

# Instructions for downloading Iowa 2020 LiDAR LAZ Tiles

## Using LAZ LiDAR Data in AutoCAD Civil 3D

**Overview:** Use 2020 state-wide LiDAR point Cloud tiles in LAZ format. The LAZ tiles can be used in AutoCAD and GIS workflows for creating surface models and other elevation derivatives. (E.g., The Iowa NRCS template uses NAD 83 UTM Zone 15, International feet). LAZ files are maintained by the Iowa NRCS GIS Section and located on a server accessible by USDA eAuthenticated users.

**Software:** AutoCAD Civil 3D 2022, Civil 3D Workspace, NRCS C3D 2022 template, DotSoft LiDAR Tools

### **Notation Method**

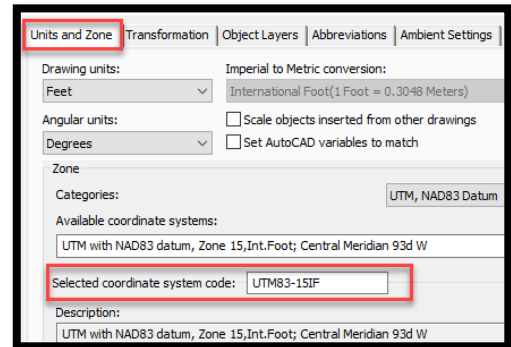
**Button to Press** *Displayed Text* **Icon** Action {Text to Enter} *Menu Item...*

- A. Identify project location and extent of data needed for the area being worked on.
- B. Download LAZ tiles from Iowa Map Viewer.
- C. Create the surface within Civil 3D using LAZ files.

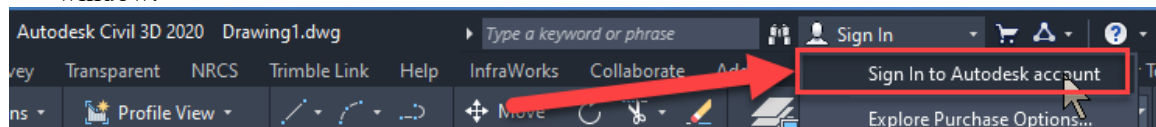
### Prerequisites

#### Set/Verify the Coordinate System and Zone of the drawing

1. Toolspace>Settings... Right click on the current Drawing name...
2. Click *Edit Drawing Settings...* Units and Zone tab
3. Click into the *Selected coordinate system code* and input value  
E.g. {UTM83-15IF} for IA.
4. Click **OK**



5. Within Civil 3D 2022, sign in to Autodesk at the top of window.



The Sign in screen allows the user to **Create Account** if you haven't done so yet.

### **A. Identify project location & extent of LiDAR data needed**

#### Use Survey Points and/or Georeferenced Image to Locate Site


Optional: Insert GNSS survey points (See **Importing Survey Point Files** instructions)

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6. Click *Geolocation... Online Map... Map Aerial...* (or whichever type of map you want to see.) The map should display in your entire drawing area.
7. Zoom to the location that you are working at.

### Draw a boundary for the LiDAR Data limits

Use a geo-referenced image or points to help you place the boundary correctly.

8. Tool Palette>NRCS 11x17B... Click *Breaklines and Boundaries...Boundary Line...*  
 ( Ctrl + 3 ) to toggle Tool Palettes on/off)
9. Click to draw a border around outside of the planned LiDAR boundary limit. **DO NOT** snap to survey points while drawing the border (F3 toggles Osnaps on/off.) To close the line cleanly, type {C} and press Enter.

### Export the proposed LiDAR boundary closed polyline as a Google KML or SHP file

10. Type {Mapexport} Press Enter
11. Pulldown "File of Type" to *Google KML or Esri Shapefile*
12. Browse to the location where you want to save the boundary file.
13. Input a filename for the export. E.g. {OpenRange LBoundary} Click OK
14. From the Selection Tab
  - a) Use *Select Manually & click* **Select Objects**  to pick the lines in CAD. When done selecting items press Enter.
15. From the Option Tab
  - a) Checkmark *Treat Closed Polyline as Polygons*
16. Click OK The processing screen will display the numbers of objects and will disappear once the file has been created.
  - a) If a shapefile is being used, browse to the export folder, select the files associated with the .shp and combine them into a Winzip file. (.dbf, .idx, .iprj, .shp, .shx, etc)

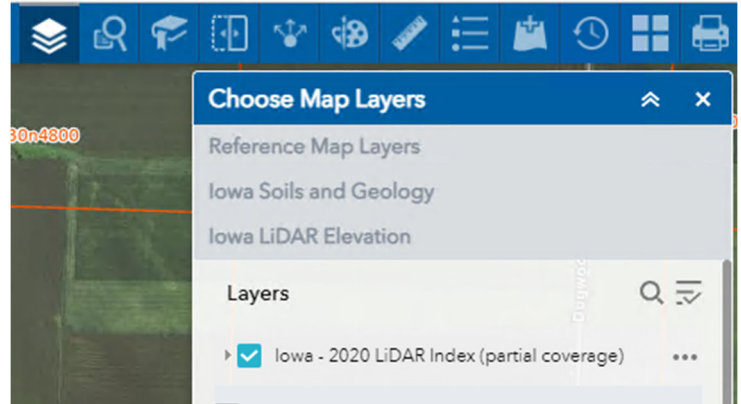
## **B. Download LAZ file from Iowa Map Viewer.**

Iowa Map Viewer for USDA Service Centers

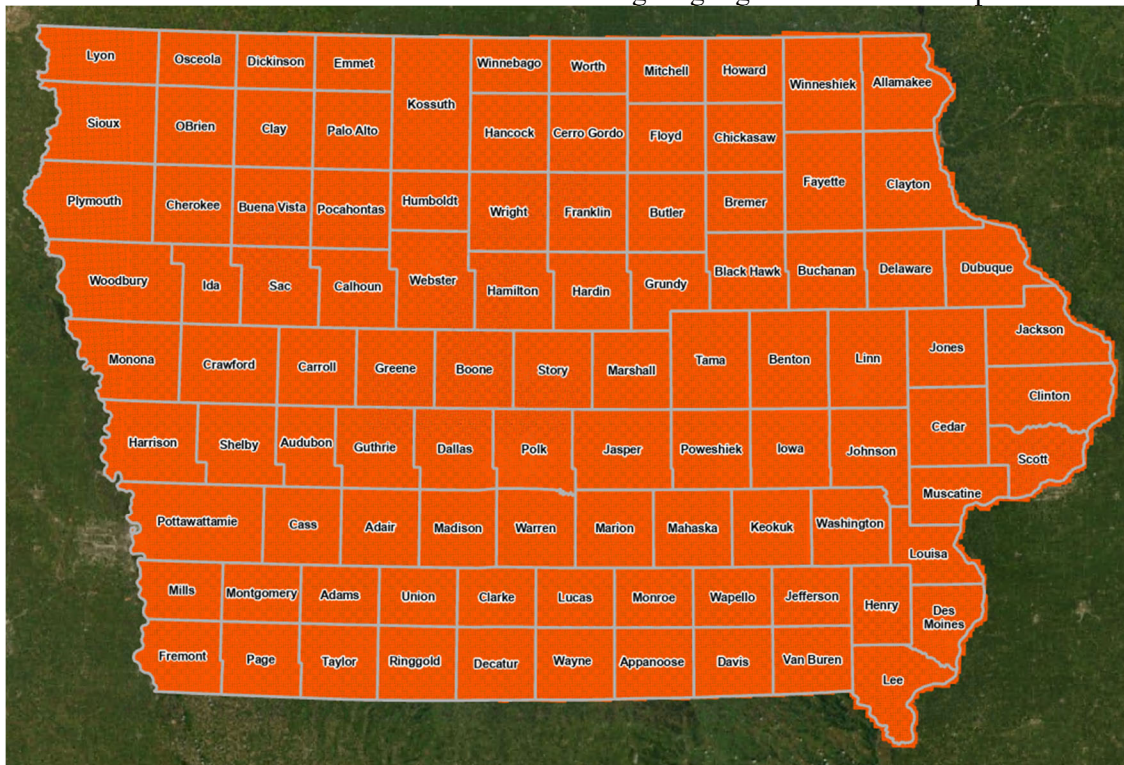
17. Microsoft Edge or Chrome web browser users complete this one-time step. *Note: the Firefox web browser is not supported*
  - a. In the Microsoft Edge or Chrome web browser open this link [Enable local file links - Chrome Web Store \(google.com\)](#)
  - b. Click *Add to Chrome*, when prompted click *Add Extension*
18. Click this link to open the [Iowa Map Viewer for USDA Service Centers](#)

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- a. When prompted, complete the USDA eAuthentication login.
- b. Click the *Choose Map Layers* button in the upper-right corner of the map viewer, under *Iowa LiDAR Elevation*, check-on the *Iowa – 2020 LiDAR Index* layer.
- c. The map viewer will refresh; the index layer will draw once you are zoomed to county-scale or closer. (Follow step 19 for zooming/navigating to a specific area of interest).



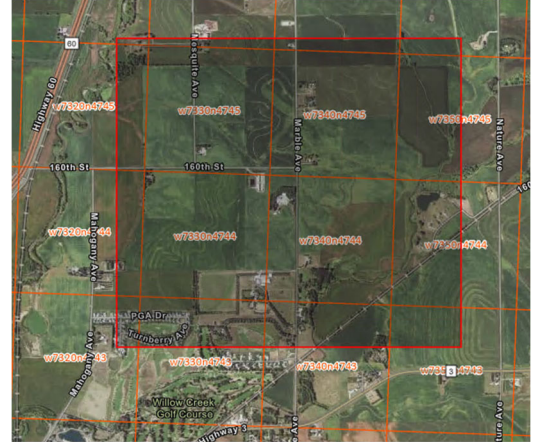
Note: LAZ tiles are available in the orange highlighted area of the map below.



19. Zoom or navigate to an area-of-interest using one of the following options:
- d. Use the mouse wheel or +/- buttons to zoom in/out on the map.

## Instructions for downloading Iowa 2020 LiDAR LAZ Tiles

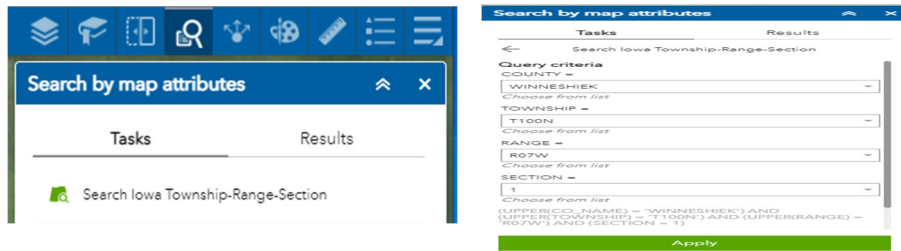
- e. Hold the shift key and click/drag a box on the map.



- f. Click in the *Find address* box and enter an address, town, place name, or coordinates.



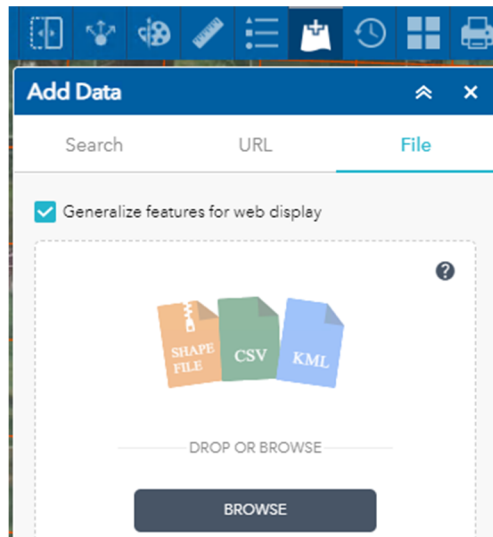
- g. Click the *Search by map attributes* button, click *Search Iowa-Township-Range-Section*, use the picklists for County, Township, Range, Section, click *Apply* to zoom the section.



- h. Click the *Search by map attributes* button, click *Search Iowa - Tracts*, use the picklists to choose Admin County and enter a Tract number, click *Apply* to zoom the tract.

## Instructions for downloading Iowa 2020 LiDAR LAZ Tiles

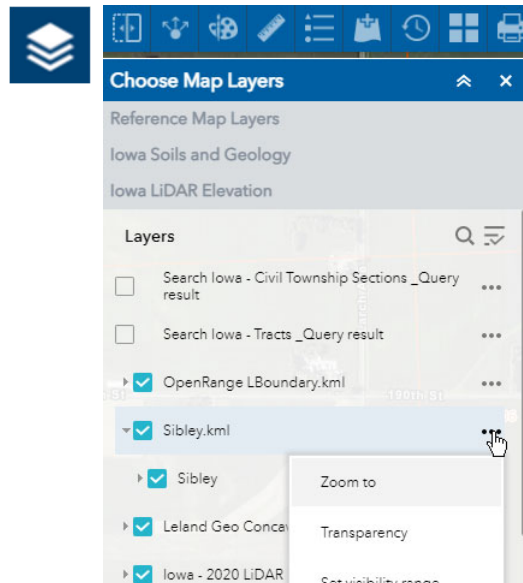
- i. Click the *Add Data* button > File, click Browse to upload a Esri Shapefile (zipped), or Google KML file.



You can drop or browse for one the following file types:

- A Shapefile (.zip, ZIP archive containing all shapefile files)
- A CSV File (.csv, with address or latitude, longitude and comma, semi-colon or tab delimited)
- A KML File (.kml)
- A maximum of 1000 features is allowed

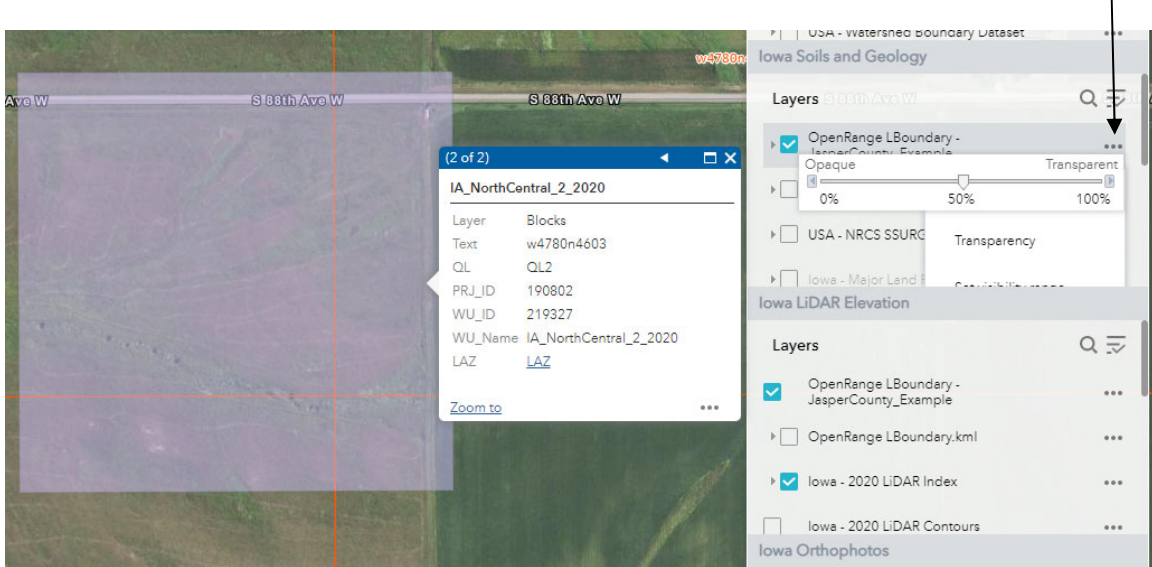
- i. After adding a Esri Shapefile, the map will refresh to the mapped area.
- ii. After adding a Google KML file, click the *Choose Map Layers* button > click the ... icon of the KML layer > *Zoom to*.



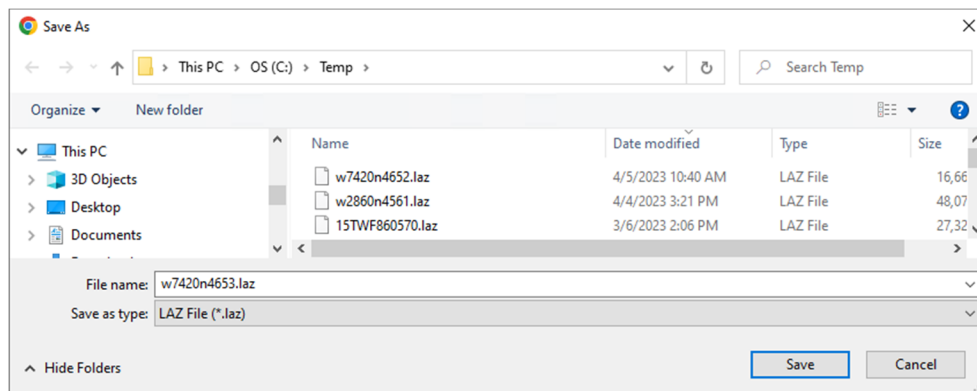
20. Once zoomed to the area-of-interest, click within one of the LiDAR index boundaries; a pop-up window will open showing information about the tile, and a *LAZ* hyperlink.

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21. To allow the imported data file to be transparent. You will need to click on the ... icon of the title of the file, select *Transparency*, and adjust accordingly (E.g. 50%).

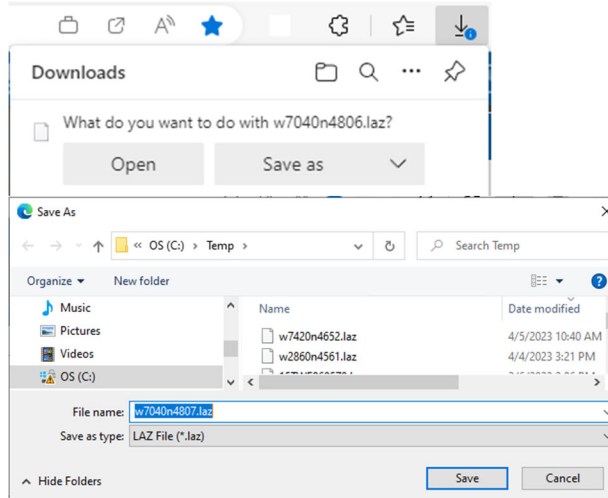


22. **Chrome users**, click the LAZ hyperlink, when prompted navigate to the folder where you want to save the LAZ file > click *Save*. Repeat this step to download any additional tiles for your project area.




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23. **Microsoft Edge users**, click the LAZ hyperlink, a download prompt will open in the upper-right corner of browser window select *Save as*, and then navigate to the folder where you want to save the LAZ file > click *Save*. Repeat this step to download any additional tiles for your project area.

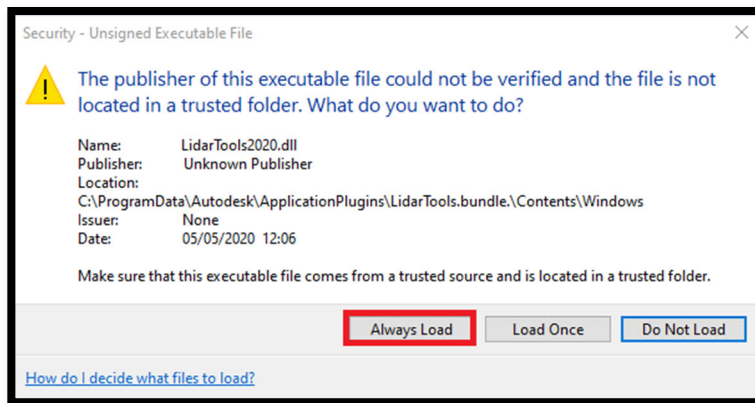


### C. Create the surface within Civil 3D using LAZ files.

Reproject the LAZ Data to the Correct Coordinate System (if needed)

24. Click *Add ins... LiDAR Tools...*  *LiDAR Project...*

**Note:** If you receive this security pop-up, click **Always Load**





25. Browse to the LAZ file that was downloaded. E.g. *w4770n4602.laz*, Click **Open**

**Note:** You can convert multiple files at once.

26. Input the Source File System code E.g. {UTM83-15} Press **Enter**

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27. Using the value of the drawing coordinate system, input the Target File System code E.g. {UTM83-15IF} Press Enter. An LAZ file with the target code included will be created.

	w4770n4602 (UTM83-15IF).laz	5/3/2023 8:06 AM	LAZ File	15,594 KB
	w4770n4602.laz	5/3/2023 7:56 AM	LAZ File	28,525 KB


Reprojected File (pointing to the first row)

Original File (pointing to the second row)

Place the Tile Limits of the LAZ Data into the Drawing

28. Click *Add ins... LiDAR Tools...*  *LiDAR Tiles...*
29. Browse to the LAZ file that was reprojected/downloaded.  
E.g. *lsjob17n5424 (utm83-15if).laz* Click Open
30. At Point Cloud Class Counts Type {N} Press Enter  
A boundary around the limits of the LiDAR Data will appear. Compare this to the Georeference map to make sure the coordinate systems are in sync.

Create the LiDAR Surface from the LAZ Data

31. Click *Add ins... LiDAR Tools...*  *Create LiDAR Tin...*
32. Browse to the LAZ file that was reprojected/downloaded.  
E.g. *lsjob17n5424 (utm83-15if).laz* (you can select multiple at once)
33. Click Open
34. At Classes Counts Type {2} Press Enter
35. At First Corner click outside of lower left corner of tile rectangle
36. At Other Corner click outside of upper right corner of tile rectangle.  
**Note:** Patiently wait for the message to disappear below the command line.  
A boundary of the LiDAR Surface will appear. The surface will appear in Toolspace with a name in the format of YYYYMMDDxxxxxxxx.

Rename the surface:

37. Select the surface in the drawing. Right click... *Surface Properties... Information...*
38. Input new name: {Ognd LiDAR LAZ}. Click Ok.

Force contours to stay inside of the boundary

- If a concave boundary was used contours that extend past the boundary can be eliminated.
39. Toolspace> Prospector... *Surfaces... Ognd LiDAR LAZ... Definition...* Right click *Boundaries*
40. Click *Add*
41. In the Add Boundaries Box set the Type to *Outer* and uncheckmark *Non-destructive breakline*.
42. Click Ok and select the previously drawn boundary line object.

Reduce the Data size of the LiDAR Surface

43. In Toolspace> Prospector... *Surfaces... Ognd LiDAR LAZ... Definition...* Right-click *Edits*
44. Click *Simplify Surface*

How to download  
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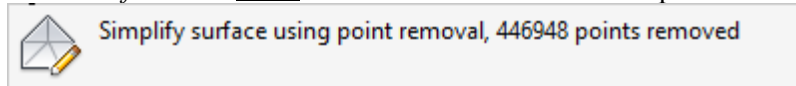


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45. Select Point Removal... (Notice the numbers of points in region) Click Next
46. Select Use existing surface border... Click Next
47. Checkmark Percentage of points to remove... Try 90%
48. Checkmark Maximum change in elevation... Try 0.1
49. Click Finish and wait for the dialog box to disappear



50. To see the number of points removed: Toolspace> Prospector... *Surfaces...* *Ognd LiDAR LAZ...* *Definition...* Click *Edits ...* and look at the description of the edit.



The information is also found on the *Surface Properties...* *Definition* tab.

### Display the Contour lines in CAD

51. Toolspace> Prospector... *Surfaces...* Right click *Ognd LiDAR LAZ...* Click *Surface Properties...*
52. Click the *Information* tab and Set the *Surface Style* to a no smoothing display that you want. E.g. *Ognd Contours (2 and 10) No Smoothing*
53. Click OK
54. If the display does not refresh type {rea} and Press Enter
55. If not all contours display while zooming in and out you can turn off Level of Detail by typing {LEVELOFDetailedOff} Press Enter.
56. If an image is present you may need to send it behind the contours. Select the image. Right-click *Display Order...Send to back...*
57. Review the contours.

### Locking a Surface to Protect it **(Highly Recommended)**

Lock the surface model once you are satisfied with it.

58. In Toolspace> Prospector... *Surfaces...* Right click *Ognd LiDAR LAZ...* Click *Lock...*

### View Statistics about the LiDAR Surface

59. Toolspace> Prospector... *Surfaces...* Right click *Ognd LiDAR LAZ...* Click *Surface Properties...*
60. Click the *Statistics* tab and expand the *General*, *Extended*, and *TIN* details
61. Click OK