



STATE OF
COLORADO

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M1980136, Chambers Pit, Inspection Report

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Fri, Aug 25, 2023 at 12:22 PM

To: "Burkey, Jason K (CRH Americas Materials)" <jason.burkey@na.crh.com>, "Bartuska, Tyra L (United Companies)" <tyra.bartuska@unitedco.com>, Ben Langenfeld <benl@lewicki.biz>

The report from the August 14, 2023 inspection is attached

(TR-5 adequacy review letter to follow shortly)

Leigh Simmons
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COLORADO
Division of Reclamation,
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Inspection Report Packet.pdf

2545K



MINERALS PROGRAM INSPECTION REPORT
PHONE: (303) 866-3567

The Division of Reclamation, Mining and Safety has conducted an inspection of the mining operation noted below. This report documents observations concerning compliance with the terms of the permit and applicable rules and regulations of the Mined Land Reclamation Board.

MINE NAME: Chambers Pit	MINE/PROSPECTING ID#: M-1980-136	MINERAL: Sand and gravel	COUNTY: Eagle
INSPECTION TYPE: Monitoring	WEATHER: Clear	INSP. DATE: August 14, 2023	INSP. TIME: 13:00
OPERATOR: Oldcastle SW Group, Inc. dba United Compas County	OPERATOR REPRESENTATIVE: Scott Barney	TYPE OF OPERATION: 112c - Construction Regular Operation	
REASON FOR INSPECTION: Normal I&E Program	BOND CALCULATION TYPE: Complete Bond	BOND AMOUNT: \$694,934.00	
DATE OF COMPLAINT: NA	POST INSP. CONTACTS: None	JOINT INSP. AGENCY: None	
INSPECTOR(S): Leigh Simmons	INSPECTOR'S SIGNATURE: 	SIGNATURE DATE: August 24, 2023	

GENERAL INSPECTION TOPICS

This list identifies the environmental and permit parameters inspected and gives a categorical evaluation of each. No problems or possible violations were noted during the inspection. The mine operation was found to be in full compliance with Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for the Extraction of Construction Materials and/or for Hard Rock, Metal and Designated Mining Operations. Any person engaged in any mining operation shall notify the office of any failure or imminent failure, as soon as reasonably practicable after such person has knowledge of such condition or of any impoundment, embankment, or slope that poses a reasonable potential for danger to any persons or property or to the environment; or any environmental protection facility designed to contain or control chemicals or waste which are acid or toxic-forming, as identified in the permit.

(AR) RECORDS----- <u>N</u>	(FN) FINANCIAL WARRANTY----- <u>Y</u>	(RD) ROADS----- <u>N</u>
(HB) HYDROLOGIC BALANCE----- <u>N</u>	(BG) BACKFILL & GRADING----- <u>Y</u>	(EX) EXPLOSIVES----- <u>N</u>
(PW) PROCESSING WASTE/TAILING---- <u>N</u>	(SF) PROCESSING FACILITIES----- <u>N</u>	(TS) TOPSOIL----- <u>N</u>
(MP) GENL MINE PLAN COMPLIANCE- <u>N</u>	(FW) FISH & WILDLIFE----- <u>N</u>	(RV) REVEGETATION---- <u>N</u>
(SM) SIGNS AND MARKERS----- <u>N</u>	(SP) STORM WATER MGT PLAN---- <u>N</u>	(RS) RECL PLAN/COMP-- <u>N</u>
(ES) OVERBURDEN/DEV. WASTE----- <u>N</u>	(SC) EROSION/SEDIMENTATION--- <u>N</u>	(ST) STIPULATIONS----- <u>N</u>
(AT) ACID OR TOXIC MATERIALS----- <u>N</u>	(OD) OFF-SITE DAMAGE----- <u>N</u>	

Y = Inspected / N = Not inspected / NA = Not applicable to this operation / PB = Problem cited / PV = Possible violation cited

OBSERVATIONS

This inspection was conducted as part of the normal monitoring program established by the Colorado Division of Reclamation, Mining and Safety (Division). The inspection was conducted by Leigh Simmons of the Division, and accompanied at times by Scott Barney of United Companies (a subsidiary company of the permittee). The Chambers Pit is a 112c operation with a total permit area of 135 acres, located west of Eagle, with access off Fairgrounds Road. There was no activity at the site at the time of the inspection. The pre-mining land use of the site was Cropland, and, following the approval of AM-1, the site will ultimately be reclaimed to a land use of Recreation.

The operator responded to problems cited in the report of the March 23, 2023 inspection by submitting TR-5. With TR-5 the operator asserts that backfilling and grading has been completed at the site. This inspection was conducted to verify that assertion and to aid with a better estimate of the remaining reclamation liability.

No Acreage Release, Surety Release or Surety Reduction Application has been received by the Division, so there is no scope to reduce the Required Surety as a result of this inspection, regardless of the estimated cost to complete the remaining reclamation tasks.

Backfilling and Grading:

In order to assess the status of backfilling and grading, the Division collected images using a DJI Phantom 4 Pro drone, flown on a single grid pattern using Pix4D Capture Pro. Images were captured at nadir, with 75% front and side overlap. Ordinarily the drone would have been flown at 400' above ground level, but given the proximity to Eagle airport the ceiling for drone operations at the site is 200' (this meant an unusually large number of images were required to cover the area of interest and made data processing rather burdensome). Propeller Aeropoints were used as ground control points (GCPs).

The data was processed using Pix4D Mapper, the processing report is appended. NAD83(2011) / UTM zone 13N was the output coordinate system. The Pix4D Mapper software identifies common pixels in overlapping images to "stitch" the images together, and to build a three dimensional model of the surface. Standard data products include a simulated point cloud, and a triangle mesh model. Additional data products generated were an orthomosaic image, a Digital Surface Model (DSM), and a Digital Terrain Model (DTM). The area per pixel in the raw imagery (termed "ground sampling distance, or GSD") is a function of the sensor resolution and the flight elevation. In this case the GSD was estimated at 1.62cm²/pixel, which is much finer than required. In the second processing step the point cloud was classified. All points were used to generate the DSM. For the DTM points classified as human-made objects, buildings and vegetation were disabled, so the model was generated just from points classified as ground or road. The resolution of the orthomosaic image and the DSM was set at 4xGSD (so approximately 6.48cm²/pixel), with automatic noise filtering and surface smoothing applied. For the DTM the settings were configured to reduce the resolution to 50cm²/pixel.

The DTM was imported into ArcPro for further analysis. Contours were generated at 2ft intervals (to match the map submitted as Exhibit F with TR-5), and a raster of slope angle was generated, using a neighborhood distance of 3m. The slope raster was symbolized to show slopes below 3H:1V in green; between 2.5H:1V and 3H:1V in yellow; between 2H:1V and 2.5H:1V in orange; and steeper than 2H:1V in red. At all stages the data was processed to minimize the confounding effects of fine details such as large boulders and unclassified vegetation, and to enhance the ability to characterize the angle of slopes where the slope length was on the

order of 10ft or greater.

The data can be viewed at <https://arcg.is/Ovi8if> (use the content tab to toggle on and off the various layers); some screenshots are included in this report.

The reclamation plan in Exhibit E of the Permit Application Packet (PAP) specifies that "All final mining slopes have been backfilled and graded to their final reclaimed 3H:1V slopes or shallower."

Figure 5 (below) shows that there are several areas where the slope is steeper than 3H:1V (yellow, orange and red areas). Some of these areas are associated with ditches, berms or stockpiled topsoil, and could reasonably be expected to be graded out as the site is disc harrowed and topsoil is spread, however there are several areas where more extensive grading work would be necessary to achieve a 3H:1V slope:

- The embankment to the west of the East Access Road (Figures 2, 5, 6 and 7) is much steeper than 3H:1V, and includes a sheer section (presumably an old high-wall)
- Slopes to the north and west of the disc golf parking area (Figures 5, 6 and 7) are steeper than 3H:1V. As the contours in Figure 7 show, this area has been graded quite differently to the surface shown on Exhibit F
- Parts of the embankments to the west of the West Access Road, and to the north of the light use road to the north west of it (Figures 3, 5, 8 and 9) are steeper than 3H:1V
- The slope to the south west of the ball fields is also slightly steeper than 3H:1V (Figure 5)

Financial Warranty:

The reclamation cost estimate was re-evaluated, using current unit costs for equipment, labor and materials, based on the tasks remaining to be completed at the site.

The Division currently holds a bond of \$694,934, which is equal to the Required Surety. This amount is adequate to complete outstanding reclamation tasks.

PHOTOGRAPHS

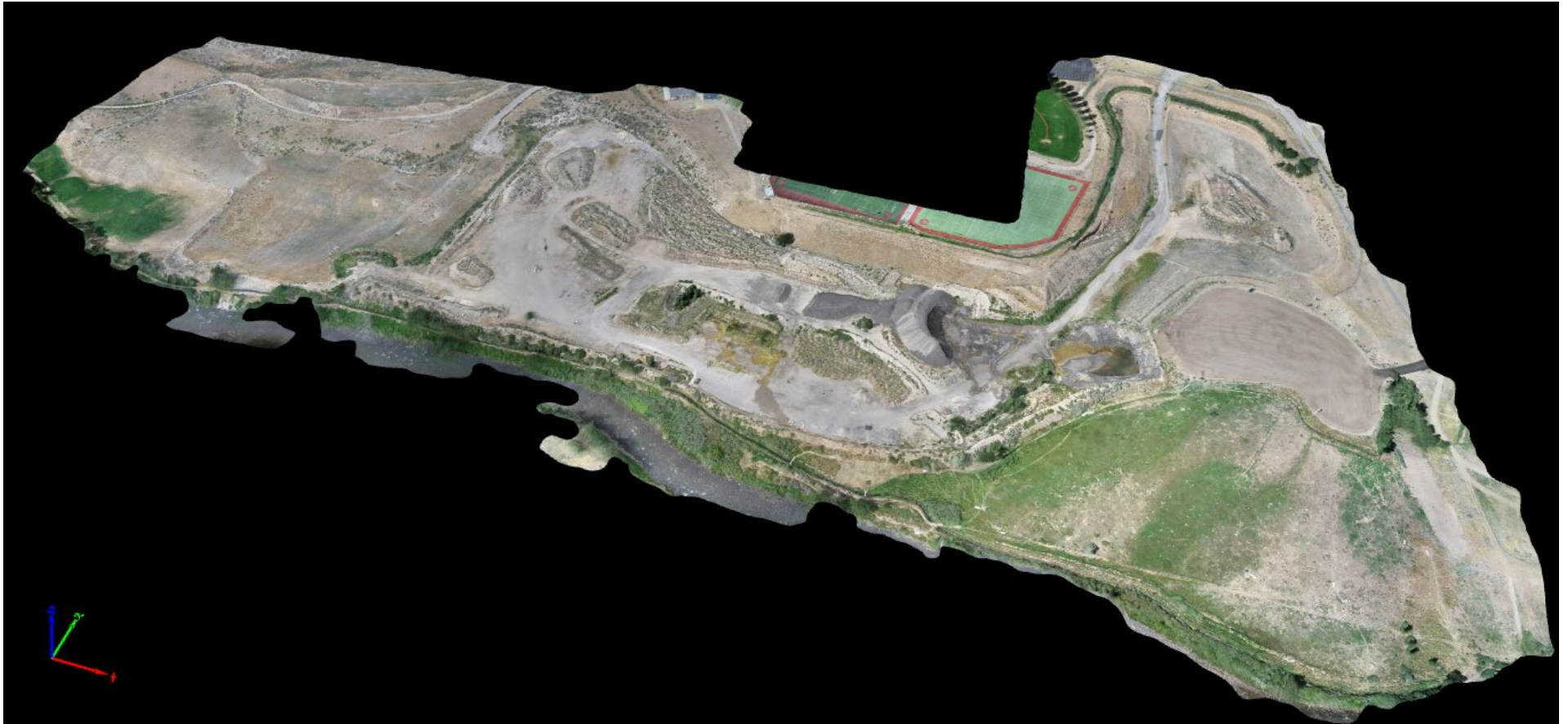


Figure 1: Screenshot from Pix4D showing triangle mesh of whole of surveyed area

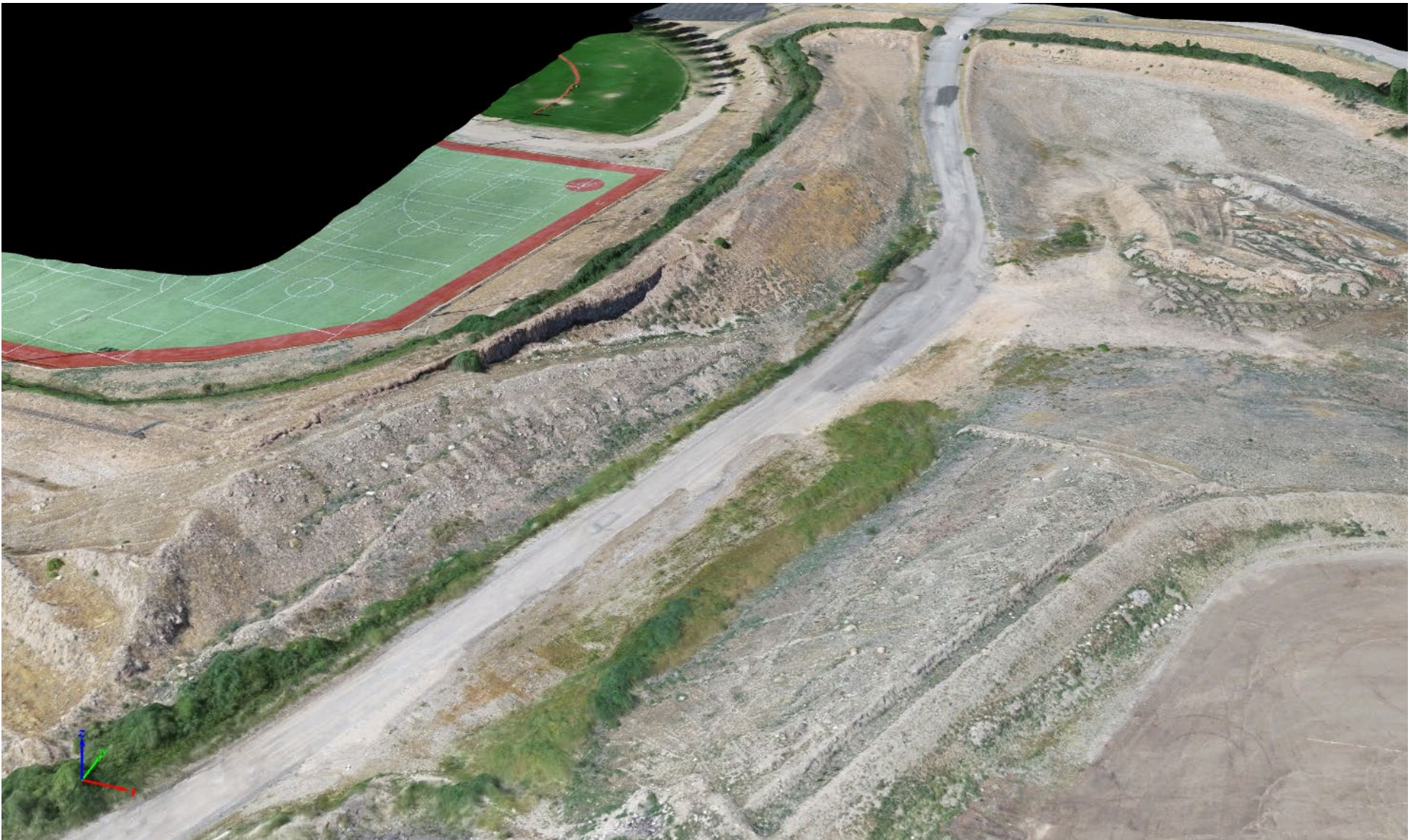


Figure 2: Screenshot from Pix4D showing triangle mesh of north eastern portion of surveyed area

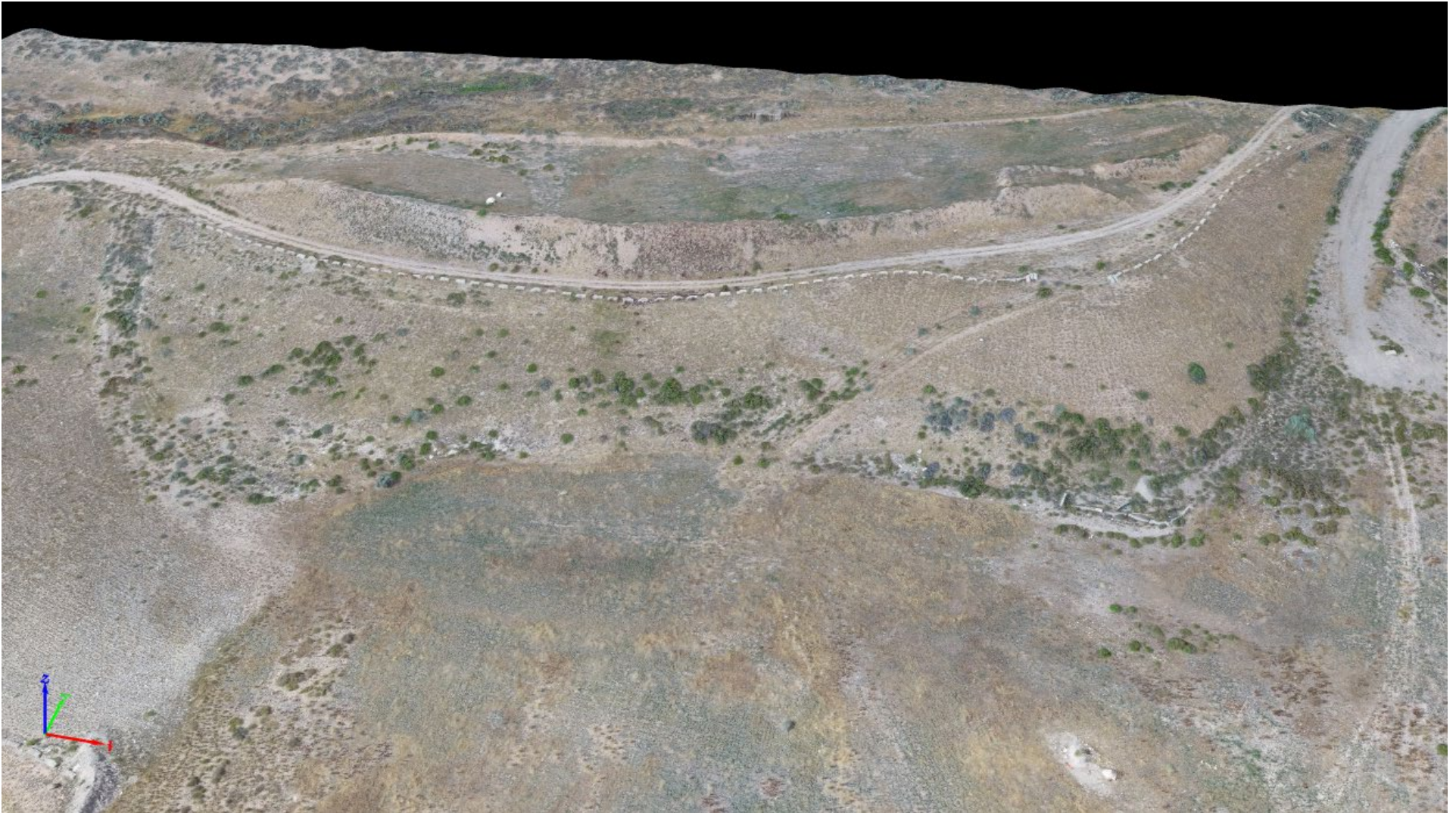


Figure 3: Screenshot from Pix4D showing triangle mesh of north western portion of surveyed area



Figure 4: Screenshot from ArcGIS Online showing orthomosaic of whole of surveyed area



Figure 5: Screenshot from ArcGIS Online showing orthomosaic of whole of surveyed area, overlaid with slope raster.

Green	Shallower than 3H:1V
Yellow	3H:1V-2.5H:1V
Orange	2.5H:1V-2H:1V
Red	Steeper than 2H:1V

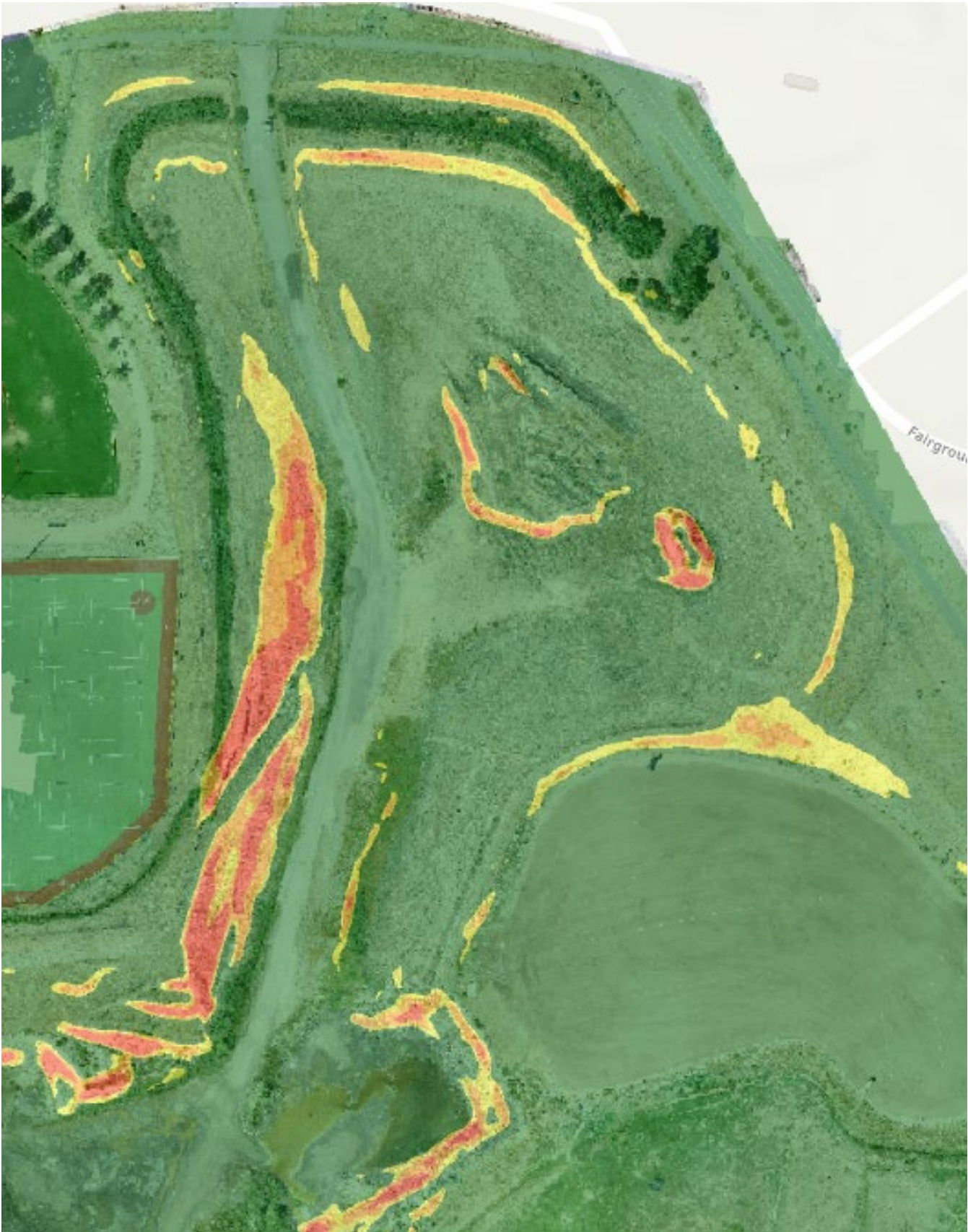


Figure 6: North eastern portion of surveyed area; Orthomosaic overlaid with slope raster

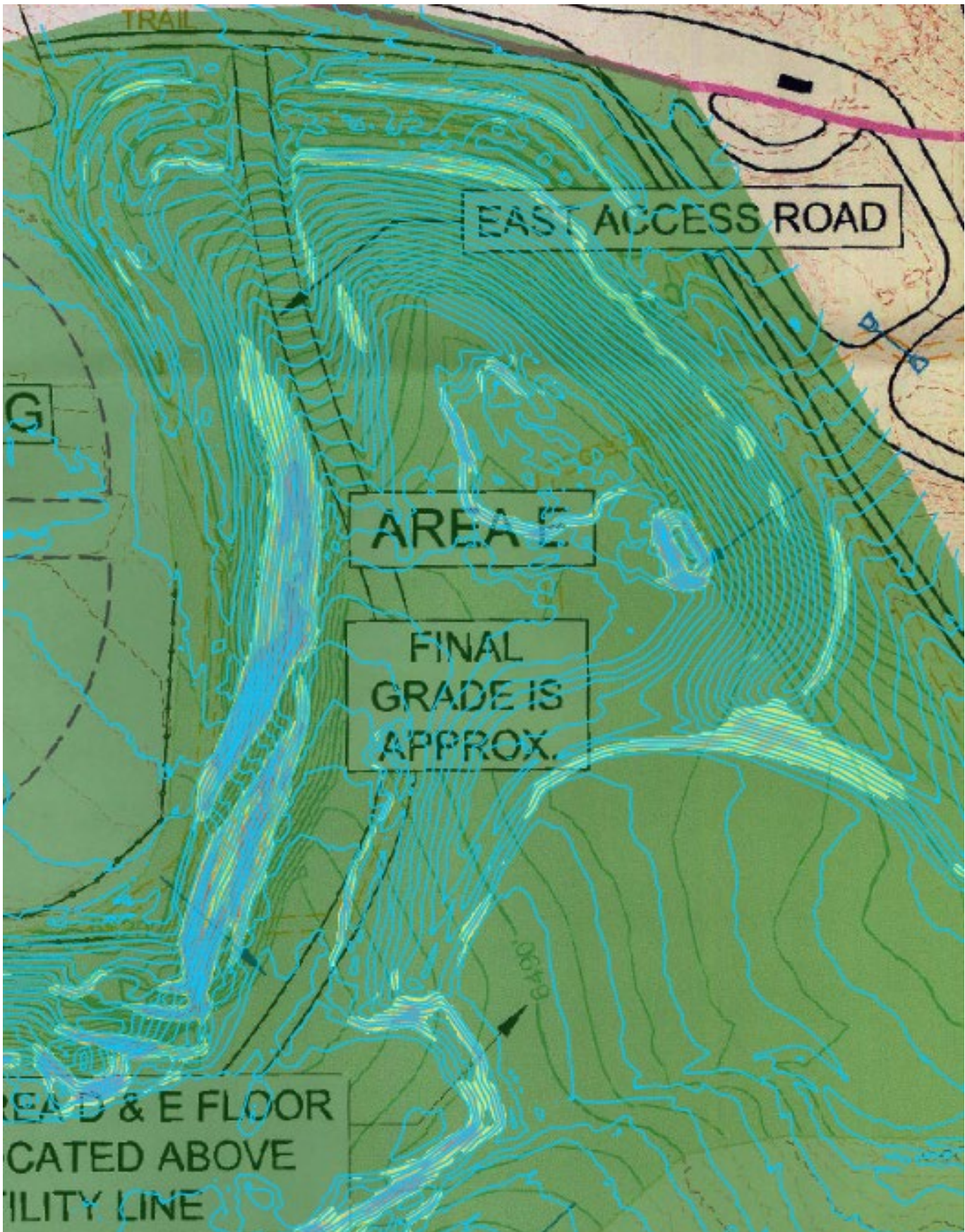


Figure 7: North eastern portion of surveyed area; Exhibit F overlaid with slope raster and generated 2ft contours (blue)

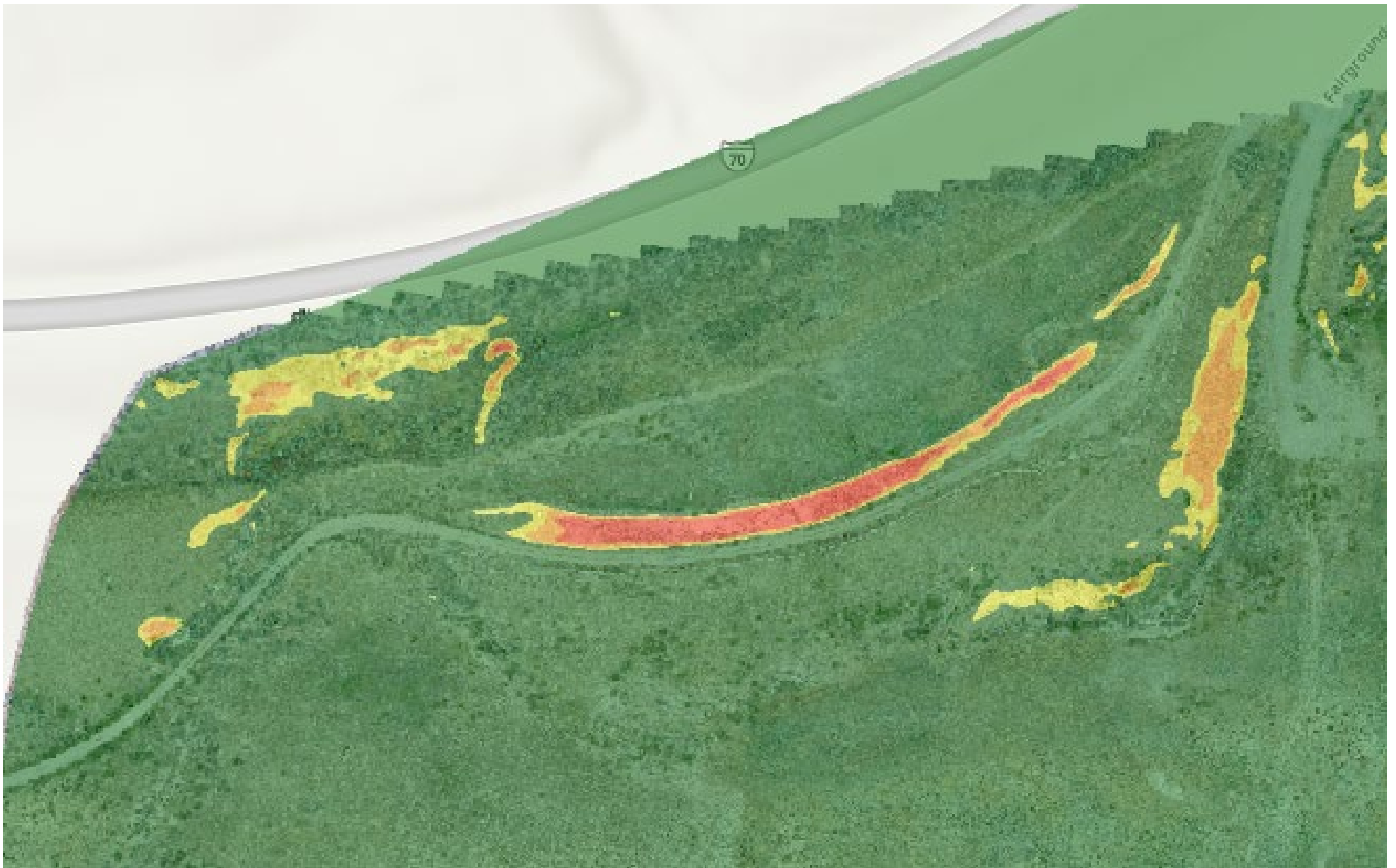


Figure 8: Western portion of surveyed area; Orthomosaic overlaid with slope raster

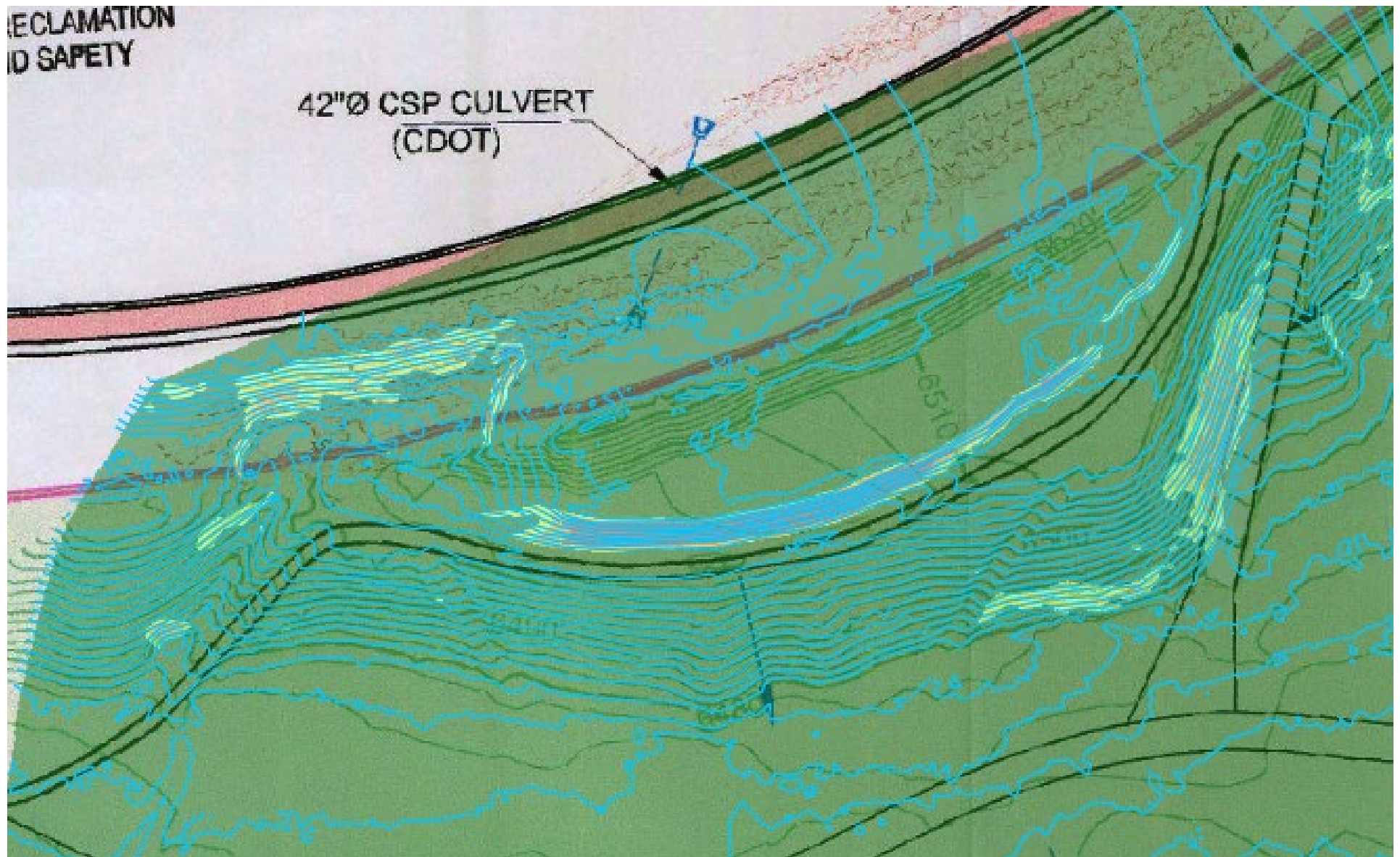


Figure 9: Western portion of surveyed area; Exhibit F overlaid with slope raster and generated 2ft contours (blue)

Inspection Contact Address

Scott Barney
Oldcastle SW Group, Inc. dba United Companies of Mesa County
2273 River Road
Grand Junction, CO 81502

Enclosure:

Appendix 1 – Pix4D Quality Report

CC: Ben Langenfeld; benl@lewicki.biz

Appendix 1 – Pix4d Quality Report

Quality Report



Generated with Pix4Dmapper version 4.6.3



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	M1980136_ChambersPit_2023_08_14
Processed	2023-08-18 12:04:29
Camera Model Name(s)	FC6310_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	1.62 cm / 0.64 in
Area Covered	0.448 km ² / 44.8433 ha / 0.17 sq. mi. / 110.8676 acres

Quality Check



Images	median of 5195 keypoints per image	
Dataset	1132 out of 1133 images calibrated (99%), all images enabled	
Camera Optimization	0% relative difference between initial and optimized internal camera parameters	
Matching	median of 2550.3 matches per calibrated image	
Georeferencing	yes, 9 GCPs (9 3D), mean RMS error = 0.002 m	

Preview

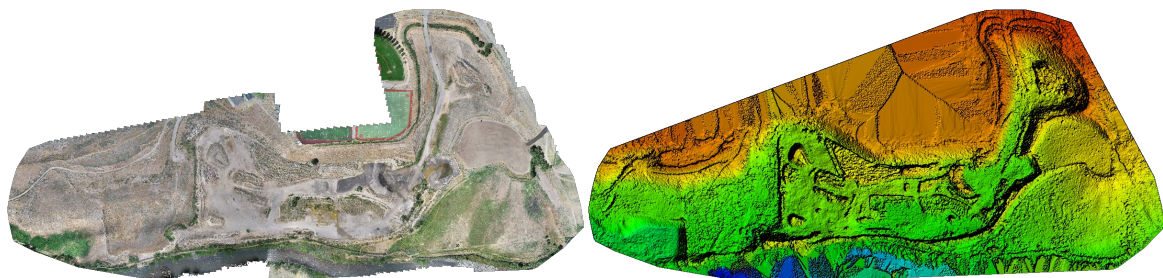


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	1132 out of 1133
Number of Geolocated Images	0 out of 1133

Initial Image Positions



The preview is not generated for images without geolocation.

Computed Image/GCPs/Manual Tie Points Positions





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	0.024	0.020	0.054	0.015	0.020	0.006
Sigma	0.012	0.007	0.032	0.004	0.011	0.003

🔍 Overlap

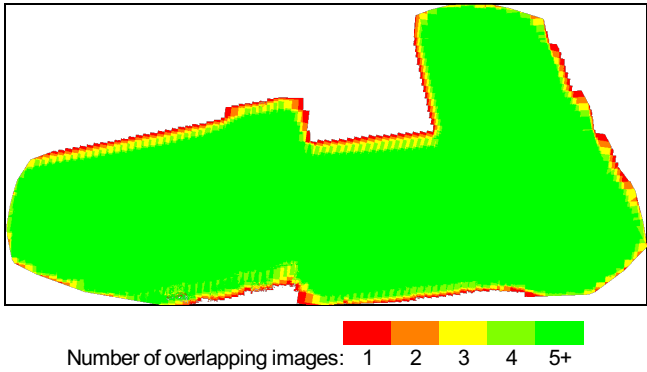


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint matches is also sufficient for these areas (see Figure 5 for keypoint matches).

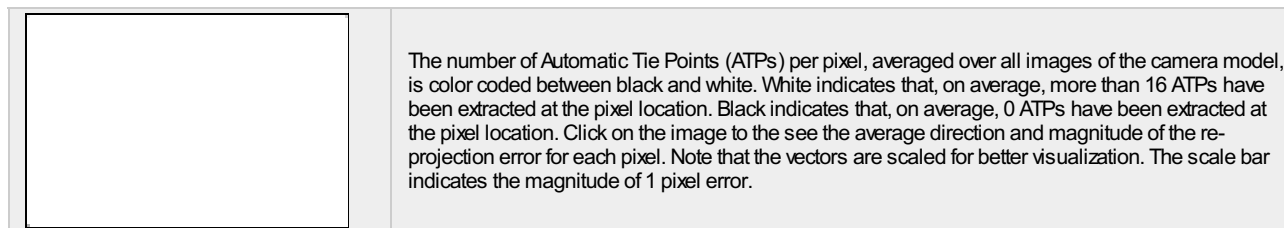
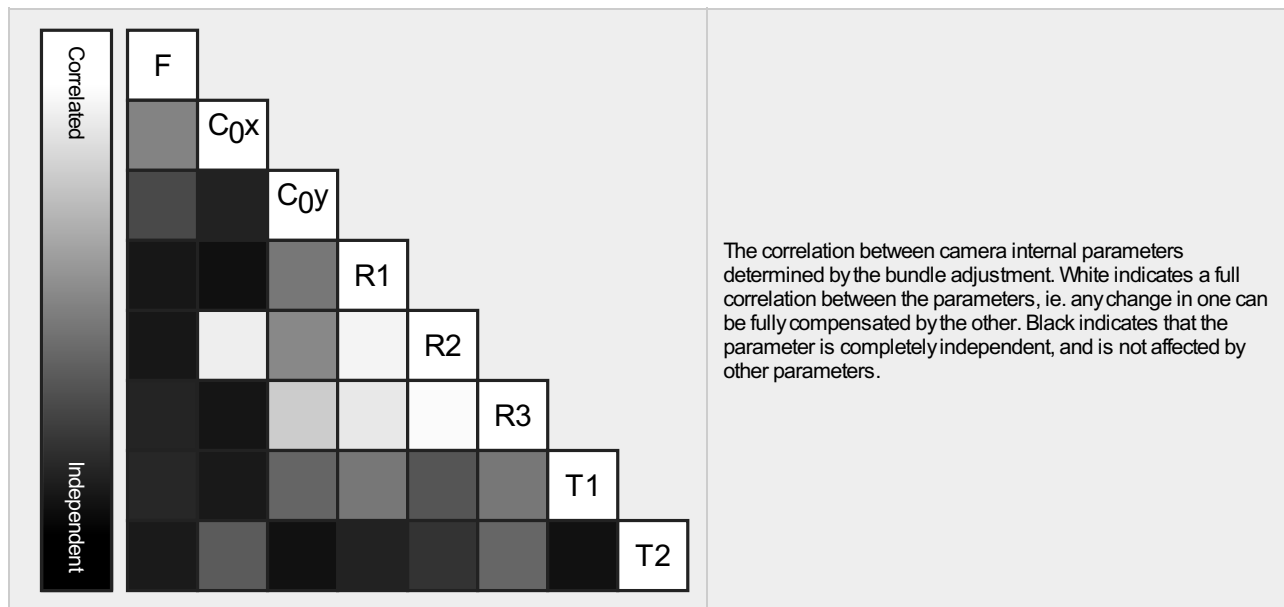
Bundle Block Adjustment Details

Number of 2D Keypoint Observations for Bundle Block Adjustment	2882519
Number of 3D Points for Bundle Block Adjustment	896645
Mean Reprojection Error [pixels]	0.100

🔍 Internal Camera Parameters

EXIF ID: FC6310_8.8_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3668.760 [pixel] 8.604 [mm]	2736.000 [pixel] 6.417 [mm]	1824.000 [pixel] 4.278 [mm]	0.003	-0.008	0.008	-0.000	0.000
Optimized Values	3668.996 [pixel] 8.605 [mm]	2712.788 [pixel] 6.362 [mm]	1861.509 [pixel] 4.366 [mm]	0.008	-0.015	0.014	0.001	-0.002
Uncertainties (Sigma)	2.272 [pixel] 0.005 [mm]	0.175 [pixel] 0.000 [mm]	0.142 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000



2D Keypoints Table



	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	5195	2550
Mn	3121	700
Max	7027	3974
Mean	5192	2546

3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	551656
In 3 Images	150951
In 4 Images	69064
In 5 Images	35718
In 6 Images	22352
In 7 Images	15301
In 8 Images	11111
In 9 Images	7988
In 10 Images	6008
In 11 Images	4972
In 12 Images	3935

In 13 Images	3113
In 14 Images	2602
In 15 Images	2115
In 16 Images	1628
In 17 Images	1283
In 18 Images	1036
In 19 Images	830
In 20 Images	813
In 21 Images	727
In 22 Images	581
In 23 Images	605
In 24 Images	628
In 25 Images	499
In 26 Images	390
In 27 Images	298
In 28 Images	228
In 29 Images	133
In 30 Images	65
In 31 Images	11
In 32 Images	3
In 33 Images	1

? 2D Keypoint Matches

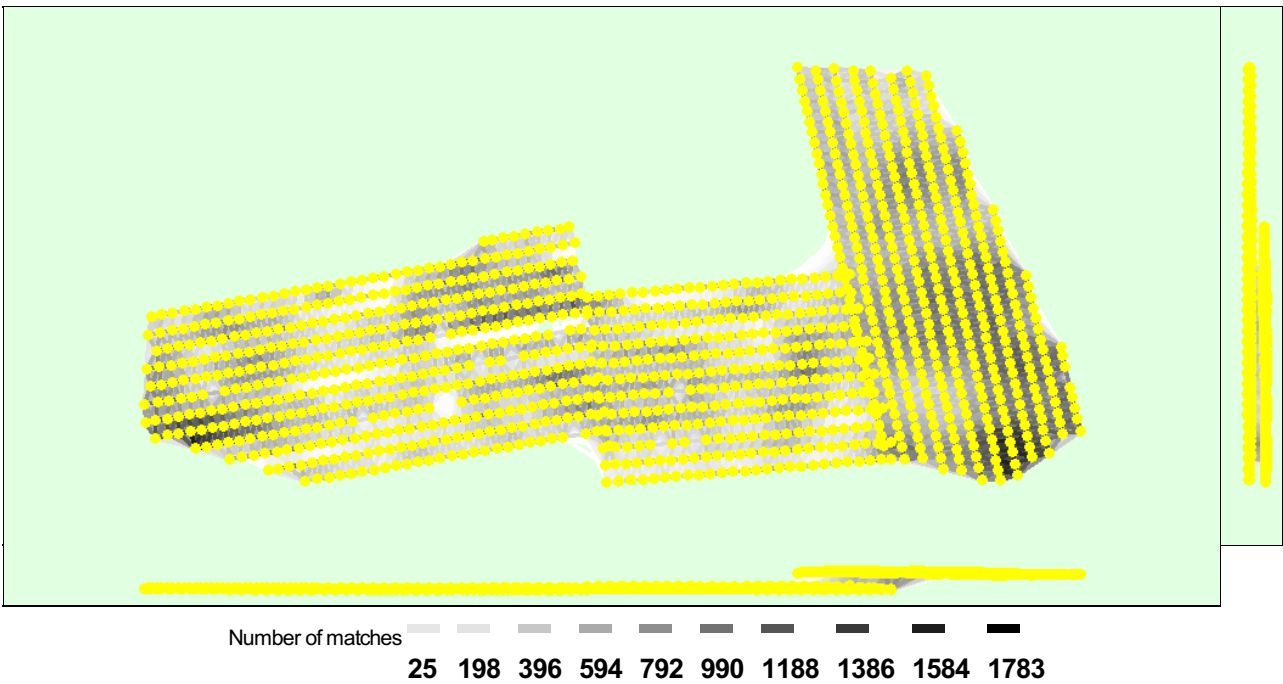


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

Geolocation Details

? Ground Control Points

GCP Name	Accuracy XY/Z [m]	Error X [m]	Error Y [m]	Error Z [m]	Projection Error [pixel]	Verified/Marked
1 (3D)	0.020/ 0.020	-0.001	0.000	0.000	0.227	17 / 17
2 (3D)	0.020/ 0.020	-0.001	-0.004	-0.003	0.189	27 / 27
3 (3D)	0.020/ 0.020	0.005	-0.000	-0.000	0.274	27 / 27

4 (3D)	0.020/ 0.020	-0.001	-0.001	0.001	0.356	22 / 22
5 (3D)	0.020/ 0.020	0.002	-0.003	0.000	0.305	17 / 17
6 (3D)	0.020/ 0.020	0.001	-0.002	-0.000	0.225	17 / 17
7 (3D)	0.020/ 0.020	-0.002	0.001	0.000	0.266	11 / 11
8 (3D)	0.020/ 0.020	0.001	0.002	-0.001	0.355	14 / 14
9 (3D)	0.020/ 0.020	-0.005	0.007	0.002	0.201	16 / 16
Mean [m]		-0.000014	0.000005	0.000039		
Sigma [m]		0.002728	0.002940	0.001102		
RMS Error [m]		0.002728	0.002940	0.001102		

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 v.s. manually marked.

Initial Processing Details

System Information

Hardware	CPU: Intel(R) Core(TM) i7-8550U CPU @ 1.80GHz RAM: 16GB GPU: Intel(R) UHD Graphics 620 (Driver: 31.0.101.2121)
Operating System	Windows 10 Enterprise, 64-bit

Coordinate Systems

Ground Control Point (GCP) Coordinate System	NAD83(2011) / UTMzone 13N
Output Coordinate System	NAD83(2011) / UTMzone 13N

Processing Options

Detected Template	No Template Available
Keypoints Image Scale	Rapid, Image Scale: 0.25
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: no
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Standard Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, yes

Point Cloud Densification details

Processing Options

Image Scale	multiscale, 1/4 (Quarter image size, Fast)
Point Density	Low (Fast)
Minimum Number of Matches	3
3D Textured Mesh Generation	yes
3D Textured Mesh Settings:	Resolution: Medium Resolution (default) Color Balancing: no
LOD	Generated: no
Advanced: 3D Textured Mesh Settings	Sample Density Divider: 1
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes

Time for Point Cloud Densification	59m:15s
Time for Point Cloud Classification	04m:44s
Time for 3D Textured Mesh Generation	47m:38s

Results



Number of Generated Tiles	1
Number of 3D Densified Points	8231709
Average Density (per m ³)	76.67

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	4 x GSD (1.62 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Smooth
Raster DSM	Generated: yes Method: Inverse Distance Weighting Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Raster DTM	Generated: yes Merge Tiles: yes
DTM Resolution	8 x GSD (1.62 [cm/pixel])
Time for DSM Generation	03m:04s
Time for Orthomosaic Generation	01h:45m:45s
Time for DTM Generation	44m:52s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s