

CI223971

## Civil and Survey Workflows Utilizing the Architecture, Engineering & Construction Collection

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D.L. Engineering & Surveying

### Learning Objectives

- Learn how to incorporate record map electronic data from government agencies into your base-mapping efforts, for example, County **DGN** files
- Learn how to locate, download, and selectively import FEMA flood map information so coordinate systems match and data sets are manageable, **SHP** files
- Learn how to utilize available point cloud data, classify it (isolate ground points from other points), and generate a Civil 3D surface from the points, **LAS** files
- Learn how to use the GEOMAP command in Civil 3D to aid in preliminary efforts and provide context to smaller sites
- **BONUS:** Learn how to use AutoCAD MAP 3D, within Civil 3D, to import GIS contours with elevation values, **SHP** files

### Description

Seasoned Autodesk users may have routines and processes that have served them well in the past. This class will provide a modern perspective of legacy workflows that still are crucial parts of day-to-day civil/survey consulting processes, proposals, and workflows. Take advantage of the tools provided with the Architecture, Engineering & Construction Collection, and relearn previous workflows that may have changed in recent releases of Civil 3D software, AutoCAD Map 3D software, ReCap software, and other tools.

### Speaker

Dino Lustri, P.E., P.S. is a consulting water resources engineer and surveyor. He began using Autodesk software in 1987. Dino has extensive experience in information technology. His professional experience includes hydrologic and hydraulic modeling as well as contracts in construction. He has acted in the capacity of city engineer, and provides expert testimony in legal cases. He has provided training for numerous organizations as well as authoring a variety of training materials and best practices for civil engineering and surveying workflows. He is a past president of the Professional Land Surveyors of Ohio, Cleveland Chapter. His present duties as Special Projects Engineer for the City of Cleveland, Department of Port Control is oversight for two airports and a municipal harbor.

## **OBJECTIVE 1 - Incorporating record map electronic data from government agencies into your base mapping efforts. (DGN files)**

The proper way to start any effort in Civil 3D is by starting a new drawing based on your template. In the absence of a properly customized template, we can start with the default Civil 3D template that is provided with the installation of the software.

This lesson will provide the detailed steps to setup, import and organize data provided in a non-Autodesk format. An added twist is the original data is in a different coordinate system than our working drawing. We will perform a coordinate conversion during the import process.

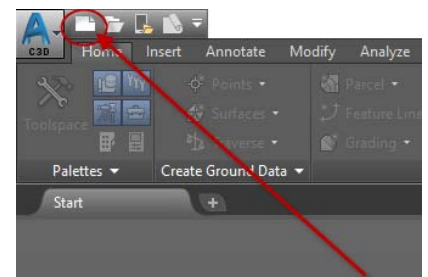
### **Utilizing the MAPIMPORT command**

There are a number of file types that aren't native to Autodesk products that we might want to utilize in our drawings. Some of those file types include....

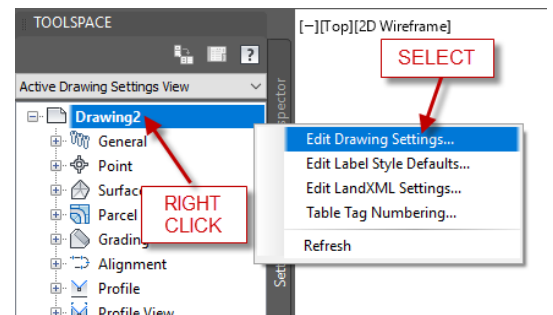
ASCII Point Files (\*.TXT, \*.CSV, \*.ASC, \*.NEZ)  
 Autodesk SDF (\*.SDF)  
 CityGML (\*.GML, \*.XML, \*.GZ)  
 ESRI ArcInfo Export (\*.E00)  
 Geography Markup Language (\*.GML, \*.XML, \*.GZ)  
 Google (\*.KML, \*.KMZ)  
 MapInfo (\*.MIF, \*.TAB)  
 MicroStation (\*.DGN)  
 MasterMap (\*.GML, \*.XML, \*.GZ)  
 Spatial Data Transfer Standard (\*.CATD.DDF)  
 SQLite Spatial (\*.SQLITE)  
 Vector Product Format (\*.FT)

- 1) Open a new drawing based on your template or the default Civil 3D template.
  - a. Click on the **QNEW** button.

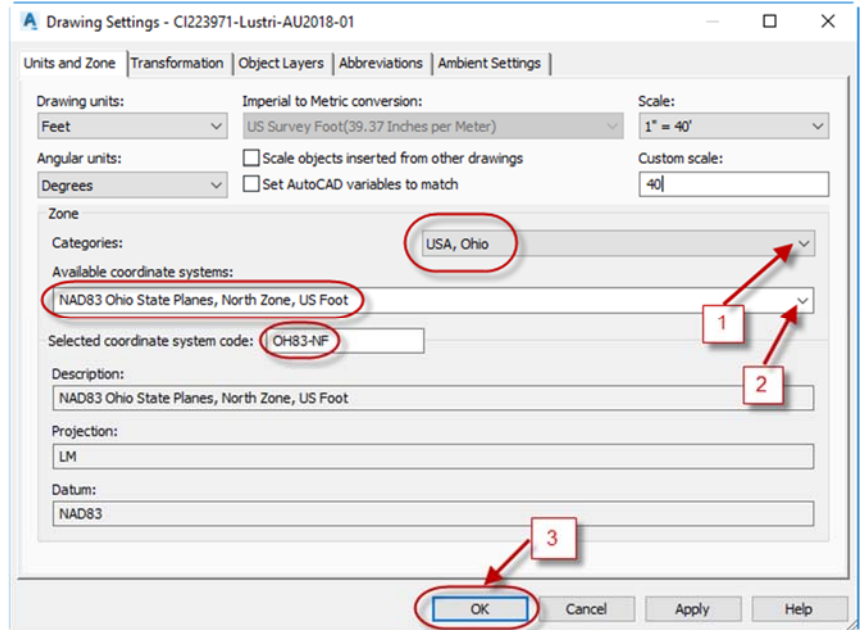
Or start by opening [CI223971-Lustri-AU2018-01.dwg](#)



- b. On the *Settings* tab of the toolspace, right click the drawing name and then select **Edit Drawing Settings...**



- c. Assign the Zone Category as **USA, Ohio** and set the Available coordinate systems: as **NAD83 Ohio State Planes, North Zone, US Foot (OH-83NF)**

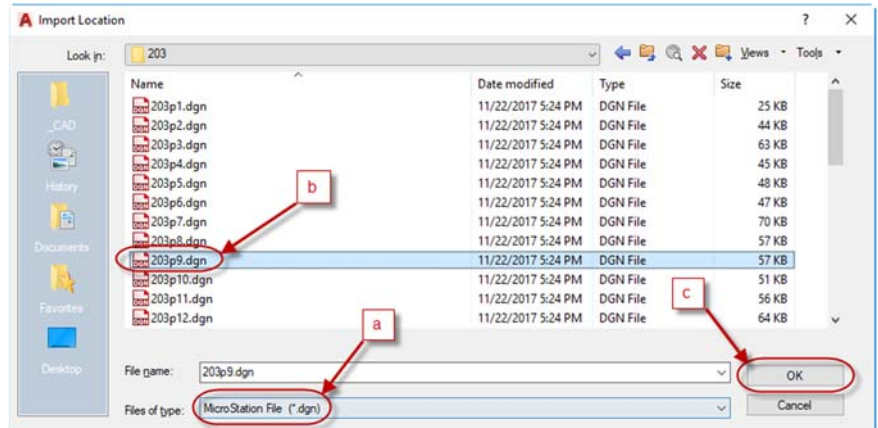


Click **OK** when finished.

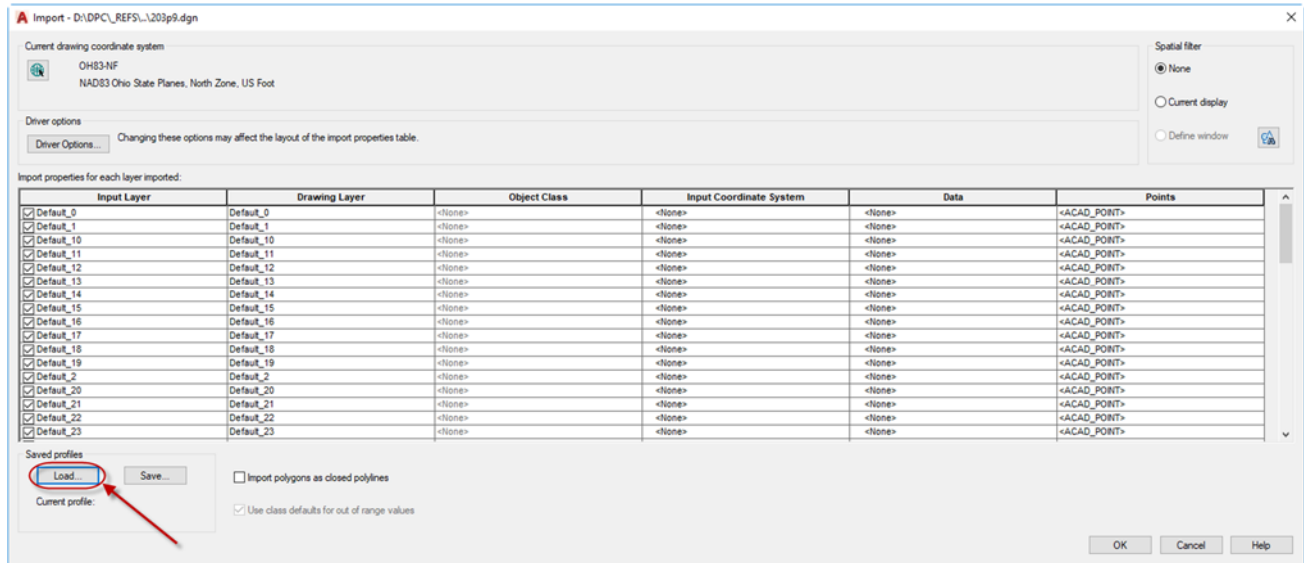
In lieu of the previous steps, start by opening **CI223971-Lustri-AU2018-02.dwg**

- 2) Type **MAPIMPORT** at the command line.

- a. Set the Files of Type: to **MicroStation File (\*.dgn)**
- b. Browse to the data files folder and select **203p9.dgn**.
- c. Click **OK**.

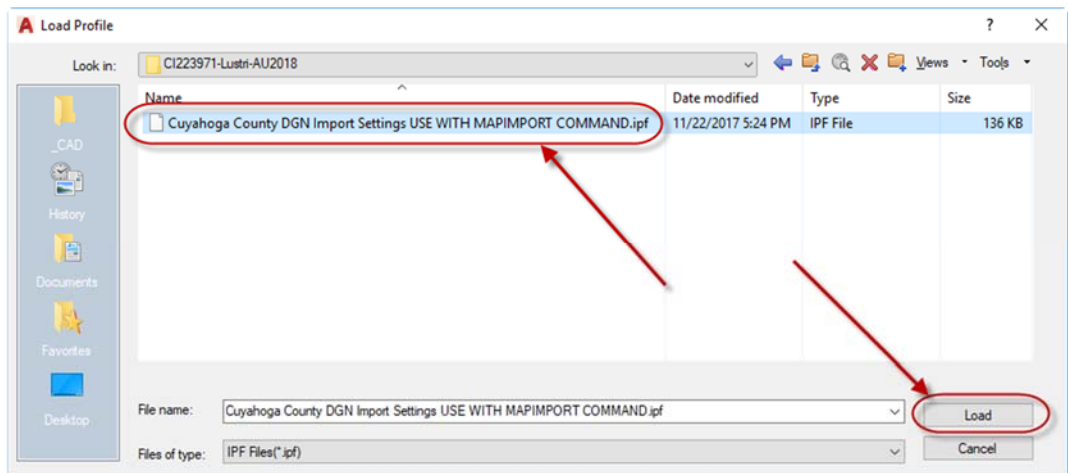


- 3) In the resulting Import dialogue box, select **Load...** under saved profiles and browse to the data folder.

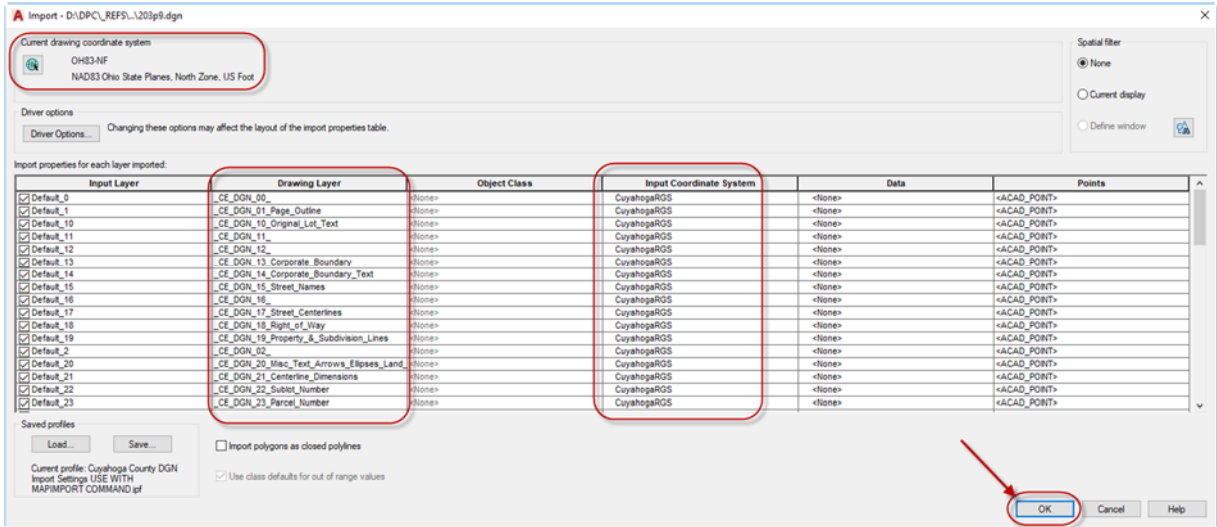


- 4) Select **Cuyahoga County DGN Import Settings USE WITH MAP IMPORT COMMAND.IPF**

Click **Load**.



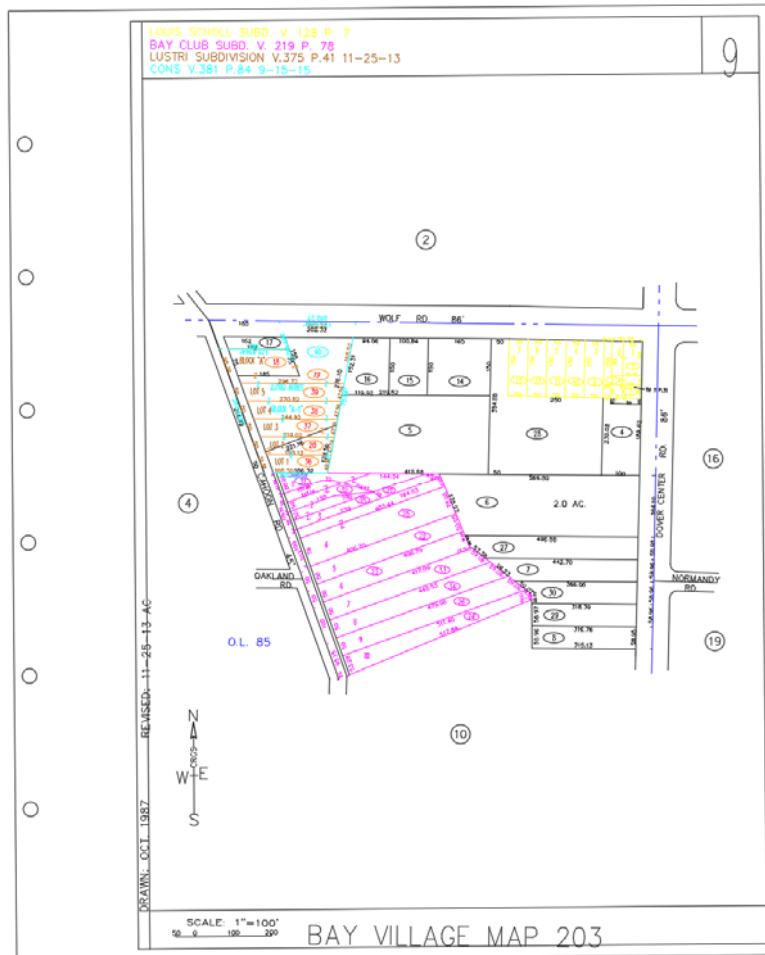
One of the benefits of loading this preconfigured file is the second column (Drawing Layer) and another benefit is the fourth column (Input Coordinate System). In the drawing layer column, you can assign whatever layer you want to use and import the sources DGN drawing levels into your layer naming convention. The Input Coordinate System column represents the original coordinate system of the file you are importing (i.e. dgn). You will have to determine what coordinate system the source files are defined. Note the upper left corner of the dialogue, this represents the coordinate system of your drawing and what the imported file will be translated to. In this case Cuyahoga Regional Geodetic Survey (CRGS) is a local proprietary coordinate system developed by the County before State Plane systems were commonplace.



After reviewing the dialogue and replacing the missing settings, click **OK** to import the data.

5) Zoom extents to see the imported data.

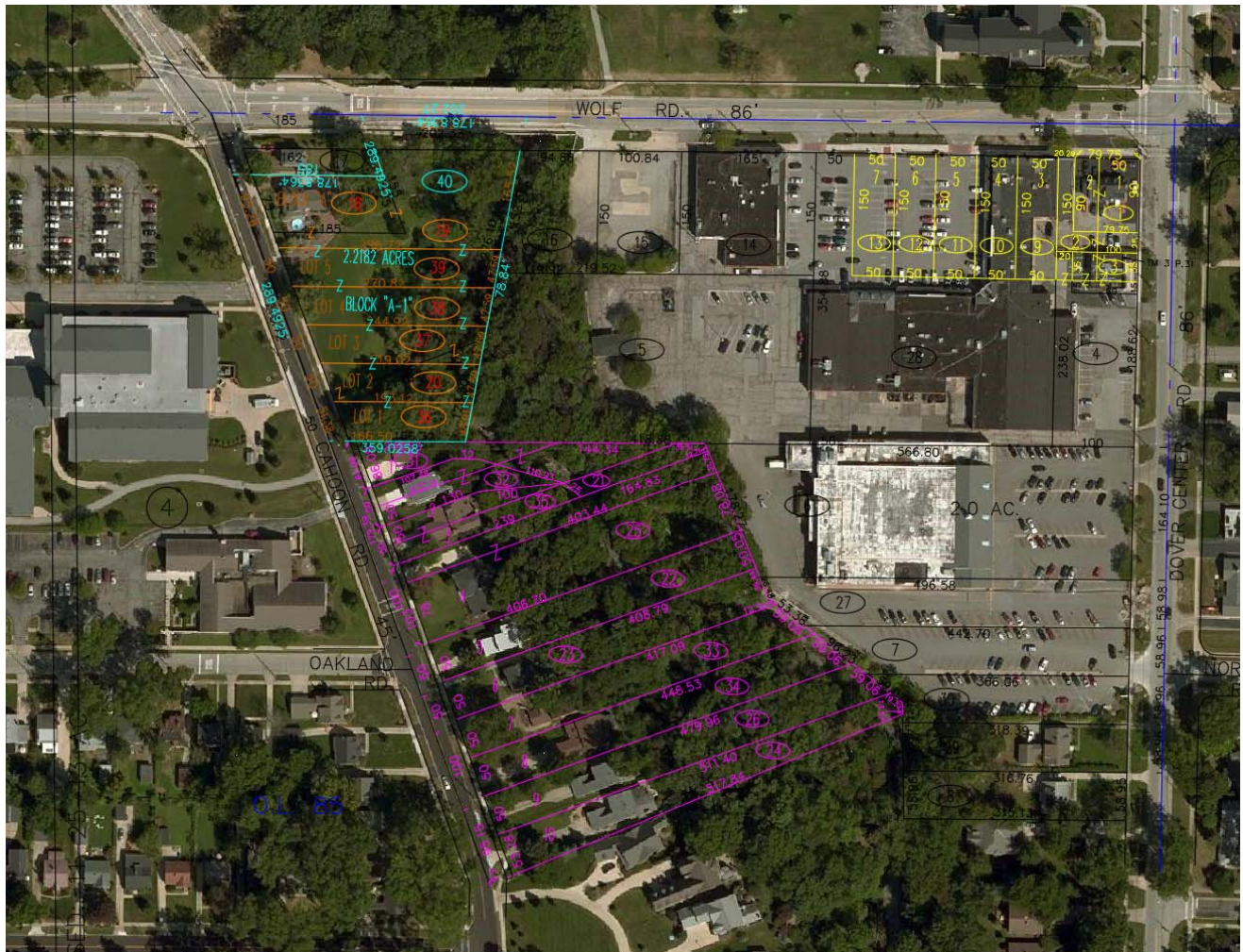
**TIP: Try double-clicking the roller button on your mouse for a zoom extents shortcut.**





- 6) The data is now geospatially rectified, so if you use the GEOMAP command and turn on aerial imagery, the imagery will appear in proper context to the data you imported. Note that it is rare that aerial imagery fits perfectly with surveyed data. The complication lies in the many processes and control points used over large areas.

Type **GEOMAP** in the command line and select **A** for Aerial.



Note that the GEOMAP command will only work if you are logged on to Autodesk Cloud Services.



Q.E.D.

The final drawing in this exercise can be viewed by opening [CI223971-Lustri-AU2018-03.dwg](#)

## TIPS & TRICKS

Whenever you import files or insert blocks you inevitably are adding data to your drawing that was performed in a poor manner. Either by lack of standards or other bad CAD etiquette, data in your drawing will be less controllable if left in this state.

I have used the following tools for years in attempts to 'clean up' imports and other people's drawings so I can spend less time manipulating them and more time using them.

Start by opening [CI223971-Lustri-AU2018-03.dwg](#)

Start with the last exercise file and turn off **GEOMAP**.

- 1) The first command we will use to clean up the data is **SETNESTEDOBJECTSBYBLOCK**
  - a. This command changes all the layers inside of a block to layer 0. In this way the block will appear the color and properties of the layer that it is on. Some would call this good CAD practice.
  - b. Type **SetNestedObjectsByBlock** at the command line.
  - c. You will be prompted to Select Block References. Simply window the entire drawing.
  - d. Any blocks that were in the windowed area now have their layers set to 0.

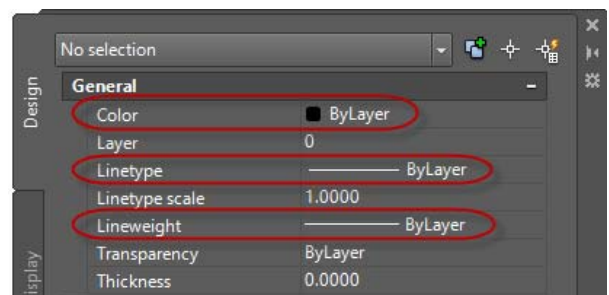
```

**** No System Variable Changed ****
Command: SETNESTEDOBJECTSBYBLOCK
Select block references: Specify opposite corner: 29 found
Select block references:
(29) block definitions were modified.
Type a command
  
```



- 2) Another good CAD practice is the properties of your objects being set to **BYLAYER, BYLAYER, BYLAYER**.
  - a. The reason this is said three times is due to historic AutoCAD use when Color, Linetype, and Lineweight were always assigned the property **BYLAYER**.

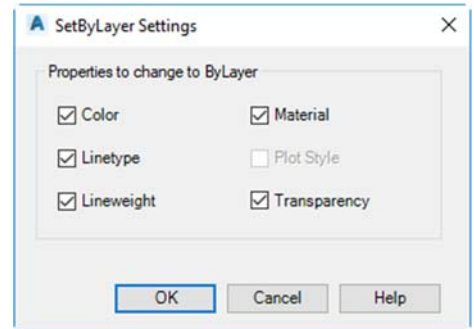
This was to allow the appearance of your drawing to be easier manipulated by changing layer properties rather than object properties.



- b. The next command we will use to clean up the drawing is **SETBYLAYER**. This command changes property overrides of selected objects to ByLayer.
- c. Type **SetByLayer** at the command line.

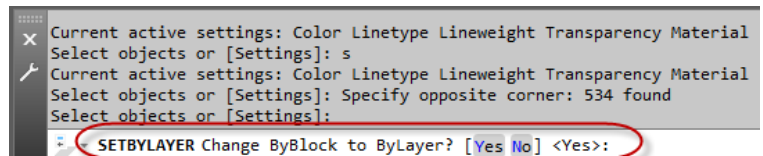
Then click S for settings.

Check that all the checkboxes are checked or manipulate as you desire.



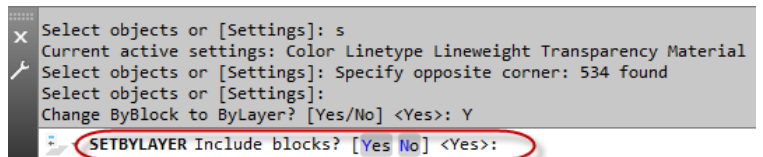
- d. Window the entire drawing and press enter.

- e. In the command line you will see a verification request. Click **Yes** to change *ByBlock* to *ByLayer*.



- f. You will then be prompted to verify if you want blocks included, click **Yes**.

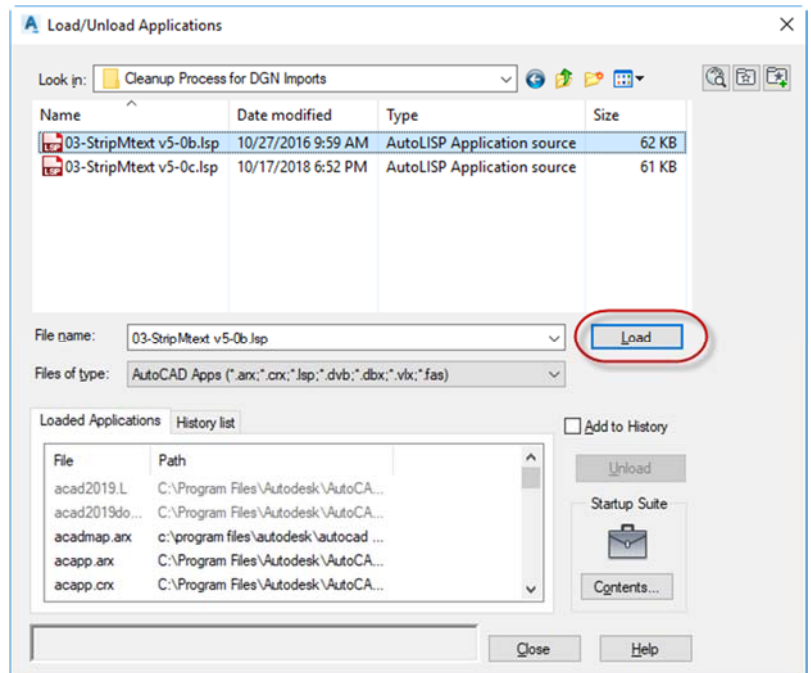
You might notice changes to your drawings upon pressing enter.



- 3) The next command we will use requires the download of a script from a user. Credit should be given to Steve Doman for creating this LSP routine. The name is **STRIPMTEXT**.

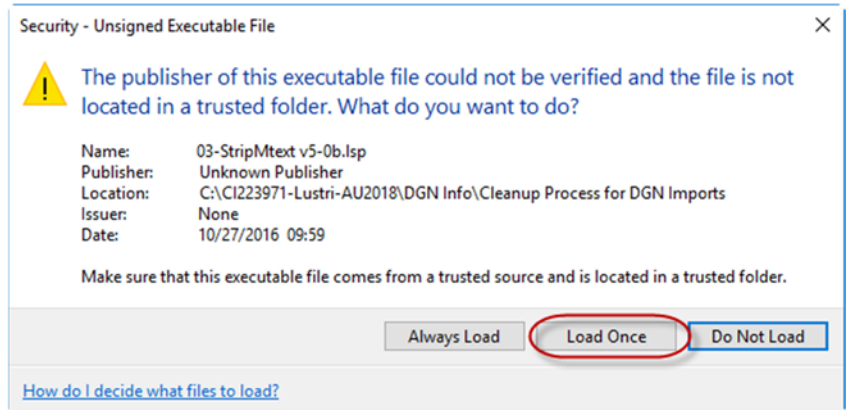
This LSP routine will remove the custom properties that may be defined in an MTEXT object.

- a. Type **APPLOAD** at the command line.
- b. Browse to the location you have it stored, select it and pick **Load**.



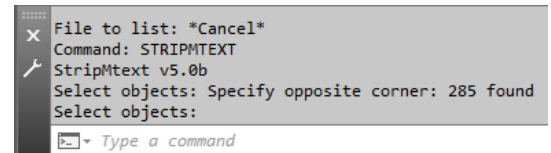


You may be prompted with a Security dialogue box stating that it is an Unsigned Executable File.

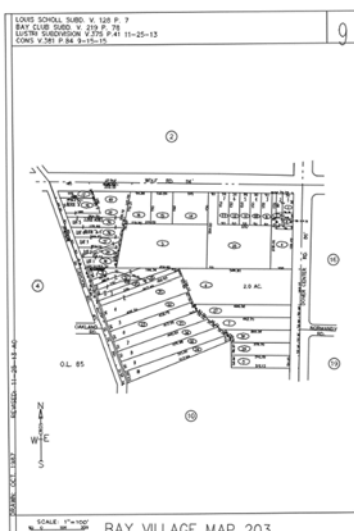
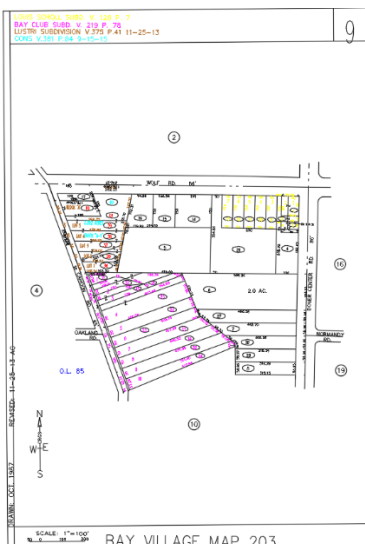
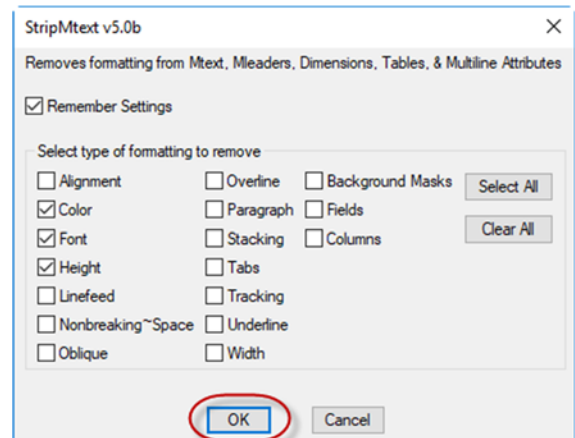


You should be very careful about using any executables downloaded from the Internet. **USE AT YOUR OWN RISK!**

- c. Click **Load Once**.
- d. Click **Close** on the *Load/Unload Applications* dialogue box.
- e. Type **STRIPMTEXT** at the command line.
- f. You will be prompted to select objects, window the entire drawing, then press Enter.
- g. The StripMtext dialogue will display. Choose the properties you wish to reset by checking the associated boxes.
- h. Click **OK**.



The results of the command are evident as all the colors revert to BYLAYER and therefore are the color of the layers assigned. Left is before the command, Right is after.



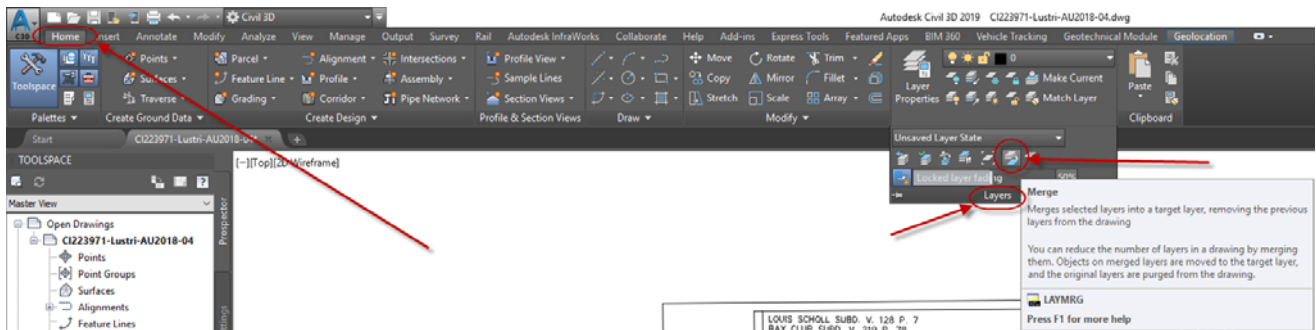
See the Layer listing.

S. Name	On	Freeze	Lock	P	Color	Linetype	Lineweight
CE_DGN_01_Page_Outline	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_09_Original_Lot_Lines	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_10_Original_Lot_Text	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_15_Street_Names	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_17_Street_Centerlines	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_18_Right_of_Way	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_19_Property_&_Subdivision_Lines	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_20_Misc_Text_Arrows_Ellipses_Land_Hooks	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_21_Centerline_Dimensions	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_22_Sublot_Number	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_23_Parcel_Number	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_26_Front_Lot_Dimensions	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_27_Frontage_Over_50_Feet	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_28_Sideline_Dimensions	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_29_Rear_Lot_Dimensions	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_30_Dimensions	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_34_Tax_Page_Cell_&_Map_Circles	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_46_Consolidations_Land_Hooks	☑	☑	☑	☑	white	Continuous	0.00 mm
CE_DGN_47_Sublot_Number_Revised	☑	☑	☑	☑	white	Continuous	0.00 mm
0	☑	☑	☑	☑	white	Continuous	Default
C-WATR-TEXT	☑	☑	☑	☑	white	DASHED	Default
Defpoints	☑	☑	☑	☑	white	Continuous	Default
Level 20	☑	☑	☑	☑	white	Continuous	0.00 mm
Level 31	☑	☑	☑	☑	white	Continuous	0.00 mm
Level 46	☑	☑	☑	☑	white	Continuous	0.00 mm
V-BLDG-OTLN	☑	☑	☑	☑	white	Continuous	0.00 mm

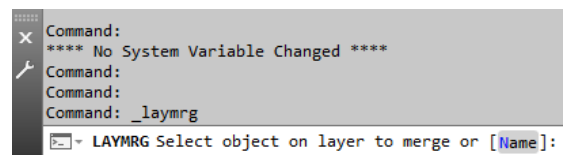
Scroll down the layer listing to see layers that were not converted in the previous exercise.

4) Often there are blocks within blocks that have the original layer name before they were made into blocks. The following command will help us merge these old layers into the new ones, bringing their data with them.

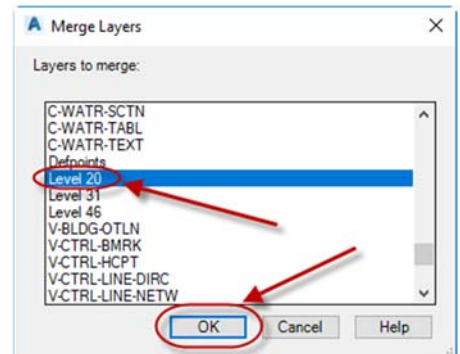
- a. On the *Home* tab of the ribbon, *Layers* panel, select the down arrow to the bottom right to expand the panel. Click **Merge**.



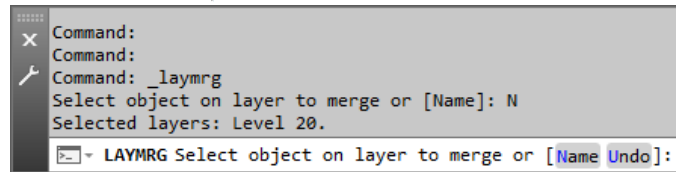
- b. You will be prompted to select object on layer to merge or [Name]. Choose **Name** and the Merge Layers dialogue will appear.



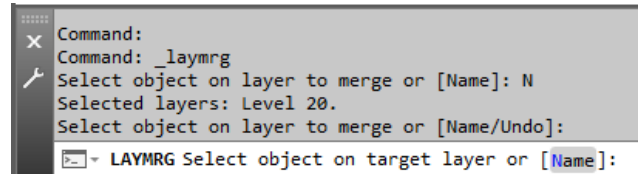
- c. Scroll down to pick the redundant layer. This is the FROM layer, you will pick the TO layer next.



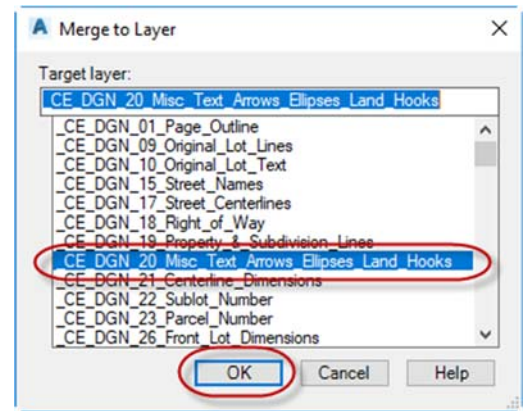
d. You will still be in selection mode, meaning that you can still select items. To end selection mode, click **Enter** one time.



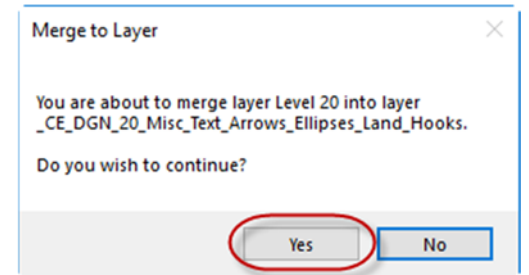
e. You will now be prompted to select object on target layer. This is the TO layer. Select **Name** again to pick from the list.



f. Choose the proper target layer and click **OK**.



g. You will be prompted with a verification dialogue. Click **Yes**.



h. Note that the layer named Level 20 no longer exists. It has been merged.



i. Repeat the steps for the other two layers. Note in this data file Level 31 does not have a target layer, you will have to create the layer first for this command to work.

The final version of this exercise can be found by opening [CI223971-Lustri-AU2018-04.dwg](#)

Q.E.D.

**OBJECTIVE 2 - Locating, downloading, and selectively importing Federal Emergency Management Agency (FEMA) flood map information to project coordinate systems. (SHP files)**

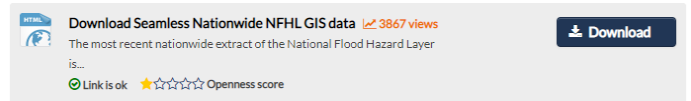
Many consulting engineers and surveyors need to show current flood plain information on their base mapping. The first step is knowing where to go to find that information. Then we need to convert it into our CAD environment, in the project’s coordinate system so that we can add project related information to it.

**FEMA Data Resources**

The following links provide access to various website locations within the FEMA website...

- 1) FEMA Flood Map Service Center – This site will provide the user with current Federal Insurance Rate Maps (FIRM)
  - a. <https://msc.fema.gov/portal/home>
- 2) FEMA Flood Map Service Center – Search All Products
  - a. <https://msc.fema.gov/portal/advanceSearch>
- 3) National Flood Hazard Layer (NFHL) – Data Home Page
  - a. <https://catalog.data.gov/dataset/national-flood-hazard-layer-nfhl>
  - b. Under Downloads & Resources, you will see a couple options to select...
    - i. If you select

**Download Seamless Nationwide NFHL GIS data...**



Download Seamless Nationwide NFHL GIS data 3867 views  
 The most recent nationwide extract of the National Flood Hazard Layer is...  
 Link is ok ☆☆☆☆☆ Openness score

**Index of /FIMA/Risk\_MAP/NFHL**

Name	Last modified	Size	Description
Parent Directory	-	-	-
00_README_NFHL.txt	07-Jun-2016 11:25	1.3K	
FIRM_Panel_USNG_Crosswalk.zip	14-Aug-2015 02:25	8.7M	
NFHL_10_0.jyr	15-Nov-2014 08:53	220K	
NFHL_20150429.jyr	24-Jun-2015 16:24	73K	
NFHL_20171004.gdb.zip	11-Oct-2017 09:55	10G	
NFHL_20180612.gdb.zip	14-Jun-2018 08:42	10G	
NFHL_20181001.gdb.zip	09-Oct-2018 12:02	11G	
NFHL_AS_OF_9-28-2012.zip	30-Aug-2018 09:42	30G	
NFHL_Core_20170313.gdb.zip	15-Mar-2017 11:23	12G	
NFHL_Repaired.gdb.zip	16-Oct-2018 05:59	9.9G	
NFHL_S_POL_AR_20180924/	25-Sep-2018 16:01	-	
Pending_20171015.gdb.zip	16-Oct-2017 15:10	877M	
metadata/	10-Aug-2016 13:27	-	
web.config	15-Nov-2014 09:08	600	

Apache Server at data.femadata.com Port 443

iii. If you select **Get Flood Maps and Data from FEMA...**



Get Flood Maps and Data from FEMA  
 Current effective maps and data at the county and state level are available...  
 Link is ok ☆☆☆☆☆ Openness score



iv. You will land on the **FEMA Flood Map Service Center: Welcome** page.

### FEMA Flood Map Service Center: Welcome!

Looking for a Flood Map? [?](#)

Enter an address, a place, or longitude/latitude coordinates:


Looking for more than just a current flood map?

Visit [Search All Products](#) to access the full range of flood risk products for your community.

#### About Flood Map Service Center

The FEMA Flood Map Service Center (MSC) is the official public source for flood hazard information produced in support of the National Flood Insurance Program (NFIP). Use the MSC to find your official flood map, access a range of other flood hazard products, and take advantage of tools for better understanding flood risk.

FEMA flood maps are continually updated through a variety of processes. Effective information that you download or print from this site may change or become superseded by new maps over time. For additional information, please see the [Flood Hazard Mapping Updates Overview Fact Sheet](#)

v. After typing in your address, you will be provided the search results of available effective flood maps, revisions, amendments and revalidations. You will also be able to generate a 'FIRMette' from this page.

### FEMA Flood Map Service Center: Search By Address

Enter an address, place, or coordinates: [?](#)

Whether you are in a high risk zone or not, you may need [flood insurance](#) because most homeowners insurance doesn't cover flood damage. If you live in an area with low or moderate flood risk, you are 5 times more likely to experience flood than a fire in your home over the next 30 years. For many, a National Flood Insurance Program's flood insurance policy could cost less than \$400 per year. Call your insurance agent today and protect what you've built.

[Learn more about steps you can take to reduce the risk flood damage.](#)

#### Search Results—Products for BAY VILLAGE, CITY OF

[Show ALL Products >](#)

The flood map for the selected area is number **39035C0131E**, effective on **12/03/2010** [?](#)

DYNAMIC MAP



MAP IMAGE

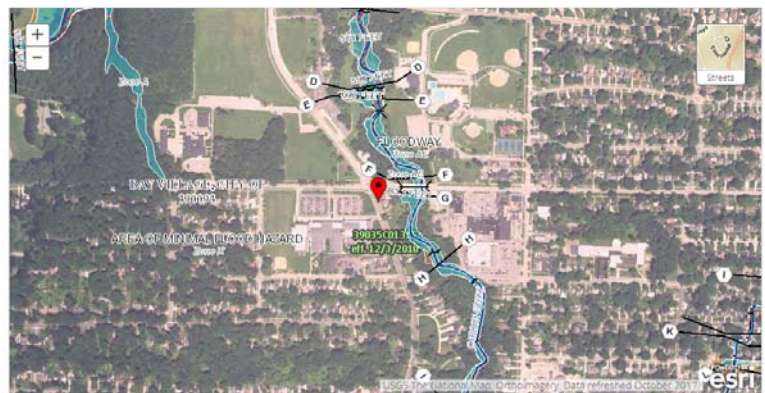


Changes to this FIRM [?](#)

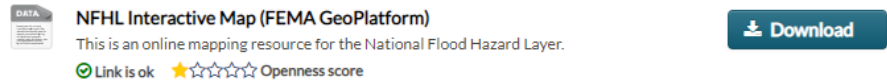
- Revisions (0)
- Amendments (4)
- Revalidations (2)

You can choose a new flood map or move the location pin by selecting a different location on the locator map below or by entering a new location in the search field above. It may take a minute or more during peak hours to generate a dynamic FIRMette.

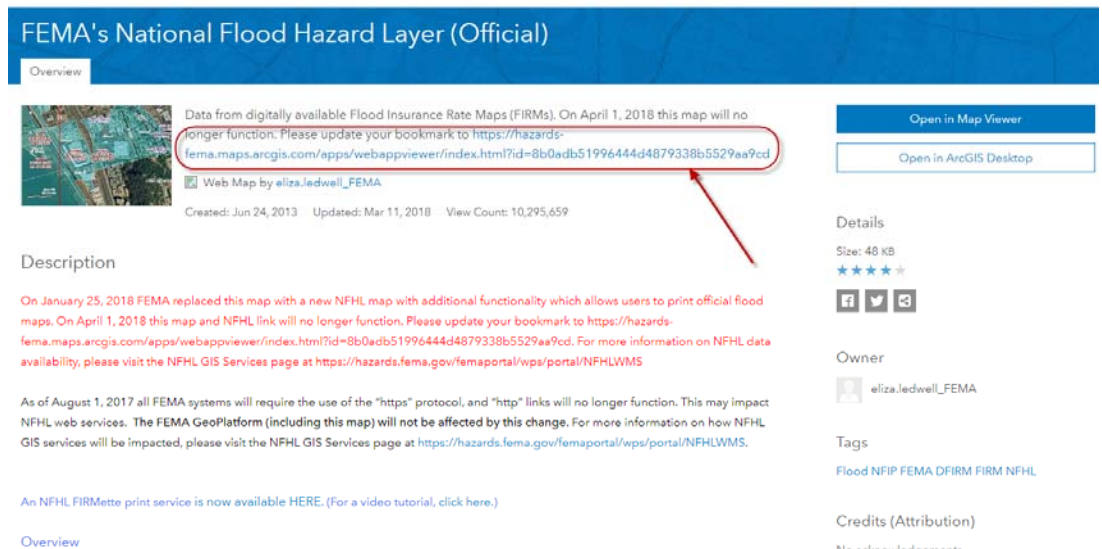
[Go To NFHL Viewer >](#)



- 4) National Flood Hazard Layer (NFHL) – GIS Viewer
  - a. This site is a modern GIS viewer that allows for both the download of FIRMs as well as the GIS data that we are interested in.
  - b. If you select **NFHL Interactive Map (FEMA GeoPlatform)**



You will land on the official NFHL page, on which the link to the ArcGIS web app viewer is found.

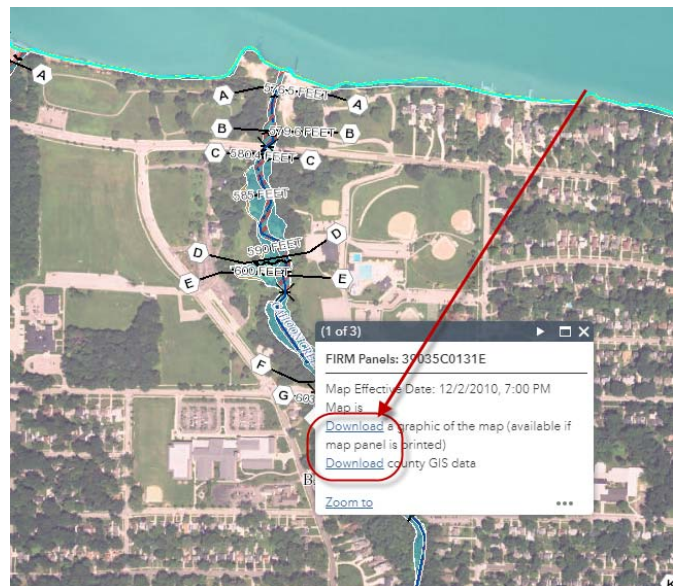


That link is:

<https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd>

Once you zoom into or type in your project location, click in the map, and download links will appear. Click on the one that refers to county GIS data.

Your download will begin. Once downloaded, extract the file contents to your project folder and review the contents.



Note: In the XML file which contains the metadata, you will find the coordinate system used as well as the vertical datum used in these files. The PRJ files are just as important as the SHP or DBF files. Make sure you keep all these together in the same folder.

## Using MAPIMPORT to import FEMA Data

Start by opening [CI223971-Lustri-AU2018-05.dwg](#)

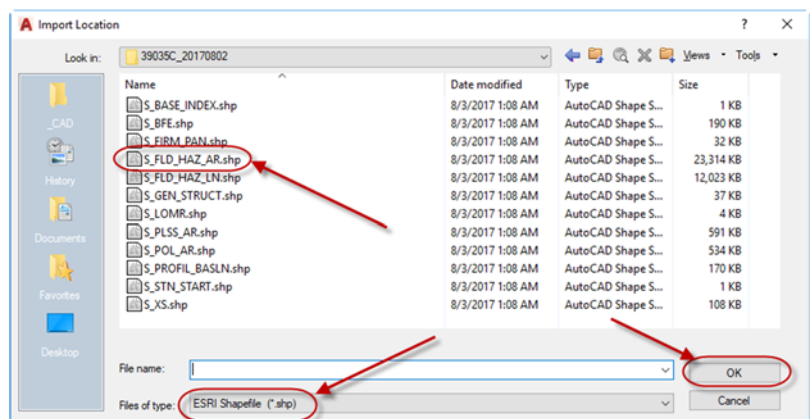
- 1) Using a drawing that has information in a geospatially correct location will help in determining the area in which to bring in the FEMA data that was downloaded.
  
- 2) The list of SHP files that were part of the download are defined in the MetaData file...
  - a. S\_Base\_Index: Location and attributes for a tiling index for raster data used for the FIRM base map.
  - b. S\_BFE: Location and attributes for base flood elevations lines shown on the FIRM.
  - c. S\_FIRM\_Pan: Location and attributes for FIRM hardcopy map panels.
  - d. S\_Fld\_Haz\_Ar: Location and attributes flood insurance risk zones shown on the FIRM.
  - e. S\_Fld\_Haz\_Ln: Location and attributes for boundaries of flood insurance risk zones shown on the FIRM.
  - f. S\_Gen\_Struct: Location and attributes for flood control structures shown on the FIRM.
  - g. S\_LOMR: A spatial data set consisting of polygons that depict effective LOMRs that have been incorporated into the NFHL since the last publication of the FIRM panel for the area.
  - h. S\_PLSS\_Ar: Location and attributes of sections, townships and ranges shown on the FIRM.
  - i. S\_Pol\_Ar: Location and attributes for political jurisdictions shown on the FIRM.
  - j. S\_Profil\_BasLn: A spatial data set consisting of lines showing the flow path used for floodplain modeling and mapping.
  - k. S\_Stn\_Start: A spatial data set consisting of points indicating the location of the reference point that was used as the origin for distance measurements along streams and rivers.
  - l. S\_XS: Location and attributes for cross-section lines in the area covered by the FIRM.

### 3) Type **MAPIMPORT** at the command prompt.

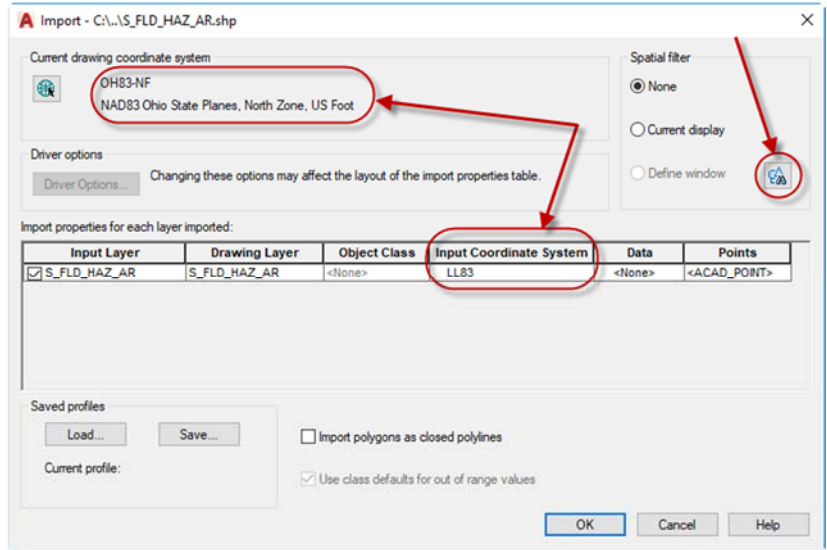
- a. Set the Files of type to ESRI Shapefile (\*.shp)

- b. Select the **S\_FLD\_HAZ\_AR.shp** file.

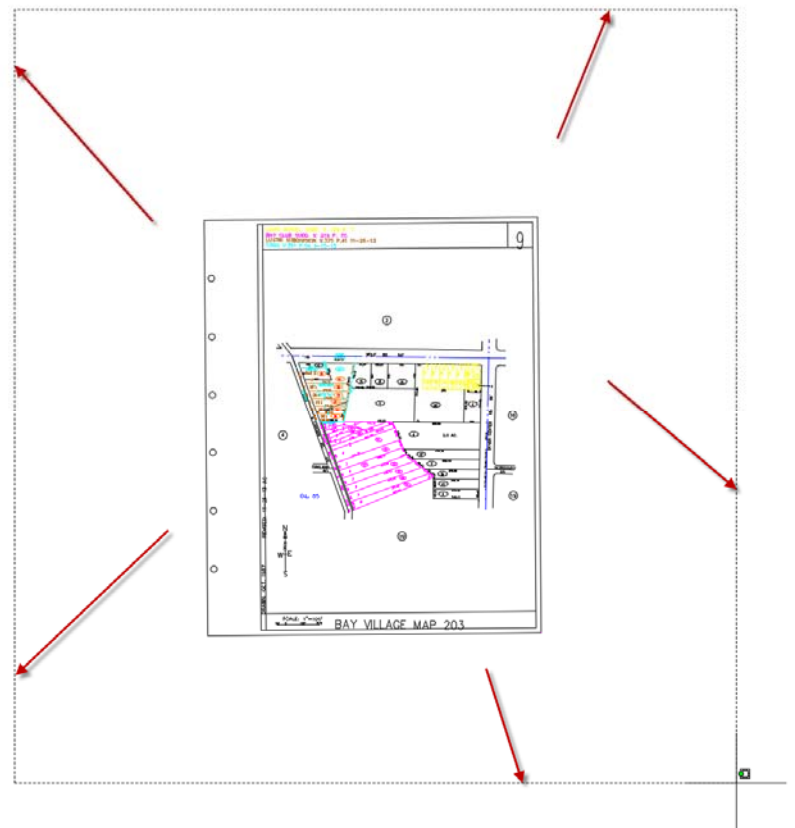
- c. Click **OK**.



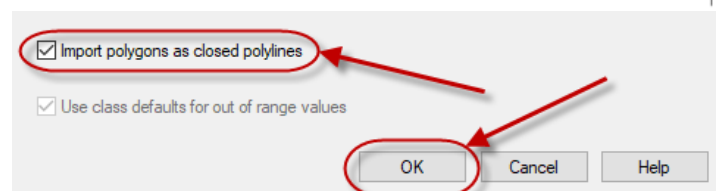
- 4) In the Import dialogue box, note the *Input Coordinate System* is present and that it is different than the *Current drawing coordinate system*. **LL83** versus **OH83-NF**. Under Spatial filter, select the Define Window button.



- 5) Window an area larger than the data set in the drawing.

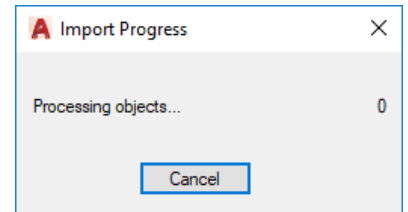


- 6) Make sure to check the box for **Import polygons as closed polylines**. Then click **OK** in the import dialogue box.

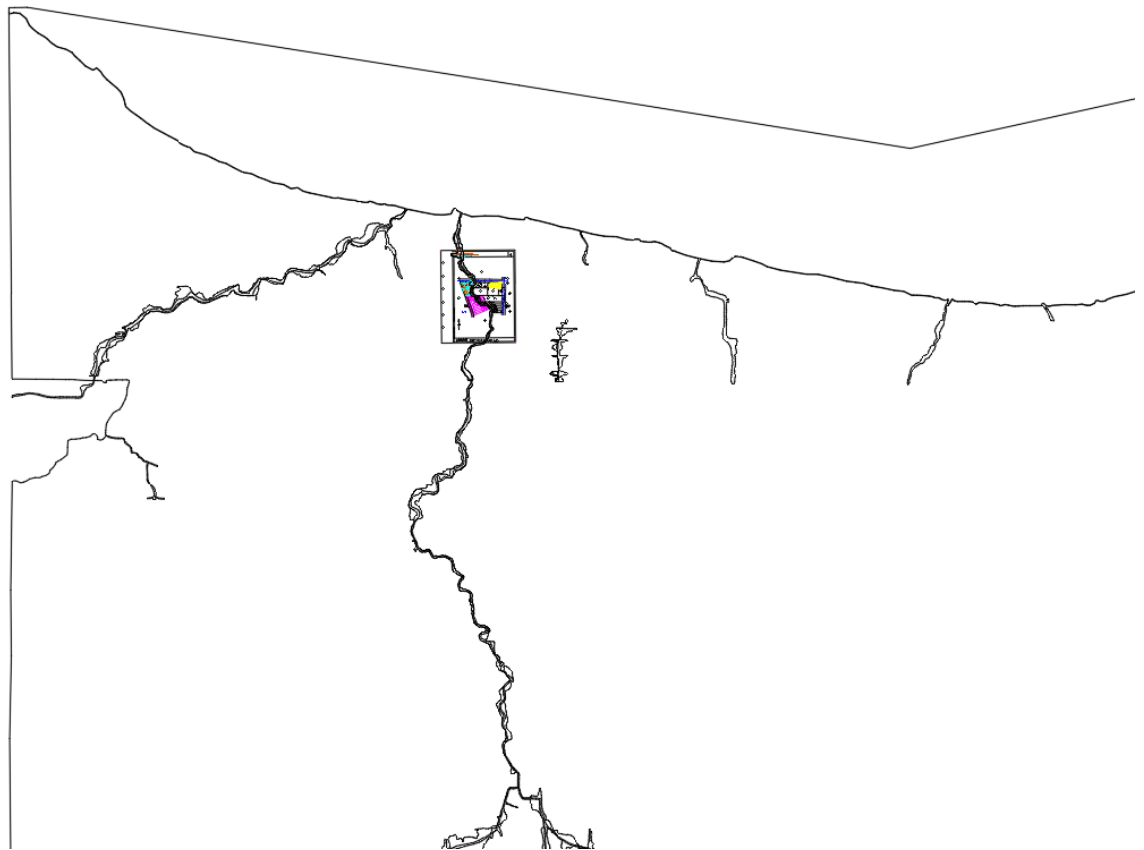




- 7) You will see the Import Progress dialogue and shortly after the linework will appear in the proper location in your drawing.



- 8) Although the windowed area is smaller, the defined window acts as a crossing window, not as an encapsulating window, so anything it touches or crosses will be included in the import.



Q.E.D.

The final drawing of this exercise can be viewed by opening [CI223971-Lustri-AU2018-06.dwg](#)

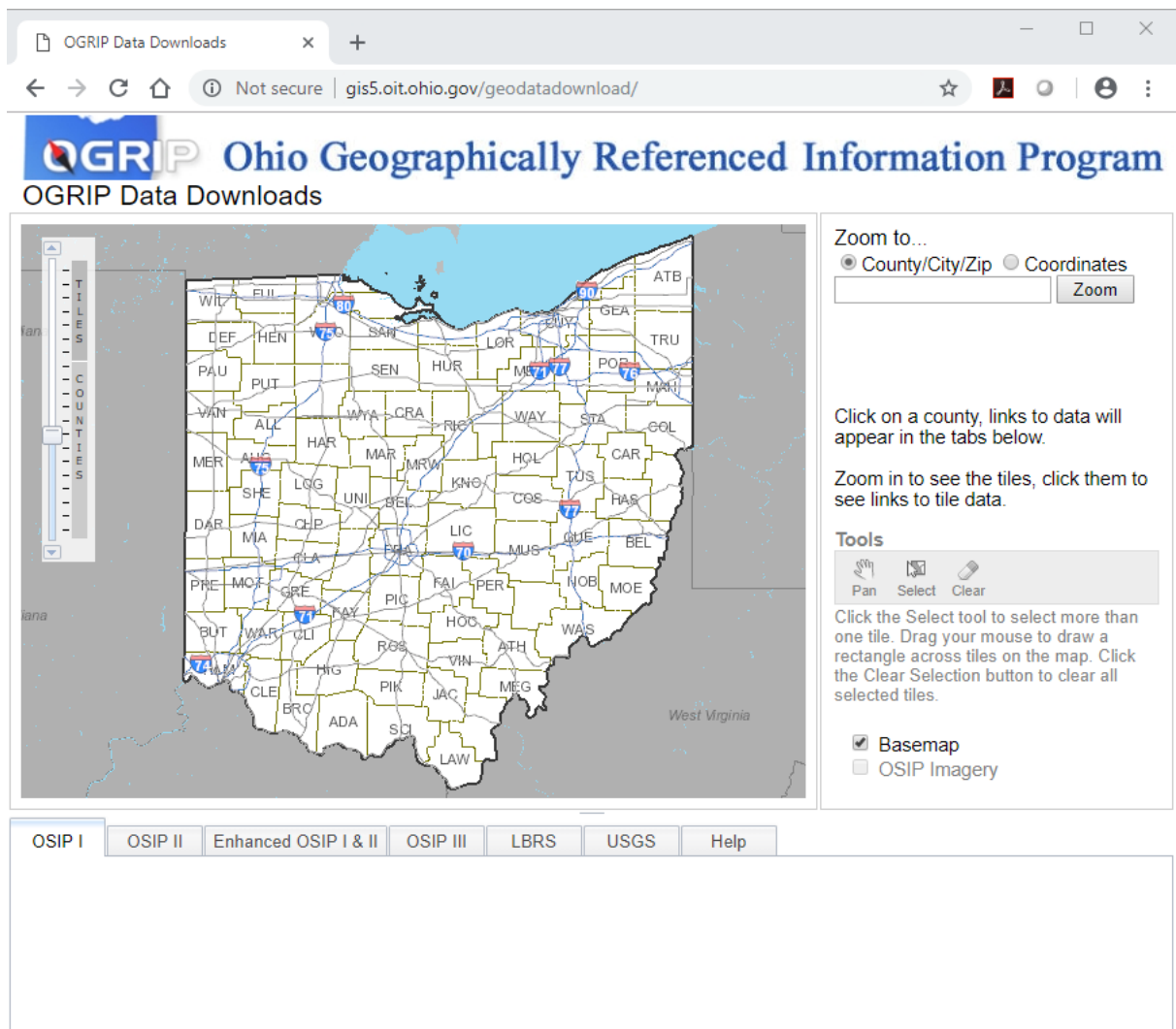
**OBJECTIVE 3 – Utilize available point cloud data, classify it (isolate ground points from other points) and generate a Civil 3D surface. (LAS files)**

Many jurisdictions are beginning to make available aerial LiDAR data that has been organized (classified). LiDAR is an acronym for **L**ight **D**etection **A**nd **R**anging. There are numerous files types for point cloud data, in this exercise we will be using LAS files.

**Ohio Geographically Referenced Information Program (OGRIP)**

The following links provide access to state of OHIO LiDAR data.

- 1) <http://gis5.oit.ohio.gov/geodatadownload/>

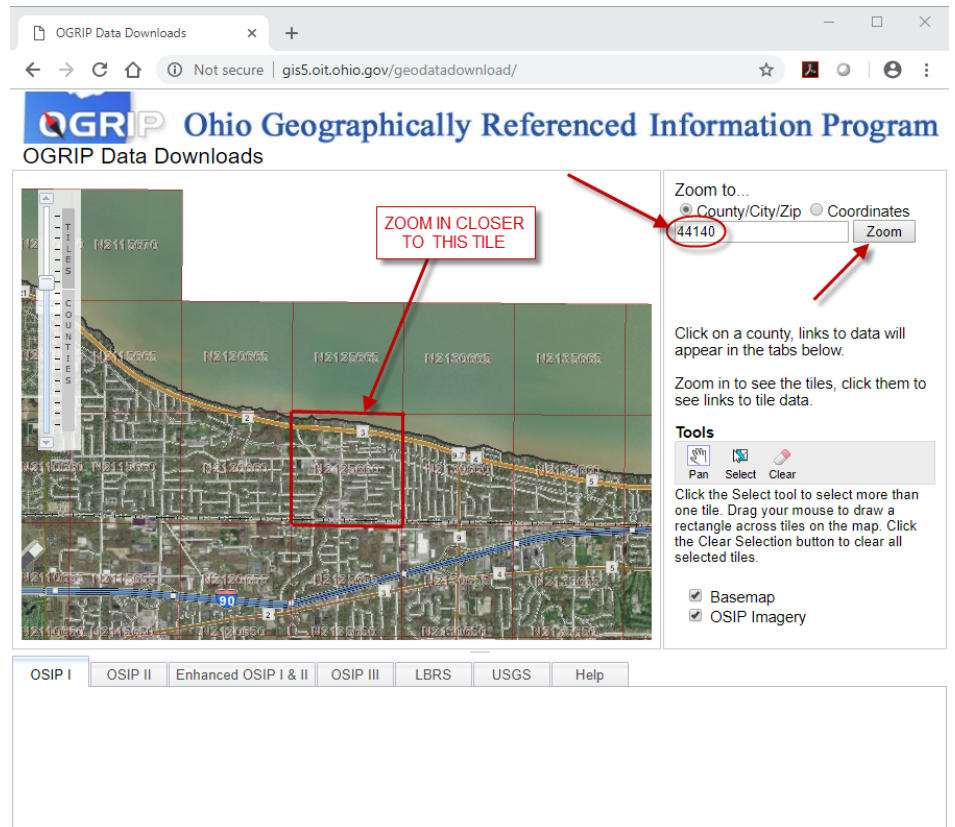


The screenshot shows a web browser window with the URL [gis5.oit.ohio.gov/geodatadownload/](http://gis5.oit.ohio.gov/geodatadownload/). The page title is "OGRIP Ohio Geographically Referenced Information Program" and the sub-header is "OGRIP Data Downloads".

The main content area features a map of Ohio with county boundaries and labels. Major highways (I-75, I-76, I-77, I-80, I-90) are also shown. To the left of the map is a vertical "TILES" and "COUNTIES" legend. To the right is a "Zoom to..." panel with radio buttons for "County/City/Zip" (selected) and "Coordinates", and a "Zoom" button. Below this is a text instruction: "Click on a county, links to data will appear in the tabs below." and "Zoom in to see the tiles, click them to see links to tile data." A "Tools" panel includes "Pan", "Select", and "Clear" buttons, with a text instruction: "Click the Select tool to select more than one tile. Drag your mouse to draw a rectangle across tiles on the map. Click the Clear Selection button to clear all selected tiles." At the bottom right of the tools panel are checkboxes for "Basemap" (checked) and "OSIP Imagery".

Below the map is a horizontal tabbed interface with the following tabs: "OSIP I", "OSIP II", "Enhanced OSIP I & II", "OSIP III", "LBRS", "USGS", and "Help". The "OSIP I" tab is currently selected.

- 2) Type 44140 in the **Zoom to...** box then click the **Zoom** button.



- 3) Zoom in closer to the tile numbered **N2125660**.

- 4) When you click on that tile, the lower part of the dialogue populates with the data that is available for that tile. For example the OSIP I tab provides TIFF, SID, LIDAR, GRID and ASCII information. While the OSIP II tab only provides TIFF and SID aerial imagery.



- 5) By clicking on the blue links, the data files will begin downloading.
- 6) Extract the contents of the file in your project folder. In this case we receive and LAS file and an XML file which is the metadata for the LAS file. This metadata will tell you the coordinate system, date the data was obtained and various other information about the processing and source of the data.

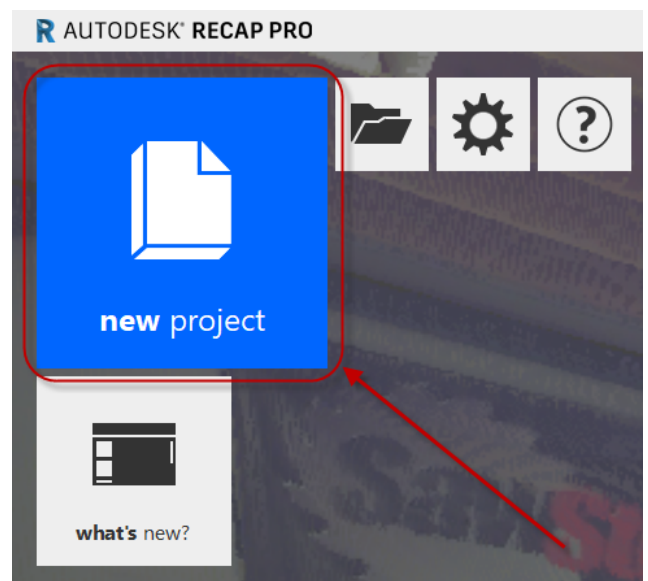
## Using RECAP to process point cloud data and prepare it for use in Civil 3D

In previous versions of Civil 3D, there was a point cloud object for the purpose of classifying point cloud data and using it to generate a Civil 3D surface. In present releases Autodesk products, namely the AEC Collection, the point cloud processing was removed from Civil 3D and placed within RECAP which is the subject matter application.

- 1) Launch RECAP. 

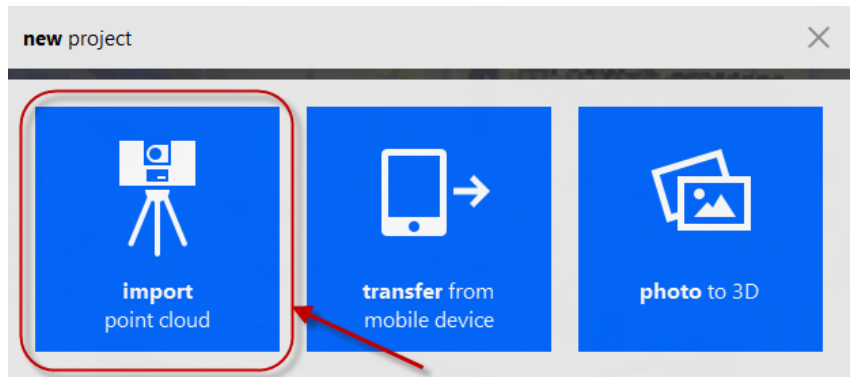


- 2) Select **new project**.

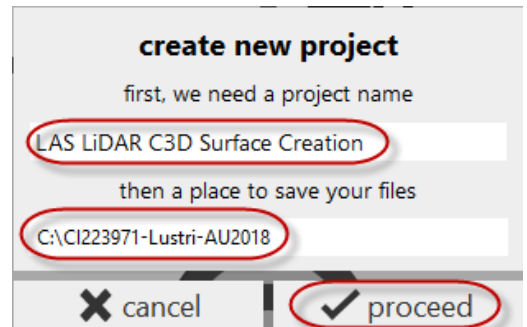




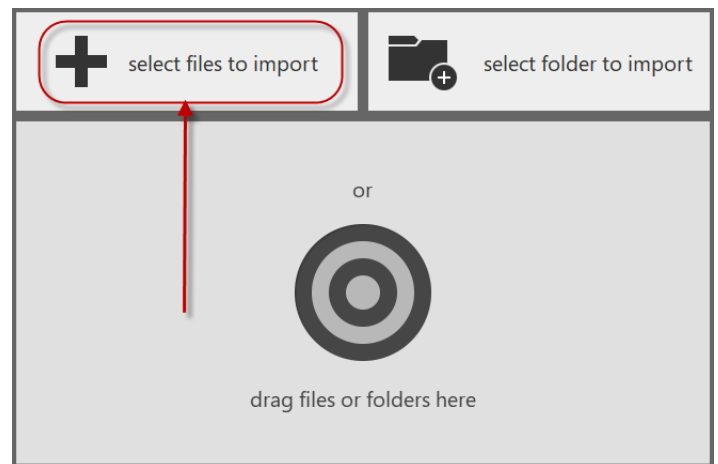
3) Select **import point cloud**.



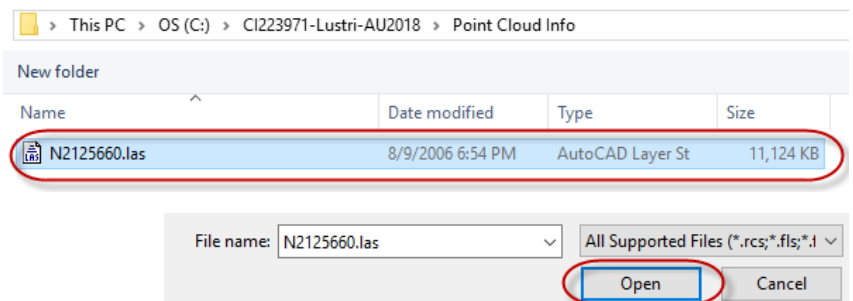
4) Provide a project name and path to save the result and click **proceed**.



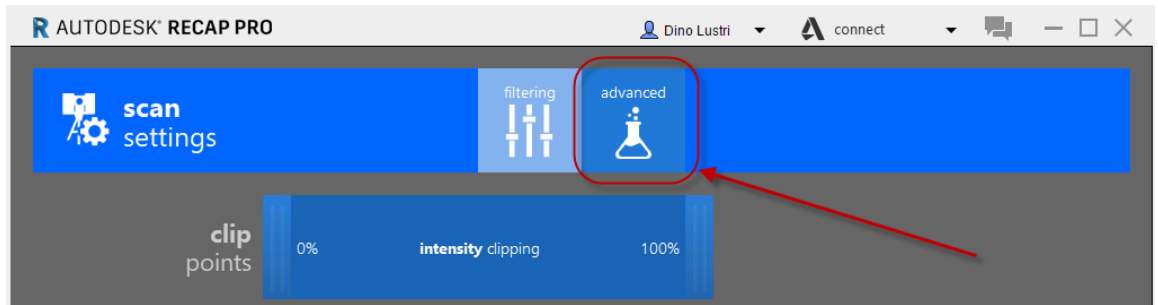
5) Choose **select files to import**.



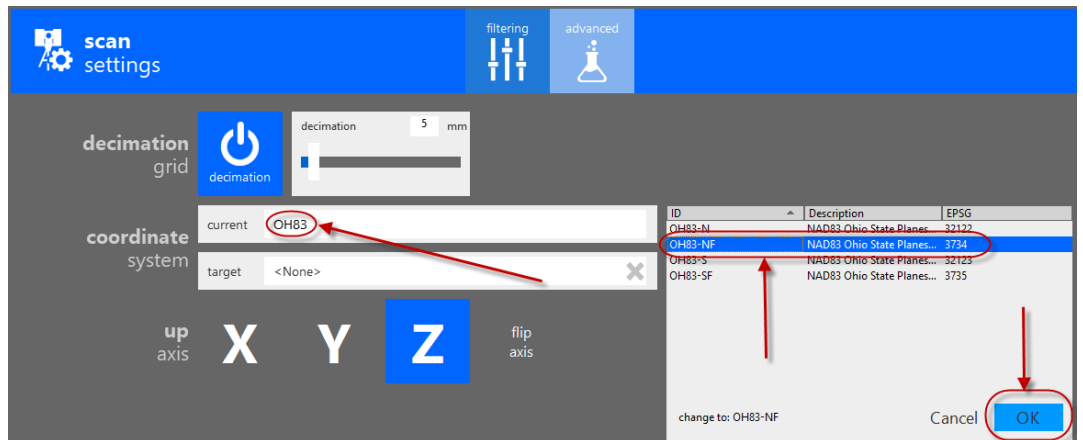
6) Choose the file and **select open**.



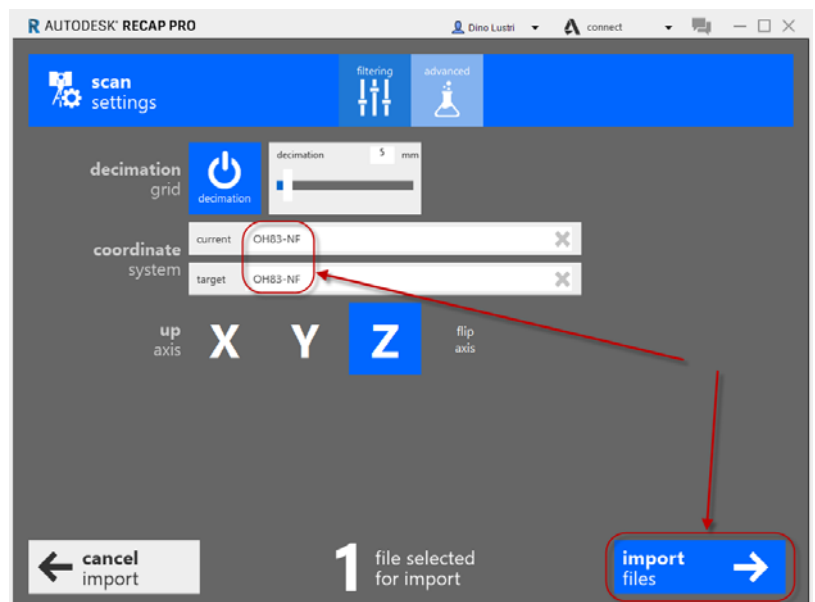
7) Select the **advanced** tab.



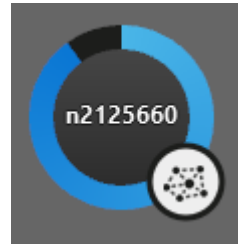
- 8) Enter the coordinate system you determined from the XML file metadata in the current field and enter the coordinate system of your drawing in the target field.
- Begin typing the coordinate system ID if you know it and the right search results will display all that being with what you type. If you know the EPSG then you can enter that as well.



- Do the same effort for the target field.
- Verify that your dialogue looks like the below before selecting **import files**.



9) The point cloud is processed and you will see the progress wheel icon in the upper left.



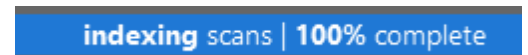
10) When it is complete, the wheel icon will display as a solid color.



11) Highlight the wheel icon and click index scans.



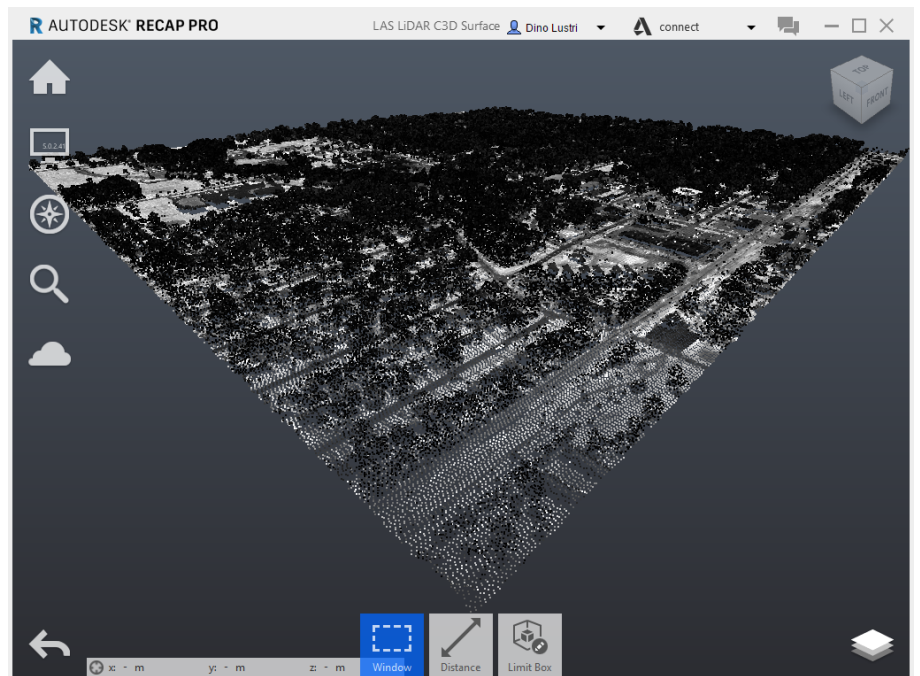
12) The bottom of the screen will indicate the progress.



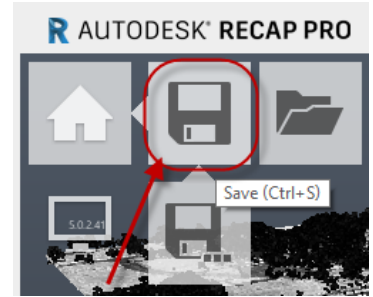
13) Click launch project.



14) A visual representation of the LiDAR file will display on your screen.

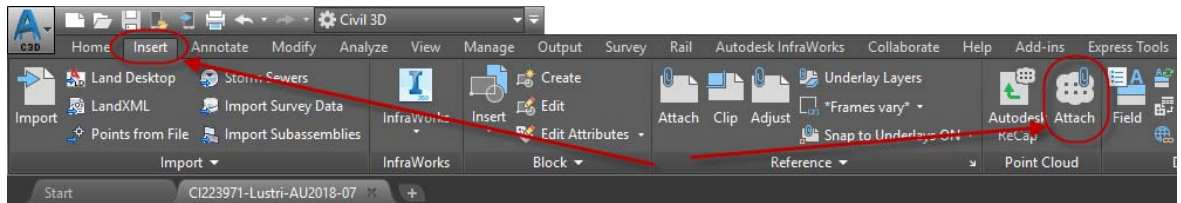


15) Hover over the house icon and select the 'floppy disk' icon for saving your processed work.



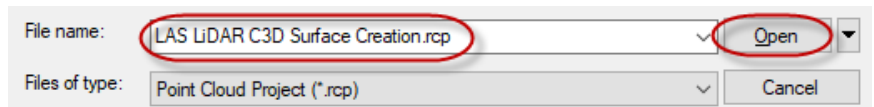
16) Launch Civil 3D.

Start by opening **CI223971-Lustri-AU2018-07.dwg**. Note this drawing had the coordinate system assigned in the previous steps. If you start from a new drawing, make sure to assign the correct coordinate system.



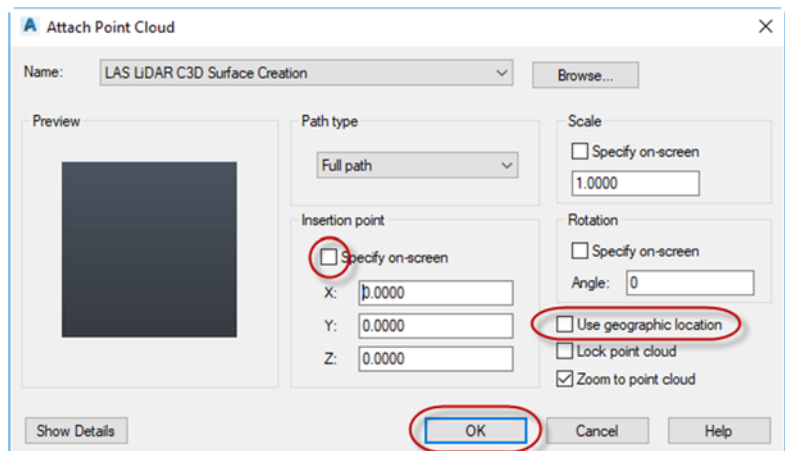
On the *Insert* tab, *Point Cloud* panel, select **Attach**.

17) Select the RCP file that you created in the steps above and pick open.

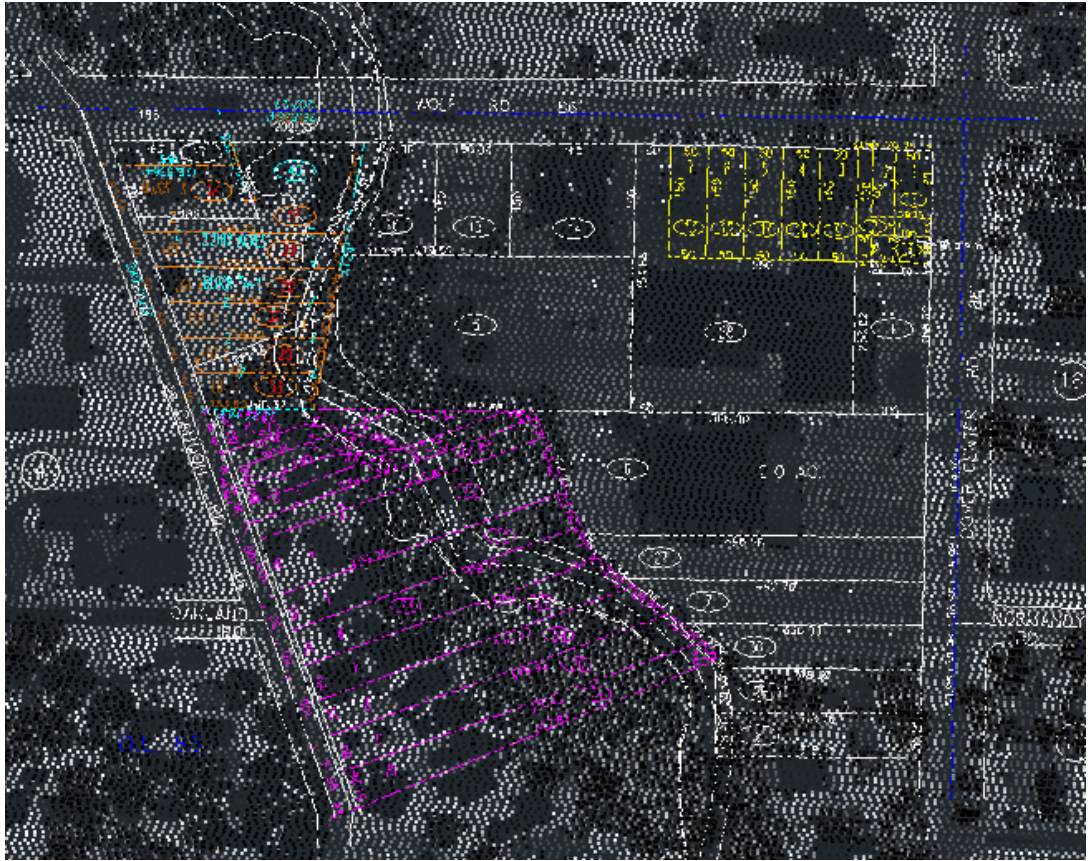


18) In the *Attach Point Cloud* dialogue box. **DO NOT CHECK Use geographic location**. Uncheck the Insertion Point, specify on-screen.

Click **OK**.

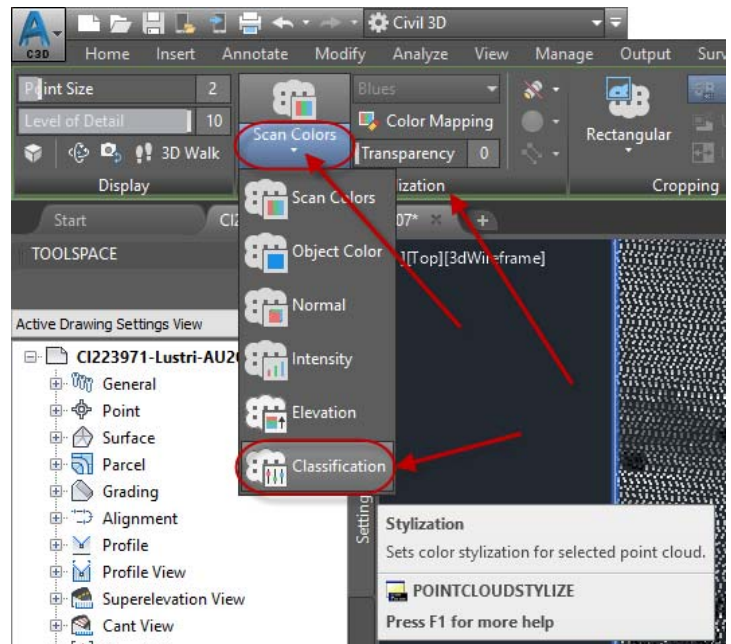


19) The point cloud should have imported to the proper location.



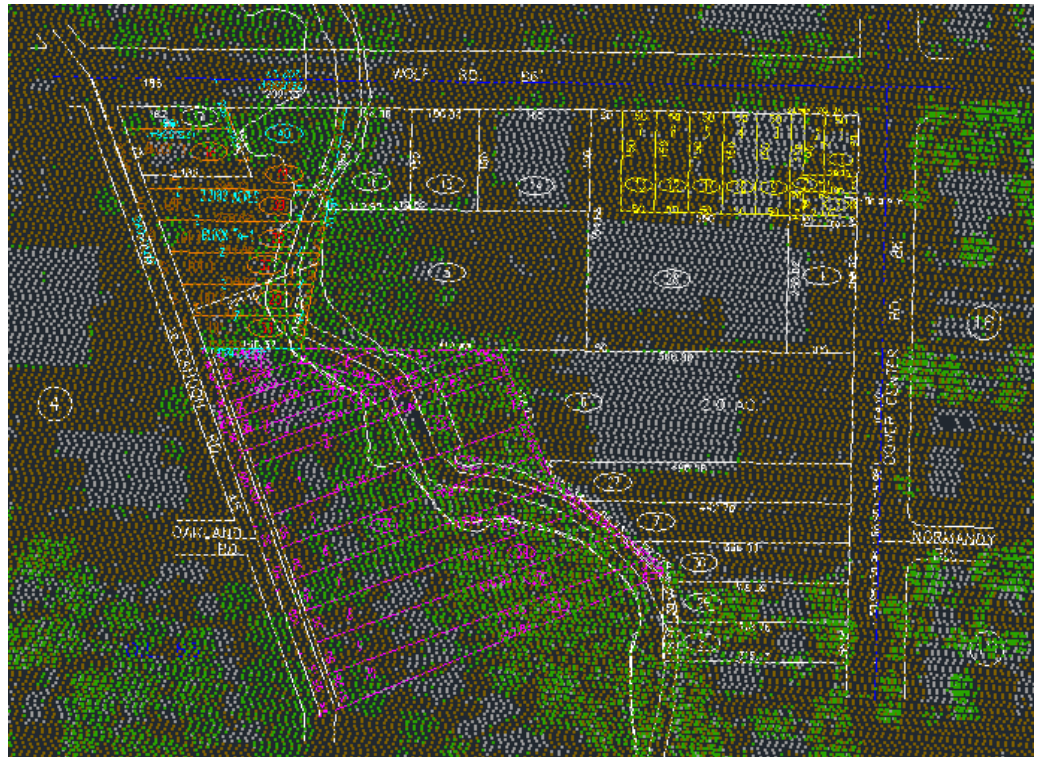
20) Click on the point cloud's edge to launch the contextual ribbon.

- a. On the contextual ribbon, visualization tab, click the lower half of the Scan Colors button to display the other visualization options. Select **Classification**.

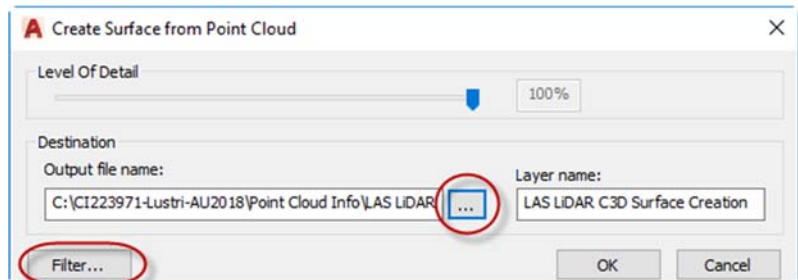




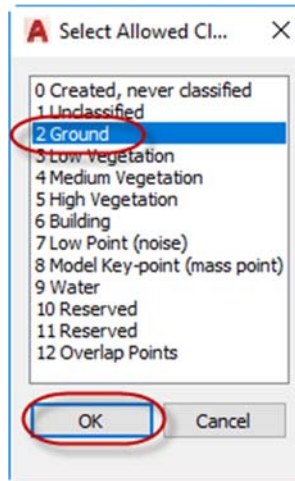
- b. This will verify that your LAS file had classes defined. In the below image you see gray representing buildings, green representing vegetation, and brown representing ground.



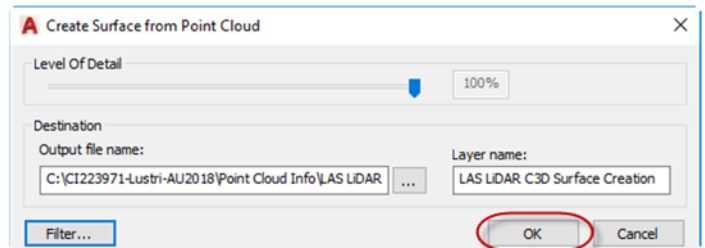
- 21) At the command line type **MAPCREATEPCSURFACE**. Be sure to type the correct command, there is a similar command called **Mapcreatesurface** that is **incorrect** for this process.
- 22) You will be prompted to select the object, pick the edge of the point cloud object. Then press enter.
- 23) In the Create Surface from Point Cloud dialogue box, choose the output file name and location, (Note the TIF suffix). Select Filter.



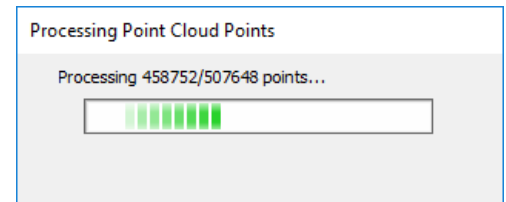
24) Choose **Ground** and click **OK**.



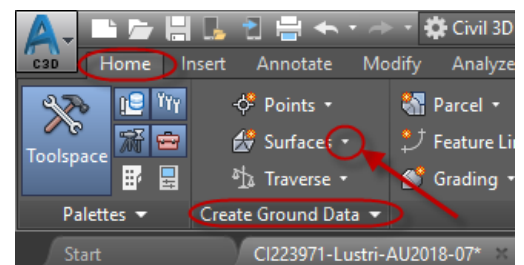
25) Click **OK** on the subsequent dialogue too.



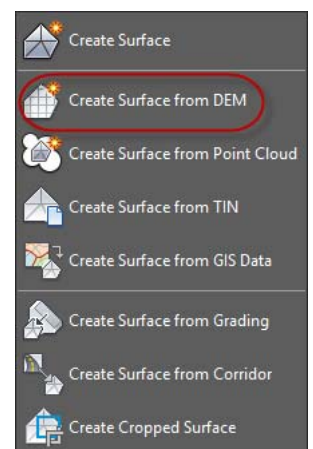
26) After the point cloud processes, you will not see a change in the point cloud object.



27) To create a surface based on the TIF you just generated, go to the *Home* tab of the ribbon, *Create Ground Data* tab, and click the down arrow to the right of *Surface*.



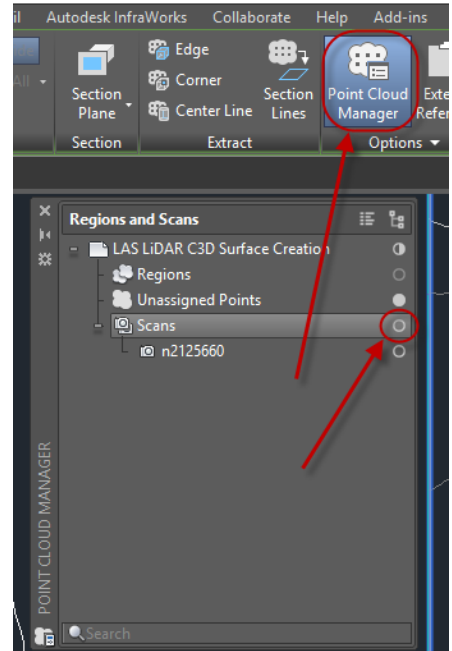
28) Select **Create Surface from DEM**.





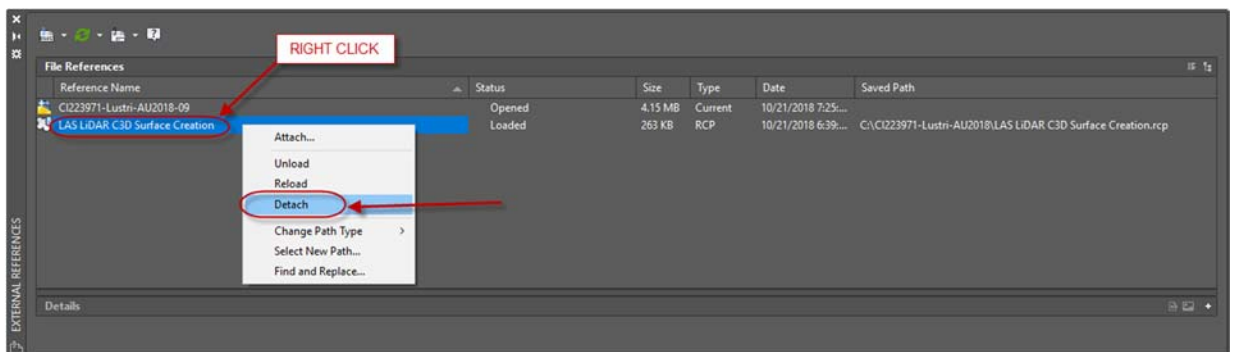
The drawing at this stage can be observed by opening [CI223971-Lustri-AU2018-08.dwg](#).

31) To manipulate the point cloud, i.e. turn it off, but not detach it, click on the point cloud object to launch the contextual ribbon. On the *Options* tab, click **Point Cloud Manager**. In the Point Cloud Manager, clicking the radio button for the scan will turn off the visibility like turning a layer off.

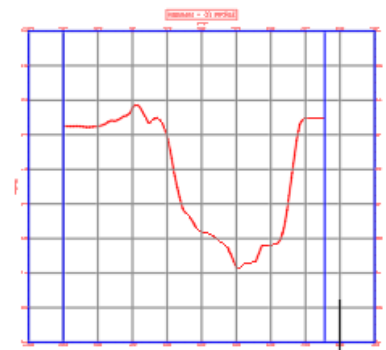


The drawing at this stage of this exercise can be found in [CI223971-Lustri-AU2018-09.dwg](#).

32) Alternatively, you could go to the XREF dialogue box and detach the point cloud permanently.



33) Even with the RCP detached, the surface can still generate profiles.



The drawing at this stage of this exercise can be found in [CI223971-Lustri-AU2018-10.dwg](#).

- 34) Using the LEVELOFDETAILOFF command allows you to keep all the contours on if you wish. Using the LEVELOFDETAIL command will all the system to display contours dependent on your zoom level.

Q.E.D.



**OBJECTIVE 4 – Utilize MAP to import SHP file contours with elevation values. (SHP files)**

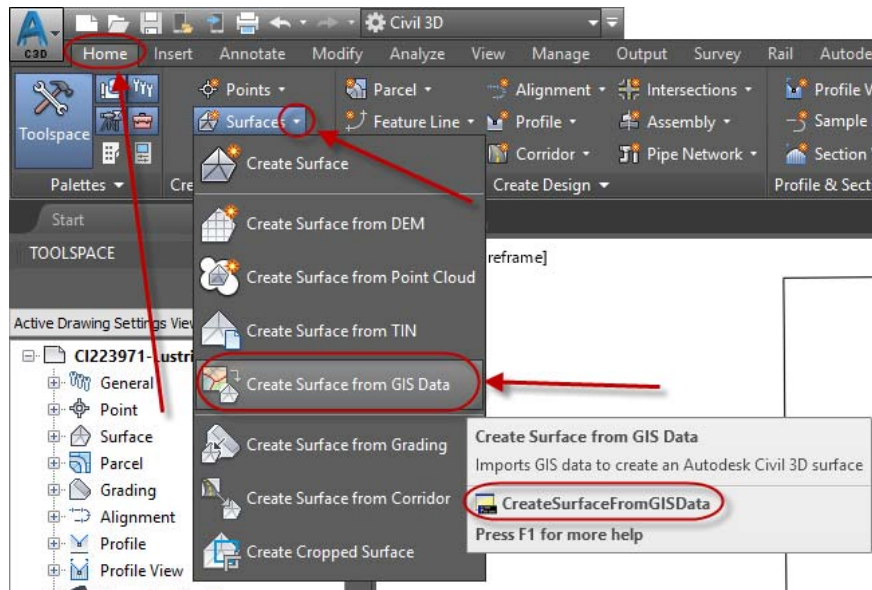
ESRI SHP files come in many variations. Autodesk added a great tool to automate the process of importing SHP contours while adding the elevation data and generating a surface through a wizard interface. Sometimes the SHP file does not work with that command. The below steps will show the ‘other’ method to assign elevation data to the CAD objects so Civil 3D can utilize it to make a surface.

**Utilizing the CREATESURFACEFROMGISDATA command**

This process demonstrates the wizard added to Civil 3D for the purpose of importing ESRI SHP contour data into Civil 3D while generating a surface.

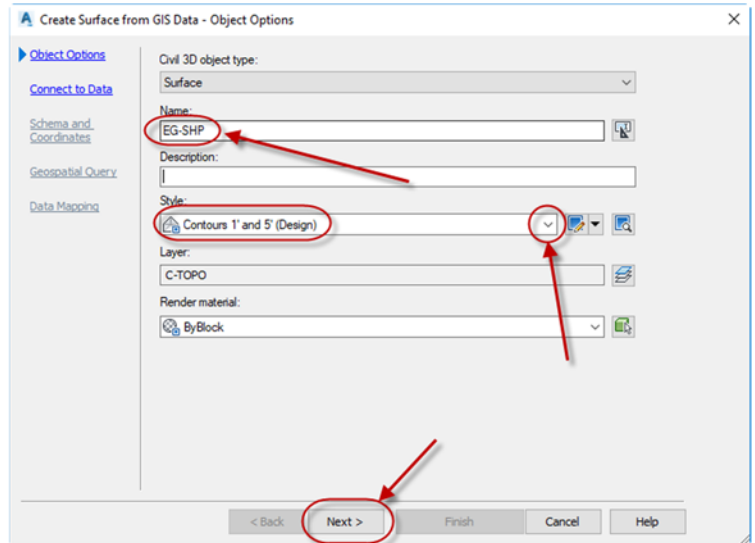
Begin by opening [CI223971-Lustri-AU2018-11.dwg](#). If you are starting from a new drawing, it is imperative to assign a coordinate system before continuing.

- 1) On the *Home* tab of the ribbon, *Create Ground Data* panel, click the down arrow next to *Surfaces* and pick **Create Surface from GIS Data**.



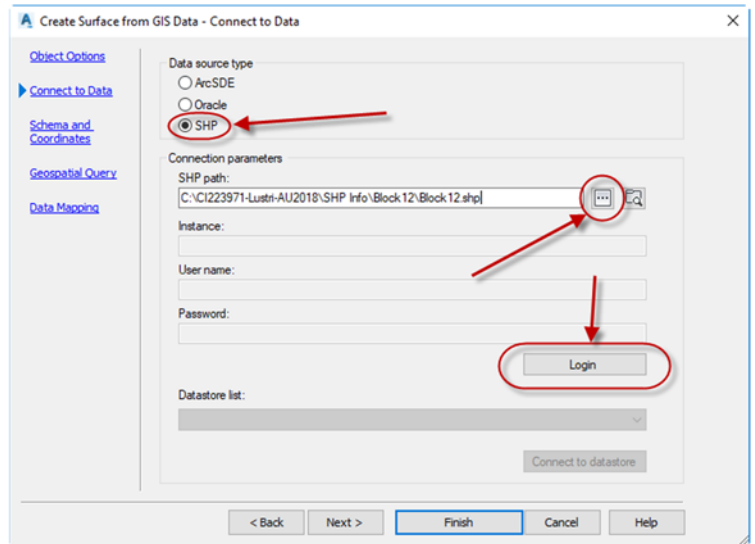
Note that you can type CREATESURFACEFROMGISDATA at the command line to launch the same wizard.

- 2) In the *Object Options* dialogue box, assign a name, assign a style and click **Next >**.

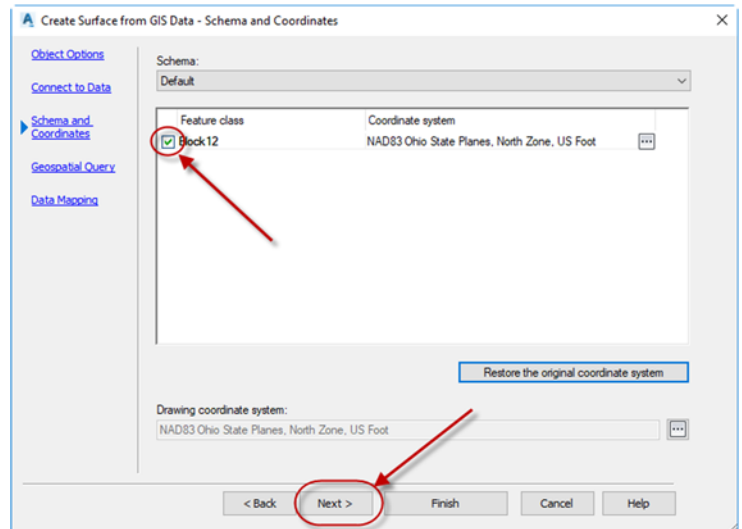


- 3) On the *Connect to Data* dialogue box, click the **SHP** radio button then click the ellipsis to browse to the SHP file.

Click **Login**.



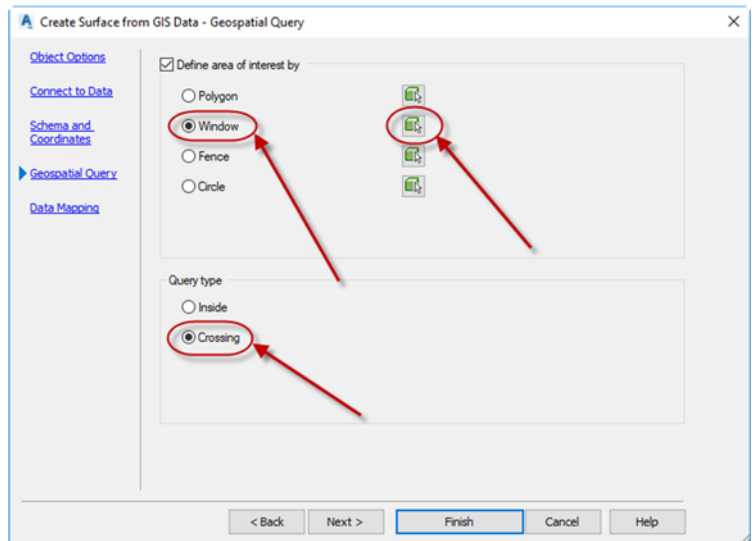
- 4) On the *Schema and Coordinates* dialogue, select the check box next to the Feature Class, then click **Next >**.



- On the *Geospatial Query* dialogue box, select the **Window** radio button. Make sure the *Query Type* is set to **Crossing** and click the query button.

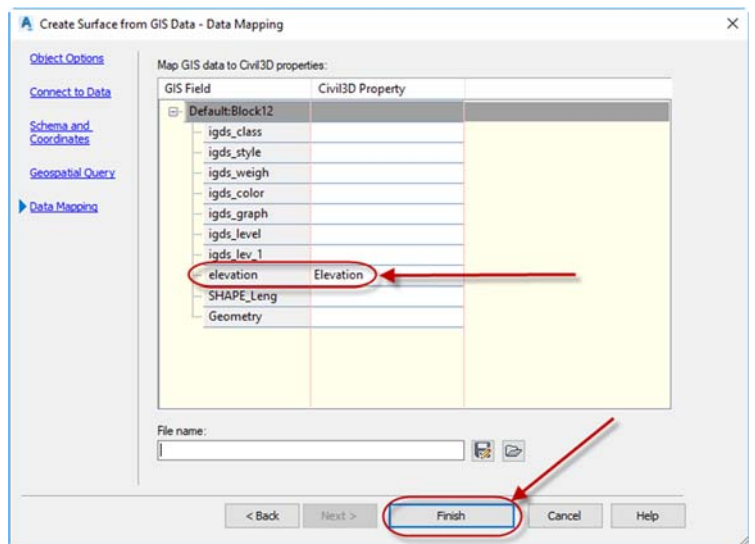
Window the target area you want imported.

Click **Next >** to continue.

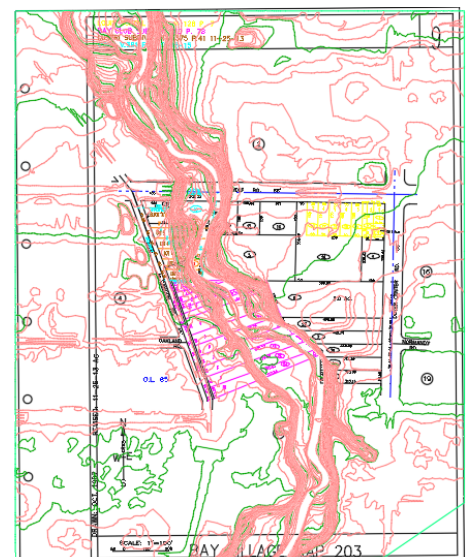


- On the *Data Mapping* dialogue, assign the elevation property next to the Elevation GIS Field.

Click **Finish** to complete the wizard.



- A Civil 3D Surface will be generated.



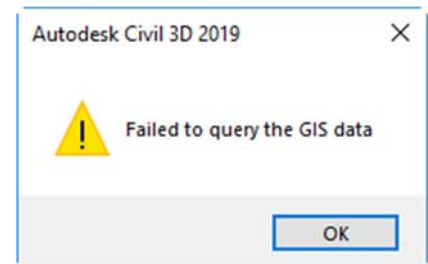
The drawing at this stage of this exercise can be found in [CI223971-Lustri-AU2018-12.dwg](#).

## Utilizing MAP to process a SHP file that does not work with the CREATESURFACEFROMGISDATA command

This process demonstrates how to use MAP in order to work around SHP files that do not cooperate with the wizard.

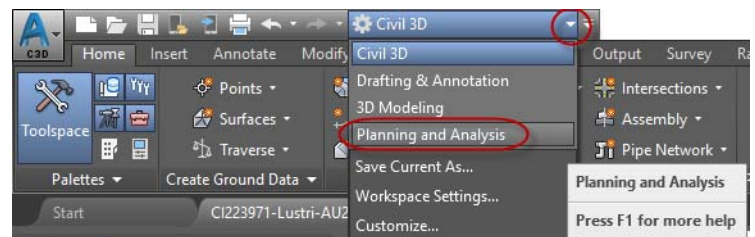
Begin by opening **CI223971-Lustri-AU2018-13.dwg**. If you are starting from a new drawing, it is imperative to assign a coordinate system before continuing.

- 1) To show that the wizard doesn't work on the second data set, we repeat the above steps to attempt an import into Civil 3D. Use the TOPO\_08 data set this time.

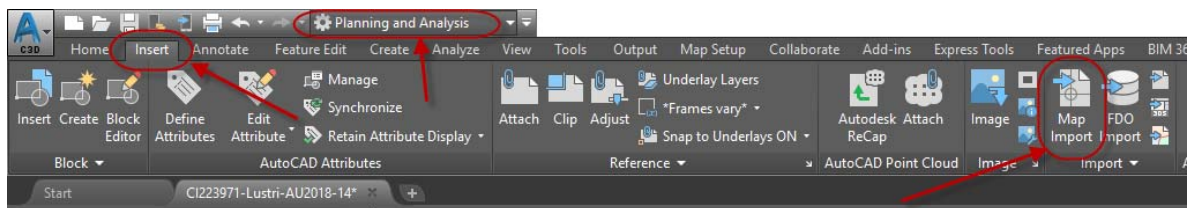


- 2) Change the workspace to **Planning and Analysis**.

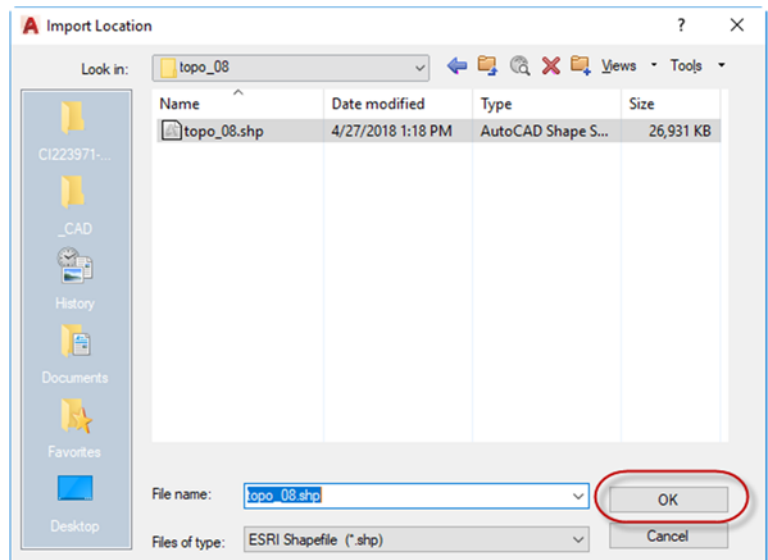
If the Map Task Pane is not showing, type **MAPSPACE** at the command line and choose **On**.



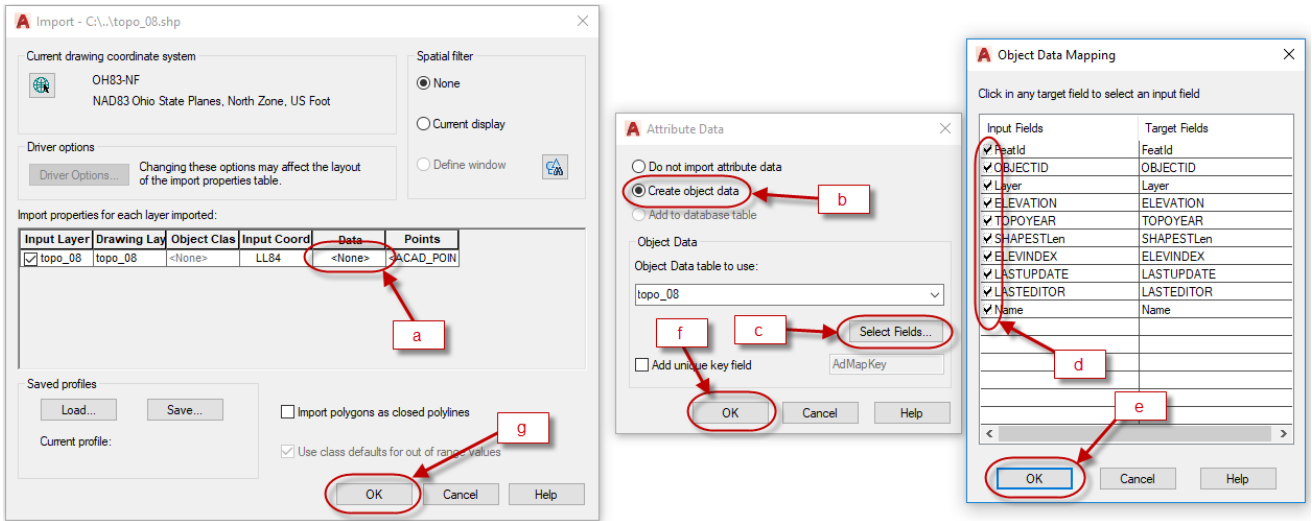
- 3) On the *Insert* tab of the ribbon, *Import* panel, select **Map Import**.



- 4) Browse to the **topo\_08.shp** file and click **OK**.

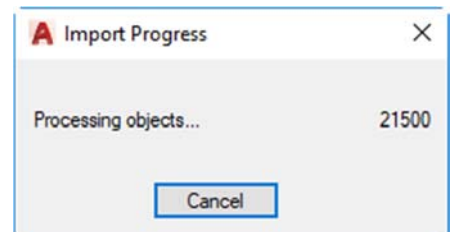


5) On the Import dialogue box, perform the following steps:

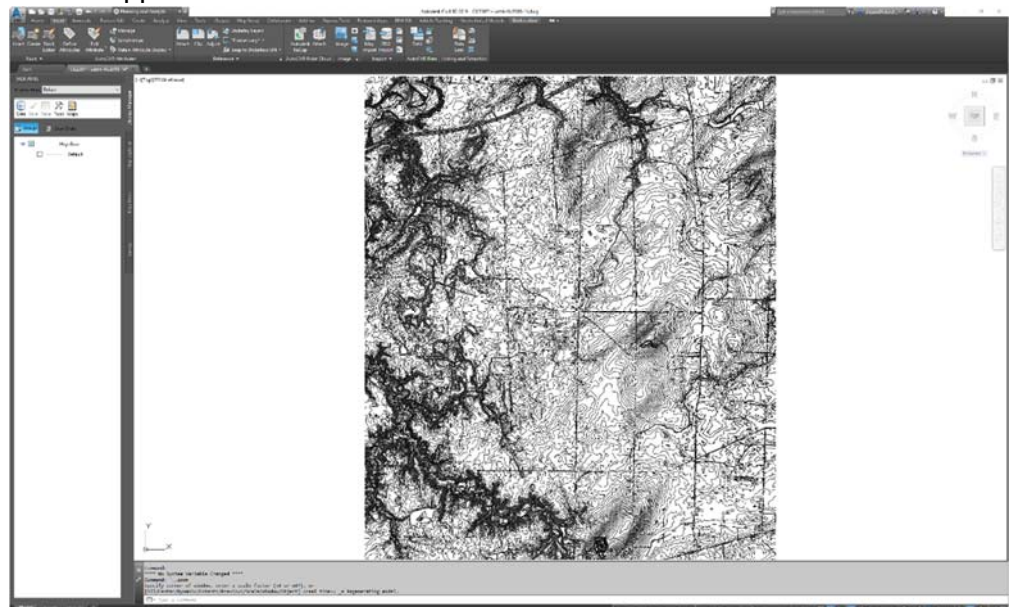


- Click on the Data field.
- Select the Create object data radio button.
- Click Select Fields.
- Verify the check boxes are selected for the object data mapping.
- Click OK.
- Click OK.
- Click OK.

6) The import will begin processing.

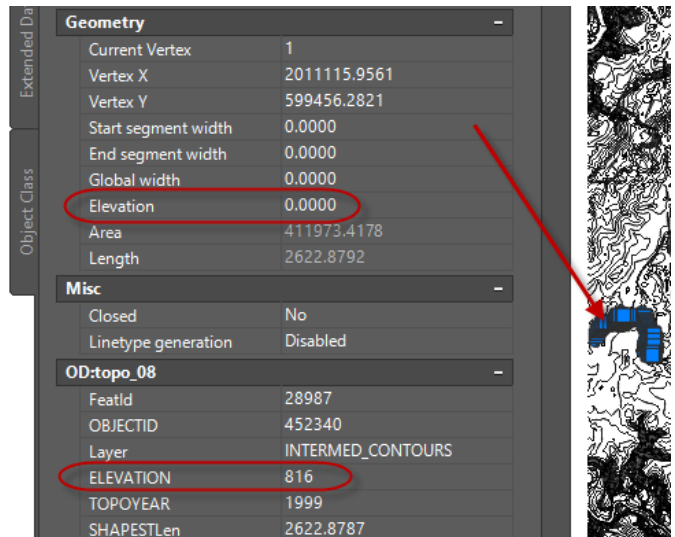


7) The imported data will appear.





- 8) By clicking on any of the lines and reviewing the properties, you will note that the elevation data is in the data table but it is not part of the AutoCAD object geometry and therefore will not be able to generate a Civil 3D Surface.



- 9) Save the drawing and close it.

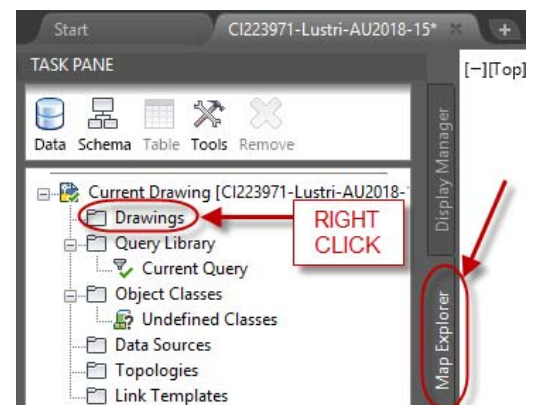
Note that it is important to close the drawing, or the following query steps will not work.

The drawing at this stage of this exercise can be found in [CI223971-Lustri-AU2018-14.dwg](#).

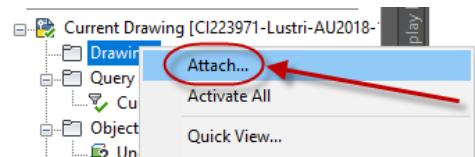
- 10) Start a new drawing and assign a coordinate system or open the following:

Start by opening [CI223971-Lustri-AU2018-15.dwg](#).

- 11) Click on the *Map Explorer* tab of the *Task Pane*.

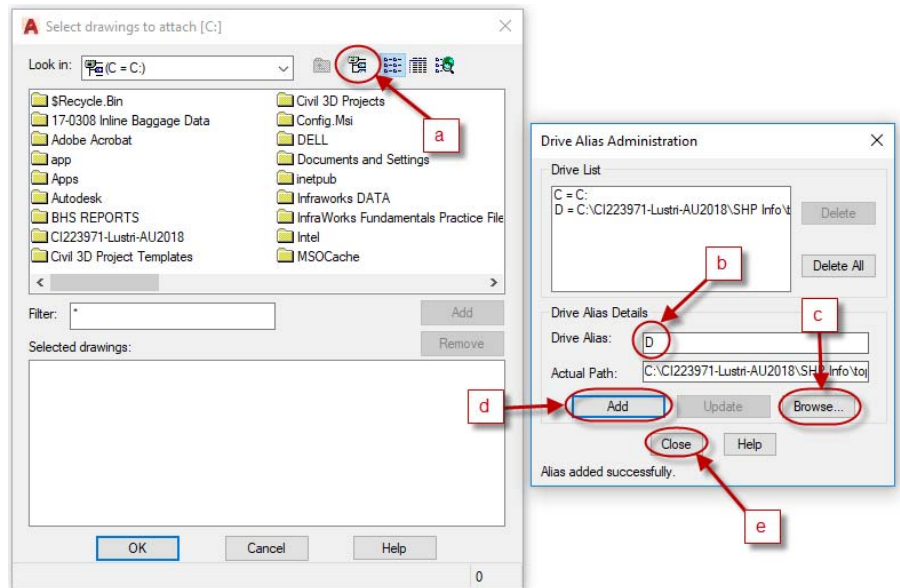


- 12) Right click Drawings and choose Attach.



13) On the Select Drawings to attach dialogue, perform the following steps:

- a. Click the Alias button.
- b. Assign a drive alias letter.
- c. Browse to the folder with the previously saved drawing completed in step 16.
- d. Click Add.
- e. Click Close.

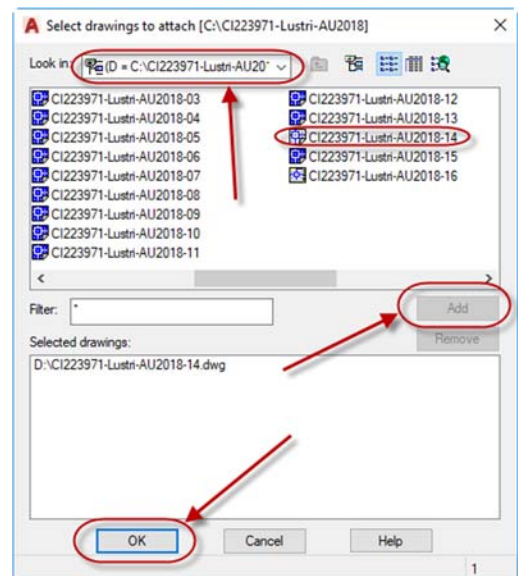


14) Assign the drive alias you just created in the Look in: location.

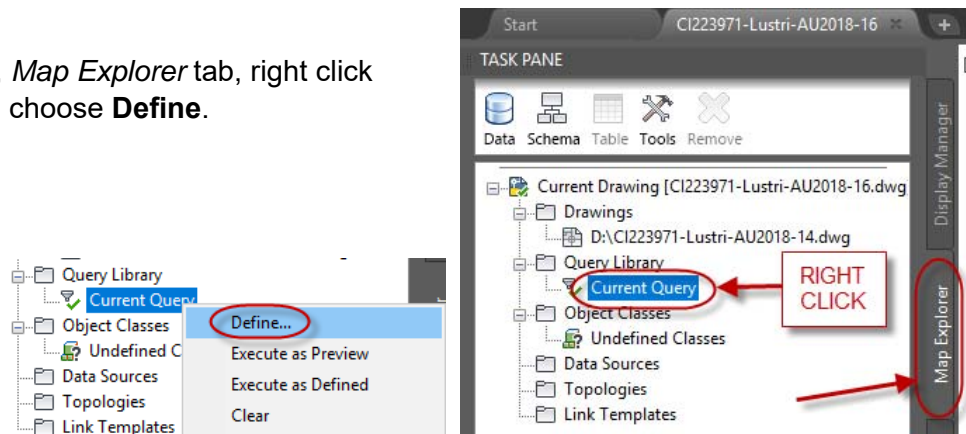
15) Select the file saved from the previous steps, i.e. step 16.

16) Click **Add**.

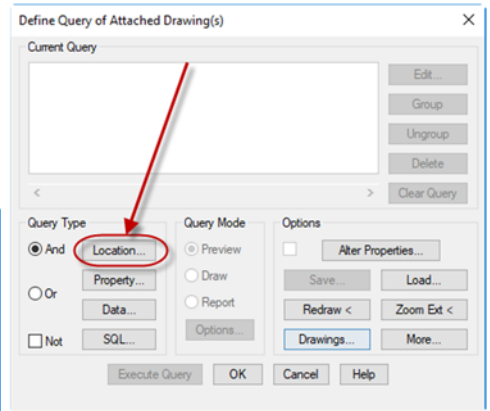
17) Click **OK**.



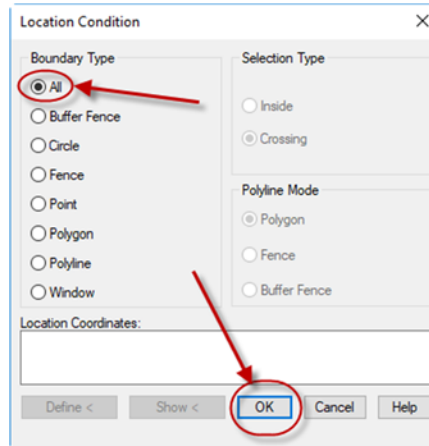
18) On the *Task Pane*, *Map Explorer* tab, right click *Current Query* and choose **Define**.



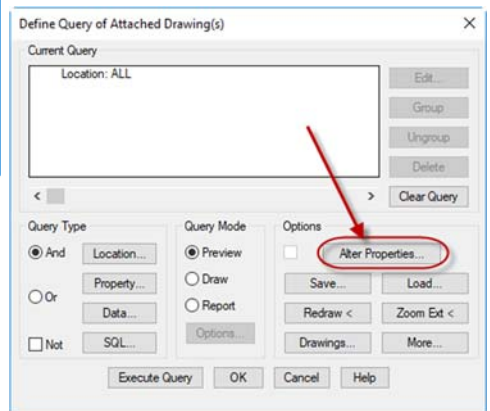
19) In the *Define Query of Attached Drawing(s)* dialogue, query type, choose **Location**.



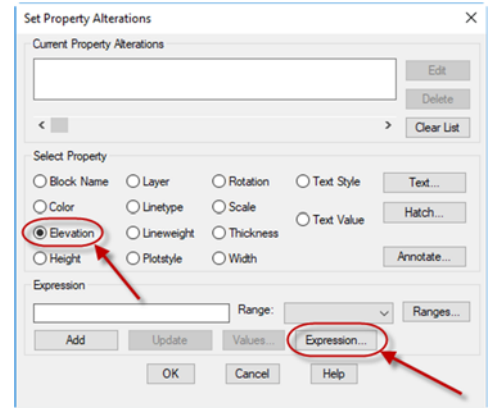
20) Select **All** then click **OK**.



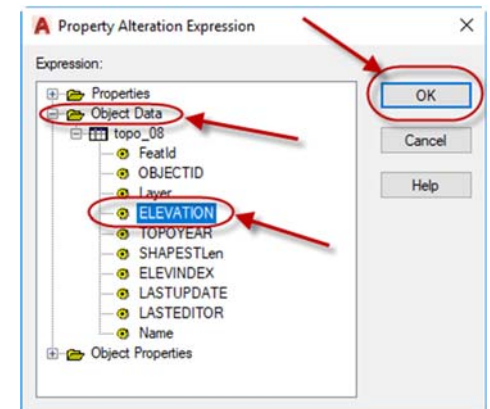
21) In the *Define Query of Attached Drawing(s)* dialogue, *Query Type*, click the **Alter Properties** button.



22) In the *Set Property Alterations* dialogue box. Click **Elevation** and then click the **Expression** button.

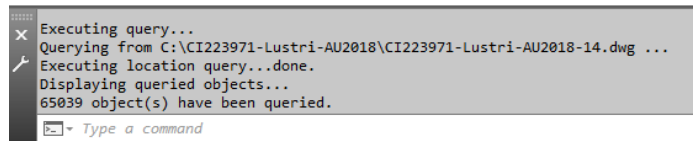
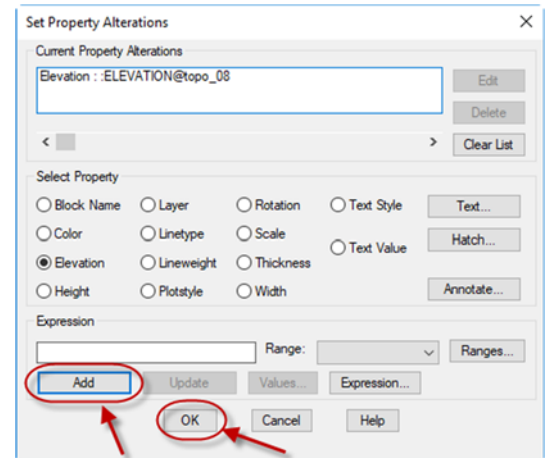
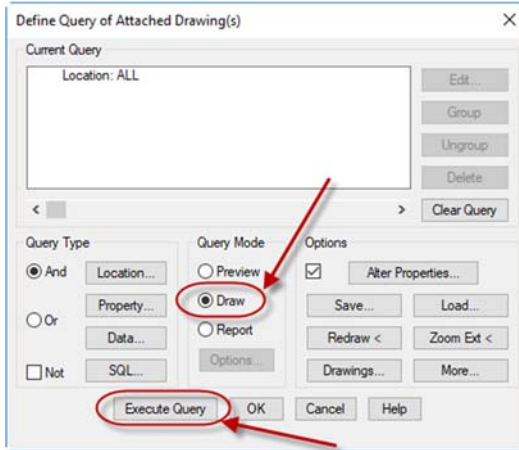


23) In the *Property Alteration Expression* dialogue box, expand **Object Data**, select **Elevation** and then click **OK**.

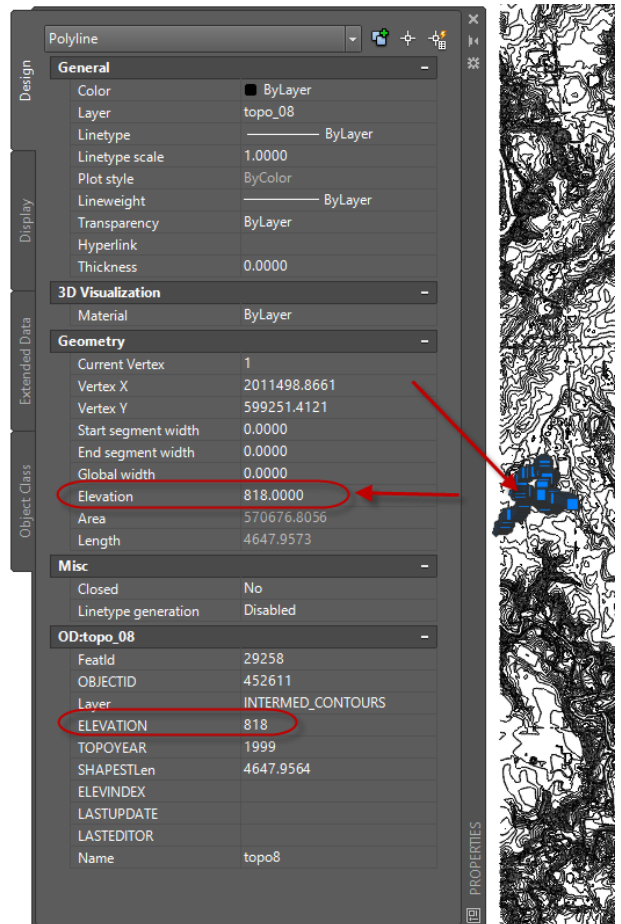


24) Click **Add**. Click **OK**.

25) In the *Define Query of Attached Drawing(s)* dialogue, click the radio button for **Draw** under *Query Mode* and the click **Execute Query**.



26) Perform a Zoom Extents to show the imported data. Click on a line in the drawing and note the properties dialogue box compared to the beginning of this exercise. The Elevation field under Geometry is now populated with the actual elevation. You can now perform the standard Civil 3D Surface Creation steps by adding this CAD data to the surface by Contours.



The drawing at this stage of this exercise can be found in [CI223971-Lustri-AU2018-16.dwg](#).

Q.E.D.