AUTODESK UNIVERSITY 2014

# A CAD Manager's Guide to AutoCAD Civil 3D

Rick Ellis – Cadapult Software Solutions

**CM6745** Are you a CAD manager where AutoCAD Civil 3D software is only one of the many software applications you are responsible for maintaining and managing, even though you might not consider yourself an AutoCAD Civil 3D power user? Even if you have an extensive background with AutoCAD Civil 3D software but you just want to learn more from a CAD management perspective, you won't want to miss this class. AutoCAD Civil 3D software is much more than just AutoCAD software for civil/survey users. It has many traits and features that make it powerful, and it can also bring unique needs and challenges to the CAD manager. The great news is that these challenges are not hard to overcome once you understand the reasons behind them. In this class we will discuss managing templates, styles, and settings—which can be the biggest obstacles to success with AutoCAD Civil 3D software. The class will also explore data compatibility and translation, output options, and different approaches to training. Don't miss this chance to learn ways to more effectively manage AutoCAD Civil 3D software within your CAD system.

## Learning Objectives

At the end of this class, you will be able to:

- Learn how to manage AutoCAD Civil 3D software templates, styles, and settings
- Understand compatibility issues with other versions of AutoCAD Civil 3D software and work with data from other design packages
- Share data with project team members who are not using AutoCAD Civil 3D software
- Learn how to identify effective methods of training for both transitioning to AutoCAD Civil 3D software and increasing productivity of existing users

## About the Speaker

Rick Ellis is the president of Cadapult Software Solutions, Inc., where he provides training and consulting services to clients around the country, helping them to get the most out of their design software investment. Rick specializes in AutoCAD Civil 3D software, AutoCAD Map 3D software, InfraWorks software, AutoCAD Raster Design software, and AutoCAD software. He is a member of the Autodesk Developer Network and the author of several critically acclaimed books on AutoCAD Civil 3D software and AutoCAD Map 3D software, including the Practical Guide series. Rick continues to use AutoCAD Civil 3D on projects in a production environment, he teaches classes to organizations both large and small around the country, and he is a member of the National Speaker Team for the AUGI CAD Camps and CAD Americas. This practical background and approach has made him a sought-after instructor by organizations worldwide.

rick@cadapult-software.com
@theRickEllis

## About the Handout

I view my course handouts as a resource you can skim before the presentation and read in more detail after the presentation. It is meant to be an additional resource for you and is not a word for word script for the presentation. I also sometimes post revised handouts after AU is completed so be sure to check back for any updates.

## Introduction

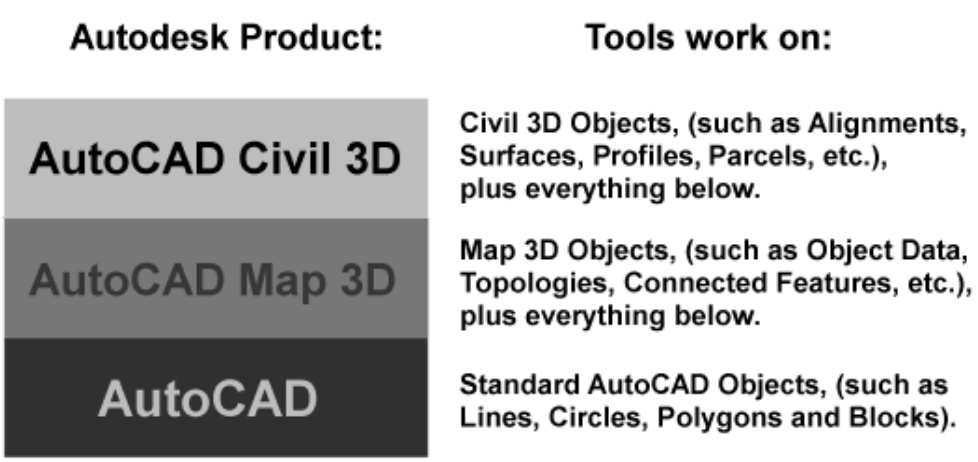
A CAD Manager can look like a lot of different things. Ranging from a person who is a full time CAD Manager, complete with the title, authority and responsibilities that the position implies; to the de-facto CAD Manager that doesn't even have a title, or authority, yet responsibilities have fallen to him/her simply because they have the most experience or have been there the longest.

Some CAD Managers work in large, multi-disciplinary firms while others work at small organizations that focus on a single discipline. You can certainly say the CAD Manager community is diverse, and with that comes a large list of challenges. Just one of those challenges is managing some very complex, and unique, software. If you graduated through the ranks and were an expert in that software then you are in great shape. But if you are asked to manage multiple disciplines, or even if software just radically changes over time, you may find yourself in a position where you are not an expert in a particular piece of software that is part of your CAD Manager responsibilities.

That issue will be the focus of this class. In particular, managing Civil 3D, and some of the unique challenges that it can bring. While it is beyond the scope of this class to make you a Civil 3D expert, we will look at some specific topics that are important to understand for any CAD Manager that has Civil 3D as part of their CAD department, and particularly those CAD Managers that may not have an extensive background with Civil 3D.

## Understand compatibility issues

*AutoCAD Civil 3D* is built on top of *AutoCAD Map 3D*, which is built on top of standard *AutoCAD*. Using the many tools found in *Civil 3D*, you can work with three types of objects: standard *AutoCAD* objects, (such as lines, arcs, circles, polylines and blocks); *Map 3D* objects, (such as *Object Data*, *Topologies* and connected *Features*); and Civil 3D objects, (such as alignments, profiles, parcels, surfaces, and pipe networks). However, commands from a lower product like AutoCAD Map, may not recognize objects created by a product above it like Civil 3D. For example, the MAPEXPORT command will not export a Civil 3D Pipe Netwrok.




### Other Versions of Civil 3D

Not all versions of Civil 3D are created equal. Up until the 2013 version there was no backward compatibility for Civil 3D objects. This means you may be able to open a 2012 drawing in 2011. However, if it contained Civil 3D objects, those objects would not display as normal, editable, Civil 3D Objects. Basically Civil 3D drawings at this time were upwardly compatible but not downward.

The only way to get your Civil 3D data into an earlier release was to export it to LandXML and import it into a new drawing in that earlier release. Then WBLOCK any non-Civil 3D linework out and insert it into that new drawing.

Thankfully, the Civil 3D objects in the 2013-2015 versions of Civil 3D are compatible and you can just open the drawing.

### Other Design Software

You may need to receive data from, or provide data to, people who are using a Civil/Survey software package other than Civil 3D. If all they are concerned with is graphics and basic geometry then you can use the Export to AutoCAD command. However, if you want to exchange the actual data then LandXML is your best option.

LandXML is a generic, non-proprietary, interchange format for Civil/Survey data. It supports Point Groups, Alignments, Profiles, Surfaces, Parcels, Pipe Networks, Pressure Networks, and Corridors. This import/export procedure only supports data, not the display of the data. So when you import a surface you will get the exact surface definition that was created in the original program, but it will be displayed according to the Civil 3D style you assign to it.

## Sharing data with project team members

### Types of users

- Civil 3D Users
- Non-Civil 3D Users
    - AutoCAD
    - AutoCAD LT
    - Any other software that reads DWG files

### Civil 3D Users

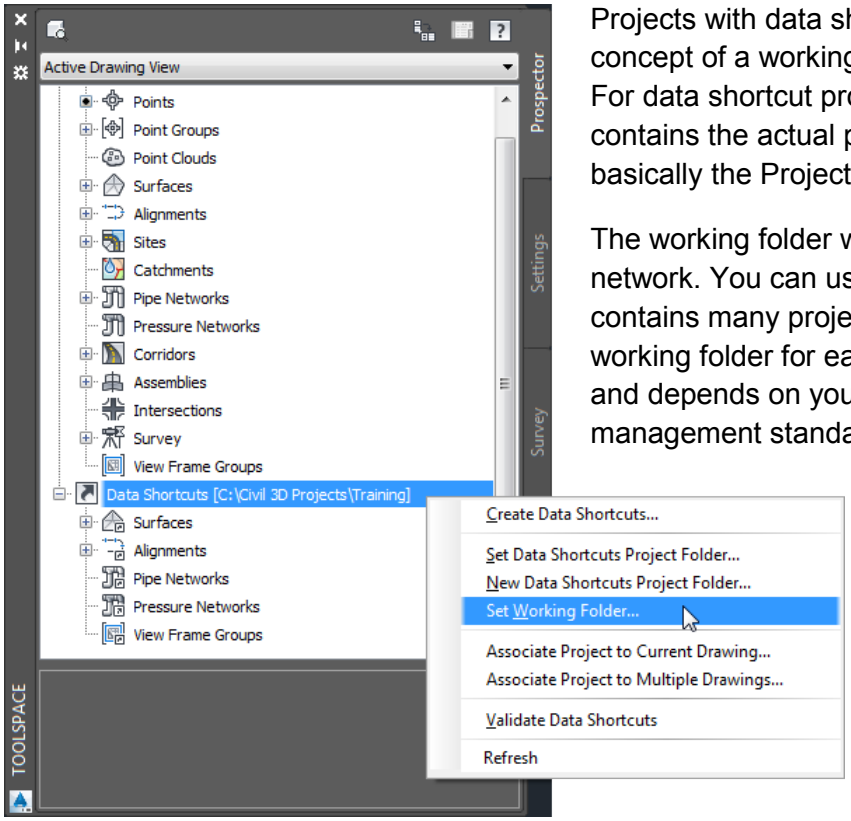
- Data Shortcuts
- Vault

### Data Shortcuts

Data shortcuts provide complete reference copies of objects that you can insert into one or more other drawings.

Data shortcuts can be created only for surfaces, alignments, profiles, pipe networks, pressure networks, and view frame groups. They provide reference links between drawings without the use of a database. When you create data shortcuts from a drawing, they appear on the Data Shortcuts node of the Prospector tree. From this location, you can insert a reference object into another open drawing by right-clicking its shortcut.

## The Working Folder

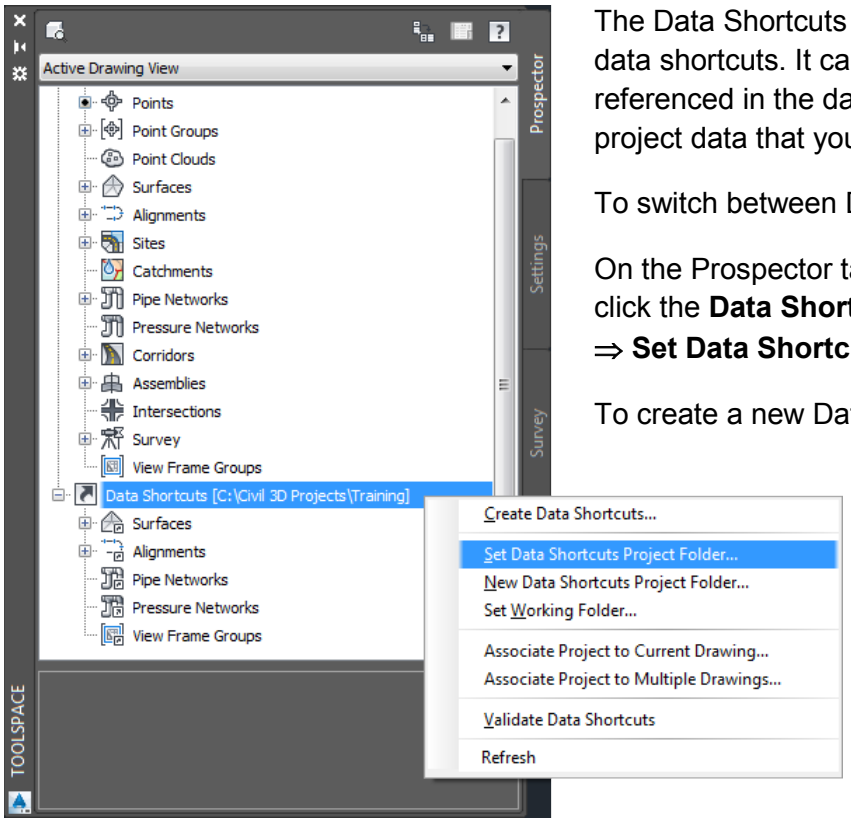



Projects with data shortcut references use the concept of a working folder for storing all projects. For data shortcut projects, the working folder contains the actual project documents. This is basically the Project Root Directory.

The working folder will typically reside on your network. You can use a single working folder that contains many projects, or you can have a new working folder for each project. This is up to you and depends on your directory structure and file management standards.

On the Prospector tab of the Toolspace, right-click the **Data Shortcuts** collection and select ⇒ **Set Working Folder**.

## The Data Shortcuts Project Folder




The Data Shortcuts Project Folder contains the data shortcuts. It can also contain the drawings referenced in the data shortcuts and any other project data that you desire.

To switch between Data Shortcut Project Folders:

On the Prospector tab of the Toolspace, right-click the **Data Shortcuts** collection and select ⇒ **Set Data Shortcuts Project Folder**.

To create a new Data Shortcut Project Folder:

On the Prospector tab of the Toolspace, right-click the **Data Shortcuts collection and select ⇒ New Data Shortcuts Project Folder**.

### Data Structure

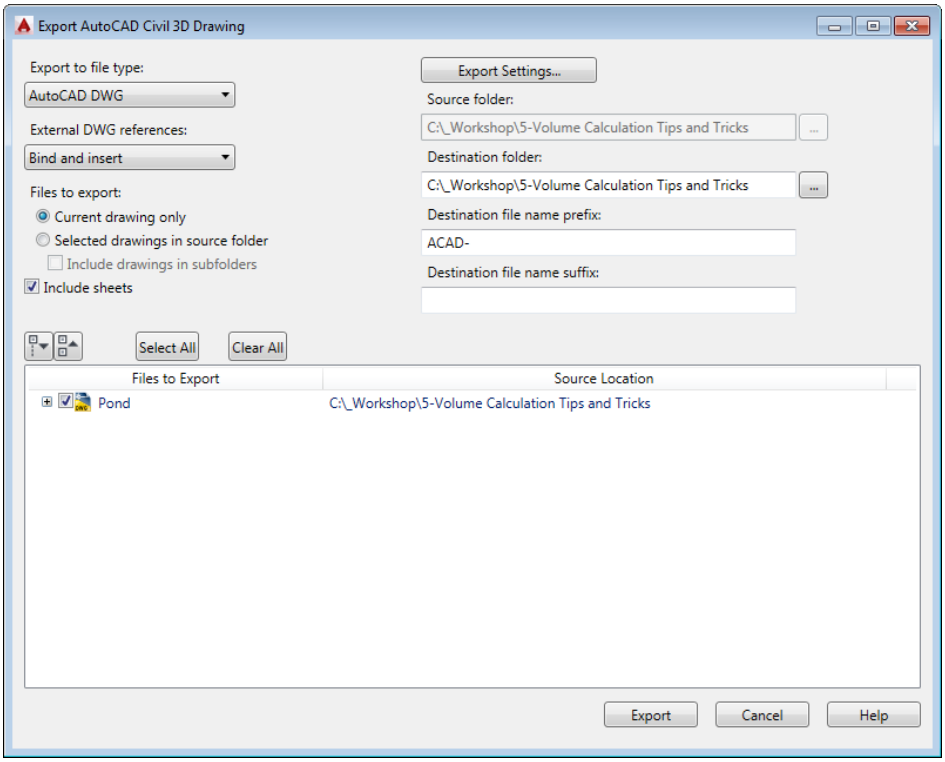
The Data Shortcut Project Folder is a subdirectory of the Working Folder. When you create a new Data Shortcut Project Folder it will automatically have one subdirectory called "_Shortcuts". You can also use a Project Template when creating a new Data Shortcut Project Folder. You can add folders to a Project Template by simply creating new folders in windows explorer. These new folders will automatically be copied to each new Data Shortcut Project Folder when new projects are created and the project template is selected.

### Vault

Autodesk Vault is a document management system. In addition to managing your drawings with a check-in\check-out system, Vault will also allow you to share Civil 3D objects similar to Data Shortcuts. Vault is a system that will change your workflow. It will require some training for your users as well as additional management of the Vault server.

### Non-Civil 3D Users

- Civil 3D Object Enabler
  - http://knowledge.autodesk.com/support/autocad/downloads/caas/downloads/content/autocad-civil-2015-object-enabler.html
- Export to AutoCAD



## Training

The fact that you are here at Autodesk University means that you, or someone at your organization, understands the value of training. However, that doesn't mean you won't be asked the question "Why should we spend money on that?" So you need to be prepared to justify your request and the most effective way to do that is in financial terms. Your boss probably cares more about schedules, deadlines and ultimately the profitability of a project than he does about your frustrations with Civil 3D styles or that user who keeps exploding Alignments or drawing Profiles manually. We know those are all related, but your boss cares about the financial part not the details of your technical issues.

So do the math. Calculate the cost of your proposed training project, including the time users will be away from billable work and attending training. Then calculate the time savings you expect the training to achieve. A time savings of 5 minutes an hour or even just 10 minutes a day can add up to a significant amount of time over the course of the year. Another financial perspective is to look at the amount of money you spend on software. It only makes sense to spend at least a small percentage of that on training your users so they can actually achieve the productivity promised by the software purchase.

You also need to have clearly defined training objectives. Your users may just want to "learn more" or "be more productive". But your job as the CAD Manager is to put a detailed plan together to make sure that actually happens. Look at your users, the processes they use, and the products they create. Then use that information to focus in on certain topics and processes that you can improve. Making sure your training is on target is key to meeting your training objectives and realizing the return on investment that you have promised.

### Types of Users

- New to Civil 3D
  - Doesn't matter if they have used other Civil/Survey software (including LDT)
  - They need a fundamentals course
- New to your organization
  - Need to learn your workflows, procedures and standards
  - Need to know how to work with your template and settings
- Existing users learning new features
  - New versions of software
  - Continuing to learn more advanced features to increase productivity

### Types of Training

- Self-Paced
  - Books
  - Videos
- In-House (short topic based)
  - Lunch and Learns
  - User groups
- Instructor Led Classes
  - On-Site or Off-Site
  - Taught by an internal staff member or by an outside consultant

### Self-Paced

This is often the cheapest option and can include things like books, YouTube videos or video training products and services. These can all be great resources. However, users often never seem to find the time to use them, or at least don't use them as much as you anticipate. Scheduling time for them to use these training resources is critical if you have an actual training goal for a user.

### In-House (short topic based)

This most often takes the form of the "Lunch and Learn" or "Brown Bag Lunch Training". This can also be a low cost training option. However, you do need to take the time to prepare for these training sessions and make them valuable. People will show up for free food if you provide it, but you will not accomplish your training objectives if you are not prepared. In addition, users will quickly get in the habit of not paying attention to these meetings is they are not conducted in a professional manner where they learn things that they can see results from when they go back to work.

### Instructor Led Classes

This is by far the most expensive training option. Whether you send users out to a class at a training center, or if bring a consultant in to teach a class in your office, you have the expense of the class itself as well as the time that your users are away from billable work. Even with the larger price tag this can often give you the most bang for your buck.

One often overlooked advantage is that you have a significant block of time that is scheduled and dedicated to the training. It doesn't get put off or rescheduled because a user is busy. You have paid for the class and it is their job to go to it and learn. Distractions are one of the biggest obstacles to learning. If you think of the last time you sat at your desk doing a tutorial, how many times did the phone ring or a coworker stop by with a question? When you consider that interruption, even if it was short, how much time did it take to get back in to the tutorial you were doing and how far did you have to backtrack to get your mind back into the learning

process? An instructor led class does a good job of minimizing or eliminating these distractions.

However, just spending the money for an instructor led class does not let you off the hook as a CAD Manager. You will still need to invest time in finding the right instructor and making sure the scope of the material covered in the class meets your learning objectives.

The biggest variable in the success of instructor led training is the instructor. Like and profession there are good ones and bad ones out there. Often you get what you pay for and a really cheap price should at least be a red flag that gives you pause to look a little closer. The most expensive class is the one where you spend your training budget and the time of your users on a class that does not accomplish your training goals. The price quoted to you by the instructor often has very little to do with this, what was quoted to you as a cheap class may turn out to be the most expensive one you have ever taken.

Your job as the CAD Manager is to thoroughly vet your instructor candidates. Talk with them at length about your training needs and objectives as well as the experience and background of your group. Find out about their background and experience. Have they actually worked in the field? Ask for a written outline for the class and if you are allowed to make changes to it. Find out how they handle situations if you are not satisfied with the class. Do they offer options to retake the class or refunds? Ask yourself if the instructor and/or company you are considering is a good match with your personality and approach to training. You are really looking for a partner here. Try to find an instructor that you are comfortable with and confident in and build a relationship with them so you can use them in future trainings. This will bring consistency to future classes and also save you time because you do not need to go through the lengthy interview process in the future.

### Types of Users Matched with Types of Training (recommendations)

- New to Civil 3D
  - Instructor Led Class
- New to your organization
  - In-House (short topic based)
- Existing users learning new features
  - Self-Paced
  - In-House (short topic based)
  - Instructor Led Class

## Managing AutoCAD Civil 3D templates, styles, and settings

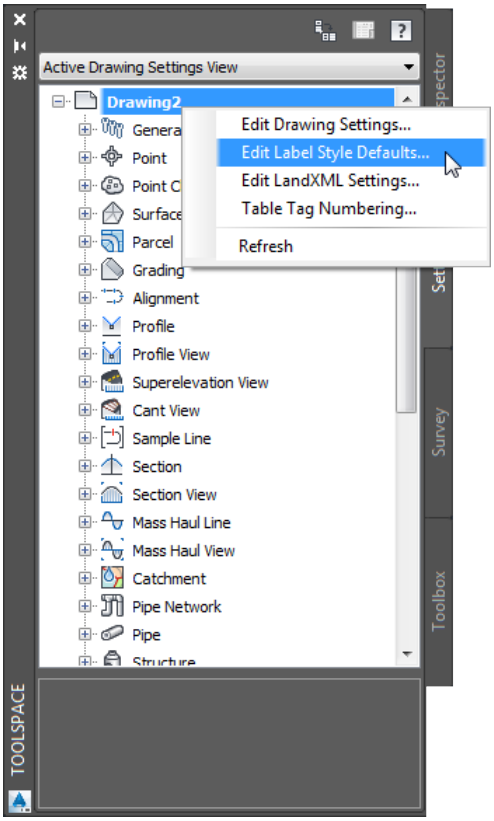
There are many different approaches to setting up and working with styles in Civil 3D. What works well for one person may or may not be the best solution for another. The goal is to first understand the options that are available to you, and then you can make decisions based on what works the best for your organization, its needs and workflows.

### Styles and Settings in Civil 3D can be categorized into the following groups:

- Object Styles
- Label Styles
- Table Styles
- Settings

### Styles and Settings from the Top Down

It can be very tedious to edit Styles and Settings one at a time. Depending on your CAD standards this may be necessary. However, it is likely that most if not all of your labels will have some things in common. For example you might use the same text style, height, or color for all of your labels. If that is the case you can set the common parameters for all of your Civil 3D Label Styles in one place. You simply need to understand the tree structure of the Settings Tab of the Civil 3D Toolspace and the hierarchy that it uses. The drawing name is the root of the tree that all the features (like Points, Surfaces, and Parcels) branch off from. Under each feature you will find a folder or collection of Label Styles. For some features you will find different categories or types of Label Styles under the Label Styles folder, while in other features the Label Styles folder contains the Label Styles themselves. For features like Parcels that do have categories or types shown the Label Styles are contained within these categories.




Once you understand how things are organized controlling large groups of Styles and Settings is much easier. Basically, the higher that you go, or the closer to the root (drawing name) that you get the more that you can control or edit all at the same time, with the drawing name level controlling all of the Styles and Settings in the entire drawing. For example you can right-click on the drawing name and select **Edit Label Style Defaults**.

## Layers

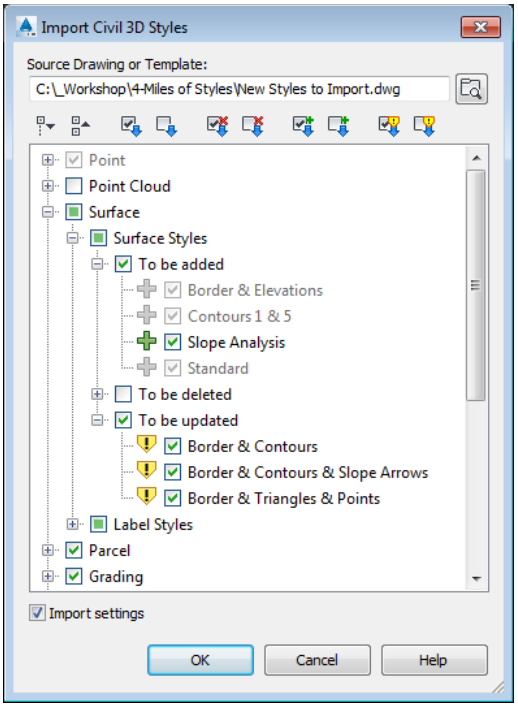
Layers can be used to control display a number of ways:

- For Objects
- For Components within Styles
- For Labels

## Import Styles and Settings

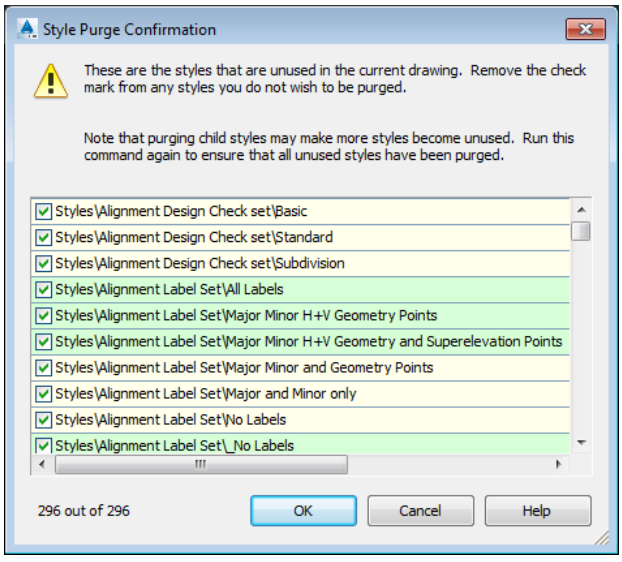
Here you are shown styles **to be added** (these are styles that do not currently exist in your drawing), styles **to be deleted** (these are styles that exist in your current drawing but do not exist in the source drawing or template) and styles **to be updated** (these are styles that exist in both the current drawing and the source drawing or template and will be updated to properties of the source drawing styles). This gives you complete control over exactly how each style is imported or if it is skipped.

There is a check box at the bottom of the dialog box to **Import settings**. This will allow you to import the Civil 3D settings from the source drawing or template.



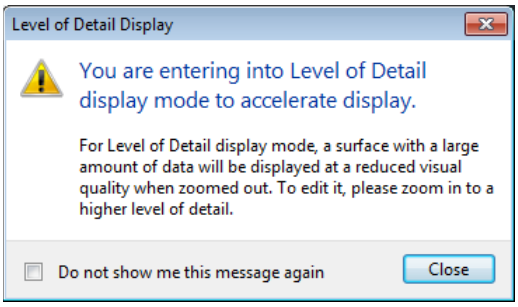

## Purge Styles

Here you are shown all of the unused styles in the drawing and can select which ones you would like to purge. You may need to run this command several times as once child styles are purged their parent styles may become unused and would then be available to be purged. It is also important to note that any styles that are set as defaults in a Civil 3D command are considered used.



## Display Tips

1. Surface Level of Detail
    - Controls visibility
    - Improves performance
    - From the Ribbon:  View > Views > Level of Detail

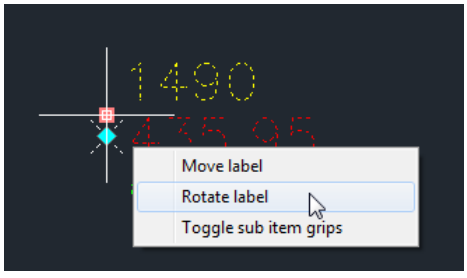



    - Once in the Level of Detail display mode, you can now zoom in and out on a large surface and see the level of detail change
    - Level of Detail works with all surface style components (with the exception of watersheds and user defined contours)
    - Plotting will not be affected by this command
    - You can still edit the surface, however the edits require that you are zoomed in enough to display the "real" level of detail

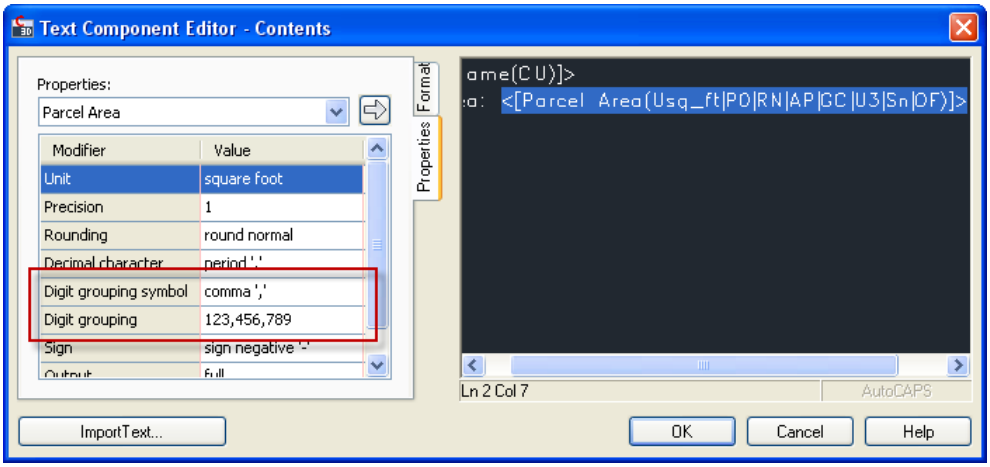
2. If your Pipes do not look smooth check the FACETDEV system variable
    - FACETDEV defines the maximum distance from the chord to the arc
    - The lower this variable is set, the more segments will be used to draw the pipe

## Labeling Tips

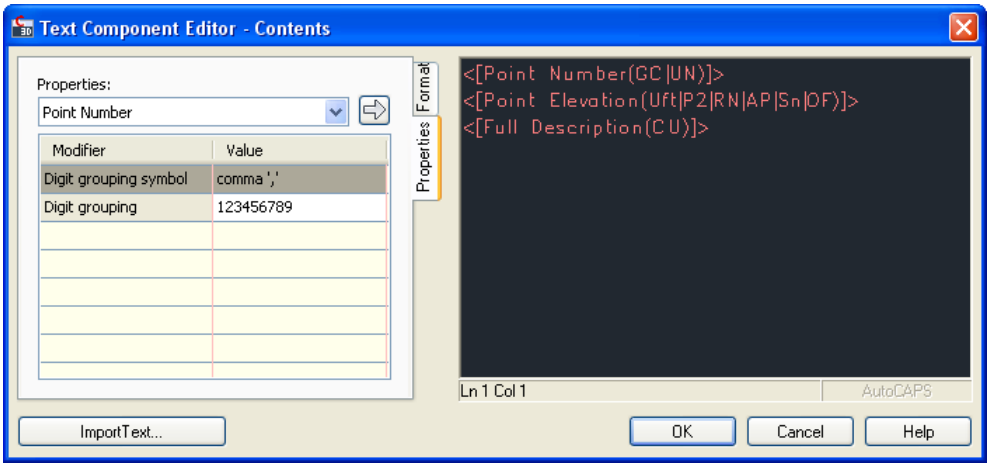
1. Label Rotation – Multi Function Grips



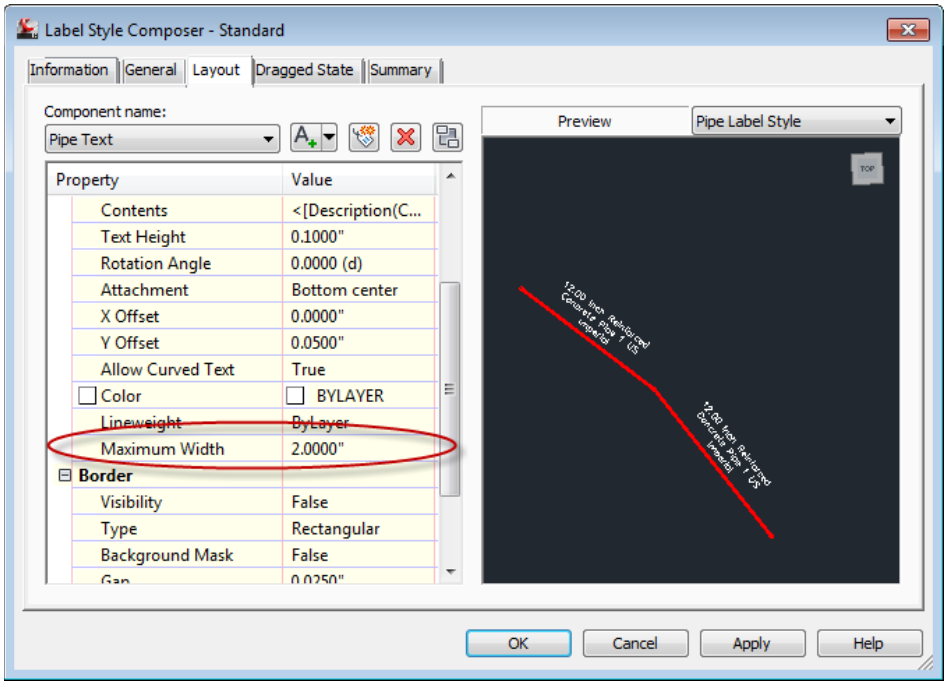
2. Digit Grouping with Commas
    - This can be set in the label style



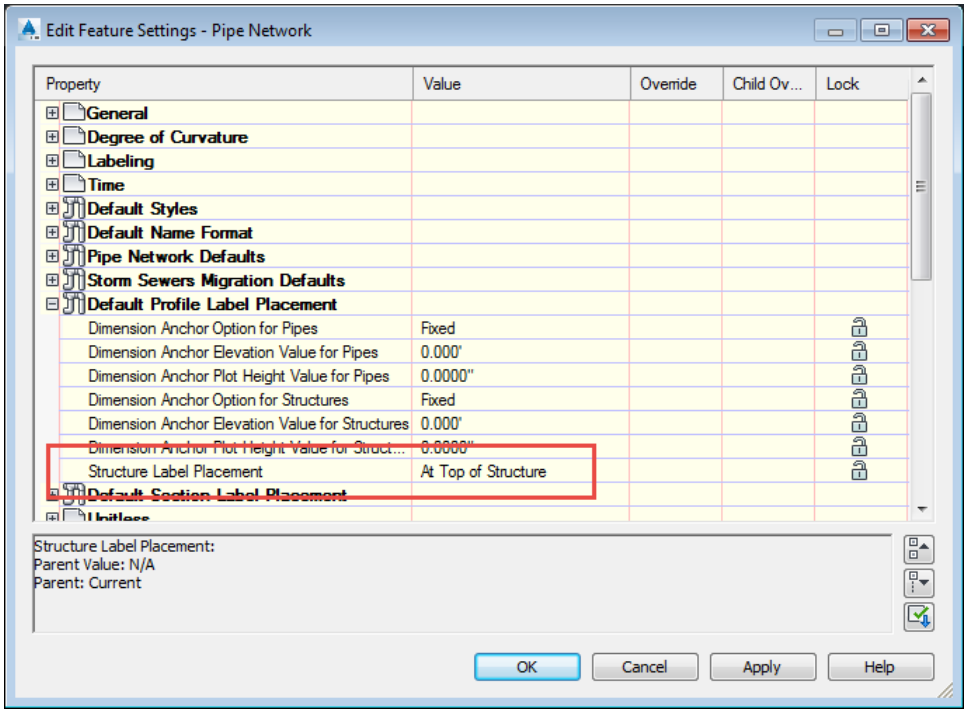

3. Minimize the number of components in label styles – particularly points
    - Each component that you have in a Label Style has a location that is determined by the Anchor Point, Attachment, X Offset and Y Offset.



4. Maximum text width in labels styles




5. Labeling Structures from the Top or Bottom
    - Go to the Pipe Network Feature Settings

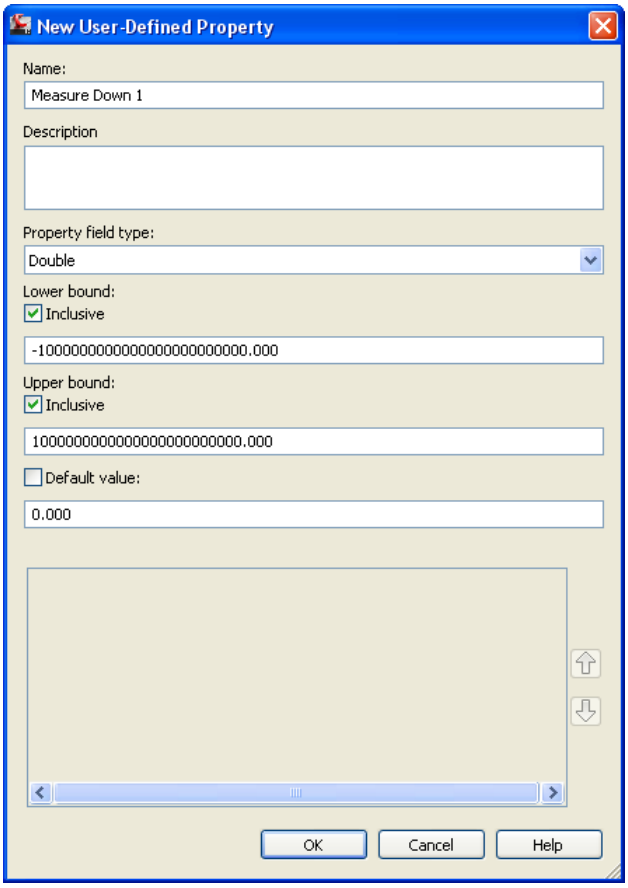


## Expressions in Labels

Expressions can be used in Civil 3D labels to calculate almost anything that you have data available for.

In this example we will look at a workflow in Civil 3D to manage and label measure down information for points representing manholes and catch basins. This can often be a tedious and error prone task so our goal here is to get the information into Civil 3D once and treat it as data that we can use for any need rather than manually creating notes as text in the drawing.

1. In Civil 3D go to the **Settings** tab of the **Toolspace**. Expand **Point** and create a new **User Defined Property Classification**.
    - This is just the name of a new collection of User Defined Properties that you will be creating.
2. Next right-click on that new **User Defined Property Classification** and create a new **User Defined Property**.

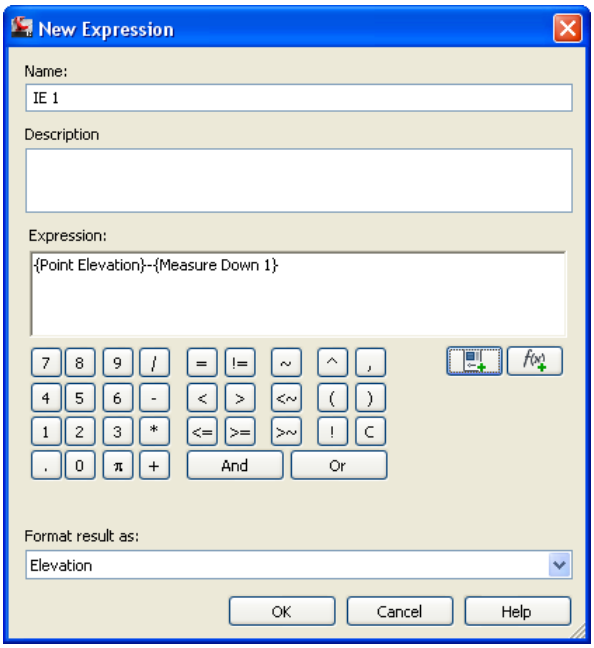


3. Give the **User Defined Property** a name.
    - In this example above I called it *Measure Down 1* as I may want to have the ability to manage information for more than 1 measure down per point in the future.

4. Set the **Property Field Type** to **Double**.
    - This will allow you to enter numbers that include decimals. You can also decide if you want to include a default value or not.

Once the **User Defined Property** is defined you need to create an **Expression** that will subtract the value of the new User Defined Property for Measure Down 1 from the Point Elevation.

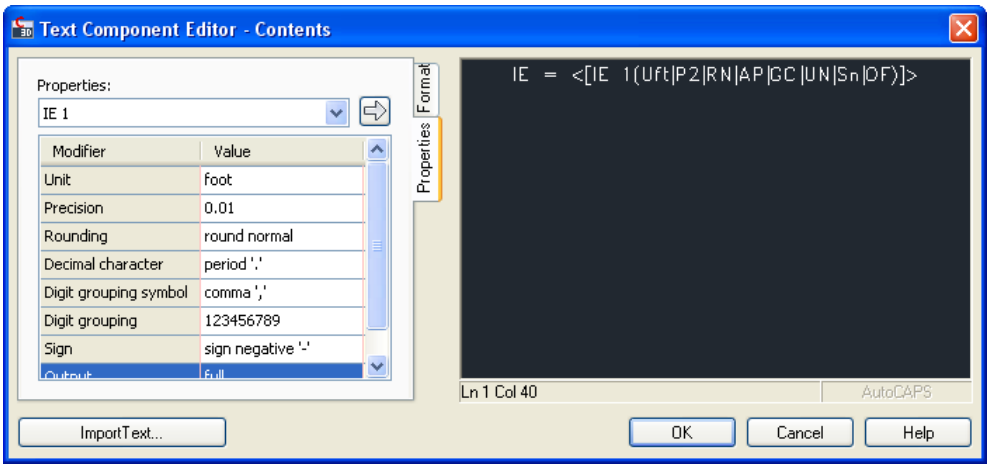
5. On the Settings tab of the *Toolspace* under **Point**, expand **Label Styles**. Right-click on **Expressions** and select New.




6. Name the expression and then in the **Expression** field create and expression that is the **Point Elevation** minus the **Measure Down 1** value.
    - Both these values can be found by selecting the **Insert Properties** button  .

7. Set the **Format result as** option to **Elevation**.

8. Once the new expression is created you can create a **Label Style** that uses the new expression value as a text component.

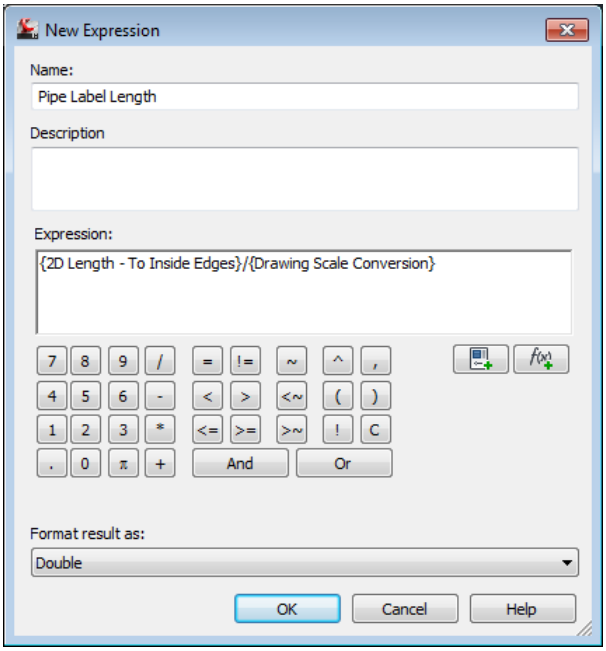



In the example above you can see that the *Property* **IE 1**, which is the result of the expression, is being used along with a basic text prefix.

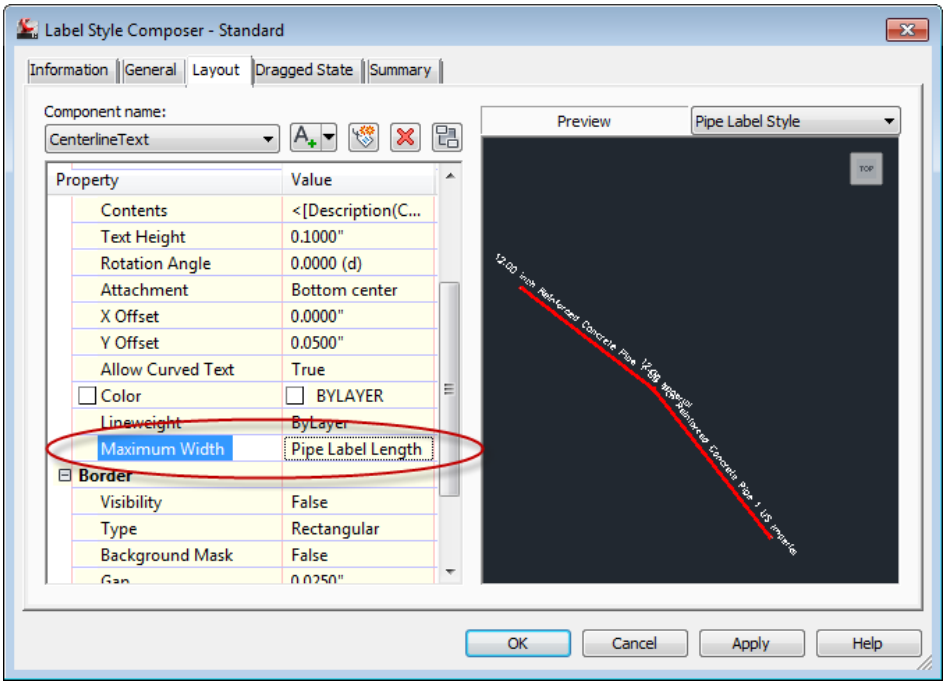
## An Example of using an Expression to Limit the Length of a Label

Use an expression to limit the length of pipe labels to the length of the pipe

{2D Length - To Inside Edges}/{Drawing Scale Conversion}



Use the Expression for the Maximum Width setting in the Label Style




## Conclusion

Keep in mind; many of the tasks we have discussed are a continual process that will never be complete. For example, your template may get to a point that it is really good, but it will never be finished. New versions bring new features and new projects bring new challenges that you may have not considered before. So hang in there, keep learning and improving. While you are at AU take advantage of being in the same place with so many other CAD Managers, meet new people, network and ask them how they approach different problems you have experienced. You might get a great idea from the person sitting next to you in class!