

KK20_HIGH

Processing Report
27 January 2023



Survey Data

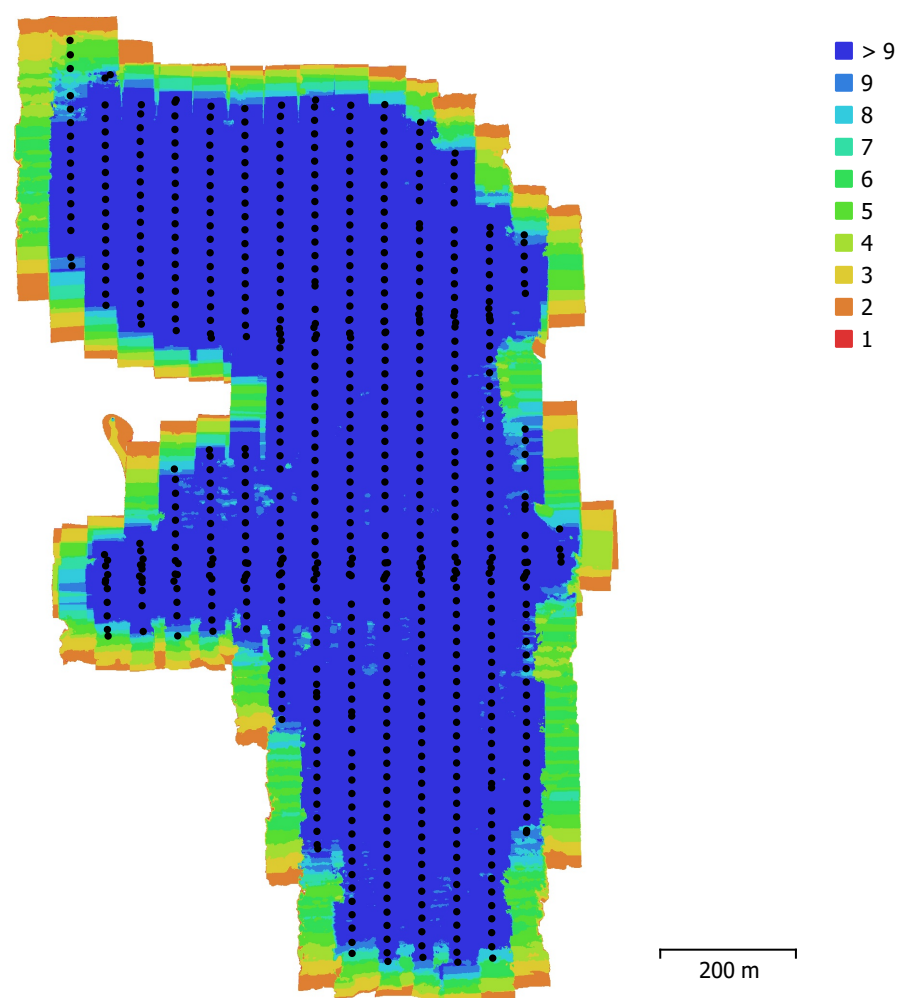


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|-----------------------|---------------------|-----------|
| Number of images: | 673 | Camera stations: | 673 |
| Flying altitude: | 118 m | Tie points: | 677,775 |
| Ground resolution: | 3.13 cm/pix | Projections: | 2,495,729 |
| Coverage area: | 0.868 km ² | Reprojection error: | 0.757 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|----------------|-------------|--------------|---------------------|---------------|
| FC6310 (8.8mm) | 4864 x 3648 | 8.8 mm | 2.61 x 2.61 μ m | No |

Table 1. Cameras.

Camera Calibration

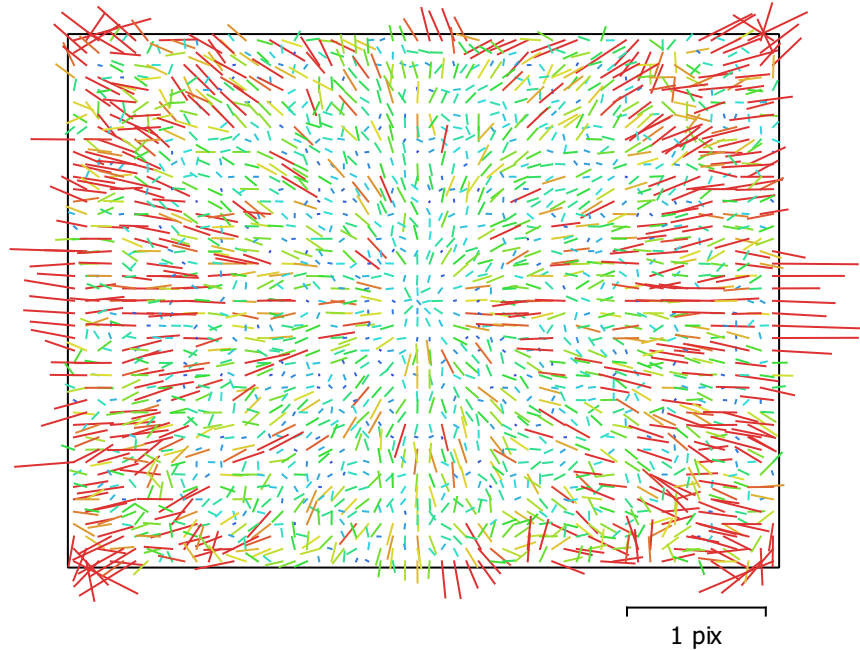


Fig. 2. Image residuals for FC6310 (8.8mm).

FC6310 (8.8mm)

673 images, additional corrections

| | | | |
|--------------|--------------------|---------------|---|
| Type | Resolution | Focal Length | Pixel Size |
| Frame | 4864 x 3648 | 8.8 mm | 2.61 x 2.61 μm |

| | Value | Error | F | Cx | Cy | B1 | B2 | K1 | K2 | K3 | K4 | P1 | P2 |
|-----------|--------------------|---------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| F | 3622.97 | 0.88 | 1.00 | -0.05 | 0.72 | -0.08 | -0.02 | -0.04 | -0.15 | 0.34 | -0.43 | -0.28 | 0.29 |
| Cx | -1.52172 | 0.034 | | 1.00 | -0.05 | 0.07 | -0.04 | 0.01 | 0.01 | -0.02 | 0.02 | 0.30 | -0.00 |
| Cy | 20.4866 | 0.042 | | | 1.00 | -0.04 | 0.01 | -0.02 | -0.12 | 0.25 | -0.31 | -0.21 | 0.42 |
| B1 | -2.41871 | 0.017 | | | | 1.00 | 0.01 | 0.01 | 0.01 | -0.02 | 0.03 | 0.02 | -0.03 |
| B2 | 0.119171 | 0.017 | | | | | 1.00 | -0.00 | 0.01 | -0.01 | 0.01 | -0.02 | -0.02 |
| K1 | -0.00206283 | 3.5e-05 | | | | | | 1.00 | -0.95 | 0.86 | -0.78 | 0.01 | -0.00 |
| K2 | -0.0323225 | 0.00019 | | | | | | | 1.00 | -0.97 | 0.92 | 0.04 | -0.04 |
| K3 | 0.101224 | 0.00042 | | | | | | | | 1.00 | -0.99 | -0.10 | 0.10 |
| K4 | -0.07111 | 0.00032 | | | | | | | | | 1.00 | 0.12 | -0.12 |
| P1 | -0.00130822 | 1.1e-06 | | | | | | | | | | 1.00 | -0.08 |
| P2 | 0.00139403 | 1.2e-06 | | | | | | | | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

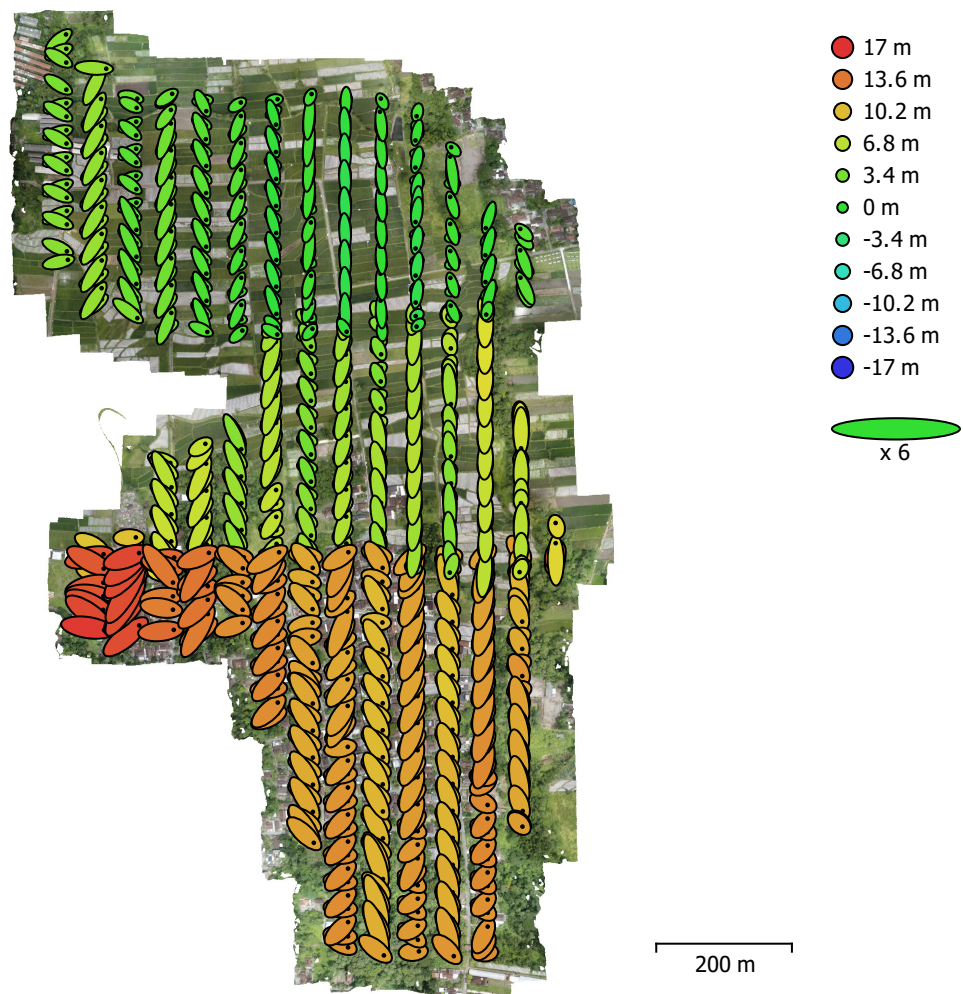


Fig. 3. Camera locations and error estimates.

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 (m) | Y error (m) | Z error (m) | XY error (m) | Total error (m) |
|-------------|-------------|-------------|--------------|-----------------|
| 2.76892 | 4.33992 | 8.09829 | 5.14799 | 9.59604 |

Table 3. Average camera location error.

X - Easting, Y - Northing, Z - Altitude.

Ground Control Points

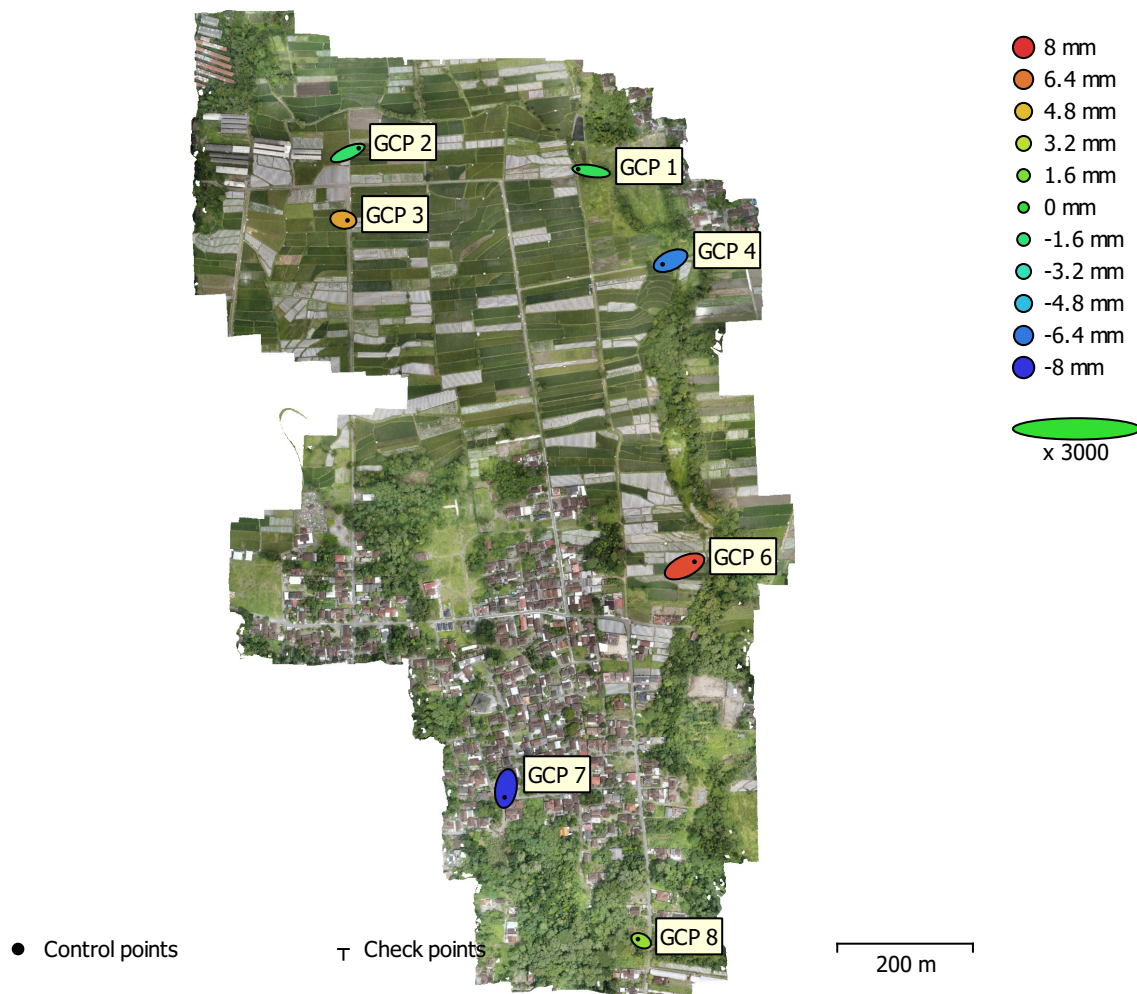


Fig. 4. GCP locations and error estimates.

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 (cm) | Y error (cm) | Z error (cm) | XY error (cm) | Total (cm) |
|-------|--------------|--------------|--------------|---------------|------------|
| 7 | 0.811564 | 0.442318 | 0.52395 | 0.924274 | 1.06245 |

Table 4. Control points RMSE.

X - Easting, Y - Northing, Z - Altitude.

| Label | X error (cm) | Y error (cm) | Z error (cm) | Total (cm) | Image (pix) |
|--------------|---------------------|---------------------|---------------------|-------------------|--------------------|
| GCP 3 | 0.407186 | -0.0621272 | 0.539845 | 0.679038 | 1.984 (4) |
| GCP 4 | -0.774666 | -0.351325 | -0.609517 | 1.04645 | 1.858 (5) |
| GCP 6 | 0.974603 | 0.460511 | 0.743676 | 1.30957 | 1.323 (7) |
| GCP 8 | -0.318128 | 0.162126 | 0.227685 | 0.423474 | 1.051 (3) |
| GCP 2 | 1.07852 | 0.4664 | -0.134749 | 1.18275 | 0.883 (6) |
| GCP 1 | -1.26974 | 0.187713 | -0.0853472 | 1.28638 | 1.105 (6) |
| GCP 7 | -0.134255 | -0.866664 | -0.792709 | 1.18217 | 1.486 (7) |
| Total | 0.811564 | 0.442318 | 0.52395 | 1.06245 | 1.414 |

Table 5. Control points.
X - Easting, Y - Northing, Z - Altitude.

Digital Elevation Model

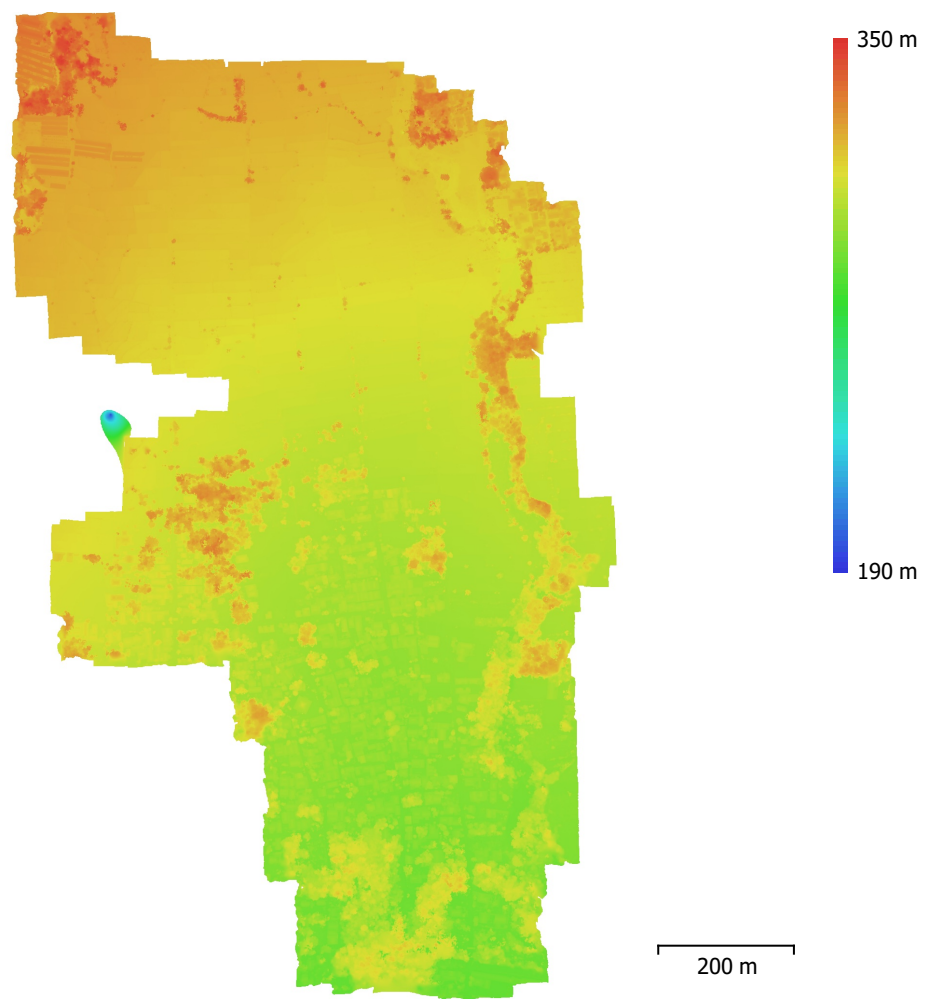


Fig. 5. Reconstructed digital elevation model.

Resolution: 6.26 cm/pix
Point density: 255 points/m²

Processing Parameters

General

| | |
|-------------------|-------------------------------------|
| Cameras | 673 |
| Aligned cameras | 673 |
| Markers | 7 |
| Coordinate system | WGS 84 / UTM zone 49S (EPSG::32749) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|-------------------------|
| Points | 677,775 of 737,210 |
| RMS reprojection error | 0.174269 (0.756621 pix) |
| Max reprojection error | 1.95499 (51.4348 pix) |
| Mean key point size | 3.34237 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 3.84157 |

Alignment parameters

| | |
|-------------------------------|----------------------|
| Accuracy | High |
| Generic preselection | Yes |
| Reference preselection | Source |
| Key point limit | 40,000 |
| Key point limit per Mpx | 1,000 |
| Tie point limit | 4,000 |
| Exclude stationary tie points | Yes |
| Guided image matching | No |
| Adaptive camera model fitting | No |
| Matching time | 3 minutes 19 seconds |
| Matching memory usage | 4.93 GB |
| Alignment time | 3 minutes 18 seconds |
| Alignment memory usage | 549.93 MB |

Optimization parameters

| | |
|-------------------------------|----------------------------------|
| Parameters | f, b1, b2, cx, cy, k1-k4, p1, p2 |
| Fit additional corrections | Yes |
| Adaptive camera model fitting | Yes |
| Optimization time | 26 seconds |
| Date created | 2023:01:25 05:31:39 |
| Software version | 1.8.5.14930 |
| File size | 60.92 MB |

Depth Maps

| | |
|-------|-----|
| Count | 673 |
|-------|-----|

Depth maps generation parameters

| | |
|------------------|-----------------------|
| Quality | High |
| Filtering mode | Moderate |
| Max neighbors | 16 |
| Processing time | 42 minutes 54 seconds |
| Memory usage | 4.86 GB |
| Date created | 2023:01:27 03:46:43 |
| Software version | 1.8.5.14930 |
| File size | 4.35 GB |

Dense Point Cloud

| | |
|--------------|----------------|
| Points | 319,838,570 |
| Point colors | 3 bands, uint8 |

| | |
|--|-------------------------------------|
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Moderate |
| Max neighbors | 16 |
| Processing time | 42 minutes 54 seconds |
| Memory usage | 4.86 GB |
| Dense cloud generation parameters | |
| Processing time | 58 minutes 27 seconds |
| Memory usage | 8.23 GB |
| Date created | 2023:01:27 04:45:11 |
| Software version | 1.8.5.14930 |
| File size | 4.08 GB |
| Model | |
| Faces | 100,066,153 |
| Vertices | 50,052,432 |
| Vertex colors | 3 bands, uint8 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Moderate |
| Max neighbors | 16 |
| Processing time | 42 minutes 54 seconds |
| Memory usage | 4.86 GB |
| Reconstruction parameters | |
| Surface type | Arbitrary |
| Source data | Dense cloud |
| Interpolation | Enabled |
| Strict volumetric masks | No |
| Processing time | 1 hours 40 minutes |
| Memory usage | 18.16 GB |
| Date created | 2023:01:27 06:17:20 |
| Software version | 1.8.5.14930 |
| File size | 2.24 GB |
| Tiled Model | |
| Texture | 3 bands, uint8 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Moderate |
| Max neighbors | 16 |
| Processing time | 40 minutes 48 seconds |
| Memory usage | 4.99 GB |
| Reconstruction parameters | |
| Source data | Dense cloud |
| Tile size | 256 |
| Face count | High |
| Enable ghosting filter | No |
| Processing time | 7 hours 13 minutes |
| Memory usage | 12.41 GB |
| Date created | 2023:01:26 18:30:53 |
| Software version | 1.8.5.14930 |
| File size | 3.09 GB |
| DEM | |
| Size | 14,224 x 23,234 |
| Coordinate system | WGS 84 / UTM zone 49S (EPSG::32749) |
| Reconstruction parameters | |
| Source data | Dense cloud |
| Interpolation | Enabled |

| | |
|----------------------------------|--|
| Processing time | 8 minutes 12 seconds |
| Memory usage | 313.09 MB |
| Date created | 2023:01:27 06:37:47 |
| Software version | 1.8.5.14930 |
| File size | 820.21 MB |
| Orthomosaic | |
| Size | 28,447 x 46,467 |
| Coordinate system | WGS 84 / UTM zone 49S (EPSG::32749) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Enable ghosting filter | No |
| Processing time | 20 minutes 12 seconds |
| Memory usage | 1019.92 MB |
| Date created | 2023:01:27 06:47:36 |
| Software version | 1.8.5.14930 |
| File size | 14.84 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.8.5 build 14930 |
| OS | Windows 64 bit |
| RAM | 31.92 GB |
| CPU | Intel(R) Core(TM) i7-10700KF CPU @ 3.80GHz |
| GPU(s) | GeForce RTX 3070 |