

FDOT Civil 3D Drainage Design & Resources



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Required Data for Pipe Networks

- ◆ Surfaces – Existing & Proposed (D-ref'd)
- ◆ Alignment – Road Centerline or Baseline (D-ref'd)
- ◆ Proposed Roadway Design (X-ref'd)
- ◆ FDOT Parts List (Truncated)

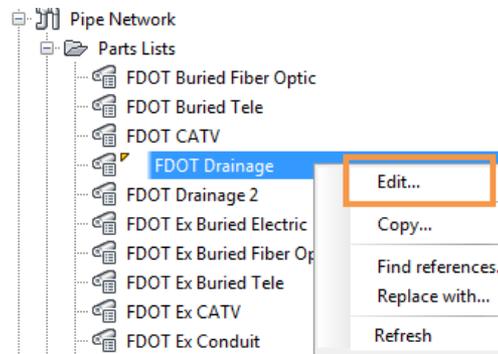
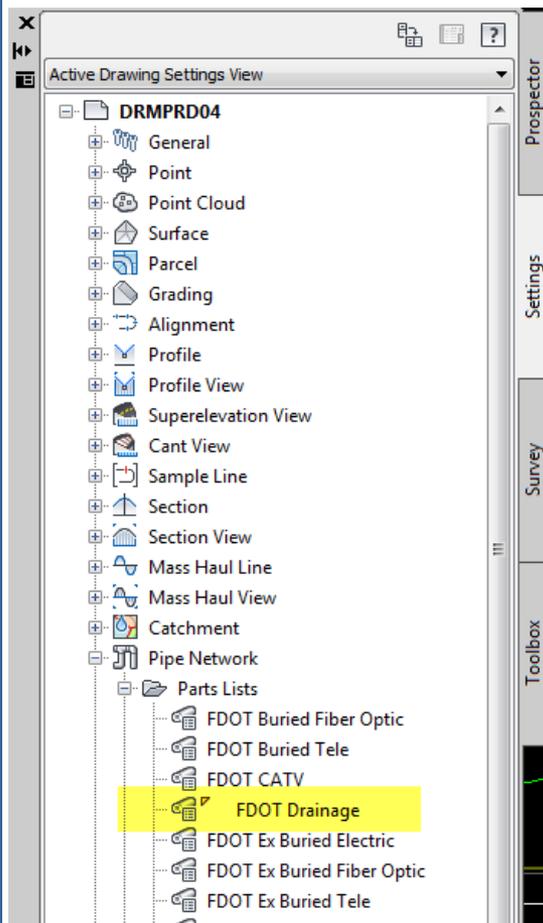
D-ref'd = Data Referenced (Data Shortcut)

X-ref'd = Xreferenced as a Overlay

Editing the “FDOT Drainage” Parts List

The parts list can be found on the settings tab in prospector.

TIP- The Yellow Triangle designates what Style or Setting is active in Civil 3D.

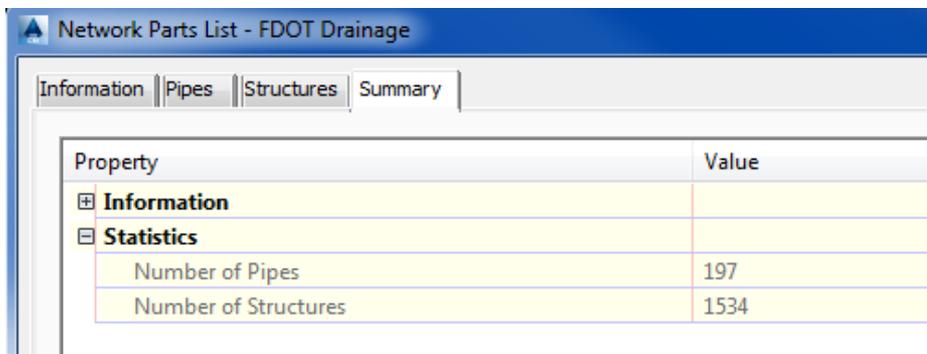


To edit the parts list Select and Right Click >Edit

It is imperative that you “DO NOT” save as or rename the parts list as you delete unneeded structure part families. The name is needed for round tripping purposes to and from SSA.

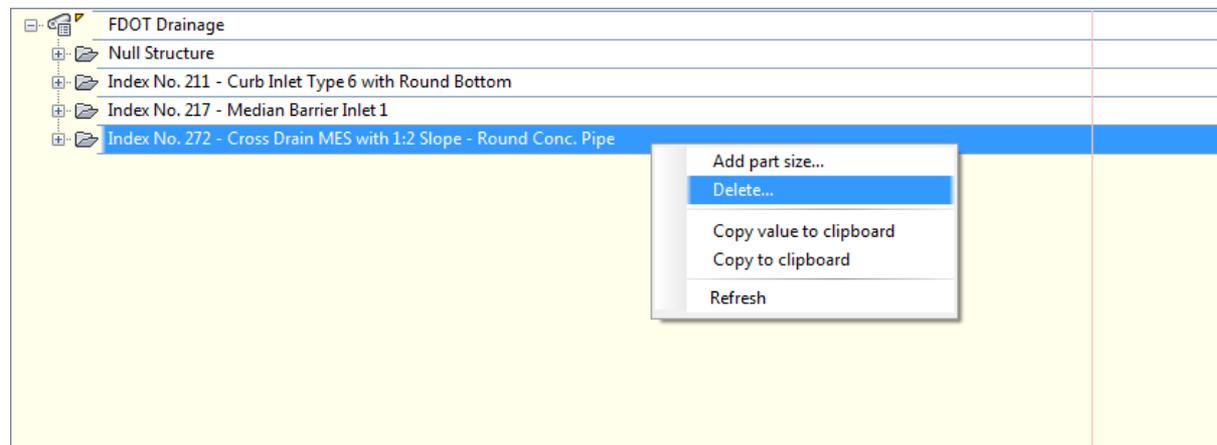
Editing the “FDOT Drainage” Parts List

The Unedited Parts List contains 197 Pipes and 1534 different Structures. Since a project will only use a fraction from the list it is recommended you delete part families that will not be used. This will improve drawing performance.



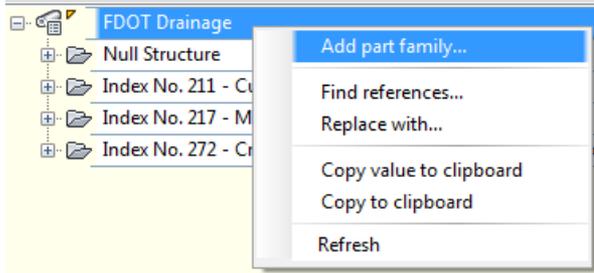
Property	Value
Information	
Statistics	
Number of Pipes	197
Number of Structures	1534

Deleting a part family will remove all part sizes associated with the family

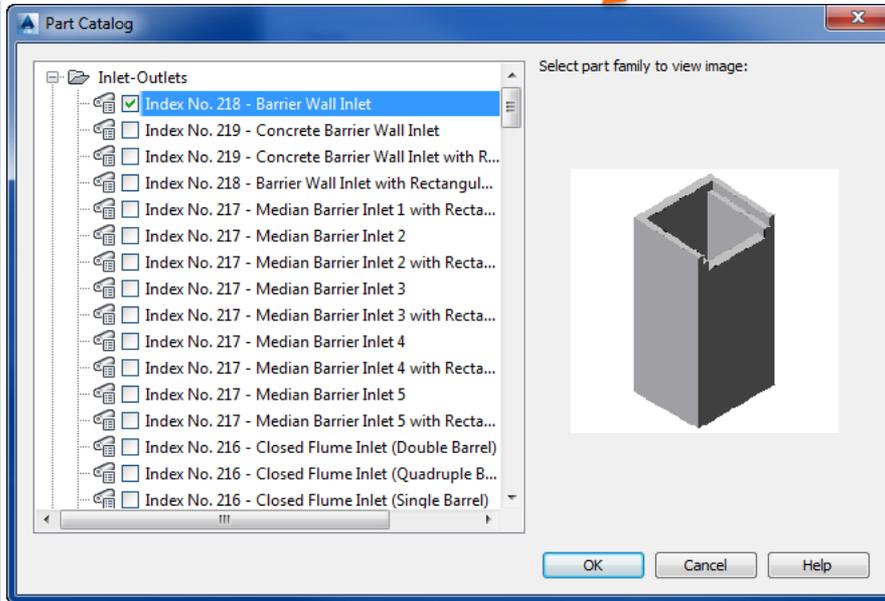


TIP – If you deleted too much or need the full parts list again don't worry. Just open the FDOTmaster.dwt and drag and drop the parts list into your file.

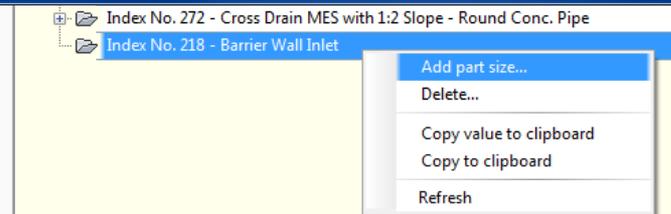
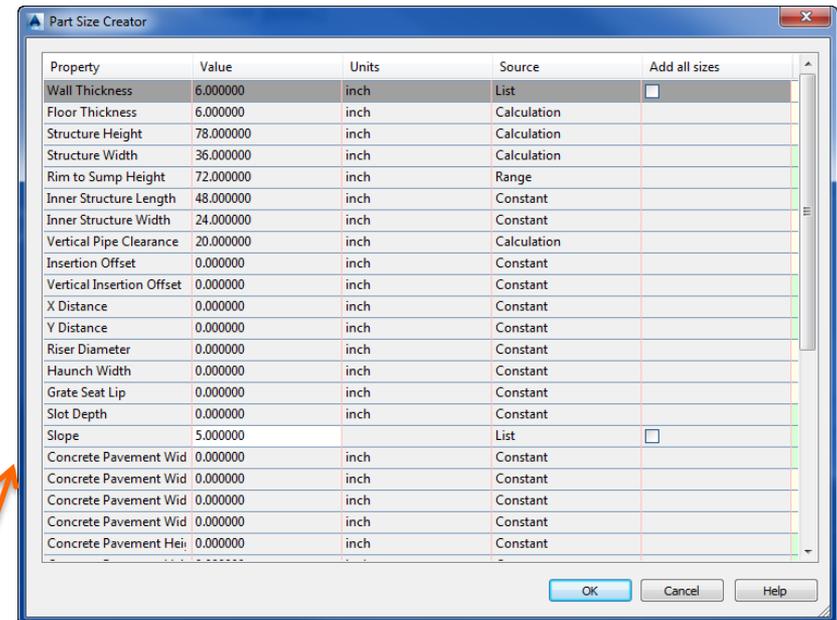
Editing your Parts List



To add back a deleted part simply right click on the Parts list and select Add “Part Family”.

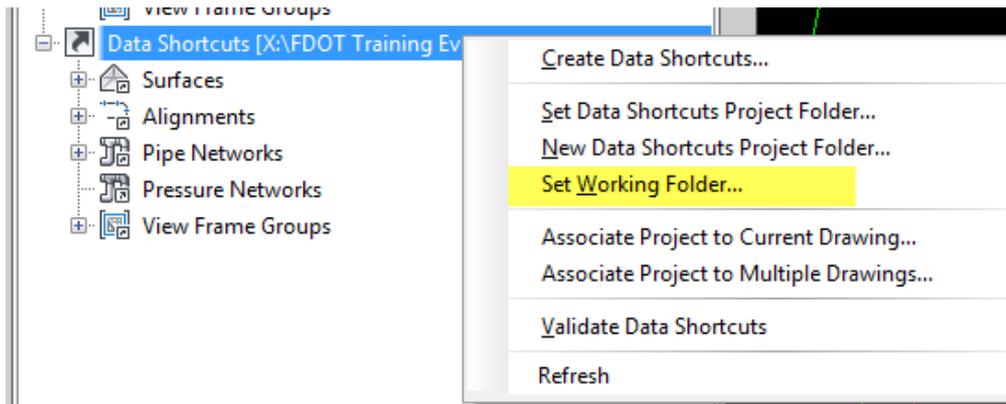


Once a part family is added browse to the bottom of the list and right click on the just added part family and select Add part size.

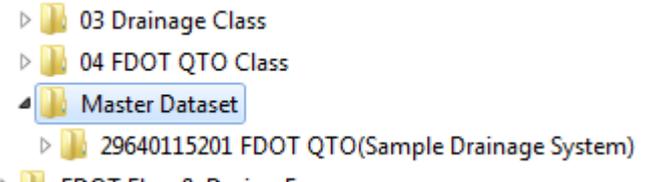


Data Shortcuts

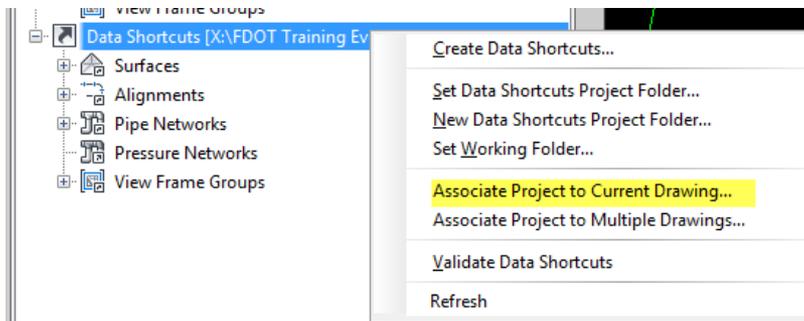
Before you start laying out your pipe network make sure you have setup data shortcuts in your file.



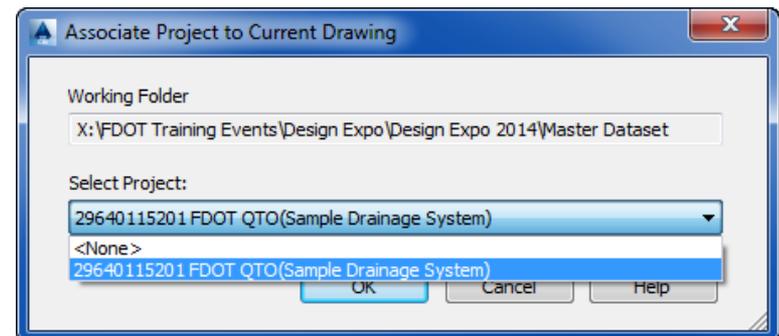
A quick refresher on Data Shortcuts – First Set your Working Folder.



When you browse to your project folder click on the root folder that contains your projects do not select the actual project folder.

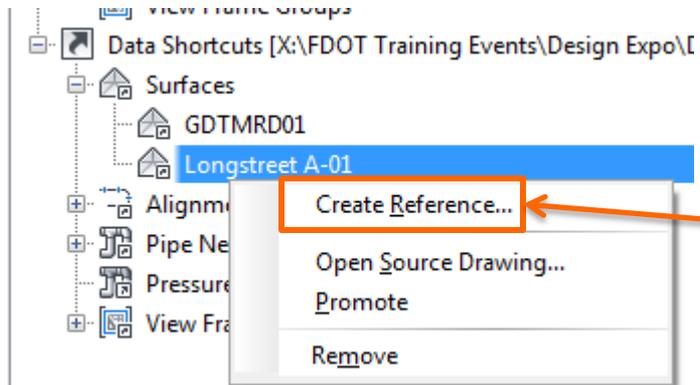


You can associate a project to your drawing. The working folder will list every project that resides within.

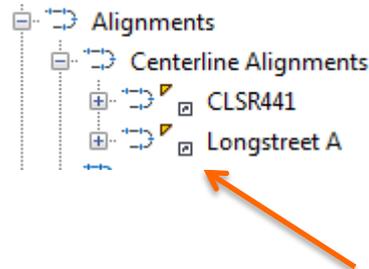


Data Shortcuts

You should have a Surface and Alignment with labels D-Ref'd (Data Reference) into your file first. In this example we are doing the drainage design in the DRMPRDXX.dwg



To create a reference go to the Data Shortcuts section on the bottom of your prospector > Expand the object you want referenced > right click and select Create Reference. A dialog will appear that will ask for various styles you want to use.

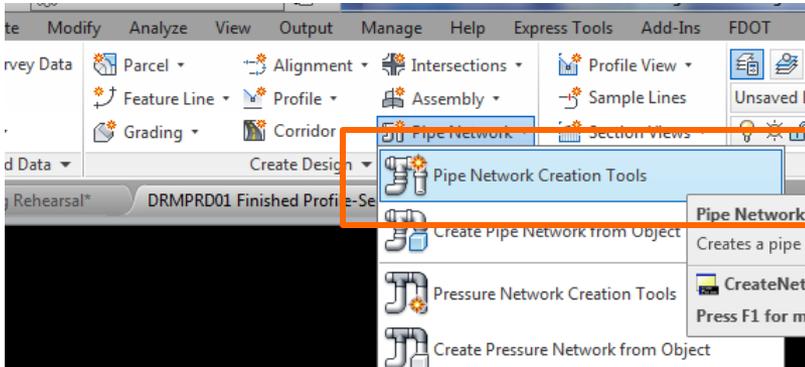


In the prospector your drawing will now contain the objects with the arrow symbol indicating that it is attached as a reference

TIP – If you don't see the object that you want to reference, open the source file and create a data shortcut. A list of available objects will appear that you can reference.

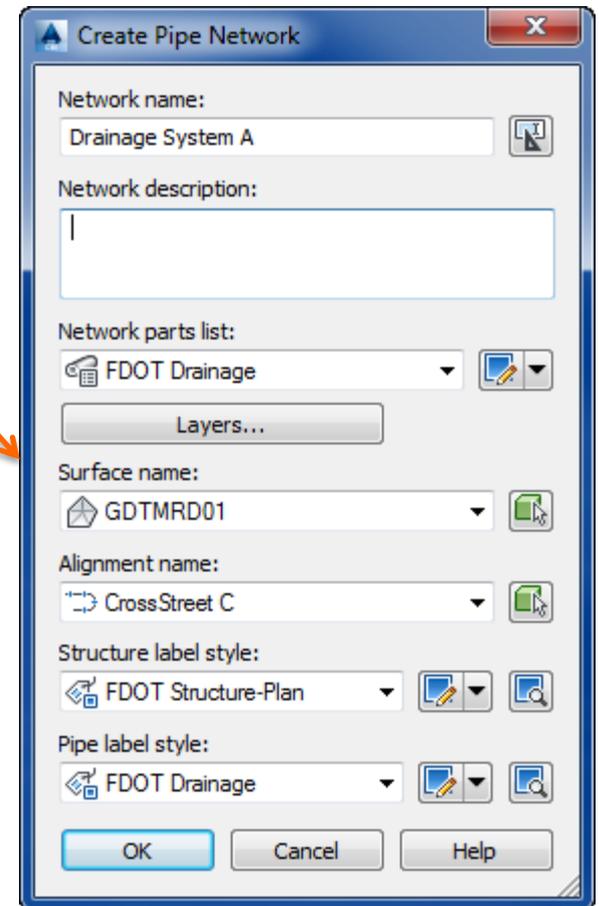
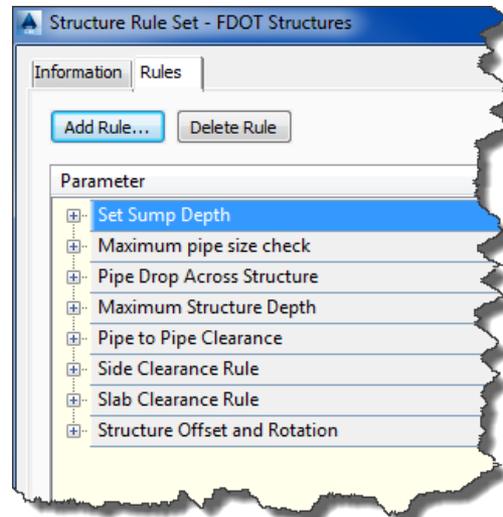
Laying out a Sample Drainage System

On the Home Ribbon Launch the Pipe Creation Tools to start the process of designing a drainage system based on the “FDOT Drainage” parts list



From top to Bottom fill in the information such as Network name, parts list, surface, etc. If you don't know the exact style you need to use you can edit it later.

TIP – Inside the “FDOT Drainage” parts list there are Pipe and Structure Rules that are followed as you insert your system which will notify you if you have a violation.

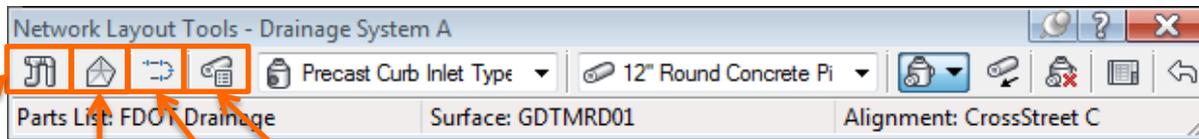


Network Layout Tools Toolbar

Let's look at the Toolbar options



Along the bottom it lists the current Parts List, Surface, & Alignment

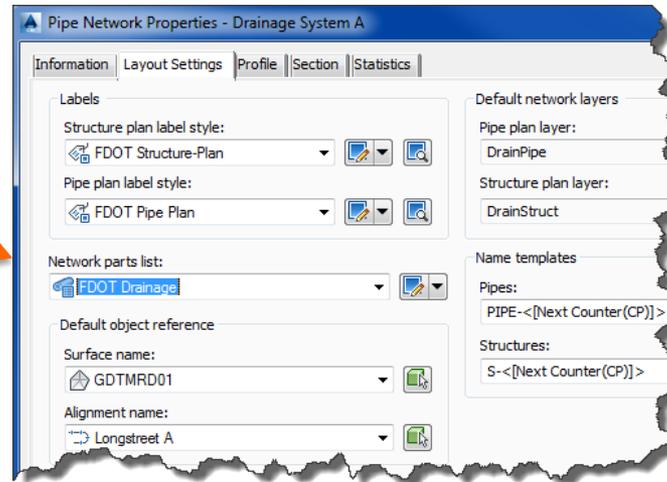


Network Properties

Select Surface

Select Alignment

Change Parts List



Network Properties contain all of the Styles, Layers, etc. used in the network

Network Layout Tools Toolbar

Let's look at the Toolbar options



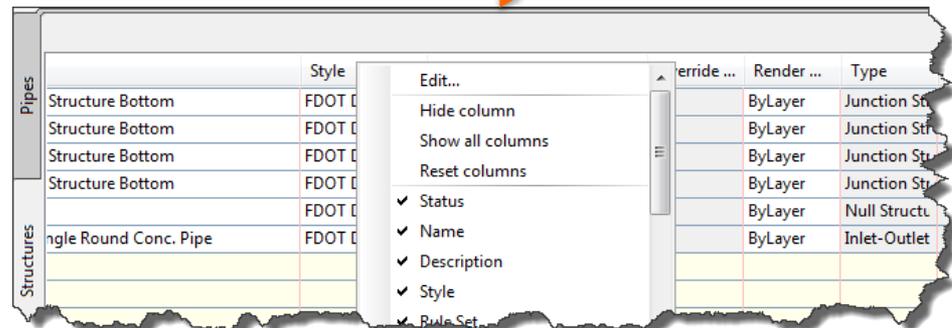
Undo

Upslope/Down slope toggle – Used to determine the flow as you place your network parts

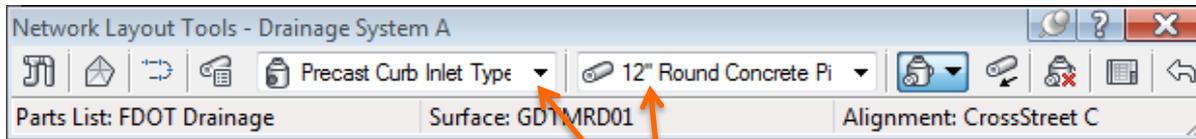
Delete a network part. You can also use AutoCAD Erase command

Panorama to edit placed Structures and Pipes

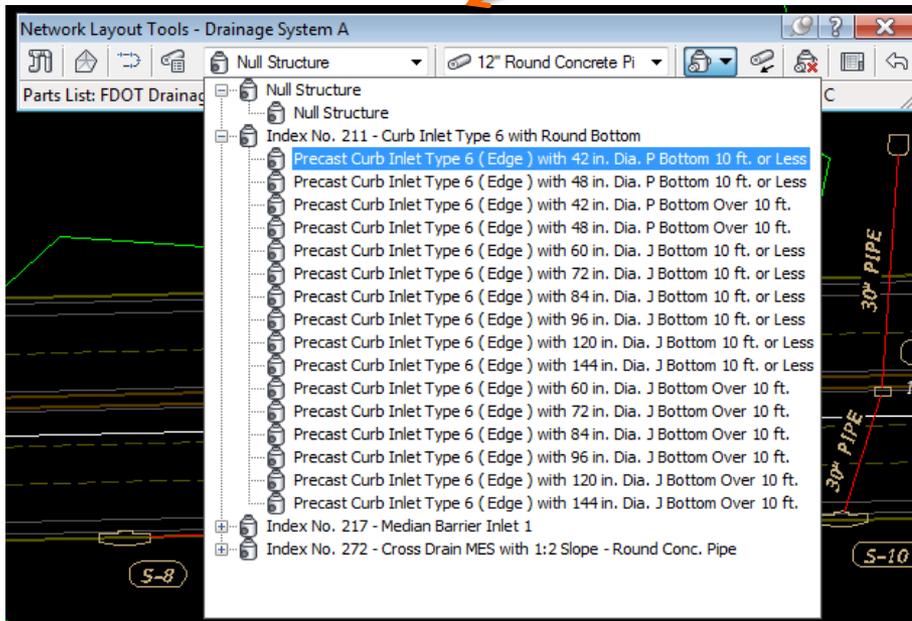
TIP - To edit the layout you can right click on a column and uncheck the columns you don't want to see.



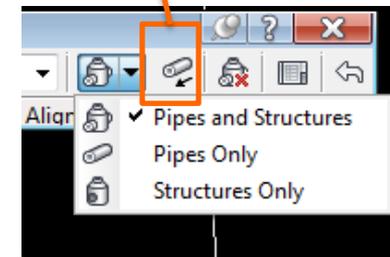
Network Layout Tools Toolbar



Structure pull down allows you to select various structures from the designated parts list you are using. The pipe pull down operates similar.



TIP- Upslope/Down slope Toggle. Make sure you are aware of which direction you are laying out your system it will make editing easier. The default is always at the highest structure



You can insert both Pipes and Structures or each separately.

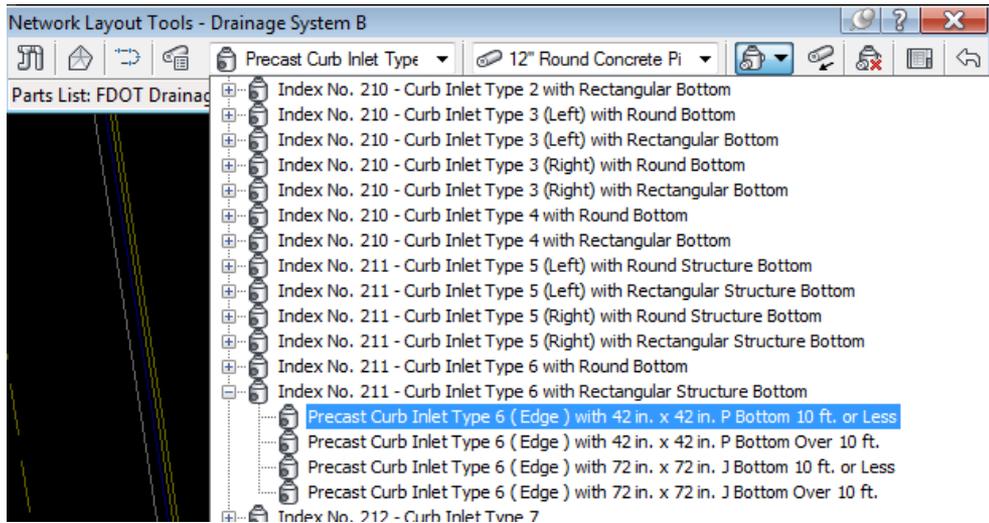
Transparent Commands

Transparent commands are used when another command is in progress, Hence the name Transparent. You can think of these as super drafting tools to aide in your design and layout. The toolbar should be on your right side of your main screen. For a detailed explanation of what each one does hover over the button and a description will pop down

- Profile Station Elevation
 - Profile Grade Station
 - Profile Grade Elevation
 - Profile Grade Length
 - Match Radius
 - Match Length
 - Curve Calculator
- 

- Angle Distance
 - Bearing Distance Distance
 - Azimuth Distance
 - Deflection Distance
 - Northing Easting
 - Grid Northing Easting
 - Latitude Longitude
 - Point Number
 - Point Name
 - Point Object
 - Zoom to Point
 - Side Shot
 - Station Offset
 - Point Object Filter
 - Profile Station From Plan
 - Profile Station & Elevation From Plan
 - Profile Station & Elevation From COGO Point
- 

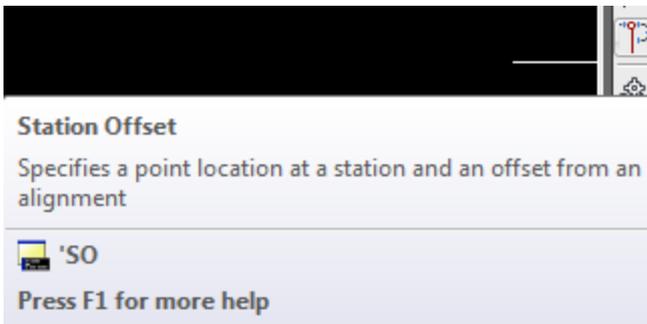
Laying Out Your System



With your selections made as far as your Structures and Pipes go you are ready to place them in the drawing.

Look on your command Line. It should be asking you for a location for placement.

 LAYOUTPIPEANDSTRUCTURE Specify the structure insertion point:



At this point select the Station Offset Transparent Command we went over a few slides back. Again read your command line for feedback. You can see the 'SO command is active and is waiting for you to select the Alignment in the drawing

  SO >>Select alignment:

Laying Out Your System

After picking your Alignment you need to specify the station along the alignment. It's important to keep a vigilant eye on your Command Line because it will ask for feedback.



SO >>Specify station along alignment:

A Red Jig will be tied to your Alignment that you can drag on it. You can either type in the station or snap to one.

Specify station along alignment: 10700| 647965.5315

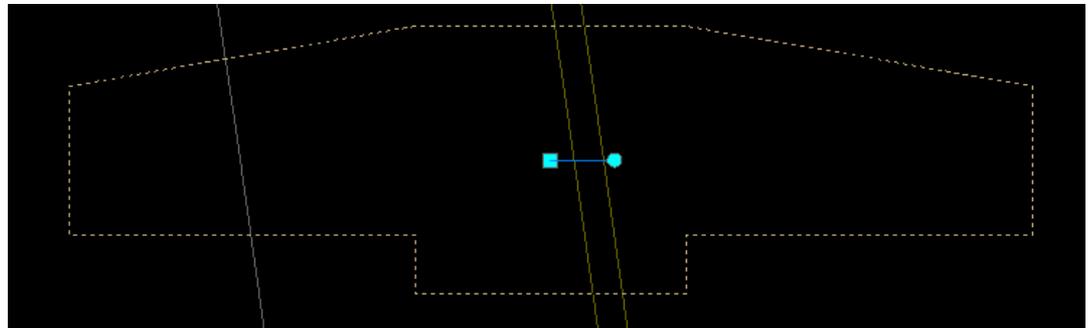


TIP – If you don't use your Dynamic Input (F12) now is a good time to use it. I always like to use it when working with drainage and profiles.

SO >>Select alignment:

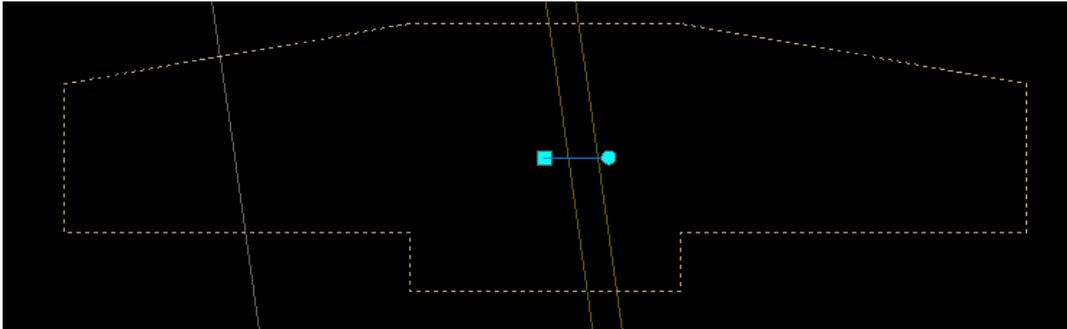
The Red Jig will lock at the Station you choose and it will now ask you for a Offset distance

Offset:40.30'
Specify station offset: 40.3 647966.044



Laying Out Your System

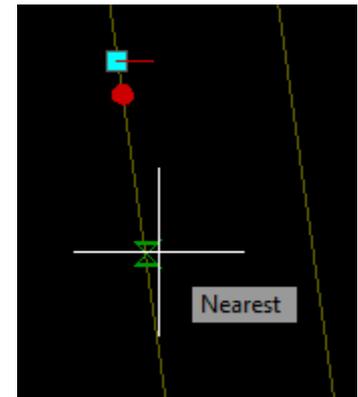
After placing your Structure and Pipes press enter and the system will label with the default style settings you specified.



You probably will want to rotate the structure there are 2 grips visible when you select the structure. The Square one allows you to move the structure and pipes that are attached to it. The Circular grip allows you to rotate the structure while holding the insertion point.

If you want to rotate the structure to be parallel to the back of curb you can select the circular grip and using your Nearest Osnap select the Curb and the structure should be perfectly rotated.

Note that the structures & pipes are labeled as you place them.

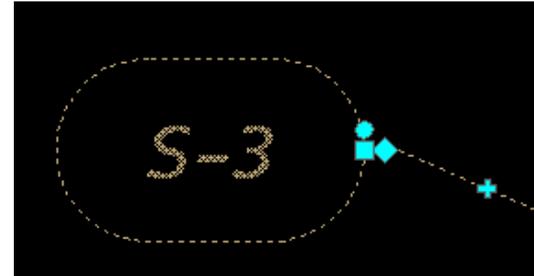
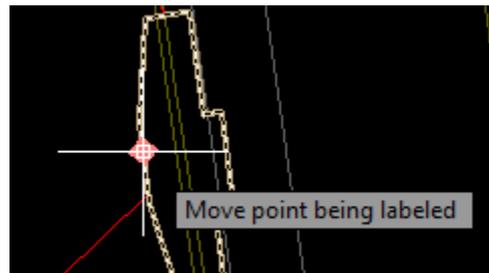


Labels, Labels, Labels



You probably also want to move that structure label to a more open area. Let's look at the Labels.

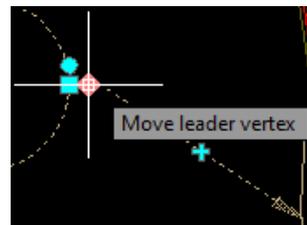
Select the Structure Label. Initially there is one Square grip visible, this represents your Label insertion point. You can drag the label off the structure by clicking this grip.



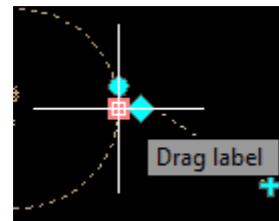
Additional grips will appear along with a leader line with a arrow head.



Adds additional Leader Vertices.



Moves only the Leader Vertex. Note the Label



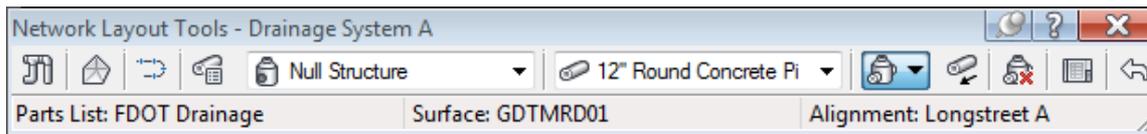
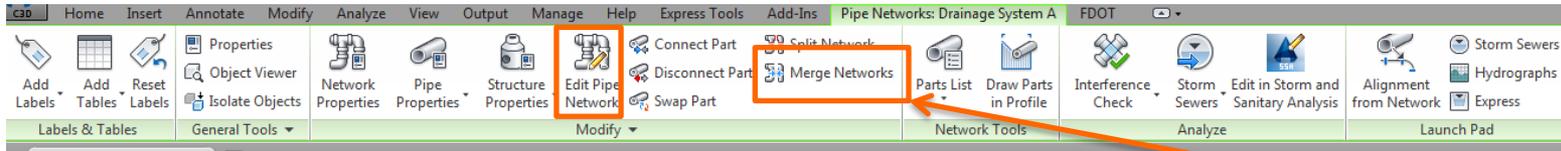
Drags the Label and the Vertices. This is the one to use if you want a new location



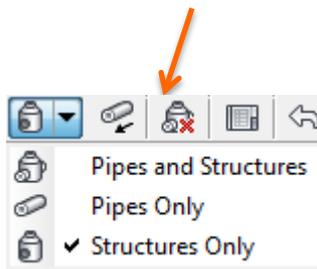
If you have messed up the Label this is your fix it option. It resets the label back to its original location so you can remove it

Editing your System

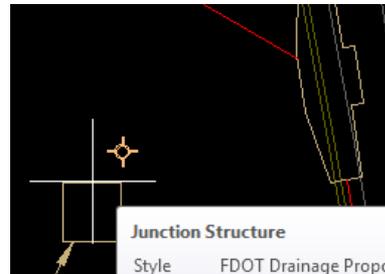
When you want to add/edit additional Structures and/or Pipes select one of the parts and select Edit Pipe Network on the contextual ribbon. This will bring up your pipes toolbar again



To add another structure and/or pipe simply pick it from the pull down. Make sure you select the proper mode



After adding a Lone Structure select Pipes Only and pick your pipe size.



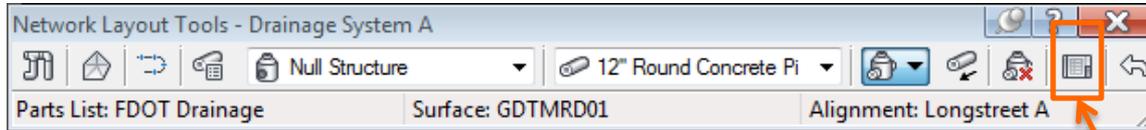
Hold your mouse over the structure you want to connect to. If you see a Glyph as above shows it means that the pipe will connect to the structure. Left click your mouse to place one end of your pipe

If you are laying out a system and want to connect to a part in another system you can't. you have to merge parts from one network to another. Use Merge Networks



Hover over the other structure you want to use to connect the pipe to. Another Glyph will show you are good to left click. You can break a pipes connection from structures also.

Editing your System



At this point you can either edit your system with the Pipe Network Vista or using the Dynamic input osnap in profile view or both.

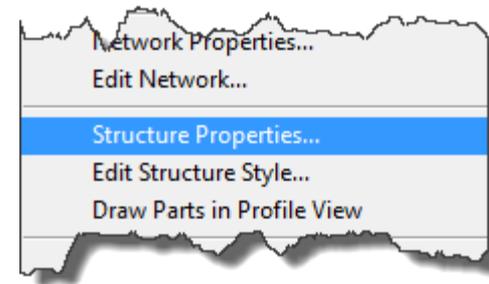
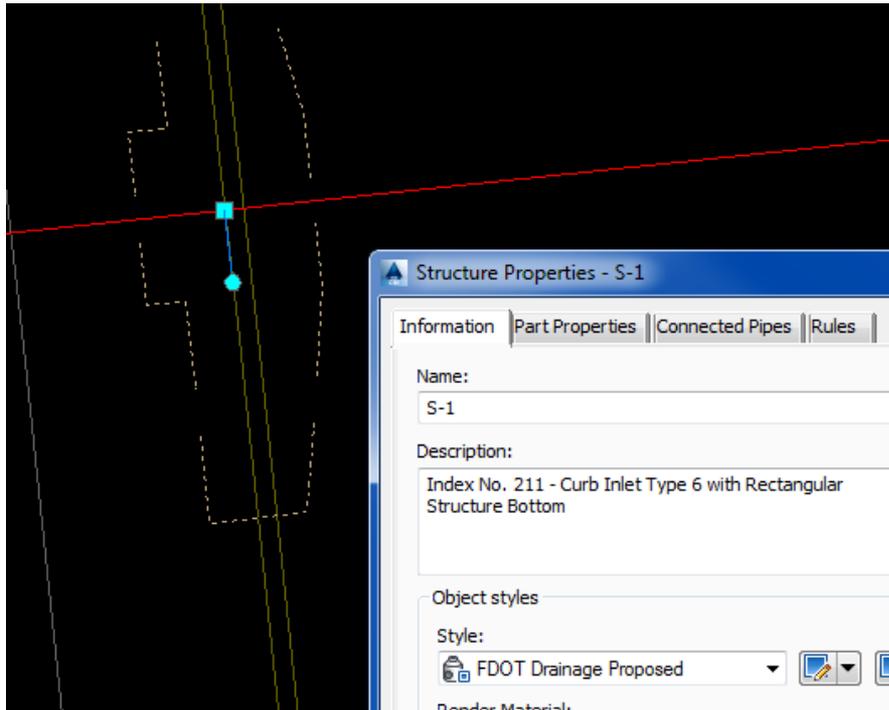
The Pipe Network Vistas Icon on the Layout Toolbar

	Status	Name	Description
Pipes	✓ 0	S-1	Index No. 211 - Curb Inlet Type 6 with Rectangular Structure Bottom
	✓ 0	S-2	Index No. 211 - Curb Inlet Type 6 with Rectangular Structure Bottom
	✓ 0	S-3	Index No. 211 - Curb Inlet Type 6 with Rectangular Structure Bottom
	✓ 0	S-4	Index No. 211 - Curb Inlet Type 6 with Rectangular Structure Bottom
Structures	✓ 0	S-10	Index No. 201 - Type 8 Manhole (Eccentric Cone with 1 or 2-Piece Cover, Recta
	✓ 0	S-5	Index No. 272 - Cross Drain MES with 1:2 Slope - Single Round Conc. Pipe

The Vista has a Pipe and a Structure Tab from here you can make adjustments to your system. For example you can switch to the Pipes Tab and control the Pipe Slope by typing it in. This is also a good method to keep your Structure and Pipe names straight.

Offset	Slope (Hold Start)	Slope (Hold End)	Slope	Start
	-1.00%	1.00%	1.00%	S-2
1'	-1.00%	1.00%	1.00%	S-2
	-1.00%	1.00%	1.00%	S-3
7'	-1.00%	1.00%	1.00%	S-4
8'	-1.00%	1.00%	1.00%	S-10

Editing your System



You can also select a part and right click >Structure Properties.

From here you can edit the part individually.

Editing your System

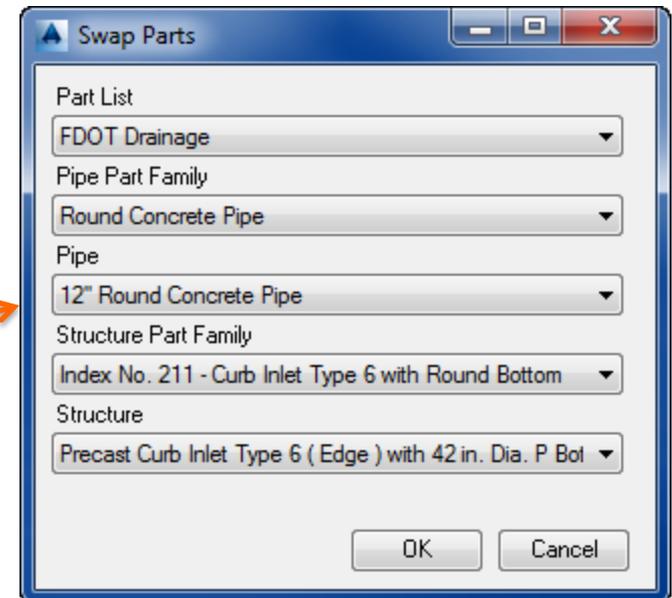
A few other editing tricks



To view parts or an entire pipe network in 3D select them and right click > Object Viewer



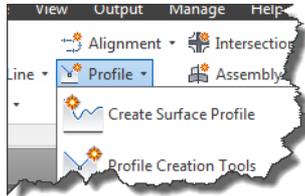
On the FDOT Ribbon there is a tool called Swap Parts that will allow you to swap multiple parts (structures and pipes) to a single part size



The contextual ribbon also has a single swap part option

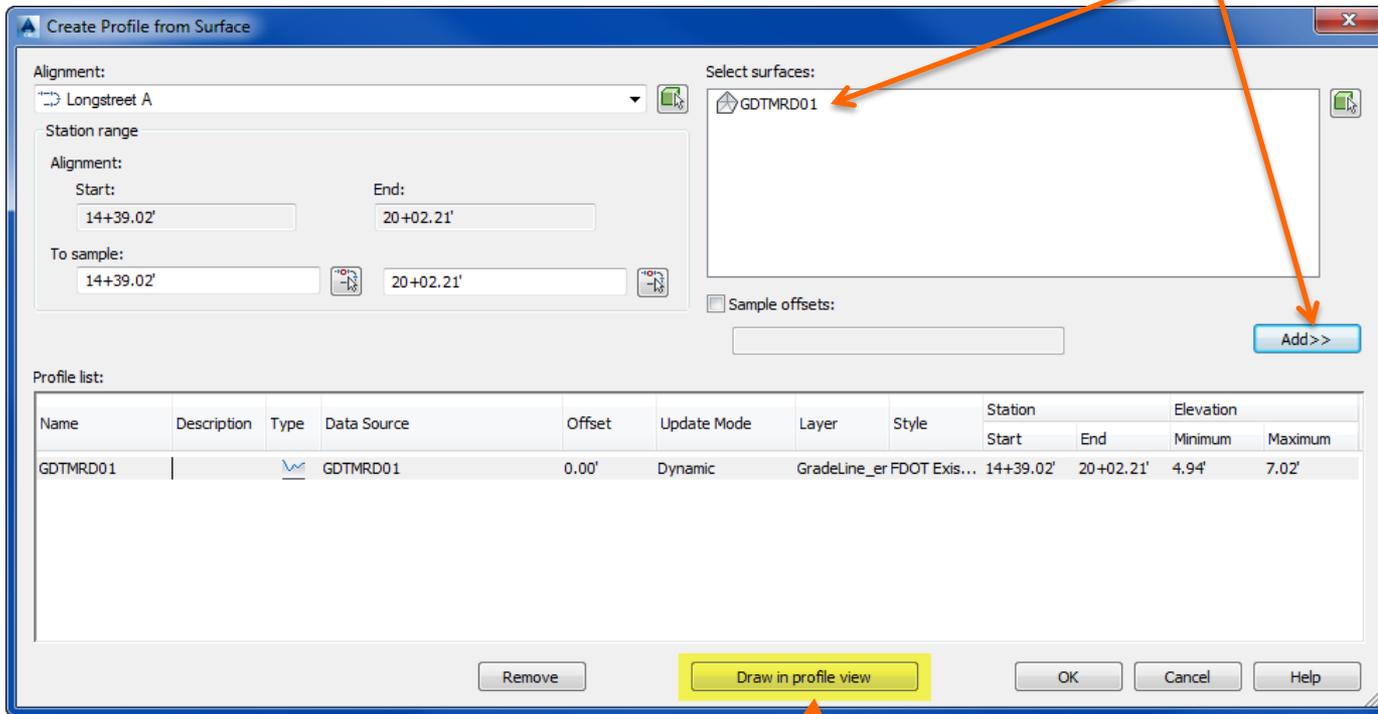
Profiles

The first step to generating Sections and Profiles is to have a Ground Profile along your Alignment(s). In this example I'm just using the Existing Grade.



On the Home Ribbon select Profile > Create Surface Profile. The Create Profile from Surface Wizard starts

Select the Surfaces you want to profile against and click on Add



Alignment:

Longstreet A

Station range

Alignment:

Start:

14+39.02'

End:

20+02.21'

To sample:

14+39.02'

20+02.21'

Select surfaces:

GDTMRD01

Sample offsets:

Add >>

Profile list:

Name	Description	Type	Data Source	Offset	Update Mode	Layer	Style	Station		Elevation	
								Start	End	Minimum	Maximum
GDTMRD01			GDTMRD01	0.00'	Dynamic	GradeLine_er FDOT Exis...		14+39.02'	20+02.21'	4.94'	7.02'

Remove

Draw in profile view

OK

Cancel

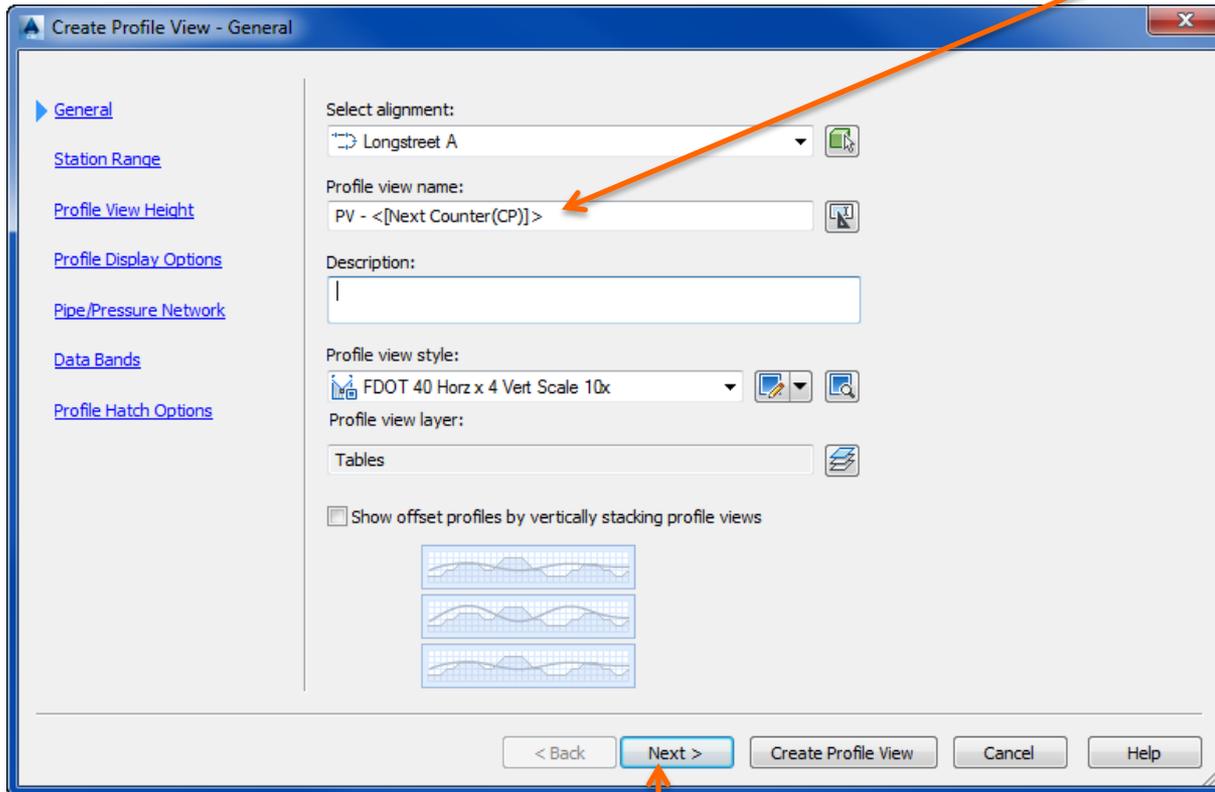
Help

At this point select "Draw in Profile View"

Profiles

The Create Profile View Wizard will walk you through the options that you should be familiar with

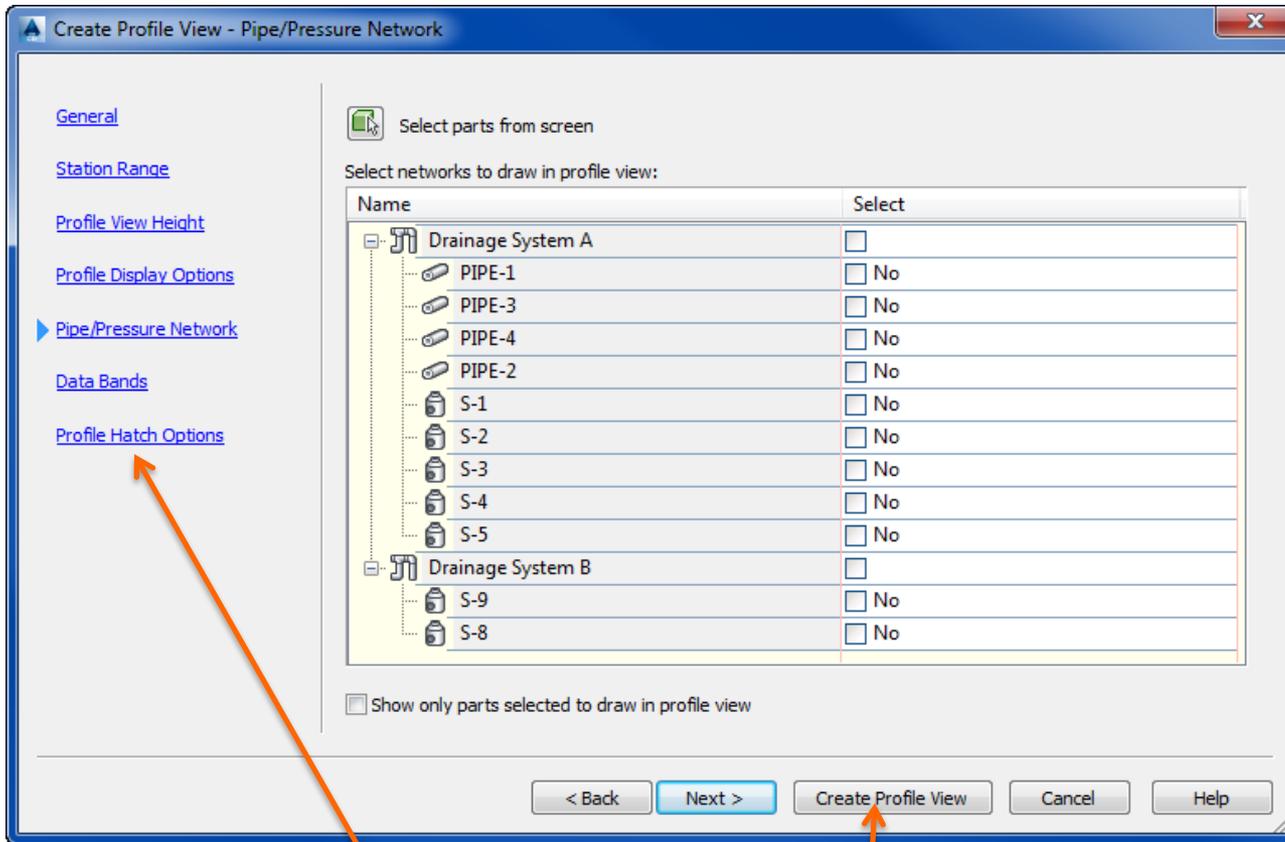
Make sure you name your Profile View Name something Unique because you may have many in a given project.



Select Next as you make your choices

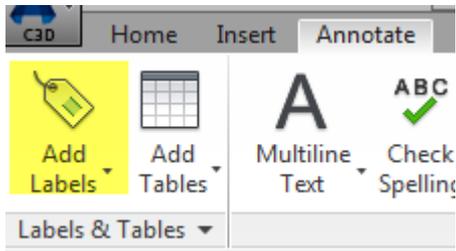
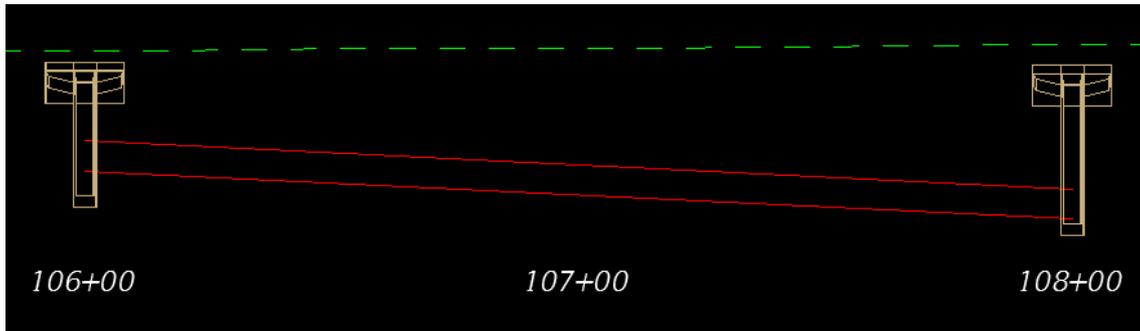
Profiles

When you get to the “Pipe/Pressure Network” screen select ONLY the pipes and structures you want in your profile. You can select individual parts or entire networks



Finish your selections and click on Create Profile View.
Select a place in model space out of the way for the profile.

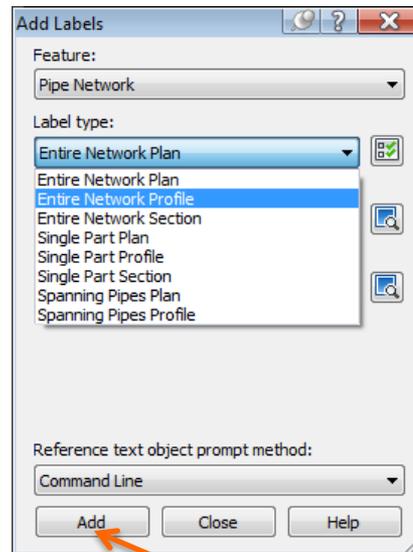
Profiles (Labeling)



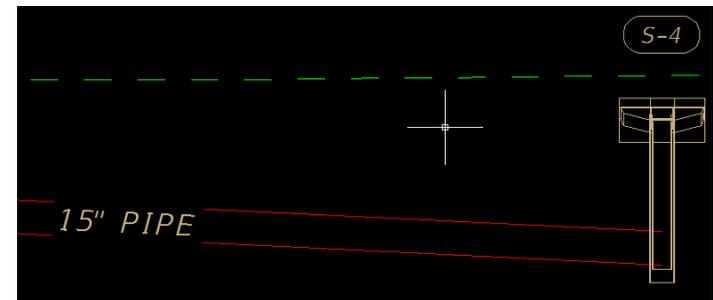
To Label your Network go to the Annotate Ribbon and select the top half of the Add Labels Icon

The Add Labels control dialog box opens and you can choose what you want to label.

Remember where this is because you will want to use this as a label option for all of your other labeling needs.



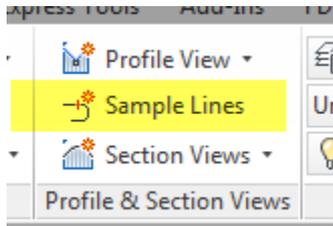
Select any network part and see the results



Select add and look at your command line for instructions



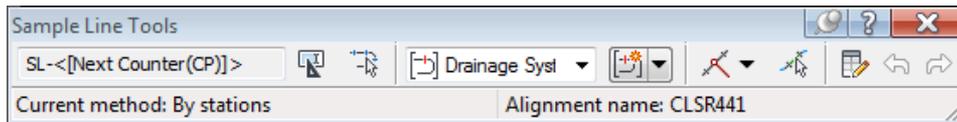
Cross Sections



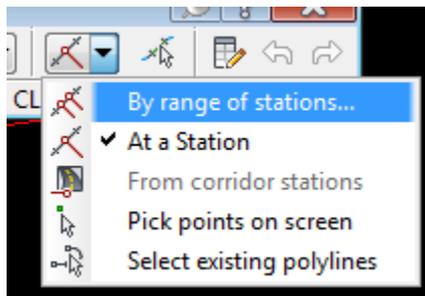
On the Home Ribbon select Sample Lines

`CREATESAMPLELINES` Select an alignment <or press enter key to select from list>:

Pay attention to your command line for instructions. Pick your Alignment in the file



Name your Sample Line group something unique.



You can create sample lines many different ways.

By range of stations- Allows you to enter a station range and swath width

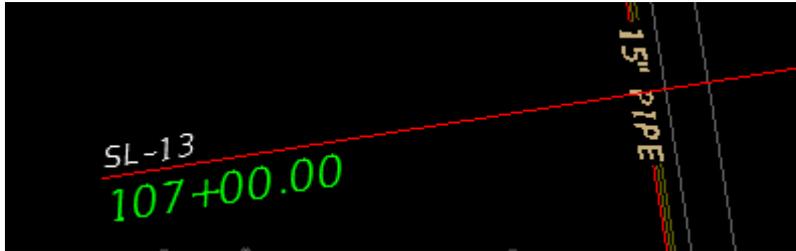
At a Station- Enter a individual Station

From Corridor Stations- If a Corridor is present you can pick stations

Pick points on Screen- By picking points on screen you can custom draw your sample lines

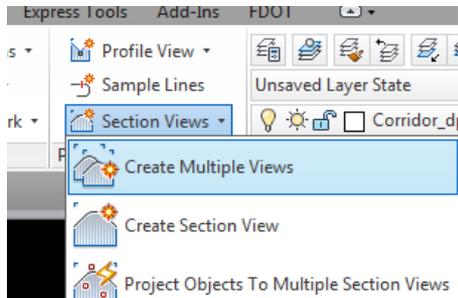
Select existing Polylines- You can draw polylines over your pipe network then convert them into Sample Lines

Cross Sections

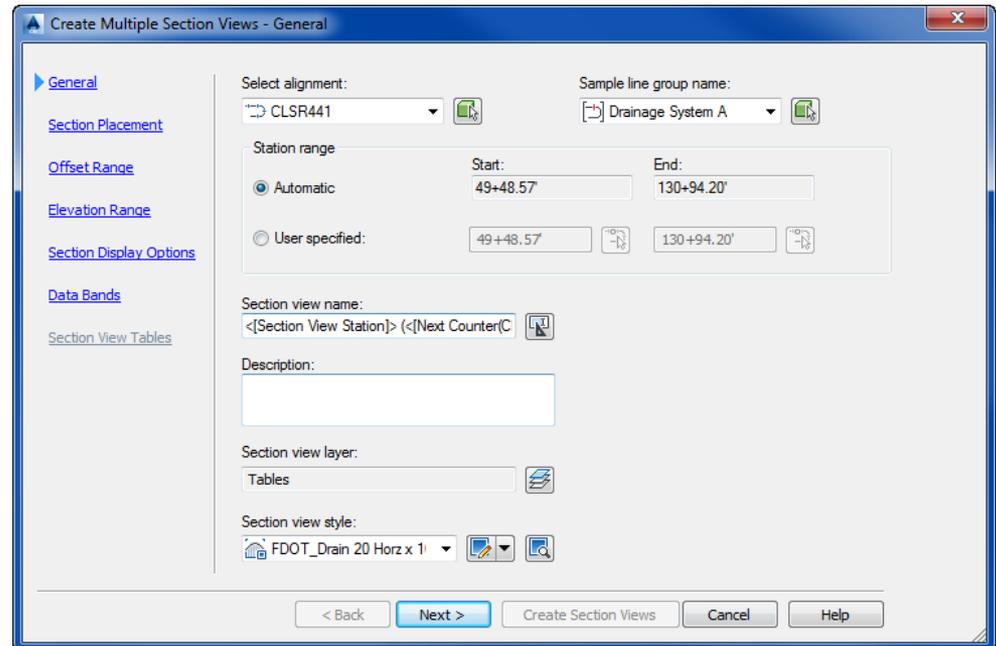


Sample Line – Each Sample Line has a name and a Station Label

On the home ribbon select Section Views > Create Multiple Views

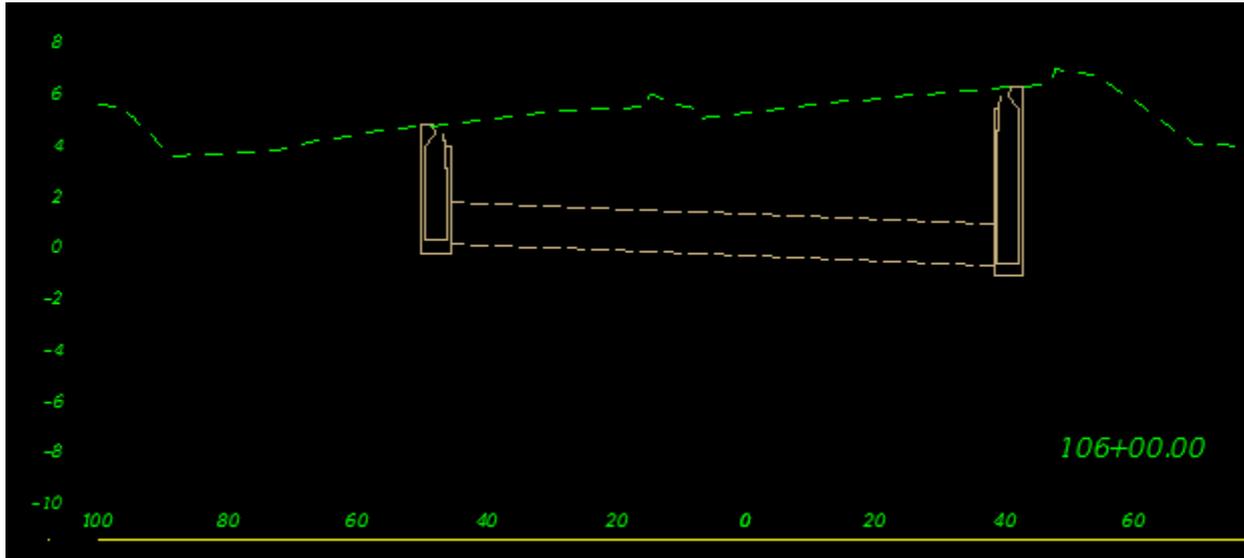


The Create Multiple Section Views wizard opens and like the Profile View Wizard you can make your choices. The one thing you may notice different is the lack of being able to select the Pipe Network. We will cover that shortly.

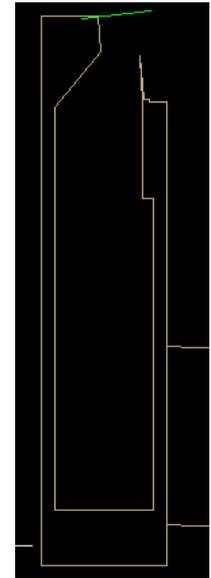
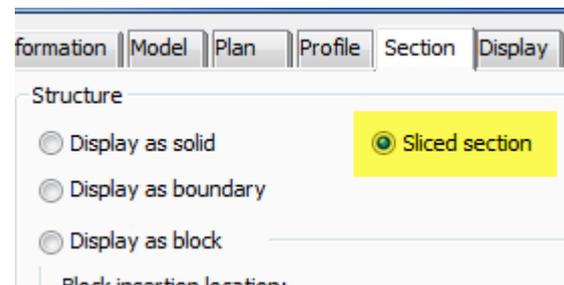


When information is complete select Create Section Views and select a open spot in model space just lie you did for the profile

Cross Sections

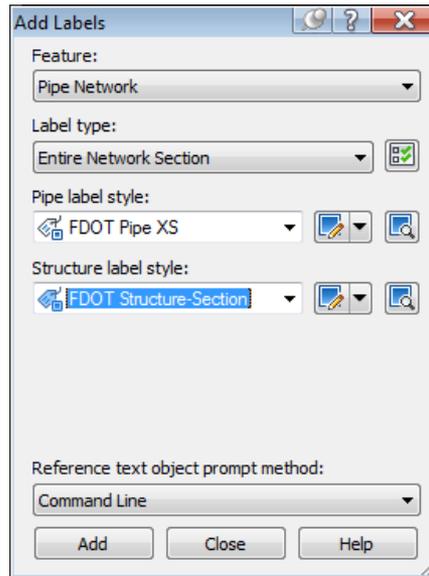
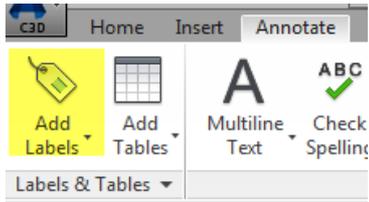


A typical Section View



Take a closer look at the structure. It is displaying as a properly sliced solid. This feature is included in the Productivity pack for Civil 3D 2014 and it is native to 2015 now. This option can be found in the Structure Style Property > Section Tab.

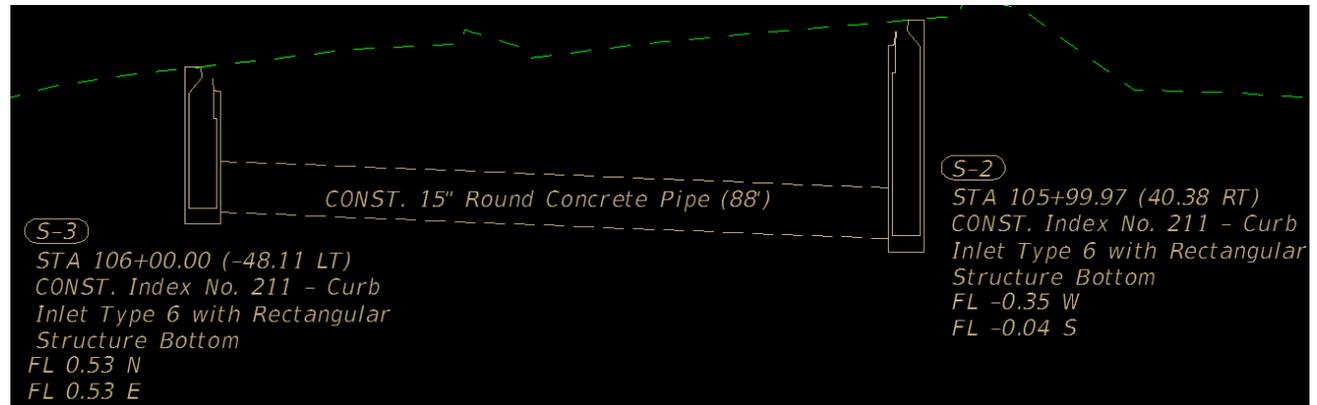
Cross Sections (Labeling)



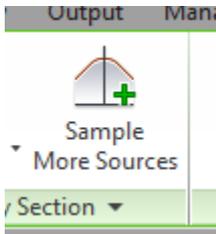
Select add and look at your command line for instructions
To select the network

Command:
ADDNETWORKPLANLABELS Select part contained in the network to be labeled:

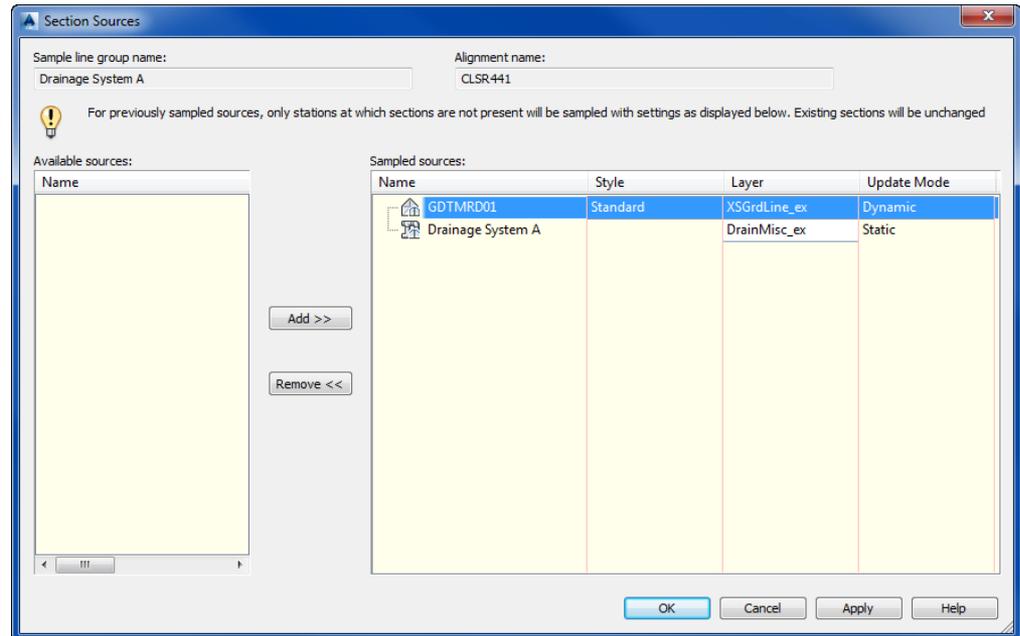
Finished Section view with Labels



Cross Sections (Adding Data)



Select a section view
and look on your
contextual ribbon.
Select Sample More
Sources



Here you can Add and Remove data from
your section views, such as water lines,
sewer and additional Pipe Networks