REPORT FOR

2022 ORTHO & OBLIQUE IMAGERY

PREPARED BY

eagleview™

25 Methodist Hill Drive
Rochester, NY 14623
Phone 585-486-0093 / Fax 585-486-0098
Registered as Pictometry International Corp.
Pictometry Business License No. LB7711

Project ID: FLLEE017/CAP021740

This report is not valid without the signature and the digital signature of a Florida licensed Professional Surveyor and Mapper. "I CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS DIGITAL ORTHOPHOTOGRAPHY MAP MEETS OR EXCEEDS THE CONTRACT REQUIREMENTS AND THE STANDARDS OF PRACTICE APPLICABLE FOR THIS WORK."

CLAIRE KIEDROWSKI
License Number
6723
STATE OF FLORIDA
Professional Surveyor and Mapper

Digitally signed by Claire E Kiedrowski
Date: 2022.06.30 12:12:17 -04'00'

Claire Kiedrowski – Senior Photogrammetrist, FL PSM #6723

Table of Contents

Introduction

This report pertains to the Photogrammetric Mapping and Digital Aerial Color Orthophotography processing performed to produce the georeferenced orthogonal imagery, as delivered to the client, Lee County, FL. All work was performed in accordance with the ***Standards of Practice*** as set forth in ***Rule Chapter 5J-17, F.A.C.***, pursuant to ***Chapter 472, F.S.***

Project Area

This report encompasses approximately 1,168 square miles of 3-inch Orthoimagery within Lee County, Florida.

Projection

State Plane Coordinate System 1983
Florida West Zone
North American Datum 1983 (2011)
NAVD88
US Survey Feet

Capture Window

Imagery was obtained between the dates of January 1 – March 13, 2022.

Digital Media

In addition to this Report, the project delivery is only complete upon receiving an external hard drive labeled: **FLLEE22**

Office Personnel

Claire Kiedrowski – Professional Surveyor & Mapper, FL PSM License #6723
Nick Gagne – Project Manager
Justin Pitts – Sr. Director Photogrammetric Production
Thaddeus Hagood – Geomatics Manager
Emma Witherwax – AT Specialist
Jose Velez Borbon – Mosaic Specialist

Professional Surveyor & Mapper

Unless otherwise noted, the scope of responsibility for the licensed professional referenced herein, is limited to the following: review and validation of the aerial data collection methodologies concepts and procedures utilized for the project; review of GPS/INS post-processing solution(s); review and validation of testing methodologies/procedures utilized to represent any accuracy statements shown herein; planning of the locations of any ground control points to be used in aerial triangulation tasks; supervision of any aerial triangulation production tasks; review and approval of DEM preparation procedures utilized to support the orthorectification of any certified orthomosaic products; preparation of the initial aero-triangulated and orthorectified mosaic utilized as the data source for any additional corrections (e.g. color/tonal balancing and individual feature correction).

LICENSED SURVEYOR & MAPPER **Claire Kiedrowski PSM #6723**

Captured Raw Data Summary

This report is complete with the accompanying external hard drives containing the digital orthophotography imagery frame mapping data.

Deliverable Information

Produced GSD	Average GSD of Source Frame	Total Area (Square Mile)
3-inch Orthoimage	2.55 Inches	1168
3-inch Oblique Image	2.59 Inches	1168

Tile Projection

System	Datum	Zone	Units
US State Plane 1983	North American Datum 1983 - 2011	Florida West Zone	US Survey Feet

Flight Logs

Capture ID: FLLEE017

Flight Plan Name	Flight Start Date	Flight End Date	Flight Altitude MSL (Usft)	Time (Hrs.)	# of Flight Lines
FLLEE_FP301	1/7/2022	1/14/2022	2500	2.45	9
FLLEE_FP302	1/3/2022	1/7/2022	2500	2.16	8
FLLEE_FP303	1/3/2022	1/3/2022	2500	2.16	8
FLLEE_FP304	1/14/2022	1/14/2022	2500	2.16	8
FLLEE_FP305	1/15/2022	1/15/2022	2500	2.16	8
FLLEE_FP306	1/3/2022	1/14/2022	2500	2.16	8
FLLEE_FP307	1/13/2022	1/15/2022	2500	2.16	8
FLLEE_FP308	1/3/2022	1/13/2022	2500	2.02	7
FLLEE_FP309	1/6/2022	1/14/2022	2500	2.03	7
FLLEE_FP310	1/15/2022	1/15/2022	2500	2.32	8
FLLEE_FP311	1/29/2022	1/30/2022	2500	2.32	8
FLLEE_FP312	1/6/2022	1/24/2022	2500	2.32	8
FLLEE_FP313	1/6/2022	1/15/2022	2500	2.32	8
FLLEE_FP314	1/6/2022	1/30/2022	2500	2.32	8
FLLEE_FP315	1/5/2022	1/5/2022	2500	2.32	8
FLLEE_FP316	1/5/2022	1/6/2022	2500	2.32	8
FLLEE_FP317	1/5/2022	1/6/2022	2500	2.32	8
FLLEE_FP318	1/6/2022	1/10/2022	2500	2.32	8
FLLEE_FP319	1/6/2022	1/10/2022	2500	2.32	8
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FLLEE_FP324	1/17/2022	1/17/2022	2500	2.32	8
FLLEE_FP325	1/17/2022	1/17/2022	2500	2.32	8
FLLEE_FP326	1/17/2022	1/17/2022	2500	2.32	8
FLLEE_FP327	1/14/2022	1/17/2022	2500	2.32	8
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FLLEE_FP331	1/3/2022	1/3/2022	2500	2.35	11
FLLEE_FP332	1/3/2022	1/3/2022	2500	2.23	11

FLLEE_FP333	1/3/2022	1/3/2022	2500	1.75	10
FLLEE_FP351	1/1/2022	1/6/2022	4500	2.22	19
FLLEE_FP352	1/7/2022	1/7/2022	4500	2.28	12
FLLEE_FP353	1/1/2022	1/8/2022	4500	2.23	9
FLLEE_FP354	1/1/2022	1/7/2022	4500	2.22	8
FLLEE_FP355	1/8/2022	1/9/2022	4500	2.17	8
FLLEE_FP356	1/8/2022	1/14/2022	4500	2.14	8
FLLEE_FP357	1/7/2022	1/14/2022	4500	2.14	8
FLLEE_FP358	1/11/2022	1/14/2022	4500	2.14	8
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FLLEE_FP362	1/8/2022	1/8/2022	4500	2.01	9
FLLEE_FP363	1/8/2022	1/14/2022	4500	1.89	9
FLLEE_FP364	1/6/2022	1/14/2022	4500	1.92	11
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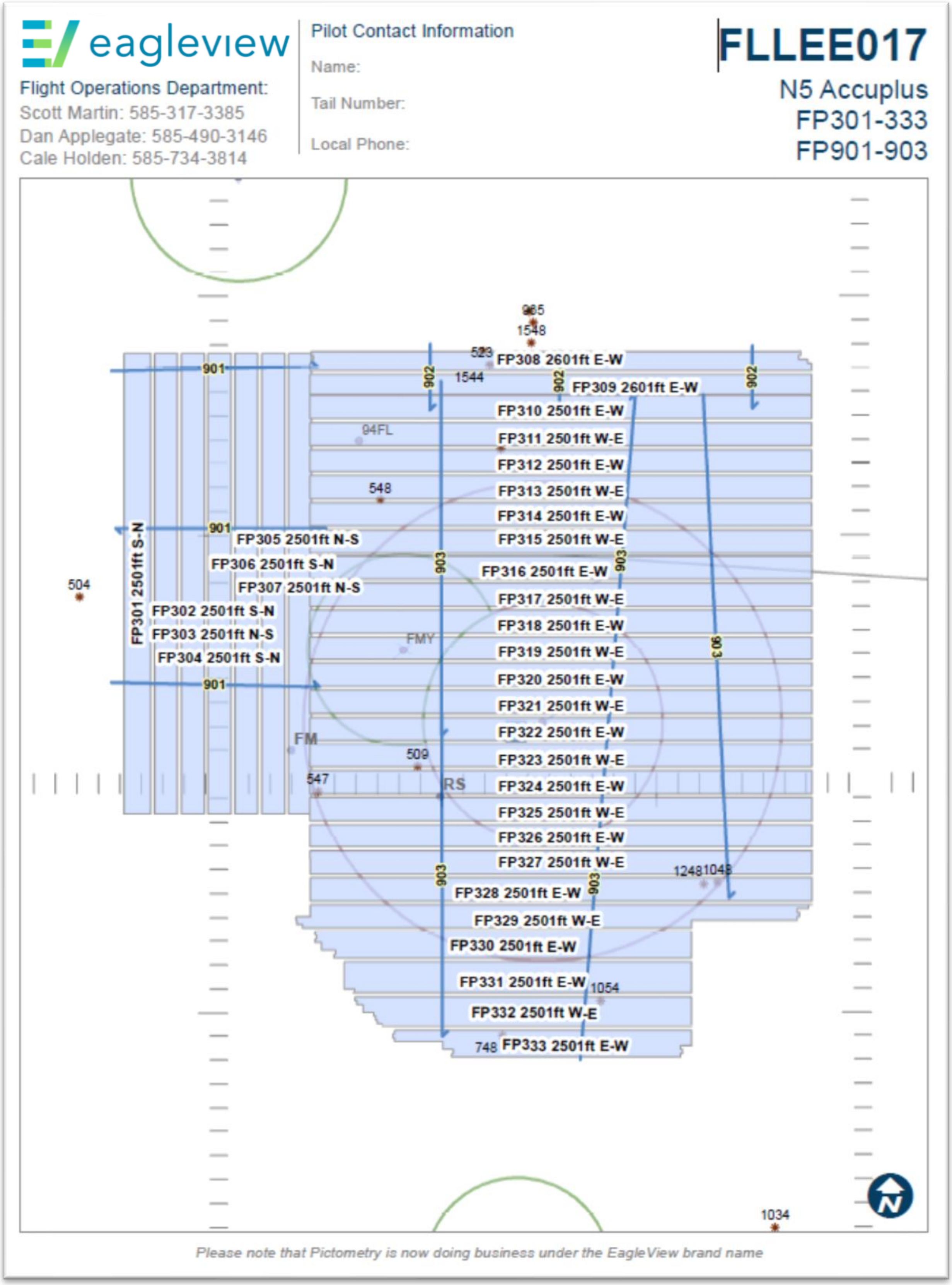
FLLEE_FP372	1/18/2022	1/19/2022	4500	2.24	10
FLLEE_FP373	1/24/2022	1/24/2022	4500	2.24	10
FLLEE_FP374	1/24/2022	1/24/2022	4500	2.24	10
FLLEE_FP375	1/18/2022	1/18/2022	4500	2.24	10
FLLEE_FP376	1/18/2022	1/30/2022	4500	2.24	10
FLLEE_FP377	1/30/2022	1/30/2022	4500	2.24	10
FLLEE_FP378	1/30/2022	1/30/2022	4500	2.24	10
FLLEE_FP379	1/15/2022	1/18/2022	4500	2.24	10
FLLEE_FP380	1/18/2022	1/19/2022	4500	2.24	10
FLLEE_FP381	1/19/2022	1/24/2022	4500	2.24	10
FLLEE_FP382	1/24/2022	1/24/2022	4500	2.24	10
FLLEE_FP383	1/24/2022	1/29/2022	4500	2.24	10
FLLEE_FP384	1/29/2022	1/30/2022	4500	2.24	10
FLLEE_FP385	1/15/2022	1/30/2022	4500	2.02	9
FLLEE_FP391	3/4/2022	3/13/2022	4500	2.13	19
FLLEE_FP392	3/4/2022	3/5/2022	4500	0.36	3
FLLEE_FP393	3/5/2022	3/13/2022	4500	1.58	14
FLLEE_FP394	3/13/2022	3/13/2022	4500	2.09	18
FLLEE_FP395	3/13/2022	3/13/2022	4500	0.32	2
FLLEE_FP396	3/13/2022	3/13/2022	4500	1.41	20
FLLEE_FP901	1/7/2022	1/11/2022	2500	0.57	3
FLLEE_FP902	1/4/2022	1/4/2022	2500	0.37	3
FLLEE_FP903	1/11/2022	1/11/2022	2500	1.22	5
FLLEE_FP951	1/11/2022	1/11/2022	4500	0.64	3
FLLEE_FP952	1/9/2022	1/11/2022	4500	0.39	3
FLLEE_FP971	1/30/2022	1/30/2022	4500	0.99	3

Flight Plan Maps



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Flight Operations Department:
Scott Martin: 585-317-3385
Dan Applegate: 585-490-3146
Cale Holden: 585-734-3814

Pilot Contact Information

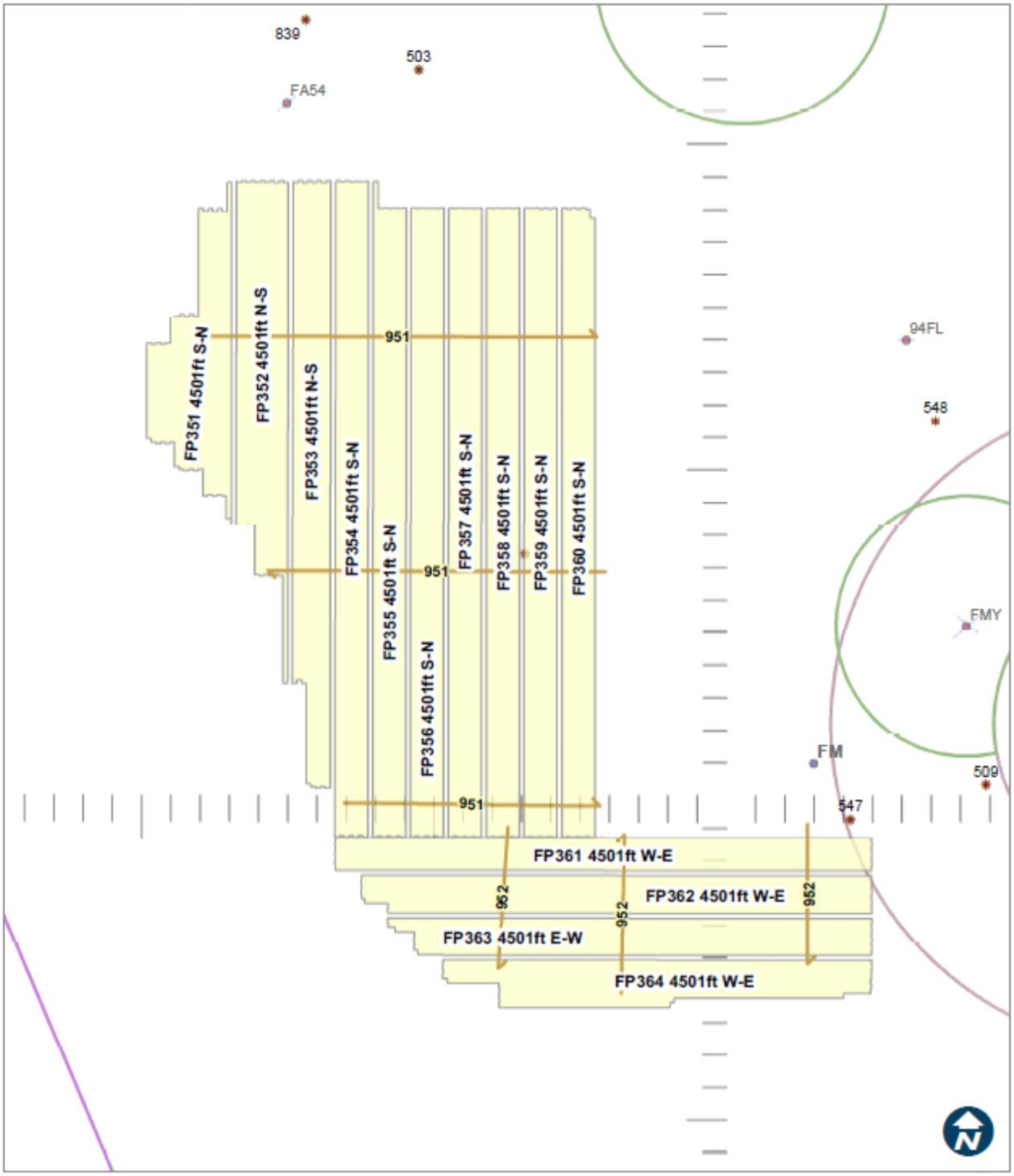
Name:

Tail Number:

Local Phone:

FLLEE017

N5 Accuplus
FP351-364
FP951-952



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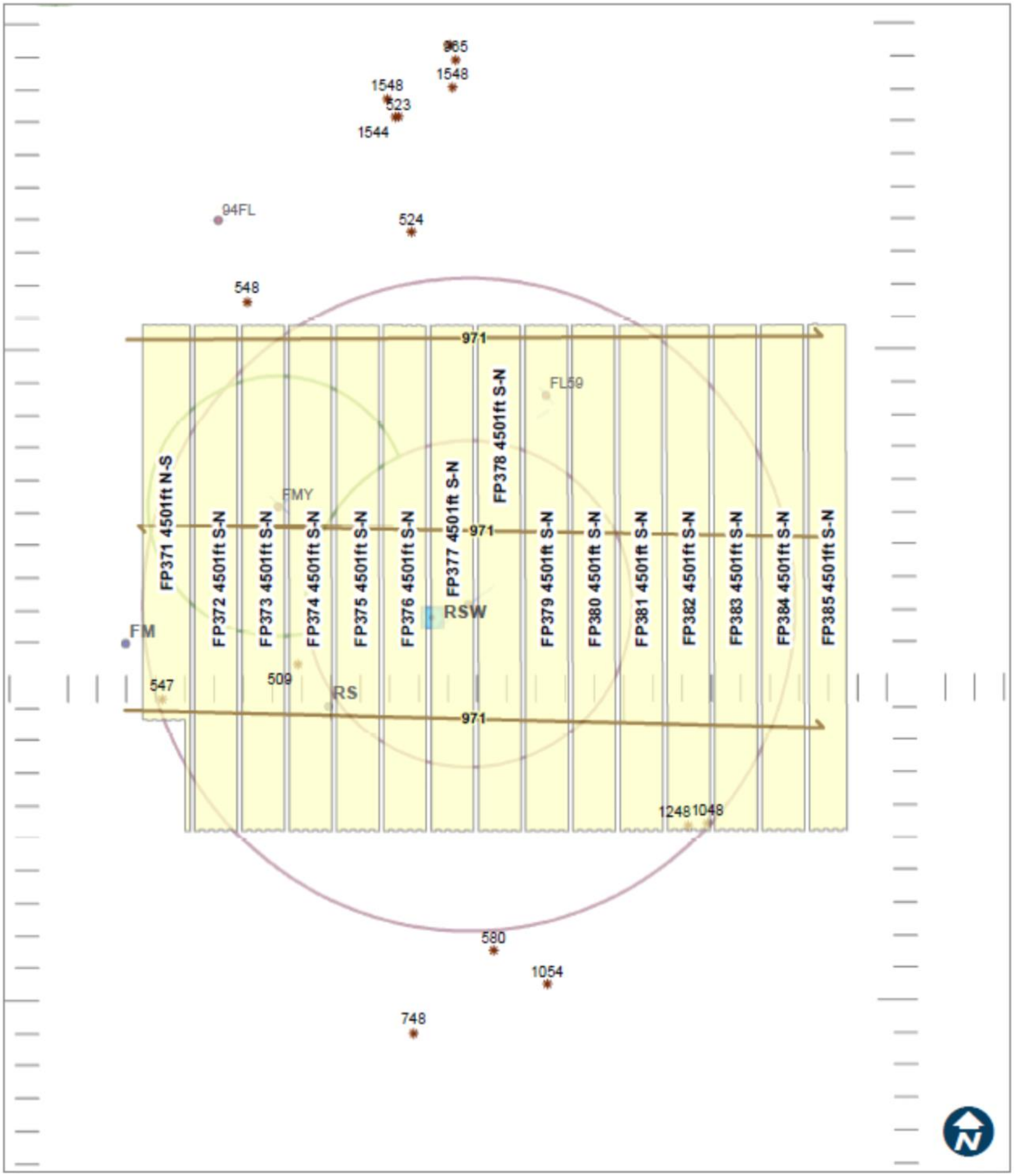
FLLEE017

N5 Hubble Accuplus
FP371-385
FP971



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Name:

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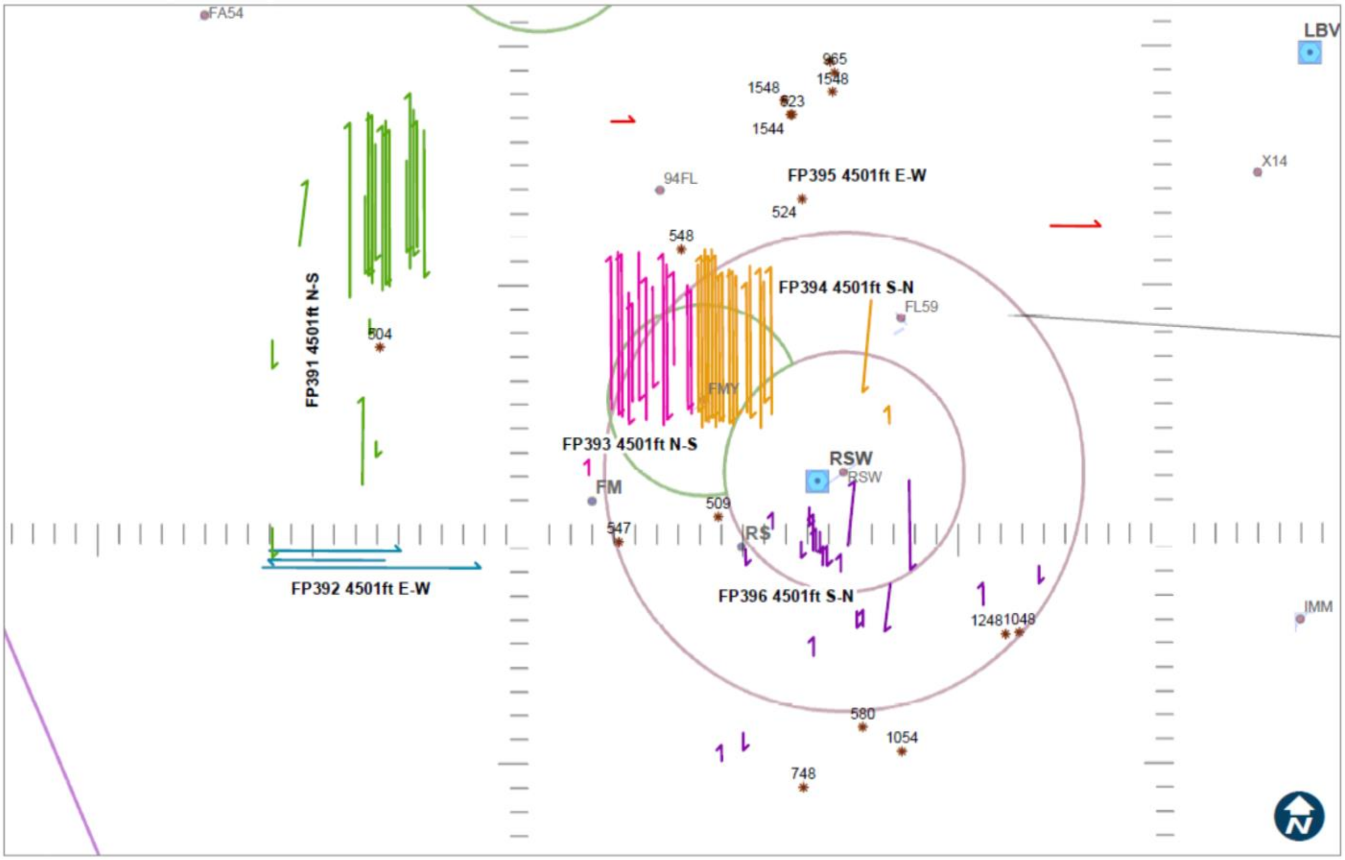
N5 Hubble AccuPlus

FP391-396



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Surveyed Ground Control

Ground control points were established to support orthoimage mapping. All control meets the requirements of the FCDOP, and directly referenced to the FPRN. Data conforms to Florida Standards of Practice 5J-17, F.A.C. *The formal signed and digitally sealed survey report includes survey details required by **2019 Florida County Digital Orthoimagery Program Standards (October 18, 2019)**.*

Source

Company: GeoPoint Surveying, Inc.
License Business Number: 7768
Supervising Surveyor: James D. LeViner, PSM LS6915
Field Dates: January 16-27, 2020

Ground Control Points constrained during AT:

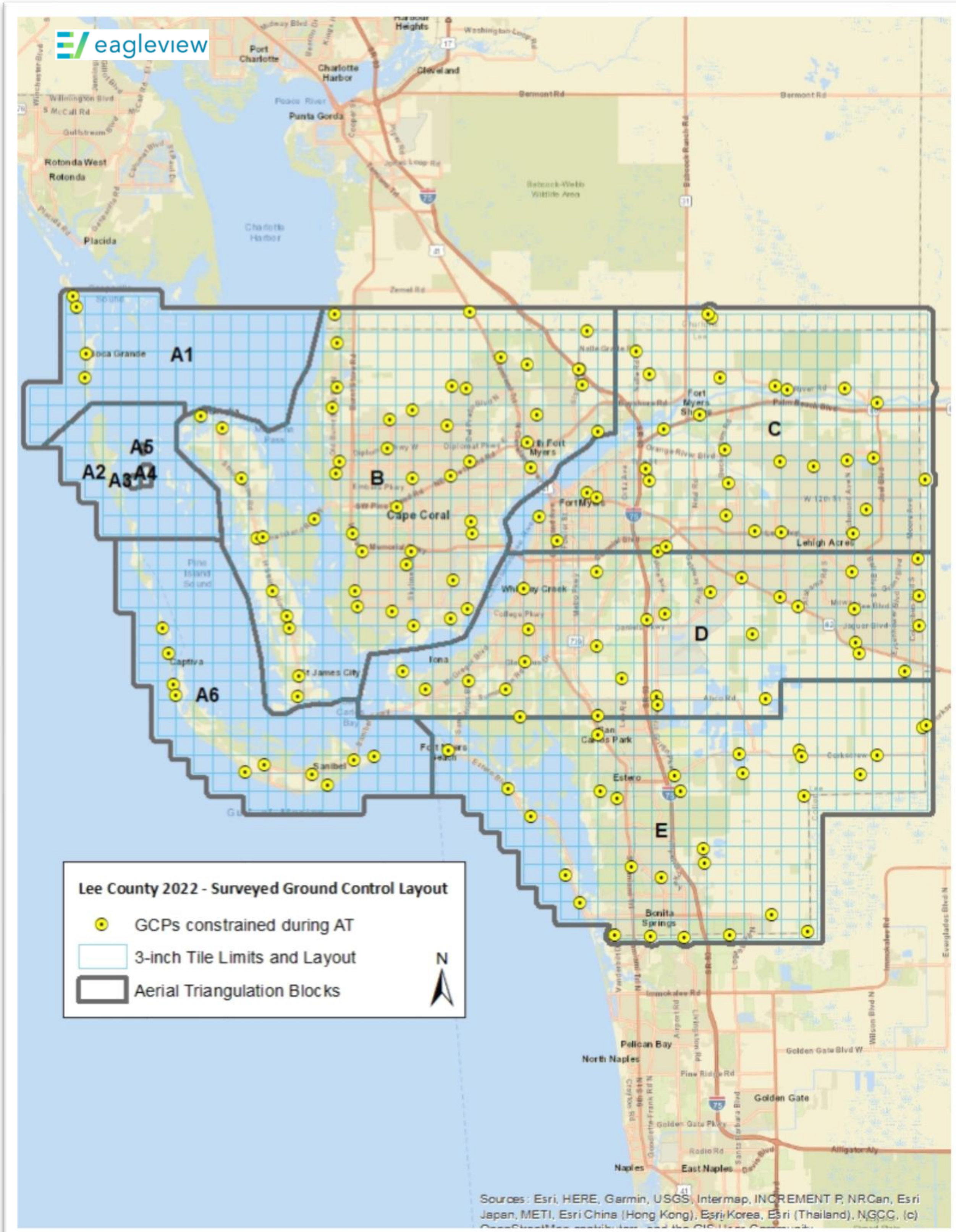
Point ID	NAD83(2011) / SPCS83 - FL West		NAVD88-Geoid18	Description
	Northing (usft)	Easting (usft)	Ortho (usft)	
63544	809820.536	780309.056	27.873	Concrete
63543	771238.824	669533.821	3.427	Concrete
63541	753276.348	692057.026	4.699	Concrete
63540	760853.408	685905.162	3.536	Concrete
63539	729600.785	705476.246	4.488	Concrete
63538	737352.302	701790.249	4.071	Concrete
63537	885244.599	707660.479	25.252	Concrete
63536	874880.070	705575.211	21.582	Concrete
63535	874896.497	705354.220	23.547	Concrete
63534	870623.402	706381.120	16.466	Concrete
63533	857994.098	710543.240	4.160	Concrete
63532	873584.124	724425.045	19.839	Concrete
63531	879966.938	720886.033	23.354	Concrete
63530	889104.838	741584.674	28.097	Concrete
63529	889996.526	740505.505	29.434	Concrete
63528	865756.651	786406.670	14.104	Concrete
63525	869761.214	777659.376	9.452	Paint
63524	869247.625	762122.251	11.394	Concrete
63523	870316.455	758823.405	15.038	Concrete
63522	872736.702	743931.466	8.990	Concrete
63521	858495.703	728582.967	9.051	Concrete
63520	862655.455	738069.147	9.088	Concrete
63519	853210.719	744929.090	11.982	Concrete
63518	848599.402	769077.955	18.375	Concrete
63517	849894.596	760098.024	18.047	Concrete
63516	850900.125	785435.438	18.977	Concrete
63515	850091.612	778508.808	19.188	Concrete
63514	844945.167	799685.238	23.446	Concrete
63513	836686.752	783693.403	22.777	Concrete
63511	830468.391	760568.277	25.516	Concrete
63510	830753.807	753306.047	23.999	Concrete
63509	843872.965	746149.933	17.322	Concrete
63508	835093.807	745423.245	22.313	Concrete
63507	847965.133	723437.442	16.887	Concrete
63506	844564.985	724540.265	20.277	Concrete
63505	720444.688	724915.421	15.703	Concrete
63504	720834.309	714954.501	9.470	Metal Grate
63503	720356.656	734053.483	15.747	Concrete
63502	726389.537	757736.075	16.488	Paint
63501	721018.037	746451.786	14.274	Concrete
63500	721833.478	767748.016	17.498	Concrete

63499	740423.984	739408.164	14.682	Concrete
63498	744491.857	739269.829	14.439	Concrete
63497	736560.104	727884.327	11.864	Concrete
63496	739357.211	719625.761	8.299	Concrete
63495	785280.803	756265.841	26.688	Paint
63494	770206.165	748973.424	20.774	Concrete
63493	765063.004	749920.548	18.991	Concrete
63492	764174.482	731351.153	17.700	Concrete
63491	760182.550	732895.639	17.691	Concrete
63490	758244.240	715589.732	13.363	Concrete
63489	760050.900	710998.831	11.152	Concrete
63488	775355.484	710621.382	10.707	Concrete
63487	790767.271	717026.981	18.006	Concrete
63486	780616.268	710510.503	10.397	Concrete
63485	785785.083	726508.643	22.599	Paint
63484	783670.887	726840.765	21.338	Concrete
63483	806834.288	724028.404	23.358	Concrete
63482	808344.286	728778.788	23.754	Concrete
63480	799680.591	710023.302	15.035	Concrete
63479	771103.904	765435.924	28.175	Concrete
63478	769515.865	765861.502	25.110	Concrete
63477	758606.617	766509.612	20.412	Concrete
63476	764712.364	782045.613	28.001	Concrete
63475	769774.066	786578.114	29.036	Paint
63474	777361.769	799088.553	29.479	Paint
63473	777995.033	799920.399	27.619	Paint
63472	792723.977	794037.339	28.006	Concrete
63471	800590.457	780518.582	28.815	Concrete
63470	797475.822	781749.253	29.763	Concrete
63469	813317.345	797990.003	27.849	Concrete
63468	805163.757	798054.458	29.217	Concrete
63466	819854.170	779580.901	27.195	Concrete
63465	812977.654	759951.100	27.194	Concrete
63464	810461.763	765094.238	27.454	Concrete
63463	802692.276	752635.977	27.347	Concrete
63462	814318.209	741294.989	26.673	Concrete
63461	818076.986	749612.002	25.791	Concrete
63460	825350.729	726695.586	23.533	Concrete
63459	826665.540	729246.480	21.191	Concrete
63458	879109.561	570680.918	5.699	Concrete
63457	872734.986	570485.985	5.367	Concrete
63456	894725.264	567216.228	5.993	Paint
63455	892030.568	568324.990	3.019	Concrete
63454	804424.005	591616.038	3.475	Concrete
63453	797542.983	593406.013	3.188	Concrete
63452	788968.710	594733.328	6.448	Concrete
63451	786122.026	595337.890	4.353	Concrete
63450	767200.497	619580.420	3.490	Paint
63449	765265.262	614325.384	5.257	Concrete
63448	764778.539	632428.389	4.261	Concrete
63447	761673.801	636737.015	4.124	Concrete
63446	768684.174	644034.074	5.814	Concrete
63445	769686.663	649332.247	4.371	Concrete
63444	787964.503	685310.903	6.613	Concrete
63442	787697.839	663519.174	7.200	Concrete
63441	792778.519	657435.938	4.770	Concrete
63439	790208.950	675104.524	7.387	Concrete
63438	804001.938	691603.690	5.425	Concrete
63437	795253.259	690475.359	3.832	Concrete
63436	815143.556	690116.520	5.536	Concrete
63435	819666.157	710183.655	15.964	Concrete

63434	841400.076	707503.798	12.619	Concrete
63433	839970.865	710276.738	16.322	Concrete
63432	848137.160	692098.754	6.647	Concrete
63431	828297.662	699493.537	13.628	Concrete
63430	834821.971	694605.706	5.018	Concrete
63429	791530.919	628967.395	4.671	Concrete
63428	785786.582	628605.199	4.588	Concrete
63427	804574.586	626443.129	6.817	Concrete
63426	814502.051	621747.093	7.182	Asphalt
63425	807732.792	625499.483	5.703	Concrete
63424	829021.113	617636.662	6.109	Concrete
63423	834063.683	633132.381	4.161	Concrete
63422	829256.376	619061.463	4.034	Concrete
63420	845149.316	613244.516	9.853	Concrete
63419	859117.968	607968.340	3.589	Concrete
63418	862226.020	602033.479	3.586	Concrete
63417	814598.985	644244.168	4.510	Concrete
63416	809158.703	654313.735	4.307	Concrete
63415	810275.932	644960.839	5.781	Concrete
63414	821789.346	658380.795	8.113	Concrete
63413	825216.096	659701.813	8.109	Concrete
63412	807083.075	670254.246	3.426	Concrete
63411	804960.669	660152.696	5.586	Concrete
63410	817656.086	671073.893	7.447	Concrete
63409	809657.895	674909.642	3.893	Concrete
63408	833502.720	675875.010	6.586	Concrete
63391	830102.074	676188.443	5.196	Concrete
63390	845868.650	670205.571	12.983	Concrete
63389	859549.676	669270.706	14.330	Concrete
63388	849909.688	675508.658	13.133	Concrete
63387	853323.804	653112.878	8.964	Concrete
63386	845145.515	659879.211	9.931	Concrete
63385	837562.966	655740.878	8.877	Concrete
63384	825333.887	646044.793	4.565	Concrete
63383	830348.283	643734.904	4.765	Concrete
63382	846395.402	639063.319	4.428	Concrete
63381	849975.253	639845.128	5.027	Concrete
63380	864448.884	638050.117	5.974	Concrete
63379	869991.706	639291.041	4.600	Concrete
63378	882123.036	639283.928	6.278	Concrete
63377	890066.733	638755.589	5.334	Concrete
63376	861301.393	653636.455	9.811	Concrete
63375	863898.500	659952.955	14.191	Concrete
63374	870276.825	670598.694	15.572	Concrete
63373	869878.510	674684.704	14.703	Concrete
63372	862610.811	693798.987	15.629	Concrete
63371	854941.285	691144.729	12.476	Concrete
63370	878223.611	683898.075	20.069	Concrete
63369	876326.403	691383.243	20.504	Concrete

Control was not located in AT Blocks A2, A3, A4 and A5 (the northwest portion of the project area), due to type of terrain (swamp and water), lack of developed hard surface features, and inability to place targets. In this area, we relied heavily on the airborne GPS and IMU data.

Surveyed Ground Control Distribution on AT Block Layout



Accuracy of Orthophotography

The accuracy of the Orthomosaic photography referenced herein is reported at the 95% confidence level as specified in the *ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014).*

3-inch GSD

This data set data was produced to meet ***ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014)*** for 0.50 foot (15.24 cm) RMSEx / RMSEy Horizontal Accuracy Class, which equates to +/- 1.22 feet (37.18 cm) NSSDA 95% confidence level.

Standard Process: Equipment and Software

Camera System

EagleView's Pentaview camera systems is based on architecture designed and patented by EagleView. The Pentaview camera system is a multi-camera system comprised of camera modules, an acquisition computer (with sensor control hardware and software) and an Applanix Position and Orientation System (POS) which includes both a Global Positioning System (GPS) antenna and an Inertial Measurement Unit (IMU). EagleView's Pentaview system is comprised of five cameras which are aimed with one looking nadir and one looking in each of the four cardinal oblique directions. Key components of the system are manufactured and assembled by qualified suppliers under contract to EagleView. Individual subsystems of the Pentaview system are integrated and tested at EagleView's facilities in Rochester, New York, as are all finished camera systems.

Manufacturing and Calibration

As part of the manufacturing and calibration process, EagleView's individual cameras are put through a rigorous calibration developed by EagleView and licensed to the USGS. The calibration is performed through the capture of a series of images from prescribed locations and at varied orientations of a stationary target cage. Targets are identified in the images collected via a semi-automatic process and a free-network bundle adjustment is performed to solve for camera interior orientation, including precise focal length, principal point location, and radial distortion coefficients. These parameters are then incorporated into the camera model used during subsequent image processing operations. Each camera is also put through a color calibration process designed by EagleView to generate a consistent response, ensuring consistent representation of ground features.

EagleView four band and color IR imagery is created through a composition of nadir (ortho) RGB imagery with near infrared (NIR) imagery. The NIR imagery is collected via a camera identical to the camera used in the Pentaview imaging system excepting the exclusion of a Bayer filter array and inclusion of a visible light blocking filter. The spectral sensitivity of the NIR camera ranges from approximately 690 to about 950 nm. Peak sensitivity is at the shortest wavelength. Exposure of the NIR camera is calibrated for green matched scene luminance of bare, dry earth.

EagleView IR cameras are calibrated using our same rigorous and USGS recognized methodology using spectrally matched illumination systems. In flight, the NIR is co-aimed with an RGB camera and captures images simultaneously using digital synchronization. Identical processing methods are used for RGB as NIR imagery. Each image is then independently geo-referenced before composition of the imagery.

Collection procedures

System Alignment

In advance of capturing the data, an additional aerial boresight calibration is performed on each of the systems involved in the project. An adjustment is computed to solve for the alignment between the optical axis of the camera and the internal coordinate axes of the Inertial Measurement Unit (IMU). This adjustment is then applied to the imagery captured throughout the project. Each system completes a boresight flight at regular intervals to ensure that the sensors have stayed in alignment.

Once the cameras are calibrated and the system is aligned, data capture can begin. Throughout each of the capture missions, GPS/IMU data is logged on the aircraft, the GPS data is recorded at a minimum rate of 2Hz and the IMU data is logged at a minimum rate of 200Hz. Concurrently, multiple GPS reference stations are logging data on the ground. These reference stations may be either part of the NGS CORS network, or a base station set up and run by EagleView or a licensed surveyor sub-consultant.

The imagery is nominally captured with a PDOP value of less than 8.0 and within 60 kilometers of an operating GPS reference station. Due to the small format of EagleView's camera, and automatic aerial triangulation techniques available, EagleView limits its sensor to 6 degrees of pitch and yaw; this limit can be utilized due to the narrow field of view of EagleView's cameras which, by design, limits the off-nadir distance of features at the edge of the frame.

Imagery is captured at 36-bit (12-bits per channel) and resampled to 24-bit RGB color for processing, with a planned forward lap of 60% and a side lap of 30%. During the capture process, EagleView's Flight Management System performs real time checks of a variety of parameters, including but not limited to: rapid histogram analysis to detect exposure errors, camera orientation (i.e. roll, pitch, yaw) to ensure perspective, and camera position to ensure coverage. Upon completion of collection, the data is transferred to EagleView's processing facility in Rochester, NY.

GPS/INS Post-Processing

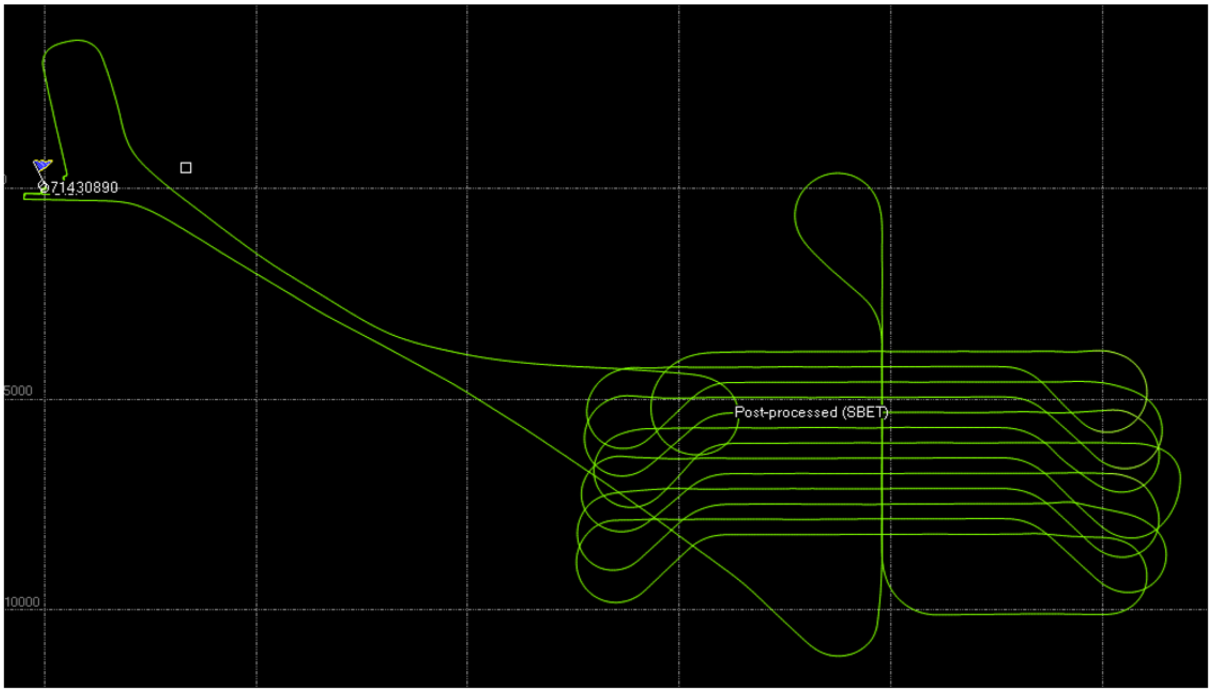
Upon receipt in Rochester, the data is immediately backed up and post-processing begins. Applanix POSPac™ software is utilized to post process the GPS/IMU data utilizing the SmartBase™ (IN-fusion). The SmartBase™ technology uses a centralized filter approach to combine the GPS receiver's raw observables (pseudorange and phase observables) with the IMU data (tightly coupled solution). The Applanix SmartBase™ engine processes the raw observables (phase and pseudorange to each tracked satellite) from a minimum of four to a maximum of 50 continuously working GPS reference stations surrounding the trajectory. The computed ionospheric, tropospheric, satellite clock, and orbital errors at all the reference stations are used to correct for the errors at the location of the remote receiver. The SmartBase™ Quality Check tool is utilized to perform a network adjustment on all the baselines and reference stations in the network. Quality checks are also performed on the individual reference station observation files before the Applanix SmartBase™ is computed. The result of this process is that the integrity of the reference station's data and coordinates are known before the data is processed.

The single base technology is different as only one dedicated base station is used as a reference station and atmospheric delay and other correction data are only retrieved at the dedicated master station.

The final smoothed best estimated trajectory (SBET) is computed from the GPS track (including Kalman Filtering). Once the final trajectory has been generated, it is applied to the imagery based on the individual time stamps associated with each frame. The location (X, Y, Z) and orientation (Roll, Pitch, Yaw) values derived from the SBET and assigned to each frame serve and serve as the initial exterior orientation (EO) values.

Applying Trajectory Information

The next step in the production of EagleView's imagery data is the application of the post-processed trajectory data with the imagery. Each image is assigned a new camera center and orientation (exterior orientation or EO) based on the post-processed trajectory. This EO serves as the origin point for all measurements and calculations.



Post-processed SBET

Concurrent with the GPS/INS processing, the imagery in RAW format is "developed" to uncompressed TIFF format. During the capture process, EagleView's Flight Management System performs real time checks of a variety of parameters, including but not limited to: rapid histogram analysis to detect exposure errors, camera orientation (i.e. roll, pitch, yaw) to ensure perspective, and camera position to ensure coverage. After the development process, the imagery is put through a rigorous QA/QC process whereby images of low quality, due to either improper exposure or sensor artifact, are identified and marked for recapture. EagleView uses both automated software it has created (proprietary) and human examination when considering whether to reject an image or pass it for production. EagleView's Image Processing Department checks for any of dozens of possible defects while assessing the quality of the imagery.

Oblique Frames

EagleView incorporates DEM data into oblique images using a patented process called a Tessellated Ground Plane (TGP). The TGP can be thought of as a grid of elevation values, each creating a triangular facet similar to a triangular irregular network (TIN), yet not irregular. The TGP is appended to the image in a trailer; the density of the TGP can be modified to suit customer needs. A very dense grid will provide the highest degree of accuracy, while a less dense grid will provide for smaller files.

Equipment (Sensor data, Mount Orientations, Camera Calibration Reports), Software data (Applanix logs), and NGS data sheets, available upon request.

Orthophotography Production (AccuPlus)

EagleView's AccuPlus certified orthomosaic is a high accuracy orthomosaic generated from the vertical imagery captured by EagleView's Pentaview Capture System. The imagery is auto correlated, surveyed ground control points are measured, and a bundle adjustment performed to ensure the high level of absolute accuracy. The triangulated frames are then orthorectified to a terrain surface either derived from LiDAR, existing Digital Elevation Models (DEM), and/or based on an automated surface extraction directly from the imagery.

The resulting ortho frames are then mosaicked using an automated seamline generating algorithm followed by a manual correction process. Bridge decks and elevated roadways are corrected to be positioned properly; any instances of severe building lean are also corrected to ensure visibility of ground level transportation features.

The photogrammetric mapping control utilized is adequate to support the identified accuracy specifications. This report documents the procedures and accuracies, aircraft positing systems and aerial triangulation statistics of the photogrammetric mapping project. The orthophotography meets the horizontal accuracy of specifications of the contract and are reported at the 95% confidence level as specified in the ***ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014).***

Fully Analytical Aerial Triangulation

The digital AGPS/INS aerial photography is processed with MATCH-AT Automatic Aerial Triangulation software to constrain the digital aerial imagery to the Applanix POSPAC software computed X, Y, Z, omega, phi, and kappa photo center parameters and the photogrammetric mapping survey control points. Bundle adjustments consisting of APGS/INS controlled photo center exposures are constrained to ground control points to compute the following values:

1. RMS automatic points in photo
2. RMS control and manual points in photo
3. RMS control points with default standard deviation set
4. RMS IMU observations
5. RMS GNSS observations
6. Average (weighted) sigma naught

Final AT Results

Excerpts from MATCH-AT Processing Report.

<u>AT Block A1</u>

Accuracy

Sigma naught [micron]	1.0683

Mean standard deviation of translations

X [user]	Y [user]	Z [user]	Total [user]
0.1422	0.1438	0.1943	0.2805

Mean standard deviation of rotations

Omega [deg/1000]	Phi [deg/1000]	Kappa [deg/1000]
1.8048	1.7674	1.8753

Mean standard deviation of terrain points

X [user]	Y [user]	Z [user]	Total [user]
0.0722	0.0730	0.3839	0.3974

Ground control point errors

#	ID	Fold	X [user]	Y [user]	Z [user]	Total [user]	Remark
1	**G20_EVS22_63455**	3	-0.0504	-0.0432	0.0124	0.0675	
2	**G20_EVS22_63457**	9	0.0504	0.0432	-0.0124	0.0675	
	Maximum		-0.0504	-0.0432	-0.0124		
	Mean		0.0000	0.0000	0.0000		
	Sigma		0.0712	0.0610	0.0176		
	RMSE(x,y,z)		0.0504	0.0432	0.0124		
	RMSEr		0.0663	SQRT(RMSEx * RMSEx + RMSEy * RMSEy)			
	ACCr (at 95% Confidence Level)		0.1148	RMSEr * 1.7308			
	ACCz (at 95% Confidence Level)		0.0244	RMSEz * 1.9600			

<u>AT Block A2 – *no GCPs due to water*</u>

Accuracy

Sigma naught [micron]	1.0870

Mean standard deviation of translations

X [user]	Y [user]	Z [user]	Total [user]
0.1355	0.1367	0.0689	0.2045

Mean standard deviation of rotations

Omega [deg/1000]	Phi [deg/1000]	Kappa [deg/1000]
1.7757	1.7482	1.6353

Mean standard deviation of terrain points

X [user]	Y [user]	Z [user]	Total [user]
0.0528	0.0526	0.2994	0.3085

AT Block A3 – *no GCPs due to water*

Accuracy

Sigma naught [micron]	1.5678

Mean standard deviation of translations

X [user]	Y [user]	Z [user]	Total [user]
0.1974	0.1984	0.1294	0.3083

Mean standard deviation of rotations

Omega [deg/1000]	Phi [deg/1000]	Kappa [deg/1000]
3.0865	3.1666	4.8332

Mean standard deviation of terrain points

X [user]	Y [user]	Z [user]	Total [user]
0.1749	0.1630	0.7604	0.7971

AT Block A4 – *no GCPs due to water*

Accuracy

Sigma naught [micron]	1.3798

Mean standard deviation of translations

X [user]	Y [user]	Z [user]	Total [user]
0.1740	0.1746	0.1101	0.2700

Mean standard deviation of rotations

Omega [deg/1000]	Phi [deg/1000]	Kappa [deg/1000]
2.6887	2.7560	3.5727

Mean standard deviation of terrain points

X [user]	Y [user]	Z [user]	Total [user]
0.1439	0.1404	0.6894	0.7181

AT Block A5 – *no GCPs due to water*

Accuracy

Sigma naught [micron]	1.1517

Mean standard deviation of translations

X [user]	Y [user]	Z [user]	Total [user]
0.1458	0.1464	0.0892	0.2251

Mean standard deviation of rotations

Omega [deg/1000]	Phi [deg/1000]	Kappa [deg/1000]
2.7770	2.7054	4.3731

Mean standard deviation of terrain points

X [user]	Y [user]	Z [user]	Total [user]
0.1745	0.1873	1.1729	1.2005

AT Block A6

Accuracy

Sigma naught [micron]	1.2515

Mean standard deviation of translations

X [user]	Y [user]	Z [user]	Total [user]
0.1601	0.1590	0.1470	0.2693

Mean standard deviation of rotations

Omega [deg/1000]	Phi [deg/1000]	Kappa [deg/1000]
2.5863	2.5749	2.0792

Mean standard deviation of terrain points

X [user]	Y [user]	Z [user]	Total [user]
0.0596	0.0608	0.3747	0.3842

Ground control point errors

#	ID	Fold	X [user]	Y [user]	Z [user]	Total [user]	Remark
1	**G20_EVS21_63445**	6	0.0052	0.0165	0.0374	0.0412	
2	**G20_EVS21_63447**	6	-0.1146	-0.0469	-0.0431	0.1311	
3	**G20_EVS21_63449**	7	-0.0256	-0.0804	0.0050	0.0845	
4	**G20_EVS21_63451**	6	0.0930	0.0286	0.0082	0.0976	
5	**G20_EVS22_63453**	3	0.0420	0.0822	-0.0076	0.0927	
	Maximum		-0.1146	0.0822	-0.0431		
	Mean		0.0000	0.0000	0.0000		
	Sigma		0.0778	0.0642	0.0292		
	RMSE(x,y,z)		0.0696	0.0575	0.0261		
	RMSEr		0.0903	SQRT(RMSEx * RMSEx + RMSEy * RMSEy)			
	ACCr (at 95% Confidence Level)		0.1562	RMSEr * 1.7308			
	ACCz (at 95% Confidence Level)		0.0512	RMSEz * 1.9600			

AT Block B

Accuracy

Sigma naught [micron]	1.1810

Mean standard deviation of translations

X [user]	Y [user]	Z [user]	Total [user]
0.1282	0.1308	0.0637	0.1939

Mean standard deviation of rotations

Omega [deg/1000]	Phi [deg/1000]	Kappa [deg/1000]
2.8253	2.7133	1.1656

Mean standard deviation of terrain points

X [user]	Y [user]	Z [user]	Total [user]
0.0388	0.0371	0.2346	0.2407

Ground control point errors

#	ID	Fold	X [user]	Y [user]	Z [user]	Total [user]	Remark
1	**G20_EVS21_63368**	6	-0.2648	0.0574	0.1098	0.2923	
2	**G20_EVS21_63369**	3	-0.1971	0.0303	0.0389	0.2031	
3	**G20_EVS21_63371**	5	0.1819	-0.2027	0.0004	0.2723	
4	**G20_EVS21_63373**	6	0.3203	-0.1300	0.0005	0.3457	
5	**G20_EVS21_63375**	3	-0.1238	-0.1335	0.0501	0.1888	
6	**G20_EVS21_63377**	5	0.0594	-0.0491	-0.1412	0.1609	
7	**G20_EVS21_63379**	5	0.1042	0.0440	-0.1051	0.1544	
8	**G20_EVS21_63381**	6	0.1807	0.0629	-0.0063	0.1915	
9	**G20_EVS21_63383**	3	0.0563	0.2363	-0.0714	0.2532	
10	**G20_EVS21_63386**	4	-0.0462	-0.1143	0.0348	0.1281	
11	**G20_EVS21_63388**	12	0.1612	-0.1064	-0.0720	0.2061	
12	**G20_EVS21_63391**	5	0.1263	-0.0441	0.0143	0.1346	
13	**G20_EVS21_63409**	11	0.0888	0.0519	0.0810	0.1309	
14	**G20_EVS21_63411**	3	-0.0168	-0.0402	-0.0189	0.0475	
15	**G20_EVS21_63413**	6	0.1117	-0.0636	0.0772	0.1500	
16	**G20_EVS21_63415**	8	0.1963	0.1252	-0.0581	0.2400	
17	**G20_EVS21_63418**	3	0.0961	-0.2073	-0.0649	0.2375	
18	**G20_EVS21_63420**	6	-0.1811	0.4212	0.0319	0.4596	
19	**G20_EVS21_63422**	9	-0.3524	0.1088	-0.0821	0.3778	
20	**G20_EVS21_63425**	5	-0.1211	0.0550	0.0851	0.1580	
21	**G20_EVS21_63428**	9	-0.0958	0.0597	0.0400	0.1198	
22	**G20_EVS21_63429**	5	-0.2022	-0.0804	0.0946	0.2373	
23	**G20_EVS22_63533**	5	-0.0023	-0.0980	0.0012	0.0980	
24	**G20_EVS22_63534**	3	-0.0933	-0.0328	-0.0383	0.1061	
25	**G20_EVS22_63537**	10	0.0138	0.0497	-0.0014	0.0516	
	Maximum		-0.3524	0.4212	-0.1412		
	Mean		0.0000	-0.0000	0.0000		
	Sigma		0.1650	0.1374	0.0665		
	RMSE(x,y,z)		0.1617	0.1346	0.0652		
	RMSEr		0.2104	SQRT(RMSEx * RMSEx + RMSEy * RMSEy)			
	ACCr (at 95% Confidence Level)		0.3641	RMSEr * 1.7308			
	ACCz (at 95% Confidence Level)		0.1278	RMSEz * 1.9600			

AT Block C

Accuracy

Sigma naught [micron]	1.1810

Mean standard deviation of translations

X [user]	Y [user]	Z [user]	Total [user]
0.1282	0.1308	0.0637	0.1939

Mean standard deviation of rotations

Omega [deg/1000]	Phi [deg/1000]	Kappa [deg/1000]
2.8253	2.7133	1.1656

Mean standard deviation of terrain points

X [user]	Y [user]	Z [user]	Total [user]
0.0388	0.0371	0.2346	0.2407

Ground control point errors

#	ID	Fold	X [user]	Y [user]	Z [user]	Total [user]	Remark
1	**G20_EVS21_63430**	6	-0.1586	0.0067	0.0515	0.1669	
2	**G20_EVS21_63433**	9	-0.1297	-0.0494	0.0300	0.1420	
3	**G20_EVS21_63435**	1	-0.2035	-0.0746	-0.0190	0.2176	
4	**G20_EVS22_63459**	3	-0.0193	-0.0507	-0.0298	0.0618	
5	**G20_EVS22_63467**	5	0.0282	0.0322	0.0236	0.0489	
6	**G20_EVS22_63506**	5	-0.0589	0.0750	-0.1220	0.1549	
7	**G20_EVS22_63508**	6	-0.0099	-0.2358	0.0088	0.2362	
8	**G20_EVS22_63511**	5	-0.0355	0.0205	-0.0592	0.0720	
9	**G20_EVS22_63512**	6	-0.0996	-0.0651	0.0511	0.1295	
10	**G20_EVS22_63514**	5	0.3414	0.1142	-0.1806	0.4027	
11	**G20_EVS22_63515**	7	0.0702	0.1946	-0.1314	0.2451	
12	**G20_EVS22_63517**	8	0.1305	0.1763	-0.1899	0.2901	
13	**G20_EVS22_63519**	3	0.0137	-0.0208	0.0048	0.0253	
14	**G20_EVS22_63521**	4	0.0215	-0.1046	0.0052	0.1069	
15	**G20_EVS22_63522**	3	0.0604	-0.0128	-0.0508	0.0800	
16	**G20_EVS22_63523**	5	0.0640	-0.1119	0.0450	0.1366	
17	**G20_EVS22_63525**	4	0.0789	-0.0722	-0.0032	0.1071	
18	**G20_EVS22_63528**	3	-0.2595	0.0730	0.0138	0.2700	
19	**G20_EVS22_63529**	8	-0.0265	0.0048	0.2320	0.2336	
20	**G20_EVS22_63531**	5	0.1921	0.1008	0.3203	0.3868	
	Maximum		0.3414	-0.2358	0.3203		
	Mean		-0.0000	0.0000	0.0000		
	Sigma		0.1372	0.1037	0.1200		
	RMSE(x,y,z)		0.1337	0.1011	0.1170		
	RMSEr		0.1676	SQRT(RMSEx * RMSEx + RMSEy * RMSEy)			
	ACCr (at 95% Confidence Level)		0.2901	RMSEr * 1.7308			
	ACCz (at 95% Confidence Level)		0.2292	RMSEz * 1.9600			

AT Block D

Accuracy

Sigma naught [micron]	0.8549

Mean standard deviation of translations

X [user]	Y [user]	Z [user]	Total [user]
0.1046	0.1060	0.0564	0.1593

Mean standard deviation of rotations

Omega [deg/1000]	Phi [deg/1000]	Kappa [deg/1000]
1.4413	1.4149	0.6607

Mean standard deviation of terrain points

X [user]	Y [user]	Z [user]	Total [user]
0.0271	0.0247	0.2303	0.2332

Ground control point errors

#	ID	Fold	X [user]	Y [user]	Z [user]	Total [user]	Remark
1	**G20_EVS21_63435**	8	-0.0783	-0.0167	0.0411	0.0900	
2	**G20_EVS21_63436**	3	0.0720	-0.0477	0.0166	0.0880	
3	**G20_EVS21_63437**	3	0.0179	-0.0898	0.0299	0.0963	
4	**G20_EVS21_63439**	12	0.0797	-0.0824	0.2214	0.2494	
5	**G20_EVS21_63441**	2	-0.0414	0.0002	-0.0021	0.0414	
6	**G20_EVS21_63443**	8	0.1741	-0.0846	-0.1364	0.2368	
7	**G20_EVS22_63459**	3	0.1386	0.0535	-0.0155	0.1494	
8	**G20_EVS22_63461**	4	0.0674	-0.0598	0.0236	0.0932	
9	**G20_EVS22_63463**	6	0.0249	-0.1796	-0.2018	0.2713	
10	**G20_EVS22_63464**	4	0.1497	0.1081	-0.0519	0.1918	
11	**G20_EVS22_63467**	5	0.0074	0.0027	0.0474	0.0480	
12	**G20_EVS22_63468**	3	0.0212	0.0179	0.0521	0.0591	
13	**G20_EVS22_63470**	9	0.0300	-0.0721	0.1629	0.1807	
14	**G20_EVS22_63472**	5	-0.1453	0.1276	-0.3495	0.3994	
15	**G20_EVS22_63480**	9	-0.0178	-0.0140	0.1792	0.1806	
16	**G20_EVS22_63482**	5	-0.1549	0.0464	-0.0487	0.1689	
17	**G20_EVS22_63484**	3	-0.2429	0.1767	-0.0798	0.3108	
18	**G20_EVS22_63486**	11	-0.2170	-0.1293	0.0657	0.2610	
19	**G20_EVS22_63495**	6	-0.0318	0.2042	-0.0099	0.2069	
20	**G20_EVS22_63512**	2	0.0513	0.0352	0.0551	0.0831	
21	**G20_EVS22_63544**	3	0.0952	0.0037	0.0006	0.0953	
	Maximum		-0.2429	0.2042	-0.3495		
	Mean		-0.0000	-0.0000	0.0000		
	Sigma		0.1146	0.0975	0.1258		
	RMSE(x,y,z)		0.1118	0.0951	0.1228		
	RMSEr		0.1468	SQRT(RMSEx * RMSEx + RMSEy * RMSEy)			
	ACCr (at 95% Confidence Level)		0.2540	RMSEr * 1.7308			
	ACCz (at 95% Confidence Level)		0.2407	RMSEz * 1.9600			

AT Block E

Accuracy

Sigma naught [micron]	1.3256

Mean standard deviation of translations

X [user]	Y [user]	Z [user]	Total [user]
0.1545	0.1528	0.0822	0.2323

Mean standard deviation of rotations

Omega [deg/1000]	Phi [deg/1000]	Kappa [deg/1000]
3.0636	3.0270	1.7261

Mean standard deviation of terrain points

X [user]	Y [user]	Z [user]	Total [user]
0.0454	0.0470	0.3194	0.3260

Ground control point errors

#	ID	Fold	X [user]	Y [user]	Z [user]	Total [user]	Remark
1	**G20_EVS21_63439**	12	0.0584	-0.1135	0.0309	0.1313	
2	**G20_EVS21_63443**	8	-0.0864	-0.0926	-0.2440	0.2749	
3	**G20_EVS22_63472**	5	-0.2782	0.2753	-0.3187	0.5048	
4	**G20_EVS22_63473**	5	0.1671	-0.1757	0.0004	0.2425	
5	**G20_EVS22_63475**	4	-0.0148	0.0154	0.0575	0.0613	
6	**G20_EVS22_63477**	5	0.2149	0.0070	-0.1425	0.2579	
7	**G20_EVS22_63479**	2	0.0873	-0.1080	-0.0120	0.1393	
8	**G20_EVS22_63484**	3	-0.3206	0.2273	-0.1090	0.4078	
9	**G20_EVS22_63486**	11	-0.1302	0.0273	-0.0391	0.1387	
10	**G20_EVS22_63489**	6	-0.1686	-0.0471	0.0833	0.1938	
11	**G20_EVS22_63491**	3	0.1426	0.0024	-0.0163	0.1435	
12	**G20_EVS22_63493**	8	-0.2094	-0.1614	-0.0113	0.2646	
13	**G20_EVS22_63495**	6	0.0828	0.2103	-0.0120	0.2263	
14	**G20_EVS22_63496**	5	0.4212	-0.1046	0.0121	0.4342	
15	**G20_EVS22_63498**	2	-0.0888	-0.1581	0.0611	0.1913	
16	**G20_EVS22_63500**	6	0.0394	0.2126	0.2574	0.3362	
17	**G20_EVS22_63501**	9	-0.1184	0.0354	0.1625	0.2042	
18	**G20_EVS22_63503**	5	0.0263	-0.0543	0.2065	0.2152	
19	**G20_EVS22_63504**	6	0.0370	0.1430	0.0691	0.1630	
20	**G20_EVS22_63540**	5	0.1385	-0.1407	-0.0358	0.2007	
	Maximum		0.4212	0.2753	-0.3187		
	Mean		0.0000	0.0000	-0.0000		
	Sigma		0.1794	0.1434	0.1361		
	RMSE(x,y,z)		0.1749	0.1397	0.1327		
	RMSEr		0.2238	SQRT(RMSEx * RMSEx + RMSEy * RMSEy)			
	ACCr (at 95% Confidence Level)		0.3874	RMSEr * 1.7308			
	ACCz (at 95% Confidence Level)		0.2600	RMSEz * 1.9600			

Production of Orthomosaics

Automatic aerial triangulation (AAT) was performed on all imagery for use in the production of ortho mosaics. The AAT process makes use of the directly observed exterior orientation (EO) of each exposure, i.e. the position and orientation of each exposure derived from the GPS and INS data in conjunction with ground control points.

EagleView used Inpho's Match-AT software for the final bundle adjustment. EagleView reviewed all residuals between control points and tie points and compared the calculated coordinates of any available check points' values to actual control. EagleView reviewed a statistical analysis of the error propagation and theoretical accuracy. If any control points were not within range or statistical analysis indicated weak ties between images, new manual tie points were added to increase the strength of the solution.

Control points on the photography were checked against control used to ensure that all available control was observed. An initial post process was performed with all control points "set to check" (an unconstrained adjustment) to verify the internal mathematical solution prior to the introduction of the control point values. Control and tie point residuals from the final bundle adjustment were examined and checked against project specifications. The bundle adjustment was also performed with a portion of the GCPs set as check points to verify the accuracy of the aerial triangulation adjustment. The RMSE error of the calculated point coordinates as compared to the surveyed point coordinates are reported.

Following the aerial triangulation phase, the nadir imagery was passed into the ortho imagery production phase. This includes orthorectification and mosaicking of individual frames to create a single area-wide image which was tiled for delivery.

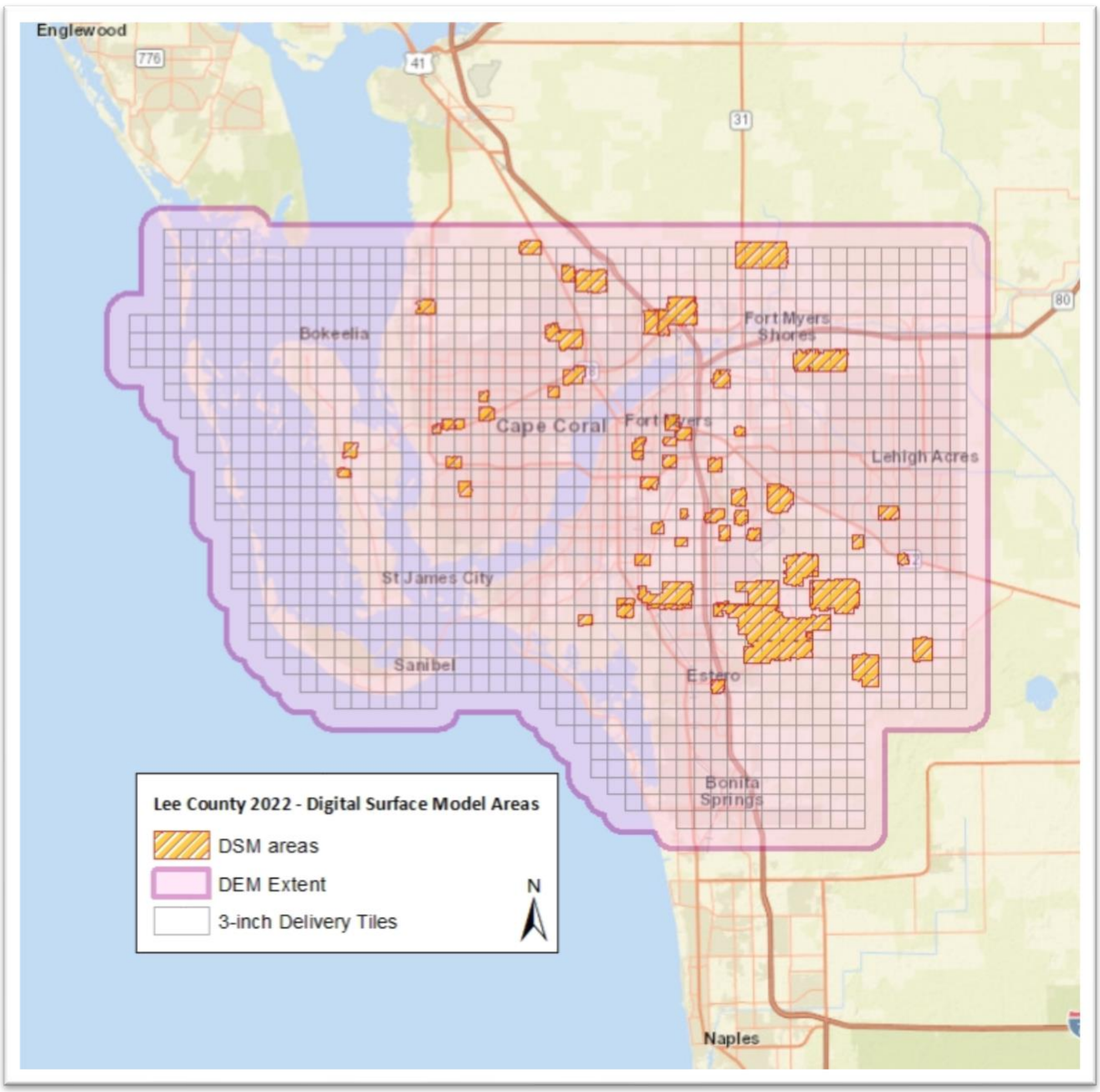
DEM Source for Orthorectification

EagleView utilized the previous 2021 Digital Elevation Model (DEM) created for the 2021 Lee County Orthoimagery Project. This 2021 DEM was developed from the following sources:

- 1/9th arc-second USGS National Elevation Dataset (NED),
- 1/3rd arc-second USGS NED data,
- Update areas by EagleView's DSM process in 2021.

Updated Digital Surface Model

As part of EagleView's quality control process, a Digital Surface Model (DSM) was autocorrelated using the 2022 aerial imagery. The previous 2021 DEM was then visually analyzed for changes and was compared to the autocorrelated surface. Major areas of change were then updated within the composite DSM. These areas are identified in the ***DSM areas*** shown in the map below. Areas of major change are approximately 26 square miles.



Orthorectification

To perform the orthorectification, EagleView utilized the aero-triangulation results, the calibrated camera model parameters, and the digital elevation model (DEM). The orthorectification process was used to remove horizontal displacement caused by terrain height variation, earth curvature, and camera-based distortions. The orthorectification process required a resampling of the imagery; a cubic-convolution method was utilized to perform this resampling. After ortho rectification, each frame containing a control point measurement was checked against the surveyed coordinates to ensure proper rectification.

Color Balancing

Consistent radiometry/photometry is recognized as an important characteristic of an ortho mosaic. EagleView has developed techniques at every step of the process to ensure this consistency in its final ortho mosaics. First, EagleView's Pentaview Sensor System is put through a color calibration prior to deployment to ensure a consistent response from each sensor in EagleView's fleet. Next each exposure is carefully monitored and data pertaining to that exposure stored for use during subsequent processing. Prior to ortho rectification, EagleView applies its proprietary brightness equalization and color balancing software techniques. Both low and high spatial frequency adjustments are applied. Though infrequently the case, following orthorectification, EagleView has the option to utilize Inpho's OrthoVista during the mosaicking process if any further correction is deemed desirable. During the review process, final local adjustments of brightness values, color, and contrast based on image content can be performed, as necessary.

Mosaicking

The mosaicking portion of the project consisted of two major steps: radiometric balancing and seamline selection. EagleView utilized both its proprietary software and Inpho’s OrthoVista software package to perform the radiometric balancing. Additionally, local adjustments of brightness values, color, and contrast were performed, as necessary.

Following radiometric balancing, the OrthoVista software package was utilized to generate automatic seamlines between source frames. The automatically generated seamlines were manually edited to eliminate feature misalignment due to seamlines which pass through features located above the DEM. EagleView minimized seamlines through buildings and performed manual corrections where seamlines through buildings are unavoidable.

In addition to editing for geometric considerations, EagleView also edited seam line placement for aesthetic purposes, including elimination of split vehicles and shadows where possible. During the seam editing process, EagleView verified that feature alignment across seamlines is 2 pixels or less.

Building Correction

Features which are elevated with respect to the DEM are subject to scale increase and radial displacement (e.g. building lean). Due to the narrow field of view of EagleView’s small format camera, building lean is minimized in most cases. To the extent possible utilizing the frames available, EagleView manually corrected buildings which obstruct transportation features due to either scale increase or building lean.

Bridge Correction

As with buildings and other elevated features, bridges are subject to the effects of scale increase and radial displacement.

EagleView manually corrected bridges as necessary to ensure proper horizontal placement and to eliminate distortion due to the DEM representing the ground and not the bridge deck. To compensate for this, EagleView used its proprietary image processing software system to ensure ground accuracy where the bridge deck meets the ground and created a deck that averages the elevations of each end of the bridge. This provides an accurate representation of the bridge's true horizontal position while removing distortion. These temporary elevation models are not saved, as they are performed on-the-fly.

In cases where the bridge deck has different elevations at each "end" an average elevation is chosen. In severe cases, the above process may be repeated multiple times along the elevated roadway.

EagleView believes that this process provides the best solution maintaining visual integrity of the bridge deck and roadway, while maximizing spatial accuracy.

Water Bodies

To preserve uniformity of appearance, EagleView utilized the seam editing process to attempt to source inland water bodies from a single frame where possible. In areas where this was not possible, EagleView manually smoothed differences in the color of water bodies and/or applied a single color to said water bodies.

Tiling

Upon completion of the area wide mosaic, EagleView tiled the imagery. Orthorectified GeoTIFF files represent "tiles" cut at even intervals (e.g. 5000 feet X 5000 feet) and cut at even foot grid lines with no overedge. Tiles are accompanied by an index sheet and shape file suitable for loading into ArcGIS. The index sheet includes tile boundary and filename. Tiles split by the project boundary are completed to their full extent.

Metadata

Project and tile level metadata describing the ortho imagery production process was not contracted as a deliverable.

Abbreviations and Definitions

AAT	Automated Aerial Triangulation
$Accuracy_r$	Horizontal (radial) accuracy at the 95% confidence level, defined by the NSSDA
$Accuracy_z$	Vertical accuracy at the 95% confidence level, defined by the NSSDA
AFB	Air Force Base
AGPS/INS	Airborne Global Positioning System/Inertial Navigation System
Applanix	Trimble company producing software used to post process data
ASFPM	Association of State Floodplain Managers
ASPRS	American Society for Photogrammetry and Remote Sensing
AT	Aerial Triangulation
C6	One of EagleView's proprietary capture systems (not technically an abbreviation)
CAM	Camera
CMAS	Circular Map Accuracy Standard, defined by the NMAS
CORS	Continually Operating Reference Station
CP	Certified Photogrammetrist (ASPRS)
CVA	Consolidated Vertical Accuracy, defined by the NDEP and ASPRS
DEM	Digital Elevation Model (gridded DTM)
DTM	Digital Terrain Model (mass points and breaklines to map the bare earth terrain)
DSM	Digital Surface Model (top reflective surface, includes treetops and rooftops)
E	East, Easting
EO	Exterior Orientation
FAAT	Fully Automated Aerial Triangulation
F.A.C.	Florida Administrative Code
FCDOP	Florida County Digital Orthoimagery Program
FDEM	Florida Division of Emergency Management
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
FL	Florida
FOV	Field of View
F.S.	Florida Statutes
FVA	Fundamental Vertical Accuracy, defined by the NDEP and ASPRS
GCP	Ground Control Point
GeoTIFF	Georeferenced Tagged Image File Format
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSD	Ground Sample Distance
GZD	Grid Zone Designation
Hrs	Hours
LAS	LiDAR data format as defined by ASPRS
LB	Licensed Business
LiDAR	Light Detection and Ranging
LS	Land Surveyor
H	Height
HARN	High Accuracy Reference Network (NAD 83/2007)
HDOP	Horizontal Dilution of Precision
hz	Horizontal
IMU	Inertial Measurement Unit
In	Inch

INS	Inertial Navigation System
IR	Infrared
LiDAR	Light Detection And Ranging
MATCH-AT	Software package to perform aerial triangulation
mi.	Mile
mm	Millimeter
MSL	Mean sea level
N	North, Northing
NAD 83	North American Datum of 1983
NAVD 88	North American Vertical Datum of 1988
NCG	Nobles Consulting Group
NDEP	National Digital Elevation Program
NE	Northeast
NED	National Elevation Dataset
NGS	National Geodetic Survey
NIR	Near InfraRed
nm	Nanometer
NMAS	National Map Accuracy Standard
NOAA	National Oceanic and Atmospheric Administration
NSSDA	National Standard for Spatial Data Accuracy
NSRS	National Spatial Reference System
NW	Northwest
NY	New York
OPUS	Online Positioning Service
PDOP	Positional Dilution of Precision
PID	Permanent Identifier
POS	Position and Orientation System
POSPac™	Software package produced by Applanix to post process POS data
PS	Photogrammetric Surveyor
PSM	Professional Surveyor and Mapper
QA	Quality Assurance
QC	Quality Control
REF	Reference frame
RGB	Red, Green, and Blue
RMS	Root Mean Square
$RMSE_r$	Horizontal (radial) RMS Error (RMSE) computed from RMSEx and RMSEy
$RMSE_x$	Horizontal RMS Error (RMSE) in the x-dimension (Easting)
$RMSE_y$	Horizontal RMS Error (RMSE) in the y-dimension (Northing)
$RMSE_z$	Vertical RMS Error (RMSE) in the z-dimension (Elevation)
RPY	Roll, Pitch, Yaw
RTK	Real Time Kinematic
rx	Residual in X
ry	Residual in Y
rz	Residual in Z
SBET	Smoothed Best Estimate Trajectory
SE	Southeast
sq.	Square
STD	Standard
Std. Dev	Standard Deviation

SVA	Supplemental Vertical Accuracy, defined by the NDEP and ASPRS
SW	Southwest
TGP	Tessellated Ground Plane
TIFF	Tagged Image File Format
TIN	Triangulated Irregular Network
US	United States
USGS	United States Geological Survey
VDOP	Vertical Dilution of Precision
VMAS	Vertical Map Accuracy Standard, defined by the NMAS
WRT	With Respect To

References

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