Quality Report

Generated with PIX4Dmapper version 4.10.0

Important: Click on the different icons for:

Help to analyze the results in the Quality Report

Additional information about the sections

Click here for additional tips to analyze the Quality Report

Summary

Project	WingtraRAY_TestFlt04_MAP61_20250707
Processed	2025-07-08 09:27:06
Camera Model Name(s)	ILX-LR1_17mmF4DGDN|Contemporary023_17.0_9504x6336 (RGB)
Average Ground Sampling Distance (GSD)	2.19 cm / 0.86 in

Quality Check

Images	median of 53744 keypoints per image	✓
Dataset	1099 out of 1106 images calibrated (99%), all images enabled, 2 blocks	⚠
Camera Optimization	0.08% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 14109.6 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Calibration Details

Number of Calibrated Images	1099 out of 1106
Number of Geolocated Images	1106 out of 1106

Initial Image Positions

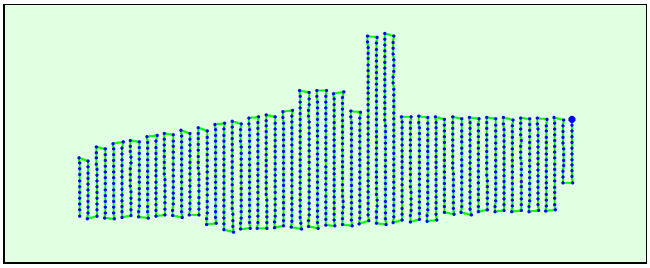
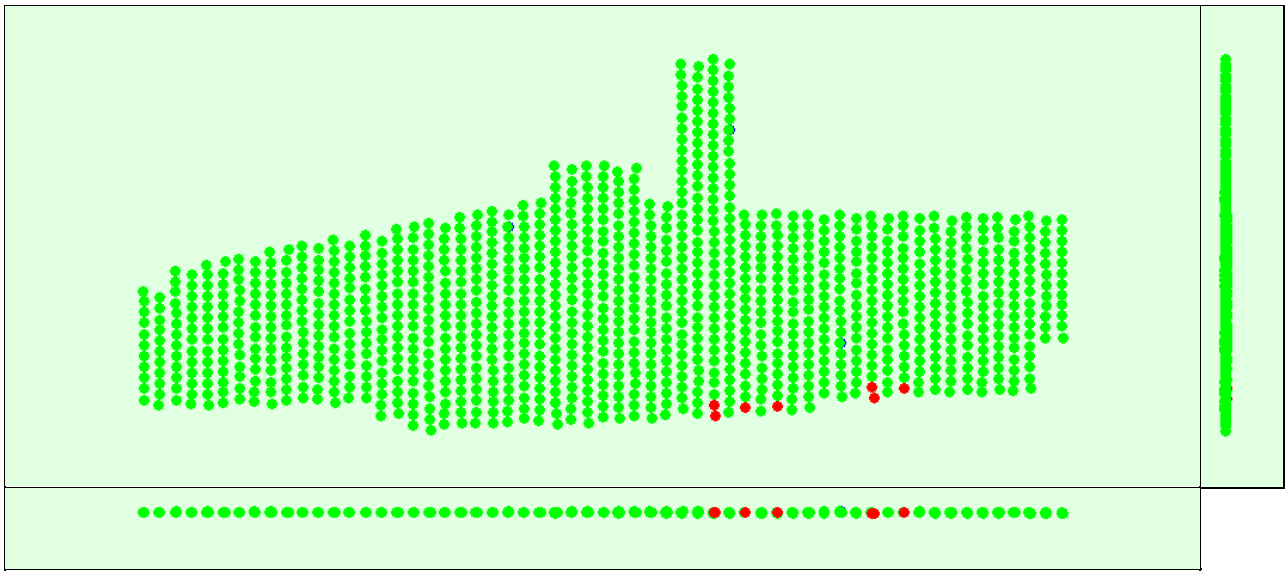


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 1000x 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 [US survey foot]	Y [US survey foot]	Z [US survey foot]	Omega [degree]	Phi [degree]	Kappa [degree]	Camera Displacement X [US survey foot]	Camera Displacement Y [US survey foot]	Camera Displacement Z [US survey foot]
Mean	0.011	0.012	0.014	0.005	0.003	0.004	0.026	0.030	0.037
Sigma	0.001	0.000	0.004	0.005	0.002	0.005	0.025	0.054	0.031

Bundle Block Adjustment Details

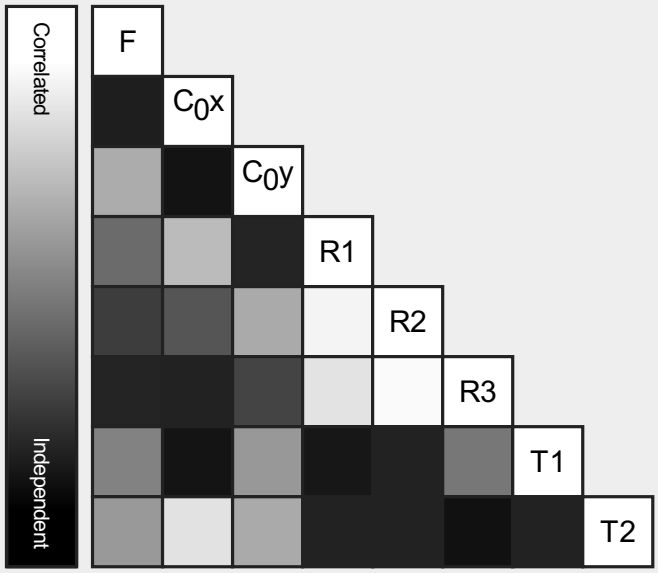
Number of 2D Keypoint Observations for Bundle Block Adjustment	14265127
Number of 3D Points for Bundle Block Adjustment	4548299
Mean Reprojection Error [pixels]	0.146

Internal Camera Parameters

ILX-LR1_17mmF4DGDN|Contemporary023_17.0_9504x6336 (RGB). Sensor Dimensions: 35.000 [mm] x 23.333 [mm]

EXIF ID: ILX-LR1_17mmF4DGDN|Contemporary023_17.0_9504x6336

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	4665.220 [pixel] 17.180 [mm]	4719.710 [pixel] 17.381 [mm]	3150.500 [pixel] 11.602 [mm]	-0.068	0.015	0.001	0.000	-0.000
Optimized Values	4669.170 [pixel] 17.195 [mm]	4735.885 [pixel] 17.441 [mm]	3163.876 [pixel] 11.651 [mm]	-0.070	0.015	0.001	-0.000	-0.000
Uncertainties (Sigma)	0.233 [pixel] 0.001 [mm]	0.037 [pixel] 0.000 [mm]	0.151 [pixel] 0.001 [mm]	0.000	0.000	0.000	0.000	0.000



The correlation between camera internal parameters determined by the bundle adjustment. White indicates a full correlation between the parameters, ie. any change in one can be fully compensated by the other. Black indicates that the parameter is completely independent, and is not affected by other parameters.

pixel count

The number of Automatic Tie Points (ATPs) per pixel, averaged over all images of the camera model, is color coded between black and white. White indicates that, on average, more than 16 ATPs have been extracted at the pixel location. Black indicates that, on average, 0 ATPs have been extracted at the pixel location. Click on the image to the see the average direction and magnitude of the re-projection error for each pixel. Note that the vectors are scaled for better visualization. The scale bar indicates the magnitude of 1 pixel error.

2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	53744	14110
Min	22889	22
Max	72353	36692
Mean	51955	12980

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	2528658
In 3 Images	876329
In 4 Images	446782
In 5 Images	243579
In 6 Images	147582
In 7 Images	102129
In 8 Images	68535
In 9 Images	46732
In 10 Images	32523
In 11 Images	22733
In 12 Images	14505
In 13 Images	8328
In 14 Images	4951
In 15 Images	2663
In 16 Images	1359
In 17 Images	587
In 18 Images	242
In 19 Images	63
In 20 Images	14
In 21 Images	4
In 22 Images	1

2D Keypoint Matches

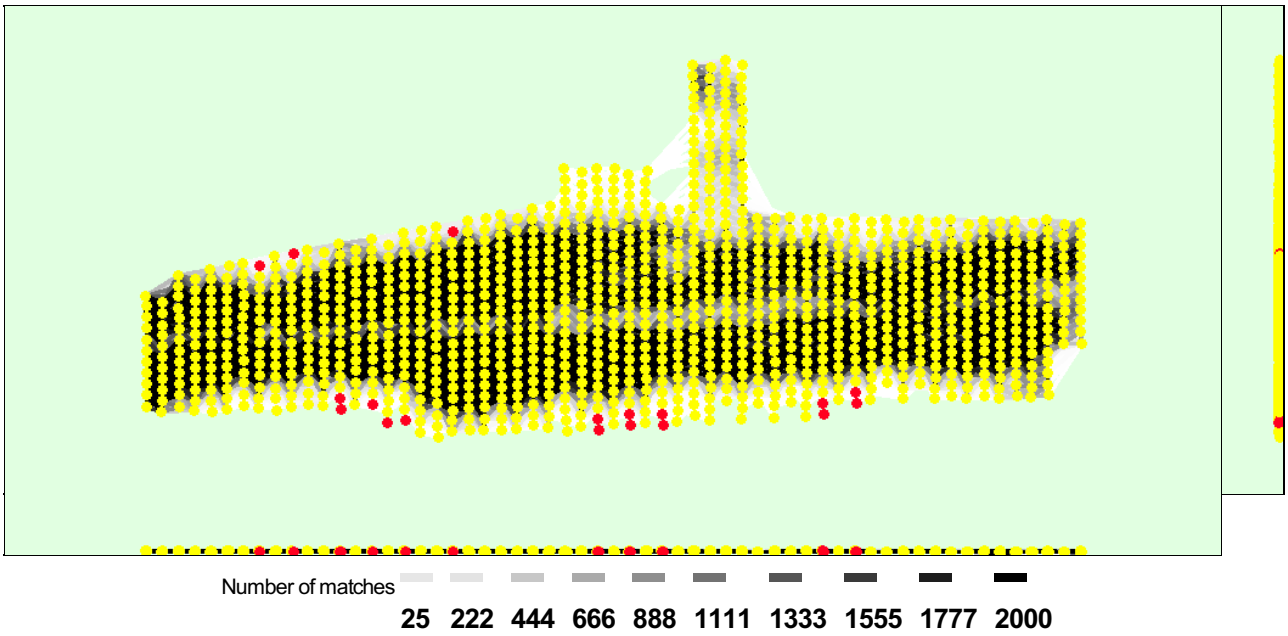


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

Geolocation Details

Ground Control Points

0 out of 10 check points have been labeled as inaccurate.

Check Point Name	Accuracy XY/Z [US survey foot]	Error X [US survey foot]	Error Y [US survey foot]	Error Z [US survey foot]	Projection Error [pixel]	Verified/Marked
511		-0.045	-0.146	-0.198	0.207	23 / 23
512		0.013	-0.083	-0.168	0.254	23 / 23
513		-0.009	-0.108	-0.229	0.198	23 / 23
514		0.046	0.010	-0.259	0.249	20 / 20
515		0.005	-0.052	-0.189	0.222	21 / 21
516		0.051	-0.100	-0.223	0.207	22 / 22
517		-0.017	-0.076	-0.215	0.278	19 / 19
518		-0.005	0.011	-0.268	0.188	19 / 19
519		-0.037	-0.010	-0.293	0.240	21 / 21
520		0.037	-0.089	-0.332	0.176	18 / 18
Mean [US survey foot]		0.004117	-0.064379	-0.237658		
Sigma [US survey foot]		0.031427	0.050216	0.047845		
RMS Error [US survey foot]		0.031695	0.081647	0.242426		

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

Min Error [US survey foot]	Max Error [US survey foot]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.15	0.00	0.00	0.09
-0.15	-0.12	0.00	0.00	0.27
-0.12	-0.09	0.18	0.00	0.73

-0.09	-0.06	0.73	0.00	4.00
-0.06	-0.03	6.19	0.09	12.92
-0.03	0.00	42.68	48.59	32.85
0.00	0.03	42.68	51.23	29.75
0.03	0.06	6.37	0.09	13.83
0.06	0.09	1.00	0.00	4.09
0.09	0.12	0.18	0.00	1.09
0.12	0.15	0.00	0.00	0.36
0.15	-	0.00	0.00	0.00
Mean [US survey foot]		0.000002	0.000000	0.000204
Sigma [US survey foot]		0.022298	0.005569	0.037016
RMS Error [US survey foot]		0.022298	0.005569	0.037016

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]	87.99	99.82	93.36
[-2.00, 2.00]	98.54	100.00	99.55
[-3.00, 3.00]	99.82	100.00	100.00
Mean of Geolocation Accuracy [US survey foot]	0.032810	0.032810	0.068964
Sigma of Geolocation Accuracy [US survey foot]	0.000000	0.000000	0.009926

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

Geolocation Orientational Variance	RMS [degree]
Omega	0.455
Phi	0.689
Kappa	1.104

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

Rolling Shutter Statistics

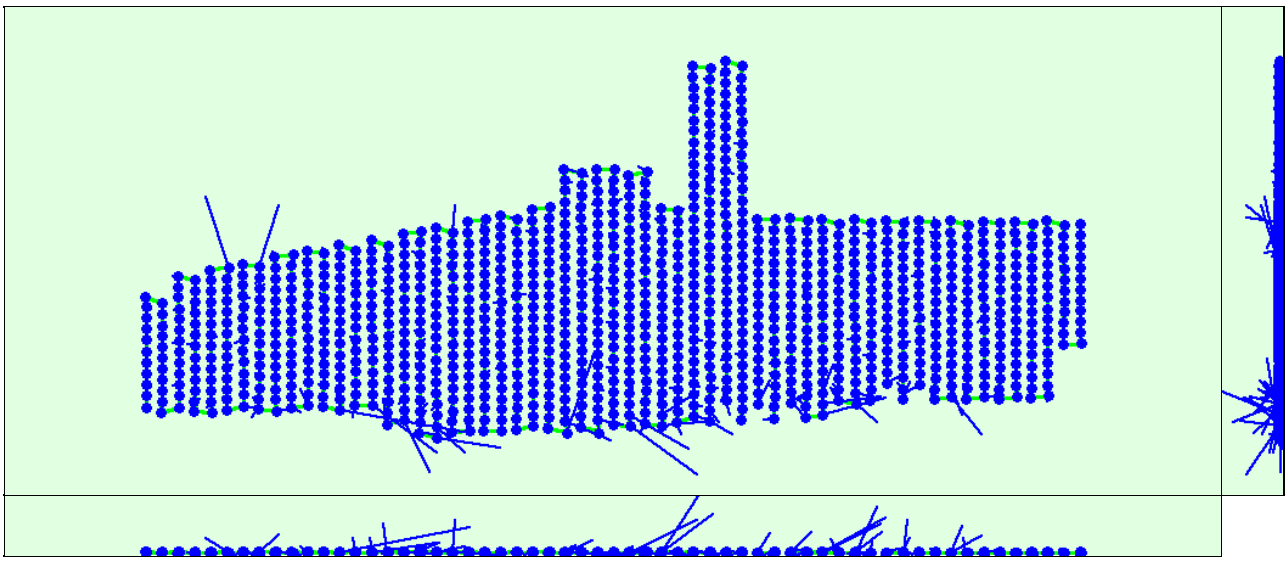


Figure 6: Camera movement estimated by the rolling shutter camera model. The green line follows the computed image positions. The blue dots represent the camera position at the start of the exposure. The blue lines represent the camera motion during the rolling shutter readout, re-scaled by a project dependant scaling factor for better visibility.

Median Camera Speed	63.6072 [US survey foot/s]
Median Camera Displacement During Sensor Readout)	0.7129 [US survey foot]

Median Rolling Shutter Readout Time	10.9522 [ms]

Initial Processing Details

System Information

Hardware	CPU: AMD Ryzen Threadripper 7980X 64-Cores RAM: 384GB GPU: Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown)
Operating System	Windows 11, 64-bit

Coordinate Systems

Image Coordinate System	NAD83(2011) / Louisiana South (ftUS) (2D)
Output Coordinate System	NAD83(2011) / Louisiana South (ftUS) (2D)

Processing Options

Detected Template	WingtraOne PPK Civil Earthworks*
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 External Parameters Optimization: All Rematch: Auto, no