



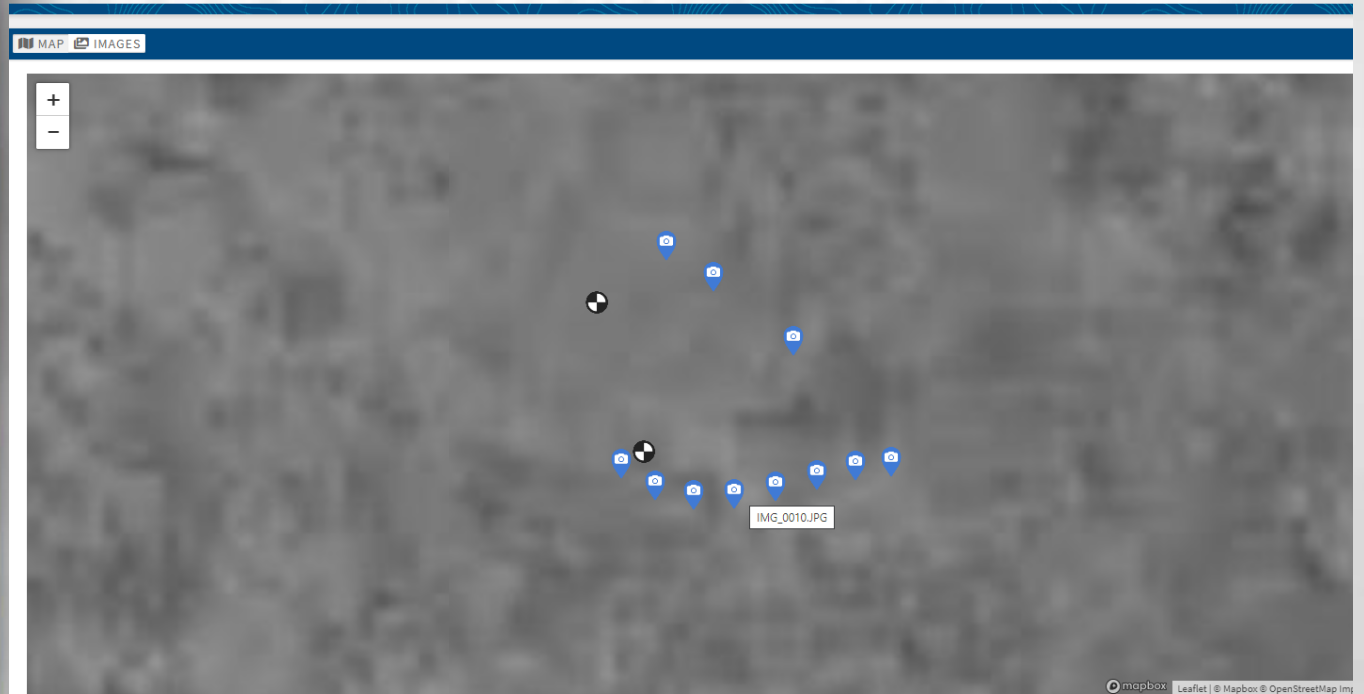
**Carlson**<sup>®</sup>  
BREAK NEW GROUND

# Carlson PhotoCapture – output products review

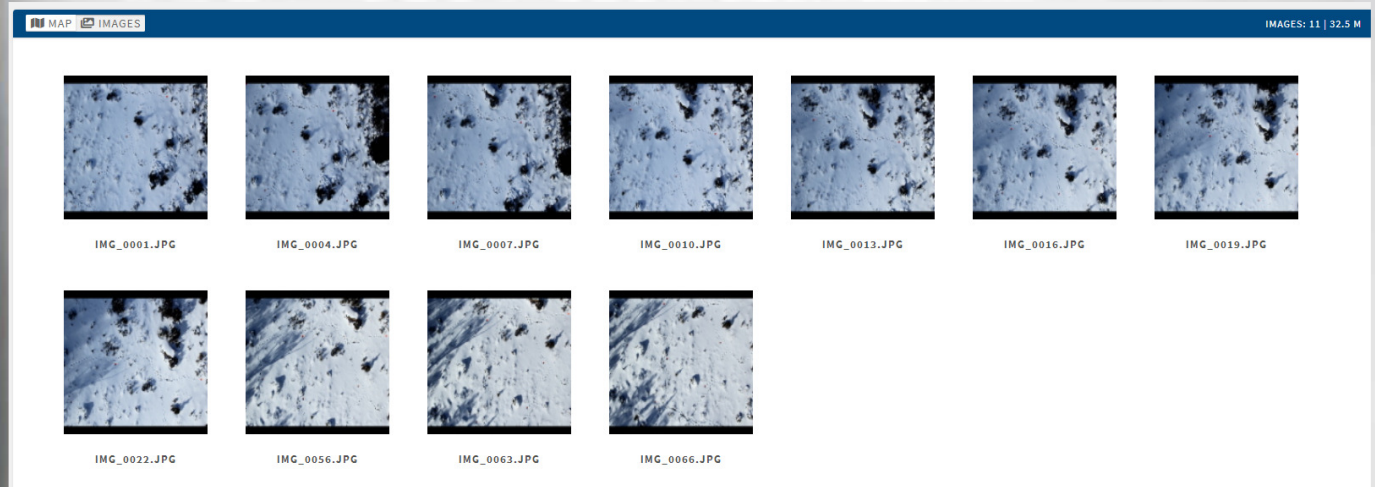
After final processing, view and download desired products

IMAGE UPLOAD	<a href="#">VIEW</a>		05/28/19 09:56AM
BUNDLE ADJUSTMENT	<a href="#">VIEW</a>	<a href="#">DOWNLOAD</a>	05/28/19 09:56AM
DENSE POINT CLOUD	<a href="#">VIEW</a>	<a href="#">DOWNLOAD</a>	05/28/19 10:31AM
SURFACE MODEL	<a href="#">VIEW</a>	<a href="#">DOWNLOAD</a>	05/28/19 10:31AM
DIGITAL ELEVATION MODEL	<a href="#">VIEW</a>	<a href="#">DOWNLOAD</a>	05/28/19 10:31AM
ORTHOIMAGE	<a href="#">VIEW</a>	<a href="#">DOWNLOAD</a>	05/28/19 10:31AM
PROJECT REPORT		<a href="#">DOWNLOAD</a>	05/28/19 10:31AM

**Image Upload can be reviewed by clicking the View button. This takes you to the Map View. Placing the cursor over an image or Ground Control Point reveals the name.**



At the top left of the Map View, click Images to change to the image thumbnails



Clicking an image loads it with it's EXIF information

Sensor		IMG_0007.JPG		GPS	
Make	CANON	Size	2.9 M	Latitude	-42.685735
Model	EOS 550D	Height	3456px	Longitude	146.594870
Type	Digital Camera	Width	5184px	Altitude	1,043.278997
<a href="#">Download</a>					

## Bundle Adjustment View - Sparse Point Cloud

Click the View Button next to Bundle Adjustment to load the Sparse Point Cloud. Use this to determine the accuracy of your cloud. Click on a GCP on the left and view the best fit of the error in the lower left. The GCPs are green, yellow or red depending on the size of the error. Clicking on a GCP shows blue lines from all images seeing a particular GCP. Clicking on an image to view it. Click on the image icon next to a GCP to see all images that see a GCP. Note that this screen always displays metric units.

In PhotoCapture viewers – Left click and hold to pan, right-click and hold to spin and rotate. Mouse zoom wheel moves closer or further away.

The screenshot displays the PhotoCapture software interface. On the left, a panel titled "Ground Control Points" lists points 148, 150, 152, 154, 166, and 174. Point 174 is selected and highlighted in blue. Below this panel, a green box shows "GCP Error" with values: dX: -0.050m, dY: 0.050m, and dZ: -0.030m, accompanied by a green checkmark. The central 3D view shows a sparse point cloud of a terrain with blue lines radiating from a point, representing camera frustums. On the right, a "Display Controls" panel includes checkboxes for "2D Orthographic View", "Show Drones", "Show Camera Frustums", "Show Camera Positions", "Show Ground Points", "Show GCPs", "Show LandXML", and "Show Labels". Below these is a "Ground Point Size" slider and an "IMPORT LANDXML" button.



# Bundle Adjustment View - Sparse Point Cloud

Turn the visibility of drones, points, camera frustrums, camera positions, gcps, labels and LandXML files. Import a LandXML containing points and linework to help find an error. Maybe an image saw 2 GCPs and you chose the wrong one or the wrong corner of a sidewalk was chosen – the LandXML may show you where a mistake was made.

**Ground Control Points**

- 8(LEWIS CLARK)
- 9(90 DEGREE CORNER B...)
- 10(CORNER BY PROPELER)
- 11(CORNER BY USBANK ...)
- 12(CORNER BY FRENCH ...)

**Display Controls**

- 2D Orthographic View
- Show Drones
- Show Camera Frustums
- Show Camera Positions
- Show Ground Points
- Show GCPs
- Show LandXML
- Show Labels

Ground Point Size

**GCP Error**

dX: 0.041m  
dY: -0.043m  
dZ: -0.022m

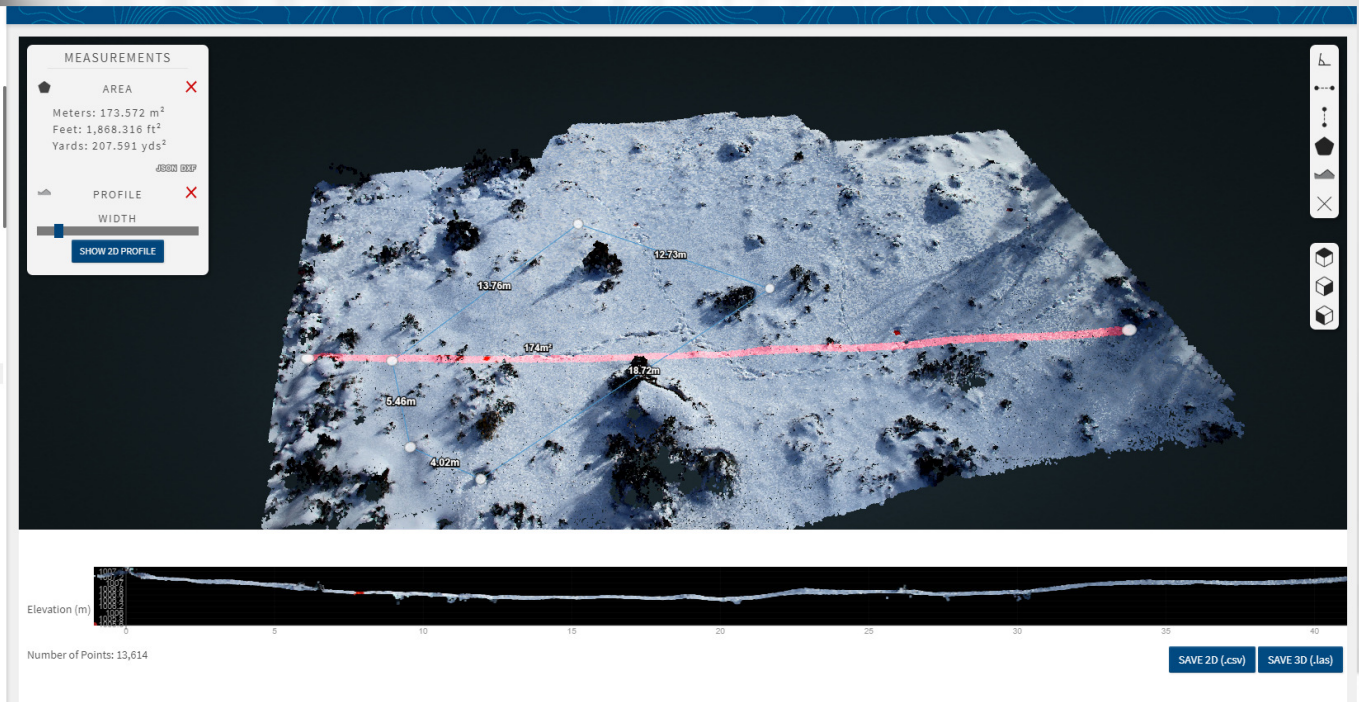
# Bundle Adjustment View - Detailed Report

Clicking the Download button will download a detailed report with statistics for the job and variances for each image as well as Ground Control Points. This report is always in metric units. Most users prefer the Project Report but this may help to find GCP survey or selection errors.

```
# herein.
# .....
#
# The camera make and model is:
# .....
# Radial Distortion (units in inverse focal length) k1-k3: 0.0075, -0.0166, 0.0156
# tangential Distortion (units in inverse focal length) t1,t2: 0.0002, 0.0014
# .....
# Focal Length (units in pixels): 3672.3
# Focal Length (units in mm): 8.8503
# .....
# Principal Point Offset (units in pixels) xo,yo: 20.86, 0.89
# Principal Point Offset (units in mm) xo,yo: 0.0583 0.0022
# .....
# Mean Residual of Bundle Adjustment (units in pixels): 0.30
# Average GSD of project in meters: 0.009
# .....
# .....
# ..... Adjusted Camera Parameters .....
# .....
# .....
# Image, Lat, Lon, Ht, Omega, Phi, Kappa, Xo, Yo, Zo, Xa, Ya, Za, dX, dY, dZ
DJI_0474.JPG, -36.95861620, 175.01635990, 149.015, 38.49356549, -32.58780612, -41.45125722, 422458.411, 791215.722, 148.675, 422458.076, 791215.811, 149.015, -0.335, 0.089, 0.339
DJI_0475.JPG, -36.95859728, 175.01639015, 149.284, 38.88268129, -33.06011759, -41.12301891, 422461.078, 791217.792, 148.975, 422460.775, 791217.902, 149.284, -0.304, 0.110, 0.309
DJI_0476.JPG, -36.95855514, 175.01646045, 149.233, 39.04327647, -33.34357334, -40.65250437, 422467.379, 791222.572, 149.075, 422467.048, 791222.563, 149.233, -0.331, -0.009, 0.158
DJI_0477.JPG, -36.95850417, 175.01654442, 149.178, 38.83666079, -33.64171202, -40.50191012, 422474.840, 791228.270, 148.975, 422474.540, 791228.199, 149.178, -0.300, -0.071, 0.203
DJI_0478.JPG, -36.95844457, 175.01664146, 149.139, 38.50999151, -33.82682020, -40.41485908, 422483.468, 791234.899, 149.075, 422483.199, 791234.789, 149.139, -0.269, -0.110, 0.064
DJI_0479.JPG, -36.95840081, 175.01671459, 149.127, 38.31903118, -33.79777864, -40.19600702, 422489.954, 791239.697, 148.775, 422489.724, 791239.628, 149.127, -0.230, -0.068, 0.352
DJI_0480.JPG, -36.95844340, 175.01675891, 149.353, 37.78592237, -34.32408152, -40.78384907, 422493.751, 791234.767, 149.175, 422493.658, 791234.891, 149.353, -0.092, 0.124, 0.178
DJI_0481.JPG, -36.95844373, 175.01670519, 148.926, 37.60968963, -34.34961413, -40.53181585, 422489.021, 791234.764, 149.075, 422488.875, 791234.868, 148.926, -0.146, 0.104, -0.149
DJI_0482.JPG, -36.95850444, 175.01659323, 148.743, 37.15892360, -34.62949511, -41.10295433, 422478.935, 791227.942, 148.875, 422478.887, 791228.157, 148.743, -0.049, 0.215, -0.132
DJI_0483.JPG, -36.95856994, 175.01648016, 148.829, 37.09143340, -34.59462838, -40.99197778, 422468.821, 791220.672, 148.575, 422468.799, 791220.916, 148.829, -0.022, 0.243, 0.253
DJI_0484.JPG, -36.95863638, 175.01636755, 149.200, 36.99454090, -34.63163982, -40.9805284, 422458.620, 791213.437, 148.875, 422458.751, 791213.569, 149.200, 0.130, 0.132, 0.322
DJI_0485.JPG, -36.95867531, 175.01641130, 149.098, 36.86856527, -34.84885595, -40.75051333, 422462.624, 791209.324, 148.875, 422462.635, 791209.239, 149.098, 0.011, -0.085, 0.222
DJI_0486.JPG, -36.95864340, 175.01646414, 148.923, 37.12007106, -34.55981303, -40.17935368, 422467.341, 791212.872, 148.975, 422467.350, 791212.767, 148.923, 0.009, -0.104, -0.064
DJI_0487.JPG, -36.95860453, 175.01652912, 148.711, 37.00059934, -34.64422153, -40.23157893, 422473.113, 791217.190, 148.775, 422473.148, 791217.066, 148.711, 0.035, -0.121, -0.064
DJI_0488.JPG, -36.95855594, 175.01660879, 148.653, 36.96095175, -34.65512414, -40.17749998, 422480.178, 791222.560, 148.675, 422480.257, 791222.438, 148.653, 0.080, -0.121, -0.023
DJI_0489.JPG, -36.95850518, 175.01669093, 148.661, 36.68878591, -34.86775996, -40.43856001, 422487.475, 791228.153, 148.775, 422487.587, 791228.052, 148.661, 0.112, -0.102, -0.114
DJI_0490.JPG, -36.95845981, 175.01676333, 148.636, 36.61497437, -34.90051959, -40.40673252, 422493.934, 791233.127, 148.775, 422494.047, 791233.070, 148.636, 0.113, -0.057, -0.139
DJI_0491.JPG, -36.95851275, 175.01682318, 149.042, 36.37361362, -35.16412648, -40.38089285, 422499.656, 791227.437, 148.875, 422499.362, 791227.180, 149.042, -0.294, -0.256, 0.166
DJI_0492.JPG, -36.95854021, 175.01677835, 149.130, 36.33196204, -35.04460596, -40.24355190, 422495.588, 791224.359, 148.975, 422495.362, 791224.144, 149.130, -0.227, -0.215, 0.155
DJI_0493.JPG, -36.95860410, 175.01667742, 149.062, 35.94778582, -35.38382470, -40.75321570, 422486.625, 791217.296, 149.075, 422486.354, 791217.078, 149.062, -0.270, -0.218, -0.013
DJI_0494.JPG, -36.95869557, 175.01653070, 149.072, 35.77513527, -35.41608958, -40.85990809, 422473.423, 791206.996, 148.975, 422473.262, 791206.963, 149.072, -0.161, -0.033, 0.097
DJI_0495.JPG, -36.95870427, 175.01638602, 149.278, 35.94510198, -35.30073679, -40.49028000, 422460.623, 791197.203, 148.975, 422460.352, 791197.154, 149.278, -0.271, -0.049, 0.302
# .....
# .....
# ..... Adjusted Ground Control .....
# .....
# .....
# Lat, Lon, Ht, X, Y, Z, dX, dY, dZ
-36.95837690, 175.01691761, 118.601, 422507.810, 791242.233, 118.601, -0.01725882, -0.02066090, 0.02114722
-36.95832086, 175.01686572, 118.763, 422503.206, 791248.464, 118.763, -0.02888952, -0.02064100, 0.06907357
-36.95829913, 175.01673278, 118.467, 422491.374, 791250.906, 118.467, 0.01224964, 0.02285370, -0.02653405
```

# Dense Point Cloud View

Clicking the View button loads the Dense Point Cloud Viewer. The toolbars on the right allow for angular, horizontal, and vertical measurements. You may also draw an Area polygon or a Profile polyline. X deletes all measurements and the profile. Right-click to end an Area polygon or a Profile polyline. There are also Top, Front and Side view buttons on the right, which can then be rotated away from by holding a right-click and moving the mouse as usual.

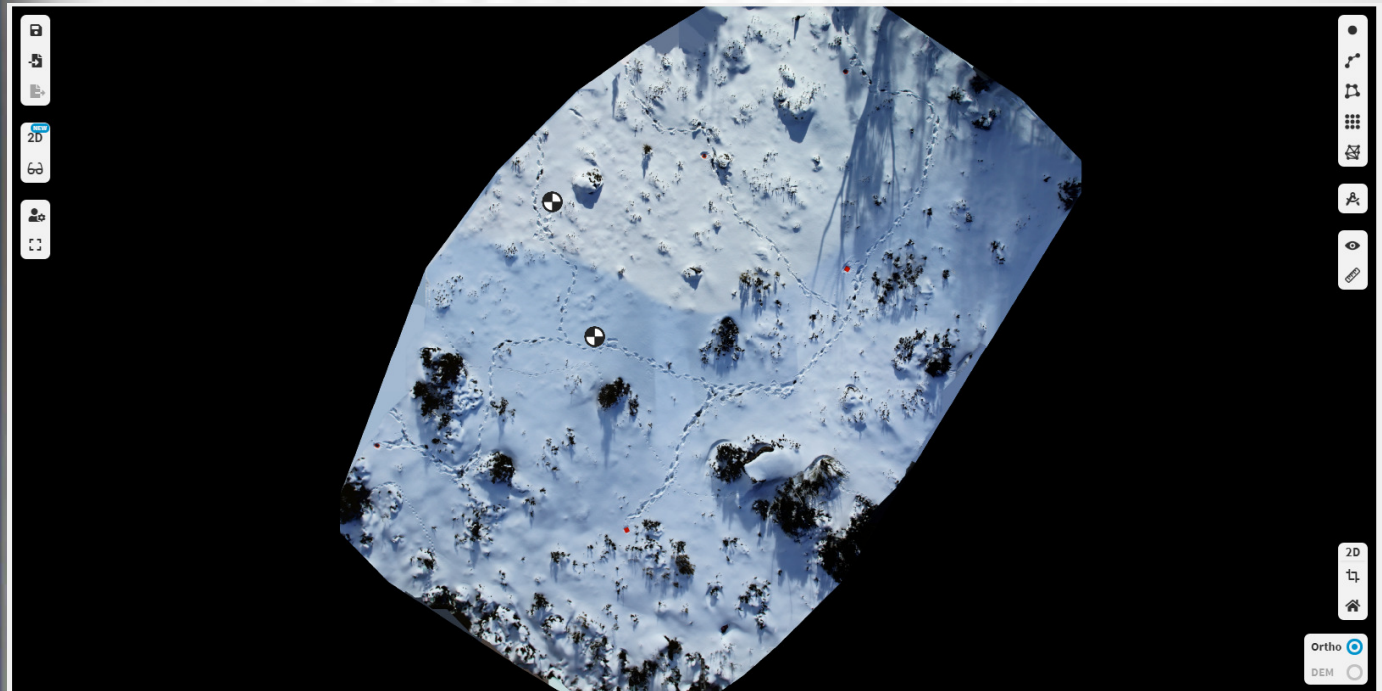




# Surface Model, Orthoimage & DEM

## The Survey Canvas

Regardless of whether you click View to see the Orthoimage, the Digital Elevation Model or the Surface Model, you enter the Survey Canvas, a powerful tool for virtually surveying your project. Here view Orthoimage was clicked. Note that you see 2D on a left toolbar and Ortho is marked in blue in the lower right



# Surface Model, Orthoimage & DEM

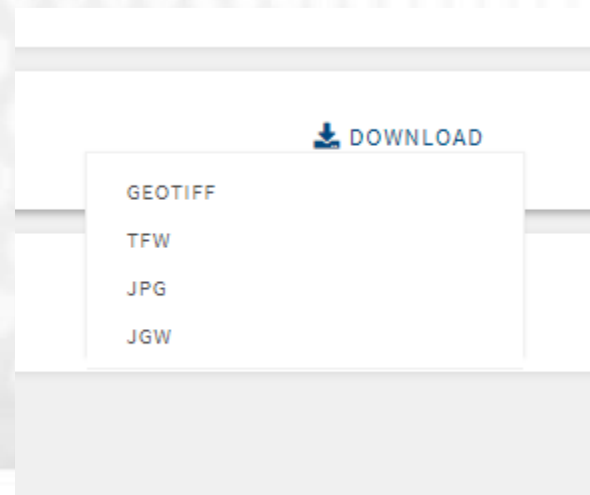
## The Survey Canvas

However, when you click Download, you get different products

Surface Model Download presents an OBJ file of the surface

Digital Elevation Model Download presents a 3D GeoTiff with associated World file (TFW) and 2D JPG file colorized by elevation with associated World file (JGW). World files geolocate images.




Orthoimage Download presents a 2D GeoTiff with associated World file (TFW) and a 2D JPG with associated World file (JGW). Both formats are colorized from the images. Geotiff files are much larger but do not have the black background that cannot be removed from the JPG format

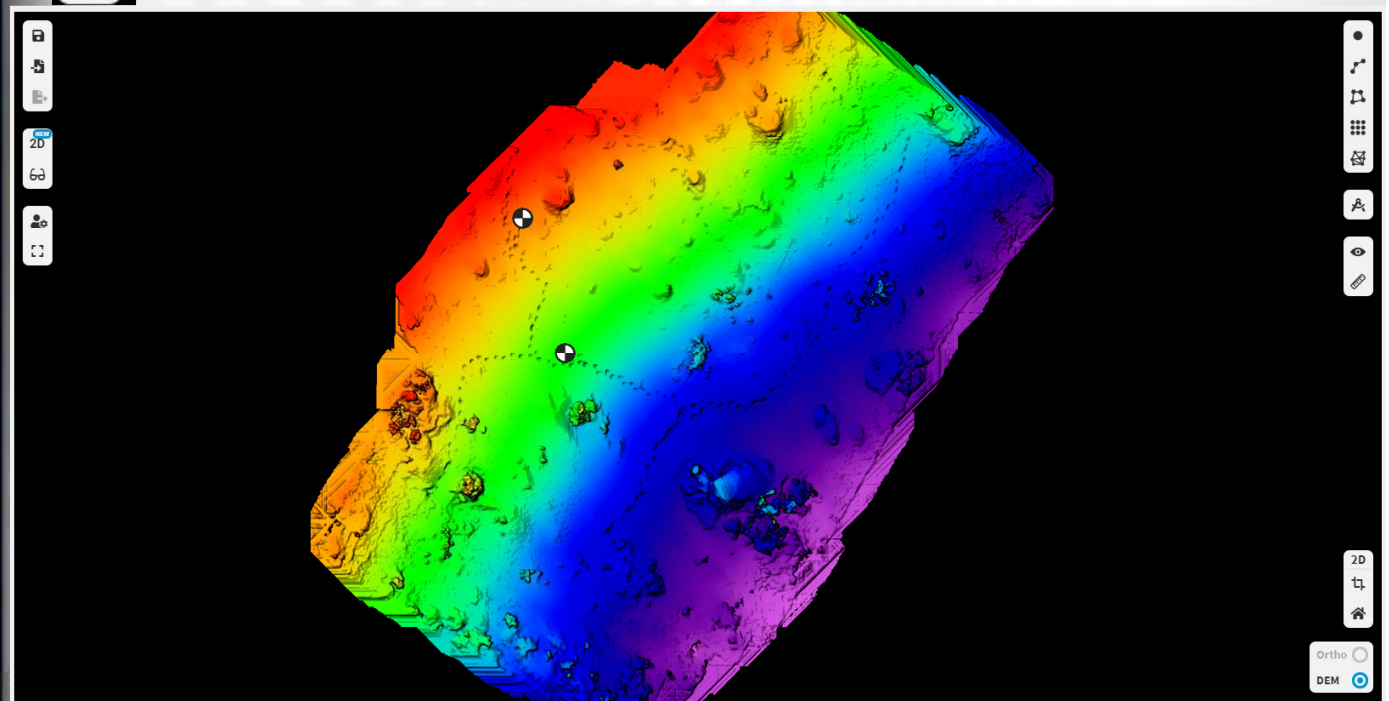


# Surface Model, Orthoimage & DEM

## The Survey Canvas

Here the DEM has been selected in the lower right and we are still in 2D mode

-  Saves your work in the Survey Canvas
-  Imports Carlson CRD, CRDB, DXF, LandXML, SHP or Text files
-  Exports your work in any of the formats listed above



# Surface Model, Orthoimage & DEM

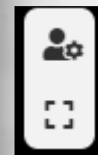
## The Survey Canvas

Continuing down the left side



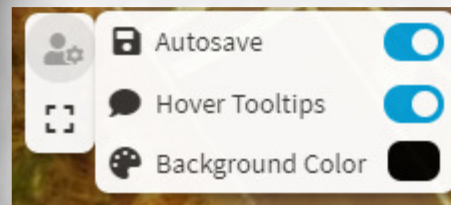
Clicking here allows 2D, 2D/3D split screen, 2D/3D tiled and 3D only

This launches the Stereo Pair tool. The tool uses a pair of 2D images to determine 3D information. Tool use is explained later in this manual



Additional Configuration Settings

Full Screen Toggle



For large surfaces, turn this off

Very helpful for newer users

Change background color as desired

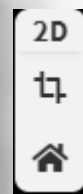


# Surface Model, Orthoimage & DEM

## The Survey Canvas

On the right side of the screen

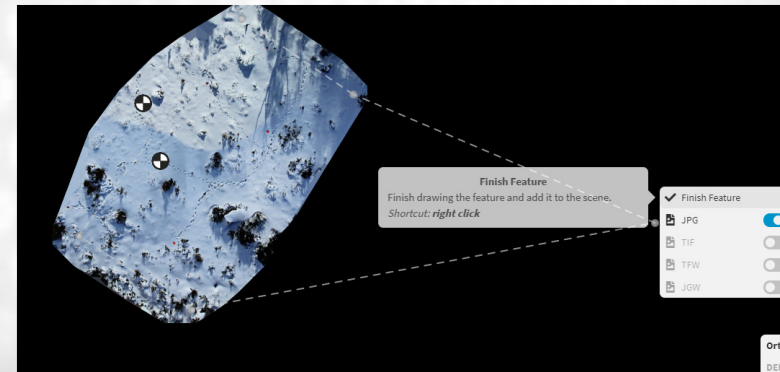
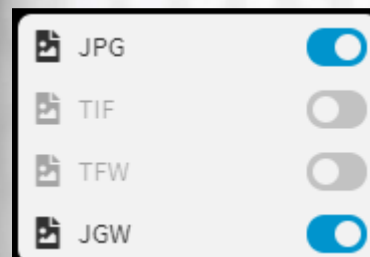
If you are in 2D mode, you will see this



This allows the cropping of the orthoimage

Zooms to the original position

When the Crop is selected, the file selection dialog is presented. Once you start drawing Finish Command appears at the top. Once you have surrounded your area of interest, finish the last segment with Finish Command and files will download



# Surface Model, Orthoimage & DEM

## The Survey Canvas

On the right side of the screen

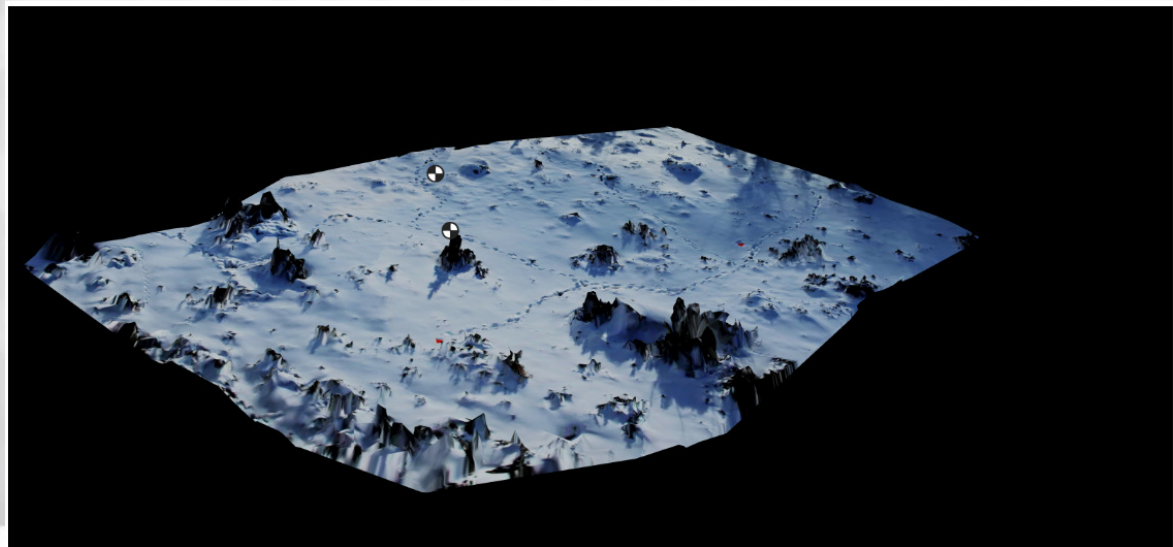
If you are in 3D mode, you will see this



This creates a PNG screenshot of your window without the toolbars

Zooms to the original position

File downloads after creation – change background color with Additional Settings



# Surface Model, Orthoimage & DEM

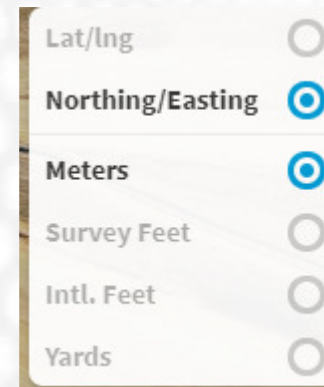
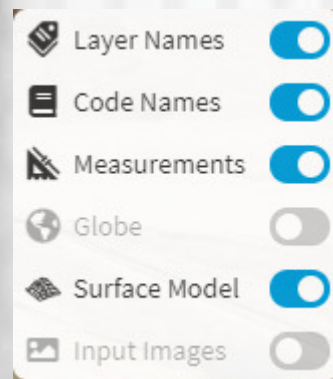
## The Survey Canvas

On the right side of the screen



Toggles the visibility of entities on the Canvas

Allows changing the units on the display – does not change the output which is controlled by the Output Projection set during Creation

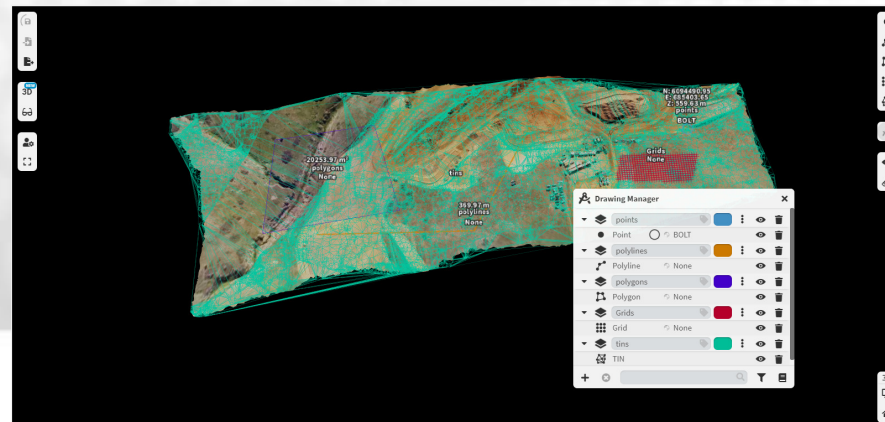


# Surface Model, Orthoimage & DEM

## The Survey Canvas

On the right side of the screen

- Creates points on surface or image in 2D or 3D modes
- Creates polylines in 2D or 3D modes
- ▭ Creates a closed polyline. Calculates areas/volumes in 2D or 3D modes
- Creates a grid in 3D mode
- △ Creates a triangulation in 3D mode of entire surface or selected area
- 🔧 Drawing Manager manages all of the entities listed above.





# Surface Model, Orthoimage & DEM

## The Survey Canvas – Drawing Manager

All layers are listed in the Drawing Manager. All entities associated with a layer are listed individually under that layer. Use the down arrow next to the layer to show or hide the entities under a layer.

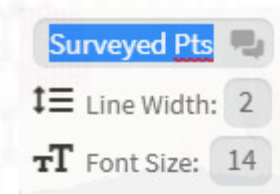
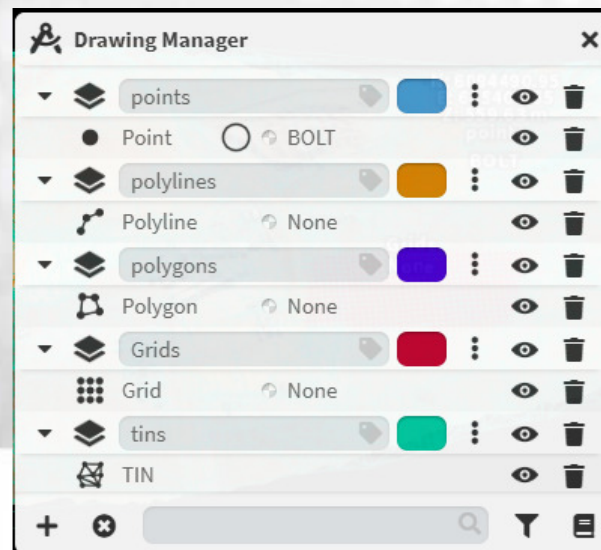
Click in the label box to change a layer name

Click the Color box to change the color of entities in the layer

⋮ Click the vertical ellipsis to add Layer Description, Line Width and Font Size

👁 Controls visibility of the Layer or Entity

🗑 Deletes a Layer or individual Entity



# Surface Model, Orthoimage & DEM

## The Survey Canvas – Drawing Manager

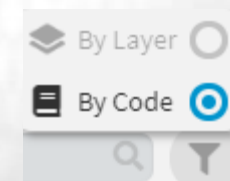
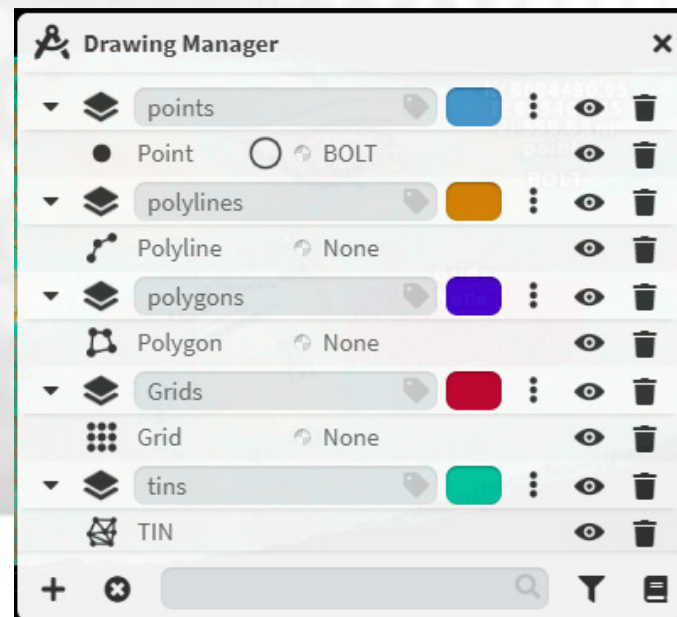
Looking across the bottom

+ adds a layer to the bottom of the list

X DELETES ALL YOUR WORK, not just a layer or an entity, be mindful

The search box searches by either layer name or code depending on the selection made under the Funnel icon to the right of the search box

The Book icon exposes the Feature Code Dictionary



# Surface Model, Orthoimage & DEM

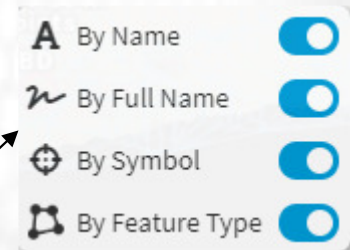
## The Survey Canvas – Feature Code Dictionary

At the bottom right, this symbol  opens File Explorer to search for a Carlson FLD file, which contains Field-to-Finish Codes, used to process field shots to CAD deliverables.

+ Allows the user to add a Feature Code

X DELETES ALL FEATURE CODES – be mindful

The search box searches and sorts by any or all of the four items listed under the Funnel icon to the right of the search box



# Surface Model, Orthoimage & DEM

## The Survey Canvas – Feature Code Dictionary

For each code:

The symbol on the left is the symbol used when the entity is assigned this code on the Survey Canvas and after processing points in Carlson CAD in Field-to-Finish



The Layer icon allows the user to select the color of the entity or By Layer

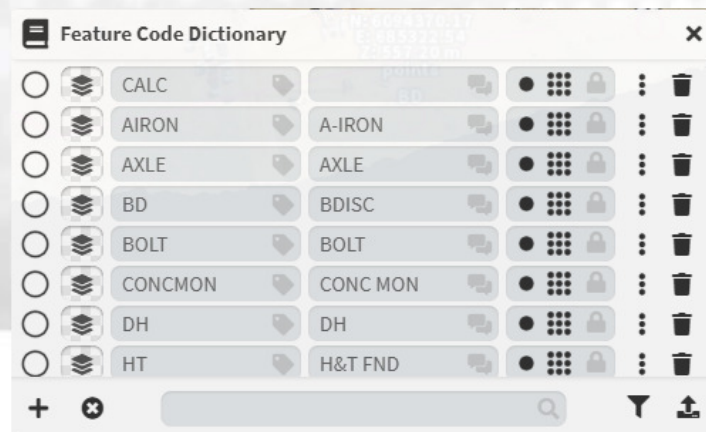
You may change the name of your Code, add or change a Code Description, and see which entities can be assigned this code in the next 3 columns. The lock is for future use.



Additional settings appropriate to the entity, like Font Size, Line Width, etc.



Deletes the Code from the Dictionary





# Surface Model, Orthoimage & DEM

## The Survey Canvas – Exporting Entities Individually

Using the Export icon on the upper left exports all entities on your Canvas.

Export or modify individual entities by clicking on them. A dialog box associated with that entity type will appear in the lower left of the Canvas

**Point**

**Layer:**

**Code:**

**Location:** N: 6094370.171  
E: 685322.538  
Z: 557.20 m  
EPSG: 32755

**Measure:**

**Action**

**Codes:**

Export

Make Invisible or Delete this point

Change the layer or color of this point

Change the Code, the Layer Color, or By Layer

Turns the N, E, Z off on the Canvas for this point

Adds an Action or Special Code to the point, such as ST (start line) or EL (end line) for example

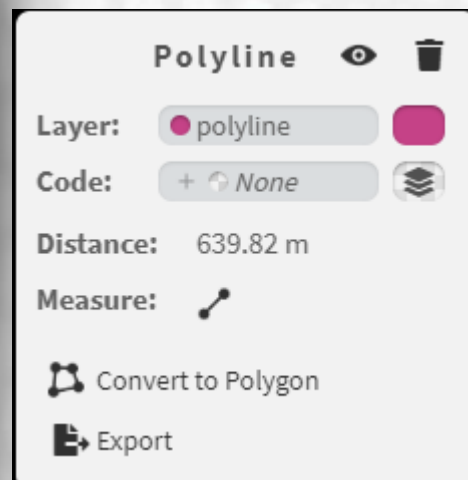
Exports this point in DXF, SHP, XML, TXT or CRD and CRDB formats

# Surface Model, Orthoimage & DEM

## The Survey Canvas – Exporting Entities Individually

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Make Invisible or Delete this polyline

Change the layer or color of this polyline

Change the Code, the Layer Color, or By Layer

Click to turn the distance measurement off on the Canvas

Converts the polyline to a polygon – measurements are lost

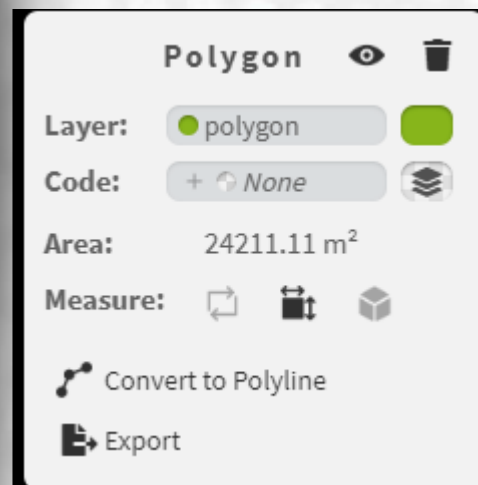
Exports this line in DXF, SHP, XML, TXT or CRD and CRDB formats

# Surface Model, Orthoimage & DEM

## The Survey Canvas – Exporting Entities Individually

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Make Invisible or Delete this polygon

Change the layer or color of this polygon

Change the Code, the Layer Color, or By Layer

Click to turn the perimeter length, area, volume on or off on the Canvas

Converts the polygon to a polyline – measurements are lost

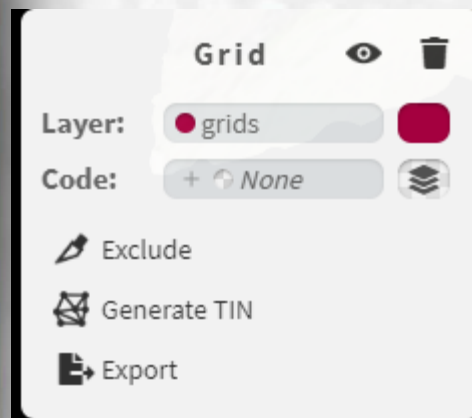
Exports this line in DXF, SHP, XML, TXT or CRD and CRDB formats

# Surface Model, Orthoimage & DEM

## The Survey Canvas – Exporting Entities Individually

Using the Export icon on the upper left exports all entities on your Canvas.

Export or modify individual entities by clicking on them. A dialog box associated with that entity type will appear in the lower left of the Canvas



Make Invisible or Delete this grid

Change the layer or color of this grid

Change the Code, the Layer Color, or By Layer

Click to draw an exclusion area in the grid

Creates a triangulation of this grid

Exports this work in DXF, SHP, XML, TXT or CRD and CRDB formats

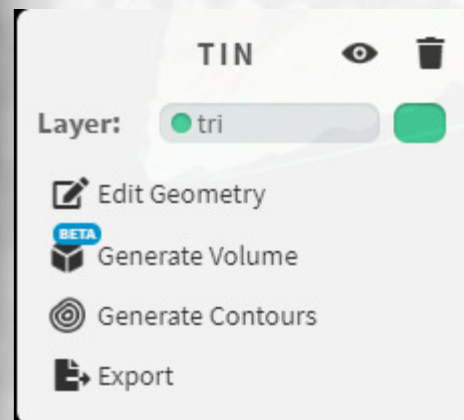


# Surface Model, Orthoimage & DEM

## The Survey Canvas – Exporting Entities Individually

Using the Export icon on the upper left exports all entities on your Canvas.

Export or modify individual entities by clicking on them. A dialog box associated with that entity type will appear in the lower left of the Canvas



Make Invisible or Delete this TIN

Change the layer or color of this TIN

Allows the editing of the TIN

Generates cut/fill volume of a TIN

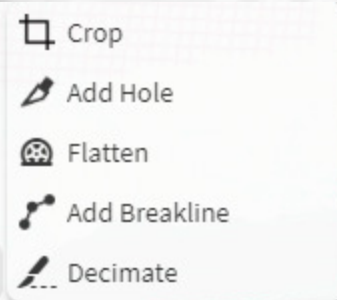
Generates contour lines of a TIN area

Exports the TIN in DXF or LandXML formats

More on these commands follow

# Surface Model, Orthoimage & DEM

## The Survey Canvas – TIN commands – Edit Geometry



Draw a TIN crop perimeter and crop the TIN

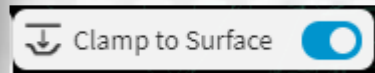
Draw a perimeter to delete triangles inside

Draw a perimeter to remove any points above and inside

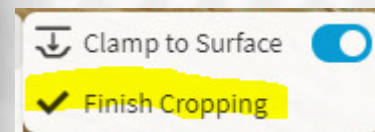
Add a breakline to the TIN

Reduce the number of triangles in a TIN

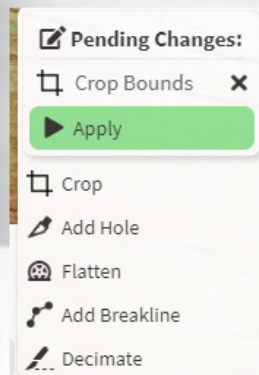
For Crop, Add Hole, Flatten and Add Breakline, the following dialog appears



Drapes to surface with toggle on, 3D polyline if off



Click here to finish your boundary or breakline

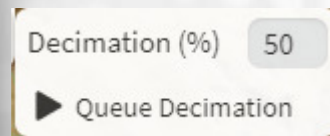


You have the chance to discard your change before rewriting the TIN

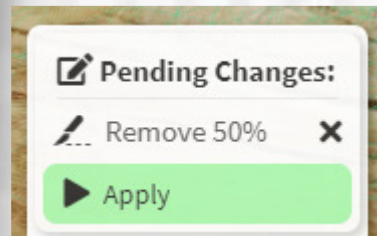
# Surface Model, Orthoimage & DEM

## The Survey Canvas – TIN commands – Edit Geometry

To Decimate, input the Decimation Percentage and click Queue Decimation



Then Click Apply to write the changes to the TIN

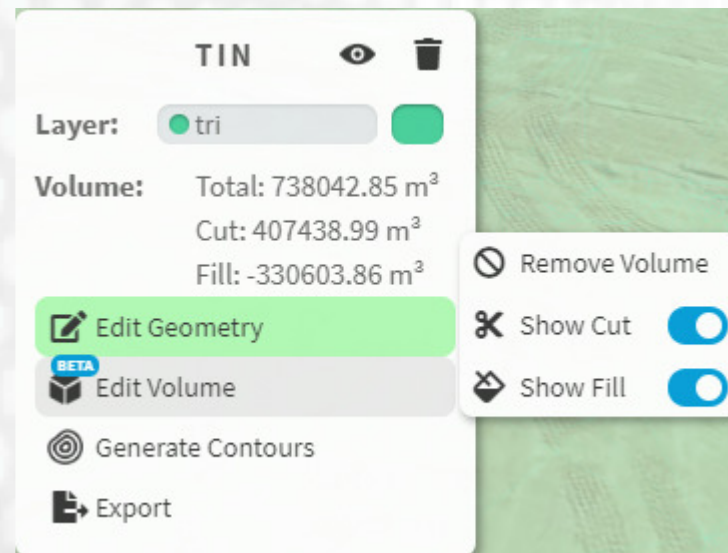


You have the chance to discard the decimation before applying

# Surface Model, Orthoimage & DEM

## The Survey Canvas – TIN commands – Generate Volume

Generate Volume is normally used for measuring a stockpile. Create a TIN of the stockpile. Select the TIN and click Generate Volume. Once the Volume is generated, you can remove it, Show Cut, Show Fill or both and the dialog now says Edit Volume because we have generated a Volume on this TIN








# Surface Model, Orthoimage & DEM

## The Survey Canvas – TIN commands – Generate Contours

Generate Contours will create exportable contour lines on the TIN

Interval (m)	<input type="text" value="1"/>
Z Max (m)	<input type="text"/>
Z Min (m)	<input type="text"/>
Min Size (m)	<input type="text"/>
Smoothing	<input type="text" value="None"/>
 Trim Edges	<input checked="" type="checkbox"/>
 Index Lines	<input checked="" type="checkbox"/>
Index frequency	<input type="text" value="5"/>
 Generate Contours	

Set the Contour interval

Control the highest contour drawn

Control the lowest contour drawn

Set the minimum length of a contour line

Set Smoothing – Low, Medium, High or None

Trim Contour edges to Tin edge or No

Index Contours or No

Set Index Frequency

Generate the Contours

## Surface Model, Orthoimage & DEM

The Survey Canvas – Stereo Reconstruction – use this command to locate a point or polyline precisely when the Surface Model is noisy or incomplete. Below we see a shadow of a light pole but the pole is not reconstructed on the Surface. We can use the Stereo Reconstruction tool to find the exact location of the top of the pole

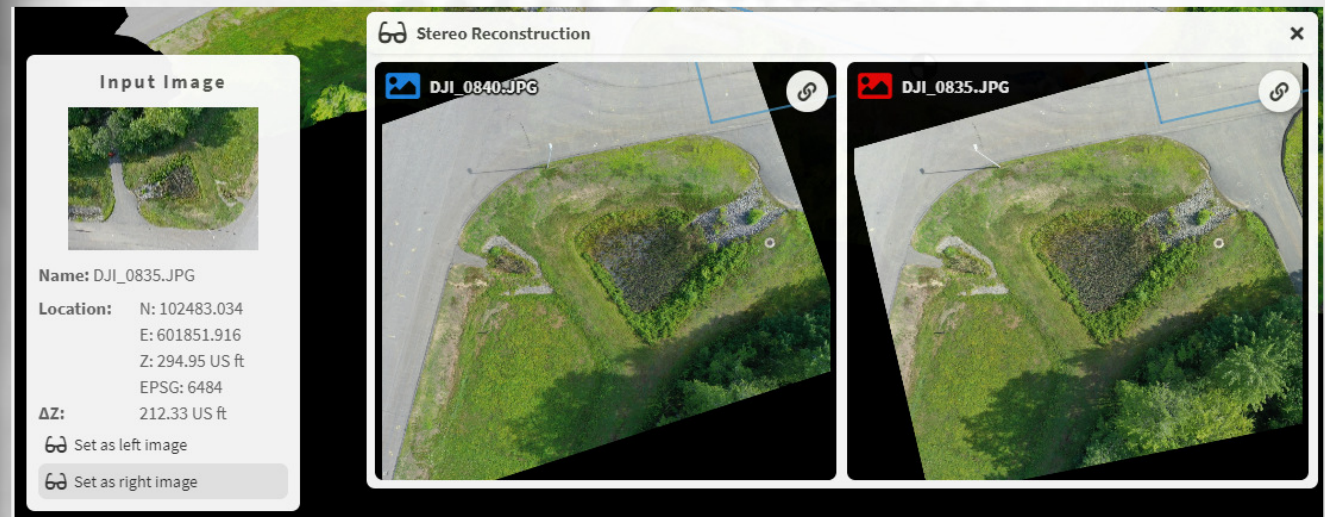


# Surface Model, Orthoimage & DEM

## The Survey Canvas – Stereo Reconstruction

Turn on the Surface Model and Input Images here  on the right

Select a left image and a right image that see the feature to be located





## Surface Model, Orthoimage & DEM

### The Survey Canvas – Stereo Reconstruction

Turn on the Surface Model and Input Images here  on the right

Select a left image and a right image that see the feature to be located

Select Point in upper right and place a point on top of the light pole in the left image. Now move the point in the right image. Note the arrows indicate X,Y move in Red, Z move in Green. Move to the point and then touch the arrow to change movement direction

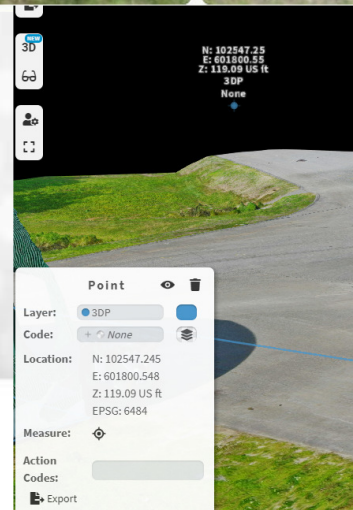
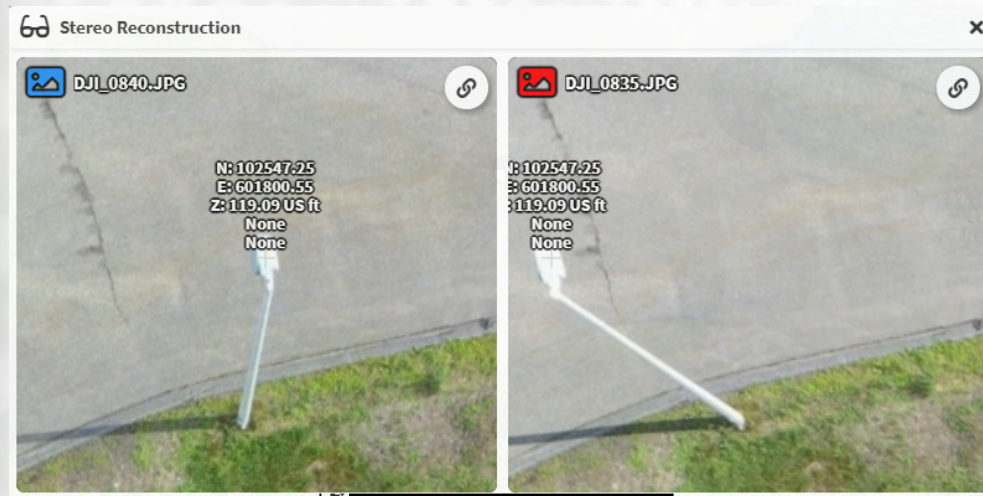




# Surface Model, Orthoimage & DEM

## The Survey Canvas – Stereo Reconstruction

Move the point in the right image to its' correct spot and the point is located correctly on the Canvas



# Project Quality Report

The Project Report reports the accuracy of the Point Cloud There is a cover page with the date the project was processed



Page 2 Top Section provides some project information, Name (not shown), Creation Date, Number of Images Uploaded, Number of Ground Control Points, The Average Ground Sampling Distance (the size of a pixel on the ground = cloud granularity, whether it was an orbital dataset for modeling a structure or a typical up-and-back survey style flight, and the size of the area reconstructed.

Note that the units presented are controlled by the projection units desired during project creation

Creation Date	2020-06-29 20:06:02
Number of Images Uploaded	51 (274.6 MB)
Ground Control Points	4
Average GSD	0.02 m
Orbital Dataset	False
Total Project Area	2.01 hectares

# Project Quality Report

Page 2 Second Section provides the Projection selected with its' associated Earth Model and the Units selected

## Coordinate System

Coordinate System	UTM zone 32N (EPSG:32632)
Earth Model	WGS 84
Output Unit Of Measure	Meters

Page 2 Third Section provides an Accuracy Summary including cameras reconstructed, the Residual, here highlighted with a Yellow warning that the Reprojection Error is greater than 0.5 pixels, the Average Camera Position Error from GPS recording from the drone vs. the reconstructed drone location and standard deviation, the Average GCP Position Error and the GCP Root-Mean-Square Error.

## Accuracy Check

Cameras Reconstructed	51 / 51	✓
Residual (error)	0.64 pixels	⚠
Average Camera Position Error	0.72 m	✓
Camera Error Standard Deviation	0.28 m	✓
Average GCP Position Error	0.03 m	✓
GCP Error RMSE	0.03 m	✓

# Project Quality Report

Page 2 Fourth Section shows Original and Corrected camera parameters. You can use these parameters on your next flight to tighten up accuracy using Advanced Fields during project creation

## Camera Parameters

Camera Model	DJI FC220
Original Focal length (mm)	4.730
Adjusted Focal Length (mm)	4.841
Original Focal length (pixels)	2993.647
Adjusted Focal Length (pixels)	3063.900
Original Radial Distortion Values (inverse focal length units)	0.000, 0.000, 0.000
Adjusted Radial Distortion Values (inverse focal length units)	0.029, -0.122, 0.132
Original Principal Point Offset (mm)	0.000, 0.000
Adjusted Principal Point Offset (mm)	0.006, 0.007
Original Principal Point Offset (pixels)	0.000, 0.000
Adjusted Principal Point Offset (pixels)	3.810, 4.330



# Project Quality Report

Pages 3 and 4 provide pictures of the orthoimage and digital elevation model as reminders

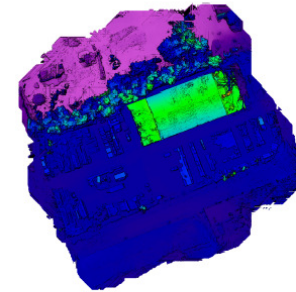
Orthoimage

GSD: 0.032 m



Digital Elevation Model

GSD: 0.064 m





# Project Quality Report

Page 5 begins the Ground Control Error Review. In column 1 is an image of the GCP



Column 2 is where you said the points were

Column 3 is the software's Best Fit of the point

Column 4 is the difference between the Original and Adjusted positions

Column 5 is a quick visual check that we think your GCP is very accurate. You may see Yellow when the Error is marginal and Red when the error is large

Ground Control Error Review

GCP Image	Original Positions	Adjusted Positions	Error	Warning Level
 511-1	X: 638908.04 m Y: 5655751.73 m Z: 168.35 m	X: 638908.03 m Y: 5655751.74 m Z: 168.32 m	X: -0.00 m Y: 0.01 m Z: -0.04 m	
 511-2	X: 638915.90 m Y: 5655731.71 m Z: 168.35 m	X: 638915.91 m Y: 5655731.71 m Z: 168.39 m	X: 0.01 m Y: 0.01 m Z: 0.04 m	
 511-3	X: 638897.22 m Y: 5655729.46 m Z: 168.32 m	X: 638897.22 m Y: 5655729.48 m Z: 168.35 m	X: 0.00 m Y: 0.02 m Z: 0.03 m	
 511-4	X: 638884.02 m Y: 5655767.04 m Z: 168.48 m	X: 638884.01 m Y: 5655767.04 m Z: 168.45 m	X: -0.01 m Y: -0.01 m Z: -0.03 m	

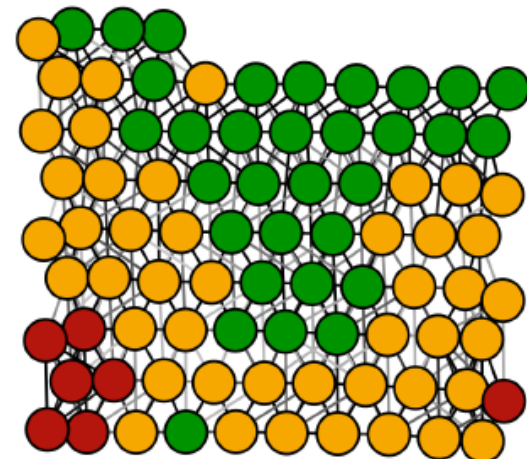
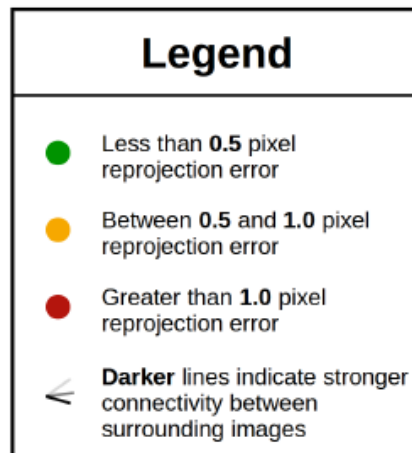


# Project Quality Report

After the Ground Control Error Review, the Image Connectivity Graph is presented.

This shows each image and color-codes it with Green for a Reprojection Error less than 0.5 pixels, Yellow when the error is between 0.5 and 1.0 and Red if the error is greater than 1.0. The relative darkness of lines connecting images is a visual representation of the amount of pixels we were able to match up from the two connected images. Reprojection errors can come from the equipment as well as tree canopy, water or extremely uniform moving objects, such as a field of wheat in a breeze.

Image Connectivity Graph



# Project Quality Report

The last entry in the report provides Dense Point Cloud data including the Total 3D Points in the cloud, the Point Density, the Minimum Stereo Pairs per Point, which can be increased in the Advanced Fields dialog during project creation. Increasing this number should increase the accuracy but may make projects fail due to insufficient correlation, and the image resolution

## Dense Point Cloud

Total 3D Points	2852898
Point Density	142 pts/m <sup>2</sup>
Minimum Stereo Pairs Per Point	2
Image resolution	1/4 original