



Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®

Nicholas Edwin – Imaginit Technologies
(Joe Hedrick)

GS2296 In this hands on lab, you will learn how to effectively use existing and created GIS layers to streamline the process of creating pre post development drainage drawing maps and inputting this data into SSA® for hydrograph creation. We will examine the various technical workflows and tips necessary to analyze soils, pervious/impervious data and automate basin data. We will also touch on the new catchment workflows in Civil 3D®. Several example projects will be used to demonstrate the pre planning efforts all the way through basic drainage map project design.

Learning Objectives

At the end of this class, you will be able to:

- Describe the preplanning process required prior to analyzing soils and their pervious or imperviousness with Map 3D®
- Attach data for impervious and pervious areas
- Analyze GIS layers in Map 3D®
- Create catchments and sub basins using various methods

About the Speaker

Nicholas Edwin is an accomplished civil application engineer who conducts training and implementation projects that garner frequent accolades from clients. Extremely proficient with AutoCAD Civil 3D, Nicholas uses his professional experience to help clients incorporate best practices to maximize the performance from their software.

Nicholas' diverse skills have been used in the civil transportation, bicycle pedestrian design, GIS mapping, imaging, cartography, and architectural disciplines. His capabilities include: subdivision design and layouts; completing commercial civil design and layouts; eminent domain research and Pre/Post/Cure plan drawing development; preliminary storm water design; signing and pavement marking design; roadway design; preparation of topographic layouts; and utility adjustment plans using Civil 3D.

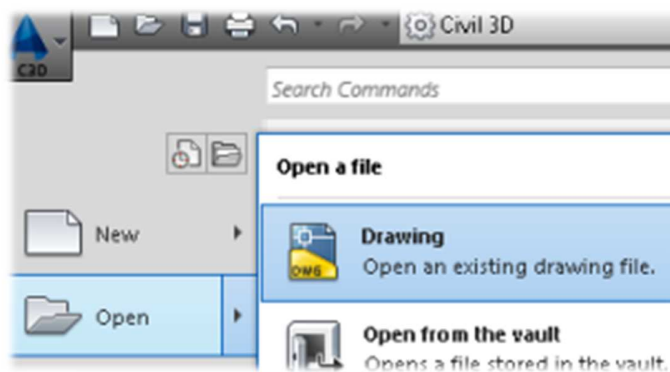
nedwin@rand.com

Section 1: Setting up the drawing for the preplanning process required prior to analyzing soils and their perviousness or imperviousness with Map 3D®/Civil 3D®.

In this section we verify what's in the drawing to prepare what method will be used for analysis.

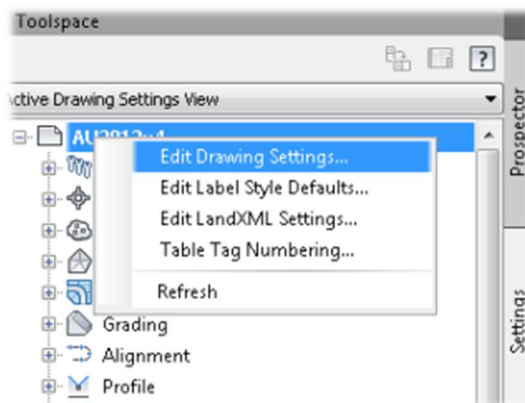


1. Open Civil 3D ➤
2. Open drawing file “AU2013v1.dwg” by clicking on the APPLICATION MENU BUTTON ➤ select the OPEN command ➤ Click drawing command ➤ Navigate to the dataset folder on the root c drive (C:\GS2296-L)



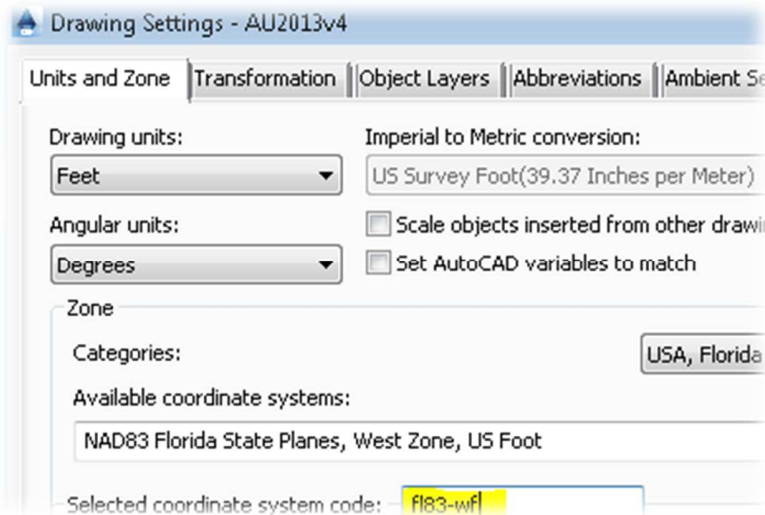
a.

3. Click on the SETTINGS tab within the TOOLSPACE ➤ Right click on name of drawing within the SETTINGS tab ➤ Select EDIT DRAWINGS SETTINGS option.
4. Note: Set Coordinate system to FL83-WF. This is important to allow for transformation of GIS data that might be based on a different coordinate system. To do this...

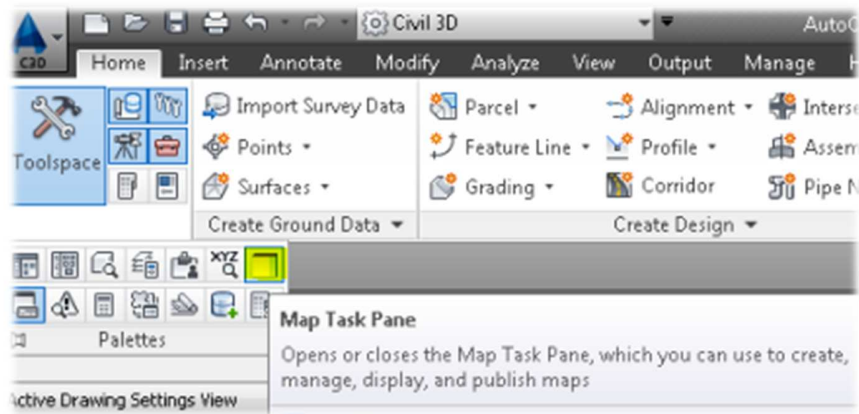


a.

5. Click on the UNITS AND ZONE tab within the DRAWING AND SETTINGS Dialog box ➤
Navigate to the SELECT COORDINATE SYSTEM CODE area delete existing period and type
“FL83-WF”

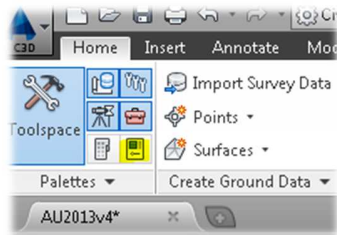


- a.
6. Click OK
7. Click HOME RIBBON TAB ➤ Navigate to the PALETTES PANEL PULLDOWN ➤ Click on the MAP TASK PANE command ➤ hit the enter key ➤.



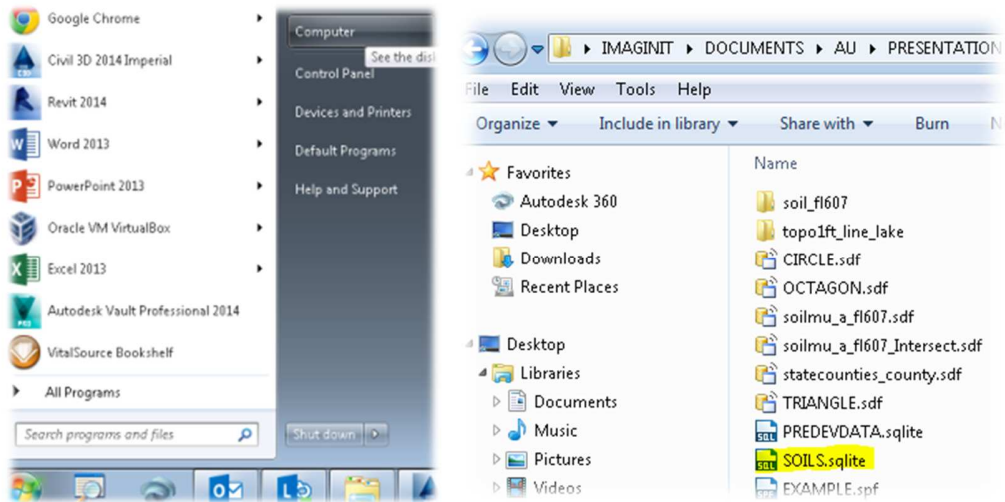
- a.
8. Click HOME RIBBON TAB ➤ Navigate to the PALETTES PANEL ➤ Click on the PROPERTIES COMMAND.

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



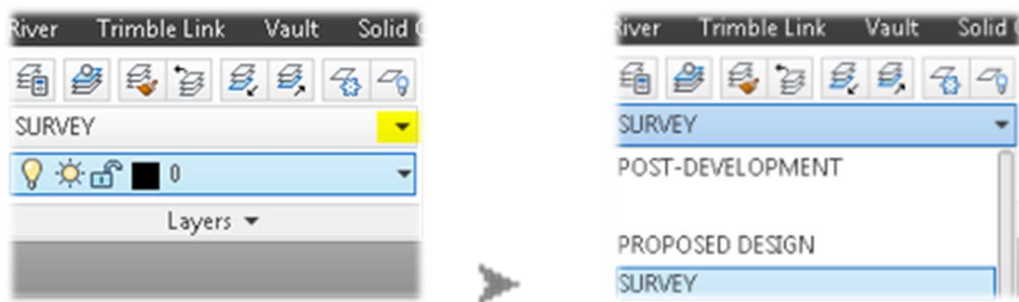
a.

9. Open Windows Explorer ➤ Click on the windows START button ➤ select COMPUTER ➤ Navigate to the dataset folder on the root c drive (C:\GS2296-L) ➤ Verify the soils data is available for drag n drop. ** The only file that is needed for this exercise is the "SOILS.sqlite"*



a.

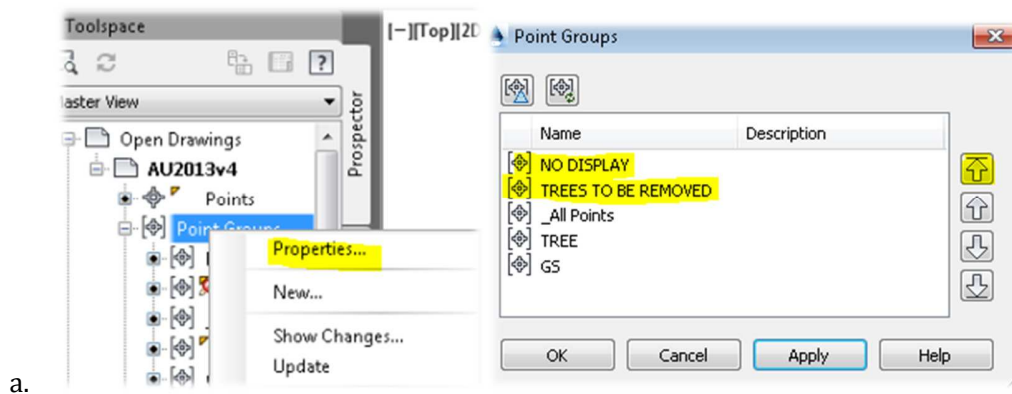
10. Click HOME RIBBON TAB ➤ Navigate to the LAYERS PANEL ➤ Click on the UNSAVED LAYER STATE button (LAYER STATE) selector and toggle through the different LAYER STATE presets. (i.e. SURVEY, POST-DEVELOPMENT, ETC....)



a.

11. Select the SURVEY LAYER STATE to proceed....

12. Verify that there are surfaces and points in the drawing PROSPECTOR tab. This is important so determine what method of sub basin delineation can/will be used or a combination there of. It's also important to change the styles of Civil 3D® objects to better analyze what the site looks like. To do this...
13. Click PROSPECTOR TAB within the TOOL SPACE ➤ Navigate to the points group category ➤ right click on the points groups ➤ Select properties ➤ move the "NO DISPLAY" and the "TREES TO BE REMOVED" to the top of the list. ➤ Select apply ➤ Click OK ➤ Type REA in the Autocad command line.



14. Click PROSPECTOR TAB within the TOOL SPACE ➤ Navigate to the SURFACE category. Notice several surfaces are in the collection reflecting existing and the proposed design for this site. Most/all of the styles have been turned off for the class exercise.

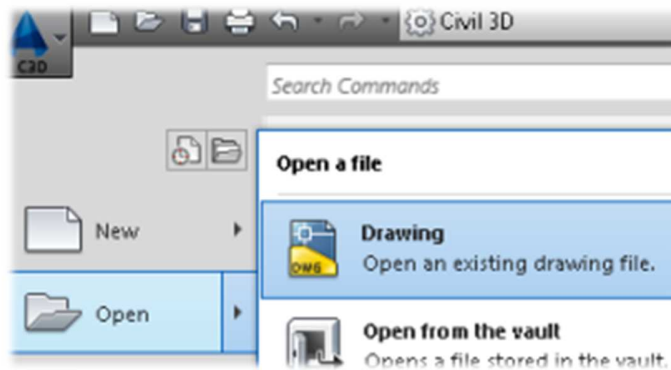


15. Save and Close Drawing File.

Section 2: Attach data for impervious and pervious areas.

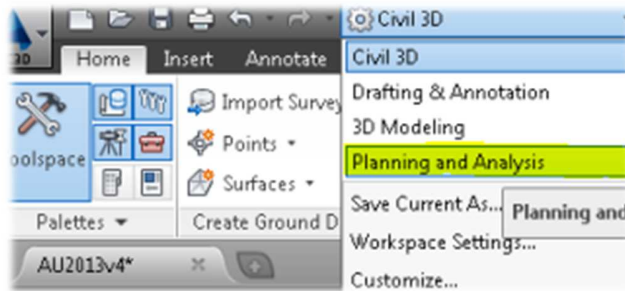
Based on section 1 preplanning, in this section we decided to use the MAP 3D® tools for the pre-development sub-basin process. Basin have been delineated using AutoCAD polylines. Next we and will attach object data the pervious and impervious areas of the site. And export the data to and SDF file format.

1. Open drawing file "AU2013v2.dwg" by clicking on the APPLICATION MENU BUTTON ➤ select the OPEN command ➤ Navigate to the dataset folder on the c drive (C:\GS2296-L)



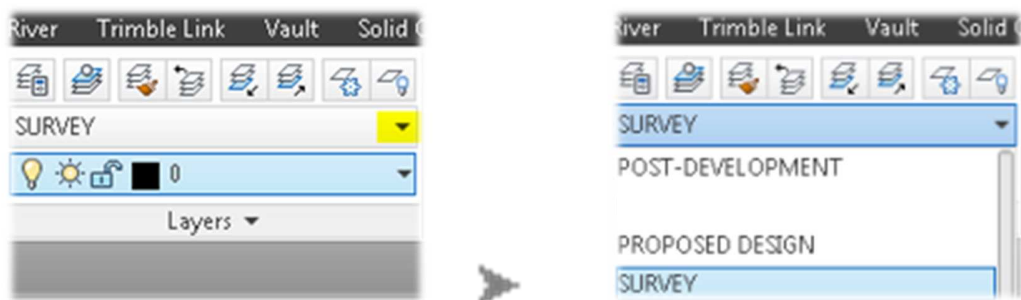
a.

2. Click on the QUICK ACCESS TOOLBAR ➤ select the WORKSPACE SWITCHING pull-down ➤ Select PLANNING AND ANALYSIS workspace



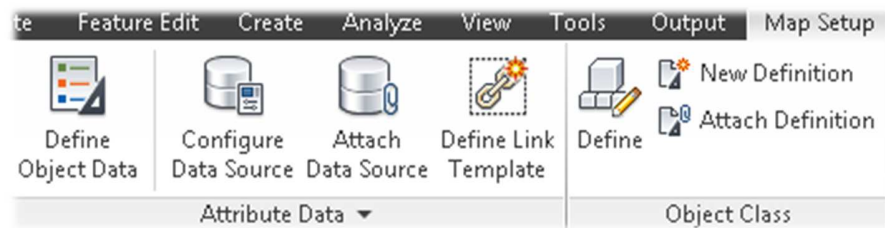
a.

3. Click HOME RIBBON TAB ➤ Navigate to the LAYERS PANEL ➤ Click on the UNSAVED LAYER STATE button (LAYER STATE) selector and toggle through the different LAYER STATE presets. (i.e. SURVEY, POST-DEVELOPMENT, ETC....)



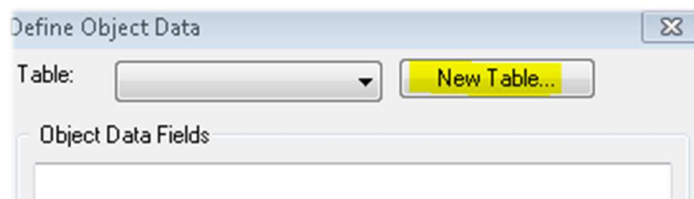
a.

4. Select the PRE-DEVELOPMENT LAYER STATE to proceed....
5. To create a shape file we first need to apply object data to the entities. To do this ➤ Click on the MAP SETUP TAB in the ribbon ➤ Navigate to the ATTRIBUTE DATA panel ➤ click on the DEFINE OBJECT DATA command.



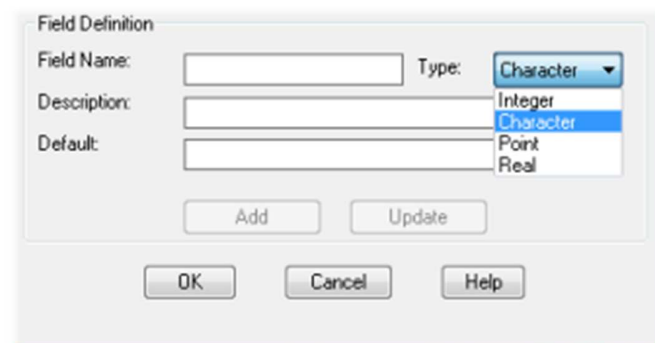
a.

6. In the DEFINE OBJECT DATA dialog box select the NEW TABLE COMMAND ➤ Click a NEW TABLE NAME "Click on new table command."



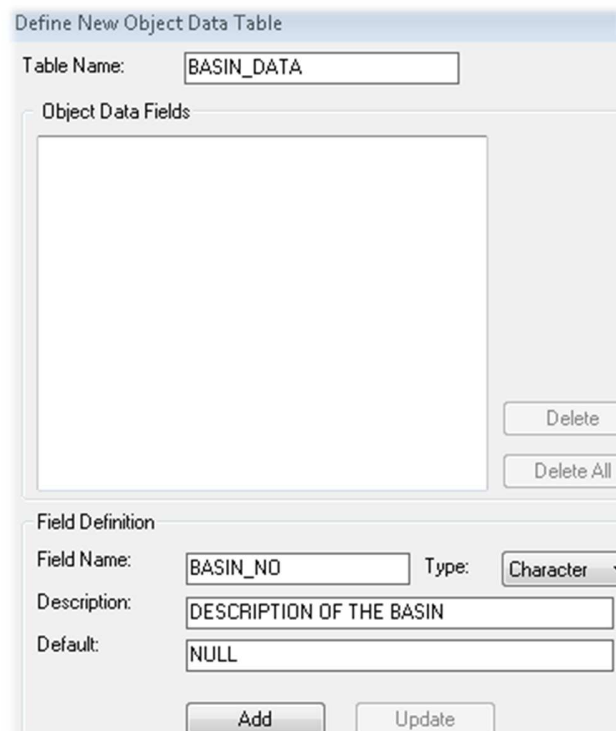
a.

7. In the DEFINE NEW OBJECT DATA TABLE dialog box ➤ switch the type from integer to character



a.

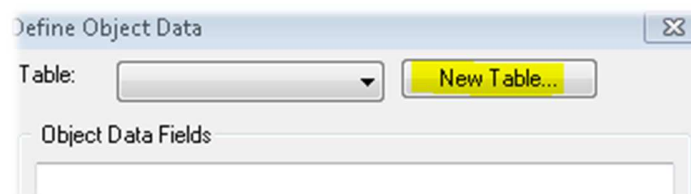
8. Next type the following in the empty fields (NO SPACES except for the description) ➤ Hit the add button after entering all data ➤ click the ok button when finished.
 - a. Table name: BASIN_DATA
 - b. Field name: BASIN_NO
 - c. Description: DESCRIPTION OF THE BASIN
 - d. Default: NULL



i.

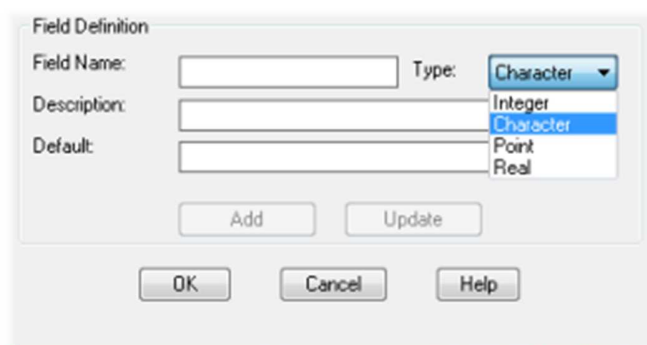
9. Click ADD ► Click OK

10. In the DEFINE OBJECT DATA dialog box select the NEW TABLE COMMAND ► Click a NEW TABLE NAME “Click on new table command.



a.

11. In the DEFINE NEW OBJECT DATA TABLE dialog box ► switch the type to character



a.

12. Next type the following in the empty fields (NO SPACES except for the description) ➤ Hit the add button after entering data ➤ click the ok button when finished.
- Table name: CURVE_DATA
 - Field name: CURVE_DESC
 - Description: CURVE DESC IMPERV OR PERV
 - Default: NULL

Table Name: CURVE_DATA

Object Data Fields

CURVE_DESC

Delete

Delete All

Field Definition

Field Name: CURVE_DESC Type: Character

Description: CURVE DESC IMPERV OR PERV

Default: NULL

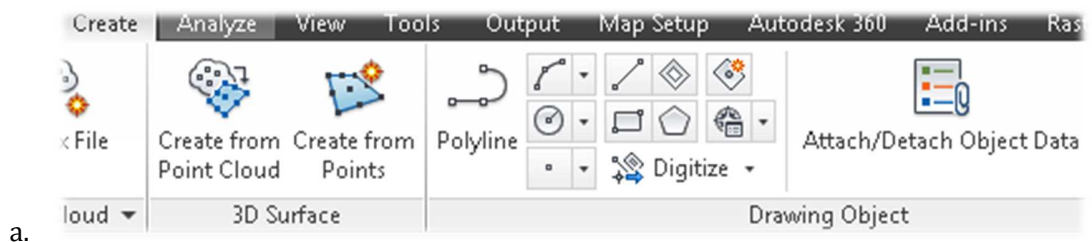
Add Update

OK Cancel Help

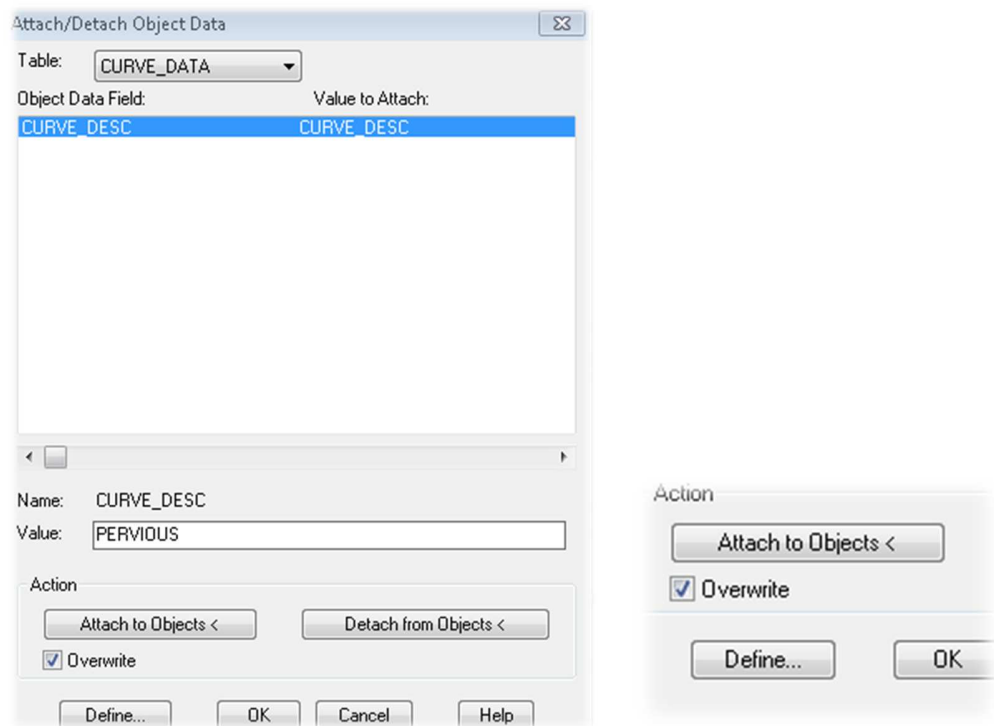
i.

13. Click ADD ➤ Click OK ➤ click CLOSE

14. To add the data to the entities. ➤ Click on the CREATE TAB in the ribbon ➤ Navigate to the DRAWING OBJECT panel ➤ click on the ATTACH/DETACH object data command.

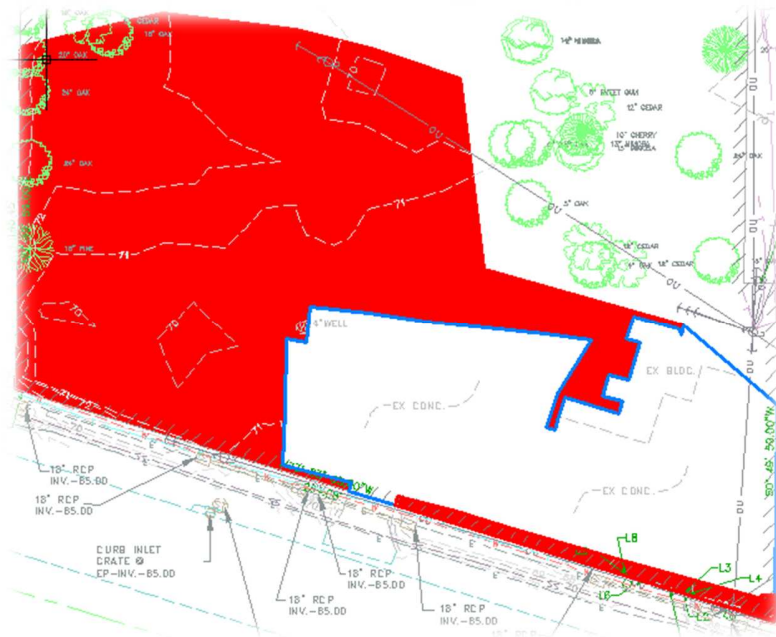


15. In the Attach/Detach Object Data dialog box ➤ Select the CURVE_DESC object data field and type PERVIOUS in the value FIELD below ➤ Hit the ENTER key on the keyboard to attach the value



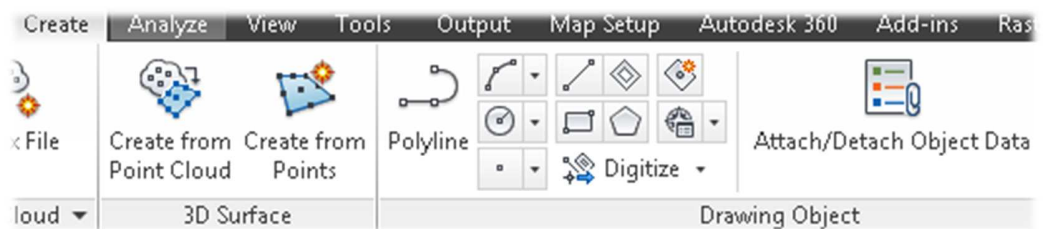
a.

16. Next click the ATTACH TO OBJECTS button located in the action area of the dialog box and ➤ select the two (2) RED polygons in the site (note: Polygons in illustrations below shows solid pattern to help distinguish shapes to be picked for the exercise)



a.

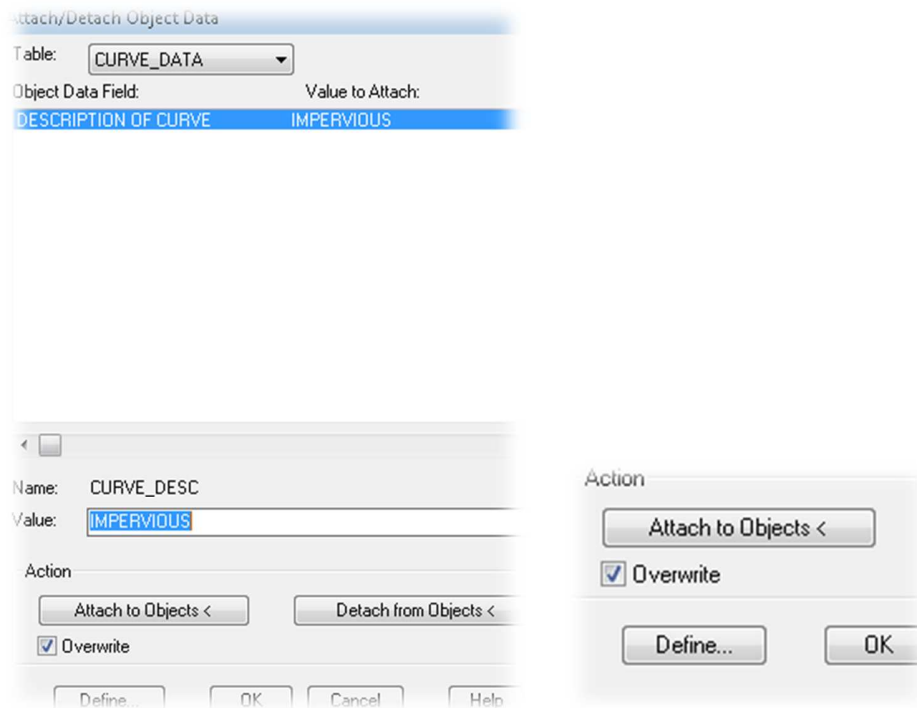
17. Next repeat the steps to add the impervious data to the entities. ► Click on the CREATE TAB in the ribbon ► Navigate to the DRAWING OBJECT panel ► click on the ATTACH/DETACH object data command.



a.

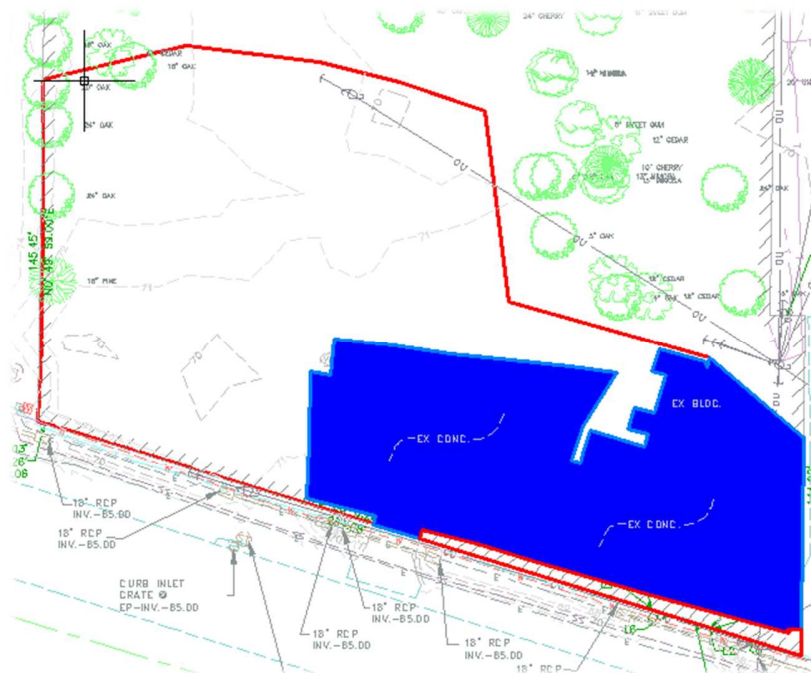
18. In the Attach/Detach Object Data dialog box ► Select the CURVE_DESC object data field and type IMPERVIOUS in the value FIELD ► Hit the ENTER key on the keyboard to attach the value.

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



a.

19. Next click the attach to object button located in the action area of the dialog box and ► select the two (1) **BLUE** polygon in the site (note: The polygon below shows solid pattern to help you distinguish the shapes to be picked for the exercise)



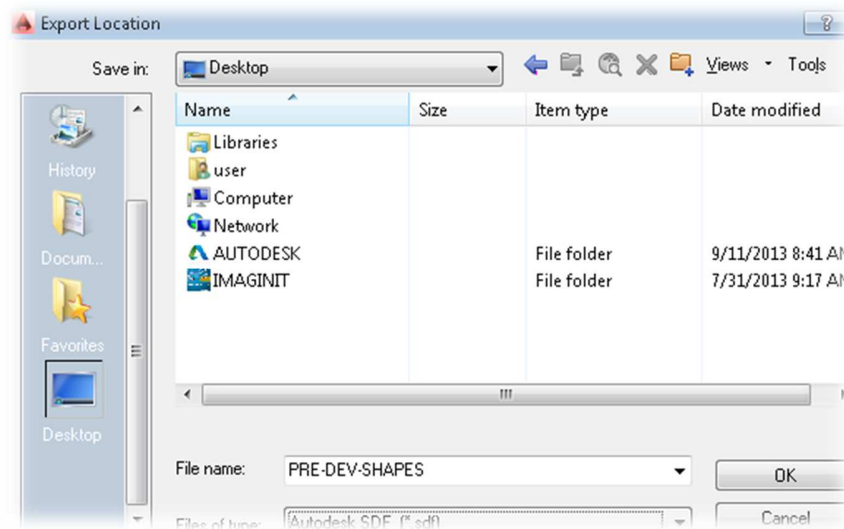
a.

20. Now we will export the **RED** and **BLUE** shapes as an sdf file to the project folder (C:\GS2296-L\) so we can analyze it as a FDO object. Type MAPEXPORT in the dynamic input or command line



a.

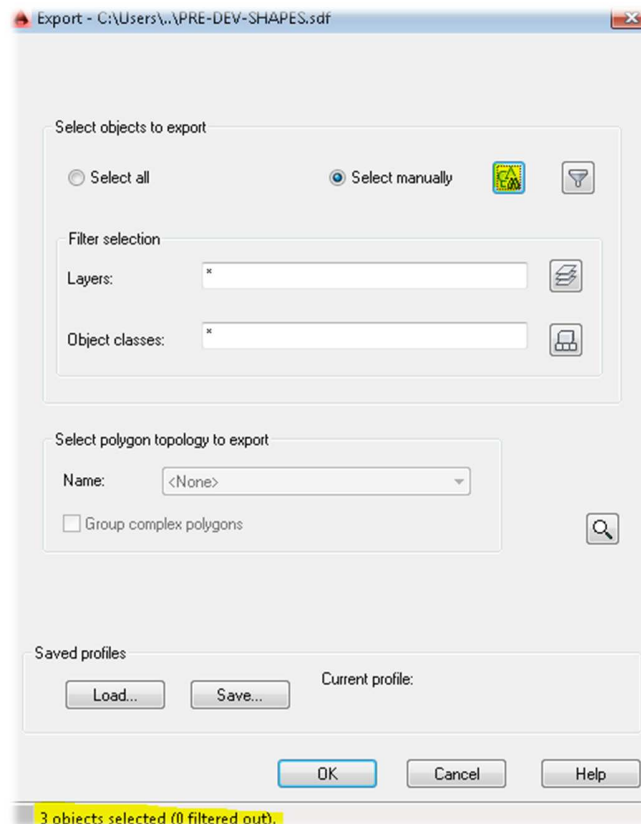
21. In the EXPORT LOCATION DIALOG BOX ➤ Type the name PRE-DEV-SHAPES in the file name area of the dialog box. ➤ Navigate to the project folder ➤ Click ok when finished to close the dialog box.



a.

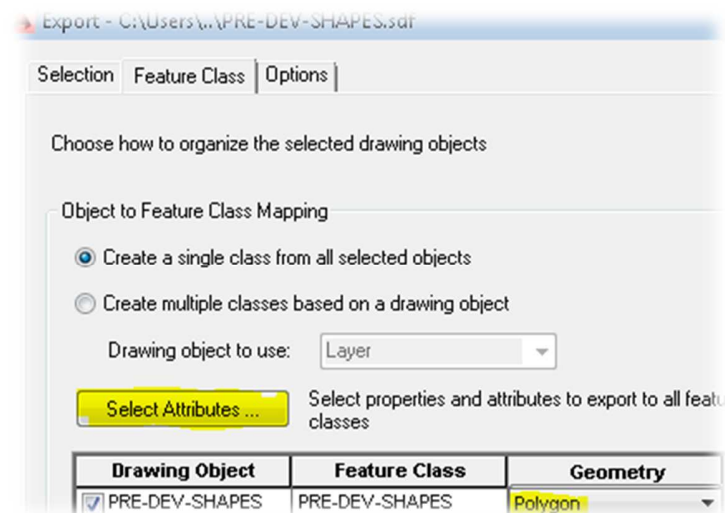
22. Select the manually button ➤ Select the three (3) **RED** and **BLUE** shapes.

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



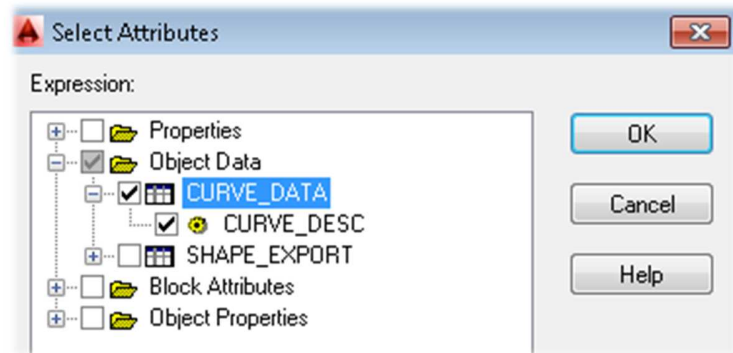
a.

23. Click on the Feature Class Tab in the dialog box ► Change GEOMETRY TO POLYGON ► Click on the SELECT ATTRIBUTES command ►



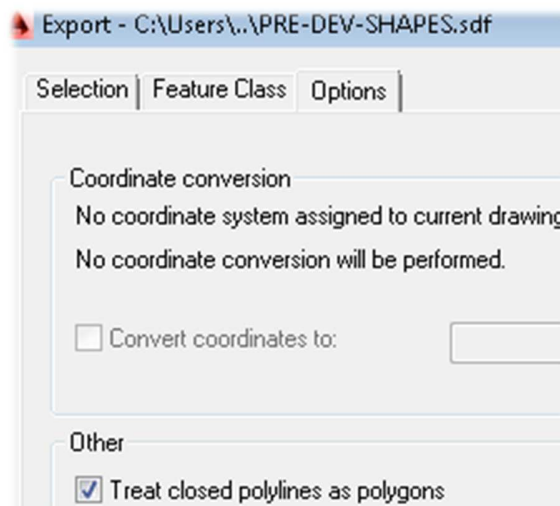
a.

24. Check the CURVE DATA expressions boxes ► Select OK



a.

25. Click on the OPTIONS tab within the dialog box ► Check the TREAT CLOSED POLYLINES AS POLYGONS ► Select OK



a.

26. Save and close the drawing

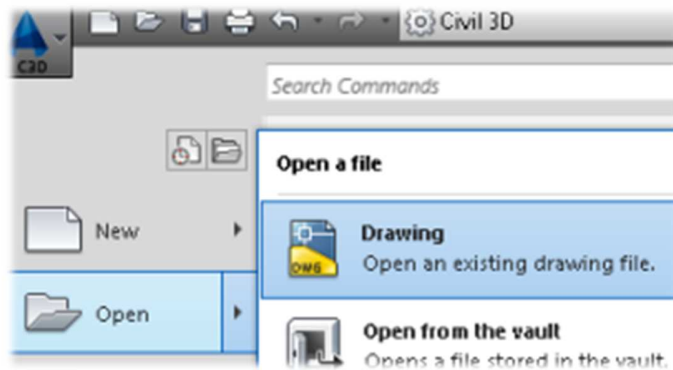
Section 3: Analyze GIS layers in Map 3D®

Based on section two's geospatial files that were created for the imperious and pervious areas. We will drag and drop the soils data and create an analysis between the geospatial file to determine the curve percentage for the SSA® sub basins.



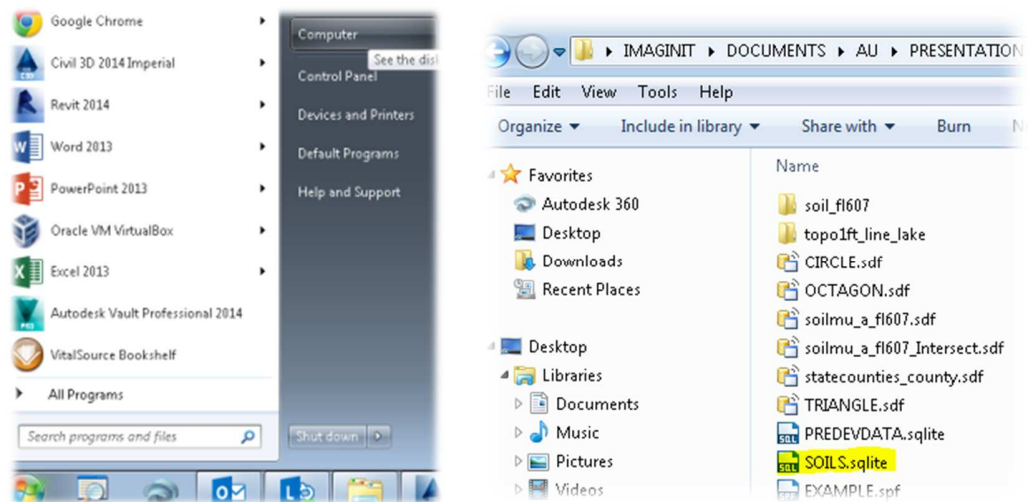
1. Open Civil 3D
2. Open drawing file "AU2013v3.dwg" by clicking on the APPLICATION MENU BUTTON ► select the OPEN command ► Navigate to the dataset folder on the c drive (C:\GS2296-L)

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



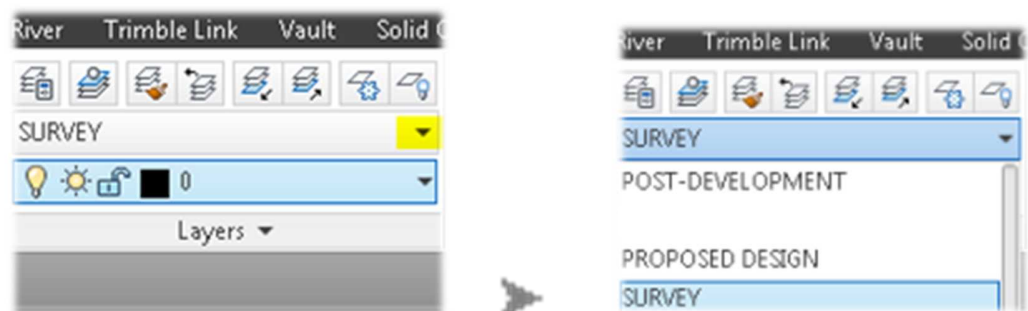
a.

3. Open WINDOWS EXPLORER ➤ Click on the windows START button ➤ select COMPUTER ➤ Navigate to the dataset folder on the C:\ drive (C:\GS2296-L) ➤ verify the soils and sub basin data is available for drag n drop. ** the only files that is needed is the "SOILS.sqlite and the PRE-DEV-SHAPES.SDF"*



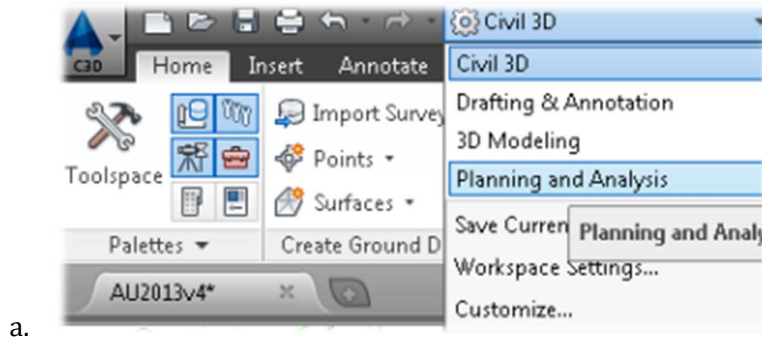
a.

4. Click HOME RIBBON TAB ➤ Navigate to the AUTOCAD LAYERS PANEL ➤ Click on the UNSAVED LAYER STATE (LAYER STATE) selector ➤ Switch LAYER STATE to SURVEY.

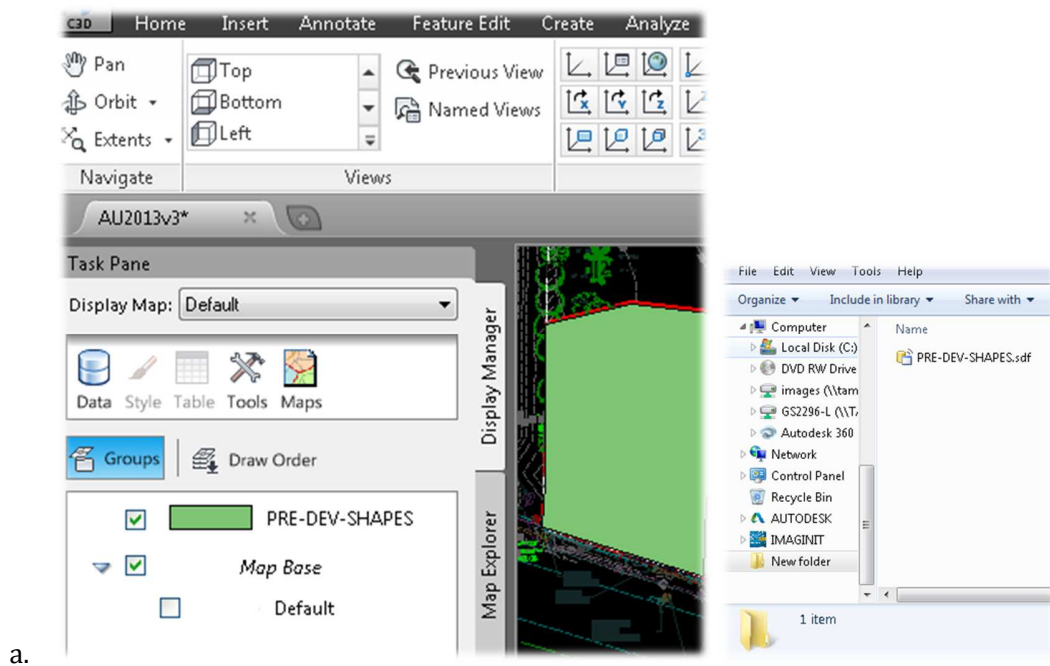


a.

5. On the QUICK ACCESS TOOLBAR ➤ verify or switch the workspace to PLANNING AND ANALYSIS

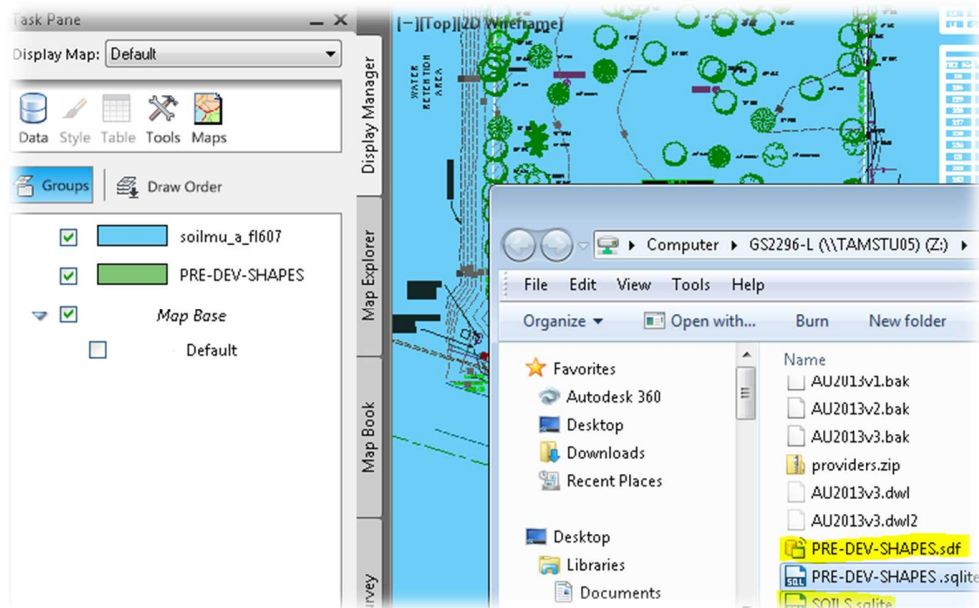


6. Drag and drop the newly created impervious/pervious geospatial file (PRE-DEV-SHAPES) to the drawing. Zoom previous or zoom to extents to display drawing limits.



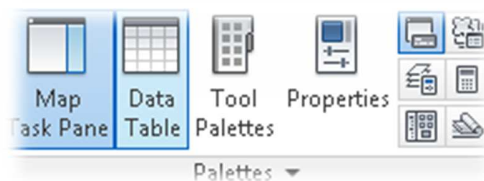
7. Drag and drop the soils geospatial file (SOILS) to the drawing. Zoom previous or zoom to extents to display drawing limits.

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



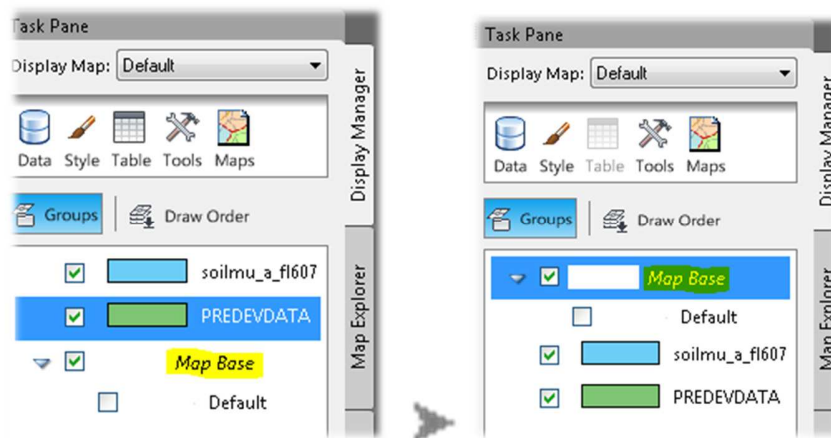
a.

8. Now the SOILS and the PRE-DEV-SHAPES data is in the drawing, the display order was rearranged. To open the TASK PANE ➤ Click on the view ribbon tab ➤ Navigate to the Palettes panel ➤ Click on the MAP TASK PANE command



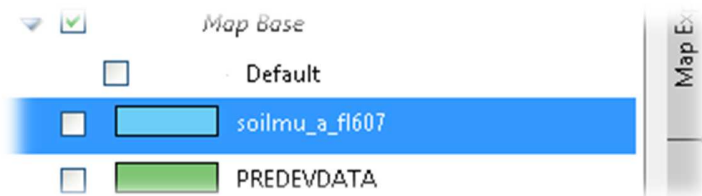
a.

9. To change the order of the shapes in the ➤ MAP TASK PANE move the MAP BASE layer from the bottom of the list to the top by dragging the layer up in the list.



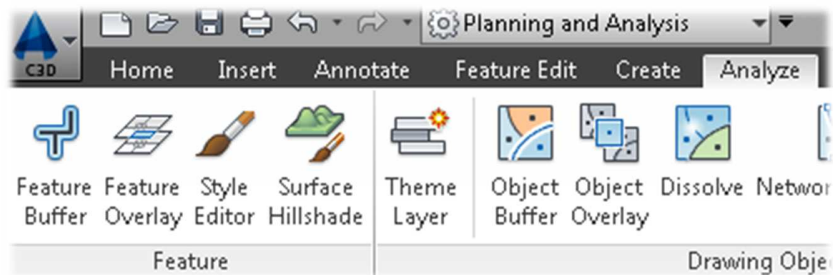
a.

10. Turn OFF the SOILS and the PREDEVSHAPE DATA layer by selecting the check marks in the MAP TASK PANE. Leave the Map Base layer ON



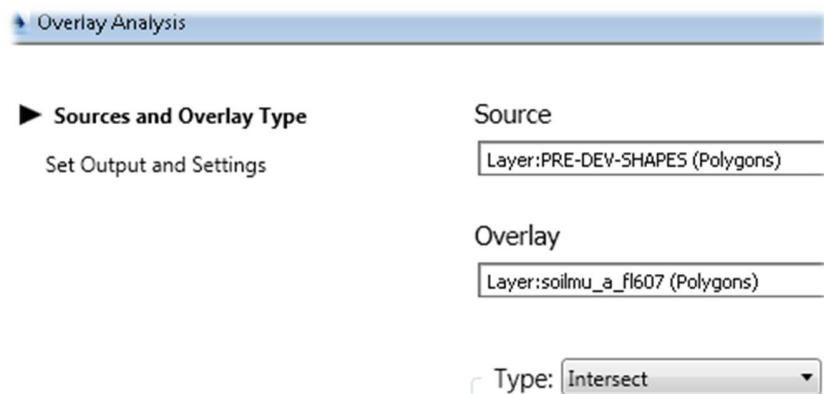
a.

11. Now that the geospatial files are in the drawing we are now ready to analyze them using the FEATURE OVERLAY command. First click on the ANALYZE RIBBON TAB ➤ Navigate to the FEATURE panel ➤ Select the FEATURE OVERLAY command.



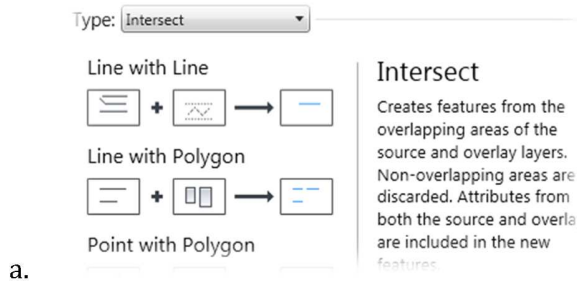
a.

12. In the OVERLAY ANALYSIS dialog box select the PREDEVDATA layer for the SOURCE ➤ select SOILS the layer for the OVERLAY method.

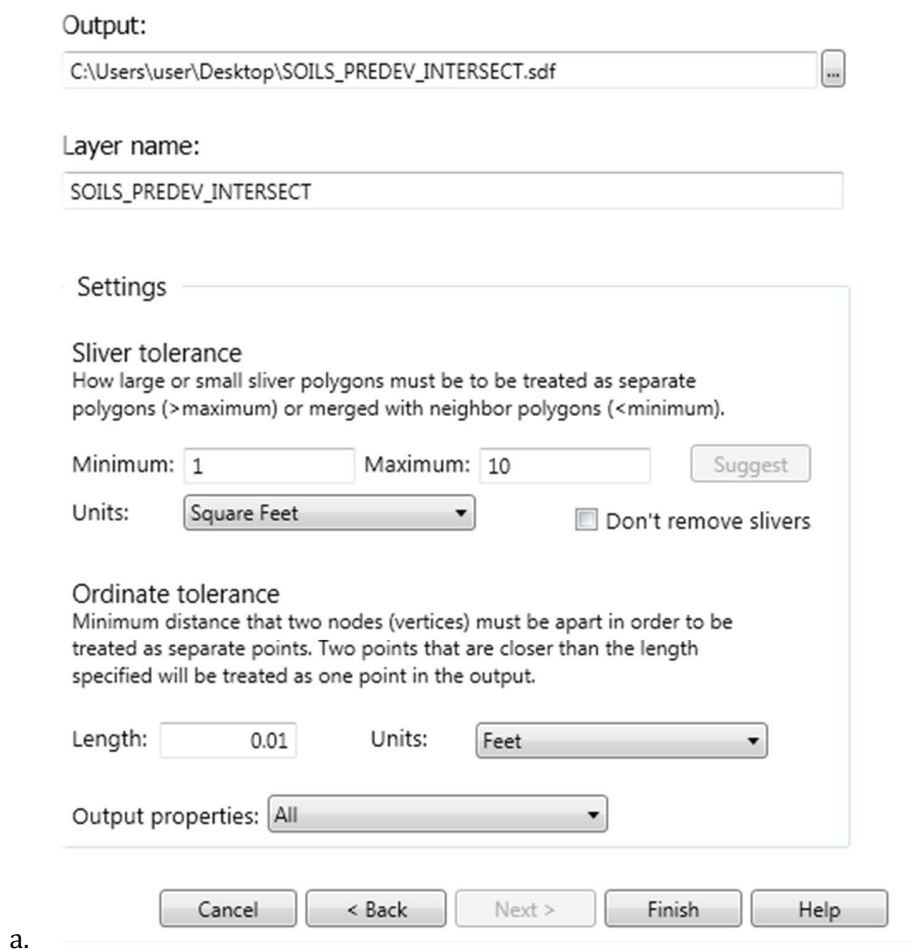


a.

13. The type should be set to Intersect ➤ Select Next

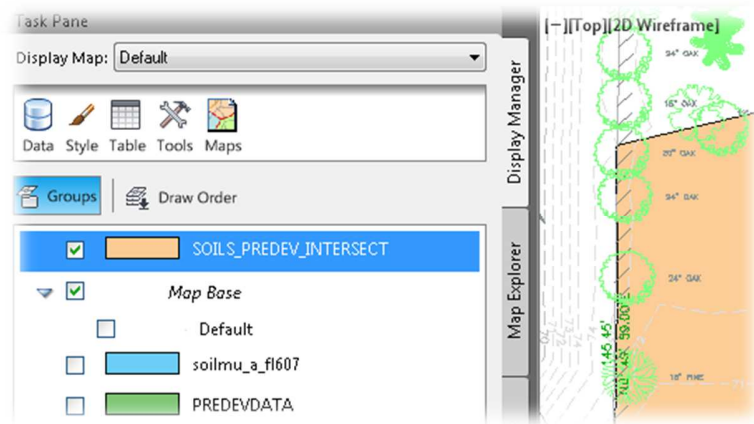


14. On the Set output and Settings screen within the OVERLAY ANALYSIS dialog box ➤ Change default file location to C:\ drive (C:\GS2296-L) and name the geospatial file to SOILS_PREDEV_INTERSECT.SDF. ➤ Change layer name to the same SOILS_PREDEV_INTERSECT ➤ Click on SUGGEST button for the sliver tolerance ➤ Click on the button located on the lower right hand corner of the dialog box.



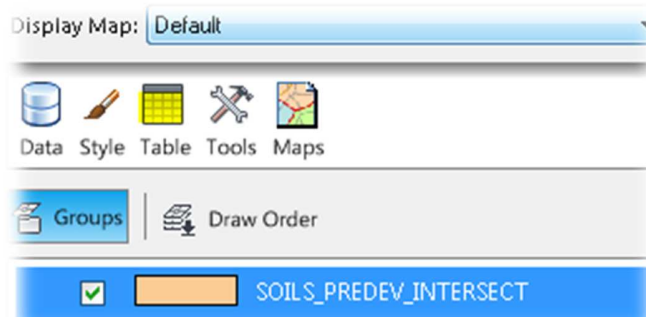
15. Wait for the overlay to be performed.

16. Notice there is a new layer created that is an intersection of the entire soils map trimmed within the pre-development sub basin 1, along with the impervious and pervious data fields embedded.

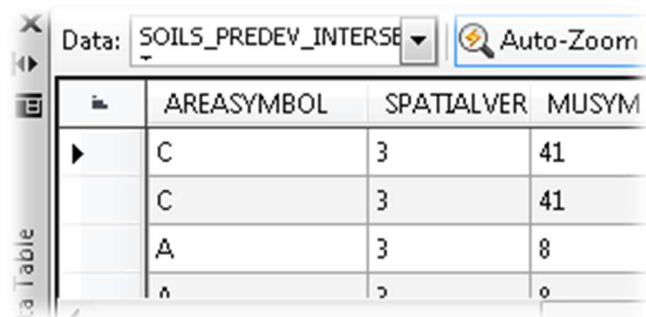


a.

17. Select the SOILS_PREDEV_INTERSECT layer and click the table button to view the data. We can see the SOIL TYPE as well as the CURVE DESCRIPTION that we gave the shape in earlier parts of the exercise.

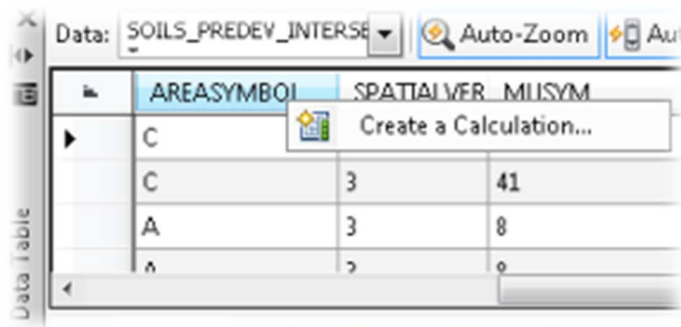


a.



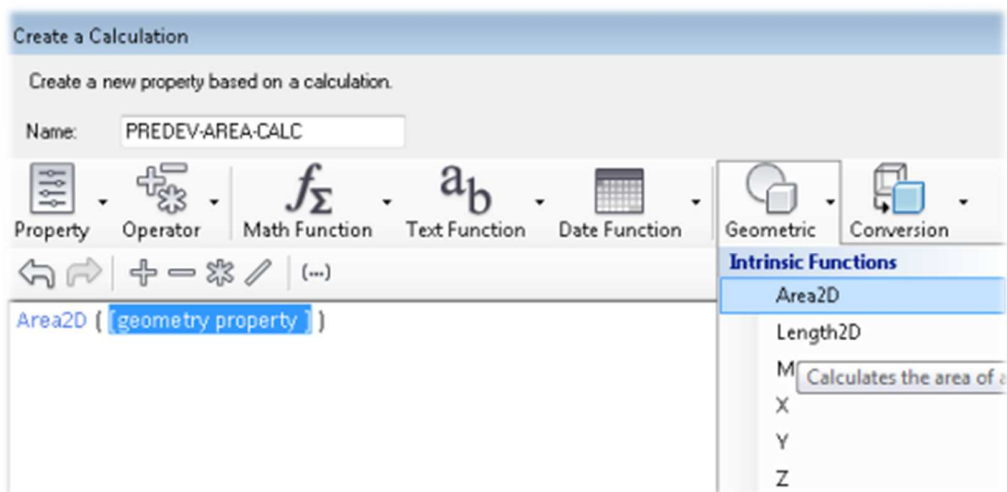
b.

18. Since the area column values from the old shape sizes are incorrect. You are going to create a calculated field to tabulate the true/correct area value of the shapes. ➤ Right click on any table header column. ➤ Select CREATE A CALCULATION command



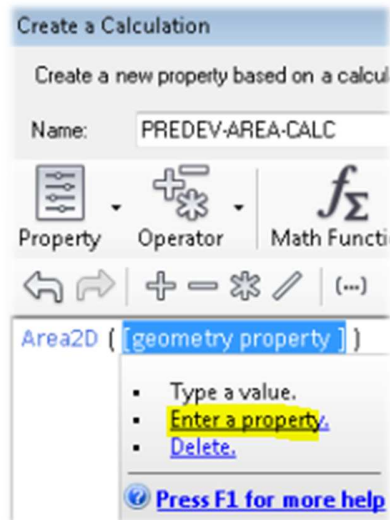
a.

19. In the create calculation dialog box ➤ Name the header calculation by typing in PREDEV-AREA-CALC ➤ Select the Geometric pull-down command ➤ Select Area 2D



a.

20. ➤ Hover over the GEOMETRY PROPERTY equation ➤ Click on the Enter Property option

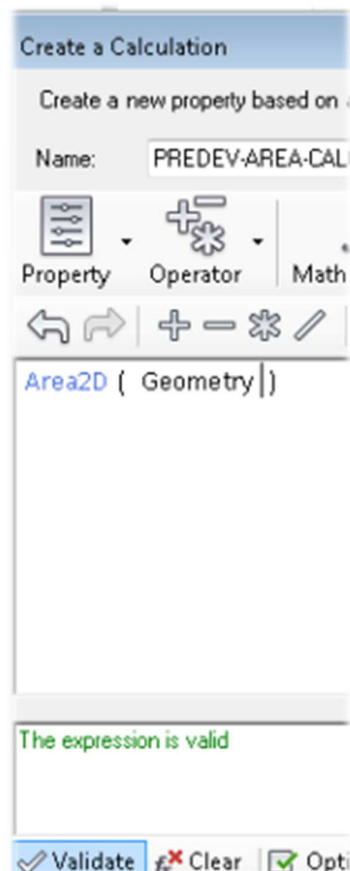


a.

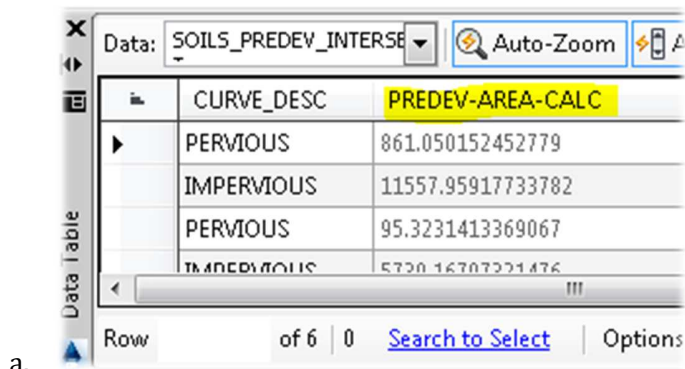
21. ➤ Select Geometry under the GEOMETRIC PROPERTIES ➤ Click validate to verify if formula is correct ➤ If the expression results in “the expression is valid” ➤ Click on the OK button to continue.



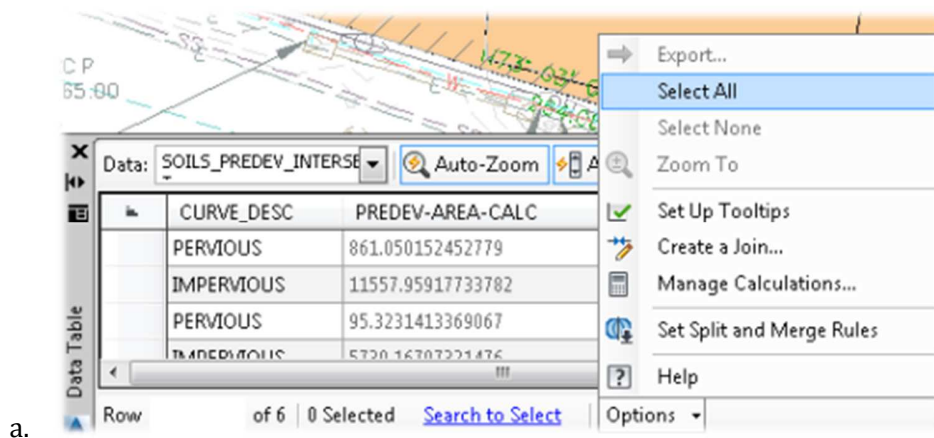
a.



22. Now the Data table should read a PREDEV-AREA-CALC as a table header ➤ If necessary Slide the slider bar or expand the column width to the FAR right to see this column
“PREDEV-AREA-CAL” all the way to the end)

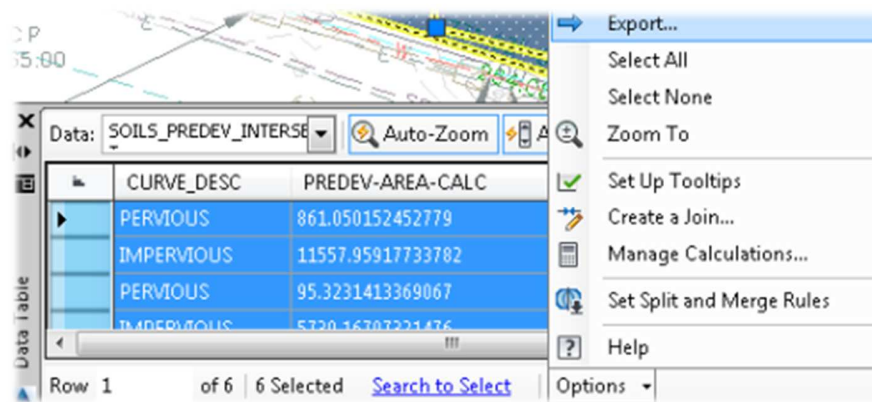


23. In the option within the DATA TABLE dialog box ➤ Click the OPTION selection button ➤ Click SELECT ALL.

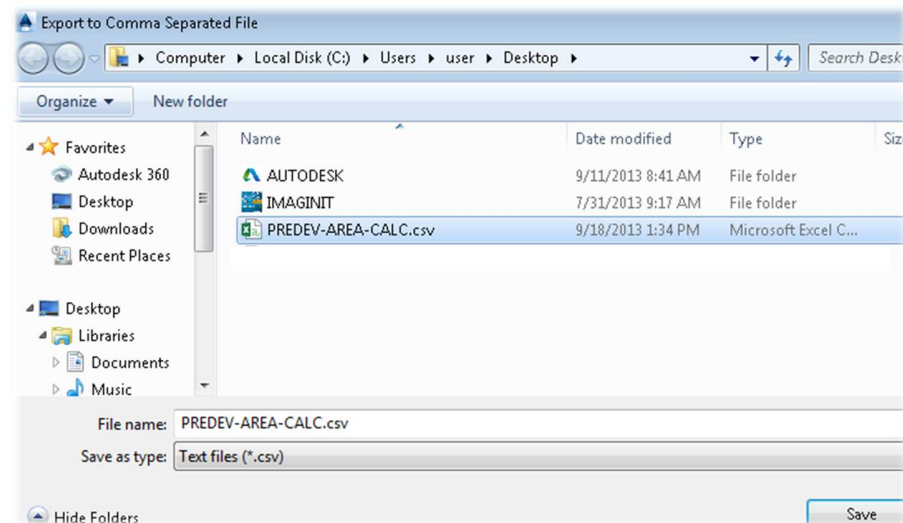


24. In the option within the DATA TABLE dialog box ➤ click the OPTION selection ➤ Click EXPORT.

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



25. Name the file PREDEV-AREA-CALC.csv ➤ and save to the project folder on the c drive.



26. Save and Close the AutoCAD Drawing

27. Open Microsoft Excel and open the file or Double click on the file that was exported on the project folder.

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®

PREDEV-AREA-CALC2.csv - Excel


FILEHOMEINSERTPAGE LAYOUTFORMULASDATAREVIEWVIEW




Clipboard




Paste

Calibri11

B*I*U

 **A**








Wrap Text

Merge & Center

General

\$ % , .00 .00

A1

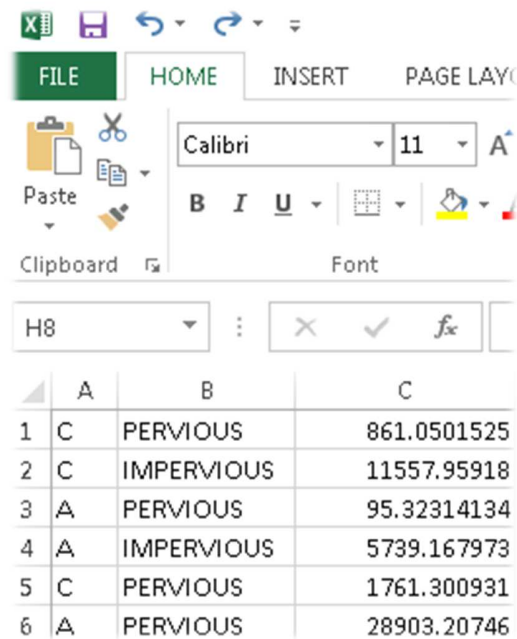
  

1

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	1	6093	6093 C	3	41	1542295	2	956.3732938	BASIN1	PERVIOUS	PR	861.0502	
2	2	6093	6093 C	3	41	1542295	4	17297.12715	BASIN1	IMPERVIOUS	PR	11557.96	
3	3	5980	5980 A	3	8	1603135	2	956.3732938	BASIN1	PERVIOUS	PR	95.32314	
4	4	5980	5980 A	3	8	1603135	4	17297.12715	BASIN1	IMPERVIOUS	PR	5739.168	
5	5	6093	6093 C	3	41	1542295	1	30664.50839	BASIN1	PERVIOUS	PR	1761.301	
6	6	5980	5980 A	3	8	1603135	1	30664.50839	BASIN1	PERVIOUS	PR	28903.21	

28. Delete all the columns except the columns listed below*. After doing this process, what remains are the cells needed to input the data into SSA®. Even though our project is small and contains only one sub-basin. Imagine if this was a large land development project with numerous sub-basins and various soils types. This analysis could save countless time on this type of repetitive tedious design tasks. **(see image below for correct cells to remain)*

- Column c *(Column may vary, choose column that displays soil types.)*
- Column f *(Column may vary, choose column that displays perv/imperv types..)*
- Column j *(Column may vary, choose column that displays calculated area values)*

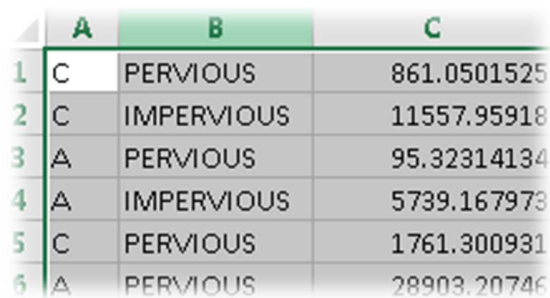


The screenshot shows the Microsoft Excel ribbon with the HOME tab selected. The font settings are set to Calibri, size 11. The spreadsheet grid contains the following data:

	A	B	C
1	C	PERVIOUS	861.0501525
2	C	IMPERVIOUS	11557.95918
3	A	PERVIOUS	95.32314134
4	A	IMPERVIOUS	5739.167973
5	C	PERVIOUS	1761.300931
6	A	PERVIOUS	28903.20746

i.

29. Select the cells in the spreadsheet ➤ Select the INSERT RIBBON tab in excel ➤ Navigate to the charts panel ➤ Select the 3dpie chart option (may vary slightly based on version of office) ➤ After the pie chart is inserted the CONTEXTUAL ribbon tab shows different styles that are available ➤ Pick a style that shows the percentage values.

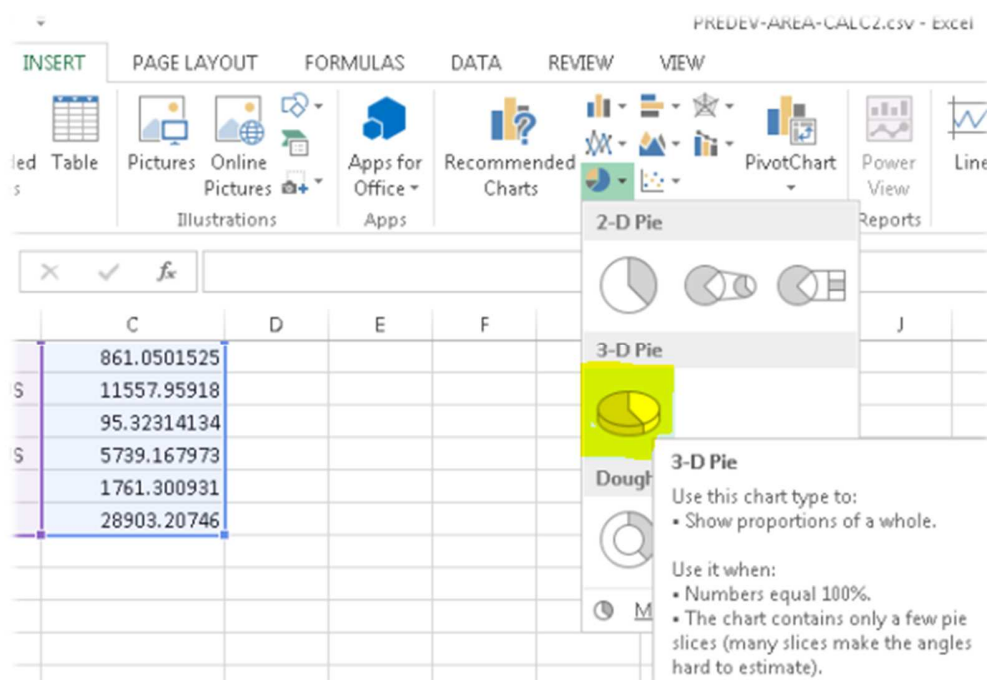


The screenshot shows the same spreadsheet grid as above, but with columns A, B, and C highlighted in green. The data is as follows:

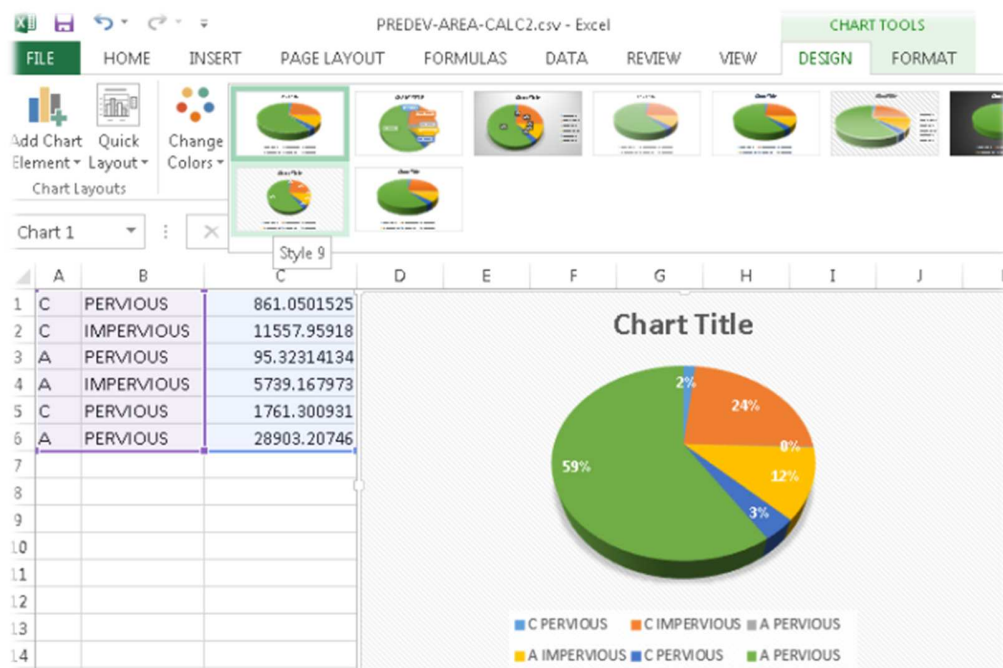
	A	B	C
1	C	PERVIOUS	861.0501525
2	C	IMPERVIOUS	11557.95918
3	A	PERVIOUS	95.32314134
4	A	IMPERVIOUS	5739.167973
5	C	PERVIOUS	1761.300931
6	A	PERVIOUS	28903.20746

a.

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



b.



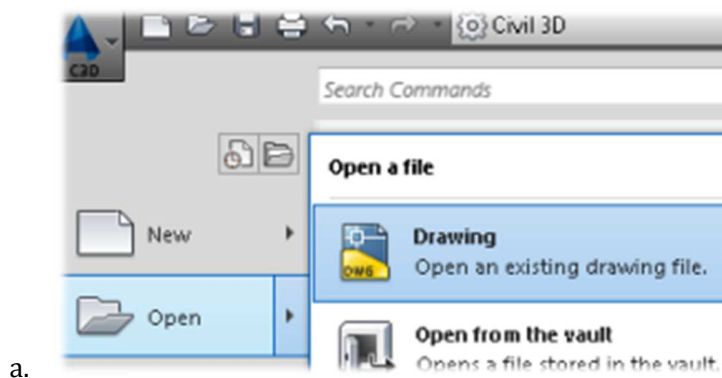
c.

30. Now remember the percentages, they will be used in the next section.

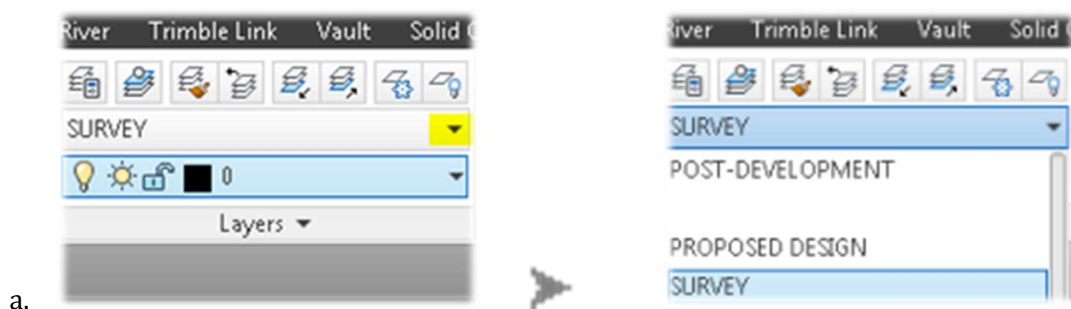
Section 4: Create Catchment and Sub basins using digitize/shape analysis method

Based on section three's analysis that were created for the imperious and pervious areas. We use those numbers along with four (4) additional methods to create catchments and hydrographs. The first method to be used is a manual entry of the data that was created in section three (3). The second method will be based on using xml. The third method will be using geospatial files and the last and fourth optional method will use the Civil 3D® catchment tools.

1. Open drawing file "AU2013v4A.dwg" by clicking on the APPLICATION MENU BUTTON ➤ select the OPEN command ➤ Navigate to the dataset folder on the c drive (C:\GS2296-L)

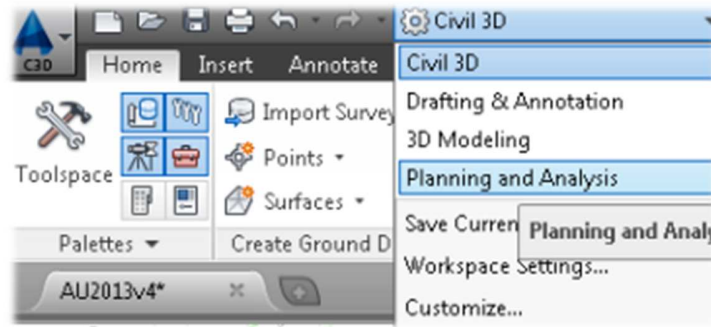


2. Click HOME RIBBON TAB ➤ Navigate to the LAYERS PANEL ➤ Click on the LAYER STATE selector and toggle through the different LAYER STATE presets. (i.e. SURVEY, POST-DEVELOPMENT, ETC....)



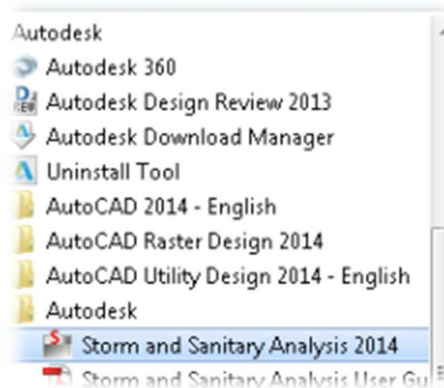
3. Select the XTRA_XML-TRACE-SHAPE LAYER STATE to proceed....
4. Click HOME RIBBON ➤ insert IMAGE.TIFF ➤ Click on the INSERT ribbon tab ➤ navigate to the IMAGE panel ➤ click on the IMAGE command ➤ browse to the project folder ➤ select the image file IMAGE.TIFF ➤ click ok to accept default values.

5. Move image to back ► select image frame perimeter by clicking on the white border ► right click and select display order option ► click send to back
6. On the QUICK ACCESS TOOLBAR ► Switch the workspace to from PLANNING AND ANALYSIS TO CIVIL 3D® ► Save the Drawing



a.

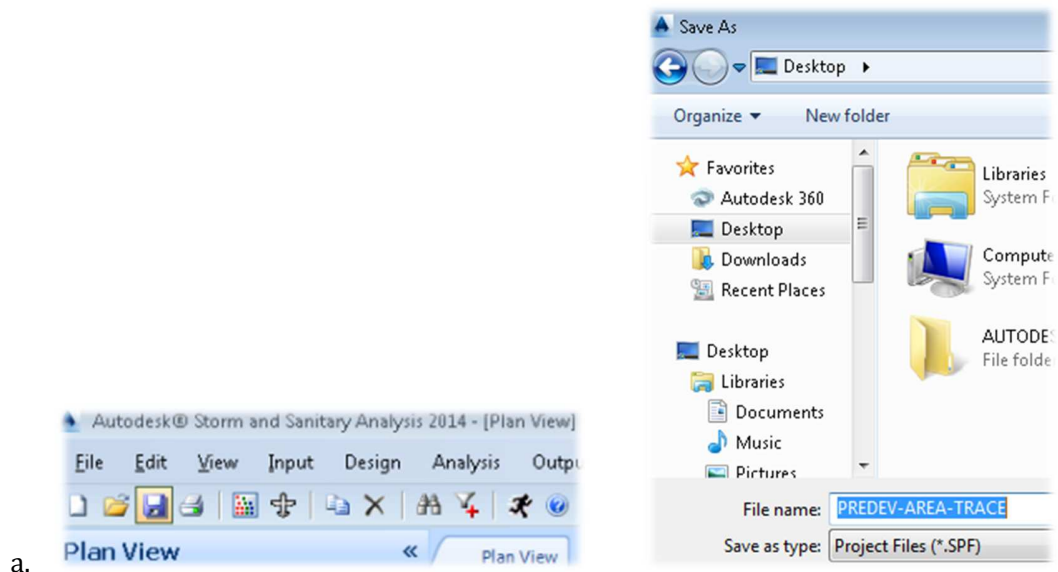
7. Click on the windows start button ► Click on the all programs button ► launch the Autodesk collection of products ► Select the Autodesk subcategory ► select Storm and Sanitary Analysis 2014



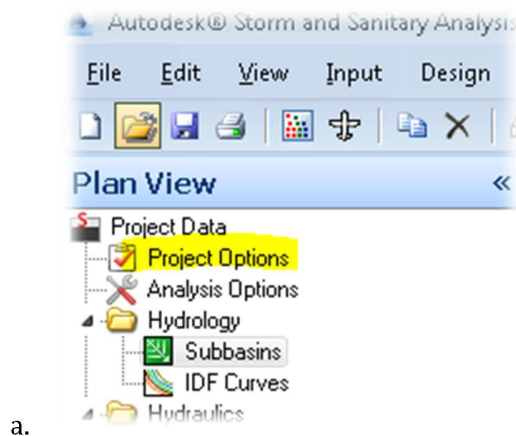
a.

8. In SSA® save to file to the C:\drive (C:\GS2296-L) as PREDEV-AREA-TRACE.spf

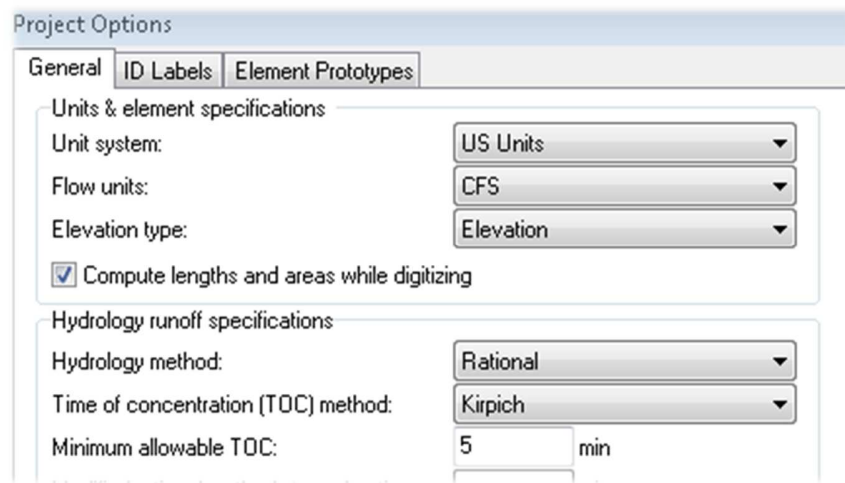
Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



9. Double click on the PROJECT OPTIONS in SSA®

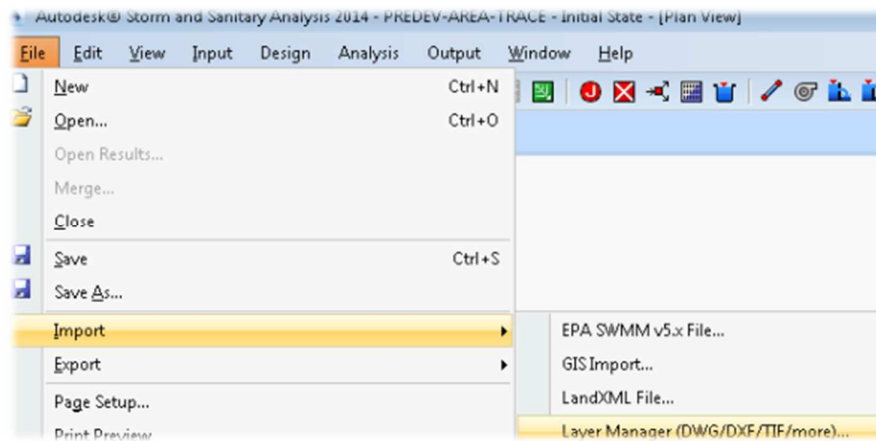


10. Change the hydrology method to RATIONAL ➤ Change the Time of concentration (TOC) method to KIRPICH ➤ Minimum allowable TOC to 6 min. ➤ Click OK




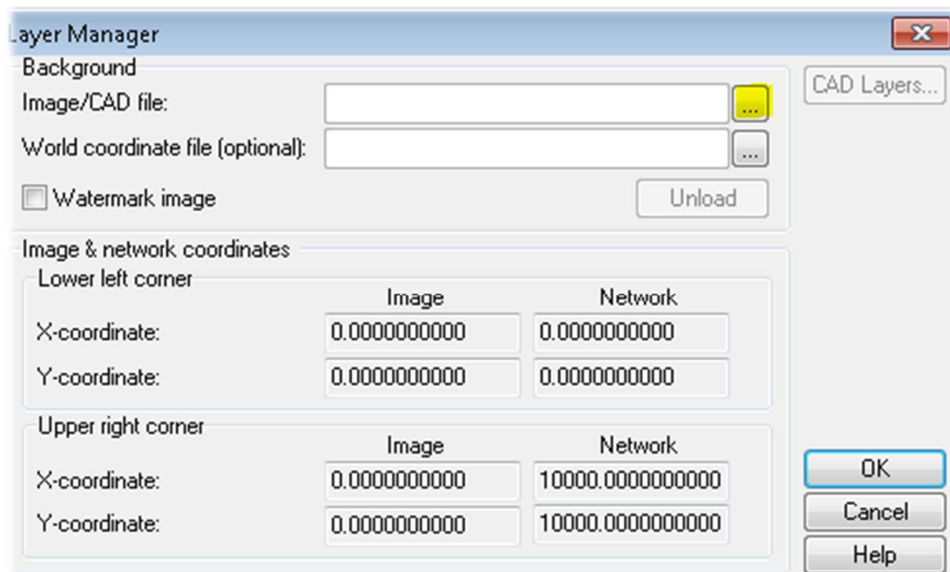
a.

11. Click on the file menu in SSA® ➤ Click the import menu ➤ select the LAYER MANAGER (DWG/DXG/TIF/MORE) command




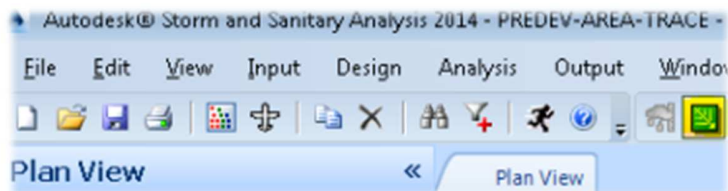
a.

12. Browse to the C:\drive (C:\GS2296-L) and select the drawing AU2013v4.dwg. by selecting the image/CAD file ellipse  button and ➤ Click OK

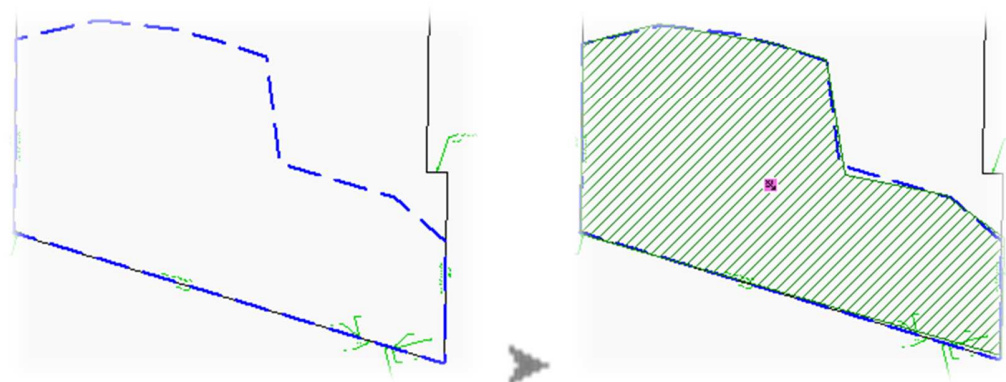


a.

13. Zoom the extent of the drawing in SSA® ➤ Click on the ADD SUB BASIN button  to trace the perimeter of the BLUE dashed line representing SUB BASIN 1. ➤ When finished with to shape hit the enter key to close the sub basin.

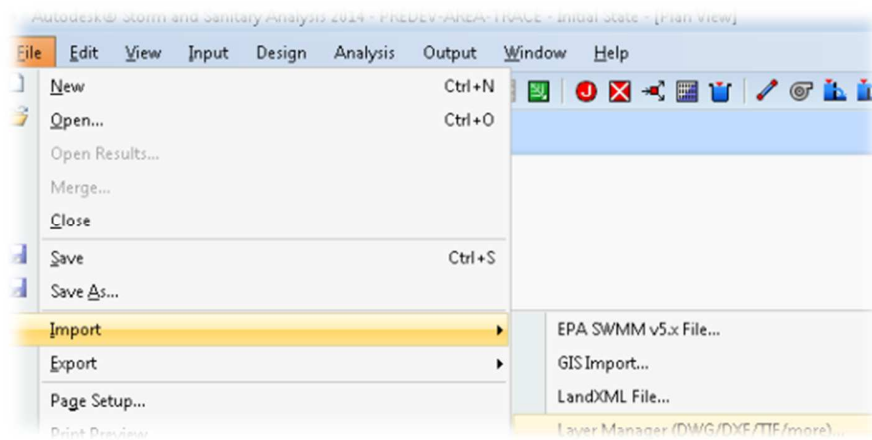


a.




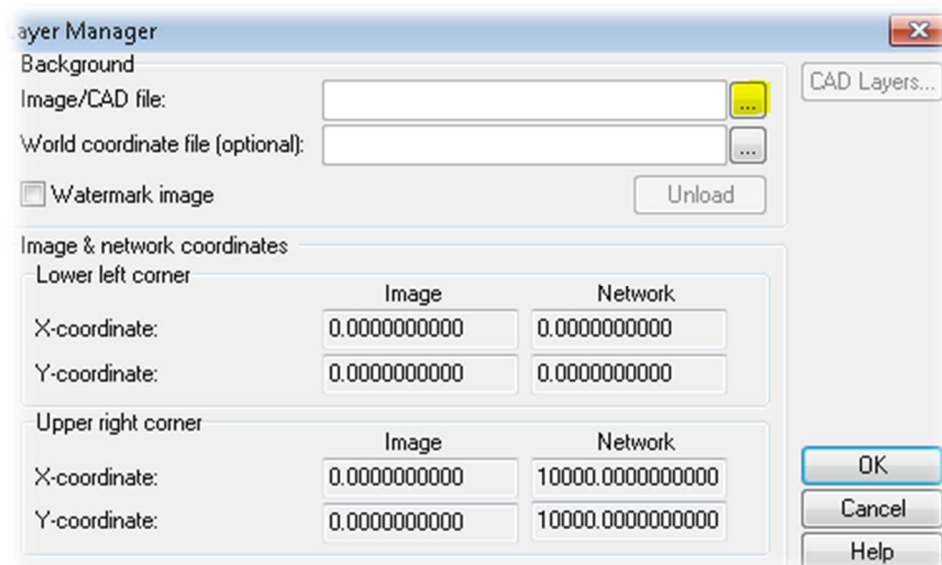
14. Click on the file menu in SSA® ➤ Click the import menu ➤ select the LAYER MANAGER (DWG/DXG/TIF/MORE) command

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®

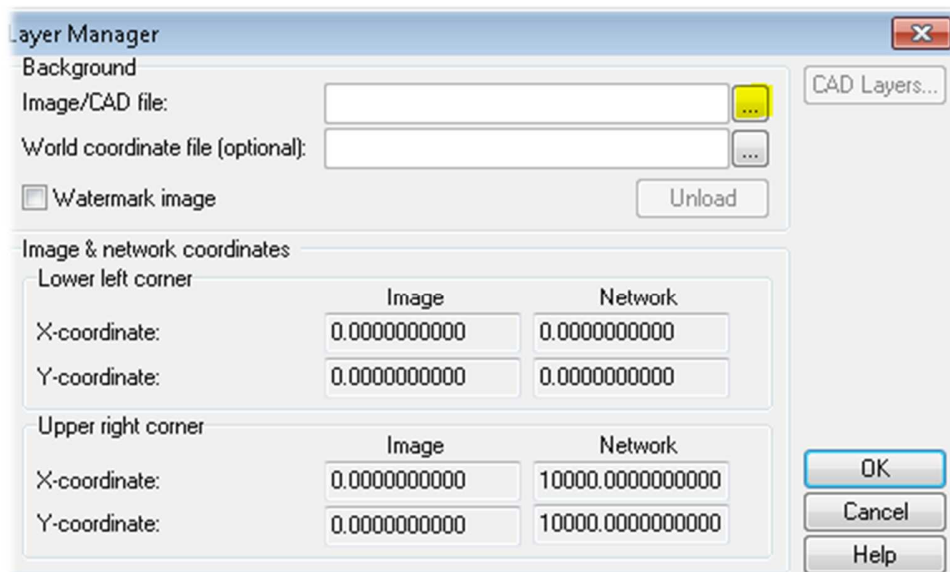


a.

15. Browse to the C:\drive (C:\GS2296-L) and select the drawing aerial image named IMAGE.TIFF. by selecting the image/CAD file ellipse  button and ➤ Click OK

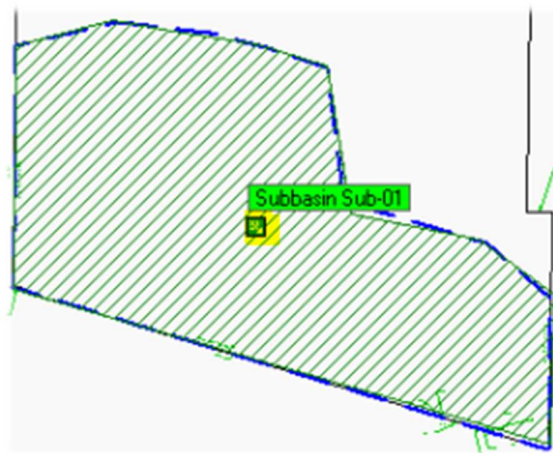


a.



b.

16. Double click on the sub basin center icon ► The sub basin Dialog box shows up



a.

Subbasins

General

Subbasin ID: **PREDEV-BASIN1**

Description:

Physical Properties

Runoff Coefficient

Physical properties

Area: 1.120 ac

Flow length: 500 ft

Average slope: 0.5 %

Impervious area

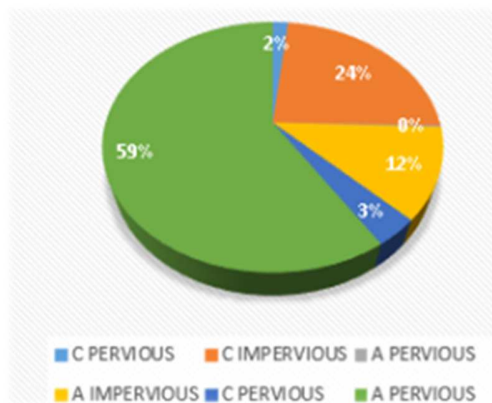
Area: 0 %

No depression: 0 %

b.

17. Change the name of the Sub basin to PREDEV-BASIN1 ➤ Click on the RUNOFF COEFFICIENT tab ➤ Based on our prior analysis exercise. Our breakdown of soils to pervious shows:

18. Impervious cumulative = 36%
19. Pervious soils A cumulative = 59%
20. Pervious soils C cumulative = 05%



a.

21. Type the **PERCENTAGES** into the Runoff Coefficient AREA%

Physical Properties Runoff Coefficient

Composite runoff coefficient

	Area (ac)	Area (%)	Runoff Coefficient	Soil Group
1	0.40320	36.00	0.96	B (2-6%)
2	0.66080	59.00	0.13	A (2-6%)
3	0.05600	5.00	0.19	C (2-6%)
4				
5				
6				

Total area: 1.120 ac Total area: 100

a.

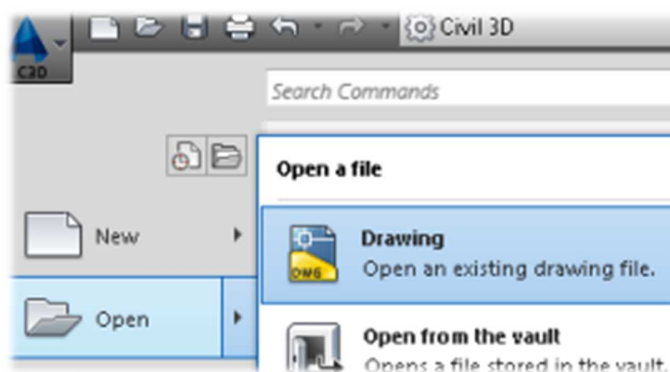
22. PLEASE MOVE ON TO THE NEXT SECTION. IF TIME PERMITS AT THE **END** OF THE CLASS USERS CAN ADD RUNOFF COEFFICIENTS AND ADD OUTFALL ➤ CONNECT THE SUB BASIN TO THE OUTFALL ➤ CALCULATE A FLOW LENGTH USING THE CAD DRAWING CONTOURS ➤ ADD A CALCULATED AVERAGE SLOPE ➤ SET A 24 HOUR STORM DURATION ➤ PERFORM ANALYSIS.

23. Save and Close the SSA® and Civil 3D® Drawings/file.

Section 5: Create Catchment and Sub basins using CIVIL 3D®

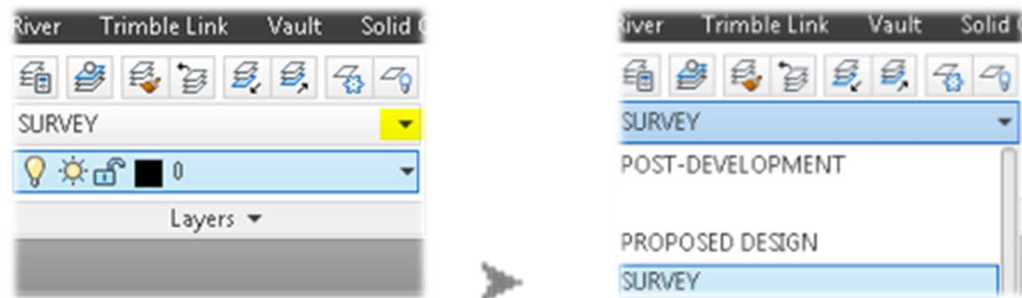
In this section we will create catchments using civil 3D® catchments command

1. Open drawing file "AU2013v4D.dwg" by clicking on the APPLICATION MENU BUTTON ➤ select the OPEN command ➤ Navigate to the dataset folder on the c drive (C:\GS2296-L)



a.

2. Click HOME RIBBON TAB ➤ Navigate to the LAYERS PANEL ➤ Click on the LAYER STATE selector and toggle through the different LAYER STATE presets. (i.e. SURVEY, POST-DEVELOPMENT, ETC....)



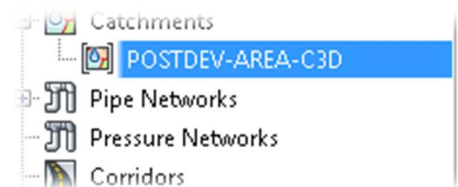
a.

3. Select the XTRA_CATCHMENTS LAYER STATE to proceed....
4. Verify the workspace switching is set to CIVIL 3D®
5. Navigate to the TOOLSPACE ➤ Click on the PROSPECTOR TAB ➤ Expand the CATCHMENTS category ➤ Right click on the CATCHMENTS category and select CREATE CATCHMENT GROUP ➤



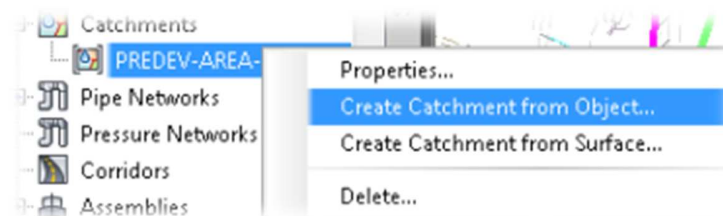
a.

6. Name the group POSTDEV-AREA-C3D ➤ Select Ok

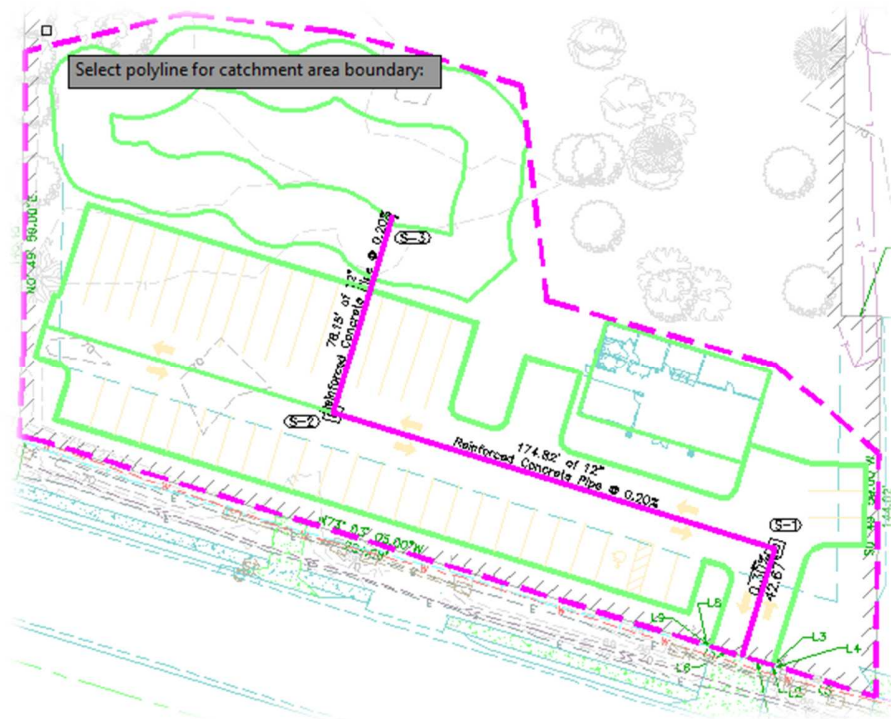


a.

7. Expand Catchments category ➤ Right Click on the Catchment POSTDEV-AREA-C3D ➤ Click on CREATE CATCHMENT FROM OBJECT ➤ Select the PINK polyline that represents the post development sub basin 1 by picking it ONCE. ➤ Hit enter



a.




b.

8. Next select a polyline on the uphill end to use as a flow path ➤ Select Beginning pink line that has a 42.67' length at the beginning of the site entrances shown in more detail in the figure below



a.

9. In the CREATE CATCHMENT FROM OBJECT dialog box ➤ Name Catchment BASIN 1 ➤ Select the storm structure S1  for the REFERENCE PIPE NETWORK STRUCTURE option ➤ Uncheck the ERASE EXISTING ENTITIES option.

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®

Create Catchment from Object

Catchment Name:
BASIN 1

Description:

Catchment Group:
POSTDEV-AREA-C3D

Reference pipe network:
PROPOSED STORM

Reference pipe network structure:
S-1

Catchment Flow Path

Catchment style:
AU2013_Catchments

Catchment layer:
C-HYDR-CTCH

Label Styles

Catchment label style:
AU2013_BASIN

Flow segment label style:
Flow Type Length and Slope

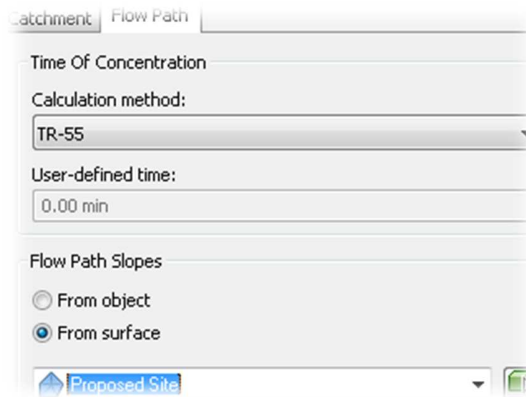
Runoff Coefficient:
0.500

☐ Erase existing entities

OK Cancel Help

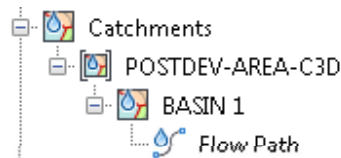
a.

10. Click the flow path tab within the dialog box ➤ Change the FLOW PATH SLOPS to FROM SURFACE ➤ Choose the PROPOSED SITE as the surface. (Pull down) ➤ Click OK ➤ Hit the esc key on the keyboard.



a.

11. Expand the PREDEV-AREA-C3D sub-basin ► Expand BASIN 1 ► Expand FLOW PATH ► Right Click on the Flow PATH ► Select CREATE FLOW SEGMENTS

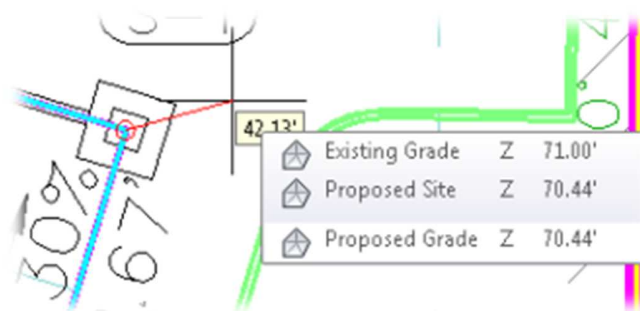


a.

Surface: Proposed Site					
Segment	Flow Type	Length	Slope	2-yr 24-hr rainfall	Surface Type
1	SCS Shallow Concer	294.91'	1.82%		Unpaved

b.

12. In the drawing click the slider near structure S1



a.

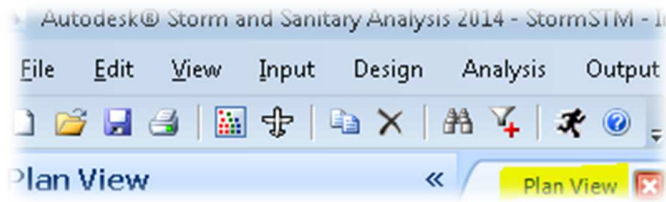
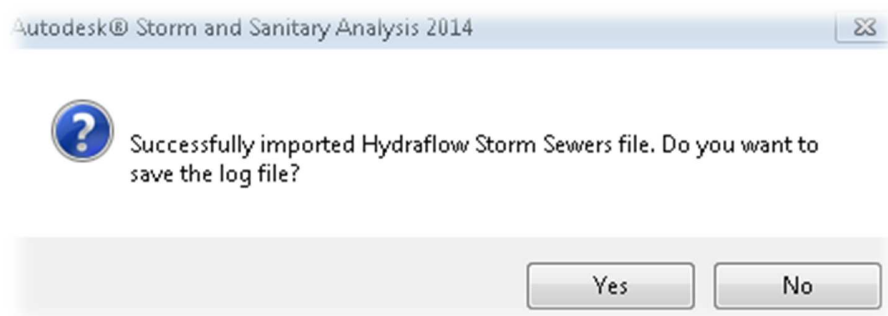
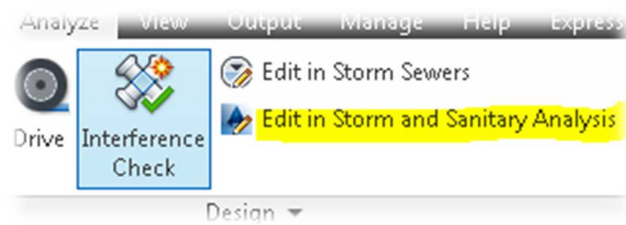
13. Change the FLOW TYPE in the dialog box and MANNINGS ROUGHNESS values as shown in the figure below ► Click the check mark to accept values on the top right hand corner of the dialog box.

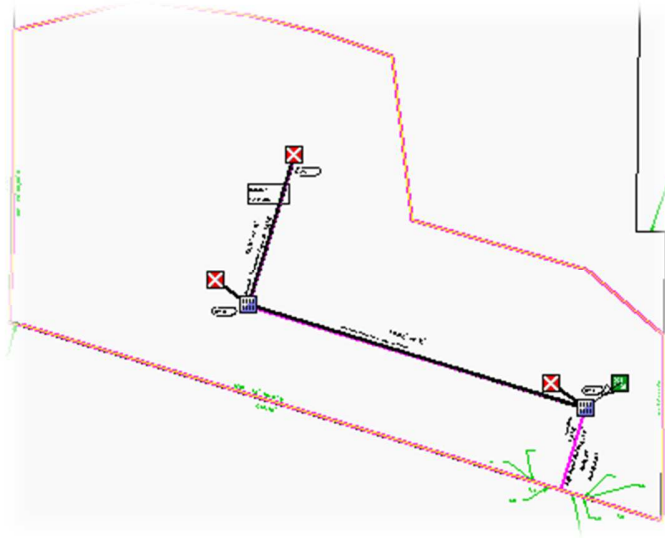
Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®

a.

Segment	Flow Type	Length	Slope	2-yr 24-hr rainfall	Surface Type	Manning's Rough...
1	SCS Sheet Flow	42.13'	0.31%	3.600"		0.013
2	SCS Channel Flow	252.78'	2.07%			0.013

14. Save drawings ➤ Select the ANALYZE ribbon tab ➤ Navigate to the DESIGN panel ➤ Click on the EDIT IN STORM AND SANITARY ANALYSIS command (wait for a bit while the program launches) ➤ click ok in the dialog box ➤ Click OK to create a new project ➤ Click NO to save the LOG ➤ Click on the PLAN VIEW Tab to view your data.





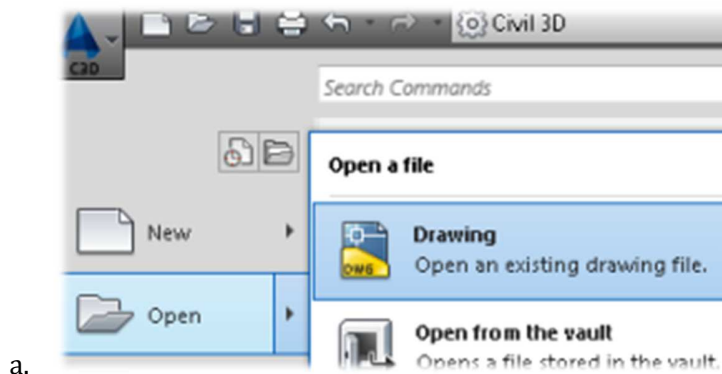
e.

15. Close the drawing and the SSA® file

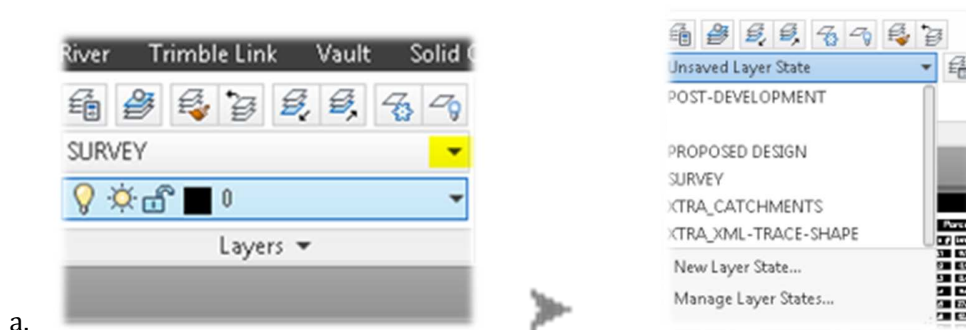
Section 6 (OPTIONAL): Create Catchment and Sub basins using xml method

In this section we create a catchment using Civil 3d parcels using xml files

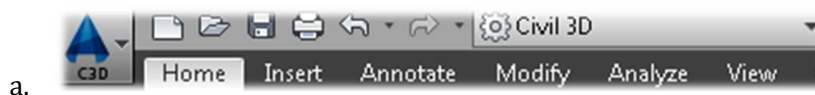
1. Open drawing file “AU2013v4B.dwg” by clicking on the APPLICATION MENU BUTTON ► select the OPEN command ► Navigate to the dataset folder on the c drive (C:\GS2296-L)



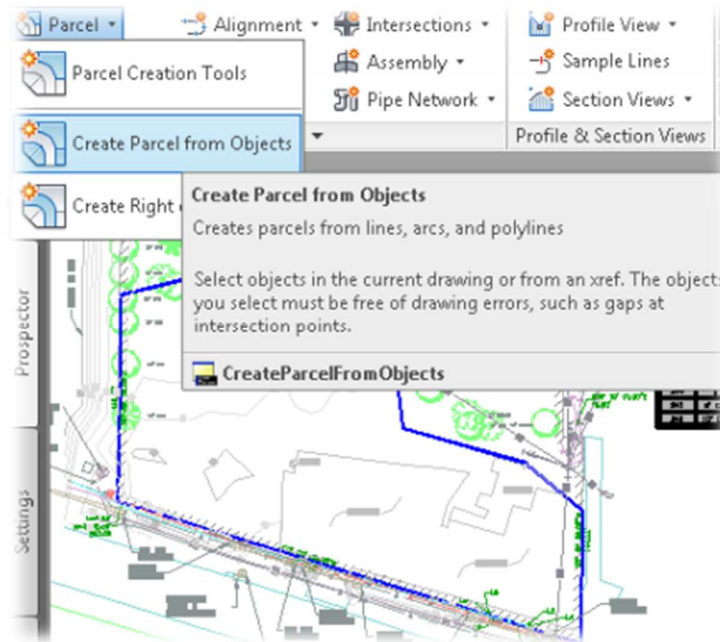
2. Click HOME RIBBON TAB ► Navigate to the LAYERS PANEL ► Click on the LAYER STATE selector and toggle through the different LAYER STATE presets. (i.e. SURVEY, POST-DEVELOPMENT, ETC....)



3. Select the XTRA_XML-TRACE-SHAPE LAYER STATE to proceed....
4. Verify the workspace switching is set to use Civil 3D®

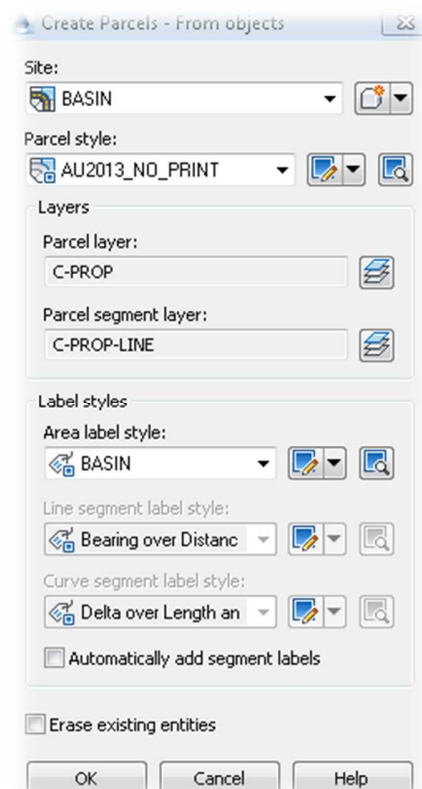


5. Click on the HOME ribbon tab ► Navigate to the CREATE DESIGN tab ► Select the PARCEL pull-down command ► Click on CREATE PARCEL FROM OBJECTS command ► Select the BLUE predevelopment sub basin 1 polyline. ► Hit the enter key



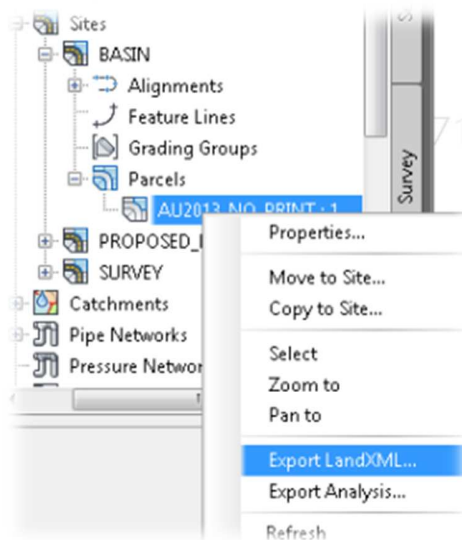
a.

6. A create Parcel – From Objects Dialog box appears ➤ verify the settings look like the figure below ➤ Click OK



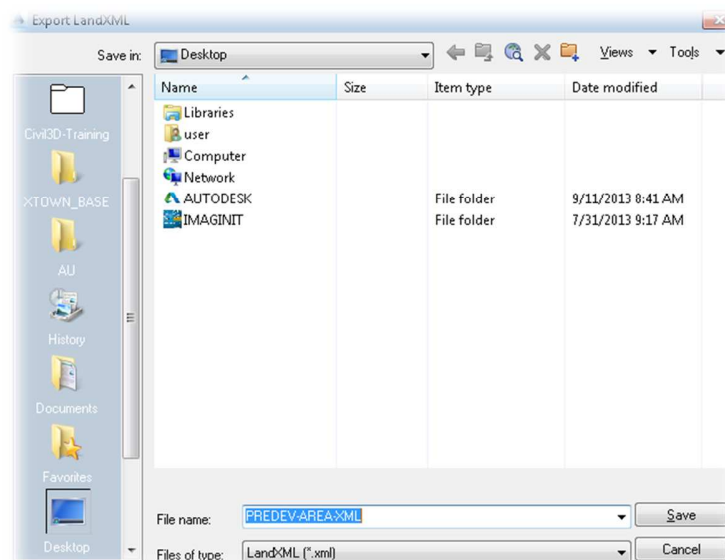
a.

7. In the Prospector tab ➤ Navigate to the SITES collection ➤ Expand the BASIN sub category ➤ Expand the parcels sub category ➤ Right click and export the parcel AU2013_NO_PRINT.... as an land xml file to the project directory as ➤ Click OK within the EXPORT TO LANDXML dialog box



a.

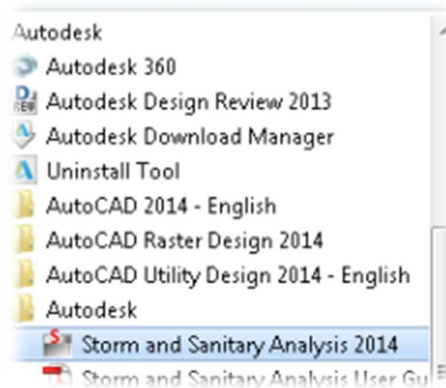
8. Save as PREDEV-AREA-XML.xml



a.

9. Click on the windows start button ➤ Click on the all programs button ➤ launch the Autodesk collection of products ➤ Select the Autodesk subcategory ➤ select Storm and Sanitary Analysis 2014

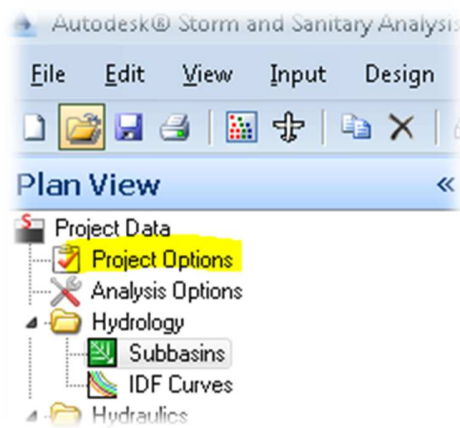
Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



a.

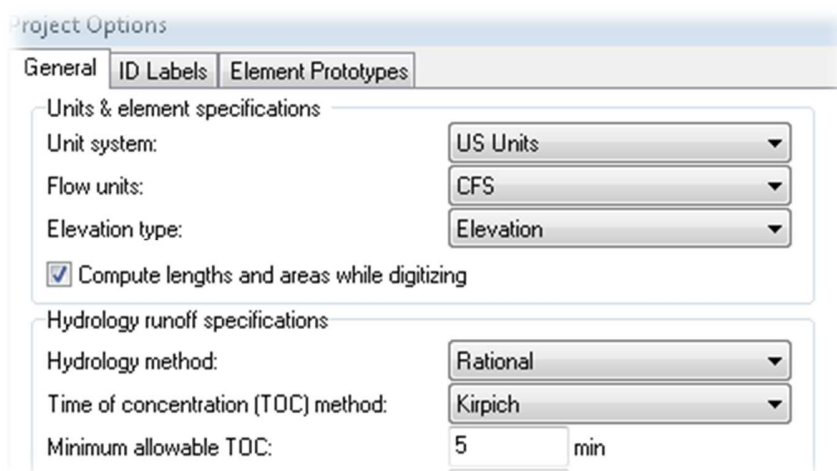
10. In SSA® save to file to the C:\drive (C:\GS2296-L) as "PREDEV-AREA-TRACE.spf "

11. Double click on the PROJECT OPTIONS in SSA®



a.

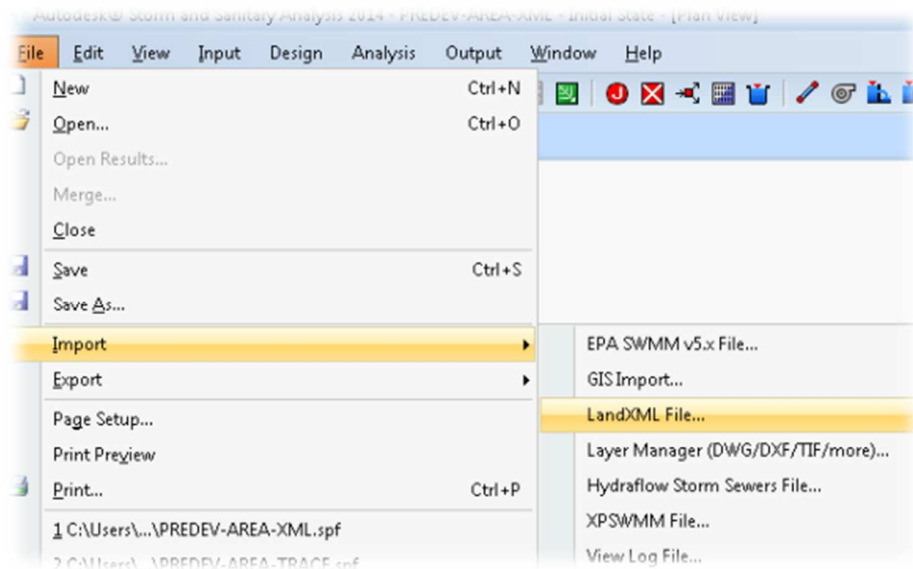
12. Change the hydrology method to RATIONAL. ➤ Change the Time of concentration (TOC) method to KIRPICH ➤ Minimum allowable TOC to 6 min. ➤ Click OK



a.

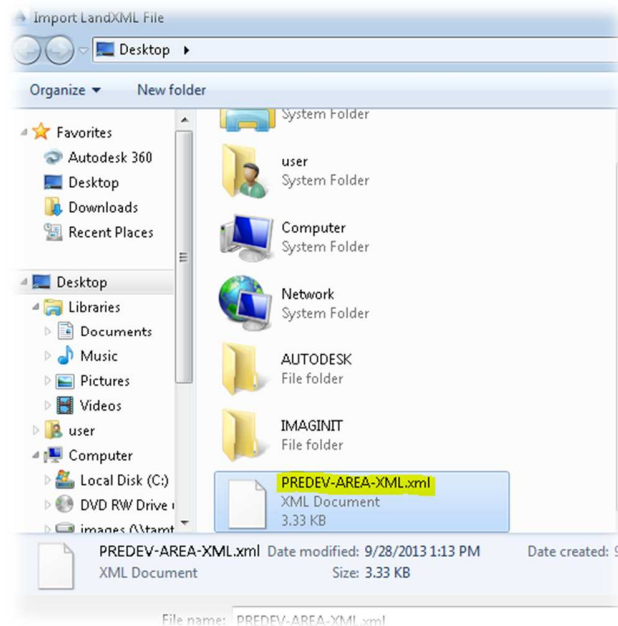
Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®

13. Click on the file menu in SSA® ➤ Click the import menu ➤ select the LANDXML FILE command



a.

14. Select the PREDEV-AREA-XML.xml file within the dialog box



a.

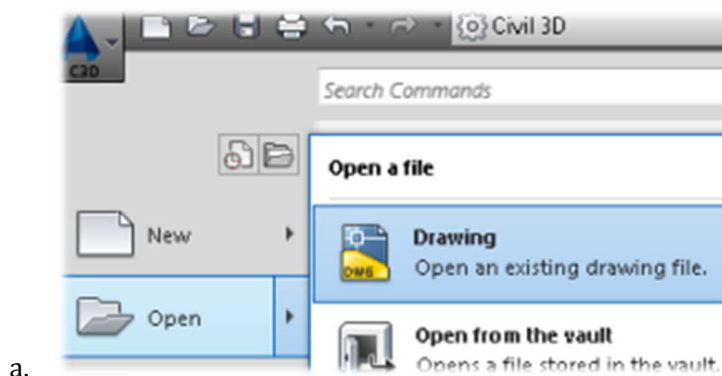
15. PLEASE MOVE ON TO THE NEXT SECTION. IF TIME PERMITS AT THE **END** OF THE CLASS
USERS CAN ADD AND OUTFALL ➤ CONNECT THE SUB BASIN TO THE OUTFALL ➤
CALCULATE A FLOW LENGTH USING THE CAD DRAWING CONTOURS ➤ ADD A
CALCULATED AVERAGE SLOPE ➤ SET A 24 HOUR STORM DURATION ➤ PERFORM
ANALYSIS.

16. Save and Close the SSA® and Civil 3D® Drawings/file.

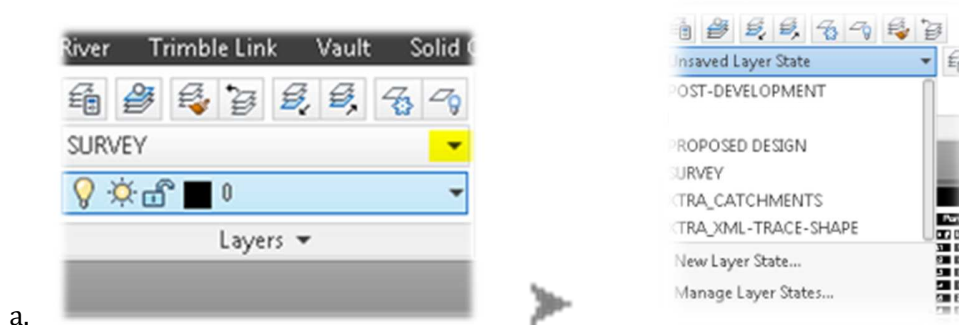
Section 7(OPTIONAL): Create Catchment and Sub basins using SHAPE FILE

In this section we create sub basins using shape files

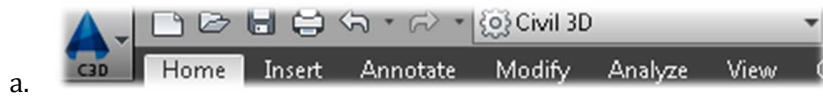
1. Open drawing file “AU2013v4C.dwg” by clicking on the APPLICATION MENU BUTTON ➤
select the OPEN command ➤ Navigate to the dataset folder on the c drive (C:\GS2296-L)



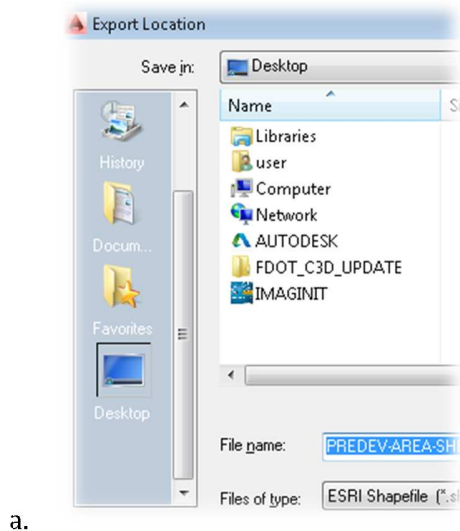
2. Click HOME RIBBON TAB ➤ Navigate to the LAYERS PANEL ➤ Click on the LAYER STATE selector and toggle through the different LAYER STATE presets. (i.e. SURVEY, POST-DEVELOPMENT, ETC....)




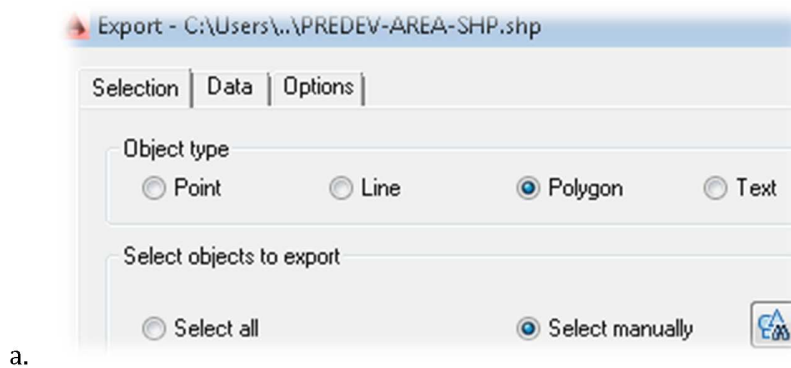
3. Select the XTRA_XML-TRACE-SHAPE LAYER STATE to proceed....
4. Verify the workspace switching is set to use Civil 3D®

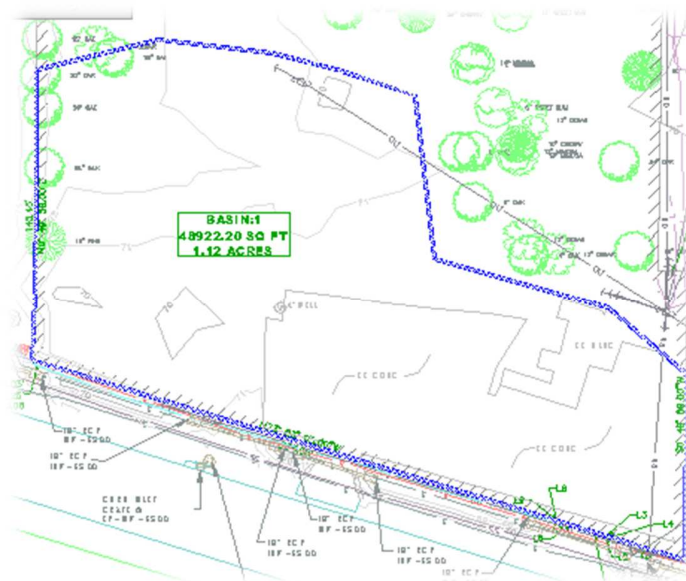


5. Type MAPEXPORT in the command line ➤ HIT ENTER ➤ in the EXPORT LOCATION dialog box ➤ Navigate to the project folder ➤ type the name PRE-DEV-AREA-SHP as the file name ➤ Switch the file type to ESRI SHAPE FLE (.shp) within the dialog box.



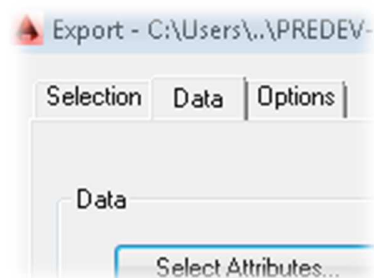
6. In the EXPORT – C:\.....PREDEV-AREA-SHP.shp dialog box ➤ Select POLYGON radio button for the OBJECT TYPE ➤ Pick the SELECT MANUALLY radio button within the SELECT OBJECTS TO EXPORT areas of the dialog box ➤ and select the selection button  to pick the BLUE polyline representing sub basin 1 ➤ Hit the enter key on the keyboard



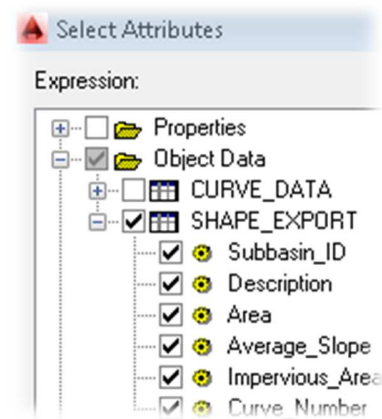


b.

7. Click on the DATA tab within the dialog box ► Select the SELECT ATTRIBUTES button ► Expand the OBJECT DATA category ► Check the SHAPE EXPORT sub category ► Click OK



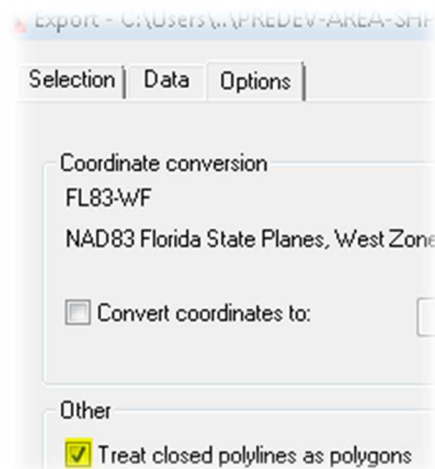
a.



b.

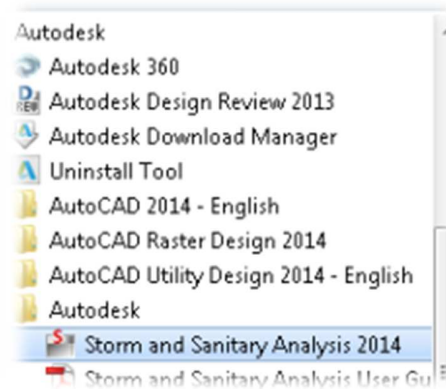
8. Click on the OPTION tab within the dialog box ► Check the TREAT CLOSED POLYLINES AS POLYGONS option located within the OTHER area of the dialog box ► Click OK

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



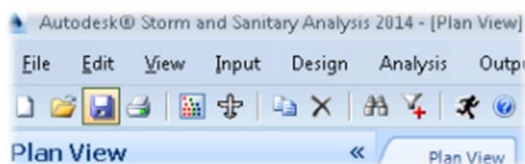
a.

9. Click on the windows start button ➤ Click on the all programs button ➤ launch the Autodesk collection of products ➤ Select the Autodesk subcategory ➤ select Storm and Sanitary Analysis 2014



a.

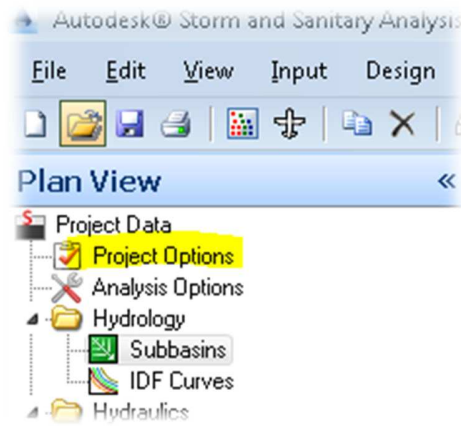
10. In SSA® save to file to the C:\drive (C:\GS2296-L) as PREDEV-AREA-SHP.spf



a.

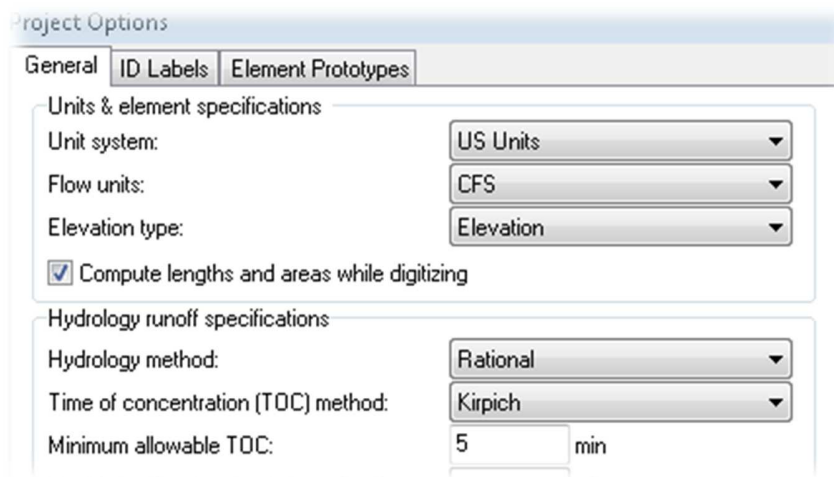
11. Double click on the PROJECT OPTIONS in SSA®

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



a.

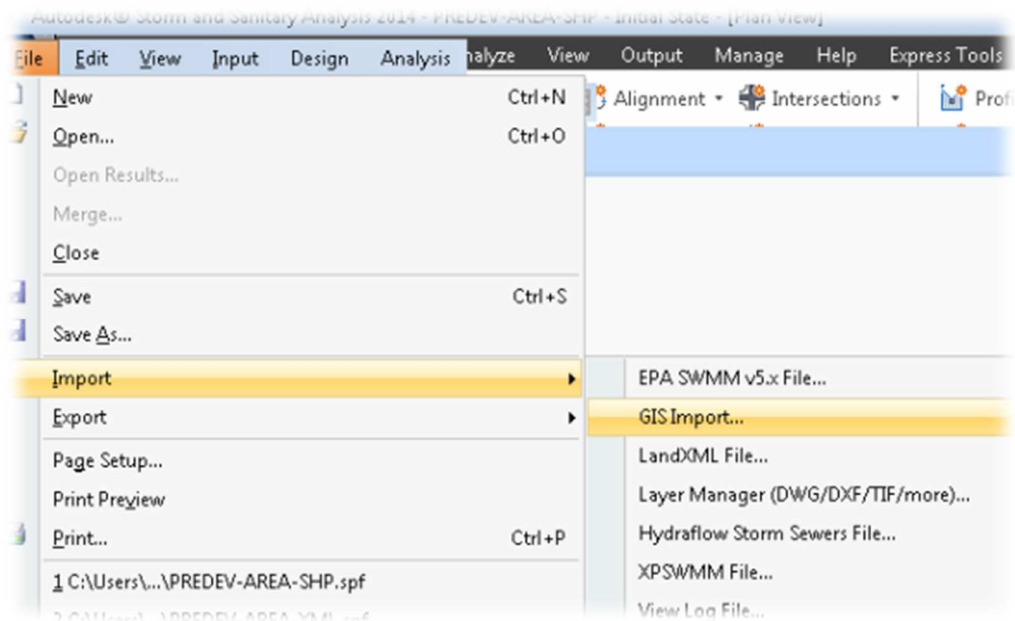
12. Change the hydrology method to RATIONAL. ➤ Change the Time of concentration (TOC) method to KIRPICH ➤ Minimum allowable TOC to 6 min. ➤ Click OK




a.

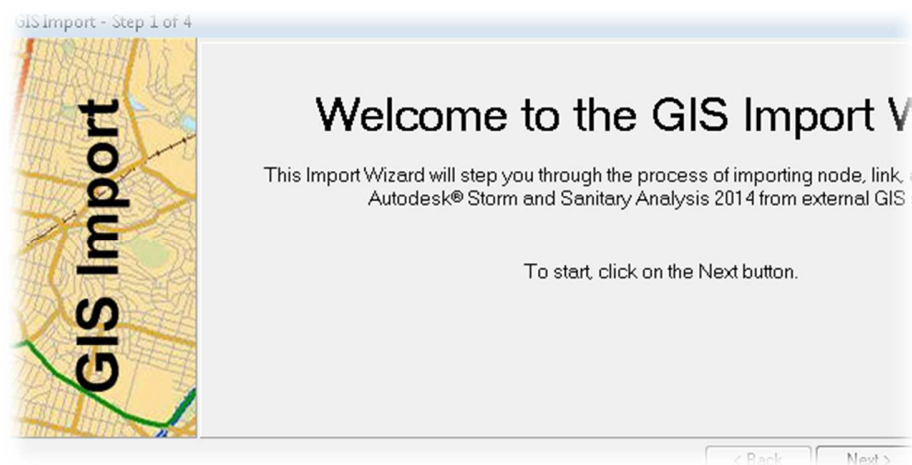
13. Click on the file menu in SSA® ➤ Click the import menu ➤ select the GIS IMPORT command

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®

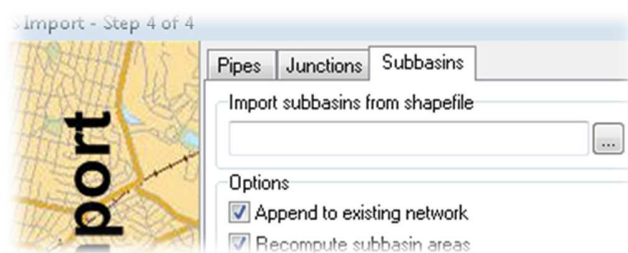


a.

14. Select the NEXT button within the GIS IMPORT dialog box step 1 of 4 ➤ Click on the SUBBASIN tab within step 4 of 4 in the dialog box ➤ Click in the  ellipse button to select the project shape file PREDEV-AREA-SHP.shp in the directory.

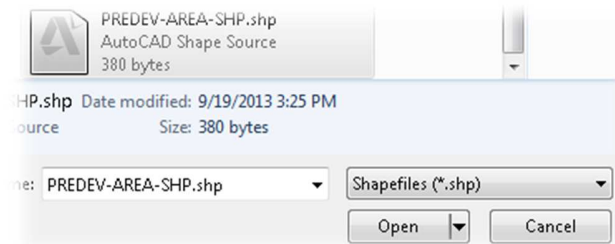


a.



b.

Data Mining for SSA® Techniques for creating Pre-Post Development drawings and Hydrographs using Civil 3D®, Map 3D® and SSA®



c.

15. Assign correct STORM FIELDS TO IMPORTED DATA FIELDS ► CLICK OK

Assign subbasin attributes

	Storm Fields	Imported Data Fields
1	Subbasin ID	Subbasin_I
2	Description	Descriptio
3	Area (acres)	Area
4	Average slope (%)	Average_SI
5	Impervious area (%)	Impervious
6	Impervious Manning's	
7	Pervious Manning's	
8	Curve number	Curve_Numb
► 9	Flow length (ft)	
10	Drainage node ID	

a.

16. PLEASE MOVE ON TO THE NEXT STEP. IF TIME PERMITS AT THE **END** OF THE CLASS
 USERS CAN ADD AN OUTFALL ► CONNECT THE SUB BASIN TO THE OUTFALL ►
 CALCULATE A FLOW LENGTH USING THE CAD DRAWING CONTOURS ► ADD A
 CALCULATED AVERAGE SLOPE ► SET A 24 HOUR STORM DURATION ► PERFORM
 ANALYSIS.

17. Save and Close the SSA® and Civil 3D® Drawings/file.