"Under Pressure"

Civil 3D Pressure Pipes

FLUG 2019

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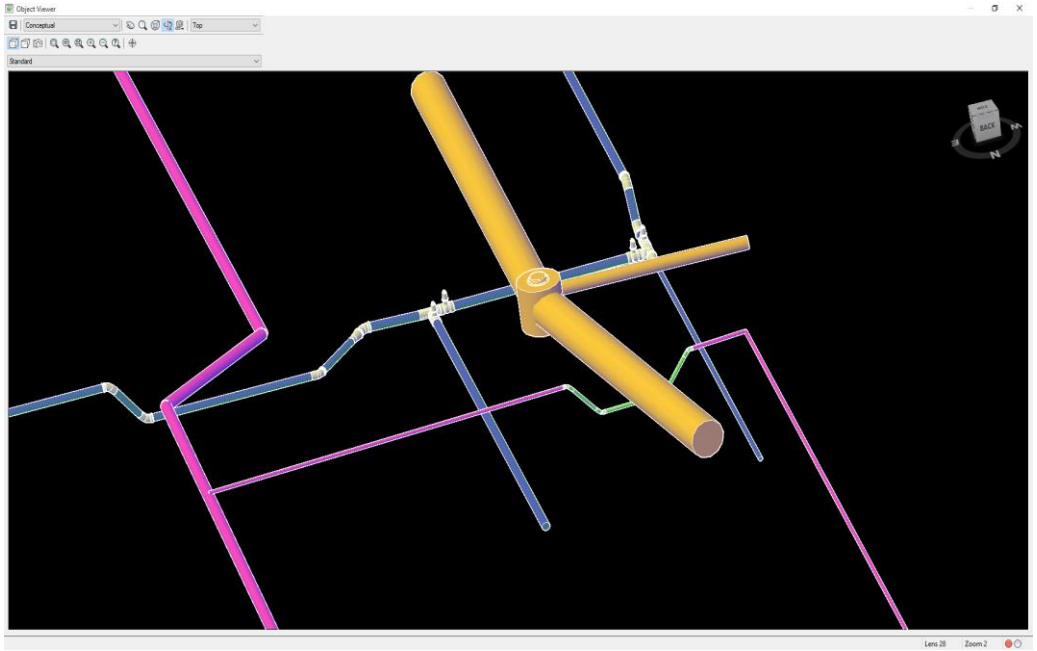
"Under Pressure" Civil 3D Pressure Pipes

Session Objectives:

- What are pressure pipes and when do you use them
- Creating pressure pipe networks
- Deflections and Conflicts



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What are pressure pipes and how do you use them:

- Watermains
- Forcemains
- Ability to show true to scale fittings and appurtenances
- Horizontal and Vertical Deflections
- Utilizing pressure networks allows you to show full 3D pipes in both plan and profile that are true to size based on specs

Creating pressure pipe networks:

- What's needed?
  - Alignment
  - Surface
  - Profiles
- Pressure pipe Styles
- Pressure Pipe Label Styles
- Creating and Drawing pressure pipe networks

Deflections and Conflicts:

- Horizontal Deflections
- Vertical Deflections
- Analyzing Conflicts

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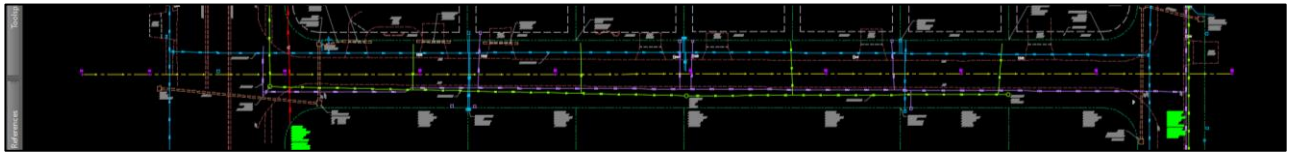
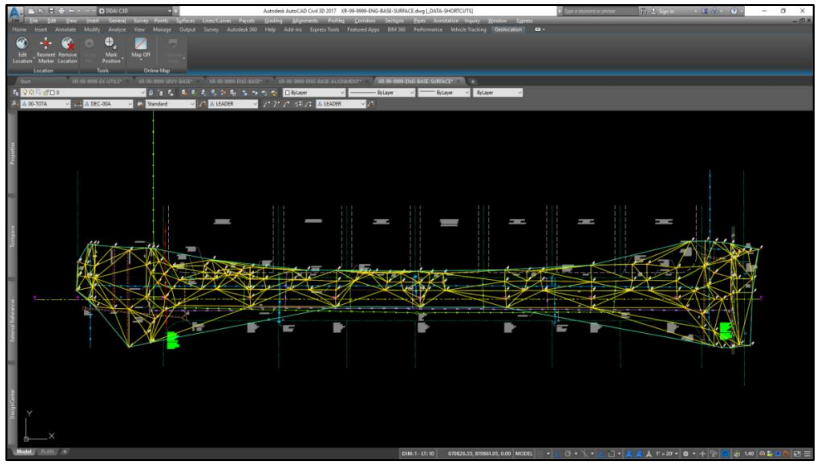
Creating pressure pipe networks:

To create pressure pipe networks within Civil 3D you will first need points, alignments and a surface. This will allow you to create an existing or proposed profile grade line and surface for reference.

Alignment



Surface/Points



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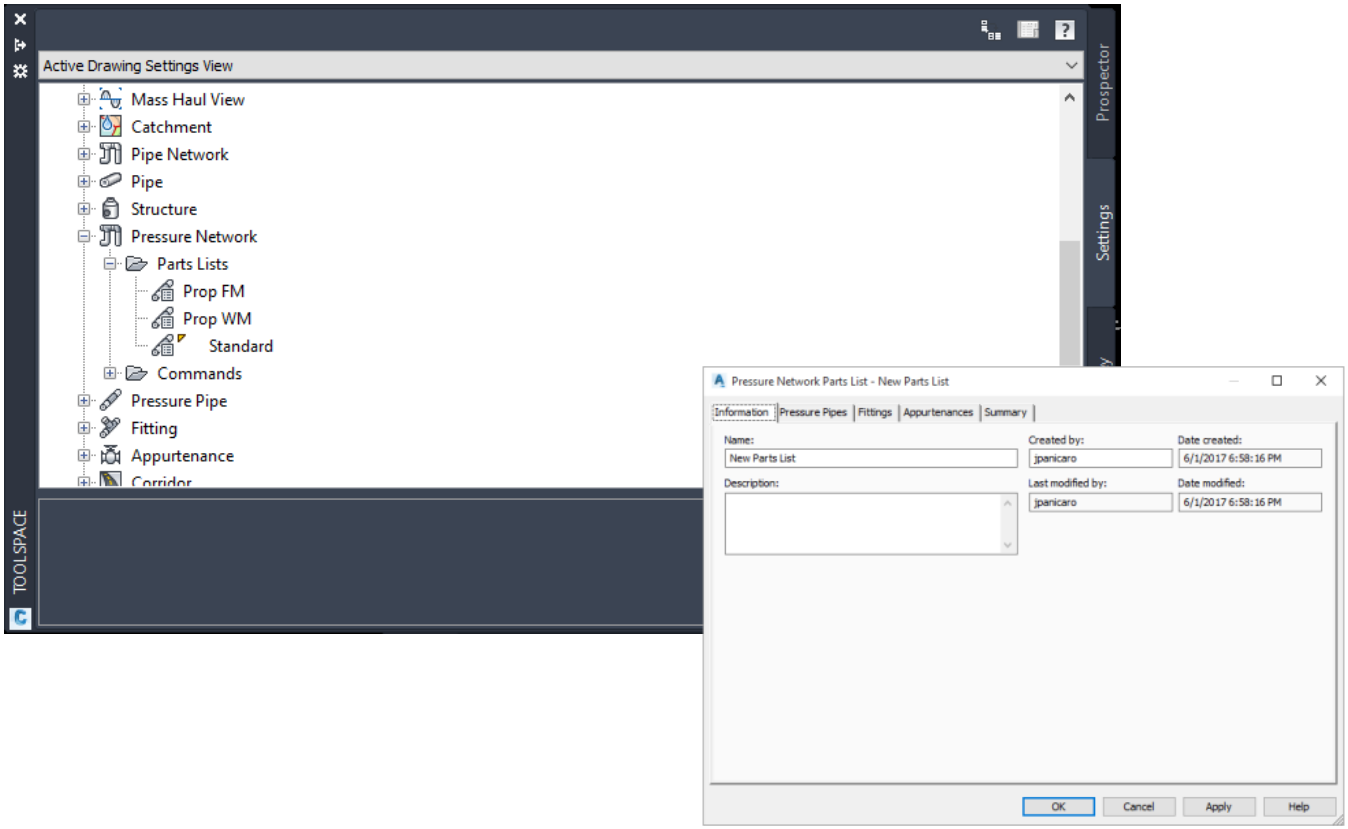
Creating pressure pipe networks:

Start by opening "Toolspace" and activating the "Settings" tab. Select pressure network and create a new parts list.



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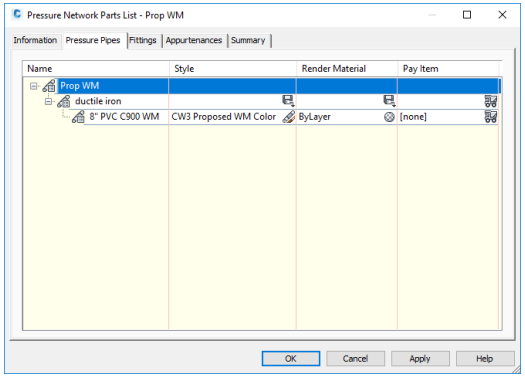
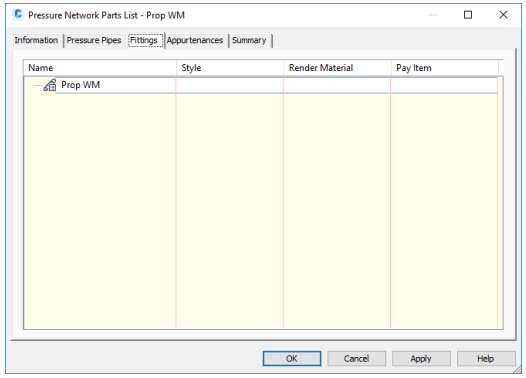
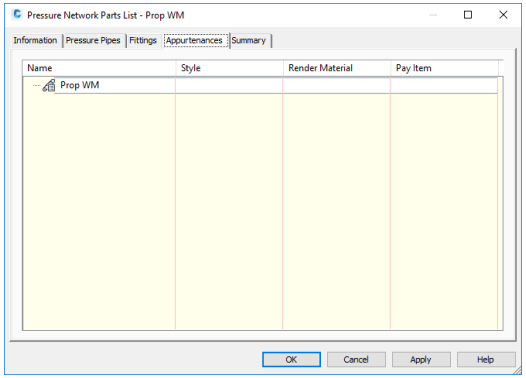
Creating pressure pipe networks:

Once the "New Pressure Network" dialog box is open you can now setup your pressure network with necessary pipe sizes, fittings, valves, etc. Styles for each of these entities will need to be setup based on company and/or FDOT Standards. The styles can also reflect proposed and/or existing pressure networks. The available parts very per catalog, ensure everything needed is available within the catalog you are using by opening the Content Catalog Editor.







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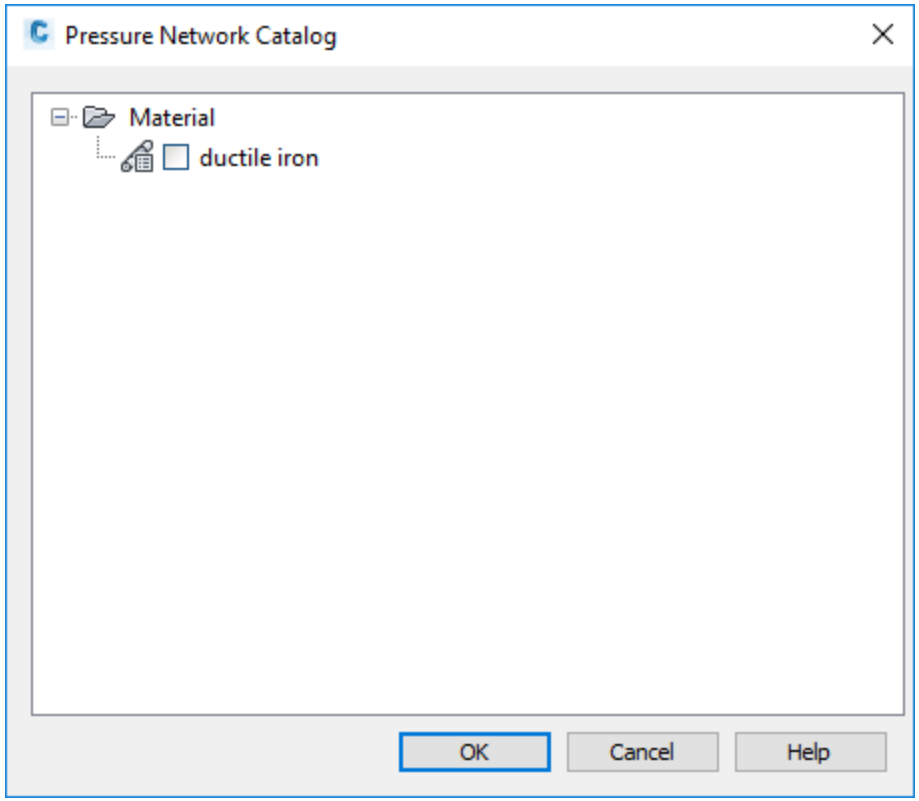
Creating pressure pipe networks:

There are 6 available catalogs to choose from depending on the release year of Civil 3D you are utilizing, these are located in the below directory: c:\ProgramData\Autodesk\C3D 2020\enu\Pressure Pipes Catalog\Imperial

For this exercise we will be utilizing the "Mechanical" catalog available in the 2017 – 2020 release.



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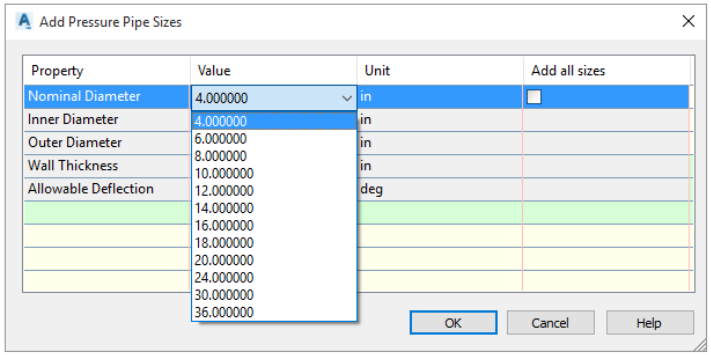
Creating pressure pipe networks:

Utilizing the mechanical catalog, select ductile iron pipes. Activate the "Pipes" tab within the pressure network tool within Toolspace, right click on the name of the parts list and select "Add Material" and select ductile iron. Once ductile iron is selected and placed into the drawing, right click and select "Add Size" and insert the required pipe sizes into the drawing. You have the option to "add all sizes" or select just the required pipe sizes. Once these are added you can name them based on the type of pipe you will be drawing. It should be noted that separate parts lists are required for different types of utilities, i.e. watermain, non-potable watermain, forcemain, etc. This allows the user to control display and layer properties per utility type.



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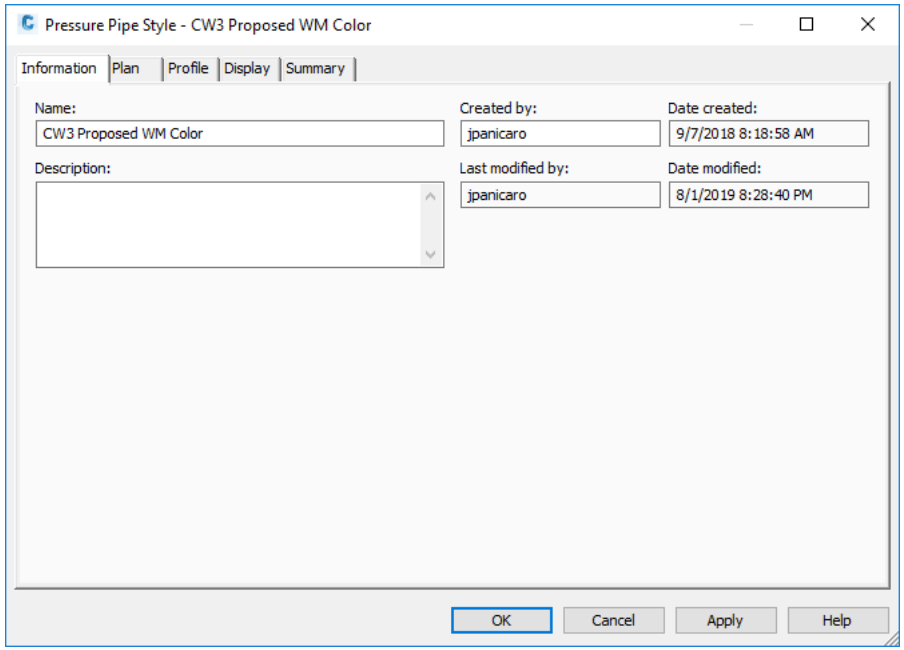
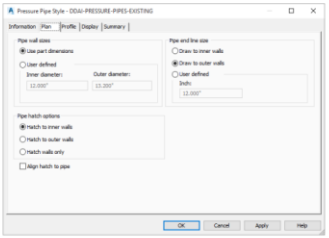
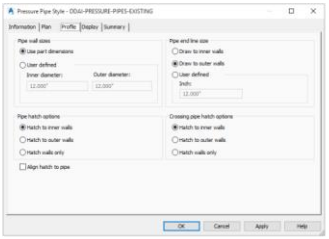
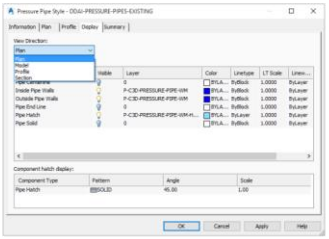
Creating pressure pipe networks:

Once the pipe sizes are added and named appropriately you can then set the "style" for the pipe. Styles will need to be created based on company standards and required display properties. Styles are created for display in plan and profile as well as sections. Display controls are available for plan, model, profile and section.









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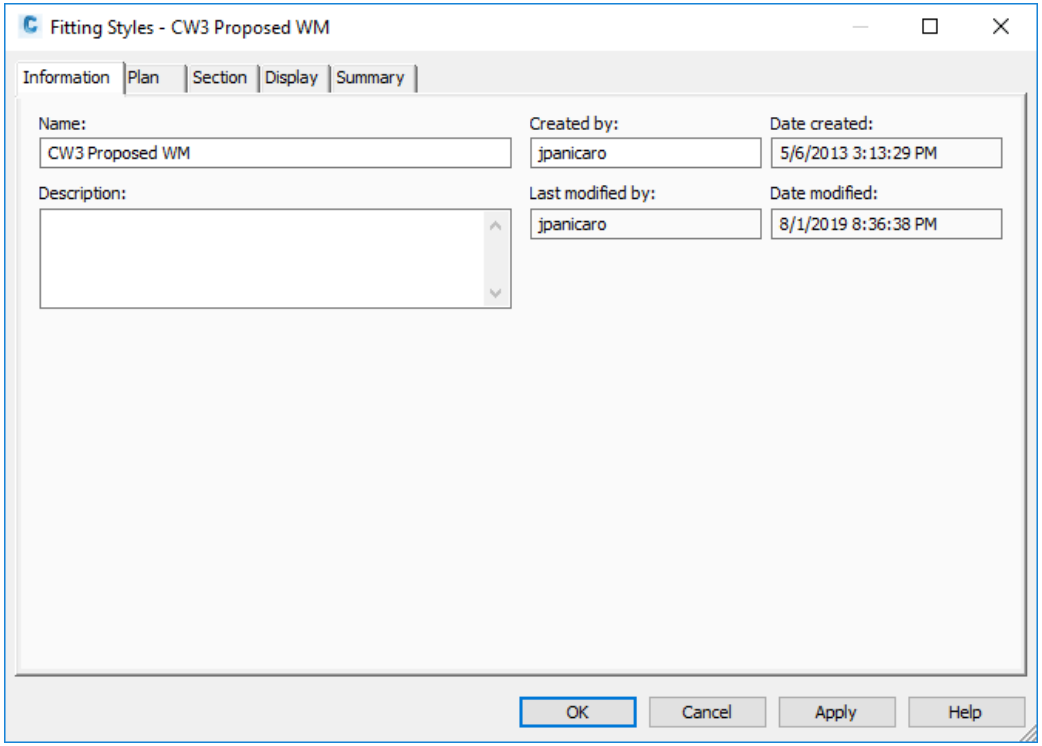
Creating pressure pipe networks:

Once pipe sizes are setup and styles defined, move onto fittings and then appurtenances. These are setup in the same fashion as the pipes. Add the required sizes and angles for bends as well as any appurtenances needed and set the style.



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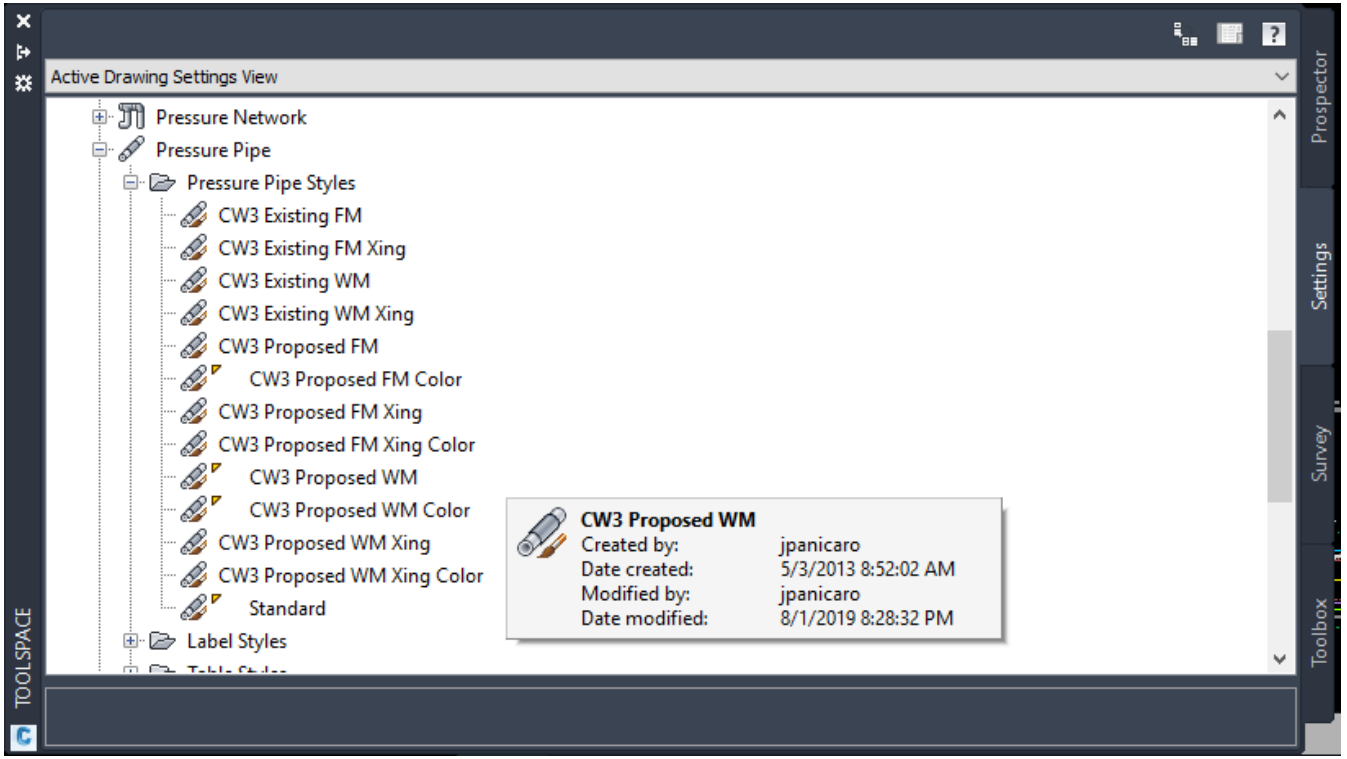
Creating pressure pipe networks:

After all networks have been setup you should see the completed list inside Toolspace. In the example below we have a parts list for Existing WM & FM and Proposed WM & FM.



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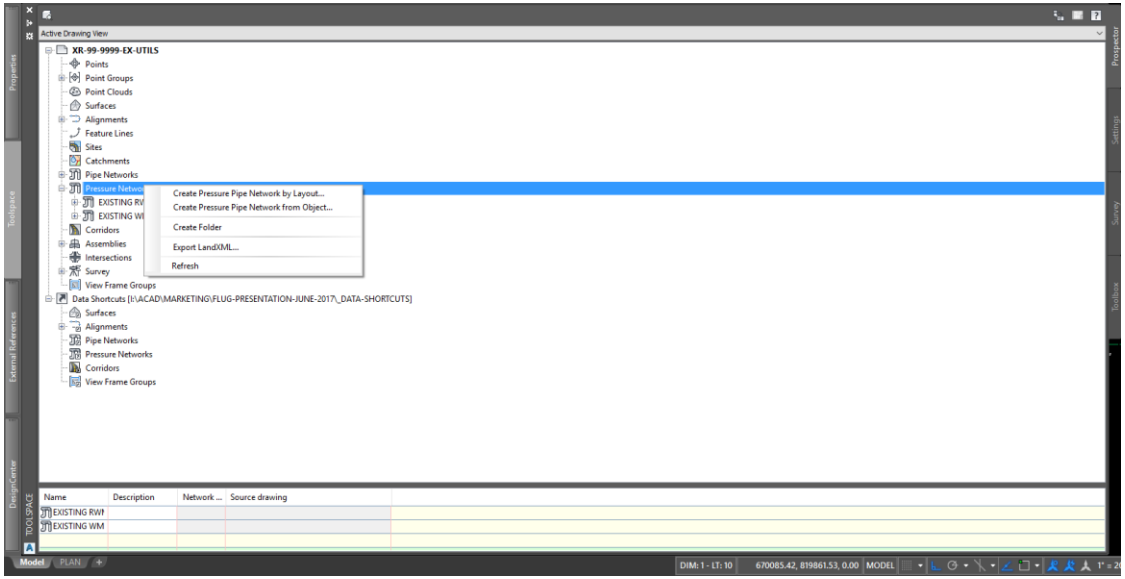
Creating pressure pipe networks:

With the "Prospector" Tab active in Toolspace right click on "Pressure Networks" and select either "Create Pressure Pipe Network by Layout" or "Create Pressure Pipe Network from Object". Creating a network by layout allows you to create the network and then trace and/or draw the pressure network in AutoCAD. Creating a network by object allows you to select an entity within the drawing and create the network. It should be noted that if a polyline has multiple segments with direction change the software will automatically add bends at these points.



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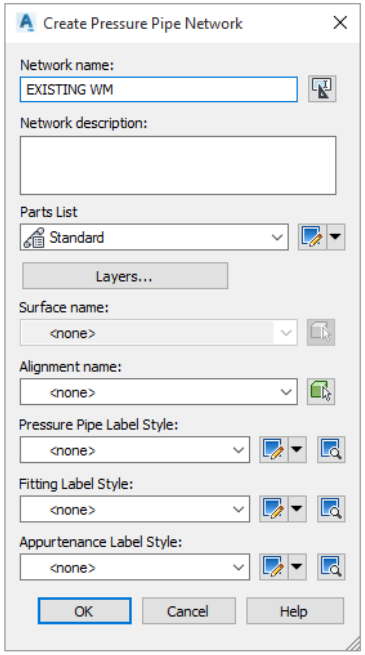
Creating pressure pipe networks:

Once the appropriate network creation tool has been opened the "Create Pressure Pipe Network" tool will open and the following information will need to be entered and setup.

- Network Name
- Network Description (If Needed)
- Parts List (Select based on type of Network)
- Layers (These need to be setup based on type of network and/or company std)
- Alignment Name
- Pressure Pipe Label Style (If Needed)
- Fitting Label Style (If Needed)
- Appurtenance Label Style (If Needed)



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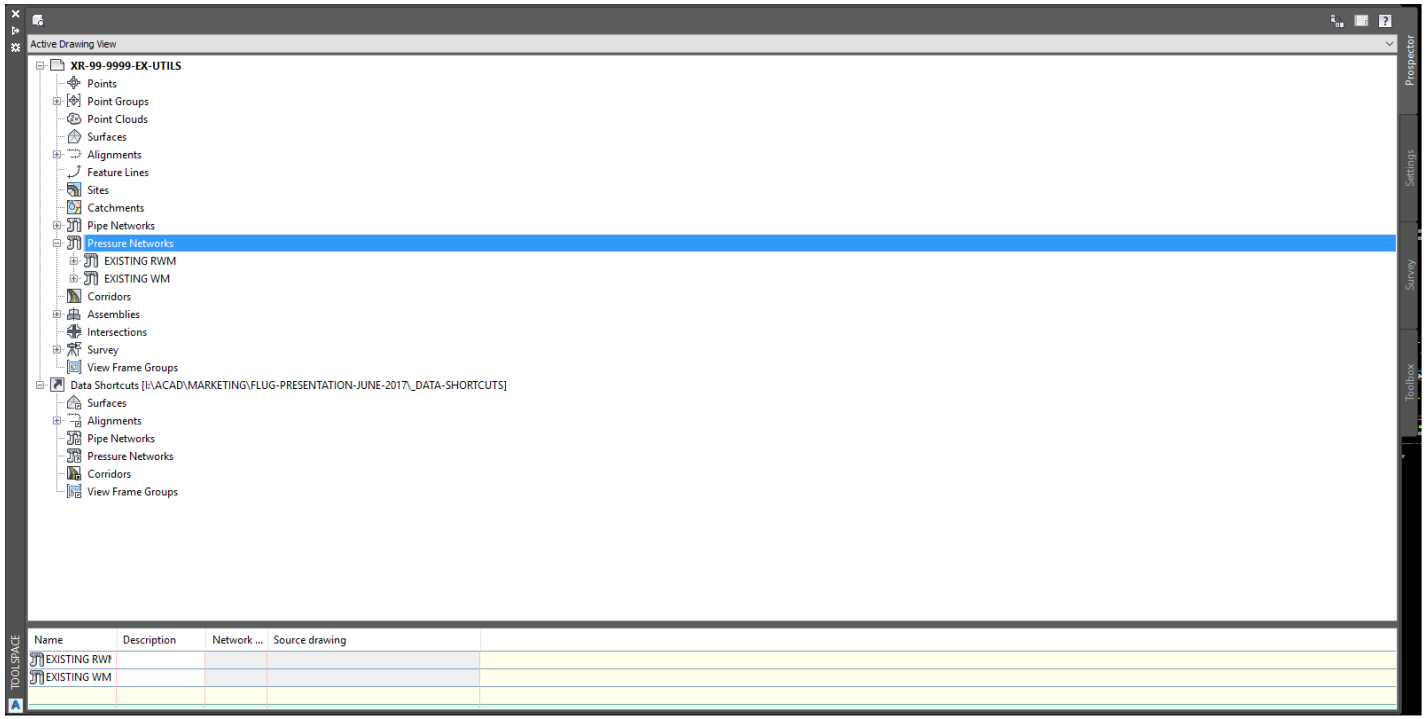
Creating pressure pipe networks:

Once all pressure networks are created you should see them in "Toolspace", see the below example:



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Creating pressure pipe networks:

You are now ready to draw your pipe networks. If you selected Create Network by Layout, right click on the network you want to draw and select "Edit Pressure Network" and either trace or draw the network in AutoCAD. You will have a ribbon toolbar within the "Edit Pressure Network" command to assist in drawing either just pipes, pipes and fittings or individual fittings and appurtenances.

If you selected the Create Network by Object tool select the polyline you are using for the network and complete the Create Pressure Pipe Network command tool. Ensure "Delete Existing Entity" is NOT checked as this will delete the existing linework from the drawing (Optional).

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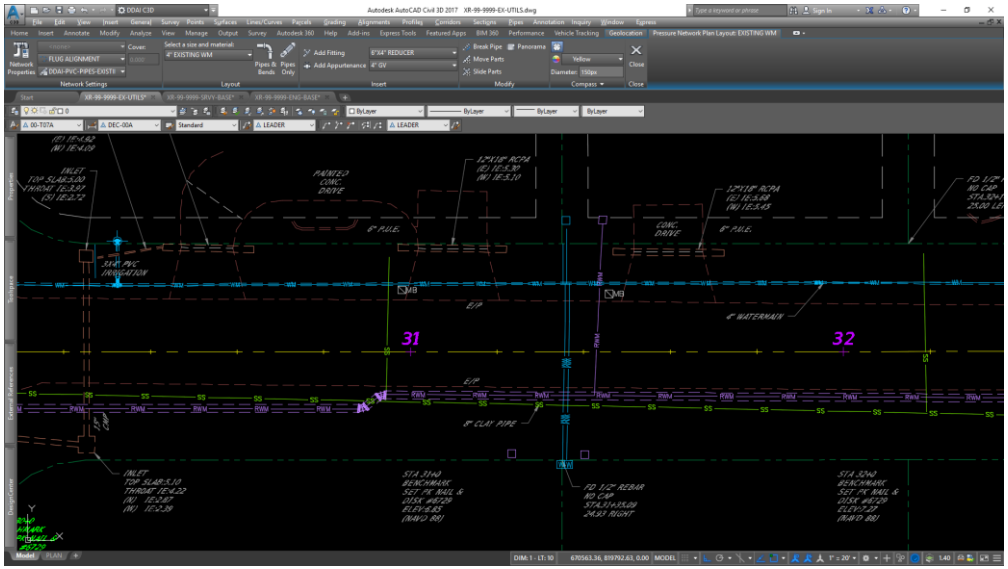
Creating pressure pipe networks:

Once all networks have been drawn and cleaned up (i.e. remove unneeded fittings, tee’s added, valves added, etc.). You will now have your pipes drawn in Civil 3D.



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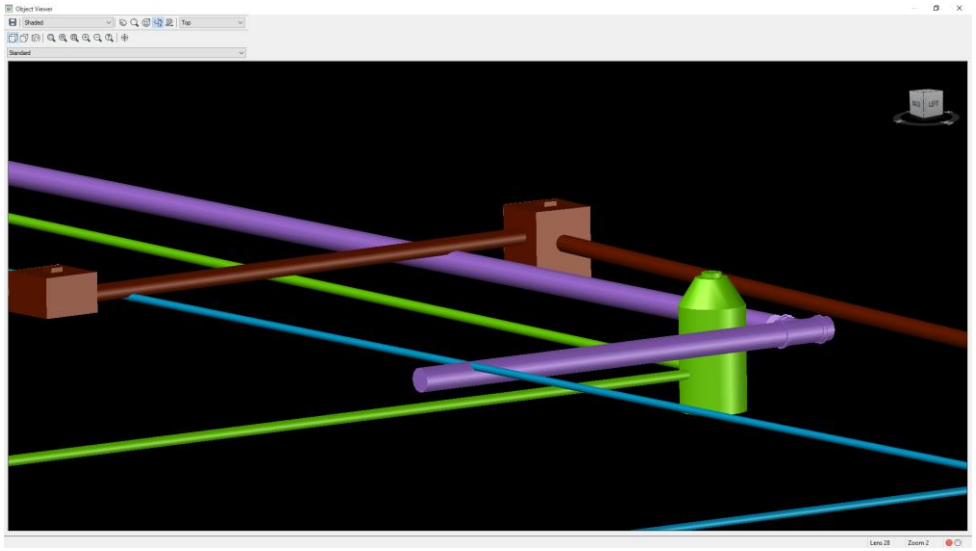
Creating pressure pipe networks:

You can utilize the "Object Viewer" shortcut and select your networks to view the pipes, fittings and appurtenances in 3D. This will allow you to check for conflicts and any needed deflections.



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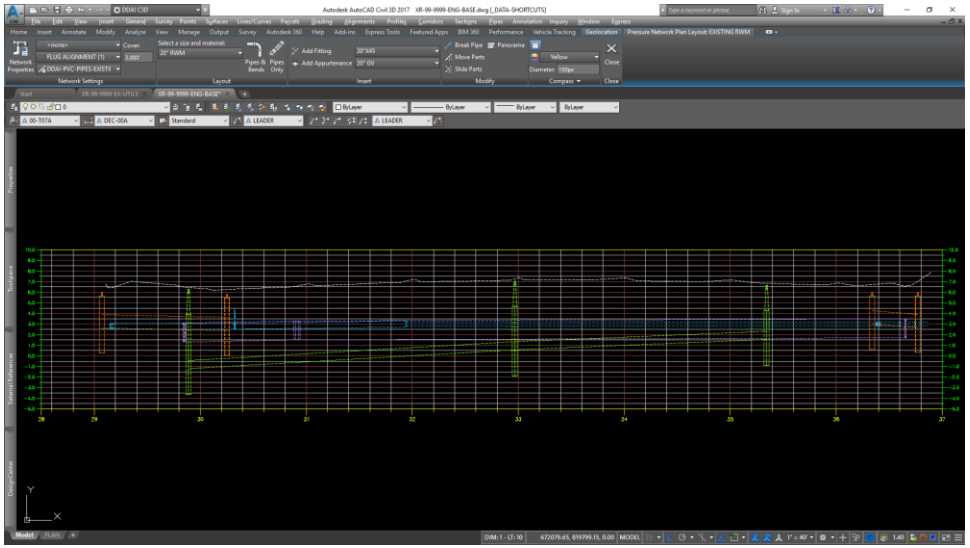
Creating pressure pipe networks:

To draw pressure networks in profile select the network entities you would like to display in profile and right click to activate the draw pressure parts in profile command and select the profile.



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Creating pressure pipe networks:

Civil 3D has the ability to draw vertical deflections in profile. To do this follow the below steps:

- Select pressure pipe where deflection is needed, right click and edit pressure network.
- Utilizing the ribbon toolbar select break pipe and select a point on the pipe to break the pipe. This will break the pipe at that location. Select draw pipes and draw the bottom of the proposed deflection using a new pressure network (Proposed) and then finish the pipe off that was broke utilizing the existing pressure network.
- Draw the new pipes into profile and set the elevations for the vertical separation per standards. Select the pressure pipe, right click and select edit pressure network in profile. The edit network ribbon toolbar will activate. Make the bend needed active and select draw fittings and follow the on screen prompts.

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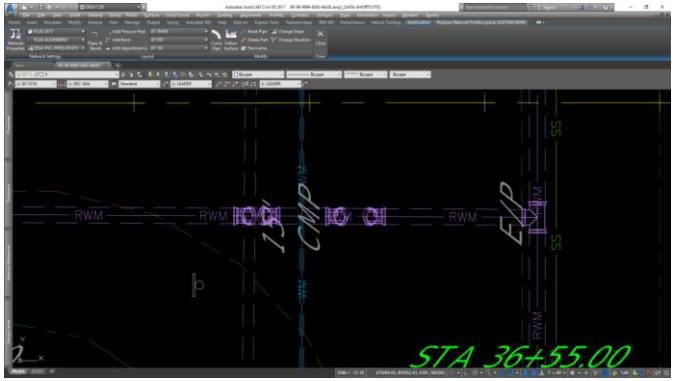
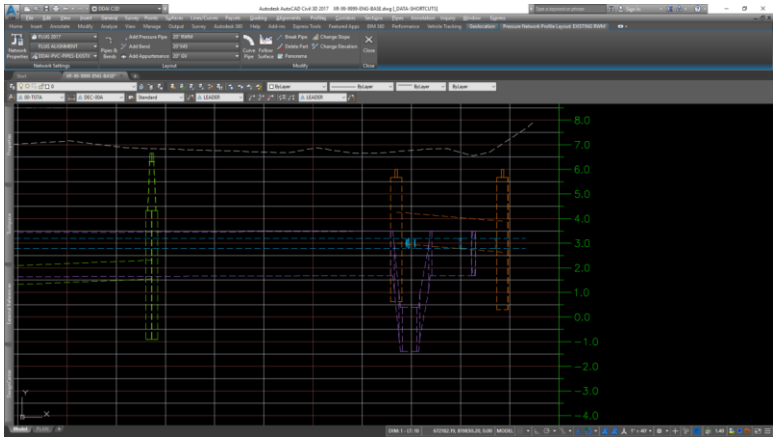
Creating pressure pipe networks:

Once the vertical deflection is drawn utilizing the proposed network it will now appear proposed and different than the existing pipes.





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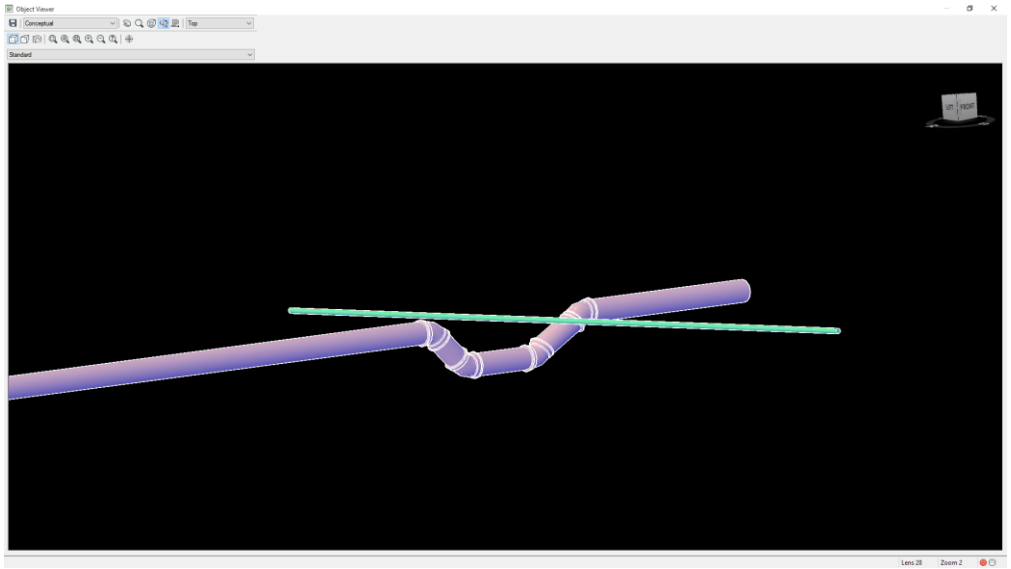
Creating pressure pipe networks:

Utilizing the object viewer command you can see the deflection in 3D.



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Pressure Pipe Tips & Tricks:

- With the Civil 3D 2017 v1 Enhancements you can utilize the "Swap Pressure Network Parts" tool to swap sizes, angles, etc. of pressure network parts. This feature is available in all releases 2018 and newer.
- Draw vertically rotated bends in plan view utilizing the 3D compass
- Design check command
- Navisworks tools for conflict analysis of gravity and pressure pipes
- Depth Check Tool
- Drawing deflections in profile

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Navisworks Manage:

Navisworks Manage has tools that can be used to analyze conflicts between pressure networks and gravity networks (Clash Detection)

- Once Navisworks is installed utilize the following commands to export Civil 3d files to navisworks:
  - Type "NWCOUT" and create a ".nwc" file
  - Open Navisworks Manage and open the .nwc file that was created
  - Run Clash Detection through navisworks. You have multiple options to check for clashes between certain layers and/or entities
  - Once the command finishes it will show you all clashes between pipes

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Thank You!

Questions/Comments?

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