Importing LiDAR Data into AutoCAD Civil 3D

Overview: Use the following processes for importing LiDAR georeferenced data into AutoCAD Civil 3D. LiDAR source data is in X,Y,Z format. (Using Iowa LiDAR data that has been converted to NAD 83 UTM Zone, International feet .)

Software: AutoCAD Civil 3D 2016, Civil 3D Workspace, NRCS C3D 2016 template

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Notation Method
Button to Press *Displayed Text* **Icon** Action {Text to Enter} *Menu Item...*

A. Identify project location and data files needed for the area being worked on.
B. Create the surface within Civil 3D using External Point files

Note: Large files can increase processing time when working across the LAN rather than on the C: drive.

A. Identify project location & data files
1. Within CAD zoom to the area of interest for your project. Insert GPS survey points (See **Importing Survey Point Files** instructions) or a geo-referenced image.

Insert an aerial photo
2. Tool Palette>NRCS 11x17B… Click *Breaklines and Boundaries...DOQ Insertion...* (or use *DRG Insertion* for USGS contour maps images)
3. Set *Files of Type = All Files(*.*)*, Browse to the image file- [Typical source: Iowa Geographic Image server downloaded in conjunction with a geo-referencing file (http://ortho.gis.iastate.edu/).] E.g. *31185.tif* . Or in F:\geodata\ortho_imagery.
4. Checkmark Modify Correlation.
5. Click Open .
6. On the *Source* tab set *Units for Insertion Point* to *Meters*.
7. Click OK . Zoom to Extents by double-clicking the mouse wheel

Display a limited portion of an Image (Optional)
8. Select the image.
9. Click *Image… Clipping… Create Clipping Boundary...*
10. Input {R} for Rectangular. Press Enter
11. Click Upper left corner of your planned image display.
12. Click Lower right corner of your planned image display.
13. Select the image. Right-Click *Display Order… Send to back...*

Use the LiDAR index maps to determine the names of the data files needed for your project.
14. Click *Insert… Reference…Attach...*
15. Browse to the file name: E.g. *P:\CADD Resources\How To\Iowa LiDAR Index Map.dwg*. Click Open .
16. Uncheck All boxes, then Click OK .
17. Once the index map appears with the Tile labels, you can make note of the tiles that you will need for your project.
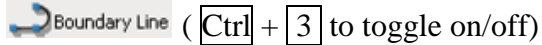
B. Civil 3D Surface Modeling:

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Civil 3D Steps

Draw a boundary for the Surface model

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If you want a limited area for the LiDAR surface model to be created, create a boundary. Use a geo-referenced image or points to help you place the boundary correctly.

18. Tool Palette>NRCS 11x17B… <u>Click</u> *Breaklines and Boundaries...Boundary Line…*
⟨ Boundary Line ⟩ (Ctrl + 3 to toggle on/off)

19. While not snapping to the points, <u>click</u> to draw a border around outside of the survey. (F3 toggles Osnaps on/off.) To close the line cleanly, <u>type</u> {C} and <u>press</u> Enter.

20. In Toolspace> Prospector… *Surfaces... Ognd LiDAR... Definition...*<u>Right click</u> *Boundaries*

21. <u>Click</u> *Add*

22. In the Add Boundaries Box set the Type to *Data Clip*.

23. <u>Click</u> Ok and <u>select</u> the previously drawn boundary line object.

<div align="center">
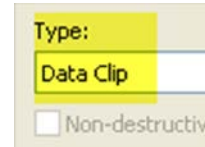
Creating a Surface model for the Original Ground using LiDAR data

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24. Connect the LiDAR Engineering external disk drive to your computer. Some engineering offices have the LiDAR stored on a workstation.

25. In Toolspace> Prospector… *Surfaces... Ognd LiDAR... Definition...*<u>Right click</u> *Point Files*
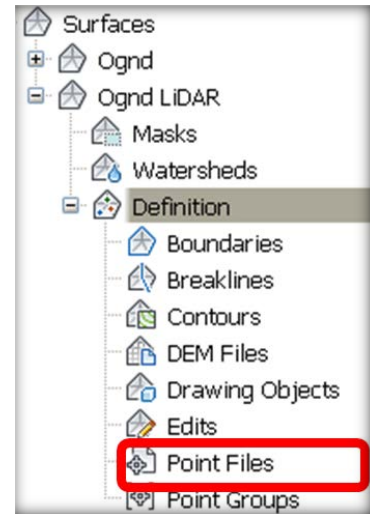
26. <u>Click</u> *Add*

27. In the Add Point File box <u>Pulldown</u> the format to *ENZ (comma delimited)*.

28. <u>Click</u> the Select Source File action ⊞ to find the LiDAR tile

29. <u>Set</u> *Files of Type = All Files(*.*)*, Browse to the LiDAR External Drive and find the file E.g. *\NE07\058004776_UTMif.asc* and <u>click</u> Open

30. (Multiple files can be used. Repeat the previous 2 steps as needed.)

31. <u>Click</u> OK

Note: Patiently wait for the processing messages to disappear below the command line.

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Force contours to stay inside of the boundary

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32. Toolspace> Prospector… *Surfaces... Ognd LiDAR... Definition...*<u>Right click</u> *Boundaries*

33. <u>Click</u> *Add*

34. In the Add Boundaries Box set the Type to *Outer* and <u>uncheckmark</u> *Non-destructive breakline*.

35. <u>Click</u> Ok and <u>select</u> the previously drawn boundary line object.

Reduce the Data size of the LiDAR Surface

36. In Toolspace> Prospector… *Surfaces... Ognd LiDAR... Definition...*Right-click *Edits*
37. Click *Simplify Surface*
38. Select Point Removal….(Notice the numbers of points in region) Click Next
39. Select Use existing surface border…. Click Next
40. Checkmark Percentage of points to remove….Try 90%
41. Checkmark Maximum change in elevation….Try 0.1
42. Click Finish and wait for the dialog box to disappear
43. To see the number of points removed: Toolspace> Prospector… *Surfaces... Ognd LiDAR... Definition...*Click *Edits ...* and look at the description of the edit.

Display the Contour lines in CAD

44. Toolspace> Prospector… *Surfaces...* Right click *Ognd LiDAR...* Click *Surface Properties...*
45. Click the *Information* tab and Set the *Surface Style* to a no smoothing display that you want. E.g. { *Ognd Contours (1 and 5) No Smoothing*}
46. Click OK
47. If the display does not refresh type {rea} and Press Enter
48. If an image is present you may need to send it behind the contours. Select the image. Right-click *Display Order...Send to back...*
49. Review the contours.
50. You can detach the index map now. Click on a line of the *Iowa LiDAR Index Map.dwg* to select it. Right-click *Detach* to detach the map.

Locking a Surface to Protect it
(Highly Recommended)

Lock the surface model once you are satisfied with it.
51. In Toolspace> Prospector… *Surfaces...* Right click *Ognd LiDAR...* Click *Lock...*
52. You can now disconnect the LiDAR Engineering disk drive.

View Statistics about the LiDAR Surface

53. Toolspace> Prospector… *Surfaces...* Right click *Ognd LiDAR...* Click *Surface Properties...*
54. Click the *Statistics* tab and expand the *General, Extended,* and *TIN* details
55. Click OK

Using Corpscon to format Unconverted data (Only needed if files are not in correct units)

1. From Corpscon <u>Click</u> *Convert... Setup...*
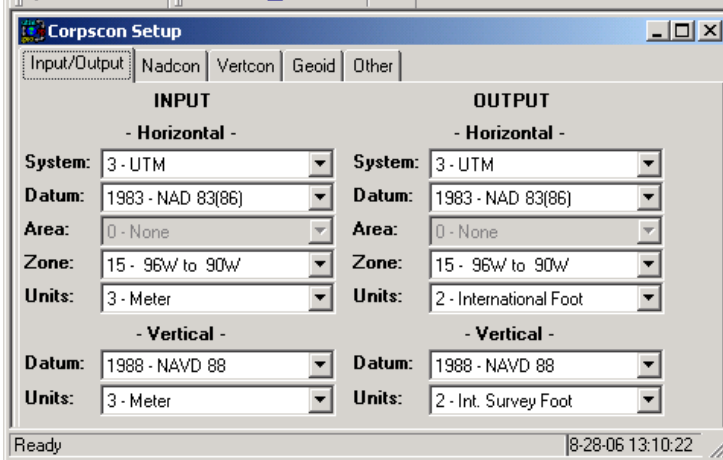
2. Set the input and output coordinate systems
3. <u>Click</u> Ok
4. From Corpscon <u>Click</u> *Convert... User Defined Data File...*
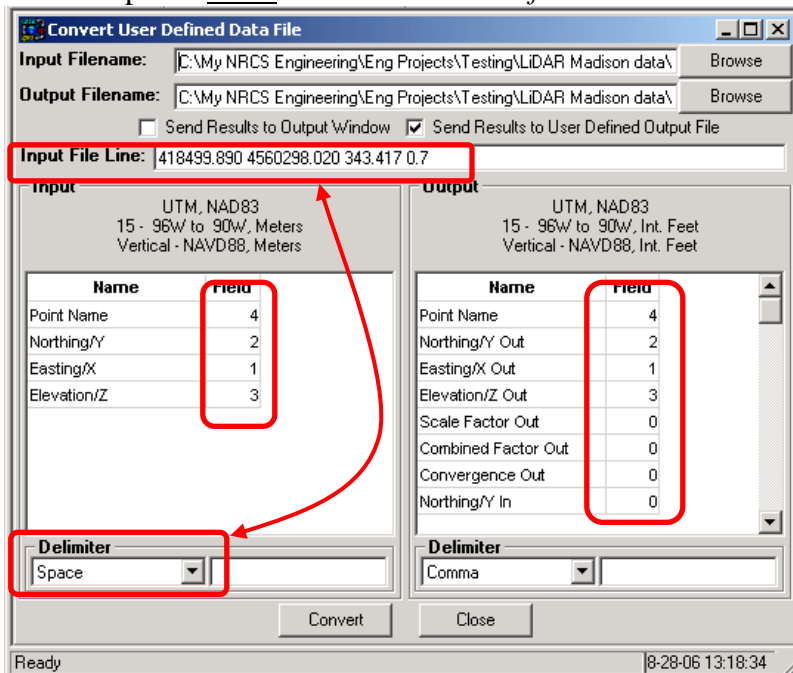
5. <u>Browse</u> to find the Input filename (The file does not need to have a header but can have one.)
6. <u>Browse</u> to set up the Output filename E.g. {*Pt000250 Converted.xyz*} (Saving to the workstation's hard drive will be the fastest)
7. <u>Uncheck</u> *Send Results to Output Window*
8. <u>Check</u> *Send Results to Defined Output File*
9. Set the correct order to the names in the Input & Output by entering the numeric order in the Field. 0 would mean that that item will not get created in the output file.
10. In the ***Input*** section, <u>select</u> the proper delimiter. *(*usually either *Space* or *Comma)* Inspect the **Input File Line** data to view the existing file format.
11. In the ***Output*** section, <u>select</u> the to *Comma*
12. <u>Click</u> Convert