

THE VELVARY GATE

Processing Report

15 May 2024



Survey Data

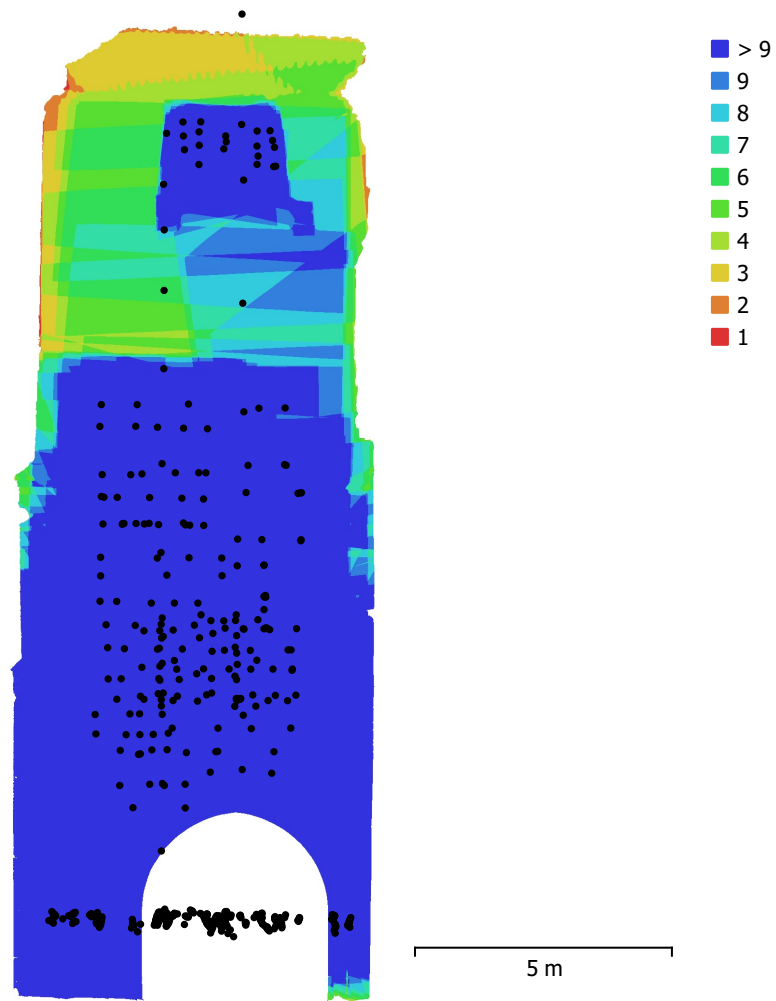


Fig. 1. Camera locations and image overlap.

Number of images:	538	Camera stations:	538
Flying altitude:	2.82 m	Tie points:	147,596
Ground resolution:	0.452 mm/pix	Projections:	924,037
Coverage area:	112 m ²	Reprojection error:	0.511 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
M3M (12.29mm)	5280 x 3956	12.29 mm	3.36 x 3.36 μ m	No
NIKON D7100 (50mm)	6000 x 4000	50 mm	4 x 4 μ m	No

Table 1. Cameras.

Camera Calibration

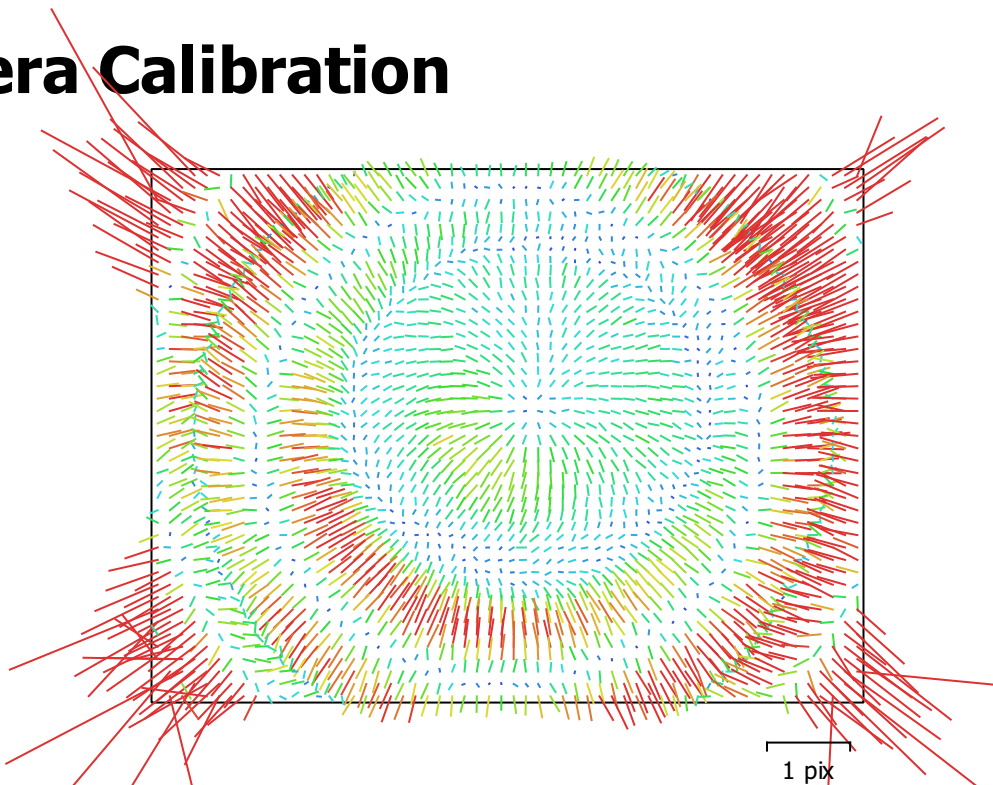


Fig. 2. Image residuals for M3M (12.29mm).

M3M (12.29mm)

219 images

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

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	3735.93	0.049	1.00	0.01	0.03	-0.04	0.08	-0.03	-0.04	-0.03
Cx	32.8028	0.052		1.00	-0.01	0.06	-0.08	0.08	0.91	-0.01
Cy	-30.4772	0.052			1.00	-0.04	0.06	-0.07	-0.01	0.89
K1	0.0158162	2.5e-05				1.00	-0.96	0.91	0.06	-0.03
K2	-0.0574179	8.7e-05					1.00	-0.98	-0.07	0.05
K3	0.0837337	9.2e-05						1.00	0.07	-0.06
P1	0.000769695	3.4e-06							1.00	-0.01
P2	-0.00121435	3.2e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Calibration

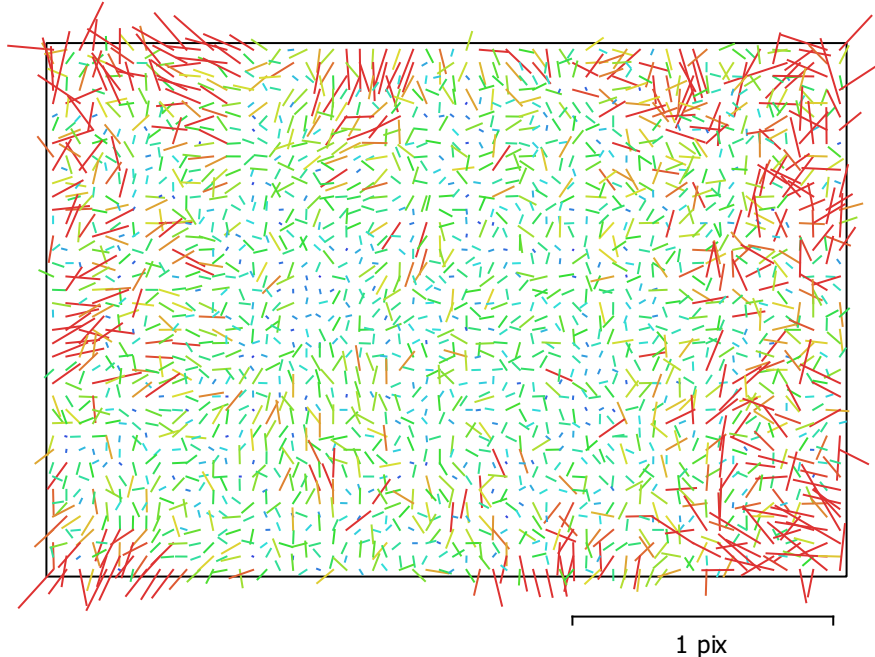


Fig. 3. Image residuals for NIKON D7100 (50mm).

NIKON D7100 (50mm)

319 images

Type	Resolution	Focal Length	Pixel Size
Frame	6000 x 4000	50 mm	4 x 4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	12106.3	0.26	1.00	-0.04	-0.23	-0.06	0.12	-0.10	-0.02	-0.18
Cx	-49.171	0.56		1.00	0.01	0.02	-0.03	0.04	0.99	0.01
Cy	13.9648	0.52			1.00	-0.03	0.00	0.00	0.00	0.98
K1	0.161506	0.00029				1.00	-0.96	0.91	0.02	-0.02
K2	0.507031	0.0083					1.00	-0.98	-0.03	0.00
K3	-0.968396	0.07						1.00	0.03	0.00
P1	-0.000421047	2.3e-05							1.00	0.00
P2	-0.000669096	2e-05								1.00

Table 3. Calibration coefficients and correlation matrix.

Ground Control Points

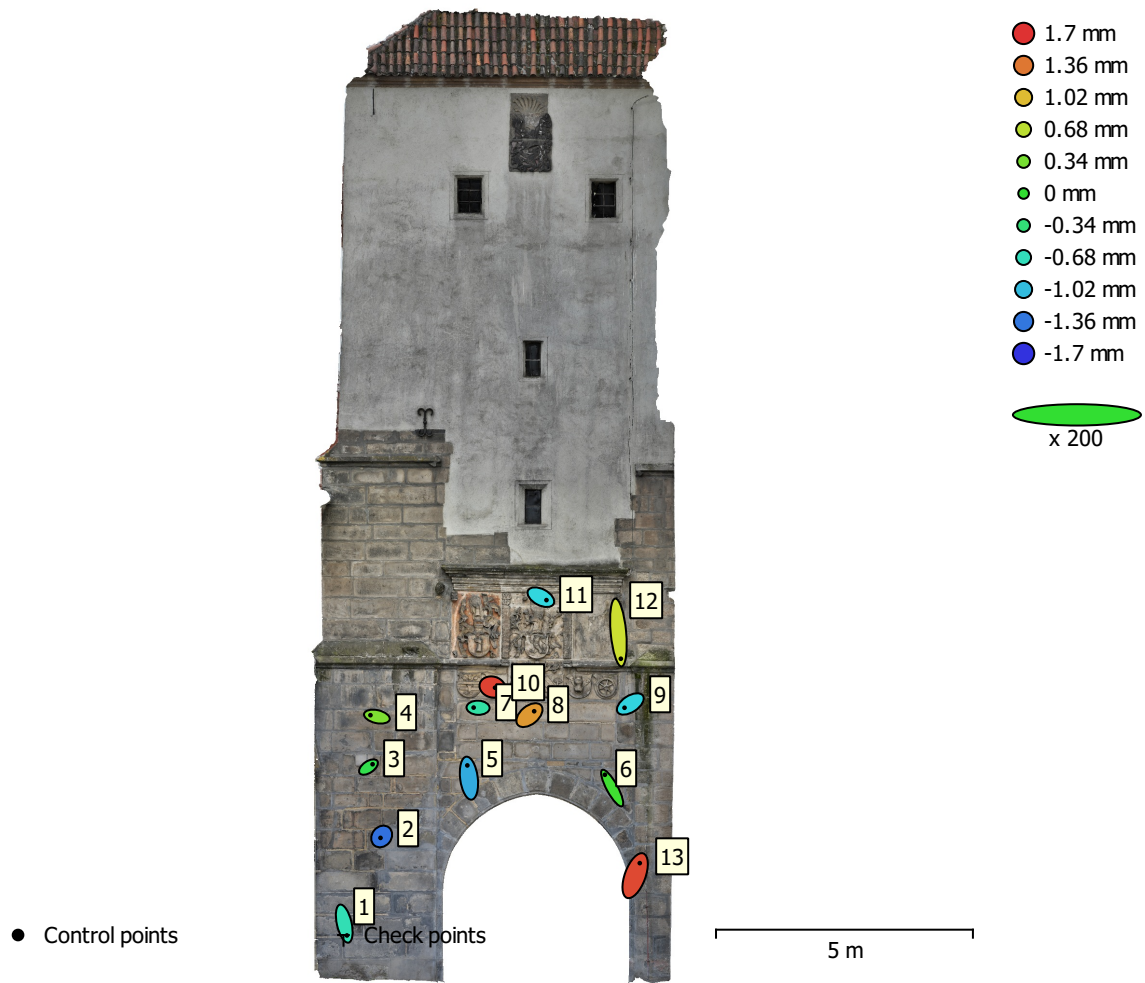


Fig. 4. GCP locations and error estimates.

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)
13	0.876419	2.00244	0.992324	2.18584	2.40054

Table 4. Control points RMSE.

Label	X error (mm)	Y error (mm)	Z error (mm)	Total (mm)	Image (pix)
1	0.525797	-2.30263	-0.643029	2.44787	1.184 (14)
2	-0.229417	-0.279119	-1.38811	1.43436	0.893 (23)
3	0.799893	0.548738	-0.136155	0.97953	1.128 (38)
4	-1.25441	0.27934	0.375053	1.33875	1.097 (39)
5	-0.312539	2.48453	-1.10327	2.73638	0.867 (48)
6	-1.41569	2.59006	0.069806	2.95254	0.918 (35)
7	-0.865539	0.0303521	-0.557603	1.03005	0.844 (49)
8	0.918178	0.755795	1.19515	1.68602	0.938 (32)
9	-1.13042	-0.735126	-0.901202	1.62186	0.994 (17)
10	0.504938	-0.13179	1.62254	1.7044	1.227 (13)
11	1.08897	-0.570362	-0.886508	1.5156	0.977 (11)
12	0.47129	-5.10767	0.764052	5.18596	1.550 (12)
13	0.898955	2.43788	1.58928	3.04585	0.699 (3)
Total	0.876419	2.00244	0.992324	2.40054	1.007

Table 5. Control points.

Digital Elevation Model

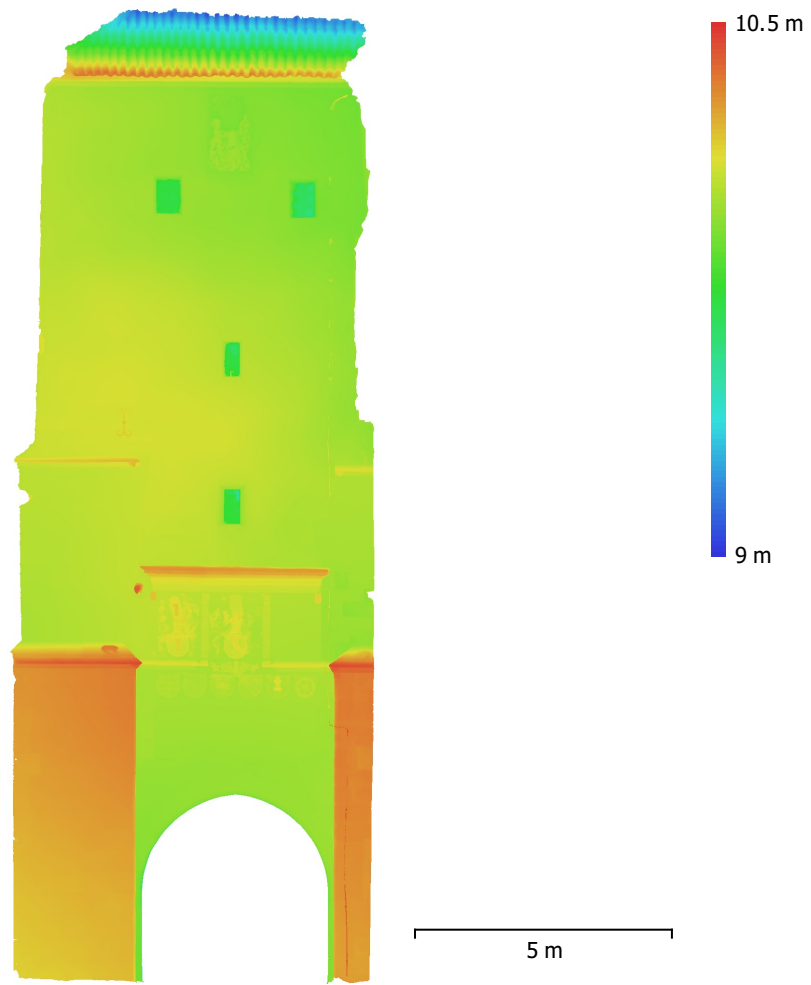


Fig. 5. Reconstructed digital elevation model.

Resolution: 1.28 mm/pix
Point density: 60.6 points/cm²

Processing Parameters

General

Cameras	538
Aligned cameras	538
Markers	13
Coordinate system	Local Coordinates (m)
Rotation angles	Yaw, Pitch, Roll

Tie Points

Points	147,596 of 1,139,774
RMS reprojection error	0.170128 (0.51067 pix)
Max reprojection error	0.844234 (6.81669 pix)
Mean key point size	2.92904 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	4.96936

Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	No
Key point limit	40,000
Key point limit per Mpx	1,000
Tie point limit	10,000
Exclude stationary tie points	Yes
Guided image matching	No
Adaptive camera model fitting	Yes
Matching time	11 minutes 28 seconds
Matching memory usage	863.90 MB
Alignment time	12 minutes 24 seconds
Alignment memory usage	540.39 MB

Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	7 seconds
Date created	2024:04:08 09:09:01
Software version	2.1.0.17532
File size	93.13 MB

Depth Maps

Count	533
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Depth maps generation parameters

Quality	High
Filtering mode	Mild
Max neighbors	16
Processing time	1 hours 21 minutes
Memory usage	6.56 GB
Date created	2024:04:10 09:31:22
Software version	2.1.0.17532
File size	3.78 GB

Point Cloud

Points	156,203,147
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Point attributes

Color	3 bands, uint8
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Normal

Point classes

Created (never classified) 156,203,147

Depth maps generation parameters

Quality High
Filtering mode Mild
Max neighbors 16
Processing time 1 hours 21 minutes
Memory usage 6.56 GB

Point cloud generation parameters

Processing time 2 hours 19 minutes
Memory usage 19.56 GB
Date created 2024:04:10 11:51:07
Software version 2.1.0.17532
File size 2.30 GB

Model

Faces 27,512,426
Vertices 13,763,877
Vertex colors 3 bands, uint8
Texture 8,192 x 8,192, 4 bands, uint8

Depth maps generation parameters

Quality High
Filtering mode Mild
Max neighbors 16
Processing time 1 hours 21 minutes
Memory usage 6.56 GB

Reconstruction parameters

Surface type Arbitrary
Source data Depth maps
Interpolation Enabled
Strict volumetric masks No
Processing time 47 minutes 44 seconds
Memory usage 11.73 GB

Texturing parameters

Mapping mode Generic
Blending mode Mosaic
Texture size 8,192
Enable hole filling Yes
Enable ghosting filter Yes
UV mapping time 2 minutes 37 seconds
UV mapping memory usage 4.92 GB
Blending time 30 minutes 36 seconds
Blending memory usage 6.62 GB
Blending GPU memory usage 3.15 GB
Date created 2024:04:11 00:59:13
Software version 2.1.0.17532
File size 1.30 GB

Orthomosaic

Size 7,093 x 10,923
Coordinate system Local Coordinates (m)
Colors 3 bands, uint8

Reconstruction parameters

Blending mode Mosaic
Surface Model
Enable hole filling Yes
Enable ghosting filter Yes

Processing time	11 minutes 3 seconds
Memory usage	17.38 GB
Date created	2024:05:03 10:25:37
Software version	2.1.0.17532
File size	2.40 GB

System

Software name	Agisoft Metashape Professional
Software version	2.1.0 build 17532
OS	Windows 64 bit
RAM	31.94 GB
CPU	Intel(R) Core(TM) i7-9700K CPU @ 3.60GHz
GPU(s)	Quadro P2000