CES462078

2D LINES TO 3D PIPE NETWORKS FOR MEGA PROJECTS AND SMALL PROJECTS

Jeff Frye
HDR, Inc

Cameron Schaefer
HDR, Inc

Sean Hulbert
Autodesk

Learning Objectives

- Use basic autocad commands to achieve great results
- Use basic Map commands
- Export Autocad linework to SHP files
- Import GIS data as pipe networks

Description

We take basic autocad objects, drape them on a surface, lower them to an assumed depth for the utility, we then assign properties to those objects, export to SHP and bring back into Civil 3d as robust powerful civil 3d pipe networks.

Isolate Objects

As a seasoned cadd manager, I believe in a clean drawing area. It is important in this workflow to have as clean of a work environment as you can. Have only those objects visible on the screen that you are going to work with.

layiso

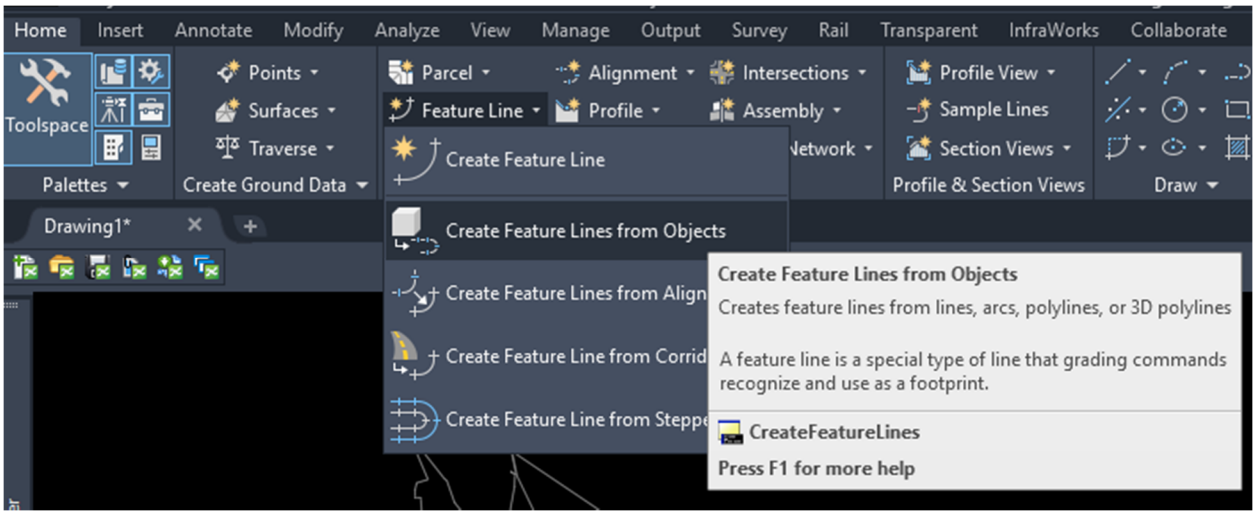
There are many many ways to isolate layers, in this class we use LAYISO to do this.

Tip: you may find that separate drawings for each utility works better for you. We had all utilities in one file, and we were able to freeze/thaw rather quickly to achieve our goal.

Create feature lines out of those objects

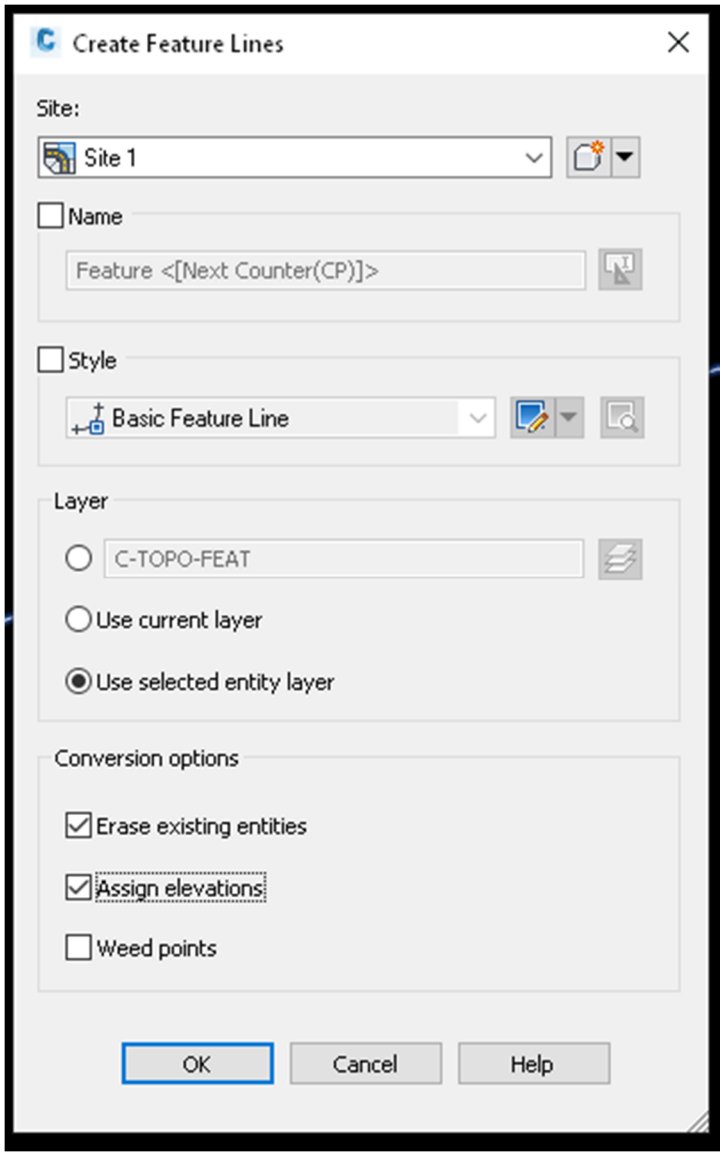
Feature lines give us the ability to make this whole process work. Create feature lines from your isolated objects, set them to the surface elevation. Then move them to your desired assumed depth.

Create Feature lines from Objects



Create Feature lines from Objects

There is no need here to assign these to a site or set the style since we will be exploding them later and that would be wasted data in the file.
Use selected entity layer should be checked so we can assign that attribute later to our pipes as a description
Erase existing entities is optional
Assign elevations will allow us to set these objects to our desired elevation below existing grade
Weed points should not be checked. This will create a pipe segment at every vertex in the polylines.



Tip: When adding break points at DTM triangles, this will cause a more accurate model, but it will also add additional size to your file

Assign attributes (elevation, thickness)

This step is critical. Make sure you know your assumed depth from existing ground. Know that each DTM triangle and each polyline vertex will be a new pipe.

Assumed Depth

This step will take all of the feature lines and put them at a single depth below ground. It will make a new pipe and every vertex in the feature line, and every DTM triangle our project had several utilities, each at different depths.

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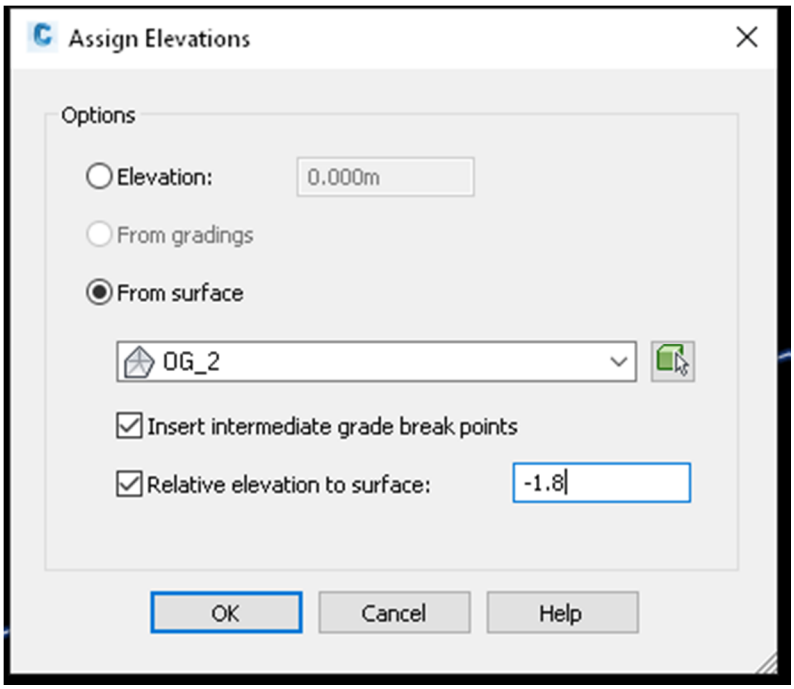
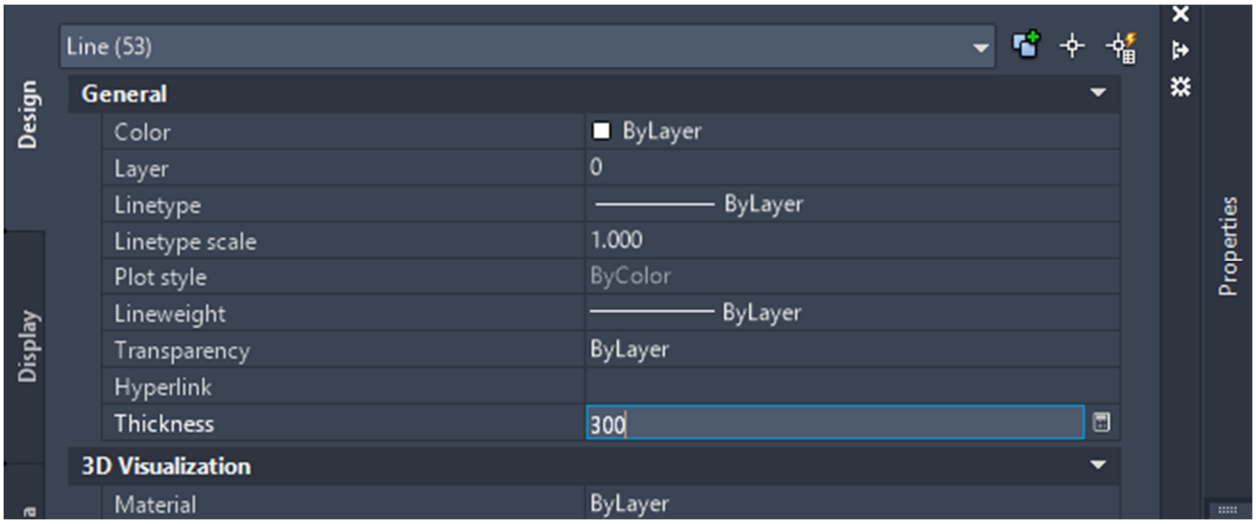


EXPLODE EXPLODE

This step will take all of the feature lines explode them twice to get 3dlines
Explode them once, then explode all those objects one more time.

Thickness

Select all of your 3d lines, and in the properties dialog box choose Thickness and set this to your inner pipe diameter. We used 300 in our class.



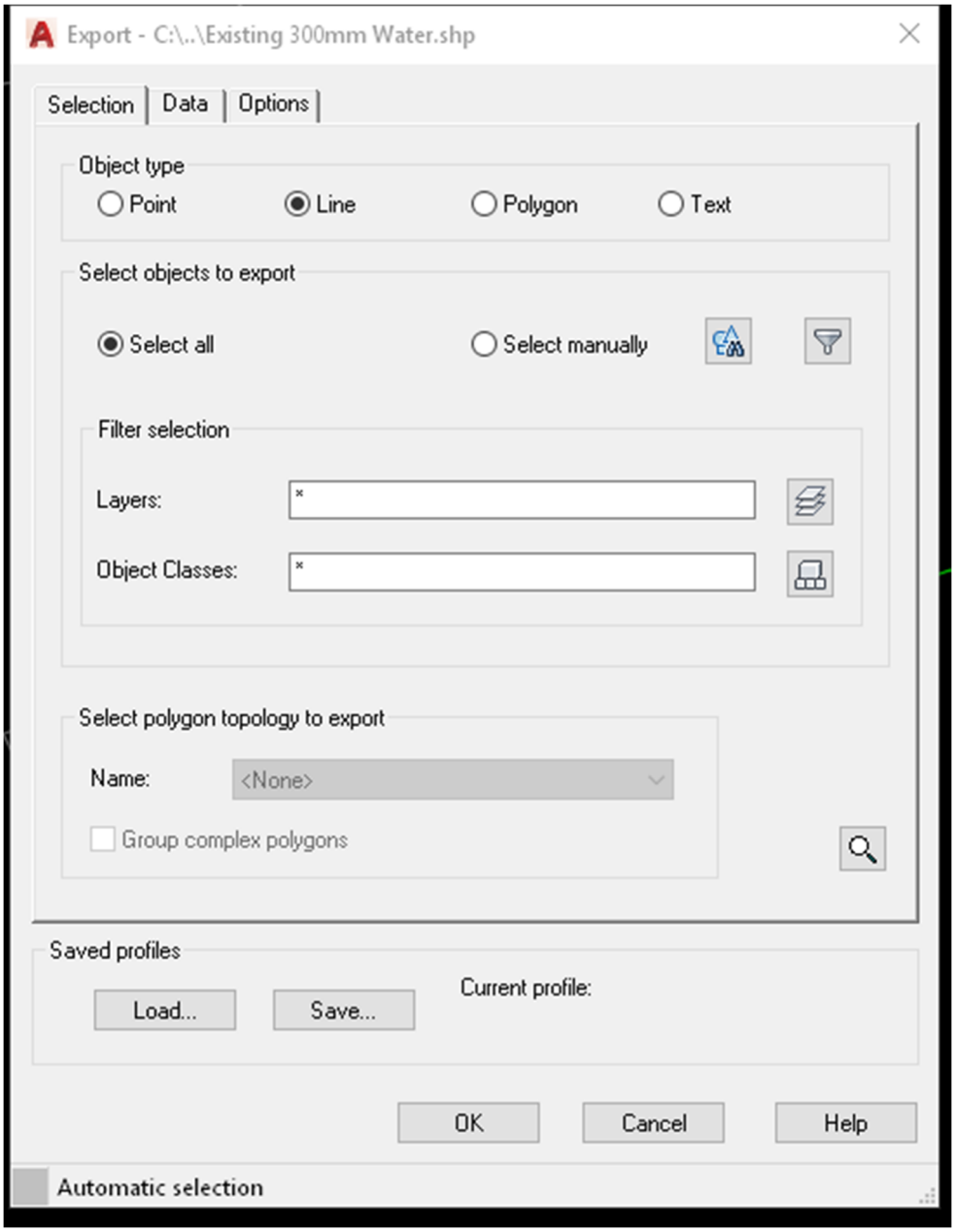
Tip: test with not adding intermediate grade breaks. Your file will be smaller, but less accurate

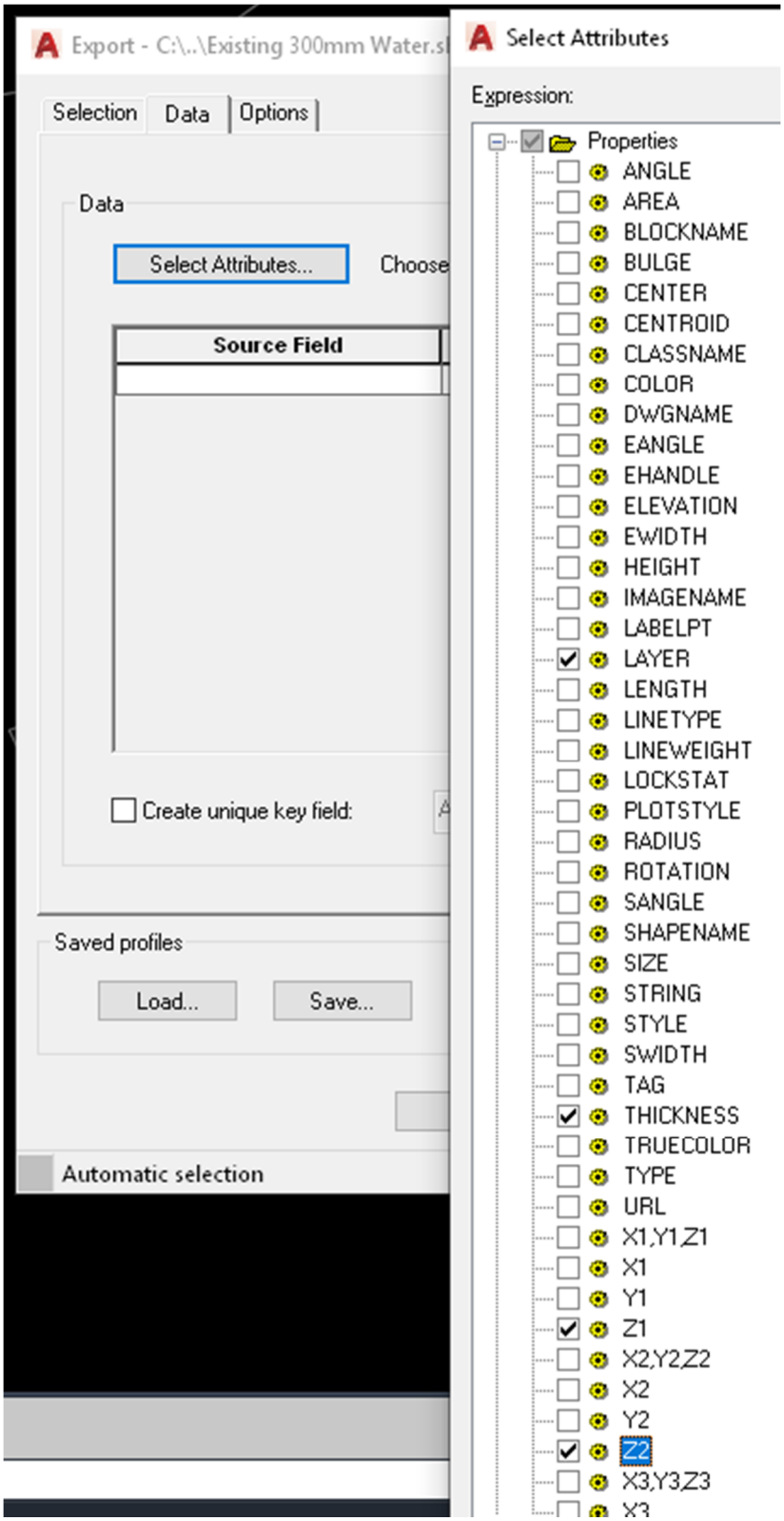
Export to SHP file

Exporting to a SHP file will allow us to attach meta data to our objects. We will set four properties in this exercise. LAYER, THICKNESS, Z1, and Z2.
Thickness was set in the last step to 300
Z1 and Z2 were set in the previous step as well when we draped on to the surface
Layer was set when we selected to keep the entity layer when we made the feature lines

MAPEXPORT

Name your SHP file something similar to what you want to call your pipe network later
Object type should be set to Line, select your objects
On the Data tab choose Select Attributes
Select LAYER, THICKNESS, Z1, and Z2


Export - C:\..\Existing 300mm Water.shp
Selection
Data
Options
Object type
Point
Line
Polygon
Text
Select objects to export
Select all
Select manually
Filter selection
Layers:
*
Object Classes:
*
Select polygon topology to export
Name:
<None>
Group complex polygons
Saved profiles
Load...
Save...
Current profile:
OK
Cancel
Help
Automatic selection


Export - C:\..\Existing 300mm Water.s
Selection
Data
Options
Data
Select Attributes...
Choose
Source Field
Create unique key field:
Saved profiles
Load...
Save...
Automatic selection
Select Attributes
Expression:
Properties
ANGLE
AREA
BLOCKNAME
BULGE
CENTER
CENTROID
CLASSNAME
COLOR
DWGNAME
EANGLE
EHANDLE
ELEVATION
EWIDTH
HEIGHT
IMAGENAME
LABELPT
LAYER
LENGTH
LINETYPE
LINEWEIGHT
LOCKSTAT
PLOTSTYLE
RADIUS
ROTATION
SANGLE
SHAPENAME
SIZE
STRING
STYLE
SWIDTH
TAG
THICKNESS
TRUECOLOR
TYPE
URL
X1,Y1,Z1
X1
Y1
Z1
X2,Y2,Z2
X2
Y2
Z2
X3,Y3,Z3

Shp file

You can now take this file out to GIS if you want. We will be directly importing back into Civil 3D as a pipe network after making a custom parts list..

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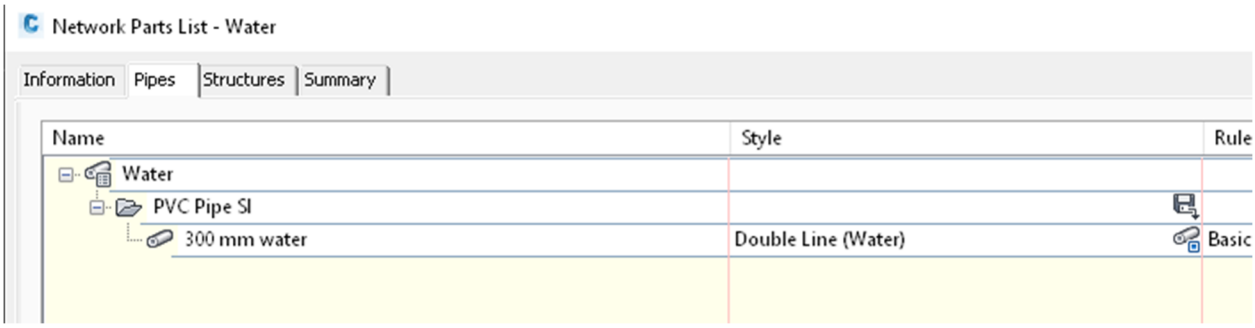
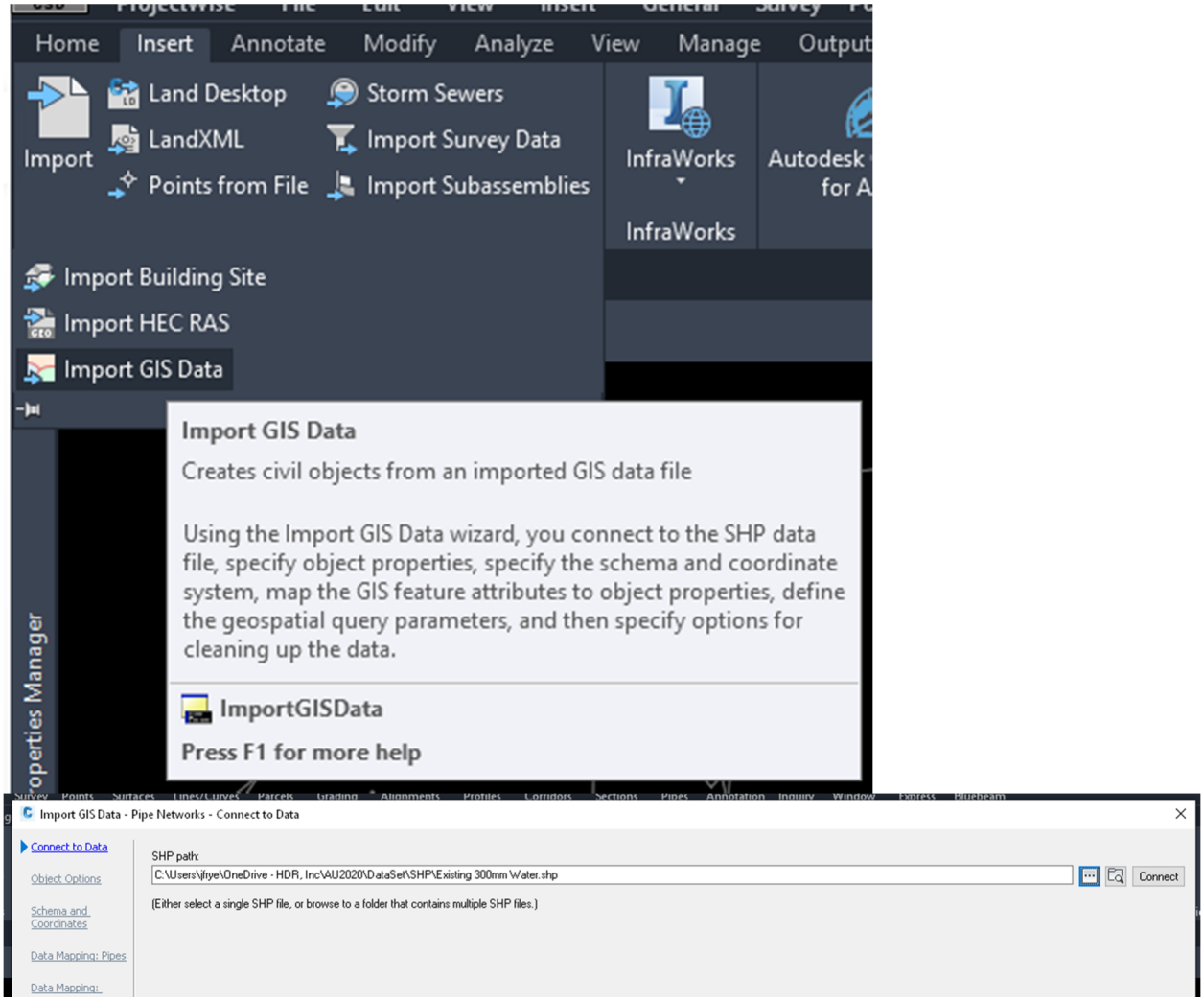
Create custom parts list

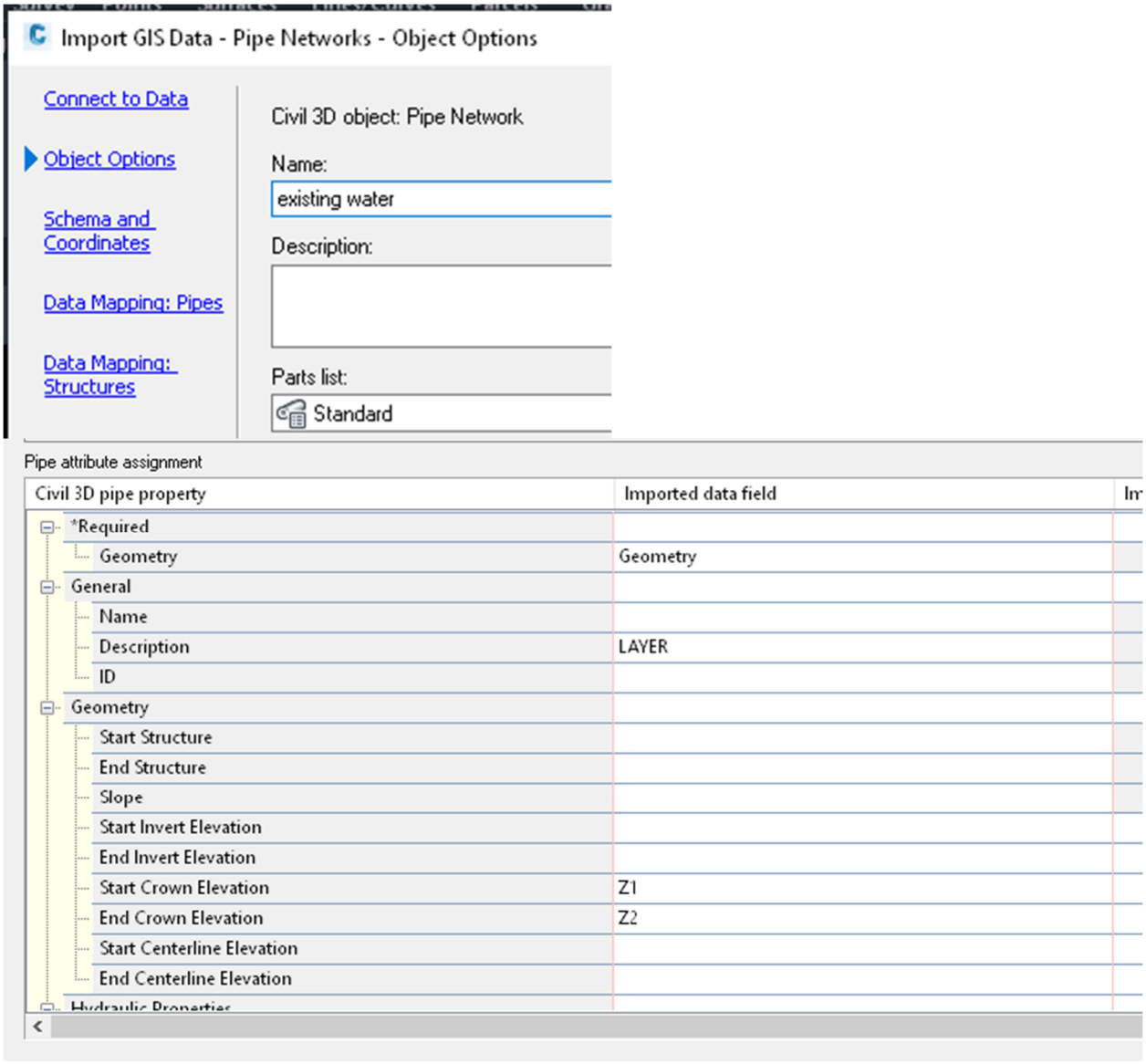
Since this class assumes an advanced knowledge of pipe networks, we will skip showing how to make a parts list.



Import SHP file as a pipe network

This final step will add all of our data together to create a robust pipe network. Below I will just show the individual steps in the wizard with little explanation.




Import GIS Data - Pipe Networks - Object Options
Connect to Data
Object Options
Schema and Coordinates
Data Mapping: Pipes
Data Mapping: Structures
Civil 3D object: Pipe Network
Name:
existing water
Description:
Parts list:
Standard
Pipe attribute assignment
Civil 3D pipe property
Imported data field
*Required
Geometry
Geometry
General
Name
Description
LAYER
ID
Geometry
Start Structure
End Structure
Slope
Start Invert Elevation
End Invert Elevation
Start Crown Elevation
Z1
End Crown Elevation
Z2
Start Centerline Elevation
End Centerline Elevation

Pipe attribute assignment

Civil 3D pipe property	Imported data field	Im
End Centerline Elevation		
Hydraulic Properties		
Hydraulic Grade Line Up		
Hydraulic Grade Line Down		
Energy Grade Line Up		
Energy Grade Line Down		
Flow Rate		
Junction Loss		
Part Data		
Wall Thickness		
Material		
Minimum Radius of Curvature		
Manning roughness coefficient (n)		
Hazen Williams roughness coefficient (C)		
Darcy Weisbach friction factor (f)		
Inner Diameter	**THICKNESS**	

Select NEXT until the network imports
Use the 3D orbit command to view your new network
You can now adjust as required.