CANTERA DE BURGUES

Processing Report
28 June 2024

Survey Data
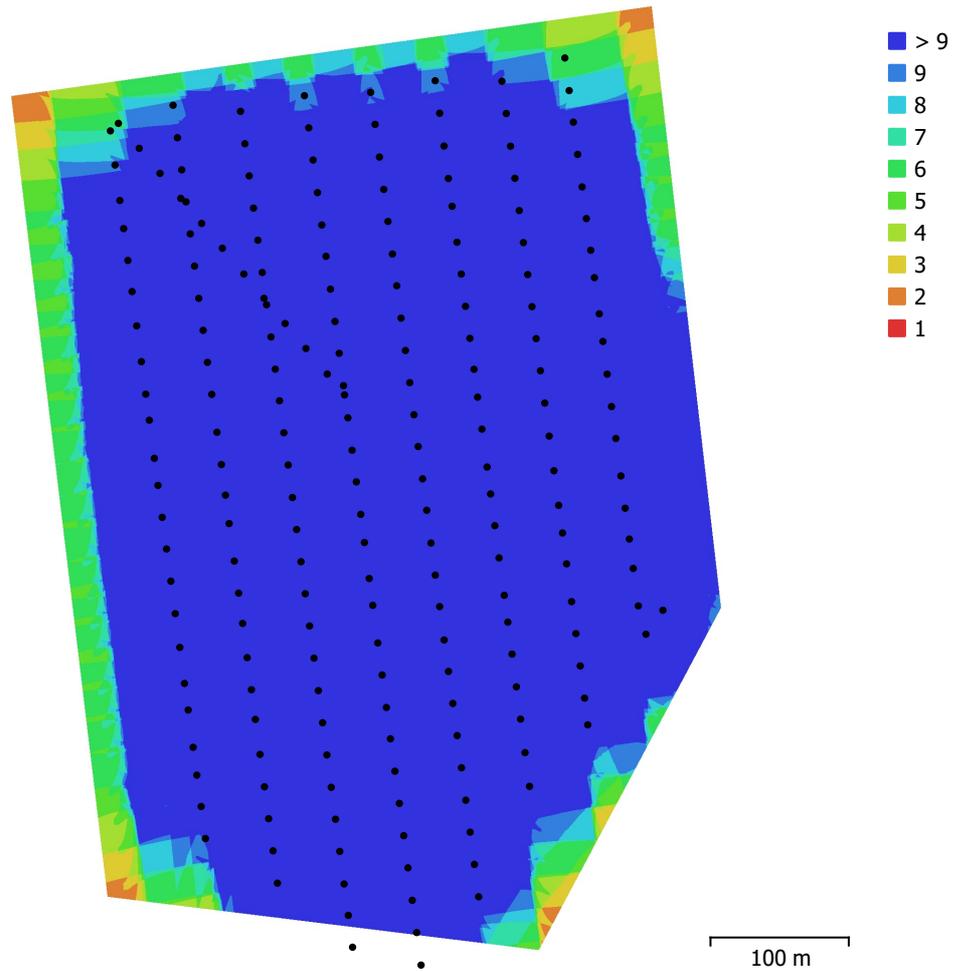
Fig. 1. Camera locations and image overlap.

Number of images:	205	Camera stations:	205
Flying altitude:	121 m	Tie points:	125,067
Ground resolution:	3.2 cm/pix	Projections:	737,331
Coverage area:	0.281 km²	Reprojection error:	0.667 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
M3E (12.29mm)	5280 x 3956	12.29 mm	3.36 x 3.36 μm	Yes

Table 1. Cameras.

Camera Calibration
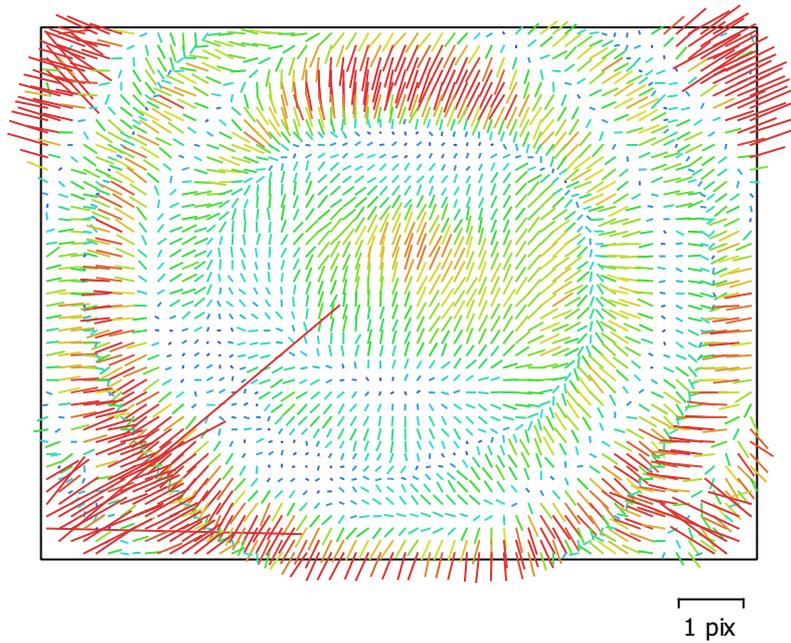

Fig. 2. Image residuals for M3E (12.29mm).

M3E (12.29mm)

205 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
Frame	**5280 x 3956**	**12.29 mm**	**3.36 x 3.36 µm**

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
F	**3696.16**	0.073	1.00	0.03	-0.44	-0.20	-0.31	-0.15	0.05	-0.02	-0.03	-0.03	0.40
Cx	**23.1233**	0.029		1.00	-0.02	-0.43	0.16	-0.03	0.01	-0.01	0.01	-0.57	0.02
Cy	**-61.6353**	0.037			1.00	0.04	-0.05	0.02	0.04	-0.05	0.07	0.02	-0.76
B1	**0.494178**	0.014				1.00	0.04	0.04	-0.02	0.02	-0.01	0.42	-0.04
B2	**-0.175994**	0.014					1.00	0.00	0.03	-0.04	0.05	-0.16	0.07
K1	**-0.0830234**	3.8e-05						1.00	-0.97	0.92	-0.87	0.02	-0.04
K2	**-0.110316**	0.00017							1.00	-0.99	0.96	-0.01	-0.02
K3	**0.18094**	0.00028								1.00	-0.99	0.01	0.03
K4	**-0.116715**	0.00016									1.00	-0.01	-0.04
P1	**7.40281e-05**	1.1e-06										1.00	-0.03
P2	**-0.000288496**	1.4e-06											1.00

Table 2. Calibration coefficients and correlation matrix.
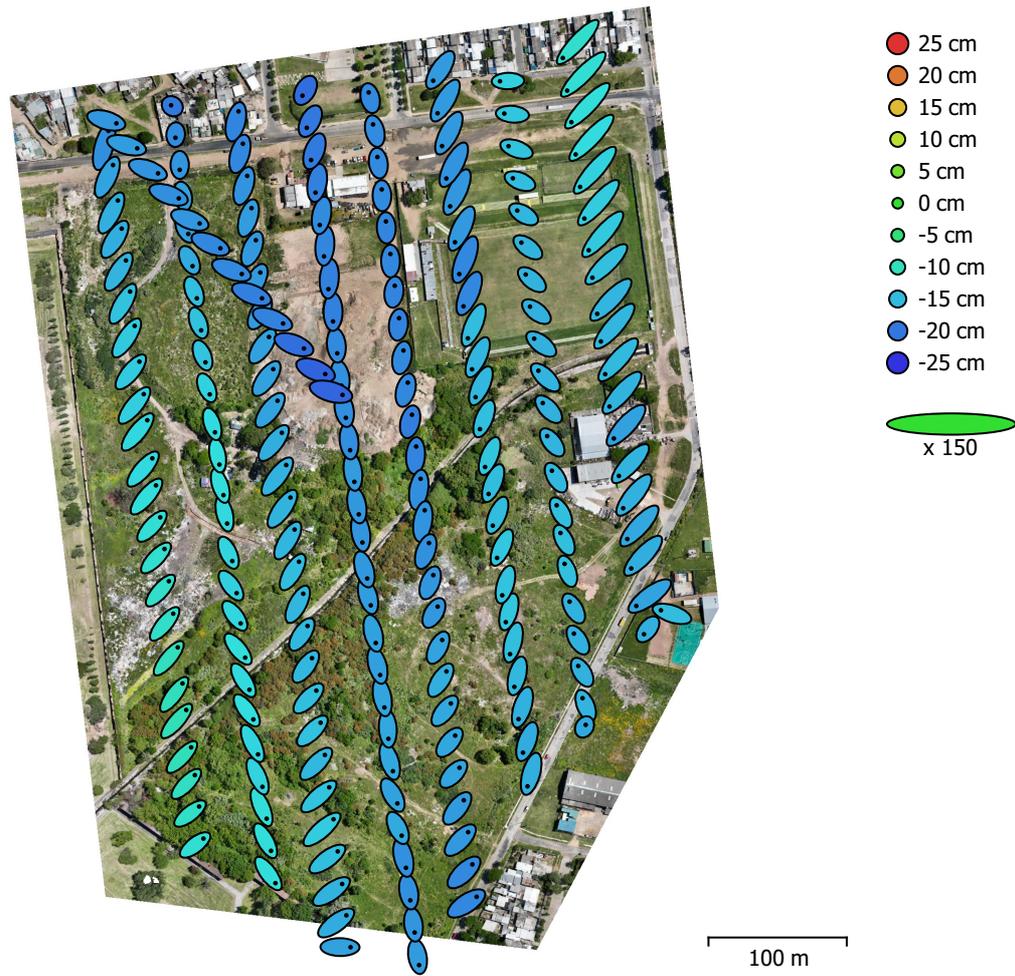
Camera Locations

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 (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total error (cm)
6.82054	9.20944	16.1301	11.4601	19.7867

Table 3. Average camera location error.

X - Easting, Y - Northing, Z - Altitude.
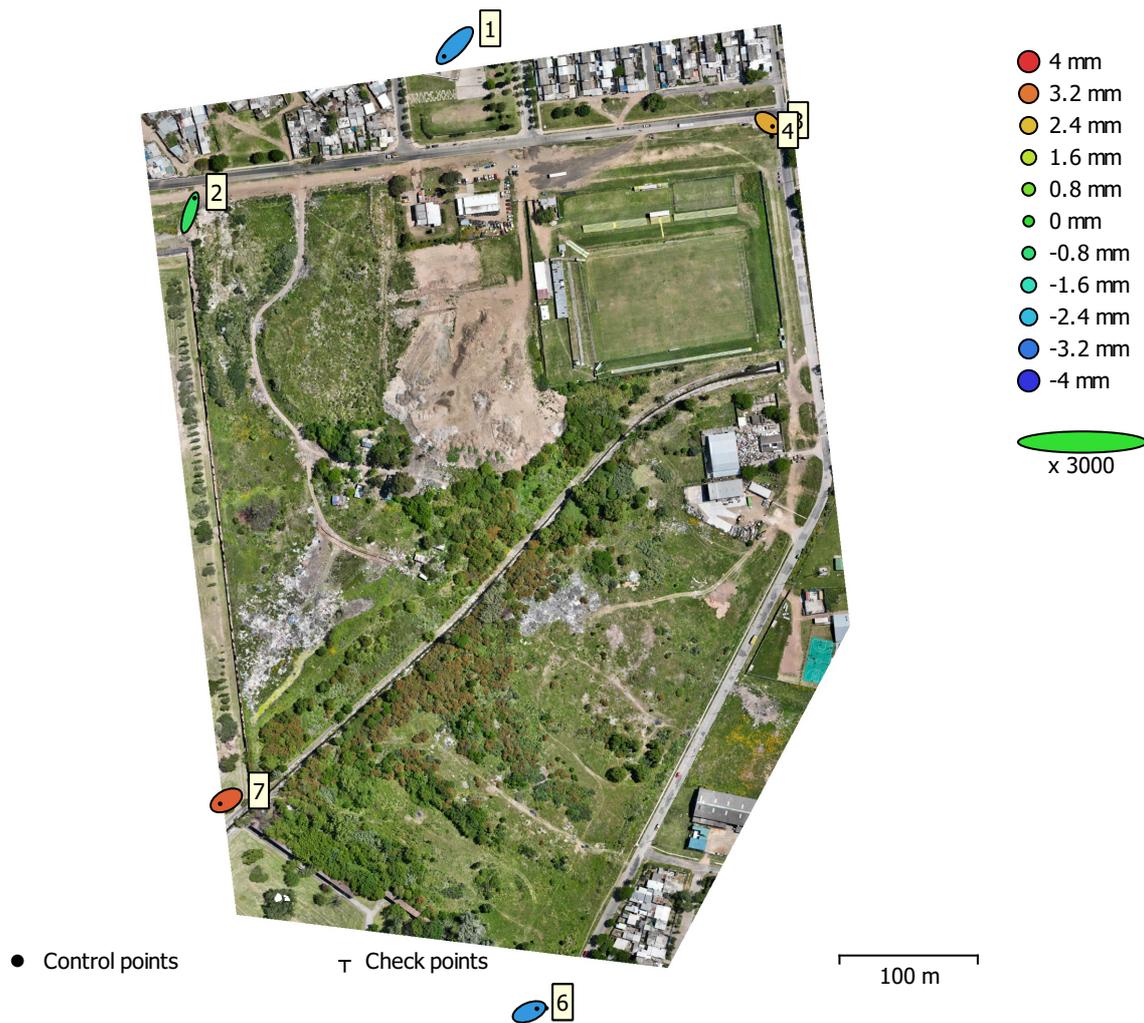
Ground Control Points

Fig. 4. GCP locations and error estimates.

Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.

Estimated GCP locations are marked with a dot or crossing.

Count	X error (mm)	Y error (mm)	Z error (mm)	XY error (mm)	Total (mm)
5	3.43039	4.12724	2.65588	5.36672	5.98793

Table 4. Control points RMSE.

X - Easting, Y - Northing, Z - Altitude.

Label	X error (mm)	Y error (mm)	Z error (mm)	Total (mm)	Image (pix)
1	-5.14969	-5.29275	-2.78274	7.89152	0.768 (4)
2	2.24112	7.03317	-0.532367	7.40078	0.441 (10)
3	2.18436	-1.6364	2.64762	3.80252	0.535 (5)
4					
5					
6	3.69823	1.53079	-2.8247	4.89889	0.523 (6)
7	-2.97452	-1.63423	3.50036	4.87555	0.428 (6)
Total	**3.43039**	**4.12724**	**2.65588**	**5.98793**	**0.523**

Table 5. Control points.

X - Easting, Y - Northing, Z - Altitude.

Digital Elevation Model
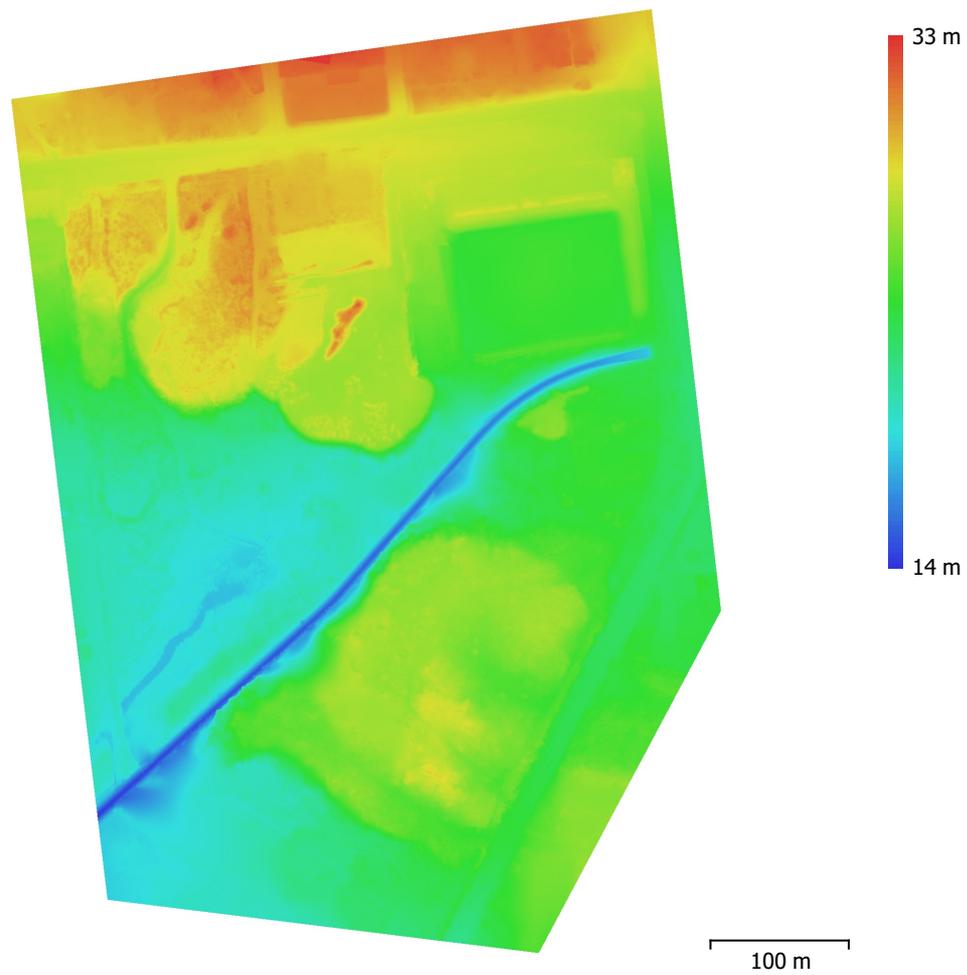
Fig. 5. Reconstructed digital elevation model.

Resolution:	6.41 cm/pix
Point density:	243 points/m²

Processing Parameters

General

Cameras	205
Aligned cameras	205
Markers	7
Shapes	
LineString	50187
Polygon	1
Coordinate system	WGS 84 / UTM zone 21S EGM08
Rotation angles	Yaw, Pitch, Roll

Tie Points

Points	125,067 of 139,483
RMS reprojection error	0.205721 (0.666801 pix)
Max reprojection error	0.775681 (32.0084 pix)
Mean key point size	2.89351 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	6.388
Alignment parameters	
Accuracy	High
Generic preselection	No
Reference preselection	Source
Key point limit	40,000
Tie point limit	4,000
Exclude stationary tie points	Yes
Guided image matching	No
Adaptive camera model fitting	Yes
Matching time	11 minutes 29 seconds
Matching memory usage	1010.84 MB
Alignment time	1 minutes 14 seconds
Alignment memory usage	104.28 MB
Optimization parameters	
Parameters	f, b1, b2, cx, cy, k1-k4, p1, p2
Adaptive camera model fitting	Yes
Optimization time	3 seconds
Date created	2023:11:28 07:58:21
Software version	1.7.2.12070
File size	16.88 MB

Depth Maps

Count	205
Depth maps generation parameters	
Quality	High
Filtering mode	Aggressive
Processing time	1 hours 44 minutes
Memory usage	6.20 GB
Date created	2023:11:28 17:38:51
Software version	1.7.2.12070
File size	1.61 GB

Point Cloud

Points	109,104,012
Point attributes	

Color	3 bands, uint8
Normal	
Confidence	1 - 36
Point classes	
Created (never classified)	43,437,833
Ground	65,605,214
Low Point (noise)	60,965
Depth maps generation parameters	
Quality	High
Filtering mode	Aggressive
Processing time	1 hours 44 minutes
Memory usage	6.20 GB
Point cloud generation parameters	
Processing time	32 minutes 44 seconds
Memory usage	8.64 GB
Ground points classification parameters	
Max angle (°)	15
Max distance (m)	0.2
Cell size (m)	50
Classification time	4 minutes 53 seconds
Classification memory usage	4.32 GB
Date created	2023:11:28 18:11:36
Software version	1.7.2.12070
File size	1.54 GB
DEM	
Size	8,764 x 11,777
Coordinate system	WGS 84 / UTM zone 21S EGM08
Reconstruction parameters	
Source data	Point cloud
Interpolation	Enabled
Processing time	1 minutes 10 seconds
Memory usage	337.46 MB
Date created	2023:12:20 15:48:33
Software version	1.7.2.12070
File size	329.47 MB
Orthomosaic	
Size	17,529 x 23,554
Coordinate system	WGS 84 / UTM zone 21S EGM08
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Enable ghosting filter	No
Processing time	5 minutes 50 seconds
Memory usage	4.45 GB
Date created	2023:11:29 11:29:50
Software version	1.7.2.12070
File size	6.27 GB
System	
Software name	Agisoft Metashape Professional
Software version	2.1.0 build 17532
OS	Windows 64 bit
RAM	63.93 GB
CPU	Intel(R) Core(TM) i7-9700F CPU @ 3.00GHz
GPU(s)	Intel(R) FPGA Emulation Device