



**US Army Corps
of Engineers®**
Engineer Research and
Development Center

Master Guide Documentation

US ARMY CORPS OF ENGINEERS CIVIL ENGINEERING STANDARDS FOR CIVIL 3D

Based on the Autodesk Civil 3D® 2022 Software

Manual: Applying and Using USACE Civil 3D 2022
Standards

May 2023

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This document processes, tips, and tricks for working with the standards in the Civil 3D Environment. The instructions are intended for use with Civil 3D 2022. While some of USACE's standards can be applied in basic AutoCAD, there are many techniques listed in this document that can only be used in Civil 3D.

For instructions on how to establish and implement the USACE Civil 3D 2022 standards on a workstation, please refer to the "USACE 2022 Standards Workstation Setup Instructions.docx" document.

For details regarding the contents of these standards, please refer to the "USACE Civil 3D 2022 Template Document v5.0 – Part 1.docx" and "USACE Civil 3D 2022 Template Document v5.0 – Part 2.docx".

3.1 Overview

USACE's Civil 3D 2022 standards are intended to be used for increasing efficiency of design and drafting, as well as the creation of consistent drawing sets. These standards should be applied by users internal to USACE as well as contractors who are working directly with USACE ERDC.

3.2 U:\ Drive

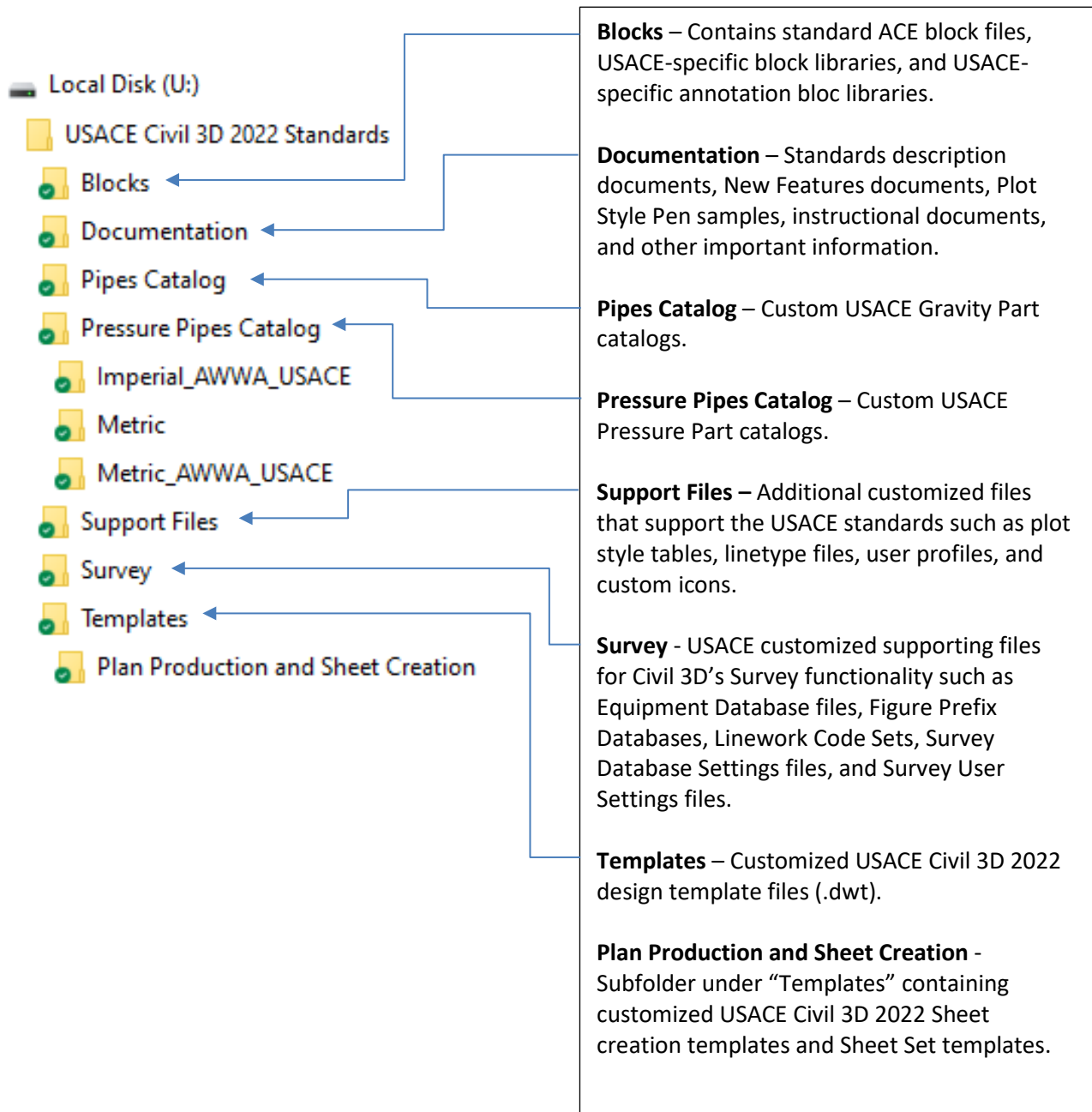
In order for the standards to be used effectively in Civil 3D, there are multiple files and file types external to DWGs that need to be accessed, often on-the-fly. To accomplish this, all AutoCAD-based products like Civil 3D contain user profiles that contain various paths for accessing these files. These user profiles can be customized, exported, and imported onto other computers, ensuring consistent pathing across all users. USACE's Civil 3D 2022 standards make use of a lettered path from a U:\ drive. The reasons for using a mapped letter drive include:

- Many of Autodesk's products have limitations to the number of characters that can be read in a single path, the use of full UNC paths is impractical and in some cases, impossible.
- Different organizations or even different office locations within the same organization often store their data in different ways:
 - On a shared network server
 - On the hard drives of individual machines
 - On a cloud service such as OneDrive, SharePoint, or Dropbox.

Regardless of the storage location, all of these options can be established as a drive letter. Using a consistent drive letter across all workstations and/or locations in an organization enables consistent access to standards and facilitates the efficient maintenance of the standards.

3.2.1 Standards Folder Structure

The USACE Civil 3D Standards package consists of the following folders:



For more information on the files in these folders, please refer to the documentation that accompanies the standards.

3.3 Available Templates

3.3.1 Overview

USACE's Civil 3D standards include master drawing templates that can be used for the creation of any new project drawings. In addition, there are discipline-specific templates that have been established as subsets of these main templates and should be used for the creation of new project drawings for those disciplines.

Master and discipline-specific templates have been established for working with Imperial Units or Metric units. Two templates of each unit type were created for the master templates as well as the discipline-specific templates to allow for the user to work with a CTB file or an STB file.

3.3.2 Master Templates

There are 4 master templates for working in Civil 3D 2022 include the following:

- USACE Civil 3D 2022 Imperial_CTB.dwt
- USACE Civil 3D 2022 Imperial_STB.dwt
- USACE Civil 3D 2022 Metric_CTB.dwt
- USACE Civil 3D 2022 Metric_STB.dwt

The Master templates contain all of the civil elements that can be used across disciplines, including:

- All B-, C-, CM-, G-, and V- Layers
- Layer filters for all disciplines
- All AutoCAD AEC Text, Dimension, Multileader, and Table Styles
- All Geotechnical (B-), Civil (C-), General (G-), and Survey (V-) Civil 3D Styles
- Description Key Sets for Alphanumeric and Numeric field codes, as well as Proposed point placement
- Full list of Point Groups
- All blocks that are used in the Civil 3D Styles, as well as some annotation blocks for use in Paper Space.

These drawing templates are stored in a folder called "Templates" under the Standards folder structure.

Note: The details of contents such as Layers, Layer Filters, AutoCAD Styles, Point Groups, Description Key Sets, Civil 3D Styles, and blocks are covered in subsequent sections of this document as well as "USACE Civil 3D 2022 Template Document v5.0 – Part 2.docx"

3.3.3 Discipline-Specific Templates

Subset templates exist for the following disciplines:

- Survey
- Navigation & Marine Design
- Site Design

All discipline-specific templates are stored under "Templates\Discipline-Specific Templates\" in the Standards folder structure.

Survey Templates

These templates are intended for use by USACE's Survey groups for use on standard, topo, and hydrologic survey projects. They include:

- USACE Civil 3D 2022 Survey_Imperial_CTB.dwt
- USACE Civil 3D 2022 Survey_Imperial_STB.dwt
- USACE Civil 3D 2022 Survey_Metric_CTB.dwt
- USACE Civil 3D 2022 Survey_Metric_STB.dwt

As a subset of the Master templates, the Survey templates contain the following:

- All CM-, G-, and V- Layers
- Survey Layer Filters
- Survey (V-) and General (G-) Civil 3D Styles
- Only the C- layers that are necessary for use in Styles and Blocks
- Description Key Sets for Alphanumeric and Numeric field codes
- All Point Groups
- Blocks necessary for the remaining Civil 3D Styles and annotation blocks for use in Paper Space.

Navigation & Marine Design Templates

These templates are intended for use in Civil 3D for navigation design, dredging, and other Marine construction projects. They include:

- USACE Civil 3D 2022 Navigation and Marine Design_Imperial_CTB.dwt
- USACE Civil 3D 2022 Navigation and Marine Design_Imperial_STB.dwt
- USACE Civil 3D 2022 Navigation and Marine Design_Metric_CTB.dwt
- USACE Civil 3D 2022 Navigation and Marine Design_Metric_STB.dwt

As a subset of the Master templates, the Navigation and Marine Design templates contain the following:

- All C-, CM-, and G- Layers
- All Layer Filters
- All Civil (C-) and General (G-) Styles
- Only Survey (V-) Styles that are necessary for representing existing conditions.
- Only the V- layers that are necessary for use in Styles and Blocks
- No Description Key Sets
- All Point Groups
- Blocks necessary for the remaining Civil 3D Styles and annotation blocks for use in Paper Space.

Site Design Templates

These templates are intended for use in Civil 3D for site design, flood control, and pavement projects. They include:

- USACE Civil 3D 2022 Site Design_Imperial_CTB.dwt
- USACE Civil 3D 2022 Site Design_Imperial_STB.dwt
- USACE Civil 3D 2022 Site Design_Metric_CTB.dwt
- USACE Civil 3D 2022 Site Design_Metric_STB.dwt

As a subset of the Master templates, the Site Design templates contain the following:

- All B-, CM-, and G- Layers
- All C- Layers except the following groups:
 - C-BECH
 - C-CHAN
 - C-DRED
- All Layer Filters
- All Geotechnical (B-) and General (G-) Styles
- Only Civil (C-) Styles that are necessary for Site Design
- Only Survey (V-) Styles that are necessary for representing existing conditions
- Only the C- and V- layers that are necessary for use in Styles and Blocks
- Description Key Set for the creation of Proposed AFLD and BORE points.
- Smaller list of Point Groups
 - _All Points
 - Points to Triangulate
 - No Show
 - No Show (overrides)
- Blocks necessary for the remaining Civil 3D Styles and annotation blocks for use in Paper Space.

3.3.3 Sheet Templates

USACE has 12 different template files that should be used for the creation of new Sheets as well as in Civil 3D Plan Production functionality (Section Sheets, Plan and Profile Sheets, etc.). As with the drawing templates, there are Sheet templates for working in both Imperial and Metric units, and in both CTB and STB environments. These templates are listed below:

- USACE Civil 3D 2022 Imperial_CTB_PlanProf Sheets.dwt
- USACE Civil 3D 2022 Imperial_CTB_Section Sheets.dwt
- USACE Civil 3D 2022 Imperial_STB_PlanProf Sheets.dwt
- USACE Civil 3D 2022 Imperial_STB_Section Sheets.dwt
- USACE Civil 3D 2022 Metric_ARCHD_CTB_PlanProf Sheets.dwt
- USACE Civil 3D 2022 Metric_ARCHD_CTB_Section Sheets.dwt
- USACE Civil 3D 2022 Metric_ARCHD_STB_PlanProf Sheets.dwt
- USACE Civil 3D 2022 Metric_ARCHD_STB_Section Sheets.dwt
- USACE Civil 3D 2022 Metric_ISO1_CTB_PlanProf Sheets.dwt
- USACE Civil 3D 2022 Metric_ISO1_CTB_Section Sheets.dwt
- USACE Civil 3D 2022 Metric_ISO1_STB_PlanProf Sheets.dwt
- USACE Civil 3D 2022 Metric_ISO1_STB_Section Sheets.dwt

The “USACE Civil 3D 2022 ...PlanProf Sheets” files listed above contain the necessary layout sheets to be used for the creation of the following sheet types at a number of different scales using Civil 3D’s Plan Production tools:

- Plan Sheets
- Plan Sheets in Series
- Profile Sheets in Series
- Plan over Plan Sheets in Series
- Plan over Profile Sheets in Series
- Profile over Profile Sheets in Series

The “USACE Civil 3D 2022 ...Section Sheets” files listed above contain the necessary layout sheets to be used for the creation of Section View Sheets in Civil 3D.

4.1 Overview

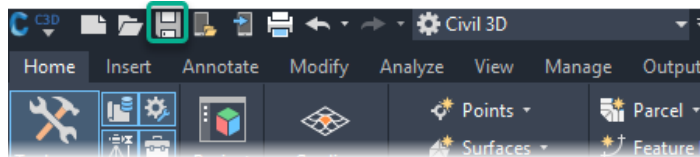
As mentioned above, drawings are created through the use of various template files. This section provides the steps necessary to use and apply these templates in USACE projects.

Note: These steps are written assuming that the USACE Civil 3D 2022 standards have already been successfully established on the workstation.

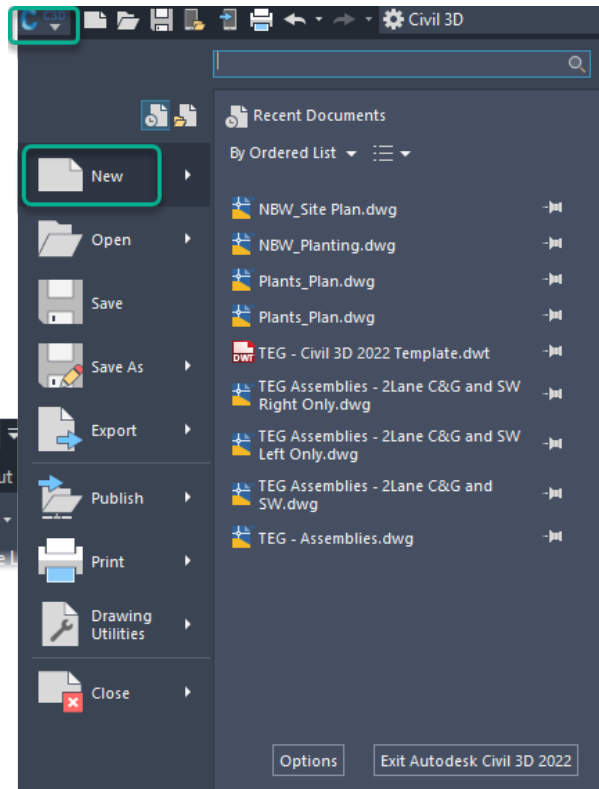
4.2 Creating New Drawings Using a USACE Template

The USACE user Profiles that were established for working in Civil 3D 2022 contain a path to the U:\USACE Civil 3D 2022 Standards\Templates folder. When the “New” command is initiated, the browse window will open directly to this default folder.

1. Open Civil 3D 2022 using either the “USACE - Civil 3D 2022 - Imperial” or the “USACE - Civil 3D 2022 - Metric” custom launch icons.
2. By default, a new drawing will be created from the default template that is established in the user Profile. If you are not sure if this is the desired template, you can close this and create a new drawing:
 - A. From the **Application Menu** (small blue “C” icon in the top left corner of the window), click on the “New” button.
 - B. In the dialog that appears, select the appropriate template, then click “Open”. A new drawing will be created in the Civil 3D program window that is an exact duplicate of the DWT file.
 - C. From the **Quick Access Toolbar** in the top left area of the screen, click on the “Save” button, as shown below:



- D. Browse to the desired location, enter a new name for the file, then click “Save”.



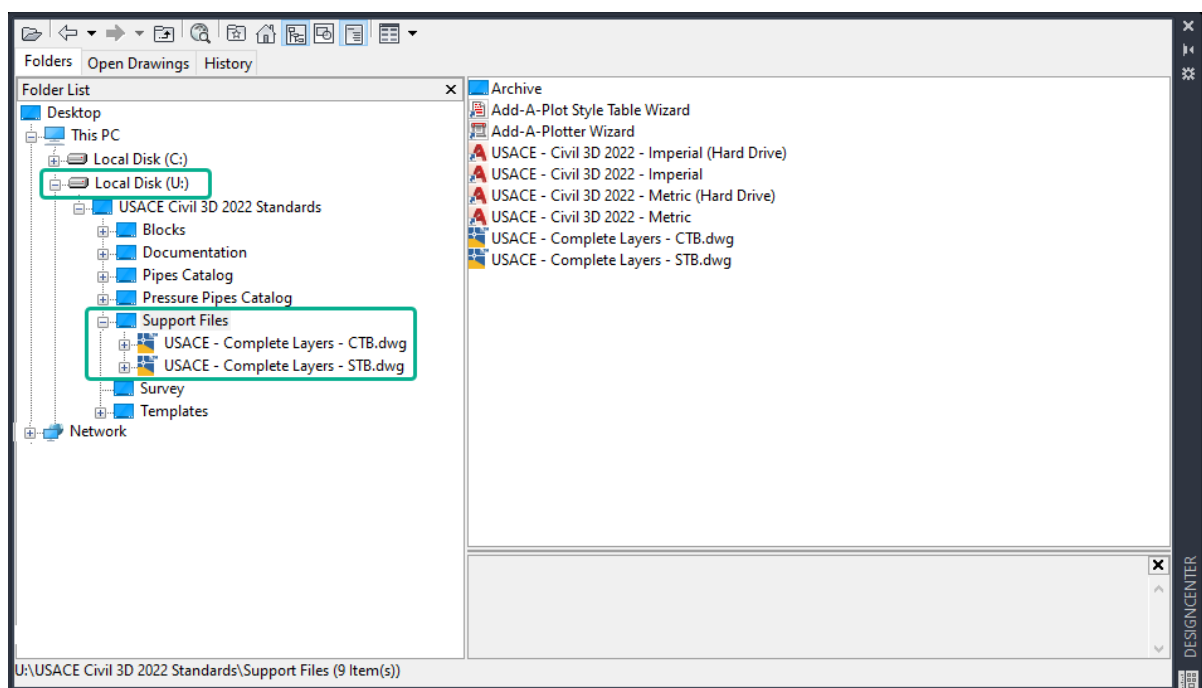
4.3 Inserting Layers Through Design Center

While the design drawing template files now only carry Layers for Geotechnical, Civil, General, and Survey, there are two separate drawings provided with the standards that carries the list of USACE Layers for all of the following disciplines:

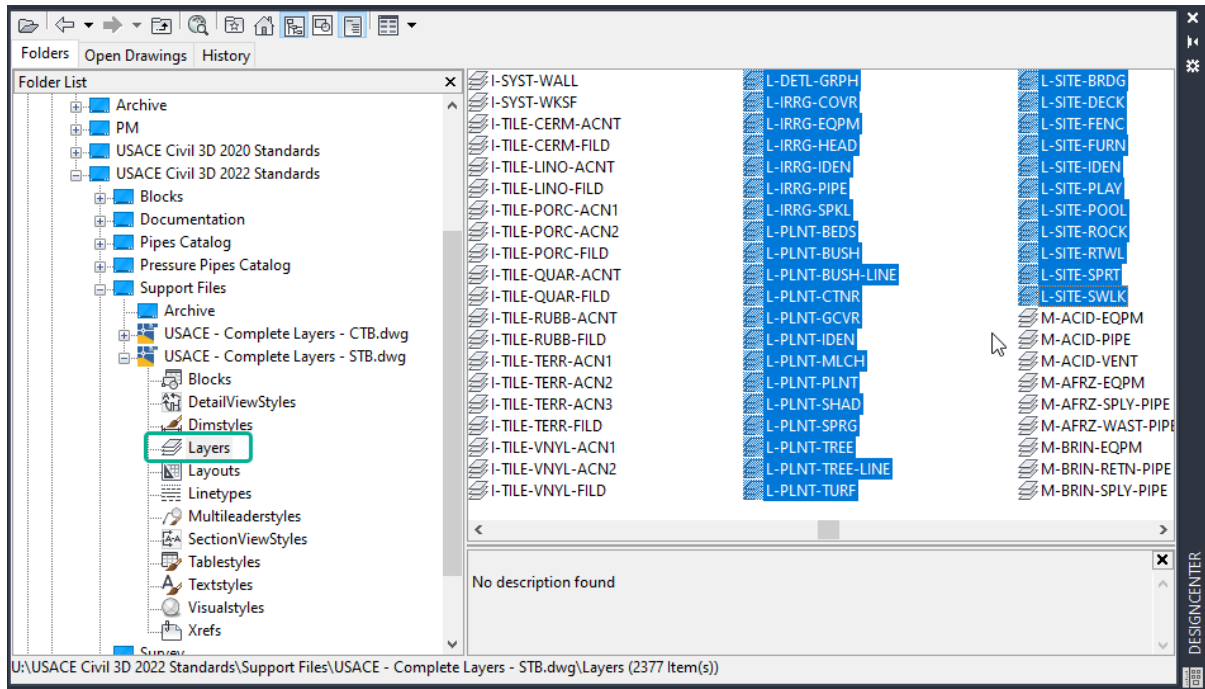
Discipline Letter	Description
A-	Architecture
B-	Geotechnical
C-	Civil
E-	Electrical
F-	Fire Protection
G-	General
H-	Hazardous Materials
I-	Interiors
L-	Landscaping
M-	Mechanical
P-	Plumbing
S-	Structural
T-	Telecommunications
V-	Survey

The two available drawings contain identical Layers. However, one of them is setup for CTB plotting and the other is setup for STB plotting. The best way to load all or some of the Layers from the master Layer drawings is to use AutoCAD's **Design Center**. The steps below outline this process:

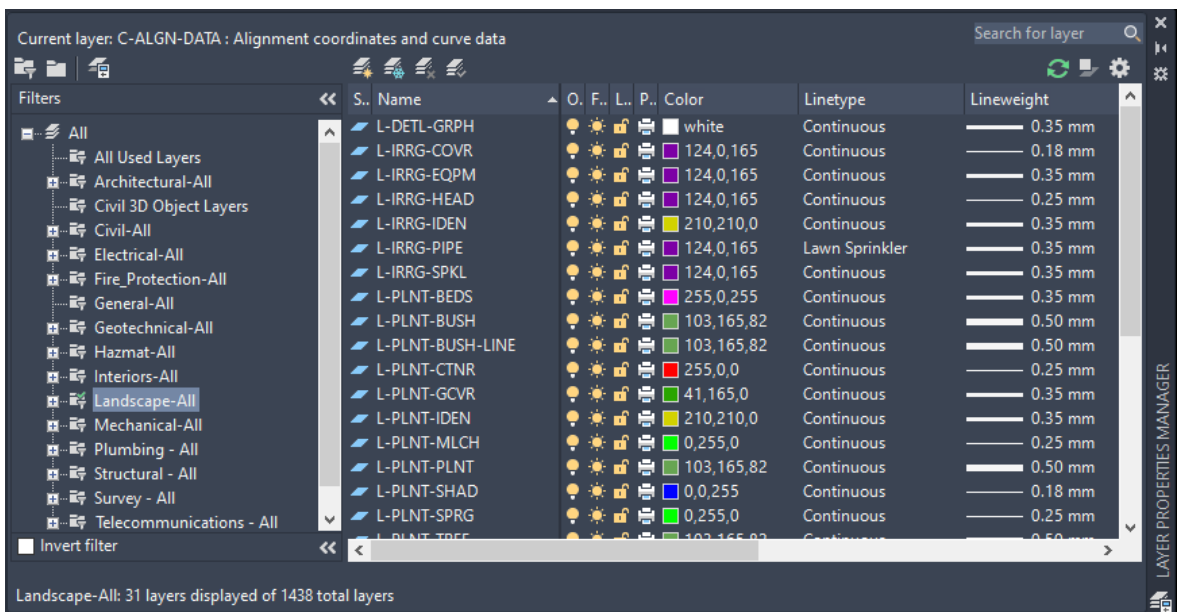
1. Open the desired drawing in which to insert more Layers (ex. Landscaping Layers).
2. At the Command Line, type in "DC" (no quotes) then hit <Enter>. The **Design Center** palette will appear.
3. In the top-right corner of the palette, make sure the "Files" tab is active.
4. In the left-side window, use the item tree to browse to U:\USACE Civil 3D 2022\Support Files, as shown below:



- Under the "Support Files" folder, expand the + for the desired "USACE - Complete Layers...." Drawing file, then click on "Layers". A list of all of the Layers in this drawing will be shown in the right-side window.
- Use the <Shift> and/or <Ctrl> keys to select the desired Layers in the window (Ex. Landscape Layers).



- Once the Layers are selected, left-click and hold on one of them, drag the cursor over the current drawing in the Civil 3D window, and let go. This will insert all of the chosen Layers from the "USACE - Complete Layers...." drawing to the current drawing.
- To check the Layer insertion, open the **Layer Properties Manager**. Click on the Layer Filter that carries the chosen Layers (ex. Landscape). The new Layers will appear.



- Save the drawing and close the **Design Center**.

5.1 Overview

Once the desired Layers are present in the drawing, there are some techniques that can be applied to objects and settings that allow for the desired output.

5.2 Creating Tree Line Polylines

The Linetype used by the V-SITE-VEGE Layer has been changed to better match the needs of USACE. Two new Linetypes were added to the standard Linetype files:

- TREELINE_L
- TREELINE_R

The “TREELINE_L” linetype is set as the default for the V-SITE-VEGE Layer. These two Linetypes display the same tree line shape. However, they are mirror images of each other, as shown below:



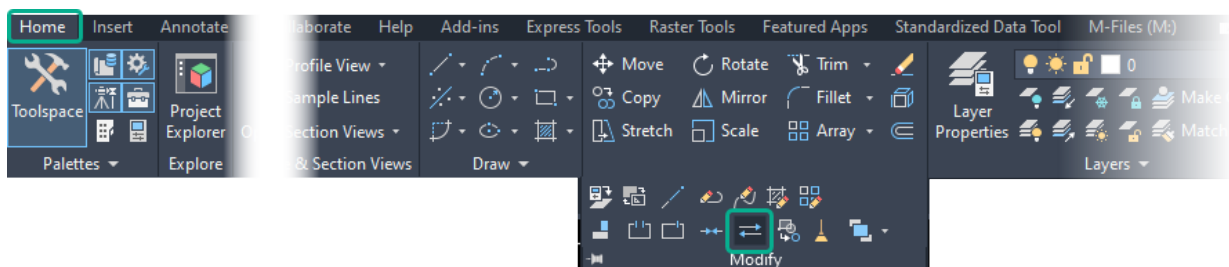
Having both of these linetypes available in the template provides the user with two options for controlling the side on which the arcs are displayed. Either the Linetype of an object can be changed or the direction of the line can be reversed.

5.2.1 Changing the Linetype

1. Once a linear entity such as a line or a polyline is created using the V-SITE-VEGE Layer, select the entity, right-click, and choose “Properties”
2. In the **Properties Palette**, set the “Linetype” option to “TREELINE_R”. The entity will update in the drawing to display the arcs on the opposite side of the line.

5.2.2 Changing the Direction

1. Once a linear entity such as a line or a polyline is created using the V-SITE-VEGE Layer, go to the “Home” tab of the **Ribbon**, click on the down-arrow ▼ next to the name of the “Modify” panel then choose the “Reverse” button, as shown below:



2. In the drawing, select the desired entity to be reversed, then hit <Enter>. The entity’s direction will be reversed and the orientation of the arcs in the linetype will be flipped.

5.3 Linetype Generation Variables

AutoCAD has a System Variable called “PLINEGEN” that controls how linetype patterns will be displayed based on the vertices of polylines. Different drafters have different needs when it comes to this, so the setting should be reviewed for each drawing. To accomplish this, simply type in “PLINEGEN” at the command line, hit <Enter>, and set the desired value.

- PLINEGEN = 0 : Linetypes start and end with a dash at each vertex of the polylines
- PLINEGEN = 1 : Linetype patterns start at the beginning of the polyline and continue uninterrupted through the vertices to the end of the polyline.

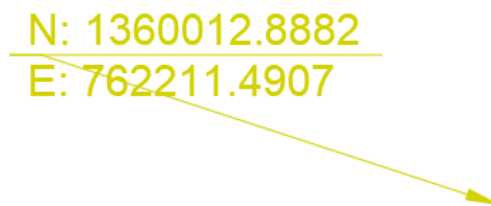
Once this is established on a workstation, it will apply to all drawings unless the variable is changed.

6.1 Overview

This section provides tips for applying the new Civil 3D 2022 standards in unique situations.

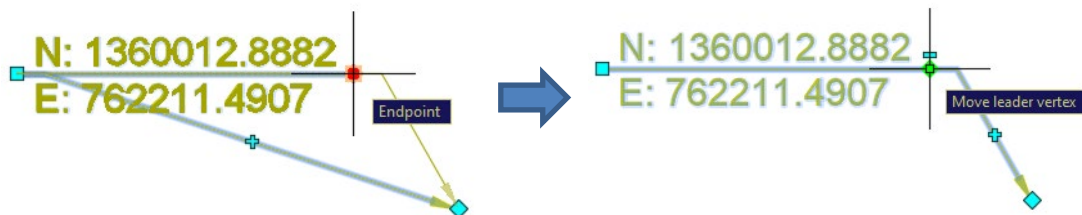
6.2 General Notes and Leaders

General Note Label Styles have been established in the Civil 3D 2020 Standards. One of these Label Styles called "G_ANNO_NOTE_Coords (USACE) displays Northing and Easting coordinates with a line separating them. In order to maintain the integrity and location of the line, this Label Style is set to show "As Composed" when it is dragged and a leader is created. Because the leader can only have one attachment point when the "As Composed" option is used, the leader will cross the Label when it is dragged to the left as shown below.



To fix this issue, the Leader connection point can be changed manually by following these steps:

1. Open the desired drawing.
2. Select the desired Note Label to display the grips.
3. Click on the diamond grip and move the attachment to the other end of the line using an Endpoint OSNAP



6.3 Soundings Points and Point Labels

A New Point Style and two Point Label Styles have been added to the Civil 3D standards for use on Sounding points.

6.3.1 Sounding Point Style

The Sounding Point Style is called “HYDS_Sounding [xx.x] (USACE)” and is set up to show no marker. This allows for the Label Styles to represent the point location.

6.3.2 Sounding Point Label Style

The following two Point Label Styles have been created:

- V_Soundings Depth Only (USACE)
- V_Soundings Depth Only_No Negative (USACE)

Both of these Label Styles are set up to create a Label with Arial font at a size of 0.1” that will place the elevation’s decimal at the Sounding point location. The difference between them is that “V_Soundings Depth Only (USACE)” will show the negative sign and the “V_Soundings Depth Only_No Negative (USACE)” will not show the sign.

6.3.3 Creating Sounding Points

The USACE Description Key Set called “National Alpha Codes” contains a key for “SNDG*”. When a Point object is created using this description, the “HYDS_Sounding [xx.x] (USACE)” Point Style and the “V_Soundings Depth Only (USACE)” Point Style are automatically used.

Changing the Label Style

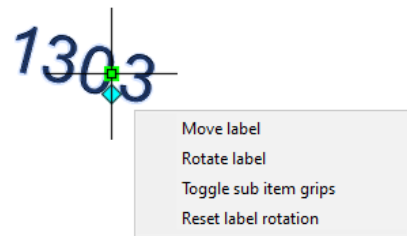
To change the Point Label Style so that the negative sign does not show up, follow the steps below:

1. Select the Point in the drawing and open the Properties Palette
2. In the Properties Palette, use the “Label Style” drop-down to change the value to “V_Soundings Depth Only_No Negative (USACE)”

Rotating the Label

To rotate the Label for a Sounding Point, follow the instructions below:

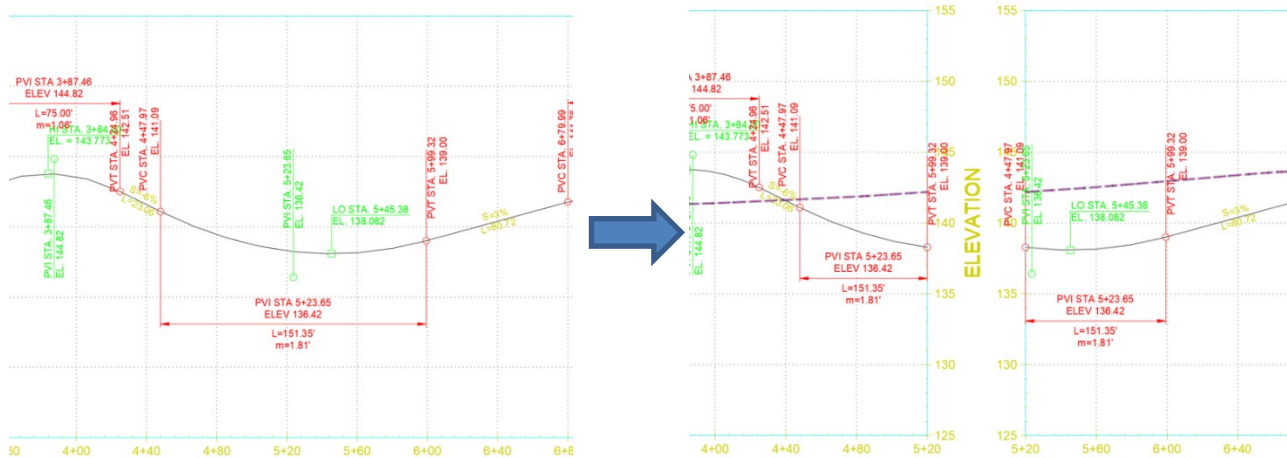
1. Select the Point by clicking on the Label. Two grips are displayed.
2. Hover the cursor over the square grip to display the pop-up menu.
3. Choose “Rotate Label”
4. Use the mouse or Dynamic Input to set a desired rotation angle and left-click to end the rotation.



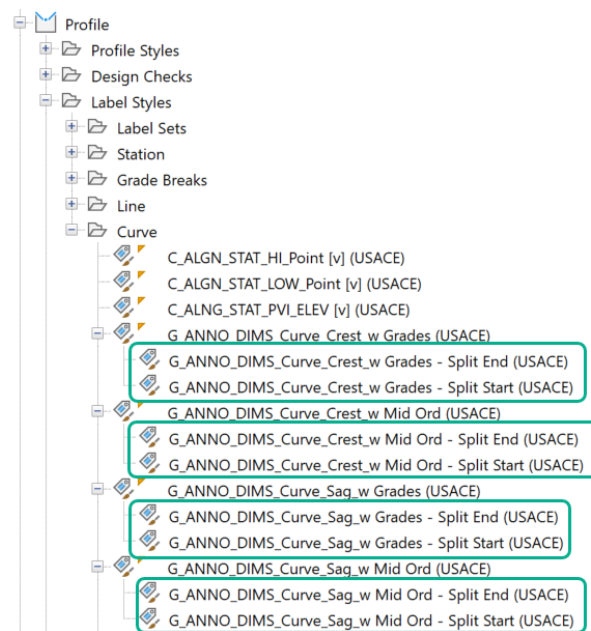
Note: To reset the Label to its original rotation, hover the cursor over the square grip and in the pop-up menu, choose “Reset label rotation”.

6.4 Splitting Profile Curve Labels

When creating a set of Profile Views in series for a single Alignment, there is a good possibility that a curve may be broken up across two Profile Views. By default when this happens, the program will create a separate label for the curve on each Profile View that is not visually accurate. An example of this is shown below:

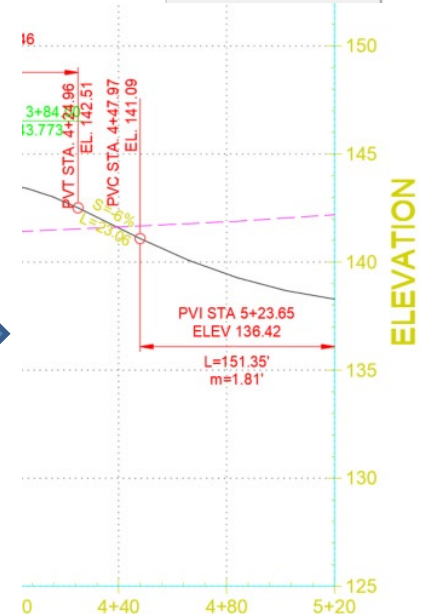


To address this, the USACE Civil 3D templates contain Profile Label Child Styles that allow for a broken curve to be displayed accurately. The screen shot below shows these Child Styles:



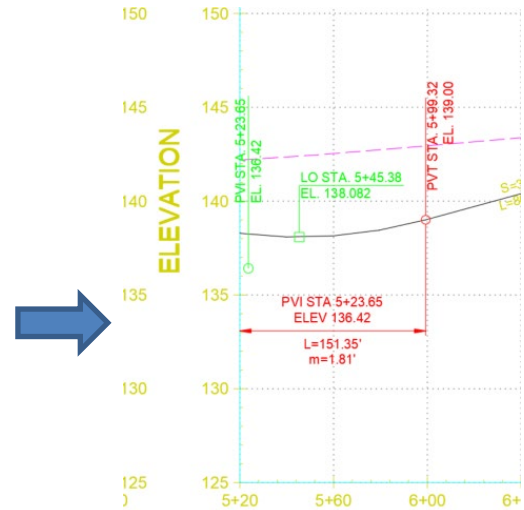
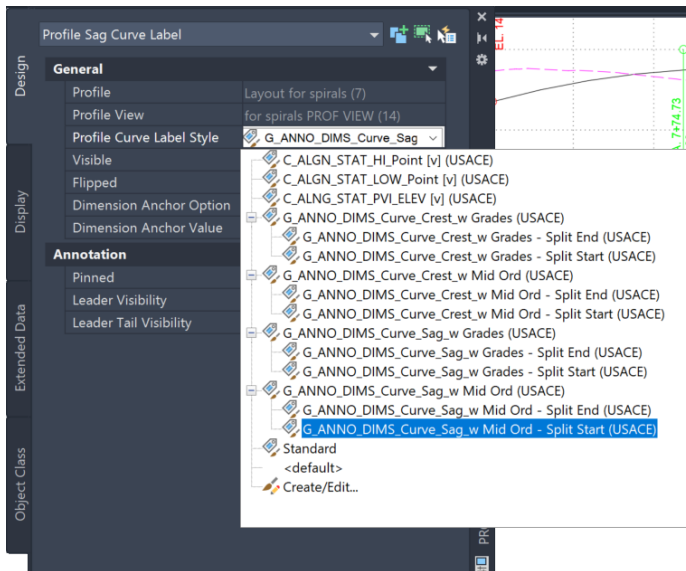
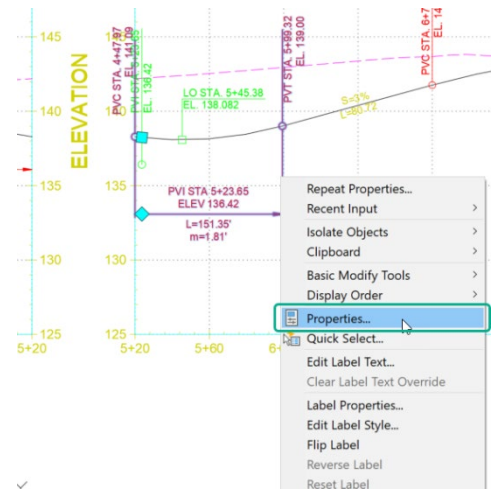
Change the Label of a Partial Curve at the End of a Profile View

- [illegible]



Change the Label of a Partial Curve at the Start of a Profile View

1. Open the drawing containing the Profile with a curve that is split across two Profile Views.
2. In a Profile View containing the second part of a curve, hold down the <Ctrl> key and select the label. This will only select the individual label. Release the <Ctrl> key.
3. Right-click and choose "Properties". The Properties Palette will open.
4. In the Properties Palette, set the "Profile Curve Label Style" to one of the Child Label Styles with a "- Split Start (USACE)" suffix (ex. G_ANNO_DIMS_Curve_Sag_w Mid Ord - Split Start (USACE)". The selected Label will change to display a label that shows a continuation from the next Profile View.



7.1 Overview

Gravity Pipe Networks are created in Civil 3D by placing 3-dimensional Pipe and Structure objects in a plan view. These pieces connect to each other to form the network. Because they are 3-dimensional pieces, they have the ability to be laid out in 3-dimensional space using rules such as minimum/maximum slope, minimum/maximum cover, pipe drop across structure, sump depth, and more.

The 3-dimensional Pipe and Structure objects used by the Pipe Networks are stored in external catalogs, and they are pulled into a template or drawing through the use of Part Lists. Parts Lists point to the desired parts in the catalog and assign rules, styles, render materials, and Pay Item codes to the parts as they are created in the drawing. For this reason, separate Parts Lists should be created for each utility type that will be designed. In addition, an Existing and Proposed version of each should also be created to ensure that the correct Styles are assigned as the Parts are placed in the drawing.

Note: Parts Lists must be able to reference the catalog every time a Pipe or Structure object is placed or edited in the drawing.

The sections below provide general instructions for the manipulation of parts in the Part Catalogs as well as the creation of Parts Lists.

7.2 Part Catalog Manipulation

Prior to the creation of Parts Lists, the external Part Catalog should be edited to include desired sizes and materials of the Parts.

7.2.1 Accessing the Catalog

To access the Part Catalog for editing, you must first set the correct path in Civil 3D. Follow the steps below to accomplish this:

2. Open Civil 3D
3. From the “Home” tab of the Ribbon, locate the “Create Design” panel and expand it by clicking on the down arrow next to the panel name.
4. In the expanded panel, click on “Set Pipe Network Catalog”
5. In the dialog that appears, make sure that the Catalog Folder is set to the folder that contains the Part Catalog
 - A. For USACE, this should be U:\USACE Civil 3D 2022 Standards\Pipes Catalog\
6. In the Pipe Catalog and Structure Catalog drop-downs, choose the desired catalogs and hit “OK”
 - A. For USACE, this should be “US Imperial Pipe Catalog” and “US Imperial Structure Catalog” for Imperial or “Metric Pipe Catalog” and “Metric Structure Catalog” for Metric.

7.2.2 Editing the Part Catalog

The Part Catalogs are broken down into Chapters (Circular Pipes, Rectangular Pipes, Inlets, etc.). Each chapter contains families that are more specific shapes or different materials. Each family contains a number of different sizes of that particular part type.

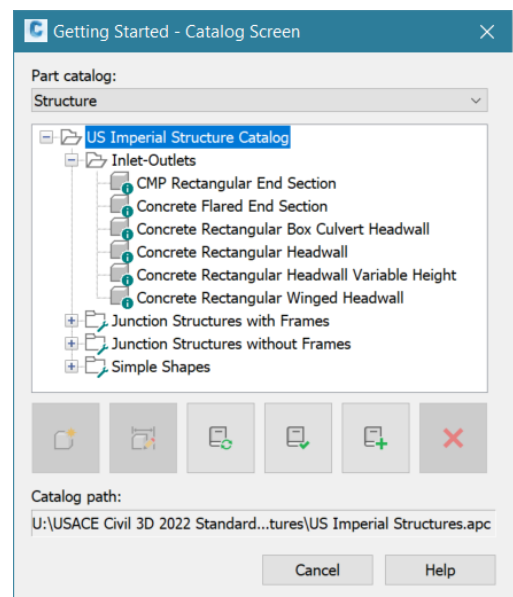
To customize a Part Catalog, the following functions are available:

- Create New Chapters
- Create New Families
- Save one Family as another (recommended)
- Add/Edit Part Sizes.

Note: If the new Part Family that is needed is similar in shape to another that already exists, CADD recommends that the creation of new Part Families be accomplished by opening the one that is similar and using the “Save As” function.

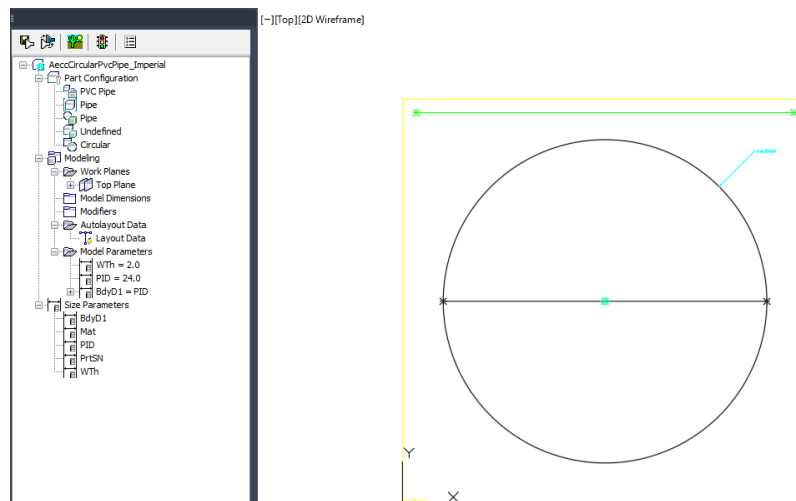
Editing the Part Catalog Organization

1. With Civil 3D open and pointing to the correct catalog, go to the “Home” tab of the Ribbon, hit the down-arrow next to the “Create Design” panel name, and choose “Part Builder”. The dialog that appears will allow you to browse, edit, or delete the current families as well as create new families.
2. Use the “Part Catalog” drop-down, choose the desired catalog to edit.
3. To create a new Chapter, right-click catalog name and choose “Add Chapter” or click on the “New Chapter” button in the bottom tool bar of the dialog.
4. To create a new Family, right-click on the desired Chapter name and choose “Add New Parametric Part” or click on the “New Parametric Part” button at the bottom left of the dialog toolbar.
5. To delete a Part Family or Chapter, select the desired item and use the red X at the bottom right in the dialog toolbar.



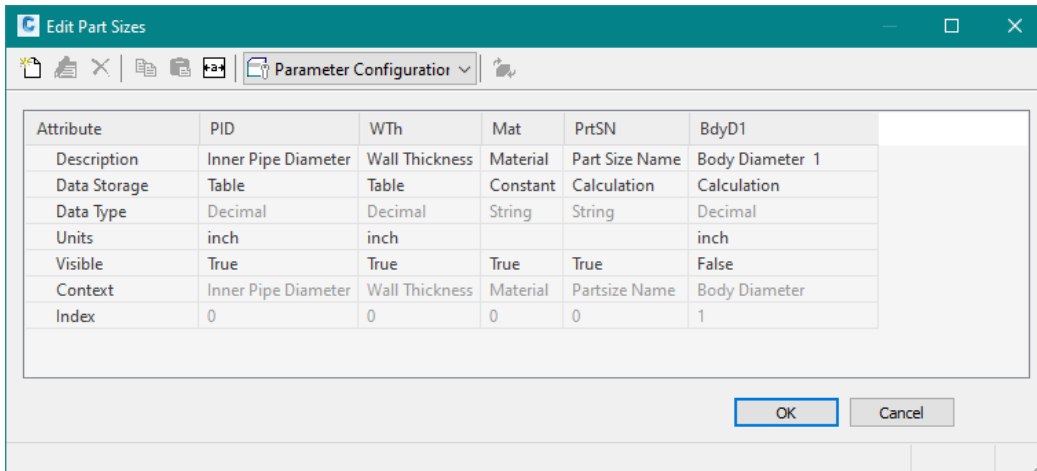
Editing a Part Family

7. To edit a Part Family, select the desired Family, right-click and choose “Modify Part Sizes” or click the Modify Part Sizes button in the toolbar at the bottom of the dialog. The drawing with the parametric part will appear, along with a specialized editing Palette.
8. To make a copy of the Part Family you have opened, click on the “Save Part Family As” button in the Toolbar on the editing Palette.



Changing the Part Family Name

9. To edit the description of the Part that will appear as the name of the Family in the Parts List, expand “Part Configuration”, right-click on the first item and choose “Edit”.
10. To review the Model Parameters and how they work together, expand “Modeling”.
11. To edit the Parameters and they type of variable, right-click on “Size Parameters” and choose “Edit Configuration”.
- A. In this dialog, the Data Storage type, units, and visibility can be changed.

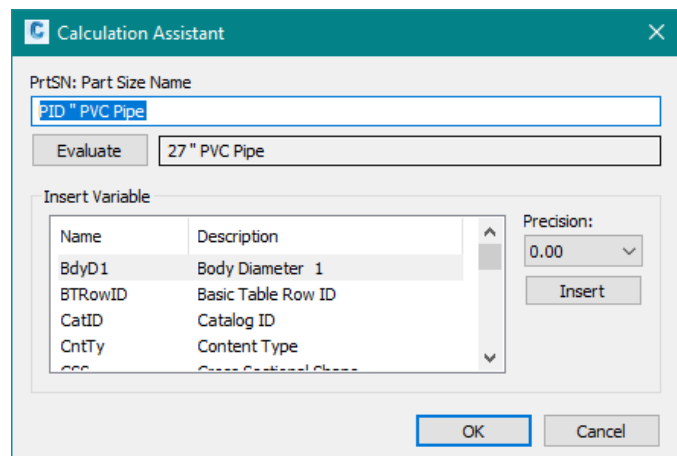


Note: Care should be taken when changing variable types as this could adversely affect the behavior of the Parametric Part.

Editing Part Naming

12. To change the name of the Parts that will appear for each part in the Parts List, choose “Calculation” from the drop-down
 - A. Double-click on any of the rows under “PrtSN”
 - B. In the dialog that appears use the variables, precision, and any additional, manually typed text to create the desired Part Name

Note: The programming language in the Part Catalog Database does not allow these names to include quotes, nor does it allow apostrophes to be created right at the end of a variable. For these reasons, the only way to automatically add the inches (quote) symbol to a name is to put a space after the size variable followed by two apostrophes, as shown below:



Editing Part Sizes

13. To edit Part Sizes, right click on the “Size Parameters” item and choose “Edit Values”.

Note: The variables to be edited vary in how they are stored. Some are stored and displayed as a table, some of them are constant values, while still others are stored in a drop-down list. The exact interface for adding/editing these values will vary based on the variable type.

- A. To edit a Constant value, double click anywhere in the column, type in the desired value and hit <Enter>. The value will update for all rows (if a table is displayed)
- B. To edit a List Value, click in the desired column and hit the “Edit” button in the toolbar of the “Edit Part Sizes” dialog. This dialog also allows for values to be added to the list
- C. To edit a Table Value, click in the desired cell, type the desired value, and hit <Enter>.
- D. To add a Table Value, click on the “New” button in the toolbar of the “Edit Part Sizes” dialog.
- E. To delete a Table Value, click on the “Delete” button in the toolbar of the “Edit Part Sizes” dialog.

Reviewing Changes

Once changes have been complete, the Part Family can be checked to make sure the definition is still sound and will work. To accomplish this, click on the “Validate” (traffic light) button at the top of the editing Palette. Results will be displayed at the bottom of the Palette.

- 14. Once changes have been complete, the Part Family can be checked to make sure the definition is still sound and will work. To accomplish this, click on the “Validate” (traffic light) button at the top of the editing Palette. Results will be displayed at the bottom of the Palette.

Saving Changes

- 15. To save the changes made the Part Family, click on the “Save” button at the top right of the editing Palette.

7.3 Working with Parts Lists

Once the library of desired parts is established in the Part Catalog, Parts Lists must be created to add enable templates and drawings to read and access these parts. Parts Lists are created and manipulated in the “Settings” tab of the Toolspace in Civil 3D.

Parts Lists not only isolate and access certain pipes and structures that will be used for the creation of Pipe Networks, but they also assign Styles, Rules, Render Materials, and Pay Item codes to these parts. For this reason, it is often necessary to establish different parts lists for the following, at a minimum:

- Existing Storm
- Existing Sanitary
- Proposed Storm
- Proposed Sanitary

While the list above is typical, it is not exhaustive. Other Parts Lists may be necessary for working with additional utility types. For example, often Gravity Pipe Catalogs are used to simulate other utilities the purposes of displaying the crossings in Profile Views. If this is the case, at least one other Parts Lists should be created containing the necessary simulated Pipes and assigning them the appropriate crossing Styles.

Parts Lists should be created in a template that can be used for drawing creation.

Note: Parts Lists do not get imported with the “Import Styles” tool. Parts Lists can be shared with other drawings or templates by opening both of the files, then using the Settings tab of the Toolspace to drag-and-drop the Parts Lists from one of the files to the other. You must be set to the “Master View” in the Settings tab to accomplish this. All Styles and Rule Sets referenced by the Parts Lists will also be brought over with the drag-and-drop.

7.3.1 Rules

To assist with the 3-dimensional layout of gravity parts, Pipe and Structure Rules can be created and assigned to the desired parts in the Parts Lists. The available rules are as follows:

Pipes

- Minimum and Maximum Slope
- Minimum and Maximum Cover
- Length Check
- Pipe to Pipe Match
- Set Pipe End

Structures

- Maximum Pipe Size Check
- Pipe Drop Across Structure
- Set Sump Depth

Because different types of utilities follow different rules in different localities, it will be necessary to create Pipe Rule Sets and Structure Rule Sets for each utility type and possibly each location.

7.3.2 Creating Parts Lists

Parts Lists can be created from scratch or by copying a Parts List that already exists in the drawing or template. These options are both completed on the “Settings” tab of the Toolspace under “Pipe Networks”.

The steps below outline the creation of a Parts List from scratch:

1. Open Civil 3D
2. Open the desired template or drawing (template recommended)
3. Check to make sure the correct Part Catalog path is set in the program.
 - A. General steps to accomplish this are in the “Accessing the Catalog” section above
 - B. Specific steps to accomplish this for USACE’s Part Catalogs are in the “Check/Set the Pipe Network Catalog Path” section above.
4. On the “Settings” tab of the Toolspace, expand “Pipe Networks”, then “Parts Lists”.
5. Right-click on “Parts Lists” and hit “New”.
 - A. To copy one that already exists, simply click on that particular Parts List, right-click, and hit “Copy”.
6. On the “Information” tab of the dialog that appears, type in a name for the new Parts List and a description if desired.

Adding Pipes to the Parts Lists

7. Add Part Families and Pipes
 - A. Click on the “Pipes” tab of the dialog
 - B. Right-click on the new Parts List name and hit “Add Part Family”
 - C. In the dialog that appears, choose one or more Pipe types by checking their boxes and hit “OK”
 - D. Right-click on one of the Part Families listed and click “Add Part Size”
 - E. In the dialog that appears, use the drop-downs and the other parameter entry fields to choose the desired values and hit “OK”.

Note: There are boxes on the right side of the dialog to add all of the sizes of one or more of the categories at the same time. If most of the sizes in one family are needed, it is sometimes easier to add all of the sizes to the list, then go back and remove the parts that are not needed (right-click on the part and choose “Delete”)

Property	Value	Units	Source	Add all sizes
Wall Thickness	4.000000	inch	Table	☐
Inner Pipe Width	24.000000	inch	Table	☐
Inner Pipe Height	24.000000	inch	Table	☐
Manning Coefficient	0.013000		List	☐
Cross Sectional Shape	SweptShape_Rectangular		Constant	
Material	RCP		Constant	
Part Type	Pipe		Constant	
Part Subtype	Undefined		Constant	
Part Description	Concrete Box Culvert		Constant	
Part Size Name	24 " x 24 " Rectangular RCP		Calculation	
Linear Center Offset	24.000000	inch	Calculation	
2D Distance	24.000000	inch	Calculation	
Minimum Curve Radius	0.000000	inch	Optional Property	
Hazen Williams Coefficient	0.000000		Optional Property	
Darcy Weisbach Factor	0.000000		Optional Property	

- F. Repeat Steps a. - e. above to add more sizes to the current family or add sizes to the other families.

8. Establish settings for the Pipe Parts

- A. To apply a Style to a single pipe size, click on the  button in the row corresponding to that pipe type and size under the “Style” column, choose the desired Style in the dialog that appears, and hit “OK”
- B. To apply one Style to all of the pipe sizes in one Part Family, click on the  button in the row that displays the Part Family Name the “Style” column, choose the desired Style in the dialog that appears, and hit “OK”
- C. To apply a Rule Set to a single pipe size, click on the  button in the row corresponding to that pipe type and size under the “Rules” column, choose the desired Rule Set in the dialog that appears, and hit “OK”
- D. To apply a Rule Set to all of the pipe sizes in one Part Family, click on the  button in the row that displays the Part Family Name the “Rules” column, choose the desired Rule Set in the dialog that appears, and hit “OK”
- E. To apply a Render Material to a single pipe size, click on the  button in the row corresponding to that pipe type and size under the “Render Material” column, choose the desired material in the dialog that appears, and hit “OK”
- F. To apply a Render Material to all of the pipe sizes in one Part Family, click on the  button in the row that displays the Part Family Name the “Render Material” column, choose the desired material in the dialog that appears, and hit “OK”
- G. To apply a Pay Item Code to a single pipe size, click on the  button in the row corresponding to that pipe type and size under the “Pay Item” column, choose the desired Pay Item Code in the dialog that appears, and hit “OK”
- H. To apply a Pay Item Code to all of the pipe sizes in one Part Family, click on the  button in the row that displays the Part Family Name the “Pay Item” column, choose the desired Pay Item Code in the dialog that appears, and hit “OK”
- I. Repeat the necessary steps above until all Pipe Sizes have been assigned the necessary properties.

Adding Structures to the Parts List

9. Add Structures to the Parts List

- A. Click on the “Structures” tab of the dialog
- B. Right-click on the new Parts List name and hit “Add Part Family”
- C. In the dialog that appears, choose one or more Structure types by checking their boxes and hit “OK”
- D. Right-click on one of the Part Families listed and click “Add Part Size”
- E. In the dialog that appears, use the drop-downs and the other parameter entry fields to choose the desired values and hit “OK”.

Note: There are boxes on the right side of the dialog to add all of the sizes of one or more of the categories at the same time. If most of the sizes in one family are needed, it is sometimes easier to add all of the sizes to the list, then go back and remove the parts that are not needed (right-click on the part and choose “Delete”

Part Size Creator

Property	Value	Units	Source	Add all sizes
Wall Thickness	5.000000	inch	List	☐
Frame Diameter	18.000000	inch	List	☐
Frame Height	4.000000	inch	List	☐
Cone Height	24.000000	inch	List	☐
Inner Structure Diameter	48.000000	inch	List	☐
Structure Shape	BoundingShape_Cylinder		Constant	
Vertical Pipe Clearance	29.000000	inch	Calculation	
Rim to Sump Height	60.000000	inch	Range	
Floor Thickness	3.000000	inch	Constant	
Barrel Pipe Clearance	1.000000	inch	Constant	
Structure Height	63.000000	inch	Calculation	
Structure Diameter	58.000000	inch	Calculation	
Part Type	Struct_Junction		Constant	
Part Subtype	Concentric		Constant	
Part Description	Concentric Cylindrical Struct		Constant	
Part Size Name	48 in MH		Calculation	
Frame Cylinder Height	4.000000	inch	Calculation	
Barrel Cylinder Height	35.000000	inch	Calc. Calculation	
Workplane Offset 1	4.000000	inch	Calculation	
Workplane Offset 2	28.000000	inch	Calculation	
Material	Reinforced Concrete		Optional Property	
Frame	Standard		Optional Property	
Grate	Standard		Optional Property	
Cover	Standard		Optional Property	

OK Cancel Help

F. Repeat Steps a. - e. above to add more sizes to the current Family or add sizes to the other families

10. Establish settings for the Structure Parts

- To apply a Style to a single Structure size, click on the  button in the row corresponding to that Structure type and size under the “Style” column, choose the desired Style in the dialog that appears, and hit “OK”
- To apply one Style to all of the Structure sizes in one Part Family, click on the  button in the row that displays the Part Family Name the “Style” column, choose the desired Style in the dialog that appears, and hit “OK”
- To apply a Rule Set to a single Structure size, click on the  button in the row corresponding to that Structure type and size under the “Rules” column, choose the desired Rule Set in the dialog that appears, and hit “OK”
- To apply a Rule Set to all of the Structure sizes in one Part Family, click on the  button in the row that displays the Part Family Name the “Rules” column, choose the desired Rule Set in the dialog that appears, and hit “OK”
- To apply a Render Material to a single Structure size, click on the  button in the row corresponding to that Structure type and size under the “Render Material” column, choose the desired material in the dialog that appears, and hit “OK”
- To apply a Render Material to all of the Structure sizes in one Part Family, click on the  button in the row that displays the Part Family Name the “Render Material” column, choose the desired material in the dialog that appears, and hit “OK”
- To apply a Pay Item Code to a single Structure size, click on the  button in the row corresponding to that Structure type and size under the “Pay Item” column, choose the desired Pay Item Code in the dialog that appears, and hit “OK”

- H. To apply a Pay Item Code to all of the Structure sizes in one Part Family, click on the  button in the row that displays the Part Family Name the “Pay Item” column, choose the desired Pay Item Code in the dialog that appears, and hit “OK”
- I. To apply a Structure Type to a single Structure size, click on the  button in the row corresponding to that Structure type and size under the “Structure Type” column, choose the desired Type in the dialog that appears, and hit “OK”
- J. To apply a Structure Type to all of the Structure sizes in one Part Family, click on the  button in the row that displays the Part Family Name the “Pay Item” column, choose the desired Type in the dialog that appears, and hit “OK”
- K. Repeat the necessary steps above until all Structure Sizes have been assigned the necessary properties.

Note: The Structure Type is used for network analysis using the “Analyze Gravity Network” command.

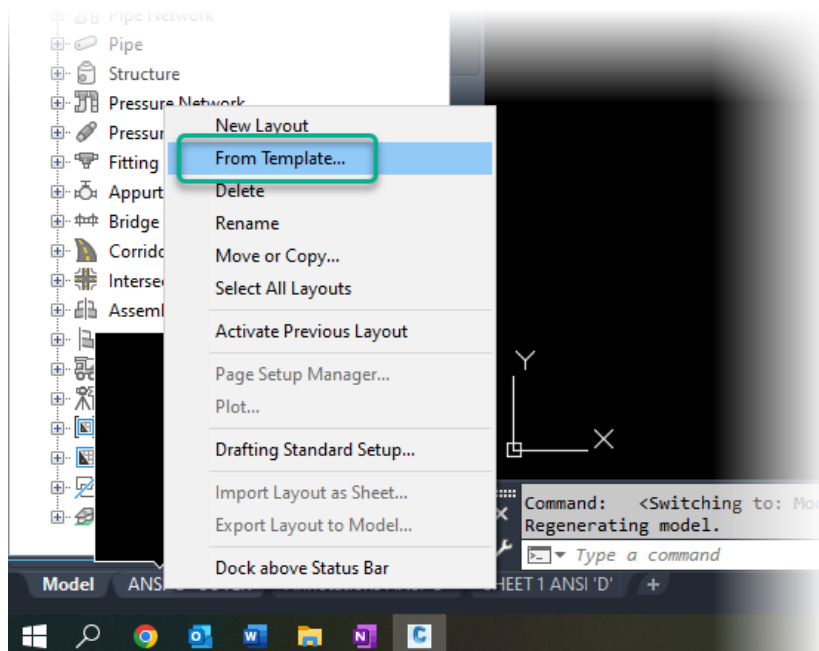
8.1 Overview

Sheet Templates and Sheet Set Templates have been established to allow for the quick creation, management, and plotting of layouts. This section provides instructions for the creation of Sheets using Sheet Templates, the establishment of a Sheet Set using a Sheet Set Template, and publishing Sheets from the Sheet Set.

8.2 Creating Basic Sheet Layouts Using a USACE Sheet Template

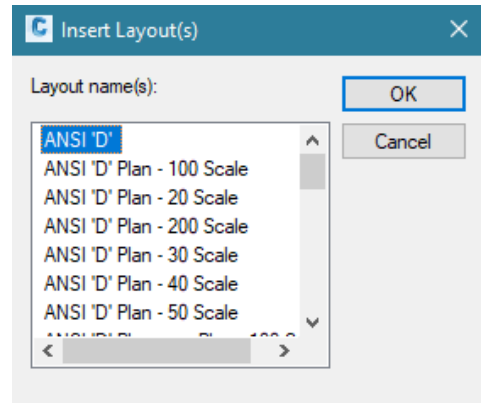
The USACE user Profiles that were established for working in Civil 3D 2022 contain a path to the U:\USACE Civil 3D 2022 Standards\Templates folder for the creation of Sheet Layouts as well as new drawings. In addition to containing layout sheets made for Civil 3D's Plan Production tools, the "PlanProf" templates contain a base layout that can be used for the creation of basic sheets manually. The instructions below provide the recommended steps for creating a new layout in a current drawing.

1. Open Civil 3D 2022 using either the "USACE - Civil 3D 2022 - Imperial" or the "USACE - Civil 3D 2022 - Metric" custom launch icons.
2. Open the desired drawing that needs a new layout.
3. In the bottom-left corner, right-click on any of the Layout (Paper Space) tabs and choose "From Template..."



4. In the dialog that appears, double-click on the "Plan Production and Sheet Creation" folder to show the files inside.
5. Select the desired "PlanProf" Sheet Template file, then click "Open". The "Insert Layout" dialog will appear.

6. In the dialog, select the “ANSI ‘D’” layout, then click “OK”. A new layout will be added to the current drawing called “ANSI ‘D’” that contains the correct page setup, the USACE Titleblock, and the blocks containing the Titleblock text that will reference a Sheet Set.

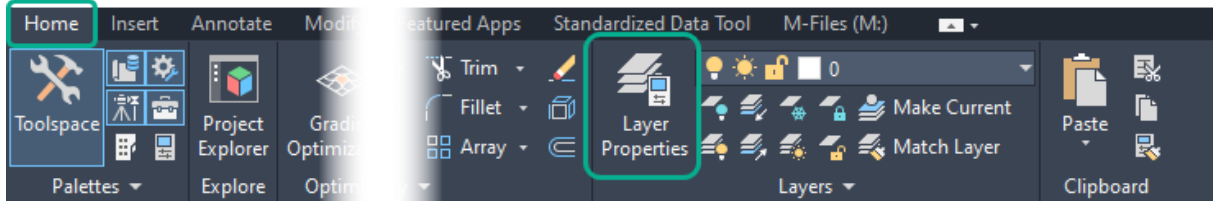


8.3 Highlighting Layers in a Plot Using Color

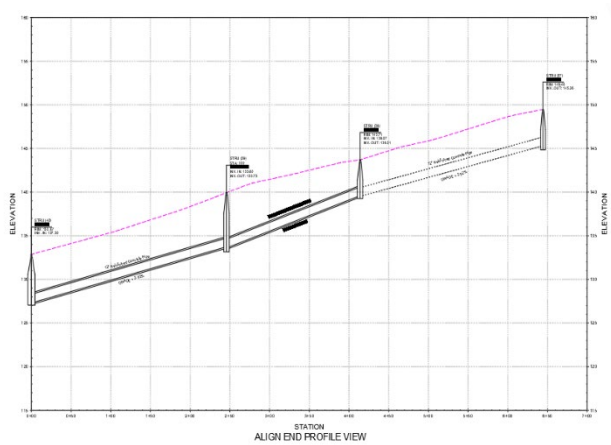
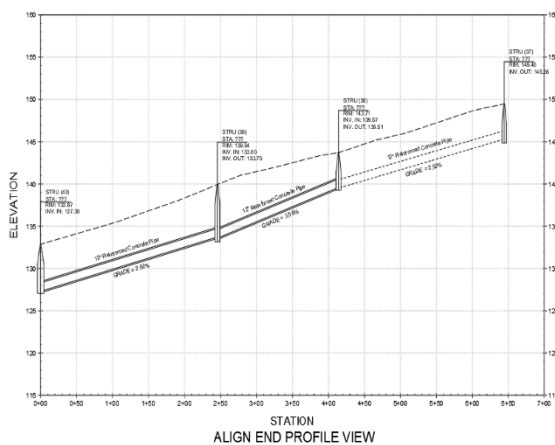
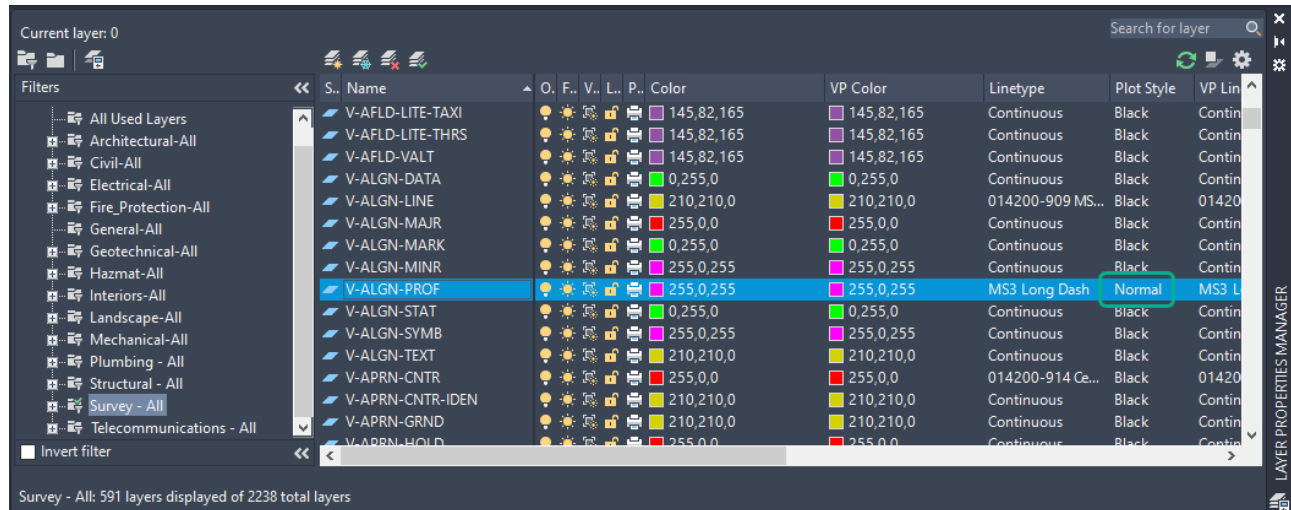
Sometimes it is necessary to generate a plot with a specific Layer highlighted. While this can be done using different lineweights, it is often more effective to plot out the objects on the desired Layer as an actual color. This allows the objects to easily stand out from the surrounding black and/or grey entities.

8.3.1 Plot out a Layer with a Color in an STB-Based Drawing

1. Open the desired drawing in Civil 3D.
2. From the “Home” tab of the **Ribbon**, on the “Layers” panel, click the “Layer Properties” button.

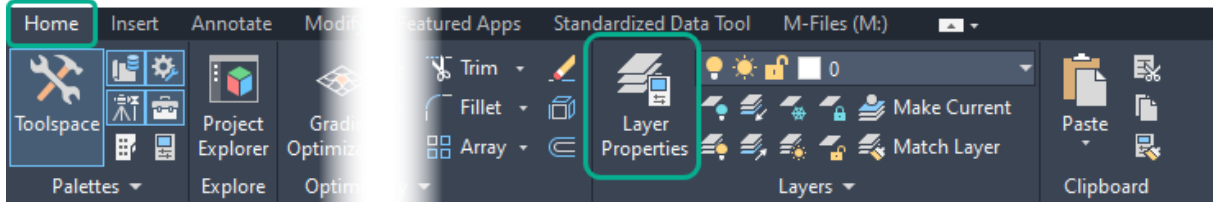


3. In the **Layer Properties Manager** palette, locate and select the desired Layer to highlight (Ex. V-ALGN-PROF).
4. In the “Plot Style” column of the palette, click on the selected Layer, choose “Normal” from the dialog, then click “OK”. The “Normal” Plot Style will tell this particular Layer to plot as the Layer color.

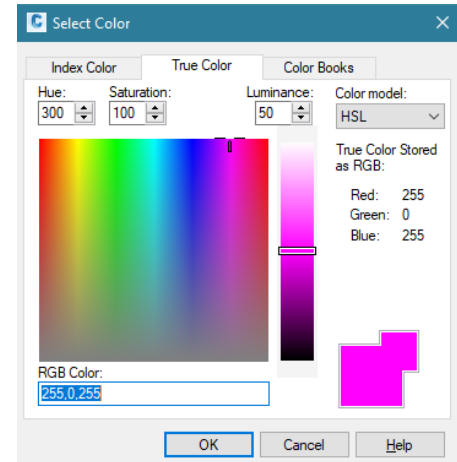


5.3.2 Plot out a Layer with a Color in a CTB-Based Drawing

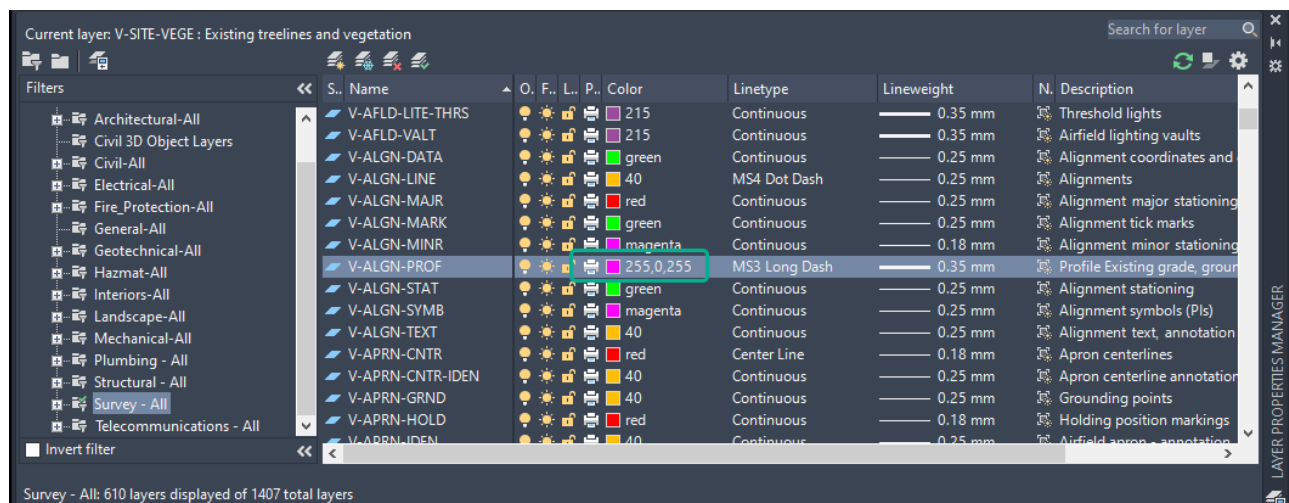
1. Open the desired drawing in Civil 3D.
2. From the “Home” tab of the **Ribbon**, on the “Layers” panel, click the “Layer Properties” button.



3. In the **Layer Properties Manager** palette, locate and select the desired Layer to highlight (Ex. V-ALGN-PROF).
4. In the “Color” column of the palette, click on the selected Layer. The “Select Color” dialog will appear.
5. Switch to the “True Color” tab, then use the graphics, the fields, or the “RGB Color” text box at the bottom to select a color.
6. Click ok “OK”. The chosen True Color value will now be shown in the **Layer Properties Manager** palette instead of the original AutoCAD Index color value. Because the True Color value is not present in AutoCAD CTB files, this particular Layer will plot out with the chosen True Color.



Note: Users are not limited to using colors that exactly match those of the Index colors.



8.4 Working with Sheet Sets

Sheet Sets are used in AutoCAD-based products to group multiple sheets across multiple drawings into a single, organized collection from which they can be managed, plotted, published, transmitted, and archived together. Sheet Sets are created from the **Sheet Set Manager** interface. They can be created from a previous (or template) Sheet Set or from a group of drawings that contain layouts.

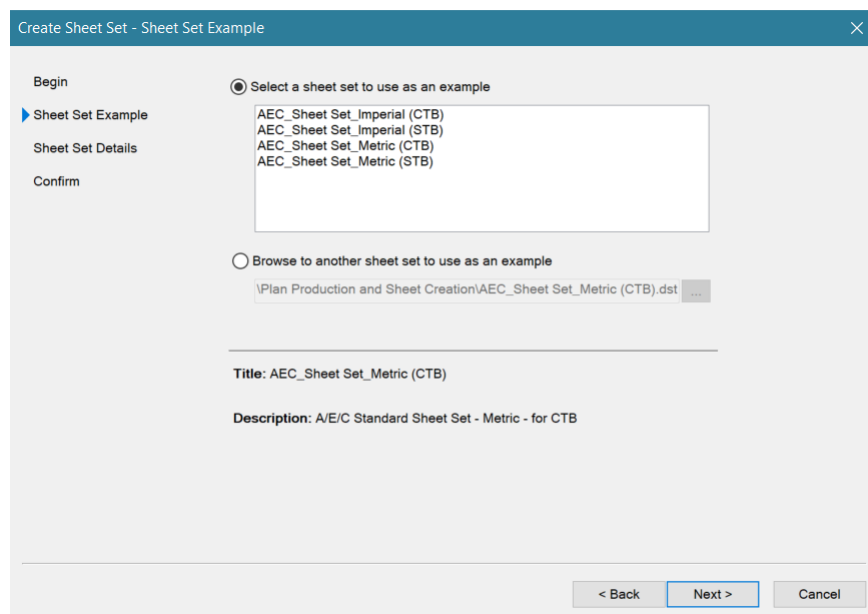
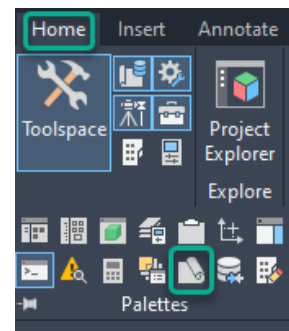
8.4.1 Creating Sheet Sets

USACE's Civil 3D 2022 Standards contain 4 different Sheet Set Templates. They are:

- AEC_Sheet Set_Imperial (CTB).dst
- AEC_Sheet Set_Imperial (STB).dst
- AEC_Sheet Set_Metric (CTB).dst
- AEC_Sheet Set_Metric (STB).dst

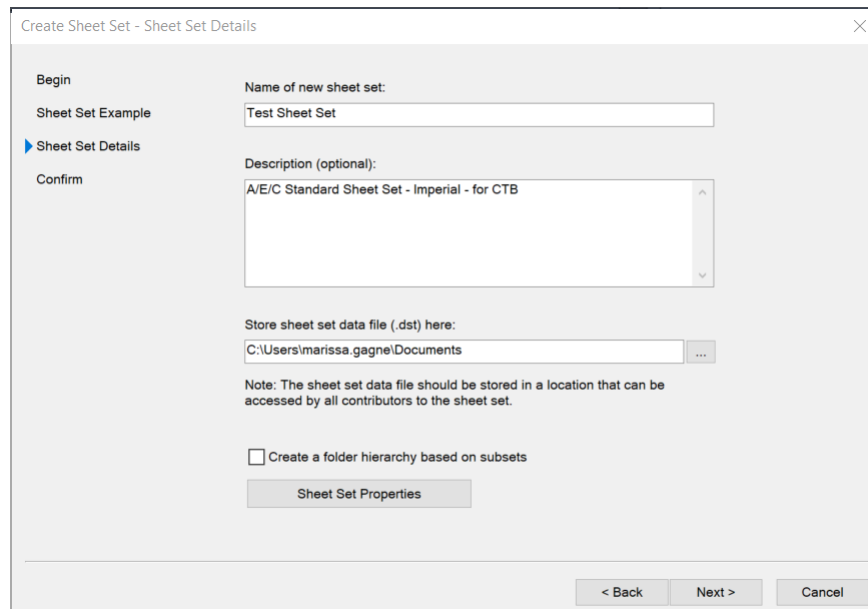
These templates are used as “examples” during the creation of new Sheet Sets. The instructions below provide the steps for the creation of new Sheet Sets:

1. Launch Civil 3D and open a drawing containing a Sheet.
2. On the “Home” tab of the Ribbon, click on the down arrow next to the name of the “Palettes” and choose the “Sheet Set” button. The **Sheet Set Manager** palette will appear.
3. In the drop-down at the top of the palette, choose “New Sheet Set”.
4. On the first page of the dialog that appears, select “An example Sheet Set” and click “Next >”.
5. At the top of the dialog, click on the “Select a sheet set to use as an example” option.



6. Choose the desired Sheet Set Template from the list, then click “Next >”.
7. In the next screen, type in a name for the new sheet set, as well as a description if desired.
8. Under “Store Sheet Set Data File (.dst) here”, click on the browse  button.

9. In the dialog that appears, browse to the desired folder in which to store the new DST file, then click “Open”.
10. Back in the wizard, click on “Next >”



11. On the next screen, review the details of the new Sheet Set, then click “Finish”. The wizard will close, and a new Sheet Set will be created and displayed in the **Sheet Set Manager**.

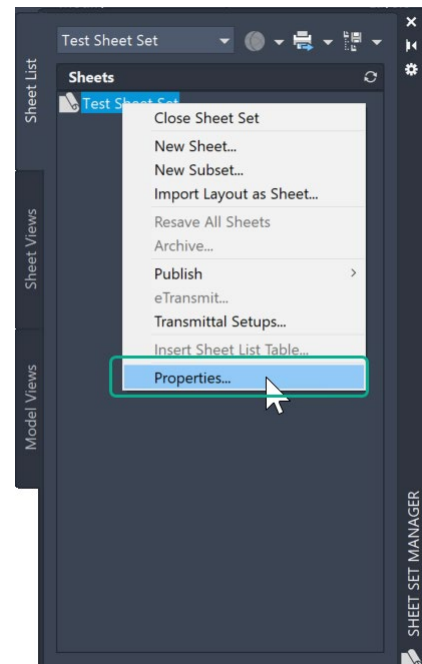
8.4.2 Changing Sheet Set Properties

USACE’s Sheet Set Templates all contain standard and custom properties at the Sheet Set and Sheet level. Many of these Sheet Set Properties are dynamically accessed by USACE’s Titleblocks. The properties can be edited before or after new sheets are added to the Sheet Set. In this example, many of the properties will be established first.

1. With the **Sheet Set Manger** palette still visible and the desired Sheet Set open, right-click on the name of the Sheet Set and choose “Properties”.
2. In the dialog that appears, fill in the “Project Control” properties, “Sheet Custom” Properties, “Sheet Creation” Properties, and “Sheet Set Custom” Properties.

Note: For more information about the Properties in this dialog, refer to the “USACE Civil 3D 2022 Template Document v.5.0 - Part 1.docx” document that was provided with the standards.

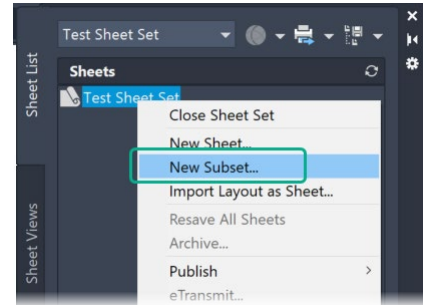
3. Click “OK” to close the dialog and save the changes to the Properties.



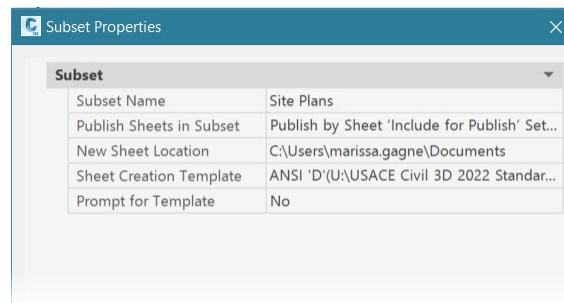
8.4.3 Creating Subsets

When a large number of sheets will be added to a Sheet Set, “Subsets” can be created to organize the sheets into smaller groups. These groups can be managed and plotted together if necessary. The instructions below outline the steps necessary for creating Subsets.

1. With the **Sheet Set Manger** palette still visible and the desired Sheet Set open, right-click on the name of the Sheet Set and choose “New Subset”.
2. In the dialog that appears, enter a name for the new Subset.
3. Review the additional settings, make any necessary changes, then click “OK”.
4. Repeat steps 1 - 3 as many times as necessary to generate the desired number of Subsets.



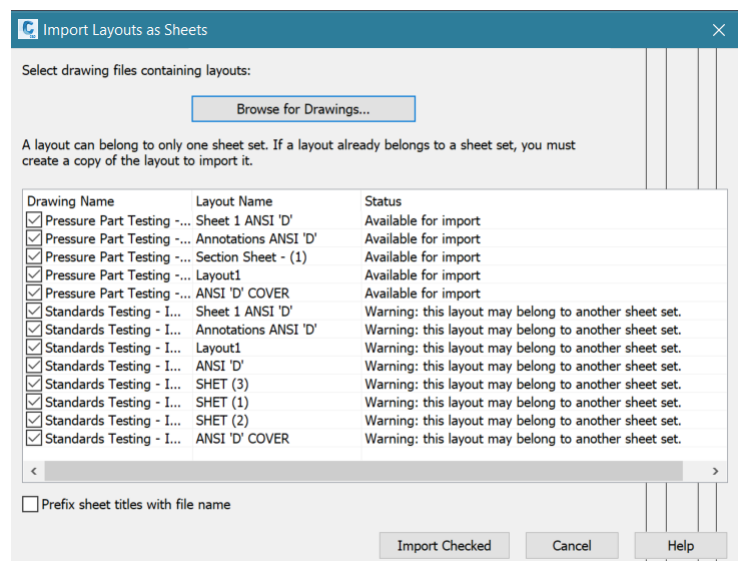
Note: Subsets can also be created inside of other Subsets.



8.4.4 Adding Layout Sheets

Layout sheets can be added to a Sheet Set either during creation or after it already exists. The instructions below outline the steps necessary to add the Layouts once the Sheet Set has been created.

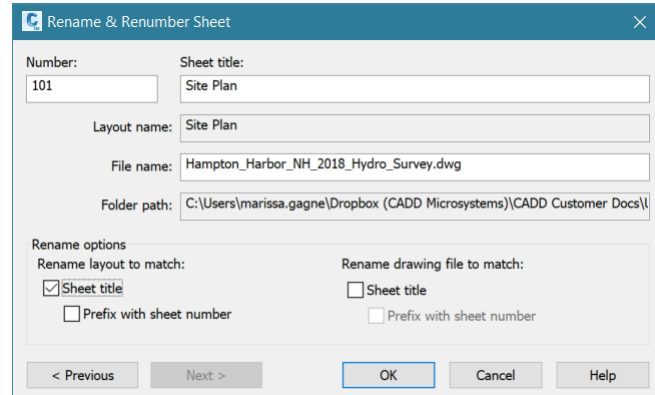
1. With the **Sheet Set Manger** palette still visible and the desired Sheet Set open, right-click on the name of the Sheet Set (or Subset) and choose “Import Layout as Sheet”.
2. In the dialog that appears, click “Browse for Drawings”.
3. Browse to the folder that holds the DWG files which contain the desired layouts.
4. Select a DWG or use <Shift>/<Ctrl> to select more than one DWG, then click “Open”.
5. Back in the “Import Layouts and Sheets” dialog, uncheck the boxes of any Layouts that should not be added to the Sheet Set.
6. At the bottom of the dialog, review the “Prefix sheet titles with file name” setting, then click “Import Checked”. The selected Sheets will be added to the Sheet Set or the Subset.



8.4.5 Changing Sheet Names and Numbers

Once Sheets are part of a Sheet Set, the names and numbers assigned to the Sheets can be edited directly in the **Sheet Set Manager** without the need to open each individual drawing that contains the Sheets. The instructions below provide the steps to accomplish this task:

1. With the **Sheet Set Manager** palette still visible and the desired Sheet Set open, right-click on the desired Layout and choose “Rename & Renumber”.
2. In the dialog that appears, enter the desired Sheet Number and Sheet Title.
3. Review and set the desired “Rename Options” at the bottom of the dialog regarding the renaming of the Layout and/or the drawing file containing the Sheet.



The dialog box titled "Rename & Renumber Sheet" contains the following fields and options:

- Number:** 101
- Sheet title:** Site Plan
- Layout name:** Site Plan
- File name:** Hampton_Harbor_NH_2018_Hydro_Survey.dwg
- Folder path:** C:\Users\marissa.gagne\Dropbox (CADD Microsystems)\CADD Customer Docs\I
- Rename options:**
 - Rename layout to match:**
 - ☒ Sheet title
 - ☐ Prefix with sheet number
 - Rename drawing file to match:**
 - ☐ Sheet title
 - ☐ Prefix with sheet number

Buttons at the bottom: < Previous, Next >, OK, Cancel, Help.

4. To continue to the next Sheet in the list, click the “Next >” button, and establish the desired settings for that Sheet.
5. Repeat step 4 as needed, then click “OK”. The Sheets will be updated in the Sheet Set and in their parent drawings.

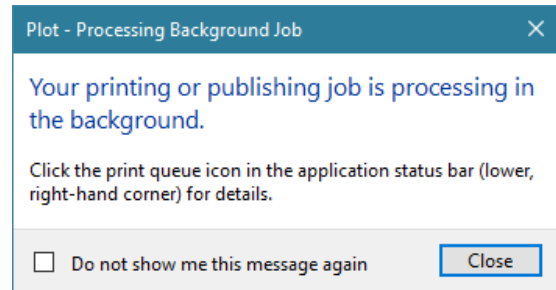
Note: If any of the drawings is current open, it may be necessary to use the “REA” command to regenerate the fields in the Titleblock in order to see the changes.

6. Repeat steps 1 - 5 as necessary to rename and/or renumber additional Sheets in the Sheet Set or a Subset.

8.4.6 Publishing Sheets from the Sheet Set

Layouts in Sheet Sets can be Published one at a time, in subsets, or all together.

1. With the **Sheet Set Manager** palette still visible and the desired Sheet Set open, select the desired Layout(s) or Subset, right-click, move the cursor down to “Publish”, then choose the necessary plotting command. Depending on the chosen command, a dialog may appear. Enter the desired settings in the dialog and click “OK”. A message will appear stating that the publishing job is processing in the background.



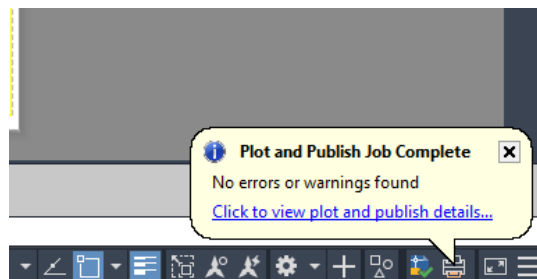
The message box titled "Plot - Processing Background Job" contains the following text:

Your printing or publishing job is processing in the background.

Click the print queue icon in the application status bar (lower, right-hand corner) for details.

☐ Do not show me this message again Close

2. Click “Close”. The sheet(s) will be plotted using the chosen settings. Once the publishing process is complete, a message bubble will appear in the bottom right corner of the program window.
3. Click on “Click to view plot and publish details”. The dialog that appears will provide information on each of the sheets and the path and filename of the PDFs that are plotted.
4. Click the “X” in the top right corner of the bubble to dismiss the message.



End of Document