

Field to Finish

AutoCAD Civil 3D

I recently came across a good article from the September 2011 edition of Professional Surveyor Magazine titled [Understanding Field to Finish](#) written by Jennifer DiBona that I think anyone involved in surveying would find useful. In it she explains in good detail what Field to Finish is and how it can make a surveyor's life easier, with particular focus on a suite of surveying tools I am not familiar with. In this article I will be looking at the capabilities of Civil 3D in our Field to Finish workflow.

What is Field to Finish?

For those who have not come across it before, Field to Finish is a general term used to describe the surveying process that determines the connectivity and symbology of points surveyed on site that match the feature name and field code that is defined in a linework code set and the description keys that are defined for the current drawing. A field code is contained within the description of a survey point, and typically contains both the name of the point feature or line feature, and a special line or curve segment code to indicate connectivity between survey points of the same feature.

Civil 3D Specifics

Civil 3D stores survey data in an external database to facilitate sharing and control of collected data and provide the ability to manage it from one location. It is also an excellent way of ensuring that the most current data is always available and used as Civil 3D will flag out of date Survey Networks as such, prompting the user to update them.

In Civil 3D using Field to Finish we benefit from the ability to:

- Insert survey points onto separate layers and sort points into point groups based on the points description
- Insert, rotate and scale symbols and labels based on the point's description
- Automatically create 2D or 3D linework based on the point's description

During the processing of linework, the linework code set interprets the syntax of the field code within a point description. When you insert points into the drawing from the survey database, the display of the survey points is determined by a raw description match with the description keys in the drawing.

As well as the above, because we are utilising the AutoCAD platform we also benefit from the incredible capabilities of Annotation Scaling that works seamlessly to ensure our survey is readable at any scale with no additional time spent resizing labels or re-exporting the model.

Field to Finish is made possible in Civil 3D through the use of Linework Code Sets, Figure Prefix Databases and further enhanced with Description Keys, Figure, Point and Label styles. The role that each of these play in the creation of our Survey and example screen captures are as follows:

Linework Code Set – interprets the syntax of the field codes that are entered into the data collector by the survey field crew. Found on the *Survey* tab of the *Toolspace*.

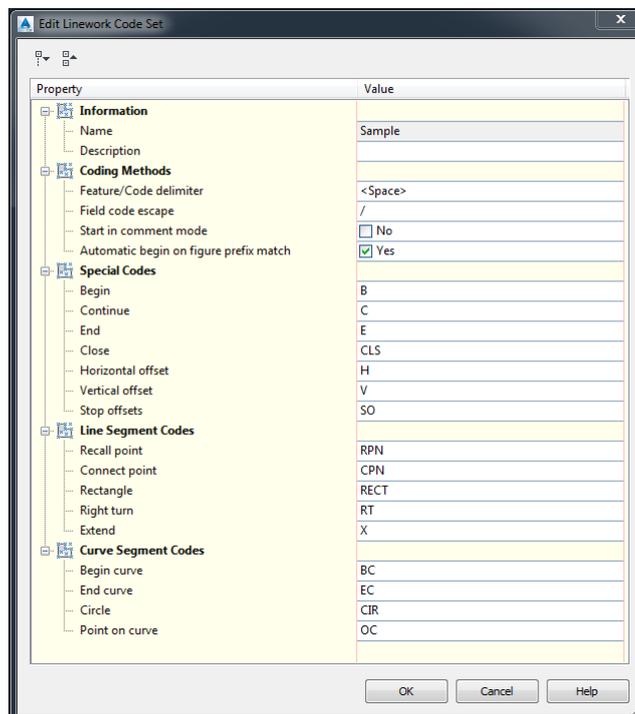
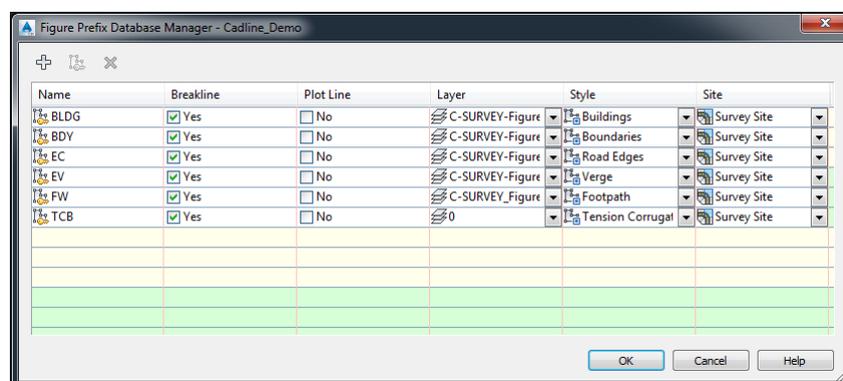


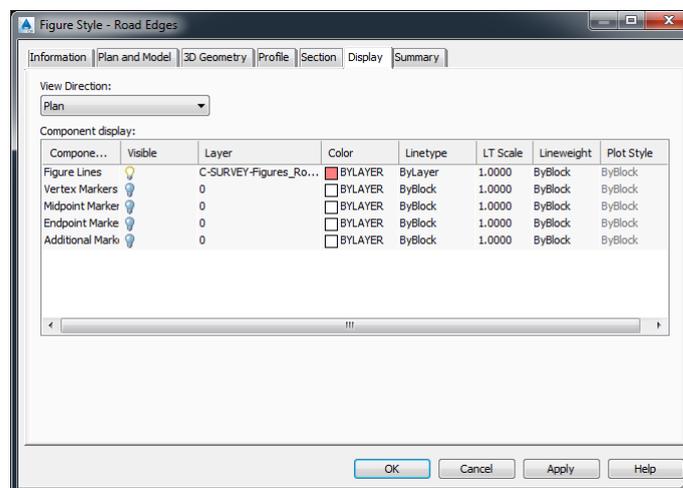
Figure Prefix Database – contains information to determine the layer that a figure is drawn on, how it is stylised and whether it is created as breaklines and plot lines. Figure prefixes are also used to determine linework connectivity when using the Process Linework command. Found on the *Survey* tab of the *Toolspace*.



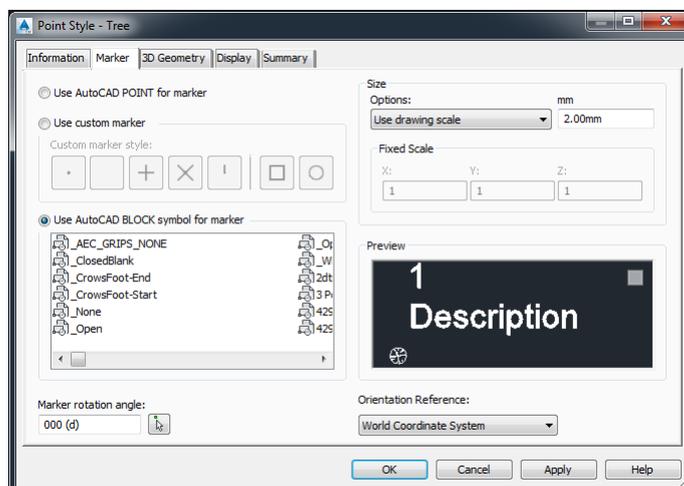
Description Keys – automatically control some drawing point properties, such as the appearance or size of a point in the drawing, when you create or import points. Found on the *Settings* tab of the *Toolspace*.

Code	Style	Point Label Style	Format	Layer	Scale Parameter	Fixed Scale Fac...	Use drawing sc...	Apply to X-Y	Apply to Z	Marker Rotate ...	Marker Fi
BB*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
BG*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
BL*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
BT*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
EP*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
FE*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
G*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
GU*	<input checked="" type="checkbox"/> Gully	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
LP*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
MH*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
PO*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
SL*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
STA*	<input checked="" type="checkbox"/> Survey Station	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
TB*	<input checked="" type="checkbox"/> Cross 2D and 3D	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
TE*	<input checked="" type="checkbox"/> Tree	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000
TR*	<input checked="" type="checkbox"/> Tree	<input checked="" type="checkbox"/> Point Number	\$*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Parameter 1	<input type="checkbox"/> 1.000	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> Parameter 2	<input type="checkbox"/> 000.000

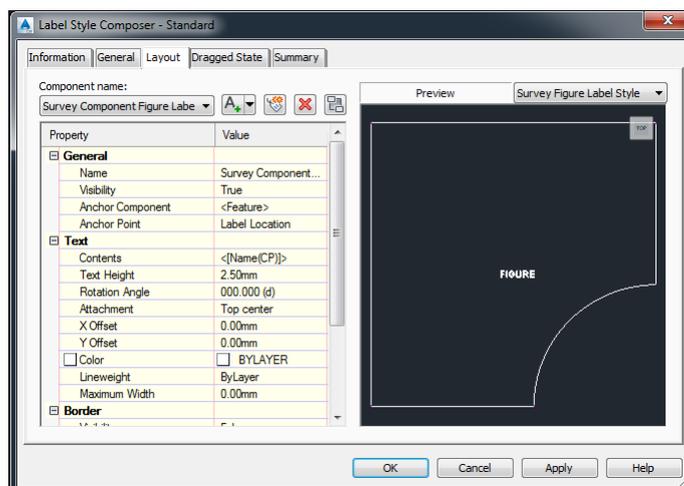
Figure Styles – control the way a figure and its components, such as points and lines, are displayed in the drawing. Found on the *Settings* tab of the *Toolspace*.



Point Styles – control how point symbols display in a drawing. Found on the *Settings* tab of the *Toolspace*.



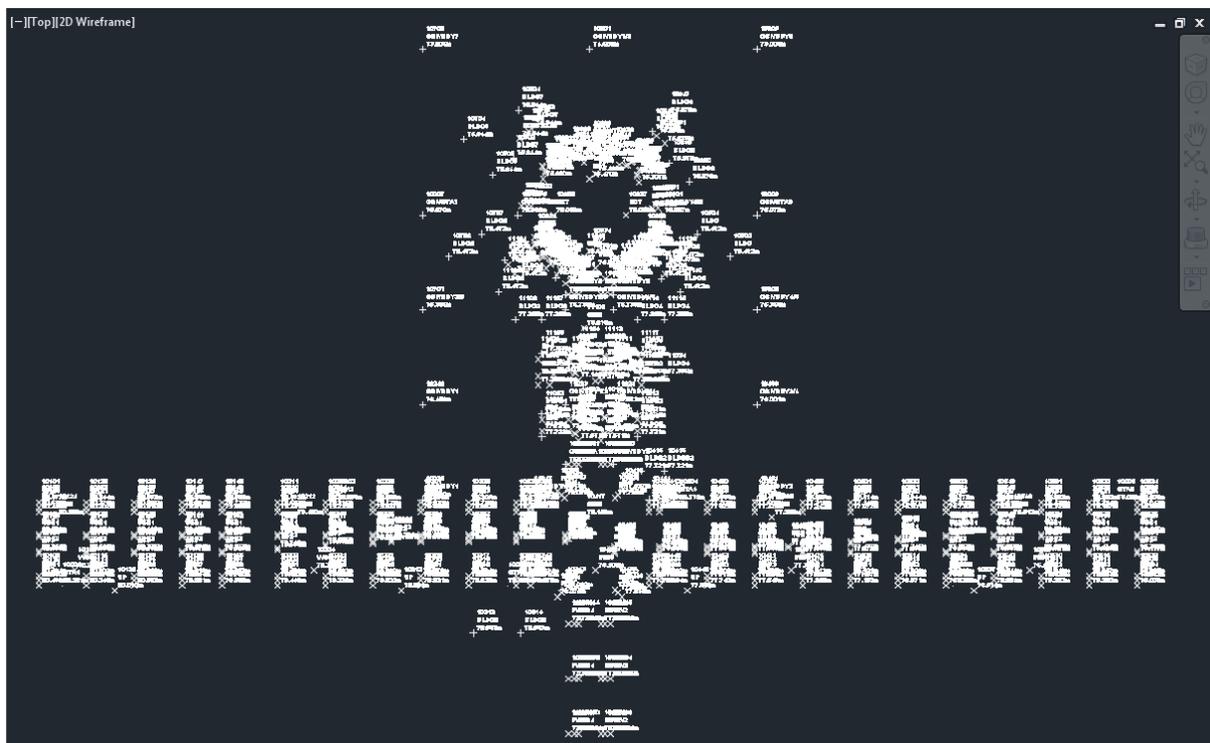
Label Styles – control the appearance, behaviour and content of labels. Every label in the drawing has a style associated with it and edits to label styles are immediately reflected in the labels in the drawing. Found on the *Settings* tab of the *Toolspace*.



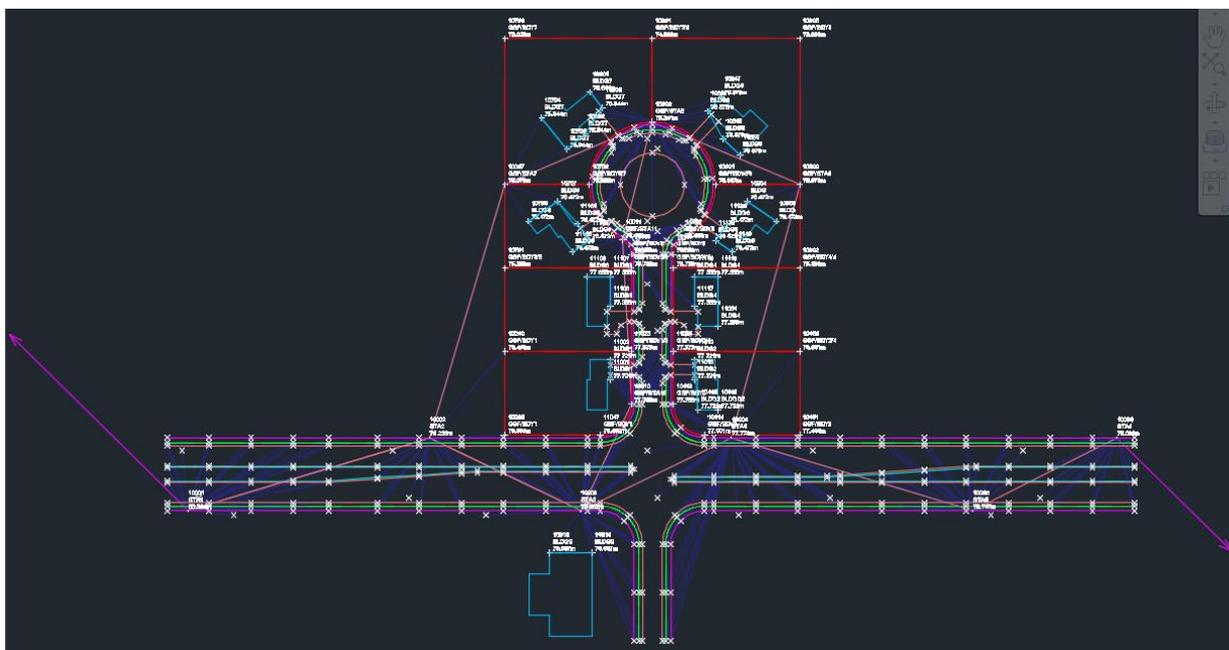
Benefits

For the first few times you process survey data in this way the concepts may seem a bit alien but familiarity will come with time and I can assure you it will be time well spent. To show you how good Field to Finish is when used to its capacity it is easiest to first identify the short falls of the previous generation workflow.

In the “good old days” points would be imported into a drawing and need manually processing to show the correct symbol or be stored on the correct layer. If we go back far enough, we had to manually connect the ‘dots’, a process that I’m sure many of us enjoyed as a child but one that quickly loses its appeal as you grow older. When I import a Survey into Civil 3D, if I don’t use any of the Field to Finish features, I am presented with a drawing that looks like this:



This is pretty hard to read, you can make out some general shapes but you would need to spend a good amount of time interrogating the points to ensure you are connecting everything up correctly and filtering out the text you didn't need. Now if I import the same file using all of the Field to Finish features I am given the following:



My lines have been drawn and placed on the correct layer with the correct colour and linetype, key points in the drawing have been labelled and I even have a visual representation of my traverse and side shots. I was even given a slick interactive presentation of the linework being drawn whilst it was imported. All in all I couldn't ask for any more. Now I will admit that this example compares one extreme of the workflow to the other and in order to be able to process your linework using this workflow some additional work is required in the field, and a little bit of template setup. However this is limited to the capture of a few additional characters, or possibly capturing the same data in a more coherent way, and the beauty of templates is that you configure once and reap the benefits many many times.

To be truly successful at implementing Field to Finish in your workflow you need to plan your implementation well. The most common difficulty in implementation is consistency in Figure Prefix's. Computers haven't yet reached the age where they can think for themselves and are only just beginning to be able to recognise patterns and so the Field Crew have to be careful that they enter the correct codes as a small typo can cause a break in your linework or for wrong lines to converge. It can also be helpful to interact with your field crew when changing or creating a Figure Prefix Database as ultimately it is they who will enter this data into the controller and so ensuring a naturally representative field code can assist the crew in entering the data exactly as it should be and later reduce inconsistencies in the office.

