

Stockpile Volume Calculation



Country	Kentucky, USA
Job Type	Volume Calculation
Project Date	February 2017
Project Size	13,200 m ² (3.3 acres)
Drone	Phantom 4 Pro
Pattern of Flight	Oblique
Number of Images	45
Accuracy	2.5% volume difference without GCPs
DatuSurvey™ Savings	0.5 field hour instead of 1.5 hours using conventional methods 1 office hour No need to climb the pile

Project Description

High precision volume calculation of the stockpile that needs to be accomplished in a short time without using Ground Control Points in a safe and automatic process.

Data Acquisition

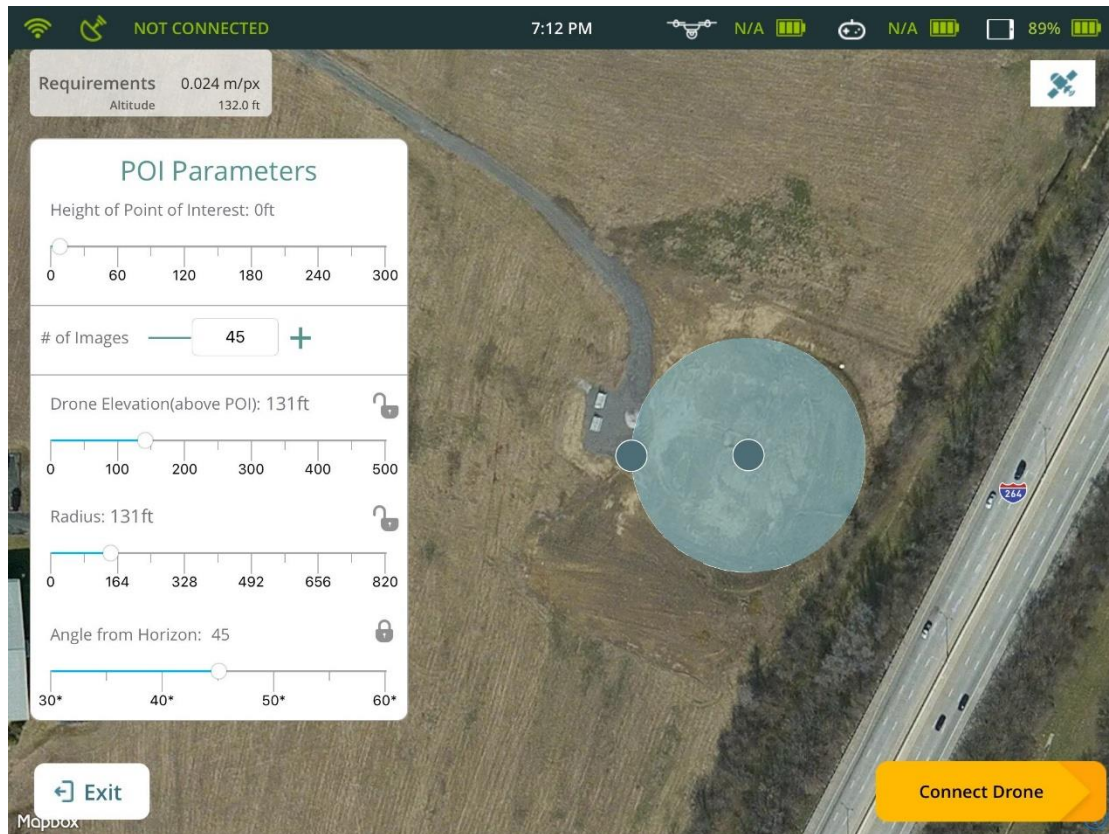
Acquiring Images

Data was collected with a DJI Phantom 4 Pro drone using a 20 MP camera.

Mission was planned with flight planner app DatuFly™, allowing quick, precise and automatic image capturing.

Flight duration was 6 minutes at an altitude of 132 ft. (40m).

Resolution was 2.4cm/pixel.



Geo-Referencing

4 Ground Control Points in the area of the project were surveyed by RTK GPS.

The first project of volume calculation was geo-referenced with the GeoTag option utilizing only the GPS data embedded in the EXIF of the image.

The second project of volume calculation was geo-referenced using Ground Control Points.

Conventional Survey

The area of the stockpile was surveyed by using the conventional method with RTK GPS. The data includes 173 points describing the surface of the pile.

This data was used for comparison.

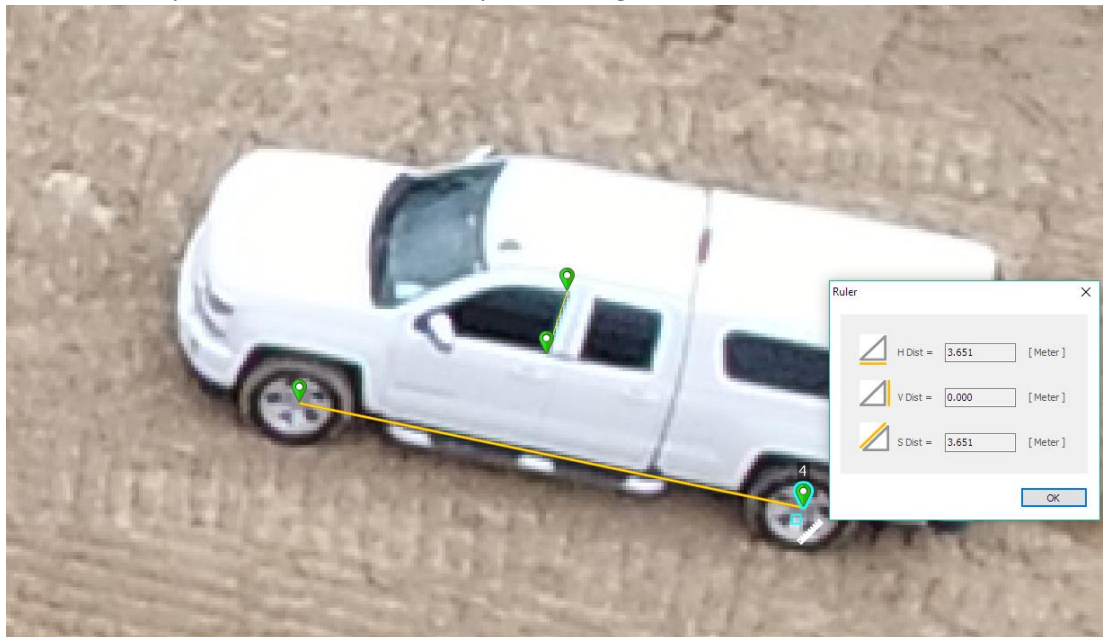
Achieved Results

The project is processed in less than an hour, including dense point cloud with mesh and texture and volume calculation reports.

The difference between volume without GCP and with GCP is **2.5%**.

The difference between volume with the conventional method and volume without GCP is **4.5%**, while there are 8,566 points describing the surface compared to 173 points of conventional survey.

Scale accuracy can also be checked by measuring the distance between the car wheels.



The distance measured in the project without GCP points differs from the actual size by **2 cm (0.06 ft.)**

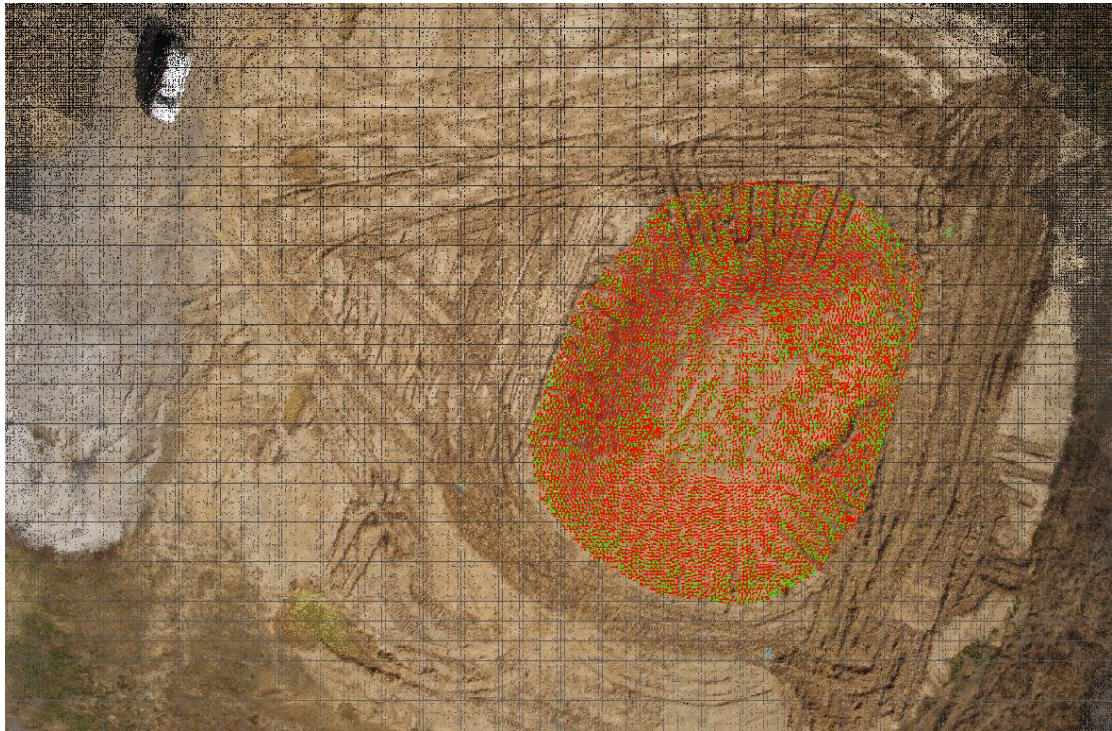
The distance measured in the project with GCP points differs from the actual size by **0.66 cm (0.002 ft.)**

DatuSurvey™ Enterprise Outputs

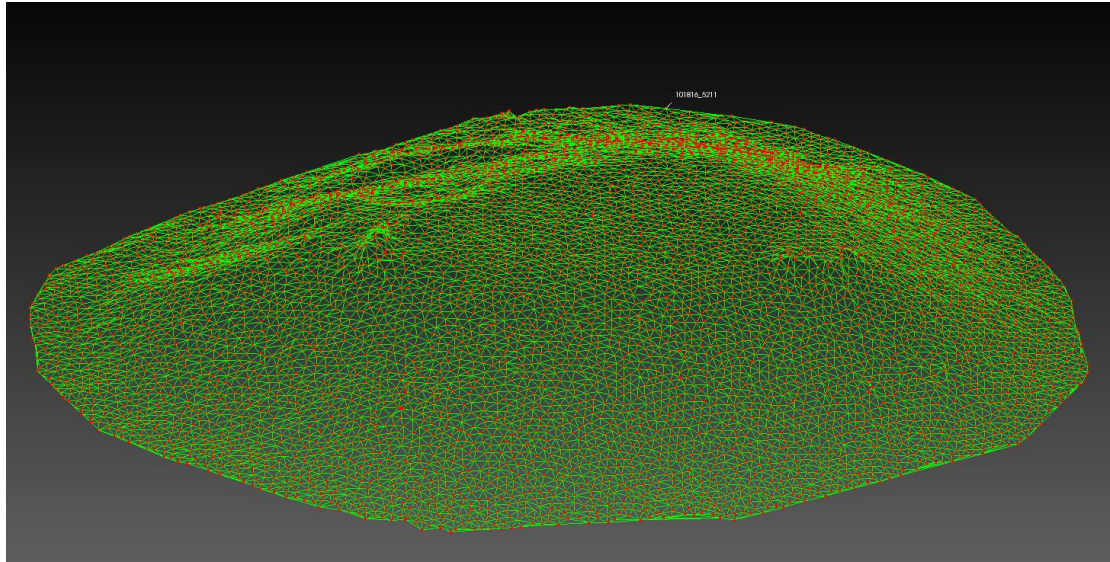
Texturized Dense Point Cloud



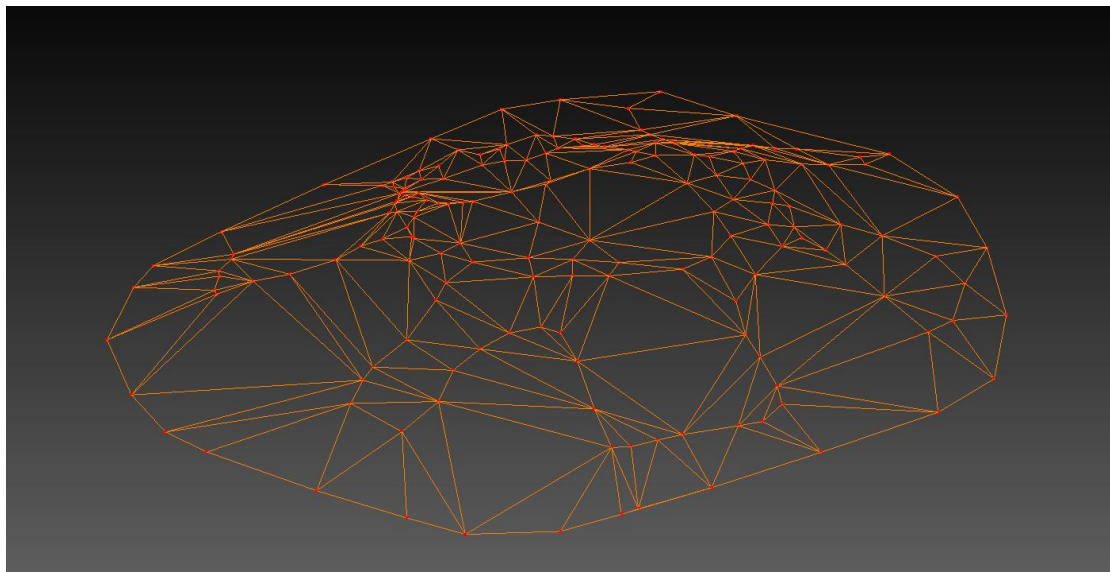
Dense Point Cloud with the Surface for Volume Calculation



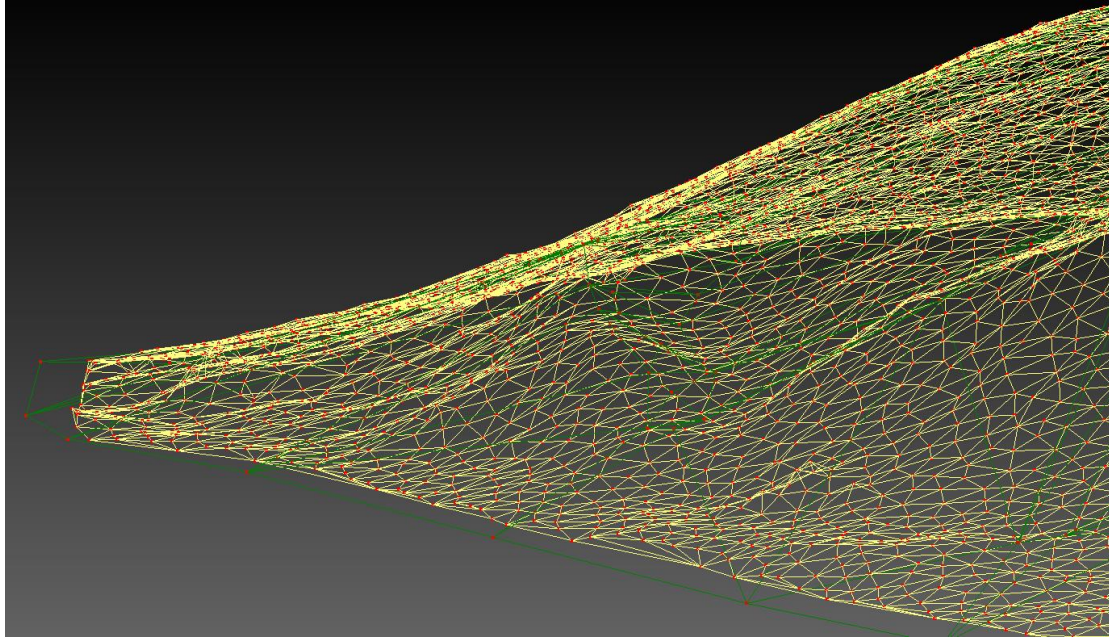
Surface for Volume Calculation



Conventional Topo Survey



Surface from DatuSurvey™ via Imported Conventional Topo Survey



Yellow TIN – DatuSurvey surface

Green TIN – conventional survey

Volume Report



DatuSurvey™ Enterprise Volume Calculation Report

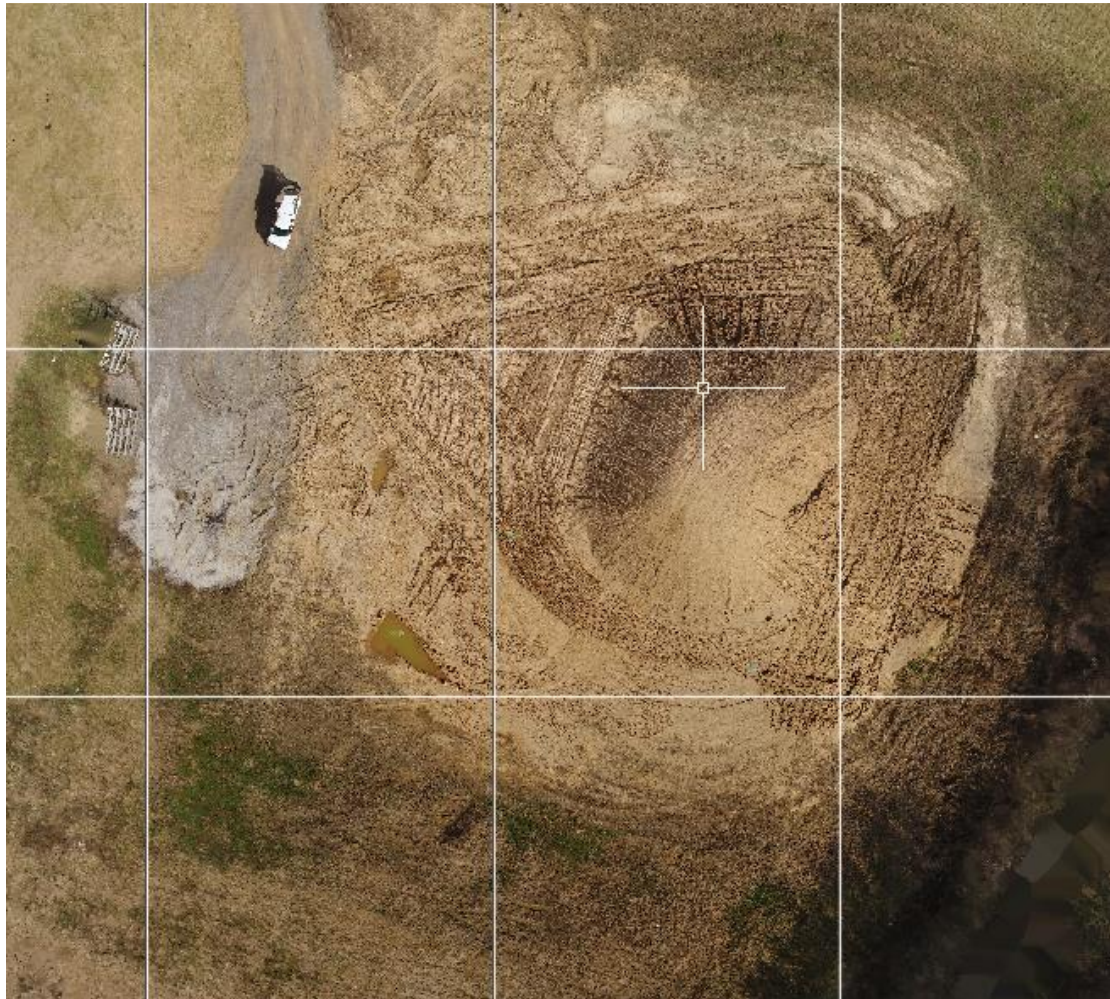
Job Name:	Stock_pile_volume
Organization Name:	
Creation Date:	28/03/2017 10:23 AM
Measurement Unit	[Meter³]

Volume Name	pile_gcp_2
Surface Name	pile_gcp
Surface Description	
Base Surface Name	
Base Surface Description	
Calculation Date & Time	10/03/2017 2:47 PM
Fill	42566.701
Cut	11.523

Volume Name	Pile_NOgcp_2
Surface Name	Pile_NOgcp
Surface Description	
Base Surface Name	
Base Surface Description	
Calculation Date & Time	10/03/2017 2:56 PM
Fill	41523.407
Cut	30.701

Orthophoto

True Orthophoto was generated from the oblique flight.



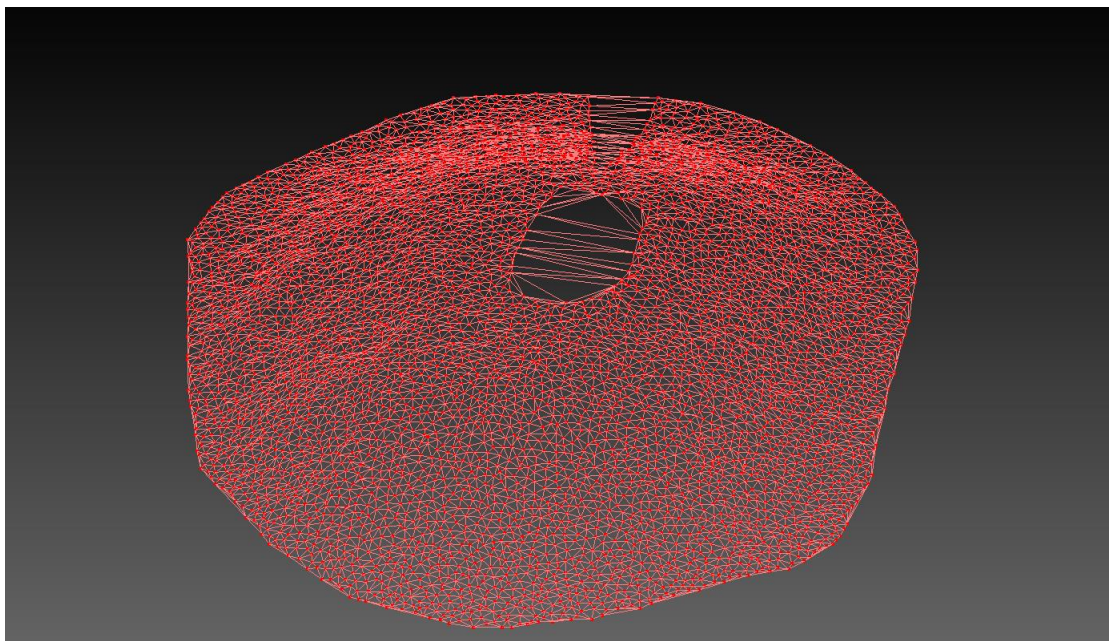
Objects Elimination

An additional project was made with a car on the top of the pile. In order to eliminate the car from the volume calculation it's simply not included in the polygon of interest:







Texturized Dense Point Cloud with a Car on Top



Surface for Volume Calculation



DatuSurvey™ Enterprise Benefits

 AUTOMATED, INTUITIVE & SIMPLE User interface that follows surveyor work process	 STAY SAFE Employ aerial and ground images	 SAVE TIME & CUT COSTS Save up to 30% office time
 PROFESSIONAL, SURVEY GRADE High Precision & reliability		 MONETIZE YOUR BUSINESS Manage more projects, grow your business

