

Protokol o tvorbě modelu vojenského opevnění v Darkovičkách

Protokol a zpracování 3D modelu
10 March 2021



Survey Data

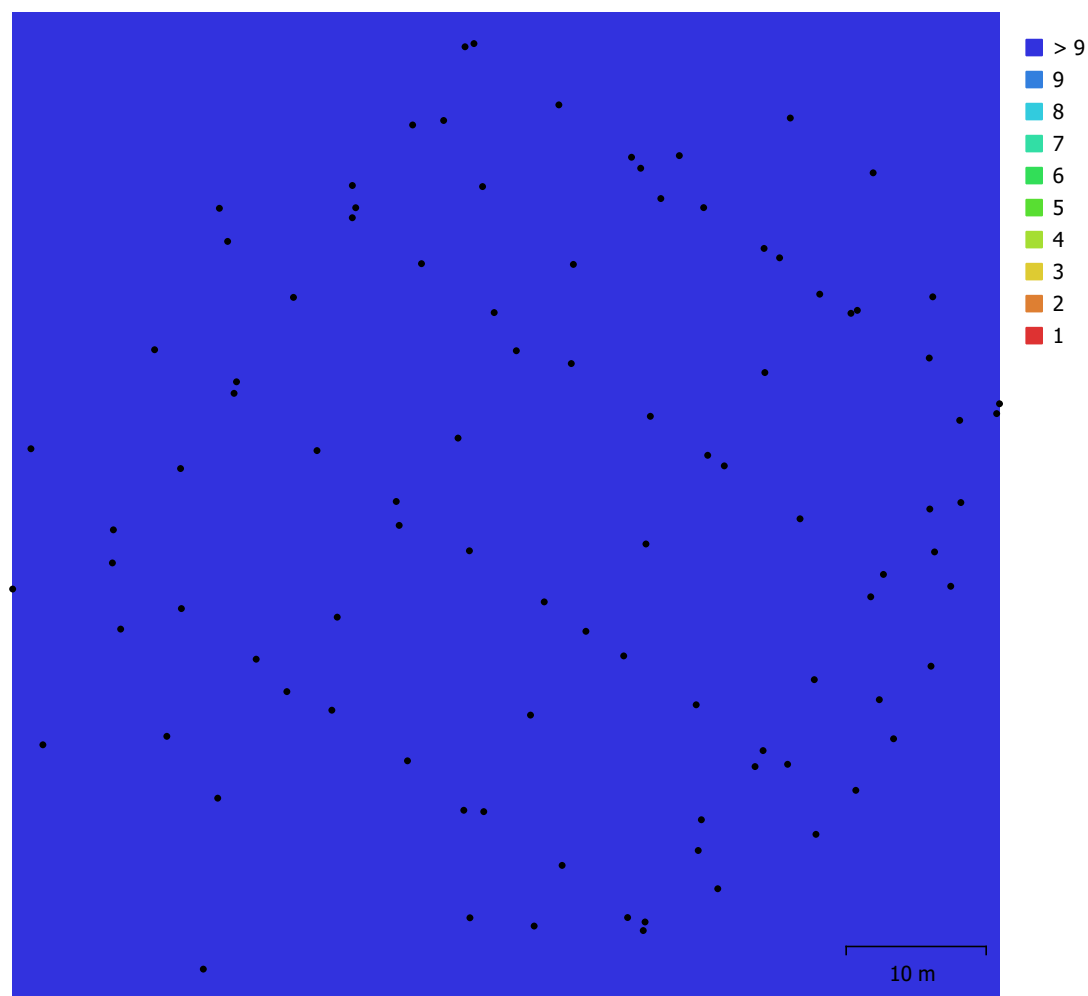


Fig. 1. Camera locations and image overlap.

Number of images:	95	Camera stations:	95
Flying altitude:	36.1 m	Tie points:	88,157
Ground resolution:	9.76 mm/pix	Projections:	253,724
Coverage area:	4.97e+03 m ²	Reprojection error:	0.606 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
FC6310 (8.8mm)	5472 x 3648	8.8 mm	2.41 x 2.41 μm	No

Table 1. Cameras.

Camera Calibration

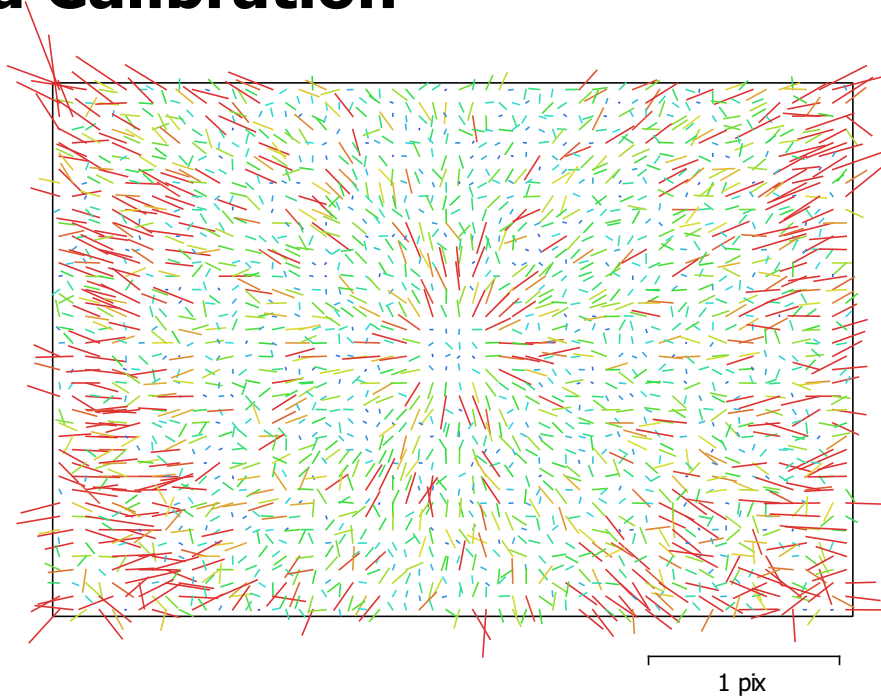


Fig. 2. Image residuals for FC6310 (8.8mm).

FC6310 (8.8mm)

95 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	3652.41	0.093	1.00	0.03	-0.77	-0.08	0.17	-0.15	0.04	-0.36
Cx	8.48316	0.057		1.00	-0.16	-0.02	0.01	-0.01	0.90	-0.10
Cy	2.95787	0.068			1.00	-0.10	-0.01	0.02	-0.17	0.66
K1	-0.00103428	5.4e-05				1.00	-0.95	0.89	-0.01	-0.18
K2	-0.00696603	0.00016					1.00	-0.98	0.00	0.05
K3	0.0074964	0.00014						1.00	-0.00	-0.05
P1	0.000989712	5.3e-06							1.00	-0.10
P2	0.000125853	5.1e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

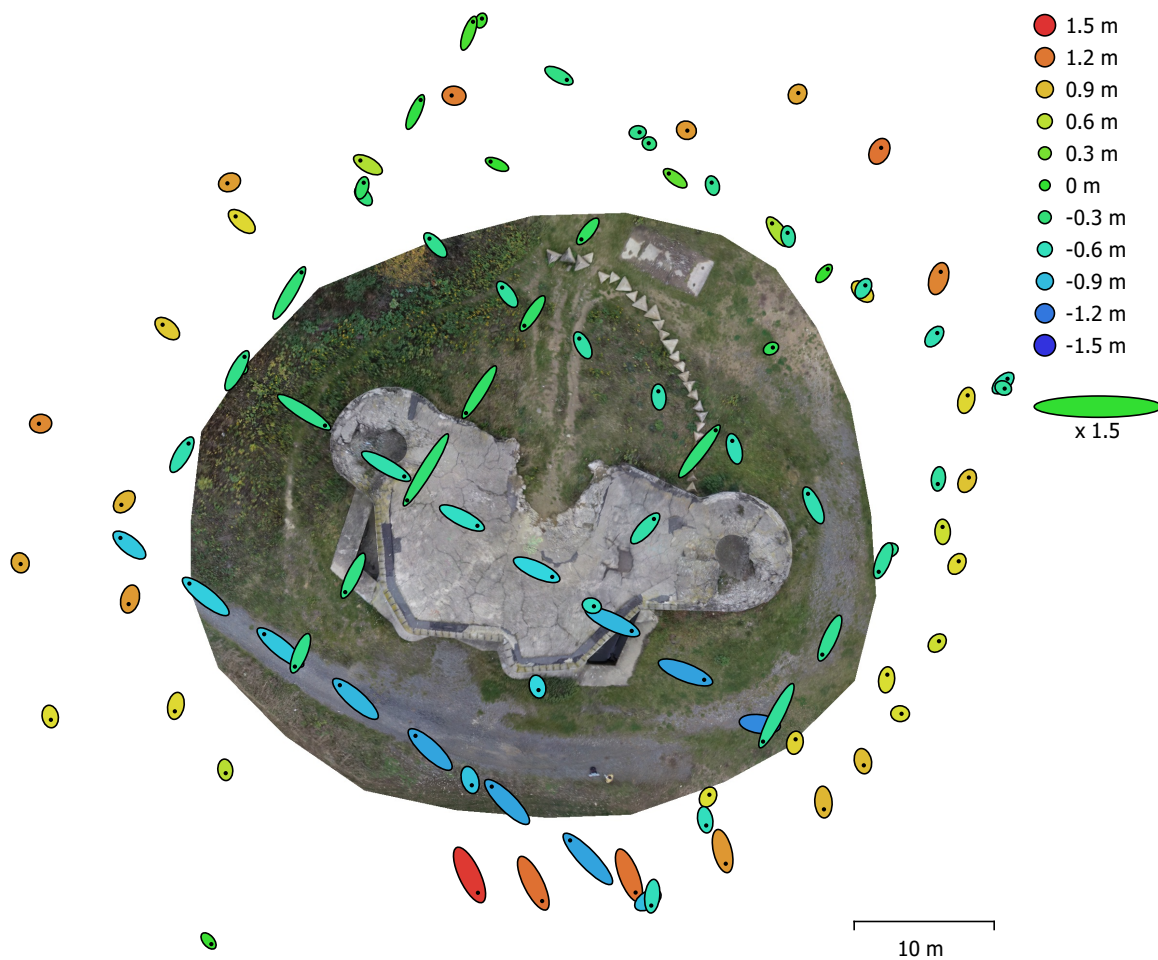


Fig. 3. Camera locations and error estimates.

Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated camera locations are marked with a black dot.

X error (m)	Y error (m)	Z error (m)	XY error (m)	Total error (m)
0.763822	0.917778	0.715279	1.19404	1.39189

Table 3. Average camera location error.
X - Longitude, Y - Latitude, Z - Altitude.

Digital Elevation Model

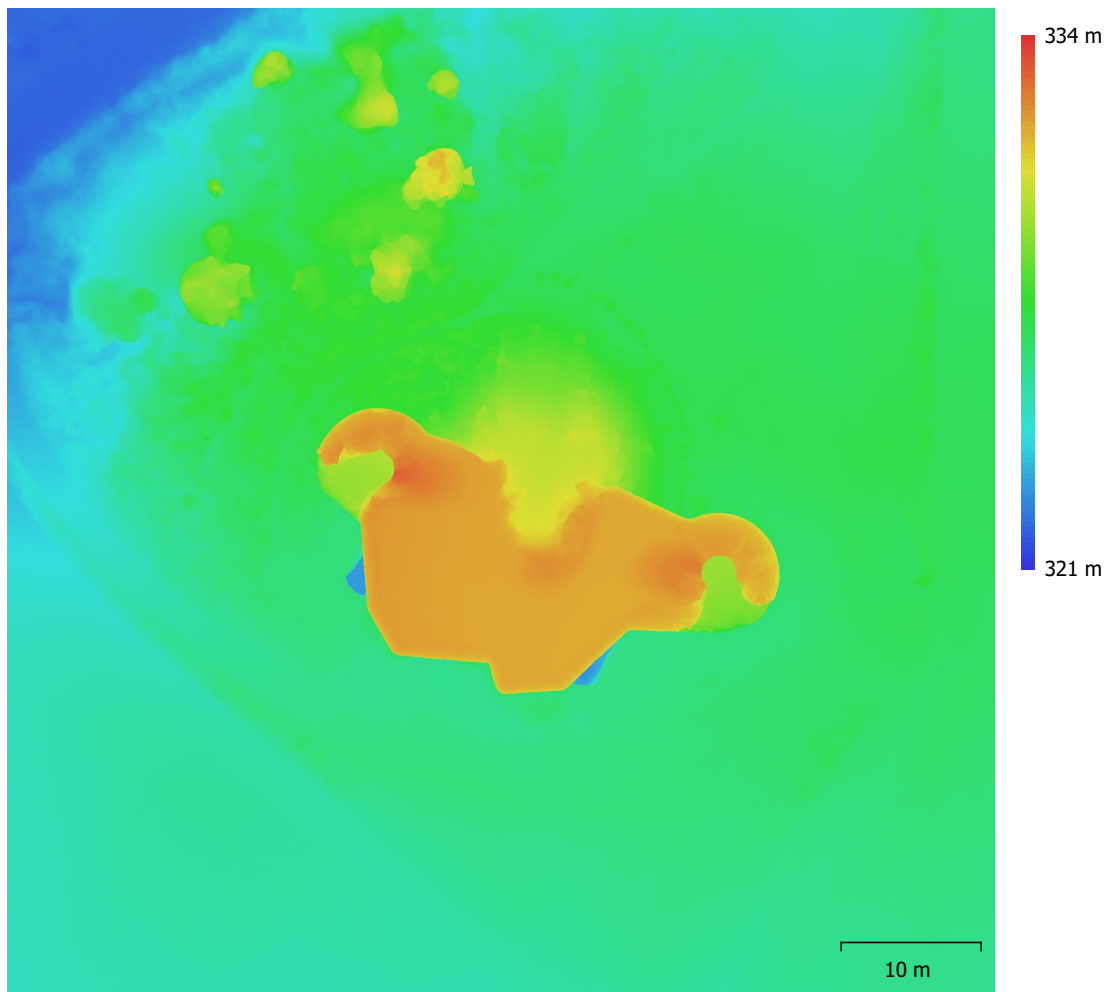


Fig. 4. Reconstructed digital elevation model.

Resolution: 6.99 cm/pix
Point density: 205 points/m²

Processing Parameters

General

Cameras	95
Aligned cameras	95

Shapes

Polygons	1
Coordinate system	WGS 84 (EPSG::4326)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	88,157 of 105,643
RMS reprojection error	0.105418 (0.606357 pix)
Max reprojection error	0.259995 (20.2833 pix)
Mean key point size	4.93707 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.26029

Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	Source
Key point limit	40,000
Tie point limit	4,000
Guided image matching	No
Adaptive camera model fitting	No
Matching time	1 minutes 45 seconds
Matching memory usage	326.34 MB
Alignment time	47 seconds
Alignment memory usage	53.57 MB
Software version	1.6.0.9925

Depth Maps

Count	95
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	14 minutes 7 seconds
Software version	1.6.0.9925

Dense Point Cloud

Points	45,254,120
Point colors	3 bands, uint8

Depth maps generation parameters

Quality	High
Filtering mode	Moderate
Processing time	14 minutes 21 seconds

Dense cloud generation parameters

Processing time	53 minutes 8 seconds
Software version	1.6.0.9925

Model

Faces	997,148
Vertices	499,974
Vertex colors	3 bands, uint8
Texture	4,096 x 4,096, 4 bands, uint8

General

Depth maps generation parameters

Quality	High
Filtering mode	Mild
Processing time	14 minutes 7 seconds

Reconstruction parameters

Surface type	Arbitrary
Source data	Depth maps
Interpolation	Enabled
Strict volumetric masks	No
Processing time	28 minutes 6 seconds

Texturing parameters

Mapping mode	Generic
Blending mode	Mosaic
Texture size	4,096
Enable hole filling	Yes
Enable ghosting filter	Yes
UV mapping time	2 minutes 57 seconds
Blending time	1 minutes 2 seconds
Software version	1.6.0.9925

Orthomosaic

Size	14,453 x 14,550
Coordinate system	WGS 84 (EPSG::4326)
Colors	3 bands, uint8

Reconstruction parameters

Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Processing time	3 minutes 48 seconds
Software version	1.6.0.9925

System

Software name	Agisoft Metashape Professional
Software version	1.6.0 build 9925
OS	Windows 64 bit
RAM	15.96 GB
CPU	Intel(R) Core(TM) i3-8100 CPU @ 3.60GHz
GPU(s)	GeForce GTX 1060 6GB