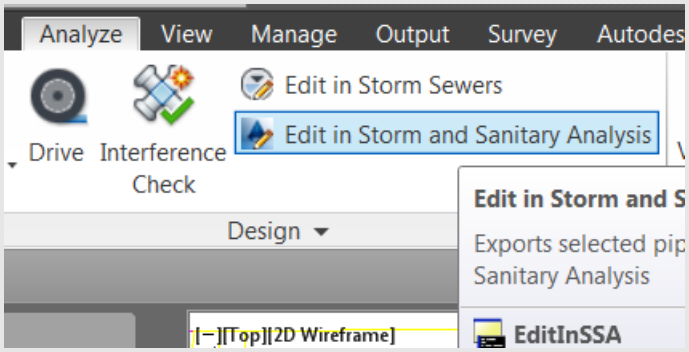
Storm and Sanitary Analysis in Civil 3D

- Presented by Carl Irwin and Brian Morse

Introduction

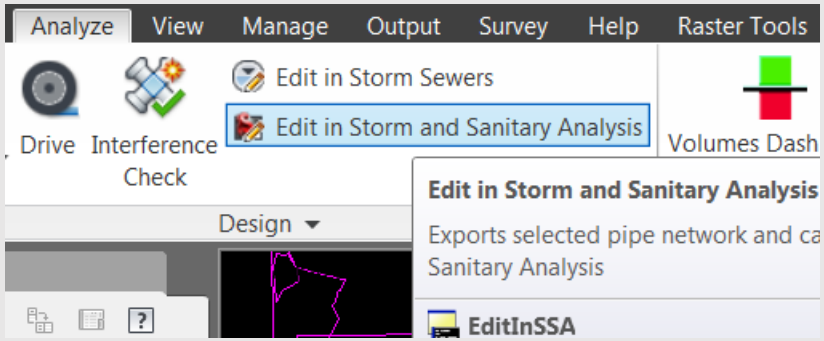


This example represents the analysis of an existing storm system. We will demonstrate the process of defining basins, nodes, and links using Autodesk Storm and Sanitary Analysis. Then quickly assigning design parameters and running an analysis. Finally we will display some output options for the final results.

First Step

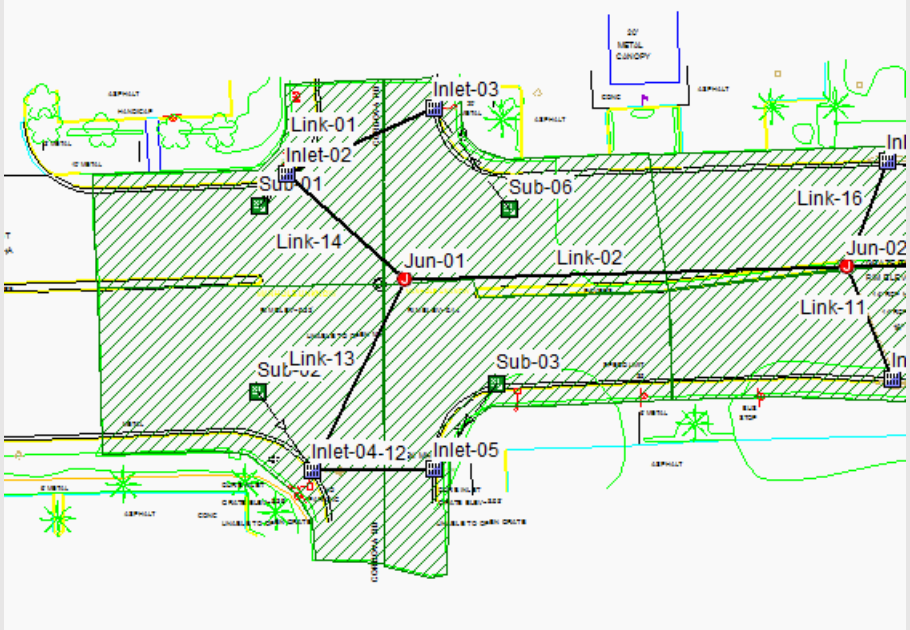
From Civil 3D to SSA

- Edit in SSA exports from Civil 3D
  - Log File Review
  - Plan View Tab
    - View Settings
- Background from Civil 3d
- Catchments from Civil 3d
- Network
  - Nodes
  - Links



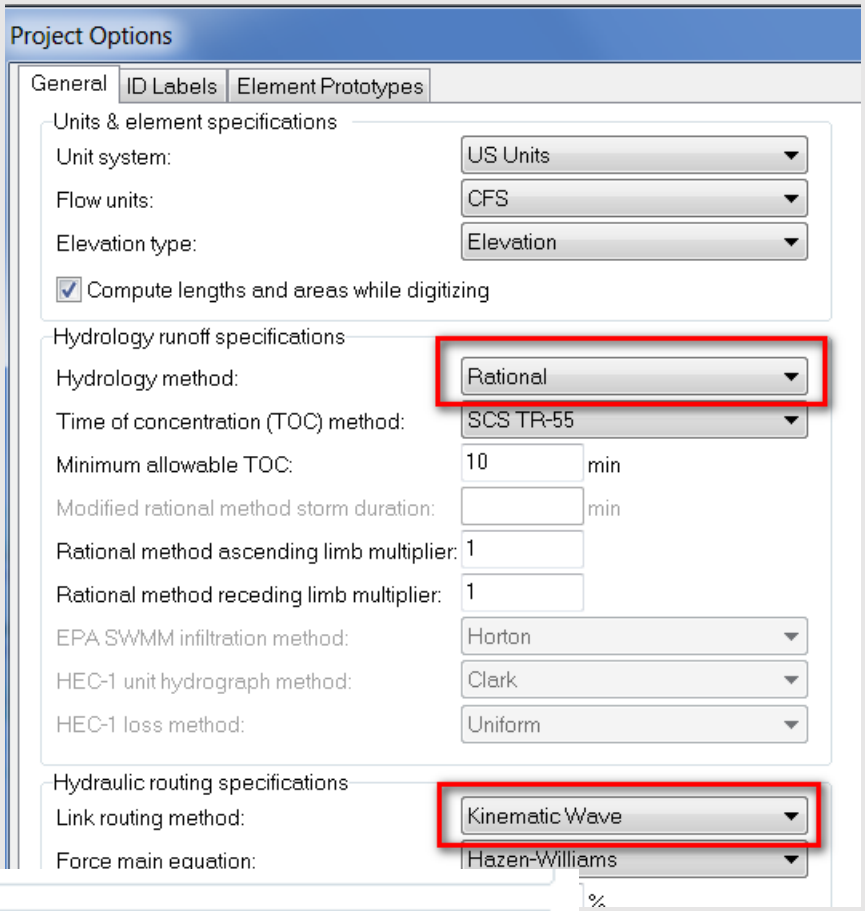
Alternate Workflow - Begin in SSA

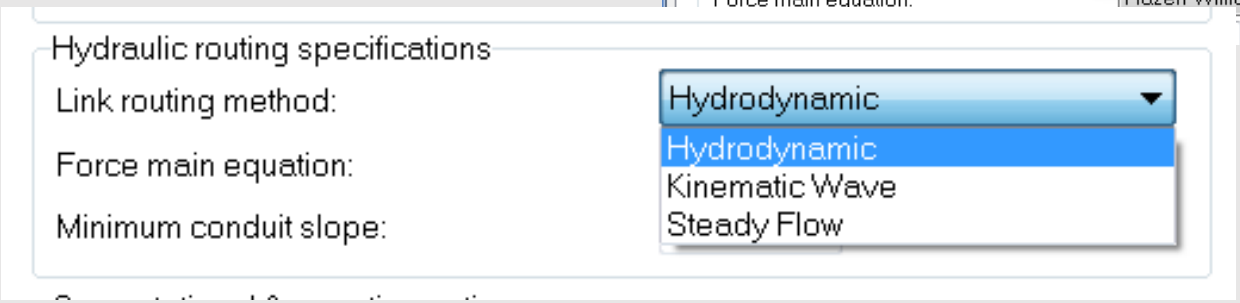
- Create in SSA
  - Basins
  - Nodes
  - Links



Second Step

Project Options



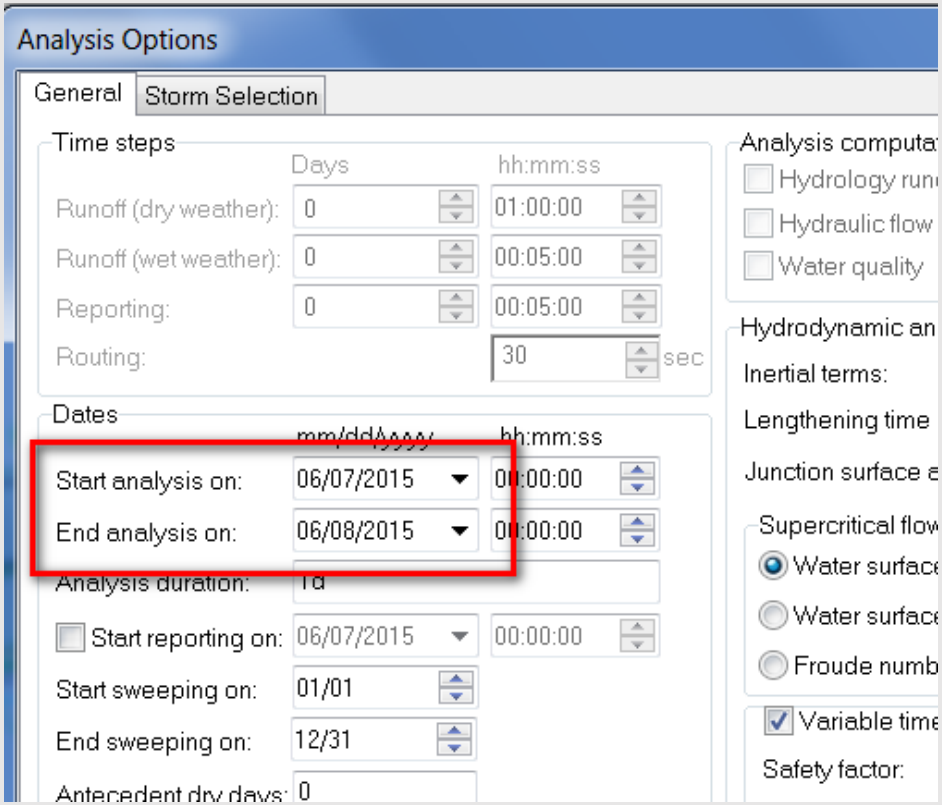


Analysis Options

Setup the Storm duration

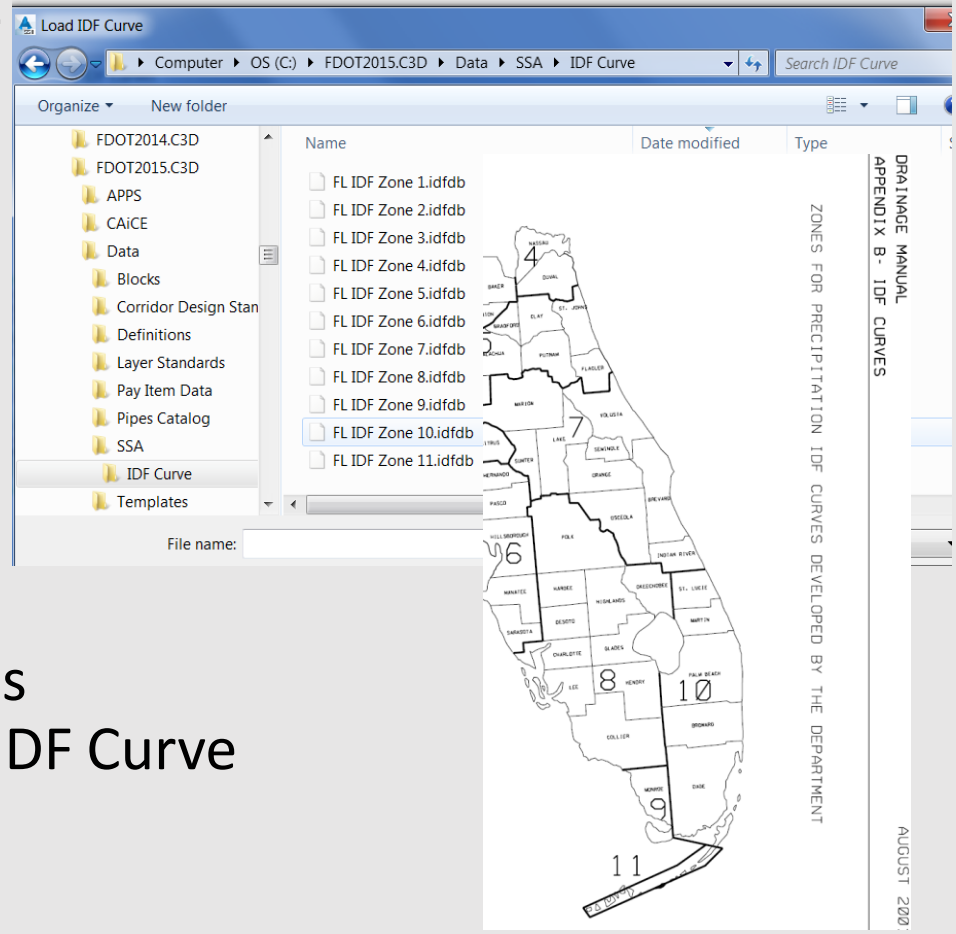
Storm Selection

3yr for this example



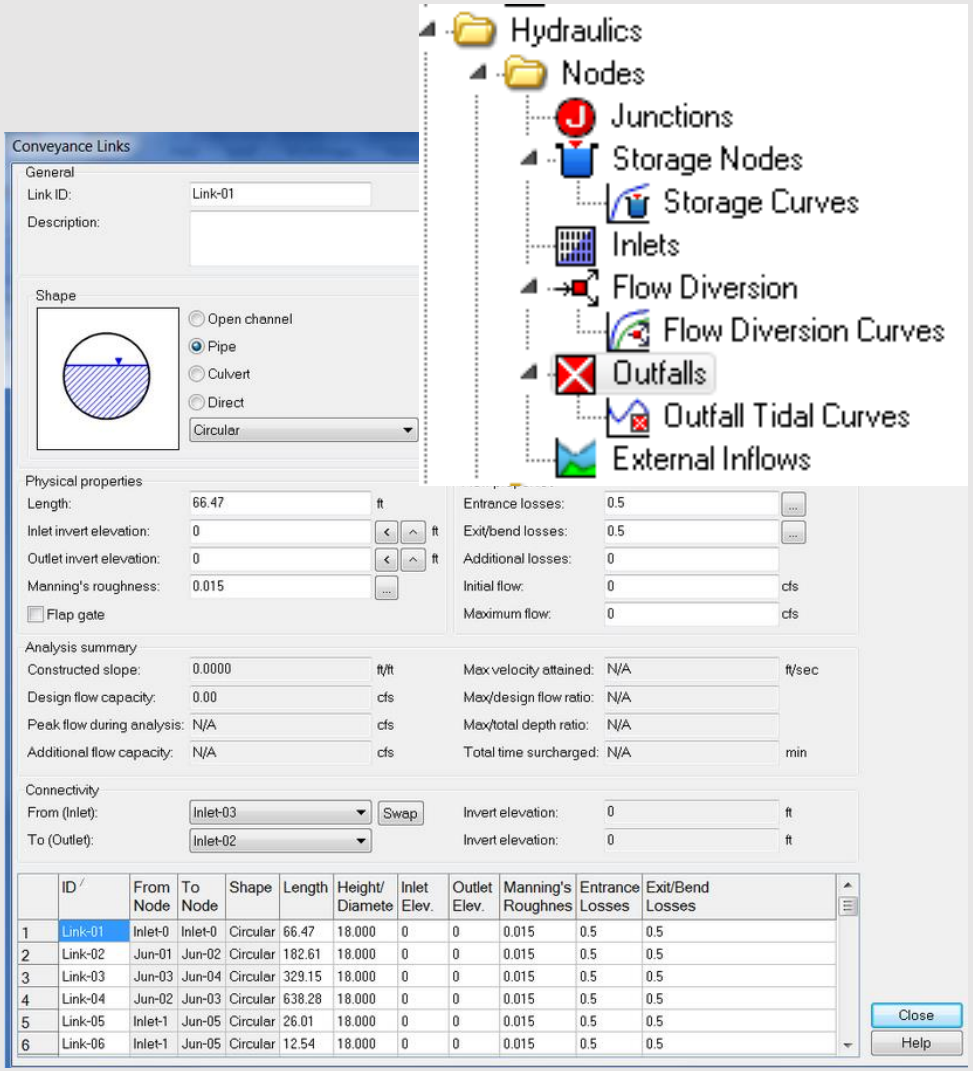
Hydrology Setup

- TR-55
  - Subbasins
    - Weighted Curve Numbers
  - Rain Gauge
    - Rainfall Designer
- Rational Method
  - IDF Curves
  - State Kit location of IDF Curves C:\FDOT2015.C3D\Data\SSA\IDF Curve
  - drainage manual
    - IDF Curves



Hydraulics

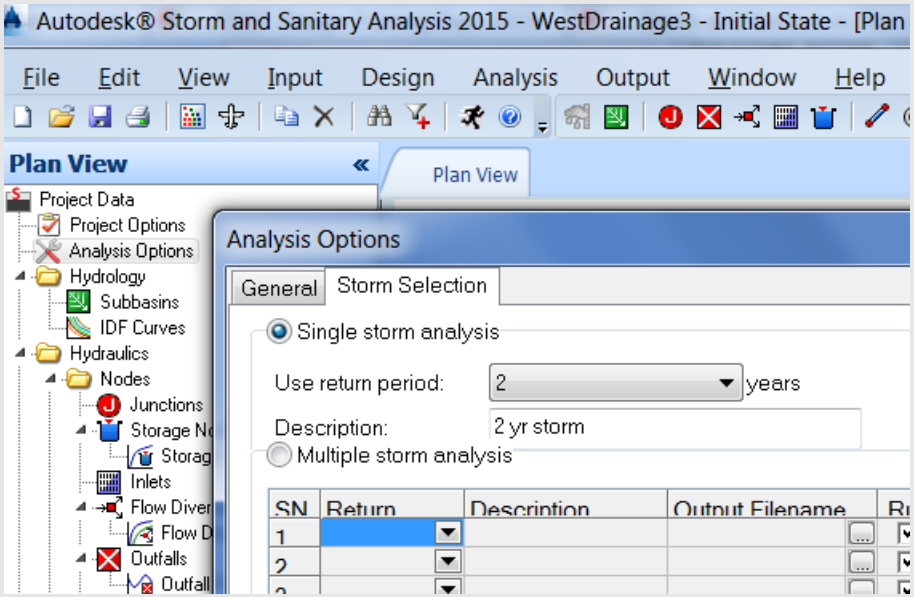
- Nodes
  - Storage Nodes
  - Outfalls
  - Inlets
    - On Sag
    - On Grade
  - Junctions
- Conveyance Links
  - Pipes
  - Channels
  - Bypass Links
  - Weirs/Orifices



Open more than one session of SSA to compare Existing and Proposed side by side

Analysis

- Storm Selection
- Messages
  - Bypass Link
- Connectivity Checks

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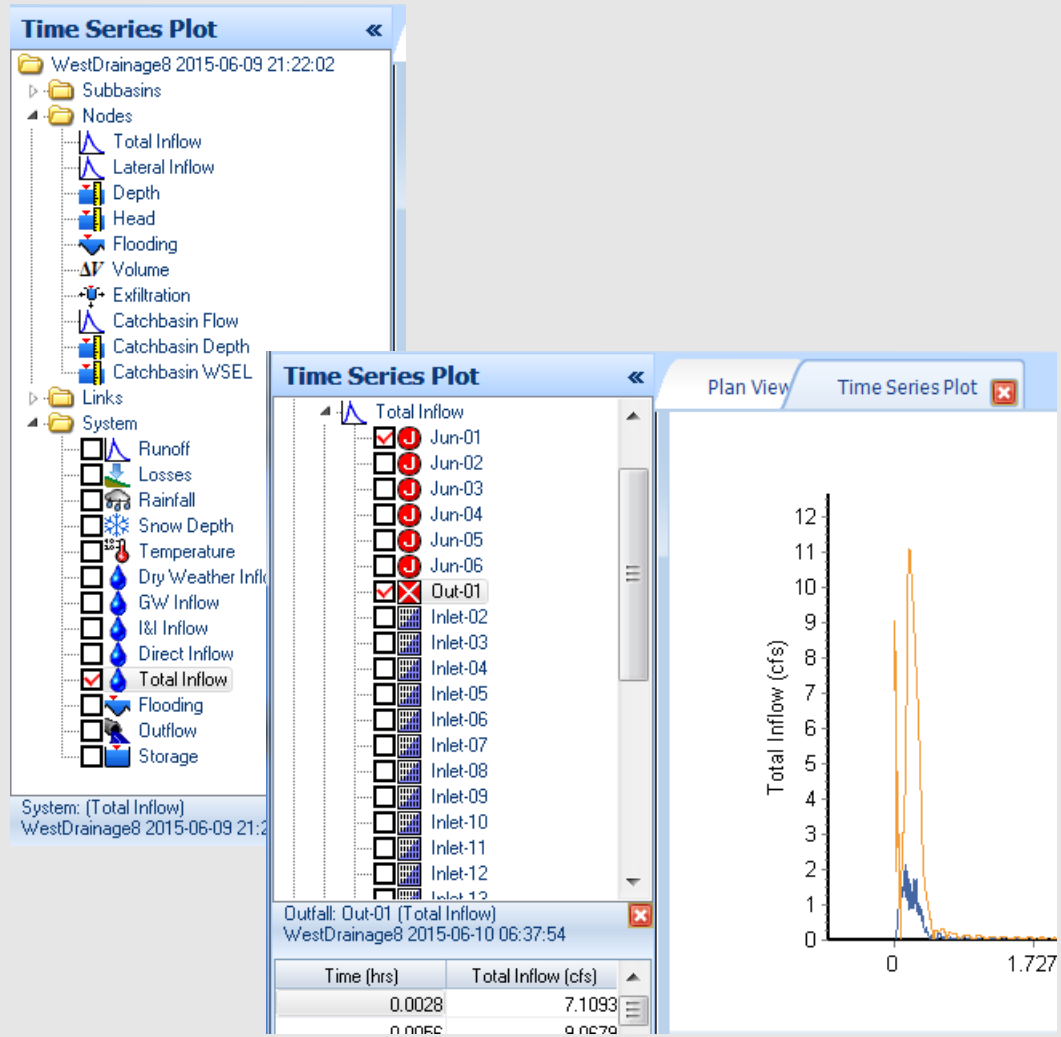
Autodesk® Storm and Sanitary Analysis 2015 - Version 9.1.157 (Build 1)
-----------------------------------------------------------------------------------------------


ERROR 601 : Inlet Inlet-02 has invalid by-pass link.at line 111 of [DIV_INL_PROPS] section:
  Inlet-02     0                          6                 10          0                 NO


ERROR 601 : Inlet Inlet-03 has invalid by-pass link.at line 112 of [DIV_INL_PROPS] section:
  Inlet-03     0                          6                 10          0                 NO
```

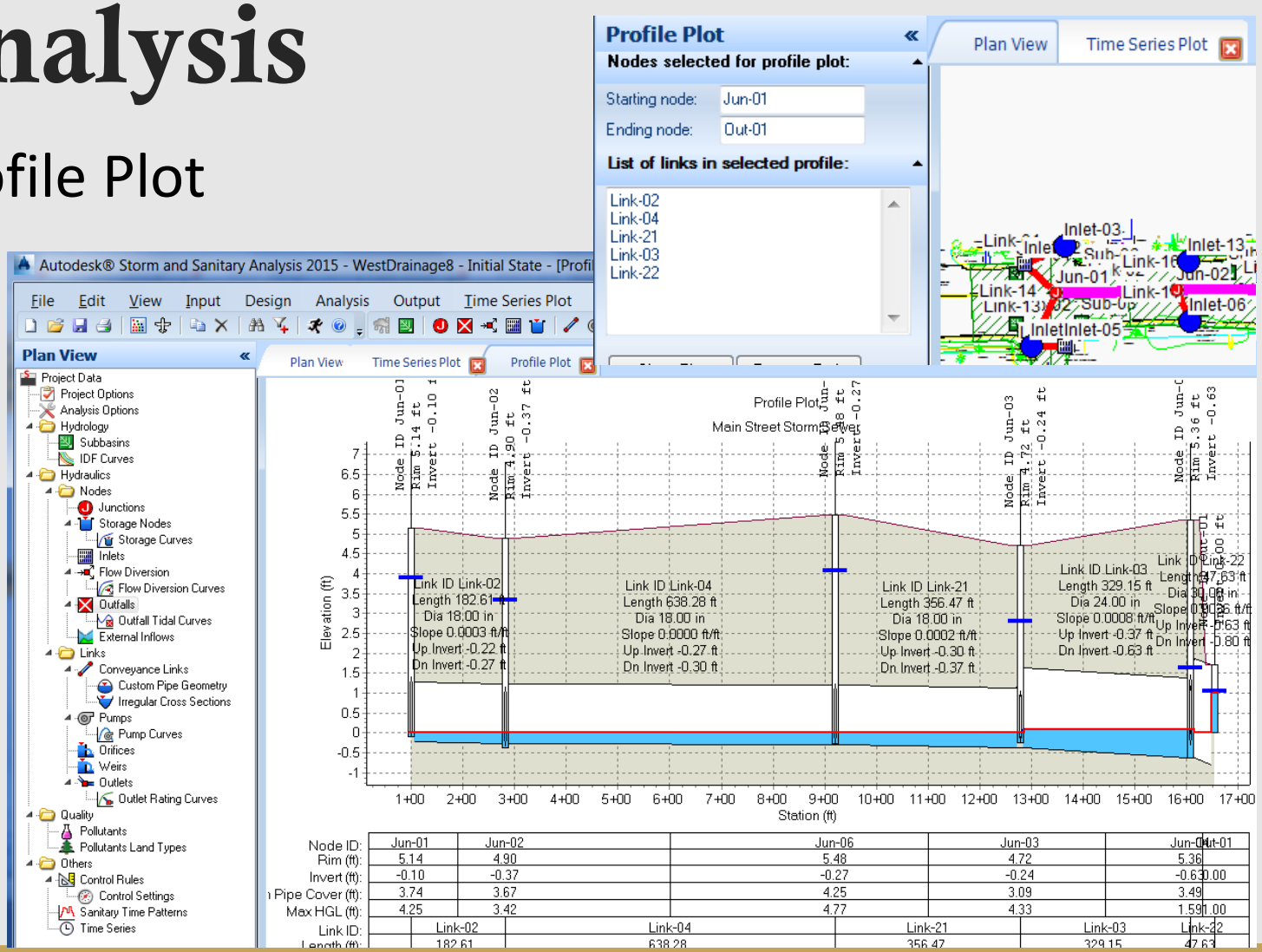
Analysis

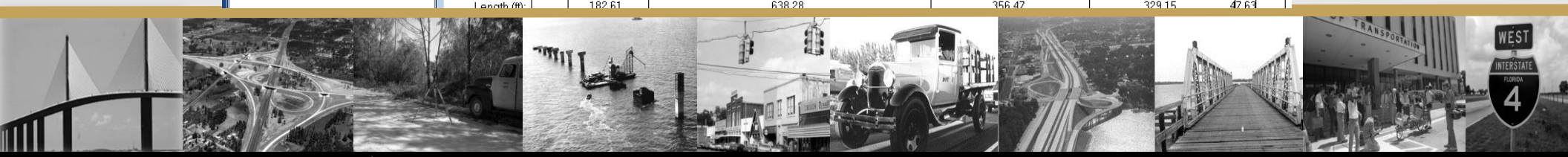
- Time Series Plot
  - Nodes
  - System



Analysis

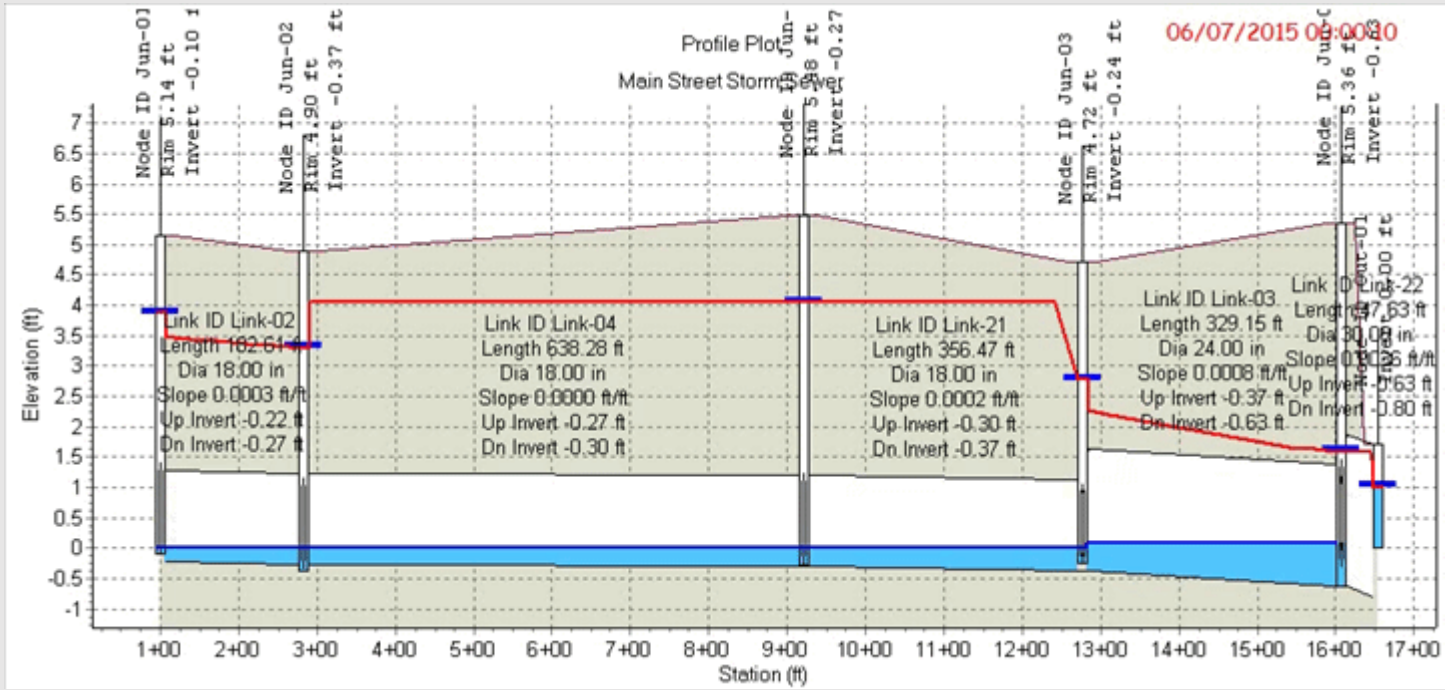
- Profile Plot





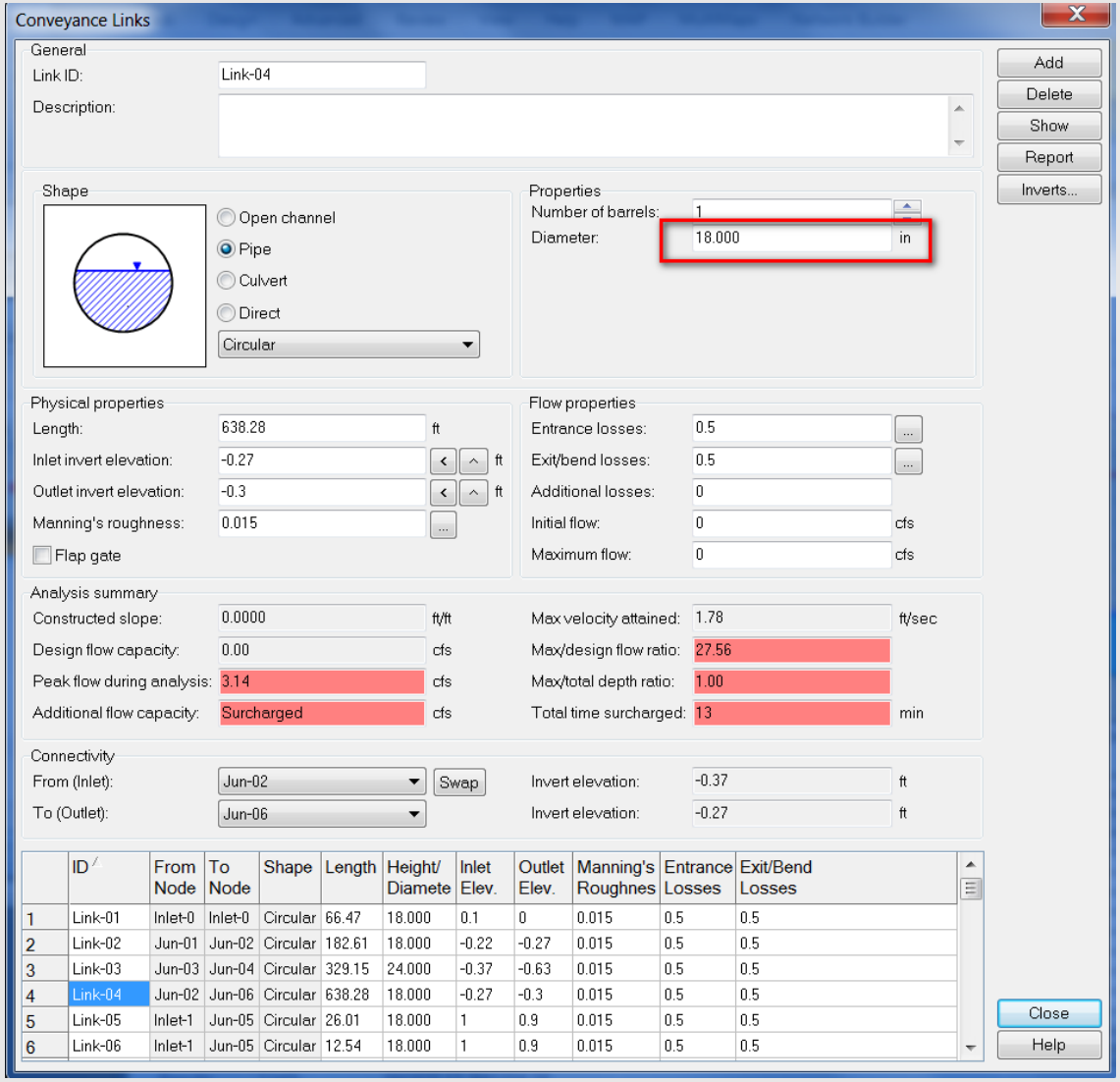
Analysis

- Profile Plot
  - Profile Animation



Analysis

- Adjust pipe size
- ReRun Analysis



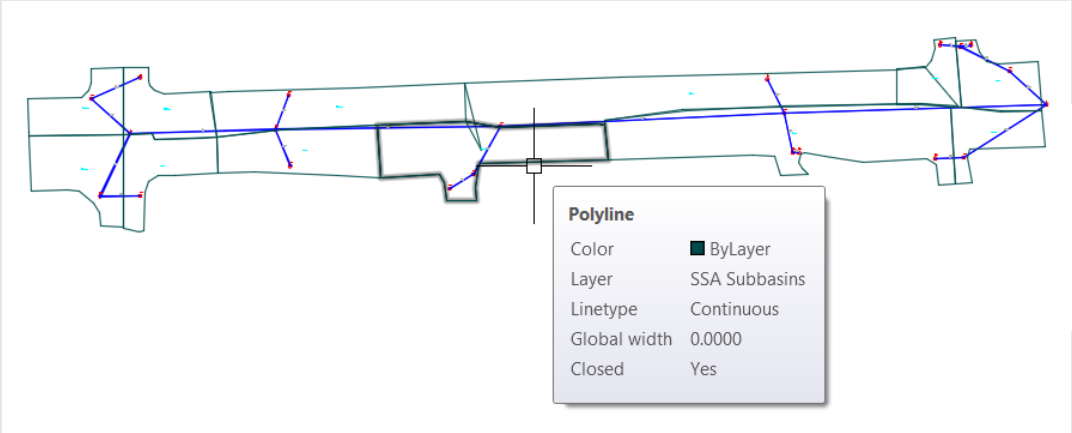
	ID	From Node	To Node	Shape	Length	Height/ Diamete	Inlet Elev.	Outlet Elev.	Manning's Roughnes	Entrance Losses	Exit/Bend Losses
1	Link-01	Inlet-0	Inlet-0	Circular	66.47	18.000	0.1	0	0.015	0.5	0.5
2	Link-02	Jun-01	Jun-02	Circular	182.61	18.000	-0.22	-0.27	0.015	0.5	0.5
3	Link-03	Jun-03	Jun-04	Circular	329.15	24.000	-0.37	-0.63	0.015	0.5	0.5
4	Link-04	Jun-02	Jun-06	Circular	638.28	18.000	-0.27	-0.3	0.015	0.5	0.5
5	Link-05	Inlet-1	Jun-05	Circular	26.01	18.000	1	0.9	0.015	0.5	0.5
6	Link-06	Inlet-1	Jun-05	Circular	12.54	18.000	1	0.9	0.015	0.5	0.5

Export formats available

- CAD
  - Nodes and Links with Labels (polylines and text)
  - Basins with Labels (polylines and text)
- GIS
  - Use FDO to Import SHP Files exported from SSA
  - Rich in Tabular Data
  - Setup Tool Tips in Civil 3D

Export to CAD

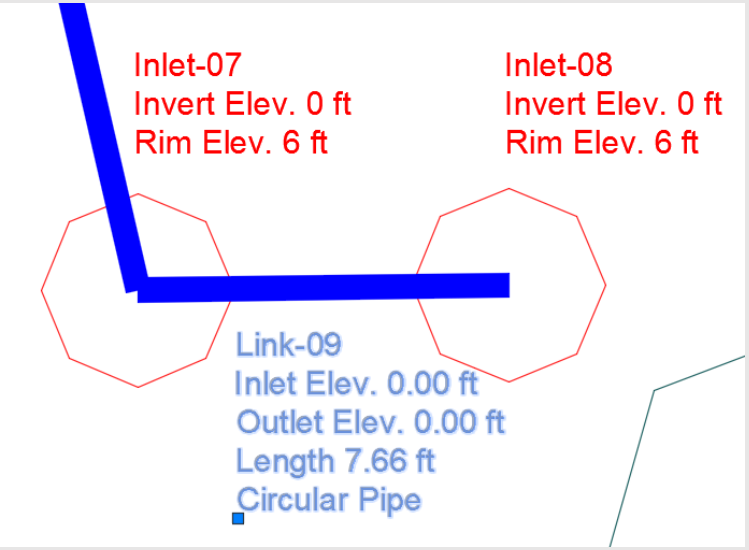
- Basins are exported as polylines with ID, area, and weighted runoff coefficient labels



Sub-08
Total Area 0.6528 ac
Weighted Runoff Coeff. 0.72

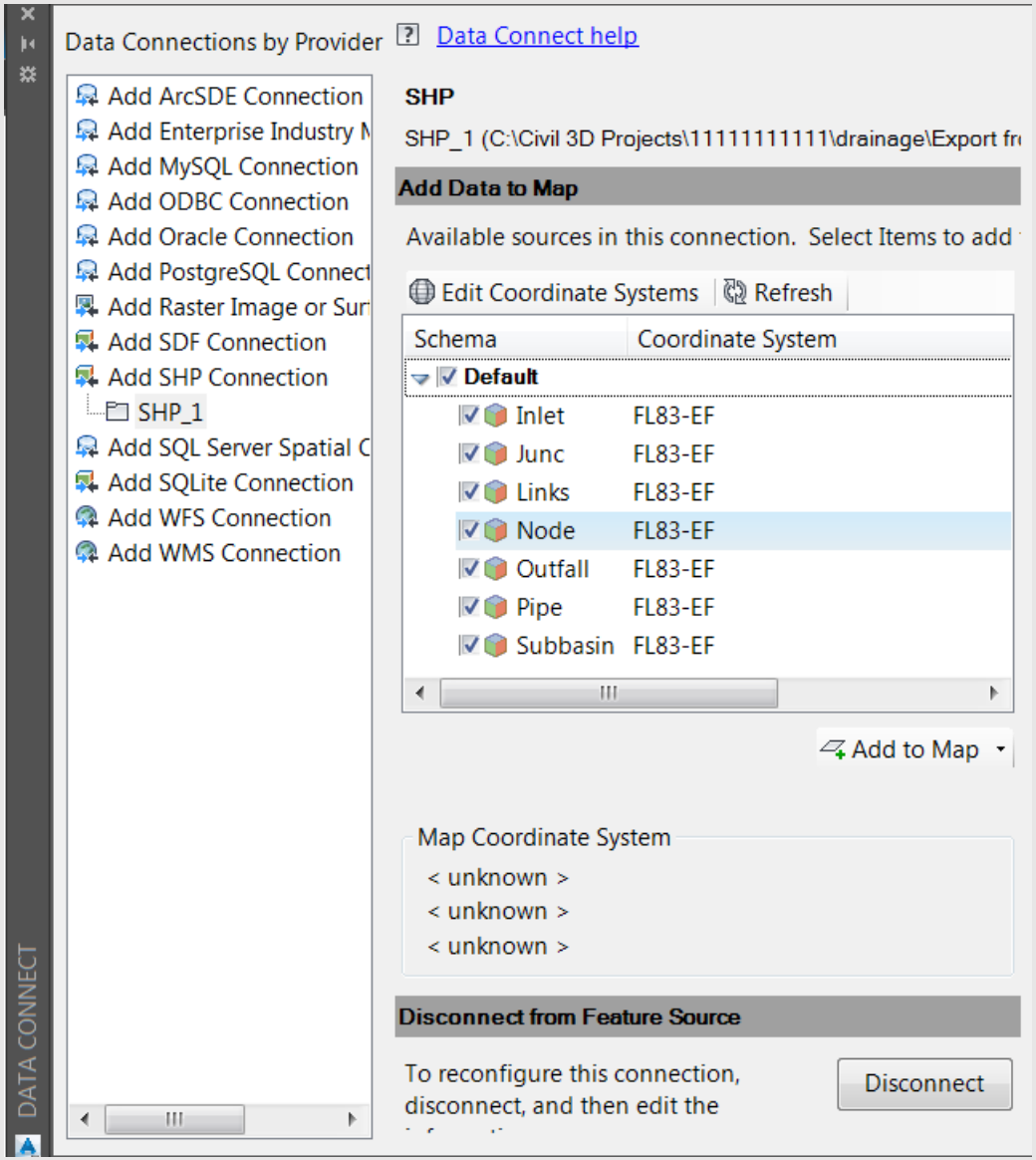
Export to CAD

- Exported entities are MTEXT, circles and polylines in dwg format
- Nodes are exported with ID, Invert elevations, and Rim elevation
- Links are exported with ID, inlet and outlet elevations, length, and pipe type (circular, elliptical, etc)



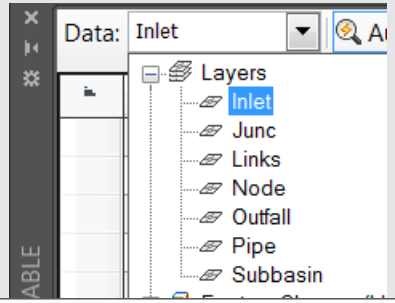
Export to GIS

- Use FDO to Import SHP Files exported from SSA
- Rich in Tabular Data
- Setup Tool Tips in Civil 3D



Export to GIS

- Rich in Tabular Data



Data: Subbasin | Auto-Zoom | Auto-Scroll

FeatId	ID	DESCRIPT	AREA	DNAGE_ID	WT_RUNCO	TOC
1	Sub-01		0.2261	Inlet-02	0.72	0
2	Sub-02		0.1983	Inlet-04	0.72	0
3	Sub-03		0.1697	Inlet-05	0.72	0
4	Sub-04		0.2579	Inlet-06	0.72	0
5	Sub-05		0.3591	Inlet-13	0.72	0
6	Sub-06		0.1677	Inlet-03	0.72	0
7	Sub-07		0.3822	*	0.72	0
8	Sub-08		0.6528	Inlet-12	0.72	0

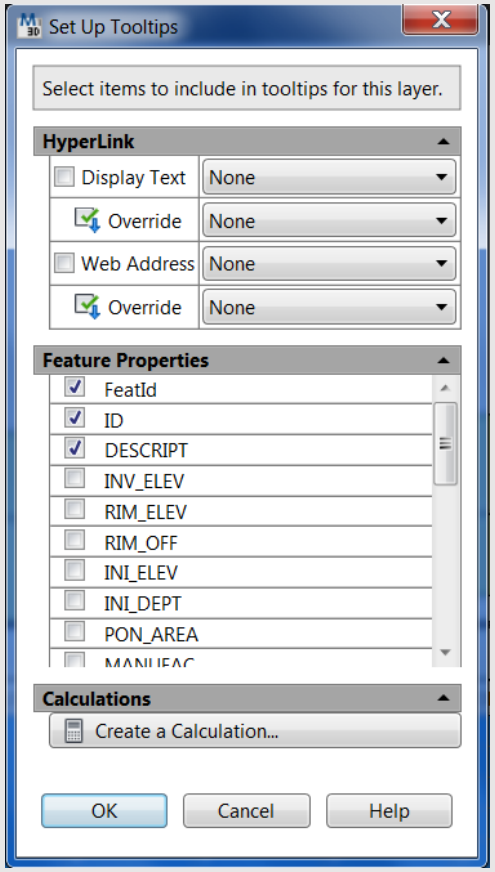
Data: Pipe | Auto-Zoom | Auto-Scroll | Filter by:

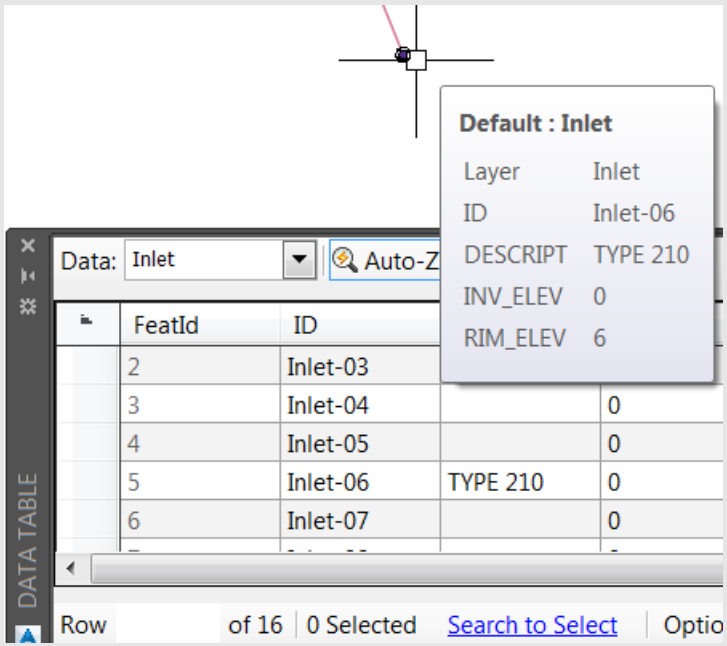
FeatId	ID	DESCRIPT	UP_NODE	DN_NODE	LENGTH	FLP_GAT	INL_ELEV	INL_OFF	AVG_SLF	OUT_ELEV	OUT_O	MAN_ROUG	ENT_LOSS	EX_LOSS	ADD_LOS	INI_FLOW	PIPE_SHP	DIA_INCH	DIA_FT
1	Link-01		Inlet-03	Inlet-02	66.47	NO	0	0	0	0	0	0.015	0.5	0.5	0	0	CIRCULAR	18	1.5
2	Link-02		Jun-01	Jun-02	182.61	NO	0	0	0	0	0	0.015	0.5	0.5	0	0	CIRCULAR	18	1.5
3	Link-03		Jun-03	Jun-04	329.15	NO	0	0	0	0	0	0.015	0.5	0.5	0	0	CIRCULAR	18	1.5
4	Link-04		Jun-02	Jun-06	638.28	NO	0	0	0	0	0	0.015	0.5	0.5	0	0	CIRCULAR	18	1.5
5	Link-05		Inlet-10	Jun-05	26.01	NO	0	0	0	0	0	0.015	0.5	0.5	0	0	CIRCULAR	18	1.5
6	Link-06		Inlet-11	Jun-05	12.54	NO	0	0	0	0	0	0.015	0.5	0.5	0	0	CIRCULAR	18	1.5
7	Link-07		Jun-05	Inlet-09	68.48	NO	0	0	0	0	0	0.015	0.5	0.5	0	0	CIRCULAR	18	1.5
8	Link-08		Inlet-09	Jun-04	62.02	NO	0	0	0	0	0	0.015	0.5	0.5	0	0	CIRCULAR	18	1.5

Row of 21 | 0 Search to Select Options

Export to GIS

- Setup Tool Tips in Civil 3D





2015 Design Training Expo

The fetch phrase is…

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