new Civil 3D product and saw a promising application evolving. After assessing and evaluating subsequent releases, Anderson made the recommendation to move from AutoCAD Land Desktop to AutoCAD Civil 3D software with the 2006 release.

Much like the firm in the first case study, JAS approached its Civil 3D implementation with a well-planned rollout strategy. First, Anderson worked with other staff members to do an internal assessment of the company's processes, personnel, and hardware. Using the information gathered in his assessment, he next developed the basics of an implementation plan. Finally, before proceeding with the execution of the plan, he consulted with outside experts to evaluate, validate, and refine the plan.

The JAS implementation plan also started with a review of existing hardware and the creation of styles and templates. No additional workstation purchases were required, as those purchased as part of JAS's typical upgrade schedule met the minimum requirements. Anderson and Wayne Bielski, a senior engineer and CAD technician, made up the team for the Civil 3D pilot project. They learned many of the software's features through self-study and developed custom styles and drawing templates based on their company's Land Desktop standards. With these items in place, they started their pilot project using AutoCAD Civil 3D 2006 and began their on-the-job learning.

The project selected for the pilot was Greenwood Falls Duplex Development, in Dolton, Illinois. This infill project was a 19-lot development on a four-acre vacated railroad right-of-way. The design cycle from start to first submittal was about eight weeks, giving the pilot team enough time to design, draft, and submit the 20-page plan set. Representative of most projects of this type, the design included floodplain fill, complex grading issues, and numerous utility conflicts. One of the first steps in the project involved creating a base drawing showing the existing site conditions. Survey data was collected by an outside surveying firm, and the data was delivered to JAS in LandXML format. This data was directly imported into Civil 3D and used to build the existing ground surface model.

As the project progressed, sharing data via data shortcuts provided a noticeable advantage over Land Desktop. "The pilot showed us that when crunch time came, we could kick out a 20-page, fully engineered plan set by splitting tasks among the team members," explains Anderson. "I was working on design and Wayne was simultaneously adding annotation and putting the plan sheets together. This allowed our project tasks to be completed in parallel, reducing overall [project] time." This contrasts with

the Land Desktop design and drafting procedures, which must more or less occur serially. The Land Desktop process often resulted in one user waiting for another to complete a specific task before they could begin their work. With little outside help, Anderson and Bielski completed the project on time and on schedule using only AutoCAD Civil 3D 2006. This project is currently under construction.

After the completion of the first project using Civil 3D, the pilot team immediately stopped using Land Desktop in production. “Understanding the differences between Land Desktop and Civil 3D functionality was an important first step for us,” Anderson says. “It was difficult at first, but after using Civil 3D on a real project we identified weaknesses in Land Desktop that we had simply become used to,” such as nondynamic updates to alignments and labels that did not automatically change when the objects changed. Since that first project, JAS has submitted more than 50 additional projects prepared using Civil 3D as the primary application. Some examples of completed projects include

- Gabriella Estates Subdivision, Steger, Illinois: 14-lot residential subdivision on five acres. Project included corridor, cul-de-sac, and storm water detention and utility design, all done in Civil 3D. Currently under construction.
- Culvers Restaurant, Homewood, Illinois: 1.5-acre commercial restaurant with storm water detention. The original survey surface and planimetric features were created in Land Desktop, but the proposed design of the site, grading, and storm water detention design were all completed in Civil 3D.
- First United Bank Administrative Building, Crete, Illinois: five-acre site (currently in development) with storm water detention, parking expansion, new building, and rehabilitation of existing parking lot.

Based on JAS’s experience with the projects completed using Civil 3D, Anderson points to several examples of efficiency gains. First, users noticed how much faster revisions were when using Civil 3D instead of Land Desktop. While some of the initial layout tasks (such as defining an alignment) took about the same amount of time, the inevitable revisions and adjustments to design and drafting were much faster. In addition to time saved on revisions, Anderson states that because of the dynamic nature of Civil 3D, better design decisions can be made much earlier in the design process. This helps to identify problems with sewer conflicts, establish and label structure rim elevations, and provide better grading designs.

“We can get more complete answers quicker. Value engineering occurs much earlier in the process than ever before,” Anderson says, defining “value engineering” as examining multiple alternatives to arrive at the best balance between engineering effectiveness and economical design. “Sewer design, quantity takeoffs, earthwork balance quantities—all are created much quicker and earlier in the life of the project, allowing us to better interact with our clients and other contractors. This absolutely makes us more valuable to our clients,” he adds.

While most of the technical staff at JAS is using Civil 3D, some teams have yet to learn the new application. The culture at JAS does not force the users to adopt new practices, and several projects have been completed with a mix of Land Desktop and Civil 3D. Anderson says that “when considering moving to Civil 3D, you need a balance between going too fast and not fast enough. We have that balance as a company, in that there are teams that want to use Civil 3D, and those that don’t aren’t forced to switch.” This approach allowed JAS to continue to get value from the Land Desktop expertise on staff while simultaneously moving to Civil 3D. As this demonstrates, Civil 3D adoption can occur over an extended period of time and still be successful.

As JAS moved further into the use of Civil 3D, the firm again sought outside help to provide advanced training on specific topics, including workflow adjustments and residential grading techniques. Like most

implementations, JAS's transition to Civil 3D was not without its difficulties. In particular, Anderson states that data shortcuts, while adequate, should be easier to use. He also states that they are now in the process of exploring Autodesk Vault implementation.

JAS staff offer the following suggestions and advice for other organizations making the transition to Civil 3D. First, do your homework before starting the implementation process. "Hidden costs could have severely hampered our implementation, so we called in outside experts to validate our implementation plan," says Anderson. Second, it is important for Land Desktop users to understand that training on Civil 3D features by itself is not adequate for an implementation to succeed. "Implementation *includes* training, but it needs to go beyond that to include assessing, planning, and developing an execution strategy for the Civil 3D rollout," Anderson explains. Finally, as an organization begins to look for their first project, examine the potential benefits Civil 3D can bring to that project. "Some projects, such as a very small single-lot survey, won't benefit nearly as much as a subdivision or larger commercial site will," says Anderson. "Of course, you can still complete all types of projects, small and large, using Civil 3D."

# Case 3: Larger Organization (50+ People)

The final case study looks at a larger organization, George Butler Associates (GBA), headquartered in Lenexa, Kansas. It has five offices across the Midwest; more than 200 employees; and works on a wide range of projects, including civil engineering/site development, land planning, municipal development, surveying, and transportation. With 50 people devoted to land development project work, the requirements for the company's design software are diverse and ever changing. This study looks at GBA's process as an example of a longer term AutoCAD Civil 3D software implementation project in which an outside consultant was used extensively.

GBA first began its migration to Civil 3D in March 2006 by retaining a consultant to give a fresh point of view into its process and to add an expert-level understanding of the software. John Postlewait, the IT coordinator for the implementation process, says, "For a firm our size, using outside consultants is a must. The time investment [to do this on our own] would far outstrip the consultant's fees." The consultant interviewed GBA's internal core CAD support team to understand its processes, data requirements, and possible obstacles to moving forward. During this process, users in all divisions were also interviewed, to uncover specific application demands that were unique. As a final part of the due diligence process, the consultant met with the executive team at GBA to learn about overall business goals for design software and to understand their concerns. After these meetings, a plan for moving forward was prepared and presented to the GBA implementation team.

One of the major issues that arises for many firms is the hardware and network requirements involved. Civil 3D is demanding design software, but Postlewait and the rest of the IT staff at GBA had been preparing for the future. GBA's only required IT acquisition was an additional server to use as a test bed for Autodesk Vault software. During the pilot project a retired workstation was used for this purpose. "We spent no more money on upgrading our hardware than we already budgeted for," states Postlewait. By reviewing the Autodesk hardware specifications as each release came out, Postlewait's team had been able to adjust incrementally to the increased demands and keep ahead of the hardware curve, assuring that hardware was not an issue in the Civil 3D deployment.

The next step in the process was to work with the core team to review both the plans produced by GBA and the company's existing CAD standards. Many firms have a collection of standards that are only loosely documented. The switch to Civil 3D is a great opportunity to spend some time to assure that standards are complete and thoroughly detailed. GBA took the time to resolve some long-standing issues

with plan appearance and began creating a new GBA-specific template for use in its pilot project. By working with a consultant to train a core group of users in the complexities of creating and managing styles, GBA was turning its in-house AutoCAD Land Desktop software experts into Civil 3D experts, capable of handling the diverse plan requirements of the full enterprise.

After the initial team worked through many of the workflow and style issues, a pilot project team was formed for testing the software in a live production environment. GBA's first Civil 3D project was an apartment complex with 17 buildings encompassing 300 units and included a pool, amenity center, and freestanding carports. In addition, the pilot bordered a flood plain and a state highway and required both private and public improvement plan submittals. After selecting its pilot project team, which included a mix of the core group and brand-new users, GBA worked with its consultant to develop a training session to focus on the project tasks at hand. This sort of training educates users beyond the basics so they can focus on using the package as a design tool. In this case, topics such as grading, intersection design, and site modeling were explored in greater detail than in the previous session.

A decision was made to make the pilot team larger than what GBA might normally use on a design project. This allowed the firm to introduce more people to Civil 3D in a live environment, distribute work to more people, and have a wider distribution of skill sets involved. The pilot team included designers with three decades of experience and a new graduate engineer who had not even had a chance to unpack her boxes. One advantage of this approach is that it lets experienced personnel rethink their approach as they try to teach it to younger staff, who are famous for asking why? It also lets a firm analyze learning time for staff members of all levels. It has been noted in many cases that the less experience users have with Land Desktop, the more easily they pick up Civil 3D.

The pilot project had a 10-week design schedule, and the team worked closely with the consultant throughout the first submittal. Planned, scheduled visits allowed GBA to move forward with confidence, keeping to its normal project-submittal schedule for this brand-new project. Having a Civil 3D expert in-house during the project lifespan helped relieve some of the tension, as new users were able to immediately get assistance with any problems that came up during their daily work, as opposed to querying a support line or posting to a website and waiting for an answer. In addition, when problems arose, they were addressed and tested in-house, on the local network, to make sure that the process of mailing files was not the source of the problem.

The inclusion of a consultant went beyond weekly phone calls and emails. At GBA the consultant was on-site for eight consecutive weeks, from three days a week in the initial stages, to get the project up and running, up to most of the week preceding the submittal deadline. GBA adopted the consultant as part of the team, assigning him a cubicle right in with the design staff and a workstation available for use during visits. When using a consultant as GBA did, it is important to set expectations. GBA expected total commitment to its success and provided the internal resources needed to make that possible. The project was submitted on time, which is the most important part of any land development job.

Working with the consultant and contacts at Autodesk, GBA tested and refined its data workflow using Autodesk Vault during the pilot project, and the firm continues to use Vault on all its projects. While Postlewait still is confronted with some IT issues, the design team likes the simplicity Vault provides for sharing data between team members and the opportunities for the division of labor. Harland Russell, project manager for the pilot project design team, and a leader in the adoption effort, says about Civil 3D, "It's scary how quickly you can pull a set of construction drawings together."

During the pilot project, GBA modified and changed its implementation plans for working with Civil 3D on an almost daily basis. "The most important part of a plan is being flexible," Postlewait comments. These changes included modification to the way drawings were broken apart, the way some items looked in construction drawings, and the way the team prepared for reviews. By being flexible on everything except

good design and an on-time submittal, GBA was able to make the pilot project a true test bed for new ideas about how its design teams would come together in the Civil 3D era.

After the pilot project was submitted, the core group, project management, and the consultant sat down to review the course taken by the pilot project team and assess for necessary changes as the adoption went forward. Taking time to review its Civil 3D implementation allowed GBA to address concerns outside the pressures of the project deadline, as well as to generate ideas with the consultant regarding possible changes in the methodology for projects going forward. Project management input was crucial, as it brought to light some issues that the design team had not noticed during the project's initial stages but that should be addressed to make future projects move through the office more smoothly.

GBA has spent a large amount of time since that initial pilot project with the core group, pilot team members, and other design team members looking at how their process has changed. By making the switch to Civil 3D, GBA has improved data sharing among different parts of the design team. Russell notes, "Engineers didn't trust surfaces from our survey department. Now GBA is investing [in making] surfaces right from the get-go." These sorts of changes in the way a firm works can be groundbreaking. He goes on to say, "We never used survey figures in Land Desktop; now we're using them in Civil 3D."

GBA currently has 12 projects in various stages of design with Civil 3D and 12 projects that have been completed. GBA has realized the benefit of Civil 3D in multiple ways on these projects. "Three thousand linear feet of revised sewers—it would have taken us two days in [Land Desktop] to make changes, 15 minutes in Civil 3D," says Russell. "We spent some extra time setting it up, but revisions are a breeze." Russell notes that the time and effort spent setting up 3D site models have paid huge dividends in his project coordination efforts with contractors.

The projects now in production at GBA reflect the wider use of Civil 3D within its office. These projects include a cemetery expansion, a large commercial warehouse site, small bank sites, a three-mile arterial road, and a public works facility with vehicle bays. As teams have adopted Civil 3D, new requirements have been discovered. With each new project, the template is updated, tweaked, and improved. A good Civil 3D template is always a work in progress, growing and adapting as needed.

As GBA is training its land development staff in incremental stages, the firm is still invested in its relationship with the consultant. "We still use them quite a bit, it pays to have an expert that understands what you've been through," says Postlewait. GBA uses the consultant for training and as a sounding board for the team. The training trips turn into a chance for the GBA implementation team to visit with their partner in the process and discuss changes in the software or other minor difficulties that have arisen.

Making a change to the design software a firm uses is not without risk. GBA's core group had a century of Land Desktop experience among the individual members and was nervous about making the switch to Civil 3D. Given skeptical managers and a sometimes reluctant team, Russell and Postlewait agree in feeling that they had wagered their careers in making the change. Then they laugh, "It's been a winning bet." It is easy to look at GBA's pilot team and see the enthusiasm for Civil 3D now. They are the internal experts. They share their discoveries with each other and are constantly exploring new ways to use the Civil 3D toolset in their design tasks.

Postlewait notes that "technology drives GBA's business; we "either keep up, or fall behind and lose business." This sentiment is what pushed GBA into originally deciding to adopt Civil 3D, but its position as an early adopter has truly become a point of pride. GBA was part of the civil engineering main-stage presentation at Autodesk University 2006, and the company is seeing a positive reaction from prospective employees who want to be involved with a firm pushing the limits in the land development industry. Postlewait says, "The people that have been successful with Civil 3D relish a challenge and enjoy it." This

attitude of always challenging themselves and their tools to be better is what has driven GBA to be a true success with Civil 3D.

**About the Authors**

Mark J. Scacco, PE, is the president and founder of Engineered Efficiency, Inc. (EE), and James A. Wedding, PE, is vice president. EE is a CAD consulting firm specializing in Civil 3D implementations and training. The firm has worked with dozens of organizations, helping them move from AutoCAD Land Desktop to AutoCAD Civil 3D software as their primary design and drafting tool. The EE staff maintains the popular free online Civil 3D knowledge base found at **www.civil3d.com**. To learn more about the company and its service offerings, visit **www.eng-eff.com**.