

# Quality Report



Generated with PIX4Dmapper version 4.7.3 Preview



**Important:** Click on the different icons for:



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Additional information about the sections



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## Summary



Project	DWH - Thornton 20210906 Smart Oblique
Processed	2021-09-06 19:16:14
Camera Model Name(s)	ZenmuseP1_35.0_8192x5460 (RGB)
Average Ground Sampling Distance (GSD)	1.49 cm / 0.59 in
Time for Initial Processing (without report)	21m:46s

## Quality Check



<b>Images</b>	median of 24587 keypoints per image	
<b>Dataset</b>	516 out of 813 images calibrated (63%), all images enabled, 2 blocks	
<b>Camera Optimization</b>	0.01% relative difference between initial and optimized internal camera parameters	
<b>Matching</b>	median of 7605.86 matches per calibrated image	
<b>Georeferencing</b>	yes, no 3D GCP	

## Calibration Details



Number of Calibrated Images	516 out of 813
Number of Geolocated Images	813 out of 813

### Initial Image Positions

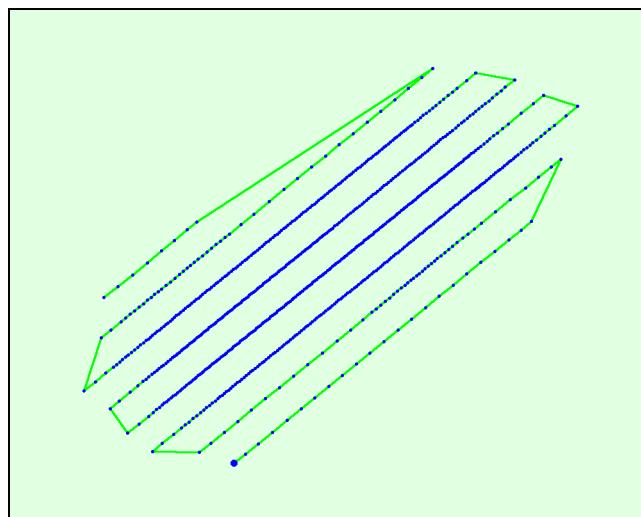
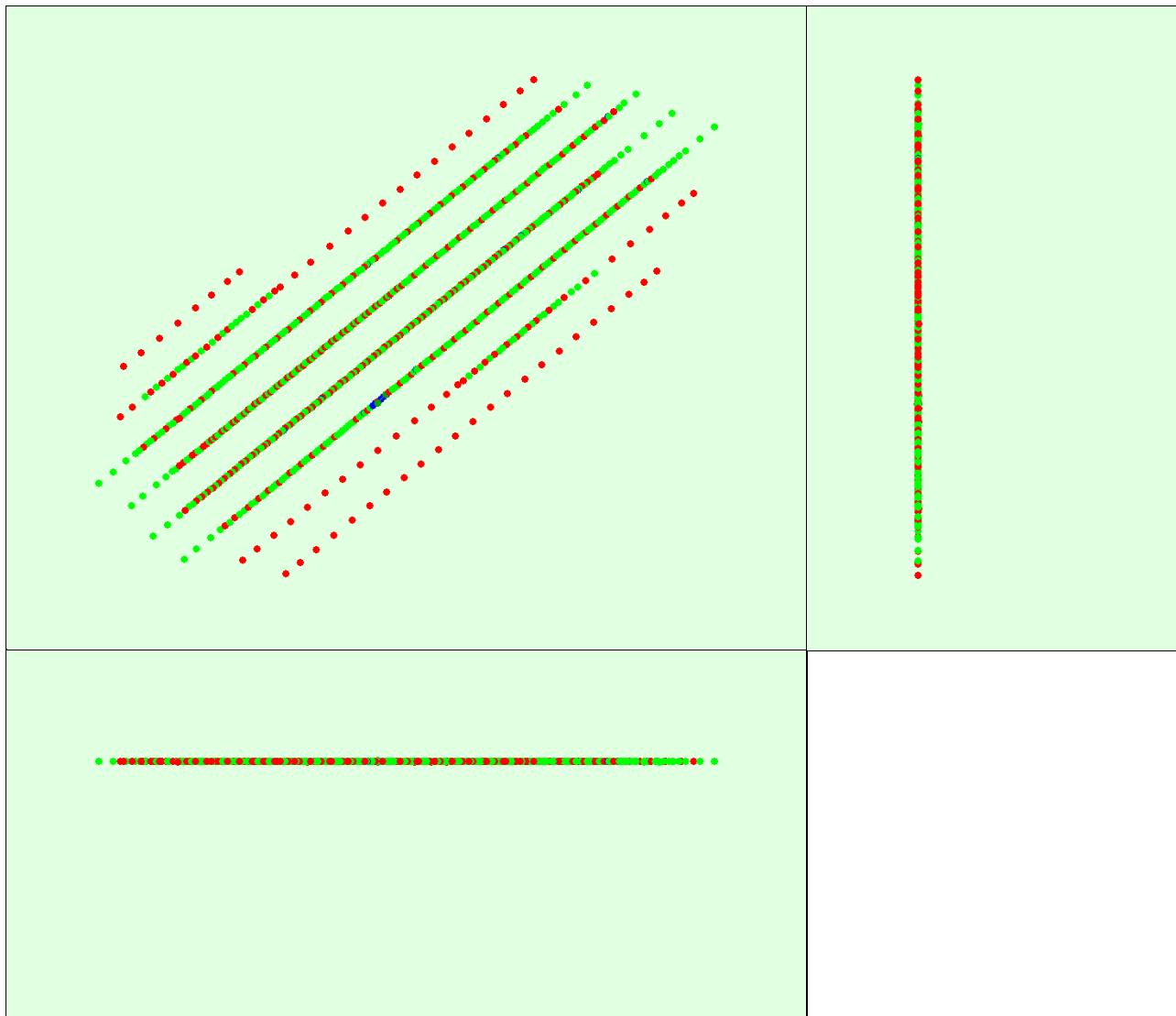


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

## Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 100x magnified

Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled or uncalibrated images. Dark green ellipses indicate the absolute position uncertainty of the bundle block adjustment result.

## Absolute camera position and orientation uncertainties



	X[m]	Y[m]	Z[m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.004	0.004	0.003	0.002	0.002	0.002
Sigma	0.002	0.001	0.001	0.004	0.004	0.003

## Bundle Block Adjustment Details



Number of 2D Keypoint Observations for Bundle Block Adjustment	3825751
Number of 3D Points for Bundle Block Adjustment	1151882
Mean Reprojection Error [pixels]	0.107

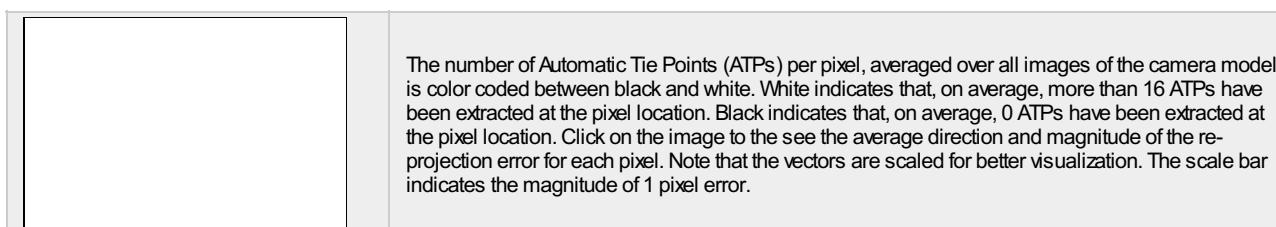
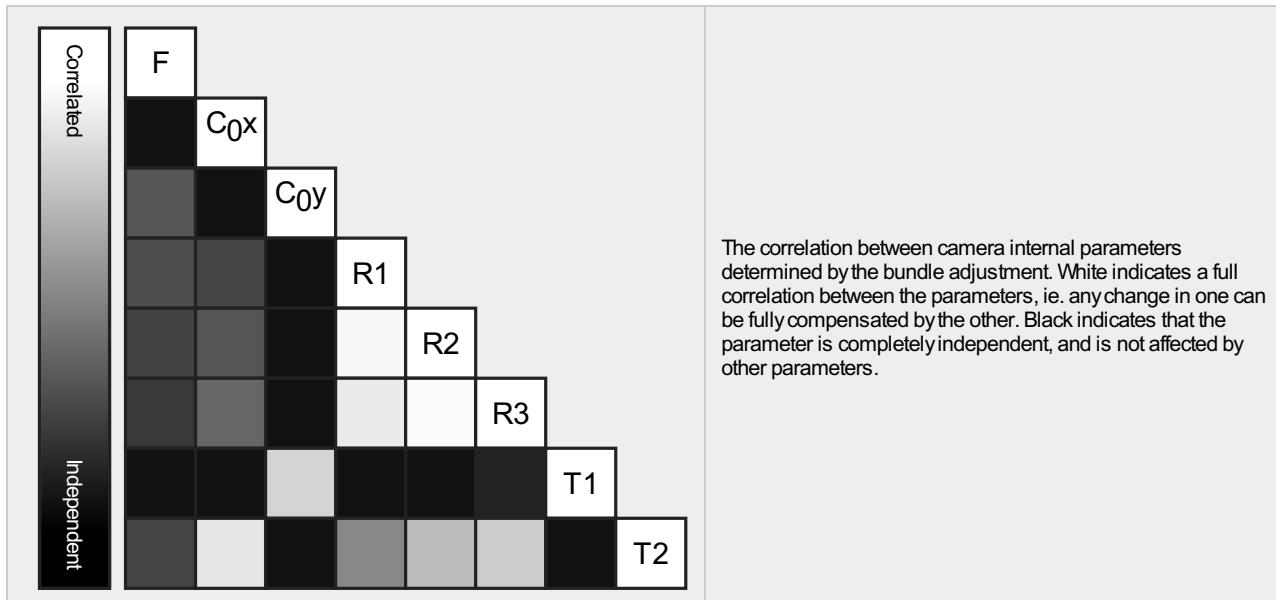
## Internal Camera Parameters



Zenmuse P1\_35.0\_8192x5460 (RGB). Sensor Dimensions: 35.000 [mm] x 23.328 [mm]



	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	8194.340 [pixel] 35.010 [mm]	4096.001 [pixel] 17.500 [mm]	2729.996 [pixel] 11.664 [mm]	-0.048	0.021	-0.097	0.002	-0.001
Optimized Values	8195.826 [pixel] 35.016 [mm]	4074.173 [pixel] 17.407 [mm]	2757.314 [pixel] 11.781 [mm]	-0.051	0.023	-0.114	0.001	-0.001
Uncertainties (Sigma)	0.120 [pixel] 0.001 [mm]	0.129 [pixel] 0.001 [mm]	0.104 [pixel] 0.000 [mm]	0.000	0.001	0.002	0.000	0.000



## 💡 2D Keypoints Table



	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	24587	7606
Mn	16473	13
Max	32169	15198
Mean	24402	7414

## 💡 3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	636780
In 3 Images	232163
In 4 Images	107129
In 5 Images	57245
In 6 Images	34192
In 7 Images	21916
In 8 Images	14901
In 9 Images	10464
In 10 Images	7357
In 11 Images	5483
In 12 Images	4287
In 13 Images	3385
In 14 Images	2708

In 15 Images	2052
In 16 Images	1710
In 17 Images	1413
In 18 Images	1121
In 19 Images	1024
In 20 Images	867
In 21 Images	699
In 22 Images	635
In 23 Images	503
In 24 Images	468
In 25 Images	412
In 26 Images	338
In 27 Images	261
In 28 Images	277
In 29 Images	213
In 30 Images	251
In 31 Images	194
In 32 Images	192
In 33 Images	164
In 34 Images	129
In 35 Images	107
In 36 Images	76
In 37 Images	64
In 38 Images	71
In 39 Images	66
In 40 Images	54
In 41 Images	58
In 42 Images	43
In 43 Images	56
In 44 Images	38
In 45 Images	34
In 46 Images	29
In 47 Images	20
In 48 Images	19
In 49 Images	20
In 50 Images	14
In 51 Images	15
In 52 Images	15
In 53 Images	17
In 54 Images	8
In 55 Images	9
In 56 Images	9
In 57 Images	14
In 58 Images	10
In 59 Images	13
In 60 Images	5
In 61 Images	7
In 62 Images	4
In 63 Images	4
In 64 Images	11
In 65 Images	6
In 66 Images	4
In 67 Images	4
In 68 Images	4
In 69 Images	4
In 70 Images	4
In 72 Images	2
In 73 Images	1
In 74 Images	1

In 75 Images	4
In 76 Images	1
In 79 Images	3
In 82 Images	1

### 2D Keypoint Matches

i

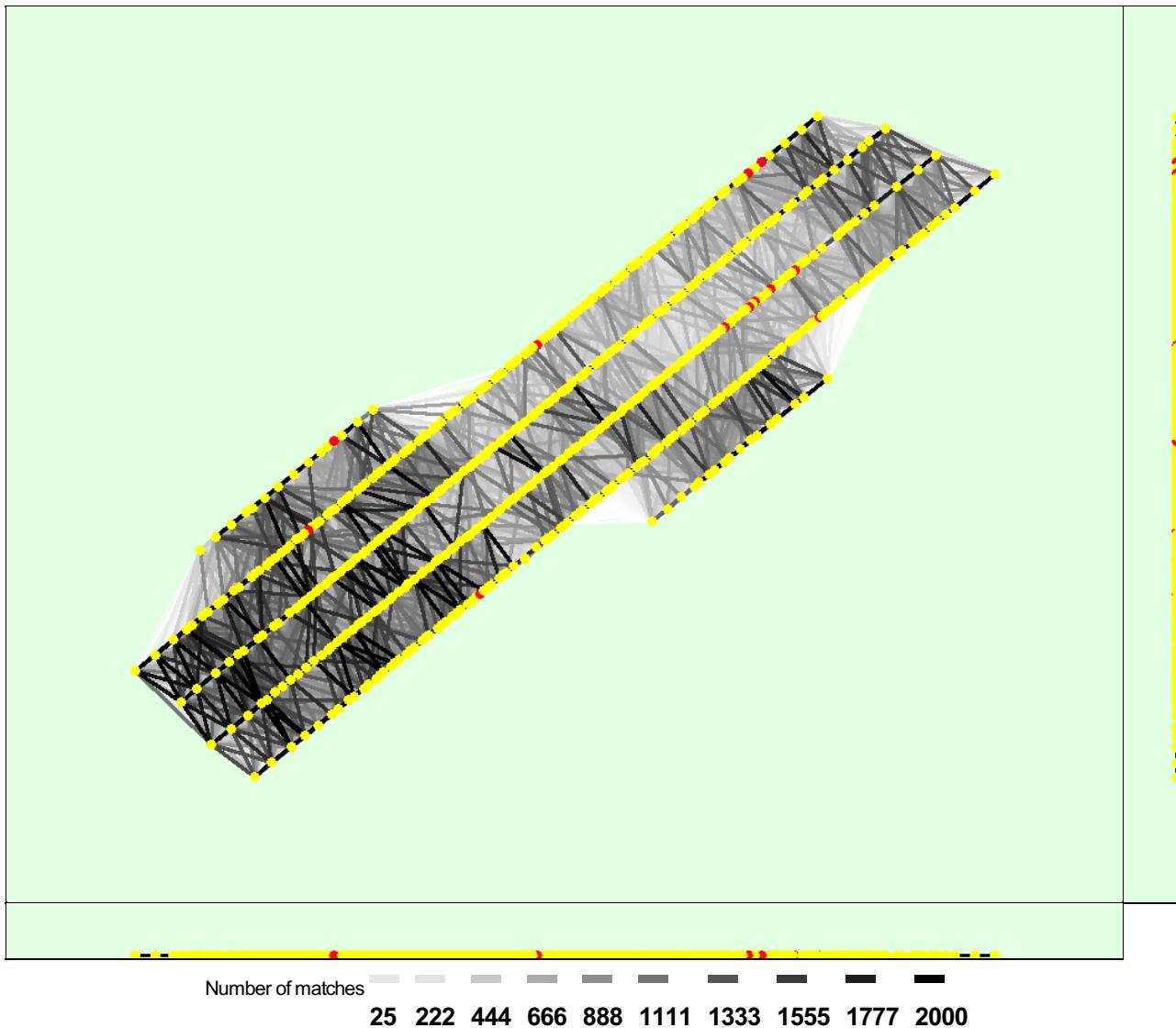


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

## Geolocation Details

i

### Ground Control Points

i

0 out of 7 check points have been labeled as inaccurate.

Check Point Name	Accuracy XY/Z [m]	Error X [m]	Error Y [m]	Error Z [m]	Projection Error [pixel]	Verified/Marked
GCP-1		0.007	0.008	-0.033	0.165	6 / 6
GCP-2		0.013	-0.036	-0.017	0.053	5 / 5
GCP-3		-1653.028	1512.147	19360.086	0.053	4 / 4
GCP-4		0.035	-0.009	0.087	0.095	4 / 4
GCP-5		-0.000	-0.042	-0.074	0.111	5 / 5
GCP-6		-0.004	-0.050	0.015	0.053	4 / 4
GCP-7		0.003	-0.008	0.059	0.082	4 / 4

Mean [m]		-236.139116	216.001406	2765.731827		
Sigma [m]		578.442297	529.149089	6774.616636		
RMS Error [m]		624.785702	571.537720	7317.424622		

Localisation accuracy per GCP and mean errors in the three coordinate directions. The last column counts the number of calibrated images where the GCP has been automatically verified vs. manually marked.

## Absolute Geolocation Variance



Mn Error [m]	Max Error [m]	Geolocation Error X[%]	Geolocation Error Y[%]	Geolocation Error Z[%]
-	-0.04	0.39	0.59	0.39
-0.04	-0.03	0.59	0.20	0.00
-0.03	-0.03	1.17	1.76	0.20
-0.03	-0.02	2.15	3.13	1.57
-0.02	-0.01	9.39	9.39	10.18
-0.01	0.00	36.79	33.86	39.92
0.00	0.01	36.01	36.99	38.55
0.01	0.02	9.39	8.02	7.05
0.02	0.03	3.13	4.11	1.37
0.03	0.03	0.20	0.98	0.39
0.03	0.04	0.39	0.39	0.00
0.04	-	0.39	0.59	0.39
Mean [m]		-0.000423	0.000106	-0.000366
Sigma [m]		0.013879	0.018055	0.009276
RMS Error [m]		0.013886	0.018055	0.009283

Min Error and Max Error represent geolocation error intervals between -1.5 and 1.5 times the maximum accuracy of all the images. Columns X, Y, Z show the percentage of images with geolocation errors within the predefined error intervals. The geolocation error is the difference between the initial and computed image positions. Note that the image geolocation errors do not correspond to the accuracy of the observed 3D points.

## Relative Geolocation Variance



Relative Geolocation Error	Images X[%]	Images Y[%]	Images Z[%]
[-1.00, 1.00]	84.54	82.00	98.63
[-2.00, 2.00]	96.48	95.50	99.22
[-3.00, 3.00]	98.83	98.63	99.80
Mean of Geolocation Accuracy [m]	0.012518	0.012518	0.023350
Sigma of Geolocation Accuracy [m]	0.000556	0.000556	0.000712

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Geolocation Orientational Variance	RMS [degree]
Omega	0.631
Phi	0.705
Kappa	1.508

Geolocation RMS error of the orientation angles given by the difference between the initial and computed image orientation angles.

## Initial Processing Details



### System Information



Hardware	CPU: AMD Ryzen 9 3950X 16-Core Processor RAM: 128GB GPU: unknown graphics card (Driver: unknown)
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Operating System	Windows 10 Pro, 64-bit
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## Coordinate Systems



Image Coordinate System	OSGB 1936 / British National Grid (2D)
Output Coordinate System	OSGB 1936 / British National Grid (2D)

## Processing Options



Detected Template	No Template Available
Keypoints Image Scale	Full, Image Scale: 0.5
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: yes
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Geolocation Based Internal Parameters Optimization: All prior External Parameters Optimization: All Rematch: Auto, no