2021

Processing Report
19 October 2021

Survey Data

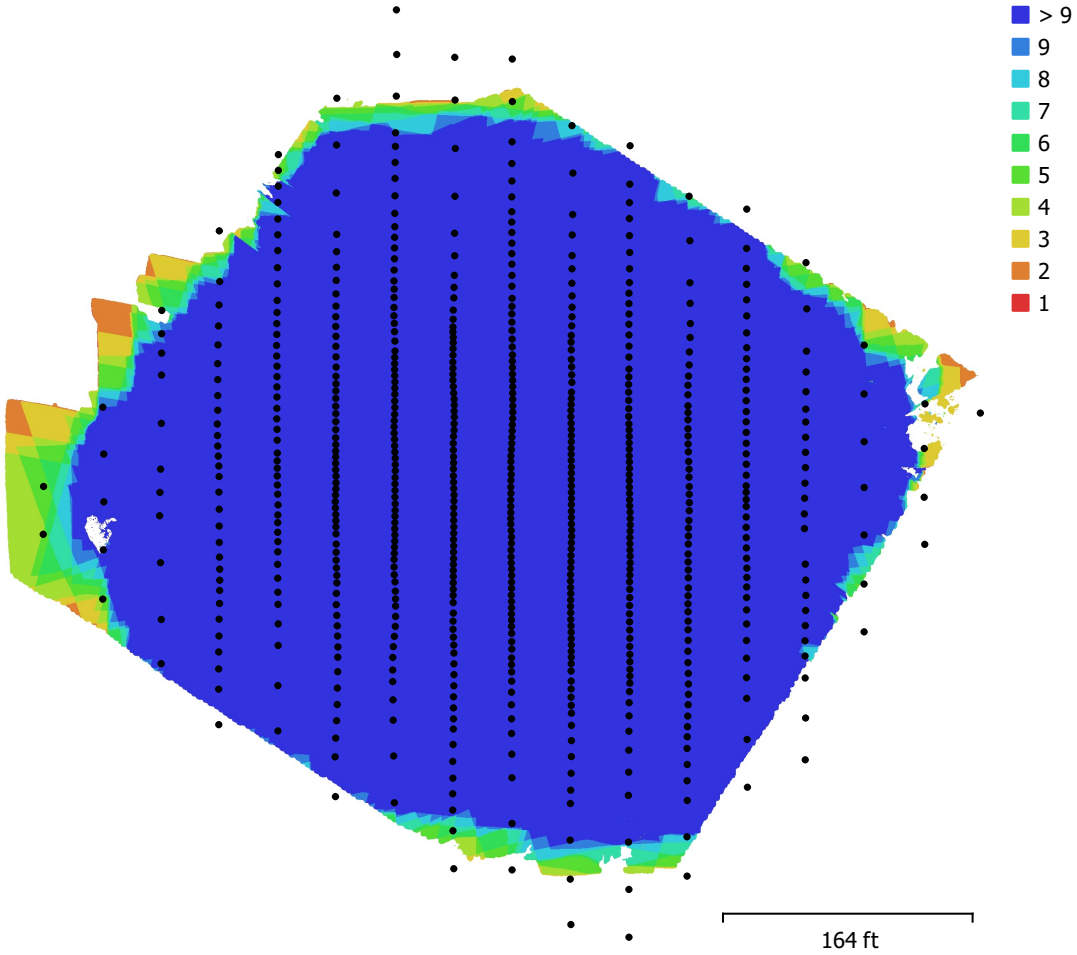

Fig. 1. Camera locations and image overlap.

Number of images:	659	Camera stations:	659
Flying altitude:	139 ft	Tie points:	343,557
Ground resolution:	0.0166 ft/pix	Projections:	1,936,065
Coverage area:	2.32e+04 yd²	Reprojection error:	0.896 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
ZenmuseP1 (35mm)	8192 x 5460	35 mm	4.39 x 4.39 µm	Yes

Table 1. Cameras.

Camera Calibration

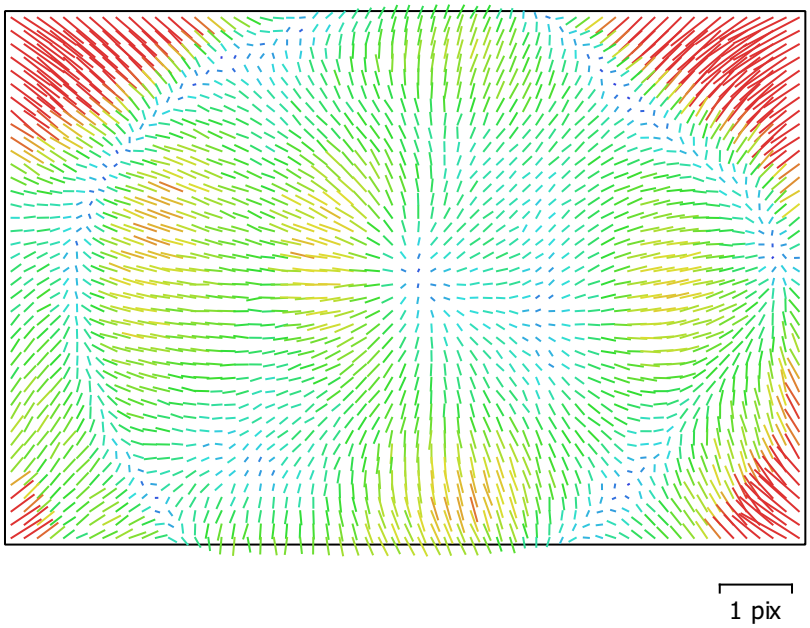

Fig. 2. Image residuals for ZenmuseP1 (35mm).

ZenmuseP1 (35mm)

659 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
Frame	**8192 x 5460**	**35 mm**	**4.39 x 4.39 µm**

F:	8186.95		
Cx:	-30.17	B1:	0
Cy:	12.95	B2:	0
K1:	-0.0507822	P1:	-2.071e-05
K2:	0.0250825	P2:	0.00037501
K3:	-0.111068	P3:	0
K4:	0	P4:	0

Camera Locations

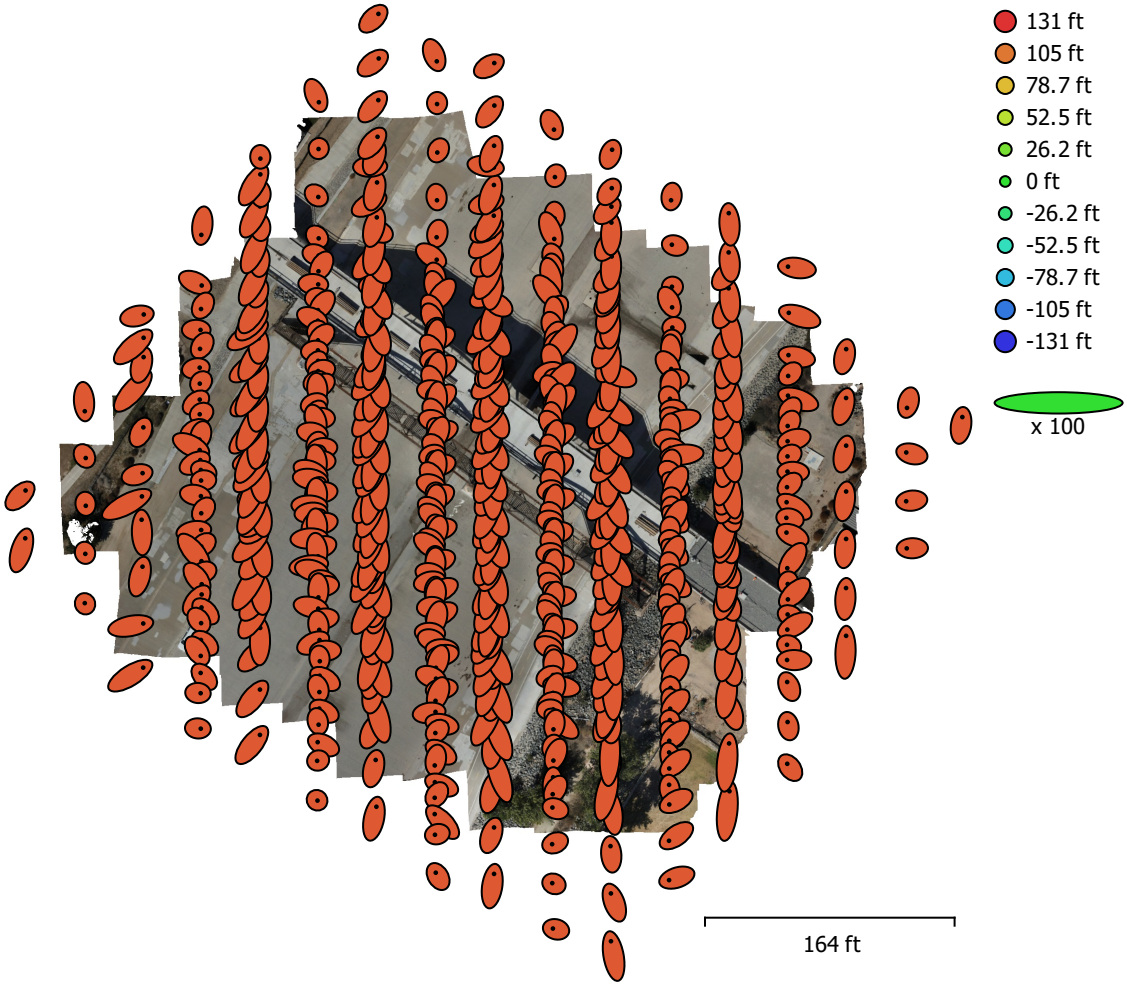

Fig. 3. Camera locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated camera locations are marked with a black dot.

X error (ft)	Y error (ft)	Z error (ft)	XY error (ft)	Total error (ft)
0.0587492	0.099235	116.54	0.115322	116.54

Table 2. Average camera location error.
X - Longitude, Y - Latitude, Z - Altitude.

Ground Control Points

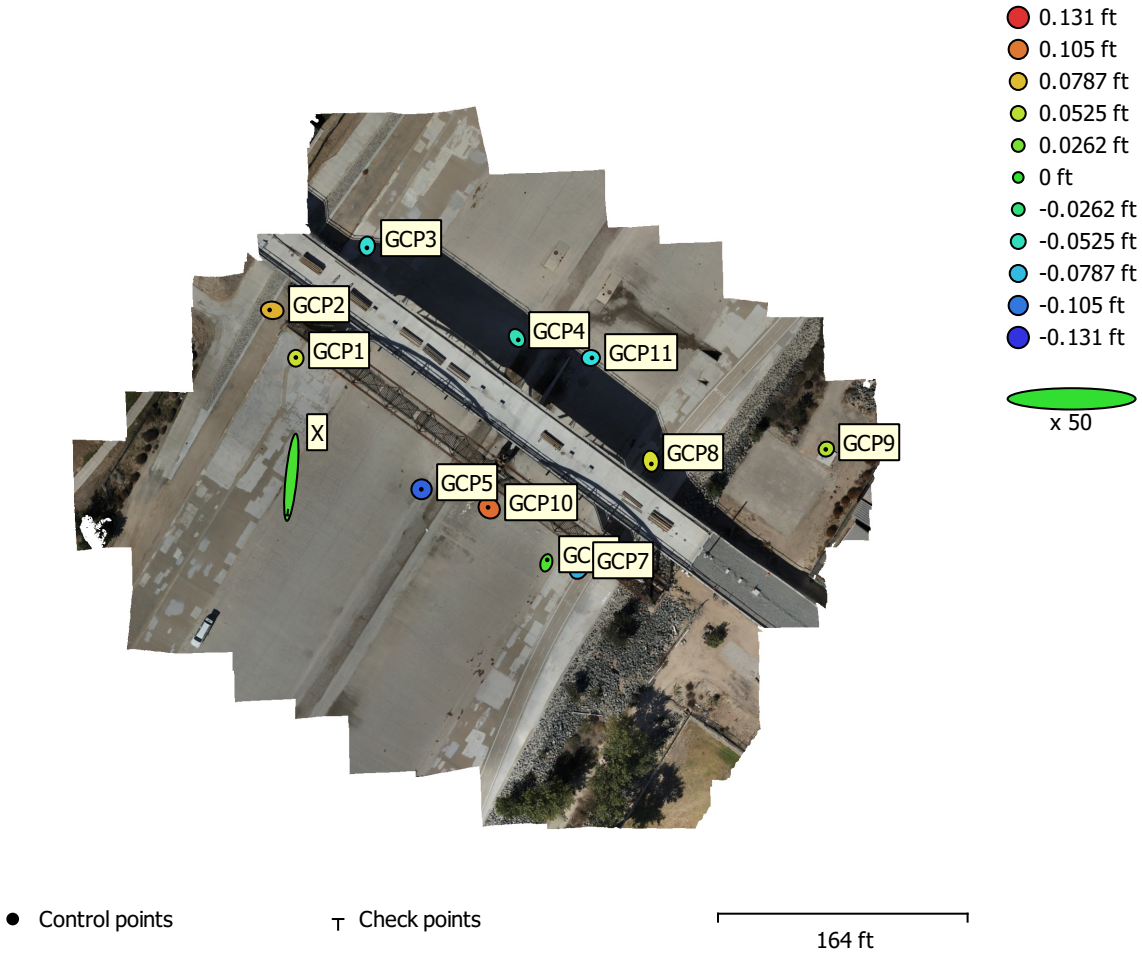

Fig. 4. GCP locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated GCP locations are marked with a dot or crossing.

Count	X error (ft)	Y error (ft)	Z error (ft)	XY error (ft)	Total (ft)
11	0.0286751	0.0408664	0.0731914	0.0499232	0.0885963

Table 3. Control points RMSE.
X - Longitude, Y - Latitude, Z - Altitude.

Count	X error (ft)	Y error (ft)	Z error (ft)	XY error (ft)	Total (ft)
1	0.102623	0.999397	0.00808972	1.00465	1.00468

Table 4. Check points RMSE.
X - Longitude, Y - Latitude, Z - Altitude.

Label	X error (ft)	Y error (ft)	Z error (ft)	Total (ft)	Image (pix)
GCP1	0.00098803	0.0190987	0.0578113	0.0608924	0.556 (8)
GCP2	-0.0689531	0.00862937	0.0832128	0.108413	0.601 (9)
GCP3	-0.00314867	-0.044868	-0.0618269	0.0764566	0.673 (7)
GCP4	0.0330235	-0.0492552	-0.0500073	0.0775716	1.144 (8)
GCP5	-0.0059713	-0.000222858	-0.112918	0.113076	0.794 (8)
GCP6	0.0224609	0.0779883	0.0112656	0.0819364	0.833 (8)
GCP7	0.0226493	0.0436209	-0.0833897	0.0967967	0.802 (8)
GCP8	0.0123751	-0.070425	0.0625598	0.0950082	0.571 (6)
GCP9	-0.0142073	-0.00866104	0.0486458	0.0514128	0.630 (7)
GCP10	-0.0294449	0.0215933	0.109582	0.115505	1.086 (8)
GCP11	0.0302285	0.00250125	-0.0649417	0.0716759	1.166 (9)
Total	**0.0286751**	**0.0408664**	**0.0731914**	**0.0885963**	**0.846**

Table 5. Control points.

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

Label	X error (ft)	Y error (ft)	Z error (ft)	Total (ft)	Image (pix)
X	-0.102623	-0.999397	0.00808972	1.00468	0.415 (7)
Total	**0.102623**	**0.999397**	**0.00808972**	**1.00468**	**0.415**

Table 6. Check points.

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

Digital Elevation Model

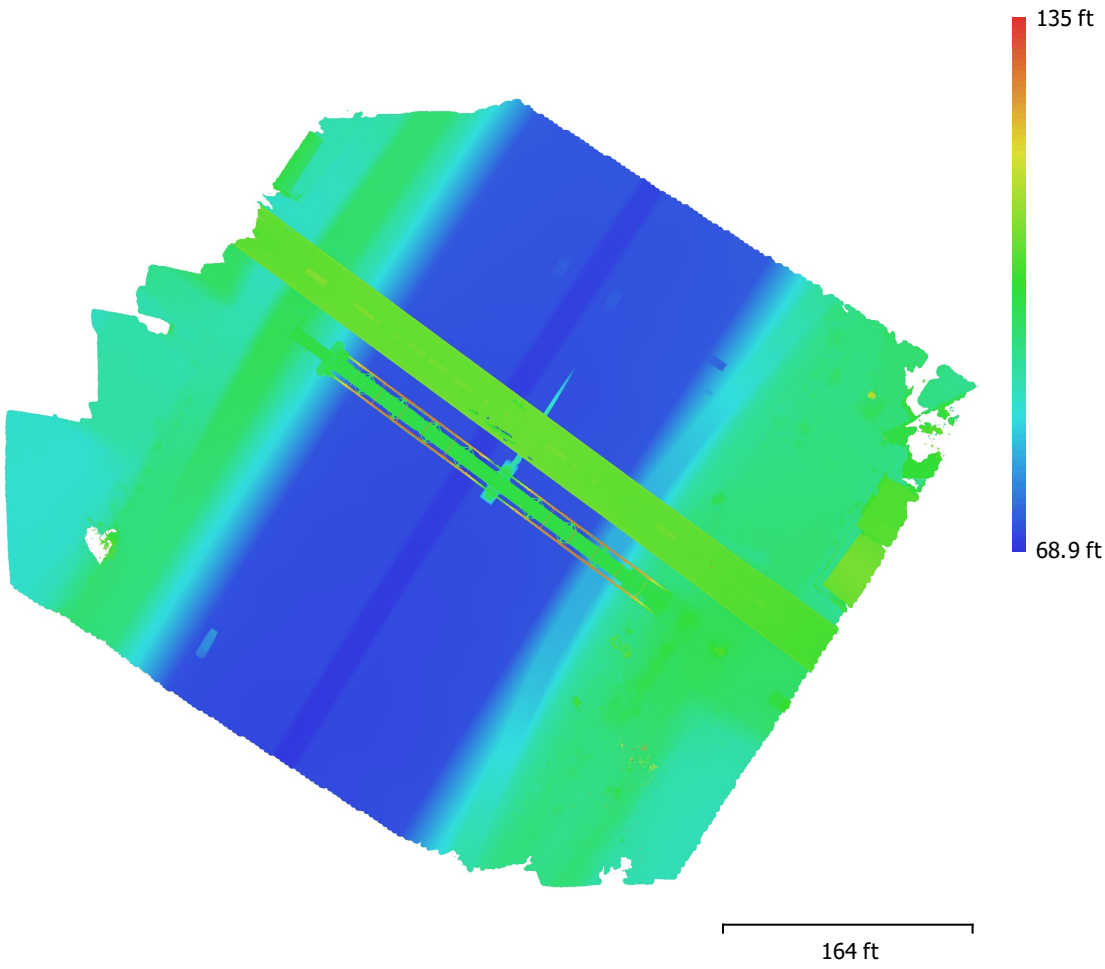

Fig. 5. Reconstructed digital elevation model.

Resolution:	0.0332 ft/pix
Point density:	905 points/ft²

Processing Parameters

General	
Cameras	659
Aligned cameras	659
Markers	12
Coordinate system	WGS 84 (EPSG::4326)
Rotation angles	Omega, Phi, Kappa
Point Cloud	
Points	343,557 of 397,559
RMS reprojection error	0.195768 (0.896086 pix)
Max reprojection error	0.594229 (55.1164 pix)
Mean key point size	3.44147 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	7.21275
Alignment parameters	
Accuracy	High
Generic preselection	Yes
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	No
Matching time	12 minutes 44 seconds
Matching memory usage	1.69 GB
Alignment time	3 minutes 48 seconds
Alignment memory usage	595.59 MB
Software version	1.7.2.12070
File size	52.84 MB
Depth Maps	
Count	659
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	3 hours 14 minutes
Memory usage	24.84 GB
Software version	1.7.2.12070
File size	9.11 GB
Dense Point Cloud	
Points	256,021,018
Point colors	3 bands, uint8
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	3 hours 14 minutes
Memory usage	24.84 GB
Dense cloud generation parameters	
Processing time	2 hours 58 minutes
Memory usage	46.70 GB
Software version	1.7.2.12070

File size	4.05 GB
Model	
Faces	51,204,203
Vertices	25,648,785
Vertex colors	3 bands, uint8
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	3 hours 14 minutes
Memory usage	24.84 GB
Reconstruction parameters	
Surface type	Arbitrary
Source data	Dense cloud
Interpolation	Enabled
Strict volumetric masks	No
Processing time	4 hours 11 minutes
Memory usage	119.95 GB
Software version	1.7.2.12070
File size	1.15 GB
Orthomosaic	
Size	38,526 x 31,169
Coordinate system	NAD83 / California zone 6 (ftUS) (EPSG::2230)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Enable ghosting filter	No
Processing time	1 hours 5 minutes
Memory usage	10.25 GB
Software version	1.7.2.12070
File size	4.42 GB
System	
Software name	Agisoft Metashape Professional
Software version	1.7.2 build 12070
OS	Windows 64 bit
RAM	127.88 GB
CPU	AMD Ryzen Threadripper 2990WX 32-Core Processor
GPU(s)	Quadro RTX 5000