



## Contract Agreement

This Agreement is made this **21st** day of **February**, 2023, between the Champaign GIS Consortium (CCGIS), 1776 E. Washington Street, Urbana, IL 61802, hereinafter referred to as the "CCGIS", and Kucera International Inc., an Ohio corporation, 38133 Western Parkway, Willoughby, OH 44094, hereinafter referred to as the "Consultant."

WHEREAS, the CCGISC desires to engage the Consultant to provide professional aerial photography and digital mapping services as described in the CCGISC's November 15, 2022 Request for Proposal (RFP) Aerial Services 2022 RFP.

WHEREAS, the Consultant desires to render those services as described in Section 1: Scope of Services;

NOW, THEREFORE, the CCGISC and the Consultant in consideration of the mutual covenants contained herein agree as follows:

### SECTION 1: SCOPE OF SERVICES

The Consultant will provide to the CCGISC professional photogrammetric services which will generally consist of digital aerial photography, ground control surveying, aerotriangulation, digital elevation model preparation/updating, and digital orthoimagery with metadata for all of Champaign, Piatt, and Douglas Counties, Illinois, with a total project area of approximately 2079 square miles.

The projectwide digital aerial photography will be acquired and digital orthoimagery will be produced/furnished in 4-band color and near infrared image form at 6" resolution. The digital orthoimagery will have reduced building lean for the designated Urbana-Champaign city center area and eliminated building lean for designated features. The orthoimagery will be delivered in uncompressed GeoTIFF/TFW and compressed JPEG/JPW tiles with FGDC-compliant project level metadata.

The project areas, services, and deliverables are more specifically described in CCGISC's November 15, 2022 Aerial Services RFP and the Consultant's December 9, 2022 proposal response, which are attached hereto as Exhibits A and B, respectively.



## SECTION 2: DEFINITION OF TERMS

- A. **Contract Officer** – shall refer to the duly designated CCGISC official charged with general administration and coordination of matters related to this Agreement on behalf of CCGISC.
- B. **Project Coordinator(s)** – shall refer to CCGISC designated person or persons who will serve as primary points of contact and be responsible for coordinating all aspects of work to be performed with the Consultant’s assigned Project Manager.
- C. **Chief Administrator** – shall refer to an official of the Consultant charged with general administration and coordination of matters related to this Agreement.
- D. **Project Manager** – shall refer to the person assigned by the Consultant to serve as the Consultant’s primary point of contact, with responsibility for oversight of the Consultant’s work, reporting the status of the work, and otherwise coordinating with the CCGISC Project Coordinator.
- E. **Project Area(s)** – shall refer to the areas designated for which the Consultant shall perform the services referenced and described in this Agreement.
- F. **Work/Deliverables** – shall refer to all data provided to CCGISC corresponding to the contracted services and described herein, e.g., imagery, reports, digital mapping, etc.
- G. **Delivery** – shall refer to transmittal of data corresponding to the contracted services from the Consultant to CCGISC.
- H. **Acceptance** – shall refer to CCGISC written or verbal acknowledgment of approval of deliverables submitted and associated series performed by the Consultant.

## SECTION 3: RESPONSIBILITIES OF THE CCGISC

- A. CCGISC shall assign a Project Coordinator(s) with the authority to review and approve materials and deliverables submitted by the Consultant and to act as liaison between CCGISC and Consultant.
- B. CCGISC shall within a reasonable time frame review any samples or deliverables and approve or comment on same.



- C. CCGISC shall within a reasonable time after a request is received from Consultant answer or address any unforeseen questions that may arise during the course of the work to be performed by Consultant.
- D. CCGISC shall provide any CCGISC-designated source data or support to the Consultant required to complete the project work.
- E. CCGISC at its expense shall pay for the shipment of any materials to the Consultant.

#### **SECTION 4: RESPONSIBILITIES OF THE CONSULTANT**

- A. The Consultant agrees to perform in a professional manner all of the services outlined in "Section 1: Scope of Services" and as further described in Exhibits A and B.
- B. The Consultant agrees that no changes shall be made in the services outlined in "Section 1: Scope of Services" and/or Exhibits A and B without the express written prior consent and Agreement of CCGISC and the Consultant.
- C. The Consultant shall be fully responsible for the technical adequacy and accuracy of the work. No action by CCGISC in its review, approval and/or acceptance or by any payment made hereunder shall be construed as a waiver of the technical adequacy and accuracy of the Consultant's work.
- D. The Consultant shall assign to the work a Project Manager whose duties will be to oversee and coordinate the work with CCGISC Project Coordinator(s) and make regular status reports to CCGISC.
- E. The Consultant shall pay for the shipment of all deliverables and materials to CCGISC.
- F. The Consultant shall begin to perform the services upon receipt of CCGISC's notice to proceed signed by the Contract Officer or designee of the same and shall complete such work as outlined in "Section 5: Time of Completion".
- G. The Consultant will retain a backup copy of all significant interim and final data produced for the contract, e.g., aerial imagery, DEM, digital orthophoto imagery, etc.
- H. The Consultant shall obtain any non-CCGISC owned/provided outside source data designated for use in the completion of the contract work.



**SECTION 5: TIME OF COMPLETION**

The Consultant agrees to complete the project work according to the following schedule:

Phase	Start	Complete
Project Initiation/Work Plan	1/23/23	2/10/23
Ground Control Survey (CCGIS)	2/15/2023	2/27/2023
Aerial Imagery Acquisition	2/27/2023	4/4/2023
Imagery Processing & QC review/raw image delivery	4/1/2023	4/30/23
Aerotriangulation/report	4/15/2023	5/15/2023
DEM review and update	5/1/2023	6/15/2023
Pilot project	6/1/2023	6/30/2023
Projectwide digital orthophoto production/metadata	6/15/2023	9/30/23

The contract work of the project shall be completed by September 2023, with the exception of add-on work mutually agreed to be subsequently completed and any revisions or additions to the work required for contract compliance determined subsequent to completion/delivery.

Consultant agrees to exercise reasonable care and diligence in anticipating potential problems and delays in completing the work. Such care shall include anticipating and making provision for loss of critical employees, normal failure of equipment, and other such schedule-disrupting occurrences normally experienced and reasonably capable of being anticipated by like organizations. Extensions of time may be granted by CCGISC upon written request of the Consultant, provided such request is made prior to the expiration of this Agreement, do not involve acts of failure by Consultant to exercise reasonable care and diligence as noted above, and are based on documented evidence of need under one or more of the following criteria:

1. Any required aerial photo reflights which may be necessary and cannot be completed during the calendar year in which the Project Area work is authorized.
2. Extensions by CCGISC in providing notices to proceed, CCGISC-designated source data, or review/acceptance of the Consultant's work.
3. Significant changes in the scope of work/project parameters which affect scheduling.



4. Acts of nature or other conditions or circumstances beyond the control of the Consultant which are not due to its negligence or that of its employees, agents or assigns, but which affect the Consultant's ability to perform.

#### **SECTION 6: PROGRESS REPORTS**

Following the first day of execution of this Agreement, the Consultant shall submit reports of progress semi-monthly which describe work completed up to the date of such report.

#### **SECTION 7: DELIVERY OF WORK/DELIVERABLES**

Consultant shall certify to CCGISC when the work or any portion thereof has been completed and products of such work have been delivered to CCGISC for inspection.

#### **SECTION 8: INDEPENDENT CONTRACTOR STATUS**

The status of the Consultant under this Agreement with respect to the services to be performed by the Consultant hereunder shall be that of "independent contractor." Nothing herein shall be construed to create an employer/employee relationship between CCGISC and the Consultant or any other subconsultant hired by the Consultant. CCGISC has an interest only in the results to be achieved, and the conduct and control of the services to be provided will lie solely with the Consultant and its employees, or any other subconsultant hired by the Consultant.

#### **SECTION 9: COVENANT AGAINST CONTINGENT FEES**

The Consultant warrants that it has not employed or retained any company or person other than a bona fide employee working solely for the Consultant to solicit or secure this Agreement, and that Consultant has not paid or agreed to pay any company or person, other than a bona fide employee working solely for the Consultant, any fee, percentage, brokerage fee, gifts, or any other consideration, contingent upon or resulting from the award or making of this Agreement. For breach of violation of this warranty, CCGISC shall have the right to annul this Agreement without liability, or, at its discretion, to deduct from the Agreement price or consideration, or otherwise recover, the full amount of such fee, percentage, brokerage fee, gifts, or contingent fee.



## SECTION 10: INSURANCE

Consultant shall maintain during the life of this Agreement such public liability and property damage insurance as shall protect Consultant and CCGISC (including officials and employees) from claims for damages for personal injury, including accidental death, as well as for claims for property damage, which might arise from operations under this Agreement, whether such operations be by Consultant or any subconsultants, or by anyone directly or indirectly employed by either of them.

Consultant shall also maintain for the term of this Agreement insurance coverages of at least \$2 million general aggregate general liability and \$1 million combined single limit per occurrence bodily injury, personal injury, and property damage general liability, and Illinois statutory workers' compensation liability.

All insurance policies shall be issued by responsible companies who are acceptable to CCGISC. The Consultant shall not cause any insurance to be canceled nor permit any insurance to lapse. All insurance policies shall contain a clause to the effect that the policy will not be canceled, reduced, restricted, or limited until thirty (30) days after CCGISC has been notified in writing by registered or certified mail, return receipt requested. Certificates of insurance shall contain transcript from the proper office of the insurer, the location, the operations to which the insurance applies, the expiration date, and the above-indicated notification clause. and shall name "Champaign County, CCGISC, and their officials and employees" as an additional insured.

## SECTION 11: WARRANTY

The Consultant, by signing this Agreement, acknowledges full understanding of the extent and character of the work required and the conditions surrounding the performance thereof. The CCGISC will not be responsible for any alleged misunderstanding of conditions surrounding the performance thereof. It is understood that the execution of this Agreement by the Consultant serves as its stated commitment to fulfill all the conditions referred to in this Agreement.

Consultant warrants that the work performed and deliverables provided under this Agreement shall conform to the project specifications and the relevant recognized standards and procedures of the aerial mapping profession, including the CCGISC's defined positional accuracy standards as applicable (i.e., positional accuracy within 1.4' RMSE, 2.4' @ 95% confidence). The work shall be of high quality, and within the tolerances allowed by the project specifications and standards. If the Consultant is notified in writing by CCGISC of a discrepancy, deficiency, inaccuracy, or fault in the work, within thirty





(30) days of such notice the Consultant shall re-perform such portions of the work necessary to correct the fault. If the fault requires a repeat of the aerial flyover of the project area, the repeat flyover will be performed at the first available opportunity at a time of the year mutually agreed upon with and approved by CCGISC. All reworks shall be made at no additional cost to CCGISC.

The warranty will apply indefinitely for major errors/defects found in Consultant's mapping and for one year from the time of final data delivery for cosmetic/minor revisions and replacement of lost data files previously documented to be delivered. The Consultant shall not be liable for secondary, incidental, or consequential damages of any nature resulting from any work properly performed under this Agreement.

## SECTION 12: INSPECTION AND CORRECTION

The Consultant shall correct any major defects/errors in the work found following CCGISC's review period, and shall make accessible to CCGISC any information, data, materials and processes CCGISC deems reasonably necessary to evaluate and confirm the accuracy and quality of Consultant's work. The Consultant shall not be liable for any expense of CCGISC's review or inspection processes.

CCGISC shall promptly, following its inspection, notify the Consultant of the nature of any work deemed non-acceptable. Upon such notification, Consultant shall within sixty (60) days replace, modify, or adjust its work to meet specifications, at its expense. Work shall be considered acceptable to CCGISC if indicated as such by the absence of other notification.

## SECTION 13: ACCEPTANCE

CCGISC shall give written notice of its acceptance or non-acceptance of work to Consultant within a 90-day review period. If no such notice is given to the Consultant, the work shall be deemed accepted by CCGISC, subject to the Consultant's warranty.

## SECTION 14: OWNERSHIP AND USE OF PROJECT DATA

A. The Consultant hereby understands and acknowledges that any and all information gathered, generated, and delivered to CCGISC as outlined in "Section 1: Scope of Services" is for the exclusive use and benefit of CCGISC, and shall be the sole property of CCGISC and that such information shall not be disseminated by the Consultant without the express written consent of CCGISC.



B. All information, data, designs, plans, drawings, maps, imagery, specifications, or other work furnished to or developed for CCGISC by the Consultant, its employees, agents, or assigns, pursuant to this Agreement, shall be the sole property of the CCGISC, and all rights therein are reserved by CCGISC. The Consultant, its assigns, employees, or agents shall not provide any imagery or map data developed under this Agreement to any party other than CCGISC without the CCGISC's consent.

C. The Consultant, upon the express written consent of CCGISC, may fill requests by non-CCGISC agents, business entities, or individuals for services/products from the project data which are not part of this Agreement. Should this occur, the Consultant shall charge a reasonable fee for its service and at CCGISC's option will credit CCGISC an agreed upon percentage of such fees.

D. The Consultant hereby agrees to maintain one copy of all information gathered, generated, and delivered within its office in digital computer file form to serve as a backup to the data furnished to CCGISC.

E. CCGISC shall be entitled to rely on the technical accuracy of the data furnished by the Consultant with the understanding that the Consultant is not responsible for alterations made to and/or improper interpretation/use of the data by CCGISC.

## SECTION 15: COPYRIGHTS AND DISCLAIMERS

A. Copyright and title to all final deliverable products (e.g., aerial imagery, digital orthophotography) shall pass from the Consultant to CCGISC upon CCGISC payment for the deliverables.

B. Use by an outside party of the project data while in the Consultant's possession shall require advance approval from CCGISC.

C. If the project data is to be made available by CCGISC for use by outside entities while in the Consultant's possession, the CCGISC and Consultant shall prior to entering an Agreement with said outside entity prepare a statement/disclaimer as to its proper use/interpretation for the protection of both CCGISC and Consultant.





**SECTION 16: COMPENSATION FOR CONSULTANT'S SERVICES**

In consideration for the services performed hereunder, Consultant shall be paid the following by County and project phase:

Deliverable	Fee			
	Champaign	Piatt	Douglass	Projectwide
Aerial Image Acquisition and Targeting	48,330	18,600	17,050	83,980
Aerotriangulation and DEM Preparation	1,900	800	800	3,500
Digital Orthoimagery	34,020	13,440	12,320	59,730
<b>Total:</b>	<b>84,250</b>	<b>32,840</b>	<b>30,170</b>	<b>147,260</b>

Invoicing for each phase will be based upon documentation of percentage completion and/or transmittal of corresponding phase deliverable.

The fees listed above include all ancillary services/products required for each cost item as defined in Exhibits A and B. Optional services will only be performed by the Consultant with written authorization of CCGISC at mutually agreed cost.

**SECTION 17: INVOICING**

The Consultant's invoices shall be submitted over the course of the contract and reflect work completed and delivered and/or documented by percentage of project phases as indicated in "Section 16: Compensation for Consultant's Services". CCGISC agrees to review and process/pay the Consultant's invoice within thirty (30) days of receipt. If an invoice is validly disputed by CCGISC or otherwise found to be in error, the invoice will be voided and a new invoice submitted at the agreed amount with a new thirty (30) day payment period.

**SECTION 18: PRICE GUARANTEE**

The fees quoted for work contracted for or by CCGISC as part of this Agreement or quoted by the Contractor for additional services during the course of this Agreement shall be applicable until December 31, 2023. Should CCGISC defer any portion of the originally specified work beyond this



date, the fee for such work deferred may be adjusted by the Consumer Price Index (CPI) for the prior year or other mutually agreed upon factor.

#### **SECTION 19: COMPLIANCE WITH THE LAW**

A. The Consultant under this Agreement is an equal opportunity employer and shall conduct all contract activities without regard to race, color, national origin, sex, sexual orientation, religion, age, and other such contract participant characteristics to the extent that such do not interfere with satisfactory contract performance.

B. The Consultant shall at all times observe and comply with all applicable statutes, ordinances, rules, and regulations of federal, state, and local governments in effect at the execution of this Agreement.

#### **SECTION 20: TERMINATION**

This Agreement shall terminate upon CCGISC acceptance of and payment for all authorized deliverables and services. The Consultant will retain a backup copy of all final and significant interim data deliverables for the contract, e.g., aerial imagery, digital orthophoto imagery, DTM/contour mapping, etc.

CCGISC may terminate this Agreement with 60 days written notice to the Consultant for reasons unrelated to the Consultant's performance (e.g., lack of adequate funding for continuation). In the event of such termination, CCGISC shall be liable for the payment of all work properly performed prior to the effective date of termination, including all portions of work which were partially completed.

#### **SECTION 21: AMENDMENTS**

No amendment to this Agreement shall be effective unless it is in writing and signed by duly authorized representatives of each party hereto.

#### **SECTION 22: AGREEMENT INTEGRITY AND PRECEDENCE**

This document and attachments represent the full and final Agreement between the Consultant and CCGISC. If any provisions of the Agreement are deemed void or unenforceable, all other provisions will remain in effect.




In the event of a discrepancy, conflict, or incongruity between the project RFP specifications (Exhibit A) and the Consultant's technical proposal (Exhibit B) or other directives not mutually agreed to by CCGISC and Consultant, the project RFP specifications shall have precedence unless otherwise mutually agreed by CCGISC and the Consultant.

**SECTION 23: JURISDICTION AND SIGNATURES**


This Contract is hereby signed in the State of Illinois and the laws of the State of Illinois shall be applicable hereto. This Agreement shall be construed, interpreted, and the rights of the parties determined in accordance with the laws of the State of Illinois.

IN WITNESS WHEREOF, the parties have executed this Agreement on the date hereinabove first written.

Agreed to by: **Champaign County GIS Consortium**

Signature:   
Name: **Steve Summers**  
Title: **County Executive**  
Date: **02/21/2023**  
E-mail: **ssummers@co.champaign.il.us**

Agreed to by: **Kucera International, Inc.**

Signature:   
Name: **John Antalovich, Jr.**  
Title: **President**  
Date: **01/19/2023**  
E-mail: **j.antalovich@kucerainternational.com**

# Exhibit A

## **Proposal Request for Aerial Services** *Champaign, Piatt, and Douglas Counties, Illinois*



Issue Date:  
Tuesday, November 15, 2022

Proposal Due:  
2:00 pm  
Friday, December 9, 2022

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## 1.0 Introduction

The Champaign County GIS Consortium (CCGIS), acting pursuant to the authority given by Champaign County as Lead Agency of CCGISC and as an administrative agent for Piatt and Douglas counties for the purpose of soliciting proposals as described herein, solicits qualified and interested firms to submit proposals for providing the services, supervision, labor, equipment, products and materials necessary to provide digital ortho-imagery services for areas within Champaign, Piatt, and Douglas counties as described in and meeting the specifications of the Scope of Work. The imagery and related products will be used within a GIS for parcel, infrastructure, and other mapping. Orthophotography was last acquired for Champaign, Piatt, and Douglas in 2020.

Champaign, Piatt, and Douglas counties are located about 135 miles south of Chicago, in the heart of East-Central Illinois. Champaign County was incorporated in 1833 and is approximately 1000 square miles in area, with a population of 209,192 (2020 census estimate). Approximately two-thirds of Champaign County's population lives within a 140 square mile area that surrounds the Cities of Champaign and Urbana, the Village of Mahomet, and the Village of Savoy.

Piatt County was incorporated in 1841 and is approximately 450 square miles in area, with a population of 16,355 (2020 census estimate). The largest community in Piatt County is Monticello with a population of approximately 5,900.

Douglas County, named for Stephen A. Douglas, was incorporated in 1859 and is approximately 420 square miles. Tuscola is the county seat and the largest city with a population of 4,650 (2020 census estimate).

This RFP does not commit CCGISC, Champaign County, Piatt County, or Douglas County to award a contract or pay for any costs incurred in the preparation of a proposal. CCGISC reserves the right to accept or reject any or all proposals received, or to cancel, in part or in whole, this RFP.

## 2.0 Scope of Work

The Champaign County GIS Consortium is interested in acquiring 4-band color infrared aerial imagery for Champaign, Piatt, and Douglas counties. The aerial imagery is to be processed to produce ortho-imagery. The CCGISC is soliciting bids for ortho-imagery covering a 2079 square-mile contiguous area (*Douglas 457; Piatt 499 square-miles; Champaign 1123 square-miles*).

### 2.1 Options

All bids need to include costs for **6-inch** and **3-inch** resolution ortho-imagery with the following options.

OPTION 1: Ortho-imagery covering a 2079 square-mile contiguous area. (*Douglas 417; Piatt 499 square-miles; Champaign 1163 square-miles*)

OPTION 2: Ortho-imagery covering a 2079 square-mile contiguous area (*Douglas 417; Piatt 499 square-miles; Champaign 1163 square-miles*) **with reduced building lean in the specified Urbana-Champaign city centers** (*approximately 1.85 square miles*).

OPTION 3: Ortho-imagery covering a 2079 square-mile contiguous area (*Douglas 417; Piatt 499 square-miles; Champaign 1163 square-miles*) **with building lean eliminated for specified points.**

OPTION 4: Ortho-imagery covering a 2079 square-mile contiguous area (*Douglas 417; Piatt 499 square-miles; Champaign 1163 square-miles*) **with reduced building lean in the specified Urbana-Champaign city centers and building lean eliminated for specified points.**

*See Attachment A and B for illustrations of Options 1, 2, 3, and 4.*

CCGIS will determine which, if any, option to proceed forward with based on the provided responses.



The resulting product is to meet the specifications as described herein.

## **2.2 Acquisition of Aerial Imagery**

The Contractor shall adhere to the following specifications for the acquisition and delivery of the requested natural-color aerial imagery.

### *2.2.1 Coordinate System and Datum*

All data shall be geo-referenced to the Illinois State Plane Coordinates, East Zone, US Survey Feet on the North American Datum (NAD) 1983 horizontal datum (2011 adjustment), and North American Vertical Datum (NAVD) 1988.

### *2.2.2 Flight Specifications*

Imagery shall be flown when deciduous foliage is under leaf-off conditions. The target flight window shall be within February 27, 2023 and April 4, 2023, or as otherwise specified by CCGISC.

The sun angle for all flights shall be at least (30) degrees above horizon. In no case shall imagery be captured when the ground is obscured by haze, snow, fog, smoke, light streaks or dust. Aerial imagery shall be flown when streams are in their normal banks and there is no evidence of temporary standing water or excessive soil moisture. The imagery shall be free of clouds and cloud shadows, and be clear, sharp, and evenly exposed. Photographs shall not contain objectionable shadows caused by building relief or low solar altitude.

All airborne equipment must be properly installed and mounted in aircrafts that provide a stable aerial photography platform. These aircrafts must be properly maintained, registered, and operated according to the rules and regulations of the Federal Aviation Administration (FAA).

### *2.2.3 Digital Aerial Camera*

The aerial camera shall be a digital camera equipped with low distortion, high-resolution optics, high geometric accuracy and forward motion compensation, and an airborne GPS and Inertial Measuring Unit (IMU). It must be capable of:

- Producing digital imagery necessary to meet the requirements of this RFP.
- Generating four-band imagery from separate co-registered IR, red, green, and blue bands.
- Supporting high geometric accuracy and forward motion compensation.

*The successful Contractor must provide the most recent calibration report for the digital sensor.*

## 2.2.4 Horizontal Accuracy

### 6-INCH ORTHOIMAGERY:

6-inch orthoimagery will conform to ASPRS Level 2 standards for 1" = 100' scale mapping with an orthoimage ground sample distance (GSD) of less than 6 inches. The orthoimagery will be produced to meet or exceed a horizontal accuracy of 1.4-foot RMSE according to ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014).

### 3-INCH ORTHOIMAGERY:

3-inch orthoimagery will conform to ASPRS Level 2 standards for 1" = 50' scale mapping with an orthoimage ground sample distance (GSD) of less than 3 inches. The orthoimagery will be produced to meet or exceed a horizontal accuracy of 0.7-foot RMSE according to ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014).

## 2.2.5 Flight Planning/Flight Lines

A flight map shall be submitted for the given project area prior to acquisition. It is suggested denser flight lines be used for options 2, 3, and 4. Appropriate endlap and sidelap shall be used for all options. Images with reduced and/or eliminated building lean shall be incorporated into the final deliverable.

The aerial mission shall be flown with coverage extending beyond the project boundary to ensure adequate coverage. All flight lines shall extend one full photo base beyond each end boundary, and all side boundaries shall be covered by a minimum of 25% of the photo image format.

*The Contractor shall provide a map of proposed flight lines for all options in their response.*

*The Contractor shall provide proposed percentages of endlap and sidelap in their response as well as flying height and proposed tolerances for crab and camera tilt.*

*The Contractor shall explain the proposed method that will be used to reduce/eliminate building lean (options 2, 3 and 4) in the specified areas (Attachment B).*

## 2.2.7 Aerial Imagery Review

Contractor shall review the processed digital imagery for the following:

- Adherence to the flight plan
- Ground Sample Distance
- Density
- Contrast
- Hot spots
- Clarity
- Shadow detail
- Overall quality

In addition, within 4-6 weeks of the aerial flight, the Contractor shall deliver the RAW images of the aerial flight for initial photo checking on portable (USB2 or USB3) external hard drives. Unacceptable aerial imagery shall be corrected at no additional cost to the CCGISC.

### *2.2.8 Camera Station Control*

Airborne GPS (AGPS) - latitude, longitude - and altitude and Inertial Measurement Unit (IMU) - attitude and velocity - data shall be recorded at the instant of exposure. An AGPS/IMU data capture solution shall follow the necessary industry acceptable standards to meet the specifications as described in this Scope of Work. Geodetic positions corresponding to the photo centers at the instant of exposure shall be calculated and combined with supplemental ground control point values in an analytical aerotriangulation solution. The horizontal root-mean-square error (RMSE) shall be based on industry acceptable standards for the specified mapping scale.

The contractor shall use tightly coupled AGPS/IMU collection techniques that provide high accuracy camera station coordinates. It is suggested that during the acquisition of the imagery, dual frequency GPS receivers shall be referenced to at least two reference stations.

*The Contractor shall produce a statistical report summarizing the results of the airborne GPS/IMU adjustment.*

### *2.2.9 Supplemental Ground Control*

Surveyed ground control shall be used to support the production and meet the accuracy standards of ortho-imagery as described herein. The CCGISC will provide a Registered Professional Land Surveyor (PLS) licensed by the State of Illinois for the capture of supplemental ground control. The Contractor will be required to coordinate the needed work with the PLS supplied by CCGISC. The capture of supplemental control needs to begin by January 3, 2023. The cost of the PLS will not be incurred by the Contractor, however, the contractor will be responsible for placing any panels if needed.

## 2.3 **Digital Ortho-Imagery Production**

### 2.3.1 *Digital Elevation Model/Digital Surface Model*

To support the production of the orthoimagery, the CCGISC can provide the Contractor with a 2019 Digital Surface Model (DSM) created from a 2019 QL2+ Lidar acquisition project with 0.5-meter nominal spacing. The DSM meets the ASPRS Positional Accuracy Standard for Digital Geospatial Data (2014) for a 10-cm RMSEz Vertical Accuracy Class.

### 2.3.2 *Aerotriangulation*

The aerial triangulation shall be sufficient to support softcopy digital photogrammetric feature accuracy requirements outlined by ASPRS Level II standards as described in the ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014).

*The Contractor shall document the used aerotriangulation process/methods and deliver a report of the analytical aerotriangulation results. Coordinates and residual values shall be reported for all points. RMSE values shall be completed and reported for the final adjustment. Discarded points shall be noted and discussed.*

#### CHECKPOINTS

The calculation of the positional values (x,y,z) for the independent checkpoints shall be used for NSSDA product accuracy reporting. The CCGISC will provide a Registered Professional Land Surveyor (PLS) licensed by the State of Illinois for the capture of checkpoints. The cost of the PLS will not be incurred by the Contractor. The placement of any required panels will be the responsibility of the Contractor and the Contractor will be required to coordinate the needed work with the PLS. Checkpoint capture must begin no later than the first week in April 2023 to provide enough time for the PLS to complete capture by the first week in May 2023.

### 2.3.3 *Digital Ortho-imagery*

Digital ortho-imagery shall be produced from the processed digital aerial imagery. Each image (raster file) shall be geo-referenced. The DEM shall be applied to the raster file to rectify the image to eliminate distortion. The rectification process shall involve the solution of the appropriate photogrammetric equations for each pixel in the output image. Solution of photogrammetric equations at anchor points only, and warping the content of the original image between anchor points (rubber-sheeting) shall not be permitted. All ortho-imagery shall be edge-matched, radiometrically corrected, and color balanced. Once the imagery has been processed, it shall be structured and formatted in a seamless image database and sampled to the final output resolution. Reduced and/or eliminated building lean tiles (*options 2, 3, and 4*) shall be incorporated into the final deliverable.

#### RADIOMETRIC CHARACTERISTICS

All orthophotos shall be composed of four (4) R, G, B, IR spectral bands: Red (R), Green (G), Blue (B), and IR (infrared). The radiometric resolution of each band shall be at least eight (8) bits, where the image brightness for each band is represented by 256 levels, ranging from 0 to 255. No data areas shall be assigned a unique value that is not found within the imagery

### IMAGE QUALITY

Orthophotos shall not contain defects or inconsistencies in tone and density between individual orthophotos.

***Radiometric Distortion:*** The Contractor shall correct distortions caused by elevated or depressed structures such as bridges, rail beds, overpasses, and steep terrain. The CCGISC shall reject any image that contains these types of distortions.

***Image Mosaicking:*** During the mosaick process, the image judged to have the best contrast shall be used as the reference image. All other images shall have their brightness values adjusted to that of the reference image. Join lines between overlapping images shall be chosen so as to minimize tonal variations. Localized adjustment of the brightness values shall be performed to minimize tonal differences between join areas. Mosaic lines should not cross through buildings, bridges, or other fabricated structures not at ground level. Visible seams or sutures within a digital orthophoto which exhibit a noticeable “edge” or “feather” effect shall be grounds for rejection of that digital orthophoto.

***Edge Matching:*** The digital images are to be edge matched with no pixel gaps between geographic partitions. The maximum mismatch/offset shall not exceed to ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014)

***Band to Band Registration:*** Misalignment between any color bands shall not exceed 1 pixel.

### TILING SCHEME AND NAME

The Contractor shall deliver the GeoTIFF images with associated TFW files as well as compressed jpeg 2000 with associated jpw files. Both files are to be aligned with and named according to the provided 2,500 feet x 2,500 feet index grid.

### DATA DELIVERY

All ortho-imagery shall be delivered on external hard drive(s) (USB2/USB3). Each drive shall contain the following reference information:

- Identification number
- Our name - Champaign County GIS Consortium
- Consultant name
- Date of delivery
- Listing of tiles

### PRODUCT ACCURACY AND PRODUCT ACCURACY REPORTING

All inputs and processes such as aerotriangulation, control, general methodologies, and sensor calibrations used in the production of digital ortho-imagery shall be sufficient to ensure that all final digital ortho-imagery deliverables meet the defined project accuracy standards.

*Product accuracy shall be reported according to NSSDA specifications which are available at <http://www.fgdc.gov/standards/projects/FGDC-standards-projects/accuracy/part3/chapter3>.*

### 3.0 Deliverables

All reports, documentation, and maps shall be delivered as an Adobe Acrobat (.pdf) document.

*The Contractor shall certify in writing that the all deliverables described herein meet the technical standards of this RFP.*

#### ACQUISITION OF AERIAL IMAGERY (SECTION 2.2)

- Copy of the most recent calibration report for the digital sensor.
- Camera certification report
- GIS layers and map of the project area outline and flight lines.
- One set of RAW imagery within 4-6 weeks of aerial acquisition.
- A statistical report summarizing the results of the airborne GPS/IMU adjustment.

#### DIGITAL ORTHO-IMAGERY PRODUCTION (SECTION 2.3)

- A report describing the aerotriangulation process and analytical aerotriangulation results.
- Coordinates and residual values shall be reported for all points. RMSE values and ground elevation accuracy shall be completed and reported for the final adjustment. Discarded points shall be noted and discussed.
- Final product accuracy shall be reported according to most recent NSSDA guidelines.
- Digital orthorectified imagery in both GeoTIFF format with associated TFW files & compressed jpeg 2000 format with associated jpw files, meeting all standards and specifications as described herein.

#### METADATA

- FGDC compliant metadata for the ortho-imagery.

### 3.1 Quality Control of Deliverables

The CCGISC has the right to perform its own quality control and due diligence. Any image or other deliverable not meeting the requirements of this Scope of Work may be rejected for non-compliance. CCGISC shall have ninety (90) calendar days to evaluate a deliverable.

### 4.0 Contractor Responsibilities

- It shall be the responsibility of the Contractor to obtain flight clearances for any airports or other facilities that may interfere with flight plans.
- Quality control and responsibility for adherence to standards and specifications described herein rest with the Contractor.
- The Contractor shall be responsible for obtaining any necessary clearances related to controlled air space. The Contractor must also obtain all licenses, permits, and clearances necessary for performance of the Scope of Work.



## 5.0 Suggestions or Modifications to the Scope of Work

Contractors may and are even encouraged to provide alternate approaches or modifications to the specifications as found in Scope of Work. However, for a Contractor to be considered, a response to the provided Scope of Work following the Proposal Submittal Guidelines found in Section 6.0 must be supplied. Any modifications and or suggestions are to be supplied in addition to the response of the provided Scope of Work.

## 6.0 Proposal Format / Requirements

All responses must follow the same format. To be accepted for evaluation, the response format must address all required components in order.

The requirement of a response format is to simplify 1) the response preparation and 2) the evaluation process, to ensure that all responses receive the same orderly review.

All responses must include the following components:

### 1. Cover Letter

- a. A brief statement of the respondent's understanding of the project
- b. The name, title, phone number, fax number, E-mail address, and street address of the person in the proposer's organization who will respond to questions about the response.
- c. Highlights of the respondent's proposal and ability to perform the project services

### 2. Company Overview

- a. Company Name / Address / Telephone /Fax Numbers
- b. Contact Person
- c. Type of Organization
- d. Total Number of Staff

### 3. Brief Company History Summary of Related Experience

- a. Project Name / Location / Dollar Value / Owner Information. Include Contact Person with Phone Number.
- b. Start / Finish Dates.
- c. Services Provided
- d. Key Team Members and Consultants in Project Team.

### 4. Financial / Legal

- a. Provide a Copy of Last Year-End Financial Statement or Letter from Accountant / Bank Regarding Firm's Financial Position. Financial References may be substituted for Financials, if necessary, but Financial Statement would be preferred.
- b. State of Illinois Business License.
- c. Provide Insurance Coverage Certification. See Attachment C for insurance guidelines.
- d. Provide Statement of Current Legal Actions Relating to Current or Past Projects.

## 5. Project Team

- a. Organizational Chart
- b. Individual Team Members /Position Title / Job Function
- c. Resumes
- d. Preliminary Staff Allocation Schedule by Percent
  - Per Month
  - Overall Totals
  - Consultants Percentage Allocation Schedule

## 6. Project Approach

- a. Describe detailed approach to Scope of Work.
- b. Describe unique or innovative approaches to any of the required services.
- c. Provide estimate of project completion term with anticipated delivery schedule of project deliverables.
- d. Describe experience in meeting the stated project specifications and deliverables.

## 7. Firm / Individual Commitment to Project

- a. Future Availability
- b. Current Contractual Commitments

## 8. Cost Proposal

- a. An itemized cost for each task – including time estimates and separate costs for Champaign, Piatt, and Douglas counties.
- b. Provide costs for each of the products as described in the Scope of Work.

## 9. Project References

- a. list of at least three (3) current references for whom comparable work has been performed
- b. Include client name, person to contact, address and telephone number with each project reference.

## 7.0 Proposal Submittal

One (1) digital copy (*PDF format*) of the proposal must be received on or before **Friday, December 9, 2022 at 2:00 pm.**

**The digital proposal shall be emailed to:**

*Leanne Brehob-Riley, GIS Director at [lbrehob-riley@co.champaign.il.us](mailto:lbrehob-riley@co.champaign.il.us)*

The email subject line shall state “*RFP 2022 – 001: Aerial Photography Services*”.

Inquires pertaining to Request for Proposal must include “RFP 2022-001 Questions” in the subject line. Questions should be referred via email by 4:30 pm, local prevailing time, on or before Wednesday, November 30, 2022 to:

Leanne Brehob-Riley, GIS Director  
(217) 819-4050  
[lbrehob-riley@co.champaign.il.us](mailto:lbrehob-riley@co.champaign.il.us)

Addenda question answers will be posted on the Champaign County GIS Consortium’s website at:  
<https://www.ccgisc.org/administration.aspx>

## 8.0 Proposal Evaluation

Selection shall be made of Contractors deemed to be fully qualified and best suited among those submitting proposals, on the basis of the following factors:

- **Proposed Scope of Services:** The proposal will be evaluated based on the Contractors demonstrated understanding of the Scope of Work.
- **Qualifications of the Project Team:** The quality and experience of the proposed staff and the proper balance of relevant skills.
- **Delivery Schedule**
- **Proposal Content:** The proposal will be evaluated for brevity, professional accuracy, and content. There is no need for elaborate presentation documents or brochures.
- **Cost:** Please note that while costs shall be considered, it will not be the sole determining factor.

## 9.0 General Information and Requirements

CONTRACT: Should a contract be awarded as a result of this RFP; the contract will be with Champaign County as the lead agency of CCGISC.

RIGHTS OF CCGISC: The CCGISC, acting pursuant to the authority given by Champaign County as Lead Agency of CCGISC and as an administrative agent for Piatt and Douglas counties for the purpose of soliciting proposals as described herein reserves the right to accept or reject all or any part of any proposal, waive informalities and award the contract to the proposer that best serves its interests.

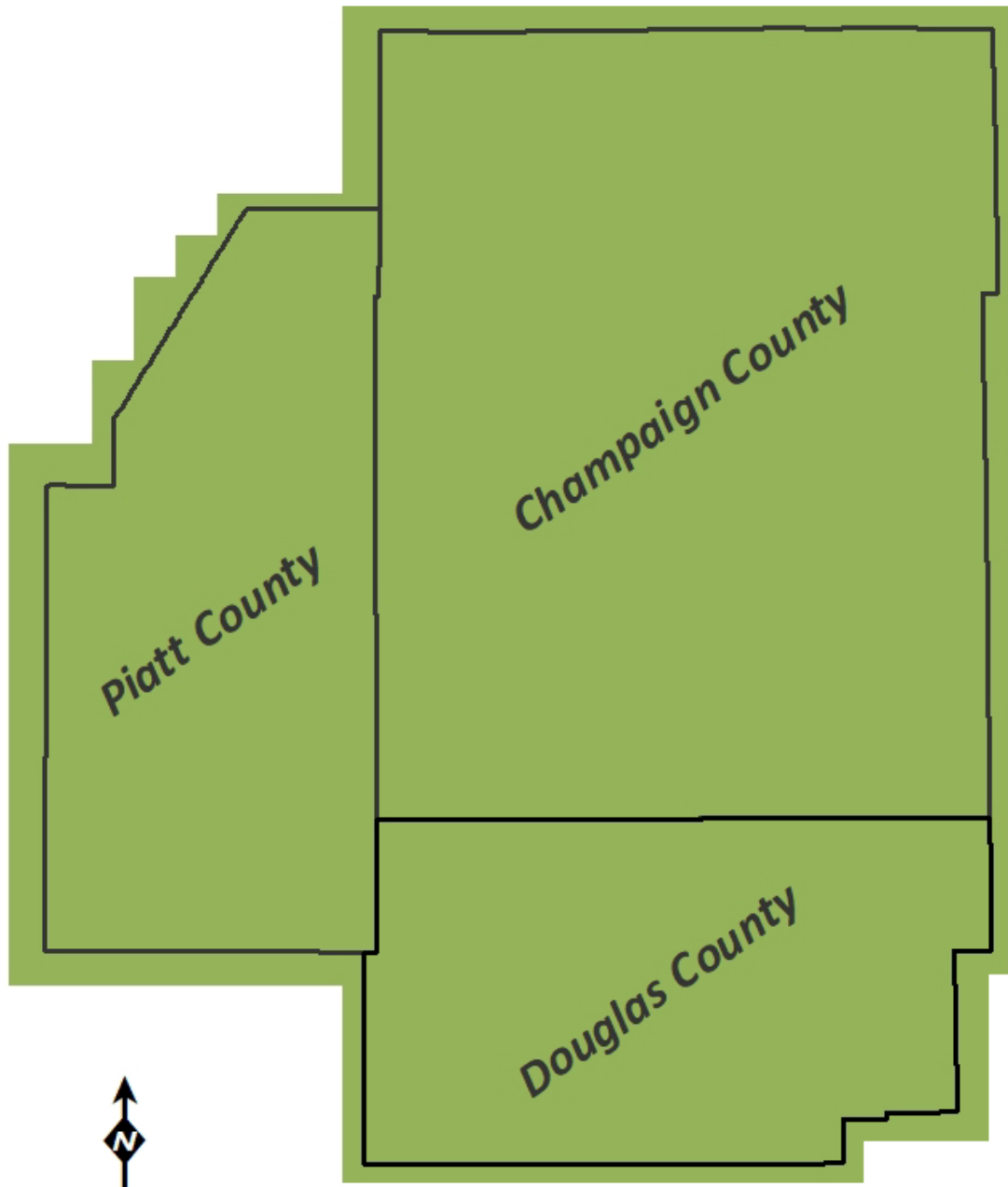
REALISTIC COST ESTIMATES: While cost estimates are requested with responses, the practice of “low balling” a cost in response to this RFP is STRONGLY DISCOURAGED. Should a contractor attempt to negotiate project costs unjustifiably higher than estimates indicated in the RFP, the negotiations will be IMMEDIATELY TERMINATED.

SUBCONTRACTORS: All proposers shall include a list of all subcontractors with their proposal.

OFF SHORE SERVICES: The use of subcontractors or service providers outside of the United States of America will NOT be accepted. The contractor will provide a signed statement assuring the CCGISC that all required services will be performed within the United States of America.


LICENSE REQUIREMENT: All firms doing business in Champaign County are required to be licensed in good standing with the State of Illinois.

# Attachment A



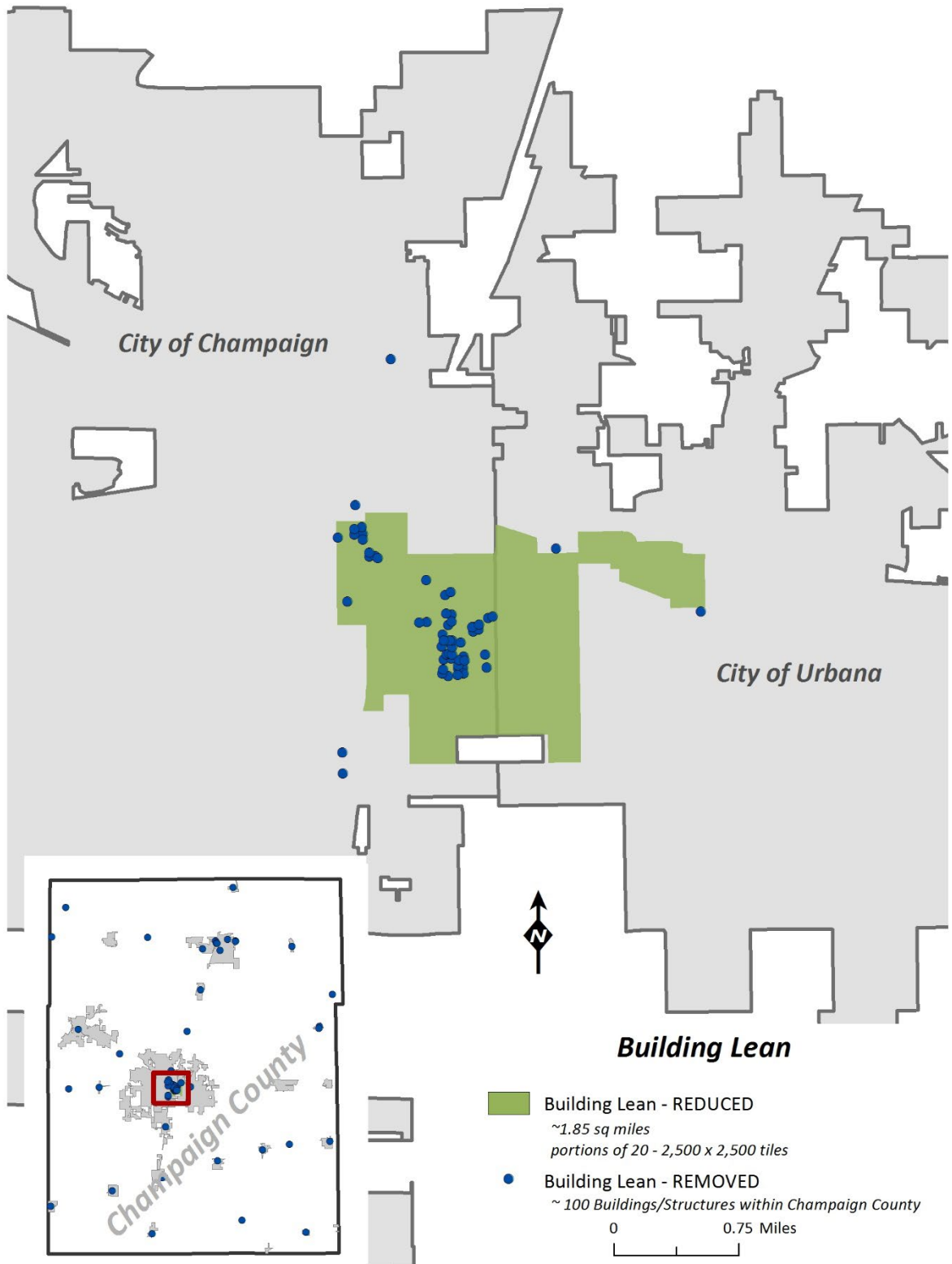
0 3.5 7 Miles

### *Proposed Capture Area*

 Capture Area - 6 inch and 3 inch

*(2079 total sq miles - Champaign 1123 sq miles; Piatt 499 sq miles; Douglas 417 sq miles)*

# Attachment B



## Attachment C

### **INSURANCE GUIDELINES**

1. **Binders/Certificates of Endorsements/Endorsements/Coverage Verification:**

All vendors submitting bids must provide binders or certificates of endorsement insurance forms as completed by authorized agent or broker. Insurance coverage must be placed with an insurance company that has at least a Best A rating. The certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. CCGISC reserves the right to require complete, certified copies of all required insurance policies at any time. If subcontractors are to be utilized, vendors shall include them as insured's and shall furnish separate certificates of insurance and endorsements for each subcontractor.

2. **Adjustments to Insurance Policy:** Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, cancelled by either party, reduced in coverage or in limits except after twenty (20) days prior written notice by certified mail, return receipt requested, has been given to CCGISC.

3. **Minimum Limits of Insurance:** Vendors shall maintain each category of insurance and its corresponding minimums-

\$1,000,000 combined single limit **per occurrence** for bodily injury, personal injury and property damage. Contractual Liability, Broad Form Property Damage, Products and Completed Operations Liability insurance is to be carried in sufficient **aggregate value** as to sufficiently cover this project.

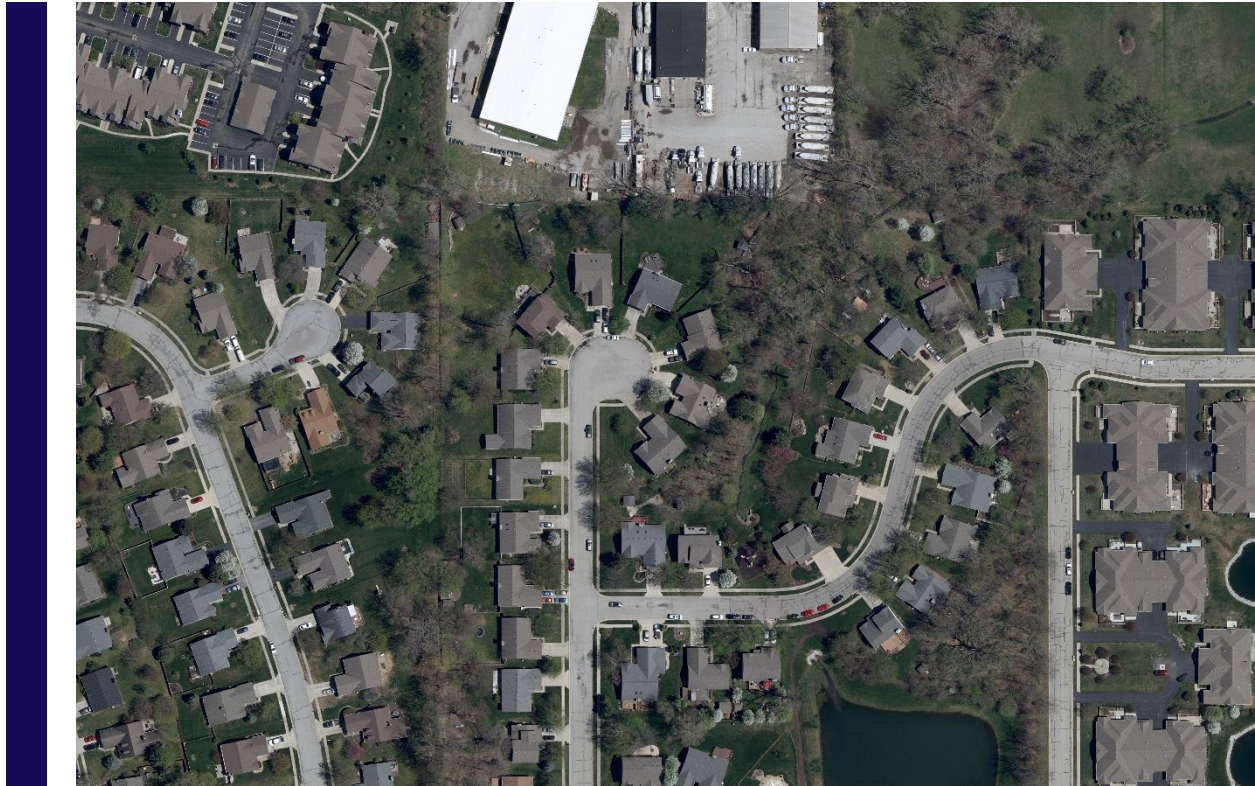
Policies are to contain the following provisions:

1. CCGISC, its officials and employees are to be covered as insured's as respects: liability arising out of activities performed by or on the behalf of the vendor; products and completed operations of the vendor, or all automobiles utilized by the vendor. The coverage shall contain no special limitations on the scope of protection afforded to CCGISC, its officials or employees.
2. The vendor's insurance coverage shall be primary insurance as respects CCGISC, its officials and employees. Any insurance issued to CCGISC, its officials or employees shall be in excess of that vendor's insurance and shall not contribute with it.
3. Any failure to comply with the reporting provisions of the policies shall not affect coverage provided to CCGISC, its officials or employees.
4. The vendors insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.



# Exhibit B

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## Proposal for 2023 Digital Color Orthoimagery Acquisition

Champaign County GIS Consortium  
RFP 2022-001

DUE DATE: December 9, 2022 at 2PM CT



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Prepared For:  
Champaign County GIS  
Consortium  
1776 East Washington Street,  
POD 400  
Urbana, Illinois 61802  
(217) 819-3555  
Attn: Leanne Brehob-Riley,  
GIS Director

---

Submitted By:  
Kucera International Inc.  
38133 Western Parkway  
Willoughby, OH 44094

## Table of Contents

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Champaign County GIS Consortium (CCGIS)  
1776 East Washington Street, POD 400  
Urbana, IL 61802

December 9, 2022  
Corporate Headquarters

Re: Proposal for 2023 Digital Color Orthoimagery Acquisition  
RFP 2022-001

Attn: Leanne Brehob-Riley, GIS Director

Dear Ms. Brehob-Riley:

Kucera International Inc. is pleased to offer this proposal for aerial photography and digital orthophotography covering Champaign, Piatt, and Douglas Counties, Illinois, as described in CCGISC's Request for Proposal (RFP) No. 2022-001 issued November 15, 2022 and associated correspondence.

In accordance with CCGISC's evaluation criteria, this proposal submission includes this cover letter, Kucera's company profile/overview, company history/experience data, financial/legal data, project management team resumes, approach to the work, availability and commitment statement, cost proposal, and project references.

Kucera understands that CCGISC is seeking a contractor to provide new (February-April 2023) leaf-off season digital aerial photography, digital orthophotography, and associated services and data products (e.g., aerotriangulation, DEM preparation) covering Champaign, Piatt, and Douglas Counties in Illinois.

Kucera International Inc. specializes in the work being sought and stands as one of the most advanced, experienced, and reputable firms in the aerial mapping services profession. Kucera is currently in its 70th year of providing aerial photography and photogrammetric base mapping as primary services and has been producing orthophotography in-house for over 30 years. Kucera has to date successfully completed these services for over 600 counties and cities throughout the country, including over 25 counties and cities in Illinois. Kucera successfully performed aerial imaging and orthophoto mapping for Champaign County in 2011 and 2013 and for Champaign and Piatt Counties in 2017.

In the same fashion as for Kucera's past service to CCGISC, all the work for this contract will be performed in-house from/at Kucera's corporate headquarters facility located in Willoughby, Ohio. Kucera's headquarters has a full-time staff of over 50 geomatics professionals with an average individual experience level of over 15 years available for commitment to this contract. Kucera's headquarters office serves as a base of operations for Kucera's fleet of twin-engine aircraft outfitted with the most advanced aerial sensing systems and houses over 50 workstations dedicated to aerial and ground data acquisition and processing, photogrammetric modeling, mapping, and imaging, and geospatial CAD/GIS conversion work.

Kucera's approach to the CCGISC 2023 project will feature advanced, proven in-house technologies and procedures, including adjustments to improve the orthoimagery data quality from that produced by Kucera for CCGISC's 2017 project. The aerial flyover will again be accomplished using Kucera's in-house, high performance Piper Navajo Chieftain twin-engine aircraft, and the imagery capture performed with Kucera's Vexcel UCE100 Eagle large format digital aerial frame cameras. Reduction of building lean will be accomplished using direct overhead "spot shots" of identified features and/or block coverage acquisition using flight lines with at increased side overlap in two directions.

A cursory comparison of Kucera's 2017 orthoimagery for CCGISC with the 2020 project orthoimagery indicates no significant differences in degree of lean reduction and significantly longer shadows in the 2020 imagery. As in 2017, Kucera will plan to perform the imagery acquisition at a time of the day with increased sun height to avoid long shadows.

All Kucera aerial sensor systems have integrated first order airborne GPS/IMU systems for accurate in-flight georeferencing of the captured aerial data. The georeferencing will be checked against ground control and refined as needed through a rigorous aerotriangulation adjustment process. Kucera's first order softcopy stereoplotters will be used to photogrammetrically review the source DEM data and update/augment as needed to support the 2023 orthoimage rectification. For the digital orthophoto production, the georeferenced aerial imagery will be automatically rectified and tone balanced/mosaiced/tiled into a seamless image representation with each of these stages followed by a thorough manual inspection and edit on dedicated image processing stations. The ortho processing and associated quality control will be focused on achieving high tested/certified accuracy and superior overall color/tone and detail visibility.-

Kucera is fully committed to completion and delivery of the 6" projectwide orthoimagery by September 2023 and alternative 3" projectwide orthoimagery by December. The project work will be rigorously managed throughout its duration by a team of experienced geomatics professionals, all of whom have had management/supervisory positions on numerous similar multi-county orthophotography contracts. The management team will coordinate closely on the project and exercise strict production and quality management through a job tracking/reporting system and contract-specific quality control plan. Kucera will draw upon its thorough familiarity with the CCGISC project area and expectations and will establish a good working rapport with CCGISC as on past aerial contracts to help ensure a successful project outcome.

As Kucera's Project Manager and primary point of contact, I will be dedicated to ensuring that all aspects of Kucera's service on this project will be fully satisfactory to the CCGISC. I and the other members of Kucera's management team will be available at all times to report to and/or consult with CCGISC and the Counties.

Kucera appreciates being considered for this project and looks forward to serving the Champaign County GIS Consortium. Please contact me for follow-up as needed.

Sincerely,



John Antalovich Jr., PE, PS  
President

Kucera International Inc.  
38133 Western Parkway  
Willoughby, OH 44094  
440-975-4230 x123  
j.antalovich@kucerainternational.com

## 2. Company Overview

Kucera International's company profile is provided on the following pages. All work for this contract will be accomplished in-house from/at Kucera's corporate headquarters and hangar facility at Lake County Executive Airport in Willoughby, Ohio. Relevant information on the Kucera International organization is as follows:

Kucera International Inc.  
38133 Western Parkway  
Willoughby, OH 44094  
Phone: 440-975-4230

Contact - John Antalovich Jr., President, [j.antalovich@kucerainternational.com](mailto:j.antalovich@kucerainternational.com)

Organization Type: Private Corporation

Total Staff: 65



# Company Profile



Kucera International Inc.  
Corporate Headquarters  
38133 Western Parkway  
Willoughby, OH 44094

## Company Mission & Vision

Kucera International Inc. has been fully dedicated to providing high quality, cost effective aerial photography/remote sensing, photogrammetric mapping, geospatial data conversion, and related services for over 70 years. Today, Kucera stands as one of the most reputable and experienced companies in the aerial surveying/mapping and geomatic services professions, annually completing hundreds of individual projects throughout the country and abroad covering areas ranging in size from a few acres to tens of thousands of square miles. Through high-caliber in-house staff and technology resources, extensive experience, sound planning, and management, honest and ethical business conduct, and superior customer relations Kucera has earned numerous longstanding clients and aims to be a world leader in the aerial mapping/geospatial services profession.

## Company Information

**Established:**

1947 (Incorporated in 1956)

**Firm Names:**

Name changed from Kucera & Associates Inc. to Kucera International Inc. in 1985

**Place of Performance:**

Kucera Corporate Headquarters  
Willoughby, Ohio

**Firm Type:**

Independent, privately held US (Ohio) corporation

**Firm Size:**

~\$7 million annual sales/staff 65

**Business Classification (NACIS/SIC) Codes:**

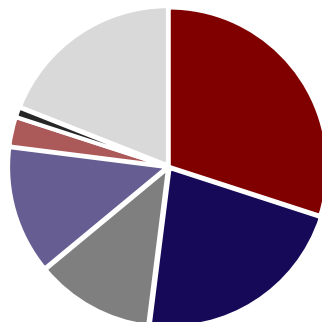
541370 / 7289  
541922 / 7335

## Background, Longevity, Financial Stability

Kucera's overall business strategy is one of steady, manageable growth founded on a core expertise in aerial imaging/sensing and photogrammetric mapping with controlled expansion into related geomatic services e.g., ground surveying, mapping, data conversion, and GIS support. This strategy has enabled Kucera to remain as one of the most stable and financially sound companies in the mapping profession and operate as the same privately held corporation for over 70 years. Over its history the company has experienced steady growth at an average rate of 5 to 10% annually and has always kept its growth within its capacity to perform. Kucera has never failed to complete a contract and has consistently maintained high financial ratings and low employee turnover. Kucera's staff is a primary source of its stability, with average employee tenure of over 15 years. Kucera's management/principals operate under a written succession/continuation plan. Kucera has annual sales of over \$7 million and an annual technology investment of over \$1,000,000. Kucera maintains a current asset-to-liability ratio of 1:3:1 and a \$2 million line of credit with PNC Bank. Kucera also has a strong financial relationship with JP Morgan/ Chase bank.

## Customer Base

- City/County/Regional
- State
- Federal
- Professional
- International
- Education/Research



\*by sales volume in the last 3 years



Phone: 440-975-4230  
map@kucerainternational.com  
www.kucerainternational.com

### Corporate Headquarters

**Staff:** 46  
**Address:** 38133 Western Parkway,  
 Willoughby, OH 44094  
**Phone:** 440-975-4230

### Flight Operations (Cartoflight)

**Staff:** 8  
**Address:** 38580 Jet Center Drive,  
 Willoughby, OH 44094  
**Phone:** 440-975-4230

### Kucera Columbus

**Staff:** 4  
**Address:** 3389 Grove City Road, Grove City,  
 OH 43123  
**Phone:** 614-539-3925

### Kucera Pittsburgh

**Staff:** 3  
**Address:** 1121 Boyce Road, Suite 3100,  
 Pittsburgh, PA 15241  
**Phone:** 724-942-2881

### Kucera Plant City

**Staff:** 4  
**Address:** 110 W. Reynolds Street, Suite 207  
 Plant City, FL 33563  
**Phone:** 813-754-9247

### In-House Services:

- Vertical aerial photography (film since 1953, digital since 2005)
- Georeferenced digital oblique aerial photography (since 2009)
- Aerial lidar surveying (since 2003)
- Multispectral and thermal remote sensing (since 1975)
- Control surveying (conventional ground since 1953, GPS ground since 1991, airborne GPS/IMU since 1999)
- Aerotriangulation (analytical since 1975, digital since 1996)
- Orthophotography (analytical since 1984, digital since 1994)
- Digital terrain/elevation/surface modeling (since 1980)
- Plan/topo feature compilation/mapping (conventional since 1953, digital since 1985)
- Cadastral/land use mapping (since 1975)
- CAD/GIS Conversion (since 1986)
- Metadata generation (since 1996)

### Large Area Experience:

Digital vertical aerial photography ~ 750,000 sq. miles

Digital orthophotography >600 counties/cities, ~ 570,000 sq. miles

Aerial lidar surveying >400 projects, ~ 200,000 sq. miles

Topo/plan feature mapping (1995-2020) >300 projects, ~ 90,000 sq. miles

Digital aerial oblique imaging >30 counties/cities, ~ 12,000 sq. miles

## Primary Equipment

4	Twin-engine Piper Navajo Chieftain aircraft w/ dual sensor ports
1	Twin-engine Cessna 441 Conquest turbine aircraft w/ dual sensor ports
2	Single-engine Cessna TU206 aircraft
3	Leica ADS100 4-band large format pushbroom digital cameras
3	Vexcel Ultracam UCE100 Eagle 4-band large format digital frame cameras
2	Optech Galaxy T2000 2000KHz aerial lidar systems w/ pulse and swath tracking
1	Leica ALS80 1000 KHz aerial lidar systems w/MPiA
2	Vexcel Osprey M3P 80 megapixel 5-way digital oblique/vertical camera systems
2	iGage5, 8 dual frequency survey-grade GPS/GNSS receivers
8	Topcon HIPER GPS/GNSS Receivers
2	Topcon ET2 total stations
2	Terratech TerraPOS AGPS processing stations
1	Cannon Pro6100S 2400 dpi 60" color plotter
1	HP 5500 1200 dpi color inkjet plotter
3	Leica XPro digital aerial strip image processing stations
3	Vexcel UltraMap digital aerial frame image processing stations
2	Inpho Match-AT digital aerotriangulation stations
2	Leica ORIMA digital aerotriangulation stations
2	GeoVista + Orbit oblique image application stations
4	Z/I OrthPro ortho rectification stations
8	Inpho OrthoMaster/OrthoVista ortho processing stations
5	TerraSolid and GeoCue LP360 lidar processing stations
4	Cardinal Systems VR2 softcopy stereoplotters (2 w/3D lidargrammetry)
2	Dat-EM Summit Evolution softcopy stereoplotters
10	Cardinal Systems VR1/2 map edit stations (4 w/TIN/contour generation)

6	ArcGIS, ERDAS ER Mapper, Global Mapper GIS stations
8	AutoCAD, Microstation, PLS-CAD, Terramodel CAD stations
2	Leica DSM autocorrelation/surface modeling stations
2	Inpho SCOP, MicroStation InRoads TIN/contour generation stations

## Staff Breakdown

8	Management /Administration/Sales
5	Aircraft pilots
5	Aerial sensor operators
2	Aircraft mechanics
4	Surveyors/geodesists
3	Aerotriangulation specialists
7	Lidar processing specialist
10	Digital orthophoto/imaging specialist
6	Stereocompilers
8	GIS/CAD specialist
5	QC & oblique imaging specialists
2	Metadata specialists
2	Professional Engineers
6	Professional Surveyors
3	Certified Photogrammetrists/Mappers
2	Certified GIS Specialists (GISP)
6	Multi and single engine commercial pilots
2	Certified aircraft mechanics (A & P)
2	Certified UAS pilots

## Awards/Recognition

New York State DOT Certificate of Achievement in recognition of outstanding accomplishment and contributions for aerial LiDAR and photo acquisition covering NY Lock 3 at Lock 9 along Mohawk River, NY following Tropical storms Irene and Lee (2011)



Recognition of Outstanding Effort and Contributions to Rochester Institute of Technology (RIT) Haiti Earthquake Response Project - for aerial LiDAR survey services following January 2010 Haiti Earthquake (2010)





### 3. Company History/Related Experience

#### Company History

The Kucera organization was founded as "Kucera & Associates" ("K&A") in 1947 by Robert "Bob" Kucera, an avid pilot and early innovator in the US aerial mapping services profession. Operating from Cuyahoga County, Ohio airport, Kucera initially served local industrial, commercial, and professional clients, but soon expanded to larger government and research projects throughout the US and in Central and South America. In the early 1950s Kucera was incorporated in Ohio as "Kucera & Associates Inc." and moved into a newly constructed headquarters facility and hangar at Lost Nation Airport in Mentor, Ohio. In the 1960s Kucera established branch offices in Colorado and Florida and built up a veteran management and production team, including John Antalovich Sr. as Vice President and General Manager. Mr. Antalovich Sr. became Kucera's President in 1969 following Bob Kucera's death and acquired full ownership of the Kucera organization in 1984.

Under John Antalovich Sr. Kucera continued to innovate and expand. In the 1970s Kucera updated its aircraft fleet with Cessna twin and single-engine planes and was an early convert from analog to optical train stereo mapping systems, becoming the largest user of these systems. In the 1980s the organization name was changed to "Kucera International Inc." to reflect Kucera's expanded geographic range and new branch offices were established through acquisitions of Henderson Aerial Surveys in Columbus, Ohio and Keddal Aerial Mapping in Pittsburgh, Pennsylvania. In the early 1990s Kucera moved to its current 50000 square foot headquarters and hangar facilities at the west end of Lost Nation (now Lake County Executive) Airport in Willoughby, Ohio. In the 1990s Kucera upgraded its twin-engine aircraft to dual-port Piper Navajo Chieftains. Also during this period, Kucera was one of the first companies to move to from analytical to digital photogrammetric mapping and imaging systems and became an early user and supporter of GIS and CAD technologies. In the early 2000s Kucera became one of the first companies to utilize large format pushbroom digital aerial cameras (Leica ADS), aerial lidar systems (Leica ALS), oblique imaging systems (Geospan GeoVista), and multispectral/thermal sensors (RIT WASP). Since 2010 Kucera has added turbine twin-engine aircraft (Cessna Conquest) to its fleet and large format digital frame cameras (Vexcel UltraCam) to its sensors, has upgraded all of its sensors to latest generation systems, and has upgraded and expanded its automated photogrammetric processing, lidargrammetry, GIS support, IT infrastructure, and data/web hosting capabilities. Ownership of the Kucera organization transferred from John Antalovich Sr. to sons John (President) and Scott (Vice President) in 2019. Kucera's most recent acquisition (2022) is an Optech Galaxy T2000 2mHz aerial lidar system.

Kucera today is a leading provider of aerial photography/sensing, photogrammetric imaging/mapping/modeling, geospatial data conversion and related geomatic services for government, professional, industrial/commercial, and educational/research applications. Through full-service production offices in Ohio, Pennsylvania and Florida Kucera annually completes throughout the US and abroad hundreds of projects ranging in size from a few acres to tens of thousands of square miles. Kucera's veteran staff of over 60 includes licensed/certified photogrammetrists, surveyors, engineers, lidar specialists, and GIS and project management professionals. Kucera's in-house equipment/technology includes a fleet of seven twin and single-engine aircraft outfitted with latest generation aerial sensors, and over 90 servers and workstations for photogrammetric and geospatial data extraction, processing, conversion, application, and hosting. Through optimized, "best value" aerial services/solutions which are high quality, timely, and cost-effective Kucera has earned numerous satisfied customers. With this focus and its high caliber resources, extensive experience, sound management, honest and ethical business conduct, and superior customer relations Kucera continues its mission of being

a world leader in the aerial mapping/geospatial services profession. Kucera is an ESRI Business Partner and a longstanding active member of the ASPRS and MAPPS professional organizations.

## Experience and Management Team

Kucera has been performing 4-band based direct digital aerial image capture in-house since 2005 and to date has completed digital aerial imaging at 1.5' - 0.15' resolutions covering over 750,000 square miles. Kucera has been producing digital orthophotography in-house since 1994 and to date has produced 3 and 4-band orthoimagery covering over 600 county, multi-city, and multi-county regional areas covering over 570,000 square miles. In the State of Illinois, Kucera has produced digital orthophotography for 25 cities, counties, and regions covering over 15,000 square miles. Kucera's experience includes performance of digital aerial photography and digital orthophoto mapping covering portions of Champaign County in 2011 and 2013, as well as all of Champaign and Piatt Counties in 2017. In 2020, Kucera completed 6" resolution digital aerial photography and orthophotography covering the entire State of South Carolina (32,000 square miles).

A listing of Kucera's recent (2018-2022) similar completed countywide 6" and 3" resolution digital aerial photography and orthophotography projects is provided on the following pages. The management team for 90% of these projects was as follows:

- Project Manager - John Antalovich Jr., PE, PS
- Production/QC Manager - Scott Antalovich, PE, PS
- Survey Targeting Manager - Steve Wood, CP, IL PS
- Flight Planning Manager - Andrew Mitchell, CP
- Flight Operations Manager - Steve Smetters
- Chief Pilot - Drew Walker
- Chief Sensor Operator - Joe Pocs
- Aerotriangulation Manager - Jim Jenkins
- DEM Stereocompilation Manager - Mike Mekinda
- Orthophoto Production Manager - John H. Antalovich
- Metadata Manager - Ryan Hnida

This same highly experienced Kucera management team is proposed for the CCGISC 2023 project, as described in Proposal Section 5.

## Recent Experience (2018 - 2022)

<p><b>Regional One Planning Council - 900 sq. mi. Winnebago and Boone Counties, IL</b>            March 2021 - October 2021            \$55,000            Steve Gregg - (815) 319-4455</p>	<p><b>JoDaviess, Carroll, Whiteside Counties, IL - 2200 sq. mi.</b>            February 2021 - September 2021            \$86,300            Joe Kratcha - (815) 776-9297</p>
<p>Services: Multi-county digital aerial photo + 4-band digital ortho @ 6" GSD</p>	<p>Services: Multi-county digital aerial photo + 3-band color digital ortho @ 6" GSD</p>

**Monroe County, IL – 445 sq. mi.**

February 2021 – October 2021

\$52,300

Laura Henry – (618) 939-8681

Services: Countywide 3" GSD digital aerial photo + 4-band orthophoto

**Rutherford County, TN – 770 sq. mi.**

March 2019 – September 2019

March 2018 – September 2018

\$205,000

Mike Curtis – (615) 898-7762

Services: Countywide 6" GSD digital aerial photo + 4-band orthophoto updated 1"=100' scale, 2' contour plan/topo mapping

**Tri-County Regional Planning Commission, MI – 2400 sq. mi.**

February 2019 – December 2019

\$257,114

Laura Tichisihart – (517) 393-0342 x21

Services: 3 County/10 City/Township digital aerial photo + 4-band orthophoto @ 6" GSD (1300 sq. mi) 4" GSD (700 sq. mi), 3" GSD (400 sq.mi.), minimized lean "true" 3" orthoimagery for 40 sq. mi.

**Macomb County, MI – 538 sq. mi.**

Mar. 2018 – Aug. 2018, Mar. 2019 – Aug. '2019

\$86,000

Dan Durkee – (586) 469-5285

Services: Countywide 6" GSD digital aerial photo + 4-band orthophoto

**Kershaw County, SC – 750 sq. mi.**

February 2019 – August 2019

\$46,000

Cindy Masi – (803) 425-1500 x5444

Services: Countywide 6" GSD digital aerial photo + 4-band orthophoto

**Muskegon County, MI – 518 sq. mi.**

April 2019 – August 2019

\$45,000

Thomas Van Bruggen – (231) 724-4458

Services: 4-band 6" GSD digital aerial photography and orthophotography

**Madison County, IL – 818 sq. mi.**

February 2022 – September 2022

\$63,000

Dave Parizon – (618) 296-4701

Services: Countywide 6" GSD digital aerial photo + 4-band orthophoto

**Dekalb County, IL – 750 sq. mi.**

March 2019 – September 2019

\$54,500

Bruce Hamilton – (815) 899-0704

Services: 4-band 6" GSD digital aerial photography and orthophotography

**Bay County, FL – 988 sq. mi.**

January 2019 – May 2019

\$160,000

Jennifer Morgan – (850) 248-8073

Services: Countywide digital aerial photo + 4-band orthophoto @ 3" GSD

**Benton County, AR – 900 sq. mi.**

December 2019 – March 2020

December 2018 – March 2019

~\$329,000/year

Aaron Lattin – (479) 271-5786

Services: 4-band 6" GSD digital aerial photography and orthophotography

**Belmont County, OH – 540 sq. mi.**

March 2020 – September 2020

\$39,500

Anthony Atkins – (740) 526-9306

Countywide 6" GSD digital aerial photo + 4-band orthophoto

**City of Dubuque, IA – 268 sq. mi.**

March 2020 – September 2020

\$56,900

Nikki Rosemeyer – (563) 589-4174

Services: 4-band 3" GSD digital aerial photography and orthophotography

**Orange County, FL - 1149 sq. mi.**

January 2019 - July 2019

\$220,000

Tatsiana Sokalava - (407) 836-5021

Services: 4-band 6" & 3" GSD digital aerial photography and orthophotography

**Dutchess County, NY - 830 sq. mi.**

March 2020 - August 2020

\$57,000

Joe Rutkowski - (845) 486-2408

Services: Countywide 6" GSD digital aerial photo + 4-band orthophoto

**Lee County AL Cooperative - 656 sq. mi.**

January 2019 - June 2020

\$504,716

Chris Graff - (334) 501-7207

Services: Countywide digital aerial photo + 4-band orthophoto @ 6" GSD (436 sq. mi.) + 3" GSD (220 sq. mi), aerial lidar + hydro DEM, planimetric/topographic feature mapping

**Huron County, MI - 963 sq. mi.**

March 2020 - December 2020

\$83,000

Deanna Kidd - (989) 269-9421

Services: Countywide/citywide digital aerial photo + 4-band orthophoto @ 6" GSD (963 sq. mi) / 3" GSD (83 sq. mi)

**Alachua County, FL - 1090 sq. mi.**

January 2020 - May 2020

\$90,000

Bob Bates - (852) 338-3259

Services: Countywide digital aerial photo + 4-band orthophoto @ 6" GSD

**Highlands County, FL - 1256 sq. mi.**

January 2020 - June 2020

\$107,000

Stephen Anderson - (863) 402-6672

Services: Countywide digital aerial photo + 4-band orthophoto @ 6" GSD

**Washington County, IA - 600 sq. mi.**

March 2020 - October 2020

\$250,825

Dewy Royer - (319) 653-7790

Services: 4-band 3" GSD digital aerial photography and orthophotography

**Saginaw Bay Area, MI Consortium - 2400 mi<sup>2</sup>**

March 2020 - December 2020

\$251,800

Dan Hoffman - (989) 790-5522

Services: Multi-County, multi-city digital aerial photo + 4-band orthophoto @ 6" GSD ( 1580 sq. mi.) 4" GSD (570 sq. mi.), 3" GSD (250 sq. mi)

**Jackson County, MI - 456 sq. mi.**

March 2020 - November 2020

\$237,000

Scott Ambs - (517) 768-6691

Countywide digital aerial photo + 4-band orthophoto @ 4" GSD, countywide 4-way oblique aerial @ 4" midline GSD, building footprint mapping

**Howell County, MO - 928 sq. mi.**

February 2020 - November 2020

\$70,000

Melanie Barnett - (417) 256-7170

Services: Countywide digital aerial photo + 4-band orthophoto @ 6" GSD

**Wilson County, TN - 590 sq. mi.**

February 2020 - August 2020

\$71,290

Julie Hooper - (615) 449-2836

Services: Countywide 4" GSD digital aerial photo + 4-band orthophoto

**Hendry County, FL - 1302 sq. mi.**

January 2020 - June 2020

\$101,600

Luis Calderon - (863) 675-5365

Services: Countywide digital aerial photo + 4-band orthophoto @ 6" GSD

**Florida Dept. of Revenue (6 Counties) – 4700 sq. mi.**

January – April 2019, 2021 (2 surveys)  
\$714,000  
Charles Russell – (850) 617-8867

Services: Multi-county 4-band 6" + 3" GSD digital aerial photography and ortho-photography

**State of South Carolina – 32,000 sq. mi.**

January 2020 – March 2021  
Adam DeMars – (803) 896-9235  
\$2.05 million

Services: Statewide digital aerial photo and 4-band digital ortho @ 6" GSD

**Dubuque County, IA – 900 sq. mi.**

March 2021 – September 2021  
\$113,400  
Jeff Miller – (563) 589-7896

Services: Countywide digital aerial photo + 4-band orthophoto @ 3" GSD

**Wyandot County, OH – 408 sq. mi.**

March 2021 – September 2021  
\$26,537  
Michael Kohl – (419) 294-2330

Services: County/citywide 6/3" GSD digital aerial photo + 4-band orthophoto

**Kane County, IL – 624 sq. mi.**

February 2021 – November 2021  
\$94,800  
Thomas Nicoski – (630) 208-8655

Services: 4-band 3" GSD digital aerial photography and orthophotography

**Wexford County, MI – 575 sq. mi./21 sq. mi. city area**

February 2021 – August 2021  
\$38,250  
Sara Mertz – 231-779-9534

Services: County/citywide 6"/3" GSD digital aerial photo + 4-band orthophoto

**Hamilton County, IN – 434 sq. mi.**

Feb. 2020 – Dec. 2020, Feb. 2022 – July 2022  
\$419,760  
Joan Keene – (317) 776-8254

Services: Countywide 3" GSD aerial photo + 4-band ortho, aerial lidar + hydro DEM, 1"=100' scale, 1' contour + updated plan mapping

**Sherburne County, MN – 482 sq. mi.**

March 2022 – July 2022  
\$46,000  
Brett Forbes – (763) 765-3311

Services: Countywide digital aerial photo + 4-band orthophoto @ 4" GSD

## 4. Financial/Legal

Provided on the following pages are copies of Kucera International's last Year-End Financial Statement, State of Illinois Business License, and Insurance Certificate.

Kucera International Inc. has no current legal actions relating to current or past projects.

**KUCERA INTERNATIONAL, INC. AND SUBSIDIARY**

**Consolidated Financial Statements  
and Supplementary Information**

**Years Ended March 31, 2022 and 2021**

**(With Independent Accountants' Review Report Thereon)**

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY

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*Bond, Sippola, DeJoy & Co.*  
BUSINESS ADVISORS AND  
CERTIFIED PUBLIC ACCOUNTANTS

## Independent Accountants' Review Report

To the Board of Directors and Shareholders  
Kucera International, Inc.  
Willoughby, Ohio

We have reviewed the accompanying consolidated financial statements of Kucera International, Inc. (a C corporation), which comprise the consolidated balance sheets as of March 31, 2022 and 2021, and the related consolidated statements of income, shareholders' equity and cash flows for the years then ended, and the related notes to the consolidated financial statements. A review includes primarily applying analytical procedures to management's financial data and making inquiries of company management. A review is substantially less in scope than an audit, the objective of which is the expression of an opinion regarding the consolidated financial statements as a whole. Accordingly, we do not express such an opinion.

### **Management's Responsibility for the Consolidated Financial Statements**

Management is responsible for the preparation and fair presentation of these consolidated financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of the consolidated financial statements that are free from material misstatement whether due to fraud or error.

### **Accountants' Responsibility**

Our responsibility is to conduct the review engagements in accordance with Statements on Standards for Accounting and Review Services promulgated by the Accounting and Review Services Committee of the AICPA. Those standards require us to perform procedures to obtain limited assurance as a basis for reporting whether we are aware of any material modifications that should be made to the consolidated financial statements for them to be in accordance with accounting principles generally accepted in the United States of America. We believe that the results of our procedures provide a reasonable basis for our conclusion.

(Continued)

Independent Accountants' Review Report, Continued

**Accountants' Conclusion**

Based on our reviews, except for the issues noted in the Known Departure From Accounting Principles Generally Accepted in the United States of America paragraphs, we are not aware of any material modifications that should be made to the accompanying consolidated financial statements in order for them to be in accordance with accounting principles generally accepted in the United States of America.

**Known Departures From Accounting Principles Generally Accepted in the United States of America**

As disclosed in Note 1 (f) to the consolidated financial statements, accounting principles generally accepted in the United States of America requires disclosures regarding the adoption of the Accounting Standards Update (ASU) No 2014-09, revenue from Contracts with Customers (Topic 606) and the nature, amount, timing and uncertainty of revenue and cash flows arising from the customer contracts, performance obligations including significant judgements and estimates and changes in judgements and assets recognized from costs incurred to obtain or fulfill a contract. Management has informed us that these disclosures are not included in the accompanying consolidated financial statements.

As disclosed in Note 4 to the consolidated financial statements, accounting principles generally accepted in the United States of America require management to determine if the Company has any uncertain tax positions. Management has informed us that the Company has not considered whether there may be any uncertain tax positions. Management has not determined the effects of this departure from accounting principles generally accepted in the United States of America on financial position, results of operations and cash flows.

**Consolidated Supplementary Information**

The consolidated supplementary information included in Schedules 1 and 2 is presented for purposes of additional analysis and is not a required part of the basic consolidated financial statements. Such information is the responsibility of management and was derived from, and relates directly to, the underlying accounting and other records used to prepare the consolidated financial statements. The consolidated supplementary information has been subjected to the review procedures applied in our reviews of the basic consolidated financial statements. We are not aware of any material modifications that should be made to the consolidated supplementary information. We have not audited the consolidated supplementary information and do not express an opinion on such information.

*Bond, Sippola, DeJoy & Co.*

Chardon, Ohio  
August 9, 2022

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Consolidated Balance Sheets  
March 31, 2022 and 2021

<u>Assets</u>	<u>2022</u>	<u>2021</u>
Current assets:		
Cash and cash equivalents	\$ 74,214	79,575
Accounts receivable, net of allowance for doubtful accounts of \$15,000	1,032,863	1,035,480
Customer contracts	818,780	817,241
Due from officers	-	10,159
Prepaid expenses and other current assets	19,943	24,822
Total current assets	1,945,800	1,967,277
Property and equipment:		
Airplanes	4,742,589	4,709,189
Automobiles	72,516	72,516
Machinery and equipment	12,139,609	10,896,246
Furniture and fixtures	44,392	44,392
Leasehold improvements	242,067	242,067
	17,241,173	15,964,410
Less accumulated depreciation and amortization	12,844,034	12,096,138
Net property and equipment	4,397,139	3,868,272
Other assets:		
Cash surrender value of life insurance	111,766	540,850
Investment in joint venture	108,855	114,500
Deposits	13,100	36,533
Total other assets	233,721	691,883
Total assets	\$ 6,576,660	6,527,432

See accompanying notes and independent accountants' review report.



Liabilities and Shareholders' Equity

	<u>2022</u>	<u>2021</u>
Current liabilities:		
Line of credit	\$ 70,000	53,000
Current portion of long-term debt	258,269	546,673
Current portion of forgivable debt to government entity	-	336,925
Accounts payable	71,725	70,250
Subcontractors payable	192,796	122,588
Notes payable - related parties	488,543	488,543
Accrued rent - related party	570,259	487,079
Accrued liabilities and taxes	<u>322,623</u>	<u>307,818</u>
Total current liabilities	1,974,215	2,412,876
Long-term debt, net of current portion	267,068	525,340
Forgivable debt to government entity, excluding current portion	-	948,845
Deferred income tax liability	<u>104,472</u>	<u>81,799</u>
Total liabilities	2,345,755	3,968,860
Shareholders' equity:		
Class A common stock, no par value, 1,011 shares authorized, 11 shares issued, 4 shares outstanding	5,000	5,000
Class B common stock, no par value, 889 shares authorized, 399 shares issued and outstanding	18,000	18,000
Retained earnings	<u>4,265,942</u>	<u>2,593,609</u>
	4,288,942	2,616,609
Cost of treasury stock		
7 shares Class A common stock	<u>(58,037)</u>	<u>(58,037)</u>
Total shareholders' equity	<u>4,230,905</u>	<u>2,558,572</u>
Total liabilities and shareholders' equity	<u>\$ 6,576,660</u>	<u>6,527,432</u>

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Consolidated Statements of Income  
Years Ended March 31, 2022 and 2021

	<u>2022</u>	<u>2021</u>
Net sales	\$ 6,561,831	6,194,681
Cost of sales	<u>4,077,968</u>	<u>4,638,800</u>
Gross profit	2,483,863	1,555,881
Selling, general and administrative expenses	<u>2,552,175</u>	<u>2,709,698</u>
Operating loss	(68,312)	(1,153,817)
Other (expense) income:		
Interest expense	(58,492)	(84,168)
Loss on disposal of property and equipment	-	(806)
Forgiveness of debt to government entity	1,285,770	-
Life insurance proceeds	520,026	-
Other income, net	7,264	9,051
Increase in cash surrender value of life insurance	8,701	13,542
Interest income	<u>49</u>	<u>4</u>
Total other income (expense)	<u>1,763,318</u>	<u>(62,377)</u>
Income (loss) before federal income taxes	1,695,006	(1,216,194)
Federal income tax expense:		
Current	-	-
Deferred	<u>22,673</u>	<u>55,552</u>
	<u>22,673</u>	<u>55,552</u>
Net income (loss)	<u>\$ 1,672,333</u>	<u>(1,271,746)</u>

See accompanying notes and independent accountants' review report.

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Consolidated Statement of Shareholders' Equity  
Years Ended March 31, 2022 and 2021

	<u>Class A Common Stock</u>	<u>Class B Common Stock</u>	<u>Retained Earnings</u>	<u>Treasury Stock</u>	<u>Total</u>
Balance at March 31, 2020	\$ 5,000	18,000	3,865,355	(58,037)	3,830,318
Net income	-	-	(1,271,746)	-	(1,271,746)
Balance at March 31, 2021	5,000	18,000	2,593,609	(58,037)	2,558,572
Net loss	-	-	1,672,333	-	1,672,333
Balance at March 31, 2022	<u>\$ 5,000</u>	<u>18,000</u>	<u>4,265,942</u>	<u>(58,037)</u>	<u>4,230,905</u>

See accompanying notes and independent accountants' review report.

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Consolidated Statements of Cash Flows  
Years Ended March 31, 2022 and 2021

	2022	2021
Cash flows from operating activities:		
Net income (loss)	\$ 1,672,333	(1,271,746)
Adjustments to reconcile net income to net cash provided (used) by operating activities:		
Depreciation and amortization	747,896	729,773
Loss on disposal of property and equipment	-	806
Cash surrender value of life insurance	429,084	(13,542)
Loss from investment in joint venture	5,645	5,571
Deferred income tax liability	22,673	55,552
Cash (used) provided by changes in certain assets and liabilities:		
Accounts receivable	2,617	(200,258)
Customer contracts	(1,539)	612,759
Due from officers	10,159	10,160
Prepaid expenses, other current assets and deposits	28,312	46,611
Accounts and subcontractors payable	71,683	(495,866)
Accrued rent, liabilities and taxes	97,985	266,643
	3,086,848	(253,537)
Net cash provided (used) by operating activities		
Cash flows from investing activities:		
Purchase of property and equipment	(1,276,763)	(270,343)
	(1,276,763)	(270,343)
Net cash used by investing activities		
Cash flows from financing activities:		
Borrowings on line of credit	1,998,000	2,269,000
Principal payments on line of credit	(1,981,000)	(2,526,000)
Principal payments on notes payable - related parties	-	(32,188)
Principal payments on long-term debt	(546,676)	(451,743)
Forgiveness of debt from government entity	(1,285,770)	-
Borrowing of forgivable debt from government entity	-	1,285,770
	(1,815,446)	544,839
Net cash (used) provided by financing activities		
Net (decrease) increase in cash and cash equivalents	(5,361)	20,959
Cash and cash equivalents at beginning of year	79,575	58,616
	\$ 74,214	79,575
Cash and cash equivalents at end of year		

See accompanying notes and independent accountants' review report



KUCERA INTERNATIONAL, INC.AND SUBSIDIARY  
Notes to Consolidated Financial Statements  
March 31, 2022 and 2021

(1) Summary of Significant Accounting Policies

(a) Nature of Operations

Kucera International, Inc. and subsidiary (together the "Company") is principally engaged in aerial photogrammetry services. The Company sells its services nationwide and internationally. The Company maintains facilities in Ohio, Pennsylvania and Florida.

(b) Organization and Principles of Consolidation

The accompanying consolidated financial statements include the accounts of Kucera International, Inc. (the parent Company) and its wholly-owned subsidiary, Carto Flight, Inc. All significant intercompany investments, balances, and transactions have been eliminated in the consolidation.

(c) Concentrations of Credit Risk

Financial instruments which potentially subject the Company to a concentration of credit risk consist principally of trade receivables. The Company sells photogrammetric consulting and engineering services nationwide and internationally, primarily to governmental agencies and industrial users. To reduce credit risk, the Company performs ongoing credit evaluations of its customers' financial condition. The Company generally does not require collateral.

The Company maintains their cash and cash equivalents balances in bank deposit accounts at financial institutions. The cash balance, at times, may exceed federally insured limits. The cash and cash equivalents balance at March 31, 2021 and 2020 did not exceed the federally insured limits.

The Company's operations may be affected by the ongoing outbreak of the coronavirus disease 2019 (COVID-19) which was declared a pandemic by the World Health Organization in March 2020. The ultimate disruption which may be caused by the outbreak is uncertain; however, it may result in an adverse impact on the Company's financial position, operations and cash flows. Any related impact cannot be estimated at this time.

(d) Cash and Cash Equivalents

The Company considers all highly liquid financial instruments purchased with a maturity of three months or less to be cash equivalents.

See independent accountants' review report.

(Continued)



KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Notes to Consolidated Financial Statements, Continued  
March 31, 2022 and 2021

(1) Summary of Significant Accounting Policies, Continued

(e) Accounts Receivable

Accounts receivable are periodically reviewed by management for collectibility. Factors used for this process include payment history, customer discussions, and other credit information. Any amounts deemed to be uncollectible are reserved in the allowance for doubtful accounts.

(f) Revenue and Cost Recognition

The Company adopted Accounting Standards Update (ASU) No 2014-09, revenue from Contracts with Customers (Topic 606) as of April 1, 2020. The ASU provides a single principles based revenue recognition model with a five step analysis of transactions to determine when and how revenue is recognized. The Company determined that the result of adopting Topic 606 and implementing the changes aforementioned was immaterial and, therefore, there was no change to retained earnings as of the date of adoption.

Accounting principles generally accepted in the United State of America requires disclosures regarding the adoption of the new standard and the nature, amount, timing and uncertainty of revenue and cash flows arising from the customer contracts, performance obligations including significant judgements and changes in judgements and assets recognized from costs incurred to obtain or fulfill a contract. Management has informed us that these disclosures are not included in these consolidated financial statements.

(g) Property and Equipment

Property and equipment are stated at cost. For financial statement purposes, the Company provides for depreciation and amortization on either the straight-line or the declining balance methods for financial reporting purposes with estimated useful lives as follows:

Airplanes	5-10 years
Automobiles	5 years
Machinery and equipment	5-10 years
Furniture and fixtures	5-10 years
Leasehold improvements	10-39 years

See independent accountants' review report.

(Continued)

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Notes to Consolidated Financial Statements, Continued  
March 31, 2022 and 2021

(1) Summary of Significant Accounting Policies, Continued

(h) Subcontractors Payable

Subcontractors payable consists of amounts due to subcontractors. Generally, these amounts are paid when the Company receives payment on the project in which the subcontractor performed the work.

(i) Deferred Income Taxes

Deferred income taxes are provided for temporary differences between the financial reporting basis and tax basis of the Company's assets and liabilities. The Company uses the accrual basis of accounting for taxes and financial reporting purposes.

(j) Use of Estimates

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

(k) Sales Tax

Various states impose a sales tax on the Company's sales to non-exempt customers. The Company collects that sales tax from customers and remits the entire amount to the various states. The Company's accounting policy is to exclude the tax collected and remitted to the states from revenue and cost of sales. It is recorded in accrued liabilities and taxes on the consolidated balance sheets until remitted to the various states.

(l) Subsequent Event

Management has evaluated subsequent events through August 9, 2022 which was the date that the financial statements were available to be issued.

See independent accountants' review report.

(Continued)

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Notes to Consolidated Financial Statements, Continued  
March 31, 2022 and 2021

(2) Supplemental Disclosure of Cash Flow Information

Cash paid during the year for:	2022	2021
Interest	\$ 46,221	63,771

(3) Financing Arrangements

A summary of long-term debt is as follows:	2022	2021
--	------	------

Note payable with a fluctuating interest rate equal to the one-month LIBOR rate plus 2.25% (one-month LIBOR rate equals .44514% at March 31, 2022). Commencing September 2017, the note is payable in 64 monthly installments of \$13,380 plus interest. The note is secured by equipment.	\$ 194,349	354,859
--	------------	---------

Note payable with a fixed interest rate of 5.62%. Commencing November 2018, the note is payable in 84 monthly installments of \$8,143 plus interest. The note is secured by equipment.	330,988	428,748
--	---------	---------

Note payable with a fixed interest rate of 5.6%. Commencing February 2019, the note was payable in 35 monthly installments of \$6,143 plus interest. This loan was paid in full at March 31, 2022.	-	288,406
--	---	---------

Total long-term debt	525,337	1,072,013
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Less current portion of long-term debt	258,269	546,673
--	---------	---------

Long-term debt, net of current portion	\$ 267,068	525,340
--	------------	---------

See independent accountants' review report.

(Continued)



KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Notes to Consolidated Financial Statements, Continued  
March 31, 2022 and 2021

(3) Financing Arrangements, Continued

Future maturities of long-term debt for the years ending March 31 are as follows:

2023	\$	258,269
2024		131,508
2025		97,714
2026		<u>37,846</u>
	\$	<u>525,337</u>

As a response to the coronavirus disease (COVID-19) outbreak, the U.S. government responded with relief legislation. Certain legislation called the Coronavirus Aid, Relief, and Economic Security Act (CARES Act), as amended and expanded under later legislation, among other things, authorized emergency loans to businesses by establishing, and providing funding for, forgivable bridge loans under the Paycheck Protection Program (PPP).

In April 2020, the Company received \$746,600 under the PPP. In March 2021, it was determined that the loan was overfunded and the Company paid back \$114,282, the balance of \$632,318 was outstanding as of March 31, 2021. The entire balance was forgiven as of March 31, 2022.

In April 2020, Carto Flight, Inc., a wholly owned subsidiary of the Company, received \$47,700 under the PPP, which the entire balance is forgiven as of March 31, 2021.

In February 2021, the Company received \$570,117 under the second round of PPP loans, which the entire balance was forgiven as of March 31, 2022.

In March 2021, Carto Flight, Inc., a wholly owned subsidiary of the Company, received \$35,635 under the second round of PPP loans, which the entire balance was forgiven as of March 31, 2022.

See independent accountants' review report.

(Continued)

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Notes to Consolidated Financial Statements, Continued  
March 31, 2022 and 2021

(3) Financing Arrangements, Continued

Under the PPP, the Small Business Administration (SBA) will forgive the proceeds received if eligibility and other criteria are met related to use of the funds, at which time the Company will recognize the forgiven amount as income. Once the SBA reviews and approves the forgiveness amount, the SBA will have the right to audit the Company's compliance with the PPP for a period of up to six years.

The Company has a \$1,000,000 line of credit available at March 31, 2022 and 2021. The outstanding balances were \$70,000 and \$53,000 at March 31, 2022 and 2021, respectively. The line of credit is secured by accounts receivable, work in process and equipment. The line of credit bears interest, payable monthly, at the one-month LIBOR rate plus 3.75% (one-month LIBOR rate equals .44514% at March 31, 2022). The line of credit matures on September 30, 2022 and is expected to be renewed.

The Company is obligated under the building lease, as disclosed in Note 5, and under other noncancelable operating leases. Future minimum lease payments under noncancelable operating leases for equipment and building (with initial or remaining lease terms in excess of one year) for the years ending March 31 are as follows:

2023	\$	241,461
2024		239,400
2025		239,400
2026		239,400
2027		<u>239,400</u>
	\$	<u>1,199,061</u>

Total rental expense was \$337,702 and \$334,727 for the years ended March 31, 2022 and 2021, respectively.

See independent accountants' review report.

(Continued)

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Notes to Consolidated Financial Statements, Continued  
March 31, 2022 and 2021

(4) Federal Income Taxes

Income tax expense consists of the following:

	2022	2021
Federal:		
Current	\$ -	-
Deferred	22,673	55,552
	\$ 22,673	55,552

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. The types of temporary differences that give rise to significant portions of the deferred tax liability (benefit) at March 31, 2022 and 2021 consist of the following:

	2022	2021
Allowance for doubtful accounts	\$ (3,150)	(3,150)
Property and equipment	401,277	460,309
Capital loss carryforward	(1,968)	(1,968)
Accrued liabilities and taxes	(121,575)	(120,172)
Contributions carryforward	(40)	(1,023)
Net operating loss carryforward	(170,072)	(252,197)
Deferred income tax liability	\$ 104,472	81,799

The Company has net operating loss carryforward of approximately \$2,115,980 and \$1,200,933 at March 31, 2022 and 2021, respectively.

The accompanying consolidated financial statements reflect a provision for federal income taxes different than that computed by applying the U.S. Federal corporate tax rate of 21 percent to earnings before income taxes. The reasons for the difference are as follows:

See independent accountants' review report.

(Continued)



KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Notes to Consolidated Financial Statements, Continued  
March 31, 2022 and 2021

(4) Federal Income Taxes, Continued

	2022	2021
Computed "expected" tax expense (benefit)	\$ 336,022	(255,401)
Permanent and other differences	(313,349)	310,953
Federal income tax expense (benefit)	\$ 22,673	55,552

Accounting principles generally accepted in the United States of America require management to determine if the Company has any uncertain tax positions. The Company has not considered whether there may be any uncertain tax positions, which is not in accordance with accounting principles generally accepted in the United States of America. The effects of this departure on the consolidated financial statement has not been determined.

The federal, state and local income tax returns of the Company are subject to examination by the Internal Revenue Service and applicable state and local taxing authorities, generally for three to four years after the returns are filed.

(5) Related Party Transactions

The Company leases the main facility from a related party through March 31, 2027. Effective April 1, 2021, the monthly lease payments were \$19,500. Rent expense for this related party lease was \$234,000 for the years ended March 31, 2022 and 2021. The Company had rent payable to this related party in the amount of \$570,529 and \$487,079 as of March 31, 2022 and 2021, respectively.

The Company had notes payable to related parties in the amount of \$571,555 and \$558,805 (including \$83,012 and \$70,262 of accrued interest) at March 31, 2022 and 2021, respectively. The principal and interest at 5% are payable in full on demand.

The Company has other related party transactions as described in Note 8 and 9.

(6) Profit Sharing and 401(k) Plan

The Company has a profit sharing and 401(k) plan for virtually all employees with discretionary matching contributions determined annually by the Board of Directors. There were no employer contributions to the plan for the years ended March 31, 2022 and 2021.

See independent accountants' review report.

(Continued)

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Notes to Consolidated Financial Statements, Continued  
March 31, 2022 and 2021

(7) Stock Restriction Agreement

The Company has an agreement with its shareholders which restricts the transfer of stock. Terms of the agreement require the Company, under certain conditions, to purchase shares owned by any shareholder at the time of their death. The purchase price is agreed upon annually by the Company and its shareholders, or in lieu of any current agreement, shall be determined by the net book value of each share as shown by the Company's accrual balance sheet as of the close of the fiscal year immediately preceding the event which gives rise to the purchase of the shares pursuant to this agreement.

(8) Investment in Joint Venture and Contingencies

On July 17, 2000, the Company entered into an agreement with JTV Enterprises, LLC to form Evergreen Properties, LLC for the purpose of constructing an airplane hangar. Each member leases 50% of the hangar space. Each member has a 50% interest in the limited liability company. The investment is accounted for using the equity method. The Company was allocated \$5,645 and \$5,571 of the net loss of the limited liability company at December 31, 2021 and 2020, respectively, which is included in other income, net on the consolidated statements of income. Rent expense to this related party was \$13,200 and \$14,469 for the years ended March 31, 2022 and 2021, respectively.

(9) Treasury Stock

On April 1, 2018 the Company purchased seven shares of its Class A common stock for \$8,291 per share or a total of \$58,037 pursuant to the stock restriction agreement (Note 7).

See independent accountants' review report.



CONSOLIDATED SUPPLEMENTARY INFORMATION

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Schedule 1 - Consolidated Cost of Sales  
Years Ended March 31, 2022 and 2021

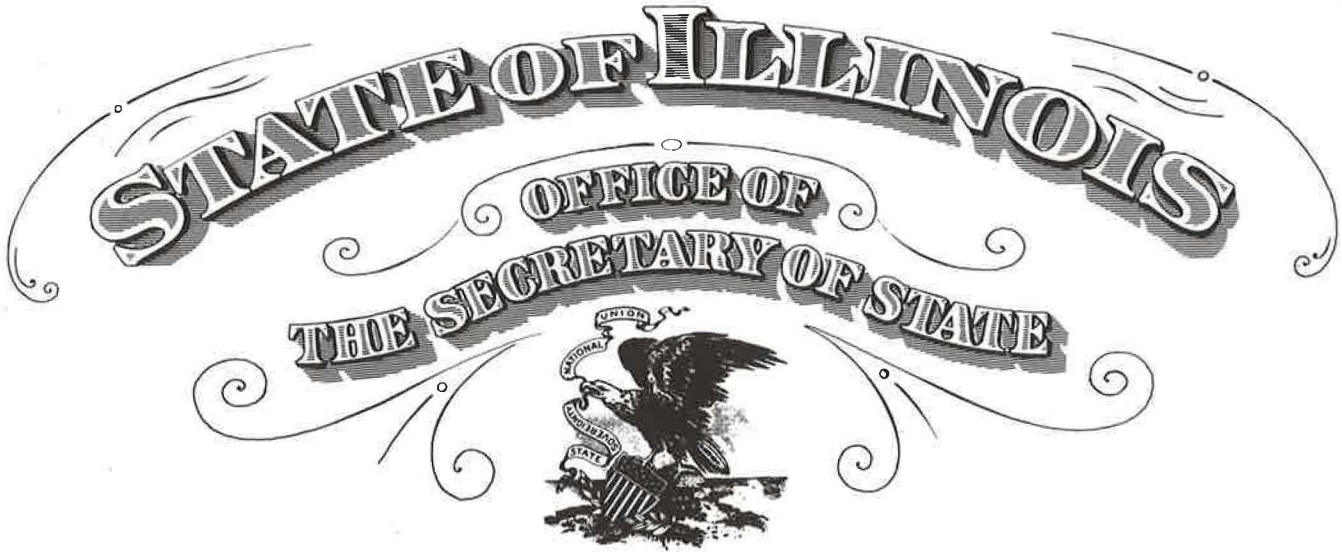
	<u>2022</u>	<u>2021</u>
Labor	\$ 1,632,529	1,697,417
Subcontract	512,134	846,244
Airplane operation	510,625	273,317
Deprecation	730,971	710,513
Freight	29,031	14,020
Maintenance - airplanes	193,127	142,612
Maintenance - equipment	244,280	200,609
Materials	18,291	11,545
Meals - job related	34,242	20,581
Operating supplies	17,326	4,545
Rental - equipment	17,993	15,668
Rental - hanger and runway	28,622	29,285
Travel - job related	<u>110,336</u>	<u>59,685</u>
	4,079,507	4,026,041
Uncompleted contracts at beginning of year, net	817,241	1,430,000
Uncompleted contracts at end of year, net	<u>(818,780)</u>	<u>(817,241)</u>
	<u>\$ 4,077,968</u>	<u>4,638,800</u>

See independent accountants' review report.

KUCERA INTERNATIONAL, INC. AND SUBSIDIARY  
Schedule 2 - Consolidated Selling,  
General and Administrative Expenses  
Years Ended March 31, 2022 and 2021

	<u>2022</u>	<u>2021</u>
Administrative salaries	\$ 803,948	976,078
401(k) employee	186,295	164,637
Advertising	4,025	-
Automobile	4,248	-
Bank and service fees	7,065	6,446
Cleaning	9,686	6,693
Depreciation and amortization	16,925	19,260
Donations	1,004	192
Dues and subscriptions	39,309	49,487
Employee recruitment, training and temporary staffing	6,100	7,847
Employee welfare	10,096	9,036
Heat, light and power	32,088	30,581
Insurance - comprehensive and liability	212,098	198,177
Insurance - health and disability	441,797	406,589
Insurance - life	24,458	72,368
Maintenance - automobile	2,534	2,552
Maintenance - building	17,965	22,203
Miscellaneous	2,640	9,260
Office supplies	12,858	8,818
Performance bonds	65,851	15,024
Professional services	77,658	89,377
Rent - automobile	-	167
Rent - building	281,429	280,476
Rent - equipment	9,658	9,131
Taxes - payroll	210,809	218,251
Taxes - real estate	32,732	33,110
Taxes - state and local	3,594	16,254
Telephone and internet	17,937	57,462
Travel - sales related	17,368	222
	<u>\$ 2,552,175</u>	<u>2,709,698</u>

See independent accountants' review report.



**To all to whom these Presents Shall Come, Greeting:**

*I, Jesse White, Secretary of State of the State of Illinois, do hereby certify that*

KUCERA INTERNATIONAL INC., INCORPORATED IN THE STATE OF OHIO AND LICENSED TO TRANACT BUSINESS IN THIS STATE ON JUNE 21, 1988, APPEARS TO HAVE COMPLIED WITH ALL THE PROVISIONS OF THE BUSINESS CORPORATION ACT OF THIS STATE RELATING TO THE FILING OF ANNUAL REPORTS AND PAYMENT OF FRANCHISE TAXES, AND IS AT THIS TIME A FOREIGN CORPORATION IN GOOD STANDING AND AUTHORIZED TO TRANACT BUSINESS IN THE STATE OF ILLINOIS\*\*\*\*\*

EXPEDITED  
SECRETARY OF STATE  
STATE OF ILLINOIS



**In Testimony Whereof, I, hereto set my hand and cause to be affixed the Great Seal of the State of Illinois, this** 12TH  
**day of** NOVEMBER **A.D.** 2002.

*Jesse White*

SECRETARY OF STATE



# Illinois Business Authorization



**KUCERA INTL INC**


**38133 WESTERN PKWY  
WILLOUGHBY OH 44094-7589**

**Expiration Date:  
9/14/2023**

## Certificate of Registration

Use Taxes

(1013-1752)

 **ILLINOIS REVENUE**  
*[Signature]*  
36 Director



# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

6/15/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

<b>PRODUCER</b> Zito Insurance Agency, A Division of Risk Strategies 8339 Tyler Blvd. Mentor OH 44060	<b>CONTACT NAME:</b> Jacqueline Smith <b>PHONE (A/C No. Ext):</b> 440-205-7400 <b>E-MAIL ADDRESS:</b> jacquithsmith@zitoinsurance.com		<b>FAX (A/C, No):</b> 440-205-7410
	<b>INSURER(S) AFFORDING COVERAGE</b>		
License#: 28630 KUCEINT-01	<b>INSURER A:</b> CINCINNATI INSURANCE COMPANY*	<b>NAIC #</b> 10677	
<b>INSURED</b> Kucera International 38133 Western Pkwy Willoughby OH 44094	<b>INSURER B:</b> Cincinnati Indemnity Company	<b>NAIC #</b> 23280	
	<b>INSURER C:</b> Cincinnati Specialty Underwriters Insurance Compan	<b>NAIC #</b> 13037	
	<b>INSURER D:</b>		
	<b>INSURER E:</b>		
	<b>INSURER F:</b>		

**COVERAGES**

CERTIFICATE NUMBER: 893841217

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			EPP 0459056	10/20/2020	10/20/2023	EACH OCCURRENCE	\$ 1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	\$ 500,000
							MED EXP (Any one person)	\$ 10,000
							PERSONAL & ADV INJURY	\$ 1,000,000
							GENERAL AGGREGATE	\$ 2,000,000
							PRODUCTS - COMP/OP AGG	\$ 2,000,000
								\$
A	<input checked="" type="checkbox"/> AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY			EPP 0459056	10/20/2020	10/20/2023	COMBINED SINGLE LIMIT (Ea accident)	\$ 1,000,000
							BODILY INJURY (Per person)	\$
							BODILY INJURY (Per accident)	\$
							PROPERTY DAMAGE (Per accident)	\$
								\$
A	<input checked="" type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> DED <input checked="" type="checkbox"/> RETENTION \$ 0			EPP 0459056	10/20/2020	10/20/2023	EACH OCCURRENCE	\$ 5,000,000
							AGGREGATE	\$ 5,000,000
								\$
A B	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N	N/A	EPP 0459056 EWC 0479441	10/20/2020 4/16/2022	10/20/2023 4/16/2023	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER	OH EMPLOYER
							E.L. EACH ACCIDENT	\$ 1,000,000
							E.L. DISEASE - EA EMPLOYEE	\$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	\$ 1,000,000
C A	Professional Liability Cyber			CSU 0011144 EPP 0459056	5/23/2022 10/20/2020	5/23/2023 10/20/2023	Limit limit	2,000,000 100,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

**CERTIFICATE HOLDER****CANCELLATION**

Proof of Coverage

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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## 5. Project Team

### General Company Organization

Kucera's overall organizational structure is straightforward with direct lines of authority and no "outside parent" control. The lead principal with overall final decision-making authority is the company's President. Immediately next in line in this hierarchy is the company's Vice President. Secondary principals reporting to the President are the corporate headquarters group/production managers and branch office managers. The headquarters office is structured into departments by office function and major production phase with designated department heads. The branch production offices have full in-house mapping capability and provide backup production support to the corporate headquarters office for large contracts.

### Place of Performance

All of the 2023 CCGISC contract work will be conducted in-house from/at Kucera International's corporate headquarters facility in Willoughby, Ohio. This fully in-house approach will provide clearly defined responsibility and maximum control over the data quality and completion schedule. Backup production support (20% to 30% added capacity) will be provided by Kucera's three branch production offices, with the headquarters office's backlog of non-CCGISC project work being shifted to these offices as needed to maintain or increase the headquarters commitment to the CCGISC project.

### Management Staff

For all major contracts, Kucera assembles a contract-permanent project management team consisting of selected company principals for overall management/administration and relevant production department heads, key technicians, and subcontractor (if used) representatives for individual work phase (e.g., aerial photography, control surveying, etc.) management.

The Project Manager is a senior Kucera principal who is optimally suited for this position in terms of familiarity with the client, similar project experience, expertise, office location, availability, and overall management/communication skills. Kucera requires that the manager be a licensed/certified photogrammetrist, surveying, or engineering professional with at least 10 years of similar practical work/management experience and ability to meet regularly with the client and devote two or more days per week to contract management activity.

Kucera's designated Project Manager for this contract is Kucera's President, John Antalovich Jr. Mr. Antalovich Jr. has over 35 years of practical experience in aerial mapping services, including over 25 years of project management experience involving hundreds of countywide and multi-county orthophotography projects. As Kucera's President, Mr. Antalovich has full authority to issue corporate directives for action as needed to ensure all CCGISC multi-county aerial project work is completed in accordance with the project specifications and schedule.

For major contracts, Kucera also has senior staff members serving as Production and Quality Control Managers and who assist in the overall project management, quality control, and liaison activities and who serve as secondary points of contact. Kucera department heads and key technicians on the management team serve as specific work-phase (e.g., control surveying, aerotriangulation) managers responsible for the workflow, time tracking, quality control, and specific technical issues within their department/work phase. These individuals are all experienced ( $\geq 5$  years) technicians with full work assignment, supervision, and review authority within their department and significant availability for the contract.

Kucera’s project management team and corresponding project assignment, experience, and anticipated monthly time commitment/percentage to this contract are as follows:

Assignment	Name/Title	Years of Experience	Monthly Time Commitment (hrs)
Project Manager	John Antalovich Jr., PE, PS President	39	64 (30%)
Production Manager	Scott Antalovich, PE, PS Vice President	38	80 (40%)
Flight Planning & QC Manager	Andrew Mitchell, ASPRS CP Photogrammetrist	20	64 (30%)
Flight Ops Manager	Steve Smetters Flight Operations Manager	38	50 (25%)
Control Targeting Manager	Steve Wood Ground Survey Manager	43	80 (50%)
Chief Pilot	Drew Walker Chief Pilot	21	40 (100%)
Chief Sensor Operator	Joe Pocs Chief Sensor Operator	9	40 (100%)
Aerotriangulation Manager	Jim Jenkins Aerotriangulation Manager	34	40 (100%)
Stereocompilation/ DEM Update Manager	Mike Mekinda Senior Stereocompiler	31	40 (100%)
Orthophoto Production Manager	John H. Antalovich Orthophoto Manager	7	40 (80%)
Metadata Manager	Ryan Hnida Metadata Manager	8	50 (25%)

**A management team organization chart and management team resumes are provided at the back of this proposal section.** Kucera’s project management team offers a wealth of practical experience and includes individuals licensed/certified in surveying, mapping, photogrammetry, and engineering. All project management team members have previously held supervisory roles on numerous similar countywide and multi-county orthophoto base mapping projects in Illinois and other states, including the Champaign-Piatt County 2017 project.

### Management Process

Throughout the contract period, the designated Project Manager serves as the primary point of contact responsible for reporting to the client and overall coordination of the project work.

Before commencing any project work, the Project Manager prepares a comprehensive job write-up/work plan detailing the project specifications, schedule milestones, designated technologies and procedures, management team member/departmental assignments, estimated manhours by phase, and the project critical path network. The work plan is posted to and reviewed with each member of the project management team through an online job database accessible to all team members. As the project goes through the production process, the status will be updated at least weekly by the relevant project management team members in the online database. The Project Manager and members of the management team review the

status and schedule through the database and SharePoint and plan for work accordingly. Kucera’s Production Manager checks recorded vs. estimated hours and resource allocation by phase to determine if process adjustments are needed. Master hardcopy and digital office files containing a copy of the job write-up, project specifications and notes, status reports, and all significant correspondence and transmittal documents are maintained in a central storage area and in SharePoint, which are accessible to all management team members.

Throughout the execution of the contract, the management team will closely monitor/track the designated individual work phases and completion schedule. On a weekly basis throughout the contract period, the Project Manager meets with relevant members of the management team to review the scope of work/work completed, upcoming project assignments, delivery milestones/completion status, actual vs. estimated costs, quality control procedures and results, client feedback, and other relevant contract information. Primary emphasis will be placed on completing work phases ahead of schedule with all quality criteria maintained. Microsoft SharePoint is used to develop and monitor the project critical path. When work on a particular phase is completed ahead of schedule, the work on the subsequent phase will be started immediately in order to accelerate deliveries and allow greater flexibility in maintaining the overall schedule. The various production phases will also be performed concurrently to the fullest extent possible in order to maximize production effectiveness and efficiency. The individual work phases are completed in logical segments or blocks defined by the client’s priorities and/or optimal procedural efficiency to allow for a simultaneous work effort and progressive deliveries.

If the work on a project phase is falling behind schedule, the Project and Production Managers immediately review the circumstances with the personnel who directly oversee the phase and determine corrective measures available to accelerate the completion. These measures may include authorizing overtime or assigning additional equipment and/or staff to the work from Kucera’s headquarters or branch production offices.

## Resource Allocation

Kucera’s staffing and equipment commitment to the 2023 CCGISC aerial services contract is shown in the Firm Commitment section of this proposal submission. The hours allocated by project phase in relation to Kucera’s estimated phase hours (including lean reduction/elimination options) and resulting time for phase completion is as follows:

<u>Phase</u>	<u>Hours Allocated</u>	<u>Estimated Phase Hours</u>	<u>Phase Completion Time</u>
Aerial photo acquisition	350 crew hours/ month	6" - 16 flight, 80 standby 3" - 29 flight, 120 standby	6" - 1 month 3" - 1 month
Aerotriangulation	300 hours/month	6" - 80 3" - 140	6" - 0.5 month 3" - 0.5 month
DEM update/preparation	400 hours/month	6" - 200 3" - 400	6" - 0.5 month 3" - 1.5 months
Orthophoto production	800 hours/month	6" - 900 3" - 2800	6" - 2 months 3" - 4 months
	<b>Total:</b>	<b>6" - 1276 3" - 3489</b>	<b>6" - 4 months 3" - 7 months</b>

Kucera International Inc. Project Organization Chart  
2023 Digital Color Orthoimagery Acquisition  
Champaign County GIS Consortium



CHAMPAIGN COUNTY GIS CONSORTIUM



KUCERA INTERNATIONAL INC.  
*Willoughby, Ohio*

PROJECT MANAGER

John Antalovich Jr, PE, PS, President  
440-975-4230 x123  
j.antalovich@kucerainternational.com

Production/QC Manager - S. Antalovich, PE, PS

Flight Planning Manager - A. Mitchell, CP

Flight Ops Manager - S. Smetters

Ground Control Manager - S. Wood

Chief Pilot - D. Walker

Chief Sensor Operator - J. Pocs

Aerotriangulation Manager - J. Jenkins

Stereocompilation/DEM Update Manager - M. Mekinda

Orthophoto Manager - J. H. Antalovich

Metadata Manager - R. Hnida

**John Antalovich Jr., PE, PS**  
**PROJECT MANAGER**



Mr. Antalovich's experience with Kucera International Inc. has included positions as photo lab technician, cartographic draftsman, ground control survey crew member, aerotriangulation technician, CAD/editor, and orthophoto technician. He has served as a Kucera Project Manager since 1987 and as Kucera's President and a contract manager since 1995. He is active in both the ASPRS and MAPPS professional organizations, currently serving as co-chairman of the MAPPS Aerial Acquisition Working Group and Vice President of the ASPRS Eastern Great Lakes Region (EGLR) Chapter. He has also authored several project articles in PE&RS and other geospatial profession publications. Mr. Antalovich has served as project manager or contract manager/senior advisor for over 500 large projects and geospatial service contracts in 30 different states and two foreign countries. He has consulted with a number of government bodies on standards and specifications, including the South Carolina Geodetic Survey, Florida Department of Revenue, and New York State DOT.

**PROJECT/CONTRACT MANAGEMENT EXPERIENCE**

**South Carolina Geodetic Survey ~ 2011 - 2020**

Project manager for countywide, regional, and statewide digital aerial photography, orthoimagery, and GIS base mapping services at 1"=200/0.5' and 1"=400'/1' scale/resolution. Total project area ~32,000 sq. miles. 2020 statewide contract value - \$2.05 million.

**Florida Department of Revenue ~ 2004 - 2022**

Project Manager and Chief Administrator for FLDOR service contract annual multi-county and countywide digital orthophotography - 40 surveys covering over 30,000 sq. miles. Combined contract value - \$3 million.

**Metro Washington Airports Authority ~ 2011 - 2015**

Contract manager for aerial photogrammetric and GIS utility conversion contract for Dulles and Reagan Airports, VA - contract value \$1.26 million.

**Denver Regional Council of Governments ~ 2012 - 2013 and 2014 - 2020**

Project manager for repeat contract digital aerial photography and orthophotography covering 10-county, 7,000 sq. mile area and planimetric feature mapping for 1,300 sq. miles around Denver, Colorado. Contract value - \$2 million.

**CAGIS - Cincinnati/Hamilton County OH ~ 2011 - 2017**

Project manager for countywide (650 sq. mi) digital aerial photo and aerial lidar, digital orthoimagery, new DTM-based topo feature mapping, new and updated planimetric feature mapping, stream network creation. Surveys performed in 2011, 2015, 2017. Total contract value - \$940875.

**Bi-State Commission Iowa/Illinois ~ 2014 - 2015**

Project manager for four county, 10 city digital aerial photo, orthophoto, and lidar (approximately 2,800 sq. miles), with DTM/topo and plan feature mapping of selected City areas. Contract value - \$562,400.

**Benton County, Fayetteville, Arkansas, and Northwest Arkansas RPC ~ 2009 - 2019**

Project manager for annual countywide and Fayetteville (approximately 900 sq. miles) Winter season digital aerial photo and orthophotography, single season countywide lidar and oblique imagery, new and update planimetric feature mapping - 9 surveys performed. Contract Value -\$800,000.

**Lee County, Alabama Cooperative ~ 2011, 2017, and 2020**

Project manager for county/citywide digital orthophoto, lidar, DTM/topo, planimetric feature mapping - 650 sq. miles. Combined contract value - \$1.37 million.

**Western Connecticut COG/18 Towns ~ 2013 - 2015**

Project manager for digital aerial photography, lidar, oblique photography, 4-band orthophotography, DTM and large-scale (1"=40', 1' contour) planimetric/topography covering 620 sq. miles SWRPA and HVEP regions. Contract value - \$1.02 million.

**Headwaters Corporation/Platte River Recovery Program ~ 2011 - 2015**

Project manager for four-year contract for semi-annual (fall, spring) digital aerial photography and 4-band orthophotography covering approximately 750 sq. mile area and annual aerial lidar and hydro-flattened DEM covering approximately 130 sq. miles area along Platte River in Kearney, Nebraska. Contract value - \$475,000.

**GVGIK/Country of Poland ~ 2010 - 2015**

Contract manager for high res (4-12ppsm) aerial lidar and 0.5' GSD aerial photo capture covering ~19,000 square miles of Warsaw and Gdansk regions of ISOK Extraordinary Hazards Protection System.

POSITION	President
OFFICE LOCATION	Willoughby, Ohio
YEARS OF EXPERIENCE	Kucera: 39 Career Total: 39
EDUCATION/FORMAL TRAINING	B.S., Civil and Environmental Engineering: Cornell University (1981) M.B.A., Management Information Systems: Case Western Reserve University (1983)
REGISTRATION/CERTIFICATION	1989, Professional Engineer Ohio Lic. No. E-52690 1995, Professional Surveyor Florida Lic. No. LS5463 1999, Professional Land Surveyor North Carolina Lic. No. L-4208 2004, Photogrammetric Surveyor South Carolina Lic. No. 24071 2010, Professional Land Surveyor Virginia Lic. No. 0408000154
PROFESSIONAL AFFILIATIONS	Photogrammetry and Remote Sensing: ASPRS, MAPPS Surveying: ACSM, Various state surveying societies GIS: URISA, GITA

Scott Antalovich, PE, PS  
**PRODUCTION/QUALITY CONTROL MANAGER**



Mr. Antalovich has significant (>5 years) working experience in numerous phases of Kucera's photogrammetric operations, including ground control surveying, aerotriangulation, orthophoto production, stereocompilation, CAD/GIS and overall quality control. He has served as Kucera's Vice President and Production Manager since 1995 and as a Project and Quality Control Manager since 2000. His project, production and quality control management experience includes thousands of aerial base mapping projects of all types/applications and locations throughout the US and abroad. His project/production/QC management experience profile includes:

**PRODUCTION/QUALITY CONTROL MANAGEMENT EXPERIENCE**

**South Carolina Geodetic Survey ~ 2006 - 2021**

Production and QC manager for countywide, regional, and statewide orthophoto and base mapping services covering ~32,000 sq. miles., including 2020 statewide orthophoto contract value - \$2.05 million.

**Florida Department of Revenue ~ 2004 - 2022**

Production manager for 3", 6", and 12" GSD orthoimagery production. 40 surveys covering over 30,000 sq. miles. Combined contract value - \$3 million.

**Cincinnati Area Geographic Information System (CAGIS) ~ 2017 - 2018**

Production and QC manager for 0.5' GSD orthoimagery production, QL-3 grade aerial lidar processing, DTM feature compilation, 2' contour topography, and 2D/3D new/updated 1"=100' scale planimetric feature mapping covering 650 sq. miles. Contract value - \$498,000.

**Stantec/Findlay, Hancock County, Ohio ~ 2018**

Production manager for rapid response 0.2' GSD orthoimagery production, 5 ppsm aerial lidar survey, hydro feature stereocompilation, and hydro-enforced 1' contour-grade DEM covering flood diversion project area. 280 sq. miles. Contract value - \$153,000.

**Lee County, Alabama Cooperative ~ 2011, 2017, and 2020**

Production/technical support manager for repeat survey county/citywide digital orthophoto, lidar, DTM/topo, planimetric feature mapping. 650 sq. miles. Combined contract value - \$1.37 million.

**Benton County, Fayetteville, Arkansas, and Northwest Arkansas RPC ~ 2009 - 2019**

Production and QC manager for annual countywide and Fayetteville (approximately 900 sq. miles) Winter season digital aerial photo and orthophotography, single season countywide lidar and oblique imagery, new and update planimetric feature mapping - 9 surveys performed. Contract value -\$800,000.

**Bi-State Commission Iowa/Illinois ~ 2014 - 2015**

Production and QC manager for four county, 10 city digital aerial photo, orthophoto, lidar (2,800 sq. miles). DTM/topo and plan feature mapping of select City areas. Contract value - \$562,400.

**Metro Washington Airports Authority (MWA)/Dulles and Reagan Airports, Virginia/DC ~ 2011 - 2015**

Project manager for large scale, high resolution orthophotography, planimetric/topographic, and utility mapping, including ground control, field edit, and field utility survey and utility data GIS and CAD conversion. Contract value \$1.26 million.

**State of Kansas ~ 2011 - 2013**

Production/technical support manager for aerial lidar survey, hydro breaklines, hydro-flattened DEM covering 21-county, 22,000 sq. mile area in central Kansas. Contract value \$1.76 million.

**Thew Associates/New York Windfarms ~ 2012 - 2018**

Project manager for digital aerial photo, lidar, orthophoto, DTM/topo, and plan feature mapping covering seven NY Windfarms - 500 sq. miles. Contract value \$200,000.

**Denver Regional Council of Governments ~ 2012 - 2013 and 2014 - 2020**

Production/technical support and QC manager for Denver Region 10-county, 7,000 sq. mile digital aerial photography and orthophoto projects and 1,100 sq. mile planimetric feature mapping projects. Contract value - \$2 million.

**Kanawha, Marion, Logan, Mason Counties, West Virginia ~ 2017 - 2018**

Production and QC manager for countywide aerial photo, lidar, orthophoto, DEM/DTM mapping, 2,100 sq. miles.

**Cities of Brentwood and Franklin, TN ~ 2018**

Production and QC manager for new citywide 1"=100' scale full feature planimetric and DTM/2' contour topographic mapping-133 square miles.

<b>POSITION</b>	Vice President
<b>OFFICE LOCATION</b>	Willoughby, Ohio
<b>YEARS OF EXPERIENCE</b>	Kucera: 38 Career Total: 38
<b>EDUCATION/FORMAL TRAINING</b>	B.S., Surveying/Civil Engineering: Ohio State University (1985) Leica, Zeiss, Applanix User Group Meetings (1995-2009)
<b>REGISTRATION/CERTIFICATION</b>	1986, Surveying Intern, Ohio 1991, Professional Engineer Ohio Lic. No. E-56921 1995, Professional Surveyor Florida Lic. No. LS5460 1999, Professional Land Surveyor North Carolina Lic. No. L-4107 2004, Photogrammetric Surveyor South Carolina Lic. No. 24024 2008, Professional Surveyor Oregon Lic. No. 80805
<b>PROFESSIONAL AFFILIATIONS</b>	Photogrammetry and Remote Sensing: ASPRS, MAPPS Surveying: ACSM, Various state surveying societies GIS: URISA, GITA



**Andrew Mitchell, ASPRS CP**  
**FLIGHT PLANNING & QC MANAGER**



Mr. Mitchell joined the Kucera International Inc. staff in 2005 after graduating from Westfield Massachusetts State College and working as a GIS Specialist for Optram Incorporated in Massachusetts. His primary work at Optram was classification of and feature extraction from aerial lidar data return for the Chicago Railway Corridor Mapping Project. He has worked as a lidar processing specialist and flight planner for Kucera and currently serves as a photogrammetrist/QC specialist and flight planning manager. He is active in ASPRS, IMLF, NE OH GIS/GUONO, and has given several college class and conference presentations on remote sensing/aerial mapping services.

**MANAGEMENT EXPERIENCE**

**Continental Mapping Consultants / Minnesota DOT ~ 2018 - 2021**

Project Manager for annual Spring season leaf off high res (3.5 cm) digital aerial frame photo and high res (20 ppsm) aerial lidar acquisition with delivery of georeferenced imagery and georeferenced/calibrated lidar return covering 6 - 7 designated road corridors in southern MN - total 20 corridors / ~1500 miles. Contract value - \$189,000.

**Aerographics/USDA APFO ~ 2020, 2021**

Project Manager for annual summer season "spot shot" digital aerial photography and 4-band 6" GSD orthoimagery covering ~2500 DLI and NRI sites in WV, MI, and AR.

**Lee County, Alabama Cooperative ~ 2011, 2017, and 2020**

Flight plan development for countywide (660 sq. miles) ADS pushbroom camera and ALS lidar system aerial acquisition, processing of lidar return.

**South Carolina Geodetic Survey ~ 2011 - 2020**

ADS/UCE digital pushbroom/frame camera flight plan preparation, flight status tracking and reporting for 1' and 0.5' resolution digital aerial photography for approximately 40 countywide surveys and the 2020 statewide survey (32,000 sq. miles).

**Denver Regional Council of Governments (DRCOG) ~ 2012 - 2014**

Flight Plan Manager for regionwide (~7000 square miles) digital aerial photo acquisition at 3" (~700 square miles), 6" (~3000 square miles) and 12" (~3300 square miles)

**Florida Department of Revenue ~ 2009 - 2020**

Flight plan preparation, restricted airspace identification, flight status tracking and reporting for 1' and 0.5' resolution ADS pushbroom/UCE frame aerial photo covering 12 counties/~12,000 sq. miles.

**Hamilton County, Indiana ~ 2019 - 2020**

Frame photo and lidar acquisition flight plan development for countywide (~400 sq. miles) aerial base mapping project. QC review/certification of aerotriangulation and digital orthophoto production.

**State of New York and Ohio DOT ~ 2010 - 2021**

UCX and Eagle digital frame camera and simultaneous ALS aerial lidar survey flight plan preparation for 0.15'-0.25' resolution digital aerial photography and 0.5-1m density lidar return covering approximately 200 highway and bridge sites.

**State of Kansas ~ 2011 - 2012**

ALS aerial lidar system flight plan preparation, restricted airspace identification, flight status tracking and reporting for 1.2 m lidar survey covering 22-county/21,000 sq. mile area in central Kansas.

**Western Connecticut COG/18-Town Aerial Survey ~ 2013 - 2015**

Flight plan development for UCX frame 3" digital aerial photography and 0.7 m ALS70 lidar capture covering 620 sq. miles SWRPA and HVEP area, 3" oblique for 260 sq. miles SWRPA area, including adjustments for tall structure areas, low tide areas, airspace access.

**MWAA - Reagan and Dulles Airports, DC/VA ~ 2021**

Flight plan manager for 2" + 6" GSD photo and QL1/8ppsm lidar capture covering Reagan National (DCA) and Dulles International (IAD) Airports and Dulles Corridor Enterprise (DCE) areas (~190 sq. mi.), with flight plan adjustments to access in highly restricted airspace.

**Claremont, New Hampshire ~ 2014**

Project manager for citywide orthoimagery, oblique imagery, and mapping (44 sq. mi.), including training of city staff in use of GeoVista oblique application software.

**POSITION**  
Photogrammetrist & Flight  
Planning Specialist

**OFFICE LOCATION**  
Willoughby, Ohio

**YEARS OF EXPERIENCE**  
Kucera: 17  
Career Total: 20

**EDUCATION/FORMAL  
TRAINING**  
B.S., Regional Planning:  
Westfield Massachusetts  
State College (2004)

**REGISTRATION/  
CERTIFICATION**  
2019, ASPRS Certified  
Photogrammetrist, Lic. No.  
1647  
2019, ASPRS Certified  
Lidar Mapping Scientist,  
Lic. No. L040

# Steve Smetters

## SENIOR PILOT/FLIGHT OPERATIONS MANAGER



Mr. Smetters has worked for Kucera since 1984 and has served as a photo lab tech, aerial photographer, aerotriangulation specialist, stereocompiler, and pilot. He has been a Kucera pilot since 1992 and has logged over 11,000 in flight aerial survey pilot hours on projects throughout the US and abroad. He has performed all restricted airspace coordination for Kucera since 2012 and has served as Kucera's flight operations manager since 2014. He has overseen Kucera's drone/UAS operations since 2017 and has given several presentations on UAS for engineer/surveyor continuing education courses.

### PILOT/FLIGHT OPERATIONS MANAGEMENT EXPERIENCE

#### Cornell University/NYS DEC - Hudson River ~ 2014, 2016, 2018, 2022

Flight operations manager for biannual low-tide, low turbidity aerial photo flyover of ~150 miles of Hudson River corridor (Hastings to Troy), including wetland area lidar capture for 2016 survey.

#### Aerographics - USDA Digital SLI and NRI Easements in IL, MN, WV, MI, AR ~ 2017 - 2021

Flight operations manager for annual Summer-Fall season digital aerial photo capture for ~3,900 SLIs and 1,700 NRIs covering ~1,200 sq. miles.

#### USDA NAIP program acquisition support in OR, ND, SD, MI, OH, NY, GA, SC, WV, IA, WI ~2009-2022

Pilot and flight operations manager for ADS100 pushbroom camera imagery acquisition @ 20 - 50cm GSD covering ~300,000 sq. miles. Work performed as subconsultant to all three major NAIP prime contractors (QSI/NV5, Surdex, NW Geomatics)

#### South Carolina Geodetic Survey ~ 2014 - 2020

Flight operations manager responsible for coordination of flight crews, daily reporting, and airspace access requests for approximately 40 countywide/regional surveys and the 2020 statewide survey (32,000 sq. miles).

#### Florida Department of Revenue ~ 2009 - 2022

Flight operations manager for digital pushbroom and frame aerial camera-based image acquisition covering approximately 16,000 sq. miles/16 Counties. Extensive coordination for both commercial Class B (Orlando, Miami) and military MOA (Eglin AFB) airspace access.

#### Norman Manley International Airport, Jamaica ~ 2020

Flight operations manager for simultaneous 7.5 cm digital aerial photo capture and 10 ppsm digital aerial lidar acquisition covering Area 2C (50 sq. miles). Coordination with Jamaica Airport Authority for airspace access.

#### Vexcel Corporation - Gray Sky Program Post-Disaster Image Acquisition Areas - MO, OH, FL ~ 2018, 2019

Flight operations manager for next day flyover of designated disaster areas in Apalachicola, FL (post-hurricane), Jefferson City, MO (post-tornado) and Dayton, OH (post-tornado).

#### Nebraska Public Power - Spencer NE/Niobrara River Flood ~ 2019

Flight operations manager for rapid response multi-flyover photo + lidar capture of dam break/flood area (~218 sq miles).

#### GeoDigital- OH, WV, VA, KY, IN, TN, AL, GA, KS, TX Transmission Line Corridors ~ 2014 - 2022

Flight operations manager for aerial image and/or lidar capture covering ~ 10,500 linear miles of transmission line corridors.

#### Mid-America Regional Council - Kansas City, Missouri ~ 2018

Flight operations manager for QL2 and QL0 aerial lidar capture for ~ 1,200 sq. mi., 2 county/5 city area.

#### NY DOT - Road / Railroad Corridors, Bridges, Locks/Dams Throughout New York ~ 2009 - 2022

Pilot and flight operations manager for low-alt digital aerial frame photo and lidar surveys for ~ 200 sites, including emergency response post-hurricane flooding, landslide, and bridge/lock collapse sites and coordination for commercial Class B airspace access over NYC, Albany, and Buffalo.

#### Lee County, AL Cooperative ~ 2017, 2020

Countywide winter season 4-band pushbroom sensor imagery capture @ 6" and 3" GSD and aerial lidar capture @ QL2/2ppsm - 650 sq. miles.

POSITION  
Flight Operations Manager

OFFICE LOCATION  
Willoughby, Ohio

YEARS OF EXPERIENCE  
Kucera: 38  
Career Total: 38

EDUCATION/FORMAL TRAINING  
A.A.S., Aerospace Technology: Kent State University of Ohio  
Aircraft Maintenance: U.S. Air National Guard Technical School

REGISTRATION/CERTIFICATION  
Single- and multi-engine, land, pilot ratings  
UAS certified pilot

PROFESSIONAL AFFILIATIONS  
American Society of Photogrammetry and Remote Sensing: ASPRS

Steven Wood, PS, CP  
GROUND SURVEY MANAGER



Mr. Wood has served as a Kucera associate and manager of ground surveys since 2012. He previously was a Vice President/principal in charge of MSE Corp. Surveyors/Civil Engineers of Indianapolis, IN. He has over 40 years of practical surveying experience, including responsible charge for hundreds of city/county, regional, and other large area GPS control surveys, as well as numerous boundary, construction, hydrographic, ROW, utility/asset inventory, and ALTA-standard surveys. He has extensive control surveying experience working at military installations, including MCAS Yuma AZ and Camp Pendleton and Miramar/San Diego CA. He is a licensed surveyor in 17 states and a ASPRS Certified Photogrammetrist.

**SURVEY MANAGEMENT EXPERIENCE**

**MARC-Kansas City, Missouri Area ~ 2018**

Surveyor in charge for GPS establishment of 25 XYZ control points and 50 NVA + VVA checkpoints for multi-county QL2 aerial lidar survey - 1,145 sq. miles.

**City of Indianapolis and Marion County, Indiana ~ 2019**

Surveyor in charge for GPS establishment of XYZ control points and NVA + VVA checkpoints for QL2 aerial lidar survey - 490 sq. miles.

**Hamilton County, Indiana ~ 2019 and 2022**

Surveyor in charge for static GPS establishment of 30 ground control points and approximately 50 NVA + VVA lidar checkpoints for countywide aerial mapping - 430 sq. miles.

**Wisconsin Department of Military Affairs ~ 2017, 2018, 2019**

Surveyor in charge for VRS GPS establishment of 30-40 ground control points for annual aerial mapping of ~20 Wisconsin National Guard sites.

**Rutherford County, Tennessee ~ 2017**

Surveyor in charge for static GPS ground surveying of approximately 30 control points over total area of approximately 800 sq. miles.

**Premier Silica/Voca, Texas Mine ~ 2017**

Surveyor in charge for static GPS ground surveying of 10 control points over total area of approximately 20 sq. miles of quarry area, including safety briefing/training.

**Dekalb County, Illinois ~ 2019**

Surveyor in charge for VRS GPS establishment of 15 ground control points for countywide orthophoto project - 430 sq. miles.

**City of Franklin and Brentwood, Tennessee ~ 2018**

Surveyor in charge for static GPS survey of 12 photo-id control points for citywide aerial base mapping - 133 sq. miles.

**Pacer Minerals - Black Hills, South Dakota ~ 2019**

Surveyor in charge for static GPS establishment of approximately 15 targeted ground control points at four remote mine sites for aerial topo mapping.

**Benton County, Arkansas ~ 2017 and 2019**

Surveyor-in-charge for static GPS survey/establishment of 20 targeted or photo-id feature control points for annual countywide orthoimagery project.

**McLean County, Illinois ~ 2018**

Surveyor in charge for VRS GPS establishment of 30 photo-id feature control points for countywide orthoimagery project.

**Boone, Winnebago, Jo Daviess, Carrol, Whiteside, Monroe, and Kane Counties, IL ~ 2021**

Surveyor in charge for VRS GPS establishment of ~140 PID feature and targeted control points for seven countywide aerial orthoimagery projects covering ~4160 sq. miles.

POSITION  
Ground Survey Manager

OFFICE LOCATION  
Willoughby, Ohio

YEARS OF EXPERIENCE  
Kucera: 10  
Career Total: 43

EDUCATION/FORMAL TRAINING  
A.A.S., Civil Engineering  
Technology: Purdue University (1972)  
B.S., Land Surveying: Purdue University (1974)

REGISTRATION/CERTIFICATION  
Professional Land Surveyor:  
Arkansas, California, Colorado, Florida, Idaho, Illinois, Indiana, Kansas, Maryland, Montana, North Carolina, North Dakota, New Mexico, Ohio, Oklahoma, South Dakota, and Wyoming

Certified Photogrammetrist

PROFESSIONAL AFFILIATIONS  
Photogrammetry and Remote Sensing: ASPRS

# Andrew Walker

## CHIEF PILOT



Mr. Walker joined Kucera in 2012 after serving six years in the U.S. Navy and graduating with honors in Aeronautics from Kent State University, where he served on the Precision Flight Team. In 2012 and 2013, he served as a digital camera and lidar system operator and developed excellent familiarity with Kucera's digital vertical and obliques aerial cameras, lidar systems, and multi-spectral imaging systems. He also served as a single-engine pilot and in 2014 became a full-time twin-engine pilot. He was named Kucera's Chief Pilot in 2018. He is a certified twin-engine pilot instructor and serves as Kucera's flight safety management system officer.

### CHIEF PILOT EXPERIENCE

#### **Aerographics - USDA Digital SLI and NRI Easements in IL, MN, WV, MI, AR ~ 2017 - 2021**

Pilot for annual Summer-Fall season digital aerial photo capture for ~3,900 SLIs and 1,700 NRIs covering ~1,200 sq. miles.

#### **USDA NAIP program acquisition support in OR, ND, SD, MI, OH, NY, GA, SC, WV, IA ~ 2016 - 2021**

Pilot for ADS100 pushbroom camera imagery acquisition @ 20 - 50cm GSD covering ~200,000 sq. miles. Work performed as subconsultant to all three major NAIP prime contractors (QSI/NV5, Surdex, NW Geomatics)

#### **Florida Department of Revenue ~ 2014 - 2019**

Digital aerial photo capture at 3"-6" resolutions covering approximately 12,000 sq. miles, 12 Florida counties.

#### **Quantum Spatial/FEMA ~ 2014 - 2018**

QL2 aerial lidar acquisition of approximately 6,300 sq. miles throughout New York and Vermont in support of FEMA contracts.

#### **Norman Manley International Airport, Jamaica ~ 2020**

Simultaneous 7.5 cm digital aerial photo capture and 10 ppsm digital aerial lidar acquisition covering Area 2C (50 sq. miles). Coordination with Jamaica Airport Authority for airspace access.

#### **Mosaic Corporation Central Florida Properties ~ 2014 - 2019**

Annual digital aerial photo capture at 1' resolution covering 2,100 sq. miles, aerial lidar capture at 2m resolution covering 760 sq. miles, high resolution lidar and photo covering nine reclamation sites.

#### **South Carolina Geodetic Survey ~ 2014 - 2020**

Digital aerial photo capture at 0.5' and 1' resolutions for approximately 40 countywide surveys and the 2020 statewide survey (32,000 sq. miles).

#### **Bay County, Florida ~ 2016, 2019**

Countywide aerial photo at 0.5' resolution in 2016, 0.25' resolution in 2019, post-storm flyover of coastline area.

#### **GAI/Dominion ~ 2015 - 2016**

Simultaneous 0.5' digital aerial photography and 0.7 m aerial lidar covering 800 miles of Dominion ACP pipeline corridor in North Carolina, Virginia, West Virginia, Pennsylvania.

#### **Geodigital ~ 2015 - 2019**

Digital aerial photo capture at 0.5' resolution covering ~ 4,000 miles of TVA transmission line corridor in Tennessee, Mississippi, Kentucky, Alabama, Ohio, West Virginia, and Virginia.

#### **RCID/Disneyworld ~ 2014 - 2019**

Digital aerial photo and aerial lidar acquisition for Disney properties in Florida and Bahamas.

#### **Sanborn Mapping Co./States of Michigan, Connecticut ~ 2015, 2016, and 2019**

QL2 aerial lidar acquisition for approximately 8,000 sq. miles in Michigan and Connecticut.

#### **MCA Maps ~ 2015**

Simultaneous aerial photo and 10ppsm lidar acquisition for approximately 1,800 linear miles of pipeline corridor in New York, West Virginia, Pennsylvania.

POSITION  
Chief Pilot

OFFICE LOCATION  
Willoughby, Ohio

YEARS OF EXPERIENCE  
Kucera: 10  
Career Total: 21

EDUCATION/FORMAL  
TRAINING

B.S., Aeronautics: Kent State University (2012)  
U.S. Navy Nuclear Power Training School (2001)

LICENSES AND  
CERTIFICATION  
FAA multi and single-engine, land, commercial and instrument pilot, certified flight instructor

**Joe Pocs**  
**SENSOR OPERATIONS MANAGER**



Mr. Pocs joined Kucera's staff in 2017 after graduating with a photography degree from Columbia College in Chicago, IL and working as a photo lab tech for Meijer Corp. in Mansfield, OH and Midwest Photo Corp. in Columbus, OH. He has been trained to operate Kucera's large format pushbroom and frame digital cameras, aerial lidar systems, and digital aerial oblique imaging systems. He currently oversees Kucera's aerial sensor operation and maintenance.

**SENSOR OPERATOR MANAGEMENT EXPERIENCE**

**Aerographics - USDA Digital SLI and NRI Easements in IL, MN, WV, MI, AR ~ 2018 - 2021**

Sensor operator for annual Summer-Fall season digital frame aerial photo capture for ~3,900 SLIs and 1,700 NRIs covering ~1,200 sq. miles.

**USDA NAIP program acquisition support in MI, OH, NY, WV, IA ~ 2017 - 2021**

Sensor operator for ADS100 pushbroom camera imagery acquisition @ 20 - 50cm GSD covering ~150,000 sq. miles. Work performed as subconsultant to all three major NAIP prime contractors (QSI/NV5, Surdex, NW Geomatics)

**South Carolina Geodetic Survey ~ 2017 - 2020**

Sensor operator for 0.5' and 1' resolution digital aerial photography for several countywide surveys and the 2020 statewide survey (32,000 sq. miles).

**Quantum Spatial/State of Kentucky ~ 2017**

Lidar operator for QL2 acquisition covering approximately 3,800 sq. miles throughout Kentucky.

**Logan and Mason Counties, West Virginia ~ 2018**

Sensor operator for 0.5' resolution digital frame aerial photo and QL3 aerial lidar covering approximately 900 sq. miles

**Continental Mapping Consultants/FEMA ~ 2017**

Lidar sensor operator for QL2 aerial lidar survey covering approximately 1,300 sq. miles (Waushara County, WI, Calhoun County, MI) and QL1 aerial lidar covering 10 sq. miles of Racine, WI.

**Sanborn/State of Michigan ~ 2019**

Lidar sensor operator for QL2 aerial lidar acquisition covering approximately 4500 sq. miles of counties throughout Michigan lower peninsula.

**Mosaic Fertilizer Corporation - Central Florida ~ 2017, 2018**

Sensor operator for annual 0.75' resolution digital pushbroom aerial photo capture covering approximately 2,000 sq. miles and QL3 aerial lidar survey covering approximately 700 sq. miles.

**Lee County, Alabama Cooperative ~ 2017, 2020**

Sensor operator for countywide digital pushbroom photography and QL2 aerial lidar survey - 600 sq. miles.

**Monroe and Knox Counties, Ohio ~ 2018**

Chief sensor/lidar operator for QL3 aerial lidar (1 ppsm) covering approximately 1,000 sq. miles.

**MARC - Kansas City, Missouri Area ~ 2018**

Chief sensor/lidar operator for QL2 aerial lidar acquisition covering 1,200 sq. miles and 20 ppsm lidar covering 8 sq. miles.

**Berkeley and Williamsburg Counties, South Carolina ~ 2018**

Chief sensor operation for countywide 0.5' resolution digital pushbroom photo acquisition covering approximately 2,000 sq. miles.

**McLean County, Illinois ~ 2018**

Sensor operator for countywide 3"-6" ADS digital aerial photography, 1,200 square miles.

**Continental Mapping Consultants/Minnesota DOT ~ 2018 - 2019**

Chief sensor operator for 10-20 ppsm aerial lidar acquisition and 3.5 cm digital aerial photo capture covering 13 road corridors.

**POSITION**  
Chief Sensor Operator

**OFFICE LOCATION**  
Willoughby, Ohio

**YEARS OF EXPERIENCE**  
Kucera: 5  
Career Total: 9

**EDUCATION/FORMAL TRAINING**  
2012 - BS, Photography:  
Columbia College,  
Chicago, Illinois



# James Jenkins

## AEROTRIANGULATION MANAGER



Mr. Jenkins served for nine years as an officer in the United States Coast Guard and two years as a remote sensing specialist/thermal scanner operator for Davis Aviation Inc. before joining Kucera in 1998. He graduated with honors from Kent State University and was a recipient of numerous military service and academic awards, including 1995 Association of American Geographers Academic Excellence Award and Kent State Outstanding Academic Achievement Award. His experience with Kucera includes orthophoto production, thermal survey analysis, aerotriangulation, and metadata preparation. He has over 15 years' experience in performing imagery aerotriangulation. He transferred to Kucera's Plant City office in 2020.

**Software Proficiencies:** Microsoft Office 365

### AEROTRIANGULATION MANAGEMENT EXPERIENCE

#### South Carolina Geodetic Survey ~ 2016, 2019, and 2020

Control location selection and aerotriangulation of countywide/statewide Leica ADS digital pushbroom and Vexcel UCE100 digital frame camera imagery at 1' and 0.5' resolutions for orthophoto production and selected countywide planimetric feature mapping.

#### Lee County, Alabama Cooperative ~ 2011, 2017, and 2020

Aerotriangulation of ADS100 pushbroom camera 0.5'/0.25' GSD imagery and FGDC metadata preparation for county/citywide digital orthoimagery, aerial lidar, topo and plan feature mapping. Preparation of thermal imagery report for Auburn University area for 2017 project.

#### Florida Department of Revenue and Orange County, Florida - 20 Countywide Surveys ~ 2014 - 2022

Aerotriangulation of ADS digital pushbroom and UCE digital frame camera imagery at 3", 6", and 12" GSD for countywide orthophoto production - 30,000 sq. miles.

#### Miami-Dade County, Florida ~ 2018

Aerotriangulation of 0.25' GSD (900 sq. miles) digital aerial photography from Vexcel UCE100 digital frame camera and 0.75' GSD (1,500 sq. miles) digital aerial photography from ADS100 digital pushbroom camera.

#### Stantec/Findlay, Hancock County, Ohio ~ 2018

Aerotriangulation of 0.2' digital aerial photography covering 280 sq. miles for flood diversion project.

#### Harford, Montgomery, Prince Georges Counties, Maryland ~ 2013 - 2015

Aerotriangulation of Kucera-acquired or Maryland State-provided 0.5' resolution digital aerial frame photography covering approximately 1,400 sq. miles/6,000 exposures in support of countywide ortho and planimetric/topographic mapping, FGDC project level metadata prep for orthoimagery, lidar, planimetric/topographic mapping.

#### GAI/Dominion - Atlantic Coast Pipeline North Carolina, Virginia, West Virginia ~ 2015

Aerotriangulation of 0.5' resolution UCX digital aerial photo covering 600-mile pipeline corridor route, approximately 2,900 exposures.

#### Bi-State Region, Illinois/Iowa ~ 2015

Aerotriangulation of ADS pushbroom camera imagery and FDGC tile level metadata preparation for regionwide orthophotography (2,900 sq. miles), hydro DEM (180 sq. miles), and DTM/contour mapping (180 sq. miles).

#### Benton County, Arkansas ~ 2012 - 2019

Aerotriangulation of digital ADS pushbroom or UCE frame aerial imagery at 0.5' GSD for annual countywide orthoimagery and metadata preparation - 900 sq. miles.

#### Apex Clean Energy ~ 2015 - 2019

Aerotriangulation of frame-based 0.5' and 0.25' resolution digital aerial photography for aerial base mapping - 16 sites, ~1,760 sq. miles of imagery coverage.

#### Metro Washington Airport Authority/Dulles and Reagan airports Virginia/Washington, DC ~ 2012

High accuracy aerotriangulation of large-scale (0.18' resolution) digital frame aerial photography, 1,200 exposures. FGDC metadata preparation for orthophotography and planimetric/topographic feature mapping.

### JOB TITLE

Aerotriangulation  
Manager

### OFFICE LOCATION

Plant City, Florida

### YEARS OF EXPERIENCE

Kucera: 21  
Career Total: 34

### EDUCATION/FORMAL TRAINING

B.A., Geography,  
Cartography: Kent State  
University (1995)

ISO Metadata Training  
(2012)

Intro to Metadata  
Workshop: NOAA  
National Coastal Data  
Development Center  
(2010)

IMAGIN Metadata  
Training Workshop:  
Pontiac, Michigan (2001)  
Applanix AGPS/IMU  
Workshop: Washington,  
DC (2002)  
Leica LiDAR Training  
(2003)

### PROFESSIONAL AFFILIATIONS

Photogrammetry and  
Remote Sensing: ASPRS



Mr. Hnida joined the Kucera staff in 2014 after graduating with honors in Geography and Environmental Studies and receiving the Outstanding Geosciences Departmental Senior award from Edinboro University of Pennsylvania. With Kucera, he has performed ArcGIS-based QC and data edit of GIS feature mapping for numerous city, county, and regionwide base mapping projects. He currently serves as Assistant GIS Manager responsible for base mapping quality control oversight. He also has performed metadata creation since 2016 and serves as Kucera's metadata manager.

**Software Proficiencies:** Microsoft Office 365, ArcGIS

#### METADATA PREPARATION EXPERIENCE

##### **Western Connecticut Council of Governments (WCCOG) ~ 2014 - 2015**

18-Town Stamford-Bridgeport-Danbury Area Aerial Sensing and Base Mapping Project - data edit and QC for 1"=40' large scale plan feature mapping and DTM 1' contour topography covering 620 square miles.

##### **Denver Regional Council of Governments (DRCOG) ~ 2015 - 2020**

Regionwide Planimetric Feature Mapping - GIS QC and metadata manager for new and updated 1"=100' scale stereocompiled 3D buildings, pavement edges, hydrography, and 2D ortho-digitized pavement edges, parking, sidewalk; impervious surface dataset preparation; ArcGIS topological conversion and FGDC metadata preparation - 1,100 square miles.

##### **Cincinnati Area Geographic Information System (CAGIS) ~ 2017 - 2018**

Aerial Survey/GIS Base Mapping Services for Cincinnati/Hamilton County, Ohio - GIS QC and metadata manager for hydro/road/wall break-line feature stereocompilation, DTM, and 2' contour topo w/ spot elevations, 2D/3D new and updated 1"=100' scale planimetric feature mapping covering ~ 650 square miles.

##### **Lee County, Alabama Cooperative ~ 2017 - 2018**

Countywide GIS base mapping - Lee County, Alabama - GIS QC and metadata manager for DTM hydro/road/wall breakline, 1' contour topographic, and 1"=100' scale planimetric feature mapping of hydro, stormwater, structures, transportation, and utilities covering 650 square miles; 4-category land cover mapping w/ 2 acre MMU for City of Auburn and surrounding area.

##### **Erie, Pennsylvania Waterworks ~ 2018**

Service Area Aerial GIS + CAD Base Mapping Services Project - GIS QC and metadata manager for hydro/road/wall breakline mapping, DTM and 1' contour topography, FDGC metadata covering 140 square miles.

##### **Hamilton County, Indiana ~ 2019 - 2020**

Countywide Planimetric, Topographic, Orthophoto Mapping Project - GIS QC manager for hydro/wall/road edge DTM breakline feature 1' contour mapping, new and updated 1"=100' scale planimetric feature mapping - 434 square miles.

##### **Benton County, Arkansas ~ 2018 - 2020**

Development of FGDC metadata for annual countywide aerial orthoimaging.

##### **Cities of Brentwood and Franklin, Tennessee ~ 2018**

GIS QC, and metadata preparation for citywide aerial lidar, orthoimagery, planimetric mapping and DTM/topographic mapping covering ~ 133 square miles.

##### **NW Arkansas Regional Planning Commission and City of Fayetteville, Arkansas ~ 2018**

GIS QC review/edit and metadata preparation for citywide new planimetric/impervious surface feature mapping covering ~ 117 square miles.

##### **Rutherford County, Tennessee ~ 2018 - 2019**

GIS QC review/edit and metadata preparation for countywide orthoimagery (2 surveys) and updated planimetric/topographic feature mapping - 770 square miles.

POSITION  
Metadata Manager & GIS  
Specialist

OFFICE LOCATION  
Willoughby, Ohio

YEARS OF EXPERIENCE  
Kucera: 8  
Career Total: 8

EDUCATION/FORMAL  
TRAINING  
B.A., Geography &  
Environmental Studies:  
Edinboro University of  
Pennsylvania (2014)

**Mike Mekinda**  
**STEREOCOMPILATION MANAGER**



Mr. Mekinda started with Kucera in 1992 as an aerial photographer and photo lab technician. In 1994, he was trained as a stereocompiler on Kucera's Zeiss analytical stereoplotters, and in 1999 he began working on Kucera's softcopy compilation systems. He is fully proficient in the operation of Cardinal Systems VR, DAT/EM Summit, BAE Socet Set, and Hexagon/Leica SSK digital stereoplotters for all types of stereocompilation work, including large and small scale plan features, DTM breaklines, lidar augmentation, direct contour topo mapping, and plan/profile recording. He has served as Kucera's stereocompilation manager since 2016.

**STEREOCOMPILATION MANAGEMENT EXPERIENCE**

**South Carolina Geodetic Survey ~ 2010 - 2020**

Review and update/augmentation of existing and new lidar DEM for countywide/statewide orthophoto production. 32,000 sq. miles.

**City of Indianapolis and Marion County, Indiana ~ 2019**

Stereocompilation management for lidargrammetry and existing orthophoto-derived hydro feature and road edge breakline compilation, hydro-flattened DEM, and 1' contour topography with spot elevations. 490 sq. miles.

**Lee County, Alabama Cooperative ~ 2011, 2017, and 2020**

Senior/lead stereocompiler for county/citywide DTM breakline feature and 1"=100' scale new planimetric mapping. 600 sq. miles.

**City of Gainesville and St. John's River Water Management District ~ 2018**

Senior/lead stereocompiler for citywide hydro/wall/road breakline compilation from existing aerial photography and 1' contour DTM. 225 sq. miles.

**SW Connecticut Regional Planning Agency (SWRPA) ~ 2014 - 2015**

Stereocompilation management for new 1"=40' scale full plan feature and 1' contour DTM breakline mapping covering 260 sq. miles around Stamford, Connecticut.

**CAGIS - Hamilton County, Ohio ~ 2011 and 2017**

Stereocompilation management for new 2' contour grade DTM breakline and new + updated 1"=100' scale planimetric feature mapping (standard features + building heights) in 2011 and again in 2017 - 650 square miles

**Bi-State Commission Greater Quad Cities Region, Illinois/Iowa and Johnson County, Iowa ~ 2015**

Stereocompilation management for new 1"=100' scale planimetric feature mapping of Cities of Bettendorf, Iowa and Rock Island, Illinois (90 sq. miles), new 2' contour DTM breakline mapping of Cities of Moline and Rock Island, Iowa (80 sq. miles), 1' contour grade hydro-flattened DEM breaklines for Greater Quad Cities area (240 sq. miles), new 1' contour DTM breaklines for Cities of Iowa City, North Liberty, Coralville, Iowa (80 sq. miles) and updated 1"=100' scale planimetric feature mapping with new sidewalk features for City of Iowa City (56 sq. miles).

**Harford, Montgomery, Prince Georges Counties and City of Gaithersburg, Maryland ~ 2015**

Stereocompilation management for new 1' contour-grade DTM breaklines and updated 1"=100' scale planimetric mapping of Prince Georges County (490 sq. miles), change detection plus updated 2' contour DTM breaklines and 1"=100' scale planimetric feature mapping covering Harford County (380 sq. miles), updated 1"=100' scale planimetric feature mapping for Montgomery County (500 sq. miles), and 2014-2015 yearly updated 1"=100' scale planimetric feature mapping for City of Gaithersburg (10 sq. miles).

**Denver Regional Council of Governments ~ 2015 - 2016, 2019**

Lead stereocompiler for 3D mapping of building roofprints, edge of pavement lines, and hydro features for approximately 1,100 sq. miles of Denver, Colorado metro area.

**Metro Washington Airports Authority ~ 2011 - 2015**

Lead stereocompiler for 1"=50' scale planimetric and DTM breakline compilation covering Dulles and Reagan Airports.

**Metro Nashville Tennessee Airport Authority ~ 2016**

Lead stereocompiler for updated planimetric/topographic feature mapping @ 1"=100', 2' contour and identification of Part 77 obstructions for ~50 square mile Airport area.

**POSITION**  
Stereocompilation  
Manager

**OFFICE LOCATION**  
Willoughby, Ohio

**YEARS OF EXPERIENCE**  
Kucera: 27  
Career Total: 31

**EDUCATION/FORMAL TRAINING**  
A.A., Communications and Civil Engineering Technology: Lakeland Community College, Ohio (1992)

**PROFESSIONAL AFFILIATIONS**  
American Congress

**John Henry Antalovich**  
**DIGITAL ORTHOPHOTO PRODUCTION MANAGER**



Mr. Antalovich has been working in digital orthophoto production at Kucera International Inc. since 2015 and has significant experience in all phases of this work (e.g., DEM prep, batch rectification and mosaicking/tiling/tone balancing, manual seam edit, tile and mosaic QC review/edit, lean reduction, image compression/mosaicking, image projections, data formatting, media delivery and posting, etc.) using both frame and pushbroom captured imagery in 3 and 4-band at 2"-12" GSD for all types of terrain and land cover. He is proficient with multiple year experience in the use of a variety of orthophoto/image processing technologies/software, including Inpho Orthomaster, Leica XPro, Adobe Photoshop, Global Mapper, Lizardtech MrSID, Leica ERDAS and ESRI ArcGIS. He has served as Kucera's orthophoto manager since 2020.

**ORTHOPHOTO PROJECT MANAGEMENT/PRODUCTION EXPERIENCE**

**State of South Carolina - 2020-2021**

Statewide (~ 32000 sq. mi.) 4-band orthoimagery @ 6" GSD in GeoTIFF tile and county + statewide SID mosaic forms produced from merged digital frame and pushbroom camera-acquired imagery. Imagery web-hosting and data drive delivery

**Washington County, Iowa - 2020**

Countywide (~ 600 sq. mi.) 3-band color + grayscale orthoimagery @ 3" GSD in GeoTIFF tile and countywide SID mosaic form produced from digital pushbroom camera-acquired imagery.

**City of Dubuque, Iowa - 2020**

Citywide (~ 270 sq. mi.) 4-band orthoimagery @ 3" GSD in GeoTIFF tile and citywide SID mosaic form produced from digital frame camera-acquired imagery.

**Tri-County Regional Planning Commission (TCRPC) - Lansing MI Area - 2020 -2021**

Regional (~ 2,400 sq. mi.) 4-band orthoimagery @ 3" (8 cities/townships + Michigan State U. - 500 sq. mi.) 4" (1 county - 690 sq. mi.) and 6" (2 counties - 1200 sq. mi) GSD in GeoTIFF modular coordinate-defined or PLS coverage tiles and township + countywide SID or ECW mosaic form produced from digital pushbroom camera-acquired imagery. Merging of resolutions for countywide ortho coverages. True orthoimagery covering 36 sq. mi. Delivery on USB drive media

**Saginaw MI Area GIS Authority and Huron County MI- 2020 -2021**

Regional (~ 3500 sq. mi.) 4-band orthoimagery @ 3" (20 cities/townships + costal area - 300 sq. mi.) 4" (1 county - 600 sq. mi.) and 6" (3 counties - 2600 sq. mi) GSD in GeoTIFF modular coordinate-defined or PLS coverage tiles and township + countywide SID or ECW mosaic form produced from digital frame camera-acquired imagery. Delivery on USB drive media

**Florida Dept. of Revenue - 6 County Panhandle Region - 2019**

Regionwide (~ 4700 sq. mi.) 4-band orthoimagery @ 6" GSD in GeoTIFF tile and countywide SID mosaic produced from digital frame and pushbroom camera-acquired imagery. State of Florida Digital Orthophoto Program-compliant. Data drive media delivery

**Aerographics/USDA APFO Digital Stewardship Land and Natural Resource Inventory (SLI/NRI) Program - MI, AR, WV - 2020- 2021**

4-band orthophoto production @ 6" GSD covering ~ 2700 SLI + NRI buffered tracts/easements covering ~ 435000 acres from Summer season/leaf-on captured digital frame camera imagery. Digital drive posting and media delivery

**Lee County, Alabama - 2020**

Countywide (~ 660 sq. mi) 6" + city area (Auburn + Opelika - ~ 220 sq. mi.) 3" GSD 4-band orthoimagery in GeoTIFF tile and countywide + citywide SID mosaic form produced from digital pushbroom camera-acquired imagery. Resampling and merger of 3" with 6" imagery for countywide coverage. Web hosted and delivery on drive media

**Benton County, Arkansas - 2020**

Countywide (~ 900 sq. mi.) 4-band orthoimagery @ 6" GSD in GeoTIFF tile and countywide SID mosaic form produced from digital pushbroom camera-acquired imagery.

**POSITION**  
Orthophotography  
Manager

**OFFICE LOCATION**  
Willoughby, Ohio

**YEARS OF EXPERIENCE**  
Kucera: 7  
Career Total: 7

**EDUCATION/FORMAL TRAINING**  
BS Civil Engineering,  
Minor in Surveying: Ohio  
State University (2019)

## 6. Project Approach

### Statement of Work

The primary services and associated data products Kucera International (Kucera) will furnish to the Champaign County GIS Consortium (CCGISC/Consortium) for this contract will be new, winter-spring 2023 leaf-off condition digital aerial photography, ground control and accuracy checkpoint selection and targeting as needed, aerotriangulation, digital elevation model (DEM) updating/preparation, and 4-band digital orthophotography 6" or alternative 3" resolution with associated FGDC metadata covering Champaign, Piatt, and Douglas Counties, Illinois, with a total project area of approximately 2,079 square miles. The orthoimagery will optionally have reduced building lean for the designated Urbana-Champaign city center area and/or eliminated building lean for designated features.

Kucera has a superior working knowledge of the project, having successfully completed a similar project for CCGISC covering Champaign and Piatt counties in 2017. A comparison of Kucera's 2017 orthoimagery with the CCGISC 2020 orthoimagery shows Kucera's orthoimagery to be of at least equivalent image quality and feature lean. Kucera proposes to improve upon the image quality and feature lean reduction in the fashion subsequently described.

### Project Standards and Accuracies

All project work will be conducted in full accordance with CCGISC's 2023 Aerial Photography Project RFP 2022-001 Scope of Work, including conformance with ASPRS Class 2 and ASPRS 14 horizontal accuracy standards as cited for representation of positions for well-defined, ground-based features in relation to their "true" (accurately surveyed) locations. By these standards the orthoimagery will have the following accuracies:

Resolution	RMSE(R)	XY @ 95% Confidence
6"	1.4'	2.4'
3"	0.7'	1.2'

The orthoimage accuracies will be determined/checked for conformance using CCGISC-surveyed independent (i.e., not used in image georeferencing processes) checkpoints at Kucera-selected locations spread throughout the project area, with surveyed "true" coordinates being compared with orthoimage read positions to determine accuracy displacement. In order to have 95% accuracy confidence, at least 20 checkpoints will be selected/used for the projectwide accuracy verification. If an accuracy verification by County is desired, at least 20 checkpoints will be selected for each County and distributed through the County. The results of the accuracy testing will be included in the project metadata. The datasets will not be considered acceptable until meeting the project accuracy standards and will be revised/reproduced by Kucera as needed to meet the standards at no added cost to the CCGISC.

Note that the horizontal accuracy specifications will not apply to structure roof locations and other significantly elevated features represented in the orthophotography due to inherent radial distortion/"feature lean" displacement effects, although Kucera uses technologies and procedures as subsequently described which reduce these effects, particularly for the Consortium's designated Option 2, 3, and 4 urbanized/tall structure areas.

## Project Datums and Units

The project datasets will be georeferenced on the NAD83/2011 IL State Plane East Zone horizontal coordinate datum and the NAVD88 vertical datum as specified. The coordinates and elevations will be expressed in US survey feet units.

## Approach Phases

In order to complete the contract work in a timely, organized, and cost-effective manner while maintaining a high level of quality and accuracy, Kucera will utilize a systematic, phased approach incorporating the most advanced available, proven photogrammetric, remote sensing, surveying, and imaging technologies and procedures. The major phases of Kucera's approach in general order of performance will be as follows:

1. Project Initiation - Finalize scope of work and document in project work plan. Acquire and review project source materials.
2. Ground Control and Checkpoint Selection and Targeting - Select locations to be ground surveyed by CCGISC for use as georeferencing control and blind accuracy checkpoints. Perform targeting of locations as needed.
3. Aerial Photography - Perform aerial flyover/photography of the project area using Vexcel UCE100 Eagle digital aerial cameras interfaced with airborne GPS/IMU system for in-flight position/altitude georeferencing measurement. Process and check the aerial imagery and airborne GPS/IMU survey measurements.
4. Aerotriangulation - Use a softcopy aerotriangulation process with ground and airborne GPS/IMU control survey input to check and finalize the georeferencing of the project aerial imagery.
5. Digital Elevation Model (DEM) Preparation - Photogrammetrically review the source DEM data against the new triangulated aerial photography, and update/augment the DEM as needed to support the new ortho image rectification.
6. Digital Orthophoto Production - Orient triangulated digital photo imagery and ortho rectify to prepared/updated DEM. Batch and manually process rectified imagery into final orthophotography.
7. Metadata/Project Wrap-up - Produce and furnish FGDC metadata for the finalized orthoimagery. Review project specifications and transmittals/deliverable records to ensure all specified data has been received and approved.

The work phases will be performed concurrently to the maximum extent possible to maximize efficiency and accelerate turnaround/completion times.

Descriptions of the procedures, technologies, quality control measures, and deliverables for the various phases of the project are provided in the subsequent numbered subsections of this Project Approach, followed by Kucera's proposed completion schedule for the work.

### 1. Project Initiation

#### 1.1. Project Review/Startup

Immediately upon notice of award, Kucera's Project Manager will convene members of the project management team to review the scope of work, specifications, deliverables, resource commitment, schedule, and administrative requirements. At this project review meeting, the Project Manager will solicit questions and recommendations to be presented to the CCGISC.

The Project Manager will subsequently schedule a “kickoff” meeting or conference with the CCGISC to establish lines of communication, review the scope of work, and address any outstanding questions/issues related to the project.

## **1.2. Project Work Plan**

Following the kickoff meeting/conference, the Project Manager will prepare a comprehensive job write-up and project work plan. The work plan will include a summary of project procedures and deliverables, project completion schedule and milestones, communication/reporting procedures, flight and control network diagrams, projectwide tile scheme, sensor calibration reports, and quality control plan/acceptance criteria for the project. The plan will be revised/updated as needed over the course of the project to reflect approved procedural changes and additional procedures/information as required.

## **1.3. Tile System**

The tile system used for the delivery of the project orthophotography will be the CCGISC’s existing 2,500’ x 2,500’ tile index grid. In the project initiation phase, Kucera will review the projectwide tile scheme with the CCGISC and adjust for project area coverage as needed.

## **1.4. Flight/Control Plan**

Based on the finalized tile grid system, Kucera will prepare and submit for CCGISC’s review/comment a finalized projectwide flight and ground control/checkpoint plan upon beginning of the project. The plan will include the project boundary and tile scheme as needed to verify coverage of all tiles with controlled aerial imagery. The finalized plan will be followed in proceeding with the ground control survey and aerial photo flyover.

## **1.5. Quality Control System**

Kucera will develop a quality control system specifically for the project. The system will be overseen by the designated Project and Production/QC Managers and will include the following elements:

- Quality control checklists and acceptance criteria (quantitative and/or qualitative) for each phase of the project. Checklists prepared by project manager and production QC managers, completed by phase managers, and reviewed, summarized, and reported by QC manager.
- Procedures supporting prompt internal reporting and addressing of QC issues found to production manager and project manager.
- Test/calibration of project equipment to ensure proper working order and operating characteristics within designated tolerances before use on project.
- Review of project specifications and standards by all project management team members.
- Pilot project or projects for CCGISC approval/selection of sample final project deliverables.
- Report deliverable for each project phase documenting procedures used and results achieved.
- Review of all project source data and prompt reporting of anomalies/deficiencies found.
- Full manual review of all project data deliverables before transmittal by separate dedicated QC/edit staff.



- Procedures/technologies for support of and response to CCGISC image review/QC process and for prompt addressing of quality control issues, including documentation of nature of issue, cause, and method of resolution.

Kucera has an excellent track record of minimal or no QC calls on projects and has always been able to provide data which meets or exceeds customer satisfaction. For customer QC review, Kucera supports/offers both direct data delivery with posted calls and web hosted/online review. For the former, email and FTP posting are typically used for receipt of and response to customer comments and calls. For the latter, Kucera provides a secure, online ESRI Web AppBuilder/ArcGIS Enterprise-based/interface QC application/service which supports up to 50 users and which can be accessed through any popular web browser. Orthoimagery and other large datasets are tile-cached to allow for fast display performance without significant image refresh delays. Once a block of imagery/data is ready to be reviewed, users will receive an email with a link to access the web application. Upon completion of review and notice by mail, Kucera will review all marks and/or comments and accordingly fix any issues. During the project initiation phase, Kucera will request the contact information of specified users, set up access, and communicate with users regarding any questions or concerns. For QC call-out/markup, users can draw a polygon or point-mark any observed issue and choose from a variety of pre-programmed calls/tags or "Other" with comment.

Kucera recognizes that multi-county consortiums have varying areas of priority and levels of manpower for the quality control inspection process. Kucera can accommodate a variety of inspection and approval/rejection procedures. For larger projects involving progressive delivery of completed imagery over a period of time, the preference is to receive the QC inspection results progressively corresponding chronologically to shipments previously received. For smaller projects or where manpower does not permit, QC results can be transferred and processed following all shipments. All QC calls are responded to by Kucera within one week of receipt with correction or explanation of "no correction" or "further revision" with time period for completion. Where major/high incidence revisions are sought, Kucera will immediately investigate the issue and submit a written report detailing the cause and proposed course of remedial action.

### **1.6. Communication Plan**

Kucera's Project Work Plan will include a Communication Plan documenting reporting and response procedures and Kucera points of contact. Kucera's Project Manager will provide written status reports to the CCGISC on at least a semi-monthly basis throughout the contract duration. The reports will be provided more frequently as needed for phases of the project with more frequently changing and time/delivery-sensitive status, such as the aerial photo flyover phase. Status reports/communication will also be made promptly if any significant data delivery and/or quality issues are encountered or when information is needed from the CCGISC. Kucera's management team members will serve as secondary points of contact in the Project Manager's absence or for technical data exchange as needed. All CCGISC inquiries will be responded to promptly and within 24 hours of receipt.

### **1.7. Project Source Data**

In the project initiation phase, Kucera will acquire, review and organize/document the available source data. For source data furnished by the CCGISC, Kucera will request clarifications as needed and will report any possible anomalies and missing data for review and resolution.

The project source data will include the following:

1. Project boundary files/tile grids - as available from CCGISC
2. Ground control and checkpoint survey coordinates - as provided by CCGISC
3. DEM - As provided by CCGISC (e.g., 2019 lidar DEM) or obtained from State (e.g., 2020 State lidar DEM)
4. Other existing GIS datasets/layers (e.g., structures, bridges) or records (e.g., recent major construction areas) where applicable for reference and as available from CCGISC, Counties, or the State

## **2. Ground Control and Checkpoints**

### **2.1. Overview/Ground Point Plan**

The flight/control diagram provided at the back of this proposal section shows Kucera's initially proposed locations of ground control points and accuracy checkpoints in relation to the projectwide aerial photography flight lines for the 6" and 3" resolution alternatives.

The ground control and checkpoints will be spread generally uniformly around the periphery and through the interior of the three-county project area. The project ground control together with the airborne GPS/IMU measurements will support accurate georeferencing of the projectwide aerial imagery and production of orthoimagery meeting the CCGISC's accuracy standards. The checkpoints will be withheld from the georeferencing processes and used to determine and report the accuracy of the finalized projectwide orthoimagery. A total of approximately 25-35 ground control points and at least 20 checkpoints will be selected for the project. In the selection process, Kucera will use a logical point-naming convention which distinguishes control points from accuracy checkpoints.

### **2.2. Ground Point Selection/Targeting**

Kucera understands that CCGISC will provide the survey of the ground points and will coordinate closely with the CCGISC to ensure the selected points are received from Kucera in a timely fashion and changed in any cases of non-accessibility.

All points will be selected at distinct, flat surface, photo-identifiable (PID) feature locations e.g., corners of painted stop bars, corners of catch basins, etc. In the case of having no photo-identifiable features in a critical location, Kucera will request the establishment of a semi-permanent mark with recovery reference, and Kucera will be responsible for targeting of the location in advance of the flyover. The targets will be of appropriate shape and dimensions for visibility in the aerial imagery. Targets on non-paved areas will be properly affixed to the ground and removed following the flyover.

It is assumed that the surveyed control and checkpoint coordinates and elevations will be provided in the specified project datums and will be accurate to within approximately 4cm horizontally. It is also assumed that the point data will be provided with sufficient identifying reference/location data, such as field photos. Kucera's aerotriangulation manager will coordinate with the CCGISC surveyor to ensure mutual understanding through the control point survey process.

## **3. Aerial Photography/Airborne GPS-IMU Survey**

### **3.1. Season/Environmental Conditions**

The project aerial photography will be performed on a first-priority basis in the designated Winter-Spring 2023 flight season (approximately February 27 - April 4) before significant emergence of vegetation and as soon after flight plan approval as weather (clear, no excessive cross winds) and ground (no significant ice, snow, smoke, fog, flooding) conditions permit. The

photography will only be taken during the time of day (approximately 10 a.m. to 2 p.m.) when the sun angle is greater than 30 degrees to minimize shadows. For the airborne GPS/IMU work, the aerial photography will be taken only at times when at least five satellites are observable with a PDOP of less than 3 and the cutoff angle/elevation mask is greater than 15.

Weather conditions will be monitored via direct observation and weather forecasts from the US National Weather Service, the Weather Channel, and terminal forecasts from local flight service centers. Kucera's Project and/or Flight Operations Manager will maintain regular contact with the CCGISC throughout the aerial photography period to report on flight conditions and completed flying. Computer files of weather sequences will be maintained as a record of photography conditions. Kucera will consult with the CCGISC as needed in cases of uncertainty of suitable ground conditions, such as recent flooding or lingering snow piles.

### **3.2. Aircraft Commitment/Flight Time**

The aerial flyover will be performed from Kucera's twin-engine Piper Navajo Chieftain aircraft. These are low-wing, turbo-charged aircraft with a cruise speed of 180 to 200 mph, fuel capacity for six hours of continuous flight, and IFR weather instrumentation. The aircraft can be operated efficiently and safely at speeds down to 130 mph as needed for high quality aerial data capture. The aircraft are equipped with GPS-based flight management and navigational systems and have Novatel dual-frequency antennas mounted above the camera port for airborne GPS. The aircraft have two sensor ports, providing the ability to concurrently carry both the digital camera and another sensor system (e.g., lidar system).

The projectwide aerial photo flyover will require approximately 13-30 on-line flying hours, depending on the resolution and options specified by CCGISC. Kucera will be committing up to three of its twin-engine aircraft to the flyover and with these aircraft will be able to complete the image capture within 2 - 4 flight sessions. Kucera's aircraft will be based on site until the flyover is complete to ensure the flyover is performed in the shortest possible timeframe with consistent ground and lighting conditions. By minimizing flight sessions, Kucera will better ensure ability to readily achieve consistent tone and color balance in the projectwide orthophoto coverage.

### **3.3. Airspace Access**

Kucera's flight crews have extensive experience performing aerial flyovers over large airports, military operations, and other areas having restricted airspace access. Kucera's flight crews will provide the appropriate air traffic control centers with copies of the project flight plans and a detailed description of the flight parameters, and will work closely and cooperatively with the centers throughout the flyover period to determine optimal periods of airspace access and to take advantage of all available windows of access availability in periods of suitable weather conditions. Aircraft assignments will be made so as to prioritize completion of the flyover work in restricted areas when windows of access are open and to redirect to-from restricted and non-restricted areas as necessary to ensure restricted area coverage is obtained as early in the flight season as possible while simultaneously making maximum progress on non-restricted image coverage.

### **3.4. Aerial Camera/Sensor System**

For the 2023 CCGISC project aerial imagery acquisition, Kucera is proposing to use its Vexcel UCE100 Eagle large format digital frame camera systems. The UCE100 is proven, advanced digital photogrammetric imaging/sensor technology having a 20,000 pixel capture width, 5 micron resolving power, and superior exposure latitude. The UCE 100 also has a relatively long, 100 mm focal length, which allows for higher flying altitudes than many digital camera systems

having shorter focal lengths and reduced feature lean in the captured imagery. Kucera has used the UCE100 digital frame camera technology for over six years and to-date has successfully completed UCE100 imagery capture for over 100 counties/cities covering over 70,000 square miles, including Champaign County in 2017.

A comparison of Kucera's UCE100-captured 2017 orthoimagery of Champaign County with the County's 2020 orthoimagery shows equal if not superior imagery quality for the 2017 imagery. Kucera's UCE100 Eagle cameras have current manufacturer calibrations, copies of which will be provided as a deliverable for the aerial photo acquisition phase.

### **3.5. Flying Height/Capture Resolution and Motion Compensation**

With the UCE100 Eagle camera technology, flying heights of 9600'/4800' above ground will yield image capture at slightly higher than 6"/3" resolution, respectively. The Eagle camera system uses advanced TDI controlled, electronic forward motion compensation (FMC), which is superior to the mechanical FMC used in some other digital camera systems.

### **3.6. Flight Plan, Sidelap, Endlap**

The flight/control plan provided at the back of this proposal section shows Kucera's proposed flight pattern for the aerial photo capture. The flight lines of the aerial photography will be oriented in a north - south direction for efficiency of coverage and will be spaced apart so as to yield at least 30% side image overlap between adjacent flight lines. In the line of flight, the imagery will be captured with at least 60% stereoscopic forward overlap between successive images. The flight lines of digital photography will be extended and increased in number sufficiently to provide stereo image coverage beyond the project area boundaries and of all extraneous ground control points, and also ensure that all orthophoto coverage can be prepared as full modular image tiles.

### **3.7. Feature Lean Reduction**

For Options 2-4 requiring reduced building lean for the Urbana-Champaign city center area and/or eliminated building lean for specified points, Kucera will make the following flight plan adjustments:

- The Urbana-Champaign City Center area will be flown with 80-90% side overlap between flight lines and 80-90% end lap between successive exposures, providing a minimized off-nadir angle of image capture with near "straight down" views of all structures. The added side overlap will be achieved by reduced spacing between flight lines used for the areawide coverage and use of additional flight lines centered on groupings of tall structures.
- For the specified point/feature lean elimination, Kucera will perform 80-90% sidelap and forward overlap flight line capture in both the north-south and east-west directions for coverage of the clustered features within the Champaign-Urbana area and will acquire feature-centered "spot shots" of the coordinate-defined feature locations outside of the Champaign-Urbana area.

Note that lean reduction will be greater for the 6" imagery relative to the alternative 3" imagery given the 2x increased flight altitude used for the 6" imagery capture.

Our review of the Consortium's 2020 lean-reduced imagery does not appear to indicate significant lean reduction vs Kucera's 2017 orthoimagery. The imagery capture approach described will result in improved lean reduction in relation to both the CCGISC 2017 and 2020 orthoimagery.

### **3.8. Crab and Tilt Control**

With the Eagle digital camera system, camera tilt and crab are extremely limited and will be well within 3° at any point in a flight line and 1° average for an entire line. Tilt and crab correction are achieved using the camera's internal IMU linked to the camera's GSM3000 gyrostabilizing mount, providing very fast and accurate response to any altitude changes of the aircraft.

### **3.9. Image Band Acquisition**

The Eagle digital camera imagery is simultaneously captured in registered 16-bit panchromatic, RGB/color, and NIR/near infrared wavelength bands (i.e., 4-band) in the 465-885 nm spectral range (835-885 nm for NIR).

### **3.10. Photo Image Data Recording/Downloading**

The digital camera imagery is initially captured on the camera's removable solid-state data collection units (DUs). Within 24 hours of capture, the imagery is downloaded from the DXs to hard drive and shipped or otherwise delivered to Kucera's headquarters office for downloading on to Kucera's dedicated network server for initial review and further processing. The imagery is saved on the DUs until it has been successfully downloaded and reviewed at Kucera's headquarters.

### **3.11. Airborne GPS/IMU Control Survey/Image Georeferencing**

Throughout the aerial photo acquisition, the position and orientation of the Eagle camera is accurately measured using Novatel SPAN airborne GPS/IMU technology integrated with the camera systems. These measurements are applied to the captured imagery to initially establish the image georeferencing, which is checked against ground-based control and refined as needed through the aerotriangulation process.

The SPAN units include a Novatel GPS receiver linked to a GPS antenna mounted on the aircraft above the camera port for measuring position and a LN200 first order gyro-based inertial measuring unit (IMU) for measuring angular orientation. The airborne GPS survey is performed using TerraPOS PPP (precise point positioning) processing technology, which eliminates the need for ground base stations and only requires three hours of uninterrupted GPS receiver recording. Kucera has been using TerraPOS PPP for airborne GPS observation processing for over 15 years with excellent results. Observations from any suitable CORS in the project area will be included in the AGPS processing as a supplement/check to the TerraPOS data.

During the AGPS post-processing, a very robust KAR - kinematic ambiguity resolution (fixed integer solution) is implemented, along with an analysis of the day's satellite configuration and PDOP, satellite signal standard deviations, atmospheric interferences, and forward/reverse plots to attain the most accurate GPS solution available. The GPS and IMU data are processed together, with the IMU data being used to fill in and adjust the GPS results as needed and the GPS data being used to minimize the effects of aircraft "drift" in the IMU measurements. The result is a GPS solution that is more refined than the initial processing (the inherent drift is also removed), along with a highly accurate set of orientation angles for each exposure (a Smoothed Best Estimate of Trajectory). The AGPS/IMU reduction results are thoroughly analyzed to ensure proper IMU behavior and accuracy, with the data graphs also being used to ensure that the proper flying parameters are followed for each mission. The AGPS/IMU survey results can be furnished as part of the project control survey report and can include photo coordinate listings, data accuracy output, PDOP conditions, flight trajectory plots, and other relevant survey data.

### 3.12. Image Processing Chain/Inspection

The Eagle camera's raw (L0) imagery is downloaded from DX memory units along with thumbnail "quick views" (QVs) of each exposure for initial image inspection. Using Vexcel UltraMap software, initial radiometry is applied to the L0 imagery to produce L2 radiometrically-corrected RGB and IR imagery together with corresponding reduced resolution QVs for inspection purposes. The inspection includes checks for proper coverage, exposure/radiometry, crab and tilt level, and absence of image anomalies. The inspected and approved L2 imagery has AGPS/IMU georeferencing, final radiometric adjustment, and pan-sharpening applied to yield L3 georeferenced and radiometrically balanced digital photo imagery for input to the digital aerotriangulation process.

An image quality report documenting the image inspection results will be provided as a deliverable along with the corresponding flight logs. All rejected imagery is reflighted at the first possible opportunity using the same camera as used for the balance of the flight line or block. Reflights will be made in the same flight pattern as the accepted imagery and will overlap into the accepted imagery as necessary to provide continuous photographic coverage.

### 3.13. Raw Imagery Delivery

Within 4/6 weeks of the completion of the 6"/3" aerial image acquisition, Kucera will furnish on USB drive for CCGISC's assessment a copy of the initially processed/balanced and georeferenced "raw" aerial image exposures in uncompressed or compressed form.

## 4. Aerotriangulation

### 4.1. Procedures and Technology

A softcopy aerotriangulation process will be used to check the AGPS/IMU-derived georeferencing/orientation of the aerial photo imagery and refine/finalize the same as needed for the ortho image rectification. The initial input to the triangulation process will include the ground-based control points and the camera location/position and orientation data from the airborne GPS/IMU survey, which together will allow the process to converge to a final solution with a minimal number of iterations being required.

For the softcopy process Inpho MATCH AT softcopy aerotriangulation software will use image correlation technology to derive from the stereo aerial imagery coordinates/elevations for manually selected and/or automatically generated triangulation points. The MATCH AT software is designed specifically for efficient automated processing of digital frame camera imagery and typically generate hundreds or thousands of triangulation points for each triangulation block, with the number of high multiple ray/image points being maximized to maximize the triangulation accuracy. The points are run through a preliminary triangulation adjustment with a limited number of measured control points to determine the point residuals, with points having greater than a small residual being filtered out. The final triangulation is performed with the accepted points and all control points being subject to thorough manual review and adjustment as needed to achieve the optimal point location and distribution. Kucera recognizes that the autocorrelation-based automated triangulation point generation process typically used in softcopy aerotriangulation may be degraded in terrain lacking availability of distinct, ground-based feature points, such as over larger expanses of wooded areas, open water, or heavily urbanized areas. For such areas Kucera will use a manual triangulation point selection as needed in the softcopy process.

The triangulation software produces a rigorous simultaneous polynomial solution with output of RMS residual values and statistics as required for robust accuracy assessment. The triangulation software applies corrections for systematic errors resulting from systematic



distortion using sensor calibration data, and atmospheric refraction based on the flight height and ground level. The projectwide imagery will be triangulated in 2 - 4 multiple large contiguous area coverage blocks (e.g., one block per County), with the latter being rigorously tied through triangulation of common flight swaths to maximize triangulation accuracy/consistency throughout the project area.

#### **4.2. Error Tolerances**

The triangulation will support ortho image rectification and stereo feature compilation meeting the project accuracy standards, with individual point and RMS error residuals (horizontal and vertical) being limited to within one pixel (0.5') and one-half pixel (0.25') of the image capture resolution, respectively. Designated redundant targeted control stations will be used as check points in the aerotriangulation process points will have triangulated coordinates determined for them, which will be compared against the actual coordinates for the points with the expectation of RMS errors not exceeding the specified tolerances. The checkpoint triangulation sessions will be re-run until results are satisfactory.

#### **4.3. Triangulation Report**

For the completed triangulation, a digital triangulation report will be prepared and furnished as a deliverable. The triangulation report will contain summaries of the input used and results achieved along with triangulation adjustment output.

### **5. Dem Update/Preparation**

#### **5.1. DEM Source and Update Overview**

The source DEM used for the 2023 project orthorectification will be CCGISC's 2019 DSM created from a 2019 QL2 lidar acquisition project, or more recent/updated DEM (e.g., 2020 state lidar DEM) if available. Kucera will use manual photogrammetric review with automated change detection procedures as needed to check/update the source DEM so as to ensure it supports the orthoimage rectification to the project accuracy standards.

#### **5.2. DEM Update Process**

The photogrammetric update process will involve reviewing the source DEM points in 3D on top of the stereo image of the triangulated aerial photography using Cardinal System VR2 softcopy stereoplotters. All data is viewed/captured in three dimensions from parallax-cleared stereo imagery, and is compiled in intelligent, manual fashion. Kucera will utilize any information available from the Counties on bridge and overpass locations (typically removed from bare earth lidar DEM) and any available information on areas of recent major construction for reference in the DEM review/update process. Kucera will use surface modeling with change detection as needed and subsequently described to identify other areas of significant landscape change requiring DEM updating.

To find areas of major terrain/feature change for the DEM update process, Kucera will batch-generate an autocorrelated digital surface model (DSM) coverage of the project area from the newly acquired and triangulated digital aerial imagery using advanced Match AT surface model autocorrelation technology. The newly generated DSM will be compared with source DEM data in Global Mapper software to determine/flag areas of change based on elevation differences, (i.e., elevation-based change detection). If the flagged change areas are extensive, the source DEM will not be used, and a new DEM will be extracted from the generated DSM. If the change areas are not extensive, Kucera will update the DEM by removing the existing data from change areas and replacing this with DEM data newly stereocompiled from the triangulated aerial imagery and/or extracted/classified from the corresponding DSM. A ground DEM point spacing

of not more than 4' will be used. In the update process, Kucera will also add DSM-derived points to elevated features such as bridge decks to ensure these features are properly rectified.

The classification/reduction of the DSM to an ortho grade DEM is performed using TerraSolid digital modeling technology, the same technology used by Kucera for lidar data classification. The classification is performed so as to yield bare earth ground surface points and points representing elevated features requiring rectification, such as bridge decks and overpasses. Where required, the DEM will be augmented with elevated feature and grade break breaklines stereocompiled from the triangulated aerial imagery using Kucera's Cardinal System VR2 softcopy stereoplotters.

### **5.3. DEM Quality Control and Deliverable:**

Following initial production and/or review and before being used for the image rectification, the updated project DEM data will be subject to several quality control checks, including direct digital review of the data as a 2D point file and as 3D visuals to check for anomalies such as data gaps or data spikes, and use of Terrasolid Terrascan software to compare elevations of surveyed control and triangulation points to DEM surface and report displacement/vertical DEM accuracy over the project area. Where anomalies/ inaccuracies in the DEM data are found, the data is reviewed and restructured/recompiled as needed.

The final updated DEM data files used for the final ortho image rectification will be furnished as a deliverable in GeoTIFF, shapefile, or other vector or raster format in areawide coverage or tiled form.

## **6. Digital Orthophoto Production**

### **6.1. Overview**

Kucera's digital orthophoto production is a multiple-stage process consisting primarily of the following:

1. Initial image rectification and quality control review
2. Image mosaicking/tone balancing using advanced Inpho OrthoVista image processing technology
3. Final, thorough manual quality control inspection/mosaic/edit of individual image tiles.

The process includes a complete manual quality control review and edit of each image tile, as needed. Kucera's numerous county and regional orthophoto clients will readily attest to the superior quality/accuracy and low rejection rate of the orthophoto imagery generated by Kucera using this process.

### **6.2. Digital Image Rectification**

The digital orthophoto image rectification of the individual triangulated exposures of the digital aerial photography to the source DEM data will be accomplished on Inpho OrthoMaster digital orthophoto systems running on dedicated workstations.

In performing the rectification work, the imagery is subjected to an initial visual quality control review and the project DEM data is processed via Trimble Terramodel software to a TIN model and point grid supporting the rectification. The imagery is oriented using digital camera calibration data and orientation parameters derived from the aerotriangulation process, with QC reports being produced and exterior orientation residuals being held to within a 10-micron residual tolerance. The oriented imagery is pixel-rectified to the processed point grid using a high-grade radiometric interpolation, with resampling to the target pixel resolutions being

performed as needed using a cubic convolution resampling algorithm. For this project, the finished pixel resolution will be 0.5' or 0.25' as specified.

Quality control procedures used in the rectification process include the following:

- Visual inspection of imagery for observable distortions and other anomalies, with special attention given to DEM quality "indicator" features, such as railroads, highways, and bridge overpasses.
- Check geometric accuracy "fit" of imagery to project survey control and available existing planimetric feature data of equal or higher accuracy - expecting matching with specified tolerances.
- Check of ties with adjacent images within and between flight lines, expecting fit within specified tolerances.
- Selection of imagery with minimal "hot spots"/glare off water bodies and other significant reflective surfaces.
- Check for suitable coverage of project area and tile grid.

Where rectification-related image deficiencies are found, the DEM data is reviewed and modified as necessary, and the rectification is repeated. A rectification QC signoff report is generated for each rectified image and maintained by the orthophoto department manager.

### **6.3. Image Mosaicing - OrthoVista**

Following rectification, the imagery is color/tone balanced and processed into the final seamless image tiles using Inpho OrthoVista, an automated orthophoto image processing program which performs optimized radiometry adjustment, resampling, and tile formation in a batch mode.

In performing the automated processing, sample images are run through the OrthoVista program and used to adjust the automated image dodging and seam removal intensity in relation to the tone of the imagery and the terrain being covered. With the parameters defined, a block of images are then batch processed to a seamless overall image representation, from which coordinate-defined tiles and/or resampled imagery is copied/extracted and output in the appropriate format. The seam lines are selected in specified/optimal image locations, with a "seam editor" feature being used for manual adjustment of seam lines where required. The OrthoVista software uses advanced feature detection (vs. more rudimentary adaptive feathering) and automatically selects areas of limited tone transition for seam line placement to avoid having seams placed through buildings and other areas where seams would be evident. Existing building footprint vector data can also be input to OrthoVista and support optimized seam line placement.

For this project, Kucera will be using OrthoVista to mosaic the imagery and extract the specified modular coordinate-defined tiles. All adjacent tiles will tie seamlessly (match perfectly) in the overlap areas since they are being extracted from the same master image mosaic. OrthoVista will also be used to produce re-tiled/block mosaic versions of the orthoimagery as needed for the compressed image delivery.

In cases of countywide/large area imagery coverage having to be divided into multiple sub-blocks for automated mosaicing, Kucera reviews the processed sub-blocks as a projectwide image mosaic and performs additional OrthoVista processing to ensure there are no significant tone differences or color shifts between the blocks which can result in a "banding" effect in an areawide mosaic. This process will ensure seamless projectwide imagery with an even tone and color balance throughout.

#### **6.4. Seam Line Review and Adjustment**

Kucera's quality control following OrthoVista processing includes a full manual review of seam line locations within the imagery to check for seam anomalies, such as mis-shaped structures, significant feature breaks, double imaging, and shifts in image tone, color, or density/resolution. Seam anomalies are flagged and manually adjusted as needed to be least apparent and have least effect on the represented features, with the OrthoVista color/tone adjustment process being repeated as needed. The final seam line locations can be provided in GIS format as a deliverable supporting the CCGISC's QC review process. Image displacement at seam lines will be kept within 4 pixels in accordance with ASPRS14 accuracy standards.

#### **6.5. Radiometric Processing**

Kucera performs an initial radiometric adjustment on each exposure of the captured frame camera imagery using Vexcel UltraCam software. This adjustment is to establish initial color and even out contrast differences within the exposures, yielding resultant "neutral" imagery for orthophoto production. Image block-wide radiometric adjustment is accomplished using one or more runs of Inpho OrthoVista automated mosaicking and color/tone balancing software, which outputs color + tone balanced tiles.

Final radiometric adjustment on the ortho tiles is performed using Adobe Photoshop. In the radiometric adjustment process, the DN (digital number/pixel values) of the imagery are stretched to take advantage of the full range of brightness values on computer monitors, i.e., 0 (black) to 255 (white). Given the curve of normal pixel value distribution in the orthoimagery, Kucera's target in the project-wide imagery stretching/radiometric adjustment is to keep the mean of values within ~ 20 units/two standard deviations of the 127.5 mean of 0-255, i.e., within a 108-147 range. This helps ensure optimal color, contrast, and sharpness of the imagery and prevent excessive darkness/flatness or brightness/contrast.

Special attention will be given to ensuring good detail visibility in both shadow and highlight/reflective surface (e.g., industrial building roof) areas and minimizing reflection and significant tone transition-induced anomalies. In the case of 4-band imagery, the radiometric adjustment of the color IR band is limited to the automated mosaicking process to preserve the captured spectral characteristics unless further adjustment is sought.

#### **6.6. Water Areas**

The mosaiced imagery will be reviewed and processed with the intent of preserving and properly representing small surface features and shallow submerged features. Water color/tone will be adjusted for consistency between mosaiced images through OrthoVista subarea polygon processing tools to the extent possible without affecting visibility and accuracy of submerged feature detail. "Speckling"/glint and glare/reflection hotspots will be removed/reduced to the extent possible.

#### **6.7. Farm Fields**

For project areas which are predominately agricultural with farm fields, Kucera puts seam lines at the field edges and strives for color/tone consistency to prevent appearance of false "breaks" in the fields. The timing of the aerial photo capture is also controlled so as to avoid long time spans between flight sessions and shifts in field coloration from brown/yellow to green as crops begin to emerge in the Spring. An occasionally seen visual effect that generally cannot be eliminated is the so-called Moiré pattern effect, which results from image pixel representation of field lines being aligned with the viewing array of higher resolution computer monitors, creating apparent repeating line patterns at some viewing magnifications.

## 6.8. Bridges, Overpasses, Elevated Features

In areas having significant (> 50' - 100' span) bridges and overpasses, feature-centered imagery (e.g., from specifically flown flight line coverage) and/or photo-compiled breaklines will be used as needed in the orthoimage production to provide proper feature rectification and appearance.

Feature centered aerial imagery is used for extraction of bridges which predominately span water, such as over large rivers. Feature edge and/or centerline breaklines are used to control rectification of bridge decks and overpasses spanning ground areas, with the breakline rectified imagery being merged with the rectified imagery representing the underlying ground and features. Edge and/or centerline breaklines are also used as needed for proper rectification and appearance of linear elevated features such as railroads and roads, with the breaklines maintaining the linear nature by controlling the image adjustment and preventing "waviness" which can be induced by DEM mass points which vary in proximity to the linear feature. Note that breaks in visible high tension/transmission line wires are a non-correctable, inherent characteristic in the orthoimagery due to being elevated well above the ground and corresponding DEM surface.

## 6.9. Feature Lean Control

As described previously in this Proposed Approach, Kucera will be using a 100 mm focal length digital frame camera and selecting optimal exposure coverage in the mosaicing process to achieve general projectwide feature lean control.

For Option 2 building lean reduction for the Urbana-Champaign city center area, Kucera will acquire multi-directional, high overlap imagery as previously described, providing multi "near nadir" views of each structure. Kucera's experienced senior orthophoto technicians will review the views and select those which provide the greatest overall lean reduction of structures within the area. With the high overlap in multiple directions and selection of optimal exposures, it is expected that feature lean will be help to within approximately 10-15% of the structure height.

For Option 3 building lean elimination, "spot shots" or high (80-90%) forward overlap flight lines centered on the identified structure locations/coordinates will be acquired and the nadir coverage exposures individually orthorectified and mosaiced with the surrounding orthoimagery. The mosaicing will ensure general tone color consistency across the imagery. Review of the CCGISC 2020 orthoimagery indicates some tone inconsistencies between the lean reduced and projectwide orthoimagery.

## 6.10. Accuracy

For the finalized orthoimagery, Kucera will perform an RMS and 95% horizontal accuracy assessment using the surveyed checkpoints, with the expectation of horizontal displacements/accuracy well within the specified tolerances. The results of the accuracy assessment will be reported to the CCGISC and included in the project metadata. The orthoimagery will only be considered acceptable if meeting the CCGISC project accuracy criteria.

## 6.11. Image Finalization

The image tiles produced through OrthoVista will be thoroughly manually inspected individually and together, with a quality certification for each batch of images passing inspection. Elements of the final inspection and quality certification process will include the following:

Characteristic	Acceptance Criteria
Automated processing artifacts (e.g., image smears)	98% absent / 0% visible @ 2x zoom
Tone transition	< 10% variance
Image artifacts (e.g., speckling) 0% visible at target scale	< 5 artifacts per tile
Checkpoint image position offset (from survey coordinates)	Within ~4 pixels for each measured point and within ~2.5 pixels overall RMSE
Seam line match	Within approximately 4 pixels
Elevated features (bridges, railroads, etc.)	No breaks/warping, < 3 pixel waviness
Shadow/highlight areas	Good detail visible at target and magnified viewing scales, < 25% features obscured by shadows
Color/contrast/radiometry	Match with approved/pilot sample Mean DN 108-147
Building Lean (Options 2-4)	Reduced lean displacement - within 10-15% building height Eliminated lean - no significant feature displacement

In general, Kucera will process the imagery in contiguous blocks and expect these to have a seamless appearance throughout when viewed at the target and reasonably (e.g., 2x) enlarged scales and have control/triangulation point displacement and seam mismatches/offsets within the target horizontal accuracy tolerance. Displacement from stereocompiled breaklines and planimetric features in the orthoimagery will be no more than twice the tolerances indicated above, accounting for the accuracy level of both the imagery and the compiled features. Correction of minor image imperfections and “sharpening” of tone as needed will be performed as needed using Adobe Photoshop software.

### 6.12. Pilot Project

Kucera will initially produce and deliver the final orthophotography covering a designated small, contiguous tile pilot area within each County appropriately representative of the project terrain and land cover. Kucera will consult with the CCGISC as needed to select pilot areas representative of specific land cover types and/or showing transition between flying days. The pilot project will be used to validate all procedures and verify that orthophotography meets each County’s specifications and expectations in terms of tile naming, shadow and highlight detail, color balance, etc. The pilot image submittal can include samples of tiles with variation in color/contrast for selection of the preferred image radiometry.

Following CCGISC review and comment, the pilot area imagery will be adjusted if needed and resubmitted for verification of changes. The fully approved sample imagery will be used as a standard for the balance of the image delivery and integrated with this delivery.

### 6.13. Orthophotography Delivery

The finalized orthophotography will be furnished in 32-bit 4-band form as uncompressed GeoTIFF (with associated TFW files) and compressed JPEG 2000 tiles (with associated jpw files), and in optional JPEG, SID (V2 or V3) and/or ECW compressed countywide or projectwide



mosaic form. The tiles will be aligned with and named according to the CCGISC's provided 2,500' ft x 2,500' ft index grid. The imagery will be delivered on properly labeled USB2 external hard drive(s).

For the optional compressed image delivery, Kucera will provide samples prepared at varying compression factors and mosaic file size information as needed for CCGISC's review and selection of the preferred compression.

## **7. Metadata and Project Wrap-Up**

### **7.1. Procedures and Deliverables**

With the delivery of the finalized orthophotography, Kucera will provide FGDC-compliant project level metadata in XML or HTML format. A metadata questionnaire will be provided to the CCGISC to complete and return, indicating points of contact, distribution process, and other County-specific information as needed to complete the metadata. Kucera will provide all technical/process details required in the metadata, including technologies/methodologies used, accuracy assessment, etc. The USGS TKME metadata parser will be used for QC of the metadata format and content.

In the project wrap-up phase of the project, Kucera will review the project transmittals/records and specifications to ensure that all deliverables were received. The CCGISC will also be requested to review its records as well to ensure all deliverables are accounted for. A backup copy of the various project datasets (e.g., orthoimagery, DEM, etc.) in restorable/replacement form will be retained by Kucera and appropriately stored at Kucera's headquarters facility.

### **7.2. Data Warranty**

Kucera provides a perpetual data warranty for any major errors/anomalies found in the data deliverables, and such errors/anomalies will be promptly corrected at no added cost. Kucera will perform minor image edits/aesthetic adjustments and replace lost data at no charge for six months from data delivery and at a minimal charge based on Kucera's cost after six months.

## Completion Schedule

As described in the Firm/Resource Commitment section of this proposal submission, Kucera International Inc. is in an excellent position to make a major commitment of staff and equipment resources to the CCGISC 2023 aerial orthophotography contract work and complete this work in a timely fashion. Kucera’s committed completion schedule by phase/deliverable is as follows, assuming a contract start date by approximately January 1, 2023:

Phase/Deliverable	Start	Complete
Project initiation, work plan <ul style="list-style-type: none"> <li>• Finalized flight + control plan</li> <li>• Control + checkpoint locations (for CCGISC survey)</li> </ul>	1/1/23	1/10/23
Ground control + checkpoint targeting	2/15/23	2/27/23
Aerial photo flyover/flight status reports	2/27/23	4/4/23
Imagery processing + QC review/raw image delivery	6" - 4/1/23 3" - 4/1/23	6" - 4/30/23 3" - 5/15/23
Aerotriangulation/report	6" - 4/15/23 3" - 4/15/23	6" - 5/15/23 3" - 5/30/23
DEM review + update	6" - 5/1/23 3" - 5/10/23	6" - 6/15/23 3" - 6/30/23
Pilot project ortho submission and CCGISC review	6" - 6/1/23 3" - 6/1/23	6" - 6/30/23 3" - 6/30/23
Projectwide digital orthophoto production (GeoTIFF + JPG 2000) and metadata	6" - 6/15/23 3" - 6/15/23	6" - 9/30/23 3" - 12/15/23

The finalized projectwide orthoimagery and metadata will be progressively delivered by County (1 county/month) in July-September for the 6" resolution and in October-December for the 3" resolution.

Kucera will provide written status updates on at least a semi-monthly basis throughout the contract period and will make every attempt to complete the project work and make deliveries ahead of schedule.

## 7. Firm Commitment to Project

A summary of Kucera's current workload is provided on the following page. Kucera is in an excellent position to make a major commitment of staff and equipment resources to the CCGISC contract work and complete this work in a timely fashion. Kucera's current digital aerial photo and orthophoto backlog is predominantly from the southeastern US, with flyovers scheduled for the December 2023 - February 2023 time frame and orthoimagery delivery in the first half of 2023. This work will not interfere with the performance of the CCGISC project due to minimal overlap in time schedule of production phases, i.e., the CCGISC project flyover and subsequent orthophoto production will follow the corresponding phases for southeastern US projects.

Kucera has one statewide 6" orthophoto project (South Carolina) with completion scheduled for December 2023. This project will be flown in January-February and have six separate (from CCGISC project) orthophoto techs assigned from Kucera's headquarters and branch offices, and will not impact the completion of the CCGISC 2023 project.

Kucera's proposed staff and equipment commitment to the CCGISC project is as follows:

### Project Staff:

- Three (3) overall project/production/QC management - > 200 hours/month
- Three (3) aerial flight crews (pilot and sensor operator) - > 350 crew hours/month
- One (1) ground survey/targeting crew - > 100 hours/month
- Two (2) AGPS/IMU and aerotriangulation technicians - > 300 hours/month
- Four (4) stereocompilers (DEM review/update) - > 400 hours/month
- Five (5) orthophoto production technicians - > 800 hours/month
- Two (2) GIS/metadata technicians - > 100 hours/month

### Project Equipment:

- Three (3) twin-engine Piper Navajo Chieftain aircraft w/dual sensor ports
- Three (3) Vexcel UCE100 Eagle large format digital pushbroom cameras
- One (1) Inpho Match AT aerotriangulation stations
- Four (4) Inpho OrthoMaster/OrthoVista orthophoto production stations
- Two (2) Cardinal Systems VR2 softcopy stereoplotters (DEM review/update)
- Two (2) Adobe Photoshop and Lizardtech GeoExpress ortho edit/compression stations
- Three (3) GIS conversion/review stations running ArcGIS and Global Mapper

All staff are full time personnel of Kucera's headquarters office, and all equipment is owned and operated by Kucera from/at Kucera's headquarters facility. All equipment is currently calibrated and in good operational condition. The resource allocation provided in Section 5 (Project Team) shows completion times based on Kucera's staff + equipment commitment and estimated project hours. Additional staff and equipment from Kucera's three branch production offices (up to approximately 20% capacity increase) will be committed to the contract by directive of Kucera's Project Manager as needed to fully maintain the project specifications and schedule.

## Kucera International Inc. – Current Workload Summary December 2022

<b>Project</b>	<b>Current Phase/ Work Remaining</b>	<b>Project Hours Remaining</b>	<b>Est. Project Completion</b>	<b>Projected Personnel Commitment</b>	<b>Current Equipment Commitment</b>
<b>Mosaic Corp.</b> Monthly digital aerial photo of active minelands in central Florida – ~120 sq. mi.	Digital aerial photography and imagery delivery (End of December)	2 flyover hours + 20 production hours/month	End of each month through March 2023	Project/Production Manager – 1 Flight crew – 1 Imaging tech - 1	Aircraft + camera – 1 Imaging station – 1
<b>NYS DOT</b> Fall '22 aerial photo + lidar – 30 road sites in NY	Image prep + lidar classification (Flyover completed)	24 image prep + 210 lidar processing	January 2023	Project Manager – 1 Image prep tech -2 Lidar techs – 2	Image prep station – 1 Lidar station – 1
<b>FLDOR - Alachua, Highlands, Hendry, St. Lucie Counties</b> Countywide 6” aerial photo + orthoimagery – 3627 sq. mi.	Aerial flyover (Jan '23) Image Prep + aerotriangulation (Feb '23) Orthophoto Production (Mar – Jun '23)	40 flight 160 image prep/AT 1200 orthophoto production	June 2023	Flight crews – 3 Image + prep tech – 2 Aerotrig tech – 2 Orthophoto tech – 3	Orthophoto stations – 2 Aircraft + camera – 3 Image prep station – 1 Aerotrig station – 1 Orthophoto station – 2
<b>Minnesota DNR</b> Fall '22 50 cm multi-county digital aerial orthoimagery – 9,400 sq. mi.	Orthoimagery (Nov – Dec '22) (Flyover completed)	100 orthophoto	December 2022	Project Manager – 1 Production/QC Manager – 1 Orthophoto techs – 3	Ortho stations – 2
<b>State of South Carolina</b> 2023 Statewide 6” digital orthoimagery – 32,000 sq. mi.	Aerial flyover (Jan – Feb '23) Image process/AT (Mar – Jun '23) Orthophoto (Feb – Dec '23)	290 flyover 1,100 image prep/AT 8,000 orthophoto	December 2023	Project Manager – 1 Production/QC Manager – 1 Flight crews – 5 (2 sub) Image prep/AT techs – 4 Ortho techs – 6	Aircraft + camera – 5 (2 sub) Image prep/AT station – 3 Ortho station – 3
<b>NV5 Geospatial</b> PA/PEMA State Imagery	Aerial flyover (Nov '22 – Apr '23) (currently 40% flown)	45 flight	April 2023	Project Manager – 1 Flight crews – 2	Aircraft + camera – 2

<b>Mosaic Corp.</b> Minewide aerial orthophoto and lidar - ~2000 sq. mi. in Central FL	Aerial flyover (Dec '22) Image process/AT (Jan '23) Orthophoto and classified lidar return (Feb '23)	12 flight 24 image prep/AT 150 lidar 230 orthophoto	February 2023	Project Manager – 1 Production Manager – 1 Flight crew – 1 Image Prep/AT techs – 2 Lidar techs – 2 Orthophoto techs – 3	Aircraft + camera + lidar – 1 Image prep/AT station – 2 Lidar process station – 2 Ortho process station – 2
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**Contacts:**

<b><i>Project</i></b>	<b><i>Contact Name</i></b>	<b><i>Phone No.</i></b>
Mosaic Corp.	Joshua House	813-500-6906
NYS DOT	Lori Gallagher	518-457-5290
Florida DOR	Charles Russell	850-617-8867
Minnesota DNR	Jennifer Corcoran	651-259-5898
State of South Carolina	Adam DeMars	803-896-9235
NV5 Geospatial	Brad Muecke	920-627-5237

## 8. Cost Proposal

Item/Phase	Fee			
	Champaign	Piatt	Douglas	Projectwide
<b>Option 1: 6" countywide orthoimagery</b>				
1. Digital aerial photo acquisition + targeting	\$41,850	\$18,600	\$17,050	\$77,500
2. Aerotriangulation and DEM preparation	\$1,900	\$800	\$800	\$3,500
3. Digital orthoimagery	\$30,240	\$13,440	\$12,320	\$56,000
<b>Option 1 Total:</b>	<b>\$73,990</b>	<b>\$32,840</b>	<b>\$30,170</b>	<b>\$137,000</b>
<b>Option 1A: 3" countywide orthoimagery</b>				
1. Digital aerial photo acquisition + targeting	\$68,040	\$30,240	\$27,720	\$126,000
2. Aerotriangulation and DEM preparation	\$2,160	\$960	\$880	\$4,000
3. Digital orthoimagery	\$92,880	\$41,280	\$37,840	\$172,000
<b>Option 1a Total:</b>	<b>\$163,080</b>	<b>\$72,480</b>	<b>\$66,440</b>	<b>\$302,000</b>
<b>Option 2: 6" countywide orthoimagery w/ reduced lean</b>				
1. Digital aerial photo acquisition + targeting	\$41,850	\$18,600	\$17,050	\$77,500
2. Aerotriangulation and DEM preparation	\$1,900	\$800	\$800	\$3,500
3. Digital orthoimagery	\$31,860	\$14,160	\$12,980	\$59,000
<b>Option 2 Total:</b>	<b>\$75,610</b>	<b>\$33,560</b>	<b>\$30,830</b>	<b>\$140,000</b>
<b>Option 2A: 3" countywide orthoimagery w/ reduced lean</b>				
1. Digital aerial photo acquisition + targeting	\$68,040	\$30,240	\$27,720	\$126,000
2. Aerotriangulation and DEM preparation	\$2,160	\$960	\$880	\$4,000
3. Digital orthoimagery	\$96,120	\$42,720	\$39,160	\$178,000
<b>Option 2a Total:</b>	<b>\$166,320</b>	<b>\$73,920</b>	<b>\$67,760</b>	<b>\$308,000</b>



Item/Phase	Fee			
	Champaign	Piatt	Douglas	Projectwide
<b>Option 3: 6" countywide orthoimagery w/ eliminated lean</b>				
1. Digital aerial photo acquisition + targeting	\$47,790	\$21,240	\$19,470	\$88,500
2. Aerotriangulation and DEM preparation	\$1,900	\$800	\$800	\$3,500
3. Digital orthoimagery	\$32,400	\$14,400	\$13,200	\$60,000
<b>Option 3 Total:</b>	<b>\$82,090</b>	<b>\$36,440</b>	<b>\$33,470</b>	<b>\$152,000</b>
<b>Option 3A: 3" countywide orthoimagery w/ eliminated lean</b>				
1. Digital aerial photo acquisition + targeting	\$75,600	\$33,600	\$30,800	\$140,000
2. Aerotriangulation and DEM preparation	\$2,700	\$1,200	\$1,100	\$5,000
3. Digital orthoimagery	\$102,600	\$45,600	\$41,800	\$190,000
<b>Option 3a Total:</b>	<b>\$180,900</b>	<b>\$80,400</b>	<b>\$73,700</b>	<b>\$335,000</b>
<b>Option 4: 6" countywide orthoimagery w/ reduced + eliminated lean</b>				
1. Digital aerial photo acquisition + targeting	\$48,330	\$21,480	\$19,690	\$89,500
2. Aerotriangulation and DEM preparation	\$1,900	\$800	\$800	\$3,500
3. Digital orthoimagery	\$34,020	\$15,120	\$13,860	\$63,000
<b>Option 4 Total:</b>	<b>\$84,250</b>	<b>\$37,400</b>	<b>\$34,350</b>	<b>\$156,000</b>
<b>Option 4A: 3" countywide orthoimagery w/ reduced + eliminated lean</b>				
1. Digital aerial photo acquisition + targeting	\$75,600	\$33,600	\$30,800	\$140,000
2. Aerotriangulation and DEM preparation	\$2,700	\$1,200	\$1,100	\$5,000
3. Digital orthoimagery	\$106,920	\$47,520	\$43,560	\$198,000
<b>Option 4a Total:</b>	<b>\$185,220</b>	<b>\$82,320</b>	<b>\$75,460</b>	<b>\$343,000</b>

## 9. Project References

References with client name and contact information for three Illinois county/multi-county 6" and/or 3" aerial orthoimagery projects completed by Kucera subsequently to the Champaign-Piatt County 2017 project are provided on the following pages. Additional references for Kucera orthoimagery projects in Illinois and other states will be provided upon request.

# Kane County, Illinois

## 2021 COUNTYWIDE ORTHOPHOTOGRAPHY

### SERVICES

#### Digital Aerial Photography

4-band image capture at 0.25' resolution (approximately 4,800' AGL flying height) performed with Vexcel UCE100 digital frame sensor, flight index and collection report. Flyover completed in two flying days in late March - early April.

#### Image Georeferencing

Aerotriangulation using sensor-captured airborne GPS/IMU and 25 surveyed photo id feature points, aerotriangulation to finalize georeferencing.

#### DEM Preparation

Review/update of 2017 Illinois State LiDAR DEM to support orthoimage rectification, delivery of updated DEM in GeoTIFF.

#### Digital Orthophotography

Countywide 0.25'/3" resolution. Furnished in RGB color as uncompressed 2,500' x 2,500' modular tiles in GeoTIFF, countywide and townshipwide compressed mosaics in SID v2 and v4.

#### Metadata

FGDC-compliant, XML format

#### Accuracy

Horizontal within 1' at 95% confidence



Kane County, IL 2021 3" Orthoimagery



SIZE  
624 square miles

POPULATION  
532,400

VALUE  
\$94,800

DURATION  
February - November 2021

CLIENT  
Kane County  
719 South Batavia Avenue  
Geneva, IL 60134

CONTACT  
Thomas Nicoski  
630-208-8655  
nicoskithomas@co.kane.il.us

#### MANAGEMENT TEAM

Project Manager: J. Antalovich  
Production: S. Antalovich  
Flight Plan: A. Mitchell  
Image Processing/QC: T. Connolly  
Flight Ops: S. Smetters  
Aerotriangulation: J. Jenkins  
Orthophoto: J. H. Antalovich  
Metadata: R. Hnida

# Region 1 Planning Council

2021 WINNEBAGO & BOONE COUNTIES IL ORTHOPHOTOGRAPHY PROJECT



## SERVICES

### Aerial Photography

Performed in 4-band using Vexcel Eagle UCE100 digital aerial frame camera at 0.5' GSD resolution with 9,600' AGL flying height.

### Georeferencing

GPS ground control survey of 25 PID feature and targeted control points. Aerotriangulation of sensor captured airborne GPS/IMU combined with ground surveyed control to finalize georeferencing.

### Digital Orthophotography

Produced at 0.5' resolution in 3-band color. DEM update and preparation to support ortho rectification. Delivered in uncompressed GeoTIFF and compressed MrSID countywide mosaics. 2,500' x 2,500' tile scheme. Included pilot project for Council to review and confirm before projectwide imagery processing.

### Metadata & Accuracy

FGDC metadata. Horizontal accuracy within 1.2' @ 95% confidence.



Winnebago County 2021 Orthoimagery



SIZE  
~900 square miles (total project area)

VALUE  
\$55,000

DURATION  
March - October 2021

CLIENT  
Region 1 Planning Council  
127 N. Wyman Street, 1st Floor  
Rockford IL 61101

CONTACT  
Steve Gregg  
815-319-4455  
Sgregg@r1planning.org

## PROJECT MANAGEMENT TEAM

Project Manager: J. Antalovich, Jr.

Production: S. Antalovich

Quality Control: A. Mitchell

Flight Ops: S. Smetters

Ground Survey: S. Wood

Aerotriangulation: J. Jenkins

Orthophotography: J. H. Antalovich

Metadata: R. Hnida



# McLean County, Illinois

## 2018 COUNTYWIDE ORTHO & UPDATED CITY FEATURE MAPPING

### SERVICES

#### Digital Aerial Photography

Performed with Vexcel Eagle UCE100 digital frame camera, 4-band image capture @ 6" GSD (9600' AGL flying height) for County (1186 sq mi) and 3" GSD (4800' AGL flying height) for Bloomington-Normal City area (~ 100 sq mi)

#### Control Survey and Aerotriangulation

Airborne GPS/IMU plus 30 GPS-surveyed photo id feature ground control points (11 points for City area). Softcopy aerotriangulation using Match AT to finalize imagery georeferencing.

Control and aerotriangulation reports.

#### DEM Preparation

Photogrammetric review/update of existing/2012 IL State lidar DEM to support new orthoimage rectification. Delivery of DEM to County.

#### Digital Orthophotography

3-band color @ 6" resolution Countywide and 3" resolution for Bloomington-Normal city area. Delivered in modular coordinate grid-defined tiles in uncompressed GeoTIFF w/TFW format and as SID-compressed projectwide ortho mosaics.

#### Planimetric Feature Mapping

For Bloomington-Normal City Area - Photogrammetrically updated 1"=50' scale building footprint mapping and newly compiled street and pavement mapping. Delivered in geodatabase format.

#### Metadata and Accuracy

FGDC-compliant project level in XML for orthoimagery and feature mapping, ASPRS Class 1 horizontal accuracy - 1' and 0.5' RMSE for 6" orthoimagery and 3" orthoimagery/planimetric mapping, respectively.



McLean County 2018 Base Mapping



### SIZE

1,186 square miles (County)  
100 square miles (City)

### VALUE

\$103,500

### DURATION

January - September 2018

### CLIENT

McLean County  
115 E Washington St., RM 202  
Bloomington, IL 61701

### CONTACT

David Peters, GISP, GIS  
Coordinator  
(309) 434-6566  
david.peters@  
mcleancountyil.gov

### MANAGEMENT TEAM

PM: J. Antalovich, Jr.  
Production: S. Antalovich  
Flight Plan/QC - A. Mitchell  
Flight Ops: S. Smetters  
Ground Survey: S. Wood  
Stereocomp: M. Mekinda  
Orthophoto: A. Kaschalk  
Mapping/GIS: S. Wong  
Aerotriangulation: J. Jenkins  
Metadata: R. Hnida