Autodesk®
Civil 3D®

CAD Manager's Guide

Autodesk® Civil 3D® 2007 software is a powerful, mature, civil engineering application designed to significantly increase productivity, save time, and decrease costs. It uses an industry-proven dynamic engineering model that maintains intelligent object relationships, so a change made in one place instantly updates your entire project to help you work faster and more accurately.

This document is designed for CAD and IT Managers responsible for deploying Autodesk Civil 3D in their organizations. For the existing Autodesk® Land Desktop customers, there are a number of new technologies introduced in Autodesk Civil 3D. With these new technologies, there are likely to be questions on how best to prepare for using them in a production environment. This document identifies those areas of consideration, and provides some guidance for your decision making process, as well as where to find additional information.

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Chapter 1: Autodesk Civil Technology Overview

Autodesk® Civil 3D® 2007 software is a powerful, mature, civil engineering application designed to significantly increase productivity, save time, and decrease costs. It uses an industry-proven dynamic engineering model that maintains intelligent object relationships, so a change made in one place instantly updates your entire project to help you work faster and more accurately.

Civil 3D and Land Desktop Compared

If you've never seen or tried Civil 3D, your first questions might be, Why bother? Isn't Civil 3D just the "next version" of Autodesk® Land Desktop software? If not, how is it different from Land Desktop?

Land Desktop (and its predecessors) has been the workhorse civil engineering design and drafting application for engineering designs for more than a decade. And although it was an integral part of countless numbers of successful projects, it had reached the limits of what it could do based on the technical foundation on which it was built. Therefore, Autodesk decided to create a new model-based tool for design professionals.

Unlike previous technology from Autodesk, Bentley, EaglePoint, and others, Civil 3D was built from the ground up as a model-based, multiuser production tool that can help users overcome the technical and industry challenges that most organizations face. These challenges include the following:

- Synchronizing design elements and labels across many pages and among many users

- The time-consuming task of revising designs and drafting

- Constant industry pressure to do more work with less staff

- Competition with other firms for the best people

- Lack of integration of engineering design applications and drafting tools for creating final construction plan sets

Dynamic Model and Automated Annotation: As a project moves through the design process, certain adjustments may be required that affect related elements in the project. For example, if after designing a subdivision road, you determine that a fill slope encroaches on a wetland area, you may need to adjust the horizontal and vertical alignments to limit the affect on the wetlands. Using traditional software, this change would require several tedious rework steps: erase original design; create new design; draft new design; review for impact on wetlands; repeat as needed until design criteria are satisfied.

Dynamically linked models in Civil 3D greatly reduce the time required to accomplish these tasks. Civil 3D lets you create dynamically linked models of your project element and annotation. In the simplest terms, *dynamically linked models* are related entities in a drawing that automatically update when changes are made to one of the entities. These entities include drawing *objects* that constitute the model itself (such as digital terrain models, alignments, and corridors) and the annotation or *labels* associated with the objects. The appearance and behavior of these objects and labels are controlled by

styles. Through styles, Civil 3D gives users great flexibility in the presentation of design elements.

The Importance of Civil 3D for Design Staff

The Civil 3D application was created for both drafters and designers. Although Civil 3D is valuable as a drafting tool, the greatest benefit is achieved when it is used as an integrated part of the design process from which the final drafting can be extracted.

Civil 3D for Engineers

One of the challenges that engineers face during the initial design process is evaluating several possible design configurations and selecting the best solution. Often time and budget constraints limit the engineer's ability to examine multiple design options, resulting in a "good-enough" design. Because of its powerful design tools, dynamically linked model, and easy-to-use interface, Civil 3D lets the engineer examine many possible solutions and select the best, resulting in better overall designs. In addition, the nature of the dynamic model means that design elements are always synchronized, eliminating costly errors before they even happen. Simply put, Civil 3D helps engineers create better designs in less time with fewer errors.

Another huge challenge is the effort involved in revising designs. Again, the dynamic model makes the engineer's tasks easier. Changes to one component of the model are automatically reflected in associated elements, accelerating the process and reducing the chances for error. For example, after the initial layout of an alignment, the alignment may need to be moved. Because of the dynamic link between the alignment and its labels, graphical changes to the alignment (for example, by grip edit) result in immediate changes to the station and geometry point labels. There is no need to redefine and relabel the alignment. Both are done automatically.

Civil 3D for Drafters

The purpose of a set of construction plans is to convey the engineering design intent to jurisdictional authorities and the contractor so the project can be approved and built. It is the drafter's job to create a set of plans that achieves these objectives. Civil 3D object and label styles make the drafter's tasks much easier.

First, object styles provide a simple yet powerful method for creating design elements that look the way they should, adhering to an organization's standards. Elements of the design object are automatically set to the correct linetype, color, layer reference, and so forth. Changes to the design are immediately reflected in the object's appearance. For example, various styles for surface objects can be created and used to change the display of the existing ground at various stages of the project. For presenting the topographic survey, the surface contours may be presented as heavy, continuous lines. As an underlay to the proposed grading design, those same surface contours can be shown as light, dashed lines. It's easy to achieve this effect simply by changing the surface style applied to the surface object.

Second, label styles make the labeling and annotation of design elements much easier than in the past. Simply create label styles to match your organization's standards. When design elements change, the labels update automatically. For example, if a surface is modified, all contour and spot elevation labels automatically update to reflect the changes. In addition, all labels on associated design elements, such as profiles and cross sections, also update automatically. This functionality is the same for all design elements: points,

surfaces, grading, parcels, alignments, profiles, sample lines and cross sections, pipe networks, and corridors.

Civil 3D for Your Entire Organization
In addition to these significant benefits for engineers and drafters, Civil 3D is important to the entire organization, addressing other areas of concern in the industry:

Owners, principals, and managers:

- **Get more work done with fewer resources**

    o Save time across the board as a result of synchronized design data and drawings

- **Minimize cycle time to integrate design iterations**

    o Make even late-stage revisions quickly and easily

    o Minimize schedule delays, and keep projects profitable

- **Correct the balance of time spent on projects**

    o Minimize need for dedicated drafting support staff

- **Prepare for emerging trends such as GPS machine guidance**

    o Gain all the benefits of 3D modeling

    o Generate 3D models automatically, requiring no additional time

CAD managers and IT personnel:

- **Use a powerful standards implementation and enforcement tool**

    o Easily deploy updated organization standards via styles and templates

    o Use styles to make it easier to do things right than to do things wrong

Chapter 2: Deployment Considerations and Options

Installation Issues

This chapter covers planning issues related to the deployment of Autodesk Civil 3D software. Issues to consider include what software needs to be installed, how the installation will be performed (network deployment or individual machines), and who will perform the installation (you or an outside consultant).

Software to Be Installed

The first consideration is to determine what software to install. In the civil/survey sector, software could include the following:

- Autodesk Civil 3D/Autodesk® Survey add-ons (Trimble® Link, Leica® X-Change, Carlson Connect)

- Autodesk Vault and Autodesk Vault Explorer

- Autodesk® Land Desktop Companion/Survey Extensions (Trimble Link, Leica X-Change, Carlson Connect)

- Autodesk® Civil Design Companion

- Autodesk® Raster Design

- Autodesk service packs, updates, and fixes

- Third-party applications that run on top of Civil 3D or Land Desktop

- Autodesk® DWF™ Viewer; DWG TrueView™

- Autodesk Express Tools

New Autodesk Civil 3D users may want to install Land Desktop Companion, Civil Design Companion, or both. These applications can be installed in a manner similar to that used for Autodesk Civil 3D, either stand-alone or as a network deployment.

Once you have determined what to install, document the order in which the software needs to be installed. Be sure to document any patches, service packs, or fixes installed. Finally, document what machines the software will be installed on. This documentation helps you determine hardware requirements in the next section.

Autodesk Civil 3D includes a Network Installation wizard. This wizard enables you to create either a multiseat stand-alone or network deployment file so you can push the installation to the workstations rather than use the installation CD at each machine. This wizard drastically reduces installation time if you need to install on multiple machines. Network installations provide many benefits, especially for large deployments, including the following:

- Flexibility in how the application is delivered to the workstations (either "pushed" from the server or "pulled" by the workstation)

- Standardization of the initial application settings, such as user interface and support path configuration

- The addition of user-defined or third-party add-ons

In addition to the benefits at the time of initial deployment, network installations make it easy to add updates, service packs, and extensions to the original image when creating new deployments.

It is important to note that you can also use the Network Installation wizard to create installation images for use in stand-alone installations. This is called a multiseat stand-alone deployment. In these environments, the client workstations won't use the license manager but can still take advantage of the benefits listed previously.

IT Coordination

After you have determined what software to install, and which machines that software will be installed on, you need to coordinate the installation with your IT department (if this involves personnel other than yourself). Items to consider include the following:

- What operating system are you using on the client and server? Only Microsoft$^®$ Windows$^®$ systems are supported (Novell$^®$, Unix$^®$, and Linux$^®$ systems are not supported).

- Who will perform the installation? The CAD manager or the IT department?

- Who will authorize the software (obtain licenses, activate software, and so forth)?

- Who will download and install updates and service packs?

- Do you have administrator access to the workstations?

- Do you have administrator access to the server?

- Can you reboot the server (if installing FLEX*lm*$^®$ license management software)?

- When will the installation take place? After hours? On weekends?

- How long will the installation take?

- Will the software be installed in stages or simultaneously to all users?

- What must happen before the installation? Hardware upgrades, new computers, and so forth?

- Do you have antivirus software? Can you temporarily disable it?

- Has your key data been backed up, and risk to data minimized?

Single-Site and Multisite Issues

Your organization may have multiple locations where Civil 3D is to be used. There are generally no problems with this type of configuration, unless you have specific needs, such as employees from multiple offices working on the same project at the same time. A multisite configuration may experience poor system performance, legal issues, or both, relating to which license structure you choose. Whether you have a single site, multiple individual sites, or multiple sites that act as one, you need to consider the following:

- Will you share licenses between sites?

- Do you have enough licenses to meet all users' needs in all offices?

- Do you require licensing reporting (SAM*report*)?

- Do you want to create license restrictions?

- How reliable is the connection to the license server? On the local area network (LAN)? On the wide area network (WAN)?

- Do you need the ability to check out licenses from the license pool?

- What kind of network hardware do client workstations encounter when communicating with the server? Certain ports have to be opened by the network administrator for FLEX*lm* software to work.

- What is your WAN uptime?

The answers to these questions help determine what FLEX*lm* tools to install and use for training. Answers also help determine any hardware upgrades that may be required. You also need to examine how you would like to share data.

- Do multiple people need simultaneous live connections to the project data?

- If so, how fast and reliable is the network connection?

- Dropped packets of data can cause irrecoverable model files. Are you experiencing anything like this with any other application?

The answers here also help determine hardware requirements.

Installation Options: Network or Stand-Alone License Models

The next installation consideration is licensing. If your organization has stand-alone licenses, you need to authorize each workstation individually. You also need a unique license for each workstation running Civil 3D. If you have multiseat stand-alone licenses, the products can be installed via a network deployment using a single serial number. The first time the application is run, it is authorized via the Internet. If no Internet connection is available, the software must be authorized manually. This step takes extra time, so be sure to plan for it. Although installed via the network, multiseat stand-alone installations share the same licensing characteristics as single-seat installations in that each workstation installation requires a license.

Network licenses enable your organization to "pool" licenses, making them available to workstations upon request. Each workstation has Civil 3D installed, but the software functions only after a valid license has been obtained from the license server. The concept behind floating licenses is that not all users are using Civil 3D simultaneously, and therefore every workstation does not need its own license all the time (which is what happens in single- and multiseat stand-alone installations). By pooling licenses, your organization can purchase only the number of licenses needed. If the need for more licenses later arises (for example, if employees are added to your organization), they can be purchased and easily added to the license pool.

If using network licensing, you have a few more considerations and options than in the stand-alone configurations. First, you need to schedule the installation of FLEX*lm* on the license server. If you are already using FLEX*lm* for license management, determine the version and upgrade the software if necessary. When scheduling the installation or upgrade, be sure that you have administrator rights to the server, and verify that you can reboot the server. You should also determine whether your organization requires FLEX*lm* reporting tools. Finally, obtain a license file from your reseller or from the Autodesk Business Center. This step requires the server name and MAC address of the license server.

Also determine which licensing server option best suits your organization's needs—single server, distributed server, or redundant server. For more information about these servers, see the next section.

Stand-Alone License Options
Stand-alone installations are those that are licensed for use of the application locally on the workstation. There are two ways to deploy Civil 3D for a stand-alone installation: single-seat stand-alone (commonly referred to simply as *stand-alone*) and multiseat stand-alone.

Single-Seat Stand-Alone: This is the simplest installation. Simply install the software on the workstation using the installation discs. The discs come with a serial number that is used to authorize the application either automatically online or via the Autodesk Business Center. Use this option for small deployments of five or fewer users.

Multiseat Stand-Alone: This stand-alone installation makes deployment easier by enabling you to create an installation image on a network server one time and then install the application on the workstations from the image. The advantages over the single-seat option are that you do not need the physical discs. Users in your organization can install the software themselves by clicking the deployment shortcut on the server. In addition, you can use a single serial number for all deployments. This deployment method is best for situations with many mobile users who are disconnected from your organization's network for extended periods of time and or with remote computers (desktop or laptop) that have limited or no Internet connectivity.

Contact the Autodesk Business Center or your reseller to have them issue a multiseat serial number. This method of deployment is similar to a licensed deployment but does not require a continuous connection to the license manager (see below), and it does require a separate license for each workstation.

Network License Options
In a stand-alone deployment, each installed instance of Civil 3D requires a license for the application to run. Network installations pool licenses on a license server and distribute them on an as-needed basis to the workstations on the network. Therefore, each workstation does not have its own license, but rather requests one when a user launches Civil 3D. If a license is available, one is issued. If not, the user must wait until a license becomes available. Civil 3D uses FLEX*lm* to manage licenses, which must be installed before Civil 3D will function on the workstations.

Single Server: With the single-server model, license management takes place on one server. The license file is created and resides on that server, which represents the total number of licenses available.

For most firms this is the recommended configuration.

The single-server model has the following characteristics:

- Easy to install

- Requires the least amount of maintenance.

- Requires only one server

- Can be used across WAN (assuming reliable WAN connection)

- No built-in redundancy (This limitation can be overcome by having another server, even the CAD manager's workstation, set up as a license manager and have the workstations look to it as the secondary server. This is done more or less automatically in the distributed server model.)

Distributed Server: With the distributed server model, the Network License Manager is distributed across more than one server. To create a distributed server pool, you must install the Network License Manager on each server that is part of the distributed server network. At a minimum, you must install the Network License Manager on each server that you want to manage licenses.

When Civil 3D is deployed to the workstation, the server installation adds a new environment variable on each workstation that identifies the license server that the client communicates with to obtain a network license. This environment variable includes a pointer to each of the distributed servers on the network.

The distributed server model requires a unique license file for each server.

This configuration is commonly used in larger organizations with multiple offices, segmented networks, or both.

The distributed server model has the following characteristics:

- Easy to install

- Requires more maintenance compared to single server

- Requires at least two servers with *different* license files

- Can be used across WAN (assuming reliable WAN connection)

- Flexible in configuration: automatically establishes search paths on workstations for primary and secondary license servers

- Allows sharing of licenses among offices or departments

- Some built-in redundancy with workstations looking for primary and secondary license servers

Redundant Server: With the redundant server model, you must use at least three servers to authenticate a single license file. One server acts as the master, while the other two provide backup if the primary server fails. Using this configuration, the system continues to monitor and issue licenses as long as at least two servers are functional.

For organizations that cannot afford for their CAD systems to be down for any length of time (even a few minutes), the redundant server model provides uninterrupted license management in the event of a primary server failure.

However, there are easier ways to provide server backup and redundancy using the other two configuration models. Work with your reseller or independent CAD consultant to review these other methods.

The redundant model is not recommended for most customers.

The redundant server model has the following characteristics:

- Built in fault-tolerant redundancy: if the primary license server fails, the others automatically assume license management duties

- Works only with Windows 2000 Server and Windows 2003 Server

- Requires a minimum of three separate servers

- Difficult to implement and maintain

- Requires more planning and expertise than other configurations

Combining Licenses: In environments with licensed seats of both Land Desktop 2007 and Civil 3D Land Desktop Companion, network licensing has been simplified compared to previous releases. Both Land Desktop 2007 and Civil 3D Land Desktop Companion now use the same feature code. Civil 3D 2007 has its own feature code, separate from Civil 3D Land Desktop Companion.

Land Desktop and Civil 3D licenses cascade in the following manner:

- If a user has Land Desktop 2007 and Civil 3D 2007 on a single workstation and launches Land Desktop 2007 when there are no Land Desktop licenses available, Land Desktop consumes a Civil 3D license.

- The server keeps looking for an available Land Desktop license. If it finds one, it returns the Civil 3D license and takes the Land Desktop license.

- If a user tries to launch Civil 3D and a Civil 3D license is not available, Civil 3D will *not* take a Land Desktop license.

Chapter 3: Civil 3D Configuration and Content Management

A successful implementation of Autodesk Civil 3D requires an appraisal of current hardware and software, careful planning of user training, and preparation of necessary background support customization and templates. A successful CAD manager understands not just the software features but also the effort that goes into making software use as effortless as possible for the end user. This chapter introduces Civil 3D styles, discusses strategies for developing styles, and looks at management techniques for keeping a company's expanding collection of styles and content in check.

An Introduction to Styles

Civil 3D works with on a collection of custom elements representing alignments, surfaces, profiles, and other design objects. Display of Civil 3D objects is based entirely on styles. Styles control the color, linetype, lineweight, and linetype scale of Civil 3D objects and their nested components. Learning how to use, develop, and manage styles in Civil 3D can mean the difference between a successful transition from other CAD platforms or a frustrating, costly experience that results in the firm reverting to its original design package. This chapter provides background information on Civil 3D styles needed to plan a strategy for their development and management within the CAD organization.

Styles apply not only to objects, but also to labels for those objects. In Civil 3D, display of the Civil 3D objects can take either a ByStyle or ByLayer approach. The following table summarizes key differences in these two approaches.

	Advantages	Disadvantages
ByStyle Approach	• Hard-coded display helps ensure that standards are followed. • Style-level display control means fewer layers to manage. • A single dialog box controls the display of most Civil 3D objects.	• Difficult to manage downstream data. • Not obvious to layer-trained users. • Requires a new style for every display permutation.
ByLayer Approach	• Comfortable to end users. • Works well with others using Civil 3D content as background or xref data. • Fewer styles to manage. • AutoCAD users can manipulate display using familiar layer controls.	• Requires layering and Civil 3D standards for adequate control. • Difficult to track down various component controls.

Because Civil 3D styles cannot be modified in any other version of AutoCAD® software, most Civil 3D implementations currently use the ByLayer approach. That approach allows the creation of styles in Civil 3D that are the most flexible for more users.

In addition to the main Civil 3D objects having their own styles associated, many subcomponents have a style as well. For example, contour labels are a subcomponent of the surface object, and major station styles are a subcomponent of alignments. In the entire Civil 3D model, more than 100 types of styles can be defined. Thankfully, you don't have to create them all from scratch.

Label styles also have a parent-child relationship that merits more understanding for a CAD manager directing the deployment across a production team. The parent-child relationship in Civil 3D acts much as it does in standard AutoCAD dimensions. The child inherits all the properties and functionality of the parent, but allows for changes at its own level. This concept is important because it can be used to quickly and simply modify a large number of labels depending on client or agency CAD standards.
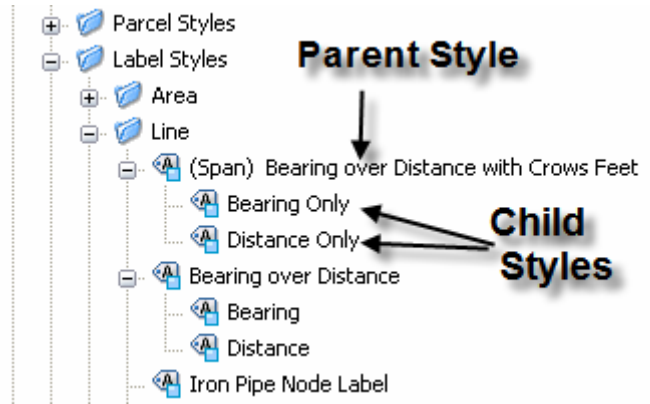
Developing Styles

Civil 3D ships with several templates for designs using both imperial and metric units. These templates represent typical use cases in the land development field. In addition to ByLayer and ByStyle templates, Civil 3D 2007 includes some requested and more expansive templates. They are as follows (with references to imperial and metric for clarity):

- **NCS Base:** This template contains a basic style for every element, and little else. It is designed for the CAD manager who wants to build from scratch with little overhead. This template should be used only by experienced Civil 3D users because there is little material in the template file to modify.

- **NCS Classic:** This template contains styles that reflect the built-in appearance of the Autodesk Land Desktop program. This template allows a user to move easily to Civil 3D and get acceptable results quickly and easily.

- **NCS Extended:** This template contains multiple styles for almost every Civil 3D object. The variety of use cases and permutations in this template makes it a good place to start. The less experienced CAD manager can use it to explore how styles and labels are built. Plus it gives more experienced CAD managers a wide variety of use cases. This template is the most fleshed out.
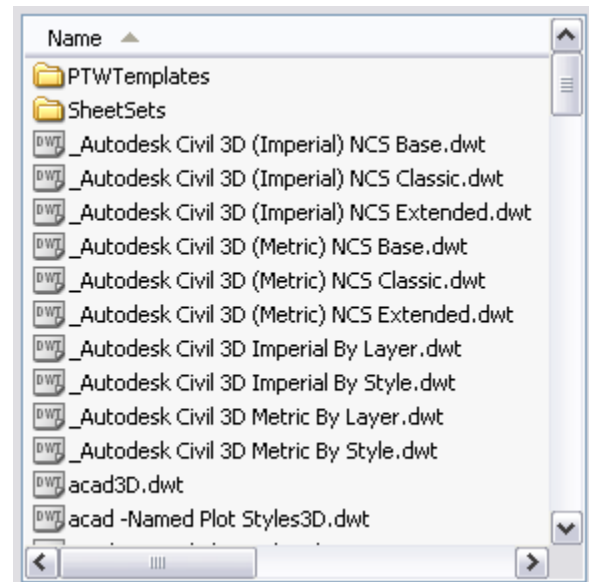
By using one of these templates as a starting point, you can begin to understand the wealth of display and labeling options that Civil 3D offers.

The templates that come with Civil 3D provide many styles that work out of the box with little customization. In addition, they provide a large repertoire of samples that CAD managers who want a more custom approach can modify. Creating styles is an important part of managing the product during a successful deployment. Consideration should be given to how your firm will develop its catalog of styles. Two approaches can be taken: bringing in outside help, or doing the work in-house. The merits of both are discussed in the following section.

Bringing in Outside Help

Outside help, whether resellers, professional consultants, or even temporary technicians, can help alleviate the pressure on a CAD manager to create and understand styles, while maintaining an existing system and in many cases remaining billable. (For the sake of

simplicity, this document refers to all of these team members as *consultants.*) This approach works best when a well-defined CAD standards system is already in place, enabling the CAD manager to instruct the consultant to base the styles on an existing body of work. In cases where a firm has typical plan sheets that can be used as reference material, this process is even simpler. Outside consultants have generally mastered styles, helping to ensure that template creation is a not a delaying factor in the implementation. Their experience also enables them to create more complicated styles and make the styles closely match existing layering and display standards.

Complications from using consultants can include a lack of institutional control, poor-quality deliverables, and miscommunication of desired deliverables. In the case of only loosely defined CAD standards, it can be difficult to achieve a satisfactory template because the consultant must simply guess or assume your needs. In this case, the work might be more efficiently performed in-house.

The Do-It-Yourself Approach
Performing the work yourself is the best way to learn the program, but not necessarily the most efficient. If your firm wants you to be a guru, however, this is the way to proceed. By building styles, you develop a series of styles that match your standards with no chance for miscommunication, you learn the minutiae of the Civil 3D interface to be a better technical resource, and you create a complete body of work for your end users. Another ancillary benefit of creating styles is the power of standardization that comes from creating a complete palette of styles.

The obvious drawback is opportunity cost, which should be considered before you decide to create styles for your firm. The time involved is significant, and the learning time can be lengthy. Creating styles for things such as profile vertical curves or sanitary sewer manholes is complicated, and typically requires several iterations to achieve the desired result. Many CAD managers have taken on this task only to get too bogged down to make good progress.

Combo: You work with Consultant
One approach that has been successful is a combination of these two methods. While not leaving the entire template creation to a consultant, neither should you do it all yourself. By bringing in a qualified consultant for training and implementation work, you get the best of both worlds. Ask your consultant to work with you and your team to make the first few styles that your training or pilot project will use. Make these styles with the consultant's guidance so you understand how styles are built and edited. Then, give the rest of the styles creation work to a consultant and reap the benefits of expert-level efficiency and knowledge of the software.

It's important to understand that your styles collection will be organic, changing and growing as standards change. Every project requires at least one or two new styles to be created or modified. Users should have the basic knowledge to modify styles, but the CAD manager should be in charge of maintaining the template that new drawings are created from. With the knowledge you acquire during the initial training, you can manage and edit styles as needed and be ready to create new styles to address future needs.

Managing Styles and Templates
Standards and styles go hand in hand. Many firms use Civil 3D styles as a convenient and practical point in their CAD standardization process to bring order out of chaos.

Maintenance of the firm template file should be considered during deployment and implementation planning.

The power of Civil 3D templates is that they can be created by a few people and then shared throughout the company. Using AutoCAD options, users can be directed to a company template every time they click the New button. This template file can also be used after the creation stage to verify and enforce crucial appearance issues that make a plan set usable.

Currently, styles can be modified in every Civil 3D drawing. This functionality enables the user to modify styles to provide a specific appearance, but it also means that it's easy to modify a style away from the standard. CAD managers can use the tools in Civil 3D so that the styles being used match the standard. In addition you should implement a procedure for adding new styles to the company template.

User creation of new styles to address specific needs is an important part of the workflow process for a design team using Civil 3D. As users work through real-world problems, they need new permutations of styles and entirely new ones as well. Realizing this, the CAD manager must act as the guardian of the template, adding new material and keeping out styles that don't reflect company standards or good plan production.

A successful approach should include vetting new styles as they are created. Ask users to let you know when they modify a style or make a new one. Then find out why they did so. A unique use case or labeling requirement should be investigated, understood, and added to the template. By letting users in on the creation and development of the Civil 3D template, you help others to feel involved in the process. As a result, they may be more willing to invest their skills and time to make it as complete as possible. If the user didn't need a new style, but created one anyway, you have an opportunity to educate and find out how you can make your styles easier to understand and use.

Your Civil 3D template should be in a read-only location for most users. This allows you to vet any change to the template file before adding it. New style content can be dragged from users' production drawings back to the template using the Toolspace in Civil 3D, allowing for convenient and simple updating of the template.

Chapter 4: Multiuser Considerations

As explained in the first chapter, Autodesk Civil 3D technology is different from Autodesk Land Desktop technology in that Civil 3D users approach the project from a 3D model point of view as opposed to a series of steps that they must complete. Project design and drafting data are no longer stored externally from drawings, but instead are saved in the drawings themselves. This capability allows true, real-time dynamic relationships among objects and labels, and means that drawings exist without the need for a "project." It also enables users to open multiple drawings at the same time in a single Civil 3D session. However, lacking the centralized, external project database of Land Desktop and with object data stored in individual drawings, how do you share this data among drawings and among users? This chapter addresses this topic as well as sharing data with team members who don't use Civil 3D.

It is likely that you and your users are making the transition to Civil 3D from Land Desktop and are therefore quite familiar with the Land Desktop concept of projects. Land Desktop projects are a disparate collection file folders, databases, text files, and proprietary files that keep track of project data. Each drawing created using Land Desktop must be assigned to a project and can therefore access this external project data. However, since this data is external to the drawings themselves, there is limited real-time connection between changes in the drawing, the project databases, and other project drawings accessing (or "consuming") the project data.

Managing Data with Civil 3D

There are two methods for sharing drawings and data in a multiuser environment. The first method uses the drawing as data stores. The second uses an external file management system called Autodesk® Vault.

Drawing Data Stores: Data Shortcuts and Data References

The first method uses the drawing files as data stores and provides sharing of certain data via *data shortcuts* and *data references.* Read, write, and modify access to the drawings and the data in the drawings is controlled by access to the drawings themselves. This access control is exercised via Microsoft Windows Explorer folder permissions and via the file-locking mechanisms built into AutoCAD software and, by extension, Civil 3D. The concepts behind this method are as follows:

1. A drawing containing project data, such as surfaces and alignments, is attached to a Civil 3D project.

2. You share data by creating a *data shortcut* to the objects you want to share with others and then notify them (via email, phone, and so forth) of the drawing name and location where it was saved.

3. Another user creates a drawing and attaches it to the same Civil 3D project as your drawing.

4. The other user consumes data by creating *data references* to shortcut objects you created in the first step.

5. An object referenced by the consuming drawings can be used as if the object existed in the drawing itself, with the exception that it cannot be edited. However, the object styles and label styles for the object can be changed.

6. Design changes to the original objects in the source drawing are reflected in the consuming drawings, similar to how linework changes in xrefs are reflected in other drawings.

Data sharing and consumption are managed in Civil 3D. However, access permission to data is ultimately controlled by end users' access to the drawing files containing the data objects. If they have full access to the drawing file itself, they have full access to edit the objects in the drawing. Therefore, data protection relies on drawing file protection, which is controlled via Windows file permissions.

The advantages of sharing project data via shortcuts and references are as follows:

- **Ease of Use:** Data shortcuts and references are easy to use and require no external application.

- **Familiarity:** Drawings, and associated data, are created, shared, and accessed in a familiar manner via the Open, Save, and Save As commands.

- **Simple Permissions:** File and data access is controlled simply by controlling user rights to the folders in which the drawings are saved.

There are also some disadvantages to using drawings as data stores:

- **Lack of Version Tracking:** Data shortcuts and references provide no specific method for communicating the changes made to a given version of a drawing or data object. Communicating these changes among users is a manual process.

- **Data Types:** Surfaces, alignments, profiles, and pipe networks are the only data types available.

Autodesk Vault

The second method of sharing data with Civil 3D uses the Autodesk Vault project management application. Although Vault interaction with Civil 3D does require training users to approach the data in a new way, the powerful data management tools and increased data sharing functionality make it an invaluable part of a successful Civil 3D 2007 implementation.

In this section you learn the key concepts regarding Autodesk Vault, Autodesk Civil 3D Vault add-in, and the stand-alone application, Vault Explorer.

Autodesk Vault is a data management system for sharing design data across project teams. Autodesk Vault consists of two components: Server and Client.

Vault Server: Vault Server is a secure repository for project data external to Civil 3D. It has two components: the *relational database* and the *file store.* The relational database stores crucial information about project data, including version history, purpose and content of revisions, and user and group access privileges. The file store stores the physical copies of all versions of all files.

The following Civil 3D data types can be added directly to the Vault:

- Survey Data
- Surfaces
- Profiles

- Points
- Alignments
- Pipe Networks

Design data can encompass many different types of files, from drawings created in Autodesk Civil 3D or other AutoCAD-based products, to Microsoft® Word documents and

Microsoft® Excel® spreadsheets. Autodesk Vault manages any data associated with a design project, no matter what its type. As with Civil 3D and AutoCAD drawings, the version history of these supporting files can be fully tracked. Plug-ins are available for AutoCAD and Autodesk Land Desktop that allow drawings from these applications to be checked in, checked out, and opened in read-only mode in a Vault. Vault can manage all of the following document types:

- Drawing files (Civil 3D or others)

- Image files (JPG, BMP, or others)

- Microsoft Office files (DOC, XLS, or others)

- Civil 3D project data

- Microsoft Database files (MDB)

The Vault database can be installed in two ways:

- **Microsoft SQL Server™ Desktop Engine (MSDE):** This software is included on the Civil 3D installation discs and requires no separate license. You can install unlimited instances of Vault. Each Vault relational database can be up to 2 GB. The size of the file store is limited only by the capacity of the server. This installation typically works well for project teams of fewer than 20 members.

- **Microsoft SQL Server:** This software requires a separate license for the server application, runs on a dedicated server, and is intended for large companies or teams.

You may use the Vault Server directly for a variety of administrative and security tasks, including creating, modifying, and deleting projects and project folders, restoring files to prior versions, and managing backups and user access for individuals and groups.

Vault Clients: There are two distinct interfaces for the client component of Autodesk Vault. The Vault add-in for Civil 3D is built into Civil 3D and is accessed via the Prospector tab. Vault Explorer is a separate stand-alone application with a Windows Explorer-like interface. Both are used to check data in and out of Vault.

- **Autodesk Civil 3D Components:** The Vault add-in for Civil 3D offers a fully integrated way to manage your Civil 3D data, DWG™ files, and xrefs. When you are working on files that are managed by Autodesk Vault, it is important to understand that you are checking out a copy of a file that is stored in the Vault. Vault users never directly edit the master copies. When you view a file, the server sends a copy of the file to the client's workspace. Until they are checked out, these files are read-only. Only one user at a time may check out a file. Changes that have been made to checked-out files are sent back to the server when the file is checked in.

- **Autodesk Vault Explorer:** Autodesk Vault Explorer is a stand-alone client providing full access to Vault functionality. Vault Explorer enables you to add all supported types of data, such as image files, Microsoft® Office documents, and more. Using Vault Explorer, you are not limited to working with only Autodesk Civil 3D files and objects.

Installing Vault
The client component (Vault Explorer) is installed automatically when you install Civil 3D and so is the Vault add-in for Civil 3D. The Vault server components, both MSDE and MS

SQL must be installed separately, regardless of whether the Vault is located on the local workstation with Civil 3D or on a separate server. MSDE can be installed on the same computer after installing and registering Autodesk Civil 3D as explained in the previous sections.

Using Civil 3D and Vault

Vault and Civil 3D are integral to creating and managing Civil 3D projects. All the drawings and related data for Civil 3D projects are managed and checked into the Vault located in a specific directory on the server. Other team members can access the Vault and use this data on their projects.

Without doubt, users are accustomed to accessing drawings using the Open command, editing the drawings and drawing objects, and then using the Save and Save As commands to store those edits. In addition, if your organization uses Land Desktop, you also access project data from an external project database.

Using Civil 3D 2007 requires a fundamental shift in how users save and retrieve project data, and in how and where data is saved. The most common method for working with project data in Civil 3D is using Prospector to access Vault.

Logging into Vault: To create and manage projects and project data, you need to access Vault. You can log into Vault locally if the server is installed on your machine, or from a network server. Do this via the Prospector tab of the Toolspace in Civil 3D.

Creating New Projects: A project is a database directory that contains all the drawings and related data for an engineering project. To set up a new project in Civil 3D, use the Toolspace to first log in to the Vault, and then create the project.

Adding Project Data: Once you've created a project, you add data to it by first attaching a drawing. At the time a drawing is attached to the project, you can also add the data objects within the drawing. Adding drawings is done via the Prospector tab, which launches a wizard to guide you through the process.

Working with Project Data: Working with project data involves checking drawings in and out, and more.

- **Check Out:** If you want to open a drawing in a project and edit that drawing, you need to check out that drawing. This step gives you write access to the drawing and locks the drawing to prevent others from using it. It is important to note that there is a process change here, in that you need to use the Check Out function from the Prospector tab to properly open and edit a drawing file from a project. Once you have done so, you can continue to work on that file with Civil 3D as you always have.

  To communicate the various states of the data, Civil 3D uses a set of icons. These icons are shown in the following table:

Icon	Meaning
	If no icon is displayed, then the drawing has been added to the project, but you do not have a local copy.
○	The drawing is available to be checked out, and the version of the master copy in the Vault database matches your local copy.
●	The drawing is available to be checked out, but your local copy is newer than the latest version in the Vault database. This usually means that you made changes to the local copy without checking it out.
●	The drawing is available to be checked out, and your local copy is older than the latest version in the Vault database.
✔	The drawing is checked out to you, but you do not have a local copy of the object.
✔	The drawing is checked out to you, and the version of the drawing in the Vault database matches your local copy.
✔	The drawing is checked out to you, and your local copy is newer than the latest version in the Vault database. This usually means that you have made changes to the drawing since you checked it out.
✔	The drawing is checked out to you, and your local copy is older than the latest version in the Vault database.
✖	The drawing is checked out to someone else, and you do not have a local copy.
✖	The drawing is checked out to someone else, and your local copy matches the latest version in the Vault database.
⊗	The drawing is checked out to someone else, and your local copy is newer than the latest version in the Vault database.
⊗	The drawing is checked out to someone else, and your local copy is older than the latest version in the Vault database.
🔒	The drawing is locked, and you do not have a local copy.
🔒	The drawing is locked, and your local copy matches the latest version in the Vault database.
🔒	The drawing is locked, and your local copy is newer than the latest version in the Vault database.
🔒	The drawing is locked, and your local copy is older than the latest version in the Vault database.

- **Check In:** When you want to add your drawings and later your drawing changes to the project, you check the drawing in from the Prospector tab and Civil 3D takes care of adding the changes and the data to the Vault behind the scenes.

- **Open (Read Only):** It is likely that at some time you will need to view a file that is either in use (checked out) or that you have not checked out yourself. (You might not want to check out the drawing so that others still have the ability to check it out while you are viewing it.) In these situations, you can open the file in read-only mode. This can be done from the Prospector tab on Toolspace by right-clicking the drawing file and choosing Open (read-only).

- **Creating References:** To work with the data that is added to the project, you need to create a reference of the object from the project. This provides a read-only copy of the object in the current drawing, but allows you to use the object to create design elements, as well as display it as needed.

Configuring Civil 3D

When working with projects in Civil 3D, be aware of configuration settings. Of particular importance are the working folder, the active project, and the display of projects.

Working Folders: The working folder contains local copies of project drawings and points. Drawings that you check out of the database are copied to the working folder. From the working folder you can troubleshoot any problems with drawings and their versions. By default the working folder is set during installation.

Active Project: The active project setting enables you to pick a current project and make all project-related functions refer to that project without having to select it every time.

Display of Projects: You can also set a list of projects to display in Prospector. This helps in situations where many projects exist and where users can make a subset of the projects that they work with most often. When an active project has been set, the name of the active project does not display in the list.

Sharing Civil 3D Data with AutoCAD and Land Desktop Users

As you move to Civil 3D you may still need to exchange files with outside consultants and users in your organization who are still using other design applications. Fortunately, Civil 3D provides several tools for doing this.

Sharing Data with Land Desktop Users

Sharing data with Land Desktop is important when implementing Civil 3D. There are several methods for doing so, including reading and writing directly to a Land Desktop project database, transferring data between Land Desktop and Civil 3D via LandXML, and using Vault plug-ins. Also, you can share Civil 3D drawings with Land Desktop using the Civil 3D object enabler.

Land Desktop Database: Civil 3D has two commands you can use to transfer data directly to and from a Land Desktop database: ImportLdtData and ExportLdtData. As the names imply, these commands import data from Land Desktop into Civil 3D and export data from Civil 3D to Land Desktop, respectively.

The ImportLdtData command can be accessed from the File menu in Civil 3D or by typing the command name at the command prompt. You can then select the project path and project, and import the data.

The ExportLdtData command is accessible only from the command line and can be run only after the ARX for the ImportLdtData command has been loaded. The easiest way to do this is to simply launch the ImportLdtData command and then cancel it. You can then type ExportLdtData at the command prompt to execute the export function. It works like the import command, enabling you to select a Land Desktop project and the data to be exported. A similar command can also be executed from Land Desktop.

LandXML: Since its first release, Civil 3D has supported data transfer via LandXML. Civil 3D 2007 provides data transfer with Land Desktop and other applications that can create and parse LandXML data.

From the File menu, select either the Import LandXML or Export LandXML command.

Vault Plug-Ins: Plug-ins are available for AutoCAD and Land Desktop that allow drawings from these applications to be checked in, checked out, or opened in read-only mode in a Vault.
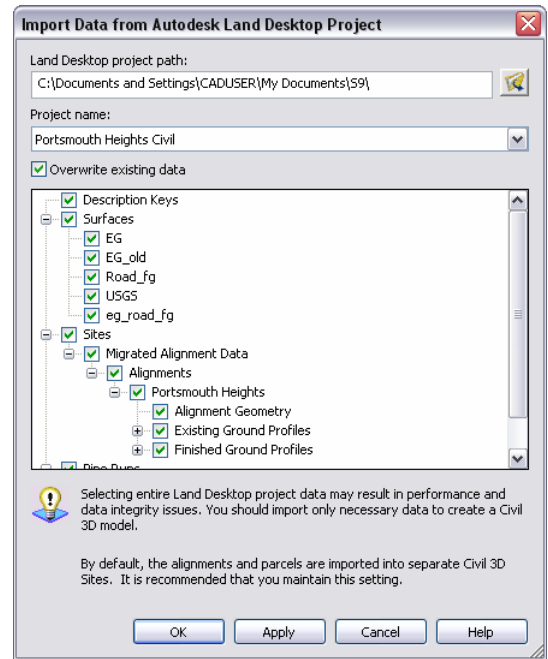
Sharing Data with AutoCAD Users

Sharing data with AutoCAD is also important when implementing Civil 3D. There are two main mechanisms for sharing data with AutoCAD users: exporting to AutoCAD and using object enablers.

Civil 3D data can be exported to AutoCAD using the Export to AutoCAD command. This step explodes the Civil 3D objects into standard AutoCAD entities. The advantage is that recipients of this file can then use the linework, text, and other entities as they see fit. This solution is generally better for subcontractors and other recipients where you cannot control their working environment or ask that they install additional software to use your original Civil 3D objects. These objects lose all intelligence and relationship information during the export.

Within your own firm and for users with whom you share data frequently, an object enabler is a better solution. The object enabler for Civil 3D installs on top of AutoCAD or another AutoCAD-based product and allows users to view Civil 3D objects in their native format. Users can modify layers as needed to control the display of the Civil 3D objects, without destroying the intelligence and relationships between objects. This is the preferred solution.

Chapter 5: Training Considerations

A training plan is a crucial part of your Autodesk Civil 3D software implementation. When developing your training plan, consider your users' experience, the types of projects your organization works on, schedules, and budgets. In addition to training core users of Civil 3D, consider a plan to train other people such as managers, people who need to view data, or IT personnel who need to maintain the software.

Developing a Plan to Address Required Skills

Training can be grouped into three general categories: basic training, advanced (sometimes referred to as *targeted*) training, and mentored (or "on-the-job") training. There are also various combinations of these categories, including advanced custom training and targeted mentored training.

The type of training your organization needs depends on the type of projects you work on, the number of users, and the departmental structure of your organization. For example, if you only design highways, the training you get should focus on the software's road design features, covering other features only briefly.

In addition, specific tasks may be performed by specific people. Therefore, each user may have different responsibilities (designer, surveyor, drafter, and so forth) that require different training. Plan to address the required skills and accommodate training for various skill levels and tasks. Whatever the case, create an outline for the training and work with the people in your departments to ensure that the tasks they are required to perform are covered in the training you propose.

When creating a training plan, consider the following:

- Who will deliver the training? Will it be you? Will you bring in an outside consultant? Will you go to your reseller?

- Where will the training take place? Will it be at your site? If so, do you have the appropriate resources available? These include a quiet training area with workstations, network access, projector, and possibly a microphone.

- If needed, are you prepared to grant the instructor network access so files can be shared easily between instructor and students?

- Identify a sample data set to be used in training that represents your project types.

- It is important that the students are able to focus on the training during class time. You might require that attendees be "off limits" during the training or that they not have Internet or email access. Interruptions can drastically reduce the effectiveness of training.

- Request that the instructor tailor the training to account for different skill levels.

- Request that the instructor tailor the training to account for different tasks and responsibilities within your organization. Training might include separate sessions for engineers, surveyors, and drafters.

- You might also request a combination of formal training and on-the-job training. This approach gives users a good knowledge base of the product's features as well as access to an expert while they work on real-world projects. The benefit is

that you and your users can look at issues specific to your design environment. One preferred method of knowledge transfer follows this sequence: classroom training, mentoring (on-the-job training), reviewing and making adjustments to training, followed by ongoing support.

Selecting a Consultant

The skill level and experience of your instructor is crucial to the success of your training experience. Specifically, make sure a consultant meets the following two qualifications:

Real-World Production Project Experience

A consultant should have experience with your type of business. In the construction and engineering industries, look for someone who has designed a project or worked in the field on a project, or both. Preferably, look for a technology consulting firm with recent experience and references that relate to the construction industry (not just the technology).

Expert Knowledge on Product

It may seem obvious, but be sure that your consultant has thorough knowledge of the product. He or she should at least have expert knowledge of your version of Civil 3D. In addition to expertise with the software, the consultant must also have experience *using* the software to complete a real-world project. This requirement is directly connected to the first item. Knowing what works and what doesn't work in a production environment is essential.

In addition to these two crucial requirements, also consider these criteria when choosing consultants:

- Make sure the consultant has the availability and capacity to meet your training needs.

- Ask about the individual consultant(s) who will provide your training. Don't assume that because the consulting firm has a good reputation that the individual consultant meets the two main criteria.

- If a prospective consultant's fees seem too good to be true (very low), then they probably are. Expect to pay for high-quality consulting. The flip side, of course, is to be wary of consulting firms that charge overly high fees without providing expertly qualified consultants.

Finding Help

Finding a qualified consultant is the first step in getting the most out of Civil 3D 2007. Several resources are available to you.

Resellers

The first place to look for training services is the reseller who sold you the software. Nearly all resellers offer training on standard features to get you familiar with Civil 3D basics. Several offer advanced training and consulting. Many resellers maintain a regular schedule of classes on various topics and also offer custom classes that can be scheduled at any time and filled with attendees only from your organization. Instructors for classes presented by the resellers are often Autodesk Civil 3D Implementation Certified Experts (ICE). The ICE program was designed to provide advanced training to reseller Application Engineers and to test their implementation knowledge with an in-depth exam.

For more information on reseller training, call or visit the reseller's website or visit www.autodesk.com/reseller to locate a reseller near you.

Autodesk Consulting

Autodesk Consulting professionals help you get started quickly and effectively with your new Autodesk software by providing assistance and direction so that you can meet your business goals and objectives. Autodesk Consulting provides a full range of services, including process and productivity, migration and translation, software customization, and customized training.

For more information on Autodesk Consulting, go to www.autodesk.com/civil3d and select Consulting on the left side.

Technology Consulting Firms and Independent Consultants

Another source of consulting services are individuals and firms that specialize in providing training and consulting on Civil 3D. These consultants have deep knowledge of the product. More important, qualified firms have extensive, relevant industry experience and understand your organization's business beyond the product on which they train. Industry experience is crucial to understanding what your firm does and how technology fits into its process. This expertise on software and hardware features combined with their industry experience make them uniquely qualified to help you improve your business efficiency and profits. These individuals and firms are often more difficult to locate, but with a little research on the web you can find what you need. Start by asking your reseller for a referral and read discussion groups for names and contact information.

Following is a short list of qualified consulting firms:

- APW Engineering, Inc. (http://apwengineering.com)

- Engineered Efficiency, Inc. (www.eng-eff.com)

Chapter 6: Pilot Project Strategies

Implementation of Autodesk Civil 3D software into your production environment occurs when you begin your pilot project. All the research, planning, training, and preparation come together in a single project that may determine the success of your overall implementation project. This chapter looks at pilot project selection, strategies for pilot project training, and how to measure the success of your pilot project.

Selecting a Pilot Project

There are two approaches to selecting a pilot project. The advantages and disadvantages of each are discussed here. The first is to select an existing job that was done in your previous design package and redo the work using Civil 3D. The second is to select a new project and perform it using Civil 3D as your design platform.

Using an existing project for your pilot has several advantages. There is no timeline on the job, no client to satisfy with design changes, no budgetary restraint (except what you allot for training), and less pressure on team members. In addition, once a component of the design has been figured out, you can move to the next portion instead of completing the construction documents. This means that the overall time to completion is lower.

The disadvantages of using an existing project are similar. Without a timeline and the rush of client and city demands, many end users find it hard to work effectively and with their usual level of detail. Some portions of the design might not be fully explored during this type of pilot, leading to a false sense of security. Finally, using an existing project does not allow you to gather real-world metrics to measure the success of Civil 3D in your project environment.

A new pilot project brings in the full host of issues that all new projects bring, in addition to time spent learning the new software. However, a live project allows you and your team to learn how to better deal with the design process, plan production, change orders, and plan reviews. If you choose this approach, selecting the right project is crucial.

A good candidate for a pilot project has the following characteristics: straightforward design that your company is familiar with; an understanding client with whom you have a good relationship; and a smaller job. Your Civil 3D pilot project is not the time to test a large master-planned community for a new client in city where you've never worked. Using a live project also allows your team to measure improvements in plan production, a crucial part of selling Civil 3D to executive management for support of future expansion of the product through your design teams.

Pilot Project Training and Knowledge Disbursement

Your Civil 3D pilot project also leads the way in how you train and bring other users onto Civil 3D as a design platform. Some suggested methods are as follows:

- *Rotating Pilots:* Each design team is trained in turn, one after another. This allows you to train a group of users and work through a project with them before moving to the next. Each team should complete a basic level of training before beginning a project. This typically means training to various levels and covering the full extent of the product in every pilot project since the team will be rookies for each one. This process can be expensive because expert-level trainers should be used for each team.

- *Viral Pilots:* The initial project team consists of users who have been through basic training and for whom the pilot project acts as advanced training. This team completes the first project at your firm, developing standards, operating practices, and templates along the way. After this project is complete, this group disseminates knowledge to the next group. These team members then become responsible for teaching the basics to the next generation of users, honing their own skills in the process. This method can be the least expensive, but often results in a slower adoption and more uncertainty that users are learning best practices and techniques.

- *Hybrid Methodology:* This method combines aspects of the other two methods. The hybrid training plan typically includes basic training for the initial group of users from an outside expert-level trainer. This group completes a project, working with the expert to build styles and standards in preparation of more widespread user base. After this project is complete, these users are then used with the expert as a training core, rotating through teams and acting as the mentor for their peers. This approach allows the first generation of users to train while having the expert immediately available for assistance if needed. Because this method allows local users to be more involved in the training of the next generation of users, more customization based on skill levels is possible.

By reviewing your goals for implementation speed and cost, you can decide on a pilot and training methodology and begin detailed planning for your user-base training.

Metrics of Your Pilot Project

Most engineers enjoy the challenge of their work and the feeling of solving a tough problem. With that in mind, engineering is still a business, and part of your job is to make the design staff and CAD technicians in your firm as successful as possible. Part of that success is understanding the measurement of success for your pilot project and implementation.

Firms measure success in many different ways. Some firms base team or process success purely on the change in the bottom line. Many firms use a multiplier to understand the rewards of adopting new technology. In land development, cost per lot or acre developed is a common metric, as is designer or technician hours on a specific component of the work. Before beginning a pilot project, it is important that you understand the metric used to measure your success.

Your goal might be to make your users' lives easier and send them home with fewer headaches; reduce errors and omissions due to inconsistent annotation; or help your designer explore more options to deliver value engineering. Your users might simply want to spend less time at work. Or maybe they dislike labeling or redline markups. Making end users happy helps to increase their respect for you as a leader of the CAD team. No matter what metric you use to measure success, it's important that it is understood up front as part of the pilot project.

By being clear on this from the outset, you can focus on what matters to all interested parties. By delivering results to all stakeholders on their own terms, you can make your pilot project a success.

Chapter 7: Deployment Strategies for Civil 3D 2007

As you approach the deployment of Autodesk Civil 3D software into your production environment, consider whether you want to do it yourself or bring in professional help. Many firms think nothing of installing a new AutoCAD software package, with all the changes in customization, drivers, hardware requirements, and so forth, but would never dream of installing new asset management software without outside help. Even if you are comfortable moving from one version of Autodesk Land Desktop to the next, the change from Land Desktop to Civil 3D is dramatic enough at the user and support level that you should carefully consider your approach to this upgrade. This chapter focuses on a process that organizations can use during the deployment, and then on the two main options for outside help: ICE resellers and professional consultants.

Deployment Considerations

Autodesk recommends a deployment process that consists of these four phases:

- Assess

- Plan

- Solve

- Confirm

The following sections cover the decisions you will need to consider in each phases.

Assess

By understanding pain points in the design process, you can better address them with new software. Reviewing your firm's current workflow and infrastructure is the first step. This assessment should include project data storage strategies, libraries of blocks and other common data sources, backup plans, and bottlenecks in the design process.

In addition, a crucial review of in-place standards gives you a better feel for how long it takes to create the templates and styles that give Civil 3D its power. If you do not have a full CAD standard in place, the implementation of Civil 3D can help you make order from chaos.

Finally, comprehensive inventory of software and hardware in the organization helps you understand whether your firm is ready to begin installing an advanced engineering application. Many workstations that work well for Land Desktop production use are not adequate for the Civil 3D model-based approach.

Plan

After completing an assessment of your current situation, plan for where you want to be with a successful Civil 3D implementation. By considering all the issues, you will be ready to address questions as they arise from users or executives regarding your implementation.

Installation issues have been addressed in a previous section of this primer, but based on the review of in-place hardware and software, you should plan for how coordination within the IT infrastructure will take place. Work closely with your firm's IT or IS department to

make sure they understand what demands Civil 3D will place on the infrastructure. By doing so, you improve your chance of a smooth deployment. Discuss any RAM, video, or other hardware upgrades with that group. Once infrastructure issues have been addressed, you must also plan on how to deal with requests for Civil 3D drawings from other users, internal and external to your organization. This can include making object enablers available, or simply being sure to cover the Export to AutoCAD functions during training.

In addition, consider any file management issues you found during the assessment; security concerns and how you will maintain privileges for users who can modify your templates, and which users those will be; what to do with current project files; and whether and how you will port existing data to Civil 3D.

Finally, planning how Civil 3D will work in your environment is a major component of a complete deployment. Consider how the creation of templates and styles will be accomplished; the workflow of Civil 3D data; and how to approach training for all users. These Civil 3D–specific tasks are the most challenging, but there are many resources available to help you take them on and make your plan complete.

Solve

After reviewing the current state of your firm and planning for your Civil 3D deployment, it is time to put your work to the test. It is important to take the same methodical approach to the solving phase as you have in earlier work.

Begin with a punch list that includes the work done to date as well as the major milestones to come. Some of the items on your list will be installation, training, customization, meetings with key personnel (both behind-the-scenes users and end users) and follow-up. A punch list makes it easy to stay on track and review your progress. In addition, it's a clear display of your commitment to the project.

Next, consider the resources you need to complete those tasks, and where you will find those resources. It's important that you decide what should and must be done by you or members of your firm, and what could possibly be outsourced, working with a value-added reseller (VAR) or consultant to make the punch list more manageable. Many of the customization and configuration tasks can be done off site and are easily delegated to other team members. In-house tasks typically include backup plans, network optimization, hardware upgrades, and data migration.

Now that you're almost ready to put the software into use, it's time to train your users. The importance of this step cannot be emphasized enough. Whether you use an in-house professional, your reseller, or a qualified consultant, good training is essential. The best trainers are enthusiastic about the product, knowledgeable, helpful, and know where to look for answers to questions they can't answer themselves. Their enthusiasm and knowledge can infect your users and make their transition to Civil 3D much easier.

Finally, keep up with your project. Maintain your schedule and punch list. Make notes of deviations and why you changed from the original plan. Document your work so that your users and your firm understand what has happened within the system and can follow your work.

Confirm

You should now look back at your implementation and review your work critically. Have you succeeded? Are end users working in production efficiently? What course corrections are necessary?

The success of this project is based on the metrics you set in the original assessment stage. You learned then how your users, peers, and superiors would measure success and can now use their scale to judge your project. If there were problems, be honest about them, document them, and start planning how to resolve them.

In addition to troubleshooting, it's also time to start the cycle over, with refinement in mind. What areas are users having trouble with? What opportunities exist for customization of tools to deliver greater productivity? What tasks can be made simpler? These questions lead you to the ongoing training that should be a part of using Civil 3D in a real-world environment. There are always new ways to use the tools and areas of the program that your users haven't gotten into yet but will want to. Ongoing training creates an atmosphere of learning, keeping users up to date and leading to higher productivity.

Now that you've outlined the steps of deployment, the next section considers some ways to get there.

Outside Assistance

The addition of any new technology to a firm's infrastructure should include research, planning, documentation, troubleshooting, and training. In the case of Civil 3D, bringing in outside help can reduce the burden on CAD managers still trying to maintain productivity as they prepare for a significant change in design software. In addition, more experienced implementation experts can reduce the opportunity cost by limiting downtime and accelerating deployment and learning time. There are two main sources for outside assistance: Implementation Certified Experts (ICE) in the reseller channel, and independent professional consultants.

Implementation Certified Experts

The ICE program is a four-day classroom training developed by Autodesk to train reseller Application Engineers (AEs) in the full gamut of issues presented in this primer. These classes were developed by industry leaders with real-world experience to train AEs to help CAD managers implement Civil 3D. Your reseller should have ICE AEs on staff, trained in the four-phase implementation approach. The ICE should be able to examine your firm from top to bottom, ask the right questions, give you clear answers, and address the concerns of your organization's management.

Professional Consultants

Professional consultants are typically longtime users and CAD managers who have decided to build a career on their technical expertise. The best of these consultants are licensed in their field (PE or AIA) and have spent many years in industry. Their licensure gives them a level of credibility in the eyes of senior management that a technician turned Application Engineer simply doesn't have. Licensed or not, the consultant you choose should have solid references, connections with known industry leaders, and experience in training. A consultant who regularly teaches at Autodesk University, for example, will have the experience and skills to deliver the training and knowledge your deployment requires.

Chapter 8: Support Resources

This chapter lists resources supporting Autodesk Civil 3D software. The amount of support you need depends on your level of in-house technical expertise, the nature of the problems, and the personnel and time resources you can commit to support. For many issues, you can easily find the answers using these resources

Free Support Resources

Knowledge Base

The Autodesk Knowledge Base is the first place to look for support. Refer your clients to the Autodesk Civil 3D main Support page. This site lists current hot topics and has a searchable database of past issues and resolutions.

To access the Knowledge Base, go to www.autodesk.com/civil3d and click Support.

Discussion Groups

Autodesk-sponsored discussion groups provide an environment where Autodesk product users and industry partners can ask questions and share information about Autodesk products. Discussion group topics are publicly available worldwide. Autodesk encourages you to participate by posting questions or providing input or answers to questions from other users.

To participate in discussion groups, go to: http://discussion.autodesk.com.

Webcasts

Weekly Autodesk Civil 3D webcasts highlight Civil 3D features, tips, and tricks. Presenters include members of Autodesk Civil product management and development teams. Civil 3D webcasts take place every Friday from 12 noon to 1 p.m. Eastern time. All sessions are recorded and archived on the Civil 3D website.

For more information about Civil 3D webcasts, go to www.autodesk.com/civil3d and click View Free Webcasts.

White Papers

As you move to Autodesk Civil 3D software, check out the variety of white papers that address key questions, discuss the options, recommend procedures for using Autodesk Civil 3D, and show compelling return on investment (ROI) findings. You'll also find several comparative analysis white papers.

For more information about Civil 3D white papers, go to www.autodesk.com/civil3d and click White Papers.

Autodesk Civil 3D 2007 Readme

Located on the installation disc, the *Readme* file contains important information about the release of Autodesk Civil 3D 2007 that may not be included in the printed documentation or help file. Because Civil 3D is built on AutoCAD and Autodesk Map® 3D software platforms, items about those products are also included in this file.

Fee-Based Support Resources

In addition to free resources, Autodesk provides a number of customer, reseller, and consulting programs to support customers' migration needs.

Enterprise Support

Autodesk[®] Enterprise Support links your support staff directly to the experts at Autodesk, available to provide support 24 hours a day, 7 days a week, in your choice from among 10 languages. With 14 support centers worldwide, you can easily get support for multiple sites. And everything is connected by a single web-based tracking system, so you can keep track of all your queries online. With Autodesk Enterprise Support, you get fast, accurate help straight from the source, helping to ensure maximum productivity and reduce costly downtime.

Support Request

Support Request is a web interface you can use to submit queries directly to Autodesk support experts. You can review and update your support queries and attach files or other relevant information. You automatically receive an email notification each time an Autodesk support expert responds to one of your queries.

Support Request is available to customers of the following Autodesk support programs:

- Autodesk Enterprise Support

- Autodesk Store warranty program

- Autodesk Partner support programs

Autodesk Consulting

Whatever your business, you face constant change, fierce competition, and customers who demand more. Choosing the right products is only part of the story. You need complete solutions that help you implement those products for maximum competitive advantage.

Autodesk Consulting professionals help you get started quickly and effectively with your new Autodesk software by providing assistance and direction so that you can meet your business goals and objectives.

Authorized Training Centers

You perform faster, smarter, and better with Autodesk software products when you turn to the Autodesk Authorized Training Center (ATC) network. There are more than 1,100 ATC[®] sites located worldwide that meet the needs of design professionals for discipline-specific, locally based training. ATC training providers are authorized by Autodesk to deliver hands-on, instructor-led training to design professionals using Autodesk software and are recognized by Autodesk for their rigorous standards of excellence.

Autodesk Resellers

Most Civil 3D resellers provide fee-based training and support. Talk to your reseller to determine if they offer the services you need. Also, review the reseller resources on the Autodesk website at www.autodesk.com/reseller.

Independent Consulting Firms

Call on the professional experience and software expertise of a professional Civil 3D consultant. These independent firms are often the best source for real-world knowledge on using Civil 3D in a production environment. Check the web to find one that meets your needs.