

UAV / Drone Mapping

Creating a High Quality Georeferenced 3D Model

High Density Point Cloud



READ ME

Purpose:

Using UAV Drone to map existing structures. This is a demonstration of complications that you might face while creating a 3D model and how to rectify errors.

Statement of Problem:

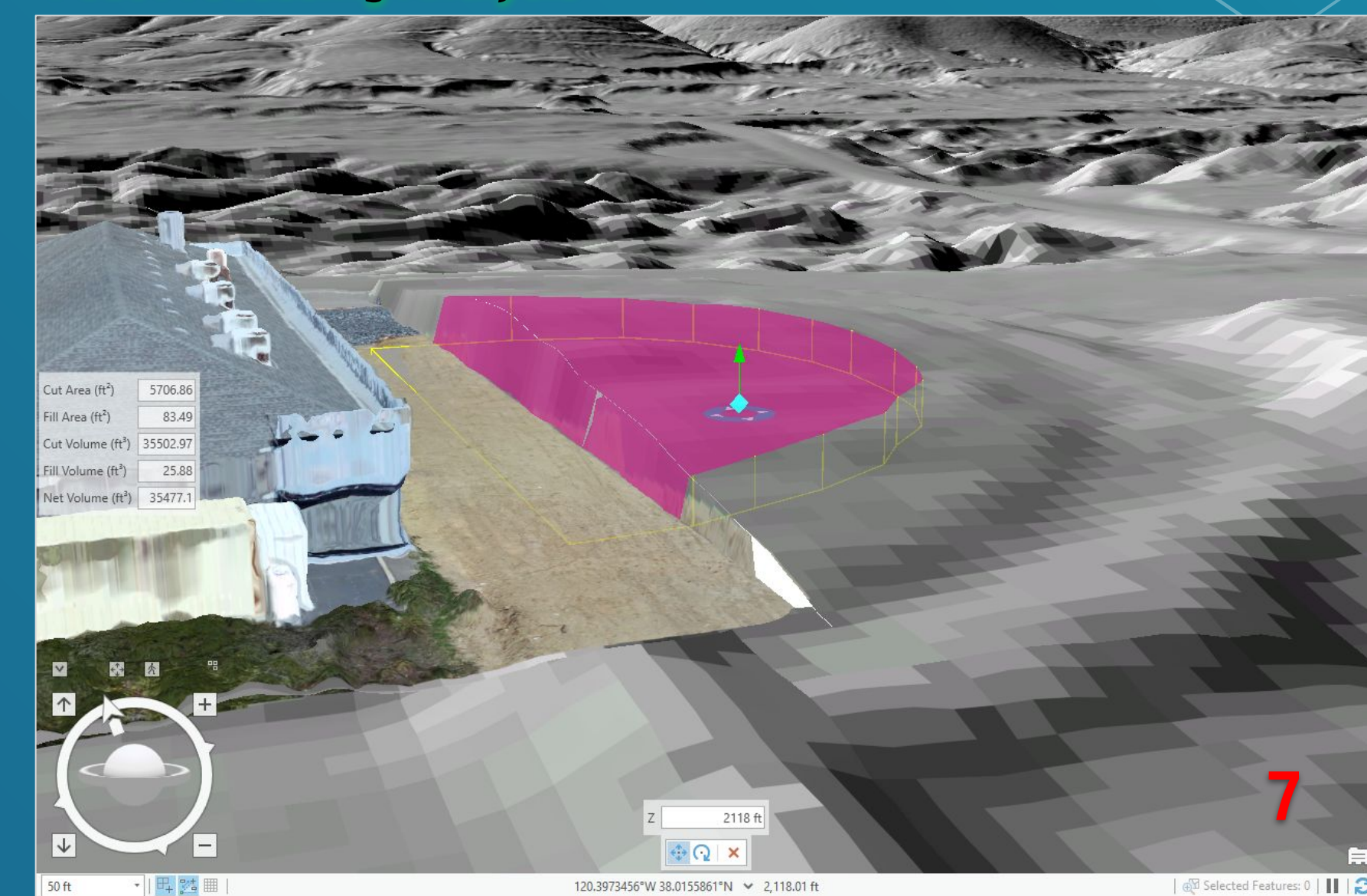
Mapping without using the appropriate spatial references will cause a model to float or sink depending on misconfiguration. Without Ground Control Points the model will rely upon onboard GPS from the drone which is only moderately accurate.

Significance of Problem:

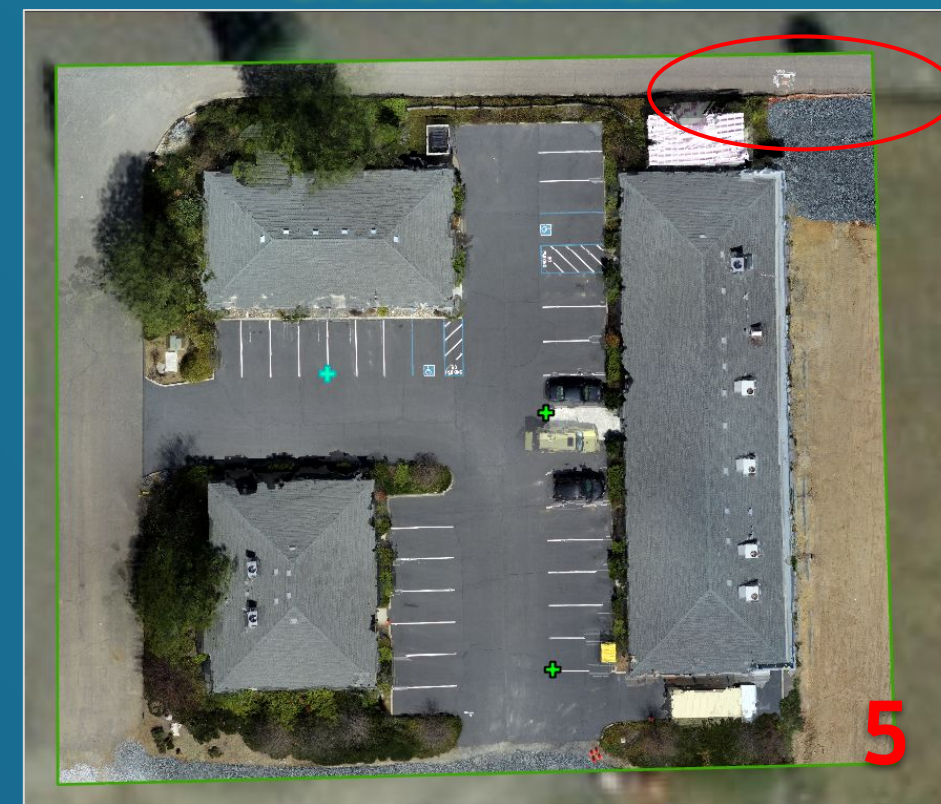
Only so much analysis can be done from a stand alone model. While this can still serve many purposes, it is far more valuable to merge mapping data with other remotely sensed data sets. Performing spatial analysis by comparing data layers opens up a wide range of geoprocessing tools that can exponentially increase the practicality and function of your model.

- Power of merging layers is illustrated below. This is passive sensing from drone imagery merged with active sensing using LIDAR. An explanatory 3D analysis was performed to identify Cut/Fill volume of targeted area with polygon vertices.

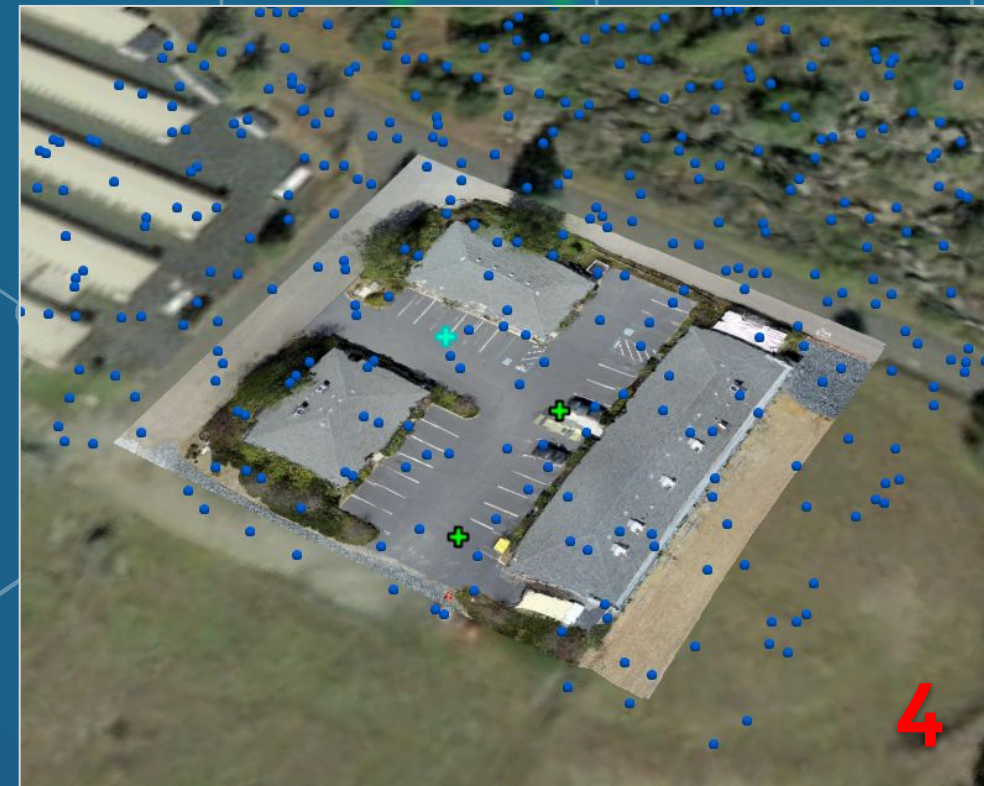
Post Processing Analysis



Orthorectified

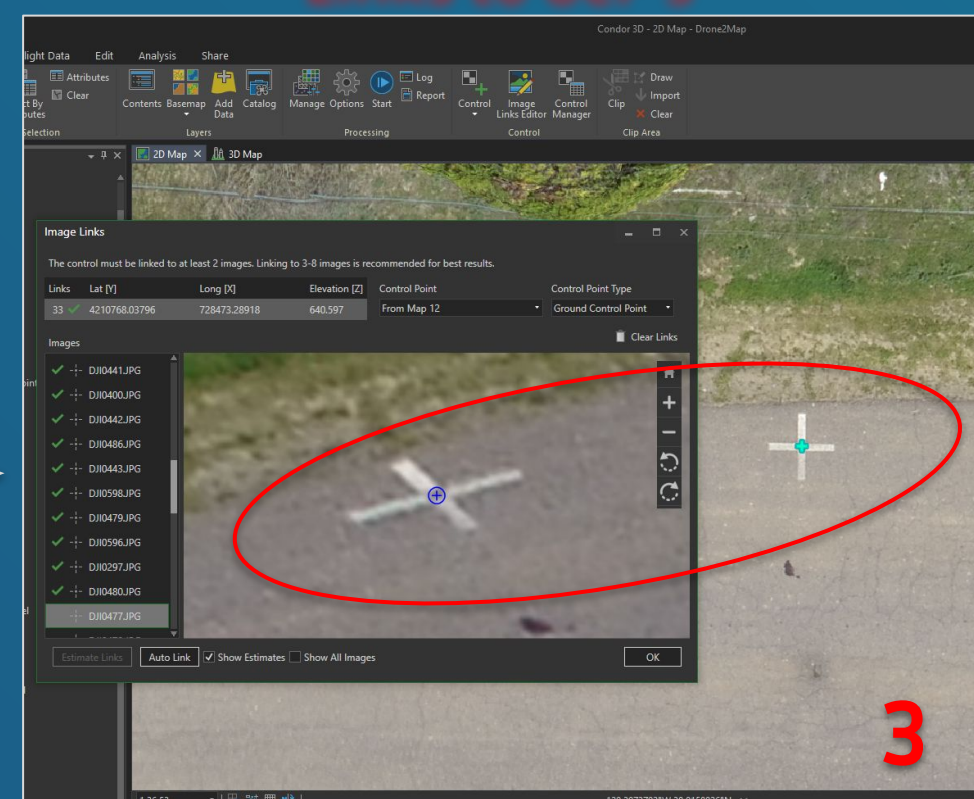


Correcting Image Altitudes



- Knowing reference Z (Alt) you can set flight altitudes at constant above ground level

Links to GCP's



- Tie in clear ground truth key-points using image links editor to georectify model.

Bad Ground Control



- If using GCP's from basemap; don't use structure corners as key-points

No Ground Control



- For 3D models to rectify to a base map requires Ground Control Points

Abstract:

Learned about creating an accurate georeferenced 3D model that does not float or sink in reference to a base map in ArcPro.

This is significant so accurate measurements can be calculated in post processing analysis. If data is processed correctly feature layers can be merged for comparative analysis.

Model was created using Drone2Map in conjunction with Emlid GNSS Real Time Kinematic receiver system and Phantom-4 UAV for field image collection and associated geospatial metadata.

Referencing Ground Control Points with the appropriate spatial reference must be achieved in order to rectify a model X/Y/Z-values to base map or other elevation sources. Using image links editor to validate GCP's needs to reference ground truth's in preferably a clear unobstructed area. Allow drone time to average GPS corrections for several minutes before flight for best flight metadata results. Best 3D model can be achieved using cross hatch flight pattern with 35-degree gimbal angle.

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