CTC SOFTWARE

A SYMETRI COMPANY

CTC CIM Project Suite™ User Guide

Contents

Overview

Autodesk® Civil 3D® users will find great value in the CIM Project Suite. With tools for grading, sheet production, corridors, pipe networks, and surveying, users of all levels will benefit. Firms of any size, performing all types of infrastructure projects will see their productivity increase with the CIM Project Suite.

The CIM Project Suite is all about taking tedious tasks in Civil 3D and automating them through intuitive workflows and interfaces. All objects created and edited by the CIM Project Suite are native Civil 3D objects. No proprietary objects are created by the CIM Project Suite, ensuring that drawings created with the assistance of these apps are totally compatible with any Civil 3D user that may not have the CIM Project Suite.

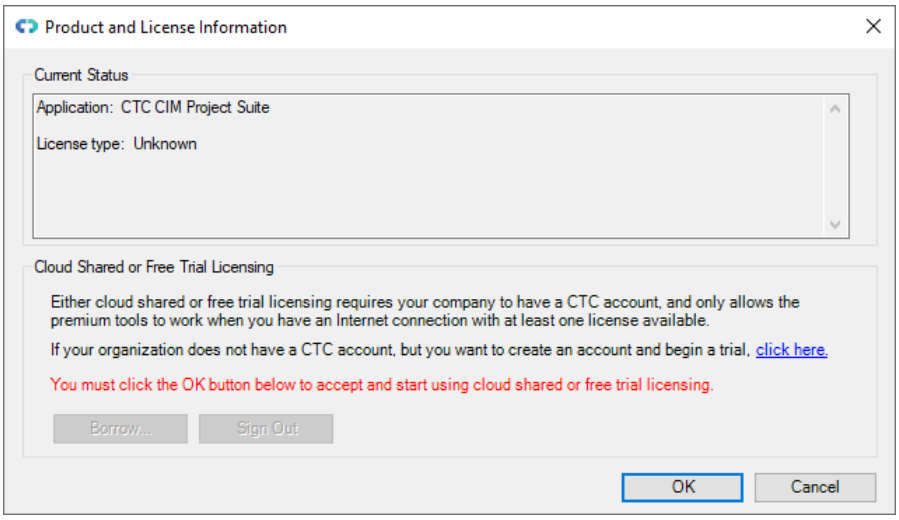
Installation and Configuration

The standard workstation installation requires little more than running the setup program. For more information regarding topics such as automating workstation installations and preconfiguring workstation settings, please refer to the *CTC CIM Suites Installation and Configuration Guide* document.

License Activation and Management

The productivity tools provided with light background colors are free tools that run without any special licensing. The productivity tools provided with dark background colors are premium tools which require licensing.

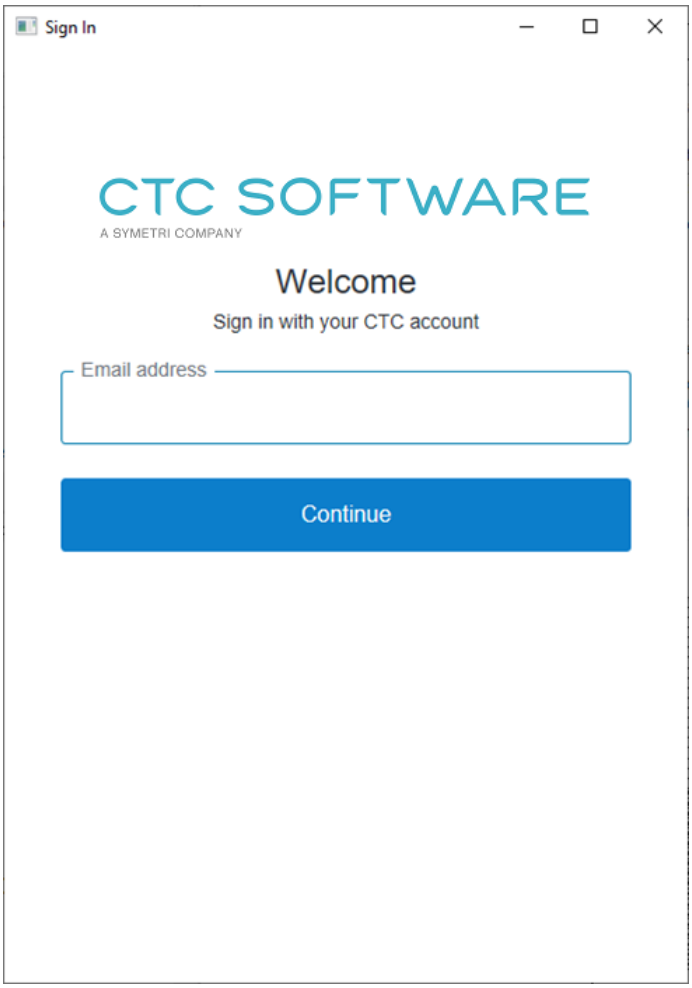
Unless initially preconfigured by the system administrator, the first time any of the licensed tools are launched, the *Product and License Information* dialog will appear which requires acknowledging the licensing requirements by clicking the OK button at the bottom.



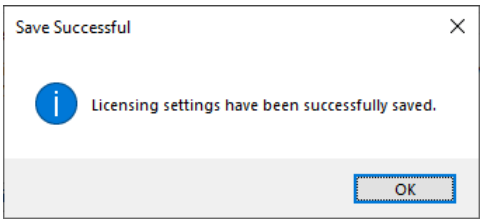
CTC Software products support only cloud-shared licensing, and also free trial licenses that use CTC's cloud licensing engine. You must click the OK button to activate the cloud licensing and acknowledge using a CTC cloud account.

The licensing will automatically apply to all of the tools that are included in the suite which require licensing. So once the first tool has configured the licensing, the other premium tools in the suite will automatically use the same configuration.

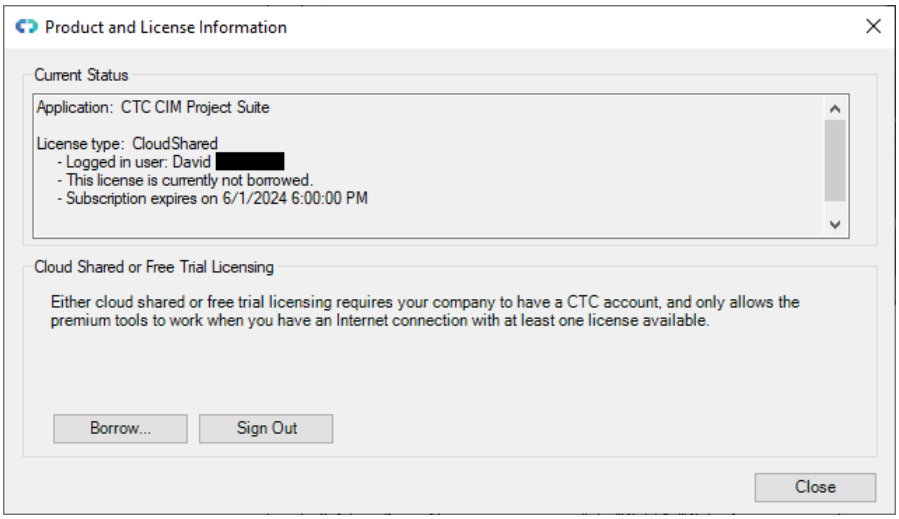
Once you click the OK button, you may be asked to login, if you aren't already logged in from using another CTC product:



Either way, once you have logged in, the product will be configured for cloud shared licensing:



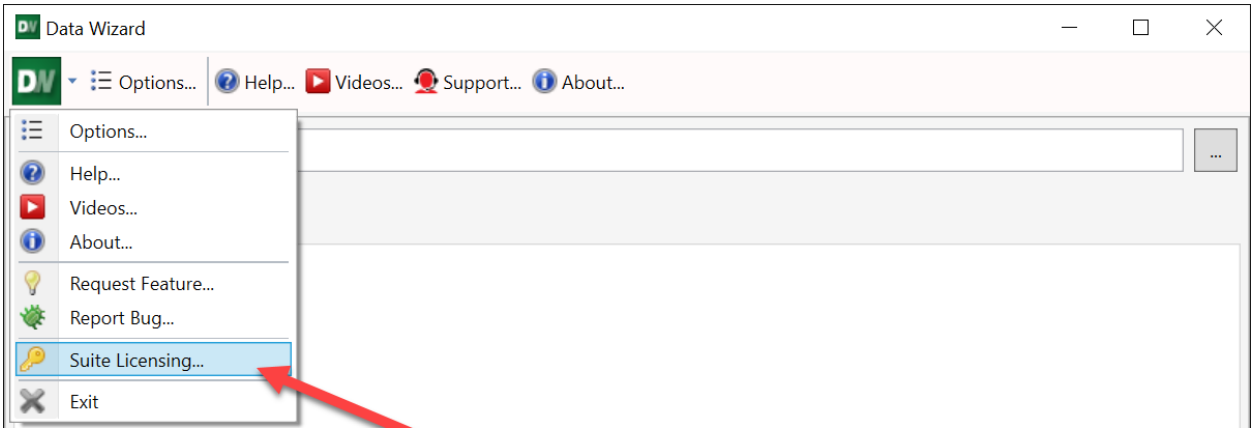
and the licensing screen will be updated to show that:



At this point, you may borrow a license for offline use. You may also Sign Out from the cloud licensing system in case a different user needs to sign in on this computer.

Changing Licensing at Any Time

Licensing can also be changed at any time using the "Suite Licensing" option from the application menu in any premium tool:



Borrowing a Cloud Shared License

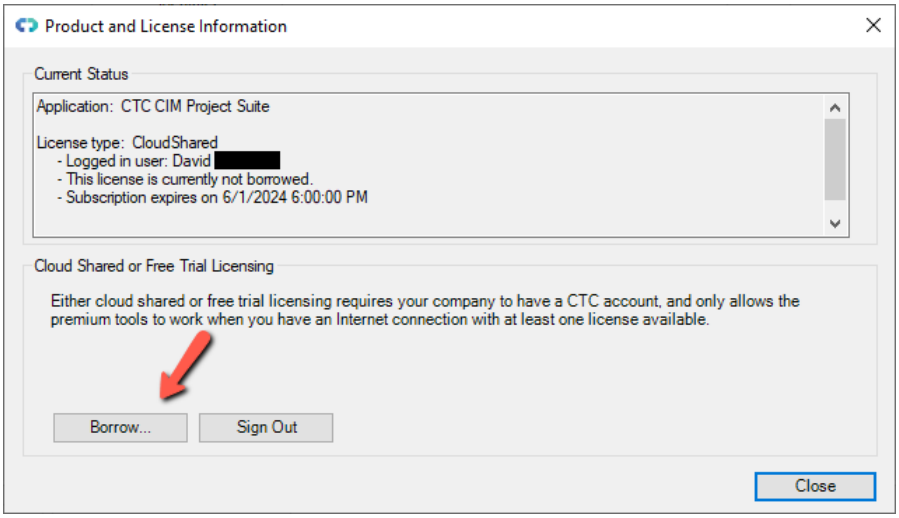
If a license is needed in anticipation of being disconnected from the Internet, borrowing a license can ensure that the CTC tools are available for use when offline.

IMPORTANT: For normal use of the software, where you have a standard Internet connection, you DO NOT need to borrow a license. Borrowing a license is normally only needed when you know you will need to use the software at a time when you won't have a reliable Internet connection. While you have a license borrowed, that is one less shared license available to all other users.

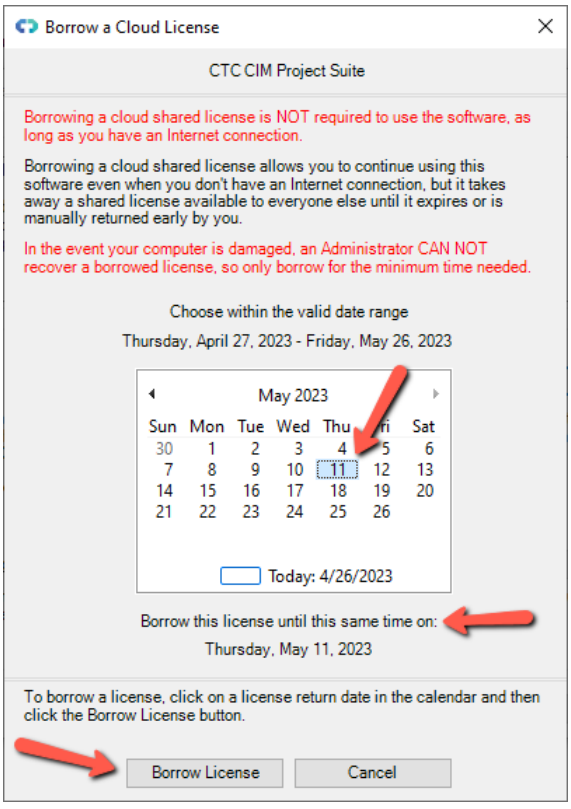
NOTE: Borrowing is only available for purchased cloud shared licenses. **Borrowing is not available for trial licenses.**

IMPORTANT: In the event your computer is lost, stolen or damaged (e.g. a hard drive crash) **an administrator CAN NOT recover a borrowed license.** In that case, the license will be unavailable to all users until the borrow period has naturally expired. *As such, you only want to borrow a license for the barest minimum amount of time needed.*

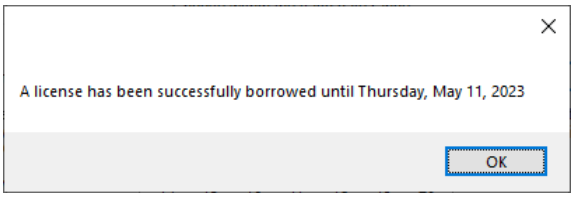
Begin by opening the *Product and License Information* screen from the main pulldown menu of a premium tool. From here, click the 'Borrow…' button to begin the process of choosing the length of time to borrow a Cloud Shared license.



The date selector should appear:

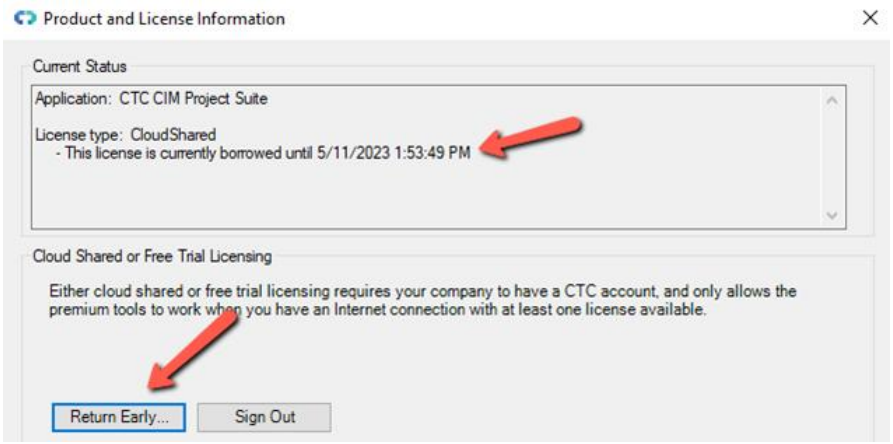


Confirm the date selection and click the *Borrow License* button. A success message should appear.

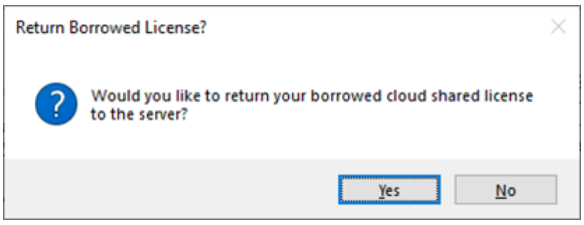


Returning a Borrowed Cloud Shared License Early

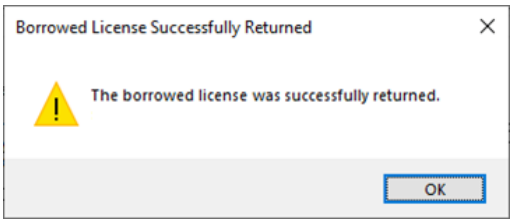
To return the license early, in the *Product and License Information* form, find the *Return Early…* button and click it.



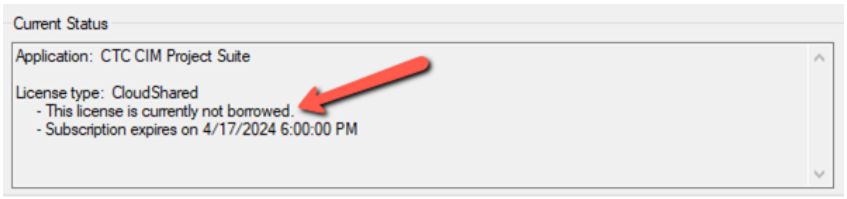
A prompt will appear confirming that the license should be returned.



Click the Yes button, then you should see:

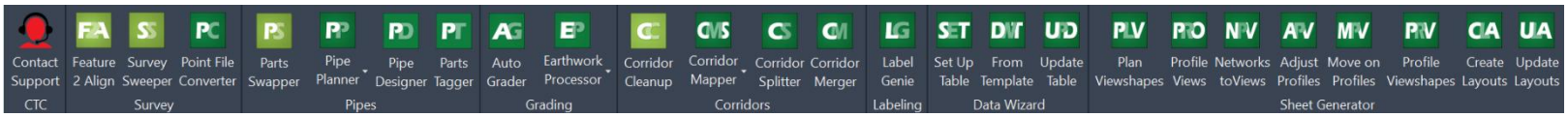


The license status should now show a ‘not borrowed’ message.

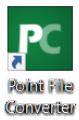


How to Use

All tools are launched from the CIM Project Suite Ribbon tab or command line strings.



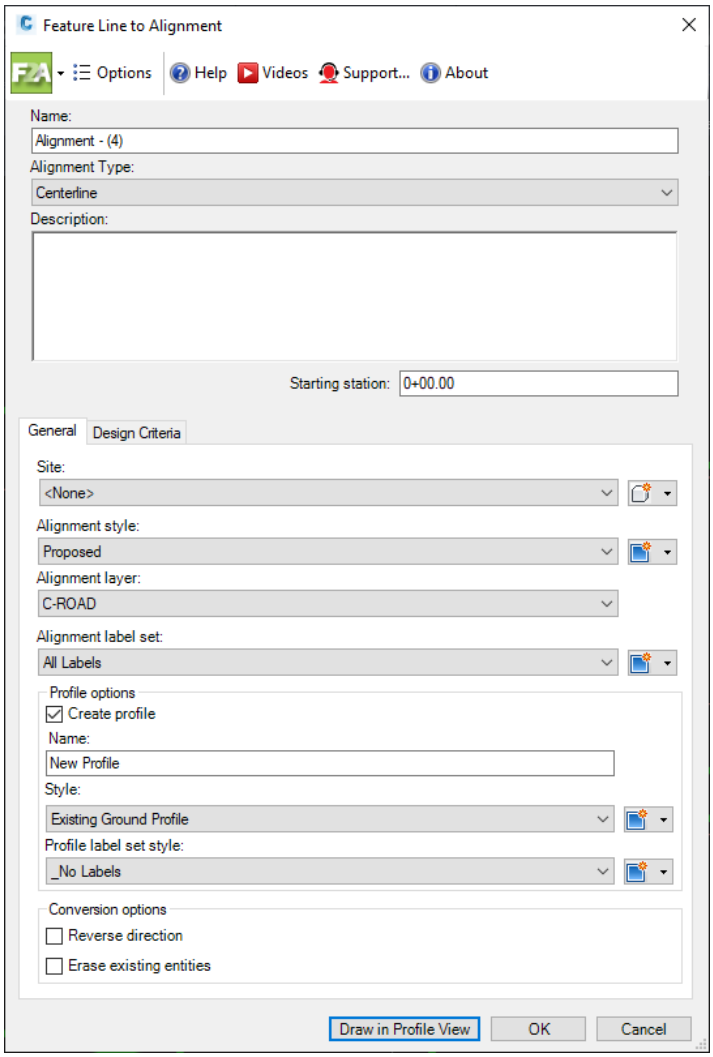
- Feature Line to Alignment — FL2A
- Survey Sweeper — SDSW
- Point File Converter — N.A. (launched from Ribbon or desktop Icon)



- Parts Swapper — PARTSWAPMULT
- Pipe Planner
  - Edit/export parts — PIPESEDIT
  - Import parts — PIPESIMPORT
- Pipe Designer — PIPEDES
- Parts Tagger — PARTSTAG
- Auto Grader — AUTOGRADER
- Earthwork Processor:
  - Create earthwork sets — EARTHPROC
  - Offset subgrade regions — REGIONOFFSET
- Corridor Cleanup — CORC
- Corridor Mapper
  - Setup Targets — CMAP_SETUP
  - Auto Map Targets — CMAP_AUTO
  - Rename Layers/Subassemblies — CMAP_RENAME
  - Layers from Subassemblies — CMAP_LFS
- Corridor Splitter — CORS
- Corridor Merger — CORM
- Label Genie — LABELGENIE
- Data Wizard
  - Set Up Legend — DATAWIZARD
  - Legend from Template — LEGENDTEMPLATE
  - Update Legend — LEGENDUPDATE
- Sheet Generator
  - Plan Viewshapes — VIEWSHAPES
  - Profile Views (native) — AeccCreateMultipleProfileView
  - Networks to Views — UPDATEPROFILEVIEWPARTS
  - Adjust Profiles — ADJUSTVIEWS
  - Move on Profiles — MOVEONEPROFILEVIEWS
  - Profile Viewshapes — PROFILEVIEWSHAPES
  - Create Layouts — CREATELAYOUTS
  - Update Layouts — UPDATELAYOUTS

Feature Line to Alignment

The tool consists of one dialog box. Detailed descriptions of all features are explained below.



- **Name**: Name of the Alignment to be created
- **Alignment Type**: Select from one of the Alignment types.
- **Starting Station**: Starting station of the Alignment

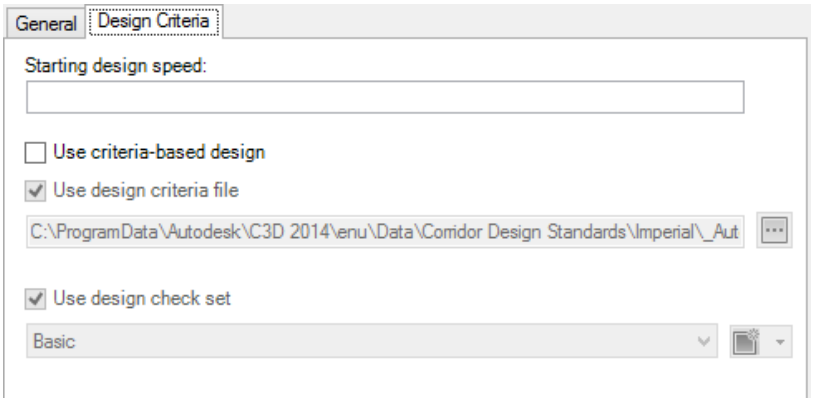
General Tab

- **Site**: If desired, Site in which the Alignment will reside
- **Alignment Style**: Object Style to control Alignment display
- **Alignment Layer**: Layer on which Alignment will reside (from Object Layers)
- **Alignment Label Set**: Label Set Styles for the Alignment
- **Profile Options – Create profile**: Option to create a Layout Profile
- **Profile Options – Name**: Name of the Profile to be created
- **Profile Options – Style**: Object Style to control Profile display
- **Profile Options – Label Set**: Label Styles or the Profile
- **Conversion Options – Reverse Direction**: Option to switch the stationing direction from default. Note: low station will be at the end that is closest when selecting the Feature Line. Unlike the out-of-box tool for Polyline conversion, this tool does not prompt the user with a direction arrow prior to the dialog box opening.

- **Conversion Options – Erase Existing Entities**: Option to erase the Feature Line at the time of Alignment and Profile creation

Design Criteria Tab

Note: this functionality is the same as the out-of-box tools for Polyline conversion.



- **Starting Design Speed**: Design speed for Alignment
- **Use Criteria-based design**: Option to use an external XML file to check design parameters are meeting specifications.
- **Use Design Criteria file**: Option to use external file containing design specifications
- **Use Design check set**: Option to use design check set from definitions within the drawing

NOTE: Alignment Type option is only available in version 2018 and newer.

Survey Sweeper

This tool will delete selected Survey Points and Survey Figures in the current drawing AND it's corresponding Survey Database. The point of this tool is to alleviate the tedious process required to delete Survey Points and Figures in the Survey Database. For this tool to function, the user must have a drawing open containing Survey Points and/or Survey Figures, as well as the Survey Database from which the drawing's Survey Points or Figures originated. The Survey Database must be opened for editing.

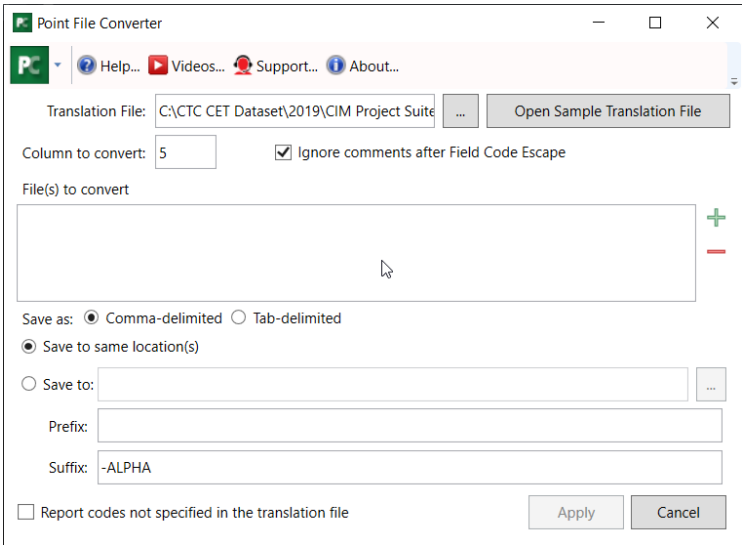
The user will be prompted to select Survey Points or Survey Figures to be deleted. After selection and initiation of the command, a message will display the number of Survey Points and Figures to be deleted. The user can then click Yes or No. Items will then be deleted from both the drawing and the Survey Database.

Point File Converter

This tool converts survey point files (.csv, .txt, etc.) from one code list to another, allowing field work in one code list, and CAD processing in another. Through a simple Excel "translation file" that spells out the code conversions, the tool will read the conversions and apply them to one or more point files. Line work codes, prefixes and suffixes, Field Code Delimiters and Field Code Escape codes are all accounted for. Users can create as many Translation Files as needed, then simply point to them when running this tool.

Interface

Point File Converter is a standalone tool that can be launched from within Civil 3D, or the desktop icon that installs. The following dialog box is used to perform the conversions.



- **Translation File**: Excel spreadsheet that spells out the conversions. More details below on creating these.
- **Open Sample Translation File**: opens a same Excel spreadsheet with the proper formatting required the tool to function.
- **Column to convert**: column to perform the conversion on, in the specific point files.
- **Ignore comments after Field Code Escape**: if checked, all text after the Field Code Escape character specified in the Translation File will be ignored in the conversion.
- **File(s) to convert**: files on which to perform the conversion
- **Save as**: option to save the converted file as either comma- or tab-delimited.
- **Save to same location(s)**: will save converted files in same location as source files
- **Save to**: option to save converted files to a different location
- **Prefix/Suffix:** text applied to the filename of the resulting converted files
- **Report codes not specified in the translation file:** for text strings found in the source files (only in the specified column) that are NOT found in the Translation File, a report will generate if this is checked.

Translation File

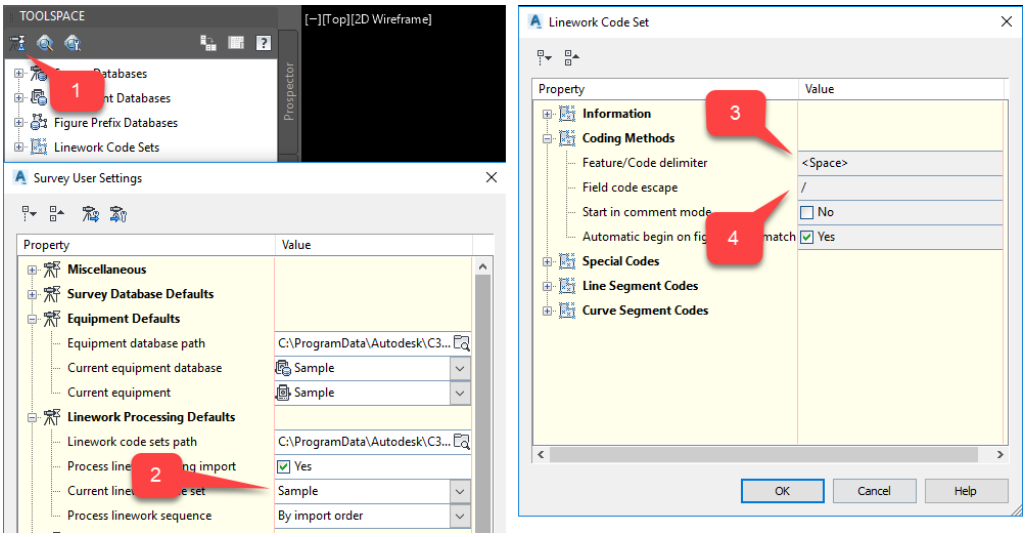
The following is the Sample Translation File provided. The order of columns, as well as the use of only one header, is critical to the tool's functionality. The header names can be changed, but not the order.

Old Code	New Code	Old Prefix	New Prefix	Old Suffix	New Suffix	Old Feature Code Delimiter	New Feature Code Delimiter	Old Field Code Escape	New Field Code Escape
BL	B			1	1	<space>	.	:	|
EL	E			2	2				
CL	CO			3	3				
PC	PC			4	4				
PT	PT			5	5				
OC	PO			6	6				
STMH	DMH			7	7				
CB	DCB			8	8				
BOX	DCU			9	9				

- **Old Code**: Survey or Linework code to be converted
- **New Code**: Survey or Linework code to convert to
- **Old/New Prefix/Suffix**: alphanumeric prefix/suffix that may be adjacent to a given survey code
    - EXAMPLE 1: to convert XYZ1 to ABC1, XYZ2 to ABC2, and so on, the columns should look like above.
    - EXAMPLE 2: to convert XYZ1 TO 123A, XYZ2 to 123B, and so on, the columns should look like below:

Old Suffix	New Suffix
1	A
2	B
3	C
4	D
5	E
6	F
7	G
8	H
9	I

- **Old/New Feature Code Delimiter:** as noted in the Civil 3D Linework Code Set, this is the character to differentiate between multiple survey and/or linework codes. Item 3 below corresponds with these columns. If you want
    - EXAMPLE 1: for a description of TOC PC B, the delimiter is a <space>
    - EXAMPLE 2: for a description of TOC.PC.B, the delimiter is a “.”
    - The Civil 3D Linework Code Set is specified in the Survey User Settings of the Survey tab in Toolspace. To use a space, be sure to type the characters <space>, as shown below.

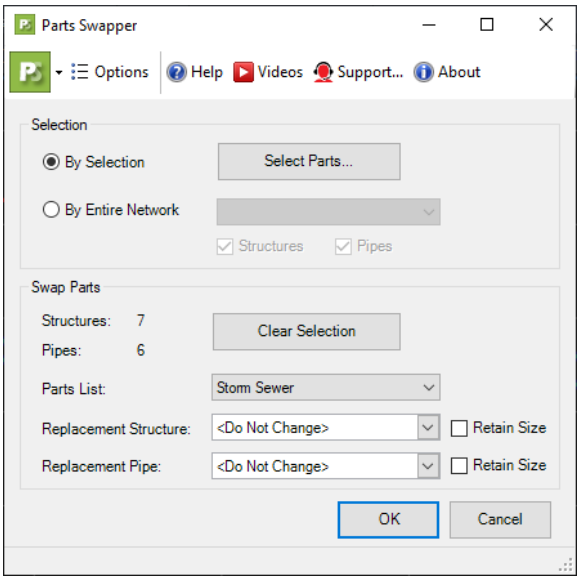


- **Old/New Field Code Escape:** as noted in the Civil 3D Linework Code Set, this is the character after which text is ignored when imported into Civil 3D. This corresponds to item 4 above.
    - EXAMPLE: for a description of TREE 16 /DEMO, the “DEMO” text will not be observed in Civil 3D and won’t be converted in Point File Converter if the “Ignore comments after the Field Code Escape” box is checked. These comments will also not be considered in the report created after file conversion.

- The Civil 3D Linework Code Set is specified in the Survey User Settings of the Survey tab in Toolspace.

Parts Swapper

This tool allows for the swapping of multiple Pipe Network parts, both Structures and Pipes, for alternatives. Users can simultaneously select parts in Plan, Profile View, or by Pipe Network name. Parts will be swapped similar to the native Swap Parts command but allow it to be performed on multiple parts at a time. Parts can also be swapped from one family to the next, allowing for the current part size to be retained while switching it to a different family. The tool will prompt users to select Pipes or Structures in Plan or Profile View manually or by pipe run. The dialog box below will then launch.



- **By Selection**: method to allow interactive selection of additional parts in the drawing, including selecting by pipe run
- **Select Parts**: click button to interactively select parts in the drawing
- **By Entire Network**: allows selection of parts by entire Pipe Network
- **Parts to Swap**: list all structures and pipes that will be swapped
- **Clear Selection**: will clear selected parts from the Parts to Swap list
- **Parts List**: current list from which to select replacement Structures and Pipes
- **Replacement Structure**: Structure to replace selected Structures
- **Replacement Pipe**: Pipe to replace selected Structures
- **Retain Size**: If checked, will allow selection of part family and not specific part. Parts Swapper will then swap the part to the corresponding size of the selected family. If there isn't a matching size, user will be prompted with option to specify.

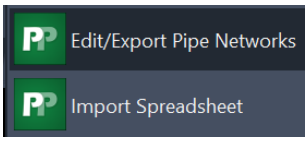
NOTE

- If a user selects parts from multiple Pipe Networks, an error message will display stating this, and all parts will not be selected.

Pipe Planner

Load pipe networks in an in-app spreadsheet or export to Excel. Edit properties and perform analyses in the spreadsheet then push changes back to the pipe network in Civil 3D. Create customized manhole schedules, pipe depth reports, and detailed QTO, all through one intuitive interface.

Included Functions



1. **Edit/Export Pipe Networks:** primary function where users can add any number of pipe networks, parts and properties to a spreadsheet interface. Full customization of property and part order are possible. Users can then edit properties in the spreadsheet and apply the updates to the drawing or choose to export the custom-built table to external spreadsheets.
2. **Import Spreadsheet:** function where users can import an external spreadsheet into the current drawing. Part IDs in the spreadsheet will match up with those in the drawing and editable parameters will be updated upon importing.

Workflows

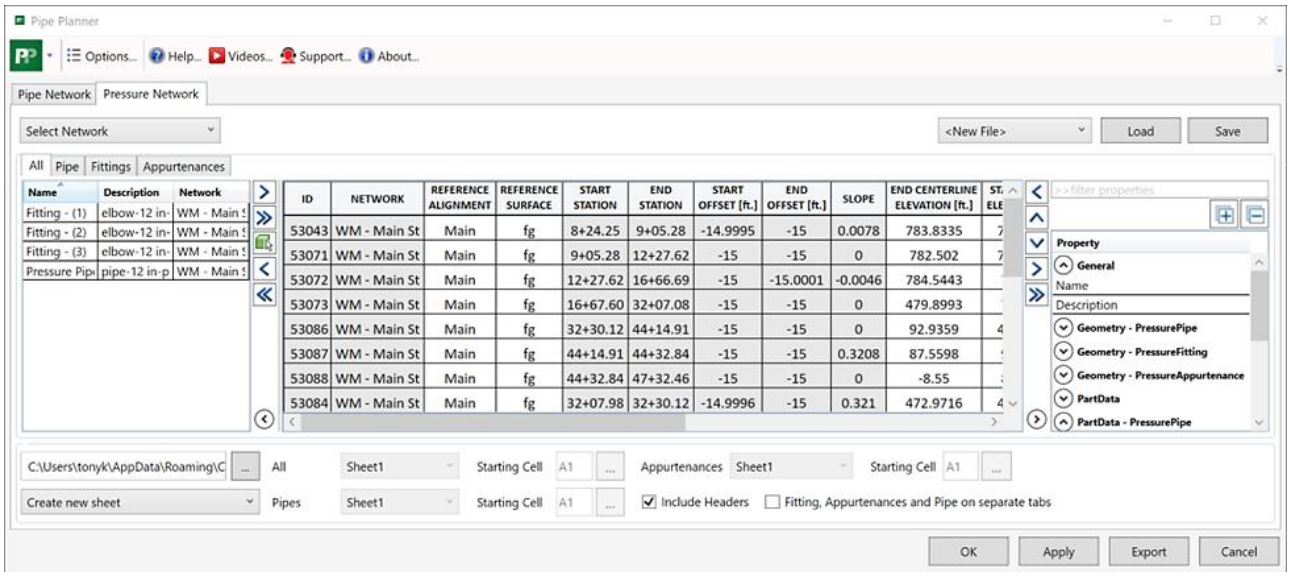
Many workflows are possible with Pipe Planner. Below are some common ones and the general steps to complete them. Details on specific functionality are found below.

- *Edit pipe networks via a customizable in-app spreadsheet*
    1. Run **Edit/Export Pipe Networks** and choose desired pipe network(s)
    2. Add parts to be edited from left table to middle
    3. Add properties to be edited from right table to middle
    4. Use manual editing, clipboard copying and press-and-drag options to edit properties
    5. Click OK or Apply to write changes back to the drawing
- *Export pipe networks to spreadsheets to perform analyses, then sync changes back to Civil 3D*
    1. Run **Edit/Export Pipe Networks** and choose desired pipe network(s)
    2. Add parts to be exported from left table to middle
    3. Add properties to be exported from right table to middle
    4. Choose export options in bottom left, creating new or exporting to pre-configured sheets
    5. Perform analyses and edits in external spreadsheet as desired, changing pipe properties and geometry as necessary
    6. Save spreadsheet
    7. Run **Import Spreadsheet** and browse to external spreadsheet
    8. Select desired sheets to be imported
    9. Verify parts and properties to be updated
    10. Select Import to write values from spreadsheet to current drawing. Note that new parts cannot be created, only edited.
- *Export pipe depth reports, structure schedules and other reports to external spreadsheets*
    1. Run **Edit/Export Pipe Networks** and choose desired pipe network(s)
    2. Add parts to be exported from left table to middle
    3. Add properties to be exported from right table to middle. Note, for pipe depth reports, the number of created property columns will depend on the pipes' geometry and the parameters specified in Option of the app.
    4. Choose export options in bottom left, exporting to new or pre-configured sheets
- *Import external spreadsheets to update pipe networks in the current drawing*

1. Run **Import Spreadsheet** and browse to external spreadsheet
2. Select desired sheets to be imported
3. Verify parts and properties to be updated. Note that ID fields in the spreadsheet must match up with ID fields in the drawing for the part to be updated.
4. Select Import to write values from spreadsheet to current drawing. Note that new parts cannot be created, only edited.

Interface and Definitions

Running **Edit/Export Pipe Networks** will launch the following dialog box:



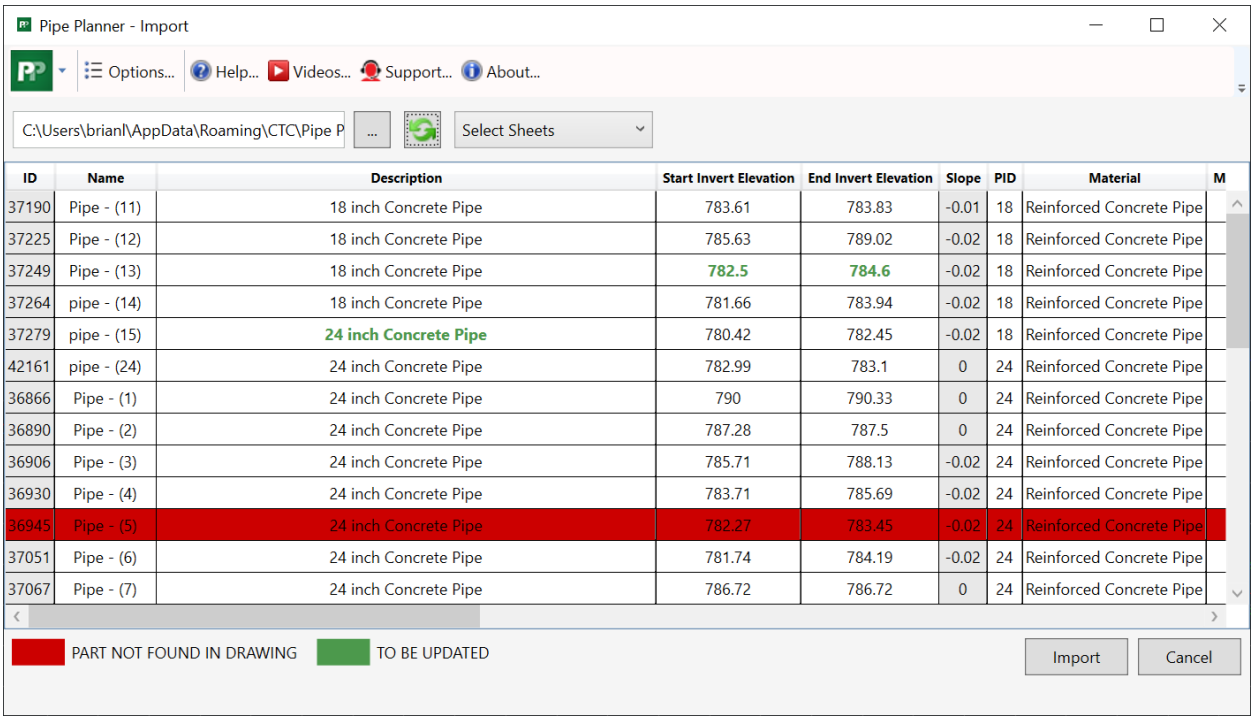
- **Select Network:** pipe networks in the current drawing, choose from gravity or pressure. Upon selection, parts and properties from that pipe network will appear in the left and right tables.
- **Template options (top right of dialog box)**
  - Option to save out templates to reuse in other drawings or in the future
  - If saved to the path specified in Options, templates will appear in the dropdown.
  - Template in dropdown can be loaded to update Pipe Planner
  - All parts and properties, where possible, will be saved to the template. If any parts or properties don't exist in the selected pipe network(s) they will be ignored.
- **All, Structure and Pipe tabs:** view structures and pipes together in one list or in separate views. This does not affect what will be exported or written to the drawing when OK/Apply is selected.
- **Left Table:** shows all parts available in the selected pipe networks.
  - Use the arrow buttons to add and subtract properties from the right table to the middle.
  - As parts are added from the left table to the middle table, they are removed from the left.
  - Click headers to control sorting
  - Add selected parts to middle table
  - Add all parts to middle table
  - Pick parts from drawing to be added to middle table
  - Remove selected parts from middle table
  - Remove all parts from middle table (if on structure or pipe tab only they will remove)
- **Middle Table:** all parts and properties that can be edited and/or exported to external spreadsheets. Parts and properties are inserted into this table so that users can work with them or export.
  - Formatting is based on settings in Options
  - Right-click options available to remove one or more rows or columns.
  - Double-click headers to sort

- **Right Table:** shows all properties available in the selected pipe networks.
    - Use the arrow buttons to add and subtract properties from the right table to the middle.
    - As properties are added from the right table to the middle table, they are removed from the right.
    - Use filter field at the top to trim the list of properties showing.
    - Categories can be minimized for easy browsing.
    - Greyed-out rows are read-only
    - ***Calculated fields – Pipe Property:*** *Pipe depth at Interval* is a unique property that will calculate depths along pipes based on their reference surface and tabulate the lengths within specified depth ranges. Settings in Options control behavior of this property. Note that depending on the number of pipes in the middle table and the value of the settings specified in Options, calculation and population of these values in the middle table can take some time.
    - ***Catchment – Structure Properties***: This is only available in Civil 3D 2022 and beyond and is based on connected catchments to structures. If there are any catchments connected to structures their properties will show up in the middle table when these properties are added. If there are no catchments attached to the structure no values will appear.
    -  Add selected properties to middle table
    -  Move selected rows in the middle table up
    -  Move selected rows in the middle table down
    -  Remove selected properties from middle table
    - Remove all properties from middle table, except ID (if on structure or pipe tab only those types of properties will remove)
    - ***Description Property*:** if edited and applied to the current drawing, and the new value matches another part name in the parts list for that pipe network, a SWAP PART function will be performed. If the new Description property does not match any parts in the parts list, the Description field will simply be updated for that part in the drawing. This should be how users change part sizes, not attempting to change Inner Diameter properties, or similar.
- **Export Options**
    - *External spreadsheet path*: set a path and spreadsheet to export the middle table to. If the spreadsheet doesn't exist at the time of export, one will be created based on the path and name in this field.
    - *Create new or write to existing sheets*: dropdown to control whether the middle table will export to preconfigured sheets in the specified spreadsheet or create new ones. If *Write to existing sheet* is chosen sheet names will appear in the dropdowns to the right.
    - *Structures sheet*: When *write to existing sheet* is chosen, option to specify the sheet to write to for structures (note, this will read "All" if the *Structure/Pipe on separate tabs* is disabled)
    - *Pipes sheet*: When *write to existing sheet* is chosen, option to specify the sheet to write to for pipes (note, this will be disabled if the *Structure/Pipe on separate tabs* is disabled)
    - *Starting Cells*: starting cell where the top left cell of the middle table will insert. If *Include headers* is enabled this cell will be where the leftmost header inserts. Click the ellipsis button (…) to interactively select the starting cell.
    - *Include headers*: option to include headers in the export
    - *Structure/Pipe on separate tabs*: option to separate structures and pipes onto separate tabs in the export. Note, the current tab selected (All, Structures, Pipes) in this dialog box does not have any effect on how the data is exported.
- **OK and Apply:** writes all data (for editable fields only) from the middle table back to the drawing, accounting for any edits the user may have made in the middle table.
    - If multiple fields are added to the middle table that are related (for example, pipe end invert and pipe end crown) the rightmost property will control when writing to the drawing. In other words, Pipe Planner writes properties from the middle table starting with the leftmost column and ending with the right when updating the drawing.

- After the drawing has been updated the middle table will refresh if any of the values are affected by the updating of related values.
- Clicking OK will close the dialog box afterwards, Apply will keep it open.

- **Export:** exports middle table data based on the properties specified in the dialog box for export options.
  - No formatting from the middle table will be carried to the spreadsheet except for bolding of headers. Formatting can be specified in an existing spreadsheet and when Pipe Planner exports to it only values will be exported, not formatting.

Running **Import Spreadsheet** will launch the following dialog box. This function is for updating of pipe network parts only. It will not create new parts or networks. Parts are updated by matching the ID field in the spreadsheet with those in the drawing. This is the "handle" of the object and is something Civil 3D manages in the background. When exporting spreadsheets, simply leave the ID field alone.

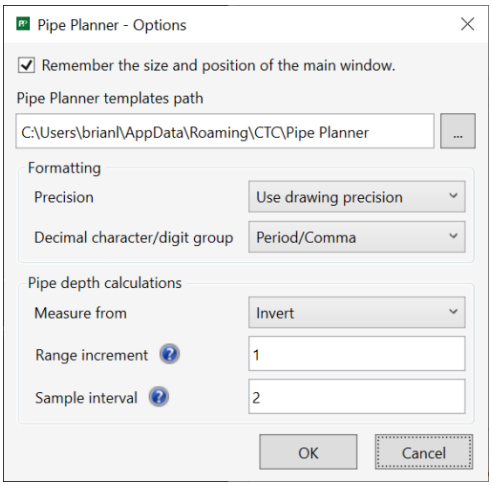


ID	Name	Description	Start Invert Elevation	End Invert Elevation	Slope	PID	Material	M
37190	Pipe - (11)	18 inch Concrete Pipe	783.61	783.83	-0.01	18	Reinforced Concrete Pipe	
37225	Pipe - (12)	18 inch Concrete Pipe	785.63	789.02	-0.02	18	Reinforced Concrete Pipe	
37249	Pipe - (13)	18 inch Concrete Pipe	782.5	784.6	-0.02	18	Reinforced Concrete Pipe	
37264	pipe - (14)	18 inch Concrete Pipe	781.66	783.94	-0.02	18	Reinforced Concrete Pipe	
37279	pipe - (15)	24 inch Concrete Pipe	780.42	782.45	-0.02	18	Reinforced Concrete Pipe	
42161	pipe - (24)	24 inch Concrete Pipe	782.99	783.1	0	24	Reinforced Concrete Pipe	
36866	Pipe - (1)	24 inch Concrete Pipe	790	790.33	0	24	Reinforced Concrete Pipe	
36890	Pipe - (2)	24 inch Concrete Pipe	787.28	787.5	0	24	Reinforced Concrete Pipe	
36906	Pipe - (3)	24 inch Concrete Pipe	785.71	788.13	-0.02	24	Reinforced Concrete Pipe	
36930	Pipe - (4)	24 inch Concrete Pipe	783.71	785.69	-0.02	24	Reinforced Concrete Pipe	
36945	Pipe - (5)	24 inch Concrete Pipe	782.27	783.45	-0.02	24	Reinforced Concrete Pipe	
37051	Pipe - (6)	24 inch Concrete Pipe	781.74	784.19	-0.02	24	Reinforced Concrete Pipe	
37067	Pipe - (7)	24 inch Concrete Pipe	786.72	786.72	0	24	Reinforced Concrete Pipe	

- **Spreadsheet path:** browse to external spreadsheet to be imported into Civil 3D.
- **Refresh button:** Option to refresh the results table if something has changed in the referenced spreadsheet
- **Select Sheets:** option to choose which sheets in the selected spreadsheet should be imported into the current drawing.
- **Results table:** shows all parts to be updated from the selected spreadsheet.
  - New parts will not be created, only existing parts updated.
  - Properties highlighted in green are ones to be updated, meaning the value found in the spreadsheet is different than that found in the current drawing.
  - Rows highlighted in red contain IDs (or parts) that are not found in the current drawing. Parts with valid ID matches can still be updated from the import, but red highlighted rows will be ignored.
  - Columns highlighted in grey are read-only properties and will not be updated from the spreadsheet, even if they are different values from those in the current drawing.
- **Import:** clicking import will update the drawing and all parts shown in the table to match the new values displayed.
  - Red highlighted rows will be ignored since there is no matching ID in the current drawing.
  - New parts will not be created, only existing parts updated.

- For Description properties that have changed, if the new value matches another part name in the parts list for that pipe network, a SWAP PART function will be performed. If the new Description property does not match any parts in the parts list the Description field will simply be updated for that part in the drawing.

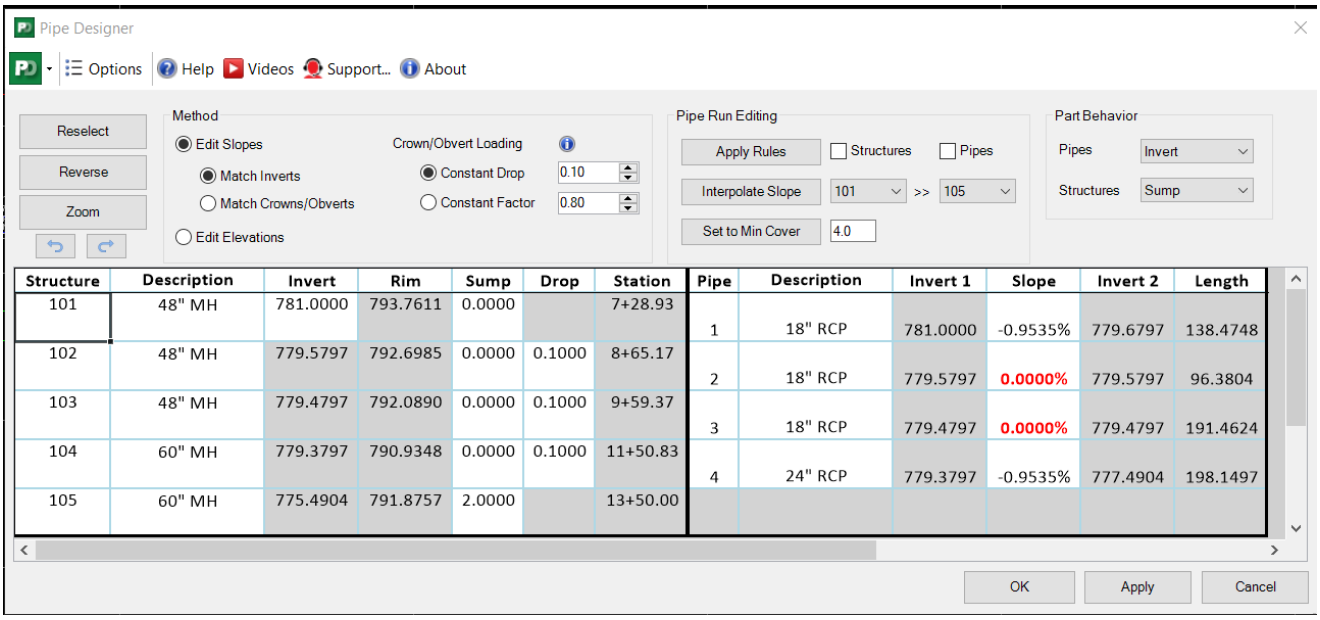
Clicking the Options button in either function will launch the following dialog box:



- **Remember the size and position of main window:** controls main dialog box behavior
- **Pipe Planner templates path:** Default path of where templates are saved to and opened from
- **Formatting:** controls appearance of middle table and import results values. Note, these formatting settings do not export to external spreadsheet.
- **Pipe depth calculations:** these parameters control behavior of the properties *Pipe depth at interval* for pipes
  - **Measure from:** the distance that pipe depth is measure to (from the pipe's reference surface to this value)
  - **Range Increment:** controls the value of the pipe depth ranges in the middle table
  - **Sample interval:** determines how often Pipe Planner will calculate depths along the length of pipe.

Pipe Designer

This tool allows for the design of Pipe Network runs within Civil 3D using a spreadsheet editor. The parts can be modified by elevations or slopes. Options for slope interpolation, rule-based editing, and minimum pipe cover are also available. The tool will prompt users to select Pipes or Structures in Plan or Profile View. The following dialog box will then launch.



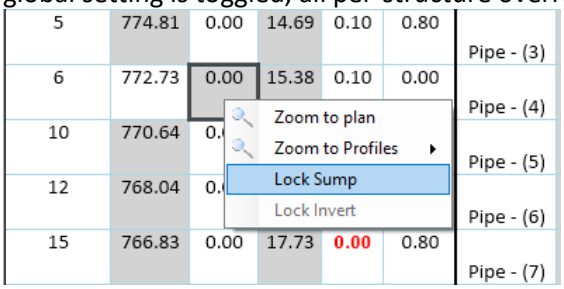
- **Reselect:** allows interactive selection of additional/alternate Parts in the drawing.
- **Reverse:** provides the ability to reverse the order without having to go into the drawing
- **Zoom:** allows users to select a window target for a new view state.
- **Undo:** Undoes the previous action within the Tool. Will not undo edits applied to parts.
- **Redo:** Redoes the action undone within the Tool. Will not undo edits applied to parts.
- **Method:** affects whether network parts will be designed by slope input or by elevation input. Values that cannot be edited will have a gray highlight over the cell.
    - **Edit Slopes:** allows users to modify the slope of all selected Pipes. Pipe end elevations are not editable.
        1. **Match Inverts:** will force all Pipes to join at the invert of the Pipes and incorporate the value from the Drop column.
        2. **Match Crowns/Obverts:** will force all Pipes to join at the crown/obvert of the Pipes and incorporate the value from the Drop and Factor columns.
    - **Edit Elevations:** allows users to modify the elevation at both ends of the Pipe.
    - **Crown/Obvert Loading**
        1. For crown matching method only, both Drop and Factor play into the calculation of end elevation of the outgoing pipe, based on the following formula:

           outgoing.pipe.elevation.1 = incoming.pipe.elevation.2 – Drop + Factor*(outgoing.pipe.dia – incoming.pipe.dia)/drawing.conversion.units

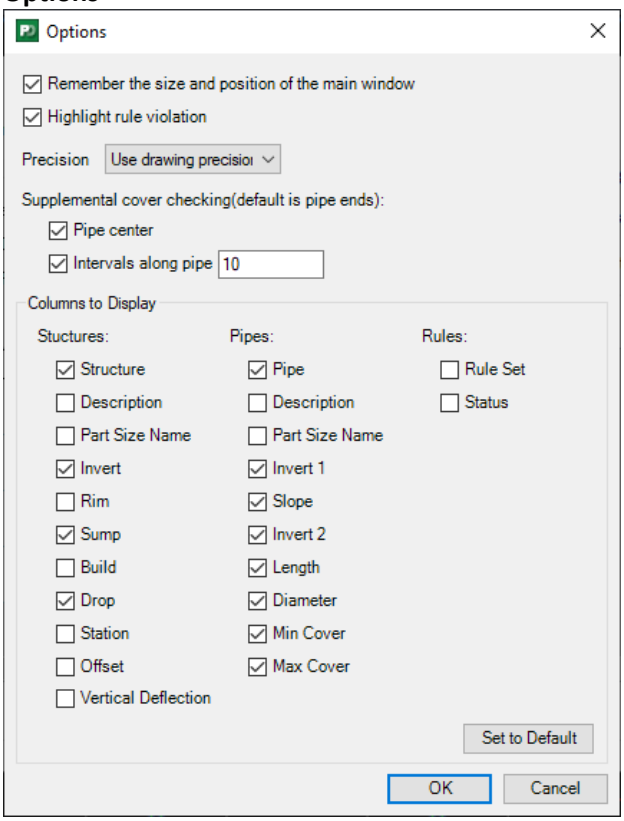
        2. When Pipe Designer is launched in Match Crowns method, OR when Match Crowns method is initially selected, these values determine which property will be controlling, and which calculated. Changing these values after the fact will not change the design unless the method is toggled to Match Inverts and then back to Match Crown. Choosing constant drop will set drop values as specified, then calculate the resulting factor. Choosing constant factor will set the

factor values as specified, then calculate the resulting drop. This only applies to structures with pipes of differing diameters. Both Drop and Factor can be changed after initial load.

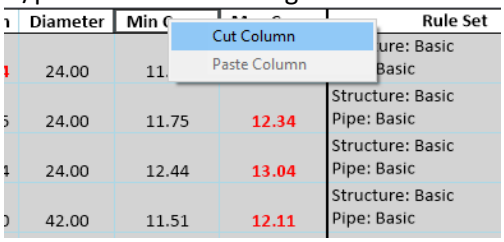
- **Pipe Run Editing**
  - **Apply Rules:** option to apply rules assigned to selected parts to the entire pipe run loaded in Pipe Designer. Rules will be applied to the Pipe Designer spreadsheet first, not to the parts in the drawing themselves. To apply changes resulting from rule application select Apply or OK.
    1. Rules will be assigned in the spreadsheet in a top-down manner, starting with the first part in the pipe run and ending with the last.
    2. Right-click options for applying rules to specific parts is also available
    3. If multiple rules are found in a part's rule set they will be applied from the bottom up within that rule set
    4. Rule sets must be assigned to the selected parts to have any effect
    5. Rules that do not affect the slope or elevations of parts will not have any effect in Pipe Designer
    6. If cover-based rules are applied, cover is checked at pipe ends only, unless additional locations are specified in Options, as described below
    7. If a structure is set to Lock Invert, as noted below under Structures, and a rule would lower that structure invert, the structure invert will lower to the extent required to meet the rule requirements
    8. Option not available for Edit Elevations method
  - **Interpolate Slope:** option to calculate a constant slope between specified parts. The invert elevations of the first and last specified parts will hold constant and a constant slope will be calculated.
    1. If a structure is set to Lock Invert, as noted below under Structures, and an interpolation would lower that structure invert, the structure invert will lower to the extent required to meet the rule requirements
    2. Option not available for Edit Elevations method
  - **Set to Min Cover:** option to set all pipes to a specified minimum cover over pipes. This will ignore slopes and edit part elevations to minimize pipe cover.
    1. Cover is checked at pipe ends only, unless additional locations are specified in Options, as described below.
    2. If Method is set to Edit Slopes, Drop will be held constant while minimizing pipe cover
    3. If Method is set to Edit Elevations, Drop is allowed to vary to minimize pipe cover
- **Part Behavior**
  - **Pipes**
    1. **Invert:** sets the pipe end elevation column Invert
    2. **Crown/Obvert:** sets the pipe end elevation column Crown/Obvert
  - **Top of Pipe**: sets the pipe end elevation column Top of Pipe **Structures**
    1. **Sump:** allows structure sump values to be edited and makes invert values calculated
    2. **Invert:** allows structure invert values to be edited and makes sump values calculated
    3. By right-clicking on a structure cell, users can also switch this setting for a single structure. If the global setting is toggled, all per-structure overrides will be erased



- **Options**



  - **Remember the size and position of main window:** controls main dialog box behavior
  - **Highlight Rule Violation**: based on the rules assigned to the part, values will be highlighted red when rules are violated
  - **Precision**: set the precision value for numerical cells. If "Use drawing precision" is selected, units will be red from the current drawings setting in AutoCAD UNITS
  - **Supplemental cover checking:** applies to Apply Rules and Set to Min Cover functionality. When using a Cover Only, a Cover and Slope rule, or the Set to Min Cover, by default only the pipe ends are accounted for unless additional options are specified here.
    1. **Pipe Center**: checks cover at pipe center
    2. **Intervals along pipe**: checks pipe at specified intervals
  - **Columns to Display**: choose which columns are displayed. Users can also right-click on columns to cut/paste them and change the order. The Structure and Pipe columns are locked.



    1. **Structure Column**
       - **Structure:** rename the selected Structure (optional)
       - **Description:** structure description
       - **Part Size Name:** structure part size name
       - **Invert:** structure invert. Editable if Structures setting above it set to Invert, or structure row is right-click and Lock Invert is selected.
       - **Rim:** structure rime elevation
       - **Build:** calculated difference between rim and invert

- **Sump:** adjusts/displays the sump value of the Structure. This value represents the difference in elevation between the Structure invert and the lowest Pipe invert connected to the Structure. Positive values are in the negative-Z direction.
- **Drop:** adjusts/displays the difference in elevation between upstream and downstream pipe crown or invert, depending on which method is selected above. Positive values are in the negative-Z direction.
- **Station and Offset:** station and offset of structure, based on it's reference alignment
- **Vertical Deflection:** deflection measured between two pipes connected to a structure. Does not account for horizontal deflection, only a difference between pipe slopes.

2. **Pipe Columns**
    - **Pipe:** rename the selected Pipe (optional)
    - **Description:** pipe description
    - **Part Size Name:** pipe part size name
    - **Invert/Crown/Top 1:** adjusts/displays the invert of the Pipe relative to the Structure in the same row of the spreadsheet as the Pipe being adjusted
    - **Slope:** adjusts/displays the slope of the Pipe.
    - **Invert/Crown/Top 2:** adjusts/displays the invert of the Pipe relative to the Structure in the row of the spreadsheet below the Pipe being adjusted.
    - **Length:** displays the length of the Pipe (not editable). Accounts for the pipe rule, "Set Pipe end location".
    - **Diameter:** displays the diameter of the Pipe (not editable)
    - **Min/Max Cover:** as calculated in the part itself, the minimum and maximum cover along the length of the pipe. Note that these fields will only update once table edits have been applied to the parts in the drawing.
3. **Rules Columns:** Contain data for both structures and pipes
    - **Rule Set:** the rule set applied to the pipe or structure in that row.
    - **Status:** report rule set violations appear here.

- **Right Click (Structure or Pipe Column)**
    - **Zoom to Plan:** adjusts drawing view state to zoom to the selected Part in plan view.
    - **Zoom to Profiles:** adjusts drawing view state to zoom to the selected Part in Profile View. If the Part exists in multiple Profile Views, the user may choose which to zoom to.

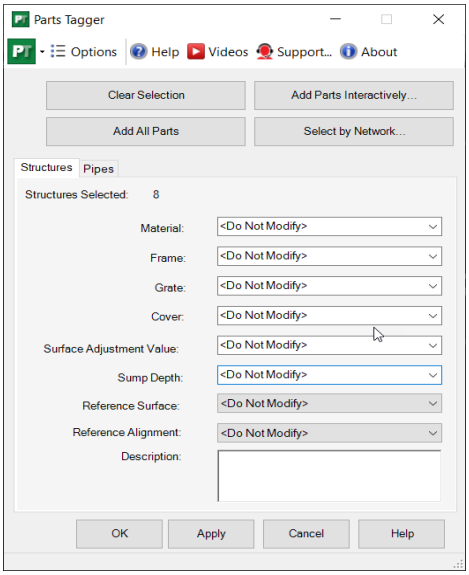
NOTES

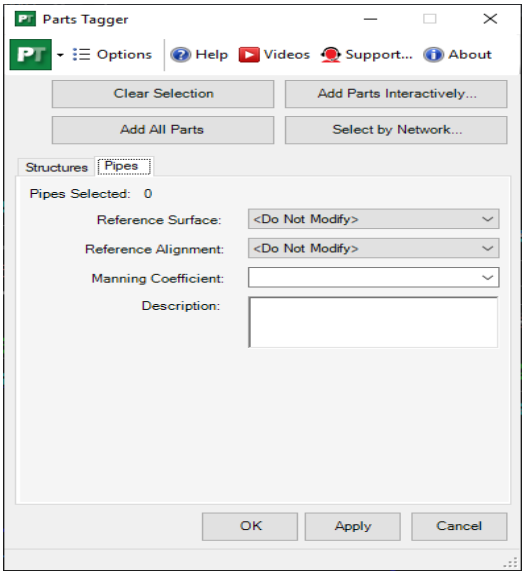
- If a user selects parts from multiple Pipe Networks, Parts that are not continuously connected, or Parts from a mix of Plan and Profile View, an error message will display stating this, and all Parts will not be selected.
- The flow direction and start and end of Pipes, as defined during initial creation of the Pipe Network Parts, has no effect on Pipe Designer. Pipe Designer edits pipes in the direction of the selection path defined when launching the tool.
- Structure Rim elevation may be modified by Pipe designer, such that it no longer follows the Reference Surface of the Structure. This may occur when a Structure Invert is specified that creates a Structure that is too shallow. In these cases, the tool will prompt the user.

Parts Tagger

This tool provides an interface to push user-defined values for Grate, Cover, Frame, Material, Reference Alignment, and Reference Surface to multiple Parts in a single command. These fields exist in full-function manhole Structures in the out-of-the-box Parts Catalog and both Structures and Pipes can be assigned a single Reference Alignment and Surface. These fields can be used in Civil 3D Labels or Tables to automatically display information like the casting type used on a manhole and stationing and offset locations. These fields can be found in Structure or Pipe Properties of most Parts.

The point of this tool is to replace the tedious process of manually entering these values in Part Properties. Because these values can be pushed to many Parts at once, things like Manhole/Pipe Schedules or detailed Labeling are much quicker.





- **Clear Selection:** remove previously selected structures from selection
- **Add All Structures:** add all Structures in the drawing to the selection list
- **Add Structures Interactively:** allows interactive selection of Structures in the drawing
- **Select by Network:** allows selection of multiple Parts by Pipe Network
- **Structures Tab**
    1. **Structures Selected:** number of structures slated to have one or more values assigned to them
    2. **Properties fields (Material, Frame, Grate, Cover, Surface Adjustment Value, Sump Depth, Reference Surface, Reference Alignment, Description)**
        - Users can enter any value desired to be populated to selected structures
        - If <Do Not Modify> is selected, there will be nothing added to that field of the selected Structures
    3. **Manning Coefficient:** choose from a dropdown (if all selected pipes have an equivalent list value), or manual entry (if all selected pipes have a string type field). Will be greyed out if the Manning Coefficient field for all selected pipes is not of the same type and/or list of values.
- **Pipes Tab**
    1. **Pipes Selected:** number of Pipes slated to have one or more values assigned to them.
    2. **Properties fields (Reference Surface, Reference Alignment, Description)**
        - Users can enter any value desired to be populated to selected structures
        - If <Do Not Modify> is selected, there will be nothing added to that field of the selected Pipes

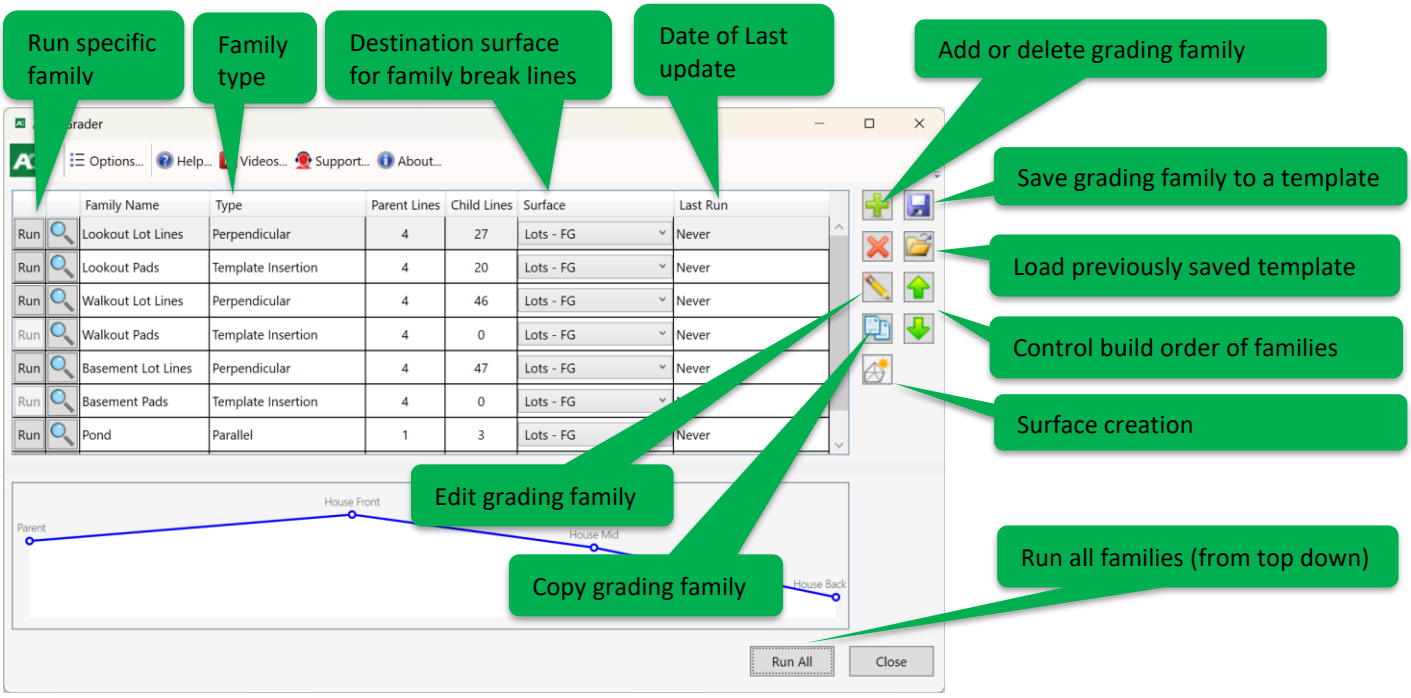
NOTE

- If selected Structures do NOT contain one or all of the fields, there will be no effect

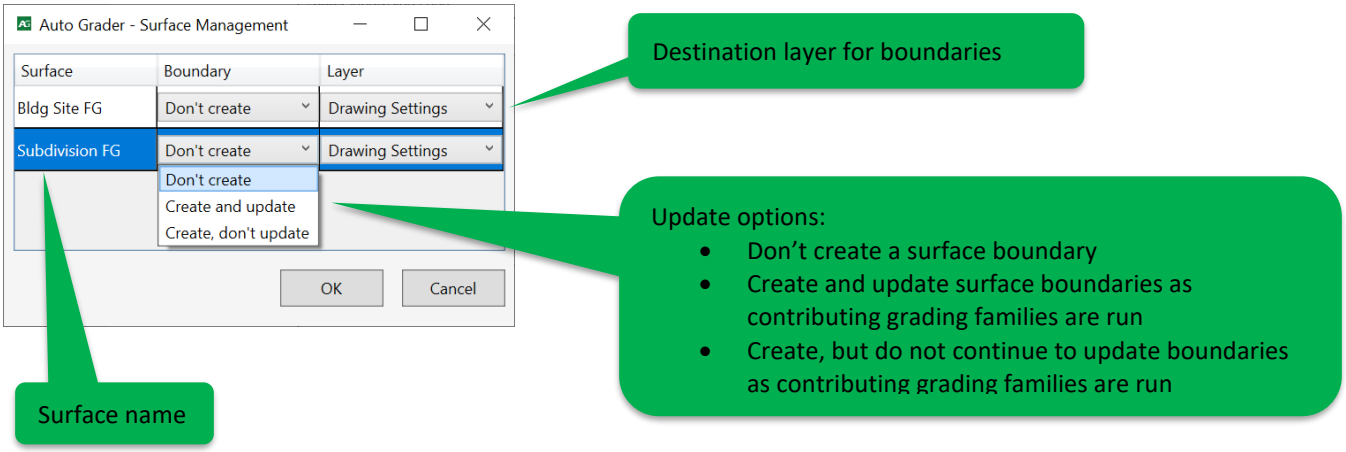
Auto Grader

Create site grading models that are both dynamic and stable. Generate grading families using existing feature lines as “parents” to dynamically create “child” feature lines as breaklines, which update when the parent feature lines change. Child feature lines can be created parallel, perpendicular, or based on a template feature line. Various methods, including slope, distance, and surface targeting, define child creation options and can be added to surfaces as breaklines. Formatting options allow for feature line styles, layers, site assignments, and naming conventions.

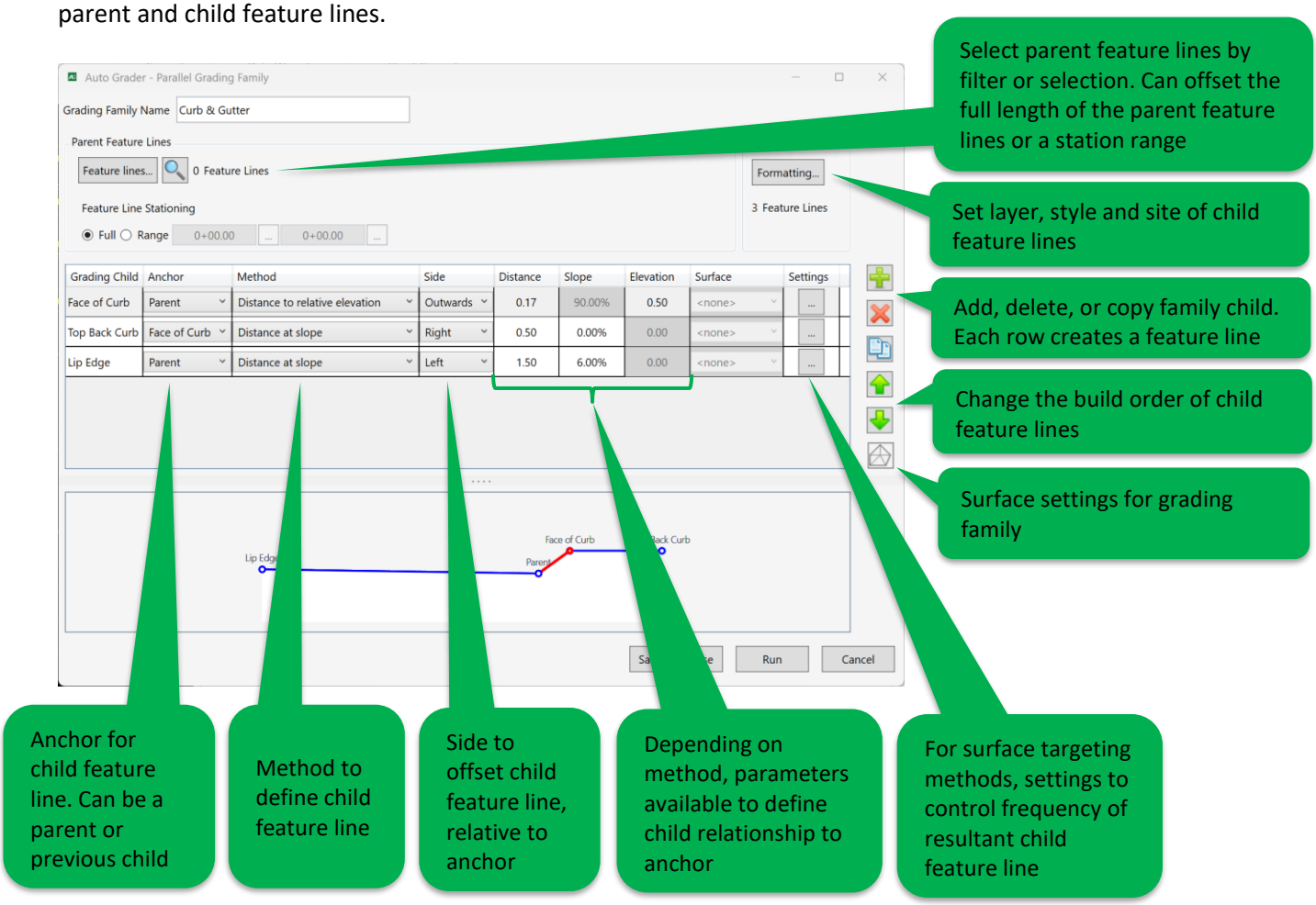
The main dialog below is where users manage grading families for different portions of the drawing.



The following form will launch when the **Surface Boundaries** button is selected. Surfaces in the drawing appear here if they are selected in any of the grading families in the main form. Auto Grader will create 2D polylines based on a best fit assumption of where the surface boundary should be placed. This polyline will be added to the surface as a “destructive” boundary, allowing users to make edits manually to fine tune the boundary. Boundaries will update when running a grading family if the update option is selected below.



Upon creating a new family, the option to choose from a parallel, perpendicular or template insertion family will be available. **Parallel Families** will create 3d parallel offsets of parent feature lines and launch the following family editor dialog. Common uses are grading curbs, ponds, berms, or anything where there's a concentric relationship between the parent and child feature lines.



Select parent feature lines by filter or selection. Can offset the full length of the parent feature lines or a station range

Set layer, style and site of child feature lines

Add, delete, or copy family child. Each row creates a feature line

Change the build order of child feature lines

Surface settings for grading family

Anchor for child feature line. Can be a parent or previous child

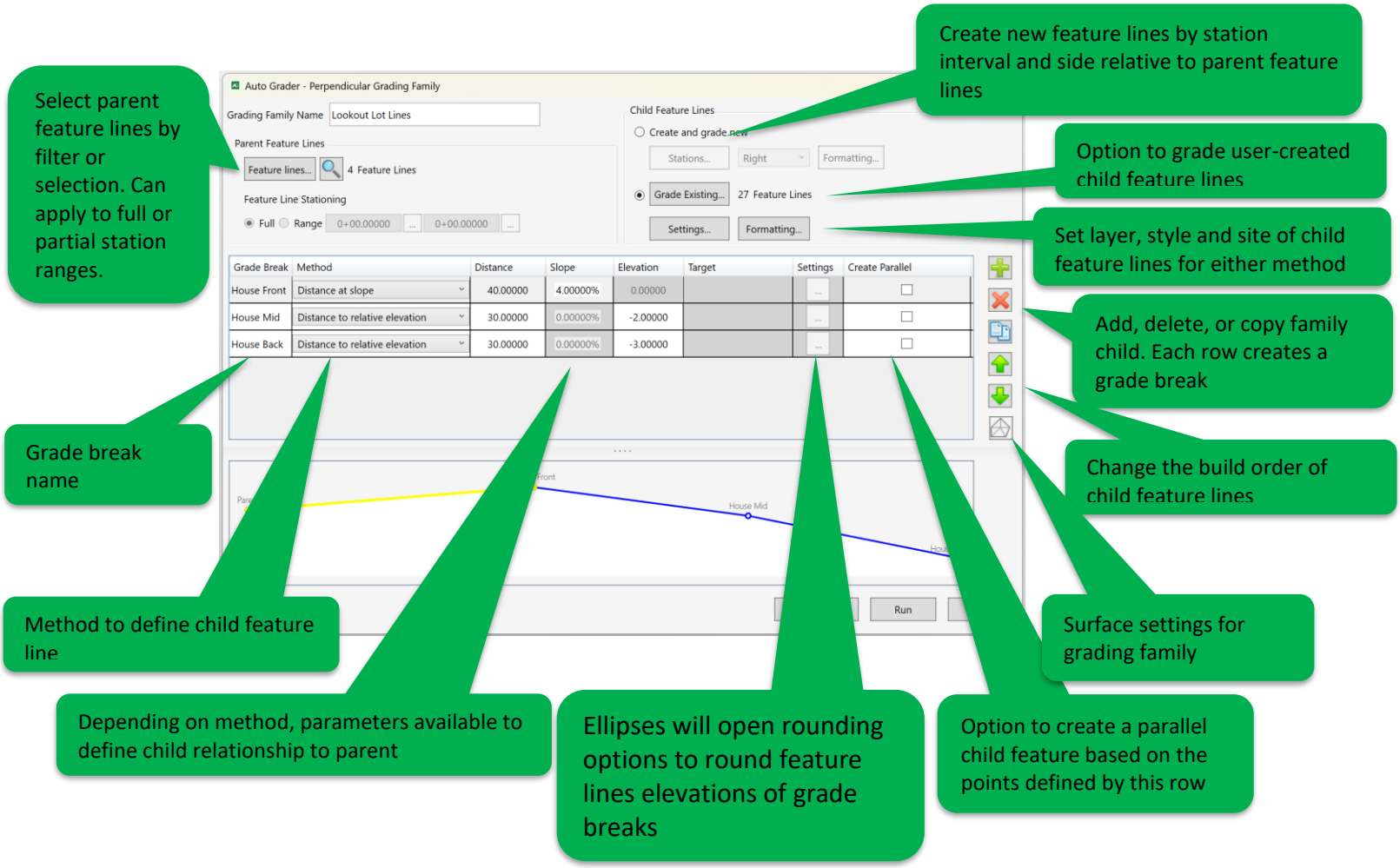
Method to define child feature line

Side to offset child feature line, relative to anchor

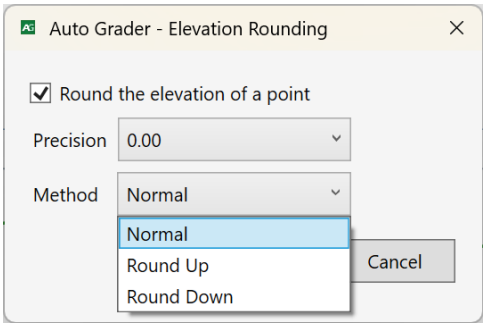
Depending on method, parameters available to define child relationship to anchor

For surface targeting methods, settings to control frequency of resultant child feature line

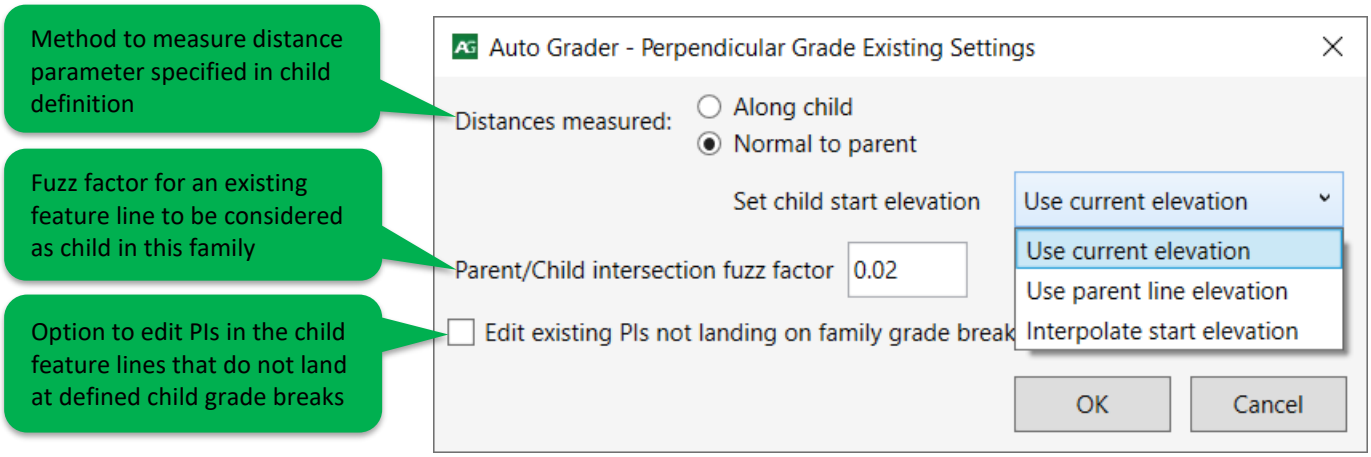
If a **Perpendicular Family** is created the following dialog will display. This family type will create child feature lines perpendicular to the parent feature lines. It will also edit existing feature lines that intersect the parent feature lines. Common use cases include grading of side lot lines in residential projects.



Rounding options for perpendicular family grade breaks.



Grade existing **Settings:**



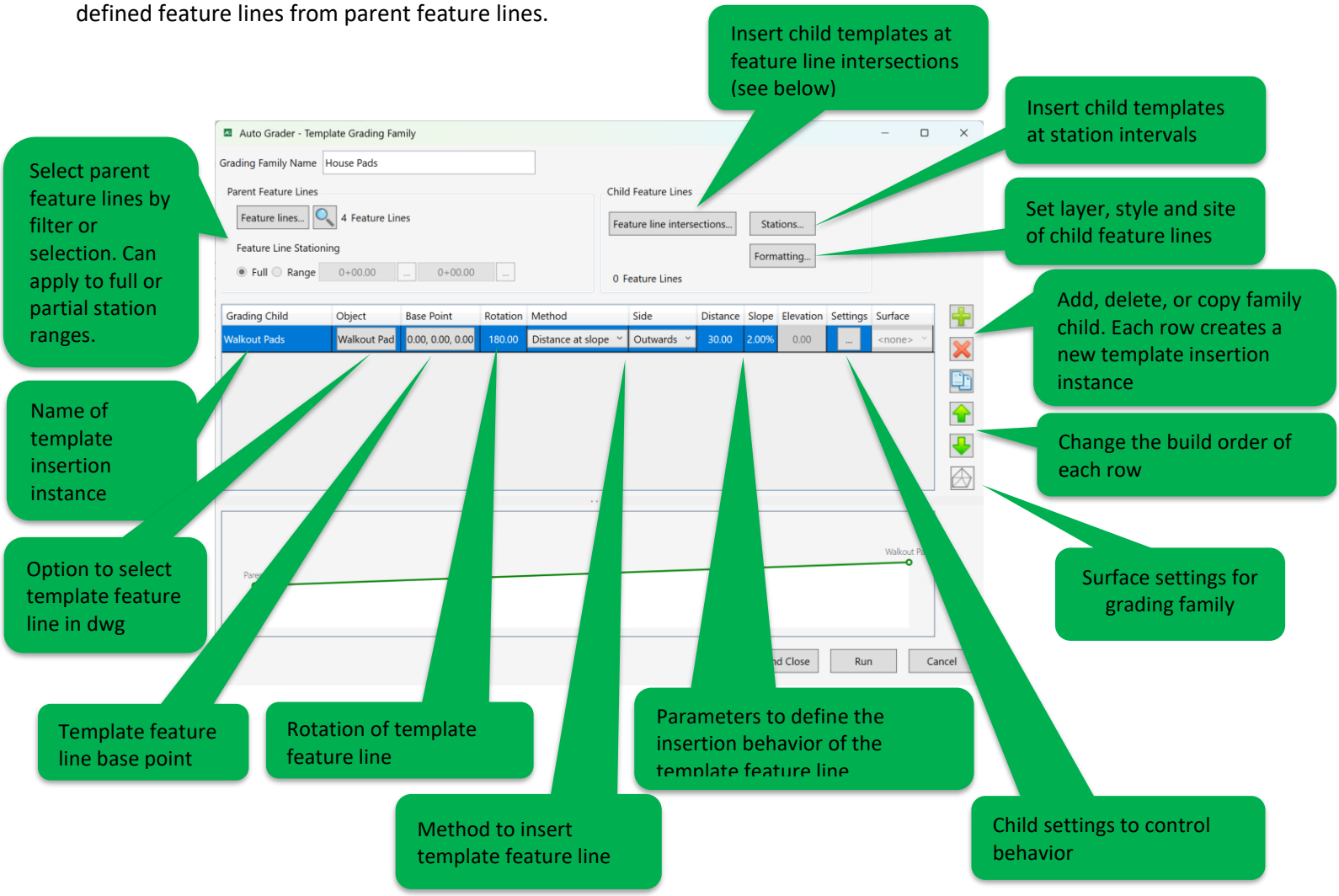
Definitions:

Distance measured 'Along child' will go the set distance on the child line, normal to parent will go the set distance from the parent line. When 'Along child' is selected the starting point elevation of the child line will be set to the elevation of the parent line at the apparent intersection. When 'Normal to parent' is selected, you may choose to leave the starting point elevation of the child line at its current elevation, use the parent line elevation at the apparent intersection, or interpolate the elevation based on the distance from the intersection of the child and parent line.

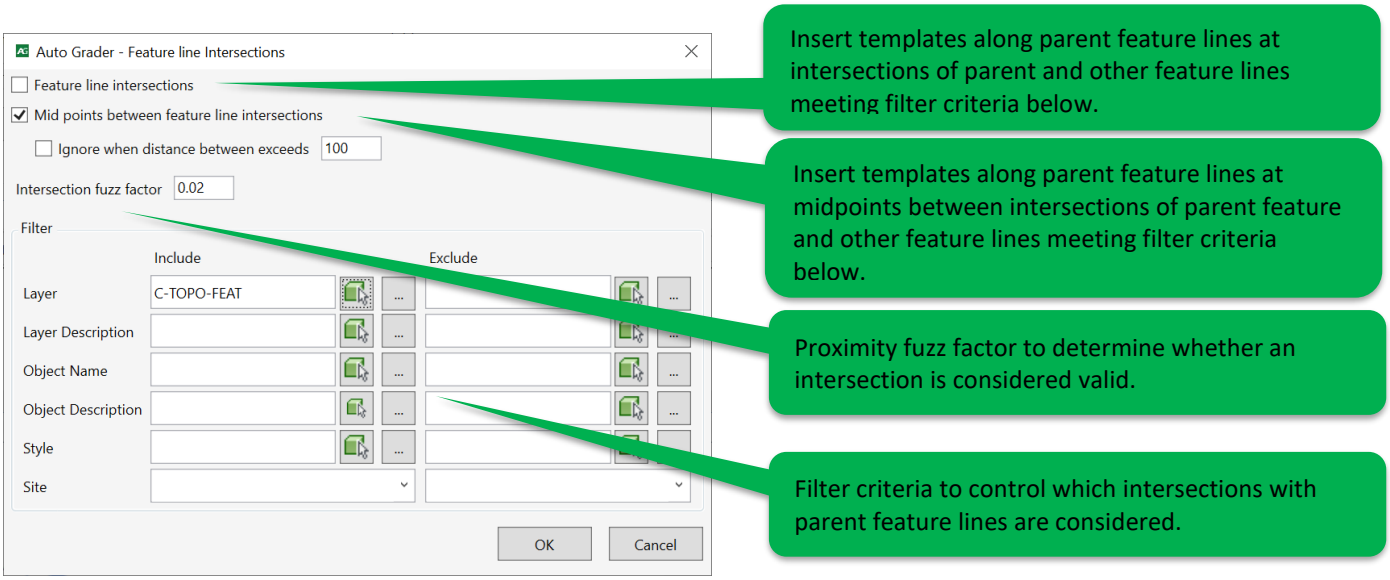
Example: If the existing child line is 2' from the parent line and you are grading a distance of 10' at a given grade, the inserted PI will be at 8' whereas in the same scenario along the child line it will be 10' from the end of the child at the specified elevation.

Fuzz Factor is the distance away from the parent line Auto Grader will search for non-intersecting entities to create child feature lines.

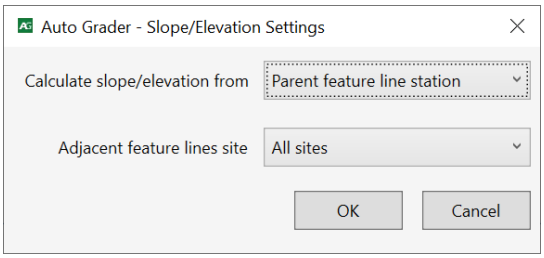
If a T**emplate Insertion Grading Family** is created the following dialog will display. This family type will insert user-defined feature lines from parent feature lines.



Feature line intersections:

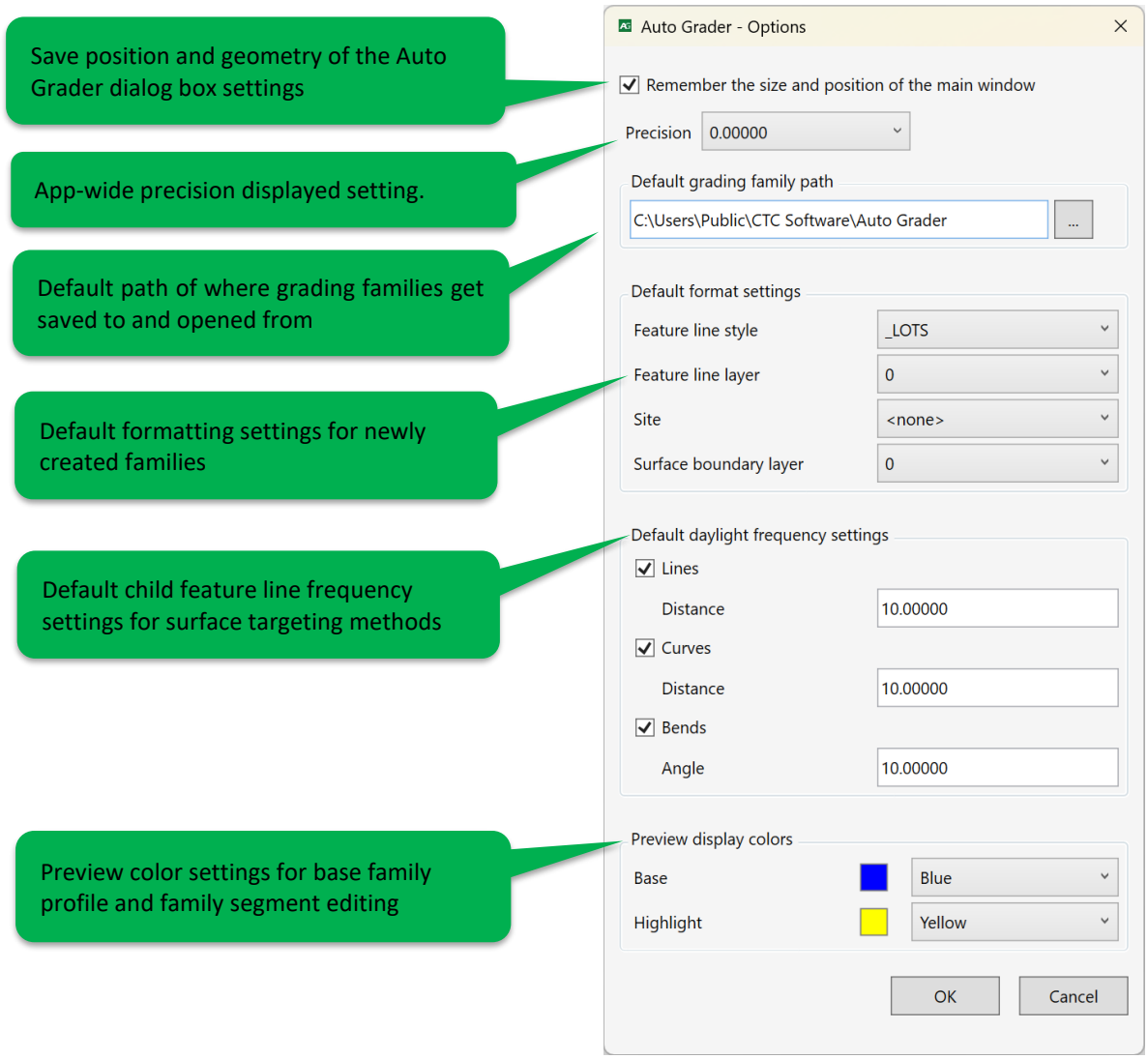


Child **Settings** form will be available for *Distance at slope* and *Distance to relative elevation* methods.



- **Calculate slope/elevation from:** option to choose how child template insertion elevations will be calculated. Note that the template insertion northing and easting values will still be calculated from the parent feature line(s).
    - *Parent feature line station:* calculate slope/elevation based on the grading family parent feature line(s)
    - *High/low/mean point of adjacent feature lines:* calculate slope/elevation by this method:
        1. Looking along the parent feature line to find the first upstream and downstream crossing feature lines that meets the fuzz factor in **Feature line intersections** and the selected **Adjacent feature lines site.**
        2. Based on the option chosen here, find the high, low or mean elevation point from the two found upstream and downstream feature lines.
        3. Use the grading child parameters to calculate the template insertion elevation.

Launching **Options** from the main dialog will bring up the following dialog with specific controls for app-wide behavior:

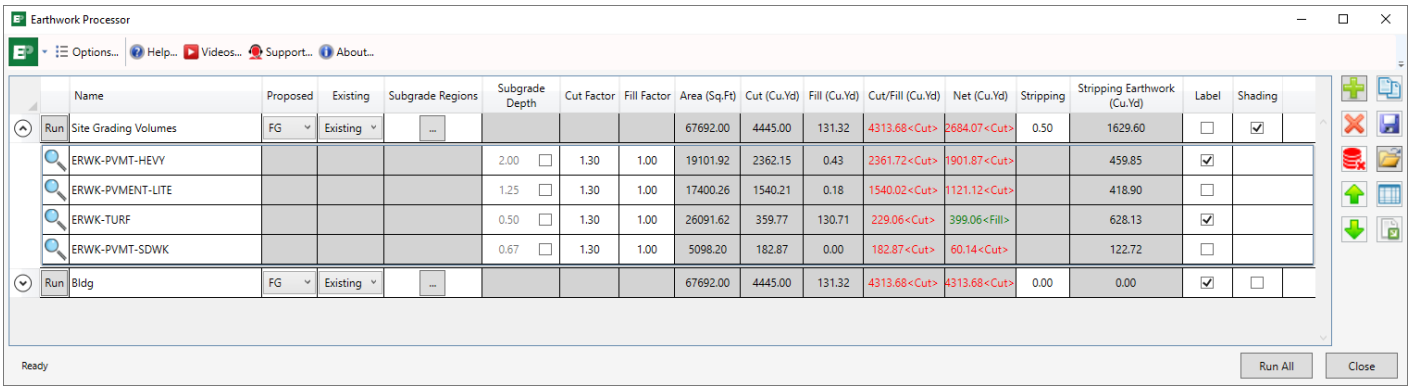


Notes about Auto Grader behavior

- Auto Grader creates native Civil 3D feature lines and is “aware” of the feature lines it created compared to user-defined feature lines using AutoCAD XDATA.
- Feature lines created and edited by Auto Grader are not dynamic to the parent feature lines. Users must run a grading family again to update the child feature lines based on the parent feature line.
- Auto Grader will add feature lines (both parent and child) to selected surfaces with the breaklines settings specified. Users can make additional edits to the surface and Auto Grader will continue to only “manage” the breakline sets defined in grading families.
- Grading family templates are of the type .ag, but follow the industry standard JSON file format. These templates can be edited in a notepad editor if familiar with JSON file editing.
- Parent feature lines from one family can be based on child feature lines from another. However, one should be aware of the build order on main dialog when updating grading families. The dependent family should be set below the independent family.
- The family preview is a visual representation only and is not to scale.

Earthwork Processor

Generates detailed earthwork definitions by creating earthwork sets. Provide an existing and proposed surface, as well as polylines or feature lines to represent varying subgrade depths across the site. Earthwork Processor will then generate a dynamic subgrade surface, accounting for topsoil stripping, and providing cuts and fills per subgrade region. When designs change, refresh the Earthwork Set and everything will be updated. Results can be labeled, shaded, inserted in AutoCAD tables, and exported to Excel.

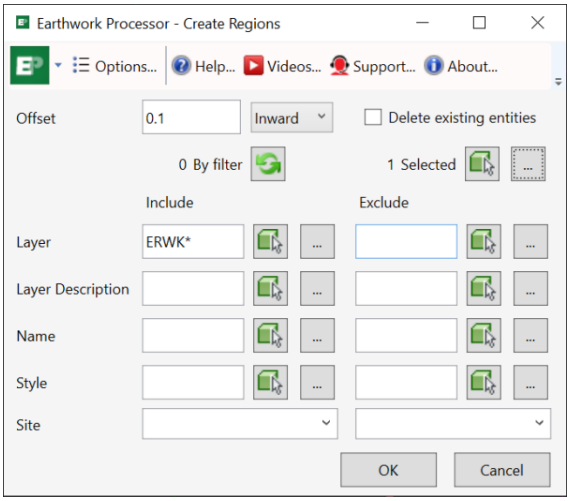


Definitions

- **Run:** create/update surfaces and volumes.
- **Run All:** create/update surfaces and volumes for all earthwork sets.
- **Proposed:** user-defined proposed grade surface.
- **Existing:** user-defined existing grade surface.
- **Subgrade Regions:** user-defined polylines or feature lines representing different subgrade depths. Can be selected in drawing manually or referenced through object property filters.
- **Subgrade Depth:** depth of each subgrade region. Read from the elevations assign to the region polylines and feature lines. Can be overridden which, upon running earthwork set, will update the elevations of the region objects. Values entered cannot be negative values, depths are relative to comparison surfaces.
- **Cut/Fill Factors:** user-defined multipliers affecting cut and fill volumes.
- **Area:** area of region(s) to be calculated.
- **Cut/Fill Volumes:** calculated volumes based on region objects and surfaces. Earthwork set volumes are based on summing the individual region volumes.
- **Cut/Fill:** calculated volume between cut and fill prior to applying stripping.
- **Net:** calculated volume difference between cut, fill and stripping, if applied.
- **Stripping Depth:** optional stripping depth to be applied to each set. If specified, an additional stripping surface will be created by earthwork processor. NOTE: If stripping depths don't coincide with proposed region areas, create a secondary earthwork set with different region objects representing the existing subgrade. Use the results of subgrade surface in this earthwork set in the primary set as the existing surface.
- **Stripping Volume:** calculated volume based on difference between existing and stripping surfaces.
- **Label:** option to insert mtext labels. Parameters displayed in labels based on settings in Options.
- **Shading:** option to apply surface shading to the final earthwork surface. This assigns an elevation analysis in surface properties. Details are specified in Options.
- **Totals:** summed totals of all earthwork sets.
- Create new earthwork set.
- Delete selected earthwork set.
- Delete selected earthwork set and associated objects (surfaces and labels).
- Change build order of selected earthwork set.

- Copy selected earthwork set.
- Save selected earthwork set to external template.
- Create earthwork set from external template.
- Create AutoCAD table from selected earthwork sets (settings in Options).
- Export selected earthwork sets to Microsoft Excel (settings in Options).

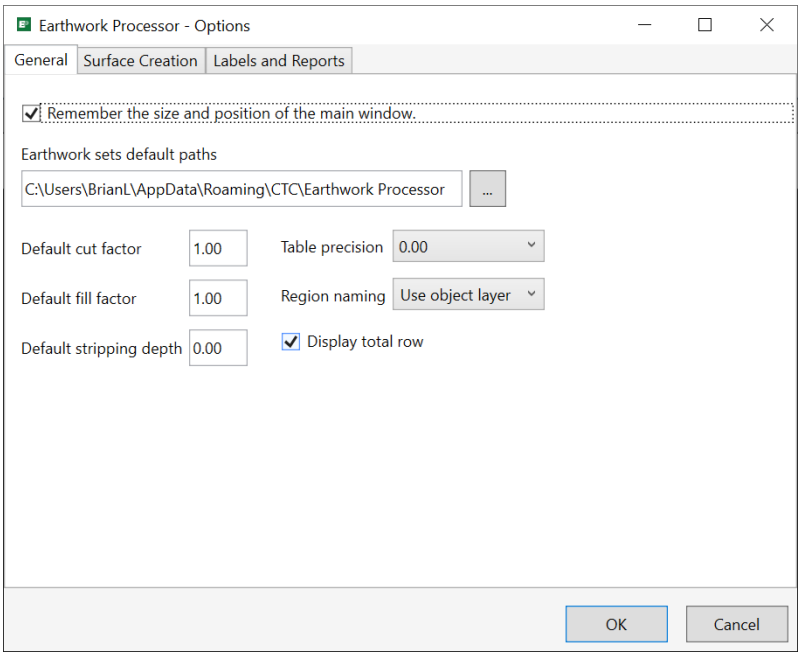
Subgrade regions, as defined above, must not overlap with one another since they are used as breaklines in surfaces. To assist with this, utilize the **Create Regions** function. Through filtering and/or manual selection, this function will create offset objects based on previously drawn objects.



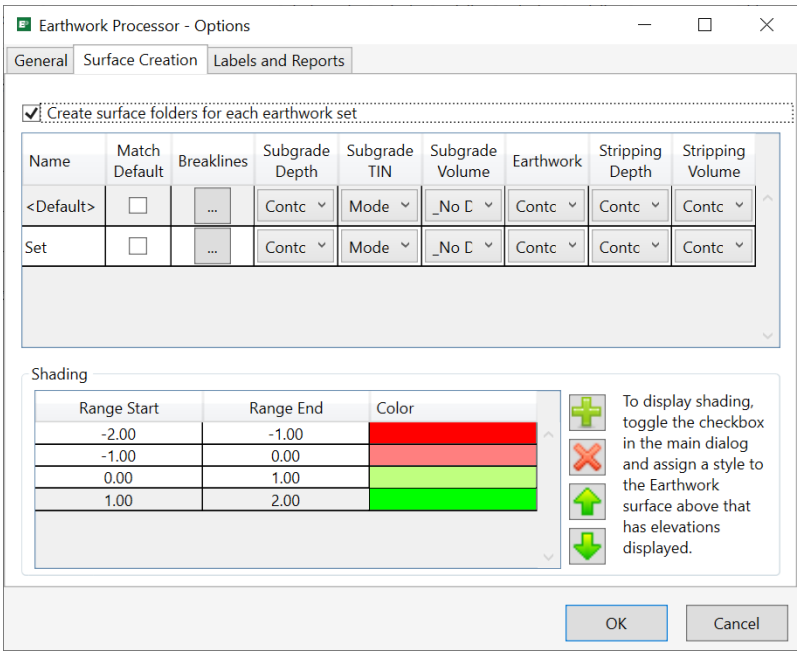
Definitions

- **Offset:** horizontal distance to offset selected objects
- **Inward:** direction, relative to the source object, to offset new objects
- **Delete existing entities:** option to delete the selected objects to be offset
- **By filter:** number of objects to offset found through filtering
- **Selected:** number of objects to offset found through manual selection
- **Filter properties:** various filtering methods to include or exclude different source objects to be offset. Note that if a property is left blank for both include and exclude, no objects will be found. If a value for exclude is specified, all objects NOT meeting that criterion will be found.

Launching **Options** from the menu bar will open the following dialog:

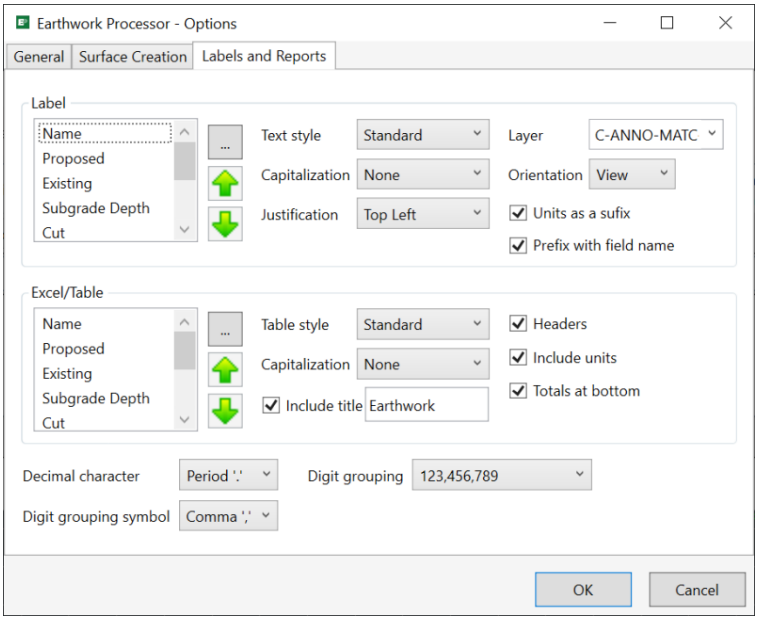


- **Earthwork sets default paths:** path opened when saving/opening earthwork set templates
- **Default Cut/Fill factors, stripping depth:** value used for newly created earthwork sets
- **Table precision:** numeric precision of values displayed in the main dialog
- **Region naming**: option to use object layer or object name as the name template of new subgrade regions
- **Display total row:** option to toggle totals row at the bottom of the main dialog



- **Create surface folders for each earthwork set:** automatically create a surface folder for all earthwork processor surfaces
- **Surfaces tables:** options to specify unique surface styles and breakline settings to each earthwork processor surface. (Each of these surfaces are defined in the section below.) If match default is selected for an earthwork set it will follow the app default. If match default is selected for the app default, it will follow the current drawing's settings.

- **Shading:** options to specify surface shading to be applied to earthwork surfaces, allowing differentiation between different cut/fill ranges. This will assign an elevation analysis to the Earthwork surface for each earthwork set if shading is checked on in the main dialog. A style with elevations displayed must also be assigned to the earthwork surface in this dialog.



- **Label and Excel/Table sections:** formatting options for MText labels and Excel/Table creation.
  -  Choose which parameters display
  - Double click on the parameter in the list to specify formatting or rename
  -  Set the order of parameters
- **Decimal character, Digit grouping symbol, Digit grouping:** global formatting settings for Labels, Excel exports and Table creation. Does not apply to main dialog displays.

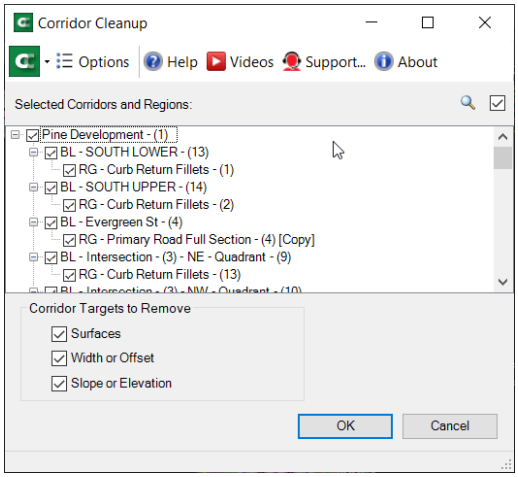
*NOTE: Label must be checked on for a given subgrade region or set to be created/updated.

Earthwork Processor behavior:

- This app calculates volumes based on a prescribed workflow of surface creation for each earthwork set. Each time an earthwork set is run these operations run and the following surfaces are created and/or updated.
  1. **Create subgrade depth surface** by adding region objects as breaklines. This is an auxiliary surface used only to create the subgrade surface.
  2. **Create subgrade volume surface** comparing depth and finish grade surface.
  3. **Create subgrade TIN surface** by pasting in subgrade volumes surface. This represents the variable depth subgrade surface and is used to calculate earthwork volumes.
  4. **Create optional stripping surface** by pasting in existing surface, then lowering surface points by specified stripping depth, per subgrade region.
  5. **Create earthwork volume surface** comparing subgrade TIN surface and existing grade surface (stripping surface if stripping depths are specified). This surface is what provides the volumes in the main dialog.
- All surfaces and labels will be updated when an earthwork set is run. Users can make changes to region objects, earthwork set inputs, and finish and existing grade surfaces and Earthwork Processor will take care of the rest.
- If manual surface edits to Earthwork Processor-created surfaces are performed outside of the app, then the earthwork set that created those surfaces is run, the manual edits will be overwritten.

Corridor Cleanup

Corridor Cleanup will remove Corridor Targets from selected Corridors, Baselines and Regions. The point of this tool is to alleviate the tedious process of removing targets from one or more regions.

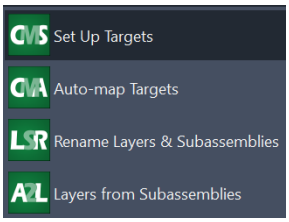


- **Selected Corridors and Regions:** Users can check/uncheck desired Corridor, Baselines, and/or Regions requiring Target Removal
    - When a given row is highlighted, the screen will automatically zoom to that item (disable this feature by unchecking the box next to the magnifying glass
- **Corridor Targets to Remove:** Users can check/uncheck Target types to be removed in the lower portion of the dialog box

Corridor Mapper

Corridor Mapper will allow for corridor targets to be automatically assigned by mapping subassemblies to layers, styles, objects names, or mirrored from other subassemblies. Manual drawing selection of targets can also be used within Corridor Mapper. Users can define a "mapping" for a given corridor then simply create target objects and Corridor Mapper will automatically assign those targets to the appropriate subassemblies based on the previously-defined mapping. This tool completely replaces the native target mapping dialog box with a much more dynamic and powerful option.

Included Functions



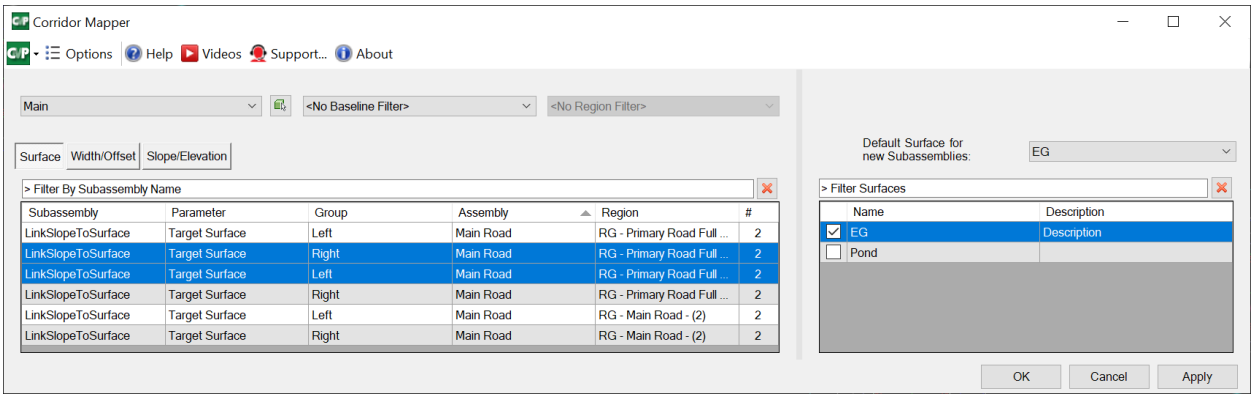
1. **Set up targets:** primary function where user links layers, styles, object names and other subassemblies to subassemblies to automatically assign targets to corridors
2. **Auto-map targets:** Once target mappings have been defined, user can select the Auto-map command to automatically assign newly-drawn target objects to the corridor
3. **Rename layers & subassemblies:** Automatic renaming of layers to the name of selected subassemblies, and vice-versa
4. **Layers from subassemblies** Automatic creation of new layers, the names of which are based on the names of selected subassemblies

Workflow

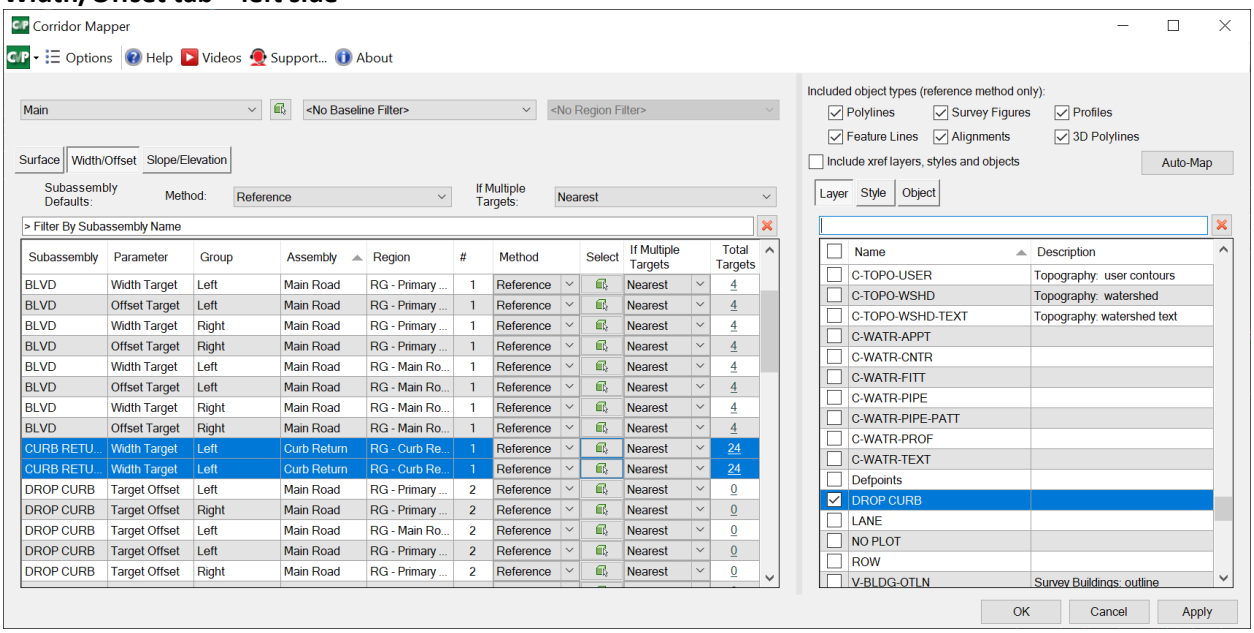
1. Run **Set up targets** to map layer, style, object name and other subassemblies to subassembly names of a given corridor. Objects meeting the specified properties will then automatically be assigned to the appropriate subassemblies as corridor targets. The mapping defined in setup will be saved to that corridor, even if the drawing is closed and reopened. If the corridor had targets assigned previously through the native Civil 3D functions, Corridor Mapper will prompt the user with options.
2. As new target objects are drawn on previously mapped layers, styles or object names, users simply need to run **Auto-map targets** and the tool will automatically assign newly-created target objects to the appropriate subassemblies.
3. As users continue to draw new target objects, the **Rename layers & subassemblies** and **Layers from subassemblies** functions can be utilized to aid in the process of defining additional target mappings.

Interface and Definitions

Running **Set up targets** will launch the following dialog box:

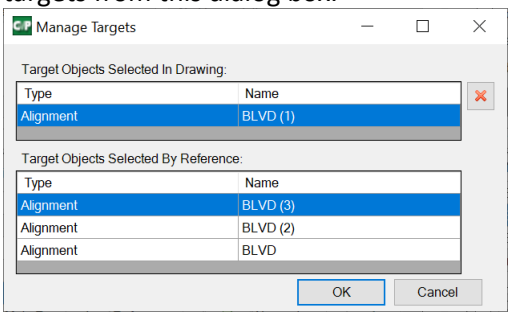


- **Corridor filter dropdown:** corridor to receive target mappings (dropdown or select in drawing)
- **Baseline filter dropdown:** select a single baseline within the selected corrido to show only subassemblies within that baseline
- **Region filter dropdown:** select a single region within the selected baseline to show only subassemblies within that region
- **Surface tab – left side**
    - List all subassembly parameters allowing surface targets, based on filtering options
    - Select one or more subassembly parameters to receive a target assignment
    - Type in manual test filter to further limit the list
    - **# column:** number of subassemblies found with identical parameter names. Will be 1 unless all the column values for a subassembly matches another.
- **Surface tab – right side**
    - **Default Surface for new Subassemblies:** option to specify surface that will automatically be assigned to newly added subassembly instances. Users will not have to return to this tab and continue to assign surface targets if all surface-targeting subassemblies should always receive the same surface target.
    - List of surfaces available to be assigned as a target. Option to filter by manual text.
- **Width/Offset tab – left side**

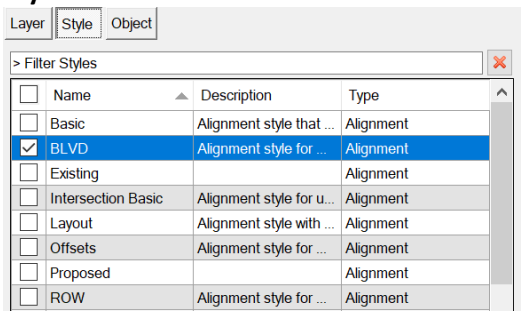


    - List all subassembly parameters allowing width/offset targets, based on filtering options. Includes option for manual text filtering based on subassembly name.
    - **Subassembly defaults:** option to specify default properties for newly added subassemblies. Will not change properties of existing subassemblies.

- **# column:** number of subassemblies found with identical parameter names. Will be “1” unless all the column values for a subassembly matches another.
- **Method:**
  - **Reference:** assignment of targets via layer, style, and object name
  - **Mirror:** assignment of targets via mirroring of another valid subassembly
- **Select:** option to manually select targets in the drawing
- **If Multiple Targets:** option to specify how it handles multiple found targets
  - **Nearest:** targets nearest found object based on horizontal distance
  - **Farthest:** targets farthest found object based on horizontal distance
- **Total Targets:** list total number of target objects assigned, based on both reference targeting and manual drawing selection. Click the number to display the following. User can delete manually selected targets from this dialog box.

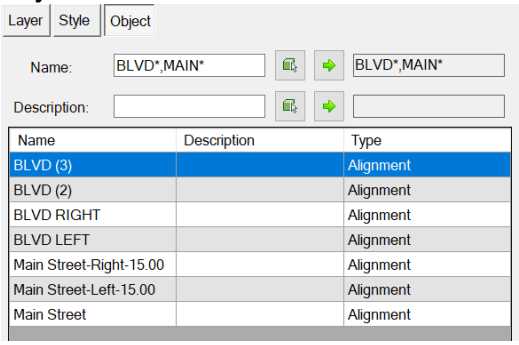


- **Width/Offset tab – right side**
  - **Included object types:** option to include/exclude certain object types from consideration when assigning targets through Reference method (layers, styles, object names)
  - **Include xref layers, styles and objects:** option to include xref drawings as eligible targets
  - **Auto-Map:** automatically assigns layers or styles to subassemblies if their names match
  - **Layer tab**
    - List of layers in current drawing
    - Checking layers will assign eligible targets on those layers to the selected subassemblies on the left side of the dialog box
    - Option to manually filter layer list by text input.
  - **Style tab**



    - List of *in-use* styles that are assigned to valid target objects
    - Checking styles will assign eligible targets with those styles to the selected subassemblies on the left side of the dialog box
    - Option to manually filter style list by text input

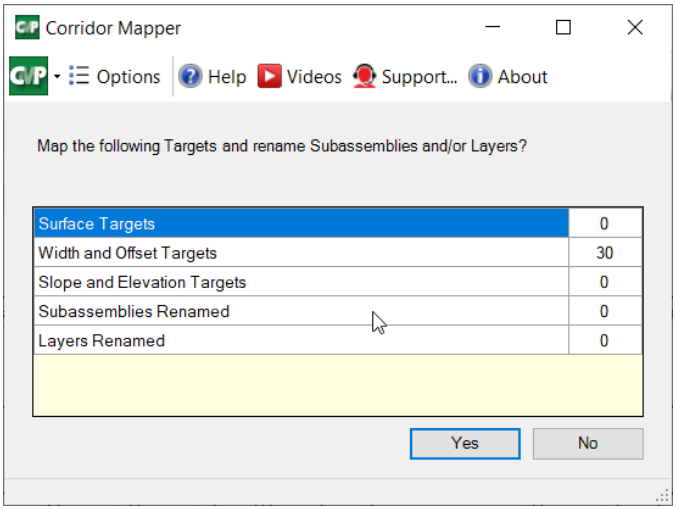
- **Object tab**



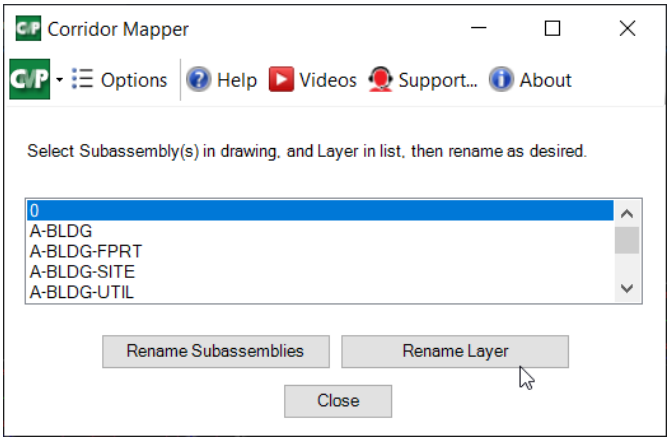
  - Option to assign target objects by object name
  - Type in one or more filter strings
    - Use commas to separate multiple strings
    - Use * to specify prefixing or suffixing
  - Click  to assign the found objects as targets to the subassemblies selected in the left side of the dialog box
  - Click  to read value from selected objects in drawing

- **Slope/Elevation tab:** all behavior is the same as the Width/Offset tab except:
  - **If Multiple Targets:** option to specify how it handles multiple found targets
    - **Nearest:** targets nearest found object based on elevation
    - **Farthest:** targets farthest found object based on elevation
    - **Flattest:** targets object resulting in the flattest slope for the subassembly
    - **Steepest:** targets object resulting the steepest slope for the subassembly

Upon confirmation of the above dialog box, the following confirmation will prompt the user. If Yes is selected, targets will be assigned based on specified target mapping. If NO is selected, the user will be returned to the primary target mapping dialog box.

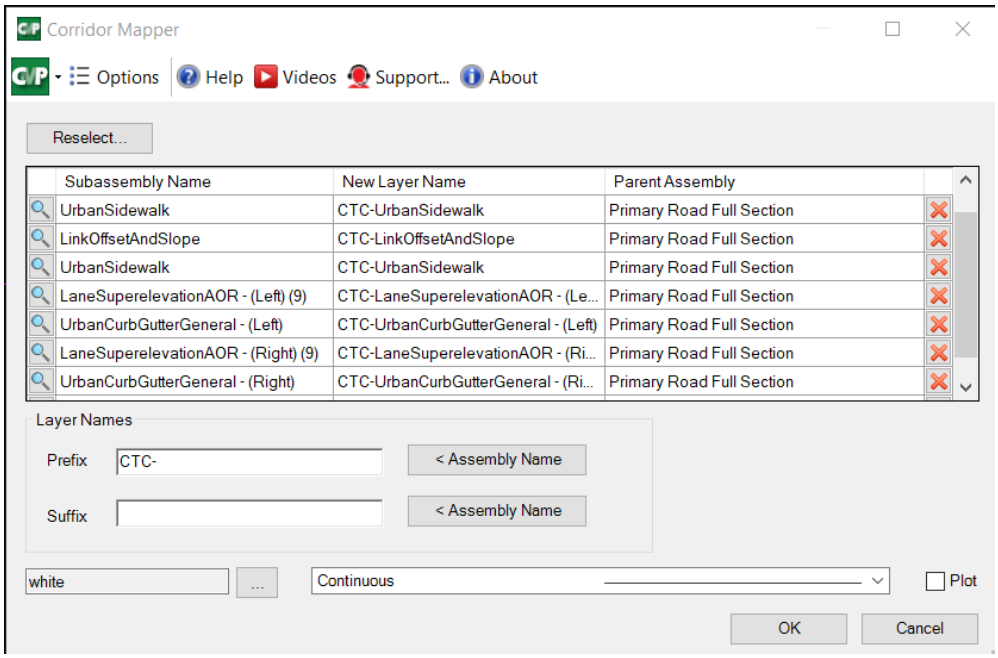


Initiating the **Rename layers & subassemblies** function will launch the following:



- **Rename Subassemblies:** will rename the subassembly(ies) based on the selected layer from the list. Workflow:
    1. Select the Layer
    2. Click “Rename Subassembly”
    3. Select Subassembly(ies) from drawing
    4. ENTER to exit the selection process
    5. Subassemblies will be renamed to match the name of the layer that was selected
- **Rename Layer:** Will rename the selected Layer from the list based on the Subassembly that is selected.
    1. Select the Layer
    2. Click “Rename Layer”
    3. Select Subassembly from drawing
    4. Layer will be renamed to match the name of the Subassembly that was selected.

Initiating the **Layers from subassemblies** function will launch the following:



- **Reselect:** will allow additional subassemblies to be selected from drawing
- **Magnifier:** icon will zoom to subassembly, can also right-click zoom
- **Red X:** will remove that subassembly part

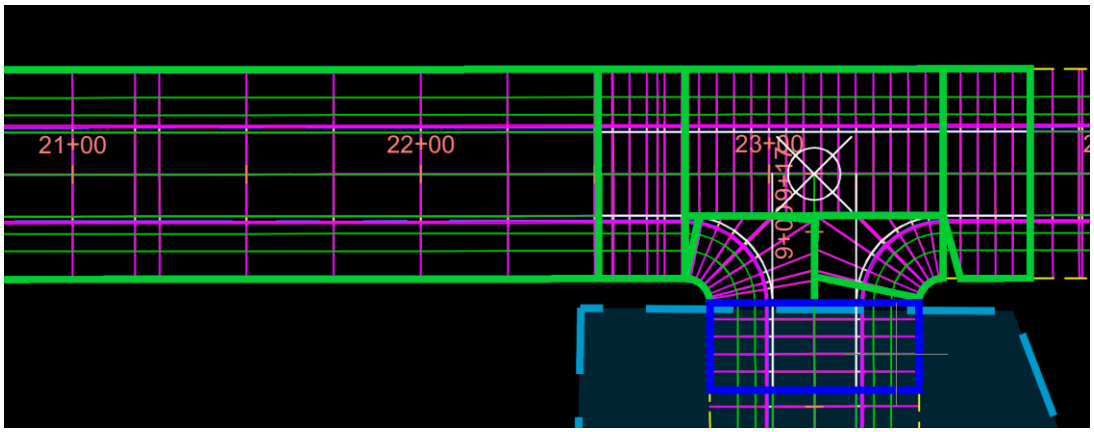
- **Prefix and Suffix:** uses custom naming or will insert the main assembly name
- Preview pain displays new layer name to be created
- Select color and line type for newly created layer(s)
- Check box whether or not to plot new layer(s) created

Corridor Splitter

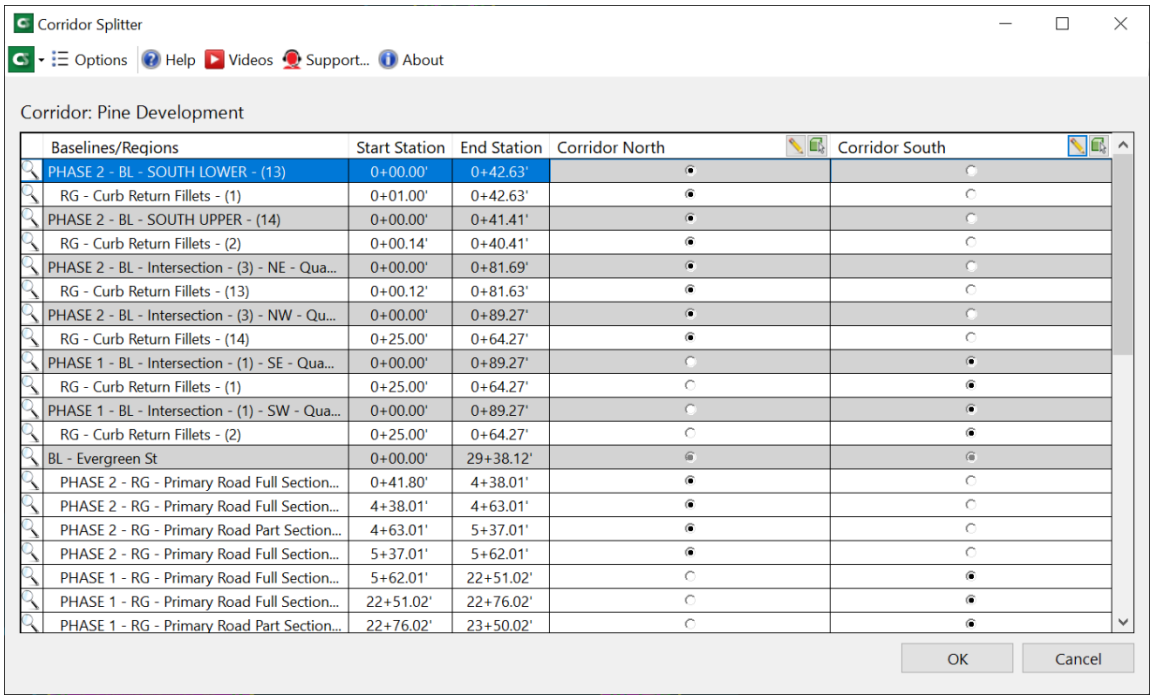
This tool allows a single Corridor to be split into two Corridors. All original corridor properties, including targets, frequencies, surfaces, and more, will remain intact.

The user can select which Regions and Baselines will belong to which corridor. Users have additional options to rename the new corridor names, as well as the baseline and region names.

Once initiated, the tool will prompt the user to select a corridor, then to select regions to be split into the new corridor. Regions can be interactively selected, with selected regions turning from blue to green when clicked.



Clicking enter at any point will launch the dialog box:



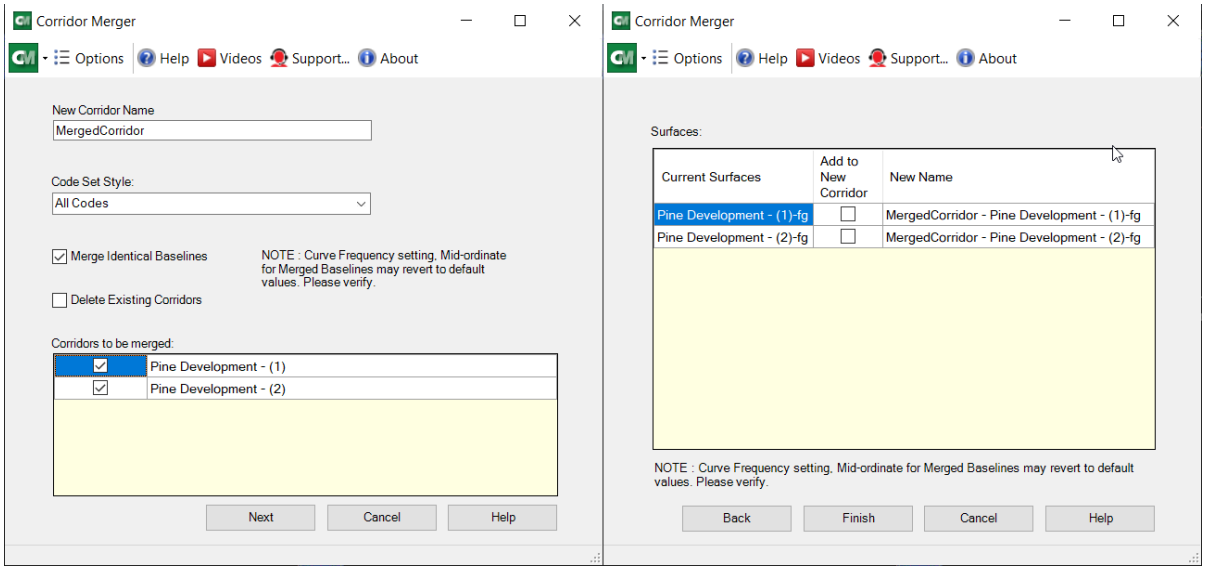
- **Corridor:** name of the selected Corridor to be split
- **Baselines/Regions:** list of Baselines and Regions to be split
  - Double-click the Baseline/Region name to rename
- **Start/End Station:** station values from selection Corridor
- **<Corridor Names>:** toggle Baselines and/or Regions to dictate which new Corridor they will belong to.

    - Click edit button to rename the corridor
    - Click the green selection button to interactively select regions in the drawing
- **Zoom/highlight:** selecting any number of rows will highlight the region in the drawing

Corridor Merger

Corridor Merger will combine multiple Corridors into one. All Corridor Baseline and Region definitions will merge into one Corridor, including Assemblies, Station Limits, Frequency, Targets, and Overrides.

Once initiated, the tool will prompt the user with the following dialog box:

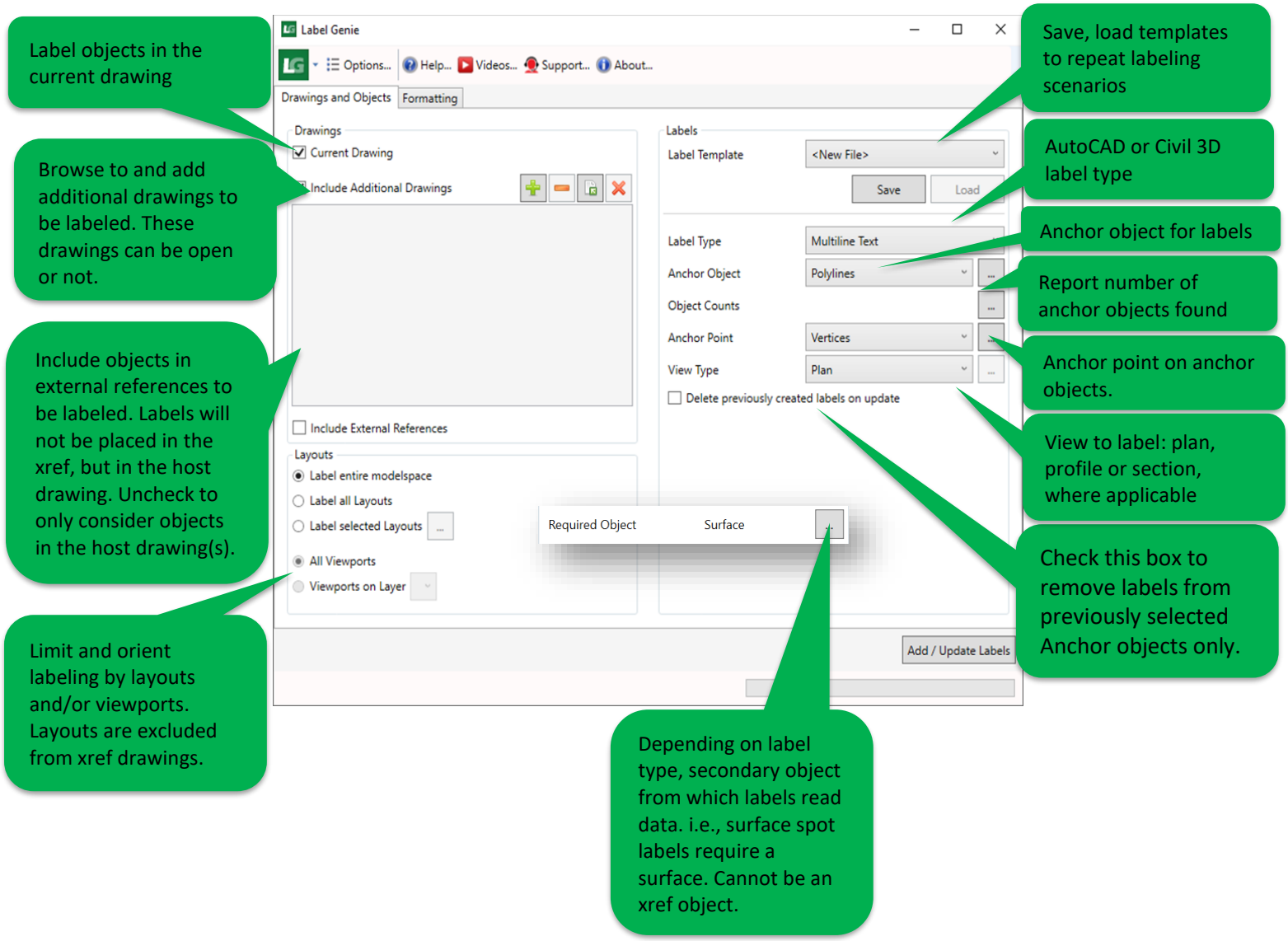


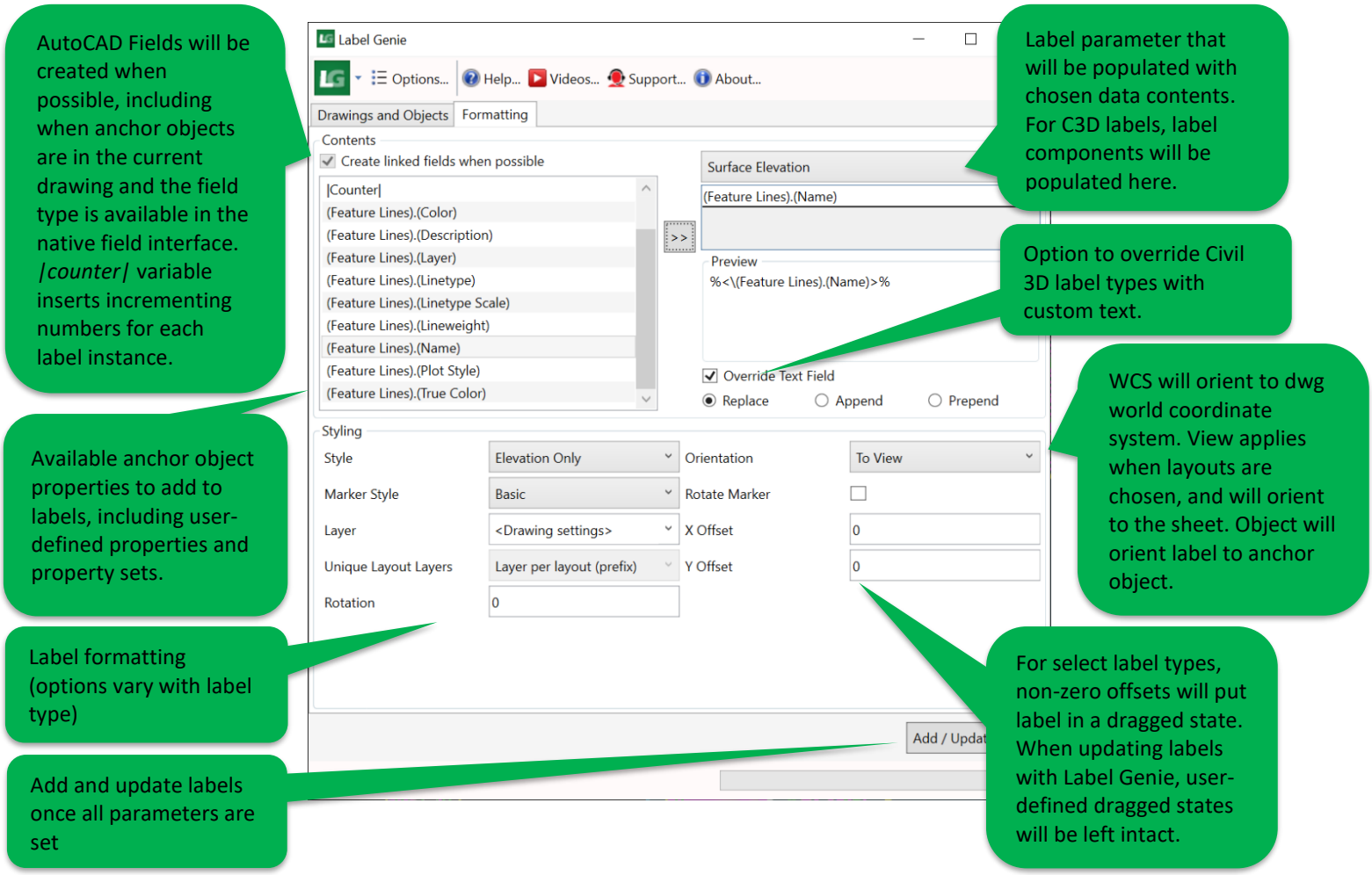
- **New Corridor Name:** Users can specify a new name for the merged Corridor.
- **Code Set Style:** User can select a Code Set Style. The default style will be as specified in the current drawings Corridor Settings.
- **Merge Identical Baselines:** Baselines from Corridors selected that contain the same Alignments and Profiles, will be merged into one Baseline. The Corridor Regions for these merged Baselines will become Regions under the single, merged Baseline. When unchecked, Baselines and Regions from selected Corridors will stay intact in the new merged Corridor, even if some of the Baselines contain the same Alignment and Profile. **Note** that Mid-Ordinate values for Frequency settings will revert to default settings when Baselines are merged.
- **Delete Existing Corridors**: When checked, all selected Corridors, and associated Corridor Surfaces, will be deleted after Corridor Merger is executed.
- **Corridors to be Merged:** By default, every Corridor Selected will be checked on. Users will have the option to uncheck Corridors and remove them from the Corridor merge.

- **Surfaces:** A list of Surface definitions found in selected Corridors will appear. Users can decide which Surface definitions to transfer to the newly created merged Corridor and define a new name as well. **Note** that the full Surface definitions found in the Corridor Surfaces and Boundaries dialog boxes will be transferred, but additional Surface edits, as found in the Surface Properties > Definition, tab will not be transferred to the new Corridor Surface.

Label Genie

Automatically label your sheets and drawings with both Civil 3D and AutoCAD annotation. Choose anchor objects through property filters, then insert 100s of labels at once on surfaces, feature lines, polylines, pipe networks, points, alignments, blocks, and more. Works on multiple drawings and layouts at the same time. Users have detailed control of label insertion, including offsets, rotation, scaling, styles, and more. Labeling can occur in plan views, or profile and section views where applicable. Both AutoCAD and C3D labels can be populated with basic object fields, user defined properties or property sets. Save labeling templates for quick repeat on other projects or drawings.





Notes about Label Genie behavior:

- Label Genie will simultaneously add and update labels
- Label Genie assigns XDATA to label objects it creates, allowing the app to update labels
- Label Genie has no affect on labels created by other means
- For a label to be updated it must match criteria specified for the following parameters. If these don't match those used to originally create the label, Label Genie will not update it. This allows multiple label scenarios to be applied without interfering with one another.
    - Label Type
    - Anchor objects and filter properties
    - Anchor point of anchor object and associated properties
- Labeling templates are of the type .lg, but follow the industry standard JSON file format. These templates can be edited in a notepad editor if familiar with JSON file editing.
- When labeling additional drawings, the current state of the drawings may affect Label Genie's ability to add labels. To ensure proper behavior, ensure drawings are saved and don't have any processes running in them.
- For labels created by Label Genie that have a user-defined dragged state applied, Label Genie will not change the dragged state properties of the label object but will move the label anchor point if warranted.
- See below for all the different label combinations, including limitations in certain situations.

Pl = Plan View Pr = Profile View Xs = Section View *Not supported when projected to profile and section views **No support for xref objects or property sets		Anchor Object												
		3D Polyline*	Alignment	Assembly	Block*	Feature Line*	Hatch	Line and Arc	Parcels	Pipe Network	Point (Cogo, Survey)*	Polyline	Surface Contours	Survey Figure*
Label Type	Alignment - Station Offset	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Pl		Pl	Pl		Pl
	Blocks	PlPrXs	Pl	Pl		Pl	PlPrXs	PlPrXs	Pl		Pl	PlPrXs		Pl
	Dimension	Pl	Pl			Pl		Pl	Pl			Pl		Pl
	General Note	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Pl		Pl	Pl		Pl
	Line and Curve		Pl**			Pl**		Pl**				Pl**		
	Spiral		Pl											
	MultiLeader	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs		PlPrXs	PlPrXs		PlPrXs
	Multiline Text	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs		PlPrXs	PlPrXs		PlPrXs
	Pipe Networks (Parts Lists)									PlPr				
	Profile View - Station Elevation	Pr			Pr		Pr	Pr				Pr		
	Profile View - Depth	Pr					Pr	Pr				Pr		
	Section View - Offset Elevation	Xs			Xs		Xs	Xs				Xs		
	Section View - Grade	Xs					Xs	Xs				Xs		
	Singleline Text	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs	PlPrXs		PlPrXs	PlPrXs		PlPrXs
	Surface Slope (one point)	Pl	Pl			Pl		Pl	Pl			Pl		Pl
	Surface Slope (two point)	Pl	Pl			Pl		Pl	Pl			Pl		Pl
	Surface Spot	Pl	Pl			Pl		Pl	Pl			Pl		Pl
	Surface Contour												Pl	
	Surface Spot on Grid	Pl				Pl						Pl	Pl	Pl

Clash Seeker

Clash Seeker is a set of tools that will assist with running checks for object collisions, creating reports of said collisions, and updating and managing objects within the clash reports. Clash detections can happen on a wide array of object types in the active dwg file. Once the clash set has been defined and run in the dwg, the results can be reviewed within the Clash Seeker interface or exported to an xlsx file or saved as a Table and placed within the dwg. When there are changes made to the site or profiles or alignments, these clash reports can be updated based on the current state of the drawing to reflect the changes made. Clash Set settings files can also be saved out of Clash Seeker and used again for different drawings or projects.

Summary of Functions

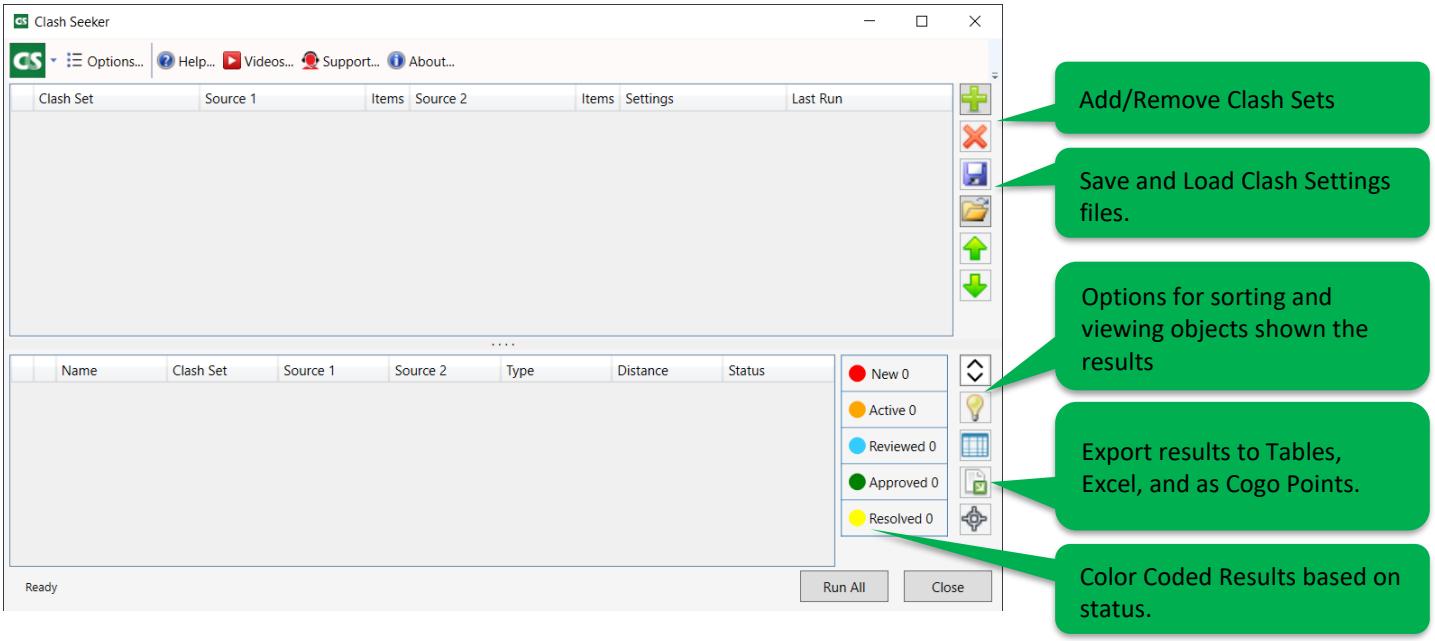
Clash Seeker is made up of one main command and two update functions.

The Clash Seeker icon found on the General panel within the CIM Project Suite ribbon tab. Clicking this icon will launch the main user interface where the clash sets, and early reports will reside.

The UPDATECLASHPOINTS command runs an update on the clash sets in the dwg without opening the Clash Seeker window and then updates the COGO points placed in the dwg to help locate the clashes found.

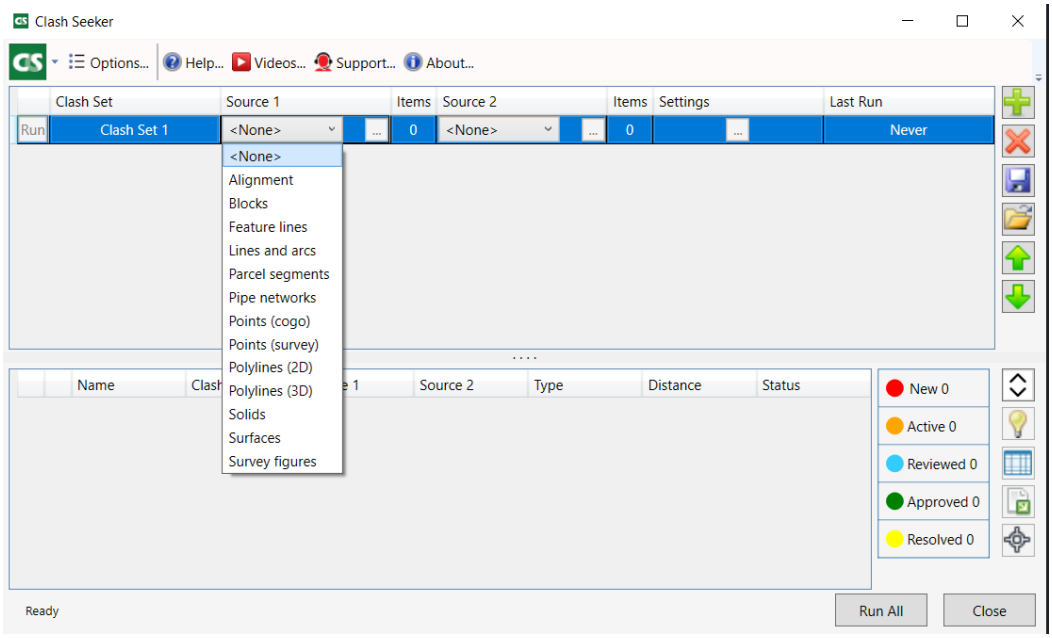
The UPDATECLASHTABLE command runs an update to the clash sets found in the dwg without opening Clash Seeker and then updates the Table(s) placed in the dwg with the latest clash set results.

The image below is a quick rundown of the Clash Seeker interface and where various tools are found with a brief description on what they do.

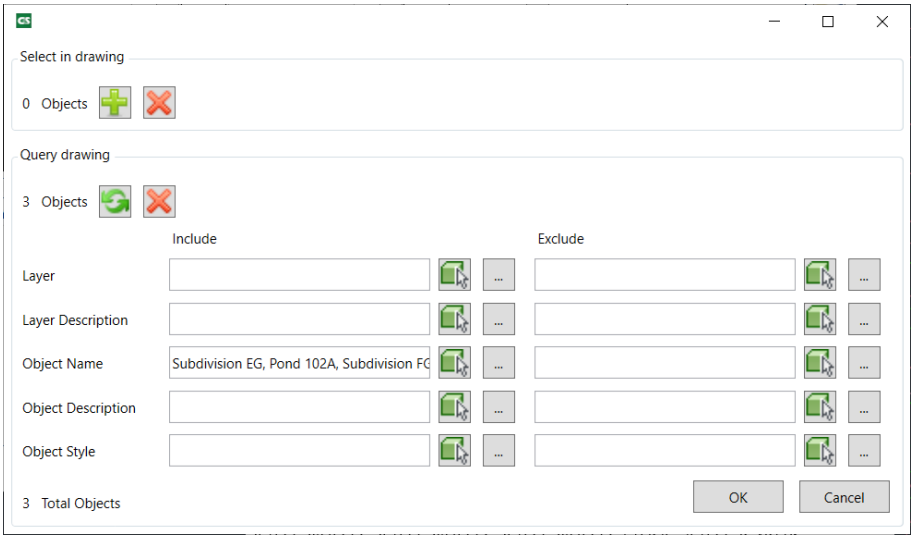


Setting up Clash Sets

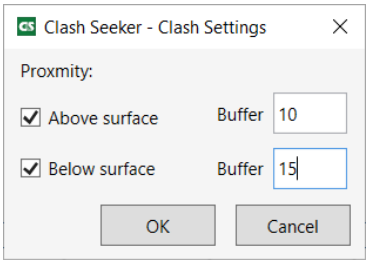
To set up a clash set, click the plus sign to add a row, then specify which object types to be clashed using the Source 1 and Source 2 columns.

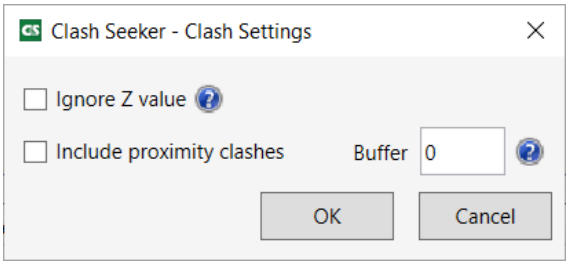


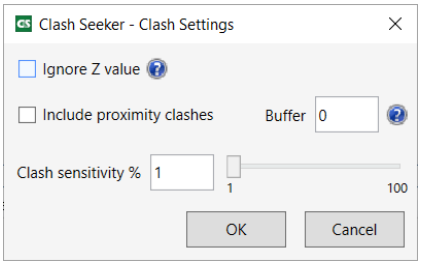
Next to each object type, there is a browse type icon. Click this to open the object selector widow. This window will assist with how objects in the dwg will be selected. Use this window to manually select the objects or create a selection filter to find objects by layer, description, object type, etc.



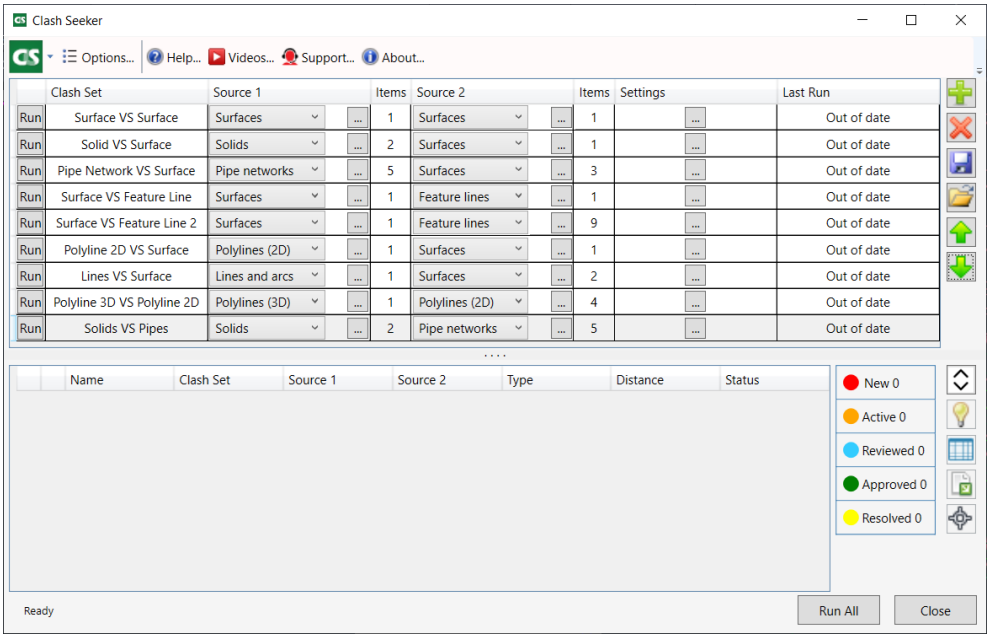
The final step is to define the clash set settings. In the Settings column there is another browse type icon. Click it and the settings appropriate to the current clash set will appear. This window will change based on what two object types are selected.





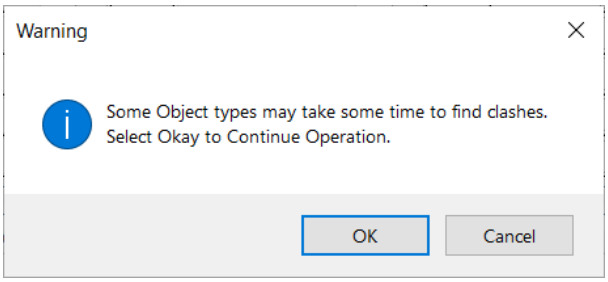


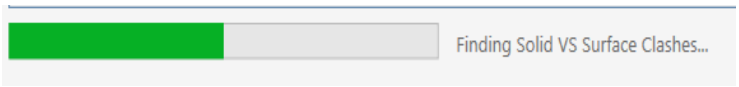
Create as many clash sets as needed. If a mistake was made during this process, each setting can be edited until they are correct. If one or more need to be removed, select the set(s) and click the red x.



Clash Reports

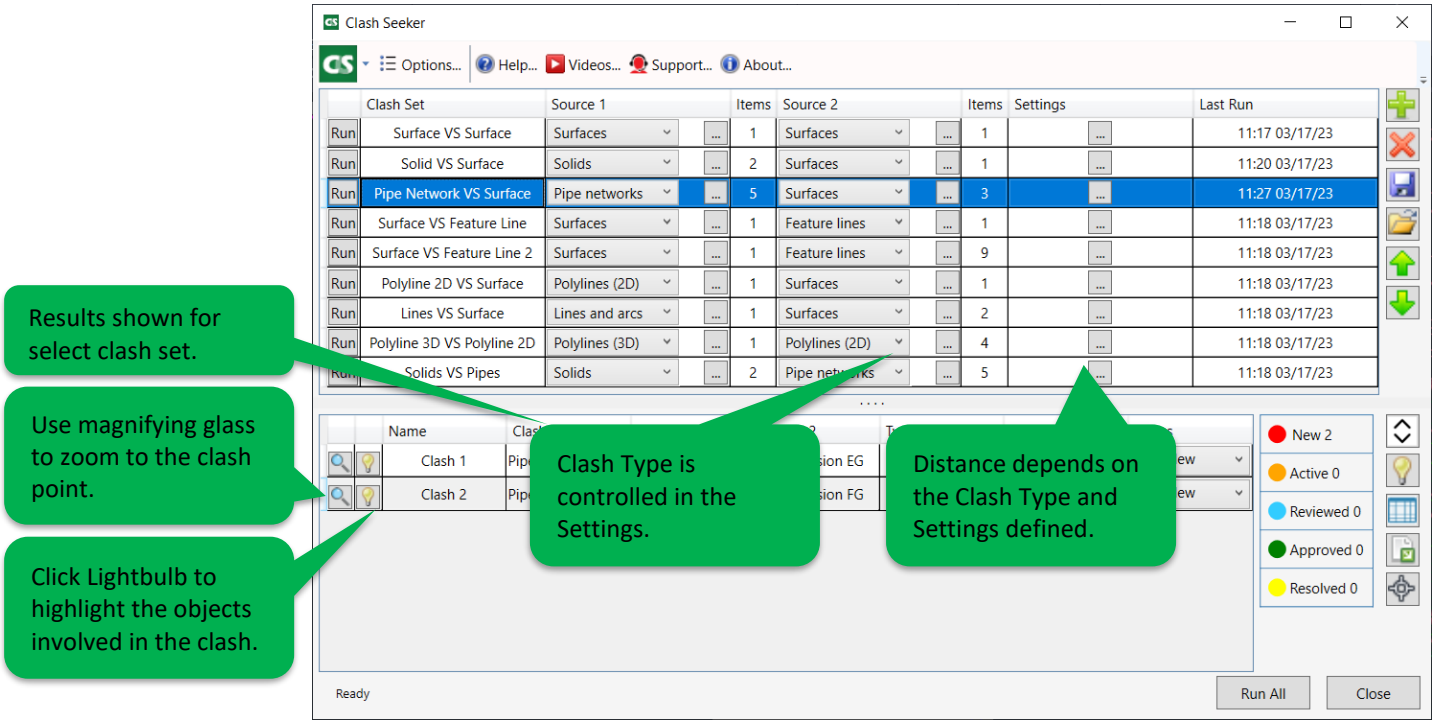
To run a clash set, click the Run button next to the desired clash set or click the Run All button at the bottom. Depending on the number of objects found in each clash set, this process may take a few minutes. There will be a warning reminder and a progress bar at the bottom indicating which clash set is currently being processed.



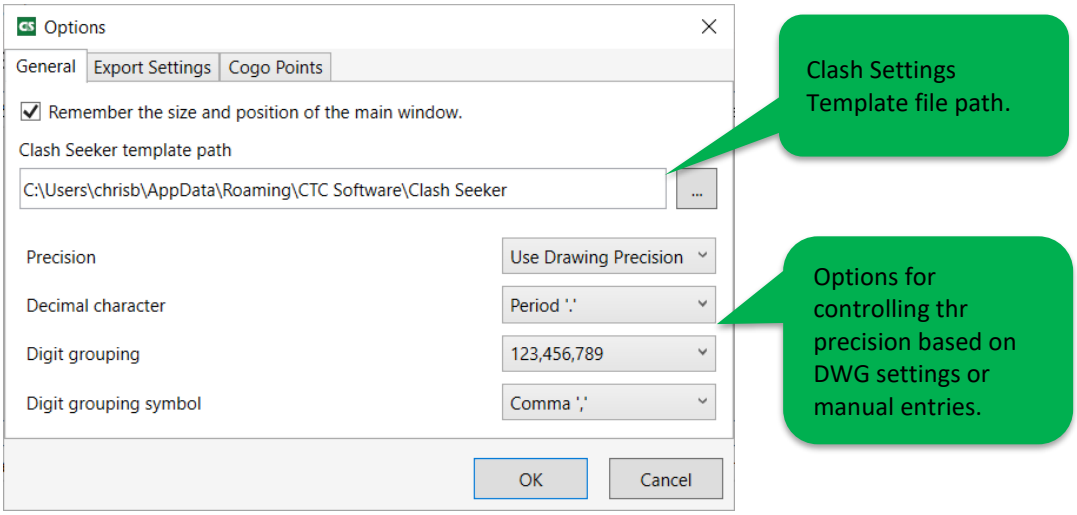


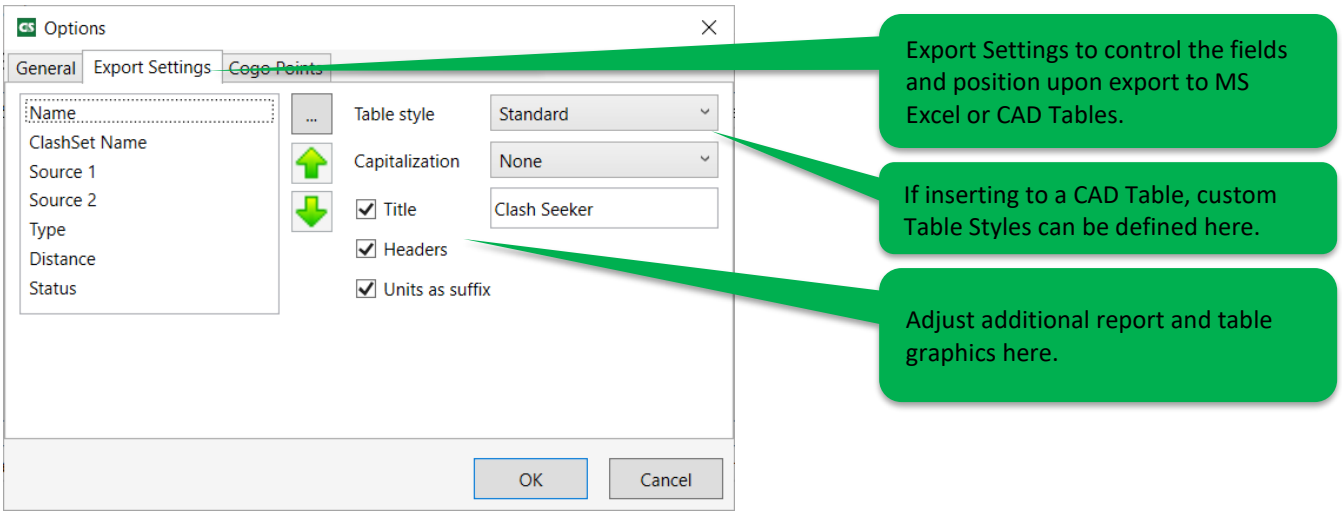
NOTE: If objects have been selected for a clash, but they are turned off when the clash set is run, they will automatically be filtered out of the clash report. For any object to be clashed against, they must be visible in the dwg at the time the set is run.

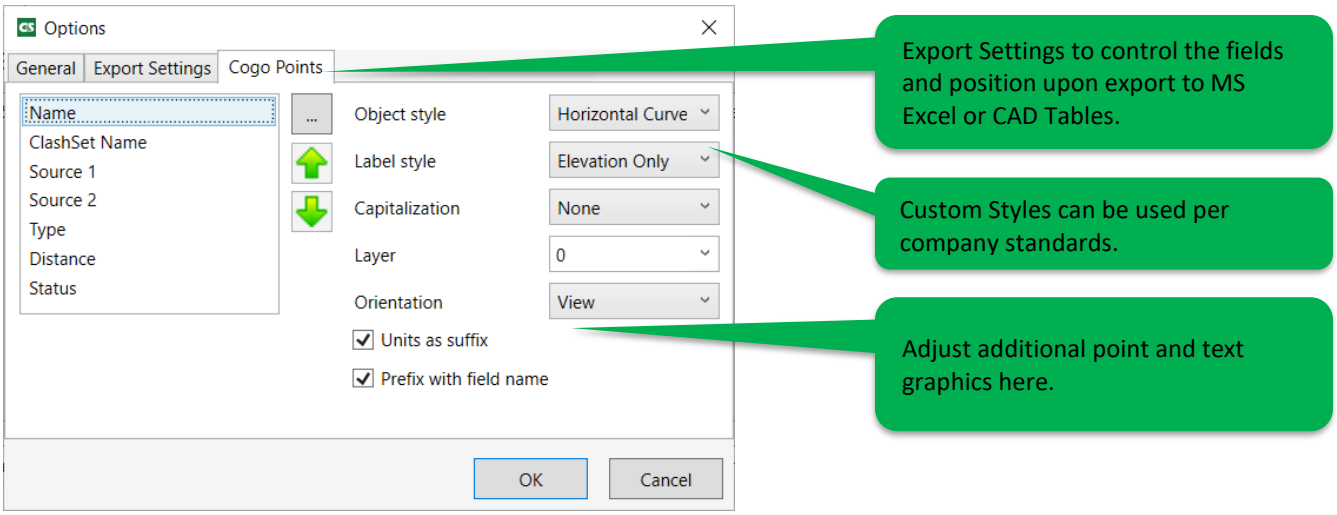
Once a clash has been run and there results to view, there are a few different tools to use to gain insight on the clash. Each time the clash set is run, the Status will update based on when each clash result was found or updated. First time a clash set is run they are all marked as New. Anytime after that, an existing clash found is considered Active. Clash results can be manually changed to Reviewed or Approved for tracking purposes. Clashes that were once new or active that were resolved by edits to the drawing will automatically get marked as Resolved after the next run.



At this time, clash reports can be created by exporting the results to MS Excel, or inserted into the drawing as a Table. In addition to this, each clash result can be marked with a COGO point that displays information about the clash. Settings for creating these reports is found in the Options button shown here.







Creating Clash Settings

By default, the clash sets and clash reports live inside of the DWG file and will be remembered each time that file is opened. To be able to use the same settings in another dwg, they will need to be saved to a '.csk' file. Select all the individual clash sets and click the Save icon. The General Tab in Options will provide ability to set a default template path, use this before saving the settings.

To load the settings into another project, click the Open Folder icon.

After loading the settings into another DWG, they will come in the same as when originally created. Be sure to open each sets object selection window and click the refresh button to ensure that the selections are correct prior to running the clash.

Updating Clash Reports

To update the clash reports or tables or COGO points, there area couple ways to accomplish this. First is to open the Clash Seeker app, re-run specific clash sets or click Run All. Then use the create table, or export to excel or create COGO points commands. There are a couple of built in update tools that do not require opening Clash Seeker.

In the command line, type UPDATECLASHTABLE and press enter. There will be a prompt to select a table that was created from Clash Seeker. Select a table and press enter. Clash Seeker will run in the background to re-run that clash set and update the table accordingly. There will be a progress bar that appears to indicate the app is working.

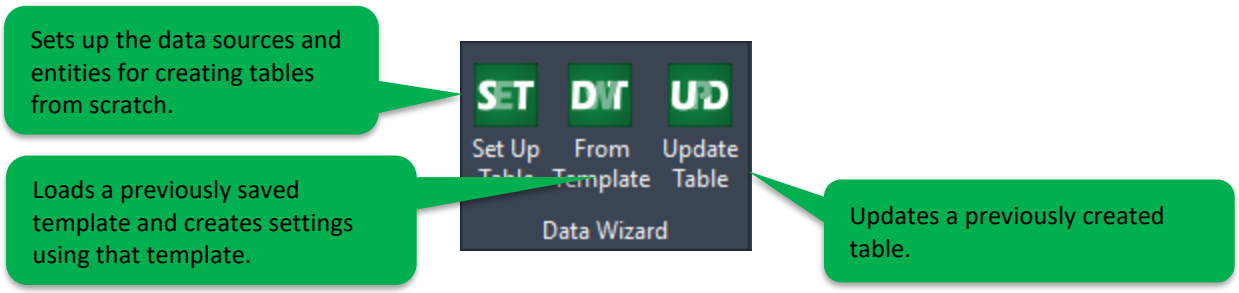
The UPDATECLASHPOINTS command will update all COGO points placed for a particular set of clash results. Type UPDATECLASHPOINTS into the command line, press enter. There will be a prompt to select a COGO point that was generated using Clash Seeker. Once selected, press enter. Clash Seeker will run in the background to re-run that clash set and update the COGO points accordingly. There will also be a progress bar to indicate the app is working.

Data Wizard

Data Wizard is a toolset that creates AutoCAD and spreadsheet tables from AutoCAD and Civil 3D entities. All types of tables, legends, lists, key maps, and quantity takeoffs can be created with Data Wizard. These entities can reside in the current drawing, in external references, additional drawings, or limited to a viewport in the current drawing. Once tables are set up, running the update table command will refresh a table based on any changes that may have taken place in the drawings. Templates can also be saved out to external files to quickly recreate custom tables on other projects.

Summary of Functions

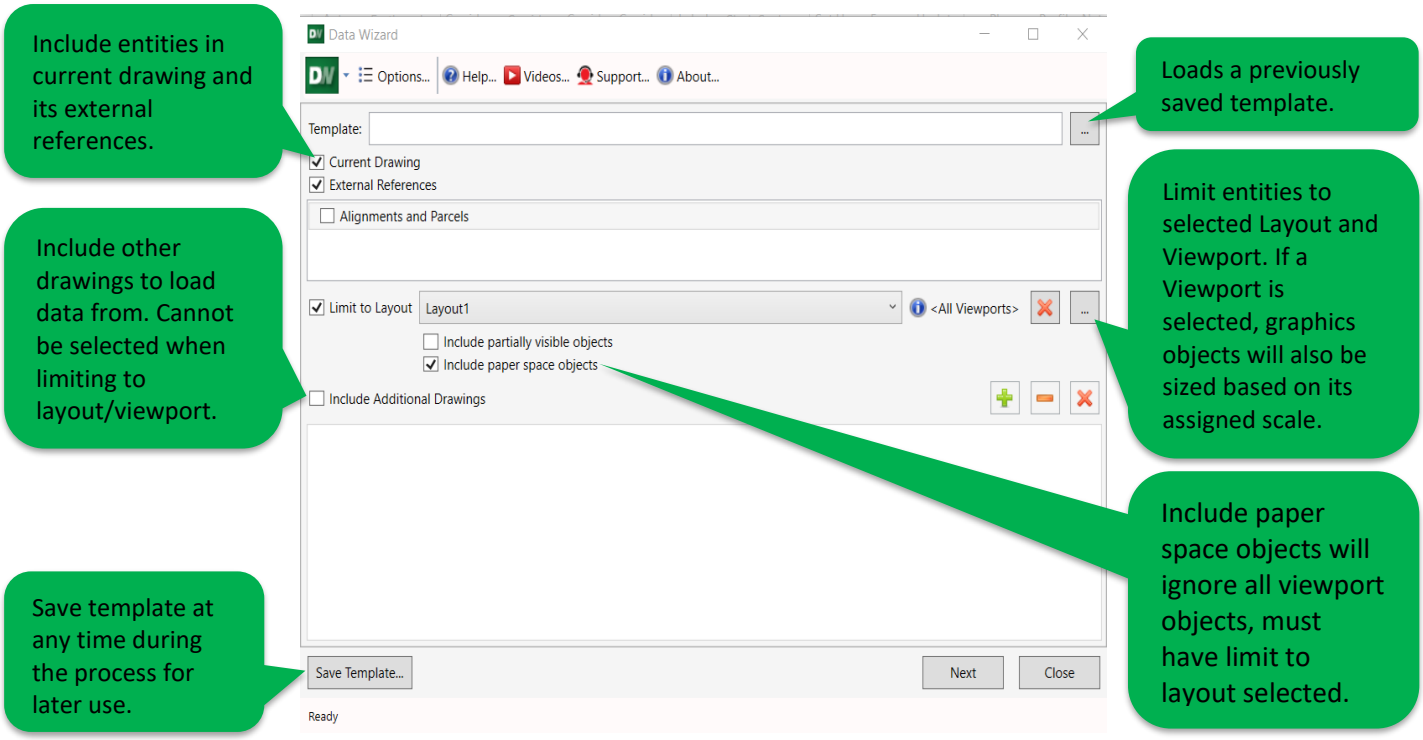
Data Wizard consists of three main commands:



Tables should be initially set up and created using the Set Up Table command. Once tables are created, they can be updated using the Update Table command to reflect the latest changes in the source drawings, or to update the applied template. If the settings file is saved during setup, it can be used in the From Template command to create tables without going through the Set Up Table wizard again.

Setting Up Tables

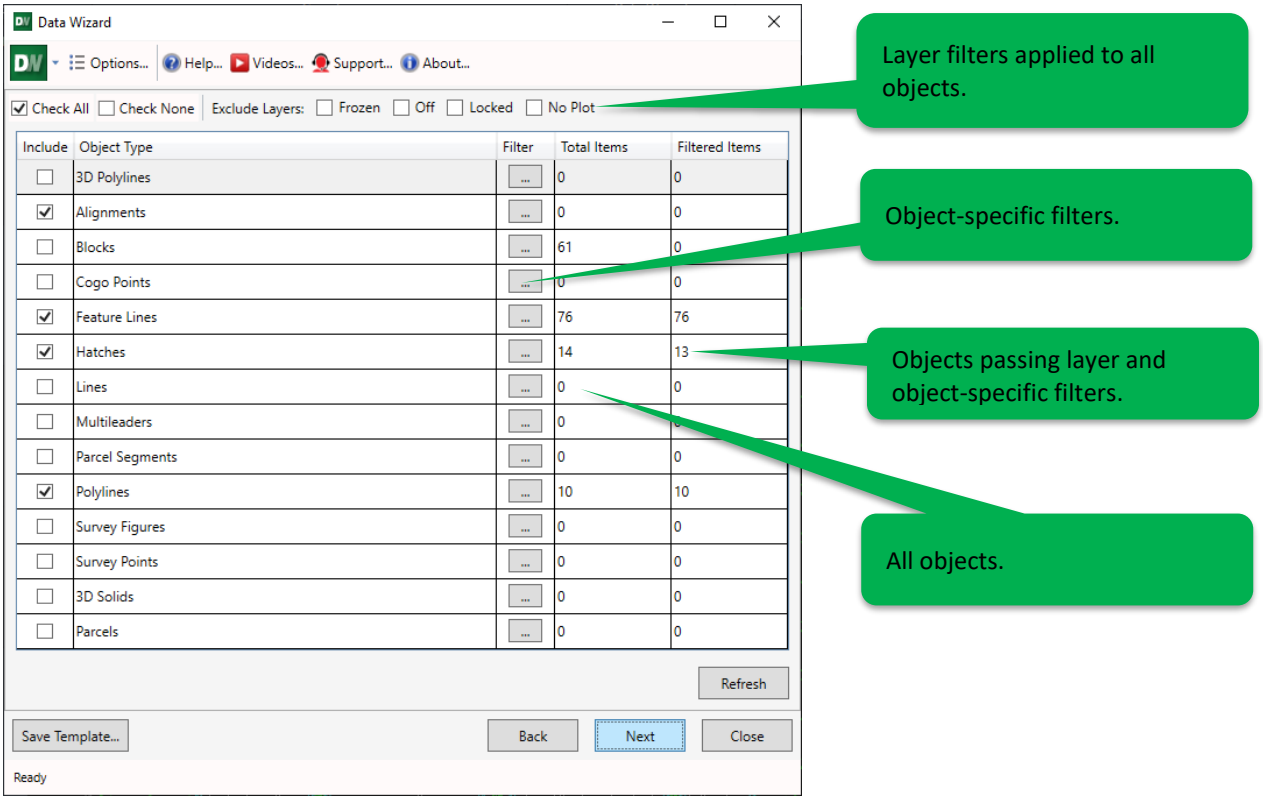
Set Up Table command should be used to define all details for creating a table. Running this command opens the main user interface.

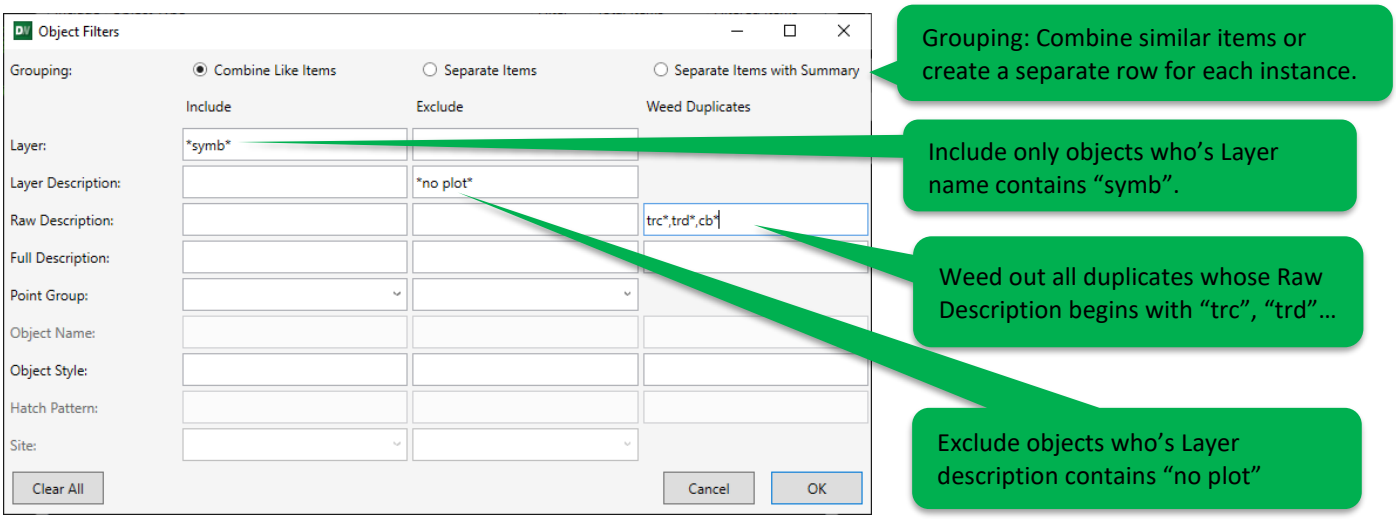


It should be noted that users can either select to limit the objects to a layout or a viewport, or to source the objects from other drawings, but not both. When limiting to a layout, all viewports in that layout will be considered, unless a viewport is explicitly selected. The checkbox to include partially visible objects controls whether the objects should be entirely visible in the viewport(s) to be listed or not. This works in a similar manner to window or crossing selection in AutoCAD. The checkbox to include paper space objects will be available only when selecting limit to layout and will ignore all viewport objects.

In the next step a list of all supported AutoCAD and Civil 3D entities is presented. At this point, none of the source drawings are queried to get the objects, so the quantity columns will be empty. If values in these columns are immediately desired, the “Refresh” button should be pressed. Otherwise, the objects will be queried when the user presses next.

Once the drawings are queried, the “Total Items” and “Filtered Items” columns will be populated. The “Total Items” indicates the total number of objects found in the source drawings, and the “Filtered Items” is the number of objects passing the filter criteria; these criteria include the Layer property checkboxes on the top of this page and the individual filters applied to each object type.



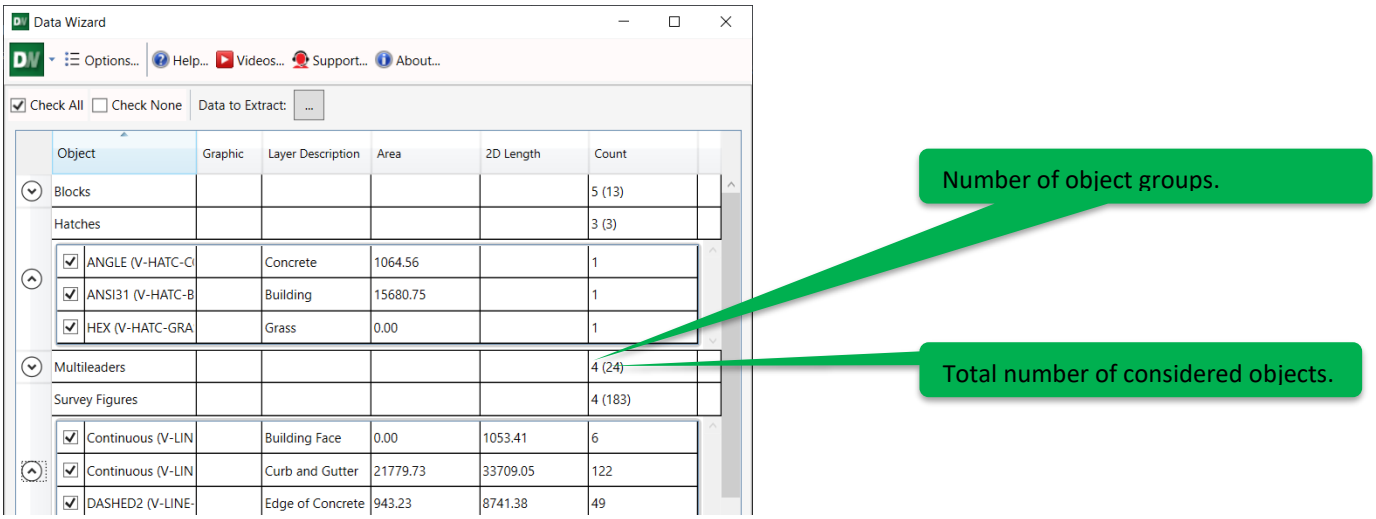


Note that depending on the object type, the filters that are applied to it will vary. As an example, Hatches are only filterable by layer, layer description and hatch pattern. For an object to pass these filters, all criteria must be satisfied. That is, the non-empty filters are combined using the "and" operator.

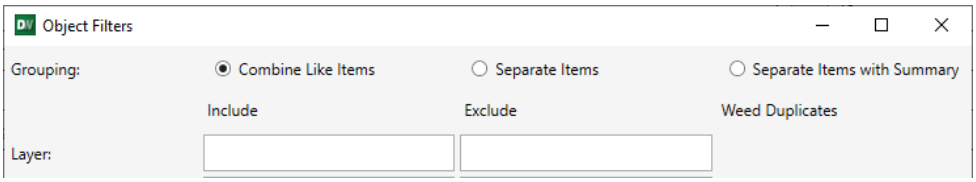
Users can also use common Windows search wild cards to input filters. For example, to eliminate Points with " B" and " E" after the raw description, in the exclude column for Raw Description this would be entered: ***B*,* E*.**

Users can also eliminate objects with similar properties using the Weed Duplicates fields. For example, if there are many Point that begin with TRC, followed by a number value, but only one of these TRC points should be included, one can enter a "weeding" string.

On the third screen users see the results of filters selected on the 2nd screen. Each of the grid rows can be expanded to show all groups and the number of objects in them. The quantities shown are those summed up for all objects falling into the specific group. For example, expanding the Hatches row shows all the groups that contain hatches with matching patterns and layers.



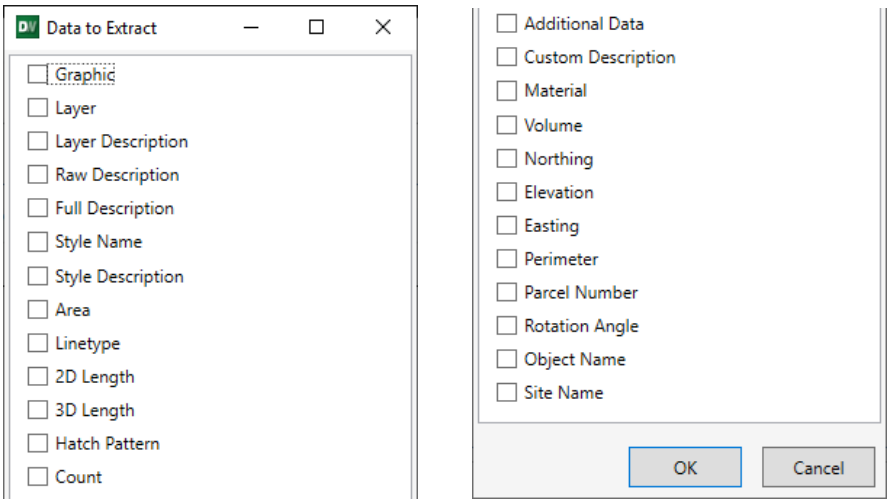
The items displayed in the grid depend on the criteria specified in the Filter settings. If either the Separate items or Separate items with summary was chosen, the grid will display every instance matching the filter. If Combine like items was chose, then a "representative" object will appear in the grid.



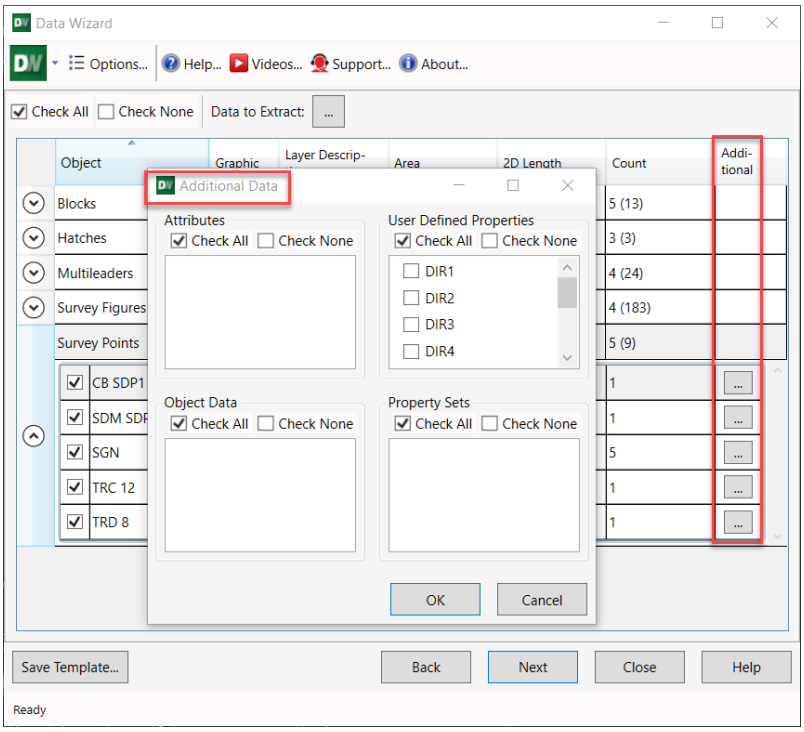
The following rule set describes the grouping each of the objects, and how Data Wizard identifies a given object as unique. The same criteria are used to give each object group a unique name.

- Blocks: Block Name, Layer
- Cogo and Survey Points: Raw Description
- Multileaders: Style Name, Layer
- Lines, Polylines, 3D Polylines, Features Lines, Survey Figures, Parcel Segments, Alignments: Linetype, Layer
- Hatches: Pattern, Layer
- Solids: Layer
- Parcels: Style Name, Site

Clicking on Data to Extract button opens a dialog where user can select headers to include in table.

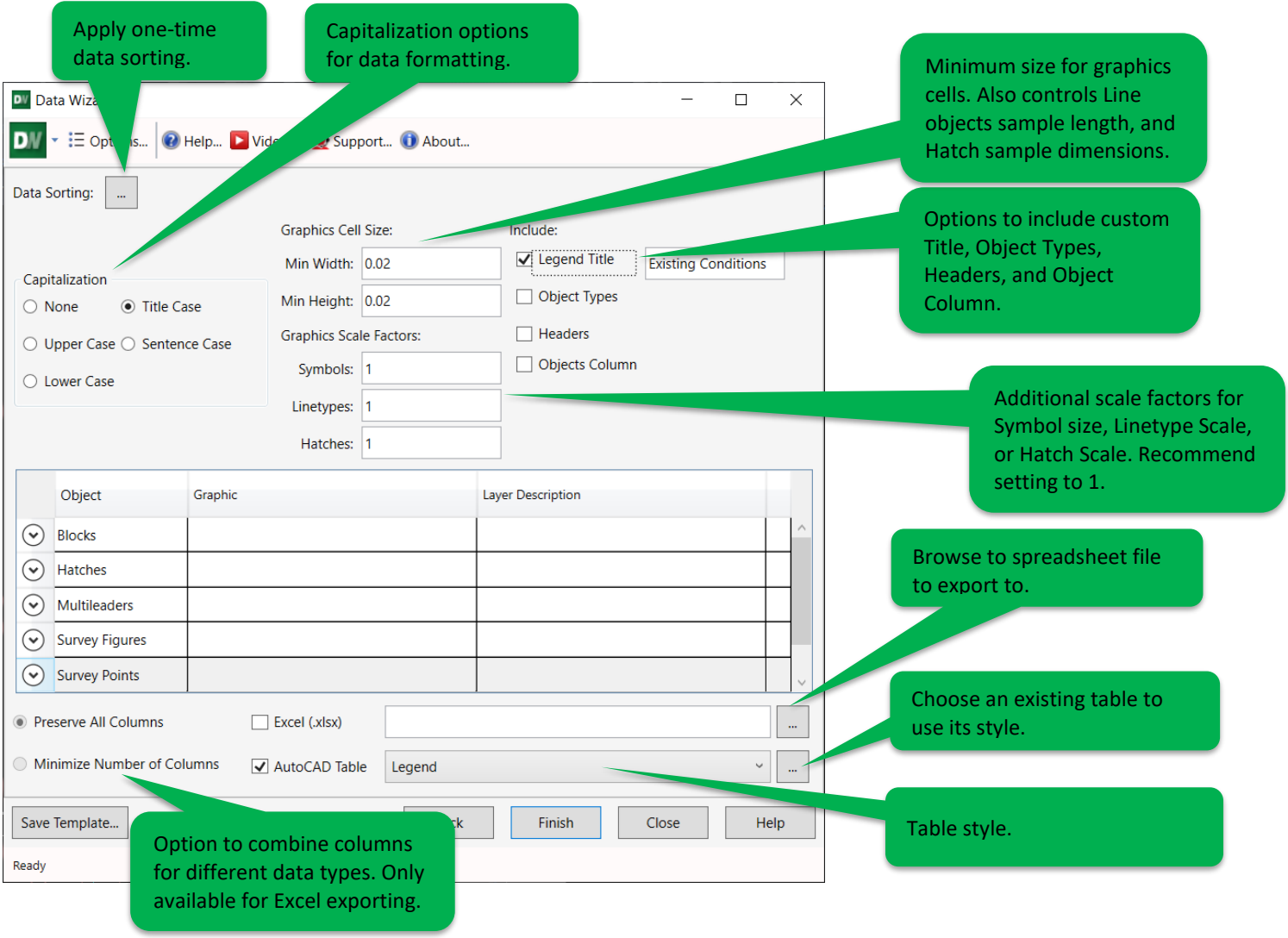


Additional data includes attributes, user defined properties, object data and property sets. The availability of additional data columns depends on their availability in source drawings and the type of the object in question. To illustrate, if user-defined properties are found for Cogo Points when querying the source drawings, they will be available to include as columns in the table using Additional Data dialog.



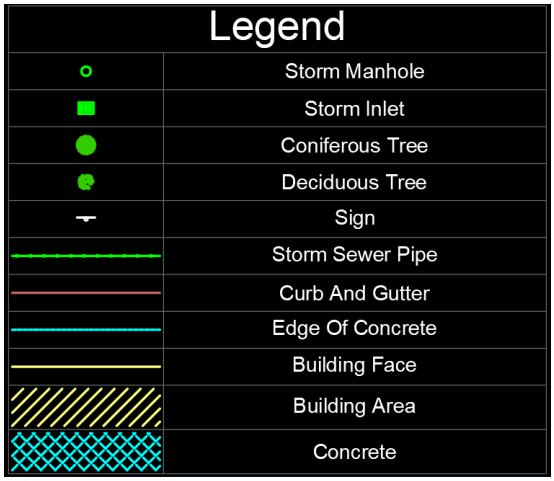
The final step of the wizard provides the user with options for text capitalization, graphics cell sizes (AutoCAD tables only), output type, and data organization and sorting. The Data Sorting dialog can be used to apply a one-time sorting to each object type based on the selected column. Users can also reorder columns or rows using drag-and-drop at any time during this process.

The data columns will be populated with the information read form each of the objects within a group. If the column is a summable quantity (such as length or area), the displayed data will be the sum over all the objects within that group. Otherwise (such as columns for Style Name or Additional Data), the column will list the common value if it is the same for all group members, or “(Varies)” otherwise.



Pressing “Finish” in this step creates the tables. If AutoCAD table is selected, the user will be prompted to select the insertion point of the table. Depending object and table styles, the result would be something like this.

It should be noted that to create detailed legends with Data Wizard like the one below, that Styles, Layers, Descriptions, Codes, Block Definitions, and more all play a part. All this content must be organized in such a way that Data Wizard can extract it and tabulate it. For example, if block sizes are not drawn to standard sizes, the resulting legends may look undesirable. If Layer Descriptions, Styles Descriptions, or whatever information is used to create tables is not standardized, then the outputs from Data Wizard will not be standardized.



Below is an example of a spreadsheet output.

Polylines

Object	Layer	Layer Description	Raw Descri	Full Descri	Style Name	Style Description
Continuous (0)	0					
DASHED (0)	0					
DASHED (C-ANNO-MATC)	C-ANNO-MATC					
Continuous (_C-CTC-PLAN-Viev	_C-CTC-PLAN-Viewsha	Annotation: Reference Symbols				

Cogo Points

Object	Layer	Layer Description	Raw Descri	Full Descri	Style Name	Style Description
TR	V-NODE-TREE	Survey Node: Tree Points.	TR	TR	Tree	Style For Tree
T	V-NODE-SSWR	Survey Node: Sanitary Sewer And Appurtenances	Tavallal	Tavallal	Shrub - 5Ft	Style For Shrub - 5'.
G	V-NODE-TREE	Survey Node: Tree Points.	Gholi	Gholi	Basic	
	V-NODE-SSWR	Survey Node: Sanitary Sewer And Appurtenances	Points.		Water Valve	Style For Water Valve.
Axis	V-NODE-TREE	Survey Node: Tree Points.	Axis	Axis	Water Shutoff	Style For Water Shutoff.
S	V-NODE-SSWR	Survey Node: Sanitary Sewer And Appurtenances	Shahrdari	Shahrdari	Horizontal Curve Pc	Style For Horizontal Curve Point.
R	V-NODE-TREE	Survey Node: Tree Points.	Rob Sekke	Rob Sekke	STA	
Axisev	V-NODE-TREE	Survey Node: Tree Points.	Axisev	Axisev	Hydrant (Proposed	Style For Proposed Fire Hydrant.

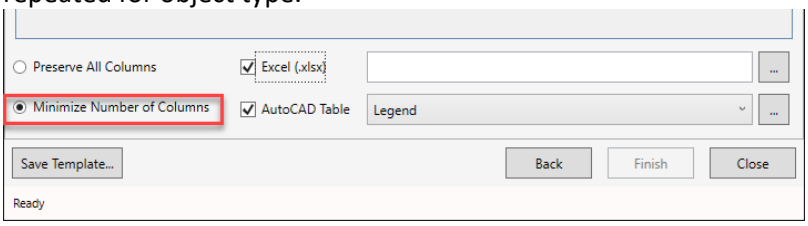
Feature Lines

Object	Layer	Layer Description	Raw Descri	Full Descri	Style Name	Style Description
Continuous (C-TOPO-FEAT)	C-TOPO-FEAT				Basic Feature Line	

Parcel Segments

Object	Layer	Layer Description	Raw Descri	Full Descri	Style Name	Style Description
Continuous (C-PROP-LINE)	C-PROP-LINE	Property: Parcel Lines				

When creating Excel spreadsheets, the number of columns can be minimized by only showing the columns that contain data for each object type. This option is at the bottom of the 4th screen. For this purpose, the headers need to be repeated for object type.



Object	Layer	Layer Description	Linetype	2D Length	Count
Continuous (0)	0		Continuous	13.62	1
Continuous (_C-CTC-TICK)	_C-CTC-TICK	Annotation: Reference Symbols	Continuous	15600	33

Polylines

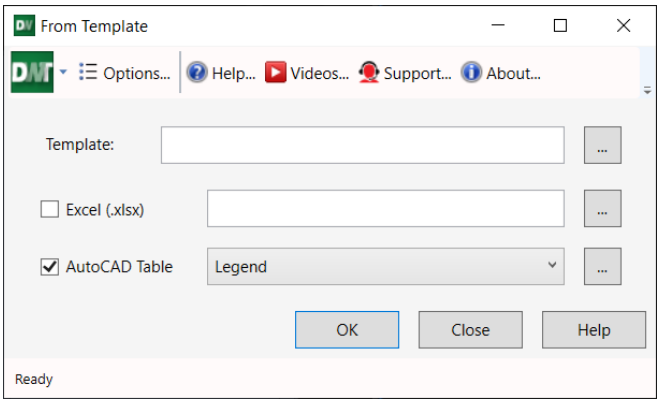
Object	Layer	Layer Description	Linetype	2D Length	Count
Continuous (0)	0		Continuous	416.2	2
DASHED (0)	0		DASHED	166.33	1
DASHED (C-ANNO-MATC)	C-ANNO-MATC		DASHED	21603.77	13
Continuous (_C-CTC-PLAN-Viev	_C-CTC-PLAN-Viewsha	Annotation: Reference Symbols	Continuous	57631.6	41

Cogo Points

Object	Layer	Layer Description	Raw Descri	Full Descri	Style Name	Style Description	Count
TR	V-NODE-TREE	Survey Node: Tree Points.	TR	TR	Tree	Style For Tree	1
T	V-NODE-SSWR	Survey Node: Sanitary Sewer And Appurtenances	Tavallal	Tavallal	Shrub - 5Ft	Style For Shrub - 5'.	1
G	V-NODE-TREE	Survey Node: Tree Points.	Gholi	Gholi	Basic		1
	V-NODE-SSWR	Survey Node: Sanitary Sewer And Appurtenances	Points.		Water Valve	Style For Water Valve.	1
A	V-NODE-TREE	Survey Node: Tree Points.	Axis	Axis	Water Shutoff	Style For Water Shutoff.	1
S	V-NODE-SSWR	Survey Node: Sanitary Sewer And Appurtenances	Shahrdari	Shahrdari	Horizontal Curve Pc	Style For Horizontal Curve Point.	1
R	V-NODE-TREE	Survey Node: Tree Points.	Rob Sekke	Rob Sekke	STA		1
Axisev	V-NODE-TREE	Survey Node: Tree Points.	Axisev	Axisev	Hydrant (Proposed	Style For Proposed Fire Hydrant.	1

Creating Tables from Saved Templates

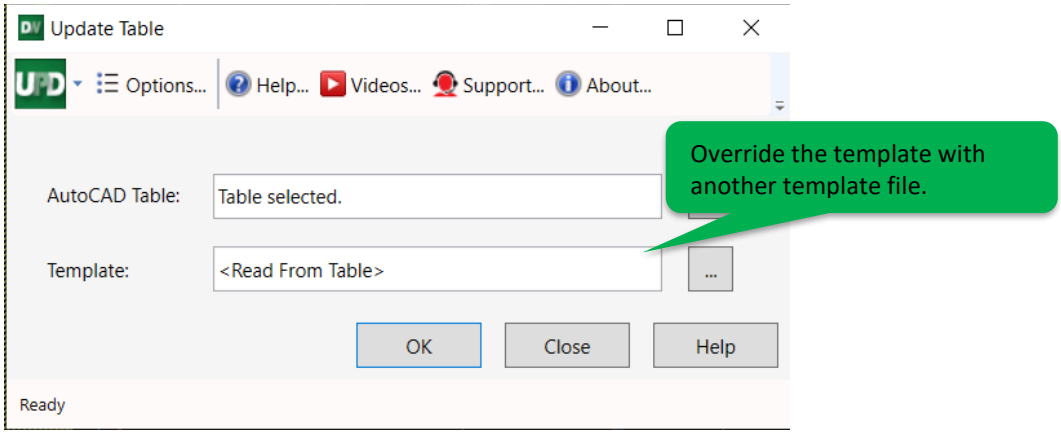
Instead of going through all the steps that were illustrated in the previous section, if a previously saved template with desired settings exists, the From Template command can be used to utilize that template to create tables quickly.



Updating AutoCAD Tables

Once the AutoCAD tables are created, Update Table command can be used to update the table using the same or updated templates. Running this command first prompts the user to select an existing table. Once selected, the user will be presented in a dialog to select a previously-saved template.

If allowed by AutoCAD, the update command may be able to load the last template used to create this table, in which case the template text box reads "<Read From Table>." Note that extremely detailed templates cannot be saved in the table due to the limitations of extended data sizes. In these cases, a template must be selected before updating the table. Either way, the user can override this template by selecting another template file.



Notes:

- If working with Cogo or Survey Points, and the Point Style Size option is set to "Use size relative to screen", this will be incompatible with Data Wizard. Data Wizard will instead use the "Use size in absolute units" option, with a Feet value equal to the Percent value specified in the "relative to screen" option. This only applies to objects who's Point Styles are set to "Use size relative to screen".
- When referencing objects from xref or additional drawings and creating an AutoCAD table with graphics in it, Layers referenced in those objects will be imported into the current drawing. The source drawing definitions of those Layers (color, linetype, etc.) will be used to define the newly-created Layers in the current drawing, and NOT any potential Layer Overrides that may exist on the Xref version of that Layer in the current drawing.
- Parcel object data extraction limitations

- Cannot extract from xrefs or additional drawings, only current drawing.
- Cannot extract native fields, Parcel Address and Parcel Tax ID. However, use of User-defined properties for this data type can be used.

Sheet Generator for Roads

Sheet Generator is a multi-function, workflow-based solution for the creation and editing of plan/profile, plan/plan, or profile/profile sheets. Users can set up and modify plan sheet layout along alignments. Profile views can then be automatically adjusted to match plan view station ranges. Sheets can be automatically created with full integration into Sheet Set Manager or directly into the active drawing. Finally, and most importantly, edits to plan and profile configurations can then be made in modelspace, and the changes pushed to all previously created layouts and viewports, saving lots of time in manual sheet editing, and preventing sheet recreation.

Sheet Generator is an alternative to the native viewframes toolset in Civil 3D. It replaces all functionality provided and adds additional functionality such as updating of sheets after they've been created, profile view buffers, superior profile elevation range, smart plan view matchline placement, profile matchlines, and non-Civil 3D object management in profile views.

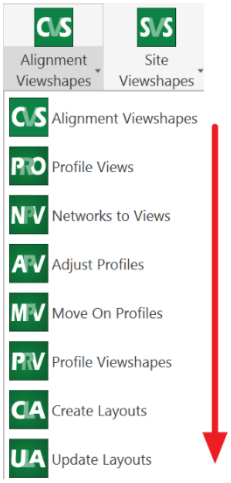
Definitions and Initial Configuration

To properly use the Sheet Generator to match your organization's standards, some simple setup is required, and definitions understood, including creation of some or all the following blocks and files.

- VIEWSHAPES – Polylines created in plan and profile that represent the shape of viewports created in sheets. The tool will create these, but this term is referred to throughout the functions.
- PRINT AREA BLOCKS (PLAN AND PROFILE) – User-defined blocks that link the viewshape placement in plan or profile to the viewport placement on sheets. These must be created and placed in the plan and profile print areas within the standard layout template. The insertion point of the block must be the midpoint of the left edge.
- MATCHLINE BLOCKS – User-defined block for plan or profile that contains the matchline, stationing, sheet name and sheet, number, as desired.
- MASKING BLOCKS – User-defined block for profile views that will mask data sources past the matchline. This is if additional overlap stationing for profile views is desired, but data (surfaces, pipes, etc.) is not to be shown in this area.
- SHEET TEMPLATE – User-defined DWT file containing predefined layouts with title blocks, viewports, print area blocks, and other relevant sheet information.

Workflow Overview

Sheet Generator for roads is a series of separate functions that should follow this workflow. Upon scope changes, users can back up to any stage of the workflow, edit plan or profile configurations, then go through the remaining workflows to update all sheets. The order of buttons in the ribbon represents the workflows, from top to bottom.



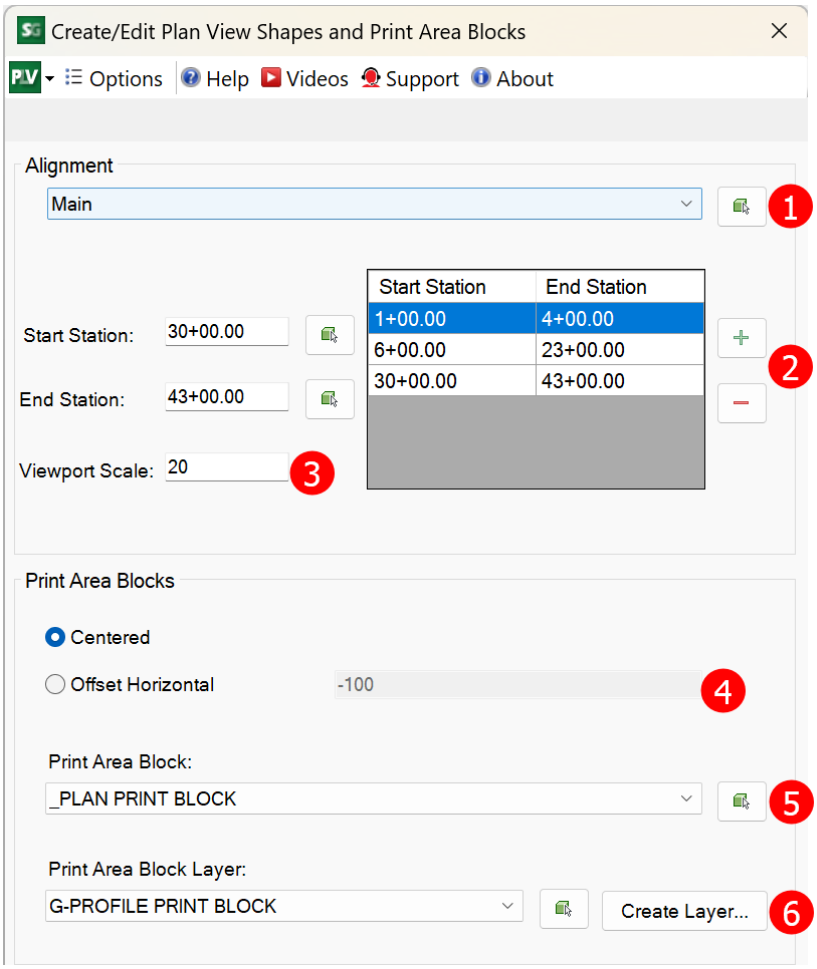
Workflow is from top to bottom

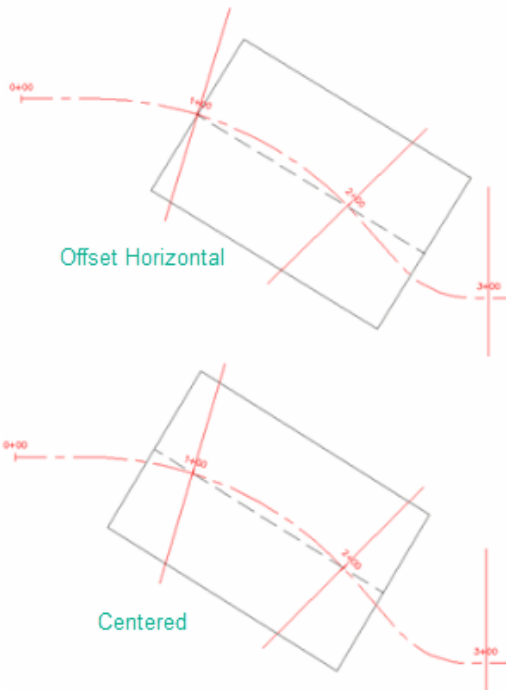
1. Layout plan views along an alignment by creating plan viewshapes.
2. Create multiple profile views using this shortcut to the native Civil 3D command.
3. Add pipe networks to profile views as desired.
4. Adjust profile view station and elevation ranges to match plan views and sheet size.
5. Automatically adjust non-Civil 3D objects placed on profile views en masse.
6. Create initial layouts from plan and profile viewshapes.
7. Make desired changes at any stage of the workflow to accommodate project changes.
8. Automatically update layouts according to project changes.

FUNCTION OVERVIEW: Alignment Viewshapes

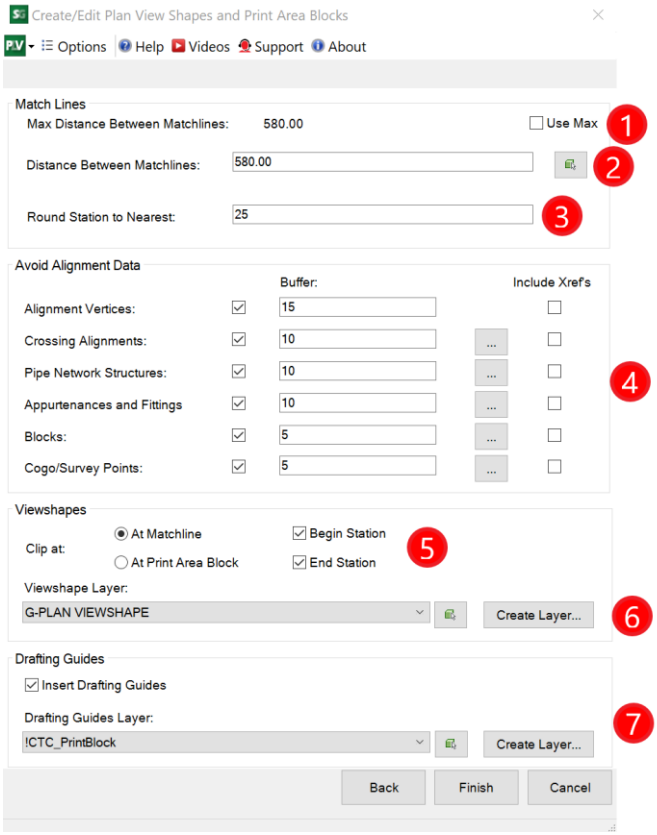
Creates polylines and print area blocks in plan view based on selected alignment and pre-defined print area block. The following dialog launches upon initiation of the command.

Page 1 of Wizard





1. Alignment to create viewshapes along, select from pulldown or pick in drawing. Can be live, DREF or XREF
2. Start and end stationing range along which to create viewshapes for sheets. Enter station values or select in drawing by clicking the green cube to pick stations along alignment
    a. After entering a station range, select the green + button to add the range to the table grid
    b. To remove station range, highlight desired range and select the red – button
3. Plan viewport scale for layouts in sheet set drawing or the active drawing
4. Print area block positioning selection
    a. Centered, is placed at centroid of block as seen in illustration above
    b. Offset horizontal, is placed at left or right of the block midpoint, then allows for an offset in the direction of the block placement as seen in illustration above
5. User defined print area block in the current drawing, must be present in the drawing
6. Layer on which to place print area blocks, can select by using the pulldown, selecting in the drawing or can be created in the tool (Note: layer creation will be name only and not have the options of the layer manager)

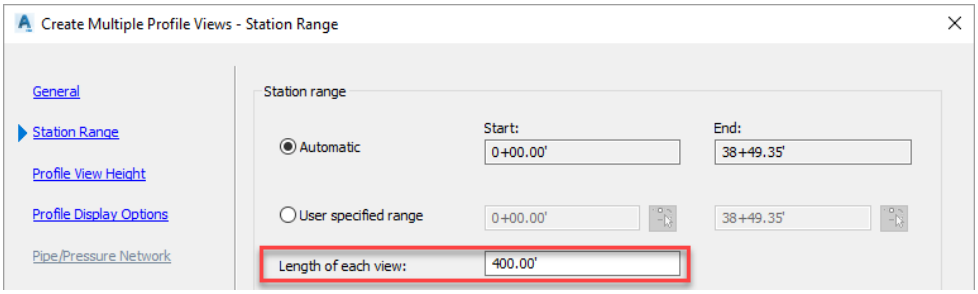


1. Selection to use the calculated maximum distance between matchlines based on viewport scale and print area block size.
2. Specify the distance between matchlines by entering a value or using the selection button to pick in the drawing.
3. Station interval along which to place matchlines, rounding to start at the nearest station.
4. Avoids placement of matchlines at selected data within the specified buffer. If data selection is avoided, matchlines will be placed at nearest station of rounding values. Distance between matchlines will adjust accordingly.
5. Specifies whether viewshapes are clipped at matchlines or at the print area block limits and if matchlines are placed at the beginning and ending stations.
6. Layer on which to place viewshapes, can select by using the pulldown, selecting in the drawing or can be created in the tool (Note: layer creation will be name only and not have the options of the layer manager).
7. Option to insert “drafting guides” as extended polylines on a set layer, to represent the matchlines in the plan viewshapes. This aids in the manual adjustment of the plan viewshapes prior to layout creation. (Note: layer creation will be name only and not have the options of the layer manager).

FUNCTION OVERVIEW: Profile Views

Native tool to create multiple profile views. The button is in the ribbon for convenience. See Autodesk Help for assistance.

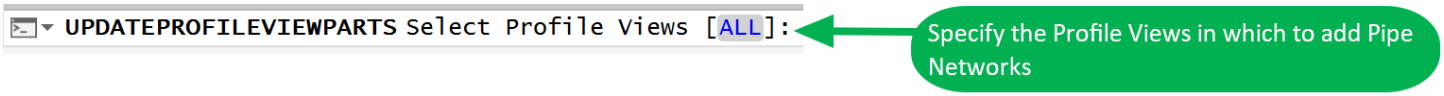
The value for distance between matchlines from create viewshapes should match the stationing and length of view in the Multiple Profile Views dialog box:



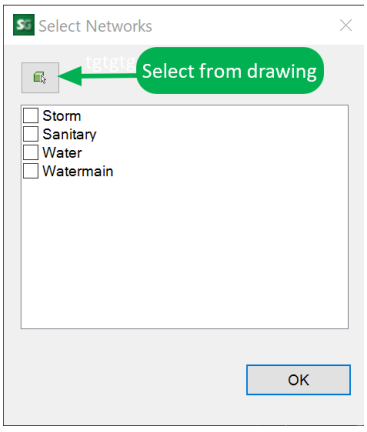
FUNCTION OVERVIEW: Networks to Views

Simple function that adds all Pipe Networks within a specified perpendicular distance of an alignment to selected Profile Views. This tool will only add parts that are within or partially within the Profile View Station range. Native tools will add the entire Pipe Network to every Profile View, which greatly affects Civil 3D performance. This tool should always be used in place of the option to add Pipe Networks at the end of the Multiple Profile Views native function. There is functionality built into the tool to select specific pipe networks, both gravity and pressure, to add to selected profile views. The function is mainly command line-based:

Once Networks to Views is selected the drawing will become active to select individual profile views or hit enter to select ALL views in the drawing:

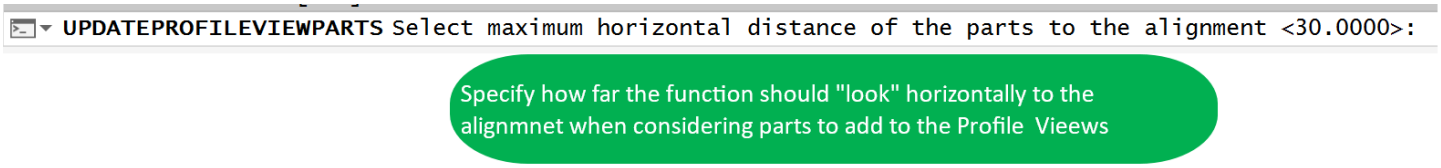


After selecting individual profiles views or ALL, the following dialogue will appear to select which network to promote into the Profile Views:



When selecting from drawing select any part of the network to promote

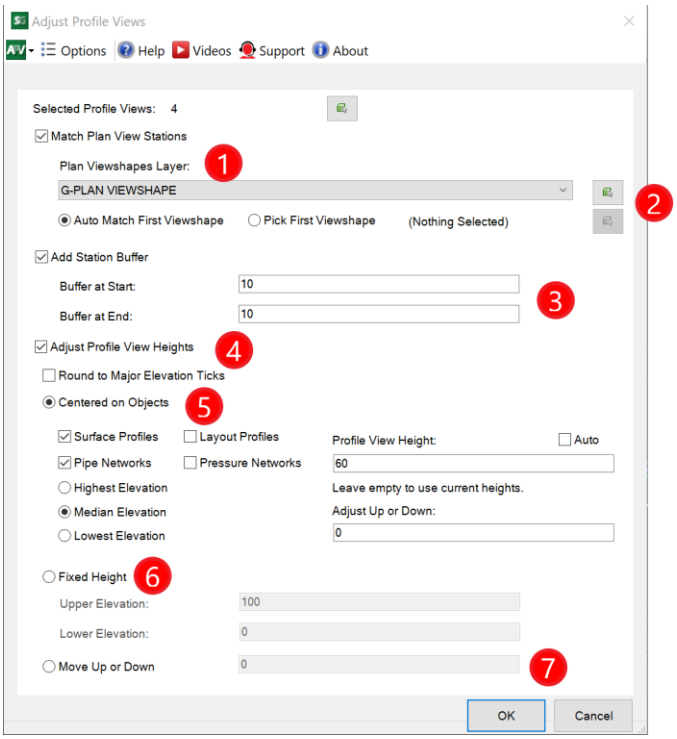
The following command prompt will be active:



FUNCTION OVERVIEW: Adjust Profiles

Adjusts Profile View station ranges to match plan Viewshape stationing, including the option to add station overlap to the start and end of Profile Views. Also, adjust Profile View elevation ranges to be justified on chosen data sources. The following dialog launches upon initiation of the command and profile selection, user may also hit enter to launch dialog and use the pick from drawing to select additional Profile Views to add:

:



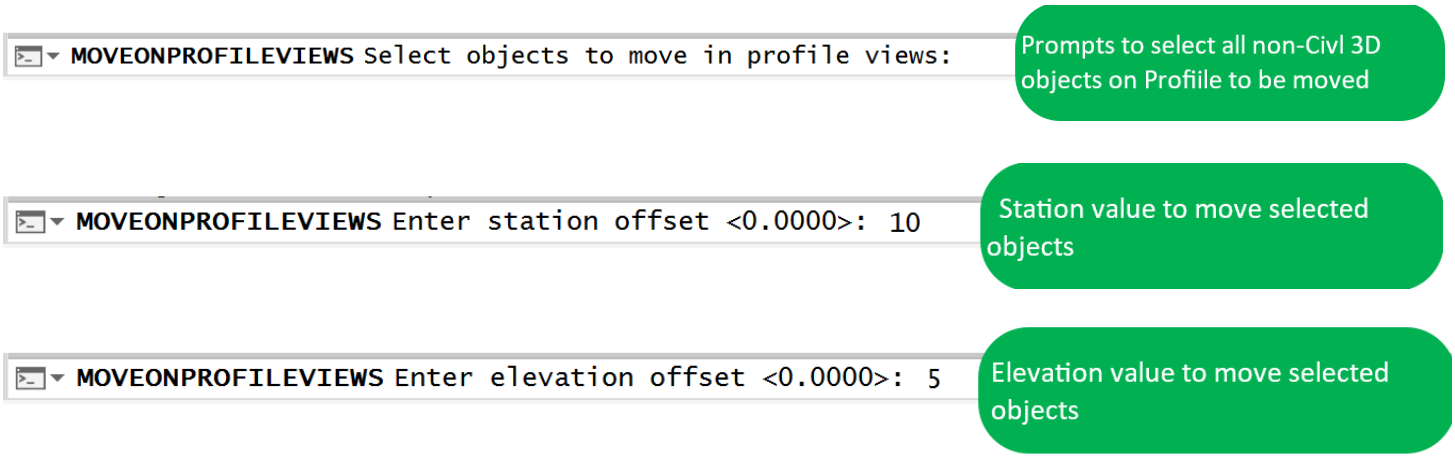
1. Layer on which to find plan viewshapes, choose from pulldown or select in drawing
2. Auto match will choose the lowest station plan viewshapes to start matching to profile views. Pick Prompts the users to choose the first plan viewshape to which profile views should correspond.
    a. Once the first plan viewshape is determined, function will move up station along the alignment and profile views to continue to match viewshapes to profile views.
3. Option to add additional overlapping stationing to profile views
4. Option to adjust profile view heights, and when doing so, whether to round to major elevation ticks as specified in the current profile view styles
5. Centered on objects, adjusts profile view elevation ranges based on selected data sources
    a. Option to fix the profile view height to an entered value or automatically
    b. Option to choose from highest median or lowest elevation
    c. Option to adjust elevations up or down to an entered Y value
6. Fixed height allows a fixed elevation to an entered value for all profile views
7. Move up or down, allows for shifting of elevations either up or down to an entered Y value

FUNCTION OVERVIEW: Move on Profiles

Moves non-Civil 3D objects (MText, Polylines, etc.) drawn in profile views to account for adjustment of profile view station and elevation ranges in the previous function. If moving the object would result in it falling outside the current profile view station range, the object will be moved to the adjacent profile view.

The function is command line-based:

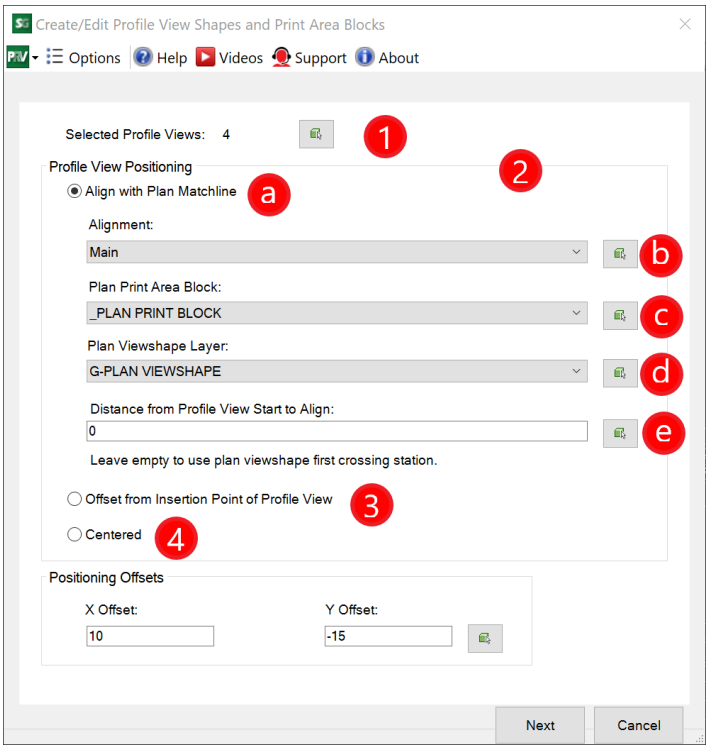
Command: **MOVEONPROFILEVIEWS**



FUNCTION OVERVIEW: Profile Viewshapes

Creates polylines and print area blocks for profiles based on selected profile views and pre-defined print area block. This function behaves similar to the plan viewshapes function but serves to properly position profile views within viewports once the sheets are created. Profile views can be live in the drawing or XREF'd. The following dialog launches upon initiation of the command.

Page 1 of Wizard

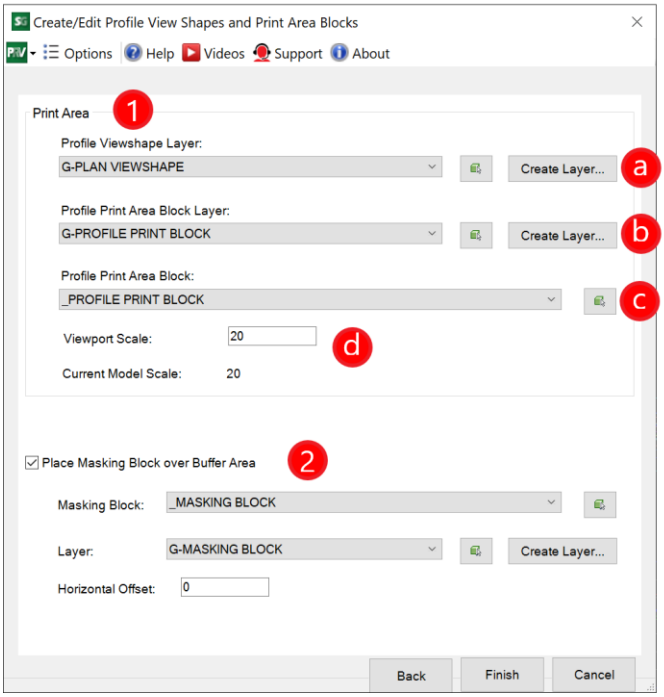


1. Selected Profile Views around which to place Print Area Blocks and Viewshapes
2. Profile View Positioning
    a. Align with Plan Matchline - positions Viewshapes so that the starting station of the Profile View will align with the same station in Plan
    b. Alignment -select alignment to follow to place Profile View, should match plan Viewshapes
    c. Plan Print Area Block - select plan print block to match profile views with, match to plan viewshapes
    d. Plan Viewshape Layer - select plan Viewshape layer, same as plan viewshapes

e. Distance from Profile View Start to Align – default stationing to align between plan and profile is at the low station matchline. Option to enter station offset value from station

3. Offset from Insertion Point of Profile View – uses values of Positioning Offsets for additional offsets to Profile Views relative to the Viewshape
4. Centered – centers Profile Views within Viewshapes

Page 2 of Wizard

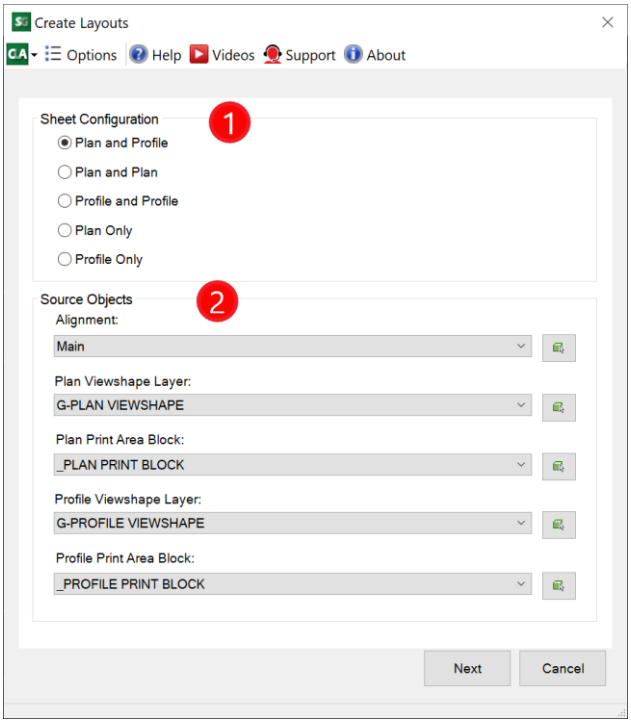


1. Print Area settings for Profile Viewshapes
    a. Profile Viewshape Layer, use same layer from Wizard Page 1, (area 2.d)
    b. Profile Print Area Block Layer, set from pulldown, select in drawing or create
    c. Profile Print Area Block, use to place around Profile Views. Select from pulldown or select in drawing
    d. Viewport Scale, match to layout template
2. Select to Place Masking Block over Buffer Area in profile at profile limits. Choose block from pulldown or select in drawing. Set Layer, from pulldown, select from drawing or create. Set offset for block placement

FUNCTION OVERVIEW: Create Layouts

Creates Layouts based on Plan and/or Profile Viewshapes and Print Area Blocks and a user-defined Layout to act as a template that has been set up in the current drawing with Plan and Profile Print Area Blocks and North Arrow Block inserted. New drawings will be created, and sheets placed into a sheet set or directly in the active drawing. The following dialog launches upon initiation of the command.

Page 1 of Wizard

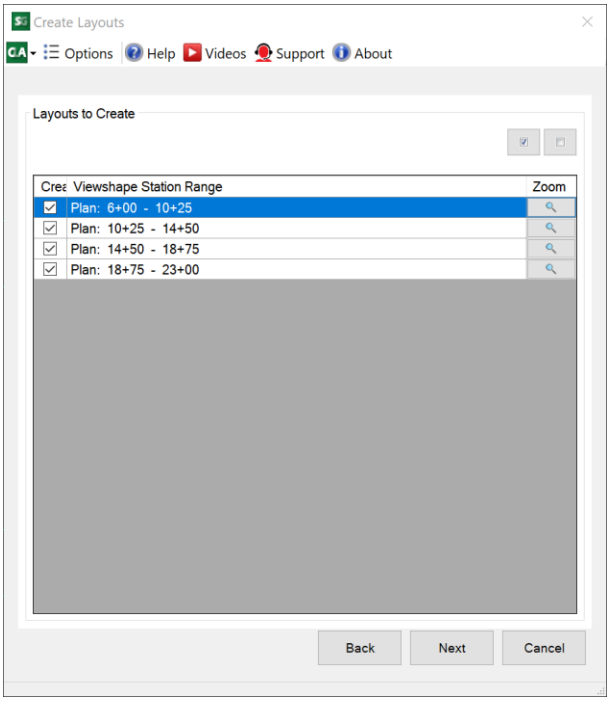


1. Sheet Configuration: select from layout options to match desired configuration as set in user defined layout template

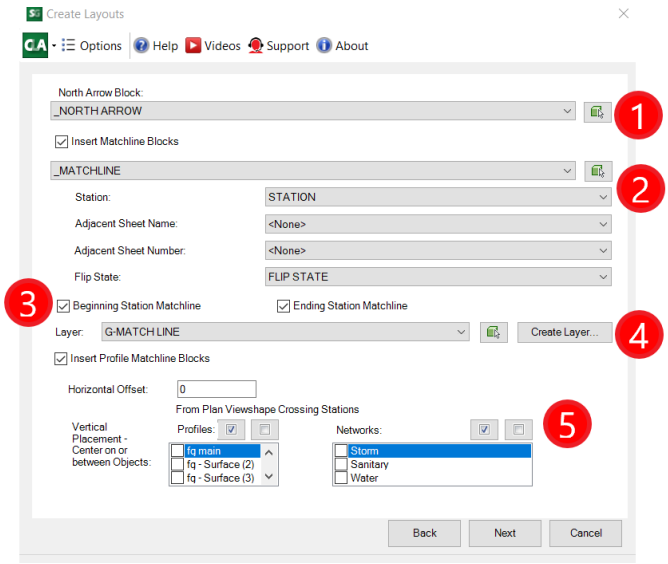
2. Source Objects: sets references matching settings from Create/Edit Profile Viewshapes and Print Area Blocks. These should default to previous settings and need to match those for tool to function correctly

Page 2 of Wizard

Layout to Create: Use selection buttons to check, uncheck all or individually. Use zoom functionality to verify viewport locations. Stationing is based on matchlines previously set

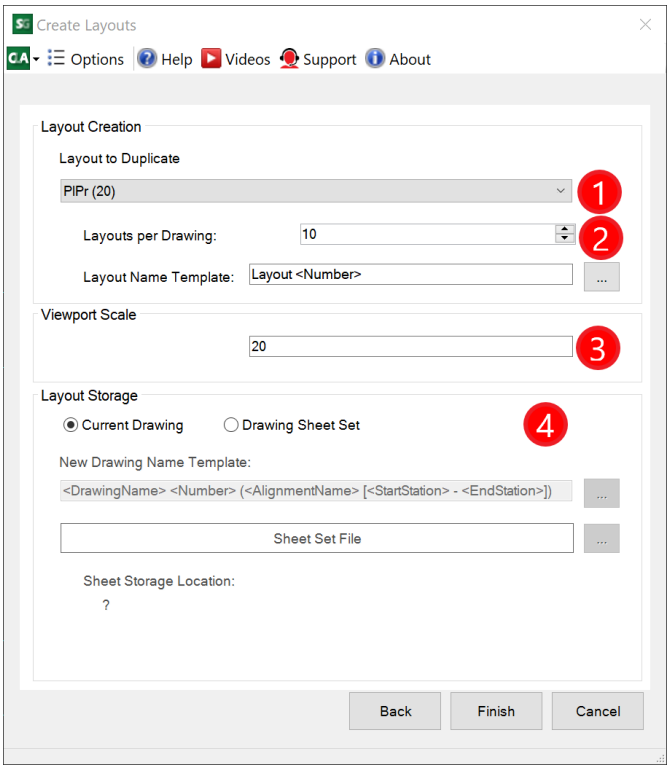


Page 3 of Wizard



1. User defined north arrow block, needs to be inserted in the layout template
2. User defined matchline block to be inserted in Paperspace of each Layout.
    a. **NOTE:** Block should have attributes of all data to be shown. Fields will be populated when sheets are created
3. Options to place matchline blocks at the beginning and/or ending stations in Viewshapes
4. Layer to place matchlines on, select from pulldown, select in drawing or create
5. Selection to insert profile matchlines, with value entered horizontal offsets and data selection to center them on

Page 4 of Wizard

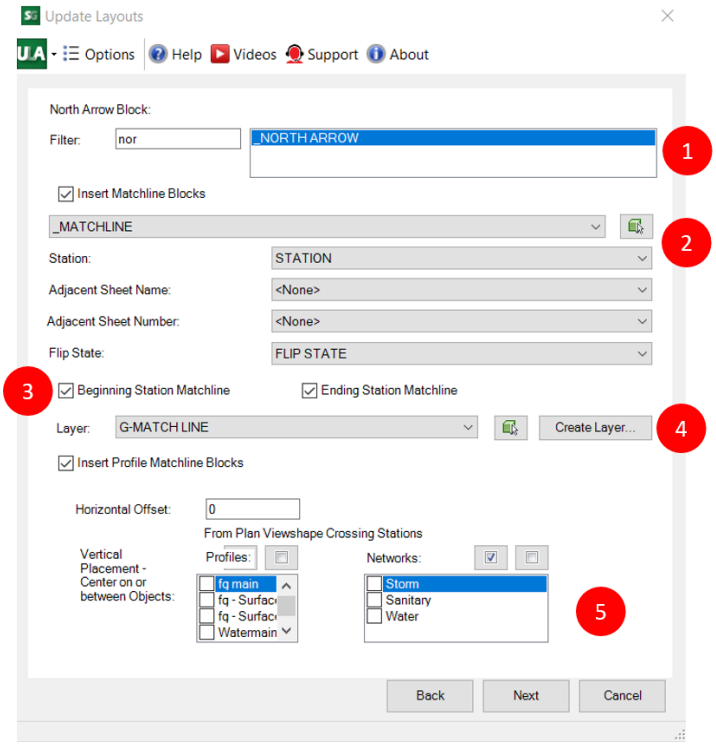


1. Layout template to duplicate, needs to be in current drawing with blocks inserted
2. Layouts per newly created drawing or current drawing and layout naming format from ellipse button options
a. When naming layouts, custom text can be inserted
3. Viewport scale for Paperspace viewport, will default to drawing scale or value can be entered
4. Drawing Name Template for sheet set drawing creation from ellipse button. This option will be disabled if creating layouts in the current drawing

FUNCTION OVERVIEW: Update Layouts

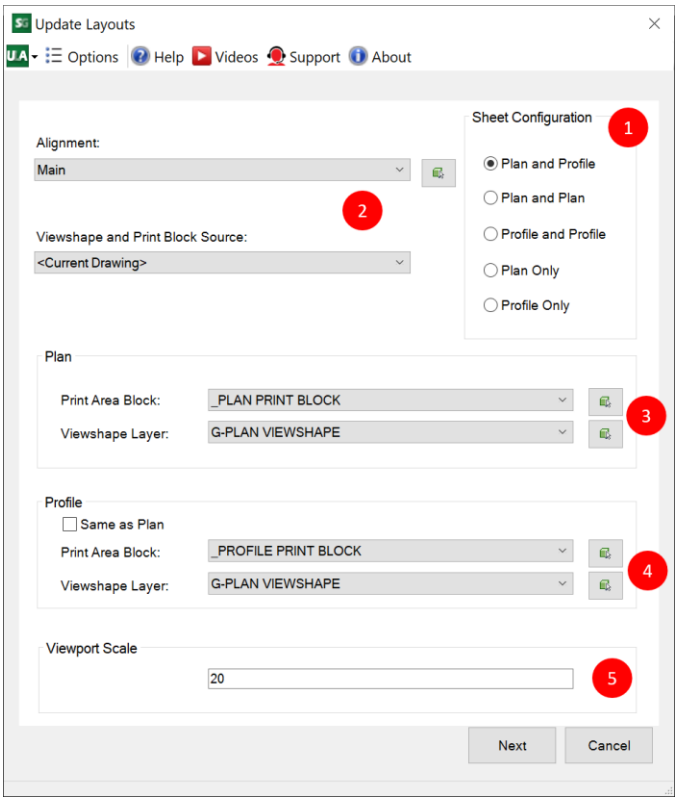
Updates previously created Plan and/or Profile sheets based on Viewshapes and Print Area blocks. User can make any manual or automated edits (per previous functions in this tool) to Modelspace Print Area Blocks and Viewshapes, and "push" those edits to all layouts. (This is the main point of this entire toolset). User must choose Block and Layer names requested in this function that correspond with those created in previous functions. This function needs to be run within the drawing that the Layouts were created. Sheet Set data will also be updated per these changes. The following dialog box launches upon command initiation:

Page 1 of Wizard



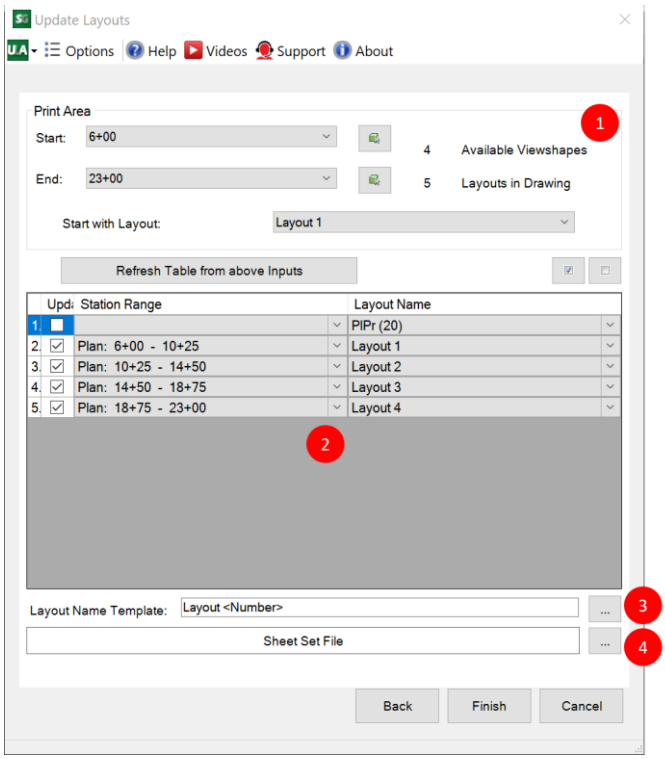
1. Sheet Configuration should be the same as was used during the Create Layouts function
2. Source and alignment from which to scan Print Area Blocks
3. Plan Print Area Blocks and Viewshapes Layer to use for updating layouts.
    a. Both settings, block and layer, must match what was used when Viewshapes were created
4. Profile Print Area Blocks and Viewshapes Layer to use for updating layouts. If PLpan and LPan is used, select Same as Plan to disable profile settings
    a. Both settings, block and layer, must match what was used when Viewshapes were created
5. Viewport Scale, will default to originally crated viewports and can be changed if desired

Page 2 of Wizard



1. User defined north arrow block to be updated. Use filter to narrow selection
2. User defined matchline block to be updated in Paperspace of each Layout.
    a. **NOTE:** Block should have attributes of all data to be shown. Fields will be populated when sheets are updated
3. Options to update matchline blocks at the beginning and/or ending stations in Viewshapes
4. Layer to update matchlines on, select from pulldown, select in drawing or create
5. Selection to update profile matchlines, with value entered horizontal offsets and data selection to center them

Page 3 of Wizard



1. Filter options to control how many layouts show in the list below (area 2). Start with Layout will limit the list to start with selected layout. Use refresh button to repopulate the available layouts
2. Station Range is based on Plan Viewshapes.
    a. Tool will match these with logical corresponding layout.
    b. User may override this when layouts do not match.
    c. Major station changes in the layout will usually require overrides.
3. Layout Naming Template to rename layouts if desired. Use the ellipse button to access settings fields.
4. Sheet Set to update with layout names and stationing.
    a. **NOTE:** Layout names will be overwritten in sheet sets and active drawing

Sheet Generator for Sites

Sheet Generator for sites is a workflow-based solution as an alternative to manually creating viewports for the creation and editing of plan sheets. Users can set up and modify plan sheets to fit a site and is independent of alignments. Sheets can be automatically created with full integration into Sheet Set Manager or created directly into the active drawing. Finally, and most importantly, edits to plan sheet layout configurations can then be made in Modelspace, and the changes pushed to all previously created layouts and Viewports, saving lots of time in manual sheet editing, and preventing sheet recreation.

Definitions and Initial Configuration

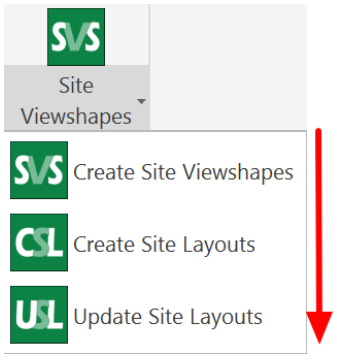
To properly use the Sheet Generator to match your organization's standards, some simple setup is required, and definitions understood, including creation of some or all of the following blocks and files. Some default blocks have been provided and will load if selected. The storage location is important and will not function if moved, blocks can be edited to match company standards if desired and are located here: *C:\Users\Public\CTC Software\Sheet Generator*

A Sheet Set .dst is also located here *C:\Users\Public\CTC Software\Sheet Generator* and is used temporarily to create layouts in the current drawing, if the file is altered or moved the program may not function as desired.

- VIEWSHAPES – Polylines created in plan and profile that represent the shape of Viewports created in sheets. The tool will create these, but this term is referred to throughout the functions.
- PRINT AREA BLOCKS – Defined Blocks that link the Viewshape placement Plan configuration to the Viewport placement on sheets. These must be created and placed in the Plan Print areas within the standard Layout template. The insertion point of the block must be the bottom left edge corner
- MATCHLINE BLOCKS – User-defined Block for plan matchline, sheet name and sheet, number, as desired. A default bubble type block with adjacent sheet number attribute is provided and can be used if desired.
- SHEET TEMPLATE – User-defined DWT file containing predefined Layouts with title blocks, Viewports, Print Area Blocks, and other relevant sheet information.

Workflow Overview

Sheet Generator for Sites is a series of separate functions that should follow this workflow. Upon scope changes, users can back up to any stage of the workflow, edit plan configurations, then go through the remaining workflows to update all sheets. The order of buttons in the Ribbon represents the workflows, from top to bottom.



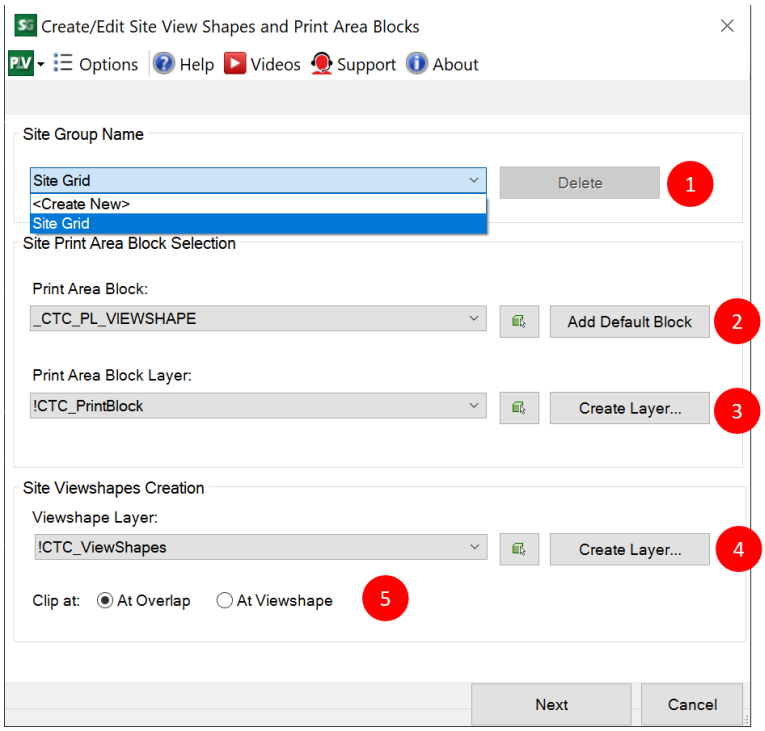
Workflow is from top to bottom

1. Create Site Viewshapes: Places site viewshapes to encompass your site in a grid pattern by picking in the drawing or within a region defined by a polyline
2. Create Site Layouts: Creates layouts from Plan Viewshapes in a sheet set or in the drawing
3. Update Site Layouts: Updates plan Viewshapes if changes have been made or layout tabs need to be renamed

FUNCTION OVERVIEW: Create Site Viewshapes

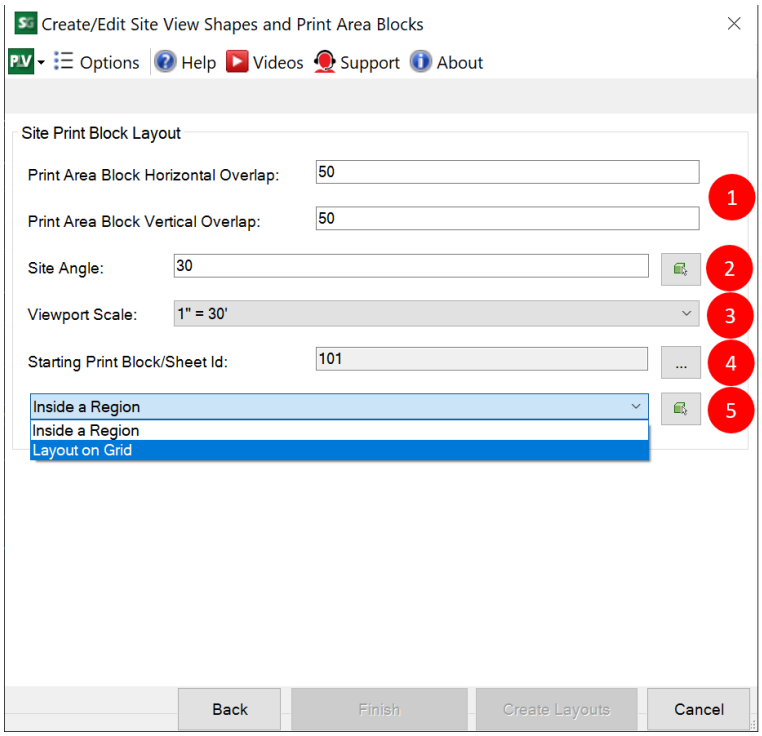
Creates Polylines and Print Area Blocks in plan view based on selected layout method from page two and pre-defined Print Area Block. The following dialog launches upon initiation of the command.

Page 1 of Wizard



1. **Site Group Name:** Create a site group for plan Viewshapes to be associated with. The group name will be selectable for the workflow, multiple groups can be used for different rotations or locations on the site
    a. If no groups are present, select <Create New> from the pulldown to create named group
    b. Delete unwanted groups by selecting the group and selecting delete
2. **Print Area Block:** Block used to define plan layouts
    a. Add Default Block will insert the provided print block with identifier and will be scaled by the viewport scale set on page 2
    b. Note: Can be a user defined block and must be present in the drawing to be slected
3. **Print Area Block Layer:** Sets the layer for the insertion of the print block
    a. Note: this layer must be used for the entirety of the workflow for tool to function correctly
4. **Viewshape Layer:** Sets the layer for the Viewshape polyline that represents the Viewport in the layout
5. **Clip at:** At Overlap will VPCLIP the polyline Viewshape at the midpoint between adjacent Viewshapes. At Viewshape will extend the polyline to the extents of the block and overlap the blocks.
    a. Distances in drawing units will be entered on page 2 of the wizard

Page 2 of Wizard

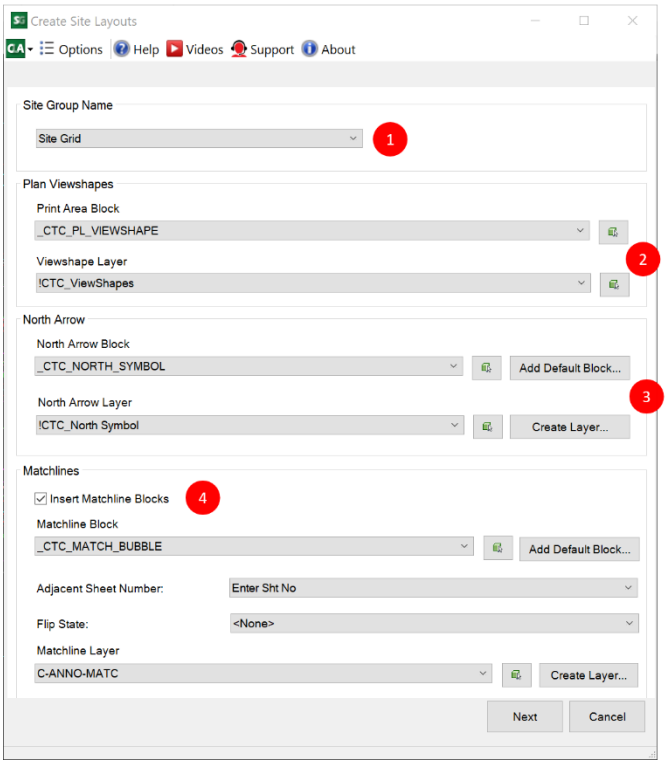


1. Overlap distance in drawing units to define Viewshape for viewports
2. Site angle setting for Viewshape placement
    a. Note: If using angle, model space will temporarily DVIEW Twist for visual representation of viewport
3. Viewport scale as expected in sheet, will default to drawing setting or can be selected from available scales
4. Sheet Id used to identify location and order of print block placement, use ellipse button to choose and enter settings
5. Method for print block placement, select from grid or region and choose the pick in drawing button to be directed to drawing model space, follow command line prompts, enter
    a. After placement, editing can be done by repeating 5
    b. Once shapes are placed select Create Layouts button to move to step 2 or Finish to edit manually

FUNCTION OVERVIEW: Create Site Layouts

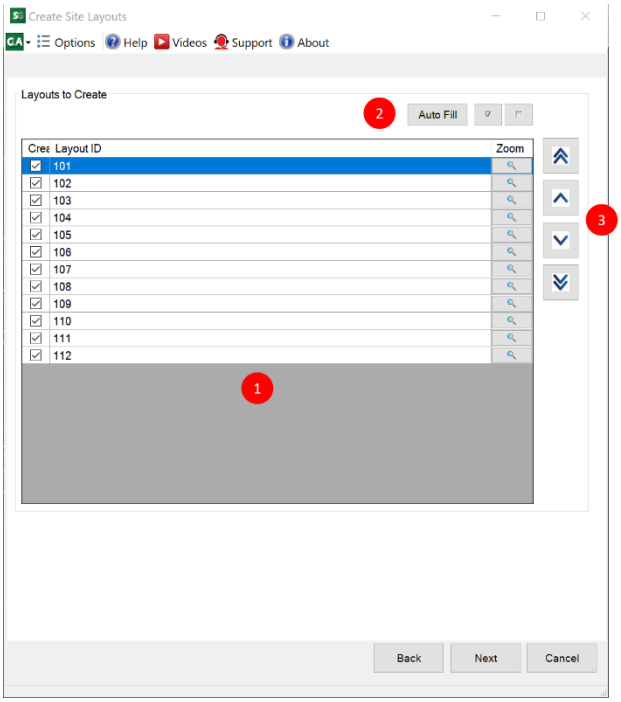
Creates Layouts based on Plan Viewshapes and Print Area Blocks and a user defined Layout Tab that has been set up in the current drawing with Plan Print Area Blocks and North Arrow Block inserted to act as a template. New drawings will be created, and sheets placed into a sheet set or directly in the active drawing. The following dialog launches upon initiation of the command.

Page 1 of Wizard



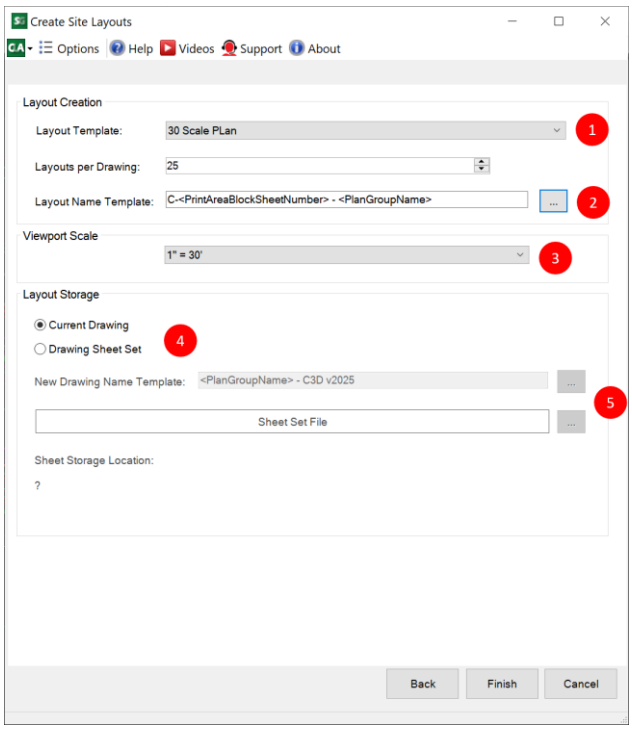
1. Select group name for layouts to associated with
2. Select print block and layer as set in the Create Site Viewshapes
    a. **NOTE:** Must match those previously set in Create Site Viewshapes for tool to function
3. North arrow block and layer, select from existing or load default provided with install
    a. Print block and north arrow must be in layout template at the anticipated scale
    b. In the case where no north arrow is present, block will be placed in upper left corner of viewport by default
4. Matchline selection will insert at the midpoint of the intersection of adjacent viewports, can be user defined with defined attributes or use provided default bubble with adjacent sheet number field

Page 2 of Wizard



1. Sheet layout grid and order of creation from block ID attribute
    a. ID numbers can be renamed if desired
    b. Zoom function will zoom to the model space block for identification
2. Auto Fill will renumber ID and sort if changed or edited
3. Order buttons to move layouts in list, use in conjunction with Auto Fill to sort

Page 3 of Wizard



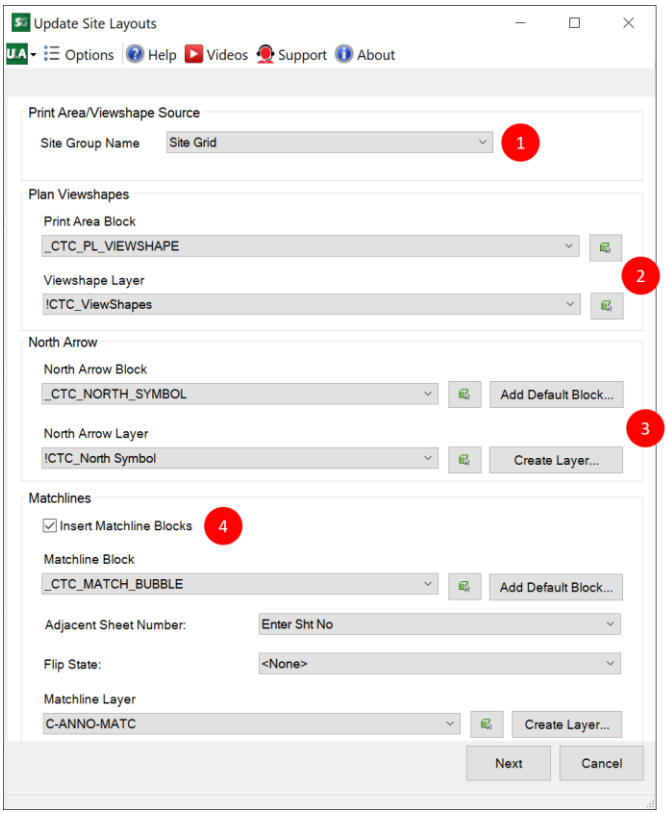
1. Layout template to duplicate for sheet layouts with organizational border, Print Block for Paperspace viewport creation and North Arrow inserted and number layout per drawing to create
2. Layout naming format, use ellipse to populate fields
3. Viewport scale, will default to drawing settings or can be selected from available drawing scales

4. Layout placement setting to create layouts in drawing or Sheet Set
    a. **NOTE:** if layouts per drawing exceeds set limit tool will need to be rerun for new sheet set drawing
5. Sheet set drawing naming format and path for sheet set storage

FUNCTION OVERVIEW: Update Site Layouts

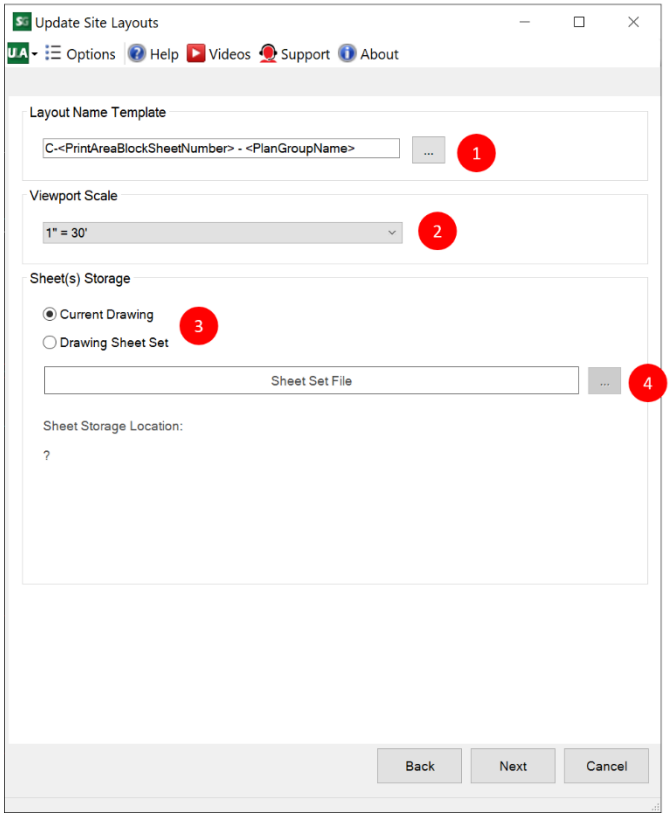
Updates previously created Plan sheets based on Viewshapes and Print Area blocks. User can make any manual or automated edits (per previous functions in this tool) to Modelspace Print Area Blocks and Viewshapes, and "push" those edits to all layouts. (This is the main point of this entire toolset). User must choose Block and Layer names requested in this function that correspond with those created in previous functions. This function needs to be run within the drawing that the Layouts were created. Sheet Set data will also be updated per these changes. The following dialog box launches upon command initiation:

Page 1 of Wizard



1. Select group name for layouts to associated with and updated
2. Select print block and layer as set in the Create Site Viewshapes
    a. **NOTE:** Must match those previously set in Create Site Viewshapes for tool to function
3. North arrow block and layer, select from existing or load default provided with install
    a. Print block and north arrow must be in layout template at the anticipated scale
    b. In the case where no north arrow is present, block will be placed in upper left corner of viewport by default
4. Matchline selection will insert at the midpoint of the intersection of adjacent viewports, can be user defined with defined attributes or use provided default bubble with adjacent sheet number field

Page 2 of Wizard



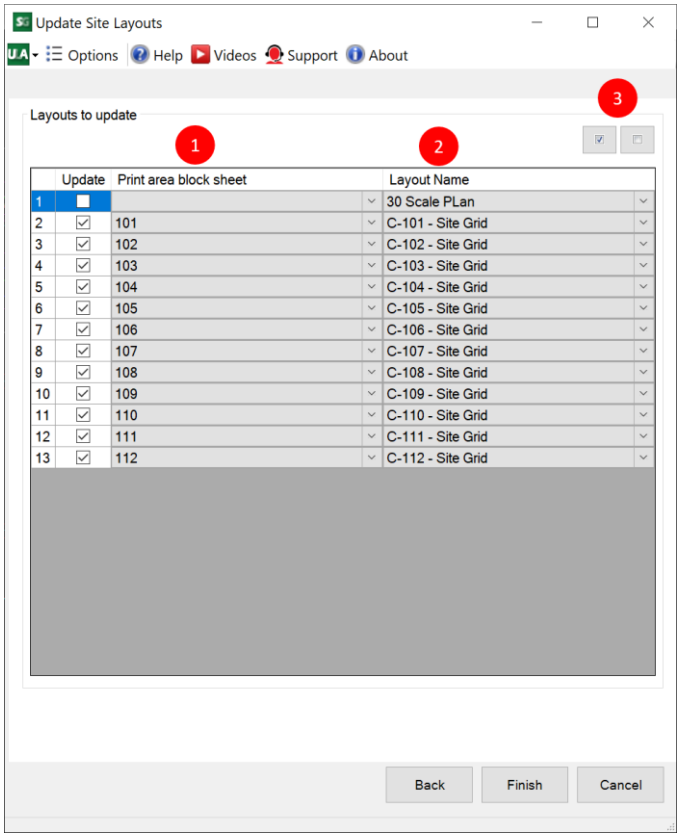
1. Layout naming format, use ellipse to populate fields

2. Viewport scale, will default to drawing settings or can be selected from available drawing scales

3. Layout placement setting to update layouts in drawing or Sheet Set

4. Sheet set drawing naming format and path for sheet set updates

Page 3 of Wizard



1. Print area block sheet to be updated
2. Layout name to match with print block to be updated
3. Update selection buttons, select all clear all

Getting Help

A variety of help and resources is accessible right within the applications:

- **Help:** directs you to our help page.
- **Videos:** launches YouTube playlist of videos for that specific application
- **Support:** launches webpage to fill out support request to communicate with tech support personnel
- **About:** provides information about current app, as well as direct access to download the latest release