

Sheboygan_May2018 Photoscan Report

Processing Report
27 June 2019



Survey Data

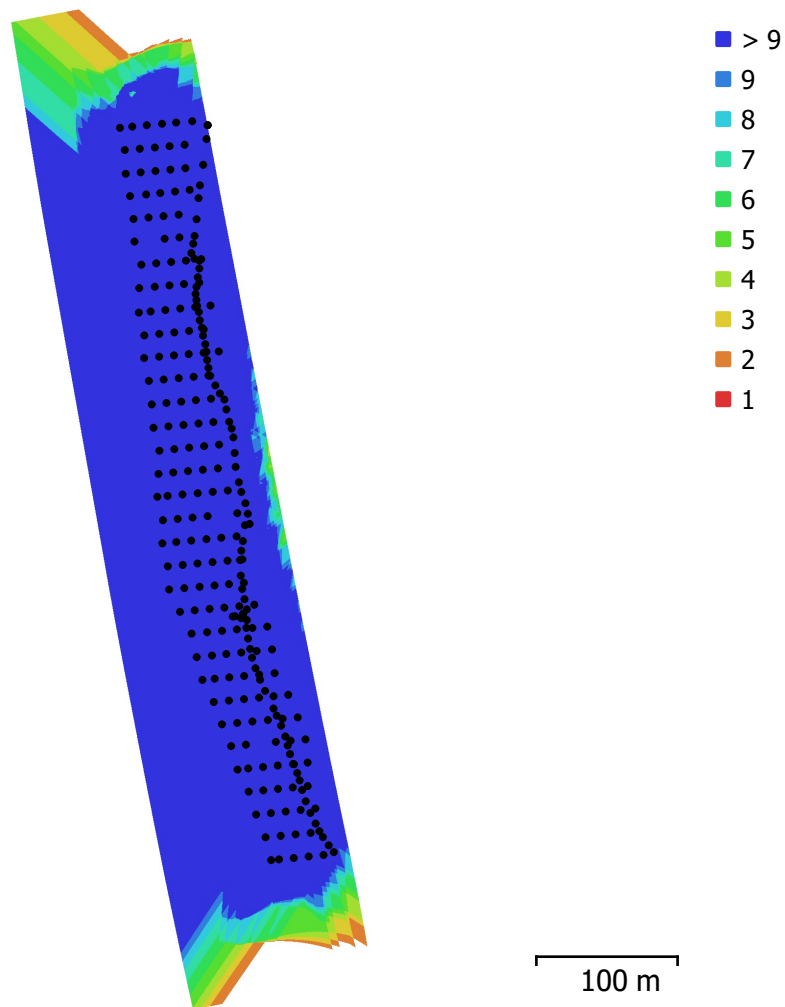


Fig. 1. Camera locations and image overlap.

Number of images:	254	Camera stations:	254
Flying altitude:	53.7 m	Tie points:	436,165
Ground resolution:	1.34 cm/pix	Projections:	1,555,402
Coverage area:	0.0864 km ²	Reprojection error:	0.535 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
FC6310 (8.8mm)	5464 x 3640	8.8 mm	2.42 x 2.42 μ m	No
FC6310 (8.8mm)	5464 x 3640	8.8 mm	2.42 x 2.42 μ m	No

Table 1. Cameras.

Camera Calibration

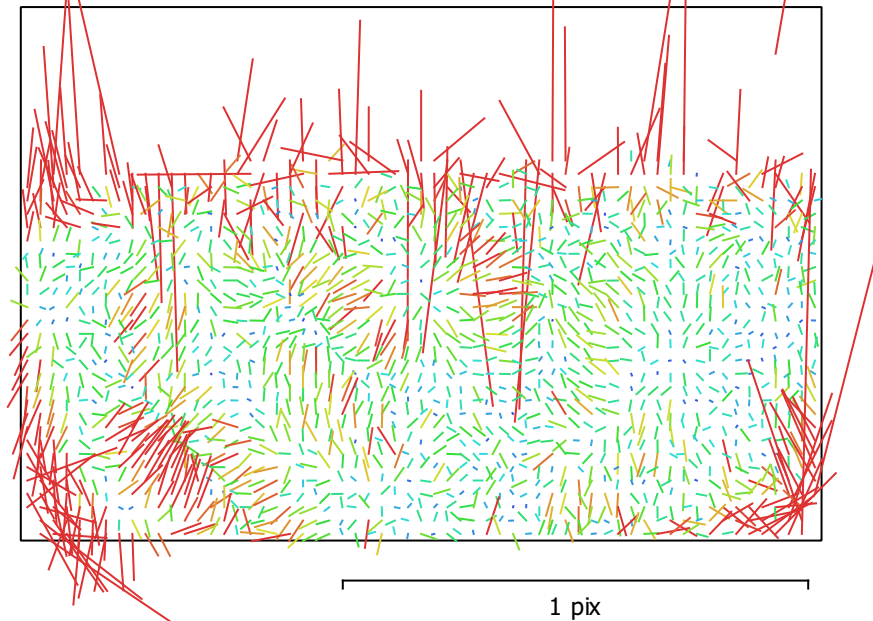


Fig. 2. Image residuals for FC6310 (8.8mm).

FC6310 (8.8mm)

78 images

Type
Frame

Resolution
5464 x 3640

Focal Length
8.8 mm

Pixel Size
2.42 x 2.42 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	P1	P2	P3	P4
K4	0.0142247													
F	3659.59	0.29	1.00	0.01	0.26	-0.97	0.14	-0.37	0.18	-0.14	-0.24	-0.27	0.18	-0.02
Cx	-11.4991	0.14		1.00	0.03	-0.04	0.45	0.06	-0.01	0.01	-0.22	-0.17	0.17	-0.13
Cy	41.7929	0.066			1.00	-0.34	0.20	-0.06	0.07	-0.02	-0.46	-0.72	0.38	-0.11
B1	-2.62223	0.25				1.00	-0.19	0.29	-0.15	0.11	0.28	0.34	-0.22	0.04
B2	0.312327	0.12					1.00	0.04	-0.01	0.01	-0.45	-0.38	0.37	-0.19
K1	-0.270577	2.1e-05						1.00	-0.92	0.85	-0.03	-0.03	0.03	-0.03
K2	0.128251	4.6e-05							1.00	-0.98	0.03	0.02	-0.05	0.06
K3	-0.0601834	3.2e-05								1.00	-0.04	-0.05	0.06	-0.08
P1	8.84227e-05	5.4e-06									1.00	0.92	-0.95	0.56
P2	4.41421e-05	3.1e-06										1.00	-0.87	0.51
P3	1.6231	0.18											1.00	-0.79
P4	0.0562777	0.071												1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Calibration

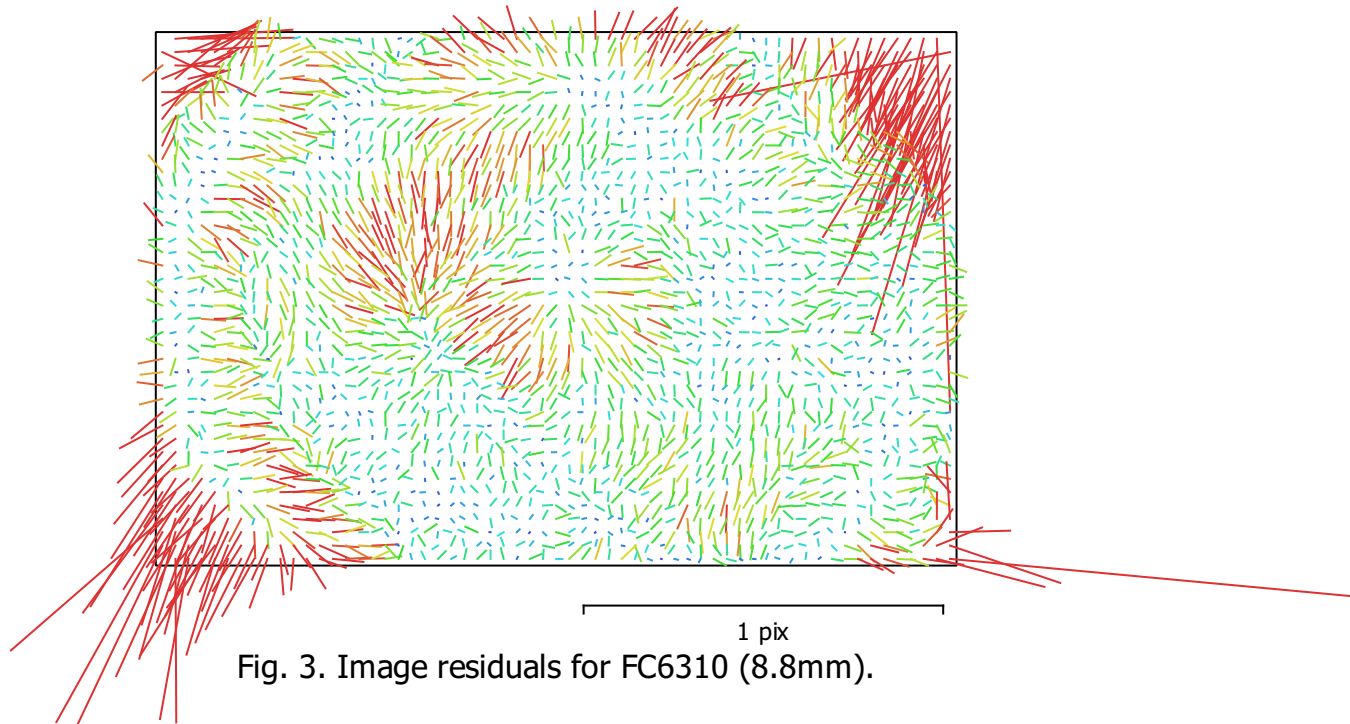


Fig. 3. Image residuals for FC6310 (8.8mm).

FC6310 (8.8mm)

176 images

Type
Frame

Resolution
5464 x 3640

Focal Length
8.8 mm

Pixel Size
2.42 x 2.42 μ m

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	P1	P2	P3	P4
K4	0.0147849													
F	3659.41	0.33	1.00	0.05	-0.32	-0.30	0.13	-0.98	0.87	-0.69	0.05	0.24	-0.06	0.04
Cx	-9.11067	0.016		1.00	-0.12	-0.09	-0.00	-0.05	0.05	-0.05	0.06	0.13	-0.10	0.07
Cy	39.9005	0.011			1.00	0.05	-0.22	0.32	-0.29	0.23	0.20	-0.00	-0.26	0.24
B1	2.25674	0.041				1.00	-0.03	0.19	-0.20	0.20	0.15	-0.00	-0.00	-0.02
B2	-2.28998	0.034					1.00	-0.13	0.12	-0.11	0.07	0.19	-0.06	0.04
K1	-0.271295	4.4e-05						1.00	-0.94	0.79	-0.06	-0.25	0.06	-0.04
K2	0.129043	3.5e-05							1.00	-0.95	0.05	0.22	-0.06	0.04
K3	-0.0610766	1.6e-05								1.00	-0.03	-0.18	0.05	-0.04
P1	0.000220628	9e-07									1.00	0.83	-0.84	0.71
P2	0.000308293	1.2e-06										1.00	-0.86	0.73
P3	-0.132669	0.0095											1.00	-0.96
P4	0.216809	0.007												1.00

Table 3. Calibration coefficients and correlation matrix.

Ground Control Points

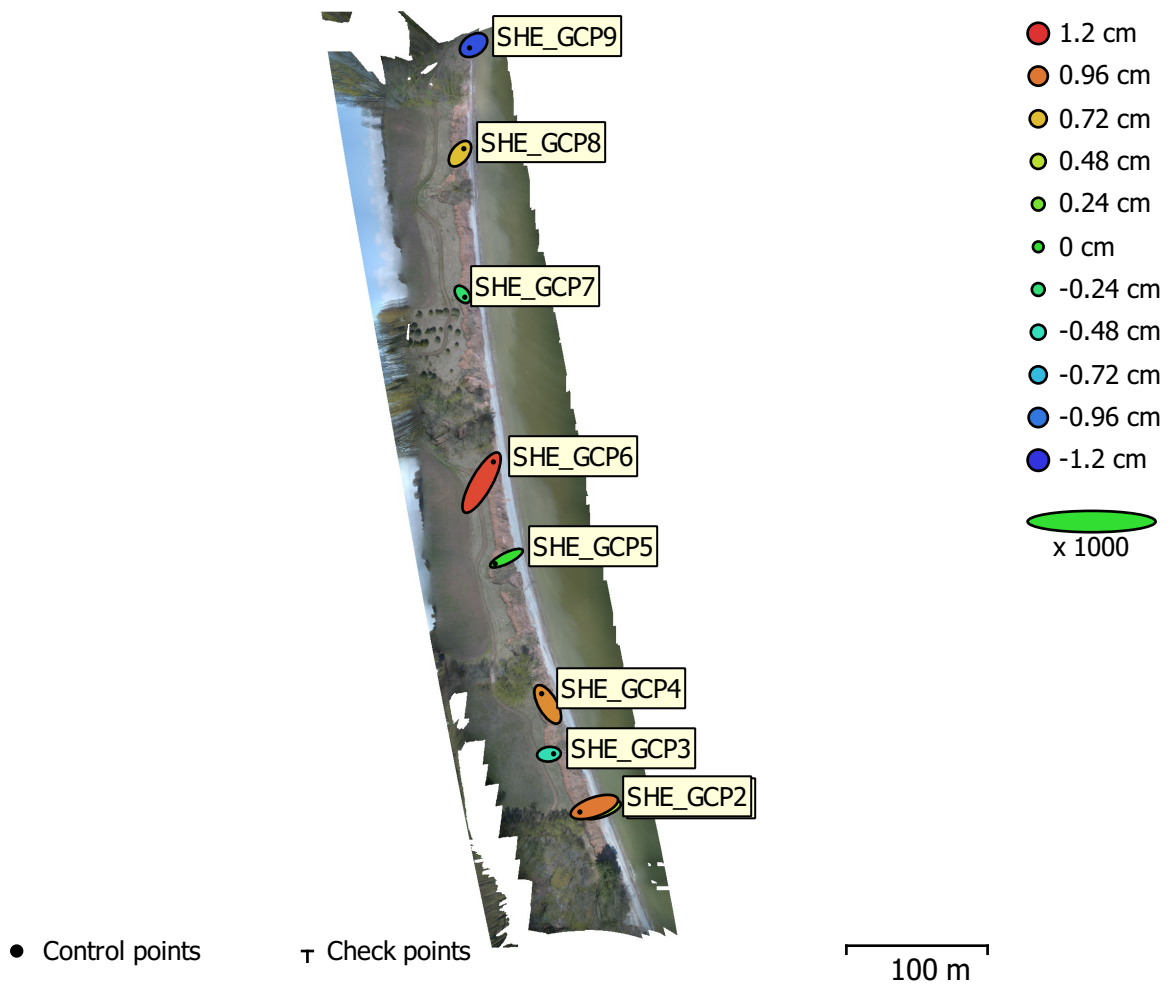


Fig. 4. GCP locations and error estimates.

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 (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
9	1.26596	1.21212	0.752499	1.75268	1.90739

Table 4. Control points RMSE.

X - Longitude, Y - Latitude, Z - Altitude.

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
SHE_GCP1	-1.72066	-0.584379	0.444492	1.87076	0.253 (31)
SHE_GCP2	-2.04921	-0.706522	0.955386	2.36879	0.239 (29)
SHE_GCP3	0.651987	0.0612005	-0.443178	0.79072	0.320 (28)
SHE_GCP4	-0.863868	1.51112	0.885549	1.95294	0.269 (31)
SHE_GCP5	-1.60289	-0.797459	0.0137056	1.79036	0.276 (34)
SHE_GCP6	1.67145	2.9406	1.12326	3.56407	0.241 (37)
SHE_GCP7	0.324476	-0.404205	-0.20648	0.557943	0.425 (33)
SHE_GCP8	0.545417	0.705236	0.708128	1.13854	0.175 (31)
SHE_GCP9	-0.571719	-0.389172	-1.09516	1.29526	0.054 (6)
Total	1.26596	1.21212	0.752499	1.90739	0.280

Table 5. Control points.
X - Longitude, Y - Latitude, Z - Altitude.

Digital Elevation Model

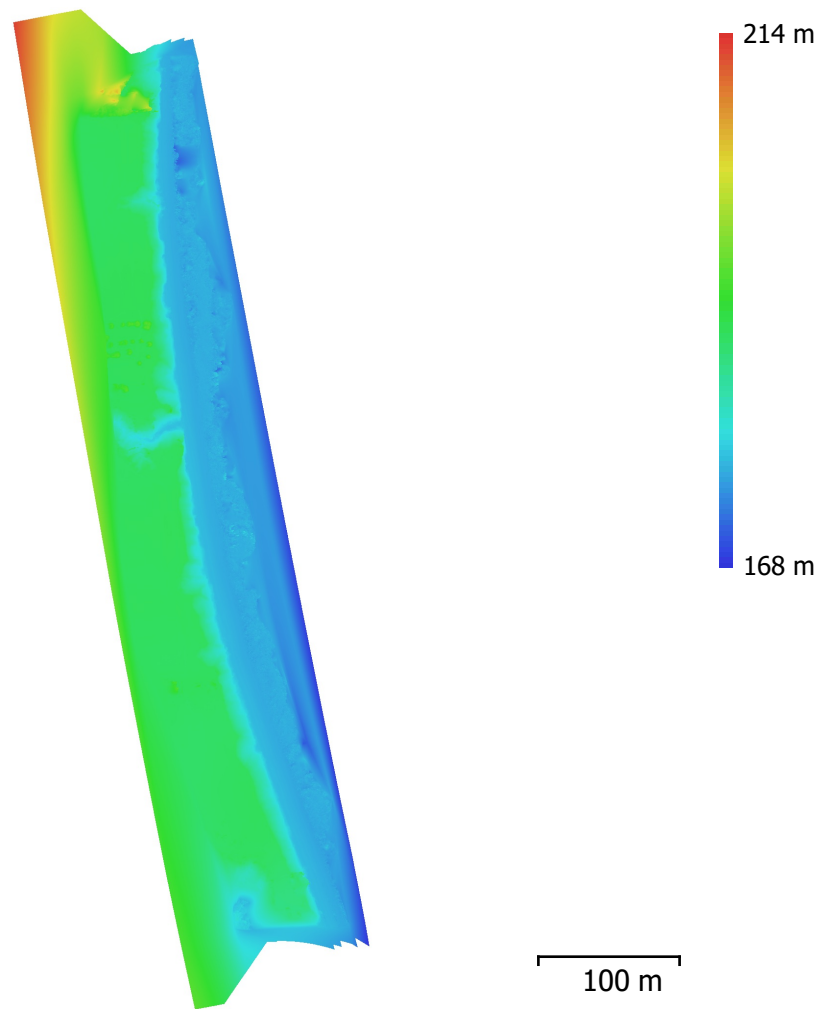


Fig. 5. Reconstructed digital elevation model.

Resolution: 2.69 cm/pix
Point density: 13.9 points/cm²

Processing Parameters

General

Cameras	254
Aligned cameras	254
Markers	9
Coordinate system	WGS 84 (EPSG::4326)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	436,165 of 485,981
RMS reprojection error	0.121448 (0.535164 pix)
Max reprojection error	0.815892 (35.1627 pix)
Mean key point size	3.48593 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.84253

Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	Yes
Key point limit	40,000
Tie point limit	10,000
Adaptive camera model fitting	Yes
Matching time	15 minutes 52 seconds
Alignment time	6 minutes 32 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k3, p1-p4
Adaptive camera model fitting	No
Optimization time	20 seconds

Depth Maps

Count	254
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	3 hours 29 minutes

Dense Point Cloud

Points	75,611,394
Point colors	3 bands, uint16

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	3 hours 29 minutes
Dense cloud generation time	1 hours 7 minutes

Model

Faces	15,095,493
Vertices	7,549,256
Vertex colors	3 bands, uint16

Reconstruction parameters

Surface type	Height field
Source data	Dense
Interpolation	Enabled
Quality	High
Depth filtering	Aggressive
Face count	15,122,278
Processing time	5 minutes 24 seconds

Orthomosaic

Size	18,353 x 52,741
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Coordinate system	WGS 84 / UTM zone 16N (EPSG::32616)
Colors	3 bands, uint16
Reconstruction parameters	
Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Processing time	50 minutes 29 seconds
Software	
Version	1.4.3 build 6529
Platform	Windows 64